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SITE INSPECTION/CONFIRMATORY SAMPLING REPORT FOR SITE 4, SITE 5, SITE 7, SITE 9 SITE 13, SITE 16, SITE 27 AND SITE 35 MCRD PARRIS ISLAND SC

1/1/2010

TETRA TECH NUS

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-94-D-0888

Rev. 1
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Site Inspection/ Confirmatory Sampling Report
for
Site/SWMU 4, Site/SWMU 5, Site/SWMU 7, Site 9/SWMU 8, Site 13C/SWMU 13, Site/SWMU 16, SWMU 27, and SWMU 35

Marine Corps Recruit Depot
Parris Island, South Carolina

Contract Task Order 0084

January 2010

NAVFAC
Naval Facilities Engineering Command
NAVFAC SOUTHEAST

NAS Jacksonville
Jacksonville, Florida 32212-0030

TETRA TECH NUS, Inc.

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SITE INSPECTION/ CONFIRMATORY SAMPLING REPORT for SITE/SWMU 4, SITE/SWMU 5, SITE/SWMU 7, SITE 9/SWMU 8, SITE 13C/SWMU 13, SITE/SWMU 16, SWMU 27, AND SWMU 35

MARINE CORPS RECRUIT DEPOT PARRIS ISLAND, SOUTH CAROLINA

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command Southeast
NAS Jacksonville Building 103
Jacksonville, Florida 32212

Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, Pennsylvania 15220

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0084

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PREPARED UNDER THE SUPERVISION OF:

MARK SLADIC
PROJECT MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMITTAL BY:

DEBBIE HUMBERT
PROGRAM MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

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ACRONYMS

B&R Environmental	Brown & Root Environmental
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Contaminant of Concern
CTO	Contract Task Order
DPT	Direct Push Technology
DRMO	Defense Reutilizaton and Marketing Office
EE/CA	Engineering Evaluation and Cost Analysis
EP	Extraction Procedure
ESVs	Ecological Screening Values
IAS	Initial Assessment Study
IDW	Investigation-Derived Waste
IR	Installation Restoration
MCLs	Maximum Contaminant Levels
MCRD	Marine Corps Recruit Depot
msl	Mean Sea Level
NACIP	Naval Assessment and Control of Installation Pollutants
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NPL	National Priorities List
NTU	Nephlometric Turbidity Unit
PA	Preliminary Assessment
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PID	Photoionization Detector
PPL	Priority Pollutant List
ppm	Parts Per Millions
PRGs	Preliminary Remediation Goals
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
RBCs	Risk-Based Concentrations

RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RI VS	Remedial Investigation Vertification Step
SAA	Satellite Accumulation Area
SARA	Superfund Amendments and Reauthorization Act
SCDHEC	South Carolina Department of Health and Environmental Control
SI/CS	Site Inspection/Confirmatory Sampling
SMCL	Secondary Maximum Contamination Level
SOUTHDIV	Southern Division
SSL	Soil Screening Level
SVOCs	Semivolatile Organic Compounds
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TCL	Target Compound List
TtNUS	Tetra Tech NUS, Inc.
U.S. EPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
VSI	Visual Site Inspection
VZV	Vandose Zone Vaper

1.0 INTRODUCTION

This Site Inspection/Confirmatory Sampling (SI/CS) report addresses the following sites/solid waste management units (SWMUs) located at the Marine Corps Recruit Depot (MCRD) Parris Island, South Carolina:

- Site/SWMU 4 – Dredge Spoils Area Fire Training Pit
- Site/SWMU 5 – Former Paint Shop Disposal Area
- Site/SWMU 7 – Page Field Fire Training Pit
- Site 9/SWMU 8 – Paint Waste Storage Area
- Site 13C/SWMU 13 – Inert Disposal Area C (Dredge Spoils Area)
- Site 16/SWMU 16 - Pesticide Rinsate Disposal Area
- SWMU 27 – Equipment Parade Deck Satellite Accumulation Area (SAA)
- SWMU 35 – Defense Reutilization and Marketing Office (DRMO) Salvage Yard

Tetra Tech NUS, Inc. (TtNUS) prepared this report for the Department of the Navy (Navy) Southern Division (SOUTHDIV) Naval Facilities Engineering Command (NAVFAC) under Contract Task Order (CTO) 0084, Comprehensive Long-Term Environmental Action Navy (CLEAN) III, Contract Number N62467-94-D-0888.

1.1 REGULATORY SETTING

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Superfund Amendments and Reauthorization Act of 1986 (SARA) established a program for the cleanup of hazardous waste disposal and spill sites nationwide. This program contains provisions for the cleanup of contamination from past hazardous waste operations and past hazardous material spills and is the framework for Installation Restoration (IR) programs at Navy and Marine Corps installations. The Resource Conservation and Recovery Act (RCRA), as amended, also establishes a cleanup program that provides for current and future hazardous waste management practices, as well as cleanup of past disposal sites at permitted or interim status Navy/Marine Corps installations. NAVFAC is responsible for implementing the IR Program at MCRD Parris Island.

Because of the past activities conducted at the MCRD Parris Island, South Carolina, the MCRD meets criteria for conducting IR activities under the CERCLA regulatory framework. The MCRD also meets the criteria for conducting IR activities under the authority of RCRA because, in the late 1980s, the MCRD submitted a RCRA Part A application. Per RCRA, this action required the MCRD to conduct corrective action for the release of hazardous waste or hazardous constituents from SWMUs. An interim RCRA

Facility Assessment (RFA) was conducted in 1990 as part of this requirement. All seven sites were addressed within the RFA. Prior to issuing the RFA report, the MCRD withdrew its Part A application.

Because of the circumstances surrounding the IR program history at MCRD, discussions have been held among representatives from the Marine Corps, Navy, South Carolina Department of Health and Environmental Control (SCDHEC), and United States Environmental Protection Agency (U.S. EPA) Region 4 to determine the appropriate regulatory framework for conducting IR activities at the MCRD. From these discussions, it has been decided that this report will encompass both CERCLA and RCRA requirements and the title, SI/CS, reflects this decision. For ease of reading and clarity, investigation areas with both a site and SWMU designation will be referred to as the name indicated in the parentheses (shown as follows).

- Site/SWMU 4 (Site 4) – Dredge Spoils Area Fire Training Pit
- Site/SWMU 5 (Site 5) – Former Paint Shop Disposal Area
- Site/SWMU 7 (Site 7) – Page Field Fire Training Pit
- Site 9/SWMU 8 (Site 9) – Paint Waste Storage Area
- Site 13C/SWMU 13 (Site 13C) – Inert Disposal Area
- Site 16/SWMU 16 (Site 16) - Pesticide Rinsate Disposal Area
- SWMU 27 – Equipment Parade Deck SAA
- SWMU 35 – DRMO Salvage Yard

1.2 SCOPE/OVERVIEW OF SI/CS

The SI/CS addressed eight sites/SWMUs at MCRD Parris Island: Site 4, Site 5, Site 7, Site 9, Site 13C, Site 16, SWMU 27, and SWMU 35. The Superfund site identification number for MCRD Parris Island is 0403488. The U.S. EPA identification number is SC6170022762.

The SI/CS field investigation was conducted in October and December 1999 and August 2000. At each site, environmental samples were collected from various media (i.e., soil, sediment, and groundwater). The purpose of the SI/CS was to determine whether contaminant releases have occurred at each of the seven sites and whether further investigation or action is required. A summary of the field activities conducted at each site is provided in Sections 3.0 through 9.0.

In addition to the activities supported by TtNUS personnel, several subcontractors were utilized for field activities. Chemical analysis of 1999 environmental samples was conducted at Severn Trent Laboratories, in University Park, Illinois. Temporary monitoring wells were installed by Columbia Technologies, of Jessup, Maryland and Vironex, Inc. of Glen Burnie, Maryland. Test pitting services were

provided by United Eco Systems, of High Point, North Carolina. Lastly, surveying services were provided by Christensen Khalil Surveyors, Inc., of Beaufort, South Carolina.

Analytical results are presented in Appendix A. This appendix contains all analytical results, including positive detections and detection limits for non-detected parameters. Data collected during the investigation have been entered into a database, and full data validation was conducted. Data validation summaries are included in Appendix B.

1.3 FACILITY BACKGROUND

MCRD Parris Island is located along the southern coast of South Carolina, approximately 1 mile south of the city of Port Royal and 3 miles south of the city of Beaufort within Beaufort County. MCRD Parris Island covers approximately 8,047 acres that consist of dry land, salt marshes, saltwater creeks, and ponds, as shown in Figure 1-1. MCRD Parris Island is the reception and recruit training facility for the Marine Corps for enlisted men from states east of the Mississippi River and for enlisted women nationwide.

The Depot trains and graduates 17,000 recruits per year with an average daily recruit population of 4,000. Recruits undergo a 12-week training program. The Depot is operated and maintained by a permanent staff of over 2,500 Marines, sailors, and civilians. There are 231 housing units and 125 mobile home spaces for active-duty Marines and sailors at the Depot (MCRD Parris Island, 2000). The populations of Port Royal and the city of Beaufort are estimated to be 3,314 and 9,956 persons, respectively (U.S. Census, 1998).

1.4 REPORT ORGANIZATION

This report is divided into eight sections. Section 1.0, the Introduction, presents the regulatory setting at MCRD Parris Island, a scope and overview of the SI/CS, the facility background information, and the report organization. Section 2.0, Environmental Setting, briefly describes the climate, topography, surface water drainage, soils, geology, hydrogeology, and ecology at MCRD Parris Island. Sections 3.0 through 9.0 address the eight sites and provide a site description, a summary of previous investigations, a description of the 1999 to 2000 SI/CS, the site-specific geology and hydrogeology, the site-specific ecological setting, the SI/CS and historic analytical results, and conclusions and recommendations. Appendix A presents analytical data, Appendix B presents data validation information, and Appendix C presents field forms, including chain-of-custody records, sample log sheets, and well permits.

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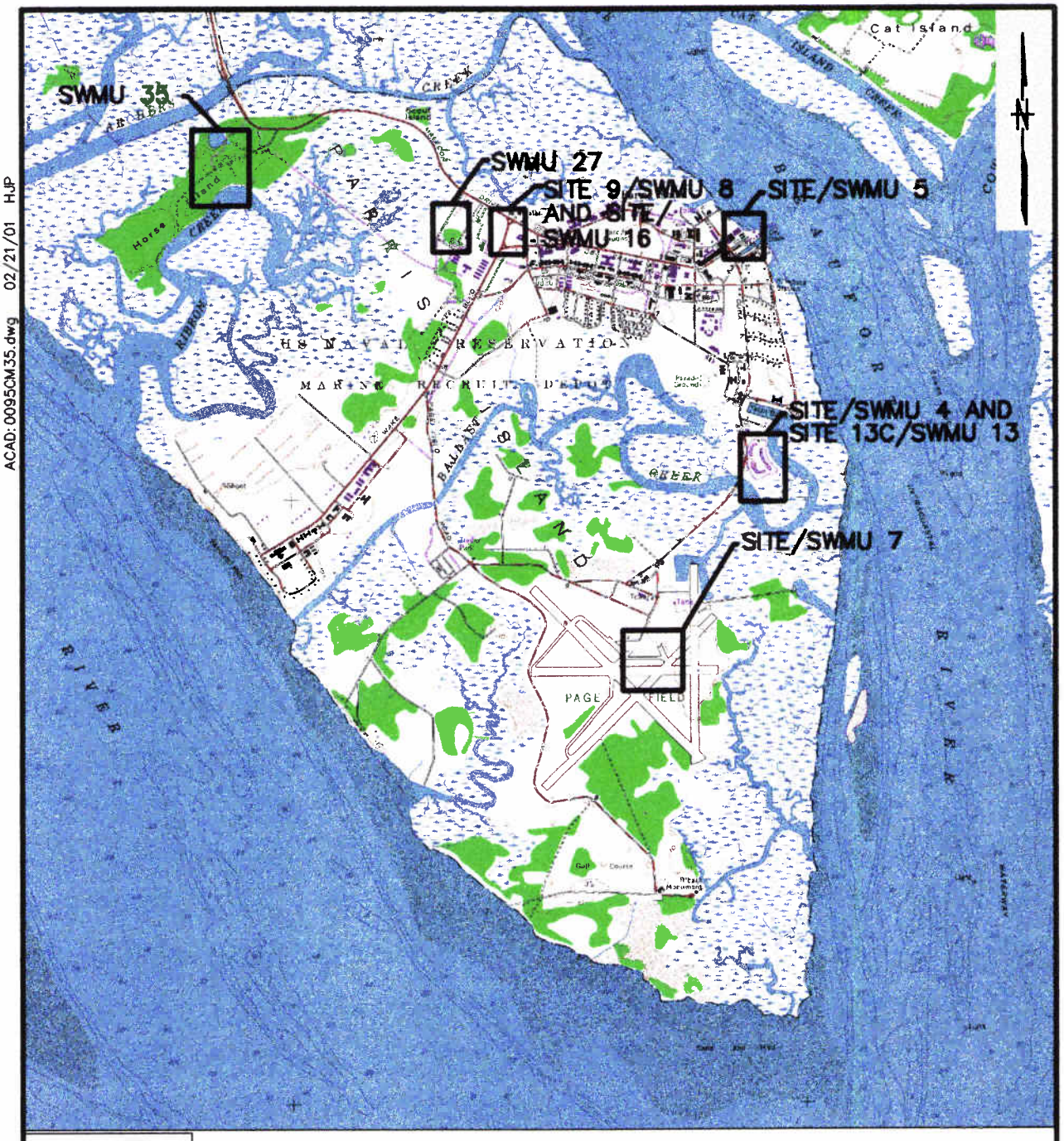

QUADRANGLE LOCATION

SOURCE: USGS QUADRANGLE MAP PARRIS ISLAND, S.C. 1979

0 4000 8000

SCALE IN FEET

DRAWN BY HJP DATE 12/30/98	DEPARTMENT OF THE NAVY SOUTHERN DIV FACILITIES ENGINEERING COMD	DEPOT/SITE LOCATION MAP MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095
CHECKED BY DATE			APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-1 / REV. 0

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

2.0 ENVIRONMENTAL SETTING

This section briefly describes the environmental setting at MCRD Parris Island. A more comprehensive description is located in the MCRD Parris Island Master Work Plan [Brown and Root Environmental (B&R Environmental), 1998] and the Initial Assessment Study (IAS) (NEESA, 1986).

2.1 CLIMATE

MCRD Parris Island is located in the southernmost region of South Carolina, where the climate is milder than elsewhere in the state. This low-lying coastal area has numerous islands, inlets, streams, and marshes and a temperature regime that clearly reflects the influences of its maritime and southerly location. The climate is subtropical, with long and hot summers followed by short and mild winters. Precipitation is abundant, averaging about 49 inches per year and remaining within the range of 40 to 58 inches during most years. Precipitation in the amount of 0.1 inch or more falls an average of about 77 days per year. The annual distribution shows a major monthly maximum of about 7 inches in July and a major monthly minimum of about 2 inches in November. The period from April through October, which includes the growing season for most crops in this area, receives an average of about 34 inches of rain, which is about 70 percent of the annual total.

2.2 TOPOGRAPHY

MCRD Parris Island lies in the Lower Coastal Plain Physiographic Province. Elevations range from sea level to 22 feet above mean sea level (msl). The Depot consists of Parris Island (the largest and most developed island), seven smaller named islands, many small unnamed islands, salt marshes, and related tidal creeks. Because of the low elevation, most of the Depot is located within the 100-year flood plain. The majority of the area of Parris Island north of Ballast Creek, the east-central area of Page Field, and the central part of Horse Island are the only surfaces above the 100-year flood plain (NEESA, 1986).

The Depot covers 8,047 acres: 1,502 acres are devoted to forest management; 744 acres are grass and facilities; 4,344 acres are saltwater marsh; and the remainder consists of creeks, ponds, and causeways. Dry land makes up 3,274 acres (NEESA, 1986).

2.3 SURFACE WATER DRAINAGE

Drainage off the land surface is to the nearest surface water body. Three generally east-west creeks drain much of the Depot. Archers Creek is at the northern boundary of the Depot and connects Battery Creek to the north with the Broad River to the west of Parris Island (see Figure 1-1). Ribbon Creek drains the area between Horse and Parris Islands and flows westward into the Broad River. Ballast Creek

enters the Beaufort River and drains central Parris Island. Smaller unnamed creeks drain the areas west and east of Page Field.

The Beaufort and Broad Rivers meet at the southern end of Parris Island to form Port Royal Sound, which extends about 4 miles southeastward to the Atlantic Ocean.

2.4 SOILS

Soils at MCRD Parris Island have been mapped by the United States Soil Conservation Service as both individual soils and groupings of soils (units). The Depot has been mapped as having 15 individual soil types, but only eight types are present beneath the identified sites. Three soil units have been mapped for the Depot (Wando-Seabrook-Seewee, Coosaw-Williman-Ridgeland, Bohicket-Capers-Handsboro Soil Unit). A further discussion of the soils and soil units identified at the MCRD can be found in the MCRD Parris Island Master Work Plan (B&R Environmental, 1998) and the IAS (NEESA, 1986).

2.5 GEOLOGY

Four geological units in the Beaufort-Jasper County Area are of local interest in terms of groundwater supply and environmental investigations. These units from the oldest (Eocene age) to the youngest (Pleistocene age) are the Santee Limestone, Cooper Marl, Hawthorn Formation, and Pleistocene sands and clays. A further discussion of the geology of the Beaufort-Jasper County area can be found in the MCRD Parris Island Master Work Plan (B&R Environmental, 1998) and the IAS (NEESA, 1986).

2.6 HYDROGEOLOGY

Two primary aquifers are present within the Beaufort-Jasper County Area: the surficial aquifer, comprising Pleistocene age sediments, and the Floridan Aquifer (Santee Limestone). These aquifers are generally separated by the Hawthorn Formation and Cooper Marl, which act as confining units to the underlying Floridan Aquifer.

In the MCRD Parris Island area, the shallow, unconfined aquifer generally consists of permeable, fine to medium, Pleistocene age sands. Groundwater recharge to the unconfined (water table) aquifer is through precipitation infiltration. Surface relief is relatively low. The area is drained by fresh and brackish water streams inland and by tidal streams along the coast. The water table in the MCRD Parris Island area usually ranges from 0 to 10 feet below ground surface (bgs) and is most commonly found at a depth of 3 feet bgs. Water-table fluctuations are a function of recharge, evaporation, and transpiration and have been observed to be as great as 6.5 feet at some locations (Glowacz et al., 1980). The direction of

groundwater flow in the surficial aquifer is generally toward the nearest surface water body, such as a pond, river, tidal creek, or the ocean.

In the Beaufort-Jasper County Area, the Floridan Aquifer system occurs near the land surface and confining beds vary from essentially 0 to more than 150 feet in thickness. Groundwater in the aquifer occurs in solutionally enlarged openings or cavities in the limestone. In general, groundwater occurs in a series of broadly defined water-bearing (permeable) zones that serve as aquifers and are separated by less permeable rocks. Two hydrogeologic zones within the Floridan Aquifer are present beneath the MCRD Parris Island area. These two hydrogeologic units include of a 200-foot-thick Upper Hydrogeologic Unit and an 800-foot-thick Lower Hydrogeologic Unit. Within each hydrogeologic unit, there is a discrete zone of higher permeability rocks separated by thick sequences of lower permeability rocks. The Lower Hydrogeologic Unit has a somewhat lower overall permeability compared to the Upper Unit.

A further discussion of the hydrogeological characteristics of the Beaufort-Jasper County area can be found in the MCRD Parris Island Master Work Plan (B&R Environmental, 1998) and the IAS (NEESA, 1986).

2.7 WATER USE

Within a 4-mile radius of Parris Island lies the southern portion of the city of Beaufort and the city of Port Royal. Also within this radius are the southern portion of St. Helena Island, Cane Island, Gibbes Island, Daws Island, and the southern tip of Port Royal Island. Potable water in the area is supplied by the Beaufort-Jasper Water and Sewer Authority. Saltwater has encroached into the area over time so that local wells installed in the various aquifers beneath the area are no longer used to supply domestic water. There are, however, wells in the area used by locals for the irrigation of gardens and lawns.

The rivers and waterways adjacent to Parris Island are tidally influenced and contain high saline content waters. Therefore, the rivers and streams are not used as a source of drinking water.

2.8 ECOLOGY

A general discussion of the ecoystems that are present and threatened and endangered plants and animals that occur or potentially occur on MCRD Parris Island can be found in the MCRD Parris Island Master Work Plan (B&R Environmental, 1998) or the IAS (NEESA, 1986). Site-specific ecological discussions can be found in site-specific sections of this report.

3.0 SITE 4 – DREDGE SPOILS AREA FIRE TRAINING PIT

3.1 SITE DESCRIPTION

Site 4, the former Dredge Spoils Area Fire Training Pit, is located in the east-central portion of MCRD between Cuba Street and Ballast Creek. Site 4 was first used as a fire training area in the 1940s; the area became inactive in the late 1960s. In 1976, an irregular-shaped earthen berm was constructed in the vicinity of the fire training pit. After construction, 300,000 cubic yards of dredge spoils from the nearby marina/Ballast Creek dredging operations were placed inside the bermed area. The suspected former locations of Site 4 are illustrated on a 1951 aerial photograph shown in Figure 3-1. The present boundary of Site 13C is also superimposed on this figure. Site 13C is addressed in Section 7 of this report.

While in use, the fire training pit was a shallow, unlined depression where MCRD fire-fighting personnel held monthly training sessions. During each session, it is believed that 300 to 400 gallons of contaminated fuels, waste motor oils, and petroleum-based solvents were poured into the training pit, set ablaze, and then extinguished. The contaminated fuels are thought to have contained gasoline, diesel fuel, and aviation gasoline. The solvents consisted mainly of mineral spirits, kerosene, and Varsol. In addition, approximately 10,000 gallons of waste motor oil and contaminated fuels were burned at the fire training pit solely for disposal purposes.

The location of the former fire training pit is in an undeveloped, unpopulated portion of the Depot. The nearest resident lives approximately 2,000 feet north of Site 4. No daycare facilities or schools are located within 200 feet of the site.

3.2 PREVIOUS INVESTIGATIONS

Previous investigations at Site 4 include the Initial Assessment Study (IAS), RI Verification Step (VS), and Interim RFA. Based on the results of these investigations, the MCRD Parris Island partnering team determined that Site 4 required further evaluation and recommended SI/CS activities. A brief description of each previous investigation is presented below.

3.2.1 Initial Assessment Study

In 1986, the Naval Energy and Environmental Support Activity (NEESA) conducted an IAS (NEESA, 1986) under the Naval Assessment and Control of Installation Pollutants (NACIP) Program. The IAS is equivalent to the PA phase of the CERCLA process. The purpose of the IAS (Phase I of the NACIP Program) was to identify potentially contaminated sites at MCRD Parris Island that may pose a threat to

human health or the environment. Because of the potential for contaminant migration of fuels and solvents and their potential impact on receptors, Site 4 was recommended for additional study.

3.2.2 Remedial Investigation Verification Step (RI VS)

In February 1988, McClelland Consultants conducted an RI VS of various sites at MCRD Parris Island. Site 4 was included in the investigation, based on the recommendation of the IAS.

At the suspected locations of Site 4, five soil borings (PAI4-SB1 to PAI4-SB5) were advanced approximately 400 feet apart along the southern perimeter of the embankment, as shown on Figure 3-2. The borings were drilled to a depth of 20 feet below the natural grade, and soil samples from each boring were collected at various depths for headspace screening and chemical analysis. Headspace analysis did not indicate the presence of VOCs. A subsurface soil sample was collected from each boring and analyzed for total cadmium, chromium, and lead and also for the extraction procedure (EP) toxicity characteristic concentrations of these metals. One boring (PAI4-SB2) showed a total lead concentration of 13.0 mg/kg at the 1-foot depth interval. Sample PAI4-SB5 had a total chromium content of 7.69 mg/kg at a depth of 7.5 feet. The chemical analysis results indicated that no cadmium, chromium, or lead were present in the EP toxicity samples submitted to the laboratory. As a result, the report recommended no further study or action.

3.2.3 Interim RCRA Facility Assessment

In January 1990, A.T. Kearney conducted a file review of the MCRD Parris Island facility, and in February of that same year, they conducted a Visual Site Inspection (VSI) of the facility, culminating in an Interim RFA. Site 4 was included in the Interim RFA. During the RI VS, both lead and chromium were detected in the vicinity of Site 4, but during the VSI, no pronounced signs of contamination were noted. Because documented contamination existed, however, Kearney recommended that an RFI be conducted at Site 4.

3.3 1999 AND 2000 INVESTIGATION

SI/CS investigation activities at Site 4 were conducted in stages in December 1999, April 2000, and August 2000. During the investigation, hand-driven soil borings and hand-dug test pits were performed in four areas in attempts to locate the former fire training pit. Additionally, three groundwater samples were collected from temporary monitoring wells and two subsurface soil samples were collected to determine whether contamination from past fire training activities remained at the site. The following sections discuss the activities conducted during the SI/CS at Site 4. Field activities were conducted in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan Addendum 1 (TtNUS, 1999a) and Addendum 2 (TtNUS, 2000).

3.3.1 Test Pits

In December 1999, a limited test pit investigation was conducted at a hummock located 150 feet east of the southeastern corner of Site 13C. This area was selected as a potential area of the fire training pit based on historical aerial photographs. At three locations (PAI-04-TP-01 through PAI-04-TP-03), soil was removed to the water table (2 feet bgs) using a hand shovel. Visual inspection of the soil indicated no evidence of stained soil or backfilled material, and the test pit investigation was terminated. Appendix C contains test pit log sheets.

3.3.2 Soil Borings

In December 1999, 10 hand-driven soil borings (PAI-04-SB-01 through PAI-04-SB-10) were performed outside the Site 13C berm in the area shown on Figure 3-2. At each 6-inch interval, soils were scanned with a photoionization detector (PID), and PID readings and lithology of the sample interval were recorded on soil boring logs (included in Appendix C). The soil borings terminated when groundwater was encountered at depths of 3.5 to 4 feet bgs. No elevated PID levels were recorded and no fill material or soil staining was observed in these soil borings. Because elevated PID levels or stained soils were not encountered, subsurface soils were not collected for chemical analyses.

However, upon receiving survey results of the site, it was determined that these hand auger borings were installed south of their intended location. Reasons for this occurrence include the absence of noticeable landmarks in this area and the change in flow patterns of Ballast Creek since 1951. Consequently, additional hand-driven soil borings were conducted in April 2000 in the areas shown on Insets A and B of Figure 3-2. Soil borings PAI-04-SB-15 through PAI-04-SB-19 were installed outside the bermed area, and soil borings PAI-04-SB-20 to PAI-04-SB-25 were installed inside the berm. These areas were chosen from features identified on historical aerial photographs that were identified as possible locations of the fire training pit. Soil from the borings was screened with a PID and visually inspected for stained soil.

In soil borings PAI-04-SB-15 through PAI-04-SB-19, black stained soil was observed at PAI-04-SB-16 at a depth of 1.5 to 2.5 feet below ground surface (bgs). Additionally, trace staining was observed in soil boring PAI-04-SB-18, collected north of PAI-04-SB-16. Although stained soil was not observed in PAI-04-SB-17, a PID reading of 51 parts per million (ppm) was measured at a depth between 1.5 and 2.0 feet bgs. Because historical photographs indicate that this a possible location of the former fire training pit and based on the elevated PID readings and soil staining observed in soil borings, this area is likely the location of the former fire training pit.

In soil borings PAI-04-SB-20 through PAI-04-SB-25, PID readings of 0 ppm were observed in all soil borings. In two of the soil borings (PAI-04-SB-21 and PAI-04-SB-23), trace fragments of black coal material were observed at depths below 2.0 feet bgs; however, the material was not consistent with remnants of fire training pit activities. Rather, this material is likely remnants of the roads constructed of coal that were used to access the fire fighting training pit (NEESA, 1986). In all soil borings, dredge spoil clays were observed in the upper portion of the borings with natural sands or marsh clays observed by 3.5 feet bgs.

3.3.3 Soil Sampling

Soil samples were collected in accordance with the SI/CS Work Plan Addendum 2 (TtNUS, 2000). Based on the PID reading of 51 ppm observed in soil boring PAI-04-SB-17, one subsurface soil sample was collected from PAI-04-SB-17 at a depth of 1.5 to 2 feet bgs in August 2000. Additionally, based on the black staining observed at PAI-04-SB-16, one soil sample was collected from the stained interval (2 to 2.5 feet bgs). The samples were sent to a laboratory and analyzed for target compound list (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs) and target analyte list (TAL) metals and cyanide. For the samples that were to be analyzed for TCL VOCs, the samples were collected from the soil boring auger head using Encore® samplers. A pre-cleaned disposable trowel was used to collect the samples that were to be analyzed for the remainder of the analytical parameters. Upon collection, the samples were placed on ice. In accordance with the work plan (TtNUS, 2000), soil borings were backfilled with soil cuttings. A copy of the surface soil sample log sheets is provided in Appendix C.

3.3.4 Temporary Monitoring Well Installation

Three temporary monitoring wells were installed as part of Site 4 SI/CS field activities. Temporary well PAI-04-MW-01(S) was installed in December 1999 by a South Carolina licensed driller employed by Columbia Technologies in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan Addendum 1 (TtNUS, 1999b). Temporary wells PAI-04-MW-02(S) and PAI-04-MW-03(S) were installed in August 2000 by a South Carolina licensed driller employed by Vironex in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan Addendum 2 (TtNUS, 2000). All temporary wells were hand driven with DPT equipment. Soils were not collected for lithological characterization during temporary well installation. Temporary well PAI-04-MW-01(S) was installed to a depth of 12 feet bgs and temporary wells PAI-04-MW-02(S) and PAI-04-MW-03(S) were installed to a depth of 11 feet bgs. Once driven to depth, the DPT equipment was removed from the borings and 3/4-inch PVC well material, consisting of riser and 5-foot screen sections (0.005-inch slotted-well screen), was installed in the borings. After sample collection, the DPT borings were abandoned in accordance with SCDHEC regulations. A thin bentonite-cement grout was added

through the PVC pipe as the well casing and screen was removed from the boring. The boring was grouted to the surface.

3.3.5 Groundwater Sampling

Groundwater was sampled using low flow sampling techniques in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan Addenda 1 and 2 (TtNUS, 1999b and 2000). A peristaltic pump and disposable tubing were used to collect the groundwater samples from the temporary wells. The tubing was lowered to the approximate midpoint of the groundwater column in the monitoring wells and the approximate midpoint of the DPT screen. Groundwater samples were collected after the required volume of water was purged.

The groundwater sample from each well, with the exception of groundwater that was analyzed for TCL VOCs, was collected by reducing the flow to minimize volatilization of the sample and by filling the appropriate containers directly from the tubing after it passed through the peristaltic pump. The TCL VOC samples were collected by removing the tubing from the well and allowing the water in the tubing to flow under gravity backward into the sample container. The samples were then placed on ice. Groundwater low flow purge sheets and sample log sheets are included in Appendix C.

Groundwater samples PAI-04-GW-01-01 and PAI-04-MW-02-01 were analyzed for TCL VOCs, SVOCs, pesticides, and PCBs and TAL metals and cyanide. Samples from these wells were also analyzed for Appendix IX parameters not included on the TCL/TAL list. Groundwater sample PAI-04-MW-03-01 was analyzed for TCL VOCs and SVOCs.

Because temporary monitoring well PAI-04-MW-01(S) is located in an area that was not in the vicinity of the former fire training pit, groundwater sample PAI-04-GW-01-01 will not be used in the further evaluation of Site 4. However, because this well is located downgradient of Site 13C, the results from the temporary well will be used in the evaluation of Site 13C in Section 7.0.

Groundwater-quality field parameters, including temperature, pH, specific conductance, turbidity, dissolved oxygen, and salinity, were collected during purging of the wells. The following is a summary of the groundwater-quality parameters collected for groundwater samples PAI-04-MW-02 and PAI-04-MW-03.

Sample Number	PAI-04-MW-02-01	PAI-04-MW-03-01
Temperature (°C)	22.1	24.0
pH	5.68	5.74
Specific Conductance (mS/cm)	10.9	9.2

Sample Number	PAI-04-MW-02-01	PAI-04-MW-03-01
Dissolved Oxygen (mg/L)	1.44	1.86
Salinity (%)	0.61	0.51
Turbidity (NTU)	10	50

The salinity readings indicate that the groundwater samples were saline (fresh water is less than 0.048 percent salinity as identified by SCDHEC; 1998). The wells were purged in an effort to reduce the turbidity to less than the benchmark of 5 NTUs. Due to the presence of clayey soils in the screened zones, which reduced well yields, the target turbidity level could not be reached. The turbidity ranged from 10 to 50 NTUs at time of sampling.

3.4 SITE-SPECIFIC GEOLOGY/HYDROGEOLOGY

Site 4 is located within 70 feet of Ballast Creek and within the 100-year flood zone. Groundwater flow in the shallow aquifer within the vicinity of the site flows to the east toward Ballast Creek. The soils encountered in the soil borings and in the temporary well locations consisted of sands, silty and clayey sands, sandy clays, and clay. The clayey soils were encountered 1.5 to 2.5 feet below land surface. Groundwater was encountered 2.5 to 3 feet below land surface. Groundwater yield to the monitoring wells was extremely slow due to the presence of the clayey material. The groundwater samples from the sites had salinity readings above what would be considered fresh water.

The aquifer of interest to Site 4 is the surficial aquifer. This aquifer is separated from underlying regional Tertiary Floridan aquifer by the Hawthorn Formation, a confining unit that extends beneath Parris Island. The surficial aquifer at the base was previously used to provide the base domestic water. The surfical aquifer drains to on-site streams and tidal areas within the base. Therefore, contaminants within this unit would ultimately discharge to these site streams and tidal areas and would ultimately discharge to the Beaufort and Broad Rivers that form Port Royal Sound. Site 4 is located near Ballast Creek. The groundwater sampling locations are located in the expected downgradient direction from the site, within 70 feet of Ballast Creek. It is expected that any contaminant released to the groundwater at Site 4 would be discharged into Ballast Creek.

3.5 SITE-SPECIFIC ECOLOGICAL SETTING

The dredge spoils area consists of a berm (approximately 8 to 12 feet in height) created by sediments dredged from Ballast Creek and the Beaufort River. Vegetation within the area enclosed by the berm is dominated by shrubby species such as Eastern baccharis (*Baccharis halimfolia*), wax myrtle (*Myrica cerifera*), yaupon holly (*Ilex vomitoria*), and blackberry (*Rubus* spp). A wooded area is located east of the site. The overstory of the wooded area consists primarily of slash pine (*Pinus elliottii*), loblolly pine (*Pinus*

taeda), live oak (*Quercus virginiana*), and laurel oak (*Quercus laurifolia*). Common understory species include Eastern baccharis, saw palmetto (*Serenoa repens*), yaupon holly, poison ivy (*Rhus radicans*), Virginia creeper (*Parthenocissus quinquefolia*), muscadine grape (*Vitis rotundifolia*), and greenbriar (*Smilax rotundifolia*). A shrubby area lies along the western and southern portions of the berm. A grassy area lies to the north between the site and structures associated with the MCRD yacht facility.

Ballast Creek is located approximately 150 feet from the eastern and southwestern portions of the bermed area. Ballast Creek adjoins the MCRD yacht basin approximately 500 feet north of the site and enters the Beaufort River approximately 2,000 feet west of the site. Extensive saltwater marshes are located along Ballast Creek south of the site and in the area between Ballast Creek and the Beaufort River. The marshes are dominated by cordgrass (*Spartina alterniflora*).

Terrestrial wildlife species that utilize the uplands on and near the site are those typically found in similar habitats throughout the Depot. These include a variety of mammals, birds, and reptiles. There are no sensitive terrestrial environments or resources at or near the site.

The nearby marshes provide habitat for a variety of fauna, particularly fish and crustaceans, as well as several species of animals that prey upon the fish and crustaceans. These predators include mammals such as the raccoon (*Procyon lotor*), mink (*Mustela vison*), and river otter (*Lutra canadensis*) and wading birds such as the tricolored heron (*Egretta tricolor*), great blue heron (*Ardea herodias*), green heron (*Butorides striatus),* and snowy egret (*Egretta thula*). Various shorebirds and wintering waterfowl forage in the marshes.

Endangered and threatened species that could potentially occur at or near the site consist of the bald eagle (*Haliaeetus leucocephalus*), wood stork (*Mycteria americana*), and American alligator (*Alligator mississippiensis*). An active bald eagle nest is located approximately 2 miles northwest of the site, and bald eagles could potentially forage in Ballast Creek. Wood storks forage in various areas throughout the Depot, and they could forage in the marshes south and east of the site. Alligators could occur in Ballast Creek. Although common in some parts of its range, the alligator is federally listed as threatened due to its similarity in appearance to the endangered American crocodile (*Crocodylus acutus*). Other endangered and threatened species occur in Beaufort County (Table 2-2 of Volume I, Master Work Plan), but Ballast Creek provides poor habitats for these species. For example, the manatee (*Trichechus manatus*), shortnose sturgeon (*Acipenser brevirostrum*), and various sea turtles are occasionally observed in the Beaufort River, and the Atlantic bottlenosed dolphin (Tursiops truncatus) is a year-round resident of coastal South Carolina. Although not threatened or endangered, dolphins are afforded protection under the Federal Marine Mammal Act.) However, these species usually are not associated with shallow marshes and narrow tidal channels like those near the site. With the exception of the bald

eagle, wood stork, and alligator, the probability of endangered and threatened species in the vicinity of the site is probably remote.

3.6 SI/CS AND HISTORIC ANALYTICAL RESULTS

During SI/CS field activities, two soil samples (PAI-04-SB-16-2-2.5 and PAI-04-SB-17-1.5-2) and three groundwater samples (PAI-04-GW-01-01, PAI-04-MW-02-01, and PAI-04-MW-03-01) were collected. Based on aerial photographs and field observations, the two soil samples represent most the likely location of the former fire training pit. Because groundwater sample PAI-04-GW-01-01 was collected in an area that was not in the vicinity of the former fire training pit, this sample will not be discussed further in this section. However, because this well is located downgradient of Site 13C; the results from the temporary well will be used in the evaluation of Site 13C in Section 7.0.

3.6.1 Soil

Table 3-1 summarizes positive detections of chemicals in the soil of Site 4. The table also provides soil background values and pertinent human health and ecological screening criteria. In addition, because of the proximity of the soil samples to Ballast Creek, background sediment values are also presented. Screening criteria consist of U.S. EPA Region 9 residential-use scenario soil preliminary remediation goals (PRGs), soil screening levels (SSLs) for migration to groundwater [dilution attenuation factor (DAF) 1], SSLs for migration to air, and U.S. EPA Region 4 soil ecological screening values (ESVs). Residential-use PRGs are soil concentrations equal to the lower of the incremental lifetime cancer risk (ILCR) of 1.0E-06 or a hazard quotient (HQ) of 1.0 for noncarcinogenic risk under a residential-use scenario.

Although soil samples were collected in locations where soil staining and elevated PID readings were observed, organic compounds were not detected in the two subsurface soil samples. Because of the proximity of these locations to Ballast Creek, it is likely that site organics would have naturally attenuated since the 1960s.

Excluding macronutrients, 13 inorganic compounds were detected in the subsurface soil samples collected at Site 4. Of these detected compounds, aluminum, arsenic, chromium, cobalt, copper, and vanadium were detected above background levels established for MCRD Parris Island in one of the two samples. Inorganics that were detected above soil background are presented in Figure 3-3.

Of the chemicals that exceed background, only aluminum, arsenic, chromium, and vanadium exceeded a human health and/or ecological screening criterion. The arsenic detection at PAI-04-SB-16 (6.1 mg/kg)

exceeded its residential-use soil PRG of 0.39 mg/kg. However the detected arsenic concentration is less than the background value of 12 mg/kg in sediment.

The arsenic and chromium detections both exceeded soil to groundwater screening values; however, groundwater at Site 4 is saline and is not a potable drinking water source. Furthermore, arsenic was not detected in Site 4 groundwater and chromium was detected in groundwater at levels below applicable groundwater screening criteria (MCLs). Chromium (7.1 mg/kg) exceeded its ESV of 0.4 mg/kg. Likewise, vanadium (11 mg/kg) exceeded its ESV (2 mg/kg). However, both of the values are less than corresponding background values in sediments (35.2 mg/kg and 50 mg/kg, respectively).

Inorganics are frequently incorporated into the soil matrix and remain bound to particulate matter. Consequently, they are expected to migrate from the source areas via erosion.

Although aluminum, arsenic, chromium, and vanadium exceeded a human health and/or ecological screening criteria, detected maximum concentrations were observed only slightly above soil background values and were less than sediment background values. Consequently, inorganic concentrations in soil do not pose potential threats to human health and ecological receptors and will not be considered further.

3.6.2 Groundwater

Table 3-2 summarizes positive detections of chemicals in the shallow groundwater aquifer at Site 4. The table also provides a comparison of the detected concentrations to pertinent human health screening criteria (U.S. EPA Region 9 tapwater PRGs and federal MCLs/SMCLs). Tapwater PRGs consist of groundwater concentrations equal to the lower of the ILCR of 1.0E-06 or a HQ of 1.0 for noncarcinogenic risk under the potable water use scenario. Detected concentrations are also compared to U.S. EPA Region 4 surface water ESVs (salt water). Based on the salinity of Site 4 groundwater, saltwater ESVs were used for screening purposes. This ecological screening assumes that ecological receptors are exposed to the groundwater concentration of the chemical upon its discharge to surface water. However, this screening is a conservative comparison because it assumes that no dispersion of the chemical occurs during discharge to surface water.

Organics were not detected in groundwater of Site 4. This finding indicates that past fire-training activities do not have a current impact on the existing condition of Site 4 groundwater.

In accordance with SI/CS Work Plan Addendum 2 (TtNUS, 2000), only monitoring well PAI-04-MW-02(S) was analyzed for inorganics. Excluding macronutrients, 10 inorganics were detected in this monitoring well. No inorganic concentrations were detected at concentrations above federal Maximum Contaminant Levels (MCLs). Aluminum (15,100 µg/L), iron (5,840 µg/L), and manganese (1,730 µg/L) were detected

at concentrations above secondary MCLs (SMCLs) (200, 300, and 50 µg/L, respectively); however, SMCLs are not health-based guidelines, but instead guidelines for chemicals that may affect the aesthetic quality of drinking water (i.e., color and taste) (AWWA, 1990). The detection of manganese (1,730 µg/L) also exceeded its tapwater PRG (880 µg/L). Detected chemicals in groundwater were not observed above MCLs; therefore, Site 4 groundwater will not be considered further for human health purposes.

Copper (7.7 µg/L) was the only detected analyte observed at a concentration above its surface water ESV (2.9 µg/L). Upon discharge of groundwater to the surface water of Ballast Creek, this copper concentration would be expected to attenuate to levels below its screening criteria. Also, the established surface water background value for copper is 7 µg/L, indicating that the site groundwater would not impact the adjacent surface water. Consequently, Site 4 groundwater will not be considered further for ecological purposes.

3.7 CONCLUSIONS/RECOMMENDATIONS

The most likely location of Site 4 fire training pit was identified during the investigation to be in the vicinity of soil borings PAI-04-SB-15 to PAI-04-SB-19 (as shown in Figure 3-2). This location also matches well with the historical photographs. Within this area, black stained soils were observed at PAI-04-SB-16 and elevated PID readings were observed in soil boring PAI-04-SB-17. Both are indications of potential hydrocarbon contamination. However, organic compounds were not detected in subsurface soil and groundwater samples collected from this area.

Most inorganic concentrations detected in soil were below or just above established MCRD Parris Island soil background values and all inorganics were detected below sediment background values. Furthermore, inorganic concentrations in groundwater were not above federal MCLs. No action/no further action is recommended for soil and groundwater at Site 41. Consequently, clean closure for this site is sought.

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1 No-action is equivalent to the RCRA term of "no-further action" and has been added at the request of SCDHEC.

TABLE 3-1

SOIL/SEDIMENT ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 4 - DREDGE SPOILS AREA FIRE TRAINING PIT
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SOIL SAMPLE RESULTS		ESTABLISHED MCRD PI BACKGROUND VALUES[2]	HUMAN HEALTH SCREENING CRITERIA			EPA REGION 4 ECOLOGICAL SCREENING CRITERIA[5]
	PAI-04-SB-16-2-2.5[1]	PAI-04-SB-17-1.5-2[1]		EPA REGION 9 RESIDENTIAL SOIL PRGs[3]	EPA SSLs MIGRATION TO AIR[4]	EPA REGION 9 SSLs MIGRATION TO GW (DAF 1)[3]	
Inorganics (mg/kg)							
ALUMINUM	2450	**7470**	7270/24,200	76000	NA	NA	**50**
ARSENIC	**6.1**	0.72	1.4/12	**0.39**	750	**1**	10
BARIUM	9.2	9.3	24/28	5400	690000	82	165
CALCIUM	517 J	181 J	766/4000	NA	NA	NA	NA
CHROMIUM	2.8	**7.1**	6.2/35.2	210[6]	270[6]	**2[6]**	**0.4**
COBALT	ND	0.4	0.36/2.6	4700	NA	NA	20
COPPER	1.9	ND	1.5/10	2900	NA	NA	40
IRON	2710	3560	3920/21,500	23000	NA	NA	200
LEAD	5.1	3.6	12.5/21	400	NA	NA	50
MAGNESIUM	249	343	515/6,400	NA	NA	NA	NA
MANGANESE	5.6	5.2	129/186	1800	NA	NA	100
NICKEL	0.6	1.3	1.8/6	1600	13000	7	30
POTASSIUM	117	126	313/3,200	NA	NA	NA	NA
SELENIUM	0.17	0.12	0.29/ND	390	NA	0.3	0.81
SODIUM	395 J	574 J	241/19,000	NA	NA	NA	NA
VANADIUM	4.6	**11**	9.5/50	550	NA	300	**2**
ZINC	ND	7.3	9.7/45	23000	NA	600	50

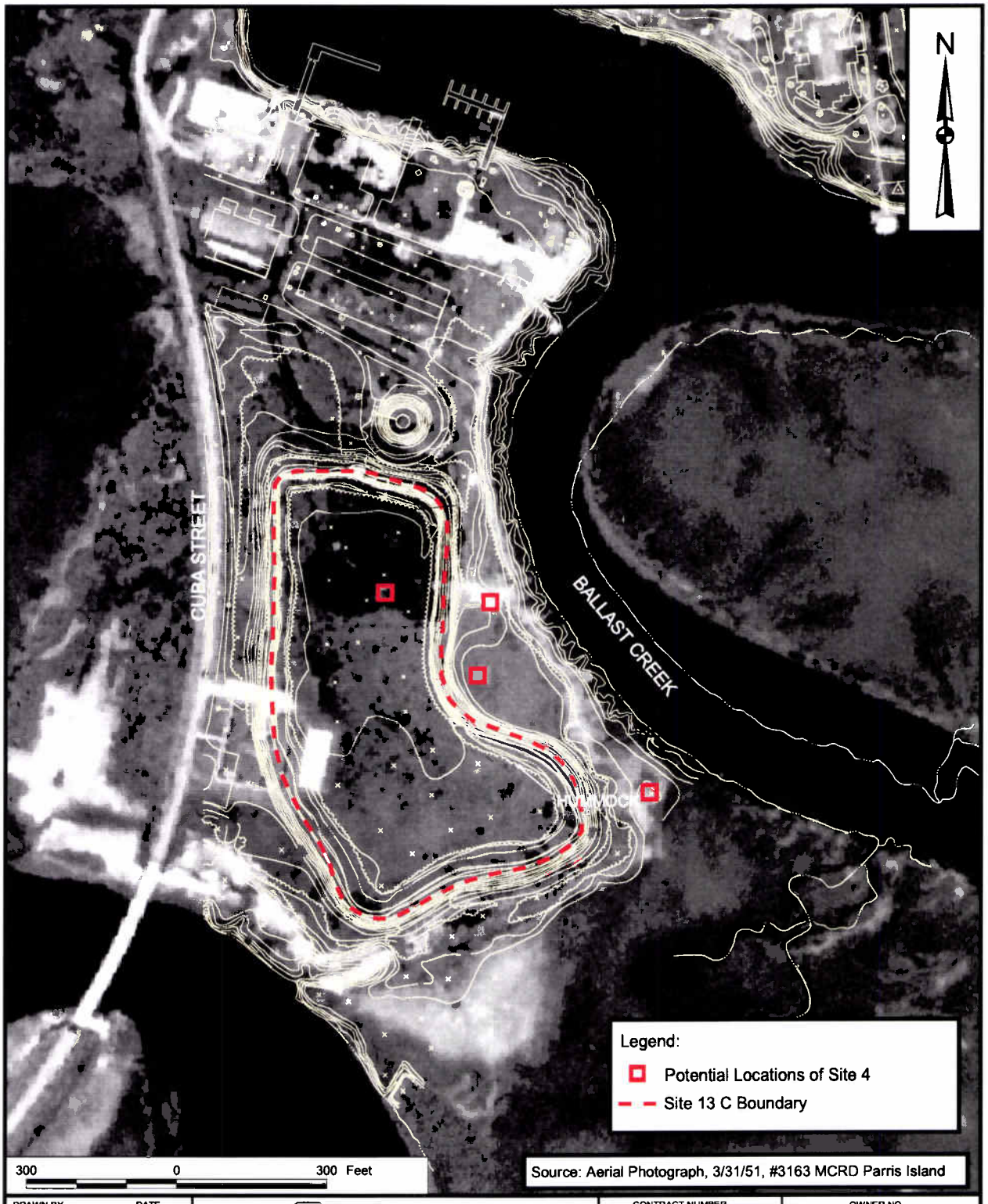
Notes:
1 - Sample Date: August 23, 2000.
2 - TtNUS, 1999c. Please note that background equals two times the mean concentration of background samples.
The calculation represents an approximate upper bound of normal metal distribution in media.
3 - U.S. EPA Region 9 Preliminary Remediation Goals, November 2000. (Cancer benchmark value = 1.0x10-6, HI = 1.0.)
4 - U.S. EPA Soil Screening Guidance: Technical Background Document, May 1996.
5 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22, 1998.
6 - Values for total chromium.
Blackened cells indicate an exceedance of background concentrations and human health and/or ecological screening criteria.
NA = Not Applicable/Not Available
ND = Not Detected
J = Estimated Value

TABLE 3-2

GROUNDWATER ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 4 - DREDGE SPOILS AREA FIRE TRAINING PIT
MCRD PARRIS ISLAND, SOUTH CAROLINA

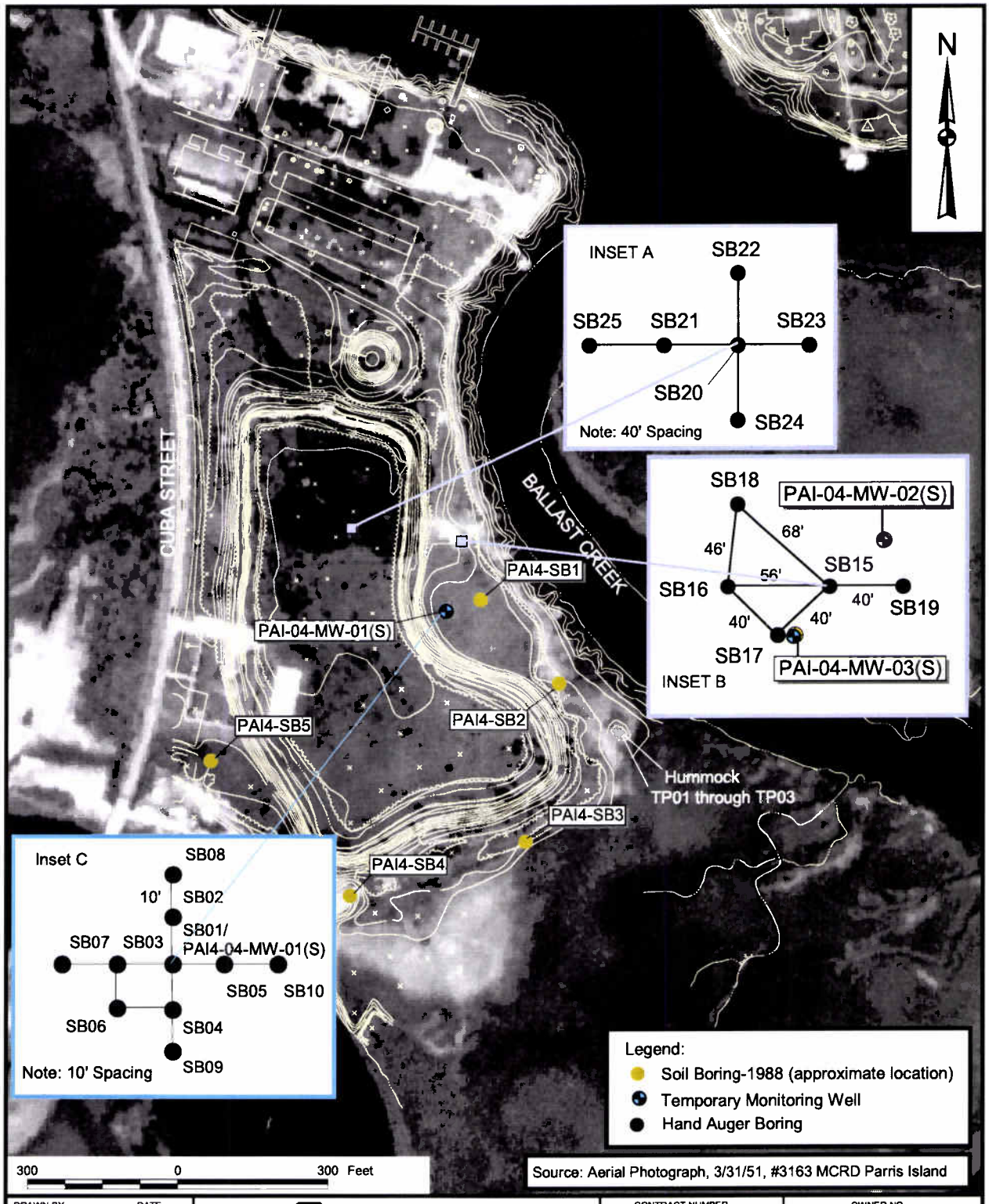
CONSTITUENT	GROUNDWATER RESULTS		HUMAN HEALTH SCREENING CRITERIA		EPA REGION 4 SURFACE WATER ESVs[5]
	PAI-04-MW-02-01[2]	PAI-04-MW-03-01[2]	EPA REGION 9 TAP WATER PRGs[3]	FEDERAL MCLs[4]	
Inorganics (ug/L)					
ALUMINUM	**15100**	[8]	36000	**50-200 (SMCL)**	NA
BARIUM	30	[8]	2600	2000	NA
CALCIUM	246000	[8]	NA	NA	NA
CHROMIUM	23.8	[8]	110[6]	100	103[7]
COBALT	1.4	[8]	2200	NA	NA
COPPER	**7.7**	[8]	1400	1300 (MCLG)	**2.9**
IRON	**5840**	[8]	11000	**300 (SMCL)**	NA
MAGNESIUM	320000	[8]	NA	NA	NA
MANGANESE	**1730**	[8]	**880**	**50 (SMCL)**	NA
NICKEL	5.1	[8]	730	100	8.3
POTASSIUM	102000	[8]	NA	NA	NA
SODIUM	1900000	[8]	NA	NA	NA
VANADIUM	24	[8]	260	NA	NA
ZINC	12.5	[8]	11000	5000 (SMCL)	86

Notes:
1 - Sampling Date: December 16, 1999.
2 - Sampling Date: August 23, 2000.
3 - U.S. EPA Region 9 Preliminary Remediation Goals, November 2000. (Cancer benchmark value = 1×10^{-6}, HI = 1.0)
4 - U.S. EPA Drinking Water Regulations and Health Advisories, Summer, 2000.
5 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22
Saltwater Values - Chronic.
6 - Value for total chromium.
7 - Value for chromium III
8 - Not an analyzed parameter per the work plan (TtNUS, 2000).
Blackened cells indicate an exceedance of a screening criteria.
NA = Not Applicable/Not Available
SMCL = Secondary MCL
MCLG = Minimum Contaminant Level Goal



DRAWN BY T. Beckman — DATE 3-6-00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 0095	OWNER NO. —
CHECKED BY — DATE —	SITES 4 AND 13C AERIAL PHOTOGRAPH - 1951 MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	APPROVED BY — DATE —	
COST/SCHEDULE-AREA		APPROVED BY — DATE —	
SCALE AS NOTED		DRAWING NO. FIGURE 3 - 1	REV 0

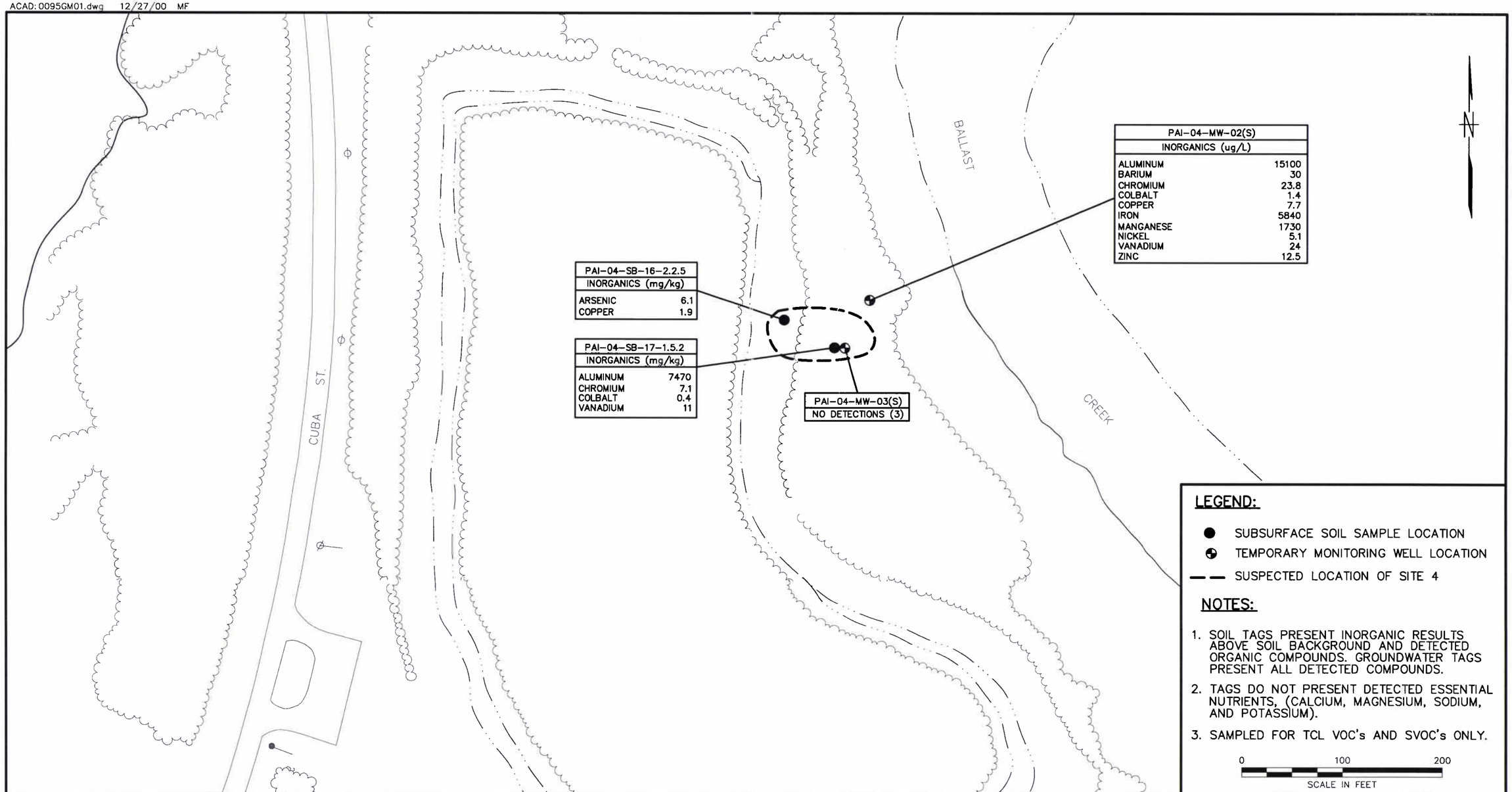
P:\GIS\MCRD_PARRISISLAND\JASON.APR WORK PLAN ADDENDUM LAYOUT 12/18/00 MGS



DRAWN BY M. Spangenberg	DATE 12/18/00	Tetra Tech NUS, Inc.	CONTRACT NUMBER — / OWNER NO. —
CHECKED BY —	DATE —	SITE 4 SAMPLE LOCATIONS MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	APPROVED BY — / DATE —
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 3-2 / REV 0

P:\GIS\MCRD_PARRISISLAND\JASON.APR\SAMPLE LOCATIONS LAYOUT 12/18/00 MGS

ACAD: 0095GM01.dwg 12/27/00 MF



LEGEND:

- ● SUBSURFACE SOIL SAMPLE LOCATION
- ⊕ TEMPORARY MONITORING WELL LOCATION
- — — SUSPECTED LOCATION OF SITE 4

NOTES:

1. SOIL TAGS PRESENT INORGANIC RESULTS ABOVE SOIL BACKGROUND AND DETECTED ORGANIC COMPOUNDS. GROUNDWATER TAGS PRESENT ALL DETECTED COMPOUNDS.
2. TAGS DO NOT PRESENT DETECTED ESSENTIAL NUTRIENTS, (CALCIUM, MAGNESIUM, SODIUM, AND POTASSIUM).
3. SAMPLED FOR TCL VOC's AND SVOC's ONLY.

0 100 200
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MF DATE 12/8/00
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

DEPARTMENT OF THE NAVY ★ SOUTHERN DIV FACILITIES ENGINEERING COMD ★

SITE 4
SOIL AND GROUNDWATER
ANALYTICAL RESULTS
DREDGE SPOILS FIRE TRAINING PIT
MCRD PARRIS ISLAND
PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 0095
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 3-3
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

4.0 SITE 5 – FORMER PAINT SHOP DISPOSAL AREA

4.1 SITE DESCRIPTION

Site 5, the Former Paint Shop Disposal Area, is an inactive site located in the northeastern portion of the Depot, adjacent to the Beaufort River (see Figure 4-1). Site 5 was a location where dried paint wastes were reportedly placed at the edge of the Beaufort River from the 1930s to the 1960s. While the site was active, the disposal area consisted of bare river embankment adjacent to a dock or wharf. After 1972, nearby marsh land was filled in with soil and, later, construction rubble.

Between 1949 and 1960, the MCRD Parris Island Paint Shop was located in Structure 177, which was a prefabricated metal structure situated close to the bank of the Beaufort River in the northeastern corner of the Depot. Prior to 1949, the Paint Shop was located in several other prefabricated metal structures, all of which were very close to the location of Structure 177. Most paints used at the Depot during this time were mixed in tanks at the Paint Shop. The mixtures consisted of white lead, zinc, and linseed oil. A paint remover consisting of diesel fuel oil or kerosene was used to remove the hardened paint waste from the mixing tanks. The hardened paint scraped from the tanks was carried to the edge of the river bank and poured down the embankment. The disposal site (Site 5) consisted of a small area, approximately 30 feet long and 5 feet wide along, the embankment, located adjacent to Structure 160A (a small pump house) and about 25 feet northwest of Tank 95.

The disposal site was reportedly used from at least the 1930s until 1960. The amount of hardened paint sludge that was poured down the embankment was estimated to be about 1,000 to 2,000 pounds per year. The total volume of paint wastes disposed at this site is estimated to be approximately 17 tons.

Site 5 is located in an industrial portion of the Depot. The closest residential area is approximately 800 feet southwest of Site 5. There are no day care facilities or schools within 200 feet of the site.

4.2 PREVIOUS INVESTIGATIONS

Previous investigations at Site 5 include the IAS, Interim RFA, and the Navy's relative site ranking efforts. Based on the results of these investigations, the MCRD Parris Island partnering team determined that Site 5 required further evaluation and recommended an SI/CS. A brief description of each previous investigation is presented below.

4.2.1 Initial Assessment Study

In 1986, the Naval Energy and Environmental Support Activity (NEESA) conducted an IAS (NEESA, 1986) under the Naval Assessment and Control of Installation Pollutants (NACIP) Program. The IAS is equivalent to the preliminary assessment (PA) phase of the CERCLA process. The purpose of the IAS (Phase I of the NACIP Program) was to identify potentially contaminated sites at MCRD Parris Island that may pose a threat to human health or the environment.

In the IAS, Site 5 was not recommended for further investigation. The study concluded that, because of the age and location of the site and the method of disposal, the wastes would likely have been washed from this site into the river and carried away. Much of the soil embankment was also eroded by river currents and storms before the area was filled with construction debris in 1972. Therefore, the study concluded that no wastes were likely to remain at the site and further migration of contaminants from this site was very unlikely.

4.2.2 Interim RCRA Facility Assessment

In accordance with the requirements of MCRD's application for a RCRA permit, an Interim RFA was performed from January 1990 to March 1990 (Kearney, 1990). The RFA concluded that, although there was no evidence of release, RFA Phase II sampling should be performed to confirm that hazardous constituents are not present at the former disposal area.

4.2.3 Relative Site Ranking

In December 1995, B&R Environmental conducted sampling and analysis of surface soil and sediment at MCRD Parris Island for the Navy's relative site ranking efforts. Two soil samples (PI-005-01 and PI-005-02) were collected from the bank of the Beaufort River near the top of the slope. Sample locations were selected based on their proximity to the rear door of Building 177 and because of the observed visual signs of dried paint. The locations of these samples are shown in Figure 4-1. The samples were analyzed for TCL VOCs, SVOCs, PCBs, pesticides, and TAL metals and cyanide. VOCs, SVOCs, pesticides, and a PCB were detected, as were inorganics, at concentrations greater than background. These analytical results (and as the SI/CS sampling results) are presented in Section 4.6.

4.3 1999 INVESTIGATION

The SI/CS field investigation at Site 5 was conducted in October 1999. During this field investigation, one sediment sample (PAI-05-SD-03-01) was collected from the Beaufort River. Information collected during the investigation was used to supplement existing information at Site 5. The approximate sample location is shown in Figure 4-1.

The sample was collected in accordance with the SI/CS Work Plan (TtNUS, 1999a). It was collected at low tide approximately 20 feet from the edge of the bank. Due to the velocity of the current and the presence of construction debris that extended into the river, a boat and standard sediment sampler could not be used to access the sample location. The sample was collected using a 2.5-gallon stainless steel bucket and nylon rope. The bucket was decontaminated before and after the sample was collected using laboratory soap and deionized water. The bucket was thrown into the river at the sample location and allowed to sink. The bucket then was pulled slowly to skim the surface of the sediment and then retrieved quickly to keep the collected sample in the container. For all analytical parameters except TCL VOCs, the sample material was placed directly in the appropriate containers and then on ice. The VOC sample was collected using Encore® samplers. The samplers were then capped and placed on ice. A copy of the sediment sample log sheet is provided in Appendix A. The sediment sample was analyzed for TCL VOCs, SVOCs, and TAL metals (total).

4.4 SITE-SPECIFIC GEOLOGY/HYDROGEOLOGY

Based on the nature of the wastes disposed and the proximity of the site to the river, the media of concern are surface soils and sediments. As a result, site-specific geologic and/or hydrogeologic studies were not performed at Site 5.

The site is located adjacent to the Beaufort River within the 100-year flood zone, as indicated in the Master Work Plan (B&R Environmental, 1998). Site 5 is located at the top of a rather steep (estimated 10 percent) embankment covered by construction debris that is exposed at low tide. The embankment is currently undergoing erosion, with several noticeable sink areas behind the construction debris. The collected sediment sample consists of a silt with a trace of fine sand. Groundwater flow within the vicinity of Site 5 is expected to be to the northeast toward the Beaufort River.

The aquifer of interest at Site 5 is the surficial aquifer. This aquifer is separated from the underlying regional Tertiary Floridan aquifer by the Hawthorn Formation, a confining unit that extends beneath Parris Island. The surficial aquifer at MCRD Parris Island was previously used to provide the base domestic water. The surfical aquifer drains to on-site streams and tidal areas within the base. Therefore, contaminants within this unit would discharge to these site streams and tidal areas that ultimately discharge to the Beaufort and Broad Rivers which form Port Royal Sound. Site 5 is located directly adjacent to the Beaufort River. It is expected that any contaminant released at Site 5 would be discharged directly to the river over a distance of 10 feet or less based on the tide.

4.5 SITE-SPECIFIC ECOLOGICAL SETTING

The former disposal area is located within an industrialized area of the Depot. Terrestrial habitat in the vicinity of the site is limited to buildings and other structures, turf grass, and construction debris. Because of the industrial character of the area, there are no sensitive terrestrial environments or resources at or near the site.

The site is situated along a 6- to 10-foot slope at the edge of the Beaufort River. There is no marsh habitat along this portion of the river, and construction debris extends from the site into the water. The Beaufort River provides habitat for a variety of fish, crustaceans, and other aquatic fauna.

Threatened and endangered aquatic and semi-aquatic species that are occasionally observed in the Beaufort River include the manatee (*Trichechus manatus*), shortnose sturgeon (*Acipenser brevirostrum*), various sea turtles, and the bald eagle. There are no sandy beach habitats favored as nesting sites by sea turtles near the site. Thus, the likelihood of sea turtles near the site (except for occasional transients) is remote. The possibility that manatees and shortnose sturgeon may occasionally occur in this portion of the Beaufort River cannot be ruled out. Likewise, the Atlantic bottlenosed dolphin (Tursiops truncatus) lives in coastal South Carolina and is occasionally observed in the Beaufort River. Although not threatened or endangered, dolphins are afforded protection under the Federal Marine Mammal Act. An active bald eagle nest is located approximately 1.5 miles west of the site, and bald eagles forage in the Beaufort River. The likelihood of finding other endangered and threatened species in the vicinity of the site is probably remote.

4.6 SI/CS AND HISTORIC ANALYTICAL RESULTS

This section discusses the results of the SI/CS, which was conducted in October 1999, and the relative site ranking, which was conducted in 1995. One sediment sample (PAI-05-SD-03-01) was collected from the bank of the Beaufort River in 1999 and two soil samples [PI-005-01(28) and –02(29)] were collected in 1995.

4.6.1 Surface Soil

Table 4-1 summarizes the positive detections in the soil at Site 5. The table also provides a comparison of the detected concentrations to pertinent screening criteria [U.S. EPA Region 9 residential-use scenario soil PRGs, SSLs for migration to groundwater (DAF 1) and migration to air, and U.S. EPA Region 4 soil ESVs]. In addition, because of the proximity of the Beaufort River, the soil results are also compared to sediment background values. Residential-use PRGs are soil concentrations equal to the lower of the ILCR of 1.0E-06 or a HQ of 1.0 for noncarcinogenic risk.

Figure 4-3 presents positive detections of inorganic compounds above established MCRD Parris Island soil background and all detections of organic compounds.

4.6.1.1 VOCs

One surface soil sample PI-005-01(28) from the 1995 investigation contained two VOCs at detectable concentrations (chloroform and carbon tetrachloride). The other soil sample did not have detectable levels of VOCs. Chloroform (6 J µg/kg) slightly exceeded the ESV of 1 µg/kg. This estimated concentration did not exceed any human health screening criteria. Carbon tetrachloride (detected at 2 J µg/kg) did not exceed human health or ecological screening criteria.

However, the detected concentrations of VOCs may not be site related, but instead be present because of laboratory or field contamination. During the relative site ranking in 1995, a total of 31 soil samples were collected across 10 sites at MCRD Parris Island. In these samples, carbon tetrachloride was detected in seven samples at concentrations ranging from 2 J to 6 J µg/kg, and chloroform was detected in 12 samples at concentrations ranging from 2 J to 11 µg/kg. These detections were observed in eight of the 10 sites investigated including sites where VOCs were not expected to be detected (e.g., Site 8 - PCB Spill Area or Site 13C - Inert Disposal Area C). Although carbon tetrachloride and chloroform were not detected in any of the quality assurance (QA)/quality control (QC) samples collected for the 1995 investigation, low-level detections observed across eight out of the 10 sampled sites suggest that these compounds may be laboratory or field artifacts.

VOCs are typically considered to be fairly soluble and have a low capacity for retention by organic carbon in soil. VOCs may migrate through the soil column as infiltrating precipitation solubilizes them. Migration occurs primarily laterally with the hydraulic gradient while some portion of the chemical may be retained by the saturated soil. Once in Site 5 groundwater, VOCs would be expected to migrate to the surface water and sediment of the Beaufort River. Neither carbon tetrachloride nor chloroform was observed in the sediment sample collected from the bank of the Beaufort River at Site 5.

4.6.1.2 SVOCs

Both soil sampling locations [PI-005-01(28) and PI-005-02(29)] contained detectable levels of PAHs. PAHs detected consist of anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene. Concentrations ranged from benzo(b)fluoranthene at 180 J µg/kg to anthracene at 19 J µg/kg.

Only one PAH, benzo(a)pyrene (130 J µg/kg), exceeded a residential-use soil PRG (62 µg/kg). Additionally, benzo(a)pyrene, fluoranthene, and pyrene slightly exceeded individual PAH ESVs at both locations (maximum HQs of 1.3, 1.6, and 1.7, respectively). However, total PAH concentrations at each location [846 µg/kg at PI-005-02(29) and 1,067 µg/kg at PI-005-01(28)] were below or just slightly above the total PAH ESV of 1,000 µg/kg.

The SVOCs carbazole, diethyl phthalate, and N-nitrosodiphenylamine were also detected in the soil samples at concentrations ranging from diethyl phthalate at 19 J µg/kg to carbazole at 51 J µg/kg. Only one detection of these three SVOCs, exceeded a screening criterion. The detection of carbazole (51 µg/kg) exceeded its soil to groundwater screening value of 30 µg/kg; however, this value was exceeded by less than a factor of two.

PAHs are typically associated with motor vehicles and roadways and could be attributable to runoff from nearby parking lots and roads. Automobile exhaust has been reported as a source of PAHs in roadways in several studies (Takada, et. al., 1991, Bradley, et. al., 1994, and Benfenati, et. al., 1992). PAHs in soil are likely to bind to soil and be transported via mass transport mechanisms than to go into solution. At Site 5, erosion of soil into the adjacent Beaufort River would be expected to be a primary transport mechanism. However, none of the SVOCs detected in surface soil were found in the adjacent sediment sample collected at Site 5.

PAHs are amenable to microbial degradation in soil. Degradation soil half lives have been reported from 57 days to 1.45 years for benzo(a)pyrene, 140 to 440 days for fluoranthene, and 210 days to 5.2 years for pyrene (Howard, 1991). Since these compounds only slightly exceed residential-use soil PRGs or ESV, concentrations would be expected to naturally attenuate to below screening criterion within 5 years.

4.6.1.3 Pesticides/PCBs

Several pesticides were identified in Site 5 soils. 4,4'-DDT, alpha-chlordane, endosulfan I, and gamma chlordane were detected at both soil sampling locations. In addition, the 4,4'-DDT breakdown product 4,4'-DDE was found at PI-005-01(28) with a concentration of 19 µg/kg. 4,4'-DDE and 4,4'-DDT at PI-005-01(28) both exceeded their ESVs (maximum HQ = 16.8). These concentrations, however, are consistent with typical concentrations found throughout MCRD Parris Island related to prior base-wide pesticide application. Because this is an industrial area, pesticide use would be expected. Detected pesticides did not exceed residential-use soil PRGs.

One PCB, Aroclor-1260 (110 µg/kg), was identified in the soil at sampling location PI-005-01(28). This concentration exceeded its ESV (HQ = 5.5); however, it did not exceed the residential-use PRG for human health.

4,4'-DDT, 4,4'-DDE, and Aroclor-1260 are considered to be persistent chemicals and would be expected to remain for an extended period of time. Degradation soil half lives have been reported from 2 to 15.6 years for 4,4'-DDE and 4,4'-DDT (Howard, 1991). They undergo extensive adsorption to chemicals and are not highly soluble. Runoff can carry these chemicals to adjacent surface water bodies and its sediment.

Because pesticide concentrations are consistent with typical concentrations found throughout MCRD Parris Island related to prior base-wide pesticide application, pesticides in soil will not be considered further. The detection of Aroclor-1260 may present potential risks to terrestrial plants and soil invertebrates, but does not represent a human health threat.

4.6.1.4 Inorganics

At Site 5, the inorganic elements detected, excluding essential macronutrients, were aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, vanadium, and zinc. Of these compounds, most exceeded both soil and sediment background values and exceeded a human health and/or ecological criteria in one or two of the locations.

Arsenic, with concentrations of 8.3 mg/kg and 3.9 mg/kg at PI-005-01(28) and PI-005-02(29) exceeded a human health screening value [residential-use PRG (0.39 mg/kg) and soil to groundwater screening criteria (1 mg/kg)]; however, these concentrations did not exceed sediment background values or ESVs.

Chromium (maximum concentration of 461 mg/kg) exceeded the residential-use PRG (210 mg/kg). Chromium concentrations also exceeded SSLs for migration to groundwater (270 mg/kg), SSLs for migration to air (2 mg/kg) and its ESV (0.4 mg/kg).

Nickel (maximum HQ of 45) and zinc (maximum HQ of 3.2) exceeded ESVs at both locations but did not exceed the residential-use PRG. Nickel also exceeded a soil to groundwater screening value.

Copper and mercury only exceeded ESVs at one location [PI-005-01(28)] with HQs of 9.6 and 1.3, respectively. Copper and mercury did not exceed the residential-use PRGs or SSLs.

Cadmium, lead, and selenium were found in the soil only at sampling location PI-005-01(28). The detection of cadmium (0.59 mg/kg) was observed above soil to groundwater screening criteria (HQ = 1.5). Lead (172 mg/kg) exceeded the ESV of 50 mg/kg and selenium (0.71 mg/kg) exceeded the soil to groundwater screening value of 0.3 mg/kg. These metals did not exceed residential-use PRGs or SSLs.

Concentrations of vanadium (maximum concentration of 11,800 mg/kg) exceeded the soil residential-use PRG of 550 mg/kg, soil to groundwater screening value of 300 mg/kg, and the ESV of 2 mg/kg. Also, aluminum and iron concentrations exceeded soil ESVs (maximum HQs of 178.4 and 52.5, respectively); however, the maximum aluminum concentration was only 1.2 times above established soil background levels and well less than sediment background levels. Similarly, the maximum iron concentration was 2.7 times above soil background levels but well less than the sediment background level. A barium concentration (101 mg/kg) also exceeded its soil to groundwater screening value of 82 mg/kg.

Inorganics are frequently incorporated into the soil matrix and remain bound to particulate matter. Consequently, they are expected to migrate from the source areas via erosion.

Concentrations of aluminum, chromium, copper, iron, lead, mercury, nickel, vanadium, and zinc were detected above ESVs. However, aluminum, iron, and mercury were detected at concentrations near established background concentrations. The remaining compounds (chromium, copper, lead, nickel, vanadium, and zinc) are present at concentrations in soil that may present potential risks to terrestrial plants and soil invertebrates. The impacted area is relatively small (0.2 acres) and isolated from terrestrial receptors by water and buildings.

4.6.2 Sediment

During the 1999 investigation, one sediment sample (PAI-05-SD-03-01) was taken from the sediment in the Beaufort River to determine whether site contaminants are migrating into the river. Table 4-2 summarizes the analytical results from this sample and compares these concentrations to human health and ecological screening criteria (U.S. EPA Region 9 residential-use soil PRG and U.S. EPA Region 4 sediment ESVs). The analytical results were qualified as estimated values (J) because the sediment sample contained less than 30 percent solids. This low solids content is typical of sediments. In this derivation, the result obtained by the laboratory is divided by the percent solids content of a sample to conservatively obtain the reported result. As a result of this calculation, the reported result is biased high.

Figure 4-2 presents positive detections of inorganic compounds above background and all detections of organic compounds.

Two organic compounds, the VOC methylene chloride (42 J µg/kg) and the PAH indeno(1,2,3-cd)pyrene (1,000 J µg/kg), were identified in the sediment sample at Site 5. The methylene chloride detection was below human health and ecological screening criteria. The PAH was greater than its residential soil PRG (620 µg/kg). The detection of indeno(1,2,3-cd)pyrene was also greater than its ESV (655 µg/kg).

Neither methylene chloride nor indeno(1,2,3-cd)pyrene were detected in the two upgradient surface soil samples. Methylene chloride could be a remnant of a laboratory contaminant. PAHs are typically associated with motor vehicles and roadways. Degradation half lives for these compounds in aqueous environments range from 1 to 4 weeks for methylene chloride and 1.64 to 2 years for indeno(1,2,3-cd)pyrene (Howard, 1991).

The inorganic elements, excluding essential macronutrients, detected in the sediment sample were aluminum, arsenic, barium, chromium, cobalt, copper, iron, lead, manganese, nickel, vanadium, and zinc. Most of the inorganic detections were similar to or slightly elevated above background.

The arsenic concentration (14.9 J) exceeded its residential-use PRG (0.39 mg/kg) and its ESV (7.24 mg/kg); however, this concentration was only slightly above established sediment background (12.2 mg/kg). A detection of iron (26,900 mg/kg) also slightly exceeded background (21,500 mg/kg) and its residential-use soil PRG (23,000 mg/kg).

Site 5 is located in an industrial-use area of the base. Only one analyte, arsenic, exceeded an ESV; however, this concentration was slightly above established background.

4.7 CONCLUSIONS/RECOMMENDATIONS

The two surface soil samples collected at Site 5 in 1995 contained, two VOCs, 12 SVOCs, five pesticides, and one PCB. Of these detections, chloroform, benzo(a)pyrene, carbazole, fluoranthene, pyrene, 4,4'-DDT, 4,4'-DDE, and Aroclor-1260 were detected above a human health and/or ecological screening criterion. Additionally, of the 15 inorganics detected (excluding macronutrients), most were found at concentrations above background values and 13 were detected above background and/or a human health and/or ecological screening criterion.

Methylene chloride and indeno(1,2,3-cd)pyrene were the only organics detected in the sediment sample collected at Site 5. Indeno(1,2,3-cd)pyrene was detected above its Region 4 soil ESV and Region 9 residential-use soil PRG. Of the 12 inorganics detected (excluding macronutrients), all were detected above established sediment background values; however, only arsenic and iron exceeded background and a human health and/or ecological screening criterion.

Site history and soil analytical results indicate that waste desposition has occurred at Site 5. However, sediment analytical results indicate that past disposal has not adversely affected the adjacent sediment.

A screening of sediment results to ecological screening criteria indicate that only minor potential ecological risks exist. Potential ecological risks to plant life and soil invertebrates are also present based on a

screening of soil analytical results to conservative ecological screening criteria. The primary chemicals in soil attributing to this potential threat are Aroclor-1260, chromium, copper, lead, nickel, vanadium, and zinc. However, terrestrial habitat in the vicinity of the site is limited to buildings and other structures, turf grass, and construction debris and there are no sensitive terrestrial environments or resources at or near the site. Also, these inorganics do not biomagnify in the food chain; therefore, effects to upper food-chain receptors are unlikely.

Due to the potential presence of wastes in the subsurface portion of the site, an RI/RFI is recommended to determine whether wastes are present.

TABLE 4-1

SURFACE SOIL ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 5 - FORMER PAINT SHOP DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SURFACE SOIL SAMPLE RESULTS		ESTABLISHED MCRD PI BACKGROUND VALUES[2] SOIL/SEDIMENT	HUMAN HEALTH SCREENING CRITERIA			EPA REGION 4 ECOLOGICAL SOIL SCREENING CRITERIA[5]
	PI-005-01(28)[1]	PI-005-02(29)[1]		REGION 9 RESIDENTIAL SOIL PRGs[3]	SSLs MIGRATION TO AIR[4]	SSLs MIGRATION TO GW (DAF 1)[3]	
Volatile Organic Compounds (µg/kg)							
CARBON TETRACHLORIDE	2 J	ND	NA	240	300	3	1000000
CHLOROFORM	**6 J**	ND	NA	240	300	30	**1**
Semivolatile Organic Compounds (µg/kg)							
ANTHRACENE	19 J	23 J	NA	22000000	NA	600000	100
BENZO(A)ANTHRACENE	79 J	47 J	NA	620	NA	80	NA
BENZO(A)PYRENE	**130 J**	34 J	NA	**62**	NA	400	**100**
BENZO(B)FLUORANTHENE	180 J	120 J	NA	620	NA	200	NA
BENZO(K)FLUORANTHENE	170 J	100 J	NA	6200	NA	2000	NA
CARBAZOLE	**51 J**	ND	NA	24000	NA	**30**	NA
CHRYSENE	130 J	140 J	NA	62000	NA	8000	NA
DIETHYL PHTHALATE	19 J	21 J	NA	49000000	2000000 (sat)	NA	100000
FLUORANTHENE	**140 J**	**160 J**	NA	2300000	NA	21000	**100**
N-NITROSODIPHENYLAMINE	47 J	ND	NA	99000	NA	60	20000
PHENANTHRENE	79 J	52 J	NA	NA	NA	NA	100
PYRENE	**140 J**	**170 J**	NA	2300000	NA	21000	**100**
Total PAHs	**1067**	846	NA	NA	NA	NA	**1,000**
Pesticides/PCBs (µg/kg)							
4,4'-DDE	**19 J**	ND	31.6	1700	NA	3000	**2.5**
4,4'-DDT	**42**	1.8 J	34.5	1700	NA	2000	**2.5**
ALPHA-CHLORDANE	62	1.6 J	13.9	1600[6]	20000[6]	500[6]	NA
AROCLOR-1260	**110 J**	ND	NA	220	NA	NA	**20**
ENDOSULFAN I	5.7 J	2.8	4.7	370000	NA	900	NA
GAMMA-CHLORDANE	58	1.7 J	13.2	1600[6]	20000[6]	500[6]	NA
Inorganics (mg/kg)							
ALUMINUM	5690	**8920**	7270/24200	76000	NA	NA	50
ARSENIC	**8.3**	**3.9**	1.4/12	**0.39**	750	**1**	10
BARIUM	**101**	23.8	24/28	5400	690000	**82**	165
CADMIUM	**0.59**	ND	NA/0.28	37	1800	**0.4**	1.6
CALCIUM	2210	1010	766/4000	NA	NA	NA	NA
CHROMIUM	**461**	**206**	6.2/35.2	**210[7]**	**270[7]**	**2[7]**	**0.4**
COBALT	15.8	4.9	0.36/2.6	4700	NA	NA	20
COPPER	**385**	15.3	1.5/10	2900	NA	NA	**40**
IRON	**10500**	**6850**	3920/21500	23000	NA	NA	200
LEAD	**172**	ND	12.5/21	400	NA	NA	**50**
MAGNESIUM	1150	1230	515/6400	NA	NA	NA	NA
MANGANESE	57.5	43.6	129/186	1800	NA	NA	100
MERCURY	**0.13**	0.04	0.11/0.09	23	10	NA	**0.1**

TABLE 4-1

SURFACE SOIL ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 5 - FORMER PAINT SHOP DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SURFACE SOIL SAMPLE RESULTS		ESTABLISHED MCRD PI BACKGROUND VALUES[2] SOIL/SEDIMENT	HUMAN HEALTH SCREENING CRITERIA			EPA REGION 4 ECOLOGICAL SOIL SCREENING CRITERIA[5]
	PI-005-01(28)[1]	PI-005-02(29)[1]		REGION 9 RESIDENTIAL SOIL PRGs[3]	SSLs MIGRATION TO AIR[4]	SSLs MIGRATION TO GW (DAF 1)[3]	
NICKEL	**1350**	**429**	1.8/6	1600	13000	7	**30**
POTASSIUM	353	392	313/3200	NA	NA	NA	NA
SELENIUM	**0.71**	ND	0.29/ND	390	NA	**0.3**	0.81
SODIUM	849	372	241/14000	NA	NA	NA	NA
VANADIUM	**11800**	**2030**	9.5/50	**550**	NA	**300**	**2**
ZINC	**162**	**140**	9.7/45	23000	NA	620	**50**

Notes:

1 - Sampling Date: December 13, 1995.
2 - Tetra Tech NUS Inc., MCRD Parris Island Site 3 Remedial Investigation (RI)/RCRA Facilities Investigation (RFI), 1999c.,
Soil and sediment background values are provided because samples were collected on the river bank and exhibited characteristics of both media.
Please note that background equals two times the mean concentration of background samples. The calculation represents an approximate upper bound of normal metal distribution in media.
3 - U.S. EPA Region 9 Preliminary Remediation Goals, November 2000. (Cancer benchmark value = 1×10^{-6}, HI =1.0)
4 - U.S. EPA Soil Screening Level Guidance: Technical Background Document. May, 1996.
5 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22, 1998.
6 - Value for chlordane.
7 - Value for total chromium.

Blackened cells indicate an exceedance of background concentrations and human health and/or ecological screening criteria.

ND = Nondetect
NA = Not Applicable/Not Available
J = Estimated Value

TABLE 4-2

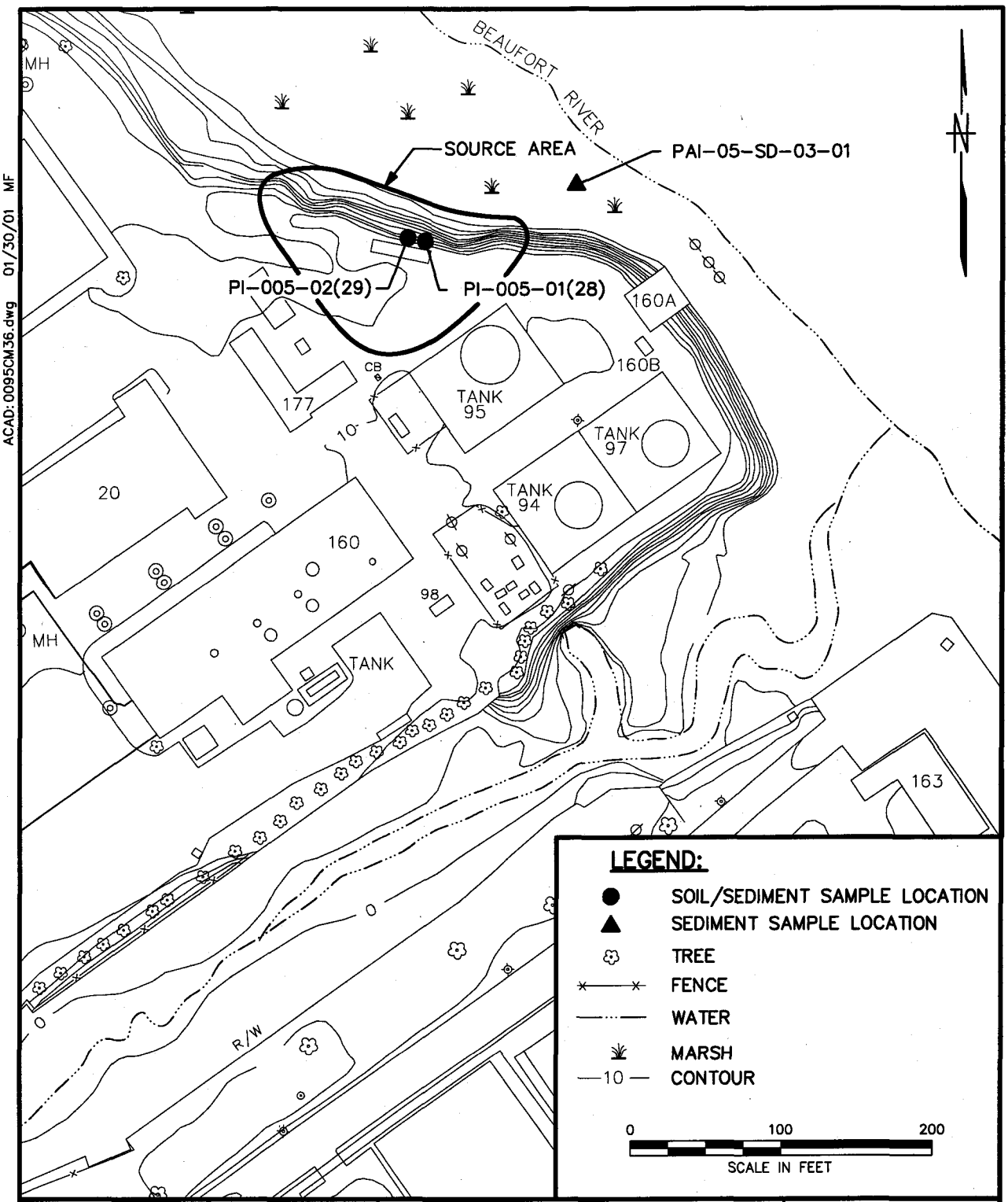
SEDIMENT ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 5 - FORMER PAINT SHOP DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SEDIMENT SAMPLE RESULTS	ESTABLISHED MCRD PI BACKGROUND VALUES[2] SEDIMENT	HUMAN HEALTH SCREENING CRITERIA	EPA REGION 4 ECOLOGICAL SED. SCREENING CRITERIA[4]
	PAI-05-SD-03-01[1]		REGION 9 RESIDENTIAL SOIL PRGs[3]	
Volatile Organic Compounds (µg/kg)				
METHYLENE CHLORIDE	42 J	NA	8900	2000
Semivolatile Organic Compounds (µg/kg)				
INDENO(1,2,3-CD)PYRENE	**1000 J**	NA	**620**	**655[5]**
Inorganics (mg/kg)				
ALUMINUM	25800 J	24200	76000	NA
ARSENIC	**14.9 J**	12.2	**0.39**	**7.24**
BARIUM	31.8 J	28	5400	NA
CALCIUM	14300 J	4000	NA	NA
CHROMIUM	46.2 J	35.2	210[6]	52.3
COBALT	5.8 J	2.6	4700	NA
COPPER	12.4 J	10.1	2900	18.7
IRON	**26900 J**	21500	**23000**	NA
LEAD	20.8 J	20.6	400	30.2
MAGNESIUM	9130 J	6437	NA	NA
MANGANESE	452 J	185.7	1800	NA
NICKEL	11.3 J	6	1600	15.9
POTASSIUM	5140 J	3190	NA	NA
SODIUM	23700 J	19110	NA	NA
VANADIUM	61.8 J	49.6	550	NA
ZINC	56 J	45	23000	124

Notes:

1 - Sampling Date: October 6, 1999.
2 - Tetra Tech NUS Inc., MCRD Parris Island Site 3 Remedial Investigation (RI)/RCRA Facilities Investigation (RFI), 1999c. Please note that background equals two times the mean concentration of background samples. The calculation represents an approximate upper bound of normal metal distribution in media.
3 - U.S. EPA Region 9 Preliminary Remediation Goals, November 2000. (Cancer benchmark value = 1×10^{-6}, HI =1.0)
4 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22, 1998.
5 - Value for high molecular weight PAHs.
6 - Value for total chromium.
Blackened cells indicate an exceedance of background concentrations as well as human health and/or ecological screening criteria.

NA = Not Applicable/Not Available
J = Estimated Value



ACAD: 0095CM36.dwg 01/30/01 MF

DRAWN BY HJP DATE 7/18/00	DEPARTMENT OF THE NAVY SOUTHERN DIV FACILITIES ENGINEERING COMMAND	SITE/SWMU 5 LOCATION MAP FORMER PAINT SHOP DISPOSAL AREA MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095
CHECKED BY DATE			APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4-1 / REV. 0

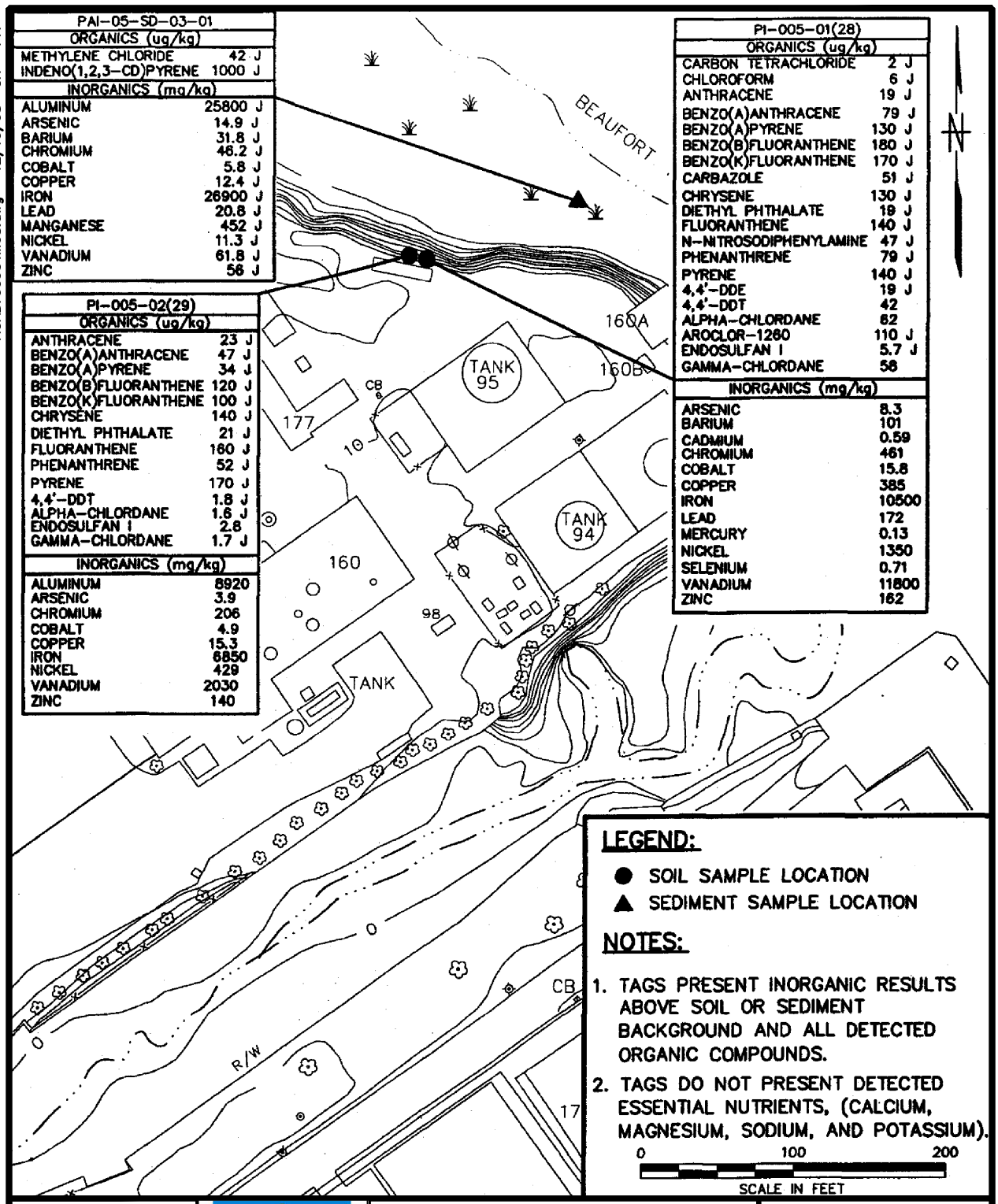
FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

ACAD: 0095TM08.dwg 12/10/08 CK PIT

PAI-05-SD-03-01	
ORGANICS (ug/kg)	
METHYLENE CHLORIDE	42 J
INDENO(1,2,3-CD)PYRENE	1000 J
INORGANICS (mg/kg)	
ALUMINUM	25800 J
ARSENIC	14.9 J
BARIUM	31.8 J
CHROMIUM	46.2 J
COBALT	5.8 J
COPPER	12.4 J
IRON	26900 J
LEAD	20.8 J
MANGANESE	452 J
NICKEL	11.3 J
VANADIUM	61.8 J
ZINC	56 J

PI-005-02(29)	
ORGANICS (ug/kg)	
ANTHRACENE	23 J
BENZO(A)ANTHRACENE	47 J
BENZO(A)PYRENE	34 J
BENZO(B)FLUORANTHENE	120 J
BENZO(K)FLUORANTHENE	100 J
CHRYSENE	140 J
DIETHYL PHTHALATE	21 J
FLUORANTHENE	160 J
PHENANTHRENE	52 J
PYRENE	170 J
4,4'-DDT	1.8 J
ALPHA-CHLORDANE	1.6 J
ENDOSULFAN I	2.8
GAMMA-CHLORDANE	1.7 J
INORGANICS (mg/kg)	
ALUMINUM	8920
ARSENIC	3.9
CHROMIUM	206
COBALT	4.9
COPPER	15.3
IRON	6850
NICKEL	429
VANADIUM	2030
ZINC	140

PI-005-01(28)	
ORGANICS (ug/kg)	
CARBON TETRACHLORIDE	2 J
CHLOROFORM	6 J
ANTHRACENE	19 J
BENZO(A)ANTHRACENE	79 J
BENZO(A)PYRENE	130 J
BENZO(B)FLUORANTHENE	180 J
BENZO(K)FLUORANTHENE	170 J
CARBAZOLE	51 J
CHRYSENE	130 J
DIETHYL PHTHALATE	19 J
FLUORANTHENE	140 J
N-NITROSODIPHENYLAMINE	47 J
PHENANTHRENE	79 J
PYRENE	140 J
4,4'-DDE	19 J
4,4'-DDT	42
ALPHA-CHLORDANE	62
AROCLOR-1260	110 J
ENDOSULFAN I	5.7 J
GAMMA-CHLORDANE	58
INORGANICS (mg/kg)	
ARSENIC	8.3
BARIUM	101
CADMIUM	0.59
CHROMIUM	461
COBALT	15.8
COPPER	385
IRON	10500
LEAD	172
MERCURY	0.13
NICKEL	1350
SELENIUM	0.71
VANADIUM	11800
ZINC	162



LEGEND:

- ● SOIL SAMPLE LOCATION
- ▲ SEDIMENT SAMPLE LOCATION

NOTES:

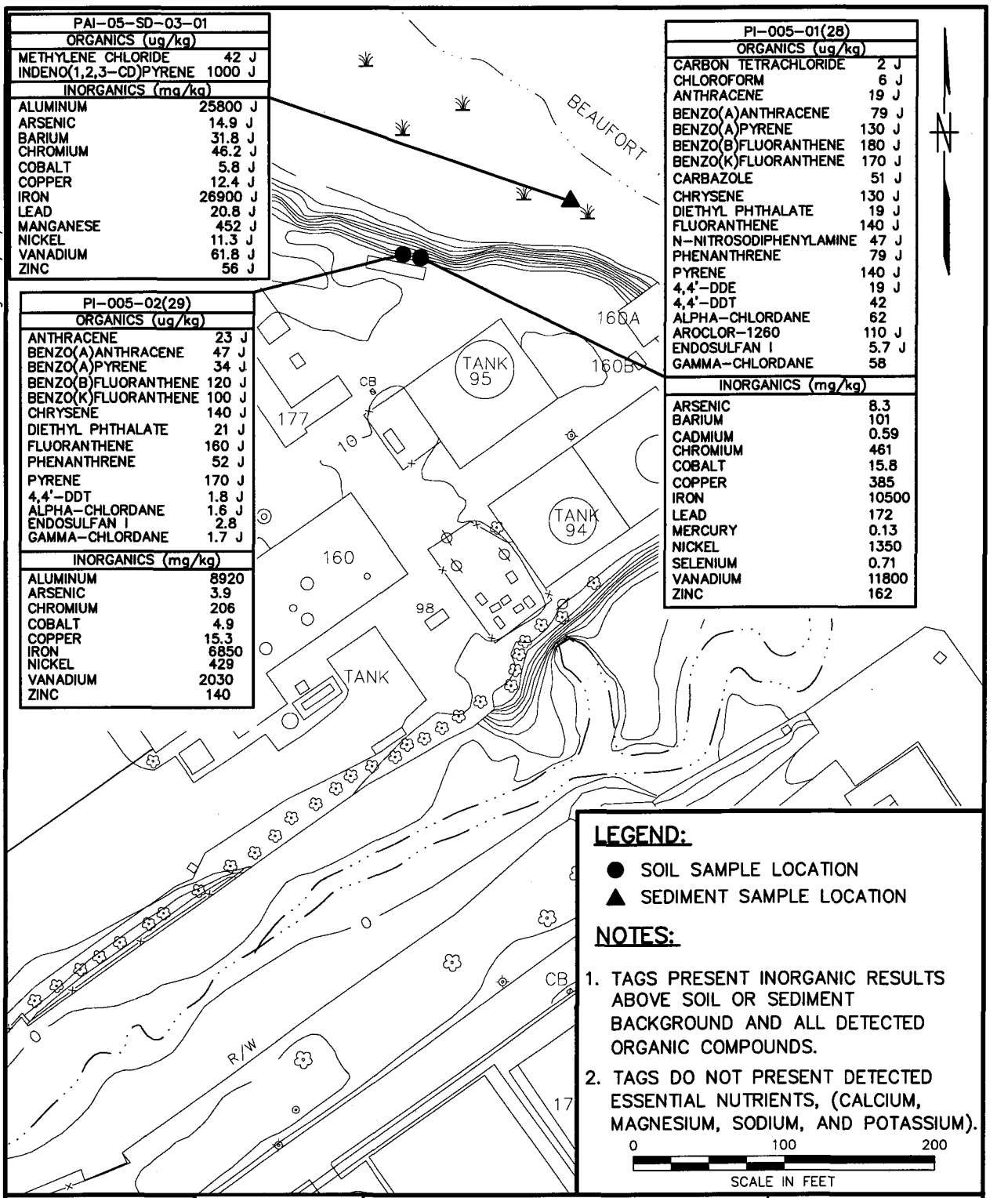
1. TAGS PRESENT INORGANIC RESULTS ABOVE SOIL OR SEDIMENT BACKGROUND AND ALL DETECTED ORGANIC COMPOUNDS.
2. TAGS DO NOT PRESENT DETECTED ESSENTIAL NUTRIENTS, (CALCIUM, MAGNESIUM, SODIUM, AND POTASSIUM).

0 100 200
SCALE IN FEET

DRAWN BY CK	DATE 12/10/08	SITE/SWMU 5 SURFACE SOIL AND SEDIMENT ANALYTICAL RESULTS FORMER PAINT SHOP DISPOSAL AREA MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095
CHECKED BY	DATE		OWNER NO.
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4-2 / REV. 0

NAVFAC

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98



PAI-05-SD-03-01	
ORGANICS (ug/kg)	
METHYLENE CHLORIDE	42 J
INDENO(1,2,3-CD)PYRENE	1000 J
INORGANICS (mg/kg)	
ALUMINUM	25800 J
ARSENIC	14.9 J
BARIUM	31.8 J
CHROMIUM	46.2 J
COBALT	5.8 J
COPPER	12.4 J
IRON	26900 J
LEAD	20.8 J
MANGANESE	452 J
NICKEL	11.3 J
VANADIUM	61.8 J
ZINC	56 J

PI-005-02(29)	
ORGANICS (ug/kg)	
ANTHRACENE	23 J
BENZO(A)ANTHRACENE	47 J
BENZO(A)PYRENE	34 J
BENZO(B)FLUORANTHENE	120 J
BENZO(K)FLUORANTHENE	100 J
CHRYSENE	140 J
DIETHYL PHTHALATE	21 J
FLUORANTHENE	160 J
PHENANTHRENE	52 J
PYRENE	170 J
4,4'-DDT	1.8 J
ALPHA-CHLORDANE	1.6 J
ENDOSULFAN I	2.8
GAMMA-CHLORDANE	1.7 J
INORGANICS (mg/kg)	
ALUMINUM	8920
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CHROMIUM	206
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VANADIUM	2030
ZINC	140

PI-005-01(28)	
ORGANICS (ug/kg)	
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CHLOROFORM	6 J
ANTHRACENE	19 J
BENZO(A)ANTHRACENE	79 J
BENZO(A)PYRENE	130 J
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CARBAZOLE	51 J
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DIETHYL PHTHALATE	19 J
FLUORANTHENE	140 J
N-NITROSODIPHENYLAMINE	47 J
PHENANTHRENE	79 J
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CADMIUM	0.59
CHROMIUM	461
COBALT	15.8
COPPER	385
IRON	10500
LEAD	172
MERCURY	0.13
NICKEL	1350
SELENIUM	0.71
VANADIUM	11800
ZINC	162

LEGEND:

- ● SOIL SAMPLE LOCATION
- ▲ SEDIMENT SAMPLE LOCATION

NOTES:

1. TAGS PRESENT INORGANIC RESULTS ABOVE SOIL OR SEDIMENT BACKGROUND AND ALL DETECTED ORGANIC COMPOUNDS.
2. TAGS DO NOT PRESENT DETECTED ESSENTIAL NUTRIENTS, (CALCIUM, MAGNESIUM, SODIUM, AND POTASSIUM).

0 100 200

SCALE IN FEET

ACAD: 0095TM08.dwg 01/30/01 MF

DRAWN BY HJP	DATE 7/18/00	SITE/SWMU 5 SURFACE SOIL AND SEDIMENT ANALYTICAL RESULTS FORMER PAINT SHOP DISPOSAL AREA MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHED-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4-3 / REV. 0

DEPARTMENT OF THE NAVY · SOUTHERN DIV FACILITIES ENGINEERING COMD

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

5.0 SITE 7 – PAGE FIELD FIRE TRAINING PIT

5.1 SITE DESCRIPTION

Site 7, the Page Field Fire Training Pit, was a concrete pit, 25 feet in diameter, located near a concrete apron at Page Field (see Figure 5-1). The pit was covered with asphalt and was encircled by a cinderblock berm. Adjacent to the pit, a 500-gallon waste oil/fuel tank sat 60 feet away and was connected to the bottom of the pit through a series of steel pipes.

Between 1965 and 1976, Site 7 was used by MCRD fire-fighting personnel for petroleum fire training purposes. A valve located near the 500-gallon tank was opened and closed to regulate the amount of waste oil/fuel allowed into the pit through the steel pipes. The waste oil/fuel was set ablaze, and then extinguished by the fire-fighting personnel. On average, 300 to 400 gallons of contaminated fuels and waste motor oils were burned per session, with one or two sessions held per month.

In 1976, cracks in the concrete lining were noticed, and fire training at the pit ceased. However, it is believed that this practice continued for 2 to 4 months after the cracks occurred but before their discovery, allowing for the discharge of contaminants into the underlying soil. It was estimated that, during that period, approximately 50 gallons of contaminated fuels and waste motor oils, including kerosene, mineral spirits, and diesel fuel, were released into the soils. The concrete pit and the 500-gallon tank have been removed. A review of the site records and additional site reconnaissance have not identified any buried fuel lines at the site.

Site 7 is currently used for Marine training activities. Page Field is no longer used for flight operation. The nearest resident lives approximately 1 mile northwest of Site 7. There are no day care facilities or schools within 200 feet of the site.

5.2 PREVIOUS INVESTIGATIONS

Previous investigations at Site 7 include the IAS, RI Verification Step, and Interim RFA. Based on the results of these investigations, the MCRD Parris Island partnering team determined that Site 7 required further evaluation and recommended an SI/CS. A brief description of each previous investigation is presented below.

5.2.1 Initial Assessment Study

In 1986, NEESA conducted an IAS (NEESA, 1986) under the NACIP Program. The IAS is equivalent to the PA phase of the CERCLA process. The purpose of the IAS (Phase I of the NACIP Program) was to

identify potentially contaminated sites at MCRD Parris Island that may pose a threat to human health or the environment.

After studying the Page Field Fire Training Pit, NEESA determined that, due to the concrete lining and the soil type below grade, the vertical movement of contaminants into the underlying aquifer was unlikely. Also, because of the small amount of contamination, it was believed that the contaminants could not travel 1,600 feet to the nearest surface water body. Therefore, no further action was recommended (NEESA, 1986).

5.2.2 Remedial Investigation Verification Step Addendum

In 1988, McClelland Consultants conducted an RI Verification Step for Site 7 as an addendum to the RI Verification Steps conducted for several other sites at MCRD Parris Island. The findings were published in June 1990. At the Page Field Fire Training Pit, 10 vadose zone vapor (VZV) probe readings were taken along the perimeter of the pit, and three permanent monitoring wells were installed for groundwater sampling. The first well was drilled along the southwestern perimeter (PAI7-GW1), the second along the eastern perimeter (PAI7-GW2), and the third along the western perimeter (PAI7-GW3).

The VZV probes were field screened for VOCs and none were found to exceed 1 part per million (ppm). The groundwater samples from the monitoring wells were tested for VOCs, SVOCs, pesticides, PCBs, and metals. None of the groundwater sample analytes exceeded Interim Primary Drinking Water Standards (McClelland, 1990). Based on these findings, no further action was recommended for Site 7.

5.2.3 Interim RCRA Facility Assessment

In January 1990, A.T. Kearney conducted a file review of the MCRD Parris Island facility and, in February of that same year, conducted a visual site inspection (VSI) of the facility, culminating in an Interim RFA Report. Site 7 was included in the investigation. During the VSI, it was noticed that no stressed vegetation existed in the vicinity of Site 7, indicating little contaminant impact on surrounding vegetation. However, based on the unknown condition of the steel supply pipes, Phase II sampling was recommended for the site.

5.3 1999 INVESTIGATION

The SI/CS field investigation at Site 7 was conducted in May and December 1999. In May, TtNUS collected depth-to-groundwater measurements and surveyed the top of existing monitoring well casing elevations to a local benchmark in order to verify the direction of groundwater flow. During the December investigation, a temporary monitoring well was installed and sampled. Two existing wells (PAI7-2 and

PAI7-3) were also sampled. Three groundwater samples and one duplicate sample (PAI7-GW2-02, PAI7-GW3-02, PAI-07-GW-04-01, and PAI-07-GW-04-01-D) were collected. Also during the December investigation, test pits (PAI-07-TP-01 and PAI-07-TP-02) were sampled and a subsurface soil sample (PAI-07-SB-01-04) was collected in an attempt to confirm the location of the old fire training pit. Information collected during the investigation was used to supplement existing geologic information at Site 7. The sample and test pit locations are shown on Figure 5-1. The following sections discuss the activities conducted during the field investigation at Site 7.

5.3.1 Test Pitting/Subsurface Soil Sampling

Two test pits were excavated at Site 7 along the western edge of the unit to locate the former fire training pit; the locations are indicated on Figure 5-1. The test pitting was performed in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan Addendum 1 (TtNUS, 1999b). Test pit PAI-07-TP-01 was approximately 40 feet long by 2 feet wide and 8 feet deep. Test pit PAI-07-TP-02 was approximately 6 feet long by 2 feet wide and 4 feet deep. The soil collected in each backhoe bucket from the test pits was scanned with a photoionization detector (PID) and classified for lithologic characteristics.

The soil encountered during test pitting at PAI-07-TP-01 consisted of disturbed fill material to a depth of approximately 4.5 feet bgs. Stained soil was encountered in the test pit at a depth of 3 to 4.5 feet bgs. Soil from test pit PAI-07-TP-01 did not exhibit elevated PID readings. In test pit PAI-07-TP-02, soils encountered included fill soil with PID readings to 107 ppm. Subsurface soil sample PAI-07-SB-01-04 was collected from test pit PAI-07-TP-02 at a depth of approximately 4 feet bgs, where the PID reading was 107 ppm. The sample was collected from the backhoe bucket using Encore® samplers for TCL VOC analysis and a pre-cleaned disposable trowel for the remainder of the analytical parameters. The Encore® Samplers were placed directly on ice. The remainder of the sample was placed in the appropriate containers on ice. Sample PAI-07-SB-01-04 was analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL metals (total), cyanide, and tin.

Soil excavated from the test pits was returned to the excavations. Stained soil, segregated during excavation, was returned to the pits at the approximate depths from which it had been removed. Prior to excavation the backhoe bucket was decontaminated using a steam-spray washer. The water was collected and containerized for disposal in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan Addendum 1 (TtNUS, 1999b).

5.3.2 Temporary Monitoring Well Installation

One temporary-monitoring well, PAI-07-MW-04 (S), was installed at the site by a South Carolina licensed driller employed by Columbia Technologies. The well was installed using direct-push technology (DPT) equipment. Temporary well PAI-07-MW-04(S) was driven to a depth of 12 feet bgs within test pit location PAI-07-TP-02. Prior to installation, all downhole equipment was decontaminated in accordance with the Master Work Plan (B&R Environmental, 1998) and SI/CS Work Plan Addendum 1 (TtNUS, 1999b). Subsurface soil was not collected for lithologic characterization during the DPT event. Soil was collected for lithology and analytical characterization during test pitting procedures at PAI-07-TP-01 and PAI-07-TP-02. Once driven to depth, the DPT equipment was retracted in order to extend a 3-foot-long well screen. Moist soil was encountered at approximately 4 feet bgs. The DPT boring was abandoned after sampling in accordance with SCDHEC regulations. A thin bentonite grout was added within the DPT rods and then removed from the boring. The boring was grouted to surface.

5.3.3 Groundwater Sampling

Groundwater was sampled using low-flow sampling techniques in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan Addendum 1 (TtNUS, 1999b). A peristaltic pump and disposable tubing were used to collect groundwater samples from existing monitoring wells PAI7-2 and PAI7-3 and from the DPT temporary well point PAI-07-MW-04 (S). The tubing was lowered to the approximate midpoint of the groundwater column in the monitoring wells and the approximate midpoint of the DPT screen. Groundwater samples PAI7-GW2-02, PAI7-GW3-02, and PAI-07-GW-04-01 and duplicate sample PAI-07-04-01-D were collected after the required volume of water was purged. The groundwater sample from each well, with the exception of TCL VOCs, was collected by reducing the flow to minimize volatilization of the sample and by filling the appropriate containers directly from the tubing after the groundwater passed through the peristaltic pump tubing. The TCL VOC samples were collected by removing the tubing from the well and allowing the water in the tubing to flow under gravity backward into the sample container. The samples were then placed on ice. Groundwater samples PAI7-GW2-02, PAI7-GW3-01, PAI-07-GW-04-01, and PAI-07-GW-04-01-D were analyzed for TCL VOCs, TAL metals (total), cyanide, and groundwater quality field parameters. In addition, samples PAI-07-GW-04-01 and PAI-07-GW-04-01-D were analyzed for TCL SVOCs, pesticides/PCBs, tin, and selected Appendix IX parameters, as summarized in Table 5-1. The groundwater sample locations are shown in Figure 5-1.

Groundwater-quality field parameters, including temperature, pH, specific conductance, turbidity, dissolved oxygen, and salinity, were collected during purging of the wells. Table 5-2 summarizes these groundwater quality parameters. Groundwater low flow purge sheets and sample log sheets are included in Appendix C. As shown in Table 5-2, the pH of the groundwater at Site 7 varied from 3.91 (PAI-07-GW-04-01) to 5.80 (PAI7-GW2-02). The temperature of the groundwater samples varied from

19.2 (PAI-07-GW-04-01) to 21.3°C (PAI7-GW2-02). The specific conductance varied from 0.169 (PAI7-GW2-02) to 0.235 mS/cm (PAI-07-GW-04-01). The salinity readings for all the groundwater samples were 0.00 percent. The salinity readings indicate that the groundwater samples collected were fresh (fresh water is less than 0.048 percent salinity, as identified by SCDHEC; 1998). Dissolved oxygen readings varied from 1.33 to 1.62 mg/L. The wells were purged in an effort to reduce the turbidity to less than the benchmark of 5 NTUs. Due to the presence of fine-grained soil in the screened zones of well PAI-07-GW-04-01, reducing the well yield, the target turbidity level could not be reached. However, a turbidity level of 9 NTUs was obtained at this well before sampling. For the remainder of the samples, a turbidity level of less than 5 NTUs was obtained.

Water level measurements were taken during this investigation and updated in 2004 when an additional monitoring well was installed. An updated understanding of the potentiometric surface and groundwater flow direction is presented in Section 5.6.

5.4 2004 INVESTIGATION

The Navy presented the results of the 1999 investigation to the MCRD Parris Island Partnering Team as part of a Draft CS/SI report submitted in February 2001. To address regulatory comments made to this draft report, the Navy developed a Work Plan for additional field work at Site 7. In accordance with this Work Plan, TtNUS field personnel installed one permanent monitoring well downgradient of Site 7 groundwate flow. Additionally, groundwater samples were collected from the three exisiting wells and the new monitoring well for laboratory analsyis. A summary of these field activities is provided in the following sections.

5.4.1 2004 Monitoring Well Installation

In 1999, remnants of fuel contamination were found in one surficial monitoring well installed at Site 7. A cohesive, black-stained, silty sand consistent with historic fire training exercises was also observed at a depth of 3 to 4.5 feet bgs in this area. As a result, one shallow permanent monitoring well was installed approximately 50 feet downgradient of Site 7 to test for the presence of petroleum-related contamination. The location of this new monitoring well (PAI-07-MW-05) is shown on Figure 5-1. A summary of monitoring well construction details is shown on Table 5-2.

The permanent monitoring well was installed within the shallow surficial aquifer to a depth of 14 feet bgs. The monitoring well was constructed with a PVC 10-foot long well screen section with 0.010-inch slot openings screwed onto a PVC riser pipe. The well screen and riser pipe were lowered through the center of the hollow stem augers and No. 2 sand was placed around the well screen to a depth of at least one foot above the top of the well screen. A one foot thick, bentonite seal was placed above the sand pack to

a depth of one foot beneath the ground surface. The remainder of the well annulus was filled with concrete and a 3 foot by 3 foot by 6 inch thick concrete pad with a protective casing and barrier posts was placed around the well. A boring log and monitoring well construction sheet was completed for the monitoring well and is provided in Appendix C. The SCDHEC-approved monitoring well permit is also provided in Appendix C.

A licensed South Carolina driller employed by Gregg Drilling and Testing, Inc. of South Carolina installed the monitoring well. The monitoring well was developed after construction using a submersible pump. The submersible pump was surged during the development process to agitate and remove fine material from around the well screen. The purge water was collected and pumped into 55-gallon drums and labeled as IDW. Field parameters of temperature, pH, specific conductance, and turbidity were collected during development. Approximately 60 gallons of water was removed during development. Well development logs were completed during development and are provided in Appendix C.

5.4.2 2004 Groundwater Sampling

The three existing monitoring wells (PAI7-GW1, PAI7-GW2, and PAI7-GW3) and new monitoring well (PAI-07-MW-05) were subsequently sampled for laboratory analysis. Groundwater samples were collected and analyzed for VOCs, SVOCs, and inorganics to determine if elevated groundwater concentrations exist at the site and to verify that contamination has not migrated. Although a groundwater sample from monitoring well PAI-07-MW-04 was identified for collection in the Work Plan, no monitoring well with this designation exists at the site; the monitoring well ID is associated with a temporary monitoring well installed in 1999 that was subsequently abandoned. As a result, a groundwater sample was not collected from PAI-07-MW-04.

Groundwater was sampled using low-flow sampling techniques in accordance with the Master Work Plan (B&R Environmental, 1998) and the Work Plan Addendum (TtNUS, 2004). A peristaltic pump and disposable tubing were used to collect the groundwater samples from the monitoring wells. The tubing was lowered to the approximate midpoint of the groundwater column in the monitoring wells and the approximate midpoint of the well screen. Groundwater samples were collected after the required volume of water was purged. All groundwater samples were collected for TAL inorganics and tin. The collected samples were then placed on ice. Groundwater low flow purge sheets and sample log sheets are included in Appendix C.

Groundwater-quality field parameters including pH, specific conductance, temperature, dissolved oxygen, and salinity were collected during purging of the wells. Table 5-3 summarizes the groundwater-quality parameters collected at Site 7. The target turbidity goal of 5 to 10 NTU could not be met for the groundwater sample collected from monitoring well PAI-07-GW3.

5.5 SITE-SPECIFIC GEOLOGY/HYDROGEOLOGY

The site is located within the paved areas of the former Page Field and is within the 100-year flood zone, as indicated in the Master Work Plan (B&R Environmental, 1998). Both fill and natural unconsolidated materials were found beneath the site. Fill consisting of silty sand with rubble or black staining was found in isolated areas (Well PAI7-GW2, and Test Pits PAI-07-TP-01and 02) to depths of up to 4.5 feet beneath the ground surface. Undisturbed silt and sand mixtures underly the fill where present, and exist at the ground surface where nonexistent; The undisturbed silt and sand mixtures extended to a depth of 14 feet which was the maximum depth of the investigation effort.

Shallow groundwater was encountered at depths of less than 5 feet beneath the ground surface at the site, and as shallow as near the ground surface at the PAI-07-MW-05 location. The shallow groundwater flows somewhat radially in a northwest, north, and northeast direction. A potentiometric surface map is shown in Figure 5-2 and hydrogeologic cross sections are shown in Figures 5-3 and 5-4.

The aquifer of interest at Site 7 is the surficial aquifer. This aquifer is separated from the underlying regional Tertiary Floridan aquifer by the Hawthorn Formation, a confining unit that extends beneath Parris Island. The surficial aquifer at the base was previously used to provide the base domestic water. The surfical aquifer drains to on-site streams and tidal areas within the base. Therefore, contaminants within this unit would discharge to these site streams and tidal areas, which discharge to the Beaufort and Broad Rivers, which form Port Royal Sound.

5.6 SITE-SPECIFIC ECOLOGICAL SETTING

Most of the ground surface in the vicinity of the site is covered with concrete, since the area is within the Page Field apron. Two small, rectangular, thickly vegetated areas of wax myrtle (*Myrica cerifera*) are located near the site. Pine forests with shrubby understories are located beyond the edges of the concrete apron. There are no surface water bodies or wetlands near the site.

The pavement surrounding most of the former fire training pit precludes the use of the area by ecological receptors. The small unpaved areas are utilized, at least occasionally, by various birds and small mammals. The forested areas beyond the concrete apron are utilized by numerous wildlife species. No threatened or endangered species are expected to utilize the site or surrounding forested areas, due to lack of appropriate habitat. Similarly, there are no sensitive terrestrial or aquatic environments or resources at or near the site.

5.7 SI/CS AND HISTORIC ANALYTICAL RESULTS

This section discusses the analytical results of the SI/CS sampling conducted in December 1999. From test pit PAI-07-TP-02, a subsurface soil sample (PAI-07-SB-01-04) was collected in duplicate to determine whether contamination was present in Site 7 soil. Based on historic records, aerial photographs, and field observations, this sample was collected from the likely area of the former fire training pit. Also, TtNUS installed one temporary monitoring well (PAI-07-GW-04-01) at the location where the subsurface soil sample was collected. This temporary well and two existing permanent monitoring wells (PAI7-GW2 and PAI7-GW3) were sampled. Figure 5-2 presents the sample locations and analytical results.

5.7.1 Subsurface Soil

Table 5-4 summarizes positive detections of chemicals in the subsurface soil at Site 7. The table also provides a comparison of the detected concentrations to pertinent screening criteria [U.S. EPA Region 9 residential- and industrial-use scenario soil PRGs, SSLs for migration to groundwater (DAF 1) and migration to air, and U.S. EPA Region 4 soil ESVs]. Residential- and industrial-use PRGs are soil concentrations equal to the lower of the ILCR of 1.0E-06 or a HQ of 1.0 for noncarcinogenic risk under residential- and industrial-use scenarios.

Although the soil sample was collected from a location where stained soil and a PID reading of 107 ppm was observed, organic compounds were not detected in the subsurface soil sample. It is likely that over the course of 25 years since the unit was last operated, rainfall precipitation and microbial degradation have attenuated any organic compounds that were deposited in this area.

Most detected inorganic analytes were below or just slightly above background concentrations. Inorganics that were detected above background consist of aluminum, chromium, and selenium. Aluminum (average concentration of 7,710 mg/kg) exceeded its ESV (50 mg/kg), but only slightly exceeded established site background (7,270 mg/kg). Chromium was detected in the initial and duplicate sample at concentration of 6.3 mg/kg and 5.9 mg/kg. These concentrations exceed chromium's soil to groundwater screening value of 2 mg/kg and ESV of 0.4 mg/kg; however, the average concentration of this sample (6.1 mg/kg) is approximately equal to site background concentration of 6.2 mg/kg. The soil detection of selenium (2.3 mg/kg) exceeded a soil to groundwater screening criteria (0.3 mg/kg); however, selenium was only detected in groundwater in one of the three monitoring wells sampled and the detected concentration was below groundwater screening criteria. The selenium detection also slightly exceeded its ESV (0.81 mg/kg) and its background concentration (0.3 mg/kg). Vanadium (average concentration of 8.2 mg/kg) exceeded its ESV (2 mg/kg); however results for this sample did not exceed established site background (9.5 mg/kg). Inorganics are frequently incorporated into the soil matrix and remain bound to particulate matter.

In summary, organics were not detected in Site 7 soil and few inorganic concentrations exceeded soil screening criteria. Furthermore, detected inorganic concentrations that exceeded screening criteria are close to established background concentrations and did not exceed residential-use soil PRGs. Consequently, Site 7 soil will not be considered further.

5.7.2 Groundwater

Table 5-5 summarizes positive detections of chemicals in the shallow groundwater aquifer at Site 7. The table also provides a comparison of the detected concentrations to pertinent human health screening criteria (U.S. EPA Region 9 tapwater PRGs and federal MCLs/SMCLs). Tapwater PRGs consist of groundwater concentrations equal to the lower of the ILCR of 1.0E-06 or a HQ of 1.0 for noncarcinogenic risk under the potable water use scenario. Detected concentrations are also compared to U.S. EPA Region 4 surface water ESVs (fresh water). Based on the low salinity of Site 7 groundwater, freshwater ESVs were used for screening purposes. This ecological screening assumes that ecological receptors are exposed to the groundwater concentration of the chemical upon its discharge to surface water. However, this screening is a conservative comparison because it assumes that no dispersion of the chemical occurs during discharge to surface water and the nearest surface water body is approximately 2600 feet away.

Four monitoring wells were sampled during the 2004 sampling event. PAI7-GW1 (upgradient), PAI7-GW3 (downgradient), PAI7-GW2 (northeast sidegradient), and PAI-07-MW-05 (northwest sidegradient) monitoring well samples were analyzed for TCL VOCs, TCL SVOCs, and TAL metals. The PAI-07-MW-05 sample was also analyzed for tin.

No VOCs or SVOCs were detected in any of the samples, except for chlorobenzene (8 µg/L), a VOC in the PAI-07-MW-05 sample. However, the concentration of chlorobenzene was below any screening level for groundwater. During the 2004 sampling event there were no detections of certain VOCs (total xylenes or ethylbenzene) or PAHs (2-methylnapthalene or naphthalene) that were detected during a previous sampling event at the temporary monitoring well (PAI-07-MW-04), which was located within the suspected fire training pit area. The data indicates that compounds that may have been present in fuels associated with the historical fire-training activities have not migrated to downgradient or sidegradient areas of the site.

Xylenes and ethylbenzene are monocyclic aromatics and are not considered to be persistent in the environment. These compounds also have specific gravities less than water; therefore, would not be expected to migrate vertically in the water table. PAHs are considered to be fairly immobile chemicals in the environment and do not migrate vertically to a great extent. The previously detected organic

compounds in groundwater within the fire-training pit area are amenable to microbial degradation. Degradation groundwater half lives have been reported from 6 to 228 days for ethylbenzene, 2 weeks to 1 year for xylenes, and 1 to 258 days for naphthalene (Howard, 1991). Based on the previously detected low-level concentration of naphthalene in groundwater (the only organic compound to exceed a screening criterion), its concentrations would be well below screening criteria after a long duration of migration to the nearest surface water body.

Arsenic was detected above its tapwater PRG (0.045 µg/L) in the PAI7-GW3-01 and PAI-07-GW-05-01 samples and above the proposed MCL (10 µg/L) in the PAI-07-GW-05-01 sample. However, the PAI-07-GW-05-01 sample was collected from a sidegradient location whereas the PAI7-GW3-01 sample was collected from a directly downgradient location to the former fire-training pit area, and therefore, the arsenic detections are not related to the site. Iron was also detected above its tapwater PRG (11,000 µg/L) and its SMCL (300 µg/L); in both of these monitoring wells, however, it is likely to have been associated with the naturally occurring minerals present in the turbid samples that were collected from these locations, especially PAI7-GW3-01. Arsenic and iron are naturally occurring metals in soil and groundwater, therefore it is likely that these concentrations reflect the presence of chemicals that are not related to the releases that occurred at the site. Among the other inorganics that may be more pertinent to the site history, it is important to note that lead (typically associated with the combustion of leaded gasoline) was not detected in any of the samples, except at a minor exceedance of the EPA Region 4 freshwater screening level (1.3 µg/L) in the upgradient sample that was collected from PAI7-GW1-01. None of the other inorganics were detected at concentrations exceeding any screening level.

5.8 CONCLUSIONS/RECOMMENDATIONS

During test pitting operations, the source area of the former fire training pit was identified (as shown in Figure 5-1). Within this area, cohesive, black-stained, silty sand was observed at a depth of 3 to 4.5 feet bgs. A subsurface soil collected from this stained interval indicates that potential volatile or semivolatile remnants from past fire-fighting no longer exist. Inorganics were detected in soil at concentrations below or just above background levels. Petroleum contaminated soil will be excavated and disposed.

Previously detected fuel-related compounds at the site were not detected in any of the monitoring wells that were resampled during 2004, indicating that natural attenuation may be occurring. Any residuals within the fire-training pit area will undergo natural attenuation before migrating offsite, as indicated by the lack of any detections of VOCs and SVOCs in downgradient and sidegradient locations. Moreover, the nearest surface water body is sufficiently far downgradient of the site such that there is a minimal potential for any adverse impact to the environment. The inorganic chemicals present in the groundwater at the site are expected to be naturally occurring. The lack of site-related contamination in groundwater supports

a case for clean closure following the removal of visually-contaminated soil from the site and confirmation that buried fuel lines have been addressed at the site.

To address concerns about potential buried fuel lines, MCRD and the Navy provided the USEPA and SCDHEC access to Site 7 in order to determine if a potential existed for continuing release from a buried product supply pipe or tube. At the site, pointed out the burn area and approximate area where the above-ground liquid fuel source tanks would have been mounted. The Team discussed whether it seemed plausible that a buried pipe or tube ever existed, and if it did, whether it would have been large enough diameter to contain enough residual product to present a significant environmental concern. Following discussion at the site, Navy and MCRD contend that it seems more likely that a small-diameter tubing or hose was used, and that this was not necessarily buried.

TABLE 5-1

SUMMARY OF SUBSURFACE SOIL SAMPLES AND GROUNDWATER SAMPLES COLLECTED SITE 7 - FIRE TRAINING PIT PAGE FIELD MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample ID	Date Collected	Depth Collected (Feet)	Analysis
SUBSURFACE SOIL SAMPLES			
PAI-07-SB-01-04 PAI-07-SB-01-04-D	12/14/99	4 ft bgs	(1), (2), (3), (4), (5)
GROUNDWATER SAMPLES			
PAI7-GW2-02	12/14/99	Shallow surficial	(1), (4), (7)
PAI7-GW3-02	12/13/99	Shallow surficial	(1), (4), (7)
PAI-07-GW-04-01 PAI-07-GW-DU04-01	12/14/99	Shallow surficial Shallow surficial	(1), (2), (3), (4), (5), (6), (7) (1), (2), (3), (4), (5), (6)

PAI-07-GW-DU04-01 - Duplicate Sample
TCL - Target Compound List
TAL - Target Analyte List
PCBs - Polychlorinated Biphenyls

1 TCL VOCs
2 TCL SVOCs
3 TCL Pesticides/PCBs
4 TAL Metals (Total) and Cyanide
5 Tin
6 Appendix IX parameters consisting of:
Additional Appendix IX VOCs
Additional Appendix IX SVOCs
Additional Appendix IX Pesticides
Additional Appendix IX PCBs
Appendix IX Organophosphorus Pesticides
Appendix IX Herbicides
Appendix IX Nonhalogenated Volatiles (isobutyl alcohol, propionitrile acetonitrile, 1,4-dioxane, methacrylonitrile)
7 Field parameters - Dissolved Oxygen, Salinity, Temperature, pH, and Turbidity

TABLE 5-2

SUMMARY OF GROUNDWATER QUALITY PARAMETERS
COLLECTED DURING PURGING
SITE 7 – FIRE TRAINING PIT PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample Number	Temperature (°C)	pH	Specific Conductance (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (%)	Turbidity (NTU)
PAI7-GW2-02	21.3	5.80	0.169	1.37	0.00	0
PAI7-GW3-02	19.8	5.60	0.212	1.33	0.00	1
PAI-07-GW-04-01	19.2	3.91	0.235	1.62	0.00	9
PAI-07-GW-DU04-01	--	--	--	--	--	--

PAI-07-GW-DU04-01 – Duplicate sample
mS/cm - milliSiemens per centimeter
mg/L - milligram per liter
NTU - Nephlometric Turbidity Units

TABLE 5-3

WATER-LEVEL MEASUREMENTS
SITE 7 – FIRE TRAINING PIT PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA

Well Number	Date Measured	Measuring Point Elevation (ft. msl)	Depth to Water (ft. from TPVC)	Groundwater Elevation (ft. msl)
PAI7-1	-- 05/12/99	-- 13.60	-- 7.83	-- 5.77
PAI7-2	-- 05/12/99	-- 13.91	-- 8.05	-- 5.86
PAI7-3	-- 05/12/99	-- 13.08	-- 7.53	-- 5.55

PAI7-2 - well installed in shallow surficial aquifer
ft msl -feet above mean sea level
TPVC -top of polyvinyl chloride (PVC)

TABLE 5-4

MONITORING WELL SUMMARY
SITE 7 - FIRE TRAINING PIT PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA

WELL NUMBER	DATE OF INSTALLATION	GROUND SURFACE ELEVATION (ft msl)	TOP OF RISER (TOR) ELEVATION (ft msl)	DEPTH TO WATER (ft below TOR)	WATER LEVEL ELEVATION (ft msl)	TOTAL DEPTH (ft bgs)	SCREENED INTERVAL (ft bgs)
PAI7-GW1	2/27/88	9.33	12.49	4.80	7.69	13	3-13
PAI7-GW2	2/27/88	9.92	13.04	6.65	6.39	13	3-13
PAI7-GW3	2/27/88	9.45	12.37	6.10	6.27	13	3-13
PAI-07-MW-04	12/14/99	approx. 9	na	7.07	na	12	9-12
PAI-07-MW-05	9/8/04	6.44	8.22	1.97	6.25	13	3-13

bgs = Below ground surface
ft msl = Elevation in feet above mean sea level
All wells are permanent installations except PAI-07-MW-04 which was a temporary well installation.
All permanent wells were constructed of 2-inch diameter PVC screen and riser.
Water levels were collected on 9/10/04 except temporary well PAI-07-MW-04 which was collected on 12/14/99

TABLE 5-5

SUMMARY OF GROUNDWATER QUALITY PARAMETERS
COLLECTED DURING PURGING
SITE 7 – FIRE TRAINING PIT PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA

Monitoring Well	Date Sampled	Temperature (°C)	pH	Specific Conductance (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (%)	Turbidity (NTU)
PAI7-GW1	9/8/04	25.3	5.99	0.103	0.00	0.00	5
PAI7-GW2	9/9/04	23.5	5.58	0.188	0.00	0.01	9
PAI7-GW3	9/8/04	23.3	5.71	0.214	0.00	0.01	50
PAI-07-MW-05	9/8/04	26.5	5.34	0.177	5.39	0.01	2

mS/cm - milliSiemens per centimeter
mg/L - milligram per liter
NTU - Nephlometric Turbidity Units

TABLE 5-6

SUBSURFACE SOIL ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 7 - PAGE FIELD FIRE TRAINING PIT
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SAMPLE RESULTS		MCRD PI BACKGROUND/ TYPICAL FACILITY CONC.[2]	HUMAN HEALTH SCREENING CRITERIA			EPA REGION 4 ECOLOGICAL SOIL SCREENING
	PAI-07-SB-01-04[1]	PAI-07-SB-01-04-D[1]		RESIDENTIAL-USE SOIL PRGs[3]	SSLs MIGRATION TO AIR[4]	SSLs MIGRATION TO GW (DAF 1)[3]	
Inorganics (mg/kg)							
ALUMINUM	**7880**	**7540**	7270	76000	NA	NA	**50**
BARIUM	13.1 J	12.6 J	23.6	5400	69000	82	165
CALCIUM	1870	1720	766.3	NA	NA	NA	NA
CHROMIUM	**6.3**	5.9	6.2	210[6]	270[6]	**2[6]**	**0.4**
IRON	2350	2140	3920	23000	NA	NA	200
LEAD	8.3	7.1	12.5	400	NA	NA	50
MAGNESIUM	258 J	231 J	515	NA	NA	NA	NA
MANGANESE	7.1 J	5.3 J	128.5	1800	NA	NA	100
NICKEL	1.3	1.5	1.8	1600	13000	7	30
POTASSIUM	ND	135	312.7	NA	NA	NA	NA
SELENIUM	ND	**2.3**	0.3	390	NA	**0.3**	**0.81**
SODIUM	25	48	240.8	NA	NA	NA	NA
VANADIUM	8.5	7.9	9.5	550	NA	300	2
ZINC	3.1	2.5	9.7	23000	NA	620	50

Notes:

1 - Sampling Date: December 14, 1999.
2 - Tetra Tech NUS Inc., MCRD Parris Island Site 3 Remedial Investigation (RI)/RCRA Facilities Investigation (RFI), 1999c.
3 - U.S. EPA Region 9 Preliminary Remediation Goals, November 2000. (Cancer benchmark value = 1×10^{-6}, HI = 1.0).
4 - U.S. EPA Soil Screening Level Guidance: Technical Background Document. May, 1996.
5 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22, 1998.
6 - Value for total chromium.

Blackened cells indicate an exceedance of background concentrations and human health and/or ecological screening criteria.

ND = Nondetect
NA = Not Applicable/Not Available

TABLE 5-7

GROUNDWATER ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 7 - PAGE FIELD FIRE TRAINING PIT
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SAMPLE RESULTS				HUMAN HEALTH SCREENING CRITERIA		EPA REGION 4 SURFACE WATER ESVs[5]
	PAI-07-GW-04-01[1]	PAI-07-GW-04-01-D[1]	PAI7-GW2-02[1]	PAI7-GW3-02[2]	TAP WATER PRGs[3]	FEDERAL MCLs[4]	
Volatile Organic Compounds (µg/L)							
ETHYLBENZENE	1	1	ND	ND	1300	700	453
XYLENES, TOTAL	0.8	1	ND	ND	1400	10000	NA
Semivolatile Organic Compounds (µg/L)							
2-METHYLNAPHTHALENE	11	13	ND	ND	NA	NA	NA
NAPHTHALENE	**10**	**11**	ND	ND	**6.2**	NA	62
Inorganics (µg/L)							
ALUMINUM	**876 J**	**2850 J**	ND	ND	36000	**50-200 (SMCL)**	NA
ARSENIC	**10.2**	**14.5**	ND	ND	**0.045**	**10**	190
BARIUM	36.7	50.8	23.7	16.3	2600	2000	NA
CALCIUM	4850	4750	3310	12100	NA	NA	NA
CHROMIUM	1.7	7.5	ND	ND	110	100	117
IRON	**17700**	**18800**	ND	**14900**	**11000**	**300 (SMCL)**	NA
MAGNESIUM	6140	6220	1800	9940	NA	NA	NA
MANGANESE	**140**	**135**	ND	**127 J**	880	**50 (SMCL)**	NA
NICKEL	9.8	8	ND	ND	730	NA	38
POTASSIUM	1830	1940	2580	2710	NA	NA	NA
SELENIUM	ND	4	ND	ND	180	50	5
SODIUM	23800	23800	32500	6800	NA	NA	NA

Notes:

1 - Sampling Date: December 14, 1999.
2 - Sampling Date: December 13, 1999.
3 - U.S. EPA Region 9 Preliminary Remediation Goals, November 2000 (Cancer benchmark value = 1×10^{-6}, HI = 1.0).
4 - U.S. EPA Drinking Water Regulations and Health Advisories, Summer 2000.
5 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22, 1998.
(Cancer benchmark value = 1×10^{-6}, HI = 1.0.)

Blackened cells indicate an exceedance of human health screening criteria.

ND = Nondetect
NA = Not Applicable/Not Available
SMCL = Secondary MCL

TABLE 5-8

GROUNDWATER ANALYTICAL RESULTS - 2004 (POSITIVE DETECTIONS)
SITE 7 PAGE FIELD FIRE TRAINING PIT
MCRD PARRIS ISLAND, SOUTH CAROLINA

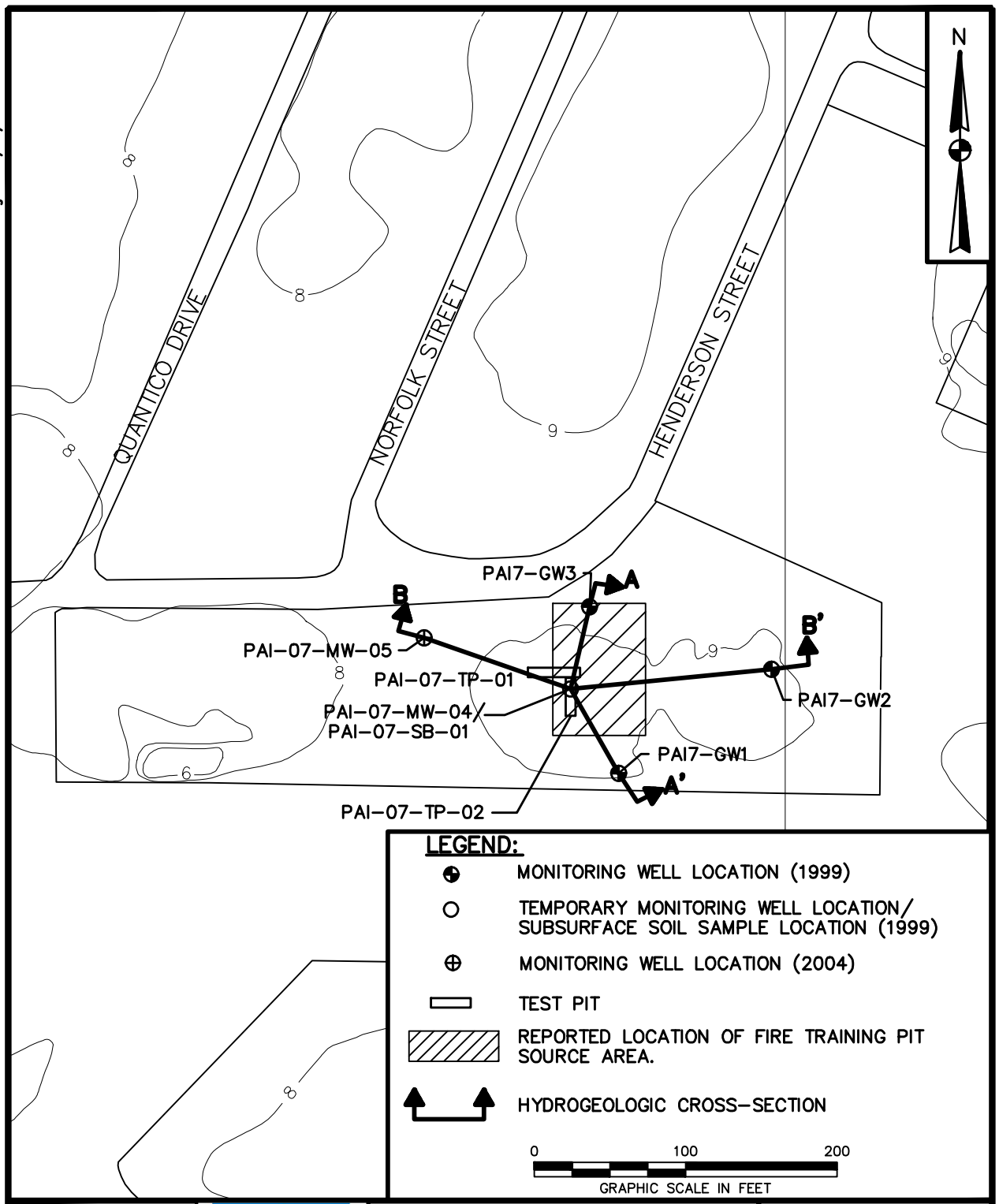
CONSTITUENT	SAMPLE RESULTS					HUMAN HEALTH SCREENING CRITERIA		EPA REGION 4 FRESHWATER SURFACE WATER ESVs (3)
	PAI7-GW1-01	PAI7-GW1-01-D	PAI7-GW2-02	PAI7-GW3-01	PAI-07-GW-05-01	TAP WATER PRGs (1)	FEDERAL MCLs (2)	
Volatile Organics (ug/L)								
CHLOROBENZENE	5U	5U	5U	5U	8	110	100	NA
Inorganics (ug/L)								
ARSENIC	3U	3U	3U	**7.4**	**26.5**	0.045	10	190
BARIUM	37.1	37.7	15.6	18.9	26.9	2600	2000	NA
CALCIUM	22200	22100	4600	14200	5290	NA	NA	NA
COPPER	**14.4**	**15**	1.9U	1.9 U	1.9U	1500	1300 (AL)	6.54
IRON	409U	402U	223U	**14800**	**4570**	11000	NA	1000 (NP)
LEAD	**4.5**	**4.4**	1.7U	1.7U	1.7U	NA	15 (AL)	1.32
MAGNESIUM	1420	1340	1210	10700	4720	NA	NA	NA
MANGANESE	34.9	35.2	15	145	73	880	NA	NA
POTASSIUM	1640U	1705U	1930U	3690	1580U	NA	NA	NA
SODIUM	2270	2380	39000	9450	24900	NA	NA	NA
ZINC	19.5	19.6	ND	ND	14.4	11000	NA	58.91

Notes:

1. U.S. EPA Region 9 Preliminary Remediation Goals, October 2004 (Cancer benchmark value= 1×10^{-6}, HI= 1.0)
2. U.S. EPA National Primary Drinking Water Regulations, July 2002.
3. Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion fo Stakeholders, U.S. EPA Region 4, June 23, 2004.

Shaded cell indicates concentration exceeds or more criteria
NA= Not Available
U= Not detected at the detection limit as noted
NP= Non Priority Pollutant
AL= Action Level

ACAD: 0095GM07.dwg 05/10/05 HJB PIT



LEGEND:

- MONITORING WELL LOCATION (1999)
- TEMPORARY MONITORING WELL LOCATION/ SUBSURFACE SOIL SAMPLE LOCATION (1999)
- MONITORING WELL LOCATION (2004)
- TEST PIT
- REPORTED LOCATION OF FIRE TRAINING PIT SOURCE AREA.
- HYDROGEOLOGIC CROSS-SECTION

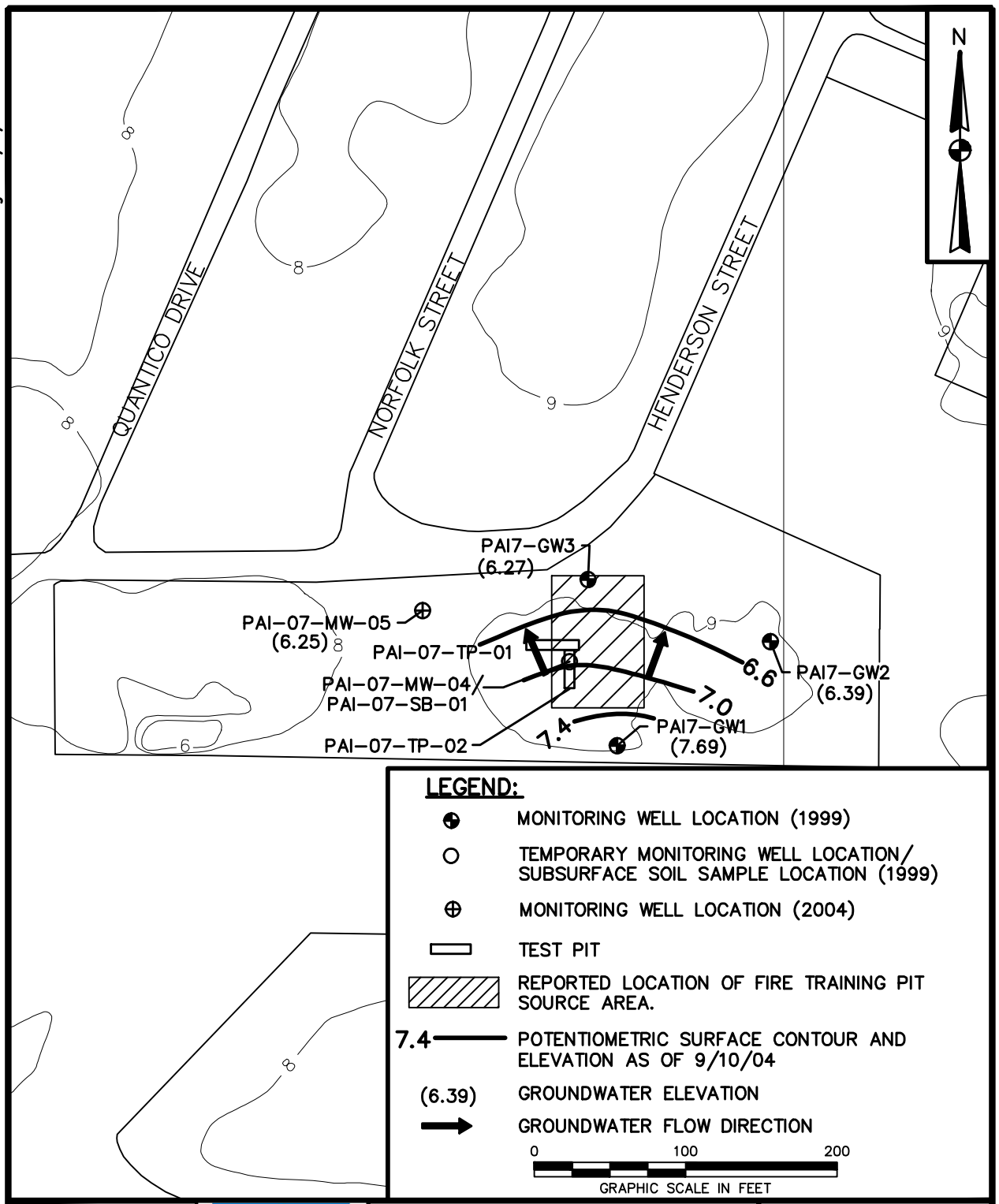
0 100 200
GRAPHIC SCALE IN FEET

DRAWN BY HJB	DATE 4/26/05	SITE/SWMU 7 CROSS SECTION LOCATION MAP PAGE FIELD FIRE TRAINING PIT MCRD PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 5-1 / REV. 0

NAVFAC

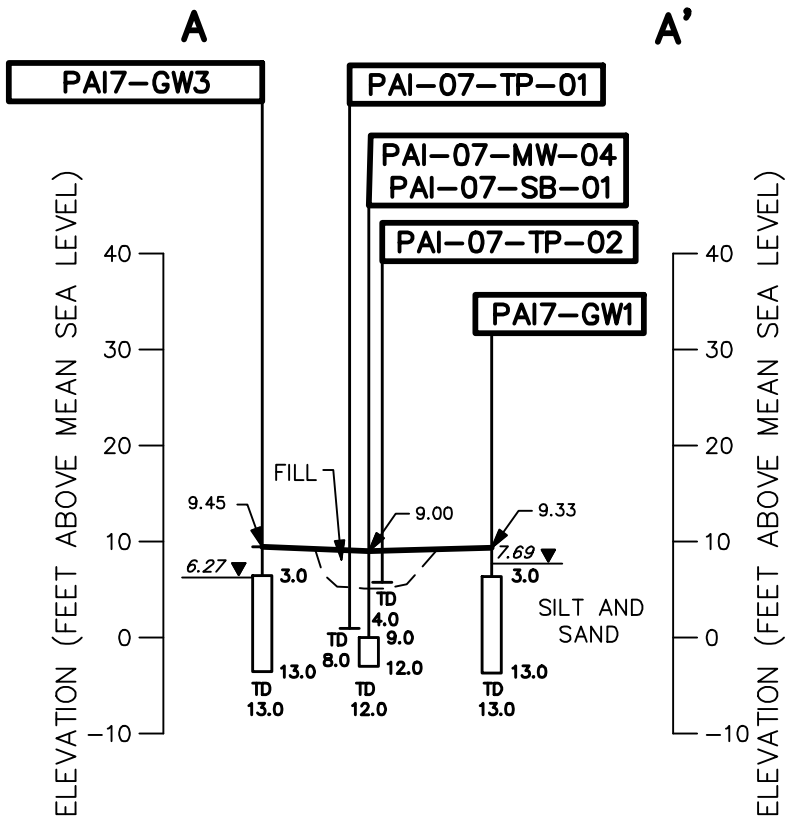
FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98

ACAD: 0095GM08.dwg 05/11/05 HJB PIT



DRAWN BY HJB DATE 4/26/05	NAVFAC	SITE/SWMU 7 POTENTIOMETRIC SURFACE MAP PAGE FIELD FIRE TRAINING PIT MCRD PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095
CHECKED BY DATE			OWNER NO. 0000
REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 5-2 REV. 0

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98



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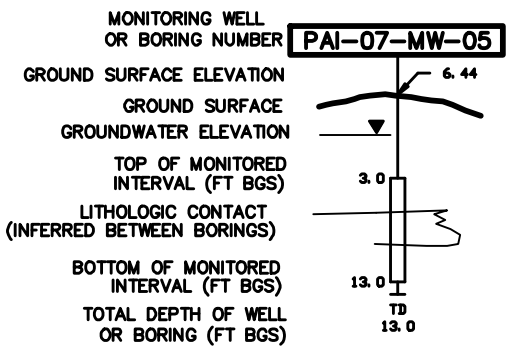

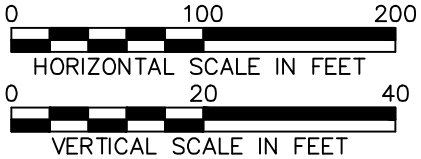

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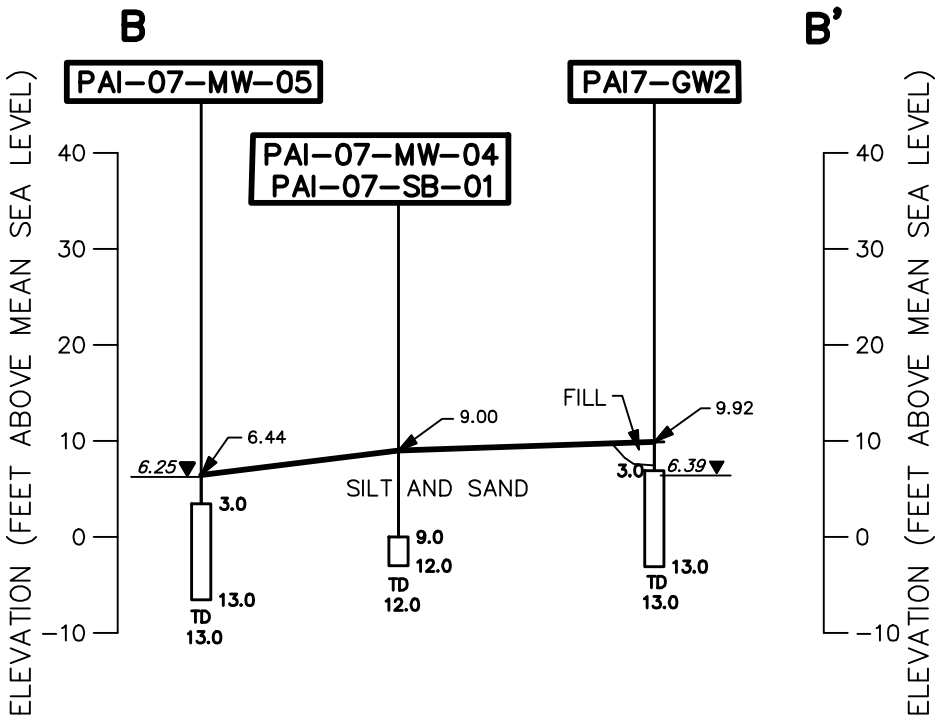

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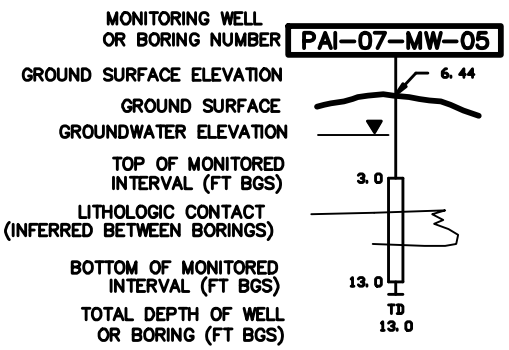

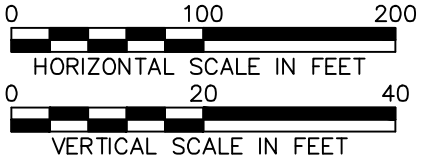

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CHECKED BY DATE	SITE/SWMU 7 GELOGICAL CROSS SECTION B–B' PAGE FIELD FIRE TRAINING PIT MCRD PARRIS ISLAND, SOUTH CAROLINA	OWNER NO. 0000	
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6.0 SITE 9 – PAINT WASTE STORAGE AREA AND SITE 16 - PESTICIDE RINSATE DISPOSAL AREA

6.1 SITE DESCRIPTION

Site 9, the former Paint Waste Storage Area, was utilized from 1969 to 1984 to store wastes from the Paint Shop. At this time, the area was a 20-foot by 60-foot, unpaved site and was located in the northwestern corner of Parris Island, between Quonset Hut N277 and Building 895. The wastes were stored in 55-gallon and 330-gallon drums used for paint waste storage. The layout of Site 9 is depicted in Figure 6-1.

While Site 9 was active, personnel from the Paint Shop placed liquid paint wastes and paint strippers in the storage drums. The paint wastes generally consisted of mineral spirits, kerosene, and diesel fuels and the paint strippers were likely methylene chloride. The wastes were accumulated in the drums, and the drums were periodically transported to a waste oil facility and the contents discharged into an underground storage tank. This practice continued until 1978, when a contractor began to dispose of the wastes at an off-base incinerator site.

During the period between 1969 and 1984, an unknown amount of paint wastes may have been spilled at the storage area. In 1984, a site cleanup was performed, and 6 inches of surface soil were removed and the area was covered by a concrete pad. Since 1984, wastes have not been stored at this site (NEESA, 1986).

At Site 16, rinsewaters from pest control spray application containers and equipment were disposed of on a grassy area located between Quonset Huts N282 and N277 from 1950 to 1977. During this time, the site received an estimated 5 to 10 gallons per week of pesticide rinsate. The disposal area was approximately 6 feet by 25 feet. Pesticides used at the Depot during this period included: aldrin, baygon, chlordane, dursban, malathion, naled, and DDT. Assuming a disposal rate of 250 to 400 gallons per year from 1950 to 1977, an estimated 8,000 gallons of rinsate were disposed of at Site 16.

Sites 9 and 16 are located in an industrial portion of the Depot. The nearest resident lives approximately 2,000 feet south-southwest of these sites. There are no day care facilities or schools within 200 feet of the sites.

6.2 PREVIOUS INVESTIGATIONS

Previous investigations at Site 9 include the IAS, Interim RFA, and Navy site ranking efforts. Previous investigations at Site 16 include the IAS, RI, VS, and Interim RFA. A brief description of each previous investigation is presented below.

6.2.1 Initial Assessment Study

In 1986, NEESA conducted an IAS (NEESA, 1986) under the NACIP Program. The IAS is equivalent to the PA phase of the CERCLA process. The purpose of the IAS (Phase I of the NACIP Program) was to identify potentially contaminated sites at MCRD Parris Island that may pose a threat to human health or the environment.

In the IAS, NEESA determined that, due to remedial action already performed in 1984, further action at Site 9 was unnecessary.

The IAS recommended Site 16 for further evaluation due to the potential for contaminant migration. Soils beneath the site are mostly sand with the high ground water table being at a depth of approximately 6 feet bgs. Because a marsh is located 700 feet to the northeast of the site, the IAS concluded that the site is within the zone of tidal influence which causes groundwater level fluctuations. This tidal action, high permeability sandy soil, and shallow water table would allow for contamination migration from this site.

6.2.2 RI VS

In February 1988, McClelland Consultants conducted an RI VS of various sites at MCRD Parris Island. Site 16 was included in the investigation based on the results of the IAS.

At Site 16, three soil borings (PAI16-SB1 to PAI16-SB3) were advanced at the locations shown on Figure 6-1. The soil borings were sampled continuously and each drilled to less than 10 feet bgs where a tight clay confining layer was encountered. Soil samples were collected at each boring and submitted to the laboratory for analyses of priority pollutant pesticides and for total metals arsenic, cadmium, chromium, and lead. All soil samples were collected from a depth of 3 feet bgs.

The results of the chemical analyses indicated that a total lead concentration of 8.4 mg/kg was present in the sample submitted from boring PAI16-SB1. In this same soil sample, the pesticide 4,4'-DDT, along with its degradation products 4,4'-DDE and 4,4'-DDD were identified at concentrations of 1,380 µg/kg, 421 µg/kg, and 486 µg/kg, respectively. No other priority pollutant pesticides or total metals arsenic, cadmium, chromium, and lead were detected in the other soil borings.

Based on these data, the RI VS recommended Site 16 for further evaluation to determine the depth and extent of the DDT and DDT degradation products present in the subsurface soils at this site. Additionally, an evaluation of the groundwater was recommended to determine whether the groundwater quality has been affected in the vicinity of Site 16.

6.2.3 Interim RCRA Facility Assessment

In January 1990, A.T. Kearney conducted a file review of the MCRD Parris Island facility and, in February of that same year, conducted a VSI of the facility, culminating in an Interim RFA report. Sites 9 and 16 were included in the investigation. Based on a review of past publications, they concluded that prior remediation at Site 9 adequately addressed site concerns and recommended no further action. For Site 16, the RFA recommended an RFI based on previous detections of 4,4'-DDT and its degradation products in the soil of the site.

6.2.4 Relative Site Ranking

In 1995, B&R Environmental conducted sampling and analysis at MCRD Parris Island for the Navy's relative site ranking efforts. During this effort, three soil samples were collected at Site 9, each at an approximate depth of 6 inches. The first sample [PAI-009-01(32)] was collected under the concrete pad. A second sample [PAI-009-02(33)] was collected directly along the eastern edge of the pavement due to a small amount of staining observed at this location, as well as the grade of the pad, which allowed runoff to accumulate at this point. A third sample [PAI-009-03(34)] was collected from a small drainage swale on the southeastern corner of the pad. The locations of these samples are depicted in Figure 6-1.

All samples were tested for TCL VOCs, SVOCs, PCBs, TAL metals, pesticides, and cyanide. The results of the analyses, as well as the SI/CS results, are discussed in Section 6.6.

6.3 1999 INVESTIGATION

The SI/CS field investigation at Site 9 was conducted in December 1999. Two temporary monitoring wells, PAI-09-MW-01(S) and PAI-09-MW-02(S), were installed and sampled. Two groundwater samples, PAI-09-GW-01-01 and PAI-09-GW-02-01, were collected. Information obtained during the investigation was used to supplement existing information regarding Site 9. The sample locations are shown in Figure 6-1. The following sections discuss the activities conducted during the field investigation at Site 9.

6.3.1 Temporary Monitoring Well Installation

Two temporary monitoring wells, PAI-09-MW-01(S) and PAI-09-MW-02(S), were installed at the site by a South Carolina licensed driller employed by Columbia Technologies in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan (TtNUS, 1999a). One well was placed in a potential upgradient location (PI-09-GW-01), and the other well was placed in a potential downgradient location (PI-09-GW-02). The wells were installed using DPT equipment to a depth of 12 feet bgs. Subsurface soil was collected for lithologic characterization and scanned with a PID for the presence of organic vapors. Once driven to depth, the DPT equipment was removed from the borings and 3/4-inch PVC well material, consisting of riser and 5-foot screen sections, was installed in the borings. Groundwater was encountered approximately 4.5 feet bgs in well PAI-09-MW-01(S) and 8 feet bgs in well PAI-09-MW-02(S). The DPT borings were abandoned after sampling, in accordance with SCDHEC regulations. A thin bentonite grout was added through the PVC pipe as the well material was removed from the boring. The boring was grouted to the surface.

6.3.2 Groundwater Sampling

Groundwater was sampled using low flow sampling techniques in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan (TtNUS, 1999a). A peristaltic pump and disposable tubing were used to collect groundwater samples from the DPT temporary monitoring wells PAI-09-MW-01(S) and PAI-09-MW-02(S). The tubing was lowered to the approximate midpoint of the well screen and the wells were purged of the required volume of water. The groundwater sample from each well, with the exception of TCL VOCs, was collected by reducing the flow to minimize volatilization of the sample and by filling the appropriate containers directly from the tubing after the tubing passed through the peristaltic pump. The TCL VOC samples were collected by removing the tubing from the well and allowing the water in the tubing to flow under gravity backward through the tubing into the sample container. The samples were then placed on ice. Groundwater samples PAI-09-GW-01-01 and PAI-09-GW-02-01 were analyzed for TCL VOCs, TAL metals (total), cyanide, and groundwater quality field parameters. In addition, PAI-09-GW-01-01 was analyzed for additional Appendix IX volatiles and tin. Analytical parameters for each sample are summarized in Table 6-1. The groundwater sample locations are shown in Figure 6-1.

Groundwater-quality field parameters, including temperature, pH, specific conductance, turbidity, dissolved oxygen, and salinity, were collected during purging of the wells. Table 6-2 summarizes these groundwater-quality parameters. Groundwater low flow purge sheets and sample log sheets are included in Appendix C. As indicated in Table 6-2, the pH of the groundwater for wells PAI-09-GW-01-01and PAI-09-GW-02-01 was 7.01 and 7.04, respectively. The temperature of the groundwater samples PAI-09-GW-01-01 and PAI-09-GW-02-01 was 19.3 and 20.6 ^{o}C, respectively. The specific conductance

for wells PAI-09-GW-01-01 and PAI-09-GW-02-01 was 0.202 and 0.187 mS/cm, respectively. The salinity reading for both groundwater samples was 0.00 percent. The salinity readings indicate that the groundwater samples collected were fresh (fresh water is less than 0.048 percent salinity, as identified by SCDHEC; 1998). Dissolved oxygen readings varied from 2.26 to 5.16 mg/L. The wells were purged in an effort to reduce the turbidity to less than the benchmark of 5 NTUs. Due to the presence of fine-grained soil in the screened zones of well PAI-09-GW-01-01, the target turbidity level could not be reached. However, a turbidity level of 8 NTUs was recorded before sampling. For sample PAI-09-GW-02-01, a turbidity level of 1 NTU was recorded.

6.4 SITE-SPECIFIC GEOLOGY/HYDROGEOLOGY

The sites are located within the paved and grassy areas of the current maintenance facility compound. The sites are within the 100-year flood zone, as indicated in the Master Work Plan (B&R Environmental, 1998). Groundwater flow within the vicinity of Sites 9 and 16 is expected to be to the north-northeast towards an unnamed tributary of Archers Creek. Subsurface soil samples were collected from the temporary well borings for lithologic classification. The soil at PAI-09-MW-01(S) consisted of sand to a depth of 6 feet bgs. Clay was encountered at a depth of 6 to 8 feet bgs. No soil sample was recovered from 8 to 12 feet bgs. Similar lithology was also observed in the three soil borings installed at Site 16. At well PAI-09-MW-02(S), concrete, base gravels, and sands were encountered to a depth of 2 feet bgs. From 2 to 12 feet bgs, sand was encountered. Groundwater samples from the site exhibited salinity readings indicative of fresh water. Recharge to the groundwater in this area is through precipitation. Topography in the area gently slopes to the southwest away from the site to the north, south, and west.

The aquifer of interest at Sites 9 and 16 is the surficial aquifer. This aquifer is separated from the underlying regional Tertiary Floridan aquifer by the Hawthorn Formation, a confining unit that extends beneath Parris Island. The surficial aquifer at the base was previously used to provide the base domestic water. The surfical aquifer drains to on-site streams and tidal areas within the base. Therefore, contaminants within this unit would discharge to these site streams and tidal areas, which ultimately discharge to the Beaufort and Broad Rivers which form Port Royal Sound.

6.5 SITE-SPECIFIC ECOLOGICAL SETTING

The site is located within an industrialized area of the Depot. Terrestrial habitat on and near the site is limited to structures, roads, pavement, gravel, and turf grass. Ecological receptors that utilize the lawns surrounding the site are limited to a few species of invertebrates, lizards, and birds that are typically found in urban areas. Because of the industrial character of the area, there are no sensitive terrestrial environments or resources at or near the site. There are no surface water bodies or wetlands near the

site. The nearest surface water body is approximately 700 feet north-northeast of the sites, where a tributary of Archer's Creek is located.

6.6 SI/CS AND HISTORIC ANALYTICAL RESULTS

This section discusses the results of the relative site ranking investigation conducted in December 1995 and the SI/CS conducted in December 1999. During the relative site ranking, B&R Environmental collected three soil samples. During the SI/CS, TtNUS installed and sampled two groundwater monitoring wells. Figure 6-2 presents the sample locations and analytical results.

6.6.1 Surface Soil

Three surface soil samples [PI-009-01(32), PI-009-02(33) and PI-009-03(34)] were collected at Site 9 during the Navy's relative site ranking investigation. All samples were tested for TCL VOCs, SVOCs, and pesticides/PCBs and TAL metals. Table 6-3 presents the analytical results. The table also provides a comparison of the detected concentrations to pertinent screening criteria [U.S. EPA Region 9 residential-use scenario soil PRGs, SSLs for migration to groundwater (DAF 1) and migration to air, and U.S. EPA Region 4 soil ESVs]. Residential-use PRGs are soil concentrations equal to the lower of the ILCR of 1.0E-06 or a HQ of 1.0 for noncarcinogenic risk under residential-use scenarios.

6.6.1.1 VOCs

Three VOCs were detected in the soil samples at Site 9. Tetrachloroethene (PCE) was detected in two samples, with a concentration of 2 µg/kg at both locations. This concentration did not exceed human health or ecological criteria. Two other VOCs, carbon tetrachloride (6 J µg/kg) and chloroform (11 µg/kg), were found at one soil location [PI-009-02(33)]. The chloroform detection exceeded its soil ESV of 1 µg/kg. In addition, the carbon tetrachloride detection exceeded the soil to groundwater screening value of 3 µg/kg. As discussed in Section 4.6.1.1, the detections of carbon tetrachloride and chloroform may be laboratory or field artifacts. Furthermore, these VOCs were not detected in the two groundwater samples collected at Site 9.

VOCs are typically considered to be fairly soluble and have a low capacity for retention by organic carbon in soil. VOCs may migrate through the soil column as infiltrating precipitation solubilizes them. Migration occurs primarily laterally with the hydraulic gradient while some portion of the chemical may be retained by the saturated soil. Once in Site 9 groundwater, VOCs would be expected to migrate north to the surface water and sediment of an unnamed tributary of Archers Creek and the Beaufort River.

VOCs were detected at low-level concentrations in soil. Additionally, two of the three detected VOCs may be attributable to field or laboratory contaminants in soil. Lastly, VOCs were not detected in Site 9 groundwater. Consequently, VOCs in soil will not be considered further.

6.6.1.2 SVOCs

Twelve SVOCs were detected at Site 9. Of these SVOCs, 10 were PAHs. The PAHs consist of (maximum concentration in parenthesis) benzo(a)anthracene (310 µg/kg), benzo(a)pyrene (580 µg/kg), benzo(b)fluoranthene (610 µg/kg), benzo(g,h,i)perylene (380 µg/kg), benzo(k)fluoranthene (560 µg/kg), chrysene (420 µg/kg), fluoranthene (300 µg/kg), indeno(1,2,3-cd)pyrene (470 µg/kg), phenanthrene (53 µg/kg), and pyrene (460 µg/kg).

Only the benzo(a)pyrene detection at PI-009-02(33) (310 J µg/kg) exceeded a residential-use soil PRG (62 and 290 µg/kg, respectively). Detections of benzo(a)pyrene, fluoranthene, and pyrene also exceeded ESVs with maximum HQs of 5.8, 3, and 4.6 corresponding to soil location PI-009-02(33). SSL migration to groundwater screening values were also exceeded by detections of benzo(a)anthracene (HQ = 3.9), benzo(a)pyrene (HQ = 1.5), and benzo(b)fluoranthene (HQ = 3.1).

With the exception of phenanthrene, the maximum concentration of all PAHs occurred at PI-009-02(33) (located adjacent to Boki Street). PAHs were also observed in sample PI-009-03(34) (located adjacent to Atsugi Street). Automobile exhaust has been reported as a source of PAHs in roadways in several studies (Takada, et. al., 1991, Bradley, et. al., 1994, and Benfenati, et. al., 1992). Runoff from Boki and Atsugi Street are a likely source of PAHs at Site 9. PAHs were not observed in sample PI-009-01-32 (located underneath the concrete pad).

It is possible that PAHs in soil may bind to soil and be transported via mass transport mechanisms than to go into solution. At Site 9, erosion of soil to the Depot's storm sewer collection system would be expected to be a primary transport mechanism. PAHs are amenable to microbial degradation in soil; however, continued deposition of PAHs from the adjacent roadway would likely occur. Soil degradation half lives have been reported from 102 days to 1.86 years for benzo(a)anthracene, 57 days to 1.45 years for benzo(a)pyrene, 1 to 1.67 years for benzo(b)fluoranthene, 140 to 440 days for fluoranthene, and 210 days to 5.2 years for pyrene.

Two other SVOCs, pentachlorophenol (23 µg/kg) and carbazole (34 µg/kg), were detected at PI-009-01(32) and PI-009-03(34), respectively. Both detections exceeded soil to groundwater screening criterion (1 µg/kg for pentachlorophenol and 30 µg/kg for carbazole). The pentachlorophenol detection also exceeded its ESV of 2 µg/kg. Pentchlorophenol is not a paint-related waste; however, was once one of the most heavily used pesticides in the United States. Adsorption decreases in neutral and basic soils;

therefore, the compound is most mobile in these soil conditions. Biodegradation is a significant process (ATSDR, 1992) and soil biodegradation rates have been reported from 23 to 178 days. Carbazole has been identified in mainstream cigarette smoke (100 ug/100 cigarettes), crude oils and coal tar (National Toxicity Program, 2001).

SVOCs, predominantly PAHs, were found in the soil samples collected from Site 9. However, the detected SVOCs are not constituents associated with paint-waste activities. PAHs are likely associated with runoff from the roads and motor vehicles adjacent to Site 9. Consequently, SVOCs in soil will not be considered further.

6.6.1.3 Pesticides/PCBs

At Site 9, four pesticides (4,4'-DDE, 4,4'-DDT, alpha-chlordane, and gamma-chlordane) were detected in soil. 4,4'-DDT and its breakdown product, 4,4'-DDE, were detected in all three samples with maximum concentrations at PI-009-03(34) of 4,200 µg/kg and 2,300 µg/kg, respectively. Both compounds exceeded the 4,4'-DDE and 4,4'-DDT ESV of 2.5 µg/kg at all three locations. The 4'-DDE and 4,4'-DDT detections at PI-009-03(34) also exceeded the residential-use soil PRG of 1,700 µg/kg. The maximum concentration of 4,4'-DDT also exceeded the soil to groundwater screening criterion of 2,000 µg/kg. Alpha-chlordane and gamma-chlordane was detected below human health and ecological screening values. The presence of pesticides are likely attributable to prior activity at Site 16 (Pesticide Rinsate Disposal Area).

One PCB, Aroclor-1260 (810 µg/kg), was detected in the soil at sampling location PI-009-02(33). This concentration exceeded the ESV of 20 µg/kg and residential-use soil PRG of 320 µg/kg. The detections of Aroclor-1260 and pesticides may present potential risks to terrestrial plants, soil invertebrates, and residential receptors; however, these concentrations do not represent a human health threat under current industrial land-use of the site.

4,4'-DDT, 4,4'-DDE, and Aroclor-1260 are considered to be persistent chemicals and would be expected to remain for an extended period of time. Degradation soil half lives have been reported from 2 to 15.6 years for 4,4'-DDE and 4,4'-DDT (Howard, 1991). They undergo extensive adsorption to soil and are not highly soluble. At Site 9, runoff can carry these chemicals to the Depot's storm sewer collection system.

6.6.1.4 Inorganics

Eighteen TAL metals (excluding the macronutrients calcium, magnesium, potassium, and sodium) were detected in the soil of Site 9. All but aluminum were detected above established soil background

concentrations in one or more of the three soil samples. The inorganic detections found above background are presented in Figure 6-2.

Only detections of arsenic (maximum concentration of 8.4 mg/kg) and lead (maximum concentration of 826 mg/kg) exceeded a residential-use soil PRG. Residential-use PRGs are 0.39 mg/kg for arsenic and 400 mg/kg for lead. No other compound exceeded a residential-use soil PRG.

Antimony, arsenic, barium, beryllium, cadmium, chromium, lead, nickel, selenium, and zinc were detected in soil above soil to groundwater migration screening values; however, none of these inorganics analytes were detected in Site 9 groundwater above a groundwater screening criteria.

Detections of 14 inorganic analytes exceeded ESVs. HQs for maximum detected concentrations are antimony (1.3), beryllium (3.4), cadmium (1.9), chromium (263), cobalt (1.2), copper (15.4), iron (83.5), lead (16.5), manganese (1.8), mercury (4.0), nickel (8.4), selenium (1.1), vanadium (6.5), and zinc (69.8). However, potential ecological risks likely do not exist from these compounds given the industrial setting and limited available habitat at Site 9. Furthermore, except for mercury, inorganics do not biomagnify in the food chain; therefore, effects to upper food-chain receptors are unlikely. Inorganics will not be considered further for soil.

6.6.2 Groundwater

Two temporary monitoring wells were installed and sampled by TtNUS in December 1999 to determine whether paint storage activities had adversely affected the groundwater of Site 9. Table 6-4 presents the analytical results and Figure 6-1 identifies the sample locations. Table 6-4 also provides a comparison of the detected concentrations to pertinent human health screening criteria (U.S. EPA Region 9 tapwater PRGs and federal MCLs/SMCLs). Tapwater PRGs consist of groundwater concentrations equal to the lower of the ILCR of 1.0E-06 or a HQ of 1.0 for noncarcinogenic risk under the potable water use scenario. Detected concentrations are also compared to U.S. EPA Region 4 surface water ESVs (fresh water). Based on the low salinity of Site 9 groundwater, freshwater ESVs were used for screening purposes. This ecological screening assumes that ecological receptors are exposed to the groundwater concentration of the chemical upon its discharge to surface water. However, this screening is a conservative comparison because it assumes that no dispersion of the chemical occurs during discharge to surface water.

The groundwater samples were analyzed for VOCs and inorganic (fractions that are associated with paint-type wastes). VOCs were not detected at either monitoring well location.

Four TAL metals (excluding the macronutrients calcium, magnesium, potassium, and sodium) were detected in the surficial aquifer at Site 9. Of these inorganics (aluminum, antimony, barium, and chromium), only aluminum at a concentration of 369 J µg/L exceeded a screening criterion (SMCL of 200 µg/L).

Site 9 groundwater analytical results indicate that past paint storage activities have not impacted the groundwater of Site 9. Consequently, groundwater will not be considered further.

6.7 CONCLUSIONS/RECOMMENDATIONS

In the three surface soil samples collected at Site 9, three VOCs, 12 SVOCs, four pesticides, and one PCB were detected. Of these detections, carbon tetrachloride, chloroform, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, carbazole, fluoranthene, pentachlorophenol, pyrene, 4,4'-DDE, 4,4'-DDT, and Aroclor-1260 were detected above the most stringent human health and/or ecological screening criteria. Additionally, of the 18 inorganics detected (excluding macronutrients), most were found at concentrations above background values and a human health and/or ecological screening criterion.

The exceedances were primarily found in soil sample PI-009-02(33), located on the eastern side of Building 895, and to a lesser extent in PI-009-03(34), at the southeastern corner of the building. Soil sample PI-009-01(32) is currently covered with concrete and contained the fewest criteria exceedances.

No VOCs were detected in groundwater. Of the 8 inorganics detected in groundwater, only one detection of aluminum exceeded a screening criterion (SMCL).

To support clean closure of the site, the following activities are recommended:

- An Extended SI followed by a Focused FS will be completed for Sites 9 and 16.
- Sites 9 and 16 would be jointly excavated and the contaminated soils disposed.
- Installation of three piezometers to determine groundwater flow direction, and for determination of whether pesticides had impacted groundwater.

Issues at Sites 9 and 16 may be addressed based on the sampling results from nearby Site 55 (Fiber Optic Vault).

TABLE 6-1

SUMMARY OF GROUNDWATER SAMPLES COLLECTED
SITE 9 – PAINT WASTE STORAGE AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample ID	Date Collected	Media	Depth Collected (Feet)	Analysis
PAI-09-GW-01-01	1999	Groundwater	Shallow surficial	(1), (2), (3), (4), (5)
PAI-09-GW-02-01	1999	Groundwater	Shallow surficial	(1), (2), (5),

TCL - Target Compound List TAL - Target Analyte List

1 TCL VOCs
2 TAL Metals (Total) and Cyanide
3 Tin
4 Additional Appendix IX VOCs
5 Field parameters - Dissolved Oxygen, Salinity, Temperature, pH, and Turbidity

TABLE 6-2

SUMMARY OF GROUNDWATER-QUALITY PARAMETERS COLLECTED DURING PURGING SITE 9 – PAINT WASTE STORAGE AREA MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample Number	Temperature (°C)	pH	Specific Conductance (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (%)	Turbidity (NTU)
PAI-09-GW-01-01	19.3	7.01	0.202	2.26	0.00	8
PAI-09-GW-02-01	20.6	7.04	0.187	5.16	0.00	1

mS/cm - milliSiemens per centimeter
mg/L - milligram per Liter
NTU - Nephlometric Turbidity Units

TABLE 6-3

SURFACE SOIL ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 9 - FORMER PAINT WASTE STORAGE AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SOIL SAMPLE RESULTS			ESTABLISHED MCRD PI BACKGROUND VALUES[2]	HUMAN HEALTH SCREENING CRITERIA			EPA REGION 4 ECOLOGICAL SOIL SCREENING
	PI-009-01(32)[1]	PI-009-02(33)[1]	PI-009-03(34)[1]		RESIDENTIAL-USE SOIL PRGs[3]	SSLs MIGRATION TO AIR[4]	SSLs MIGRATION TO GW (DAF 1)[3]	
Volatile Organic Compounds (µg/kg)								
CARBON TETRACHLORIDE	ND	**6 J**	ND	NA	240	300	**3**	1000000
CHLOROFORM	ND	**11**	ND	NA	240	300	30	**1**
TETRACHLOROETHENE	ND	2 J	2 J	NA	5700	11000	3	10
Semivolatile Organic Compounds (µg/kg)								
BENZO(A)ANTHRACENE	ND	**310 J**	44 J	NA	620	NA	**80**	NA
BENZO(A)PYRENE	ND	**580**	38 J	NA	**62**	NA	**400**	**100**
BENZO(B)FLUORANTHENE	ND	**610**	52 J	NA	620	NA	**200**	NA
BENZO(G,H,I)PERYLENE	ND	380	ND	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	ND	560	40 J	NA	6200	NA	2000	NA
CARBAZOLE	ND	ND	**34 J**	NA	24000	NA	**30**	NA
CHRYSENE	ND	420	56 J	NA	62000	NA	8000	NA
FLUORANTHENE	ND	**300 J**	100 J	NA	2300000	NA	210000	**100**
INDENO(1,2,3-CD)PYRENE	ND	470	ND	NA	620	NA	700	NA
PENTACHLOROPHENOL	**23 J**	ND	ND	NA	3000	NA	**1**	**2**
PHENANTHRENE	ND	39 J	53 J	NA	NA	NA	NA	100
PYRENE	ND	**460**	64 J	NA	2300000	NA	210000	**100**
TOTAL PAHs	ND	**4129**	447	NA	NA	NA	NA	**1000**
Pesticides/PCBs (µg/kg)								
4,4'-DDE	**56**	**210**	**2300**	31.6	**1700**	NA	3000	**2.5**
4,4'-DDT	**180**	**680**	**4200**	34.5	**1700**	NA	**2000**	**2.5**
ALPHA-CHLORDANE	ND	300	ND	13.9	1600[6]	20000[6]	500[6]	NA
AROCLOR-1260	ND	**810 J**	ND	NA	**220**	NA	NA	**20**
GAMMA-CHLORDANE	49	430	74	13.2	1600[6]	20000[6]	500[6]	NA
Inorganics (mg/kg)								
ALUMINUM	4680	5380	1620	7270	76000	NA	NA	50
ANTIMONY	ND	**4.7**	ND	ND	31	NA	**0.3**	**3.5**
ARSENIC	0.92	**8.4**	**7.3**	1.4	**0.39**	750	**1**	10
BARIUM	20.4	**104**	15	23.6	5400	690000	**82**	165
BERYLLIUM	ND	**3.7**	ND	0.1	150	1300	**3**	**1.1**
CADMIUM	ND	**3.1**	ND	ND	37	1800	**0.4**	**1.6**
CALCIUM	1140	5030	366	766.3	NA	NA	NA	NA
CHROMIUM	4	**105**	4.5	6.2	210[7]	270[7]	**2[7]**	**0.4**
COBALT	0.99	**23.5**	0.58	0.4	4700	NA	NA	**20**
COPPER	9.8	**615**	7.2	1.5	2900	NA	NA	**40**
IRON	3240	**16700**	1460	3920	23000	NA	NA	**200**
LEAD	ND	**826**	**51**	12.5	**400**	NA	NA	**50**
MAGNESIUM	489	871	105	515	NA	NA	NA	NA
MANGANESE	73.4	**178**	19.6	128.5	1800	NA	NA	**100**
MERCURY	ND	**0.4**	ND	0.11	23	10	NA	**0.1**
NICKEL	2.3	**253**	4	1.8	1600	13000	**7**	**30**

TABLE 6-3

SURFACE SOIL ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 9 - FORMER PAINT WASTE STORAGE AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SOIL SAMPLE RESULTS			ESTABLISHED MCRD PI BACKGROUND VALUES[2]	HUMAN HEALTH SCREENING CRITERIA			EPA REGION 4 ECOLOGICAL SOIL SCREENING
	PI-009-01(32)[1]	PI-009-02(33)[1]	PI-009-03(34)[1]		RESIDENTIAL-USE SOIL PRGs[3]	SSLs MIGRATION TO AIR[4]	SSLs MIGRATION TO GW (DAF 1)[3]	
POTASSIUM	662	541	71.3	312.7	NA	NA	NA	NA
SELENIUM	ND	**0.91**	ND	0.3	390	NA	**0.3**	**0.81**
SILVER	ND	0.56	ND	ND	390	NA	2	2
SODIUM	185	715	56.1	240.8	NA	NA	NA	NA
VANADIUM	5.1	**12.9**	3.2	9.5	550	NA	300	**2**
ZINC	**72.3**	**3490**	**357**	9.7	23000	NA	**600**	**50**

Notes:

1 - Sampling Date: December 12, 1995.
2 - Tetra Tech NUS Inc., MCRD Parris Island Site 3 Remedial Investigation (RI)/RCRA Facilities Investigation (RFI), 1999c. Please note that background equals two times the mean concentration of background samples. The calculation represents an approximate upper bound of normal metal distribution in media.
3 - U.S EPA Region 9 PRGs, November 2000. (Cancer benchmark value = 1×10^{-6}, HI = 1.0).
4 - U.S. EPA Soil Screening Level Guidance: Technical Background Document. May, 1996.
5 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22, 1998.
6 - Value for chlordane.
7 - Value for total chromium.

Blackened cells indicate an exceedance of background concentrations and human health and/or ecological screening criteria.

ND = Nondetect
NA = Not Applicable/Not Available
J = Estimated Value

TABLE 6-4

GROUNDWATER ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 9 - FORMER PAINT WASTE STORAGE AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

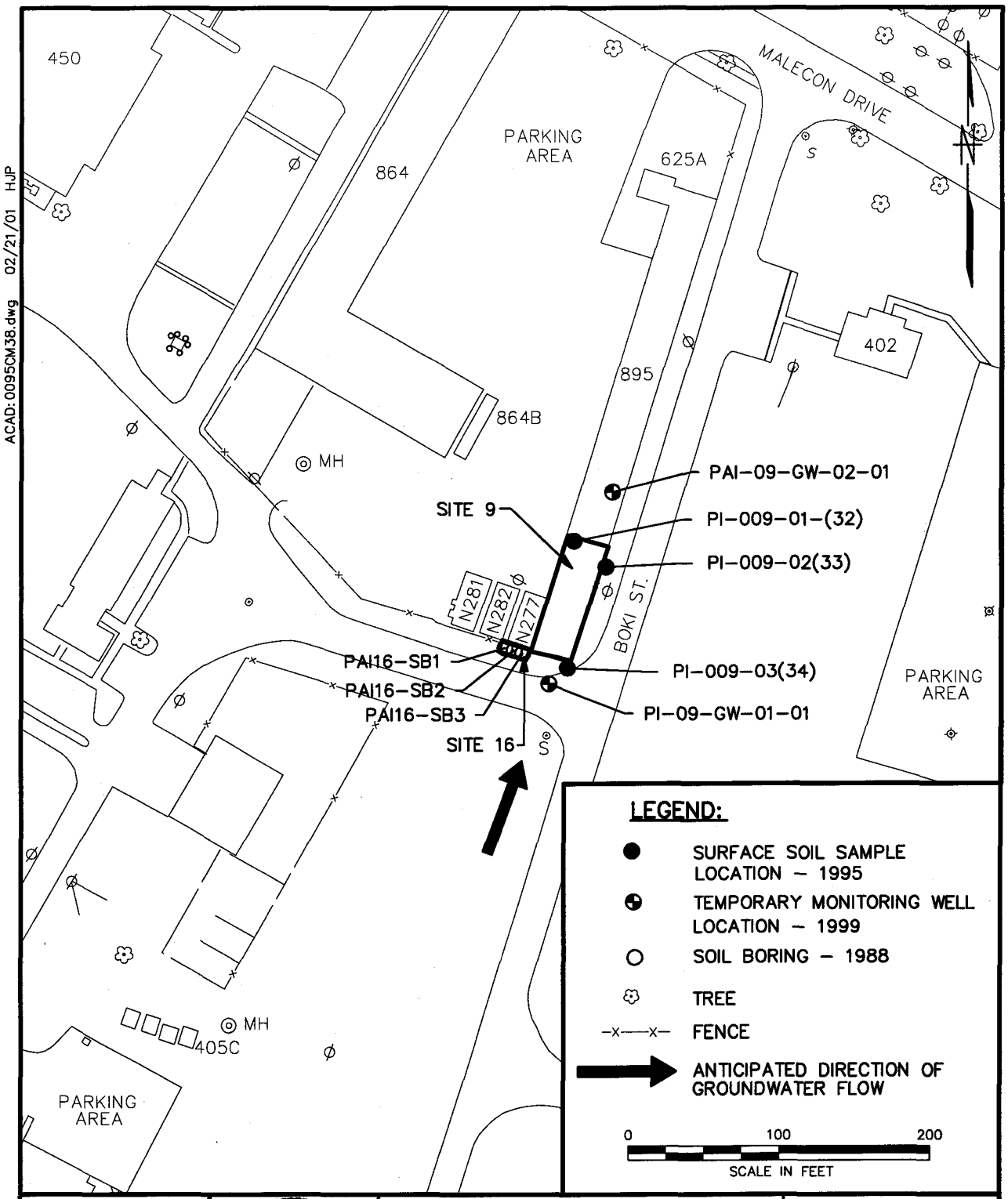
CONSTITUENT	SAMPLE RESULTS		HUMAN HEALTH SCREENING CRITERIA		EPA REGION 4 SURFACE WATER ESVs(4)
	PAI-09-GW-01-01(1)	PAI-09-GW-02-01(1)	EPA REGION 9 TAP WATER PRGs(2)	FEDERAL MCLs(3)	
Inorganics (μg/L)					
ALUMINUM	**369 J**	ND	36000	**50-200 (SMCL)**	NA
ANTIMONY	ND	5.9	15	6	160
BARIUM	23.7	ND	2600	2000	NA
CALCIUM	42500	32100	NA	NA	NA
CHROMIUM	0.7	ND	110	100	117
MAGNESIUM	1560	1330	NA	NA	NA
POTASSIUM	1610	4040	NA	NA	NA
SODIUM	ND	4540	NA	NA	NA

Notes:

1 - Sampling Date: December 4, 1999.
2 - U.S. EPA Region 9 Preliminary Remediation Goals, November 2000. (Cancer benchmark value = 1×10^{-6}, HI = 1.0).
3 - U.S. EPA Drinking Water Regulations and Health Advisories, Summer 2000.
4 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22, 1998. Freshwater - chronic.

Blackened cells indicate an exceedance of a screening criteria.

ND = Nondetect
NA = Not Applicable/Not Available
SMCL = Secondary MCL
J = Estimated Value



ACAD: 0095CM38.dwg 02/21/01 HJP

DRAWN BY HJP DATE 7/18/00			CONTRACT NO. 0095
CHECKED BY DATE			APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 6-1 / REV. 0

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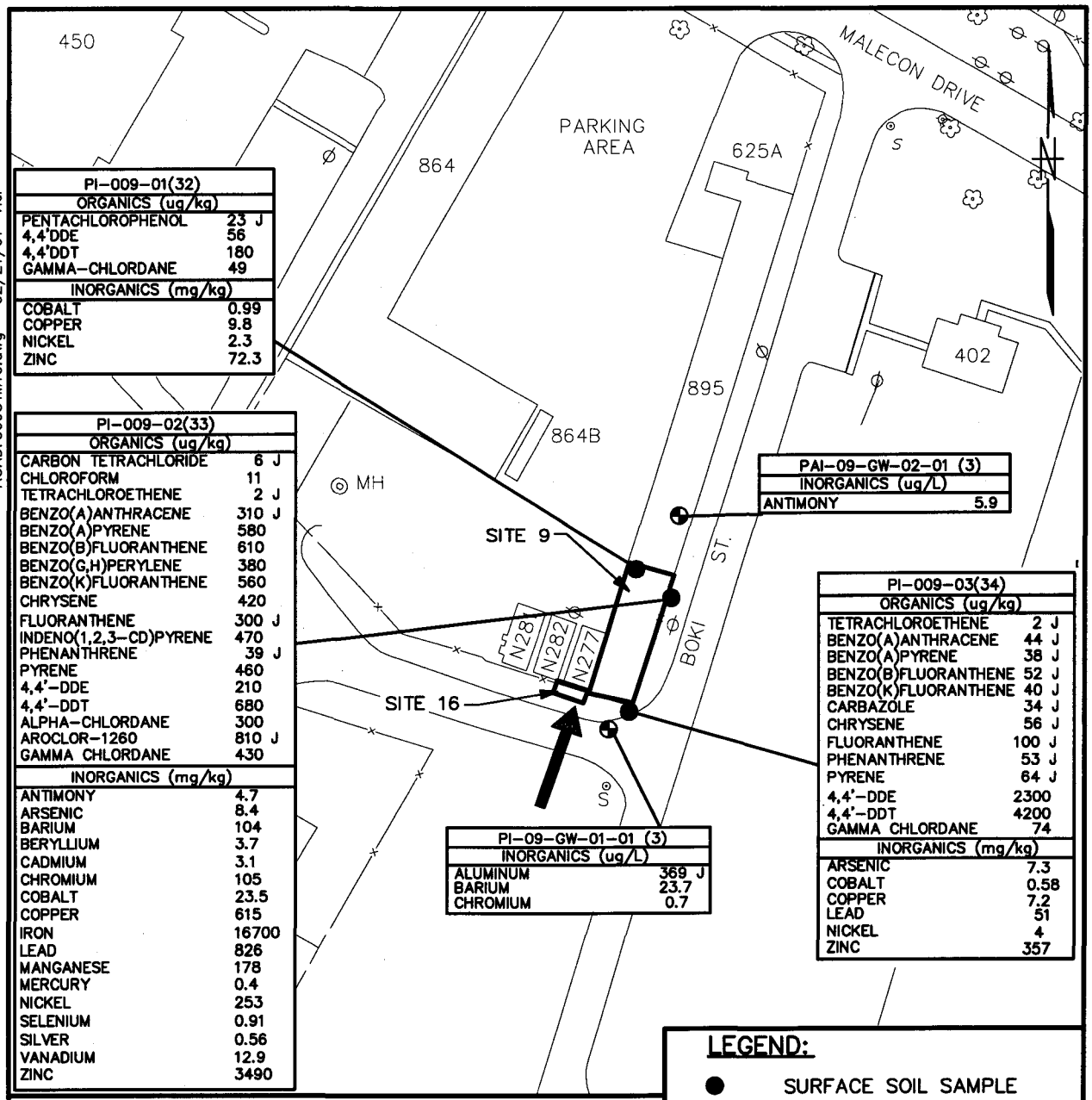
SITES 9 AND 16
LOCATION MAP
PAINT WASTE STORAGE AREA
AND PESTICIDE RINSATE DISPOSAL AREA
MCRD PARRIS ISLAND
PARRIS ISLAND, SOUTH CAROLINA

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98



PI-009-01(32)	
ORGANICS (ug/kg)	
PENTACHLOROPHENOL	23 J
4,4'DDE	56
4,4'DDT	180
GAMMA-CHLORDANE	49
INORGANICS (mg/kg)	
COBALT	0.99
COPPER	9.8
NICKEL	2.3
ZINC	72.3

PI-009-02(33)	
ORGANICS (ug/kg)	
CARBON TETRACHLORIDE	6 J
CHLOROFORM	11
TETRACHLOROETHENE	2 J
BENZO(A)ANTHRACENE	310 J
BENZO(A)PYRENE	580
BENZO(B)FLUORANTHENE	610
BENZO(G,H)PERYLENE	380
BENZO(K)FLUORANTHENE	560
CHRYSENE	420
FLUORANTHENE	300 J
INDENO(1,2,3-CD)PYRENE	470
PHENANTHRENE	39 J
PYRENE	460
4,4'-DDE	210
4,4'-DDT	680
ALPHA-CHLORDANE	300
AROCLOR-1260	810 J
GAMMA CHLORDANE	430
INORGANICS (mg/kg)	
ANTIMONY	4.7
ARSENIC	8.4
BARIUM	104
BERYLLIUM	3.7
CADMIUM	3.1
CHROMIUM	105
COBALT	23.5
COPPER	615
IRON	16700
LEAD	826
MANGANESE	178
MERCURY	0.4
NICKEL	253
SELENIUM	0.91
SILVER	0.56
VANADIUM	12.9
ZINC	3490

PAI-09-GW-02-01 (3)	
INORGANICS (ug/L)	
ANTIMONY	5.9

PI-009-03(34)	
ORGANICS (ug/kg)	
TETRACHLOROETHENE	2 J
BENZO(A)ANTHRACENE	44 J
BENZO(A)PYRENE	38 J
BENZO(B)FLUORANTHENE	52 J
BENZO(K)FLUORANTHENE	40 J
CARBAZOLE	34 J
CHRYSENE	56 J
FLUORANTHENE	100 J
PHENANTHRENE	53 J
PYRENE	64 J
4,4'-DDE	2300
4,4'-DDT	4200
GAMMA CHLORDANE	74
INORGANICS (mg/kg)	
ARSENIC	7.3
COBALT	0.58
COPPER	7.2
LEAD	51
NICKEL	4
ZINC	357

PI-09-GW-01-01 (3)	
INORGANICS (ug/L)	
ALUMINUM	369 J
BARIUM	23.7
CHROMIUM	0.7

NOTES:

1. SOIL TAGS PRESENT INORGANIC RESULTS ABOVE SOIL BACKGROUND AND DETECTED ORGANIC COMPOUNDS. GROUNDWATER TAGS PRESENT ALL DETECTED COMPOUNDS.
2. TAGS DO NOT PRESENT DETECTED ESSENTIAL NUTRIENTS, (CALCIUM, MAGNESIUM, POTASSIUM, AND SODIUM).
3. SAMPLES WERE ANALYZED FOR TCL VOC's AND TAL METALS.

LEGEND:

- ● SURFACE SOIL SAMPLE LOCATION
- ⊕ TEMPORARY MONITORING WELL LOCATION
- → ANTICIPATED DIRECTION OF GROUNDWATER FLOW.

0 100 200
SCALE IN FEET

DRAWN BY	DATE	SITES 9 AND 16 SURFACE SOIL AND GROUNDWATER ANALYTICAL RESULTS PAINT WASTE STORAGE AREA AND PESTICIDE RINSATE DISPOSAL AREA MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095	
HJP	7/18/00		APPROVED BY	DATE
CHECKED BY	DATE		APPROVED BY	DATE
COST/SCHED-AREA			DRAWING NO. FIGURE 6-2	REV. 0
SCALE AS NOTED				

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FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

ACAD: 0095TM10.dwg 02/21/01 HJP

7.0 SITE 13C - INERT DISPOSAL AREA C (DREDGE SPOILS AREA)

7.1 SITE DESCRIPTION

Site 13C, Inert Disposal Area C (Dredge Spoils Area), is located in the east-central portion of MCRD Parris Island, south of Structure 302 between Cuba Street and Ballast Creek. In 1976, a 12-foot berm was constructed to enclose an irregularly-shaped circular area that is 600 feet in diameter. The bermed area covers approximately 11 acres. In 1976, approximately 100,000 cubic yards of dredge spoils consisting mostly of inert river sediment from the marina and Ballast Creek were placed in the bermed area. A total of 200,000 cubic yards of river sediment were also placed in the bermed area as a result of dredging operations conducted in 1981 and 1984/85. The location of Site 13C is illustrated in Figure 7-1.

Site 13C was reportedly constructed near or on top of a former fire fighting training pit (Site 4 – see Section 4). Some of the contaminated soils from Site 4 site may have been disturbed and distributed during construction of the berm.

Site 13C has been inactive since 1985. The site is located in an undeveloped, unpopulated portion of the Depot. The nearest resident lives approximately 2,000 feet north of Site 13C. No day care facilities or schools are located within 200 feet of the site.

7.2 PREVIOUS INVESTIGATIONS

Previous investigations at Site 13C include the IAS, Interim RFA, and Navy relative site ranking efforts. Based on the results of these investigations, the MCRD Parris Island partnering team determined that Site 13C required further evaluation and recommended an SI/CS. A brief description of each previous investigation is presented below.

7.2.1 Initial Assessment Study

In 1986, NEESA conducted an IAS (NEESA, 1986) under the NACIP Program. The IAS is equivalent to the PA phase of the CERCLA process. The purpose of the IAS (Phase I of the NACIP Program) was to identify potentially contaminated sites at MCRD Parris Island that may pose a threat to human health or the environment.

In the IAS, NEESA concluded that further action at Site 13C was not required. This recommendation was based on the fact that only river bottom sediments were disposed in the dredge spoils area. Furthermore, any disturbed contaminated soils from Site 4 would likely be contained within the embankment in that area (NEESA, 1986).

7.2.2 Interim RCRA Facility Assessment

In January 1990, A.T. Kearney conducted a file review of the MCRD Parris Island facility, and in February of that same year, they conducted a VSI of the facility, culminating in an Interim RFA. Site 13C was included in the Interim RFA. The report concluded that, because the site is underlain by the Dredge Spoils Fire Training Pit (Site 4), where there is documented soil contamination, RFA Phase II sampling should be conducted.

7.2.3 Relative Site Ranking

In 1995, B&R Environmental conducted sampling and analysis activities at sites throughout MCRD Parris Island for the purposes of the Navy's relative site ranking efforts. Two soil samples were collected approximately 300 feet apart along the northern perimeter of the berm, each at a depth of approximately 6 inches. The first sample [PI-013-01(38)] was collected in the center of a 10-foot, sparsely vegetated drainage ditch. This drainage ditch is part of a drainage system that runs along the top of the berm. The sample location was selected as because it was a potential collection point from contributing runoff. The second sample [PI-013-02(39)] was also sampled from within the drainage ditch system. Figure 7-1 presents the locations of these samples.

All samples were tested for TCL VOCs, SVOCs, PCBs, pesticides, and cyanide and TAL metals. The results of the analyses are discussed in Section 7.6 of this report.

7.3 1999 INVESTIGATION

The field investigation for the SI/CS at Site 13C was conducted in October and December 1999. During the October investigation, one surface soil sample and duplicate sample (PAI-13C-SS-03-01 and PAI-13C-SS-03-01-D) were collected toward the center of Site 13C. During the December investigation, two groundwater samples (PAI-13C-GW-01-01 and PAI-13C-GW-02-01) were collected from temporary wells installed less than 70 feet from Ballast Creek. Data obtained from groundwater samples collected as part of Site 4 activities in December 1999 (PAI-04-GW-01-01) and August 2000 (PAI-04-MW-02-01 and PAI-04-MW-03-01) are also used for evaluating Site 13C. The sample locations are shown on Figure 7-1.

The following sections discuss the activities conducted during the field investigation at Site 13C in 1999 and 2000.

7.3.1 Surface Soil Sampling

In 1999, one surface soil sample and a duplicate sample (PAI-13C-SS-03-01 and PAI-13C-SS-03-01-D) were collected at Site 13C (Figure 7-1) in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan (TtNUS, 1999a). The samples were collected from 0 to 1 feet bgs using pre-cleaned disposable sampling trowels. For all analytical parameters except TCL VOCs, the samples were placed directly in the appropriate containers and then on ice. The soil samples that were to be analyzed for TCL VOCs were collected using Encore® samplers. The samplers were then capped and placed on ice. A copy of the soil sample log sheet is provided in Appendix C. The surface soil sample and duplicate sample were analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL metals (total), and tin.

7.3.2 Temporary Monitoring Well Installation

Two temporary monitoring wells [PAI-13C-MW-01(S) and PAI-13C-MW-02(S)] were installed at the site (Figure 7-1) by a South Carolina licensed driller employed by Columbia Technologies in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan (TtNUS, 1999a). Temporary wells PAI-13C-MW-01(S) and PAI-13C-MW-02(S) were hand driven with DPT equipment to a depth of 9 and 12 feet bgs, respectively. Once driven to depth, the DPT equipment was removed from the borings and 3/4-inch PVC well material, consisting of riser and 5-foot screen sections (0.005-inch slotted-well screen), was installed in the borings.

When the DPT equipment was removed, wet clay was observed on the DPT rods. It is likely that this wet clay smeared across the well screen and inhibited groundwater flow into the temporary well because, after 4 hours, there was not sufficient volume in the well to collect a sample. Subsequently, the well screens were removed and a 2.5-inch hand auger was used to enlarge the borings to a depth of 8 to 9.0 feet bgs. Groundwater was encountered at depths of 2.5 to 3.5 feet bgs, and the well screens were reinstalled in their respective borings. After sample collection, the DPT borings were abandoned in accordance with SCDHEC regulations. A thin bentonite grout was added through the PVC pipe as the well casing and screen was removed from the boring. The boring was grouted to the surface.

7.3.3 Groundwater Sampling

Groundwater was sampled using low flow sampling techniques in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan (TtNUS, 1999a). A peristaltic pump and disposable tubing were used to collect the groundwater samples from temporary wells PAI-13C-GW-01-01 and PAI-13C-GW-02-01. The tubing was lowered to the approximate midpoint of the groundwater column in the monitoring wells and the approximate midpoint of the DPT screen. Groundwater samples were collected after the required volume of water was purged.

The groundwater sample from each well, with the exception of groundwater that was analyzed for TCL VOCs, was collected by reducing the flow to minimize volatilization of the sample and by filling the appropriate containers directly from the tubing after it passed through the peristaltic pump. The TCL VOC samples were collected by removing the tubing from the well and allowing the water in the tubing to flow under gravity backward into the sample container. The samples were then placed on ice

Groundwater samples PAI-13C-GW-01-01 and PAI-13C-GW-02-01 were analyzed for TCL VOCs, TAL metals (total), tin, and total dissolved solids. Sample PAI-13C-GW-01-01 was also analyzed for Appendix IX VOCs not included on the TCL VOC list.

As indicated in Table 7-1, the pH of the groundwater varied from 4.11 (PAI-13C-GW-02-01) to 5.74 (PAI-04-MW-03-01). The temperature of the December 1999 groundwater samples ranged from 13 to 17.7 degrees Celsius and the August 2000 groundwater samples from 22.1 to 24 degrees Celsius. The specific conductance varied from 9.2 (PAI-04-MW-03-01) to 17.7 (PAI-13C-GW-02-01). Salinity readings ranged from 0.51 (PAI-04-MW-03-01) to 1.03 (PAI-13C-GW-02-01) percent. The salinity readings indicate that the groundwater samples that were collected were saline (fresh water is less than 0.048 percent salinity as identified by SCDHEC; 1998). Dissolved oxygen readings varied from 1.44 to 4.43 mg/L. The wells were purged in an effort to reduce the turbidity to less than the benchmark of 5 NTUs. Due to the presence of clayey soils in the screened zones, which reduced well yields, the groundwater samples were collected before the target turbidity level could be reached. The turbidity ranged from 10 to 514 NTUs at time of sampling.

7.4 2004 INVESTIGATION

The Navy presented results of the 1999 investigation to the MCRD Parris Island Partnering Team as part of a Draft CS/SI report submitted in February 2001. To address regulatory comments made to this draft report, the Navy developed a Work Plan for additional field work at Site 13C. In accordance with this Work Plan, TtNUS field personnel installed three permanent monitoring wells and one piezometer and collected groundwater, surface water, and sediment samples for laboratory analysis. A summary of these field activities is provided in the following sections.

7.4.1 <u>2004 Monitoring Well Installation and Development and Piezometer Installation</u>

In 1999 and 2000, several inorganic analytes were detected in Site 13C groundwater at concentrations that posed a potential threat to ecological receptors in Ballast Creek. However, these samples were collected from temporary monitoring wells and had turbidity levels ranging from 10 to 514 NTU. It was suspected that inorganic concentrations could be attributable to naturally-occurring inorganics in

formation soils. As a result, three permanent shallow monitoring wells (PAI-13C-MW-03, PAI-13C-MW-04, and PAI-13C-MW-05) were installed at Site 13C in 2004 to determine whether elevated inorganic concentrations were attributable to the turbid condition of the groundwater samples. One shallow piezometer (PAI-13C-MW-06) was also installed to assist in determining groundwater flow direction with respect to the bermed area. The locations of these monitoring wells and piezometer are shown on Figure 7-1. A summary of monitoring well construction details is shown in Table 7-1.

The three permanent monitoring wells were installed within the shallow surficial aquifer to a depth of 14 feet bgs. The monitoring wells were constructed with a PVC 10-foot long well screen section with 0.010-inch slot openings screwed onto a PVC riser pipe. The well screen and riser pipe were lowered through the center of the hollow stem augers and No. 2 sand was placed around the well screen to a depth of at least one foot above the top of the well screen. A one foot thick, bentonite seal was placed above the sand pack to a depth of one foot beneath the ground surface. The remainder of the well annulus was filled with concrete and a 3 foot by 3 foot by 6 inch thick concrete pad with a protective casing and barrier posts was placed around the well. A boring log and monitoring well construction sheet was completed for the monitoring well and is provided in Appendix C. The SCDHEC-approved monitoring well permit is also provided in Appendix C.

The shallow piezometer was installed by hand augering to the desired depth of the boring and inserting the well screen and riser into the open boring. The piezometer consisted of ¾ inch diameter PVC riser and ¾ inch diameter continuous wire wound screen. A No. 2 sand was placed around the well screen to a depth of one foot above the top of the well screen. A bentonite seal was placed above the sand pack to the ground surface and a cap was placed on the top of the riser pipe.

A licensed South Carolina driller employed by Gregg Drilling and Testing, Inc. of South Carolina installed each monitoring well and the piezometer. Each monitoring well was developed after construction using a submersible pump. The submersible pump was surged during the development process to agitate and remove fine material from around the well screen. The purge water was collected and pumped into 55-gallon drums and labeled as IDW. Field parameters of temperature, pH, specific conductance, and turbidity were collected during development. A minimum of 20 gallons of water was removed during development. Well development logs were completed during development and are provided in Appendix C.

7.4.2 <u>2004 Groundwater Sampling</u>

Groundwater was sampled using low-flow sampling techniques in accordance with the Master Work Plan (B&R Environmental, 1998) and the Work Plan Addendum (TtNUS, 2004). A peristaltic pump and disposable tubing were used to collect the groundwater samples from permanent monitoring wells

PAI-13C-MW-03, -MW04, and -MW-05. The tubing was lowered to the approximate midpoint of the groundwater column in the monitoring wells and the approximate midpoint of the well screen. Groundwater samples were collected after the required volume of water was purged. All groundwater samples were collected for TAL inorganics and tin. The collected samples were then placed on ice. Groundwater low flow purge sheets and sample log sheets are included in Appendix C.

Groundwater-quality field parameters including pH, specific conductance, temperature, dissolved oxygen, and salinity were collected during purging of the wells. Table 7-2 summarizes the groundwater-quality parameters collected for Site 13C. As can be seen in Table 7-2, the turbidity of the groundwater samples collected from the new monitoring wells were less than 5 NTUs and were much lower than samples obtained from the temporary wells sampled in earlier field activities. As a result, the objective of obtaining a representative groundwater sample was met.

7.4.2 2004 Surface Water and Sediment Sample Collection

In 2004, four surface water samples were collected from Ballast Creek and analyzed for TAL inorganics. Two samples were collected during high tide to represent potential surface water inflow into the monitoring wells and two samples were collected during low tide to represent potential groundwater impacts to the surface water. Inorganic analysis was performed to determine whether inorganics detected in the temporary monitoring wells were a result of the surface water inflow from Ballast Creek. The surface water samples were collected as composite samples and were collected over a 2-hour period. In addition, two sediment samples were collected in Ballast Creek and analyzed for TAL inorganics. Surface water and sediment sample log sheets are included in Appendix C.

The two sediment samples (PAI-13C-SD-01 and PAI-13C-SD-02) and surface water samples PAI-13C-SW-01-01 and PAI-13C-SW-01-02 were collected from the locations identified in the work plan. However, a surface water sample could not be collected from location PAI-13C-SW-02 at low tide because no water existed within Ballast Creek at this location at low tide as shown in Appendix C. As a result, the surface water sample location was moved approximately 50 feet yards to a location where surface water was present at both low and high tide. The location of the surface water and sediment samples are presented on Figure 7-1.

7.5 SITE-SPECIFIC GEOLOGY/HYDROGEOLOGY

Site 13C is within a bermed area consisting of fill that is comprised of silt and sand mixtures. The fill is approximately 5 feet thick in the bermed area. Natural undisturbed material consisting of silt and sand mixtures underlies the fill where present and exists at the ground surface where the fill is nonexistent.

The undisturbed silt and sand mixtures extended to a depth of 14 feet which was the maximum depth of the investigation effort.

Site 13C is located within 70 feet of Ballast Creek and within the 100-year flood zone. Shallow groundwater was encountered at depths of less than 5 feet beneath the ground surface. During both low and high tides, groundwater flow in the shallow aquifer at Site 13C flows to the east toward Ballast Creek as shown in Figures 7-2 and 7-3. Two rounds of synoptic water-level measurements were obtained from the three permanent monitoring wells and one piezometer installed during 2004 field effort. All measurements for each round were taken within a 1-hour period. Hydrogeologic cross sections are shown as Figures 7-4 and 7-5.

During the 1999 investigation, groundwater yield to the monitoring wells was extremely slow due to the presence of finer aquifer material. Even after installation of the permanent wells in 2004, the groundwater yield was affected by this material as two of the wells were purged dry during monitoring well development. However, groundwater samples with turbidity levels of 2 NTU and less were obtained during sampling of the permanent monitoring wells in 2004. The groundwater samples from both the temporary wells and the permanent wells had salinity readings above what would be considered fresh water (Table 7-2).

The aquifer of interest to Site 13C is the surficial aquifer. This aquifer is separated from underlying regional Tertiary Floridan aquifer by the Hawthorn Formation, a confining unit that extends beneath Parris Island. The surficial aquifer at the base was previously used to provide the base domestic water. The surfical aquifer drains to on-site streams and tidal areas within the base. Therefore, contaminants within this unit would ultimately discharge to these site streams and tidal areas and would ultimately discharge to the Beaufort and Broad Rivers that form Port Royal Sound. Site 13C is located near Ballast Creek. The groundwater sampling locations are located in the expected downgradient direction from the site, within 70 feet of Ballast Creek. Any contaminant released to groundwater at Site 13C would discharge into Ballast Creek.

The width of Ballast Creek varied dramatically from low tide to high tide. At surface water location PAI-13C-SW-01, the Creek's width varied from approximately 10 feet at low tide to 25 yards at high tide. Similarly, at PAI-13C-SW-02 (modified location), the width varied from approximately 3 feet at low tide to 25 yards at high tide. At the location of PAI-13C-SW-02 as originally proposed in the Work Plan, no water existed within Ballast Creek at low tide.

7.6 SITE-SPECIFIC ECOLOGICAL SETTING

The dredge spoils area consists of a berm (approximately 8 to 12 feet in height) created by sediments dredged from Ballast Creek and the Beaufort River. Vegetation within the area enclosed by the berm is dominated by shrubby species such as Eastern baccharis (*Baccharis halimfolia*), wax myrtle (*Myrica cerifera*), yaupon holly (*Ilex vomitoria*), and blackberry (*Rubus* spp). A wooded area is located east of the site. The overstory of the wooded area consists primarily of slash pine (*Pinus elliottii*), loblolly pine (*Pinus taeda*), live oak (*Quercus virginiana*), and laurel oak (*Quercus laurifolia*). Common understory species include Eastern baccharis, saw palmetto (*Serenoa repens*), yaupon holly, poison ivy (*Rhus radicans*), Virginia creeper (*Parthenocissus quinquefolia*), muscadine grape (*Vitis rotundifolia*), and greenbriar (*Smilax rotundifolia*). A shrubby area lies along the western and southern portions of the berm. A grassy area lies to the north between the site and structures associated with the MCRD yacht facility.

Ballast Creek is located approximately 150 feet from the eastern and southwestern portions of the bermed area. Ballast Creek adjoins the MCRD yacht basin approximately 500 feet north of the site and enters the Beaufort River approximately 2,000 feet west of the site. Extensive saltwater marshes are located along Ballast Creek south of the site and in the area between Ballast Creek and the Beaufort River. The marshes are dominated by cordgrass (*Spartina alterniflora*).

Terrestrial wildlife species that utilize the uplands on and near the site are those typically found in similar habitats throughout the Depot. These include a variety of mammals, birds, and reptiles. There are no sensitive terrestrial environments or resources at or near the site.

The nearby marshes provide habitat for a variety of fauna, particularly fish and crustaceans, as well as several species of animals that prey upon the fish and crustaceans. These predators include mammals such as the raccoon (*Procyon lotor*), mink (*Mustela vison*), and river otter (*Lutra canadensis*) and wading birds such as the tricolored heron (*Egretta tricolor*), great blue heron (*Ardea herodias*), green heron (*Butorides striatus),* and snowy egret (*Egretta thula*). Various shorebirds and wintering waterfowl forage in the marshes.

Endangered and threatened species that could potentially occur at or near the site consist of the bald eagle (*Haliaeetus leucocephalus*), wood stork (*Mycteria americana*), and American alligator (*Alligator mississippiensis*). An active bald eagle nest is located approximately 2 miles northwest of the site, and bald eagles could potentially forage in Ballast Creek. Wood storks forage in various areas throughout the Depot, and they could forage in the marshes south and east of the site. Alligators could occur in Ballast Creek. Although common in some parts of its range, the alligator is federally listed as threatened due to its similarity in appearance to the endangered American crocodile (*Crocodylus acutus*). Other endangered and threatened species occur in Beaufort County (Table 2-2 of Volume I, Master Work Plan),

but Ballast Creek provides poor habitats for these species. For example, the manatee (*Trichechus manatus*), shortnose sturgeon (*Acipenser brevirostrum*), and various sea turtles are occasionally observed in the Beaufort River, and the Atlantic bottlenosed dolphin (Tursiops truncatus) is a year-round resident of coastal South Carolina. (Although not threatened or endangered, dolphins are afforded protection under the Federal Marine Mammal Act.) However, these species usually are not associated with shallow marshes and narrow tidal channels like those near the site. With the exception of the bald eagle, wood stork, and alligator, the probability of endangered and threatened species in the vicinity of the site is probably remote.

7.7 SI/CS AND HISTORIC ANALYTICAL RESULTS

During the relative site ranking investigation in December 1995, B&R Environmental collected two surface soil samples at Site 13C. In October 1999, an additional soil sample was taken (in duplicate) and in December 1999, two temporary monitoring wells were installed and sampled to investigate groundwater downgradient of 13C.

Also in December 1999, one temporary monitoring well was sampled to determine contaminant levels in the groundwater at Site 4. Two additional temporary monitoring wells were also sampled in August 2000 as part of Site 4 sampling activities. Because the Site 4 temporary wells are located downgradient of Site 13C, Site 4 groundwater results will also be used in the evaluation of Site 13C.

7.7.1 Surface Soil

Table 7-3 summarizes positive detections of chemicals in the surface soils of Site 13C. The table also provides a comparison of the detected concentrations to pertinent screening criteria [U.S. EPA Region 9 residential- and industrial-use scenario soil PRGs, SSLs for migration to groundwater (DAF 1) and migration to air, and U.S. EPA Region 4 Ecological Screening Values (ESVs) for soil. Residential- and industrial-use PRGs are soil concentrations equal to the lower of the ILCR of 1.0E-06 or a HQ of 1.0 for noncarcinogenic risk under residential- and industrial-use scenarios. .

7.7.1.1 VOCs

One VOC was detected at the 1995 sampling locations. Chloroform was detected at concentrations of 5 J µg/kg and 7 J µg/kg at PI-013-01(38) and PI-013-02(39), respectively. Both detections exceeded chloroform's ESV of 1 µg/kg but were below human health screening criteria. As discussed in Section 4.6.1.1, detections of chloroform are possibly attributed to field or laboratory artifacts.

VOCs are typically considered to be fairly soluble and have a low capacity for retention by organic carbon in soil. VOCs may migrate through the soil column as infiltrating precipitation solubilizes them. Migration occurs primarily laterally with the hydraulic gradient while some portion of the chemical may be retained by the saturated soil. Once in Site 13C groundwater, VOCs would be expected to migrate east and ultimately discharge to Ballast Creek. However, VOCs were not detected in the groundwater samples collected downgradient of Site 13C. Consequently, VOCs will not be considered further in Site 13C soil.

7.7.1.2 SVOCs

Two SVOCs were detected at Site 13C (diethyl phthalate at 26 J µg/kg and pyrene at 47 J µg/kg). These SVOCs were detected at the 1995 sampling locations PI-013-01(38) and PI-013-02(39), respectively. Neither detected concentration exceeded human health or ecological screening criteria. Consequently, SVOCs will not be considered further in Site 13C soil.

7.7.1.3 Pesticides/PCBs

One pesticide, 4,4'-DDT, was detected in the duplicate sample collected from PAI-13C-SS-03-01. The measured concentration of the pesticide was 60 µg/kg, which exceeds the soil ESV of 2.5 µg/kg; however, this detection is consistent with typical concentrations found throughout MCRD Parris Island attributable to prior base-wide pesticide application. 4,4'-DDT is considered to be a persistent chemical and would be expected to remain for an extended period of time. Degradation soil half lives have been reported from 2 to 15.6 years for 4,4'-DDT (Howard, 1991). They undergo extensive adsorption to chemicals and are not highly soluble. Because soil sample PAI-13C-SS-03-01 is located in the bermed area, transport to Ballast Creek via erosion would not be expected. Consequently, pesticides will not be considered further in Site 13C soil.

PCBs were not detected in Site 13C soil and will not be considered further.

7.7.1.4 Inorganics

Seventeen inorganics (excluding the macronutrients calcium, magnesium, potassium, and sodium) were detected in the soil of Site 13C. Of these inorganics, cadmium and mercury were detected below established MCRD Parris Island sediment background values in all three locations. The remaining 15 inorganics were detected in one or more of the locations above sediment background values. Inorganics that were detected above background are presented in Figure 7-6.

Two inorganic analytes were found above residential-use scenario soil PRGs. Iron was detected at a average concentration of 29,400 mg/kg in soil location PAI-13C-SS-03 and 27,600 mg/kg in location

PI-013-01(38). These concentrations exceeded the residential-use soil PRG of 23,000 mg/kg; however, the maximum detected concentration was only 1.4 times greater than established site background for iron (21,500 mg/kg) and was less than iron's industrial-use soil PRG of 100,000 mg/kg. Arsenic (maximum concentration of 17.3 mg/kg) was detected above residential-use and industrial-use soil PRGs (0.39 and 2.7 mg/kg, respectively) in two locations. However, like iron, the maximum detection was only 1.4 times above arsenic's established background concentration (12 mg/kg).

Arsenic soil concentrations were also observed above soil to groundwater screening criteria (1 mg/kg). In groundwater, arsenic was found at concentrations above tapwater PRGs, but below the proposed MCLs (10 µg/L). Chromium, nickel, and selenium were also detected in soil at concentrations above soil to groundwater screening values; however, none of these inorganics were detected in groundwater at concentrations above groundwater screening criteria.

Detections of eight inorganic analytes exceeded ESVs. HQs for maximum detected concentrations ranged from 1.4 for beryllium to 608 for aluminum as shown below and may present potential risks to terrestrial plants and soil invertebrates; however, all of these analytes are within a factor of 2 of their established soil background concentration.

Analyte	Maximum Soil Concentration[1] (mg/kg)	Hazard Quotient	Sediment Background (mg/kg)	Max Conc./Background (unitless)
Aluminum	28,200	608	24,200	1.2
Arsenic	14.1	1.7	12	1.4
Beryllium	1.5	1.4	0.98	1.5
Chromium	47.8	127	35.2	1.4
Iron	29,400	155	21500	1.4
Manganese	257.5	3.1	186	1.7
Vanadium	60.25	31.4	50	1.2
Zinc	70.2	1.5	45	1.6

1. Average concentration of PAI-13C-SS-03-01 is used.

Among the metals that were detected in soil, all (except beryllium) were also detected in sediment samples. A comparison of the sediment concentrations of those metals that were detected in the soil above ESVs, to their respective background concentrations and the available EPA Region 4 Sediment Screening Values (SSVs), is presented in the following table.

Analyte	Sediment Concentration (mg/kg)		Sediment Background (mg/kg)	EPA Region 4 Sediment Screening Values (mg/kg)
	PAI-13C-SD-01	PAI-13C-SD-02		
Aluminum	12,800	20,500	24,200	NA
Arsenic	10.9	8	12	7.24
Beryllium	ND	ND	0.98	NA
Chromium	20.2	32.9	35.2	52.3
Iron	14500	16300	21500	NA
Manganese	51.6	88.6	186	NA
Vanadium	35	44.9	50	NA
Zinc	29.6	36.3	45	124

Notes: ND=Not Detected. Shaded value indicates sediment concentration exceedance of criterion.

As shown in the table above, concentrations of arsenic barely exceeded the SSV of 7.24 mg/kg; however, they were less than the representative background concentration of 12 mg/kg. Therefore, it appears that the sediment quality in the creek adjacent to the site has not been adversely affected by the erosion of soil.

Furthermore, the inorganics present in the soil do not biomagnify in the food chain; therefore, effects to upper food-chain receptors from exposure to these inorganic analytes are unlikely. Given these reasons and the minor exceedances of residential-use and industrial-use human health screening criterion, inorganics will not be considered further for soil.

7.7.2 Groundwater

During the October 1999 investigation, two temporary monitoring wells (PAI-13C-GW-01-01 and PAI-13C-GW-02-01) were installed at Site 13C in order to determine the impact of contaminants on the shallow aquifer groundwater. Based on the findings of the 1999 investigation, three permanent monitoring wells were constructed during 2004 in the vicinity of the temporary well locations. This section discusses the findings of the 2004 investigation for Site 13C and also provides data for the downgradient location (PAI-04-MW-02-01) that was sampled in 2000.

The analytical results of Site 13C wells and the downgradient well are summarized in Table 7-4. Data collected from the temporary wells that were installed during 1999 showed that VOCs, SVOCs, and pesticides/PCBs did not require further consideration, and therefore only inorganics were analyzed and the data is provided in this table. The table also provides a comparison of the detected concentrations to pertinent human health screening criteria (U.S. EPA Region 9 tapwater PRGs and federal MCLs/SMCLs).

Detected concentrations are also compared to U.S. EPA Region 4 surface water ESVs (salt water). This ecological screening assumes that ecological receptors are exposed to the groundwater concentration of the chemical upon its discharge to surface water. However, this screening is a conservative comparison because it assumes that no dispersion of the chemical occurs during discharge to surface water.

Excluding macronutrients, 14 inorganics were detected in the groundwater downgradient of Site 13C. Arsenic, iron, manganese, and thallium was detected at concentrations exceeding their respective tap-water PRGs. Arsenic (maximum concentration of 13.5 µg/L) also slightly exceeded its proposed MCL (10 µg/L). Thallium (maximum concentration of 5.4 µg/L) was also detected in two monitoring wells slightly exceeding its MCL of 2 µg/L. Beryllium was detected in one well at a concentration of 5.2 µg/L, slightly above its MCL of 4.0 µg/L. Concentrations of iron, and manganese exceeded their respective secondary MCLs of 300 and 50 µg/L.). However, SMCLs are not health-based guidelines, but instead guidelines for chemicals that may affect the aesthetic quality of drinking water (i.e., color and taste) (AWWA, 1990). Therefore, only minor exceedances of MCLs were found to occur in the groundwater at Site 13C.

Additionally, copper, lead, nickel, and zinc were detected in the groundwater at Site 13 C at concentrations exceeding their respective surface water ESVs. However, none of these metals were detected in the groundwater at the downgradient location (PAI-04-MW-02-01) at concentrations exceeding the ESVs, indicating that a significant degree of attenuation (dispersion, dilution, etc.) is occurring before the groundwater from Site 13 C arrives near Ballast Creek.

Surface water samples were collected in Ballast Creek at two locations (PAI-13C-SW-01 and PAI-13C-SW-02) and under low tide and high tide conditions. As shown by the sample collection logs (Appendix C-8), sample collection at one location (PAI-13C-SW-02) was difficult because of limited availability of surface water, especially at the time of low tide. Consequently, entrainment of sediment in the samples could not be adequately minimized, as indicated by the turbidity in the sample. The following table, which compares the concentrations of all detected metals in the surface water samples to ESVs also reflects the higher concentrations exceeding ESVs corresponding with the turbidity of the samples.

Analyte	**Surface Water Concentration (µg/L)**				**EPA Region 4 Surface Water ESV**
	PAI-13C-SW-01-01 (low tide)	**PAI-13C-SW-01-02 (high tide)**	**PAI-13C-SW-02-01 (low tide)**	**PAI-13C-SW-02-02 (hightide)**	
Arsenic	5.7 J	3.6 J	46.1 J	ND	36
Cadmium	8.4 J	17.3 J	13.2 J	11.4 J	9.3
Chromium	ND	ND	99.7	ND	50[(1)]
Copper	22.1 J	ND	55.7 J	16 J	2.9

Analyte	Surface Water Concentration (µg/L)				EPA Region 4 Surface Water ESV
	PAI-13C-SW-01-01 (low tide)	PAI-13C-SW-01-02 (high tide)	PAI-13C-SW-02-01 (low tide)	PAI-13C-SW-02-02 (hightide)	
Lead	3.5 J	3.3 J	45 J	2 J	8.5
Nickel	ND	ND	11.4 J	ND	8.3
Zinc	13.9 J	11.9 J	139 J	ND	86
Turbidity (NTU)	62	5.8	356	3.8	NA

Notes: ND= Non Detect; NA= Not Applicable; Shaded cell indicates that concentration exceeds screening criterion.
(1) Corresponds to oxidized state (VI) considering aerobic conditions in surface water

The table above shows that with the exception of copper and cadmium both of which have very low screening criteria (similar in magnitude to detection limits), none of the other metals were present at concentrations that exceeded screening criteria in the less turbid surface water samples.

7.8 CONCLUSIONS/RECOMMENDATIONS

In the three soil samples (and one duplicate sample) collected at Site 13C, one VOC, two SVOCs, and one pesticide were detected. Of these detections, chloroform and 4,4'-DDT concentrations were detected at concentrations exceeding ecological screening criteria. Additionally, of the 17 inorganics detected (excluding macronutrients), approximately one-half of the detections were found at concentrations above background values. Aluminum, arsenic, beryllium, chromium, iron, manganese, nickel, selenium, vanadium, and zinc were detected in one or more samples at concentrations above background and a human health and/or ecological screening criterion. Except for arsenic and iron, all detected concentrations were below Region 9 residential-use and/or industrial-use scenario soil PRGs.

Only arsenic and iron in soil exceeded a residential-use soil PRG. Several exceedances of ecological screening criteria in soil were observed, predominantly attributable to inorganics; however, concentrations of chemicals that exceeded ESVs are within a factor of two of established background concentrations. Furthermore, these inorganics do not biomagnify in the food chain; therefore, effects to upper food-chain receptors from terrestrial exposure to these inorganic analytes are unlikely. From the perspective of erosion of surface soil affecting sediment quality in Battle Creek, concentrations of arsenic barely exceeded the SSV of 7.24 mg/kg, however, they were less than the representative background concentration of 12 mg/kg. None of the other metals that were detected in the surface soil at the site exceeded their respective SSVs in the sediment. Therefore, it appears that the sediment quality in the

creek adjacent to the site has not been adversely affected by the erosion of soil. Consequently, no action/no further action for soil is recommended.[1]

Excluding macronutrients, 14 inorganics were detected in the groundwater downgradient of Site 13C. Arsenic, iron, manganese, and thallium was detected at concentrations exceeding their respective tap-water PRGs. Among these metals, arsenic, thallium and beryllium were also detected at concentrations exceeding their MCLs, while iron and manganese concentrations exceeded their secondary MCLs. Considering the high dissolved solids concentrations (0.4 to 0.8 percent or 4000 to 8000 mg/L compared to the typically prescribed limit of 500 mg/L), it is unlikely that the groundwater in the surficial aquifer would be used as a drinking water source. Therefore, from a human health perspective, no action/no further action is recommended for Site 13 C.

From an ecological perspective, copper, lead, nickel, and zinc were detected in the groundwater at Site 13 C at concentrations exceeding their respective surface water ESVs. However, none of these metals were detected in the groundwater at the downgradient location (PAI-04-MW-02-01) at concentrations exceeding the ESVs (except for a minor exceedance for copper), indicating that a significant degree of attenuation (dispersion, dilution, etc.) is occurring before the groundwater from Site 13 C arrives near Ballast Creek. Moreover, the metal concentrations in surface water samples (with the exception of one sample that contained high turbidity levels) did not exceed ESVs. Therefore, from an ecological perspective also, no action/no further action is recommended for groundwater at Site 13 C.

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1 No-action is equivalent to the RCRA term of “no-further action” and has been added at the request of SCDHEC.

TABLE 7-1

MONITORING WELL SUMMARY
SITE 13C - INERT DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

WELL NUMBER	DATE OF INSTALLATION	GROUND SURFACE ELEVATION (ft msl)	TOP OF RISER (TOR) ELEVATION (ft msl)	LOW TIDE DEPTH TO WATER 4/26/05 (ft below TOR)	LOW TIDE WATER LEVEL ELEVATION (ft msl)	HIGH TIDE DEPTH TO WATER 4/27/05 (ft below TOR)	HIGH TIDE WATER LEVEL ELEVATION (ft msl)	TOTAL DEPTH (ft bgs)	SCREENED INTERVAL (ft bgs)
PAI-13C-MW-03	9/8/04	8.13	10.77	6.44	4.33	6.44	4.33	13	3-13
PAI-13C-MW-04	9/8/04	7.66	10.43	6.72	3.71	6.63	3.80	13	3-13
PAI-13C-MW-05	9/8/04	6.44	8.22	5.67	2.55	5.48	2.74	13	3-13
PAI-13C-MW-06	9/8/04	9.93	13.93	6.66	7.27	6.71	7.22	6	2-6

bgs = Below ground surface
ft msl = Elevation in feet above mean sea level
All wells are permanent installations except PAI-13C-MW06, which is a piezometer.
All permanent wells were constructed of 2-inch diameter PVC screen and riser.

TABLE 7-2

SUMMARY OF GROUNDWATER QUALITY PARAMETERS COLLECTED DURING PURGING - SITE 4/SITE 13C MCRD PARRIS ISLAND, SOUTH CAROLINA

Monitoring Well	Type	Date Sampled	Temperature (°C)	pH	Specific Conductance (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (%)	Turbidity (NTU)
Well Paring 1								
PAI-13C-MW-01	Temp.	12/99	17.7	5.23	17.3	3.46	1.01	46
PAI-13C-MW-03	Perm.	9/04	23.7	5.30	14.1	4.50	0.82	0.4
Well Paring 2								
PAI-04-MW-02	Temp.	8/00	22.1	5.68	10.9	1.44	0.61	10
PAI-13C-MW-04	Perm.	9/04	22.9	6.07	7.5	3.79	0.41	2
Well Paring 3								
PAI-13C-MW-02	Temp.	12/99	13.0	4.11	17.7	4.43	1.03	514
PAI-13C-MW-05	Perm.	9/04	23.1	4.10	13.2	4.30	0.76	0.2
Temporary Monitoring Wells Not Associated with a Well Pairing								
PAI-04-MW-01	Temp.	12/99	16.8	4.25	11.1	3.68	0.62	146
PAI-04-MW-03	Temp.	8/00	24.0	5.74	9.2	1.86	0.51	50

Notes:
1. Permanent monitoring well PAI-13C-MW-03 was installed in the location of temporary well PAI-13C-MW-01. This pairing is defined as Well Pairing 1.
2. Permanent monitoring well PAI-13C-MW-04 was installed in the location of temporary well PAI-04-MW-02. This pairing is defined as Well Pairing 2.
3. Permanent monitoring well PAI-13C-MW-05 was installed in the location of temporary well PAI-13C-MW-02. This pairing is defined as Well Pairing 3.

mS/cm - milliSiemens per centimeter
mg/L - milligram per Liter
NTU - Nephlometric Turbidity Units

TABLE 7-3

SURFACE SOIL ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 13C - INERT DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SURFACE SOIL SAMPLE RESULTS				MCRD PI BACKGROUND/ TYPICAL CONC.[3]	HUMAN HEALTH SCREENING CRITERIA				EPA REGION 4 ECOLOGICAL SCREENING CRITERIA[6]
	PAI-13C-SS-03-01[1]	PAI-13C-SS-03-01-D[1]	PI-013-01(38)[2]	PI-013-02(39)[2]		EPA REGION 9 RESIDENTIAL SOIL PRGs[4]	EPA 9 REGION INDUSTRIAL SOIL PRGs[4]	EPA SSLs MIGRATION TO AIR[5]	EPA SSLs MIGRATION TO GW (DAF 1)[4]	
Volatile Organic Compounds (µg/kg)										
CHLOROFORM	ND	ND	**5 J**	**7 J**	NA	240	520	300	30	**1**
Semivolatile Organic Compounds (µg/kg)										
DIETHYL PHTHALATE	ND	ND	26 J	ND	NA	49000000	100000000	2000000	23000	100000
PYRENE	ND	ND	ND	47 J	NA	2300000	54000000	NA	210000	100
Pesticides/PCBs (µg/kg)										
4,4'-DDT	ND	**60 J**	ND	ND	34.5	1700	12000	NA	2000	**2.5**
Inorganics (mg/kg)										
ALUMINUM	**26000**	**30400**	23800	16200	24200	76000	100000	NA	NA	**50**
ARSENIC	**13.6**	**14.6**	**17.3**	7.5	12	**0.39**	**2.7**	750	**1**	**10**
BARIUM	30.3	36.1	28.1	26.9	28	5400	100000	690000	82	165
BERYLLIUM	**1.5**	**1.5**	**1.3**	0.73	0.98	150	2200	1300	3	**1.1**
CADMIUM	ND	ND	ND	0.16	0.28	37	810	1800	0.4	1.6
CALCIUM	8700	5360	9950	2760	4000	NA	NA	NA	NA	NA
CHROMIUM	**44.9**	**50.7**	**42.9**	25.7	35.2	210[7]	450[7]	270[7]	**2[7]**	**0.4**
COBALT	5.5	5.8	5.9	3.6	2.6	4700	100000	NA	NA	20
COPPER	17	17.6	12.9	12.6	10	2900	76000	NA	NA	40
IRON	**27900**	**30900**	**27600**	16400	21500	**23000**	100000	NA	NA	**200**
LEAD	25.3	28	ND	19.2	21	400	750	NA	NA	50
MAGNESIUM	4990	5540	6180	3190	6400	NA	NA	NA	NA	NA
MANGANESE	**273**	**242**	**314**	156	186	1800	32000	NA	NA	**100**
MERCURY	0.07	0.06	0.05	ND	0.09	23	610	10	NA	0.1
NICKEL	**12.1**	**13.1**	**12.5**	**7.5**	6	1600	41000	13000	**7**	30
POTASSIUM	3210	3730	3540	2090	3200	NA	NA	NA	NA	NA
SELENIUM	**0.45**	ND	ND	ND	ND	390	10000	NA	**0.3**	0.81
SODIUM	119	131	1380	695	19000	NA	NA	NA	NA	NA
THALLIUM	ND	0.47	ND	ND	0.4	5.2	130	NA	NA	1
VANADIUM	**57.7**	**62.8**	**55.4**	36.9	50	550	14000	NA	300	**2**
ZINC	**67.8**	**72.6**	**57.9**	36.9	45	23000	100000	NA	620	**50**

Notes:

1 - Sampling Date: October 6, 1999.
2 - Sampling Date: December 13, 1995.
3 - The soils in the Inert Disposal Area are dredged sediment from the Beaufort River. Therefore, sediment background values have been presented (TtNUS, 1999c).
4 - U.S. EPA Region 9 Preliminary Remediation Goals, November 2000. (Cancer benchmark value = 1×10^{-6}, HI =1.0.)
5 - U.S. EPA Soil Screening Level Guidance: Technical Background Document. May, 1996.
6 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22, 1998.
7 - Value for total chromium.

Blackened cells indicate an exceedance of background concentrations and human health and/or ecological screening criteria.

ND = Nondetect
NA = Not Applicable/Not Available

TABLE 7-4

GROUNDWATER ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SITE 13 INERT DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SAMPLE RESULTS					HUMAN HEALTH SCREENING CRITERIA		EPA REGION 4 SALTWATER SURFACE WATER ESVs (3)
	PAI-13C-GW-03-01	PAI-13C-GW-03-01-D	PAI-13C-GW-04-01	PAI-13C-GW-05-01	Downgradient PAI-04-MW-02-01	TAP WATER PRGs (1)	FEDERAL MCLs (2)	
Inorganics (ug/L)								
ALUMINUM	**9850**	**9810**	143U	**31600**	15100	36000	NA	NA
ARSENIC	**9.8 J**	**10.3 J**	2.34UJ	**13.5 J**	ND	0.045	10	36
BARIUM	26.3	26.6	20.3	21	30	2600	2000	NA
BERYLLIUM	3.6U	3.3U	0.27UJ	**5.2 J**	**ND**	73	4	NA
CADMIUM	**4.6 J**	3.97U	3.97U	3.97U	ND	18	5	9.3
CALCIUM	302000	291000	298000	271000	246000	NA	NA	NA
COBALT	6.7 J	4.36UJ	4.36UJ	7.5 J	1.4	730	NA	NA
COPPER	**60 J**	**55 J**	1.91UJ	**34 J**	**7.7**	1500	1300 (AL)	2.9
IRON	**14600**	**14100**	560U	**33700**	**5840**	11000	NA	NA
LEAD	**12.1 J**	**10.3 J**	1.7U	**13.4 J**	**ND**	NA	15 (AL)	8.5
MAGNESIUM	371000	363000	339000	294000	320000	NA	NA	NA
MANGANESE	**1410**	**1400**	**1300**	**1000**	**1730**	880	NA	NA
NICKEL	**20 J**	**14.2 J**	ND	10.8UJ	5.1	730	NA	8.3
POTASSIUM	89000	87400	93700	48200	102000	NA	NA	NA
SODIUM	3030000	2970000	1290000	2610000	1900000	NA	NA	NA
THALLIUM	4.09UJ	**5.4 J**	4.09UJ	**4.7 J**	**ND**	2.4	2	21.3
VANADIUM	13.1 J	10.6 J	4.14U	5.5 J	24	36	NA	NA
ZINC	**124**	**116**	23.4 J	**97.7**	**12.5**	11000	NA	86

Notes:
Notes:
1. U.S. EPA Region 9 Preliminary Remediation Goals, October 2004 (Cancer benchmark value= 1 x 10^{-6}, HI= 1.0)
2. U.S. EPA National Primary Drinking Water Regulations, July 2002.
3. Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion fo Stakeholders, U.S. EPA Region 4, June 23, 2004.

Shaded cell indicates concentration exceeds or more criteria
NA= Not Available
U or UJ= Not detected at the detection limit as noted
NP= Non Priority Pollutant
AL= Action Level

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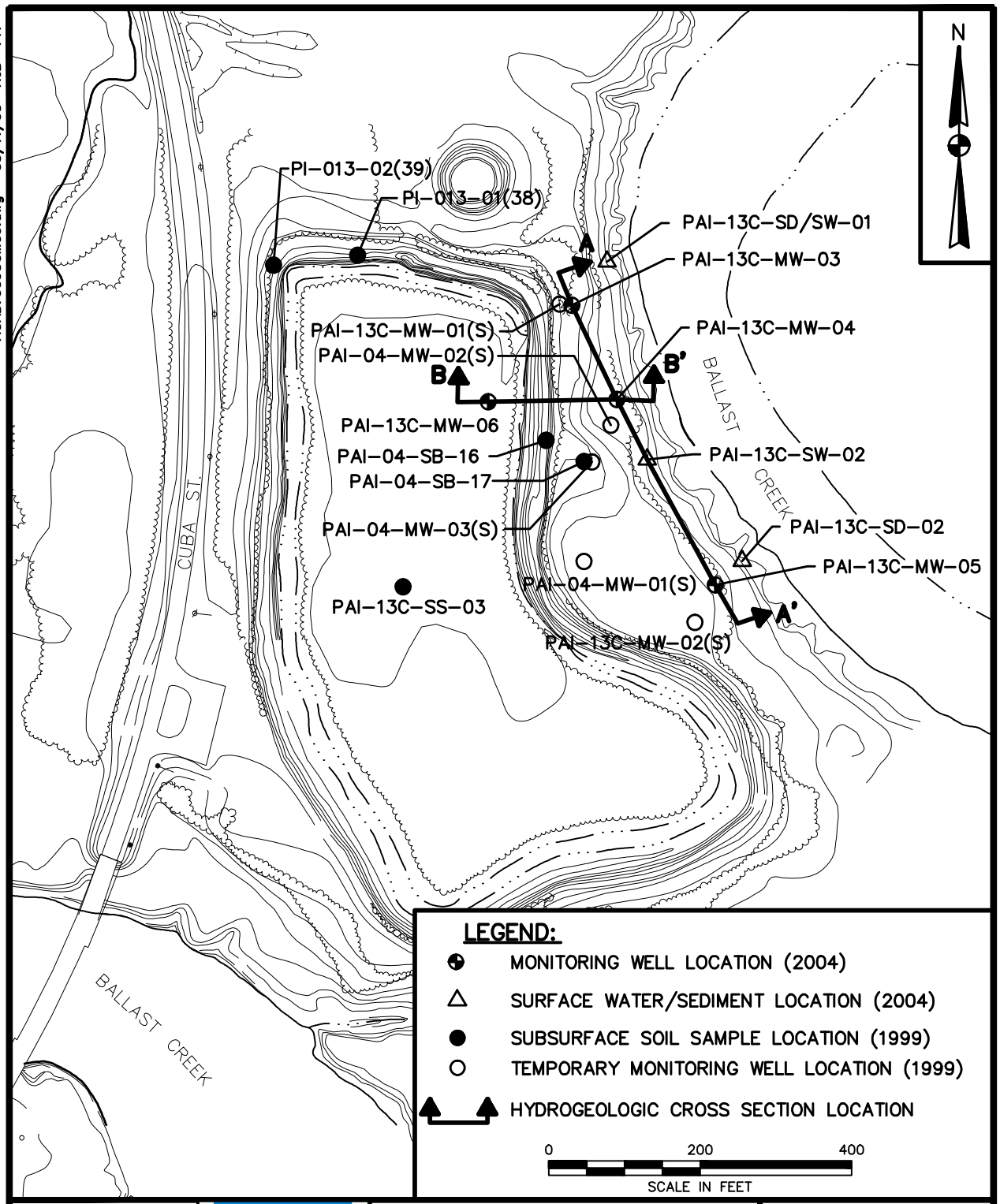

LEGEND:

- MONITORING WELL LOCATION (2004)
- SURFACE WATER/SEDIMENT LOCATION (2004)
- SUBSURFACE SOIL SAMPLE LOCATION (1999)
- TEMPORARY MONITORING WELL LOCATION (1999)
- HYDROGEOLOGIC CROSS SECTION LOCATION

0 200 400
SCALE IN FEET

DRAWN BY HJB DATE 5/10/05	NAVFAC	SITE 13C CROSS SECTION LOCATION MAP INERT DISPOSAL AREA C (DREDGE SPOILS AREA) MCRD PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095
CHECKED BY DATE			OWNER NO. 0000
REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 7-1 / REV. 0

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98

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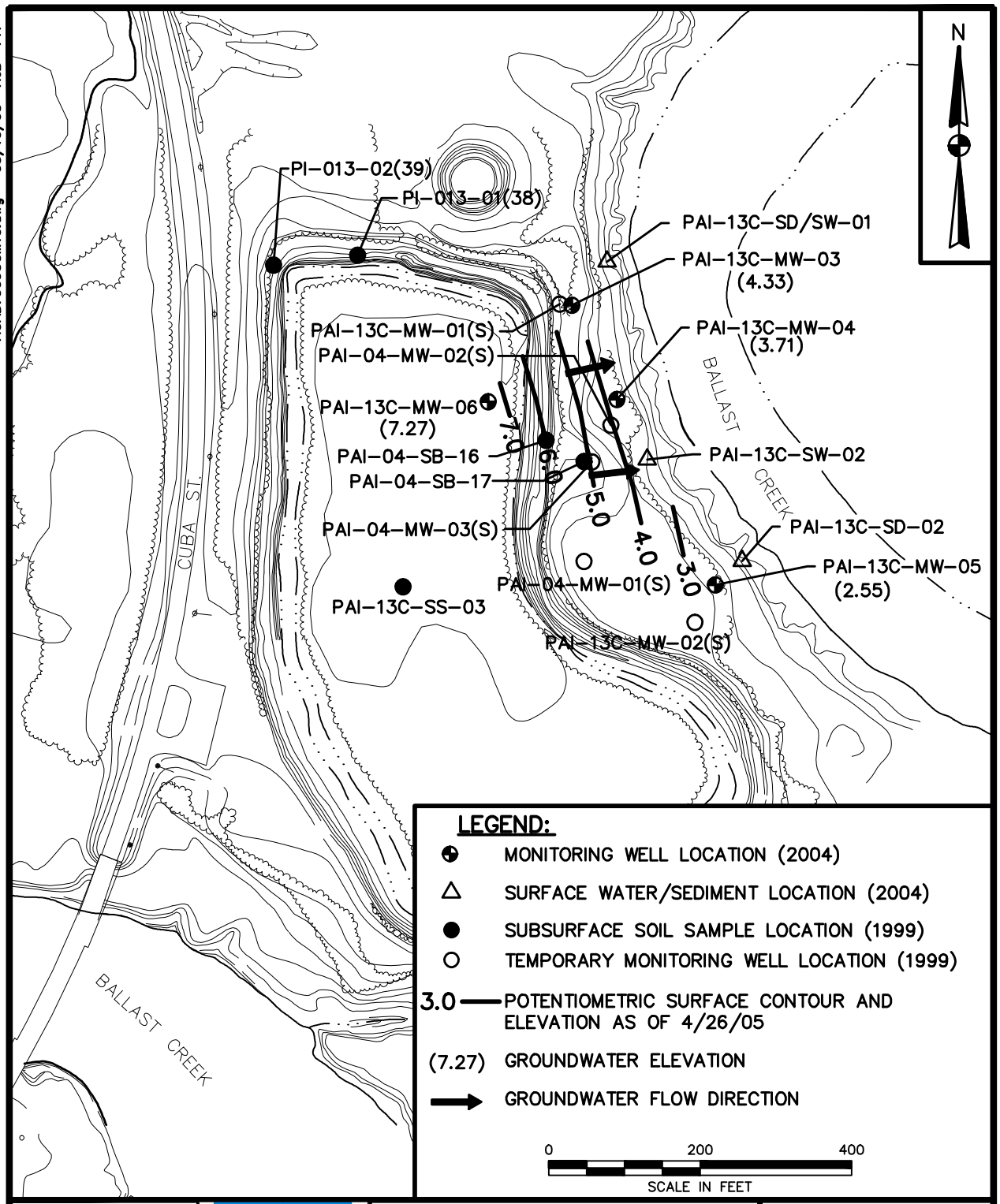


LEGEND:

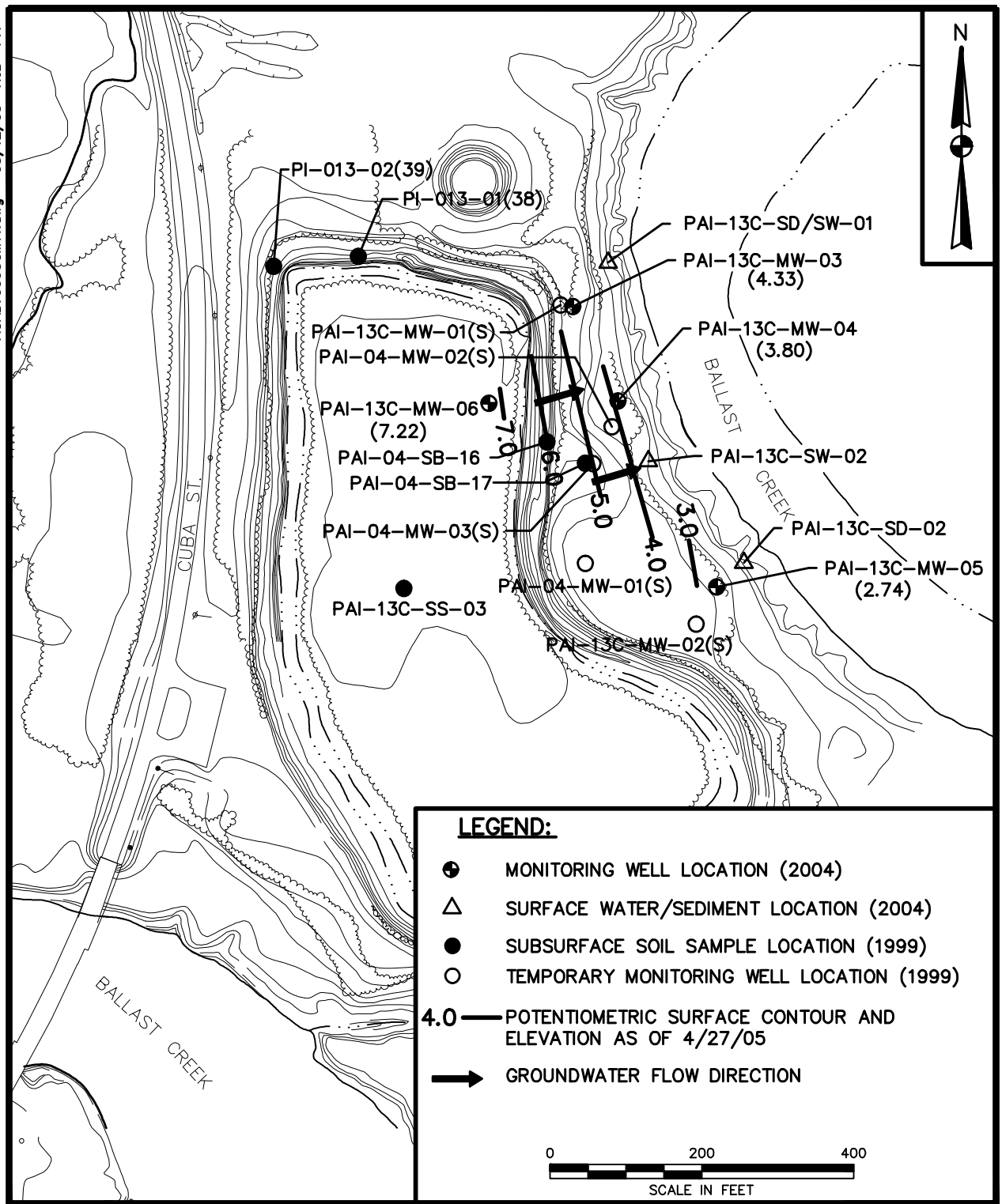
- MONITORING WELL LOCATION (2004)
- SURFACE WATER/SEDIMENT LOCATION (2004)
- SUBSURFACE SOIL SAMPLE LOCATION (1999)
- TEMPORARY MONITORING WELL LOCATION (1999)
- 3.0 — POTENTIOMETRIC SURFACE CONTOUR AND ELEVATION AS OF 4/26/05
- (7.27) GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION

0 200 400
SCALE IN FEET

DRAWN BY HJB DATE 5/10/05	NAVFAC	SITE 13C POTENTIOMETRIC SURFACE MAP LOW TIDE INERT DISPOSAL AREA C (DREDGE SPOILS AREA) MCRD PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095
CHECKED BY DATE			OWNER NO. 0000
REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 7-2 REV. 0

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98

ACAD: 0095GM11.dwg 05/12/05 HJB PIT



LEGEND:

- MONITORING WELL LOCATION (2004)
- SURFACE WATER/SEDIMENT LOCATION (2004)
- SUBSURFACE SOIL SAMPLE LOCATION (1999)
- TEMPORARY MONITORING WELL LOCATION (1999)
- 4.0 — POTENTIOMETRIC SURFACE CONTOUR AND ELEVATION AS OF 4/27/05
- GROUNDWATER FLOW DIRECTION

0 200 400
SCALE IN FEET

DRAWN BY HJB DATE 5/10/05	NAVFAC	SITE 13C POTENTIOMETRIC SURFACE MAP HIGH TIDE INERT DISPOSAL AREA C (DREDGE SPOILS AREA) MCRD PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095
CHECKED BY DATE			OWNER NO. 0000
REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 7-3 / REV. 0

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98

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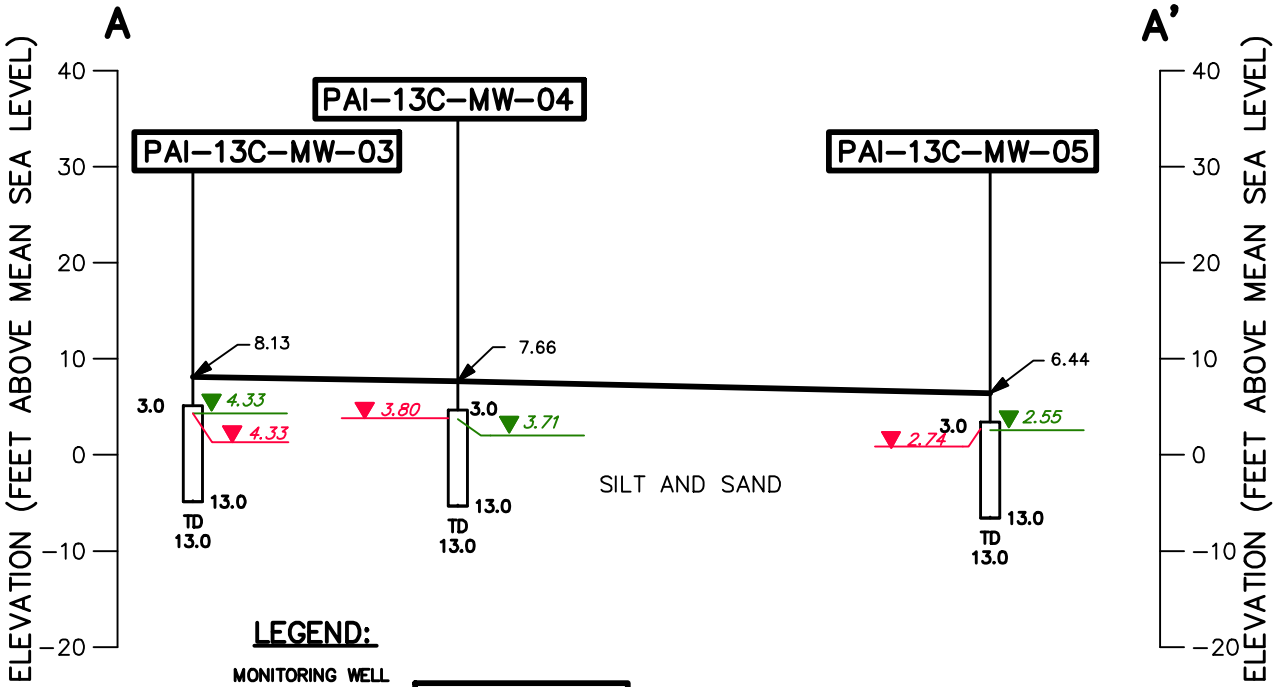

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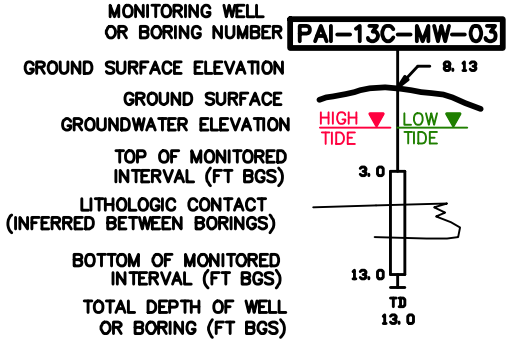

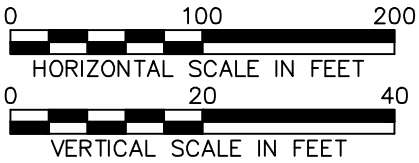

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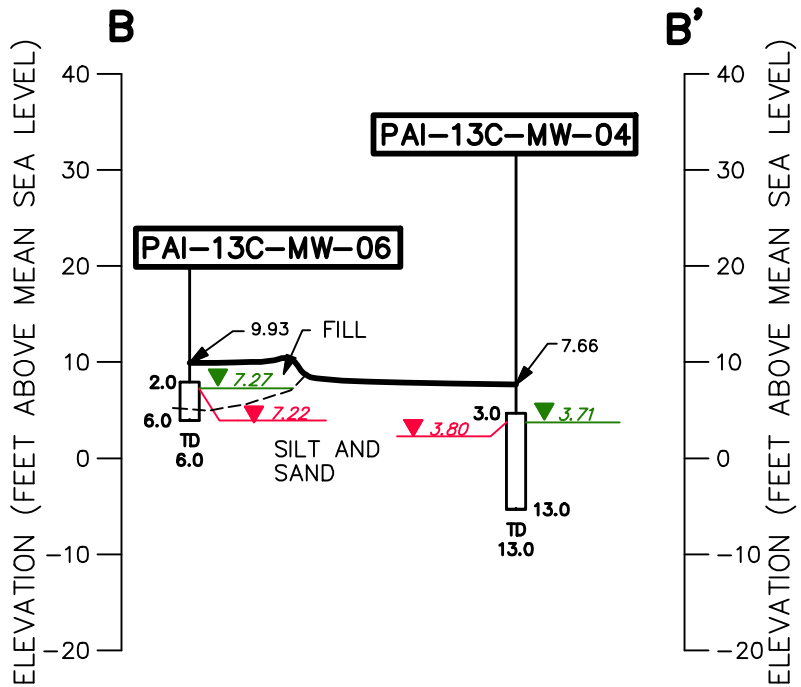
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 7−4 / REV. 0

FORM CADD NO. SDIV-AH.DWG - REV 1 - 9/10/98



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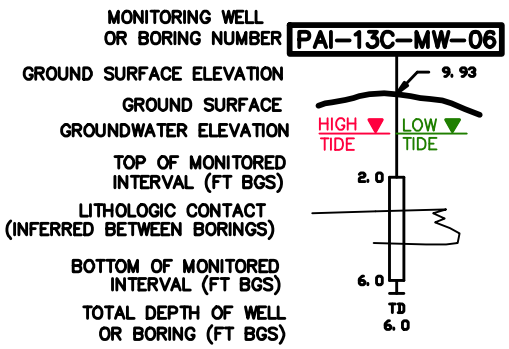

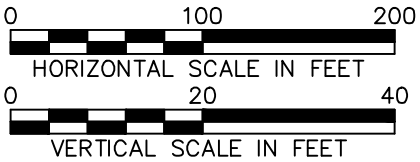

DRAWN BY HJB	DATE 5/10/05	SWMU 13C GEOLOGICAL CROSS SECTION B−B' HIGH AND LOW TIDE INERT DISPOSAL AREA C (DREDGE SPOILS AREA) MCRD PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 7−5 / REV. 0

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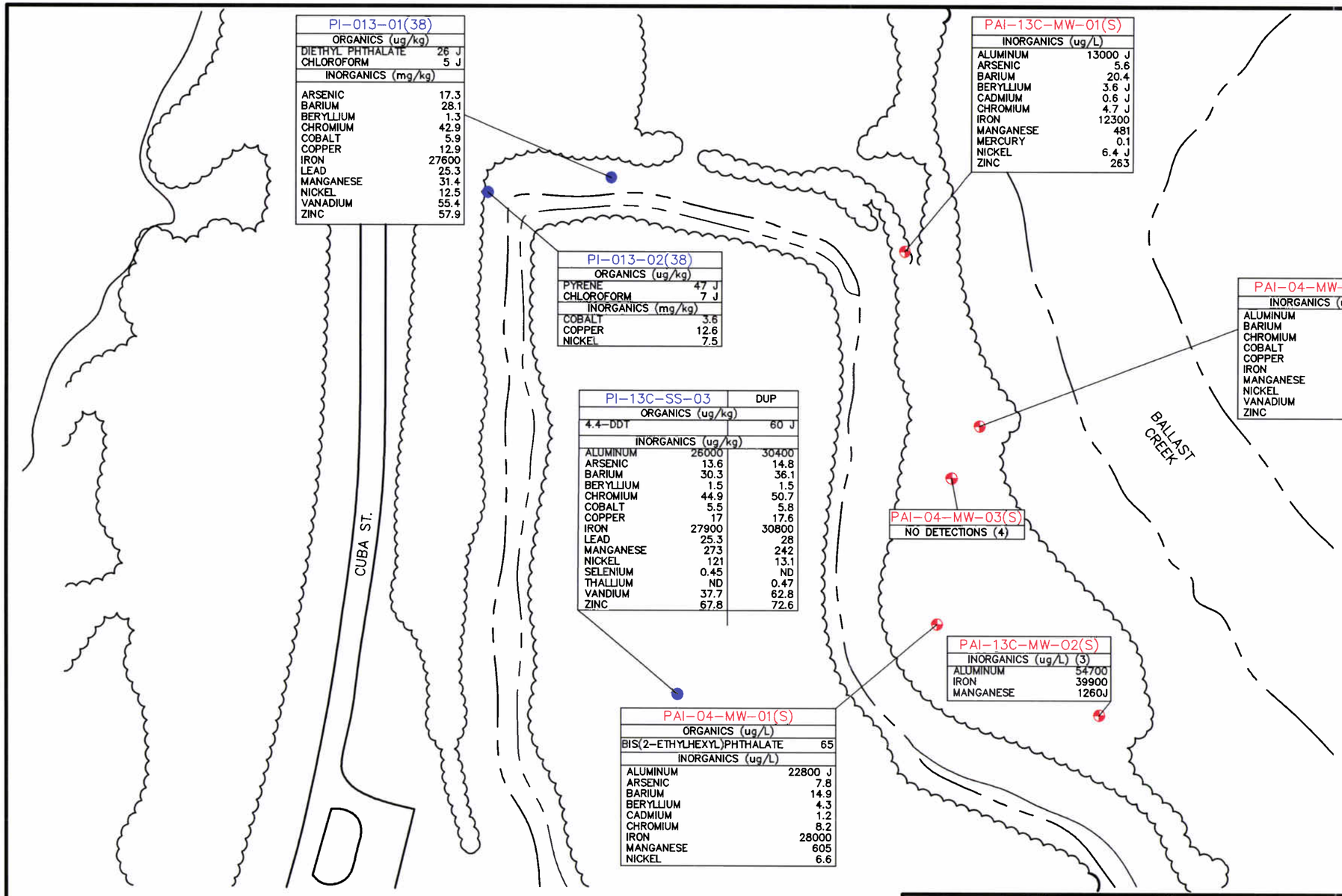

PI-013-01(38)

ORGANICS (ug/kg)	
DIETHYL PHTHALATE	26 J
CHLOROFORM	5 J
INORGANICS (mg/kg)	
ARSENIC	17.3
BARIUM	28.1
BERYLLIUM	1.3
CHROMIUM	42.9
COBALT	5.9
COPPER	12.9
IRON	27600
LEAD	25.3
MANGANESE	31.4
NICKEL	12.5
VANADIUM	55.4
ZINC	57.9

PI-013-02(38)

ORGANICS (ug/kg)	
PYRENE	47 J
CHLOROFORM	7 J
INORGANICS (mg/kg)	
COBALT	3.6
COPPER	12.6
NICKEL	7.5

PI-13C-SS-03

		DUP
ORGANICS (ug/kg)		
4,4-DDT		60 J
INORGANICS (ug/kg)		
ALUMINUM	26000	30400
ARSENIC	13.6	14.8
BARIUM	30.3	36.1
BERYLLIUM	1.5	1.5
CHROMIUM	44.9	50.7
COBALT	5.5	5.8
COPPER	17	17.6
IRON	27900	30800
LEAD	25.3	28
MANGANESE	273	242
NICKEL	121	13.1
SELENIUM	0.45	ND
THALLIUM	ND	0.47
VANDIUM	37.7	62.8
ZINC	67.8	72.6

PAI-04-MW-01(S)

ORGANICS (ug/L)	
BIS(2-ETHYLHEXYL)PHTHALATE	65
INORGANICS (ug/L)	
ALUMINUM	22800 J
ARSENIC	7.8
BARIUM	14.9
BERYLLIUM	4.3
CADMIUM	1.2
CHROMIUM	8.2
IRON	28000
MANGANESE	605
NICKEL	6.6

PAI-13C-MW-01(S)

INORGANICS (ug/L)	
ALUMINUM	13000 J
ARSENIC	5.6
BARIUM	20.4
BERYLLIUM	3.6 J
CADMIUM	0.6 J
CHROMIUM	4.7 J
IRON	12300
MANGANESE	481
MERCURY	0.1
NICKEL	6.4 J
ZINC	263

PAI-04-MW-02(S)

INORGANICS (ug/L)	
ALUMINUM	15010
BARIUM	30
CHROMIUM	23.8
COBALT	1.4
COPPER	7.7
IRON	5840
MANGANESE	1730
NICKEL	5.1
VANADIUM	24
ZINC	12.5

PAI-04-MW-03(S)

NO DETECTIONS (4)

PAI-13C-MW-02(S)

INORGANICS (ug/L) (3)	
ALUMINUM	54700
IRON	39900
MANGANESE	1260J

LEGEND:

- SURFACE SOIL SAMPLE LOCATION
- TEMPORARY MONITORING WELL LOCATION

NOTES:

1.) SOIL TAGS PRESENT INORGANIC RESULTS ABOVE SEDIMENT BACKGROUND AND DETECTED ORGANIC COMPOUNDS. GROUNDWATER TAGS PRESENT ALL DETECTED COMPOUNDS.

2.) TAGS DO NOT PRESENT DETECTED ESSENTIAL NUTRIENTS (CALCIUM, MAGNESIUM, SODIUM, AND POTASSIUM).

3.) SAMPLES ANALYZED FOR VOCs & INORGANICS.

4.) SAMPLED FOR VOCs & SVOCs ONLY.

0 100 200

SCALE: 1" = 100'

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SCALE 1"=100'	

NAVFAC

SITE 13C – SURFACE SOIL AND GROUNDWATER ANALYTICAL RESULTS INERT DISPOSAL AREA C (DREDGE SPOILS AREA) MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 0095	
OWNER NO.	
APPROVED BY	DATE
DRAWING NO. FIGURE 7-6	REV. 0

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8.0 SWMU 27-EQUIPMENT PARADE DECK SAA

8.1 SITE DESCRIPTION

SWMU 27, the Equipment Parade Deck SAA, is a 1-acre, asphalt-covered area located in the northwestern portion of MCRD Parris Island (see Figure 8-1). Its former use was as a parade ground, but the area is currently used for storage of miscellaneous equipment.

For an unknown length of time, SWMU 27 has been an area where out-of-service storage tanks, concrete cylinders, boilers, scrap metal, and piping were stored until suitable facilities for the hauling, storage, or destruction of the materials were found. An unknown amount of hazardous materials were handled on the Parade Deck; these materials may include waste petroleum products and metals. Additionally, transformers containing PCB oils were stored in the northeastern portion of the Equipment Parade Deck. The asphalt is cracked or deteriorated in several area, potentially allowing contaminants to enter the underlying soils.

SWMU 27 is located in an industrial portion of the Depot. The nearest resident lives approximately 2,000 feet south of SWMU 27. There are no day care facilities or schools within 200 feet of the site.

8.2 PREVIOUS INVESTIGATIONS

Previous investigations at SWMU 27 include the Interim RFA and Navy's relative site ranking efforts. Based on the results of these investigations, the MCRD Parris Island partnering team determined that SWMU 27 required further evaluation and recommended an SI/CS. A brief description of each previous investigation is presented below.

8.2.1 Interim RCRA Facility Assessment

In January 1990, A.T. Kearney conducted a file review of the MCRD Parris Island facility and, in February of that same year conducted a VSI of the facility, culminating in an Interim RFA report. SWMU 27 was included in the investigation. Because documentation on the site was scarce and because of stains on the asphalt (noted during the VSI), RFA Phase II sampling was recommended for the Parade Deck (Kearney, 1990).

8.2.2 Relative Site Ranking

In 1995, B&R Environmental conducted sampling and analysis of sites at MCRD Parris Island for relative site ranking purposes. Based on past records, SWMU 27 was determined to be a potential area of concern.

Two soil samples were collected at an approximate depth of six inches. The first sample [PI-027-01(46)] was collected in a low-lying area of the SAA. The asphalt was deteriorating and a dark stain was noticed at this location. The second sample [PI-027-02(47)] was collected along the northeastern edge of the Parade Deck. It was located in a grassy swale adjacent to a potential PCB-containing transformer storage site. The locations of these samples are identified in Figure 8-1.

All samples were tested for TCL VOCs, SVOCs, PCBs, pesticides, TAL metals, and cyanide. The results of the analyses, as well as the SI/CS results, are discussed in Section 8.6.

8.3 1999 INVESTIGATION

The SI/CS field investigation at SWMU 27 was conducted in December 1999. During the December investigation, three surface soil samples (PAI-27-SS-03-01, PAI-27-SS-04-01, and PAI-27-SS-05-01) were collected. PAI-27-SS-03-01 and PAI-27-SS-04-01 were collected in grassy depressions where the transformer storage site was believed to be located. PAI-27-SS-05-01 was collected in a location where cracks in the asphalt were observed. The sample locations are shown in Figure 8-2. Information collected during the investigation was used to supplement existing information at SWMU 27. The following sections discuss the activities conducted during the 1999 field investigation at SWMU 27.

8.3.1 Surface Soil Sampling

Three surface soil samples were collected at the site (Figure 8-1) in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan (TtNUS, 1999a). Samples PAI-27-SS-03-01 and PAI-27-SS-04-01 were collected 0 to 1 foot bgs using pre-cleaned disposable sampling trowels. DPT equipment was used to cut through approximately 2 inches of asphalt and 6 inches of gravel base to collect sample PAI-27-SS-05-01 at a depth of 8 to 20 inches bgs. Before the team sampled with the DPT rig, the drive head was decontaminated in accordance with the SI/CS Work Plan. A pre-cleaned disposable liner was used in conjunction with the sampling tube to collect the sample. The samples were scanned with a PID to determine the presence of organic vapors. The samples were placed in the appropriate containers on ice then later analyzed for TCL PCBs. Sample location PAI-27-SS-05 was abandoned after sampling by adding concrete patch to the hole. Sample log sheets are included in Appendix C.

8.4 SITE-SPECIFIC GEOLOGY/HYDROGEOLOGY

The site includes asphalted and grassy areas. The asphalted area consists of approximately 8 inches of asphalt and gravel underlain by sand with a varying organic content. The site topography slopes to the northwest and lies within 1,000 feet of the marsh adjacent to the Third Battalion Causeway pond. The site lies within the 100-year flood zone, as indicated in the Master Work Plan (B&R Environmental, 1998). Recharge to the groundwater in this area is through precipitation.

The aquifer of interest at SWMU 27 is the surficial aquifer. This aquifer is separated from the underlying regional Tertiary Floridan aquifer by the Hawthorn Formation, a confining unit that extends beneath Parris Island. The surficial aquifer at the base was previously used to provide the base domestic water. The surfical aquifer drains to on-site streams and tidal areas within the base. Therefore, contaminants within this unit would discharge to these site streams and tidal areas, which ultimately discharge to the Beaufort and Broad Rivers, which form Port Royal Sound.

8.5 SITE-SPECIFIC ECOLOGICAL SETTING

The entire site is paved with asphalt. Therefore, use of the site by ecological receptors is negligible. Large areas of turf grass are located north and east of the site. An isolated 400-foot by 400-foot area of large pines (*Pinus* spp.) is located south of the site. Talasea Street lies west of the site, and an area of pines and oaks (*Quercus* spp.) is located west of Talasea Street. There are no sensitive terrestrial habitats at or near the site.

An active bald eagle nest is located approximately 1,000 feet southwest of the site, and the nearest wetland is located approximately 400 feet west of the site, at the marshy edge of a large impoundment known as third Battalion Pond.

Endangered and threatened species in the vicinity of the site consist of three species that utilize the third Battalion Pond: the bald eagle (*Haliaeetus leucocephalus*), wood stork (*Mycteria americana*), and American alligator (*Alligator mississippiensis*).

8.6 SI/CS AND HISTORIC ANALYTICAL RESULTS

This section discusses the results of the relative site ranking conducted in December 1995 and the SI/CS conducted in December 1999. Figure 8-2 presents the sampling locations and analytical results. Table 8-1 also summarizes the analytical results. The table also provides a comparison of the detected concentrations to pertinent screening criteria [U.S. EPA Region 9 residential-use scenario soil PRGs,

SSLs for migration to groundwater (DAF 1) and migration to air, and U.S. EPA Region 4 soil ESVs]. Residential-use PRGs are soil concentrations equal to the lower of the ILCR of 1.0E-06 or a HQ of 1.0 for noncarcinogenic risk under residential-use scenarios.

8.6.1 VOCs

Three VOCs were detected in the soil of SWMU 27. Carbon tetrachloride (3 µg/kg) and PCE (2 J) were detected at PI-027-02(47) and chloroform (5 and 8 µg/kg) were detected in PI-027-02(47) and its duplicate sample. The chloroform detections exceeded its ESV of 1 µg/kg. No other VOC exceedance of human health or ecological screening criteria was observed. As discussed in Section 4.6.1.1, carbon tetrachloride and chloroform detections are possibly attributed to field or laboratory artifacts.

VOCs are typically considered to be fairly soluble and have a low capacity for retention by organic carbon in soil. VOCs may migrate through the soil column as infiltrating precipitation solubilizes them. Migration occurs primarily laterally with the hydraulic gradient while some portion of the chemical may be retained by the saturated soil. Once in SWMU 27 groundwater, VOCs would be expected to migrate northwest to the surface water and sediment of the pond adjacent to Malecon Drive.

VOCs were detected at low-level concentrations. Additionally, two of the three detected VOCs may be attributable to field or laboratory contaminants and the remaining VOC was below human health and ecological screening criteria. Because of the low concentrations and low rate of occurrence of VOCs observed in soils at this site, VOCs in soil will not be considered further.

8.6.2 SVOCs

Twelve SVOCs were detected at SWMU 27. Of these SVOCs, 10 were PAHs. The PAHs consist of (maximum concentration in parenthesis) benzo(a)anthracene (140 J µg/kg), benzo(a)pyrene (160 J µg/kg), benzo(b)fluoranthene (370 µg/kg), benzo(g,h,i)perylene (42 J µg/kg), chrysene (210 J µg/kg), dibenzo(a,h)anthracene (39 J), fluoranthene (270 J µg/kg), indeno(1,2,3-cd)pyrene (96 J µg/kg), phenanthrene (200 J µg/kg), and pyrene (320 J µg/kg). PAHs were detected in both PI-027-01(46) and PI-027-01(47). PAHs were not found in the duplicate sample of PI-027-02(47); however, it is likely that PAHs were not detected because of elevated detection limits from a 12.5 times dilution factor during analysis of this sample.

Only two detections of benzo(a)pyrene (maximum concentration of 160 J) exceeded a residential-use soil PRG (62 µg/kg). SSL migration to groundwater screening values were also exceeded by detections of benzo(a)anthracene (HQ = 1.8) and benzo(b)fluoranthene (HQ = 1.9). Detections of benzo(a)pyrene, fluoranthene, phenanthrene, and pyrene also exceeded ESVs with maximum HQs of 1.6, 2.7, 2.0, and 3.2

corresponding to soil location PI-027-01(46). Total PAH concentrations at both locations (total concentrations of 1,816 and 1,261µg/kg) also exceeded the total PAH ESV of 1,000 µg/kg. The presence of PAHs are likely attributable to the asphalt that has been placed in this area.

PAHs in soil are likely to bind to soil and be transported via mass transport mechanisms than to go into solution. At SWMU 27, erosion of soil to the Depot's storm sewer collection system would be expected to be a primary transport mechanism. PAHs are amenable to microbial degradation in soil. Soil degradation half lives have been reported from 102 days to 1.86 years for benzo(a)anthracene, 57 days to 1.45 years for benzo(a)pyrene, 1 to 1.67 years for benzo(b)fluoranthene, 140 to 440 days for fluoranthene, 16 to 200 for phenanthrene, and 210 days to 5.2 years for pyrene (Howard, 1991).

Two other SVOCs, bis(2-ethylhexyl)phthalate (21,000 µg/kg) and carbazole (29 J µg/kg), were detected at PI-009-01(32) and PI-009-03(34), respectively. Both were detected at concentrations below human health and ecological screening criteria.

SVOCs, predominantly PAHs, were found in the soil samples collected from SWMU 27. However, PAHs are likely associated with the asphalt that has been placed at SWMU 27. Consequently, SVOCs in soil will not be considered further.

8.6.3 Pesticides/PCBs

Five pesticides were detected in SWMU 27 soil. Endosulfan I (2 µg/kg) and gamma-chlordane (3.6 J µg/kg) were detected at one location below human health and ecological screening criteria and MCRD Parris Island typical facility concentrations. 4,4'-DDD concentrations (maximum concentration of 130 µg/kg) were found at both soil locations, and 4,4'-DDE (39 µg/kg) and 4,4'-DDT (60 µg/kg) were found at PI-027-02(47) only. These concentrations, however, are consistent with typical concentrations found throughout MCRD Parris Island related to prior base-wide pesticide application. Because this is an industrial area, pesticide use would be expected. Detected pesticide concentrations did not exceed residential-use soil PRGs.

PCBs were not detected in either the 1995 or 1999 soil samples. These results indicate that the soil of SWMU 27 has not been impacted from past use as a transformer storage area.

4,4'-DDD, 4,4'-DDE, and 4,4'-DDT are considered to be persistent chemicals and would be expected to remain for an extended period of time. Degradation soil half lives have been reported from 2 to 15.6 years for these pesticides (Howard, 1991). They undergo extensive adsorption to soil and are not highly soluble. At SWMU 27, erosion of soil to the Depot's storm sewer collection system would be expected to be a primary transport mechanism.

Because pesticide concentrations are below residential-use PRGs for protection of human health and are consistent with typical concentrations found throughout MCRD Parris Island related to base-wide pesticide application, pesticides in soil will not be considered further.

8.6.4 Inorganics

Fifteen inorganics (excluding the macronutrients calcium, magnesium, potassium, and sodium) were identified in the two soil samples collected in 1995. Of these inorganics, aluminum, iron, and manganese concentrations were detected below established MCRD Parris Island soil background values in both samples. The 12 remaining inorganics were detected at concentrations above soil background values. Detections observed above background concentrations are presented in Figure 8-2.

Only one inorganic, arsenic (average concentration of 4.1 mg/kg), exceeded background and a residential-use soil PRG (0.39 mg/kg); however, this average concentration was within a factor of 3 of arsenic's established soil background concentration (1.4 mg/kg).

Detections of antimony (0.59 mg/kg), arsenic (4.0 mg/kg), chromium (6.6 mg/kg), and selenium (0.58 mg/kg) in PI-027-02(47) and arsenic (4.2 mg/kg) in PI-027-02(47)-D were detected in soil above soil to groundwater migration screening values (0.3 mg/kg for antimony, 1 mg/kg for arsenic, 2 mg/kg for chromium, and 0.3 mg/kg for selenium). However, the maximum detection of chromium is only 1.06 times greater than background and its average concentration (6.1 mg/kg) at location PI-027-02(47) is less than chromium's established background concentration (6.2 mg/kg).

Detections of only four inorganic analytes exceeded ESVs. Chromium (6.6 mg/kg) was detected 16.5 times above its ESV of 0.4 mg/kg; however, the average detection of chromium at location PI-027-02(47) is below soil background. Similarly, vanadium [10.4 mg/kg at PI-027-01(46) and average concentration of 11.5 mg/kg at PI-027-02(47)] exceeded its ESV of 2 mg/kg, but was detected only slightly above background (9.5 mg/kg). Lead (average concentration of 61.1 mg/kg) slightly exceeded its ESV of 50 mg/kg and zinc (average concentration of 137 mg/kg) exceeded its ESV of 50 mg/kg. However, potential ecological risks likely do not exist from these compounds given the industrial setting and limited available habitat at SWMU 27. Furthermore, inorganics do not biomagnify in the food chain; therefore, effects to upper food-chain receptors are unlikely. Given these reasons inorganics will not be considered further for soil.

8.7 CONCLUSIONS/RECOMMENDATIONS

Evaluation of the soil data collected in 1995 and 1999 indicates that past use of SWMU 27 as a transformer storage area has not impacted the soil with PCBs. However, detections of inorganics above established MCRD Parris Island soil background as well as detections of organics were observed in the two surface soil samples collected in 1995 indicating that some impact has occurred. In these samples, three VOCs, 12 SVOCs, and five pesticides were detected. Of these organic detections, concentrations of chloroform, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, fluoranthene, phenanthrene, pyrene, 4,4'-DDE, 4,4'-DDE, 4,4'-DDT were observed above a human health and/or ecological screening criterion. Additionally, of the 15 inorganics identified (excluding macronutrients), antimony, arsenic, chromium, lead, selenium, vanadium, and zinc were detected in one or more samples at concentrations above background and a human health or ecological screening criterion.

Due to the proximity to and possible impact from migration of contaminants detected on Site 55 (Fiber Optic Vault), Site 27 will be addressed in an RI along with Site 55.

TABLE 8-1

SURFACE SOIL ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SWMU 27 - EQUIPMENT PARADE DECK SATELLITE STORAGE AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SOIL SAMPLE RESULTS			ESTABLISHED MCRD PI SOIL BACKGROUND/ VALUES[2]	HUMAN HEALTH SCREENING CRITERIA			EPA REGION 4 ECOLOGICAL SOIL SCREENING CRITERIA[5]
	PI-027-01(46)[1]	PI-027-02(47)[1]	PI-027-02(47)-D[1]		RESIDENTIAL-USE SOIL PRGs[3]	SSLs MIGRATION TO AIR[4]	SSLs MIGRATION TO GW (DAF 1)[3]	
Volatile Organic Compounds (µg/kg)								
CARBON TETRACHLORIDE	ND	ND	3 J	NA	240	300	3	1000000
CHLOROFORM	ND	**5 J**	**8 J**	NA	240	300	30	**1**
TETRACHLOROETHENE	ND	ND	2 J	NA	5700	11000	3	10
Semivolatile Organic Compounds (µg/kg)								
BENZO(A)ANTHRACENE	**140 J**	**110 J**	ND	NA	620	NA	**80**	NA
BENZO(A)PYRENE	**160 J**	**140 J**	ND	NA	**62**	NA	400	**100**
BENZO(B)FLUORANTHENE	**370**	**250 J**	ND	NA	620	NA	**200**	NA
BENZO(G,H,I)PERYLENE	36 J	42 J	ND	NA	NA	NA	NA	NA
BIS(2-ETHYLHEXYL)PHTHALATE	ND	ND	21000	NA	46000	31000000 (sat)	180000	NA
CARBAZOLE	29 J	ND	ND	NA	24000	NA	30	NA
CHRYSENE	210 J	150 J	ND	NA	62000	NA	8000	NA
DIBENZO(A,H)ANTHRACENE	36 J	39 J	ND	NA	62	NA	80	NA
FLUORANTHENE	**270 J**	**190 J**	ND	NA	2300000	NA	210000	**100**
INDENO(1,2,3-CD)PYRENE	74 J	96 J	ND	NA	620	NA	700	NA
PHENANTHRENE	**200 J**	74 J	ND	NA	NA	NA	NA	**100**
PYRENE	**320 J**	**170 J**	ND	NA	2300000	NA	210000	**100**
TOTAL PAHs	181 J	**1261**	0	NA	NA	NA	NA	**1000**
Pesticides/PCBs (µg/kg)								
4,4'-DDD	**130**	ND	3.9 J	33.6	2400	NA	800	**2.5**
4,4'-DDE	ND	**32**	**39**	31.6	1700	NA	3000	**2.5**
4,4'-DDT	ND	**46**	**60**	34.5	1700	NA	2000	**2.5**
ENDOSULFAN I	ND	ND	2 J	4.7	370000	NA	900	NA
GAMMA-CHLORDANE	ND	ND	3.6 J	13.2	1600[7]	20000[7]	500[7]	NA
Inorganics (mg/kg)								
ALUMINUM	2780	3680	3750	7270	76000	NA	NA	50
ANTIMONY	ND	**0.59**	ND	ND	31	NA	0.3	3.5
ARSENIC	1.4	**4**	**4.2**	1.4	**0.39**	750	1	10
BARIUM	13.8	32	31	23.6	5400	690000	82	165
CADMIUM	0.1	0.27	ND	NA	37	1800	0.4	1.6
CALCIUM	603	659	693	766.3	NA	NA	NA	NA
CHROMIUM	4.7	**6.6**	5.6	6.2	210[6]	270[6]	**2**[6]	**0.4**
COBALT	0.58	1.2	1.2	0.4	4700	NA	NA	20
COPPER	2.8	13.4	14	1.5	2900	NA	NA	40
IRON	3810	3580	3510	3920	23000	NA	NA	200
LEAD	14.9	**64.5**	**57.7**	12.5	400	NA	NA	**50**
MAGNESIUM	311	540	511	515	NA	NA	NA	NA
MANGANESE	22.6	60.6	60.2	128.5	1800	NA	NA	100
NICKEL	1.3	2.4	2.7	1.8	1600	13000	7	30
POTASSIUM	284	483	430	312.7	NA	NA	NA	NA
SELENIUM	ND	**0.55**	**0.58**	0.3	390	NA	**0.3**	0.81
SILVER	ND	0.39	0.38	ND	390	NA	2	2
VANADIUM	**10.4**	**11.5**	**11.4**	9.5	550	NA	300	**2**
ZINC	19.5	**131**	**143**	9.7	23000	NA	620	**50**

TABLE 8-1

SURFACE SOIL ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SWMU 27 - EQUIPMENT PARADE DECK SATELLITE STORAGE AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

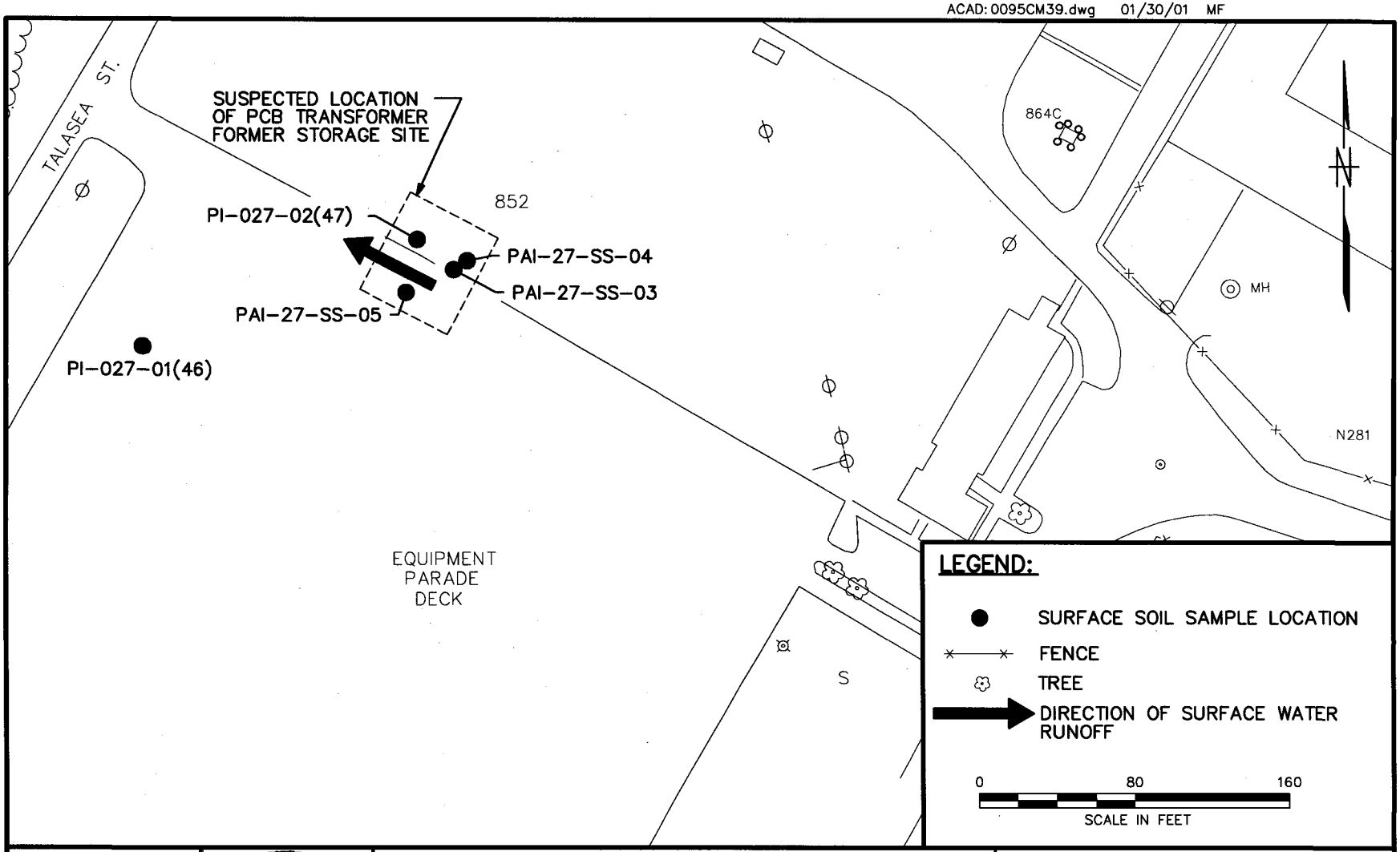
Notes:

1 - Sampling Date: December 13, 1995.
2 - Tetra Tech NUS Inc., MCRD Parris Island Site 3 Remedial Investigation (RI)/RCRA Facilities Investigation (RFI), 1999c. Please note that background equals two times the mean concentration of background samples. The calculation represents an approximate upper bound of normal metal distribution in media.
3 - U.S. EPA Region 9 Preliminary Remediatoin Goals, November 2000. (Cancer benchmark value = 1×10^{-6}, HI = 1.0.)
4 - U.S. EPA Soil Screening Level Guidance: Technical Background Document. May, 1996.
5 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22, 1998.
6 - Value for total chromium.
7 - Value for chlordane

Blackened cells indicate an exceedance of background concentrations as well as human health and/or ecological screening criteria.

ND = Nondetect
NA = Not Applicable/Not Available
J = Estimated Value

ACAD: 0095CM39.dwg 01/30/01 MF

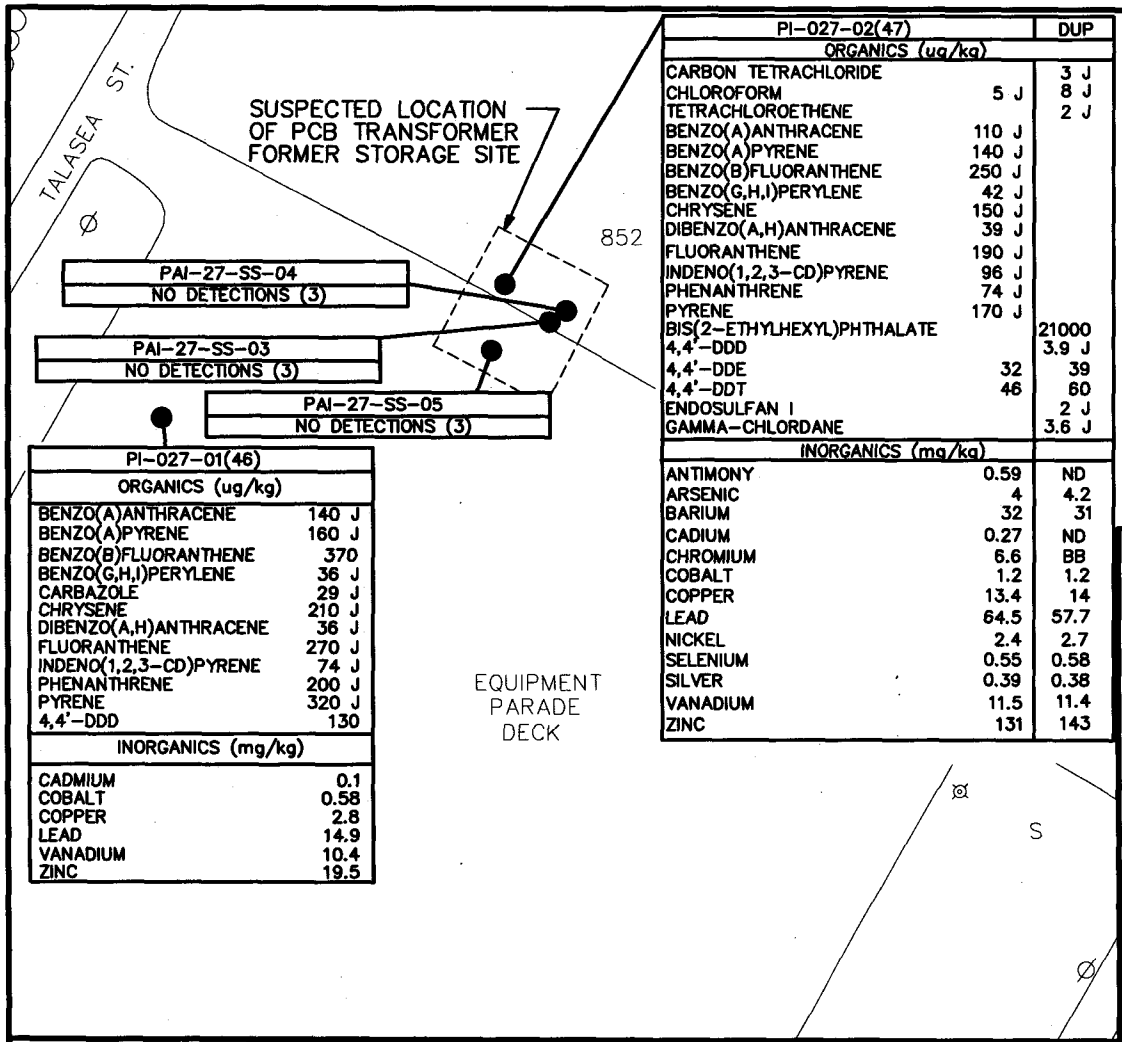


DRAWN BY HJP DATE 7/18/00	SWMU 27 LOCATION MAP EQUIPMENT PARADE DECK SAA MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095	
CHECKED BY DATE		APPROVED BY DATE	
COST/SCHED-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 8-1	REV. 0

DEPARTMENT OF THE NAVY · SOUTHERN DIV FACILITIES ENGINEERING COMD

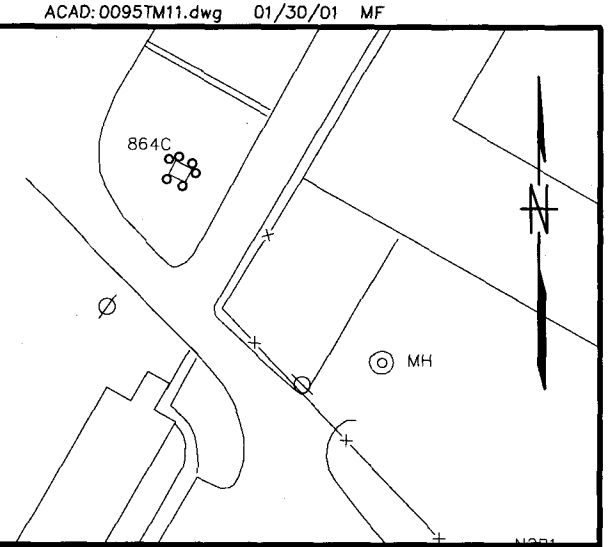
FORM CADD NO. SDIV_AH.DWG - REV 0 - 1/20/98

ACAD: 0095TM11.dwg 01/30/01 MF



PI-027-01(46)	
ORGANICS (ug/kg)	
BENZO(A)ANTHRACENE	140 J
BENZO(A)PYRENE	160 J
BENZO(B)FLUORANTHENE	370
BENZO(G,H,I)PERYLENE	36 J
CARBAZOLE	29 J
CHRYSENE	210 J
DIBENZO(A,H)ANTHRACENE	36 J
FLUORANTHENE	270 J
INDENO(1,2,3-CD)PYRENE	74 J
PHENANTHRENE	200 J
PYRENE	320 J
4,4'-DDD	130
INORGANICS (mg/kg)	
CADMIUM	0.1
COBALT	0.58
COPPER	2.8
LEAD	14.9
VANADIUM	10.4
ZINC	19.5

PI-027-02(47)		DUP
ORGANICS (ug/kg)		
CARBON TETRACHLORIDE		3 J
CHLOROFORM	5 J	8 J
TETRACHLOROETHENE		2 J
BENZO(A)ANTHRACENE	110 J	
BENZO(A)PYRENE	140 J	
BENZO(B)FLUORANTHENE	250 J	
BENZO(G,H,I)PERYLENE	42 J	
CHRYSENE	150 J	
DIBENZO(A,H)ANTHRACENE	39 J	
FLUORANTHENE	190 J	
INDENO(1,2,3-CD)PYRENE	96 J	
PHENANTHRENE	74 J	
PYRENE	170 J	
BIS(2-ETHYLHEXYL)PHTHALATE		21000
4,4'-DDD		3.9 J
4,4'-DDE	32	39
4,4'-DDT	46	60
ENDOSULFAN I		2 J
GAMMA-CHLORDANE		3.6 J
INORGANICS (mg/kg)		
ANTIMONY	0.59	ND
ARSENIC	4	4.2
BARIUM	32	31
CADIUM	0.27	ND
CHROMIUM	6.6	BB
COBALT	1.2	1.2
COPPER	13.4	14
LEAD	64.5	57.7
NICKEL	2.4	2.7
SELENIUM	0.55	0.58
SILVER	0.39	0.38
VANADIUM	11.5	11.4
ZINC	131	143



LEGEND:

- ● SURFACE SOIL SAMPLE LOCATION
- BB BELOW BACKGROUND
- ND NO DETECTION

NOTES:

1. TAGS PRESENT INORGANIC RESULTS ABOVE SOIL BACKGROUND AND DETECTED ORGANIC COMPOUNDS.
2. TAGS DO NOT PRESENT DETECTED ESSENTIAL NUTRIENTS, (CALCIUM, MAGNESIUM, POTASSIUM, AND SODIUM).
3. ANALYZED FOR PCB's ONLY.

0 80 160
SCALE IN FEET

DRAWN BY HJP DATE 7/18/00	SWMU 27 SURFACE SOIL ANALYTICAL RESULTS EQUIPMENT PARADE DECK SAA MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095
CHECKED BY DATE		APPROVED BY DATE
COST/SCHED-AREA		APPROVED BY DATE
SCALE AS NOTED		DRAWING NO. FIGURE 8-2 REV. 0

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FORM CADD NO. SDIV_AH.DWG - REV 0 - 1/20/98

9.0 SWMU 35 - DRMO SALVAGE YARD

9.1 SITE DESCRIPTION

SWMU 35 is a salvage storage yard maintained by the DRMO. SWMU 35 is located on Horse Island, northwest of MCRD Parris Island (see Figure 9-1). It is a 1.5-acre parcel, mostly covered in asphalt, with a small uncovered section where scrap metals were stored. The entire salvage yard is surrounded by a chain-link fence.

Since 1964, many recyclable materials from the MCRD and the Beaufort Marine Corps Air Station have been brought to the salvage yard. At the site, materials are stored by the DRMO until a suitable buyer is found for their recycling. The materials found on site typically are scrap metals, batteries, empty drums, expended ammunition brass, lead, fire extinguishers, and old appliances. Additionally, a lead-acid battery storage area was located within SWMU as shown on Figure 9-1. Prior to 1980, hazardous materials in drums were stored at the site; storage was for not more than 42 days at a time until a suitable buyer could be found. Unknown amounts of hazardous materials may have been handled and stored at the salvage yard since 1964.

SWMU 35 is located on the unpopulated Horse Island portion of the Depot. The nearest resident lives over 1 mile southeast of SWMU 35. There are no day care facilities or schools within 200 feet of the site.

9.2 PREVIOUS INVESTIGATIONS

Previous investigations at SWMU 35 include the Interim RFA and Navy relative site ranking efforts. Based on the results of these investigations, the MCRD Parris Island partnering team determined that SWMU 35 required further evaluation and recommended an SI/CS. A brief description of each previous investigation is presented below.

9.2.1 Interim RCRA Facility Assessment

In January 1990, A.T. Kearney conducted a file review of the MCRD Parris Island facility and, in February of that same year, conducted a VSI of the facility, culminating in an Interim RFA report. SWMU 35 was included in the investigation. They found no documentation of hazardous material spillage while the salvage yard had been in use. During the VSI, however, inspectors noticed deteriorating asphalt under a palette of used lead-acid batteries (Kearney, 1990). They determined that further investigation was necessary and recommended Phase II sampling.

9.2.2 Relative Site Ranking

In 1995, B&R Environmental conducted sampling and analysis of several sites at MCRD Parris Island for site ranking purposes. During a review of past records, SWMU 35 was determined to be a potential area of concern.

At the salvage yard, three soil samples were collected, each at an approximate depth of 6 inches. The first sample [PI-035-01(48)] was collected under an area of stained and cracked asphalt downgrade of the present unbermed transformer storage area. The second sample [PI-035-02(49)] was collected in a small drainage ditch northeast of a bermed concrete pad that supports an above-ground used oil storage tank. The final sample [PI-035-01(50)] was collected at a small depression in the southwestern corner of the salvage yard. This sample was located outside the chain-link fence, and it was believed to be the area of the greatest amount of rain runoff collection. The locations of these samples are identified in Figure 9-1.

All samples were tested for TCL VOCs, SVOCs, PCBs, pesticides, TAL metals, and cyanide. The analytical results, as well as the SI/CS results, are discussed in Section 9.6.

9.3 1999 INVESTIGATION

The SI/CS field investigation at SWMU 35 was conducted in December 1999. A temporary monitoring well was installed downgradient of the former lead-acid battery storage area and sampled (PAI-35-GW-01-01). Also three surface soil samples (PAI-35-SS-04-01, PAI-35-SS-05-01, and PAI-35-SS-06-01) were collected from the area of the former battery storage area. Samples were collected from cracks within the asphalt. The sample locations are identified in Figure 9-1. Collected information was used to supplement existing information at SWMU 35.

9.3.1 Temporary Monitoring Well Installation

Temporary monitoring well PAI-35-MW-01(S) was installed at the site by a South Carolina licensed driller employed by Columbia Technologies. The well was installed by hand using DPT equipment. The location of the temporary well was determined based on the suspected direction of groundwater flow, surface water runoff direction, and proximity to the old battery storage pad at the site. Temporary well PAI-35-MW-01(S) was driven to a depth of 16.5 feet bgs. Once driven to depth, the DPT equipment was retracted in order to extend a 3-foot-long well screen. Groundwater was encountered at approximately 13 feet bgs. The DPT boring was abandoned after sampling, in accordance with SCDHEC regulations. A thin bentonite grout was added within the DPT rods as they were removed from the boring. The boring was grouted to the surface. Prior to installation, the downhole equipment was decontaminated in

accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan (TtNUS, 1999a).

9.3.2 Surface Soil Sampling

Three surface soil samples (PAI-35-SS-04-01, PAI-35-SS-05-01, and PAI-35-SS-06-01) were collected at the locations indicated in Figure 9-1. A DPT rig was used to collect the samples at a depth of 1 foot beneath the asphalt and gravel base material. This base material extended to 12 to 14 inches bgs. Before the samples were collected, the downhole equipment was decontaminated in accordance with the Master Work Plan (B&R Environmental 1998) and the SI/CS Work Plan (TtNUS, 1999a). The collected soil was scanned with a PID and removed from the pre-cleaned disposable sleeves of the DPTs using pre-cleaned disposable trowels. No elevated PID readings were observed. The samples were placed in the appropriate sample containers on ice. The samples were analyzed for TAL metals (total), cyanide, and tin. The surface soil sample log sheet is included in Appendix C.

9.3.3 Groundwater Sampling

Groundwater was sampled using low flow sampling techniques in accordance with the Master Work Plan (B&R Environmental, 1998) and the SI/CS Work Plan (TtNUS, 1999a). A peristaltic pump and disposable tubing were used to collect groundwater from temporary monitoring well PAI-35-MW-01(S). The tubing was lowered to the approximate midpoint of the groundwater column in the temporary monitoring well at the approximate midpoint of the DPT screen. The sample containers were then placed on ice.

Groundwater-quality field parameters, including temperature, pH, specific conductance, turbidity, dissolved oxygen, and salinity, were collected during purging of the wells and recorded on low flow purge sheets and groundwater sample log sheets. The groundwater sample was collected in the appropriate containers directly from the tubing after it passed through the peristaltic pump. The samples were placed on ice. Groundwater sample PAI-35-GW-01-01 was analyzed for TAL metals (total), cyanide, tin, total dissolved solids, and groundwater-quality field parameters. The groundwater sample location is shown in Figure 9-1. Groundwater low flow purge sheets and sample log sheets are included in Appendix C.

As indicated on the groundwater sample log sheet, the pH of the groundwater at SWMU 35 was 5.03. The temperature was 20.6^{o}C. The specific conductance was 0.049 mS/cm. The salinity reading for the sample was 0.00 percent. The salinity reading indicates that the groundwater sample collected was fresh (fresh water is less than 0.048 percent salinity as identified by SCDHEC, 1998). The dissolved oxygen reading was 4.66 mg/L. The well was purged in an effort to reduce the turbidity to less than the benchmark of 5 NTUs. The groundwater sample was collected after a turbidity of 1 NTU was recorded.

9.4 SITE-SPECIFIC GEOLOGY/HYDROGEOLOGY

The site is located within the paved area of the facility on Horse Island, within the 100-year flood zone, as indicated in the Master Work Plan (B&R Environmental, 1998). Within the vicinity of the site, groundwater flow in the shallow aquifer is suspected to move toward Ribbon Creek, which is located approximately 1,000 feet southwest of the site. Subsurface soil was not collected for lithologic classification. The surface soil consisted of a fine sand. No stained soil was observed. The groundwater sample from the site exhibited a salinity reading indicative of fresh water. Recharge to the groundwater in this area is through precipitation.

The aquifer of interest at SWMU 35 is the surficial aquifer. This aquifer is separated from the underlying regional Tertiary Floridan aquifer by the Hawthorn Formation, a confining unit that extends beneath Parris Island. The surficial aquifer at the base was previously used to provide the base domestic water. The surfical aquifer drains to on-site streams and tidal areas within the base. Therefore, contaminants within this unit would discharge to these site streams and tidal areas, which ultimately discharge to the Beaufort and Broad Rivers, which form Port Royal Sound.

9.5 SITE-SPECIFIC ECOLOGICAL SETTING

With the exception of a small grassy area at the eastern end of the DRMO storage area, the entire site is covered with pavement or structures. As a result, use of the site by terrestrial receptors is negligible.

A temperate evergreen forest is located beyond the chain-link fence that surrounds the site. This forest is characterized by evergreen oaks, such as the live oak (*Quercus virginiana*) and laurel oak (*Quercus laurifolia*), and other evergreen trees and shrubs such as pine (*Pinus* spp.), southern magnolia (*Magnolia grandiflora*), red bay (*Persea borbonia*), sweet bay (*Magnolia virginiana*), yaupon holly (*Ilex vomitoria*), and saw palmetto (*Serenoa repens*). The understory includes poison ivy (*Rhus radicans*), Virginia creeper (*Parthenocissus quinquefolia*), muscadine grape (*Vitis rotundifolia*), greenbriar (*Smilax rotundifolia*), and other species. Although this forested area is not particularly sensitive or regionally important, numerous wildlife species utilize this habitat, and this habitat is part of the forested area adjacent to an MCRD-designated “Watchable Wildlife Area” near Malacon Drive.

Sensitive aquatic areas near the site consist of an inlet of Archer’s Creek, which is located approximately 400 feet northwest of the site, and Ribbon Creek, which is located approximately 350 feet south of the site. These surface water bodies provide a habitat for numerous fish, crustaceans, and other aquatic species.

The probability of terrestrial threatened and endangered species at or near the site is minimal due to the absence of appropriate habitat. However, three threatened and endangered species could occur in the surface water bodies 350 to 400 feet from the site, the bald eagle (*Haliaeetus leucocephalus*), wood stork (*Mycteria americana*), and American alligator (*Alligator mississippiensis*). An active bald eagle nest is located approximately 1 mile east of the site, and bald eagles could potentially forage on fish and waterfowl in these creeks. Wood storks and alligators forage in various areas throughout the Depot, and they could also forage in the creeks. Although common in some parts of its range, the alligator is federally listed as threatened due to its similarity in appearance to the endangered American crocodile (*Crocodylus acutus*).

9.6 SI/CS AND HISTORIC ANALYTICAL RESULTS

This section discusses the results of the SI/CS conducted in December 1999 and the relative site ranking conducted in 1995. During the SI/CS, TtNUS collected three surface soil samples at SWMU 35 and installed one DPT temporary monitoring well. During the relative site ranking investigation, B&R Environmental collected three surface soil samples. Figure 9-2 presents the sampling locations and analytical results.

9.6.1 Surface Soil

Surface soil samples were collected in areas that historically contained potentially hazardous materials, such as lead-acid batteries. The analytical results with positive detections are summarized in Table 9-1. The table also provides a comparison of the detected concentrations to pertinent screening criteria [U.S. EPA Region 9 residential-use scenario soil PRGs, SSLs for migration to groundwater (DAF 1) and migration to air, and U.S. EPA Region 4 soil ESVs]. Residential-use PRGs are soil concentrations equal to the lower of the ILCR of 1.0E-06 or a HQ of 1.0 for noncarcinogenic risk under residential-use scenarios.

9.6.1.1 VOCs

Three VOCs were detected in the soil of SWMU 35. Carbon tetrachloride (3 J µg/kg) and PCE (3 J µg/kg) were detected at PI-035-01(48) and chloroform (3 and 2 µg/kg) was detected in PI-035-01(48) and PI-035-02(49). The chloroform detections exceeded the ESV of 1 µg/kg. No other VOC exceedance of human health or ecological screening criteria was observed. As discussed in Section 4.6.1.1, carbon tetrachloride and chloroform detections are possibly attributed to field or laboratory artifacts.

VOCs are typically considered to be fairly soluble and have a low capacity for retention by organic carbon in soil. VOCs may migrate through the soil column as infiltrating precipitation solubilizes them. Migration

occurs primarily laterally with the hydraulic gradient while some portion of the chemical may be retained by the saturated soil. Once in SWMU 35 groundwater, VOCs would be expected to migrate southwest to the surface water and sediment of Ribbon Creek.

VOCs were detected at low-level concentrations. Additionally, two of the three detected VOCs may be attributable to field or laboratory contaminants and the remaining VOC was below human health and ecological screening criteria. Because of the low concentrations and low rate of occurrence of VOCs observed in soils at this site, VOCs in soil will not be considered further.

9.6.1.2 SVOCs

Seven SVOCs were detected at SWMU 35. Of these SVOCs, five were PAHs. The PAHs consist of (maximum concentration in parenthesis) benzo(b)fluoranthene (66 J µg/kg), chrysene (150 J µg/kg), fluoranthene (85 J µg/kg), phenanthrene (30 J µg/kg), and pyrene (64 J µg/kg). PAHs were detected at locations PI-035-02(49) (total PAH concentration of 77 µg/kg) and PI-035-03(50) (total PAH concentration of 300 µg/kg). The total PAH concentration in both samples were below the total PAH ESV of 1,000 µg/kg. PAHs were not detected in location PI-035-01(48). No individual PAH concentration exceeded a human health or ecological screening criterion. PAH detections are likely associated with the asphalt that has been placed at SWMU 35.

Two other SVOCs, butyl benzyl phthalate (150 J µg/kg) and di-n-butyl phthalate (5,100 µg/kg) were detected at SWMU 35. Butyl benzyl phthalate was detected below human health or ecological screening criteria and di-n-butyl phthalate was detected below human health screening criteria, but above its ESV of 200 µg/kg (U.S. EPA, 1999).

SVOCs were found in the soil samples collected from SWMU 35 at concentrations less than residential-use PRGs for the protection of human health. Additionally, only one SVOC, di-n-butyl phthalate, was found at a concentration above an ecological screening criteria. Therefore, SVOCs in soil will not be considered further.

9.6.1.3 Pesticides/PCBs

Seven pesticides were detected in SWMU 35 soil. Alpha-chlordane (17 µg/kg), endosulfan I (4 J µg/kg), endrin aldehyde (20 µg/kg), and gamma-chlordane (15 J µg/kg) were detected at one location [PI-035-03(50)] below human health and ecological screening criteria. Endrin aldehyde (7.6 J µg/kg) was also detected at PI-035-02(49) below screening criteria.

One detection of a pesticide [4,4'-DDT, 6,400 µg/kg at PI-035-01(48)] was observed above its residential-use PRG of 1,700 µg/kg. Dieldrin (7.2 J µg/kg) and 4,4'-DDT (6,400 µg/kg) also exceeded their soil to groundwater screening values (0.2 and 2,000 µg/kg, respectively). Detections of 4,4'-DDT and its breakdown product 4,4'-DDE (maximum concentrations of 6,400 and 720 µg/kg, respectively) exceeded their ESV of 2.5 µg/kg. Dieldrin (7.2 J µg/kg) also exceeded its ESV of 0.5 µg/kg.

Two PCBs were detected in the soil at SWMU 35. Aroclor-1254 and -1260 were identified in all three soil samples, with the maximum concentrations of 1,500 µg/kg and 780 J µg/kg, respectively, at PI-035-01(48). All Aroclor detections exceeded or were equal to the PCB residential-use soil PRGs (220 µg/kg) and ESV (20 µg/kg).

Pesticides were likely used at SWMU 35 for insect control due to its use as an industrial area. Additionally, pesticides and PCBs may have been stored at SWMU 35 at one time. Operations at SWMU 35 were started in 1964, 8 years prior to U.S. EPA's 1972 ban of the use of 4,4'-DDT and 13 years prior to the 1977 ban of the manufacture of PCBs. 4,4'-DDE, 4,4'-DDT, dieldrin, Aroclor-1254, and Aroclor-1260 are considered to be persistent chemicals and would be expected to remain for an extended period of time. Degradation soil half lives have been reported from 2 to 15.6 years for 4,4'-DDE and 4,4'-DDT and 175 days to 3 years for dieldrin (Howard, 1991). Both pesticides and PCBs undergo extensive adsorption to soil and are not highly soluble. At SWMU 35, erosion of contaminated soil to the south would be expected to be a primary transport mechanism.

Under current industrial conditions, chemicals in SWMU 35 soil do not pose a significant threat to human health. Concentrations of 4,4'-DDE, 4,4'-DDT, dieldrin, Aroclor-1254, and Aroclor-1260 may present potential risks to terrestrial plants and soil invertebrates. Based on the size of the area available for foraging, it is unlikely that these chemicals may pose a risk to higher food-chain receptors.

9.6.1.4 Inorganics

Three soil samples (PAI-35-SS-04, PAI-35-SS-05, and PAI-35-SS-06) were collected in December 1999 in the area where lead-acid batteries were once stored at SWMU 35. The samples were analyzed for TAL inorganics, tin, and cyanide. Of the inorganics detected, only one detection of zinc (10.8 mg/kg) and one detection of selenium (2.7 mg/kg) exceeded established soil background levels found at MCRD Parris Island. Of these two detections, only selenium slightly exceeded its soil ESV (0.81 mg/kg) and soil to groundwater screening value (0.3 mg/kg). These results indicate that past storage of lead-acid batteries at SWMU 35 has not impacted the soil of the site.

In the three soil samples collected in 1995, 17 inorganics (excluding the macronutrients calcium, magnesium, potassium, and sodium) were detected. Of these inorganics, aluminum and vanadium

concentrations were detected below established MCRD Parris Island soil background values in all three samples. The 15 remaining inorganics were detected at concentrations above soil background values. These detections are presented in Figure 9-2.

The detections of arsenic at PI-035-02(48) and PI-035-03(50) (1.8 and 2.9 mg/kg, respectively) exceeded the residential-use soil PRG of 0.39 mg/kg. However, arsenic was only detected at a factor of 2.1 times its established background concentration in soil. No other inorganic analyte exceeded a residential-use PRG.

Six inorganic analytes exceeded soil to groundwater screening values. These analytes are antimony (maximum HQ of 2.9), arsenic (2.9), cadmium (11.3), chromium (8.7), selenium (2.3), and silver (1.3). were detected in soil above soil to groundwater migration screening values. Of these inorganics, only antimony was a detected in SWMU 35 groundwater slightly above a groundwater criterion. Additionally, arsenic, chromium, and selenium were detected in soil within a factor of 3 times established soil background concentrations.

Detections of nine inorganic analytes exceeded ESVs. These analytes are cadmium (maximum HQ of 2.8), chromium (43.3), copper (1.7), iron (42.7), lead (3.3), manganese (2.5), mercury (3.1), silver (1.3), and zinc (7.4). Chromium, iron, manganese, and mercury were all detected within a factor of 3 times established soil background concentrations. Within the boundaries of SWMU 35, limited terrestrial habitat is available. If concentrations of these analytes were to migrate (e.g., erode) off site at these concentrations, potential risks to vegetation and terrestrial invertebrates may be present. However, dispersion of these chemicals would be expected if they were to migrate off site. Except for mercury, these inorganics do not biomagnify in the food chain; therefore, effects to upper food-chain receptors from these inorganic analytes are unlikely.

9.6.2 Groundwater

The analytical results from monitoring well PAI-35-GW-01-01 are summarized in Table 9-2. This table also provides a comparison of the detected concentrations to pertinent human health screening criteria (U.S. EPA Region 9 tapwater PRGs and federal MCLs/SMCLs). Tapwater PRGs consist of groundwater concentrations equal to the lower of the ILCR of 1.0E-06 or a HQ of 1.0 for noncarcinogenic risk under the potable water use scenario. Detected concentrations are also compared to U.S. EPA Region 4 surface water ESVs (fresh water). Based on the low salinity of SWMU 35 groundwater, freshwater ESVs were used for screening purposes. This ecological screening assumes that ecological receptors are exposed to the groundwater concentration of the chemical upon its discharge to surface water. However, this screening is a conservative comparison because it assumes that no dispersion of the chemical occurs during discharge to surface water.

In accordance with the work plan, the groundwater sample was analyzed for TAL metals, tin, and cyanide. Of the inorganics that were detected, only antimony exceeded a screening criterion. The antimony concentration (6.3 µg/L) slightly exceeded its MCL of 6 µg/L. No other inorganic detection exceeded a human health or ecological screening criterion. Given that groundwater contamination is minor, SWMU 35 groundwater will not be considered further.

9.7 SOIL EXCAVATION AND DISPOSAL

Kemron Environmental Services, Inc. implemented the soil excavation and disposal beginning on January 3, 2005 as outlined in the Interim Measures Work Plan prepared on September 20, 2004. Activities at the site included excavation of six inches of soil from the ground surface in an area six feet wide by the full length of the asphalt pad at the rear of the asphalt area (Figure 9-3). In addition there was a 3 foot by 3 foot location indicated by sample #16 on Figure 9-3 that was excavated to 6 inches deep. The extent of soil removal was completed under the direction of the ROICC. Dump trucks hauled the excavated soil to the Hickory Hill landfill. Soil samples were collected following excavation. The soil results were compared with the ESVs and the PRGs as presented in Table 9-3. No additional excavation or sampling was directed by the ROICC. The 3 foot by 3 foot location near sample #16 was not backfilled since the contour of the open excavation promoted storm water drainage via the drainage ditch located at the southeast corner of the asphalt area. Seeding and mulching was completed in the area of excavation for erosion control as shown in Photos 9-1 and 9-2.

9.8 CONCLUSIONS/RECOMMENDATIONS

In the six soil samples collected at SWMU 35, three VOCs, seven SVOCs, seven pesticides, and two PCBs were detected. Of these detections, chloroform, di-n-butyl phthalate, 4,4'-DDE, 4,4'-DDT, dieldrin, Aroclor-1254, and Aroclor-1260 were detected above a human health and/or ecological screening criterion. Additionally, of the 17 inorganics detected (excluding macronutrients), antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, selenium, silver, and zinc were detected at concentrations above background and a human health and/or ecological screening criterion.

In the three soil samples collected in 1999 in the area where lead-acid batteries were once stored, only one detection of selenium slightly exceeded an ecological and soil to groundwater screening criterion. These results indicate that past storage of lead-acid batteries at SWMU 35 has not impacted the soil of the site.

In most cases, the maximum concentration of detected compounds in soil was observed in sample PI-005-03(50), located in a depression in the southwestern corner of the site. Given the industrial setting of SWMU 35, chemicals in SWMU 35 soil do not pose a significant threat to human health.

Three pesticides, two PCBs, and several inorganics are present in SWMU 35 soil that may pose potential effects to ecological receptors. If concentrations of these analytes were to migrate (e.g., erode) off site, potential risks to vegetation and terrestrial invertebrates may be present. However, dispersion of these chemicals would be expected if they were to migrate off site. Most of the inorganics do not biomagnify in the food chain; therefore, effects to upper food-chain receptors from these inorganic analytes are unlikely. Based on the size of the area available for foraging, it is unlikely that organics may pose potential risks to higher food-chain receptors.

Six compounds were detected in soil above soil to groundwater screening criteria; but, of the inorganics detected in groundwater, only one detection of antimony exceeded groundwater screening criteria. The antimony concentration (6.3 µg/L) slightly exceeded the MCL of 6 µg/L.

During a team meeting on April 15, 2007, a discussion regarding the closure of Site 35 took place. Site 35 is considered an active RCRA unit due to a less than 90 day storage area located within the Site and the shelter and has achieved containment. The storage area will not be closed until MCRD closure. In order to separate the storage area from Site 35 it was suggested that a fence be placed around the storage area.

No action/no further action is recommended at this time.[1]

[1] No-action is equivalent to the RCRA term of “no-further action” and has been added at the request of SCDHEC.

TABLE 9-1

SURFACE SOIL ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SWMU 35 - DRMO SALVAGE STORAGE YARD
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SOIL SAMPLE RESULTS - 1995			ESTABLISHED MCRD PI SOIL BACKGROUND VALUES[3]	HUMAN HEALTH SCREENING CRITERIA			EPA REGION 4 ECOLOGICAL SCREENING CRITERIA[6]
	PI-035-01(48)[1]	PI-035-02(49)[1]	PI-035-03(50)[1]		REGION 9 RESIDENTIAL-USE SOIL PRGs[4]	EPA SSLs MIGRATION TO AIR[5]	EPA SSLs MIGRATION TO GW (DAF 1)[5]	
Volatile Organic Compounds (µg/kg)								
CARBON TETRACHLORIDE	3 J	ND	ND	NA	240	300	3	1000000
CHLOROFORM	**3 J**	**2 J**	ND	NA	240	300	30	**1**
TETRACHLOROETHENE	3 J	ND	ND	NA	5700	11000	3	10
Semivolatile Organic Compounds (µg/kg)								
BENZO(B)FLUORANTHENE	ND	ND	66 J	NA	620	NA	200	NA
BUTYL BENZYL PHTHALATE	ND	ND	150 J	NA	12000000	930000 (sat)	800000	NA
CHRYSENE	ND	ND	55 J	NA	62000	NA	8000	NA
DI-N-BUTYL PHTHALATE	ND	**5100**	ND	NA	6100000	2300000	270000	**200**
FLUORANTHENE	ND	42 J	85 J	NA	2300000	NA	210000	100
PHENANTHRENE	ND	ND	30 J	NA	NA	NA	NA	100
PYRENE	ND	35 J	64 J	NA	2300000	NA	210000	100
TOTAL PAHs	0	77	300	NA	NA	NA	NA	1000
Pesticides/PCBs (µg/kg)								
4,4'-DDE	**720**	**160**	**44**	31.6	1700	NA	3000	**2.5**
4,4'-DDT	**6400**	**500**	**310**	34.5	**1700**	NA	**2000**	**2.5**
ALPHA-CHLORDANE	ND	ND	17	13.9	1600[7]	20000[7]	500[7]	NA
AROCLOR-1254	**1500**	**690**	**310**	NA	**220**	NA	NA	**20**
AROCLOR-1260	**780 J**	**220 J**	**360 J**	NA	**220**	NA	NA	**20**
DIELDRIN	ND	**7.2 J**	ND	NA	30	1000	**0.2**	**0.5**
ENDOSULFAN I	ND	ND	4 J	4.7	370000	NA	900	NA
ENDRIN ALDEHYDE	ND	7.6 J	20	NA	18000	NA	NA	NA
GAMMA-CHLORDANE	ND	ND	15	13.2	1600[7]	20000[7]	500[7]	NA
Inorganics (mg/kg)								
ALUMINUM	2740	2710	3600	7270	76000	NA	NA	50
ANTIMONY	ND	ND	**0.87**	NA	31	NA	**0.3**	3.5
ARSENIC	**1.8**	1.1	**2.9**	1.4	**0.39**	NA	**1**	10
BARIUM	30	13.2	17.4	23.6	5400	690000	82	165
CADMIUM	**4.5**	ND	**3.9**	NA	37	1300	**0.4**	**1.6**
CALCIUM	456	6340	700	766.3	NA	NA	NA	NA
CHROMIUM	5.9	**8.3**	**17.3**	6.2	210[8]	270[8]	**2[8]**	**0.4**
COBALT	0.51	0.69	2.1	0.4	4700	NA	NA	20
COPPER	22.4	13	**68.9**	1.5	2900	NA	NA	**40**
IRON	2340	**4050**	**8540**	3920	23000	NA	NA	**200**
LEAD	33.9	**59.2**	**166**	12.5	400	NA	NA	**50**
MAGNESIUM	211	263	219	515	NA	NA	NA	NA
MANGANESE	94.8	66.6	**246**	128.5	1800	NA	NA	**100**
MERCURY	**0.14**	**0.15**	**0.31**	0.11	23	10	NA	**0.1**
NICKEL	4.5	3.4	6	1.8	1600	13000	7	30
POTASSIUM	81.3	174	108	312.7	NA	NA	NA	NA
SELENIUM	ND	ND	**0.69**	0.3	390	NA	**0.3**	0.81
SILVER	ND	**2.6**	ND	ND	390	NA	**2**	**2**
SODIUM	ND	ND	44.5	240.8	NA	NA	NA	NA
VANADIUM	4.3	3.7	8.4	9.5	550	NA	300	2
ZINC	**156**	**123**	**368**	9.7	23000	NA	620	**50**

TABLE 9-1

SURFACE SOIL ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SWMU 35 - DRMO SALVAGE STORAGE YARD
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SOIL SAMPLE RESULTS - 1999			ESTABLISHED MCRD PI SOIL BACKGROUND VALUES[3]	HUMAN HEALTH SCREENING CRITERIA			EPA REGION 4 ECOLOGICAL SCREENING CRITERIA[6]
	PAI-35-SS-04-01[2]	PAI-35-SS-05-01[2]	PAI-35-SS-06-01[2]		EPA REGION 9 RESIDENTIAL SOIL PRGs[4]	EPA SSLs MIGRATION TO AIR[5]	EPA SSLs MIGRATION TO GW (DAF 1)[5]	
Inorganics (mg/kg)								
ALUMINUM	3910	4010	3400	7270	76000	NA	NA	50
BARIUM	10 J	10.2 J	8.5 J	23.6	5400	690000	82	165
CALCIUM	68.2	61.4	43.7	766.3	NA	NA	NA	NA
CHROMIUM	3.4	3	2.8	6.2	210[8]	270[8]	2[8]	0.4
IRON	2150	2050	1730	3920	23000	NA	NA	200
LEAD	3.3	3.5	4.3	12.5	400	NA	NA	50
MAGNESIUM	199 J	180 J	148 J	515	NA	NA	NA	NA
MANGANESE	23.1 J	29.1 J	23.7 J	128.5	1800	NA	NA	100
MERCURY	ND	0.08	0.06	0.11	23	10	NA	0.1
NICKEL	1.7	1.5	1.6	1.8	1600	13000	7	30
POTASSIUM	ND	ND	160	312.7	NA	NA	NA	NA
SELENIUM	ND	ND	**2.7**	0.3	390	NA	**0.3**	**0.81**
SODIUM	20.8	ND	16.6	240.8	NA	NA	NA	NA
VANADIUM	3.4	2.8	2.3	9.5	550	NA	300	2
ZINC	10.8	5.8	3.8	9.7	23000	NA	620	50

Notes:

1 - Sampling Date: December 12, 1995.
2 - Sampling Date: December 16, 1999.
3 - Tetra Tech NUS Inc., MCRD Parris Island Site 3 Remedial Investigation (RI)/RCRA Facilities Investigation (RFI), 1999c. Please note that background equals two times the mean concentration of background samples. The calculation represents an approximate upper bound of normal metal distribution in media.
4 - U.S. EPA Region 9 Preliminary Remediation Goals, November 2000. (Cancer benchmark value = 1×10^{-6}, HI = 1.0.)
5 - U.S. EPA Soil Screening Level Guidance: Technical Background Document. May, 1996.
6 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22, 1998.
7 - Value for chlordane.
8 - Value for total chromium.

Blackened cells indicate an exceedance of background concentrations and human health and/or ecological screening criteria.

ND = Nondetect
NA = Not Applicable/Not Available

TABLE 9-2

GROUNDWATER ANALYTICAL RESULTS (POSITIVE DETECTIONS)
SWMU 35 - DRMO SALVAGE STORAGE YARD
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONSTITUENT	SAMPLE RESULTS	HUMAN HEALTH SCREENING CRITERIA		EPA REGION 4 SURFACE WATER ESVs(4)
	PAI-35-GW-01-01(1)	EPA REGION 9 TAP WATER RBCs(2)	FEDERAL MCLs(3)	
Inorganics (μg/L)				
ANTIMONY	**6.3**	15	**6**	160
BARIUM	13.5	2600	2000	NA
CALCIUM	6260	NA	NA	NA
POTASSIUM	924	NA	NA	NA

Notes:

1 - Sampling Date: December 14, 1999.
2 - U.S. EPA Region 3 Risk-Based Concentration Table, April 12, 1999. (Cancer benchmark value = 1×10^{-6}, HI = 1.0.)
3 - U.S. EPA Drinking Water Regulations and Health Advisories, Summer 2000.
4 - U.S. EPA Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders, December 22, 1998. Freshwater - chronic.

Bold data values indicate an exceedance of human health screening criteria.

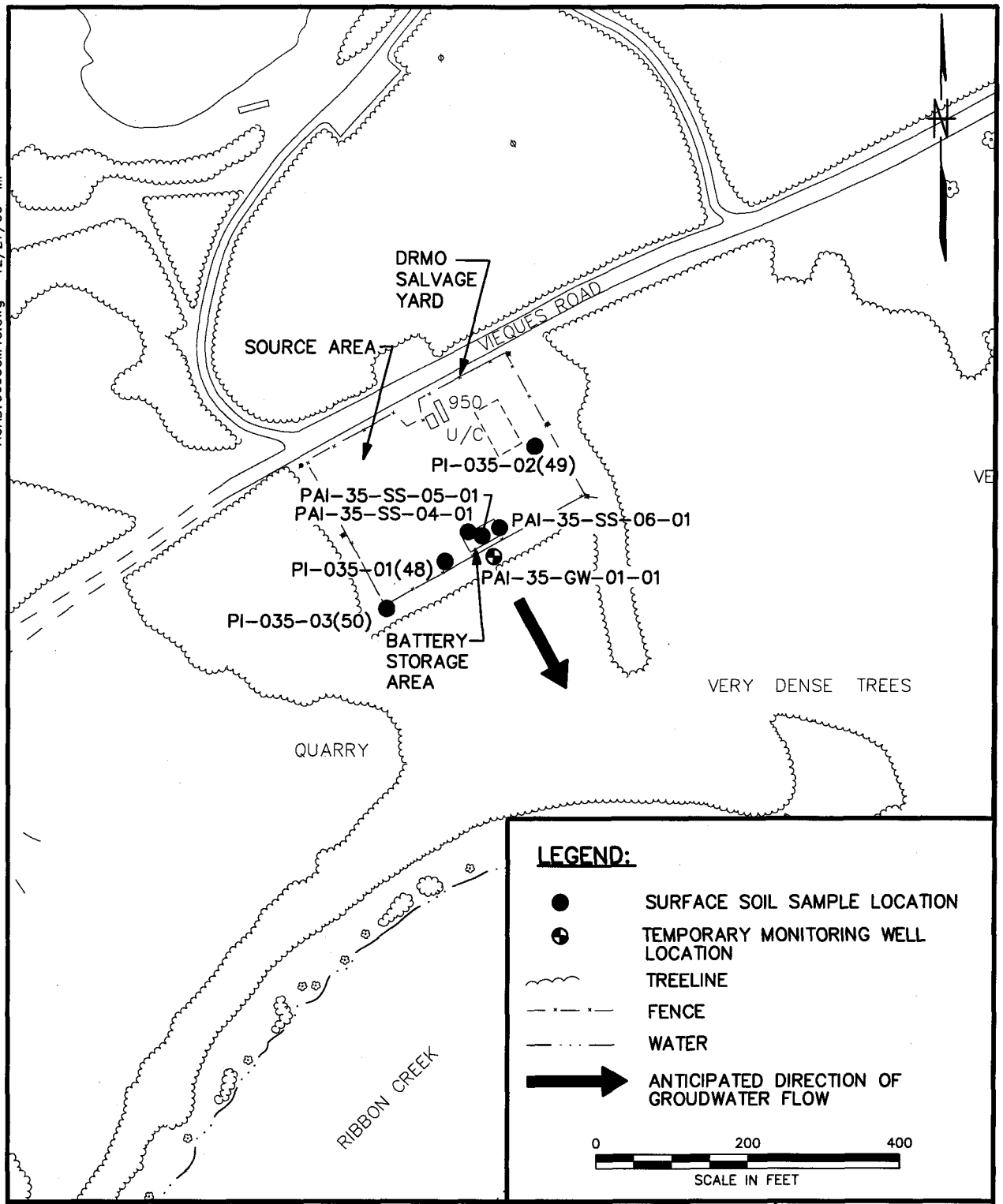
NA = Not Applicable/Not Available

TABLE 9-3

SOIL DETECTIONS ABOVE THE ECOLOGICAL SCREENING VALUES
SWMU 35 - DRMO SALVAGE STORAGE YARD
MCRD PARRIS ISLAND, SOUTH CAROLINA

Constituent	ESVs (mg/kg)	PRGs (mg/kg)	PAI-35-SS-07-01	PAI-35-SS-08-01	PAI-35-SS-09-01	PAI-35-SS-10-01	PAI-35-SS-11-01	PAI-35-SS-12-01	PAI-35-SS-13-01	PAI-35-SS-14-01	PAI-35-SS-15-01	PAI-35-SS-16-01
INORGANICS												
Aluminum	50	76,000	4,830	3,460	3,310	3,040	4,040	4,690	4,860	3,740	2,570	
Cadmium	1.6	37		-	-	-	2.6	-	-	-	2.18	-
Chromium	0.4	210	4.78	3.45	3.09	3.36	3.74	3.5	3.11	3.25	2.69	
Iron	200	23,000		2,190	2,150	2,270	2,530	2,570	2,100	2,180	1,700	2,120
Selenium	0.81	390	-	-	-	-	-	-	-	-		-
Vanadium	2	550		3.59	3.32	3	3.48	3.66	2.77	2.93	2.64	4.31
Zinc	50	23,000		-	-	-	61.9	-	-	-	69.8	-
CHLORINATED HYDROCARBONS												
PCBs (total)	0.02	22		0.134	0.036	0.0882	0.113	0.228	-	0.0237	0.075	0.102
PESTICIDES												
DDT/DDE/DDD (total)	0.0025	2.4		0.566	0.03	0.222	0.023	0.0363	0.0114	0.0228	0.0935	0.472
Total Pesticides	0.1	-		0.566	0.03	0.222	0.023	0.0363	0.0114	0.0228	0.0963	0.472

ESV = Ecological Screening Values, USEPA Region IV.
PRGs = Preliminary Remediation Goals, USEPA Region IX.
Shaded cells indicate the highest detection found.

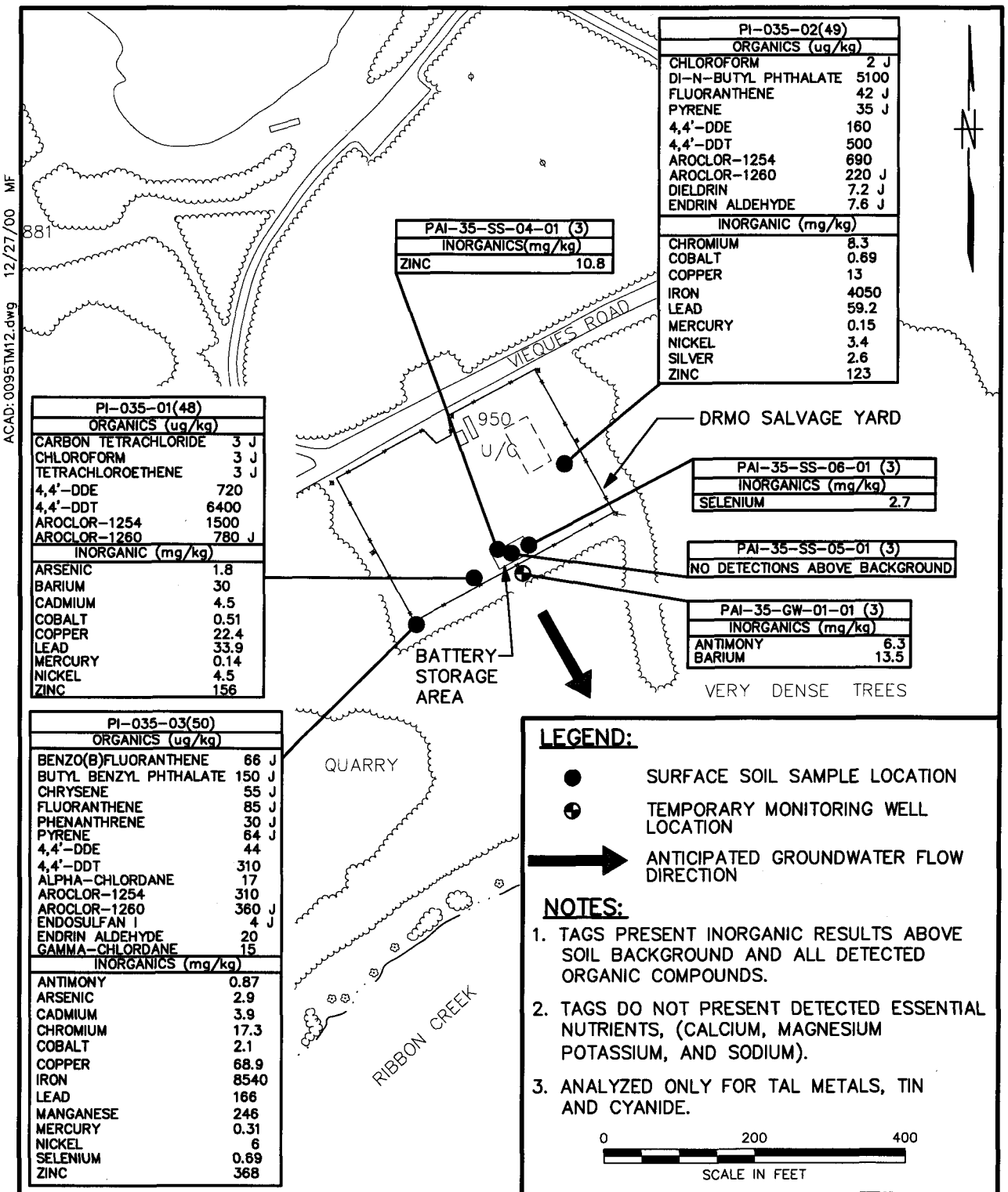


ACAD: 0095CM40.dwg 12/27/00 MF

DRAWN BY HJP DATE 7/18/00			CONTRACT NO. 0095
CHECKED BY DATE			APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 9-1 / REV. 0

SWMU 35
LOCATION MAP
DRMO SALVAGE YARD
MCRD PARRIS ISLAND
PARRIS ISLAND, SOUTH CAROLINA

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98



DRAWN BY HJP DATE 7/19/00	SWMU 35 SURFACE SOIL AND GROUNDWATER ANALYTICAL RESULTS DRMO SALVAGE YARD MCRD PARRIS ISLAND PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 0095	
CHECKED BY DATE		APPROVED BY DATE	
COST/SCHED-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 9-2	REV. 0

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

Photograph 9-1: Mulch Placement After Removal

Photograph 9-2: Mulching Complete

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APPENDIX A

ANALYTICAL DATA

A-1 SURFACE/SUBSURFACE SOIL

A-2 GROUNDWATER

A-3 SEDIMENT

A-4 SURFACE WATER

A-5 QUALITY CONTROL/QUALITY ASSURANCE

A-1

SURFACE/SUBSURFACE SOIL

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SURFACE SOIL ANALYTIC RESULTS

SITE:	SITE_05	SITE_05	SITE_09	SITE_09	SITE_09	SITE_13	SITE_13	SITE_13
LOCATION:	PI-005-01	PI-005-02	PI-009-01	PI-009-02	PI-009-03	UNDEFINED	UNDEFINED	PI-013-01
MATRIX:	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PI-005-01(28)	PI-005-02(29)	PI-009-01(32)	PI-009-02(33)	PI-009-03(34)	PAI-13C-SS-03-01	PAI-13C-SS-03-01-D	PI-013-01(38)
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM	NM	NM	NM
COLLECTION DATE:	19951213	19951213	19951212	19951212	19951212	19991006	19991006	19951213
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084	020	020	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
INORGANIC (MG/KG)								
ALUMINUM	5690	8920	4680	5380	1620	26000	30400	23800
ANTIMONY	0.47 U	0.53 U	0.36 U	4.7	0.47 U	0.45 U	0.47 U	0.65 U
ARSENIC	8.3	3.9	0.92	8.4	7.3	13.6	14.6	17.3
BARIUM	101	23.8	20.4	104	15	30.3	36.1	28.1
BERYLLIUM	0.02 U	0.021 U	0.21 U	3.7	0.19 U	1.5	1.5	1.3
CADMIUM	0.59	0.31 U	0.17 U	3.1	0.3 U	0.04 U	0.04 U	0.26 U
CALCIUM	2210	1010	1140	5030	366	8700	5360	9950
CHROMIUM	461	206	4	105	4.5	44.9	50.7	42.9
COBALT	15.8	4.9	0.99	23.5	0.58	5.5	5.8	5.9
COPPER	385	15.3	9.8	615	7.2	17	17.6	12.9
CYANIDE	0.55 U	0.56 U	0.51 U	0.54 U	0.5 U			0.85 U
IRON	10500	6850	3240	16700	1460	27900	30900	27600
LEAD	172	23.2 U	12.7 U	826	51	25.3	28	20 U
MAGNESIUM	1150	1230	489	871	105	4990	5540	6180
MANGANESE	57.5	43.6	73.4	178	19.6	273	242	314
MERCURY	0.13	0.04	0.05 U	0.4	0.05 U	0.07	0.06	0.05
NICKEL	1350	429	2.3	253	4	12.1	13.1	12.5
POTASSIUM	353	392	662	541	71.3	3210	3730	3540
SELENIUM	0.71	0.47 U	0.32 U	0.91	0.41 U	0.45	0.38 U	0.57 U
SILVER	0.13 U	0.15 U	0.1 U	0.56	0.13 U	0.08 U	0.08 U	0.18 U
SODIUM	849	372	185	715	56.1	119	131	1380
THALLIUM	0.43 U	0.49 U	0.33 U	0.41 U	0.43 U	0.45 U	0.47	0.59 U
TIN						2.4 U	2.8 U	
VANADIUM	11800	2030	5.1	12.9	3.2	57.7	62.8	55.4
ZINC	162	140	72.3	3490	357	67.8	72.6	57.9
SEMIVOLATILE (UG/KG)								
1,2,4-TRICHLOROBENZENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
1,2-DICHLOROBENZENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
1,3-DICHLOROBENZENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
1,4-DICHLOROBENZENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
2,2'-OXYBIS(1-CHLOROPROPANE)	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
2,4,5-TRICHLOROPHENOL	920 U	920 U	870 U	910 U	880 U	2100 U	2200 U	1400 U
2,4,6-TRICHLOROPHENOL	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
2,4-DICHLOROPHENOL	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
2,4-DIMETHYLPHENOL	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
2,4-DINITROPHENOL	920 U	920 U	870 U	910 U	880 U	2100 U	2200 U	1400 U
2,4-DINITROTOLUENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
2,6-DINITROTOLUENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
2-CHLORONAPHTHALENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
2-CHLOROPHENOL	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
2-METHYLNAPHTHALENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
2-METHYLPHENOL	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
2-NITROANILINE	920 U	920 U	870 U	910 U	880 U	2100 U	2200 U	1400 U
2-NITROPHENOL	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
3,3'-DICHLOROBENZIDINE	360 U	360 U	350 U	360 U	350 U	860 U	860 U	570 U

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SITE:	SITE_05	SITE_05	SITE_09	SITE_09	SITE_09	SITE_13	SITE_13	SITE_13
LOCATION:	PI-005-01	PI-005-02	PI-009-01	PI-009-02	PI-009-03	UNDEFINED	UNDEFINED	PI-013-01
MATRIX:	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PI-005-01(28)	PI-005-02(29)	PI-009-01(32)	PI-009-02(33)	PI-009-03(34)	PAI-13C-SS-03-01	PAI-13C-SS-03-01-D	PI-013-01(38)
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM	NM	NM	NM
COLLECTION DATE:	19951213	19951213	19951212	19951212	19951212	19991006	19991006	19951213
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084	020	020	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
3-NITROANILINE	920 UR	920 U	870 UR	910 U	880 UR	2100 U	2200 U	1400 U
4,6-DINITRO-2-METHYLPHENOL	920 U	920 U	870 U	910 U	880 U	2100 U	2200 U	1400 U
4-BROMOPHENYLPHENYLETHER	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
4-CHLORO-3-METHYLPHENOL	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
4-CHLOROANILINE	360 U	360 U	350 UJ	360 U	350 UJ	430 U	430 U	570 U
4-CHLOROPHENYLPHENYLETHER	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
4-METHYLPHENOL	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
4-NITROANILINE	920 U	920 U	870 U	910 U	880 U	2100 U	2200 U	1400 U
4-NITROPHENOL	920 U	920 U	870 U	910 U	880 U	2100 U	2200 U	1400 U
ACENAPHTHENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
ACENAPHTHYLENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
ANTHRACENE	19 J	23 J	350 U	360 U	350 U	430 U	430 U	570 U
BENZO(A)ANTHRACENE	79 J	47 J	350 U	310 J	44 J	430 U	430 U	570 U
BENZO(A)PYRENE	130 J	34 J	350 U	580	38 J	430 U	430 U	570 U
BENZO(B)FLUORANTHENE	180 J	120 J	350 U	610	52 J	430 U	430 U	570 U
BENZO(G,H,I)PERYLENE	360 U	360 U	350 U	380	350 U	430 U	430 U	570 U
BENZO(K)FLUORANTHENE	170 J	100 J	350 U	560	40 J	430 U	430 U	570 U
BIS(2-CHLOROETHOXY)METHANE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
BIS(2-CHLOROETHYL)ETHER	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
BIS(2-ETHYLHEXYL)PHTHALATE	530 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
BUTYLBENZYLPHTHALATE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
CARBAZOLE	51 J	360 U	350 U	360 U	34 J	430 U	430 U	570 U
CHRYSENE	130 J	140 J	350 U	420	56 J	430 U	430 U	570 U
DI-N-BUTYLPHTHALATE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
DI-N-OCTYLPHTHALATE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
DIBENZO(A,H)ANTHRACENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
DIBENZOFURAN	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
DIETHYLPHTHALATE	19 J	21 J	350 U	360 U	350 U	430 U	430 U	26 J
DIMETHYLPHTHALATE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
FLUORANTHENE	140 J	160 J	350 U	300 J	100 J	430 U	430 U	570 U
FLUORENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
HEXACHLOROBENZENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
HEXACHLOROBUTADIENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
HEXACHLOROCYCLOPENTADIENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
HEXACHLOROETHANE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
INDENO(1,2,3-CD)PYRENE	360 U	360 U	350 U	470	350 U	430 U	430 U	570 U
ISOPHORONE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
N-NITROSO-DI-N-PROPYLAMINE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
N-NITROSODIPHENYLAMINE	47 J	360 U	350 U	360 U	350 U	430 U	430 U	570 U
NAPHTHALENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
NITROBENZENE	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
PENTACHLOROPHENOL	920 U	920 U	23 J	910 U	880 U	2100 U	2200 U	1400 U
PHENANTHRENE	79 J	52 J	350 U	39 J	53 J	430 U	430 U	570 U
PHENOL	360 U	360 U	350 U	360 U	350 U	430 U	430 U	570 U
PYRENE	140 J	170 J	350 U	460	64 J	430 U	430 U	570 U

VOLATILE (UG/KG)

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CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SURFACE SOIL ANALYTIC RESULTS

SITE:	SITE_05	SITE_05	SITE_09	SITE_09	SITE_09	SITE_13	SITE_13	SITE_13
LOCATION:	PI-005-01	PI-005-02	PI-009-01	PI-009-02	PI-009-03	UNDEFINED	UNDEFINED	PI-013-01
MATRIX:	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PI-005-01(28)	PI-005-02(29)	PI-009-01(32)	PI-009-02(33)	PI-009-03(34)	PAI-13C-SS-03-01	PAI-13C-SS-03-01-D	PI-013-01(38)
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM	NM	NM	NM
COLLECTION DATE:	19951213	19951213	19951212	19951212	19951212	19991006	19991006	19951213
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084	020	020	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
1,1,1-TRICHLOROETHANE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
1,1,2,2-TETRACHLOROETHANE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
1,1,2-TRICHLOROETHANE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
1,1-DICHLOROETHANE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
1,1-DICHLOROETHENE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
1,2-DICHLOROETHANE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
1,2-DICHLOROETHENE (TOTAL)	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
1,2-DICHLOROPROPANE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
2-BUTANONE	12 U	11 U	10 U	11 U	10 U	9 UR	10 UR	16 U
2-HEXANONE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
4-METHYL-2-PENTANONE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
ACETONE	12 U	11 U	10 U	11 U	10 U	9 UR	10 UR	16 U
BENZENE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
BROMODICHLOROMETHANE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
BROMOFORM	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
BROMOMETHANE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
CARBON DISULFIDE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
CARBON TETRACHLORIDE	2 J	11 U	10 U	6 J	10 U	9 U	10 U	16 U
CHLOROBENZENE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
CHLOROETHANE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
CHLOROFORM	6 J	11 U	10 U	11	10 U	9 U	10 U	5 J
CHLOROMETHANE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
CIS-1,3-DICHLOROPROPENE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
DIBROMOCHLOROMETHANE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
ETHYLBENZENE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
METHYLENE CHLORIDE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
STYRENE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
TETRACHLOROETHENE	12 U	11 U	10 U	2 J	2 J	9 U	10 U	16 U
TOLUENE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
TRANS-1,3-DICHLOROPROPENE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
TRICHLOROETHENE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
VINYL CHLORIDE	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
XYLENES, TOTAL	12 U	11 U	10 U	11 U	10 U	9 U	10 U	16 U
PESTICIDE/PCB (UG/KG)								
4,4'-DDD	11 U	3.7 U	35 U	97 U	110 U	22 U	21 U	5.7 U
4,4'-DDE	19 J	3.7 U	56	210	2300	22 U	21 U	5.7 U
4,4'-DDT	42	1.8 J	180	680	4200	22 UJ	60 J	5.7 U
ALDRIN	5.7 U	1.9 U	18 U	9.3 U	36 U	11 U	10 U	2.9 U
ALPHA-BHC	5.7 U	1.9 U	18 U	9.3 U	36 U	11 U	10 U	2.9 U
ALPHA-CHLORDANE	62	1.6 J	42 U	300	62 U	11 U	10 U	2.9 U
AROCLOR-1016	110 U	37 U	350 U	180 U	700 U	11 U	10 U	57 U
AROCLOR-1221	220 U	74 U	700 U	370 U	1400 U	11 U	10 U	120 U
AROCLOR-1232	110 U	37 U	350 U	180 U	700 U	11 U	10 U	57 U
AROCLOR-1242	110 U	37 U	350 U	180 U	700 U	11 U	10 U	57 U
AROCLOR-1248	110 U	37 U	350 U	180 U	700 U	11 U	10 U	57 U
AROCLOR-1254	110 U	37 U	350 U	180 U	700 U	11 U	10 U	57 U

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CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SURFACE SOIL ANALYTIC RESULTS

SITE:	SITE_05	SITE_05	SITE_09	SITE_09	SITE_09	SITE_13	SITE_13	SITE_13
LOCATION:	PI-005-01	PI-005-02	PI-009-01	PI-009-02	PI-009-03	UNDEFINED	UNDEFINED	PI-013-01
MATRIX:	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PI-005-01(28)	PI-005-02(29)	PI-009-01(32)	PI-009-02(33)	PI-009-03(34)	PAI-13C-SS-03-01	PAI-13C-SS-03-01-D	PI-013-01(38)
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM	NM	NM	NM
COLLECTION DATE:	19951213	19951213	19951212	19951212	19951212	19991006	19991006	19951213
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084	020	020	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
AROCLOR-1260	110 J	37 U	350 U	810 J	700 U	11 U	10 U	57 U
BETA-BHC	5.7 U	1.9 U	18 U	9.3 U	36 U	11 U	10 U	2.9 U
DELTA-BHC	5.7 U	1.9 U	18 U	9.3 U	36 U	11 U	10 U	2.9 U
DIELDRIN	11 U	3.7 U	35 U	18 U	70 U	22 U	21 U	5.7 U
ENDOSULFAN I	5.7 J	2.8	18 U	11 R	36 U	11 U	10 U	2.9 U
ENDOSULFAN II	11 U	3.7 U	35 U	35 U	70 U	22 U	21 U	5.7 U
ENDOSULFAN SULFATE	11 U	3.7 U	35 U	35 U	70 U	22 U	21 U	5.7 U
ENDRIN	11 U	3.7 U	35 U	20 U	70 U	22 U	21 U	5.7 U
ENDRIN ALDEHYDE	11 U	3.7 U	35 U	18 U	70 U	22 U	21 U	5.7 U
ENDRIN KETONE	11 U	3.7 U	35 U	25 U	70 U	22 U	21 U	5.7 U
GAMMA-BHC (LINDANE)	5.7 U	1.9 U	18 U	9.3 U	36 U	11 U	10 U	2.9 U
GAMMA-CHLORDANE	58	1.7 J	49	430	74	11 U	10 U	2.9 U
HEPTACHLOR	5.7 U	1.9 U	18 U	9.3 U	36 U	11 U	10 U	2.9 U
HEPTACHLOR EPOXIDE	5.7 U	1.9 U	18 U	9.3 U	36 U	11 U	10 U	2.9 U
METHOXYCHLOR	57 U	19 U	180 U	93 U	360 U	110 U	100 U	29 U
TOXAPHENE	570 U	190 U	1800 U	930 U	3600 U	220 U	210 U	290 U

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CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SURFACE SOIL ANALYTIC RESULTS

SITE:	SITE_13	SITE_27	SITE_27	SITE_27	SITE_27	SITE_27	SITE_27	SITE_35
LOCATION:	PI-013-02	UNDEFINED	UNDEFINED	UNDEFINED	PI-027-01	PI-027-02	PI-027-02	UNDEFINED
MATRIX:	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PI-013-02(39)	PAI-27-SS-03-01	PAI-27-SS-04-01	PAI-27-SS-05-01	PI-027-01(46)	PI-027-02(47)	PI-027-02(47)-D	PAI-35-SS-04-01
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM	NM	NM	NM
COLLECTION DATE:	19951213	19991216	19991216	19991216	19951213	19951213	19951213	19991216
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084	084	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
INORGANIC (MG/KG)								
ALUMINUM	16200				2780	3680	3750	3910
ANTIMONY	0.74 U				0.53 U	0.59	0.53 U	2.7 UJ
ARSENIC	7.5				1.4	4	4.2	2 U
BARIUM	26.9				13.8	32	31	10 J
BERYLLIUM	0.73				0.11 U	0.2 U	0.25 U	0.13 U
CADMIUM	0.16				0.1	0.27	0.31 U	0.3 U
CALCIUM	2760				603	659	693	68.2
CHROMIUM	25.7				4.7	6.6	5.6	3.4
COBALT	3.6				0.58	1.2	1.2	0.51 U
COPPER	12.6				2.8	13.4	14	0.92 U
CYANIDE	0.74 U				0.44 U	0.58 U	0.49 U	0.51 U
IRON	16400				3810	3580	3510	2150
LEAD	19.2				14.9	64.5	57.7	3.3
MAGNESIUM	3190				311	540	511	199 J
MANGANESE	156				22.6	60.6	60.2	23.1 J
MERCURY	0.07 U				0.05 U	0.04 U	0.04 U	0.05 U
NICKEL	7.5				1.3	2.4	2.7	1.7
POTASSIUM	2090				284	483	430	138 U
SELENIUM	0.65 U				0.47 U	0.55	0.58	2.9 U
SILVER	0.21 U				0.15 U	0.39	0.38	0.37 U
SODIUM	695				39.6 U	37 U	39.5 U	20.8
THALLIUM	0.68 U				0.49 U	0.46 U	0.49 U	7 U
TIN								1.9 U
VANADIUM	36.9				10.4	11.5	11.4	3.4
ZINC	36.9				19.5	131	143	10.8
SEMIVOLATILE (UG/KG)								
1,2,4-TRICHLOROBENZENE	490 U				370 U	380 U	4800 U	
1,2-DICHLOROBENZENE	490 U				370 U	380 U	4800 U	
1,3-DICHLOROBENZENE	490 U				370 U	380 U	4800 U	
1,4-DICHLOROBENZENE	490 U				370 U	380 U	4800 U	
2,2'-OXYBIS(1-CHLOROPROPANE)	490 U				370 U	380 U	4800 U	
2,4,5-TRICHLOROPHENOL	1200 U				930 U	940 U	12000 U	
2,4,6-TRICHLOROPHENOL	490 U				370 U	380 U	4800 U	
2,4-DICHLOROPHENOL	490 U				370 U	380 U	4800 U	
2,4-DIMETHYLPHENOL	490 U				370 U	380 U	4800 U	
2,4-DINITROPHENOL	1200 U				930 U	940 U	12000 U	
2,4-DINITROTOLUENE	490 U				370 U	380 U	4800 U	
2,6-DINITROTOLUENE	490 U				370 U	380 U	4800 U	
2-CHLORONAPHTHALENE	490 U				370 U	380 U	4800 U	
2-CHLOROPHENOL	490 U				370 U	380 U	4800 U	
2-METHYLNAPHTHALENE	490 U				370 U	380 U	4800 U	
2-METHYLPHENOL	490 U				370 U	380 U	4800 U	
2-NITROANILINE	1200 U				930 U	940 U	12000 U	
2-NITROPHENOL	490 U				370 U	380 U	4800 U	
3,3'-DICHLOROBENZIDINE	490 U				370 U	380 U	4800 U	

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SITE:	SITE_13	SITE_27	SITE_27	SITE_27	SITE_27	SITE_27	SITE_27	SITE_35
LOCATION:	PI-013-02	UNDEFINED	UNDEFINED	UNDEFINED	PI-027-01	PI-027-02	PI-027-02	UNDEFINED
MATRIX:	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PI-013-02(39)	PAI-27-SS-03-01	PAI-27-SS-04-01	PAI-27-SS-05-01	PI-027-01(46)	PI-027-02(47)	PI-027-02(47)-D	PAI-35-SS-04-01
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM	NM	NM	NM
COLLECTION DATE:	19951213	19991216	19991216	19991216	19951213	19951213	19951213	19991216
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084	084	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
3-NITROANILINE	1200 U				930 U	940 U	12000 U	
4,6-DINITRO-2-METHYLPHENOL	1200 U				930 U	940 U	12000 U	
4-BROMOPHENYLPHENYLETHER	490 U				370 U	380 U	4800 U	
4-CHLORO-3-METHYLPHENOL	490 U				370 U	380 U	4800 U	
4-CHLOROANILINE	490 U				370 U	380 U	4800 U	
4-CHLOROPHENYLPHENYLETHER	490 U				370 U	380 U	4800 U	
4-METHYLPHENOL	490 U				370 U	380 U	4800 U	
4-NITROANILINE	1200 U				930 U	940 U	12000 U	
4-NITROPHENOL	1200 U				930 U	940 U	12000 U	
ACENAPHTHENE	490 U				370 U	380 U	4800 U	
ACENAPHTHYLENE	490 U				370 U	380 U	4800 U	
ANTHRACENE	490 U				370 U	380 U	4800 U	
BENZO(A)ANTHRACENE	490 U				140 J	110 J	4800 U	
BENZO(A)PYRENE	490 U				160 J	140 J	4800 U	
BENZO(B)FLUORANTHENE	490 U				370	250 J	4800 U	
BENZO(G,H,I)PERYLENE	490 U				36 J	42 J	4800 U	
BENZO(K)FLUORANTHENE	490 U				370 U	380 U	4800 U	
BIS(2-CHLOROETHOXY)METHANE	490 U				370 U	380 U	4800 U	
BIS(2-CHLOROETHYL)ETHER	490 U				370 U	380 U	4800 U	
BIS(2-ETHYLHEXYL)PHTHALATE	490 U				370 U	380 U	21000	
BUTYLBENZYLPHTHALATE	490 U				370 U	380 U	4800 U	
CARBAZOLE	490 U				29 J	380 U	4800 U	
CHRYSENE	490 U				210 J	150 J	4800 U	
DI-N-BUTYLPHTHALATE	490 U				370 U	380 U	4800 U	
DI-N-OCTYLPHTHALATE	490 U				370 U	380 U	4800 U	
DIBENZO(A,H)ANTHRACENE	490 U				36 J	39 J	4800 U	
DIBENZOFURAN	490 U				370 U	380 U	4800 U	
DIETHYLPHTHALATE	490 U				370 U	380 U	4800 U	
DIMETHYLPHTHALATE	490 U				370 U	380 U	4800 U	
FLUORANTHENE	490 U				270 J	190 J	4800 U	
FLUORENE	490 U				370 U	380 U	4800 U	
HEXACHLOROBENZENE	490 U				370 U	380 U	4800 U	
HEXACHLOROBUTADIENE	490 U				370 U	380 U	4800 U	
HEXACHLOROCYCLOPENTADIENE	490 U				370 U	380 U	4800 U	
HEXACHLOROETHANE	490 U				370 U	380 U	4800 U	
INDENO(1,2,3-CD)PYRENE	490 U				74 J	96 J	4800 U	
ISOPHORONE	490 U				370 U	380 U	4800 U	
N-NITROSO-DI-N-PROPYLAMINE	490 U				370 U	380 U	4800 U	
N-NITROSODIPHENYLAMINE	490 U				370 U	380 U	4800 U	
NAPHTHALENE	490 U				370 U	380 U	4800 U	
NITROBENZENE	490 U				370 U	380 U	4800 U	
PENTACHLOROPHENOL	1200 U				930 U	940 U	12000 U	
PHENANTHRENE	490 U				200 J	74 J	4800 U	
PHENOL	490 U				370 U	380 U	4800 U	
PYRENE	47 J				320 J	170 J	4800 U	
VOLATILE (UG/KG)								

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SITE:	SITE_13	SITE_27	SITE_27	SITE_27	SITE_27	SITE_27	SITE_27	SITE_35
LOCATION:	PI-013-02	UNDEFINED	UNDEFINED	UNDEFINED	PI-027-01	PI-027-02	PI-027-02	UNDEFINED
MATRIX:	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PI-013-02(39)	PAI-27-SS-03-01	PAI-27-SS-04-01	PAI-27-SS-05-01	PI-027-01(46)	PI-027-02(47)	PI-027-02(47)-D	PAI-35-SS-04-01
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM	NM	NM	NM
COLLECTION DATE:	19951213	19991216	19991216	19991216	19951213	19951213	19951213	19991216
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084	084	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
1,1,1-TRICHLOROETHANE					11 U	11 U	12 U	
1,1,2,2-TETRACHLOROETHANE	17 U				11 U	11 U	12 U	
1,1,2-TRICHLOROETHANE	17 U				11 U	11 U	12 U	
1,1-DICHLOROETHANE	17 U				11 U	11 U	12 U	
1,1-DICHLOROETHENE	17 U				11 U	11 U	12 U	
1,2-DICHLOROETHANE	17 U				11 U	11 U	12 U	
1,2-DICHLOROETHENE (TOTAL)	17 U				11 U	11 U	12 U	
1,2-DICHLOROPROPANE	17 U				11 U	11 U	12 U	
2-BUTANONE	17 U				11 U	11 U	12 U	
2-HEXANONE	17 U				11 U	11 U	12 U	
4-METHYL-2-PENTANONE	17 U				11 U	11 U	12 U	
ACETONE	17 U				11 U	11 U	12 U	
BENZENE	17 U				11 U	11 U	12 U	
BROMODICHLOROMETHANE	17 U				11 U	11 U	12 U	
BROMOFORM	17 U				11 U	11 U	12 U	
BROMOMETHANE	17 U				11 U	11 U	12 U	
CARBON DISULFIDE	17 U				11 U	11 U	12 U	
CARBON TETRACHLORIDE	17 U				11 U	11 U	3 J	
CHLOROBENZENE	17 U				11 U	11 U	12 U	
CHLOROETHANE	17 U				11 U	11 U	12 U	
CHLOROFORM	7 J				11 U	5 J	8 J	
CHLOROMETHANE	17 U				11 U	11 U	12 U	
CIS-1,3-DICHLOROPROPENE	17 U				11 U	11 U	12 U	
DIBROMOCHLOROMETHANE	17 U				11 U	11 U	12 U	
ETHYLBENZENE	17 U				11 U	11 U	12 U	
METHYLENE CHLORIDE	17 U				11 U	11 U	12 U	
STYRENE	17 U				11 U	11 U	12 U	
TETRACHLOROETHENE	17 U				11 U	11 U	2 J	
TOLUENE	17 U				11 U	11 U	12 U	
TRANS-1,3-DICHLOROPROPENE	17 U				11 U	11 U	12 U	
TRICHLOROETHENE	17 U				11 U	11 U	12 U	
VINYL CHLORIDE	17 U				11 U	11 U	12 U	
XYLENES, TOTAL	17 U				11 U	11 U	12 U	
PESTICIDE/PCB (UG/KG)								
4,4'-DDD	4.9 U				130	3.8 U	3.9 J	
4,4'-DDE	4.9 U				37 U	32	39	
4,4'-DDT	4.9 U				37 U	46	60	
ALDRIN	2.5 U				19 U	2 U	4 U	
ALPHA-BHC	2.5 U				19 U	2 U	4 U	
ALPHA-CHLORDANE	2.5 U				19 U	2.7 U	3.6 R	
AROCLOR-1016	49 U	9.6 U	9.6 U	9.7 U	370 U	38 U	77 U	
AROCLOR-1221	100 U	9.6 U	9.6 U	9.7 U	750 U	77 U	160 U	
AROCLOR-1232	49 U	9.6 U	9.6 U	9.7 U	370 U	38 U	77 U	
AROCLOR-1242	49 U	9.6 U	9.6 U	9.7 U	370 U	38 U	77 U	
AROCLOR-1248	49 U	9.6 U	9.6 U	9.7 U	370 U	38 U	77 U	
AROCLOR-1254	49 U	9.6 U	9.6 U	9.7 U	370 U	38 U	77 U	

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CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SURFACE SOIL ANALYTIC RESULTS

SITE:	SITE_13	SITE_27	SITE_27	SITE_27	SITE_27	SITE_27	SITE_27	SITE_35
LOCATION:	PI-013-02	UNDEFINED	UNDEFINED	UNDEFINED	PI-027-01	PI-027-02	PI-027-02	UNDEFINED
MATRIX:	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PI-013-02(39)	PAI-27-SS-03-01	PAI-27-SS-04-01	PAI-27-SS-05-01	PI-027-01(46)	PI-027-02(47)	PI-027-02(47)-D	PAI-35-SS-04-01
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	DUP	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM	NM	NM	NM
COLLECTION DATE:	19951213	19991216	19991216	19991216	19951213	19951213	19951213	19991216
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084	084	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
AROCLOR-1260	49 U	9.6 U	9.6 U	9.7 U	370 U	38 U	77 U	
BETA-BHC	2.5 U				19 U	2 U	4 U	
DELTA-BHC	2.5 U				19 U	2 U	4 U	
DIELDRIN	4.9 U				37 U	3.8 U	7.7 U	
ENDOSULFAN I	2.5 U				19 U	3.3 U	2 J	
ENDOSULFAN II	4.9 U				37 U	3.8 U	7.7 U	
ENDOSULFAN SULFATE	4.9 U				37 U	3.8 U	7.7 U	
ENDRIN	4.9 U				37 U	3.8 U	7.7 U	
ENDRIN ALDEHYDE	4.9 U				37 U	3.8 U	7.7 U	
ENDRIN KETONE	4.9 U				37 U	3.8 U	7.7 U	
GAMMA-BHC (LINDANE)	2.5 U				19 U	2 U	4 U	
GAMMA-CHLORDANE	2.5 U				19 U	2.7 U	3.6 J	
HEPTACHLOR	2.5 U				19 U	2 U	4 U	
HEPTACHLOR EPOXIDE	2.5 U				19 U	2 U	4 U	
METHOXYCHLOR	25 U				190 U	20 U	40 U	
TOXAPHENE	250 U				1900 U	200 U	400 U	

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CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SURFACE SOIL ANALYTIC RESULTS

SITE:	SITE_35	SITE_35	SITE_35	SITE_35	SITE_35
LOCATION:	UNDEFINED	UNDEFINED	PI-035-01	PI-035-02	PI-035-03
MATRIX:	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PAI-35-SS-05-01	PAI-35-SS-06-01	PI-035-01(48)	PI-035-02(49)	PI-035-03(50)
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM
COLLECTION DATE:	19991216	19991216	19951212	19951212	19951212
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
INORGANIC (MG/KG)					
ALUMINUM	4010	3400	2740	2710	3600
ANTIMONY	2.5 UJ	2.3 UJ	0.51 U	0.52 U	0.87
ARSENIC	1.8 U	1.7 U	1.8	1.1	2.9
BARIUM	10.2 J	8.5 J	30	13.2	17.4
BERYLLIUM	0.12 U	0.13 U	0.15 U	0.17 U	0.17 U
CADMIUM	0.28 U	0.39 U	4.5	1.3 U	3.9
CALCIUM	61.4	43.7	456	6340	700
CHROMIUM	3	2.8	5.9	8.3	17.3
COBALT	0.32 U	0.44 U	0.51	0.69	2.1
COPPER	0.74 U	0.89 U	22.4	13	68.9
CYANIDE	0.55 U	0.5 U	0.34 U	0.39 U	0.37 U
IRON	2050	1730	2340	4050	8540
LEAD	3.5	4.3	33.9	59.2	166
MAGNESIUM	180 J	148 J	211	263	219
MANGANESE	29.1 J	23.7 J	94.8	66.6	246
MERCURY	0.08	0.06	0.14	0.15	0.31
NICKEL	1.5	1.6	4.5	3.4	6
POTASSIUM	128 U	160	81.3	174	108
SELENIUM	2.7 U	2.7	0.45 U	0.45 U	0.69
SILVER	0.34 U	0.31 U	0.14 U	2.6	0.14 U
SODIUM	12.5 U	16.6	38.4 U	38.5 U	44.5
THALLIUM	6.5 U	5.9 U	0.47 U	0.47 U	0.45 U
TIN	1.7 U	1.6 U			
VANADIUM	2.8	2.3	4.3	3.7	8.4
ZINC	5.8	3.8	156	123	368
SEMIVOLATILE (UG/KG)					
1,2,4-TRICHLOROBENZENE			3600 U	720 U	510 U
1,2-DICHLOROBENZENE			3600 U	720 U	510 U
1,3-DICHLOROBENZENE			3600 U	720 U	510 U
1,4-DICHLOROBENZENE			3600 U	720 U	510 U
2,2'-OXYBIS(1-CHLOROPROPANE)			3600 U	720 U	510 U
2,4,5-TRICHLOROPHENOL			9100 U	1800 U	1300 U
2,4,6-TRICHLOROPHENOL			3600 U	720 U	510 U
2,4-DICHLOROPHENOL			3600 U	720 U	510 U
2,4-DIMETHYLPHENOL			3600 U	720 U	510 U
2,4-DINITROPHENOL			9100 U	1800 U	1300 U
2,4-DINITROTOLUENE			3600 U	720 U	510 U
2,6-DINITROTOLUENE			3600 U	720 U	510 U
2-CHLORONAPHTHALENE			3600 U	720 U	510 U
2-CHLOROPHENOL			3600 U	720 U	510 U
2-METHYLNAPHTHALENE			3600 U	720 U	510 U
2-METHYLPHENOL			3600 U	720 U	510 U
2-NITROANILINE			9100 U	1800 U	1300 U
2-NITROPHENOL			3600 U	720 U	510 U
3,3'-DICHLOROBENZIDINE			3600 U	720 U	510 U

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SITE:	SITE_35	SITE_35	SITE_35	SITE_35	SITE_35
LOCATION:	UNDEFINED	UNDEFINED	PI-035-01	PI-035-02	PI-035-03
MATRIX:	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PAI-35-SS-05-01	PAI-35-SS-06-01	PI-035-01(48)	PI-035-02(49)	PI-035-03(50)
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM
COLLECTION DATE:	19991216	19991216	19951212	19951212	19951212
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
3-NITROANILINE			9100 UR	1800 UR	1300 UR
4,6-DINITRO-2-METHYLPHENOL			9100 U	1800 U	1300 U
4-BROMOPHENYLPHENYLETHER			3600 U	720 U	510 U
4-CHLORO-3-METHYLPHENOL			3600 U	720 U	510 U
4-CHLOROANILINE			3600 U	720 U	510 U
4-CHLOROPHENYLPHENYLETHER			3600 U	720 U	510 U
4-METHYLPHENOL			3600 U	720 U	510 U
4-NITROANILINE			9100 UJ	1800 UR	1300 UJ
4-NITROPHENOL			9100 U	1800 U	1300 U
ACENAPHTHENE			3600 U	720 U	510 U
ACENAPHTHYLENE			3600 U	720 U	510 U
ANTHRACENE			3600 U	720 U	510 U
BENZO(A)ANTHRACENE			3600 U	720 U	510 U
BENZO(A)PYRENE			3600 U	720 U	510 U
BENZO(B)FLUORANTHENE			3600 U	720 U	66 J
BENZO(G,H,I)PERYLENE			3600 U	720 U	510 U
BENZO(K)FLUORANTHENE			3600 U	720 U	510 U
BIS(2-CHLOROETHOXY)METHANE			3600 U	720 U	510 U
BIS(2-CHLOROETHYL)ETHER			3600 U	720 U	510 U
BIS(2-ETHYLHEXYL)PHTHALATE			3600 U	720 U	510 U
BUTYLBENZYLPHTHALATE			3600 U	720 U	150 J
CARBAZOLE			3600 U	720 U	510 U
CHRYSENE			3600 U	720 U	55 J
DI-N-BUTYLPHTHALATE			3600 U	5100	510 U
DI-N-OCTYLPHTHALATE			3600 U	720 U	510 U
DIBENZO(A,H)ANTHRACENE			3600 U	720 U	510 U
DIBENZOFURAN			3600 U	720 U	510 U
DIETHYLPHTHALATE			3600 U	720 U	510 U
DIMETHYLPHTHALATE			3600 U	720 U	510 U
FLUORANTHENE			3600 U	42 J	85 J
FLUORENE			3600 U	720 U	510 U
HEXACHLOROBENZENE			3600 U	720 U	510 U
HEXACHLOROBUTADIENE			3600 U	720 U	510 U
HEXACHLOROCYCLOPENTADIENE			3600 U	720 U	510 U
HEXACHLOROETHANE			3600 U	720 U	510 U
INDENO(1,2,3-CD)PYRENE			3600 U	720 U	510 U
ISOPHORONE			3600 U	720 U	510 U
N-NITROSO-DI-N-PROPYLAMINE			3600 U	720 U	510 U
N-NITROSODIPHENYLAMINE			3600 U	720 U	510 U
NAPHTHALENE			3600 U	720 U	510 U
NITROBENZENE			3600 U	720 U	510 U
PENTACHLOROPHENOL			18000 U	1800 U	1300 U
PHENANTHRENE			3600 U	720 U	30 J
PHENOL			3600 U	720 U	510 U
PYRENE			3600 U	35 J	64 J
VOLATILE (UG/KG)					

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CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SURFACE SOIL ANALYTIC RESULTS

SITE:	SITE_35	SITE_35	SITE_35	SITE_35	SITE_35
LOCATION:	UNDEFINED	UNDEFINED	PI-035-01	PI-035-02	PI-035-03
MATRIX:	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PAI-35-SS-05-01	PAI-35-SS-06-01	PI-035-01(48)	PI-035-02(49)	PI-035-03(50)
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM
COLLECTION DATE:	19991216	19991216	19951212	19951212	19951212
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
1,1,1-TRICHLOROETHANE			11 U	11 U	11 U
1,1,2,2-TETRACHLOROETHANE			11 U	11 U	11 U
1,1,2-TRICHLOROETHANE			11 U	11 U	11 U
1,1-DICHLOROETHANE			11 U	11 U	11 U
1,1-DICHLOROETHENE			11 U	11 U	11 U
1,2-DICHLOROETHANE			11 U	11 U	11 U
1,2-DICHLOROETHENE (TOTAL)			11 U	11 U	11 U
1,2-DICHLOROPROPANE			11 U	11 U	11 U
2-BUTANONE			11 U	11 U	11 U
2-HEXANONE			11 U	11 U	11 U
4-METHYL-2-PENTANONE			11 U	11 U	11 U
ACETONE			20 U	11 U	11 U
BENZENE			11 U	11 U	11 U
BROMODICHLOROMETHANE			11 U	11 U	11 U
BROMOFORM			11 U	11 U	11 U
BROMOMETHANE			11 U	11 U	11 U
CARBON DISULFIDE			11 U	11 U	11 U
CARBON TETRACHLORIDE			3 J	11 U	11 U
CHLOROBENZENE			11 U	11 U	11 U
CHLOROETHANE			11 U	11 U	11 U
CHLOROFORM			3 J	2 J	11 U
CHLOROMETHANE			11 U	11 U	11 U
CIS-1,3-DICHLOROPROPENE			11 U	11 U	11 U
DIBROMOCHLOROMETHANE			11 U	11 U	11 U
ETHYLBENZENE			11 U	11 U	11 U
METHYLENE CHLORIDE			11 U	11 U	11 U
STYRENE			11 U	11 U	11 U
TETRACHLOROETHENE			3 J	11 U	11 U
TOLUENE			11 U	11 U	11 U
TRANS-1,3-DICHLOROPROPENE			11 U	11 U	11 U
TRICHLOROETHENE			11 U	11 U	11 U
VINYL CHLORIDE			11 U	11 U	11 U
XYLENES, TOTAL			11 U	11 U	11 U
PESTICIDE/PCB (UG/KG)					
4,4'-DDD			74 U	22 U	9.8 U
4,4'-DDE			720	160	44
4,4'-DDT			6400	500	310
ALDRIN			56 U	5.5 U	4 U
ALPHA-BHC			56 U	5.5 U	4 U
ALPHA-CHLORDANE			56 U	5.5 U	17
AROCLOR-1016			1100 U	110 U	77 U
AROCLOR-1221			2200 U	220 U	160 U
AROCLOR-1232			1100 U	110 U	77 U
AROCLOR-1242			1100 U	110 U	77 U
AROCLOR-1248			1100 U	110 U	77 U
AROCLOR-1254			1500	690	310

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CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SURFACE SOIL ANALYTIC RESULTS

SITE:	SITE_35	SITE_35	SITE_35	SITE_35	SITE_35
LOCATION:	UNDEFINED	UNDEFINED	PI-035-01	PI-035-02	PI-035-03
MATRIX:	SS	SS	SS	SS	SS
SAMPLE NUMBER:	PAI-35-SS-05-01	PAI-35-SS-06-01	PI-035-01(48)	PI-035-02(49)	PI-035-03(50)
SACODE:	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
QC_TYPE:	NM	NM	NM	NM	NM
COLLECTION DATE:	19991216	19991216	19951212	19951212	19951212
VALIDATED:	TRUE	TRUE	TRUE	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB	GRAB	GRAB	GRAB
CTO PROJECT:	084	084	084	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
AROCLOR-1260			780 J	220 J	360 J
BETA-BHC			56 U	5.5 U	4 U
DELTA-BHC			56 U	5.5 U	4 U
DIELDRIN			110 U	7.2 J	7.7 U
ENDOSULFAN I			56 U	5.5 U	4 J
ENDOSULFAN II			110 U	21 U	16 U
ENDOSULFAN SULFATE			110 U	11 U	7.7 U
ENDRIN			110 U	16 U	12 U
ENDRIN ALDEHYDE			110 U	7.6 J	20
ENDRIN KETONE			110 U	11 U	7.7 U
GAMMA-BHC (LINDANE)			56 U	5.5 U	4 U
GAMMA-CHLORDANE			56 U	2.8 R	15
HEPTACHLOR			56 U	5.5 U	4 U
HEPTACHLOR EPOXIDE			56 U	5.5 U	4 U
METHOXYCHLOR			560 U	55 U	40 U
TOXAPHENE			5600 U	550 U	400 U

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CTO 084 - MCRD PARRIS ISLAND
SUMARY OF SOIL BORING ANALYTIC RESULTS

SITE:	SITE_07	SITE_07
LOCATION:	UNDEFINED	UNDEFINED
MATRIX:	SB	SB
SAMPLE NUMBER:	PAI-07-SB-01-04	PAI-07-SB-01-04-D
SACODE:	DUP	DUP
QC_TYPE:	NM	NM
COLLECTION DATE:	19991214	19991214
VALIDATED:	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB
CTO PROJECT:	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.
INORGANIC (MG/KG)		
ALUMINUM	7880	7540
ANTIMONY	2.6 UJ	2 UJ
ARSENIC	1.9 U	1.4 U
BARIUM	13.1 J	12.6 J
BERYLLIUM	0.31 U	0.23 U
CADMIUM	0.28 U	0.21 U
CALCIUM	1870	1720
CHROMIUM	6.3	5.9
COBALT	0.61 U	0.5 U
COPPER	0.44 U	0.57 U
IRON	2350	2140
LEAD	8.3	7.1
MAGNESIUM	258 J	231 J
MANGANESE	7.1 J	5.3 J
MERCURY	0.06 U	0.06 U
NICKEL	1.3	1.5
POTASSIUM	131 U	135
SELENIUM	2.8 U	2.3
SILVER	0.35 U	0.26 U
SODIU	25	48
THALLIUM	11.4 U	5.1 U
TIN	1.8 U	1.3 U
VANADIUM	8.5	7.9
ZINC	3.1	2.5
SEMIVOLATILE (UG/KG)		
1,2,4-TRICHLOROBENZENE	420 U	430 U
1,2-DICHLOROBENZENE	420 U	430 U
1,3-DICHLOROBENZENE	420 U	430 U
1,4-DICHLOROBENZENE	420 U	430 U
1,4-DIOXANE	3400 U	3400 U
2,2'-OXYBIS(1-CHLOROPROPANE)	420 U	430 U
2,4,5-TRICHLOROPHENOL	2100 U	2100 U
2,4,6-TRICHLOROPHENOL	420 U	430 U
2,4-DICHLOROPHENOL	420 U	430 U
2,4-DIMETHYLPHENOL	420 U	430 U
2,4-DINITROPHENOL	2100 U	2100 U
2,4-DINITROTOLUENE	420 U	430 U
2,6-DINITROTOLUENE	420 U	430 U
2-CHLORONAPHTHALENE	420 U	430 U
2-CHLOROPHENOL	420 U	430 U
2-METHYLNAPHTHALENE	420 U	430 U
2-METHYLPHENOL	420 U	430 U
2-NITROANILINE	2100 U	2100 U
2-NITROPHENOL	420 U	430 U
3,3'-DICHLOROBENZIDINE	840 U	860 U

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CTO 084 - MCRD PARRIS ISLAND
SUMARY OF SOIL BORING ANALYTIC RESULTS

SITE:	SITE_07	SITE_07
LOCATION:	UNDEFINED	UNDEFINED
MATRIX:	SB	SB
SAMPLE NUMBER:	PAI-07-SB-01-04	PAI-07-SB-01-04-D
SACODE:	DUP	DUP
QC_TYPE:	NM	NM
COLLECTION DATE:	19991214	19991214
VALIDATED:	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB
CTO PROJECT:	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.
3-NITROANILINE	2100 UJ	2100 UJ
4,6-DINITRO-2-METHYLPHENOL	2100 U	2100 U
4-BROMOPHENYL PHENYL ETHER	420 U	430 U
4-CHLORO-3-METHYLPHENOL	420 U	430 U
4-CHLOROANILINE	420 U	430 U
4-CHLOROPHENYL PHENYL ETHER	420 U	430 U
4-METHYLPHENOL	420 U	430 U
4-NITROANILINE	2100 U	2100 U
4-NITROPHENOL	2100 U	2100 U
ACENAPHTHENE	420 U	430 U
ACENAPHTHYLENE	420 U	430 U
ANTHRACENE	420 U	430 U
BENZIDINE	4200 UR	4300 UR
BENZO(A)ANTHRACENE	420 U	430 U
BENZO(A)PYRENE	420 U	430 U
BENZO(B)FLUORANTHENE	420 U	430 U
BENZO(G,H,I)PERYLENE	420 U	430 U
BENZO(K)FLUORANTHENE	420 U	430 U
BENZOIC ACID	2100 U	2100 U
BIS(2-CHLOROETHOXY)METHANE	420 U	430 U
BIS(2-CHLOROETHYL)ETHER	420 U	430 U
BIS(2-ETHYLHEXYL)PHTHALATE	420 U	430 U
BUTYL BENZYL PHTHALATE	420 U	430 U
CARBAZOLE	420 U	430 U
CHRYSENE	420 U	430 U
DI-N-BUTYL PHTHALATE	420 U	430 U
DI-N-OCTYL PHTHALATE	420 U	430 U
DIBENZO(A,H)ANTHRACENE	420 U	430 U
DIBENZOFURAN	420 U	430 U
DIETHYL PHTHALATE	420 U	430 U
DIMETHYL PHTHALATE	420 U	430 U
FLUORANTHENE	420 U	430 U
FLUORENE	420 U	430 U
HEXACHLOROBENZENE	420 U	430 U
HEXACHLOROBUTADIENE	420 U	430 U
HEXACHLOROCYCLOPENTADIENE	420 U	430 U
HEXACHLOROETHANE	420 U	430 U
INDENO(1,2,3-CD)PYRENE	420 U	430 U
ISOPHORONE	420 U	430 U
N-NITROSO-DI-N-PROPYLAMINE	420 U	430 U
N-NITROSODIPHENYLAMINE	420 U	430 U
NAPHTHALENE	420 U	430 U
NITROBENZENE	420 U	430 U
PENTACHLOROPHENOL	2100 U	2100 U
PHENANTHRENE	420 U	430 U
PHENOL	420 U	430 U

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CTO 084 - MCRD PARRIS ISLAND
SUMARY OF SOIL BORING ANALYTIC RESULTS

SITE:	SITE_07	SITE_07
LOCATION:	UNDEFINED	UNDEFINED
MATRIX:	SB	SB
SAMPLE NUMBER:	PAI-07-SB-01-04	PAI-07-SB-01-04-D
SACODE:	DUP	DUP
QC_TYPE:	NM	NM
COLLECTION DATE:	19991214	19991214
VALIDATED:	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB
CTO PROJECT:	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.
PYRENE	420 U	430 U
VOLATILE (UG/KG)		
1,1,1-TRICHLOROETHANE	7 U	6 U
1,1,2,2-TETRACHLOROETHANE	7 U	6 U
1,1,2-TRICHLOROETHANE	7 U	6 U
1,1-DICHLOROETHANE	7 U	6 U
1,1-DICHLOROETHENE	7 U	6 U
1,2-DIBROMOETHANE	7 U	6 U
1,2-DICHLOROETHANE	7 U	6 U
1,2-DICHLOROETHENE(TOTAL)	7 U	6 U
1,2-DICHLOROPROPANE	7 U	6 U
2-BUTANONE	7 U	6 U
2-HEXANONE	7 U	6 U
4-METHYL-2-PENTANONE	7 UJ	6 UJ
ACETONE	13 U	18 U
BENZENE	7 U	6 U
BROMODICHLOROMETHANE	7 U	6 U
BROMOFORM	7 U	6 U
BROMOMETHANE	7 U	6 U
CARBONDISULFIDE	7 U	6 U
CARBONTETRACHLORIDE	7 U	6 U
CHLOROBENZENE	7 U	6 U
CHLOROETHANE	7 U	6 U
CHLOROFORM	7 U	6 U
CHLOROMETHANE	7 U	6 U
CIS-1,3-DICHLOROPROPENE	7 U	6 U
DIBROMOCHLOROMETHANE	7 U	6 U
ETHYLBENZENE	7 U	6 U
METHYLENECHLORIDE	7 U	6 U
STYRENE	7 U	6 U
TETRACHLOROETHENE	7 U	6 U
TOLUENE	7 U	6 U
TRANS-1,3-DICHLOROPROPENE	7 U	6 U
TRICHLOROETHENE	7 U	6 U
VINYLCHLORIDE	7 U	6 U
XYLENES,TOTAL	7 U	6 U
PESTICIDE/PCB (UG/KG)		
4,4'-DDD	4.2 U	2.2 U
4,4'-DDE	4.2 U	2.2 U
4,4'-DDT	4.2 U	2.2 U
ALDRIN	2.1 U	1.1 U
ALPHA-BHC	2.1 U	1.1 U
ALPHA-CHLORDANE	2.1 U	1.1 U
AROCLOR-1016	10 U	11 U
AROCLOR-1221	10 U	11 U
AROCLOR-1232	10 U	11 U

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CTO 084 - MCRD PARRIS ISLAND
SUMARY OF SOIL BORING ANALYTIC RESULTS

SITE:	SITE_07	SITE_07
LOCATION:	UNDEFINED	UNDEFINED
MATRIX:	SB	SB
SAMPLE NUMBER:	PAI-07-SB-01-04	PAI-07-SB-01-04-D
SACODE:	DUP	DUP
QC_TYPE:	NM	NM
COLLECTION DATE:	19991214	19991214
VALIDATED:	TRUE	TRUE
COLLECTION METHOD:	GRAB	GRAB
CTO PROJECT:	084	084
PROJECT MANAGER:	Brayack, D.	Brayack, D.
AROCLOR-1242	10 U	11 U
AROCLOR-1248	10 U	11 U
AROCLOR-1254	10 U	11 U
AROCLOR-1260	10 U	11 U
BETA-BHC	2.1 U	1.1 U
DELTA-BHC	2.1 U	1.1 U
DIELDRIN	4.2 U	2.2 U
ENDOSULFAN I	2.1 U	1.1 U
ENDOSULFAN II	4.2 U	2.2 U
ENDOSULFAN SULFATE	4.2 U	2.2 U
ENDRIN	4.2 U	2.2 U
ENDRIN ALDEHYDE	4.2 U	2.2 U
ENDRIN KETONE	4.2 U	2.2 U
GAMMA-BHC (LINDANE)	2.1 U	1.1 U
GAMMA-CHLORDANE	2.1 U	1.1 U
HEPTACHLOR	2.1 U	1.1 U
HEPTACHLOR EPOXIDE	2.1 U	1.1 U
METHOXYCHLOR	21 U	11 U
TOXAPHENE	42 U	22 U

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order	01	02
tab	tab31	tab31
location	UNDEFINED	UNDEFINED
nsample	PAI-04-SB-16-2-2.5	PAI-04-SB-17-1.5-2
sample	PAI-04-SB-16-2-2.5	PAI-04-SB-17-1.5-2
matrix	SB	SB
sacode	NORMAL	NORMAL
sample_dat	08/23/00	08/23/00
depth	NA	NA
proj_manag	Brayack, D.	Brayack, D.
sort	**c_01**	**c_02**
Volatile Organics (ug/kg)		
1,1,1-TRICHLOROETHANE	7 U	4 U
1,1,2,2-TETRACHLOROETHANE	7 U	4 U
1,1,2-TRICHLOROETHANE	7 U	4 U
1,1-DICHLOROETHANE	7 U	4 U
1,1-DICHLOROETHENE	7 U	4 U
1,2-DICHLOROETHANE	7 U	4 U
1,2-DICHLOROETHENE (TOTAL)	7 U	4 U
1,2-DICHLOROPROPANE	7 U	4 U
2-BUTANONE	7 U	4 U
2-HEXANONE	7 U	4 U
4-METHYL-2-PENTANONE	7 U	4 U
ACETONE	7 UR	4 UR
BENZENE	7 U	4 U
BROMODICHLOROMETHANE	7 U	4 U
BROMOFORM	7 U	4 U
BROMOMETHANE	7 U	4 U
CARBON DISULFIDE	7 U	4 U
CARBON TETRACHLORIDE	7 U	4 U
CHLOROBENZENE	7 U	4 U
CHLORODIBROMOMETHANE	7 U	4 U
CHLOROETHANE	7 U	4 U
CHLOROFORM	7 U	4 U
CHLOROMETHANE	7 U	4 U
CIS-1,2-DICHLOROETHENE	7 U	4 U
CIS-1,3-DICHLOROPROPENE	7 U	4 U
ETHYLBENZENE	7 U	4 U
METHYLENE CHLORIDE	7 U	4 U
STYRENE	7 U	4 U
TETRACHLOROETHENE	7 U	4 U
TOLUENE	7 U	4 U
TRANS-1,2-DICHLOROETHENE	7 U	4 U
TRANS-1,3-DICHLOROPROPENE	7 U	4 U
TRICHLOROETHENE	7 U	4 U
VINYL CHLORIDE	7 U	4 U
XYLENES, TOTAL	7 U	4 U
Semivolatile Organics (ug/kg)		
1,2,4-TRICHLOROBENZENE	350 U	340 U
1,2-DICHLOROBENZENE	350 U	340 U
1,3-DICHLOROBENZENE	350 U	340 U
1,4-DICHLOROBENZENE	350 U	340 U
2,2'-OXYBIS(1-CHLOROPROPANE)	350 U	340 U
2,4,5-TRICHLOROPHENOL	1700 U	1700 U
2,4,6-TRICHLOROPHENOL	350 U	340 U
2,4-DICHLOROPHENOL	350 U	340 U
2,4-DIMETHYLPHENOL	350 U	340 U
2,4-DINITROPHENOL	1700 U	1700 U
2,4-DINITROTOLUENE	350 U	340 U
2,6-DINITROTOLUENE	350 U	340 U
2-CHLORONAPHTHALENE	350 U	340 U
2-CHLOROPHENOL	350 U	340 U
2-METHYLNAPHTHALENE	350 U	340 U
2-METHYLPHENOL	350 U	340 U
2-NITROANILINE	1700 U	1700 U
2-NITROPHENOL	350 U	340 U
3,3'-DICHLOROBENZIDINE	700 U	690 U
3-NITROANILINE	1700 U	1700 U
4,6-DINITRO-2-METHYLPHENOL	1700 U	1700 U
4-BROMOPHENYL PHENYL ETHER	350 U	340 U
4-CHLORO-3-METHYLPHENOL	350 U	340 U
4-CHLOROANILINE	350 U	340 U
4-CHLOROPHENYL PHENYL ETHER	350 U	340 U
4-METHYLPHENOL	350 U	340 U
4-NITROANILINE	1700 U	1700 U
4-NITROPHENOL	1700 U	1700 U
ACENAPHTHENE	350 U	340 U
ACENAPHTHYLENE	350 U	340 U
ANTHRACENE	350 U	340 U

order	01	02
tab	tab31	tab31
location	UNDEFINED	UNDEFINED
nsample	PAI-04-SB-16-2-2.5	PAI-04-SB-17-1.5-2
sample	PAI-04-SB-16-2-2.5	PAI-04-SB-17-1.5-2
matrix	SB	SB
sacode	NORMAL	NORMAL
sample_dat	08/23/00	08/23/00
depth	NA	NA
proj_manag	Brayack, D.	Brayack, D.
sort	**c_01**	**c_02**
BENZO(A)ANTHRACENE	350 U	340 U
BENZO(A)PYRENE	350 U	340 U
BENZO(B)FLUORANTHENE	350 U	340 U
BENZO(G,H,I)PERYLENE	350 U	340 U
BENZO(K)FLUORANTHENE	350 U	340 U
BIS(2-CHLOROETHOXY)METHANE	350 U	340 U
BIS(2-CHLOROETHYL)ETHER	350 U	340 U
BIS(2-ETHYLHEXYL)PHTHALATE	350 U	340 U
BUTYL BENZYL PHTHALATE	350 U	340 U
CARBAZOLE	350 U	340 U
CHRYSENE	350 U	340 U
DI-N-BUTYL PHTHALATE	350 U	340 U
DI-N-OCTYL PHTHALATE	350 U	340 U
DIBENZO(A,H)ANTHRACENE	350 U	340 U
DIBENZOFURAN	350 U	340 U
DIETHYL PHTHALATE	350 U	340 U
DIMETHYL PHTHALATE	350 U	340 U
FLUORANTHENE	350 U	340 U
FLUORENE	350 U	340 U
HEXACHLOROBENZENE	350 U	340 U
HEXACHLOROBUTADIENE	350 U	340 U
HEXACHLOROCYCLOPENTADIENE	350 U	340 U
HEXACHLOROETHANE	350 U	340 U
INDENO(1,2,3-CD)PYRENE	350 U	340 U
ISOPHORONE	350 U	340 U
N-NITROSO-DI-N-PROPYLAMINE	350 U	340 U
N-NITROSODIPHENYLAMINE	350 U	340 U
NAPHTHALENE	350 U	340 U
NITROBENZENE	350 U	340 U
PENTACHLOROPHENOL	1700 U	1700 U
PHENANTHRENE	350 U	340 U
PHENOL	350 U	340 U
PYRENE	350 U	340 U
Pesticides/PCBs (ug/kg)		
4,4'-DDD	1.7 U	1.8 U
4,4'-DDE	1.7 U	1.8 U
4,4'-DDT	1.7 U	1.8 U
ALDRIN	0.87 U	0.88 U
ALPHA-BHC	0.87 U	0.88 U
ALPHA-CHLORDANE	0.87 U	0.88 U
AROCLOR-1016	8.7 U	8.8 U
AROCLOR-1221	8.7 U	8.8 U
AROCLOR-1232	8.7 U	8.8 U
AROCLOR-1242	8.7 U	8.8 U
AROCLOR-1248	8.7 U	8.8 U
AROCLOR-1254	8.7 U	8.8 U
AROCLOR-1260	8.7 U	8.8 U
BETA-BHC	0.87 U	0.88 U
DELTA-BHC	0.87 U	0.88 U
DIELDRIN	1.7 U	1.8 U
ENDOSULFAN I	0.87 U	0.88 U
ENDOSULFAN II	1.7 U	1.8 U
ENDOSULFAN SULFATE	1.7 U	1.8 U
ENDRIN	1.7 U	1.8 U
ENDRIN ALDEHYDE	1.7 U	1.8 U
ENDRIN KETONE	1.7 U	1.8 U
GAMMA-BHC (LINDANE)	0.87 U	0.88 U
GAMMA-CHLORDANE	0.87 U	0.88 U
HEPTACHLOR	0.87 U	0.88 U
HEPTACHLOR EPOXIDE	0.87 U	0.88 U
METHOXYCHLOR	8.7 U	8.8 U
TOXAPHENE	17 U	18 U
Inorganics (mg/kg)		
ALUMINUM	2450	7470
ANTIMONY	0.34 U	0.33 U
ARSENIC	6.1	0.72
BARIUM	9.2	9.3
BERYLLIUM	0.16 U	0.13 U

order	**01**	**02**
tab	tab31	tab31
location	UNDEFINED	UNDEFINED
nsample	PAI-04-SB-16-2-2.5	PAI-04-SB-17-1.5-2
sample	PAI-04-SB-16-2-2.5	PAI-04-SB-17-1.5-2
matrix	SB	SB
sacode	NORMAL	NORMAL
sample_dat	08/23/00	08/23/00
depth	NA	NA
proj_manag	Brayack, D.	Brayack, D.
sort	**c_01**	**c_02**
CADMIUM	0.04 U	0.04 U
CALCIUM	517 J	181 J
CHROMIUM	2.8	7.1
COBALT	0.27 U	0.4
COPPER	1.9	0.08 U
CYANIDE	0.47 U	0.49 U
IRON	2710	3560
LEAD	5.1	3.6
MAGNESIUM	249	343
MANGANESE	5.6	5.2
MERCURY	0.02 U	0.02 U
NICKEL	0.6	1.3
POTASSIUM	117	126
SELENIUM	0.17	0.12
SILVER	0.04 U	0.04 U
SODIUM	395 J	574 J
THALLIUM	0.12 U	0.12 U
VANADIUM	4.6	11
ZINC	3.9 U	7.3

from _allres.xls
from c:\

Site 13 Soil Results
Appendix Attachment

order	06	07	08	09
tab	tab41	tab41	tab41	tab41
location	PI-013-01	PI-013-02	UNDEFINED	UNDEFINED
nsample	PI-013-01(38)	PI-013-02(39)	PAI-13C-SS-03-01	PAI-13C-SS-03-01-D
sample	PI-013-01(38)	PI-013-02(39)	PAI-13C-SS-03-01	PAI-13C-SS-DU03-01
matrix	SO	SO	SO	SO
sacode	NORMAL	NORMAL	DUP	DUP
sample_dat	12/13/95	12/13/95	10/06/99	10/06/99
depth	0 - 1'	0 - 1'	NA	NA
proj_manag	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
sort	**c_06**	**c_07**	**c_08**	**c_09**
Volatile Organics (ug/kg)				
1,1,1-TRICHLOROETHANE	16 U		9 U	10 U
1,1,2,2-TETRACHLOROETHANE	16 U	17 U	9 U	10 U
1,1,2-TRICHLOROETHANE	16 U	17 U	9 U	10 U
1,1-DICHLOROETHANE	16 U	17 U	9 U	10 U
1,1-DICHLOROETHENE	16 U	17 U	9 U	10 U
1,2-DICHLOROETHANE	16 U	17 U	9 U	10 U
1,2-DICHLOROETHENE (TOTAL)	16 U	17 U	9 U	10 U
1,2-DICHLOROPROPANE	16 U	17 U	9 U	10 U
2-BUTANONE	16 U	17 U	9 UR	10 UR
2-HEXANONE	16 U	17 U	9 U	10 U
4-METHYL-2-PENTANONE	16 U	17 U	9 U	10 U
ACETONE	16 U	17 U	9 UR	10 UR
BENZENE	16 U	17 U	9 U	10 U
BROMODICHLOROMETHANE	16 U	17 U	9 U	10 U
BROMOFORM	16 U	17 U	9 U	10 U
BROMOMETHANE	16 U	17 U	9 U	10 U
CARBON DISULFIDE	16 U	17 U	9 U	10 U
CARBON TETRACHLORIDE	16 U	17 U	9 U	10 U
CHLOROBENZENE	16 U	17 U	9 U	10 U
CHLORODIBROMOMETHANE	16 U	17 U	9 U	10 U
CHLOROETHANE	16 U	17 U	9 U	10 U
CHLOROFORM	5 J	7 J	9 U	10 U
CHLOROMETHANE	16 U	17 U	9 U	10 U
CIS-1,3-DICHLOROPROPENE	16 U	17 U	9 U	10 U
ETHYLBENZENE	16 U	17 U	9 U	10 U
METHYLENE CHLORIDE	16 U	17 U	9 U	10 U
STYRENE	16 U	17 U	9 U	10 U
TETRACHLOROETHENE	16 U	17 U	9 U	10 U
TOLUENE	16 U	17 U	9 U	10 U
TRANS-1,3-DICHLOROPROPENE	16 U	17 U	9 U	10 U
TRICHLOROETHENE	16 U	17 U	9 U	10 U
VINYL CHLORIDE	16 U	17 U	9 U	10 U
XYLENES, TOTAL	16 U	17 U	9 U	10 U
Semivolatile Organics (ug/kg)				
1,2,4-TRICHLOROBENZENE	570 U	490 U	430 U	430 U
1,2-DICHLOROBENZENE	570 U	490 U	430 U	430 U
1,3-DICHLOROBENZENE	570 U	490 U	430 U	430 U
1,4-DICHLOROBENZENE	570 U	490 U	430 U	430 U
2,2'-OXYBIS(1-CHLOROPROPANE)	570 U	490 U	430 U	430 U
2,4,5-TRICHLOROPHENOL	1400 U	1200 U	2100 U	2200 U
2,4,6-TRICHLOROPHENOL	570 U	490 U	430 U	430 U
2,4-DICHLOROPHENOL	570 U	490 U	430 U	430 U
2,4-DIMETHYLPHENOL	570 U	490 U	430 U	430 U
2,4-DINITROPHENOL	1400 U	1200 U	2100 U	2200 U
2,4-DINITROTOLUENE	570 U	490 U	430 U	430 U
2,6-DINITROTOLUENE	570 U	490 U	430 U	430 U
2-CHLORONAPHTHALENE	570 U	490 U	430 U	430 U
2-CHLOROPHENOL	570 U	490 U	430 U	430 U
2-METHYLNAPHTHALENE	570 U	490 U	430 U	430 U
2-METHYLPHENOL	570 U	490 U	430 U	430 U
2-NITROANILINE	1400 U	1200 U	2100 U	2200 U
2-NITROPHENOL	570 U	490 U	430 U	430 U
3,3'-DICHLOROBENZIDINE	570 U	490 U	860 U	860 U
3-NITROANILINE	1400 U	1200 U	2100 U	2200 U
4,6-DINITRO-2-METHYLPHENOL	1400 U	1200 U	2100 U	2200 U
4-BROMOPHENYL PHENYL ETHER	570 U	490 U	430 U	430 U
4-CHLORO-3-METHYLPHENOL	570 U	490 U	430 U	430 U
4-CHLOROANILINE	570 U	490 U	430 U	430 U
4-CHLOROPHENYL PHENYL ETHER	570 U	490 U	430 U	430 U
4-METHYLPHENOL	570 U	490 U	430 U	430 U
4-NITROANILINE	1400 U	1200 U	2100 U	2200 U
4-NITROPHENOL	1400 U	1200 U	2100 U	2200 U
ACENAPHTHENE	570 U	490 U	430 U	430 U
ACENAPHTHYLENE	570 U	490 U	430 U	430 U
ANTHRACENE	570 U	490 U	430 U	430 U
BENZO(A)ANTHRACENE	570 U	490 U	430 U	430 U
BENZO(A)PYRENE	570 U	490 U	430 U	430 U

from _allres.xls
from c:\

Site 13 Soil Results
Appendix Attachment

order	06	07	08	09
tab	tab41	tab41	tab41	tab41
location	PI-013-01	PI-013-02	UNDEFINED	UNDEFINED
nsample	PI-013-01(38)	PI-013-02(39)	PAI-13C-SS-03-01	PAI-13C-SS-03-01-D
sample	PI-013-01(38)	PI-013-02(39)	PAI-13C-SS-03-01	PAI-13C-SS-DU03-01
matrix	SO	SO	SO	SO
sacode	NORMAL	NORMAL	DUP	DUP
sample_dat	12/13/95	12/13/95	10/06/99	10/06/99
depth	0 - 1'	0 - 1'	NA	NA
proj_manag	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
sort	**c_06**	**c_07**	**c_08**	**c_09**
BENZO(B)FLUORANTHENE	570 U	490 U	430 U	430 U
BENZO(G,H,I)PERYLENE	570 U	490 U	430 U	430 U
BENZO(K)FLUORANTHENE	570 U	490 U	430 U	430 U
BIS(2-CHLOROETHOXY)METHANE	570 U	490 U	430 U	430 U
BIS(2-CHLOROETHYL)ETHER	570 U	490 U	430 U	430 U
BIS(2-ETHYLHEXYL)PHTHALATE	570 U	490 U	430 U	430 U
BUTYL BENZYL PHTHALATE	570 U	490 U	430 U	430 U
CARBAZOLE	570 U	490 U	430 U	430 U
CHRYSENE	570 U	490 U	430 U	430 U
DI-N-BUTYL PHTHALATE	570 U	490 U	430 U	430 U
DI-N-OCTYL PHTHALATE	570 U	490 U	430 U	430 U
DIBENZO(A,H)ANTHRACENE	570 U	490 U	430 U	430 U
DIBENZOFURAN	570 U	490 U	430 U	430 U
DIETHYL PHTHALATE	26 J	490 U	430 U	430 U
DIMETHYL PHTHALATE	570 U	490 U	430 U	430 U
FLUORANTHENE	570 U	490 U	430 U	430 U
FLUORENE	570 U	490 U	430 U	430 U
HEXACHLOROBENZENE	570 U	490 U	430 U	430 U
HEXACHLOROBUTADIENE	570 U	490 U	430 U	430 U
HEXACHLOROCYCLOPENTADIENE	570 U	490 U	430 U	430 U
HEXACHLOROETHANE	570 U	490 U	430 U	430 U
INDENO(1,2,3-CD)PYRENE	570 U	490 U	430 U	430 U
ISOPHORONE	570 U	490 U	430 U	430 U
N-NITROSO-DI-N-PROPYLAMINE	570 U	490 U	430 U	430 U
N-NITROSODIPHENYLAMINE	570 U	490 U	430 U	430 U
NAPHTHALENE	570 U	490 U	430 U	430 U
NITROBENZENE	570 U	490 U	430 U	430 U
PENTACHLOROPHENOL	1400 U	1200 U	2100 U	2200 U
PHENANTHRENE	570 U	490 U	430 U	430 U
PHENOL	570 U	490 U	430 U	430 U
PYRENE	570 U	47 J	430 U	430 U
Pesticides/PCBs (ug/kg)				
4,4'-DDD	5.7 U	4.9 U	22 U	21 U
4,4'-DDE	5.7 U	4.9 U	22 U	21 U
4,4'-DDT	5.7 U	4.9 U	22 UJ	60 J
ALDRIN	2.9 U	2.5 U	11 U	10 U
ALPHA-BHC	2.9 U	2.5 U	11 U	10 U
ALPHA-CHLORDANE	2.9 U	2.5 U	11 U	10 U
AROCLOR-1016	57 U	49 U	11 U	10 U
AROCLOR-1221	120 U	100 U	11 U	10 U
AROCLOR-1232	57 U	49 U	11 U	10 U
AROCLOR-1242	57 U	49 U	11 U	10 U
AROCLOR-1248	57 U	49 U	11 U	10 U
AROCLOR-1254	57 U	49 U	11 U	10 U
AROCLOR-1260	57 U	49 U	11 U	10 U
BETA-BHC	2.9 U	2.5 U	11 U	10 U
DELTA-BHC	2.9 U	2.5 U	11 U	10 U
DIELDRIN	5.7 U	4.9 U	22 U	21 U
ENDOSULFAN I	2.9 U	2.5 U	11 U	10 U
ENDOSULFAN II	5.7 U	4.9 U	22 U	21 U
ENDOSULFAN SULFATE	5.7 U	4.9 U	22 U	21 U
ENDRIN	5.7 U	4.9 U	22 U	21 U
ENDRIN ALDEHYDE	5.7 U	4.9 U	22 U	21 U
ENDRIN KETONE	5.7 U	4.9 U	22 U	21 U
GAMMA-BHC (LINDANE)	2.9 U	2.5 U	11 U	10 U
GAMMA-CHLORDANE	2.9 U	2.5 U	11 U	10 U
HEPTACHLOR	2.9 U	2.5 U	11 U	10 U
HEPTACHLOR EPOXIDE	2.9 U	2.5 U	11 U	10 U
METHOXYCHLOR	29 U	25 U	110 U	100 U
TOXAPHENE	290 U	250 U	220 U	210 U
Inorganics (mg/kg)				
ALUMINUM	23800	16200	26000	30400
ANTIMONY	0.65 U	0.74 U	0.45 U	0.47 U
ARSENIC	17.3	7.5	13.6	14.6
BARIUM	28.1	26.9	30.3	36.1
BERYLLIUM	1.3	0.73	1.5	1.5
CADMIUM	0.26 U	0.16	0.04 U	0.04 U
CALCIUM	9950	2760	8700	5360

from _allres.xls
from c:\

Site 13 Soil Results
Appendix Attachment

order	06	07	08	09
tab	tab41	tab41	tab41	tab41
location	PI-013-01	PI-013-02	UNDEFINED	UNDEFINED
nsample	PI-013-01(38)	PI-013-02(39)	PAI-13C-SS-03-01	PAI-13C-SS-03-01-D
sample	PI-013-01(38)	PI-013-02(39)	PAI-13C-SS-03-01	PAI-13C-SS-DU03-01
matrix	SO	SO	SO	SO
sacode	NORMAL	NORMAL	DUP	DUP
sample_dat	12/13/95	12/13/95	10/06/99	10/06/99
depth	0 - 1'	0 - 1'	NA	NA
proj_manag	Brayack, D.	Brayack, D.	Brayack, D.	Brayack, D.
sort	**c_06**	**c_07**	**c_08**	**c_09**
CHROMIUM	42.9	25.7	44.9	50.7
COBALT	5.9	3.6	5.5	5.8
COPPER	12.9	12.6	17	17.6
CYANIDE	0.85 U	0.74 U		
IRON	27600	16400	27900	30900
LEAD	20 U	19.2	25.3	28
MAGNESIUM	6180	3190	4990	5540
MANGANESE	314	156	273	242
MERCURY	0.05	0.07 U	0.07	0.06
NICKEL	12.5	7.5	12.1	13.1
POTASSIUM	3540	2090	3210	3730
SELENIUM	0.57 U	0.65 U	0.45	0.38 U
SILVER	0.18 U	0.21 U	0.08 U	0.08 U
SODIUM	1380	695	119	131
THALLIUM	0.59 U	0.68 U	0.45 U	0.47
TIN			2.4 U	2.8 U
VANADIUM	55.4	36.9	57.7	62.8
ZINC	57.9	36.9	67.8	72.6

from _allres.xls
from c:\

A-2

GROUNDWATER

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00007	00007	00007
AOC	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	2004Q	1999Q	2004Q	1999Q
EVENT				
LOCATION	PAI07GW01	PAI07GW02	PAI07GW02	PAI07GW03
NSAMPLE	PAI7-GW1-01-D	PAI7-GW2-02	PAI7-GW2-02-20040909	PAI7-GW3-02
SAMPLE	PAI7-GW-DUP-01	PAI-07-GW2-02	PAI7-GW2-02	PAI-07-GW3-02
MATRIX	GW	GW	GW	GW
SACODE	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040908	19991214	20040909	19991213
2,4-DIMETHYLPHENOL	10 U		10 U	
2,4-DINITROPHENOL	25 U		25 U	
2,4-DINITROTOLUENE	10 U		10 U	
2,6-DICHLOROPHENOL				
2,6-DINITROTOLUENE	10 U		10 U	
2-ACETYLAMINOFLUORENE				
2-CHLORONAPHTHALENE	10 U		10 U	
2-CHLOROPHENOL	10 U		10 U	
2-METHYLNAPHTHALENE	10 U		10 U	
2-METHYLPHENOL	10 U		10 U	
2-NAPHTHYLAMINE				
2-NITROANILINE	25 U		25 U	
2-NITROPHENOL	10 U		10 U	
2-PICOLINE				
3,3'-DICHLOROBENZIDINE	10 U		10 U	
3,3'-DIMETHYLBENZIDINE				
3-METHYLCHOLANTHRENE				
3-NITROANILINE	25 U		25 U	
4,6-DINITRO-2-METHYLPHENOL	25 U		25 U	
4-AMINOBIPHENYL				
4-BROMOPHENYL PHENYL ETHER	10 U		10 U	
4-CHLORO-3-METHYLPHENOL	10 U		10 U	
4-CHLOROANILINE	10 U		10 U	
4-CHLOROPHENYL PHENYL ETHER	10 U		10 U	
4-METHYLPHENOL	10 U		10 U	
4-NITROANILINE	25 U		25 U	
4-NITROPHENOL	25 U		25 U	
4-NITROQUINOLINE-1-OXIDE				
5-NITRO-O-TOLUIDINE				
7,12-DIMETHYLBENZ(A)ANTHRACENE				
A,A-DIMETHYLPHENETHYLAMINE				
ACENAPHTHENE	10 U		10 U	
ACENAPHTHYLENE	10 U		10 U	
ACETOPHENONE	10 U		10 U	
ANILINE				
ANTHRACENE	10 U		10 U	
ARAMITE				
ATRAZINE	10 U		10 U	
BENZALDEHYDE	10 UJ		10 UJ	
BENZIDINE				
BENZO(A)ANTHRACENE	10 U		10 U	
BENZO(A)PYRENE	10 U		10 U	
BENZO(B)FLUORANTHENE	10 U		10 U	
BENZO(G,H,I)PERYLENE	10 U		10 U	

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00007	00007	00007
AOC	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	2004Q	1999Q	2004Q	1999Q
EVENT				
LOCATION	PAI07GW01	PAI07GW02	PAI07GW02	PAI07GW03
NSAMPLE	PAI7-GW1-01-D	PAI7-GW2-02	PAI7-GW2-02-20040909	PAI7-GW3-02
SAMPLE	PAI7-GW-DUP-01	PAI-07-GW2-02	PAI7-GW2-02	PAI-07-GW3-02
MATRIX	GW	GW	GW	GW
SACODE	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040908	19991214	20040909	19991213
ISOBUTANOL				
ISOPROPYLBENZENE	5 U		5 U	
M+P-XYLENES	10 U		10 U	
METHACRYLONITRILE				
METHYL ACETATE	5 U		5 U	
METHYL CYCLOHEXANE	5 U		5 U	
METHYL IODIDE				
METHYL METHACRYLATE				
METHYL TERT-BUTYL ETHER	5 UJ		5 UJ	
METHYLENE CHLORIDE	5 U	0.5 U	5 U	0.5 U
O-XYLENE	5 U		5 U	
PENTACHLOROETHANE				
PROPIONITRILE				
STYRENE	5 U	0.5 U	5 U	0.5 U
TETRACHLOROETHENE	5 UJ	0.5 U	5 UJ	0.5 U
TOLUENE	5 U	0.5 U	5 U	0.5 U
TOTAL 1,2-DICHLOROETHENE	10 U	0.5 U	10 U	0.5 U
TOTAL XYLENES	15 U	0.5 U	15 U	0.5 U
TRANS-1,2-DICHLOROETHENE	5 U		5 U	
TRANS-1,3-DICHLOROPROPENE	5 U	0.5 U	5 U	0.5 U
TRANS-1,4-DICHLORO-2-BUTENE				
TRICHLOROETHENE	5 U	0.5 U	5 U	0.5 U
TRICHLOROFLUOROMETHANE	5 U		5 U	
VINYL ACETATE				
VINYL CHLORIDE	5 U	0.5 U	5 U	0.5 U
SEMIVOLATILES (UG/L)				
1,1-BIPHENYL	10 U		10 U	
1,2,4,5-TETRACHLOROBENZENE				
1,2,4-TRICHLOROBENZENE				
1,2-DICHLOROBENZENE				
1,2-DIPHENYLHYDRAZINE				
1,3,5-TRINITROBENZENE				
1,3-DICHLOROBENZENE				
1,3-DINITROBENZENE				
1,4-DICHLOROBENZENE				
1,4-DIOXANE				
1,4-NAPHTHOQUINONE				
1,4-PHENYLENEDIAMINE				
1-NAPHTHYLAMINE				
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U		10 U	
2,3,4,6-TETRACHLOROPHENOL				
2,4,5-TRICHLOROPHENOL	25 UJ		25 UJ	
2,4,6-TRICHLOROPHENOL	10 U		10 U	
2,4-DICHLOROPHENOL	10 U		10 U	

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00007	00007	00007
AOC	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	2004Q	1999Q	2004Q	1999Q
EVENT				
LOCATION	PAI07GW01	PAI07GW02	PAI07GW02	PAI07GW03
NSAMPLE	PAI7-GW1-01-D	PAI7-GW2-02	PAI7-GW2-02-20040909	PAI7-GW3-02
SAMPLE	PAI7-GW-DUP-01	PAI-07-GW2-02	PAI7-GW2-02	PAI-07-GW3-02
MATRIX	GW	GW	GW	GW
SACODE	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040908	19991214	20040909	19991213
VOLATILES (UG/L)				
1,1,1,2-TETRACHLOROETHANE				
1,1,1-TRICHLOROETHANE	5 U	0.5 U	5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	5 U	0.5 U	5 U	0.5 U
1,1,2-TRICHLOROETHANE	5 U	0.5 U	5 U	0.5 U
1,1,2-TRICHLOROTRIFLUOROETHANE	5 U		5 U	
1,1-DICHLOROETHANE	5 U	0.5 U	5 U	0.5 U
1,1-DICHLOROETHENE	5 U	0.5 U	5 U	0.5 U
1,2,3-TRICHLOROPROPANE				
1,2,4-TRICHLOROBENZENE	5 UJ		5 UJ	
1,2-DIBROMO-3-CHLOROPROPANE	5 U		5 U	
1,2-DIBROMOETHANE	5 U	0.5 U	5 U	0.5 U
1,2-DICHLOROBENZENE	5 U		5 U	
1,2-DICHLOROETHANE	5 U	0.5 U	5 U	0.5 U
1,2-DICHLOROPROPANE	5 U	0.5 U	5 U	0.5 U
1,3-DICHLOROBENZENE	5 U		5 U	
1,4-DICHLOROBENZENE	5 U		5 U	
2-BUTANONE	5 U	2 UR	5 U	2 UR
2-HEXANONE	5 U	2 U	5 U	2 UR
3-CHLOROPROPENE				
4-METHYL-2-PENTANONE	5 U	2 U	5 U	2 U
ACETONE	5 U	2 UR	5 UR	2 UR
ACETONITRILE				
ACROLEIN				
ACRYLONITRILE				
BENZENE	5 U	0.5 U	5 U	0.5 U
BROMODICHLOROMETHANE	5 U	0.5 U	5 U	0.5 U
BROMOFORM	5 U	0.5 U	5 U	0.5 U
BROMOMETHANE	5 U	0.5 U	5 U	0.5 U
CARBON DISULFIDE	5 U	2 U	5 U	2 U
CARBON TETRACHLORIDE	5 U	0.5 U	5 U	0.5 U
CHLOROBENZENE	5 U	0.5 U	5 U	0.5 U
CHLORODIBROMOMETHANE	5 U	0.5 U	5 U	0.5 U
CHLOROETHANE	5 U	0.5 U	5 U	0.5 U
CHLOROFORM	5 U	0.5 U	5 U	0.5 U
CHLOROMETHANE	5 U	0.5 U	5 U	0.5 U
CHLOROPRENE				
CIS-1,2-DICHLOROETHENE	5 U		5 U	
CIS-1,3-DICHLOROPROPENE	5 U	0.5 U	5 U	0.5 U
CYCLOHEXANE	5 U		5 U	
DIBROMOMETHANE				
DICHLORODIFLUOROMETHANE	5 U		5 U	
ETHYL METHACRYLATE				
ETHYLBENZENE	5 U	0.5 U	5 U	0.5 U

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00004	00004	00004	00007	00007
AOC	DREDGE SPILS FF PIT	DREDGE SPILS FF PIT	DREDGE SPILS FF PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	1999Q	2000Q	2000Q	2004Q	2004Q
EVENT					
LOCATION	PAI04MW01	PAI04MW02	PAI04MW03	PAI07GW01	PAI07GW01
NSAMPLE	PAI-04-GW-01-01	PAI-04-MW-02-01	PAI-04-MW-03-01	PAI7-GW1-01	PAI7-GW1-01-AVG
SAMPLE	PAI-04-GW-01-01	PAI-04-MW-02-01	PAI-04-MW-03-01	PAI7-GW1-01	PAI7-GW1-01-AVG
MATRIX	GW	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL	ORIG	AVG
SAMPLE DATE	19991216	20000823	20000823	20040908	20040908
SILVER	0.8 U	0.6 U		2.84 U	2.84 U
SODIUM	2170000	1900000		2270	2325
THALLIUM	4.5 U	9.5 U		4.09 U	4.09 U
TIN	3.4 U				
VANADIUM	6.6 U	24		4.14 U	4.14 U
ZINC	36.1 U	12.5		19.5	19.55
MISCELLANEOUS PARAMETERS					
CYANIDE (UG/L)	10 U	10 U			
TOTAL DISSOLVED SOLIDS (MG/L)					

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00004	00004	00004	00007	00007
AOC	DREDGE SPILS FF PIT	DREDGE SPILS FF PIT	DREDGE SPILS FF PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	1999Q	2000Q	2000Q	2004Q	2004Q
EVENT					
LOCATION	PAI04MW01	PAI04MW02	PAI04MW03	PAI07GW01	PAI07GW01
NSAMPLE	PAI-04-GW-01-01	PAI-04-MW-02-01	PAI-04-MW-03-01	PAI7-GW1-01	PAI7-GW1-01-AVG
SAMPLE	PAI-04-GW-01-01	PAI-04-MW-02-01	PAI-04-MW-03-01	PAI7-GW1-01	PAI7-GW1-01-AVG
MATRIX	GW	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL	ORIG	AVG
SAMPLE DATE	19991216	20000823	20000823	20040908	20040908
HEPTACHLOR EPOXIDE	0.24 U	0.032 U			
ISODRIN	0.49 U	0.064 U			
KEPONE	2.9 UJ	0.38 U			
METHOXYCHLOR	2.4 UJ	0.32 U			
METHYL PARATHION	2 U				
O,O,O-TRIETHYL PHOSPHOROTHIOATE	2 U				
PHORATE	2 U				
SULFOTEPP	2 U				
THIONAZIN	2 U				
TOXAPHENE	4.9 U	0.64 U			
ORGANOPHOSPHATE PESTICIDES (UG/L)					
DIMETHOATE		2.1 U			
DISULFOTON		2.1 U			
ETHYL PARATHION		2.1 U			
FAMPHUR		2.1 U			
METHYL PARATHION		2.1 U			
O,O,O-TRIETHYL PHOSPHOROTHIOATE		2.1 U			
PHORATE		2.1 U			
SULFOTEPP		2.1 U			
THIONAZIN		2.1 U			
HERBICIDES (UG/L)					
2,4,5-T	0.01 U	0.11 U			
2,4,5-TP (SILVEX)	0.01 U	0.11 U			
2,4-D	0.1 U	1.1 U			
DINOSEB	0.01 U	0.11 U			
INORGANICS (UG/L)					
ALUMINUM	22800 J	15100		242 U	231 U
ANTIMONY	4.5 U	5.5 U		2.34 U	2.34 U
ARSENIC	7.8	5.2 U		3.03 U	3.03 U
BARIUM	14.9	30		37.1	37.4
BERYLLIUM	4.3	0.5 U		0.27 U	0.27 U
CADMIUM	1.2	0.7 U		3.97 U	3.97 U
CALCIUM	186000	246000		22200	22150
CHROMIUM	8.2	23.8		0.8 U	0.8 U
COBALT	4.8 U	1.4		4.36 U	4.36 U
COPPER	2 U	7.7		14.4	14.7
IRON	28000	5840		409 U	405.5 U
LEAD	4.7 U	1.1 U		4.5	4.45
MAGNESIUM	161000	320000		1420	1380
MANGANESE	605	1730		34.9	35.05
MERCURY	0.1 U	0.1 U		0.01 U	0.025 U
NICKEL	6.6	5.1		10.8 U	10.8 U
POTASSIUM	43600	102000		1640 U	1705 U
SELENIUM	3.6 U	9 U		3.71 U	3.71 U

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00004 DREDGE SPILS FF PIT 1999Q PAI04MW01 PAI-04-GW-01-01 PAI-04-GW-01-01 GW NORMAL 19991216	00004 DREDGE SPILS FF PIT 2000Q PAI04MW02 PAI-04-MW-02-01 PAI-04-MW-02-01 GW NORMAL 20000823	00004 DREDGE SPILS FF PIT 2000Q PAI04MW03 PAI-04-MW-03-01 PAI-04-MW-03-01 GW NORMAL 20000823	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW01 PAI7-GW1-01 PAI7-GW1-01 GW ORIG 20040908	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW01 PAI7-GW1-01-AVG PAI7-GW1-01-AVG GW AVG 20040908
NITROBENZENE	10 U	12 U	10 U	10 U	10 U
O-TOLUIDINE	10 U	12 U			
P-(DIMETHYLAMINO)AZOBENZENE	19 U	24 U			
PENTACHLOROBENZENE	10 U	12 U			
PENTACHLORONITROBENZENE	10 U	12 UR			
PENTACHLOROPHENOL	48 UR	61 U	52 U	25 U	25 U
PHENACETIN	10 U	24 U			
PHENANTHRENE	10 U	12 U	10 U	10 U	10 U
PHENOL	10 U	12 U	10 U	10 U	10 U
PRONAMIDE	10 U	24 U			
PYRENE	10 U	12 U	10 U	10 U	10 U
PYRIDINE	19 UJ	24 U			
SAFROLE	10 UJ	12 U			
PESTICIDES/PCBs (UG/L)					
4,4'-DDD	0.49 U	0.064 U			
4,4'-DDE	0.49 U	0.064 U			
4,4'-DDT	0.49 U	0.064 U			
ALDRIN	0.24 U	0.032 U			
ALPHA-BHC	0.24 UJ	0.032 U			
ALPHA-CHLORDANE	0.24 U	0.032 U			
AROCLOR-1016	0.24 U	0.32 U			
AROCLOR-1221	0.24 U	0.32 U			
AROCLOR-1232	0.24 U	0.32 U			
AROCLOR-1242	0.24 U	0.32 U			
AROCLOR-1248	0.24 U	0.32 U			
AROCLOR-1254	0.24 U	0.32 U			
AROCLOR-1260	0.24 U	0.32 U			
BETA-BHC	0.24 UJ	0.032 U			
CHLORDANE		0.13 U			
DELTA-BHC	0.24 U	0.032 U			
DIELDRIN	0.49 U	0.064 U			
DIMETHOATE	2 U				
DISULFOTON	2 U				
ENDOSULFAN I	0.24 U	0.032 U			
ENDOSULFAN II	0.49 U	0.064 U			
ENDOSULFAN SULFATE	0.49 U	0.064 U			
ENDRIN	0.49 U	0.064 U			
ENDRIN ALDEHYDE	0.49 U	0.064 U			
ENDRIN KETONE	0.49 U	0.064 U			
ETHYL PARATHION	2 U				
FAMPHUR	2 U				
GAMMA-BHC (LINDANE)	0.24 UJ	0.032 U			
GAMMA-CHLORDANE	0.24 U	0.032 U			
HEPTACHLOR	0.24 U	0.032 U			

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SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00004	00004	00004	00007	00007
AOC	DREDGE SPILS FF PIT	DREDGE SPILS FF PIT	DREDGE SPILS FF PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	1999Q	2000Q	2000Q	2004Q	2004Q
EVENT					
LOCATION	PAI04MW01	PAI04MW02	PAI04MW03	PAI07GW01	PAI07GW01
NSAMPLE	PAI-04-GW-01-01	PAI-04-MW-02-01	PAI-04-MW-03-01	PAI7-GW1-01	PAI7-GW1-01-AVG
SAMPLE	PAI-04-GW-01-01	PAI-04-MW-02-01	PAI-04-MW-03-01	PAI7-GW1-01	PAI7-GW1-01-AVG
MATRIX	GW	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL	ORIG	AVG
SAMPLE DATE	19991216	20000823	20000823	20040908	20040908
BENZO(K)FLUORANTHENE	10 U	12 U	10 U	10 U	10 U
BENZOIC ACID	48 U	61 U			
BENZYL ALCOHOL	10 U	12 U			
BIS(2-CHLOROETHOXY)METHANE	10 U	12 U	10 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	10 U	12 U	10 U	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	65	12 U	10 U	10 U	10 U
BUTYL BENZYL PHTHALATE	10 U	12 U	10 U	10 U	10 U
CAPROLACTAM				10 U	10 U
CARBAZOLE	10 U	12 U	10 U	10 U	10 U
CHLOROBENZILATE	10 U	12 U			
CHRYSENE	10 U	12 U	10 U	10 U	10 U
DI-N-BUTYL PHTHALATE	10 U	12 U	10 U	10 U	10 U
DI-N-OCTYL PHTHALATE	10 U	12 U	10 U	10 U	10 U
DIALLATE	10 U	12 U			
DIBENZO(A,H)ANTHRACENE	10 U	12 U	10 U	10 U	10 U
DIBENZOFURAN	10 U	12 U	10 U	10 U	10 U
DIETHYL PHTHALATE	10 U	12 U	10 U	10 U	10 U
DIMETHYL PHTHALATE	10 U	12 U	10 U	10 U	10 U
DINOSEB	19 U	24 U			
DIPHENYLAMINE	10 U	12 U			
ETHYL METHANE SULFONATE	10 U	12 U			
FLUORANTHENE	10 U	12 U	10 U	10 U	10 U
FLUORENE	10 U	12 U	10 U	10 U	10 U
HEXACHLOROBENZENE	10 U	12 U	10 U	10 U	10 U
HEXACHLOROBUTADIENE	10 U	12 U	10 U	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	10 U	12 U	10 U	10 U	10 U
HEXACHLOROETHANE	10 U	12 U	10 U	10 U	10 U
HEXACHLOROPHENE	140 UJ	180 U			
HEXACHLOROPROPENE	48 U	61 U			
INDENO(1,2,3-CD)PYRENE	10 U	12 U	10 U	10 U	10 U
ISOPHORONE	10 U	12 U	10 U	10 U	10 U
ISOSAFROLE	10 U	12 U			
METHAPYRILENE	24 U	61 U			
METHYL METHANE SULFONATE	10 U	24 U			
N-NITROSO-DI-N-BUTYLAMINE	10 U	12 U			
N-NITROSO-DI-N-PROPYLAMINE	10 U	12 U	10 U	10 U	10 U
N-NITROSODIETHYLAMINE	10 U	24 U			
N-NITROSODIMETHYLAMINE	10 U	12 U			
N-NITROSODIPHENYLAMINE	10 U	12 U	10 U	10 U	10 U
N-NITROSOMETHYLETHYLAMINE	10 UJ	24 U			
N-NITROSOMORPHOLINE	19 U	24 U			
N-NITROSOPIPERIDINE	10 U	12 U			
N-NITROSOPYRROLIDINE	48 U	61 U			
NAPHTHALENE	10 U	12 U	10 U	10 U	10 U

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SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00004 DREDGE SPILS FF PIT 1999Q PAI04MW01 PAI-04-GW-01-01 PAI-04-GW-01-01 GW NORMAL 19991216	00004 DREDGE SPILS FF PIT 2000Q PAI04MW02 PAI-04-MW-02-01 PAI-04-MW-02-01 GW NORMAL 20000823	00004 DREDGE SPILS FF PIT 2000Q PAI04MW03 PAI-04-MW-03-01 PAI-04-MW-03-01 GW NORMAL 20000823	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW01 PAI7-GW1-01 PAI7-GW1-01 GW ORIG 20040908	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW01 PAI7-GW1-01-AVG PAI7-GW1-01-AVG GW AVG 20040908
2,4-DIMETHYLPHENOL	10 U	12 U	10 U	10 U	10 U
2,4-DINITROPHENOL	48 U	61 U	52 U	25 U	25 U
2,4-DINITROTOLUENE	10 U	12 U	10 U	10 U	10 U
2,6-DICHLOROPHENOL	10 U	12 U			
2,6-DINITROTOLUENE	10 U	12 U	10 U	10 U	10 U
2-ACETYLAMINOFLUORENE	19 U	24 U			
2-CHLORONAPHTHALENE	10 U	12 U	10 U	10 U	10 U
2-CHLOROPHENOL	10 UJ	12 U	10 U	10 U	10 U
2-METHYLNAPHTHALENE	10 U	12 U	10 U	10 U	10 U
2-METHYLPHENOL	10 U	12 U	10 U	10 U	10 U
2-NAPHTHYLAMINE	24 U	24 U			
2-NITROANILINE	48 U	61 U	52 U	25 U	25 U
2-NITROPHENOL	10 U	12 U	10 U	10 U	10 U
2-PICOLINE	10 U	12 U			
3,3'-DICHLOROBENZIDINE	19 U	24 U	21 U	10 U	10 U
3,3'-DIMETHYLBENZIDINE	48 U	61 U			
3-METHYLCHOLANTHRENE	10 U	12 U			
3-NITROANILINE	48 UJ	61 U	52 U	25 U	25 U
4,6-DINITRO-2-METHYLPHENOL	48 U	61 U	52 U	25 U	25 U
4-AMINOBIPHENYL	19 U	24 U			
4-BROMOPHENYL PHENYL ETHER	10 U	12 U	10 U	10 U	10 U
4-CHLORO-3-METHYLPHENOL	19 U	12 U	10 U	10 U	10 U
4-CHLOROANILINE	19 U	12 U	10 U	10 U	10 U
4-CHLOROPHENYL PHENYL ETHER	10 U	12 U	10 U	10 U	10 U
4-METHYLPHENOL	10 U	12 U	10 U	10 U	10 U
4-NITROANILINE	48 U	61 U	52 U	25 U	25 U
4-NITROPHENOL	48 U	61 U	52 U	25 U	25 U
4-NITROQUINOLINE-1-OXIDE	48 UR	61 U			
5-NITRO-O-TOLUIDINE	19 U	24 U			
7,12-DIMETHYLBENZ(A)ANTHRACENE	19 U	24 U			
A,A-DIMETHYLPHENETHYLAMINE	48 U	61 U			
ACENAPHTHENE	10 U	12 U	10 U	10 U	10 U
ACENAPHTHYLENE	10 U	12 U	10 U	10 U	10 U
ACETOPHENONE	10 U	12 U		10 U	10 U
ANILINE	10 U	12 U			
ANTHRACENE	10 U	12 U	10 U	10 U	10 U
ARAMITE	19 U	24 U			
ATRAZINE				10 U	10 U
BENZALDEHYDE				10 UJ	10 UJ
BENZIDINE	97 UR				
BENZO(A)ANTHRACENE	10 U	12 U	10 U	10 U	10 U
BENZO(A)PYRENE	10 U	12 U	10 U	10 U	10 U
BENZO(B)FLUORANTHENE	10 U	12 U	10 U	10 U	10 U
BENZO(G,H,I)PERYLENE	10 U	12 U	10 U	10 U	10 U

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SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00004	00004	00004	00007	00007
AOC	DREDGE SPILS FF PIT	DREDGE SPILS FF PIT	DREDGE SPILS FF PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	1999Q	2000Q	2000Q	2004Q	2004Q
EVENT					
LOCATION	PAI04MW01	PAI04MW02	PAI04MW03	PAI07GW01	PAI07GW01
NSAMPLE	PAI-04-GW-01-01	PAI-04-MW-02-01	PAI-04-MW-03-01	PAI7-GW1-01	PAI7-GW1-01-AVG
SAMPLE	PAI-04-GW-01-01	PAI-04-MW-02-01	PAI-04-MW-03-01	PAI7-GW1-01	PAI7-GW1-01-AVG
MATRIX	GW	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL	ORIG	AVG
SAMPLE DATE	19991216	20000823	20000823	20040908	20040908
ISOBUTANOL	100 UR	100 UR			
ISOPROPYLBENZENE				5 U	5 U
M+P-XYLENES				10 U	10 U
METHACRYLONITRILE	2 UR	2 UR			
METHYL ACETATE				5 U	5 U
METHYL CYCLOHEXANE				5 U	5 U
METHYL IODIDE	2 U	2 U			
METHYL METHACRYLATE	2 U	2 U			
METHYL TERT-BUTYL ETHER				5 UJ	5 UJ
METHYLENE CHLORIDE	0.5 U	0.5 U	0.5 U	5 U	5 U
O-XYLENE				5 U	5 U
PENTACHLOROETHANE	2 U	2 U			
PROPIONITRILE	40 UR	40 UR			
STYRENE	0.5 U	0.5 U	0.5 U	5 U	5 U
TETRACHLOROETHENE	0.5 U	0.5 U	0.5 U	5 UJ	5 UJ
TOLUENE	0.5 U	0.5 U	0.5 U	5 U	5 U
TOTAL 1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	10 U	10 U
TOTAL XYLENES	0.5 U	0.5 U	0.5 U	15 U	15 U
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	5 U	5 U
TRANS-1,4-DICHLORO-2-BUTENE	2 UR	2 UR			
TRICHLOROETHENE	0.5 U	0.5 U	0.5 U	5 U	5 U
TRICHLOROFLUOROMETHANE	0.5 UJ	0.5 U		5 U	5 U
VINYL ACETATE	2 UR	2 U			
VINYL CHLORIDE	0.5 U	0.5 U	0.5 U	5 U	5 U
SEMIVOLATILES (UG/L)					
1,1-BIPHENYL				10 U	10 U
1,2,4,5-TETRACHLOROBENZENE	10 U	12 UR			
1,2,4-TRICHLOROBENZENE	10 U	12 U	10 U		
1,2-DICHLOROBENZENE	10 U	12 U	10 U		
1,2-DIPHENYLHYDRAZINE	10 U	12 U			
1,3,5-TRINITROBENZENE	39 U	49 U			
1,3-DICHLOROBENZENE	10 U	12 U	10 U		
1,3-DINITROBENZENE	19 U	24 U			
1,4-DICHLOROBENZENE	10 U	12 U	10 U		
1,4-DIOXANE	78 UJ	49 U			
1,4-NAPHTHOQUINONE	48 UJ	61 U			
1,4-PHENYLENEDIAMINE	39 U	49 U			
1-NAPHTHYLAMINE	19 U	24 U			
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U	12 U	10 U	10 U	10 U
2,3,4,6-TETRACHLOROPHENOL	10 U	12 U			
2,4,5-TRICHLOROPHENOL	48 U	61 U	52 U	25 UJ	25 UJ
2,4,6-TRICHLOROPHENOL	10 U	12 U	10 U	10 U	10 U
2,4-DICHLOROPHENOL	10 U	12 U	10 U	10 U	10 U

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SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00004 DREDGE SPILS FF PIT 1999Q PAI04MW01 PAI-04-GW-01-01 PAI-04-GW-01-01 GW NORMAL 19991216	00004 DREDGE SPILS FF PIT 2000Q PAI04MW02 PAI-04-MW-02-01 PAI-04-MW-02-01 GW NORMAL 20000823	00004 DREDGE SPILS FF PIT 2000Q PAI04MW03 PAI-04-MW-03-01 PAI-04-MW-03-01 GW NORMAL 20000823	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW01 PAI7-GW1-01 PAI7-GW1-01 GW ORIG 20040908	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW01 PAI7-GW1-01-AVG PAI7-GW1-01-AVG GW AVG 20040908
VOLATILES (UG/L)					
1,1,1,2-TETRACHLOROETHANE	0.5 U	0.5 U			
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	5 U	5 U
1,1,2-TRICHLOROTRIFLUOROETHANE				5 U	5 U
1,1-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	5 U	5 U
1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	5 U	5 U
1,2,3-TRICHLOROPROPANE	0.5 U	0.5 U			
1,2,4-TRICHLOROBENZENE				5 UJ	5 UJ
1,2-DIBROMO-3-CHLOROPROPANE	0.5 U	0.5 U		5 U	5 U
1,2-DIBROMOETHANE	0.5 U	0.5 U		5 U	5 U
1,2-DICHLOROBENZENE				5 U	5 U
1,2-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	5 U	5 U
1,2-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	5 U	5 U
1,3-DICHLOROBENZENE				5 U	5 U
1,4-DICHLOROBENZENE				5 U	5 U
2-BUTANONE	2 UR	2 UR	2 UR	5 U	5 U
2-HEXANONE	2 UR	2 UR	2 UR	5 U	5 U
3-CHLOROPROPENE	2 U	2 U			
4-METHYL-2-PENTANONE	2 UR	2 U	2 U	5 U	5 U
ACETONE	2 UR	2 UR	2 UR	5 U	5 U
ACETONITRILE	40 UR	40 UR			
ACROLEIN	160 UR	160 UR			
ACRYLONITRILE	40 UJ	32 UR			
BENZENE	0.5 U	0.5 U	0.5 U	5 U	5 U
BROMODICHLOROMETHANE	0.5 U	0.5 U	0.5 U	5 U	5 U
BROMOFORM	0.5 U	0.5 U	0.5 U	5 U	5 U
BROMOMETHANE	0.5 U	0.5 U	0.5 U	5 U	5 U
CARBON DISULFIDE	2 UJ	2 U	2 U	5 U	5 U
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.5 U	5 U	5 U
CHLOROBENZENE	0.5 U	0.5 U	0.5 U	5 U	5 U
CHLORODIBROMOMETHANE	0.5 U	0.5 U	0.5 U	5 U	5 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U	5 U	5 U
CHLOROFORM	0.5 U	0.5 U	0.5 U	5 U	5 U
CHLOROMETHANE	0.5 U	0.5 U	0.5 U	5 U	5 U
CHLOROPRENE	0.5 UJ	0.5 U			
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	5 U	5 U
CYCLOHEXANE				5 U	5 U
DIBROMOMETHANE	0.5 U	0.5 U			
DICHLORODIFLUOROMETHANE	0.5 U	0.5 U		5 U	5 U
ETHYL METHACRYLATE	2 U	2 U			
ETHYLBENZENE	0.5 U	0.5 U	0.5 U	5 U	5 U

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SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW01 PAI7-GW1-01-D PAI7-GW-DUP-01 GW DUP 20040908	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW02 PAI7-GW2-02 PAI-07-GW2-02 GW NORMAL 19991214	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW02 PAI7-GW2-02-20040909 PAI7-GW2-02 GW NORMAL 20040909	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW03 PAI7-GW3-02 PAI-07-GW3-02 GW NORMAL 19991213
BENZO(K)FLUORANTHENE	10 U		10 U	
BENZOIC ACID				
BENZYL ALCOHOL				
BIS(2-CHLOROETHOXY)METHANE	10 U		10 U	
BIS(2-CHLOROETHYL)ETHER	10 U		10 U	
BIS(2-ETHYLHEXYL)PHTHALATE	10 U		10 U	
BUTYL BENZYL PHTHALATE	10 U		10 U	
CAPROLACTAM	10 U		10 U	
CARBAZOLE	10 U		10 U	
CHLOROBENZILATE				
CHRYSENE	10 U		10 U	
DI-N-BUTYL PHTHALATE	10 U		10 U	
DI-N-OCTYL PHTHALATE	10 U		10 U	
DIALLATE				
DIBENZO(A,H)ANTHRACENE	10 U		10 U	
DIBENZOFURAN	10 U		10 U	
DIETHYL PHTHALATE	10 U		10 U	
DIMETHYL PHTHALATE	10 U		10 U	
DINOSEB				
DIPHENYLAMINE				
ETHYL METHANE SULFONATE				
FLUORANTHENE	10 U		10 U	
FLUORENE	10 U		10 U	
HEXACHLOROBENZENE	10 U		10 U	
HEXACHLOROBUTADIENE	10 U		10 U	
HEXACHLOROCYCLOPENTADIENE	10 U		10 U	
HEXACHLOROETHANE	10 U		10 U	
HEXACHLOROPHENE				
HEXACHLOROPROPENE				
INDENO(1,2,3-CD)PYRENE	10 U		10 U	
ISOPHORONE	10 U		10 U	
ISOSAFROLE				
METHAPYRILENE				
METHYL METHANE SULFONATE				
N-NITROSO-DI-N-BUTYLAMINE				
N-NITROSO-DI-N-PROPYLAMINE	10 U		10 U	
N-NITROSODIETHYLAMINE				
N-NITROSODIMETHYLAMINE				
N-NITROSODIPHENYLAMINE	10 U		10 U	
N-NITROSOMETHYLETHYLAMINE				
N-NITROSOMORPHOLINE				
N-NITROSOPIPERIDINE				
N-NITROSOPYRROLIDINE				
NAPHTHALENE	10 U		10 U	

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW01 PAI7-GW1-01-D PAI7-GW-DUP-01 GW DUP 20040908	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW02 PAI7-GW2-02 PAI-07-GW2-02 GW NORMAL 19991214	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW02 PAI7-GW2-02-20040909 PAI7-GW2-02 GW NORMAL 20040909	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW03 PAI7-GW3-02 PAI-07-GW3-02 GW NORMAL 19991213
NITROBENZENE	10 U		10 U	
O-TOLUIDINE				
P-(DIMETHYLAMINO)AZOBENZENE				
PENTACHLOROBENZENE				
PENTACHLORONITROBENZENE				
PENTACHLOROPHENOL	25 U		25 U	
PHENACETIN				
PHENANTHRENE	10 U		10 U	
PHENOL	10 U		10 U	
PRONAMIDE				
PYRENE	10 U		10 U	
PYRIDINE				
SAFROLE				
PESTICIDES/PCBs (UG/L)				
4,4'-DDD				
4,4'-DDE				
4,4'-DDT				
ALDRIN				
ALPHA-BHC				
ALPHA-CHLORDANE				
AROCLOR-1016				
AROCLOR-1221				
AROCLOR-1232				
AROCLOR-1242				
AROCLOR-1248				
AROCLOR-1254				
AROCLOR-1260				
BETA-BHC				
CHLORDANE				
DELTA-BHC				
DIELDRIN				
DIMETHOATE				
DISULFOTON				
ENDOSULFAN I				
ENDOSULFAN II				
ENDOSULFAN SULFATE				
ENDRIN				
ENDRIN ALDEHYDE				
ENDRIN KETONE				
ETHYL PARATHION				
FAMPHUR				
GAMMA-BHC (LINDANE)				
GAMMA-CHLORDANE				
HEPTACHLOR				

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SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW01 PAI7-GW1-01-D PAI7-GW-DUP-01 GW DUP 20040908	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW02 PAI7-GW2-02 PAI-07-GW2-02 GW NORMAL 19991214	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW02 PAI7-GW2-02-20040909 PAI7-GW2-02 GW NORMAL 20040909	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW03 PAI7-GW3-02 PAI-07-GW3-02 GW NORMAL 19991213
HEPTACHLOR EPOXIDE				
ISODRIN				
KEPONE				
METHOXYCHLOR				
METHYL PARATHION				
O,O,O-TRIETHYL PHOSPHOROTHIOATE				
PHORATE				
SULFOTEPP				
THIONAZIN				
TOXAPHENE				
ORGANOPHOSPHATE PESTICIDES (UG/L)				
DIMETHOATE				
DISULFOTON				
ETHYL PARATHION				
FAMPHUR				
METHYL PARATHION				
O,O,O-TRIETHYL PHOSPHOROTHIOATE				
PHORATE				
SULFOTEPP				
THIONAZIN				
HERBICIDES (UG/L)				
2,4,5-T				
2,4,5-TP (SILVEX)				
2,4-D				
DINOSEB				
INORGANICS (UG/L)				
ALUMINUM	220 U	147 U	84.9 U	84.2 U
ANTIMONY	2.34 U	4.5 U	2.34 U	4.5 U
ARSENIC	3.03 U	3.9 U	3.03 U	3.9 U
BARIUM	37.7	23.7	15.6	16.3
BERYLLIUM	0.27 U	0.7 U	0.27 U	0.7 U
CADMIUM	3.97 U	0.4 U	3.97 U	0.4 U
CALCIUM	22100	3310	4600	12100
CHROMIUM	0.8 U	0.7 U	0.8 U	0.7 U
COBALT	4.36 U	0.9 U	4.36 U	0.9 U
COPPER	15	2 U	1.91 U	2 U
IRON	402 U	554 U	223 U	14900
LEAD	4.4	2.2 U	1.7 U	2.7 U
MAGNESIUM	1340	1800	1210	9940
MANGANESE	35.2	22.2 U	15	127 J
MERCURY	0.04 U	0.1 U	0.01 U	0.1 U
NICKEL	10.8 U	1.4 U	10.8 U	1.4 U
POTASSIUM	1770 U	2580	1930 U	2710
SELENIUM	3.71 U	3.6 U	3.71 U	3.6 U

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SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00007	00007	00007
AOC	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	2004Q	1999Q	2004Q	1999Q
EVENT				
LOCATION	PAI07GW01	PAI07GW02	PAI07GW02	PAI07GW03
NSAMPLE	PAI7-GW1-01-D	PAI7-GW2-02	PAI7-GW2-02-20040909	PAI7-GW3-02
SAMPLE	PAI7-GW-DUP-01	PAI-07-GW2-02	PAI7-GW2-02	PAI-07-GW3-02
MATRIX	GW	GW	GW	GW
SACODE	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040908	19991214	20040909	19991213
SILVER	2.84 U	0.8 U	2.84 U	0.8 U
SODIUM	2380	32500	39000	6800
THALLIUM	4.09 U	4.5 U	4.09 U	4.5 U
TIN				
VANADIUM	4.14 U	1.5 U	4.14 U	1 U
ZINC	19.6	5.8 U	2.1 U	2.2 U
MISCELLANEOUS PARAMETERS				
CYANIDE (UG/L)		10 U		10 U
TOTAL DISSOLVED SOLIDS (MG/L)				

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SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00007	00007	00007
AOC	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	2004Q	1999Q	1999Q	1999Q
EVENT				
LOCATION	PAI07GW03	PAI07GW04	PAI07GW04	PAI07GW04
NSAMPLE	PAI7-GW3-01	PAI-07-GW-04-01	PAI-07-GW-04-01-AVG	PAI-07-GW-04-01-D
SAMPLE	PAI7-GW3-01	PAI-07-GW-04-01	PAI-07-GW-04-01-AVG	PAI-07-GW-DU04-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	ORIG	AVG	DUP
SAMPLE DATE	20040908	19991214	19991214	19991214
VOLATILES (UG/L)				
1,1,1,2-TETRACHLOROETHANE		0.5 U	0.5 U	0.5 U
1,1,1-TRICHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROTRIFLUOROETHANE	5 U			
1,1-DICHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	5 U	0.5 U	0.5 U	0.5 U
1,2,3-TRICHLOROPROPANE		0.5 U	0.5 U	0.5 U
1,2,4-TRICHLOROBENZENE	5 U			
1,2-DIBROMO-3-CHLOROPROPANE	5 U	0.5 U	0.5 U	0.5 U
1,2-DIBROMOETHANE	5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	5 U			
1,2-DICHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROPROPANE	5 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROBENZENE	5 U			
1,4-DICHLOROBENZENE	5 U			
2-BUTANONE	5 U	2 UR	2 UR	2 UR
2-HEXANONE	5 U	2 UR	2 UR	2 UR
3-CHLOROPROPENE		2 U	2 U	2 U
4-METHYL-2-PENTANONE	5 U	2 UR	2 UR	2 UR
ACETONE	5 UR	2 UR	2 UR	2 UR
ACETONITRILE		40 UR	40 UR	40 UR
ACROLEIN		160 UR	160 UR	160 UR
ACRYLONITRILE		40 UR	40 UR	40 UR
BENZENE	5 UJ	0.5 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	5 U	0.5 U	0.5 U	0.5 U
BROMOFORM	5 U	0.5 U	0.5 U	0.5 U
BROMOMETHANE	5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	5 U	2 UJ	2 UJ	2 UJ
CARBON TETRACHLORIDE	5 U	0.5 U	0.5 U	0.5 U
CHLOROBENZENE	5 U	0.5 U	0.5 U	0.5 U
CHLORODIBROMOMETHANE	5 U	0.5 U	0.5 U	0.5 U
CHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	5 U	0.5 U	0.5 U	0.5 U
CHLOROPRENE		0.5 UJ	0.5 UJ	0.5 UJ
CIS-1,2-DICHLOROETHENE	5 U	0.5 U	0.5 U	0.5 U
CIS-1,3-DICHLOROPROPENE	5 U	0.5 U	0.5 U	0.5 U
CYCLOHEXANE	5 U			
DIBROMOMETHANE		0.5 U	0.5 U	0.5 U
DICHLORODIFLUOROMETHANE	5 U	0.5 U	0.5 U	0.5 U
ETHYL METHACRYLATE		2 U	2 U	2 U
ETHYLBENZENE	5 U	1	1	1

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SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00007	00007	00007
AOC	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	2004Q	1999Q	1999Q	1999Q
EVENT				
LOCATION	PAI07GW03	PAI07GW04	PAI07GW04	PAI07GW04
NSAMPLE	PAI7-GW3-01	PAI-07-GW-04-01	PAI-07-GW-04-01-AVG	PAI-07-GW-04-01-D
SAMPLE	PAI7-GW3-01	PAI-07-GW-04-01	PAI-07-GW-04-01-AVG	PAI-07-GW-DU04-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	ORIG	AVG	DUP
SAMPLE DATE	20040908	19991214	19991214	19991214
ISOBUTANOL		100 UR	100 UR	100 UR
ISOPROPYLBENZENE	5 U			
M+P-XYLENES	10 U			
METHACRYLONITRILE		2 UR	2 UR	2 UR
METHYL ACETATE	5 U			
METHYL CYCLOHEXANE	5 U			
METHYL IODIDE		2 U	2 U	2 U
METHYL METHACRYLATE		2 U	2 U	2 U
METHYL TERT-BUTYL ETHER	5 UJ			
METHYLENE CHLORIDE	5 U	0.5 U	0.5 U	0.5 U
O-XYLENE	5 U			
PENTACHLOROETHANE		2 U	2 U	2 U
PROPIONITRILE		40 UR	40 UR	40 UR
STYRENE	5 UJ	0.5 U	0.5 U	0.5 U
TETRACHLOROETHENE	5 U	0.5 U	0.5 U	0.5 U
TOLUENE	5 U	0.5 U	0.5 U	0.5 U
TOTAL 1,2-DICHLOROETHENE	10 U	0.5 U	0.5 U	0.5 U
TOTAL XYLENES	15 U	0.8	0.9	1
TRANS-1,2-DICHLOROETHENE	5 U	0.5 U	0.5 U	0.5 U
TRANS-1,3-DICHLOROPROPENE	5 U	0.5 U	0.5 U	0.5 U
TRANS-1,4-DICHLORO-2-BUTENE		2 UR	2 UR	2 UR
TRICHLOROETHENE	5 U	0.5 U	0.5 U	0.5 U
TRICHLOROFLUOROMETHANE	5 U	0.5 UJ	0.5 UJ	0.5 UJ
VINYL ACETATE		2 UR	2 UR	2 UR
VINYL CHLORIDE	5 U	0.5 U	0.5 U	0.5 U
SEMIVOLATILES (UG/L)				
1,1-BIPHENYL	10 U			
1,2,4,5-TETRACHLOROBENZENE		10 U	10 U	10 U
1,2,4-TRICHLOROBENZENE		10 U	10 U	10 U
1,2-DICHLOROBENZENE		10 U	10 U	10 U
1,2-DIPHENYLHYDRAZINE		10 U	10 U	10 U
1,3,5-TRINITROBENZENE		40 U	40.5 U	41 U
1,3-DICHLOROBENZENE		10 U	10 U	10 U
1,3-DINITROBENZENE		20 U	20.5 U	21 U
1,4-DICHLOROBENZENE		10 U	10 U	10 U
1,4-DIOXANE		81 UJ	81.5 UJ	82 UJ
1,4-NAPHTHOQUINONE		50 UJ	51 UJ	52 UJ
1,4-PHENYLENEDIAMINE		40 U	40.5 U	41 U
1-NAPHTHYLAMINE		20 U	20.5 U	21 U
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U	10 U	10 U	10 U
2,3,4,6-TETRACHLOROPHENOL		10 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	25 UJ	50 U	51 U	52 U
2,4,6-TRICHLOROPHENOL	10 U	10 U	10 U	10 U
2,4-DICHLOROPHENOL	10 U	10 U	10 U	10 U

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW03 PAI7-GW3-01 PAI7-GW3-01 GW NORMAL 20040908	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW04 PAI-07-GW-04-01 PAI-07-GW-04-01 GW ORIG 19991214	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW04 PAI-07-GW-04-01-AVG PAI-07-GW-04-01-AVG GW AVG 19991214	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW04 PAI-07-GW-04-01-D PAI-07-GW-DU04-01 GW DUP 19991214
2,4-DIMETHYLPHENOL	10 U	10 U	10 U	10 U
2,4-DINITROPHENOL	25 U	50 U	51 U	52 U
2,4-DINITROTOLUENE	10 U	10 U	10 U	10 U
2,6-DICHLOROPHENOL		10 U	10 U	10 U
2,6-DINITROTOLUENE	10 U	10 U	10 U	10 U
2-ACETYLAMINOFLUORENE		20 U	20.5 U	21 U
2-CHLORONAPHTHALENE	10 U	10 U	10 U	10 U
2-CHLOROPHENOL	10 U	10 UJ	10 UJ	10 UJ
2-METHYLNAPHTHALENE	10 U	11	12	13
2-METHYLPHENOL	10 U	10 U	10 U	10 U
2-NAPHTHYLAMINE		25 U	25.5 U	26 U
2-NITROANILINE	25 U	50 U	51 U	52 U
2-NITROPHENOL	10 U	10 U	10 U	10 U
2-PICOLINE		10 U	10 U	10 U
3,3'-DICHLOROBENZIDINE	10 U	20 U	20.5 U	21 U
3,3'-DIMETHYLBENZIDINE		50 U	51 U	52 U
3-METHYLCHOLANTHRENE		10 U	10 U	10 U
3-NITROANILINE	25 U	50 UJ	51 UJ	52 UJ
4,6-DINITRO-2-METHYLPHENOL	25 U	50 U	51 U	52 U
4-AMINOBIPHENYL		20 U	20.5 U	21 U
4-BROMOPHENYL PHENYL ETHER	10 U	10 U	10 U	10 U
4-CHLORO-3-METHYLPHENOL	10 U	20 U	20.5 U	21 U
4-CHLOROANILINE	10 U	20 U	20.5 U	21 U
4-CHLOROPHENYL PHENYL ETHER	10 U	10 U	10 U	10 U
4-METHYLPHENOL	10 U	10 U	10 U	10 U
4-NITROANILINE	25 U	50 U	51 U	52 U
4-NITROPHENOL	25 U	50 U	51 U	52 U
4-NITROQUINOLINE-1-OXIDE		50 UR	51 UR	52 UR
5-NITRO-O-TOLUIDINE		20 U	20.5 U	21 U
7,12-DIMETHYLBENZ(A)ANTHRACENE		20 U	20.5 U	21 U
A,A-DIMETHYLPHENETHYLAMINE		50 U	51 U	52 U
ACENAPHTHENE	10 U	10 U	10 U	10 U
ACENAPHTHYLENE	10 U	10 U	10 U	10 U
ACETOPHENONE	10 U	10 U	10 U	10 U
ANILINE		10 U	10 U	10 U
ANTHRACENE	10 U	10 U	10 U	10 U
ARAMITE		20 U	20.5 U	21 U
ATRAZINE	10 U			
BENZALDEHYDE	10 UJ			
BENZIDINE		100 UR	100 UR	100 UR
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U
BENZO(A)PYRENE	10 U	10 U	10 U	10 U
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U
BENZO(G,H,I)PERYLENE	10 U	10 U	10 U	10 U

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SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00007	00007	00007
AOC	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	2004Q	1999Q	1999Q	1999Q
EVENT				
LOCATION	PAI07GW03	PAI07GW04	PAI07GW04	PAI07GW04
NSAMPLE	PAI7-GW3-01	PAI-07-GW-04-01	PAI-07-GW-04-01-AVG	PAI-07-GW-04-01-D
SAMPLE	PAI7-GW3-01	PAI-07-GW-04-01	PAI-07-GW-04-01-AVG	PAI-07-GW-DU04-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	ORIG	AVG	DUP
SAMPLE DATE	20040908	19991214	19991214	19991214
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U
BENZOIC ACID		50 U	51 U	52 U
BENZYL ALCOHOL		10 U	10 U	10 U
BIS(2-CHLOROETHOXY)METHANE	10 U	10 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	10 U	10 U	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	10 U	10 U	10 U	10 U
BUTYL BENZYL PHTHALATE	10 U	10 U	10 U	10 U
CAPROLACTAM	10 U			
CARBAZOLE	10 U	10 U	10 U	10 U
CHLOROBENZILATE		10 U	10 U	10 U
CHRYSENE	10 U	10 U	10 U	10 U
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U
DI-N-OCTYL PHTHALATE	10 U	10 U	10 U	10 U
DIALLATE		10 U	10 U	10 U
DIBENZO(A,H)ANTHRACENE	10 U	10 U	10 U	10 U
DIBENZOFURAN	10 U	10 U	10 U	10 U
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U
DIMETHYL PHTHALATE	10 U	10 U	10 U	10 U
DINOSEB		20 U	20.5 U	21 U
DIPHENYLAMINE		10 U	10 U	10 U
ETHYL METHANE SULFONATE		10 U	10 U	10 U
FLUORANTHENE	10 U	10 U	10 U	10 U
FLUORENE	10 U	10 U	10 U	10 U
HEXACHLOROBENZENE	10 U	10 U	10 U	10 U
HEXACHLOROBUTADIENE	10 U	10 U	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	10 U	10 U	10 U	10 U
HEXACHLOROETHANE	10 U	10 U	10 U	10 U
HEXACHLOROPHENE		150 UJ	150 UJ	150 UJ
HEXACHLOROPROPENE		50 U	51 U	52 U
INDENO(1,2,3-CD)PYRENE	10 U	10 U	10 U	10 U
ISOPHORONE	10 U	10 U	10 U	10 U
ISOSAFROLE		10 U	10 U	10 U
METHAPYRILENE		25 U	25.5 U	26 U
METHYL METHANE SULFONATE		10 U	10 U	10 U
N-NITROSO-DI-N-BUTYLAMINE		10 U	10 U	10 U
N-NITROSO-DI-N-PROPYLAMINE	10 U	10 U	10 U	10 U
N-NITROSODIETHYLAMINE		10 U	10 U	10 U
N-NITROSODIMETHYLAMINE		10 U	10 U	10 U
N-NITROSODIPHENYLAMINE	10 U	10 U	10 U	10 U
N-NITROSOMETHYLETHYLAMINE		10 UJ	10 UJ	10 UJ
N-NITROSOMORPHOLINE		20 U	20.5 U	21 U
N-NITROSOPIPERIDINE		10 U	10 U	10 U
N-NITROSOPYRROLIDINE		50 U	51 U	52 U
NAPHTHALENE	10 U	10	10.5	11

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SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW03 PAI7-GW3-01 PAI7-GW3-01 GW NORMAL 20040908	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW04 PAI-07-GW-04-01 PAI-07-GW-04-01 GW ORIG 19991214	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW04 PAI-07-GW-04-01-AVG PAI-07-GW-04-01-AVG GW AVG 19991214	00007 PAGE FIELD FIRE TRAINING PIT 1999Q PAI07GW04 PAI-07-GW-04-01-D PAI-07-GW-DU04-01 GW DUP 19991214
NITROBENZENE	10 U	10 U	10 U	10 U
O-TOLUIDINE		10 U	10 U	10 U
P-(DIMETHYLAMINO)AZOBENZENE		20 U	20.5 U	21 U
PENTACHLOROBENZENE		10 U	10 U	10 U
PENTACHLORONITROBENZENE		10 U	10 U	10 U
PENTACHLOROPHENOL	25 U	50 UR	51 UR	52 UR
PHENACETIN		10 U	10 U	10 U
PHENANTHRENE	10 U	10 U	10 U	10 U
PHENOL	10 U	10 U	10 U	10 U
PRONAMIDE		10 U	10 U	10 U
PYRENE	10 U	10 U	10 U	10 U
PYRIDINE		20 UJ	20.5 UJ	21 UJ
SAFROLE		10 UJ	10 UJ	10 UJ
PESTICIDES/PCBs (UG/L)				
4,4'-DDD		0.48 U	0.48 U	0.48 U
4,4'-DDE		0.48 U	0.48 U	0.48 U
4,4'-DDT		0.48 U	0.48 U	0.48 U
ALDRIN		0.24 U	0.24 U	0.24 U
ALPHA-BHC		0.24 UJ	0.24 UJ	0.24 UJ
ALPHA-CHLORDANE		0.24 U	0.24 U	0.24 U
AROCLOR-1016		0.26 U	0.255 U	0.25 U
AROCLOR-1221		0.26 U	0.255 U	0.25 U
AROCLOR-1232		0.26 U	0.255 U	0.25 U
AROCLOR-1242		0.26 U	0.255 U	0.25 U
AROCLOR-1248		0.26 U	0.255 U	0.25 U
AROCLOR-1254		0.26 U	0.255 U	0.25 U
AROCLOR-1260		0.26 U	0.255 U	0.25 U
BETA-BHC		0.24 UJ	0.24 UJ	0.24 UJ
CHLORDANE				
DELTA-BHC		0.24 U	0.24 U	0.24 U
DIELDRIN		0.48 U	0.48 U	0.48 U
DIMETHOATE		2.1 U	2.05 U	2 U
DISULFOTON		2.1 U	2.05 U	2 U
ENDOSULFAN I		0.24 U	0.24 U	0.24 U
ENDOSULFAN II		0.48 U	0.48 U	0.48 U
ENDOSULFAN SULFATE		0.48 U	0.48 U	0.48 U
ENDRIN		0.48 U	0.48 U	0.48 U
ENDRIN ALDEHYDE		0.48 U	0.48 U	0.48 U
ENDRIN KETONE		0.48 U	0.48 U	0.48 U
ETHYL PARATHION		2.1 U	2.05 U	2 U
FAMPHUR		2.1 U	2.05 U	2 U
GAMMA-BHC (LINDANE)		0.24 UJ	0.24 UJ	0.24 UJ
GAMMA-CHLORDANE		0.24 U	0.24 U	0.24 U
HEPTACHLOR		0.24 U	0.24 U	0.24 U

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00007	00007	00007
AOC	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	2004Q	1999Q	1999Q	1999Q
EVENT				
LOCATION	PAI07GW03	PAI07GW04	PAI07GW04	PAI07GW04
NSAMPLE	PAI7-GW3-01	PAI-07-GW-04-01	PAI-07-GW-04-01-AVG	PAI-07-GW-04-01-D
SAMPLE	PAI7-GW3-01	PAI-07-GW-04-01	PAI-07-GW-04-01-AVG	PAI-07-GW-DU04-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	ORIG	AVG	DUP
SAMPLE DATE	20040908	19991214	19991214	19991214
HEPTACHLOR EPOXIDE		0.24 U	0.24 U	0.24 U
ISODRIN		0.48 U	0.48 U	0.48 U
KEPONE		2.9 UJ	2.9 UJ	2.9 UJ
METHOXYCHLOR		2.4 UJ	2.4 UJ	2.4 UJ
METHYL PARATHION		2.1 U	2.05 U	2 U
O,O,O-TRIETHYL PHOSPHOROTHIOATE		2.1 U	2.05 U	2 U
PHORATE		2.1 U	2.05 U	2 U
SULFOTEPP		2.1 U	2.05 U	2 U
THIONAZIN		2.1 U	2.05 U	2 U
TOXAPHENE		4.8 U	4.8 U	4.8 U
ORGANOPHOSPHATE PESTICIDES (UG/L)				
DIMETHOATE				
DISULFOTON				
ETHYL PARATHION				
FAMPHUR				
METHYL PARATHION				
O,O,O-TRIETHYL PHOSPHOROTHIOATE				
PHORATE				
SULFOTEPP				
THIONAZIN				
HERBICIDES (UG/L)				
2,4,5-T		0.011 U	0.0605 U	0.11 U
2,4,5-TP (SILVEX)		0.011 U	0.0605 U	0.11 U
2,4-D		0.11 U	0.605 U	1.1 U
DINOSEB		0.011 U	0.0605 U	0.11 U
INORGANICS (UG/L)				
ALUMINUM	51.2 U	876 J	1863 J	2850 J
ANTIMONY	2.34 U	4.5 U	4.5 U	4.5 U
ARSENIC	7.4	10.2	12.35	14.5
BARIUM	18.9	36.7	43.75	50.8
BERYLLIUM	0.27 U	0.7 U	0.7 U	0.7 U
CADMIUM	3.97 U	0.4 U	0.4 U	0.4 U
CALCIUM	14200	4850	4800	4750
CHROMIUM	0.8 U	1.7	4.6	7.5
COBALT	4.36 U	1.1 U	1.3 U	1.5 U
COPPER	1.91 U	3.2 U	2.85 U	2.5 U
IRON	14800	17700	18250	18800
LEAD	1.7 U	3.7 U	3.3 U	2.9 U
MAGNESIUM	10700	6140	6180	6220
MANGANESE	145	140	137.5	135
MERCURY	0.09 U	0.1 U	0.1 U	0.1 U
NICKEL	10.8 U	9.8	8.9	8
POTASSIUM	3690	1830	1885	1940
SELENIUM	3.71 U	3.6 U	2.9	4

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00007	00007	00007
AOC	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT	PAGE FIELD FIRE TRAINING PIT
ROUND	2004Q	1999Q	1999Q	1999Q
EVENT				
LOCATION	PAI07GW03	PAI07GW04	PAI07GW04	PAI07GW04
NSAMPLE	PAI7-GW3-01	PAI-07-GW-04-01	PAI-07-GW-04-01-AVG	PAI-07-GW-04-01-D
SAMPLE	PAI7-GW3-01	PAI-07-GW-04-01	PAI-07-GW-04-01-AVG	PAI-07-GW-DU04-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	ORIG	AVG	DUP
SAMPLE DATE	20040908	19991214	19991214	19991214
SILVER	2.84 U	0.8 U	0.8 U	0.8 U
SODIUM	9450	23800	23800	23800
THALLIUM	4.09 U	4.5 U	4.5 U	4.5 U
TIN		3.4 U	3.4 U	3.4 U
VANADIUM	4.14 U	7.5 U	10 U	12.5 U
ZINC	1.44 U	36.7 U	40.55 U	44.4 U
MISCELLANEOUS PARAMETERS				
CYANIDE (UG/L)		10 U	10 U	10 U
TOTAL DISSOLVED SOLIDS (MG/L)				

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00009	00009	00013
AOC	PAGE FIELD FIRE TRAINING PIT	PAINT WASTE STORAGE AREA	PAINT WASTE STORAGE AREA	INERT DISPOSAL AREAS
ROUND	2004Q	1999Q	1999Q	1999Q
EVENT		GZ	GZ	
LOCATION	PAI07GW05	PAI09GW01	PAI09GW02	PAI13CMW01
NSAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
SAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040910	19991214	19991214	19991216
VOLATILES (UG/L)				
1,1,1,2-TETRACHLOROETHANE		0.5 U		0.5 U
1,1,1-TRICHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROTRIFLUOROETHANE	5 U			
1,1-DICHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	5 U	0.5 U	0.5 U	0.5 U
1,2,3-TRICHLOROPROPANE		0.5 U		0.5 U
1,2,4-TRICHLOROBENZENE	5 U			
1,2-DIBROMO-3-CHLOROPROPANE	5 U	0.5 U		0.5 U
1,2-DIBROMOETHANE	5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	5 U			
1,2-DICHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROPROPANE	5 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROBENZENE	5 U			
1,4-DICHLOROBENZENE	5 U			
2-BUTANONE	5 U	2 UR	2 UR	2 UR
2-HEXANONE	5 U	2 UR	2 U	2 UR
3-CHLOROPROPENE		2 U		2 U
4-METHYL-2-PENTANONE	5 U	2 UR	2 U	2 UR
ACETONE	5 UR	2 UR	2 UR	2 UR
ACETONITRILE		40 UR		40 UR
ACROLEIN		160 UR		160 UR
ACRYLONITRILE		40 UR		40 UR
BENZENE	5 U	0.5 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	5 U	0.5 U	0.5 U	0.5 U
BROMOFORM	5 U	0.5 U	0.5 U	0.5 U
BROMOMETHANE	5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	5 U	2 UJ	2 U	2 UJ
CARBON TETRACHLORIDE	5 U	0.5 U	0.5 U	0.5 U
CHLOROBENZENE	8	0.5 U	0.5 U	0.5 U
CHLORODIBROMOMETHANE	5 U	0.5 U	0.5 U	0.5 U
CHLOROETHANE	5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	5 U	0.5 U	0.5 U	0.5 U
CHLOROPRENE		0.5 UJ		0.5 UJ
CIS-1,2-DICHLOROETHENE	5 U	0.5 U		0.5 U
CIS-1,3-DICHLOROPROPENE	5 U	0.5 U	0.5 U	0.5 U
CYCLOHEXANE	5 U			
DIBROMOMETHANE		0.5 U		0.5 U
DICHLORODIFLUOROMETHANE	5 U	0.5 U		0.5 U
ETHYL METHACRYLATE		2 U		2 U
ETHYLBENZENE	5 U	0.5 U	0.5 U	0.5 U

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00009	00009	00013
AOC	PAGE FIELD FIRE TRAINING PIT	PAINT WASTE STORAGE AREA	PAINT WASTE STORAGE AREA	INERT DISPOSAL AREAS
ROUND	2004Q	1999Q	1999Q	1999Q
EVENT		GZ	GZ	
LOCATION	PAI07GW05	PAI09GW01	PAI09GW02	PAI13CMW01
NSAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
SAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040910	19991214	19991214	19991216
ISOBUTANOL		100 UR		100 UR
ISOPROPYLBENZENE	5 U			
M+P-XYLENES	10 U			
METHACRYLONITRILE		2 UR		2 UR
METHYL ACETATE	5 U			
METHYL CYCLOHEXANE	5 U			
METHYL IODIDE		2 U		2 U
METHYL METHACRYLATE		2 U		2 U
METHYL TERT-BUTYL ETHER	5 UJ			
METHYLENE CHLORIDE	5 U	0.5 U	0.5 U	0.5 U
O-XYLENE	5 U			
PENTACHLOROETHANE		2 U		2 U
PROPIONITRILE		40 UR		40 UR
STYRENE	5 U	0.5 U	0.5 U	0.5 U
TETRACHLOROETHENE	5 UJ	0.5 U	0.5 U	0.5 U
TOLUENE	5 U	0.5 U	0.5 U	0.5 U
TOTAL 1,2-DICHLOROETHENE	10 U	0.5 U	0.5 U	0.5 U
TOTAL XYLENES	15 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	5 U	0.5 U		0.5 U
TRANS-1,3-DICHLOROPROPENE	5 U	0.5 U	0.5 U	0.5 U
TRANS-1,4-DICHLORO-2-BUTENE		2 UR		2 UR
TRICHLOROETHENE	5 U	0.5 U	0.5 U	0.5 U
TRICHLOROFLUOROMETHANE	5 U	0.5 UJ		0.5 UJ
VINYL ACETATE		2 UR		2 UR
VINYL CHLORIDE	5 U	0.5 U	0.5 U	0.5 U
SEMIVOLATILES (UG/L)				
1,1-BIPHENYL	10 U			
1,2,4,5-TETRACHLOROBENZENE				
1,2,4-TRICHLOROBENZENE				
1,2-DICHLOROBENZENE				
1,2-DIPHENYLHYDRAZINE				
1,3,5-TRINITROBENZENE				
1,3-DICHLOROBENZENE				
1,3-DINITROBENZENE				
1,4-DICHLOROBENZENE				
1,4-DIOXANE				
1,4-NAPHTHOQUINONE				
1,4-PHENYLENEDIAMINE				
1-NAPHTHYLAMINE				
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U			
2,3,4,6-TETRACHLOROPHENOL				
2,4,5-TRICHLOROPHENOL	25 U			
2,4,6-TRICHLOROPHENOL	10 U			
2,4-DICHLOROPHENOL	10 U			

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00009	00009	00013
AOC	PAGE FIELD FIRE TRAINING PIT	PAINT WASTE STORAGE AREA	PAINT WASTE STORAGE AREA	INERT DISPOSAL AREAS
ROUND	2004Q	1999Q	1999Q	1999Q
EVENT		GZ	GZ	
LOCATION	PAI07GW05	PAI09GW01	PAI09GW02	PAI13CMW01
NSAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
SAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040910	19991214	19991214	19991216
2,4-DIMETHYLPHENOL	10 U			
2,4-DINITROPHENOL	25 U			
2,4-DINITROTOLUENE	10 U			
2,6-DICHLOROPHENOL				
2,6-DINITROTOLUENE	10 U			
2-ACETYLAMINOFLUORENE				
2-CHLORONAPHTHALENE	10 U			
2-CHLOROPHENOL	10 U			
2-METHYLNAPHTHALENE	10 U			
2-METHYLPHENOL	10 U			
2-NAPHTHYLAMINE				
2-NITROANILINE	25 U			
2-NITROPHENOL	10 U			
2-PICOLINE				
3,3'-DICHLOROBENZIDINE	10 U			
3,3'-DIMETHYLBENZIDINE				
3-METHYLCHOLANTHRENE				
3-NITROANILINE	25 U			
4,6-DINITRO-2-METHYLPHENOL	25 U			
4-AMINOBIPHENYL				
4-BROMOPHENYL PHENYL ETHER	10 U			
4-CHLORO-3-METHYLPHENOL	10 U			
4-CHLOROANILINE	10 U			
4-CHLOROPHENYL PHENYL ETHER	10 U			
4-METHYLPHENOL	10 U			
4-NITROANILINE	25 U			
4-NITROPHENOL	25 U			
4-NITROQUINOLINE-1-OXIDE				
5-NITRO-O-TOLUIDINE				
7,12-DIMETHYLBENZ(A)ANTHRACENE				
A,A-DIMETHYLPHENETHYLAMINE				
ACENAPHTHENE	10 U			
ACENAPHTHYLENE	10 U			
ACETOPHENONE	10 U			
ANILINE				
ANTHRACENE	10 U			
ARAMITE				
ATRAZINE	10 U			
BENZALDEHYDE	10 UJ			
BENZIDINE				
BENZO(A)ANTHRACENE	10 U			
BENZO(A)PYRENE	10 U			
BENZO(B)FLUORANTHENE	10 U			
BENZO(G,H,I)PERYLENE	10 U			

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00007 PAGE FIELD FIRE TRAINING PIT 2004Q PAI07GW05 PAI-07-GW-05-01 PAI-07-GW-05-01 GW NORMAL 20040910	00009 PAINT WASTE STORAGE AREA 1999Q GZ PAI09GW01 PAI-09-GW-01-01 PAI-09-GW-01-01 GW NORMAL 19991214	00009 PAINT WASTE STORAGE AREA 1999Q GZ PAI09GW02 PAI-09-GW-02-01 PAI-09-GW-02-01 GW NORMAL 19991214	00013 INERT DISPOSAL AREAS 1999Q PAI13CMW01 PAI-13C-GW-01-01 PAI-13C-GW-01-01 GW NORMAL 19991216
BENZO(K)FLUORANTHENE	10 U			
BENZOIC ACID				
BENZYL ALCOHOL				
BIS(2-CHLOROETHOXY)METHANE	10 U			
BIS(2-CHLOROETHYL)ETHER	10 U			
BIS(2-ETHYLHEXYL)PHTHALATE	10 U			
BUTYL BENZYL PHTHALATE	10 U			
CAPROLACTAM	10 U			
CARBAZOLE	10 U			
CHLOROBENZILATE				
CHRYSENE	10 U			
DI-N-BUTYL PHTHALATE	10 U			
DI-N-OCTYL PHTHALATE	10 U			
DIALLATE				
DIBENZO(A,H)ANTHRACENE	10 U			
DIBENZOFURAN	10 U			
DIETHYL PHTHALATE	10 U			
DIMETHYL PHTHALATE	10 U			
DINOSEB				
DIPHENYLAMINE				
ETHYL METHANE SULFONATE				
FLUORANTHENE	10 U			
FLUORENE	10 U			
HEXACHLOROBENZENE	10 U			
HEXACHLOROBUTADIENE	10 U			
HEXACHLOROCYCLOPENTADIENE	10 U			
HEXACHLOROETHANE	10 U			
HEXACHLOROPHENE				
HEXACHLOROPROPENE				
INDENO(1,2,3-CD)PYRENE	10 U			
ISOPHORONE	10 U			
ISOSAFROLE				
METHAPYRILENE				
METHYL METHANE SULFONATE				
N-NITROSO-DI-N-BUTYLAMINE				
N-NITROSO-DI-N-PROPYLAMINE	10 U			
N-NITROSODIETHYLAMINE				
N-NITROSODIMETHYLAMINE				
N-NITROSODIPHENYLAMINE	10 U			
N-NITROSOMETHYLETHYLAMINE				
N-NITROSOMORPHOLINE				
N-NITROSOPIPERIDINE				
N-NITROSOPYRROLIDINE				
NAPHTHALENE	10 U			

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00009	00009	00013
AOC	PAGE FIELD FIRE TRAINING PIT	PAINT WASTE STORAGE AREA	PAINT WASTE STORAGE AREA	INERT DISPOSAL AREAS
ROUND	2004Q	1999Q	1999Q	1999Q
EVENT		GZ	GZ	
LOCATION	PAI07GW05	PAI09GW01	PAI09GW02	PAI13CMW01
NSAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
SAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040910	19991214	19991214	19991216
NITROBENZENE	10 U			
O-TOLUIDINE				
P-(DIMETHYLAMINO)AZOBENZENE				
PENTACHLOROBENZENE				
PENTACHLORONITROBENZENE				
PENTACHLOROPHENOL	25 U			
PHENACETIN				
PHENANTHRENE	10 U			
PHENOL	10 U			
PRONAMIDE				
PYRENE	10 U			
PYRIDINE				
SAFROLE				
PESTICIDES/PCBs (UG/L)				
4,4'-DDD				
4,4'-DDE				
4,4'-DDT				
ALDRIN				
ALPHA-BHC				
ALPHA-CHLORDANE				
AROCLOR-1016				
AROCLOR-1221				
AROCLOR-1232				
AROCLOR-1242				
AROCLOR-1248				
AROCLOR-1254				
AROCLOR-1260				
BETA-BHC				
CHLORDANE				
DELTA-BHC				
DIELDRIN				
DIMETHOATE				
DISULFOTON				
ENDOSULFAN I				
ENDOSULFAN II				
ENDOSULFAN SULFATE				
ENDRIN				
ENDRIN ALDEHYDE				
ENDRIN KETONE				
ETHYL PARATHION				
FAMPHUR				
GAMMA-BHC (LINDANE)				
GAMMA-CHLORDANE				
HEPTACHLOR				

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00009	00009	00013
AOC	PAGE FIELD FIRE TRAINING PIT	PAINT WASTE STORAGE AREA	PAINT WASTE STORAGE AREA	INERT DISPOSAL AREAS
ROUND	2004Q	1999Q	1999Q	1999Q
EVENT		GZ	GZ	
LOCATION	PAI07GW05	PAI09GW01	PAI09GW02	PAI13CMW01
NSAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
SAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040910	19991214	19991214	19991216
HEPTACHLOR EPOXIDE				
ISODRIN				
KEPONE				
METHOXYCHLOR				
METHYL PARATHION				
O,O,O-TRIETHYL PHOSPHOROTHIOATE				
PHORATE				
SULFOTEPP				
THIONAZIN				
TOXAPHENE				
ORGANOPHOSPHATE PESTICIDES (UG/L)				
DIMETHOATE				
DISULFOTON				
ETHYL PARATHION				
FAMPHUR				
METHYL PARATHION				
O,O,O-TRIETHYL PHOSPHOROTHIOATE				
PHORATE				
SULFOTEPP				
THIONAZIN				
HERBICIDES (UG/L)				
2,4,5-T				
2,4,5-TP (SILVEX)				
2,4-D				
DINOSEB				
INORGANICS (UG/L)				
ALUMINUM	50.2 U	369 J	661 U	13000 J
ANTIMONY	2.34 U	4.5 U	5.9	4.5 U
ARSENIC	26.5	3.9 U	3.9 U	5.6
BARIUM	26.9	23.7	10.9 U	20.4
BERYLLIUM	0.27 U	0.7 U	0.7 U	3.6 J
CADMIUM	3.97 U	0.4 U	0.4 U	0.6 J
CALCIUM	5290	42500	32100	401000
CHROMIUM	0.8 U	0.7	1 U	4.7 J
COBALT	4.36 U	0.9 U	0.9 U	5 U
COPPER	1.91 U	2 U	2.1 U	2 U
IRON	4570	206 U	338 U	12300
LEAD	1.7 U	2.2 U	2.2 U	2.2 UJ
MAGNESIUM	4720	1560	1330	451000
MANGANESE	73	2.2 U	7.4 U	481
MERCURY	0.08 U	0.1 U	0.1 U	0.1
NICKEL	10.8 U	1.4 U	1.4 U	6.4 J
POTASSIUM	1580 U	1610	4040	94300
SELENIUM	3.71 U	3.6 U	3.6 U	3.6 U

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00007	00009	00009	00013
AOC	PAGE FIELD FIRE TRAINING PIT	PAINT WASTE STORAGE AREA	PAINT WASTE STORAGE AREA	INERT DISPOSAL AREAS
ROUND	2004Q	1999Q	1999Q	1999Q
EVENT		GZ	GZ	
LOCATION	PAI07GW05	PAI09GW01	PAI09GW02	PAI13CMW01
NSAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
SAMPLE	PAI-07-GW-05-01	PAI-09-GW-01-01	PAI-09-GW-02-01	PAI-13C-GW-01-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040910	19991214	19991214	19991216
SILVER	5.3 U	0.8 U	0.8 U	0.8 U
SODIUM	24900	2370 U	4540	3010000
THALLIUM	4.09 U	4.5 U	4.5 U	4.5 U
TIN		3.4 U		3.4 U
VANADIUM	4.14 U	1 U	4.1 U	9.7 U
ZINC	14.4	6 U	6.7 U	263
MISCELLANEOUS PARAMETERS				
CYANIDE (UG/L)		10 U	10 U	10 U
TOTAL DISSOLVED SOLIDS (MG/L)				13000

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00013	00013	00013	00013
AOC	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS
ROUND	1999Q	2004Q	2004Q	2004Q
EVENT				
LOCATION	PAI13CMW02	PAI13CMW03	PAI13CMW03	PAI13CMW03
NSAMPLE	PAI-13C-GW-02-01	PAI-13C-GW-03-01	PAI-13C-GW-03-01-AVG	PAI-13C-GW-03-01-D
SAMPLE	PAI-13C-GW-02-01	PAI-13C-GW-03-01	PAI-13C-GW-03-01-AVG	PAI-13C-GW-DUP-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	ORIG	AVG	DUP
SAMPLE DATE	19991217	20040910	20040910	20040910
VOLATILES (UG/L)				
1,1,1,2-TETRACHLOROETHANE				
1,1,1-TRICHLOROETHANE	0.5 U			
1,1,2,2-TETRACHLOROETHANE	0.5 U			
1,1,2-TRICHLOROETHANE	0.5 U			
1,1,2-TRICHLOROTRIFLUOROETHANE				
1,1-DICHLOROETHANE	0.5 U			
1,1-DICHLOROETHENE	0.5 U			
1,2,3-TRICHLOROPROPANE				
1,2,4-TRICHLOROBENZENE				
1,2-DIBROMO-3-CHLOROPROPANE				
1,2-DIBROMOETHANE	0.5 U			
1,2-DICHLOROBENZENE				
1,2-DICHLOROETHANE	0.5 U			
1,2-DICHLOROPROPANE	0.5 U			
1,3-DICHLOROBENZENE				
1,4-DICHLOROBENZENE				
2-BUTANONE	2 UR			
2-HEXANONE	2 UR			
3-CHLOROPROPENE				
4-METHYL-2-PENTANONE	2 UR			
ACETONE	2 UR			
ACETONITRILE				
ACROLEIN				
ACRYLONITRILE				
BENZENE	0.5 U			
BROMODICHLOROMETHANE	0.5 U			
BROMOFORM	0.5 U			
BROMOMETHANE	0.5 U			
CARBON DISULFIDE	2 UJ			
CARBON TETRACHLORIDE	0.5 U			
CHLOROBENZENE	0.5 U			
CHLORODIBROMOMETHANE	0.5 U			
CHLOROETHANE	0.5 U			
CHLOROFORM	0.5 U			
CHLOROMETHANE	0.5 U			
CHLOROPRENE				
CIS-1,2-DICHLOROETHENE				
CIS-1,3-DICHLOROPROPENE	0.5 U			
CYCLOHEXANE				
DIBROMOMETHANE				
DICHLORODIFLUOROMETHANE				
ETHYL METHACRYLATE				
ETHYLBENZENE	0.5 U			

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00013 INERT DISPOSAL AREAS 1999Q PAI13CMW02 PAI-13C-GW-02-01 PAI-13C-GW-02-01 GW NORMAL 19991217	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01 PAI-13C-GW-03-01 GW ORIG 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01-AVG PAI-13C-GW-03-01-AVG GW AVG 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01-D PAI-13C-GW-DUP-01 GW DUP 20040910
ISOBUTANOL				
ISOPROPYLBENZENE				
M+P-XYLENES				
METHACRYLONITRILE				
METHYL ACETATE				
METHYL CYCLOHEXANE				
METHYL IODIDE				
METHYL METHACRYLATE				
METHYL TERT-BUTYL ETHER				
METHYLENE CHLORIDE	0.5 U			
O-XYLENE				
PENTACHLOROETHANE				
PROPIONITRILE				
STYRENE	0.5 U			
TETRACHLOROETHENE	0.5 U			
TOLUENE	0.5 U			
TOTAL 1,2-DICHLOROETHENE	0.5 U			
TOTAL XYLENES	0.5 U			
TRANS-1,2-DICHLOROETHENE				
TRANS-1,3-DICHLOROPROPENE	0.5 U			
TRANS-1,4-DICHLORO-2-BUTENE				
TRICHLOROETHENE	0.5 U			
TRICHLOROFLUOROMETHANE				
VINYL ACETATE				
VINYL CHLORIDE	0.5 U			
SEMIVOLATILES (UG/L)				
1,1-BIPHENYL				
1,2,4,5-TETRACHLOROBENZENE				
1,2,4-TRICHLOROBENZENE				
1,2-DICHLOROBENZENE				
1,2-DIPHENYLHYDRAZINE				
1,3,5-TRINITROBENZENE				
1,3-DICHLOROBENZENE				
1,3-DINITROBENZENE				
1,4-DICHLOROBENZENE				
1,4-DIOXANE				
1,4-NAPHTHOQUINONE				
1,4-PHENYLENEDIAMINE				
1-NAPHTHYLAMINE				
2,2'-OXYBIS(1-CHLOROPROPANE)				
2,3,4,6-TETRACHLOROPHENOL				
2,4,5-TRICHLOROPHENOL				
2,4,6-TRICHLOROPHENOL				
2,4-DICHLOROPHENOL				

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00013 INERT DISPOSAL AREAS 1999Q PAI13CMW02 PAI-13C-GW-02-01 PAI-13C-GW-02-01 GW NORMAL 19991217	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01 PAI-13C-GW-03-01 GW ORIG 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01-AVG PAI-13C-GW-03-01-AVG GW AVG 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01-D PAI-13C-GW-DUP-01 GW DUP 20040910
2,4-DIMETHYLPHENOL				
2,4-DINITROPHENOL				
2,4-DINITROTOLUENE				
2,6-DICHLOROPHENOL				
2,6-DINITROTOLUENE				
2-ACETYLAMINOFLUORENE				
2-CHLORONAPHTHALENE				
2-CHLOROPHENOL				
2-METHYLNAPHTHALENE				
2-METHYLPHENOL				
2-NAPHTHYLAMINE				
2-NITROANILINE				
2-NITROPHENOL				
2-PICOLINE				
3,3'-DICHLOROBENZIDINE				
3,3'-DIMETHYLBENZIDINE				
3-METHYLCHOLANTHRENE				
3-NITROANILINE				
4,6-DINITRO-2-METHYLPHENOL				
4-AMINOBIPHENYL				
4-BROMOPHENYL PHENYL ETHER				
4-CHLORO-3-METHYLPHENOL				
4-CHLOROANILINE				
4-CHLOROPHENYL PHENYL ETHER				
4-METHYLPHENOL				
4-NITROANILINE				
4-NITROPHENOL				
4-NITROQUINOLINE-1-OXIDE				
5-NITRO-O-TOLUIDINE				
7,12-DIMETHYLBENZ(A)ANTHRACENE				
A,A-DIMETHYLPHENETHYLAMINE				
ACENAPHTHENE				
ACENAPHTHYLENE				
ACETOPHENONE				
ANILINE				
ANTHRACENE				
ARAMITE				
ATRAZINE				
BENZALDEHYDE				
BENZIDINE				
BENZO(A)ANTHRACENE				
BENZO(A)PYRENE				
BENZO(B)FLUORANTHENE				
BENZO(G,H,I)PERYLENE				

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00013	00013	00013	00013
AOC	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS
ROUND	1999Q	2004Q	2004Q	2004Q
EVENT				
LOCATION	PAI13CMW02	PAI13CMW03	PAI13CMW03	PAI13CMW03
NSAMPLE	PAI-13C-GW-02-01	PAI-13C-GW-03-01	PAI-13C-GW-03-01-AVG	PAI-13C-GW-03-01-D
SAMPLE	PAI-13C-GW-02-01	PAI-13C-GW-03-01	PAI-13C-GW-03-01-AVG	PAI-13C-GW-DUP-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	ORIG	AVG	DUP
SAMPLE DATE	19991217	20040910	20040910	20040910
BENZO(K)FLUORANTHENE				
BENZOIC ACID				
BENZYL ALCOHOL				
BIS(2-CHLOROETHOXY)METHANE				
BIS(2-CHLOROETHYL)ETHER				
BIS(2-ETHYLHEXYL)PHTHALATE				
BUTYL BENZYL PHTHALATE				
CAPROLACTAM				
CARBAZOLE				
CHLOROBENZILATE				
CHRYSENE				
DI-N-BUTYL PHTHALATE				
DI-N-OCTYL PHTHALATE				
DIALLATE				
DIBENZO(A,H)ANTHRACENE				
DIBENZOFURAN				
DIETHYL PHTHALATE				
DIMETHYL PHTHALATE				
DINOSEB				
DIPHENYLAMINE				
ETHYL METHANE SULFONATE				
FLUORANTHENE				
FLUORENE				
HEXACHLOROBENZENE				
HEXACHLOROBUTADIENE				
HEXACHLOROCYCLOPENTADIENE				
HEXACHLOROETHANE				
HEXACHLOROPHENE				
HEXACHLOROPROPENE				
INDENO(1,2,3-CD)PYRENE				
ISOPHORONE				
ISOSAFROLE				
METHAPYRILENE				
METHYL METHANE SULFONATE				
N-NITROSO-DI-N-BUTYLAMINE				
N-NITROSO-DI-N-PROPYLAMINE				
N-NITROSODIETHYLAMINE				
N-NITROSODIMETHYLAMINE				
N-NITROSODIPHENYLAMINE				
N-NITROSOMETHYLETHYLAMINE				
N-NITROSOMORPHOLINE				
N-NITROSOPIPERIDINE				
N-NITROSOPYRROLIDINE				
NAPHTHALENE				

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00013 INERT DISPOSAL AREAS 1999Q PAI13CMW02 PAI-13C-GW-02-01 PAI-13C-GW-02-01 GW NORMAL 19991217	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01 PAI-13C-GW-03-01 GW ORIG 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01-AVG PAI-13C-GW-03-01-AVG GW AVG 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01-D PAI-13C-GW-DUP-01 GW DUP 20040910
NITROBENZENE				
O-TOLUIDINE				
P-(DIMETHYLAMINO)AZOBENZENE				
PENTACHLOROBENZENE				
PENTACHLORONITROBENZENE				
PENTACHLOROPHENOL				
PHENACETIN				
PHENANTHRENE				
PHENOL				
PRONAMIDE				
PYRENE				
PYRIDINE				
SAFROLE				
PESTICIDES/PCBs (UG/L)				
4,4'-DDD				
4,4'-DDE				
4,4'-DDT				
ALDRIN				
ALPHA-BHC				
ALPHA-CHLORDANE				
AROCLOR-1016				
AROCLOR-1221				
AROCLOR-1232				
AROCLOR-1242				
AROCLOR-1248				
AROCLOR-1254				
AROCLOR-1260				
BETA-BHC				
CHLORDANE				
DELTA-BHC				
DIELDRIN				
DIMETHOATE				
DISULFOTON				
ENDOSULFAN I				
ENDOSULFAN II				
ENDOSULFAN SULFATE				
ENDRIN				
ENDRIN ALDEHYDE				
ENDRIN KETONE				
ETHYL PARATHION				
FAMPHUR				
GAMMA-BHC (LINDANE)				
GAMMA-CHLORDANE				
HEPTACHLOR				

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00013	00013	00013	00013
AOC	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS
ROUND	1999Q	2004Q	2004Q	2004Q
EVENT				
LOCATION	PAI13CMW02	PAI13CMW03	PAI13CMW03	PAI13CMW03
NSAMPLE	PAI-13C-GW-02-01	PAI-13C-GW-03-01	PAI-13C-GW-03-01-AVG	PAI-13C-GW-03-01-D
SAMPLE	PAI-13C-GW-02-01	PAI-13C-GW-03-01	PAI-13C-GW-03-01-AVG	PAI-13C-GW-DUP-01
MATRIX	GW	GW	GW	GW
SACODE	NORMAL	ORIG	AVG	DUP
SAMPLE DATE	19991217	20040910	20040910	20040910
HEPTACHLOR EPOXIDE				
ISODRIN				
KEPONE				
METHOXYCHLOR				
METHYL PARATHION				
O,O,O-TRIETHYL PHOSPHOROTHIOATE				
PHORATE				
SULFOTEPP				
THIONAZIN				
TOXAPHENE				
ORGANOPHOSPHATE PESTICIDES (UG/L)				
DIMETHOATE				
DISULFOTON				
ETHYL PARATHION				
FAMPHUR				
METHYL PARATHION				
O,O,O-TRIETHYL PHOSPHOROTHIOATE				
PHORATE				
SULFOTEPP				
THIONAZIN				
HERBICIDES (UG/L)				
2,4,5-T				
2,4,5-TP (SILVEX)				
2,4-D				
DINOSEB				
INORGANICS (UG/L)				
ALUMINUM	54700	9850	9830	9810
ANTIMONY	22.5 U	2.34 UJ	2.34 UJ	2.34 UJ
ARSENIC	19.5 U	9.8 J	10.05 J	10.3 J
BARIUM	27.5 U	26.3	26.45	26.6
BERYLLIUM	13.5 U	3.6 U	3.45 U	3.3 U
CADMIUM	2 U	4.6 J	3.2925 J	3.97 U
CALCIUM	269000	302000	296500	291000
CHROMIUM	18 U	2.4 U	2.3 U	2.2 U
COBALT	13 U	6.7 J	4.44 J	4.36 UJ
COPPER	10 U	60 J	57.5 J	55 J
IRON	39900	14600	14350	14100
LEAD	11 U	12.1 J	11.2 J	10.3 J
MAGNESIUM	292000	371000	367000	363000
MANGANESE	1260 J	1410	1405	1400
MERCURY	0.1 U	0.11 U	0.105 U	0.1 U
NICKEL	24 U	20 J	17.1 J	14.2 J
POTASSIUM	71200	89000	88200	87400
SELENIUM	18 U	3.71 U	3.71 UJ	3.71 UJ

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00013 INERT DISPOSAL AREAS 1999Q PAI13CMW02 PAI-13C-GW-02-01 PAI-13C-GW-02-01 GW NORMAL 19991217	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01 PAI-13C-GW-03-01 GW ORIG 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01-AVG PAI-13C-GW-03-01-AVG GW AVG 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW03 PAI-13C-GW-03-01-D PAI-13C-GW-DUP-01 GW DUP 20040910
SILVER	4 U	2.84 U	2.84 UJ	2.84 UJ
SODIUM	2800000	3030000	3000000	2970000
THALLIUM	22.5 U	4.09 UJ	3.7225 J	5.4 J
TIN	17 U	5.2 U	5.05 U	4.9 U
VANADIUM	11 U	13.1 J	11.85 J	10.6 J
ZINC	98.4 U	124	120	116
MISCELLANEOUS PARAMETERS				
CYANIDE (UG/L)	10 U			
TOTAL DISSOLVED SOLIDS (MG/L)				

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00013	00013	00035
AOC	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS	DRMO SALVAGE YARD
ROUND	2004Q	2004Q	1999Q
EVENT			
LOCATION	PAI13CMW04	PAI13CMW05	PAI35GW01
NSAMPLE	PAI-13C-GW-04-01	PAI-13C-GW-05-01	PAI-35-GW-01-01
SAMPLE	PAI-13C-GW-04-01	PAI-13C-GW-05-01	PAI-35-GW-01-01
MATRIX	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040910	20040910	19991216
VOLATILES (UG/L)			
1,1,1,2-TETRACHLOROETHANE			
1,1,1-TRICHLOROETHANE			
1,1,2,2-TETRACHLOROETHANE			
1,1,2-TRICHLOROETHANE			
1,1,2-TRICHLOROTRIFLUOROETHANE			
1,1-DICHLOROETHANE			
1,1-DICHLOROETHENE			
1,2,3-TRICHLOROPROPANE			
1,2,4-TRICHLOROBENZENE			
1,2-DIBROMO-3-CHLOROPROPANE			
1,2-DIBROMOETHANE			
1,2-DICHLOROBENZENE			
1,2-DICHLOROETHANE			
1,2-DICHLOROPROPANE			
1,3-DICHLOROBENZENE			
1,4-DICHLOROBENZENE			
2-BUTANONE			
2-HEXANONE			
3-CHLOROPROPENE			
4-METHYL-2-PENTANONE			
ACETONE			
ACETONITRILE			
ACROLEIN			
ACRYLONITRILE			
BENZENE			
BROMODICHLOROMETHANE			
BROMOFORM			
BROMOMETHANE			
CARBON DISULFIDE			
CARBON TETRACHLORIDE			
CHLOROBENZENE			
CHLORODIBROMOMETHANE			
CHLOROETHANE			
CHLOROFORM			
CHLOROMETHANE			
CHLOROPRENE			
CIS-1,2-DICHLOROETHENE			
CIS-1,3-DICHLOROPROPENE			
CYCLOHEXANE			
DIBROMOMETHANE			
DICHLORODIFLUOROMETHANE			
ETHYL METHACRYLATE			
ETHYLBENZENE			

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW04 PAI-13C-GW-04-01 PAI-13C-GW-04-01 GW NORMAL 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW05 PAI-13C-GW-05-01 PAI-13C-GW-05-01 GW NORMAL 20040910	00035 DRMO SALVAGE YARD 1999Q PAI35GW01 PAI-35-GW-01-01 PAI-35-GW-01-01 GW NORMAL 19991216
ISOBUTANOL			
ISOPROPYLBENZENE			
M+P-XYLENES			
METHACRYLONITRILE			
METHYL ACETATE			
METHYL CYCLOHEXANE			
METHYL IODIDE			
METHYL METHACRYLATE			
METHYL TERT-BUTYL ETHER			
METHYLENE CHLORIDE			
O-XYLENE			
PENTACHLOROETHANE			
PROPIONITRILE			
STYRENE			
TETRACHLOROETHENE			
TOLUENE			
TOTAL 1,2-DICHLOROETHENE			
TOTAL XYLENES			
TRANS-1,2-DICHLOROETHENE			
TRANS-1,3-DICHLOROPROPENE			
TRANS-1,4-DICHLORO-2-BUTENE			
TRICHLOROETHENE			
TRICHLOROFLUOROMETHANE			
VINYL ACETATE			
VINYL CHLORIDE			
SEMIVOLATILES (UG/L)			
1,1-BIPHENYL			
1,2,4,5-TETRACHLOROBENZENE			
1,2,4-TRICHLOROBENZENE			
1,2-DICHLOROBENZENE			
1,2-DIPHENYLHYDRAZINE			
1,3,5-TRINITROBENZENE			
1,3-DICHLOROBENZENE			
1,3-DINITROBENZENE			
1,4-DICHLOROBENZENE			
1,4-DIOXANE			
1,4-NAPHTHOQUINONE			
1,4-PHENYLENEDIAMINE			
1-NAPHTHYLAMINE			
2,2'-OXYBIS(1-CHLOROPROPANE)			
2,3,4,6-TETRACHLOROPHENOL			
2,4,5-TRICHLOROPHENOL			
2,4,6-TRICHLOROPHENOL			
2,4-DICHLOROPHENOL			

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW04 PAI-13C-GW-04-01 PAI-13C-GW-04-01 GW NORMAL 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW05 PAI-13C-GW-05-01 PAI-13C-GW-05-01 GW NORMAL 20040910	00035 DRMO SALVAGE YARD 1999Q PAI35GW01 PAI-35-GW-01-01 PAI-35-GW-01-01 GW NORMAL 19991216
2,4-DIMETHYLPHENOL			
2,4-DINITROPHENOL			
2,4-DINITROTOLUENE			
2,6-DICHLOROPHENOL			
2,6-DINITROTOLUENE			
2-ACETYLAMINOFLUORENE			
2-CHLORONAPHTHALENE			
2-CHLOROPHENOL			
2-METHYLNAPHTHALENE			
2-METHYLPHENOL			
2-NAPHTHYLAMINE			
2-NITROANILINE			
2-NITROPHENOL			
2-PICOLINE			
3,3'-DICHLOROBENZIDINE			
3,3'-DIMETHYLBENZIDINE			
3-METHYLCHOLANTHRENE			
3-NITROANILINE			
4,6-DINITRO-2-METHYLPHENOL			
4-AMINOBIPHENYL			
4-BROMOPHENYL PHENYL ETHER			
4-CHLORO-3-METHYLPHENOL			
4-CHLOROANILINE			
4-CHLOROPHENYL PHENYL ETHER			
4-METHYLPHENOL			
4-NITROANILINE			
4-NITROPHENOL			
4-NITROQUINOLINE-1-OXIDE			
5-NITRO-O-TOLUIDINE			
7,12-DIMETHYLBENZ(A)ANTHRACENE			
A,A-DIMETHYLPHENETHYLAMINE			
ACENAPHTHENE			
ACENAPHTHYLENE			
ACETOPHENONE			
ANILINE			
ANTHRACENE			
ARAMITE			
ATRAZINE			
BENZALDEHYDE			
BENZIDINE			
BENZO(A)ANTHRACENE			
BENZO(A)PYRENE			
BENZO(B)FLUORANTHENE			
BENZO(G,H,I)PERYLENE			

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00013	00013	00035
AOC	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS	DRMO SALVAGE YARD
ROUND	2004Q	2004Q	1999Q
EVENT			
LOCATION	PAI13CMW04	PAI13CMW05	PAI35GW01
NSAMPLE	PAI-13C-GW-04-01	PAI-13C-GW-05-01	PAI-35-GW-01-01
SAMPLE	PAI-13C-GW-04-01	PAI-13C-GW-05-01	PAI-35-GW-01-01
MATRIX	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040910	20040910	19991216
BENZO(K)FLUORANTHENE			
BENZOIC ACID			
BENZYL ALCOHOL			
BIS(2-CHLOROETHOXY)METHANE			
BIS(2-CHLOROETHYL)ETHER			
BIS(2-ETHYLHEXYL)PHTHALATE			
BUTYL BENZYL PHTHALATE			
CAPROLACTAM			
CARBAZOLE			
CHLOROBENZILATE			
CHRYSENE			
DI-N-BUTYL PHTHALATE			
DI-N-OCTYL PHTHALATE			
DIALLATE			
DIBENZO(A,H)ANTHRACENE			
DIBENZOFURAN			
DIETHYL PHTHALATE			
DIMETHYL PHTHALATE			
DINOSEB			
DIPHENYLAMINE			
ETHYL METHANE SULFONATE			
FLUORANTHENE			
FLUORENE			
HEXACHLOROBENZENE			
HEXACHLOROBUTADIENE			
HEXACHLOROCYCLOPENTADIENE			
HEXACHLOROETHANE			
HEXACHLOROPHENE			
HEXACHLOROPROPENE			
INDENO(1,2,3-CD)PYRENE			
ISOPHORONE			
ISOSAFROLE			
METHAPYRILENE			
METHYL METHANE SULFONATE			
N-NITROSO-DI-N-BUTYLAMINE			
N-NITROSO-DI-N-PROPYLAMINE			
N-NITROSODIETHYLAMINE			
N-NITROSODIMETHYLAMINE			
N-NITROSODIPHENYLAMINE			
N-NITROSOMETHYLETHYLAMINE			
N-NITROSOMORPHOLINE			
N-NITROSOPIPERIDINE			
N-NITROSOPYRROLIDINE			
NAPHTHALENE			

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW04 PAI-13C-GW-04-01 PAI-13C-GW-04-01 GW NORMAL 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW05 PAI-13C-GW-05-01 PAI-13C-GW-05-01 GW NORMAL 20040910	00035 DRMO SALVAGE YARD 1999Q PAI35GW01 PAI-35-GW-01-01 PAI-35-GW-01-01 GW NORMAL 19991216
NITROBENZENE			
O-TOLUIDINE			
P-(DIMETHYLAMINO)AZOBENZENE			
PENTACHLOROBENZENE			
PENTACHLORONITROBENZENE			
PENTACHLOROPHENOL			
PHENACETIN			
PHENANTHRENE			
PHENOL			
PRONAMIDE			
PYRENE			
PYRIDINE			
SAFROLE			
PESTICIDES/PCBs (UG/L)			
4,4'-DDD			
4,4'-DDE			
4,4'-DDT			
ALDRIN			
ALPHA-BHC			
ALPHA-CHLORDANE			
AROCLOR-1016			
AROCLOR-1221			
AROCLOR-1232			
AROCLOR-1242			
AROCLOR-1248			
AROCLOR-1254			
AROCLOR-1260			
BETA-BHC			
CHLORDANE			
DELTA-BHC			
DIELDRIN			
DIMETHOATE			
DISULFOTON			
ENDOSULFAN I			
ENDOSULFAN II			
ENDOSULFAN SULFATE			
ENDRIN			
ENDRIN ALDEHYDE			
ENDRIN KETONE			
ETHYL PARATHION			
FAMPHUR			
GAMMA-BHC (LINDANE)			
GAMMA-CHLORDANE			
HEPTACHLOR			

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE AOC ROUND EVENT LOCATION NSAMPLE SAMPLE MATRIX SACODE SAMPLE DATE	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW04 PAI-13C-GW-04-01 PAI-13C-GW-04-01 GW NORMAL 20040910	00013 INERT DISPOSAL AREAS 2004Q PAI13CMW05 PAI-13C-GW-05-01 PAI-13C-GW-05-01 GW NORMAL 20040910	00035 DRMO SALVAGE YARD 1999Q PAI35GW01 PAI-35-GW-01-01 PAI-35-GW-01-01 GW NORMAL 19991216
HEPTACHLOR EPOXIDE			
ISODRIN			
KEPONE			
METHOXYCHLOR			
METHYL PARATHION			
O,O,O-TRIETHYL PHOSPHOROTHIOATE			
PHORATE			
SULFOTEPP			
THIONAZIN			
TOXAPHENE			
ORGANOPHOSPHATE PESTICIDES (UG/L)			
DIMETHOATE			
DISULFOTON			
ETHYL PARATHION			
FAMPHUR			
METHYL PARATHION			
O,O,O-TRIETHYL PHOSPHOROTHIOATE			
PHORATE			
SULFOTEPP			
THIONAZIN			
HERBICIDES (UG/L)			
2,4,5-T			
2,4,5-TP (SILVEX)			
2,4-D			
DINOSEB			
INORGANICS (UG/L)			
ALUMINUM	143 U	31600	219 U
ANTIMONY	2.34 UJ	2.34 UJ	6.3
ARSENIC	3.03 UJ	13.5 J	3.9 U
BARIUM	20.3	21	13.5
BERYLLIUM	0.27 UJ	5.2 J	0.7 U
CADMIUM	3.97 U	3.97 U	0.4 U
CALCIUM	298000	271000	6260
CHROMIUM	0.95 U	6.8 U	0.7 U
COBALT	4.36 UJ	7.5 J	0.9 U
COPPER	1.91 UJ	34 J	2 U
IRON	560 U	33700	309 U
LEAD	1.7 U	13.4 J	2.2 U
MAGNESIUM	339000	294000	395 U
MANGANESE	1300	1000	20.3 U
MERCURY	0.09 U	0.12 U	0.1 U
NICKEL	10.8 UJ	10.8 UJ	1.4 U
POTASSIUM	93700	48200	924
SELENIUM	3.71 UJ	3.71 UJ	3.6 U

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE	00013	00013	00035
AOC	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS	DRMO SALVAGE YARD
ROUND	2004Q	2004Q	1999Q
EVENT			
LOCATION	PAI13CMW04	PAI13CMW05	PAI35GW01
NSAMPLE	PAI-13C-GW-04-01	PAI-13C-GW-05-01	PAI-35-GW-01-01
SAMPLE	PAI-13C-GW-04-01	PAI-13C-GW-05-01	PAI-35-GW-01-01
MATRIX	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040910	20040910	19991216
SILVER	2.84 UJ	2.84 UJ	0.8 U
SODIUM	1290000	2610000	1330 U
THALLIUM	4.09 UJ	4.7 J	4.5 U
TIN	6.4 U	5.4 U	3.4 U
VANADIUM	4.14 U	5.5 J	1.2 U
ZINC	23.4 J	97.7	4.7 U
MISCELLANEOUS PARAMETERS			
CYANIDE (UG/L)			10 U
TOTAL DISSOLVED SOLIDS (MG/L)			24

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SEDIMENT

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SEDIMENT ANALYTIC RESULTS
SITE 5

SITE:	SITE_05
LOCATION:	UNDEFINED
MATRIX:	SD
SAMPLE NUMBER:	PAI-05-SD-03-01
SACDOE:	NORMAL
QC_TYPE:	NM
COLLECTION DATE:	19991006
VALIDATED:	FALSE
COLLECTION METHOD:	GRAB
CTO PROJECT:	020
PROJECT MANAGER:	Brayack, D.
INORGANIC (MG/KG)	
ALUMINUM	25800 J
ANTIMONY	1.2 UJ
ARSENIC	14.9 J
BARIUM	31.8 J
BERYLLIUM	1.4 U
CADMIUM	0.1 UJ
CALCIUM	14300 J
CHROMIUM	46.2 J
COBALT	5.8 J
COPPER	12.4 J
IRON	26900 J
LEAD	20.8 J
MAGNESIUM	9130 J
MANGANESE	452 J
MERCURY	0.06 UJ
NICKEL	11.3 J
POTASSIUM	5140 J
SELENIUM	0.94 UJ
SILVER	0.21 UJ
SODIUM	23700 J
THALLIUM	1.2 UJ
VANADIUM	61.8 J
ZINC	56 J
SEMIVOLATILE (UG/KG)	
1,2,4-TRICHLOROBENZENE	1200 UJ
1,2-DICHLOROBENZENE	1200 UJ
1,3-DICHLOROBENZENE	1200 UJ
1,4-DICHLOROBENZENE	1200 UJ
2,2'-OXYBIS(1-CHLOROPROPANE)	1200 UJ
2,4,5-TRICHLOROPHENOL	5800 UJ
2,4,6-TRICHLOROPHENOL	1200 UJ
2,4-DICHLOROPHENOL	1200 UJ
2,4-DIMETHYLPHENOL	1200 UJ
2,4-DINITROPHENOL	5800 UJ
2,4-DINITROTOLUENE	1200 UJ
2,6-DINITROTOLUENE	1200 UJ
2-CHLORONAPHTHALENE	1200 UJ
2-CHLOROPHENOL	1200 UJ
2-METHYLNAPHTHALENE	1200 UJ
2-METHYLPHENOL	1200 UJ
2-NITROANILINE	5800 UJ
2-NITROPHENOL	1200 UJ
3,3'-DICHLOROBENZIDINE	2300 UJ
3-NITROANILINE	5800 UJ
4,6-DINITRO-2-METHYLPHENOL	5800 UJ

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SEDIMENT ANALYTIC RESULTS
SITE 5

SITE:	SITE_05
LOCATION:	UNDEFINED
MATRIX:	SD
SAMPLE NUMBER:	PAI-05-SD-03-01
SACDOE:	NORMAL
QC_TYPE:	NM
COLLECTION DATE:	19991006
VALIDATED:	FALSE
COLLECTION METHOD:	GRAB
CTO PROJECT:	020
PROJECT MANAGER:	Brayack, D.
4-BROMOPHENYL PHENYL ETHER	1200 UJ
4-CHLORO-3-METHYLPHENOL	1200 UJ
4-CHLOROANILINE	1200 UJ
4-CHLOROPHENYL PHENYL ETHER	1200 UJ
4-METHYLPHENOL	1200 UJ
4-NITROANILINE	5800 UJ
4-NITROPHENOL	5800 UJ
ACENAPHTHENE	1200 UJ
ACENAPHTHYLENE	1200 UJ
ANTHRACENE	1200 UJ
BENZO(A)ANTHRACENE	1200 UJ
BENZO(A)PYRENE	1200 UJ
BENZO(B)FLUORANTHENE	1200 UJ
BENZO(G,H,I)PERYLENE	1200 UJ
BENZO(K)FLUORANTHENE	1200 UJ
BIS(2-CHLOROETHOXY)METHANE	1200 UJ
BIS(2-CHLOROETHYL)ETHER	1200 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	1200 UJ
BUTYL BENZYL PHTHALATE	1200 UJ
CARBAZOLE	1200 UJ
CHRYSENE	1200 UJ
DI-N-BUTYL PHTHALATE	1200 UJ
DI-N-OCTYL PHTHALATE	1200 UJ
DIBENZO(A,H)ANTHRACENE	1200 UJ
DIBENZOFURAN	1200 UJ
DIETHYL PHTHALATE	1200 UJ
DIMETHYL PHTHALATE	1200 UJ
FLUORANTHENE	1200 UJ
FLUORENE	1200 UJ
HEXACHLOROBENZENE	1200 UJ
HEXACHLOROBUTADIENE	1200 UJ
HEXACHLOROCYCLOPENTADIENE	1200 UJ
HEXACHLOROETHANE	1200 UJ
INDENO(1,2,3-CD)PYRENE	1000 J
ISOPHORONE	1200 UJ
N-NITROSO-DI-N-PROPYLAMINE	1200 UJ
N-NITROSODIPHENYLAMINE	1200 UJ
NAPHTHALENE	1200 UJ
NITROBENZENE	1200 UJ
PENTACHLOROPHENOL	5800 UJ
PHENANTHRENE	1200 UJ
PHENOL	1200 UJ
PYRENE	1200 UJ
VOLATILE (UG/KG)	
1,1,1-TRICHLOROETHANE	26 UJ
1,1,2,2-TETRACHLOROETHANE	26 UJ

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CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SEDIMENT ANALYTIC RESULTS
SITE 5

SITE:	SITE_05
LOCATION:	UNDEFINED
MATRIX:	SD
SAMPLE NUMBER:	PAI-05-SD-03-01
SACDOE:	NORMAL
QC_TYPE:	NM
COLLECTION DATE:	19991006
VALIDATED:	FALSE
COLLECTION METHOD:	GRAB
CTO PROJECT:	020
PROJECT MANAGER:	Brayack, D.
1,1,2-TRICHLOROETHANE	26 UJ
1,1-DICHLOROETHANE	26 UJ
1,1-DICHLOROETHENE	26 UJ
1,2-DICHLOROETHANE	26 UJ
1,2-DICHLOROETHENE(TOTAL)	26 UJ
1,2-DICHLOROPROPANE	26 UJ
2-BUTANONE	26 UR
2-HEXANONE	26 UJ
4-METHYL-2-PENTANONE	26 UJ
ACETONE	26 UR
BENZENE	26 UJ
BROMODICHLOROMETHANE	26 UJ
BROMOFORM	26 UJ
BROMOMETHANE	26 UJ
CARBONDISULFIDE	26 UJ
CARBONTETRACHLORIDE	26 UJ
CHLOROBENZENE	26 UJ
CHLOROETHANE	26 UJ
CHLOROFORM	26 UJ
CHLOROMETHANE	26 UJ
CIS-1,3-DICHLOROPROPENE	26 UJ
DIBROMOCHLOROMETHANE	26 UJ
ETHYLBENZENE	26 UJ
METHYLENECHLORIDE	42 J
STYRENE	26 UJ
TETRACHLOROETHENE	26 UJ
TOLUENE	26 UJ
TRANS-1,3-DICHLOROPROPENE	26 UJ
TRICHLOROETHENE	26 UJ
VINYLCHLORIDE	26 UJ
XYLENES,TOTAL	26 UJ

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CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SEDIMENT ANALYTICAL RESULTS

SITE AOC ROUND LOCATION NSAMPLE MATRIX SACODE SAMPLE DATE	00013 INERT DISPOSAL AREAS 2004Q PAI13CSD01 PAI-13C-SD-01 SD NORMAL 20040908	00013 INERT DISPOSAL AREAS 2004Q PAI13CSD02 PAI-13C-SD-02 SD NORMAL 20040908
INORGANICS (MG/KG)		
ALUMINUM	12800	20500
ANTIMONY	0.43 U	0.43 U
ARSENIC	10.9	8
BARIUM	12.4	20.3
BERYLLIUM	0.36 U	0.68
CADMIUM	0.72 U	0.73 U
CALCIUM	1260	4110
CHROMIUM	20.2	32.9
COBALT	3.4	4.4
COPPER	8	9
IRON	14500	16300
LEAD	15.1	16.6
MAGNESIUM	3260	4730
MANGANESE	51.6	88.6
MERCURY	0.04 U	0.05 U
NICKEL	5.5	9.4
POTASSIUM	1470	2430
SELENIUM	0.75 U	0.68 U
SILVER	0.72 U	1.1 U
SODIUM	9080	9820
THALLIUM	0.75 U	1.5
TIN	6.4 U	5.9 U
VANADIUM	35	44.9
ZINC	29.6	36.3
MISCELLANEOUS PARAMETERS		
CYANIDE (MG/KG)	1.2 U	1.2 U
PERCENT CLAY (%)	21.4	40.7
PERCENT COARSE SAND (%)	0	0
PERCENT FINE SAND (%)	58.2	48.7
PERCENT GRAVEL (%)	0	0
PERCENT MEDIUM SAND (%)	2.6	1.5
PERCENT MOISTURE (%)	88	120
PERCENT SILT (%)	17.8	9
SIEVE 1" (%)	100	100
SIEVE 1-1/2" (%)	100	100
SIEVE 2" (%)	100	100
SIEVE 3" (%)	100	100
SIEVE 3/4" (%)	100	100
SIEVE 3/8" (%)	100	100
SIEVE NO. 004 (%)	100	100
SIEVE NO. 010 (%)	100	100
SIEVE NO. 020 (%)	98.2	99.1
SIEVE NO. 040 (%)	97.4	98.5
SIEVE NO. 060 (%)	96	97.5

A-4 SURFACE WATER

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF SURFACE WATER ANALYTICAL RESULTS

SITE	00013	00013	00013	00013
AOC	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS	INERT DISPOSAL AREAS
ROUND	2004Q	2004Q	2004Q	2004Q
LOCATION	PAI13CSW01	PAI13CSW01	PAI13CSW02	PAI13CSW02
NSAMPLE	PAI-13C-SW-01-01	PAI-13C-SW-01-02	PAI-13C-SW-02-01	PAI-13C-SW-02-02
MATRIX	SW	SW	SW	SW
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20040908	20040908	20040908	20040908
INORGANICS (UG/L)				
ALUMINUM	5030	604 U	50700	1220 U
ANTIMONY	2.34 UJ	2.34 UJ	2.34 UJ	2.34 UJ
ARSENIC	5.7 J	3.6 J	46.1 J	3.03 UJ
BARIUM	19.9 J	16 J	65.3	13.9 J
BERYLLIUM	0.27 UJ	0.27 UJ	2.7 U	0.27 UJ
CADMIUM	8.4 J	17.3 J	13.2 J	11.4 J
CALCIUM	405000	449000	409000	412000
CHROMIUM	9.6 U	0.8 UJ	99.7	1.6 U
COBALT	4.36 UJ	4.36 UJ	9.8 J	4.36 UJ
COPPER	22.1 J	5.8 U	55.7 J	16 J
IRON	5850	864	61400	1120
LEAD	3.5 J	3.3 J	45 J	2 J
MAGNESIUM	1270000	1380000	1240000	1260000
MANGANESE	630	131 J	2080	27.4 J
MERCURY	0.12 U	0.1 U	0.12 U	0.01 U
NICKEL	10.8 UJ	10.8 UJ	11.4 J	10.8 UJ
POTASSIUM	389000	424000	393000	384000
SELENIUM	3.71 UJ	3.71 UJ	3.71 UJ	3.71 UJ
SILVER	2.84 UJ	2.84 UJ	2.84 UJ	2.84 UJ
SODIUM	9930000	11400000	9890000	9700000
THALLIUM	4.09 UJ	4.09 UJ	4.09 UJ	4.09 UJ
TIN	5.9 U	5.2 U	7.7 U	4.2 U
VANADIUM	22.2 J	14.1 J	138	10.3 J
ZINC	13.9 J	11.9 J	139 J	3.8 U

A-5 QUALITY CONTROL/QUALITY ASSURANCE

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF QUALITY CONTROL/QUALITY ASSURANCE ANALYTICAL RESULTS

ROUND LOCATION NSAMPLE MATRIX QC_TYPE STATUS SAMPLE DATE	2004Q QC PAI-TB-090804 QC TB NORMAL 20040908		2004Q QC PAI-TB-091004 QC TB NORMAL 20040910	
VOLATILES (UG/L)				
1,1,1-TRICHLOROETHANE	5	U	5	U
1,1,2,2-TETRACHLOROETHANE	5	U	5	U
1,1,2-TRICHLOROETHANE	5	U	5	U
1,1,2-TRICHLOROTRIFLUOROETHANE	5	U	5	U
1,1-DICHLOROETHANE	5	U	5	U
1,1-DICHLOROETHENE	5	U	5	U
1,2,4-TRICHLOROBENZENE	5	U	0.50	J
1,2-DIBROMO-3-CHLOROPROPANE	5	U	5	U
1,2-DIBROMOETHANE	5	U	5	U
1,2-DICHLOROBENZENE	5	U	5	U
1,2-DICHLOROETHANE	5	U	5	U
1,2-DICHLOROPROPANE	5	U	5	U
1,3-DICHLOROBENZENE	5	U	5	U
1,4-DICHLOROBENZENE	5	U	5	U
2-BUTANONE	5	U	5	U
2-HEXANONE	5	U	5	U
4-METHYL-2-PENTANONE	5	U	5	U
ACETONE	5	J	6	J
BENZENE	5	UJ	5	U
BROMODICHLOROMETHANE	5	U	5	U
BROMOFORM	5	U	5	U
BROMOMETHANE	5	U	5	U
CARBON DISULFIDE	5	U	5	U
CARBON TETRACHLORIDE	5	U	5	U
CHLOROBENZENE	5	U	5	U
CHLORODIBROMOMETHANE	5	U	5	U
CHLOROETHANE	5	U	5	U
CHLOROFORM	5	U	5	U
CHLOROMETHANE	5	U	5	U
CIS-1,2-DICHLOROETHENE	5	U	5	U
CIS-1,3-DICHLOROPROPENE	5	U	5	U
CYCLOHEXANE	5	U	5	U
DICHLORODIFLUOROMETHANE	5	U	5	U
ETHYLBENZENE	5	U	5	U
ISOPROPYLBENZENE	5	U	5	U
M+P-XYLENES	10	U	10	U
METHYL ACETATE	5	U	5	U
METHYL CYCLOHEXANE	5	U	5	U
METHYL TERT-BUTYL ETHER	5	UJ	5	UJ
METHYLENE CHLORIDE	5	U	5	U
O-XYLENE	5	U	5	U
STYRENE	5	UJ	5	U
TETRACHLOROETHENE	5	U	5	UJ
TOLUENE	5	U	5	U
TOTAL 1,2-DICHLOROETHENE	10	U	10	U

CTO 084 - MCRD PARRIS ISLAND
SUMMARY OF QUALITY CONTROL/QUALITY ASSURANCE ANALYTICAL RESULTS

ROUND LOCATION NSAMPLE MATRIX QC_TYPE STATUS SAMPLE DATE	2004Q QC PAI-TB-090804 QC TB NORMAL 20040908		2004Q QC PAI-TB-091004 QC TB NORMAL 20040910	
TOTAL XYLENES	15	U	15	U
TRANS-1,2-DICHLOROETHENE	5	U	5	U
TRANS-1,3-DICHLOROPROPENE	5	U	5	U
TRICHLOROETHENE	5	U	5	U
TRICHLOROFLUOROMETHANE	5	U	5	U
VINYL CHLORIDE	5	U	5	U

APPENDIX B

PARCC PARAMETERS/DATA VALIDATION LETTERS

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B-2 DATA VALIDATION LETTERS

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PARCC PARAMETERS/QA/QC SAMPLES

DATA QUALITY

Various quality control measures were implemented during the 1995-1999 field sampling and laboratory analysis performed by TetraTech NUS at MCRD Parris Island RI/FS. These measures were conducted to ensure that the resultant data were suitable for their intended uses (i.e., nature and extent determination, risk assessment, etc.). A brief summary of the measures is provided in this appendix. Section 1.0 contains a summary of the Data Quality Objectives (DQOs). Field Quality Control Samples are discussed in Section 2.0. A summary of the data validation procedures and the results of the data validation process are provided in Section 3.0.

1.0 DATA QUALITY OBJECTIVES

A detailed discussion of the DQOs for the 1998-1999 sampling is provided in the Quality Assurance section of the MCRD Parris Island Master Work Plan (Brown & Root Environmental, 1998). DQOs for all field and laboratory analyses, which includes requirements for precision, accuracy, and completeness, are summarized in the remainder of this section.

1.1 Precision

Precision characterizes the amount of variability and bias inherent in a data set. This parameter also describes the reproducibility of measurements of the same parameters for samples under similar conditions. Precision is expressed as a Relative Percent Difference (RPD), which is defined as the relation of the range relative to the mean RPDs, which are typically expressed as percentages, are used to evaluate both field and laboratory duplicate precision and are calculated, as follows:

$$RPD = \frac{V1 - V2}{(V1 + V2)/2} \times 100$$

where: RPD = relative percent difference

V1, V2 = two results obtained by analyzing duplicate samples

The precision objectives for of ±50 percent for solid matrices and ±30 percent for aqueous matrices were employed for this project.

Field duplicates monitor the consistency with which environmental samples were obtained and analyzed. Laboratory duplicates measure the reproducibility of laboratory generated results. RPDs were calculated for each set of field and laboratory duplicates generated for the investigation. Failures in meeting the

precision objectives resulted in the qualification (as per data validation protocols) of the associated analytical data. The qualification of the 1995-1999 analytical data for MCRD Parris Island RI/FS, as well as the implication of the data qualifications, is discussed in Section 3.0 of this appendix.

1.2 Accuracy

The degree of accuracy of a measurement, which is expressed as a percent recovery, is based on a comparison of the measured value with an accepted reference or true value. Accuracy measurements are determined by the analysis of "spiked" samples (i.e., blank, surrogate, or matrix spikes). These analyses measure the accuracy of the laboratory operations as affected by the sample matrix. Percent recovery is calculated using the following equation:

$$\%R = \frac{Ss - So}{S} \times 100$$

Where:	%R	=	percent recovery
	Ss	=	result of spiked sample
	So	=	result of non-spiked sample
	S	=	concentration of spiked amount.

In general, the accuracy objective for the 1998-1999 RFI analytical data is defined as 75 to 125 percent (percent recovery). Failures in meeting the accuracy objectives resulted in the qualification (as per data validation protocols) of the associated analytical data. A discussion of the qualification of the 1995-1999 analytical data for MCRD Parris Island RI/FS and the implication of the data qualifications is provided in Section 3.0 of this appendix.

1.3 Completeness

Completeness is a measure of the amount of valid data obtained from the field and laboratory analyses in relation to the total amount of data collected. Completeness is typically expressed as a percentage and is determined using the following equation:

$$\%C = \frac{V}{T} \times 100$$

Where:	%C	=	percent completeness
	V	=	number of results determined to be valid
	T	=	total number of results

Under ideal conditions, the completeness objective would be 100 percent. However, samples can be rendered unusable during shipping, preparation (e.g., bottles broken or extracts accidentally destroyed), or analysis (e.g., loss of instrument sensitivity, strong matrix effects). The completeness objective for this project is 90%, as stated in the RFI/CMS Generic Work Plan. The calculated percent completeness for all chemical analytical data collected during the 1995-1999 sampling event for MCRD Parris Island RI/FS Site 21 is 98.0% (i.e., 143 chemical analytical results out of a total of 7254 data points were qualified as unusable), indicating that the data completeness objective for the project was achieved.

Table 1-1 contains a list of those sample results, which were determined to be invalid and unusable via data validation. Section 3.0 of this appendix contains a summary of the data validation results and describes, in general, the rationale behind the rejection of these analytical results.

2.0 FIELD QUALITY CONTROL SAMPLES

The following field quality control (QC) samples were collected for the 1995-1999 sampling effort and analyzed in accordance with DQO requirements, as specified in the MCRD Parris Island General Work Plan:

- Field duplicates were obtained at a frequency of one per every ten samples (10% per matrix). Field duplicates for soil samples are two separate samples collected from the same source. Aqueous sample duplicates are collected simultaneously. Duplicates assess the overall precision of the sampling and analysis program.

TABLE 1-1

SUMMARY OF REJECTED RESULTS
PARRIS ISLAND RI/FS SITE 21

Sample	Parameter	Matrix	Sampling Round
PAI-04-GW-01-01	4-nitroquinoline-1-oxide, benzidine, pentachlorophenol, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, acetonitrile, acrolein, isobutanol, methacrylonitrile, propionitrile, trans-1,4-dichloro-2-butene, vinyl acetate	GW	1995-1999 RI/FS
PAI-07-GW-04-01	4-nitroquinoline-1-oxide, benzidine, pentachlorophenol, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, acetonitrile, acrolein, acrylonitrile, isobutanol, methacrylonitrile, propionitrile, trans-1,4-dichloro-2-butene, vinyl acetate	GW	1995-1999 RI/FS
PAI-07-GW-04-01-D	4-nitroquinoline-1-oxide, benzidine, pentachlorophenol, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, acetonitrile, acrolein, acrylonitrile, isobutanol, methacrylonitrile, propionitrile, trans-1,4-dichloro-2-butene, vinyl acetate	GW	1995-1999 RI/FS
PAI-07-GW2-02	2-butanone, acetone	GW	1995-1999 RI/FS
PAI-07-GW3-02	2-butanone, 2-hexanone, acetone	GW	1995-1999 RI/FS
PAI-09-GW-01-01	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, acetonitrile, acrolein, acrylonitrile, isobutanol, methacrylonitrile, propionitrile, trans-1,4-dichloro-2-butene, vinyl acetate	GW	1995-1999 RI/FS
PAI-09-GW-02-01	2-butanone, acetone	GW	1995-1999 RI/FS
PAI-13C-GW-01-01	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, acetonitrile, acrolein, acrylonitrile, isobutanol, methacrylonitrile, propionitrile, trans-1,4-dichloro-2-butene, vinyl acetate, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone	GW	1995-1999 RI/FS
PAI-02-SB-02A-02	2-butanone, acetone	SB	1995-1999 RI/FS
PAI-02-SB-10-07	2-butanone, acetone	SB	1995-1999 RI/FS
PAI-02-SB-11-02	2-butanone, acetone	SB	1995-1999 RI/FS
PAI-05-SD-03-01	2-butanone, acetone	SD	1995-1999 RI/FS

PAI-07-SB-01-04	benzidine	SB	1995-1999 RI/FS
PAI-07-SB-01-04-D	benzidine	SB	1995-1999 RI/FS
PAI-10-SD-19-01	benzidine	SD	1995-1999 RI/FS
PAI-10-SD-20-01	benzidine	SD	1995-1999 RI/FS
PAI-13C-SS-03-01	2-butanone, acetone	SS	1995-1999 RI/FS
PAI-13C-SS-03-01-D	2-butanone, acetone	SS	1995-1999 RI/FS
PI-005-01(28)	3-nitroaniline		1995-1999 RI/FS
PI-008A-01(30)	3-nitroaniline, 4,4'-DDD, alpha-Chlordane, Endrin, Endrin ketone, gamma-Chlordane	SS	1995-1999 RI/FS
PI-008B-01(31)	4,4'-DDD	SS	1995-1999 RI/FS
PI-009-01(32)	3-nitroaniline	SS	1995-1999 RI/FS
PI-009-02(33)	Endosulfan I	SS	1995-1999 RI/FS
PI-009-03(34)	3-nitroaniline	SS	1995-1999 RI/FS
PI-012-01(35)	4,4'-DDT, Dieldrin	SD	1995-1999 RI/FS
PI-012-03(37)	Heptachlor	SS	1995-1999 RI/FS
PI-014-01(40)	3-nitroaniline	SD	1995-1999 RI/FS
PI-014-02(41)	3-nitroaniline	SD	1995-1999 RI/FS
PI-035-01(48)	3-nitroaniline	SS	1995-1999 RI/FS
PI-035-02(49)	3-nitroaniline, 4-nitroaniline, gamma-Chlordane	SD	1995-1999 RI/FS
PI-035-03(50)	3-nitroaniline	SS	1995-1999 RI/FS
PI-D01-121395	alpha-Chlordane	SS	1995-1999 RI/FS
PI-D02-121395	3-nitroaniline	SD	1995-1999 RI/FS
PI-D03-121395	3-nitroaniline, 4,4'-DDT, Endrin aldehyde	SS	1995-1999 RI/FS

GW Groundwater
SD Sediment
SO Soil
SW Surface Water

- Trip blanks of analyte-free water were generated by the laboratory, taken to the sampling site, and returned to the laboratory with the environmental samples to be analyzed for volatile organic compounds. Analytical results for trip blanks are used to determine the level of contamination associated with the transportation of environmental samples. One trip blank was collected per each cooler and analyzed for volatile organics.

- Rinsate blanks were obtained by pouring analyte-free water over sample collection equipment (e.g., bailers, etc.) after decontamination to assess the effectiveness of field decontamination procedures. Samples were obtained at a frequency of one per day per media per analysis.

- Field blanks consisted of source water samples used in steam cleaning and/or decontamination and are used to determine the level of contamination associated with the source water. Field blanks were collected as needed depending on site conditions

Documentation for the actual collection of the aforementioned field QC samples for all 1995-199 Parris Island RI/FS analytical data is provided in Appendix C-5 of this report.

3.0 DATA VALIDATION

All samples collected as part of the 1995-1999 Parris Island RI/FS field effort and sent to the laboratory for chemical analysis were subjected to data validation. Data validation is an objective systematic process in which analytical data are reviewed to ascertain the validity of the reported results and to identify for the data user the possible limitation of these results. This section summarizes the various aspects of the data validation process.

3.1 General Data Validation Procedures

Data validation was preformed on a minimum of 10% of all packages analyzed via SW-846 methods which are similar to the CLP methods (e.g., the 8000 series methods). Data were validated in accordance with the USEPA's CLP Functional Guidelines for Organic and Inorganic Data Review, as amended for use in USEPA Region IV.

At a minimum, the validation process included consideration of the following: data completeness, holding time compliance, mass calibrations, field QC and laboratory generated blanks, internal standards, surrogate spikes, blank spikes, matrix spikes, field duplicate precision, chemical interferences, quantitation, detection limits, and system performance.

Evaluation of laboratory and field QC blank analyses aided in the elimination of false positive results, which were identified as laboratory artifacts. The overall determination of data utility or reliability was based upon laboratory compliance with specified methods and adherence to quality control requirements. Noncompliances observed during the validation process typically resulted in the qualification of the associated analytical data. The qualifiers alert the data user to imprecise or estimated results and, in the worst case, unreliable and unusable data.

The net results of the validation process were summarized in sample delivery group-specific technical reports consisting of a memorandum, a section of qualified analytical results, and a supporting documentation section which provided the rationale for changes and/or qualification of the data. These

memoranda provide a detailed explanation of the results of the data validation review. All data validation documentation is currently retained on file by Tetra Tech NUS, in the Pittsburgh, Pennsylvania office.

3.2 Data Validation Qualifiers

As mentioned previously, the qualification of analytical data during the validation process (i.e., application of U, J, UJ, UR, and R qualifiers) was conducted as required by the USEPA Functional Guidelines. The attachment of the data qualifiers to analytical results signifies the occurrence of quality control noncompliances, which were noted during the course of data validation. The various data qualifiers are defined, as follows:

- **U** - Indicates that the chemical was not detected at the numerical detection limit (sample-specific quantitation limit) noted. Nondetected results from the laboratory are reported in this manner. This qualifier is added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

- **UJ** - Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.

- **J** - Indicates that the chemical was detected. However, the associated numerical result is not a precise representation of the amount, which is actually present in the sample. The laboratory reported concentration is considered to be an estimate of the true concentration.

- **UR** - Indicates that the chemical may or may not be present. The nondetected analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low quality control recoveries).

- **R** - Indicates that the chemical may or may not be present. The positive analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies.

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data, qualified with UR and R data validation

qualifiers. These data are considered invalid and are not used for risk assessment and decision making purposes. Minor problems are defined as issues resulting in the estimation of data, qualified with U, J, and UJ data validation qualifiers. Estimated analytical results are considered to be suitable for risk assessment and decision making purposes.

3.3 Summary of Data Validation Results

A brief summary of the data validation results for the 1995-1999 Parris Island RI/FS is provided in the remainder of this section. All validated analytical results are presented in Appendix C.

3.3.1 Organic Analyses

Acetone, benzo(g,h,i)perylene, bis(2-ethylhexyl)phthalate, di-n-butyl phthalate, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha Chlordane, beta-BHC, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin aldehyde, Endrin ketone, gamma-Chlordane and Heptachlor epoxide were identified as laboratory blank contaminants on a frequent basis. 2-Butanone was identified as field blank contaminant on a frequent basis. Detection limits for these chemicals in the affected environmental samples were elevated during the data validation process because positive results for these chemicals are considered to be attributable to blank contamination.

In general, analytical results for organic compounds were qualified as estimated, J or UJ, for observed noncompliances with holding times, calibration, field duplicate precision, percent differences between columns, percent solids less than 30% and sample quantitation. Positive results reported at concentrations less than the Contract Required Quantitation Limit (CRQL) were also qualified as estimated because of potential uncertainty near the CRQL.

Severe calibration noncompliances (i.e., relative response factors < 0.050 and/or grossly noncompliant continuing calibration verifications) were observed in the following MCRD Parris Island RI/FS Site 21 samples:

- PI-005-01(28) (3-nitroaniline)
- PI-008A-01(30) (3-nitroaniline)
- PI-009-01(32) (3-nitroaniline)
- PI-009-03(34) (3-nitroaniline)
- PI-014-01(40) (3-nitroaniline)
- PI-014-02(41) (3-nitroaniline)
- PI-035-01(48) (3-nitroaniline)
- PI-035-02(49) (3-nitroaniline, 4-nitroaniline)

- PI-035-03(50) (3-nitroaniline)
- PI-D02-121395 (3-nitroaniline)
- PI-D03-121395 (3-nitroaniline)
- PI-02-SB-02A-02 (2-butanone, acetone)
- PAI-02-SB-10-07 (2-butanone, acetone)
- PAI-02-SB-11-02 (2-butanone, acetone)
- PAI-05-SD-03-01 (2-butanone, acetone)
- PAI-13C-SS-03-01 (2-butanone, acetone)
- PAI-13C-SS-03-01-D (2-butanone, acetone)
- PAI-04-GW-01-01 (4-nitroquinoline-1-oxide, pentachlorophenol, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, acetonitrile, acrolein, isobutanol, methacrylonitrile, propionitrile, trans-1,4-dichloro-2-butene, vinyl acetate)
- PAI-07-GW-04-01 (4-nitroquinoline-1-oxide, pentachlorophenol, 2-butanone, 2-hexanone, 4-methyl –2-pentanone, acetone, acetonitrile, acrolein, acrylonitrile, isobutanol, methacrylonitrile, propionitrile, trans-1,4-dichloro-2-butene, vinyl acetate)
- PAI-07-GW-04-01-D (4-nitroquinoline-1-oxide, pentachlorophenol, 2-butanone, 2-hexanone, 4-methyl –2-pentanone, acetone, acetonitrile, acerolein, acrylonitrile, isobutanol, methacrylonitrile, propionitrile, trans-1,4-dichloro-2-butene, vinyl acetate)
- PAI-09-GW-01-01 (2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, acetonitrile, acrolein, acrylonitrile, isobutanol, methacrylonitrile, propionitrile, trans-1,4-dichloro-2-butene, vinyl acetate)
- PAI-13C-GW-01-01 (2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, acetonitrile, acrolein, acrylonitrile, isobutanol, methacrylonitrile, propionitrile, trans-1,4-dichloro-2-butene, vinyl acetate)
- TB-121499 (2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, acetonitrile, acrolein, acrylonitrile, propionitrile, trans-1,4-dichloro-2-butene, vinyl acetate)
- PAI-07-GW2-02 (2-butanone, acetone)
- PAI-07-GW3-02 (2-butanone, 2-hexanone, acetone)
- PAI-09-GW-02-01 (2-butanone, acetone)
- PAI-13C-GW-02-01 (2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone)
- TB-100599 (2-butanone, 2-hexanone, acetone)
- TB-100699 (2-butanone, 2-hexanone, acetone)
- TB-121399 (2-butanone, acetone)
- TB-121799 (2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone)

These gross noncompliances resulted in the rejection of the associated data (nondetected) in the affected samples.

Severe matrix spike and/or blank spike recovery noncompliances (i.e., percent recovery < 10%) were observed. Nondetects for these chemicals in the following samples were rejected:

- PAI-07-SB-01-04 (benzidine)
- PAI-07-SB-01-04-D (benzidine)
- PAI-10-SD-19-01 (benzidine)
- PAI-10-SD-20-01 (benzidine)
- PAI-04-GW-01-01 (benzidine)
- PAI-07-GW-04-01 (benzidine)
- PAI-07-GW-04-01-D (benzidine)

Severe percent difference between columns noncompliances (i.e., percent difference >100%) were observed for several compounds. Positive results for these chemicals in the following samples were rejected:

- PAI-008A-01(30) (4,4'-DDD, alpha-Chlordane, Endrin, Endrin ketone, gamma-Chlordane)
- PAI-008B-01(31) (4,4'-DDD)
- PI-012-01(35) (4,4'-DDT, Dieldrin)
- PI-D03-121395 (4,4'-DDT, Endrin aldehyde)
- PI-D01-121395 (alpha-Chlordane)
- PI-009-02(33) (Endosulfan I)
- PI-035-02(49) (gamma-Chlordane)
- PI-012-03(37) (Heptachlor)

Several samples exceeded the holding time until extraction and/or analysis. Since the exceedances were less than 2X the holding time, nondetects and positive results were not rejected but were qualified as estimated, J and UJ, in the following samples:

- PAI-05-SD-03-01 (all semivolatiles)
- PAI-014-03(42) (Aldrin, alpha-BHC, PCBs 1016, 1221, 1232, 1242, 1248, 1254, 1260, delta-BHC, Dieldrin, Endosulfan II, Endosulfan sulfate, gamma-BHC (lindane), Heptachlor, Heptachlor epoxide, Methoxychlor, Toxaphene)

Several sample quantitation problems were observed concerning Aroclor 1260. The retention times used by the laboratory to quantify Aroclor 1262 matched those used to quantify Aroclor 1260. Therefore, the positive results for Aroclor 1260 were qualified as estimated, J, in the following samples:

- PI-005-01(28)
- PI-D02-121395
- PI-035-01(48)
- PI-008A-01(30)
- PI-035-02(49)
- PI-035-03(50)
- PI-D03-121395
- PI-009-02(33)

Sample PAI-05-SD-03-01had a percent solid <30%. The nondetects and positive results were qualified as estimated, J and UJ, in the sample.

No qualifiers were assigned due to surrogate recoveries, internal standard recoveries or instrument performance.

3.3.2 Inorganic Analysis

Several inorganic chemicals were detected as contaminants in the laboratory blanks at varying concentrations. Beryllium and copper were detected in the field blanks. The detection limits of those results that were found to be attributable to blank contamination were raised during the validation process.

Inorganic sample results were typically qualified as estimated based on problems noted with matrix spikes, field duplicate precision, chemical interferences (ICP only), and percent solids less than 30%.

Sample PAI-05-SD-03-01had a percent solid <30%. The nondetects and positive results were qualified as estimated, J and UJ, in the sample.

It should be noted that no qualifiers were assigned on the basis of holding time noncompliance, calibrations, laboratory duplicate precision and laboratory control samples noncompliances. No inorganic data was rejected.

3.3.1 Miscellaneous Analyses

No miscellaneous parameters were detected in the laboratory method blanks or field blanks.

Miscellaneous parameters samples results were typically qualified as estimated, J, based on problems noted with matrix spike noncompliances.

No miscellaneous data was rejected.

All validated results for Parris Island RI/FS are presented in Appendix C of this report. This database is inclusive of all results (i.e., nondetects and positive results; 1995-1999) and is used to defined the nature and extent of contamination, assess contaminant fate and transport, and to complete the baseline human health and ecological risk assessments.

B-2

DATA VALIDATION LETTERS

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-02-9-054

TO: D. BRAYACK

DATE: APRIL 13, 1999

FROM: DANA PIETO

CC: DV FILE
REVISION 1

SUBJECT: ORGANIC DATA VALIDATION – TCL VOAs, SVOAs, & PEST/PCBs
CTO 084, MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG 55636

SAMPLES: Soils\VOC\SVOC\PEST\PCB:

PI-005-01(28)	PI-005-02(29)	PI-008A-01(30)
PI-008B-01(31)	PI-009-01(32)	PI-009-02(33)
PI-009-03(34)	PI-013-01(38)	PI-014-01(40)
PI-014-02(41)	PI-035-01(48)	PI-035-02(49)
PI-035-03(50)	PI-D01-121395	PI-D02-121395
PI-D03-121395		

Waters\VOC:

PI-R01-121295	PI-T01-121295	PI-T02-121395

Waters\SVOC\PEST\PCB:

PI-R01-121295

The sample set for the CTO 084, MCRD Parris Island, South Carolina, SDG 55636, consists of sixteen soil environmental samples, one rinse blank (designated R), and two trip blanks (designated T). All soil environmental samples and the rinse blank were analyzed for Target Compound List (TCL) volatile, semivolatile, and pesticide/PCB organic compounds. The trip blanks were analyzed for TCL volatiles organic compounds only. One field duplicate [PI-008A-01(30)/PI-D03-121395] was included in this SDG.

The samples were collected by Tetra Tech NUS on December 12 and 13, 1995, and analyzed by Inchcape Testing Services. The volatile, semivolatile, and pesticide/PCB compounds were analyzed under Naval Facilities Engineering Service Center (NFESC). All sample analyses were conducted using the Contract Laboratory Program (CLP) Statement of work (SOW) OLM03.0 analytical and reporting protocols.

MEMO TO: D. BRAYACK
DATE: APRIL 13, 1999

The data were evaluated according to the following parameters:

* • Holding times
  • Initial and continuing calibrations
  • Laboratory and field blank analyses

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data usability are discussed below.

Volatiles

All positive results reported at concentrations less than the Contract Required Quantitation Limit (CRQL) were qualified as estimated, (J).

The following volatile compound was detected in the laboratory method blanks at the maximum concentration indicated below:

Compound	Maximum Concentration	Soil Action Level
Acetone	10 µg/kg	100 µg/kg

Samples Affected: All.

Sample aliquot, dilution factors, and percent solids were taken into consideration during the application of the action level. Positive results for acetone reported at concentrations below the detection limit were replaced with revised detection limits and qualified as nondetects, (U). Positive results for acetone reported at concentrations above the detection limit were qualified as nondetects, (U).

Semivolatiles

All positive results reported at concentrations less than the CRQL were qualified as estimated, (J).

The following semivolatile compounds were detected in the laboratory method blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Solid Action Level
Di-n-butylphthalate	18 µg/kg	180 µg/kg
Bis(2-ethylhexyl)phthalate	94 µg/kg	940 µg/kg
Indeno(1,2,3-cd) pyrene	38 µg/kg	190 µg/kg
Dibenz(a,h)anthracene	59 µg/kg	295 µg/kg
Benzo(g,h,i)perylene	24 µg/kg	120 µg/kg

Samples Affected: All

MEMO TO: D. BRAYACK
DATE: APRIL 13, 1999

Sample aliquot, dilution factors, and percent solids were taken into consideration during the application of the action level. Positive results for di-n-butylphthalate, bis(2-ethylhexyl)phthalate, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene reported at concentrations below the detection limit were replaced with the revised detection limits and qualified as nondetects, (U). Positive results for bis(2-ethylhexyl)phthalate reported at concentrations above the detection limit were qualified as nondetects, (U).

The continuing calibration on 1/12/96 and 1/13/96 contained relative response factors (RRFs) below 0.050 for 3-nitroaniline. Nondetected results were qualified as rejected, (UR).

The continuing calibration percent differences (%Ds) on 1/12/96 exceeded 50% for 4-chloroaniline and 3-nitroaniline. The continuing calibration %Ds on 1/13/96 exceeded 50% for 3-nitroaniline. Nondetected results for 4-chloroaniline were qualified as estimated, (UJ). No action was warranted for 3-nitroaniline because the results were already qualified due to a more severe noncompliance.

The following samples were diluted upon analysis:

Sample	Dilution
PI-035-01(48)	20x
PI-035-02(49)	2x
PI-035-03(50)	1.3x
PI-D01-121395	12.5x

Pesticides

All positive results reported at concentrations less than the CRQL were qualified as estimated, (J).

It should be noted that the positive results for PCB's in samples PI-008A-01(30), PI-009-02(33), and PI-D03-121395 were confirmed by semivolatile GC/MS analysis as a tentatively identified compound.

It should be noted that the positive results for the pesticides 4,4'-DDE and 4,4'-DDT, found in samples PI-008B-01(31) and PI-009-03(34), were also observed as tentatively identified compounds in the semivolatile GC/MS analysis.

The following pesticide/PCB compounds were detected in the laboratory method and/or instrument blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Aqueous Action Level	Solid Action Level
Endosulfan sulfate[1]	0.094 µg/L	0.47 µg/L	15.65 µg/kg
4,4'-DDT[1]	0.12 µg/L	—	19.98 µg/kg
Endrin ketone[1]	0.058 µg/L	—	9.657 µg/kg
alpha-Chlordane[1]	0.036 µg/L	—	5.994 µg/kg
Endosulfan II[1]	0.092 µg/L	—	15.318 µg/kg
Endosulfan sulfate[1]	0. 51 µg/L	—	24.975 µg/kg
Endrin[1]	0.13 µg/L	—	21.645 µg/kg
4,4'-DDD[1]	0.16 µg/L	—	26.64 µg/kg

MEMO TO: D. BRAYACK
DATE: APRIL 13, 1999

[1]Maximum concentration found in the instrument blank and affects samples analyzed on instrument 2401 only.

Samples Affected: All

Sample aliquot, dilution factors, and percent solids were taken into consideration during the application of the action level. Positive results for Arochlor 1260, 4,4'-DDT, Endrin ketone, alpha-Chlordane, Endosulfan sulfate, and 4,4'-DDD reported at concentrations below the detection limit were replaced with the revised detection limits and qualified as nondetects, (U). Positive results for 4,4'-DDT, Endrin, and 4,4-DDD reported at concentrations above the detection limit were qualified as nondetects, (U).

The laboratory states that Aroclor 1262 was identified in the pesticide/PCB method blank, yet the results were reported as Aroclor 1260. Upon review, the retention times used to quantify Aroclor 1262 matched those used to quantify Arochlor 1260. Moreover, despite the laboratory's statement in the case narrative regarding samples that did not contain Aroclor 1262, it is apparent that the laboratory is treating both Aroclor 1262 and 1260 in the same manner. Therefore, the data reviewer has qualified all positive results for Aroclor 1260 as estimated, (J).

The pesticide identification summary percent differences (%D) exceeded the 25% quality control limit or exceeded 100%(#) for the following compounds. Positive results were exceeded 25% but less than 100% were qualified as estimated, (J), and positive results exceeding 100% were unusable and were rejected, (R).

Compound	Sample	%D
#Endosulfan I	PI-009-02(33)	999.9
Dieldrin	PI-035-02(49)	52.8
Endrin aldehyde	PI-035-02(49)	97.4
#gamma-Chlordane	PI-035-02(49)	999.9
Endosulfan I	PI-035-03(50)	57.5
4,4'-DDE	PI-014-01(40)	27.8
#Endrin	PI-008A-01(30)	999.9
Endosulfan II	PI-008A-01(30)	54.5
#4,4'-DDD	PI-008A-01(30)	425.0
*4,4'-DDT	PI-008A-01(30)	50.0
#Endrin ketone	PI-008A-01(30)	999.9
#alpha-Chlordane	PI-008A-01(30)	132.3
#gamma-Chlordane	PI-008A-01(30)	999.9
#4,4'-DDD	PI-008B-01(31)	999.9
4,4'-DDE	PI-D01-121395	97.4
#alpha-Chlordane	PI-D01-121395	155.6

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DATE: **APRIL 13, 1999**

Compound	Sample	%D
Endosulfan II	PI-D03-121395	69.5
#4,4'-DDT	PI-D03-121395	242.8
#Endrin aldehyde	PI-D03-121395	131.9

*Value taken from the diluted analysis.

Aroclor 1260 and 4,4'-DDT exceeded the linear calibration range of the instrument in sample PI-008A-01(30). This sample was originally diluted 2-fold and was reanalyzed at a 20x dilution. The dilution result for these compounds only were transposed over to the original sample results and used in validation of this SDG.

4,4'-DDT and 4,4'-DDE exceeded the linear calibration range of the instrument in sample PI-008B-01(31). This sample was originally diluted 10-fold and was reanalyzed at a 100x dilution. The dilution result for these compounds only were transposed over to the original sample results and used in validation of this SDG.

4,4'-DDT and 4,4'-DDE exceeded the linear calibration range of the instrument in sample PI-009-03(34). This sample was originally diluted 20-fold and was reanalyzed at a 200x dilution. The dilution result for these compounds only were transposed over to the original sample results and used in validation of this SDG.

4,4'-DDT exceeded the linear calibration range of the instrument in sample PI-035-01(48). This sample was originally diluted 30-fold and was reanalyzed at a 300x dilution. The dilution result for this compound only was transposed over to the original sample results and used in validation of this SDG.

4,4'-DDT exceeded the linear calibration range of the instrument in sample PI-035-02(49). This sample was originally diluted 3-fold and was reanalyzed at a 30x dilution. The dilution result for this compound only was transposed over to the original sample results and used in validation of this SDG.

4,4'-DDT exceeded the linear calibration range of the instrument in sample PI-035-03(50). This sample was originally diluted 2-fold and was reanalyzed at a 20x dilution. The dilution result for this compound only was transposed over to the original sample results and used in validation of this SDG.

The following samples were diluted upon analysis:

Sample	Dilution
PI-005-01(28)	3x
PI-009-01(32)	10x
PI-014-01(40)	5x
PI-D01-121395	2x
PI-D03-121395	10x

Executive Summary

***Laboratory Performance*:** The semivolatile continuing calibration contained RRFs below 0.050 for 3-nitroaniline. The semivolatile continuing calibration %Ds exceeded 50% for 4-chloroaniline and 3-nitroaniline. The pesticide identification summary %Ds between columns exceeded the 25% quality control limit for

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DATE: APRIL 13, 1999

Dieldrin, Endosulfan I, 4,4'-DDE, Endosulfan II, and 4,4'-DDT. The pesticide identification summary %Ds between columns exceeded 100% for Endosulfan I, gamma-Chlordane, Endrin, 4,4'-DDD, Endrin ketone, alpha-Chlordane, 4,4'-DDT, and Endrin aldehyde. Acetone was detected in the volatile laboratory method blanks. Di-n-butylphthalate, bis(2-ethylhexyl)phthalate, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene were detected in the semivolatile laboratory method blanks. Endosulfan sulfate were detected in the pesticide/PCB laboratory method blanks. 4,4'-DDT, Endrin ketone, alpha-Chlordane, Endosufan II, Endosulfan sulfate, Endrin, and 4,4'-DDD were detected in the pesticide/PCB instrument blanks.

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Organic Data Evaluation" and the NFESC Interim Guidance Document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (February 1996).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Dana L. Pieto

Dana L. Pieto

Tetra Tech NUS
Data Validator

Joseph A. Samchuck

Tetra Tech NUS
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-01-9-182

TO: D. BRAYACK **DATE:** MARCH 5, 1999

FROM: GRETCHEN PHIPPS **COPIES:** DV FILE

SUBJECT: INORGANIC DATA VALIDATION – TAL METALS
CTO 009 - PARRIS ISLAND
SDG - 55636

SAMPLES: 16/Soils/

PI-005-01(28)	PI-005-02(29)	PI-008A-01(30)
PI-008B-01(31)	PI-009-01(32)	PI-009-02(33)
PI-009-03(34)	PI-013-01(38)	PI-014-01(40)
PI-014-02(41)	PI-035-01(48)	PI-035-02(49)
PI-035-03(50)	PI-D01-121395	PI-D02-121395
PI-D03-121395		

1/Aqueous/

PI-R01-121295

Overview

The sample set for CTO 009, Parris Island, SDG 55636, consists of sixteen (16) soil environmental samples and one (1) rinsate blank (PI-RO1-121295).

The samples were analyzed for Target Analyte List (TAL) metals and cyanide. The samples were collected by Tetra Tech NUS on December 13 and 14, 1995 and analyzed by Inchape Testing Service Environmental Laboratories. Metals analyses were conducted using ILM03.0 methodologies.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
  • Laboratory / Rinsate Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory / Rinsate Blank Analyses:

The following contaminants were found in the laboratory / rinsate blanks at the following maximum concentrations:

Samples affected: All

Analyte	Maximum Concentration	Action Level(soil)	Action Level(aqueous)
Beryllium[1]	0.56µg/L	0.56 mg/kg	NA
Cadmium[2]	0.091 mg/kg	0.455 mg/kg	NA
Copper [1]	6.0µg/L	6.0 mg/kg	NA
Iron	12.6µg/L	12.6 mg/kg	NA
Lead[2]	0.563 mg/kg	2.815 mg/kg	NA
Thallium	3.2µg/L	3.2 mg/kg	NA
Zinc[1]	4.1µg/L	4.1 mg/kg	NA

(1) Maximum concentration present in rinsate blank.
(2) Maximum concentration present in soil preparation blank.

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot, dilution factors and percent solids were taken in to consideration when evaluating for blank contamination. Positive results < the action level for beryllium, cadmium and copper were qualified, "U", as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects. It should be noted that field quality control samples are not qualified for field blank contamination.

Notes

The Contract Required Detection Limit (CRDL) Percent Recoveries (%Rs) for mercury and lead were outside the 80-120% quality control limit. However, no validation actions were required per regional guidance.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory blanks.

Other Factors Affecting Data Quality: Several analytes were present in the rinsate blank.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitles "Navy Installation Restoration Laboratory Quality Assurance Guide." (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Gretchen A Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Control Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

PITT-11-8-065

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-02-9-043

TO: D. BRAYACK

DATE: APRIL 13, 1999

FROM: DANA PIETO

CC: DV FILE
REVISION I

SUBJECT: ORGANIC DATA VALIDATION – TCL VOAs, SVOAs, & PEST/PCBs
CTO 084, MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG 55680

SAMPLES: Soils\VOC\SVOC\PEST\PCB:

PI-012-01(35)	PI-012-02(36)	PI-012-03(37)
PI-013-02(39)	PI-014-03(42)	PI-015A-01(43)
PI-015B-01(44)	PI-021-01(45)	PI-027-01(46)
PI-027-02(47)		

Waters\VOC:

PI-R03-121495 PI-T03-121495

Waters\SVOC\PEST\PCB:

PI-R03-121495

The sample set for the CTO 084, MCRD Parris Island, South Carolina, SDG 55680, consists of ten soil environmental samples, one rinse blank (designated R), and one trip blank (designated T). The environmental samples and the rinse blank were analyzed for Target Compound List (TCL) volatile, semivolatile, and pesticide/PCB organic compounds. The trip blank was analyzed for TCL volatile organic compounds only.

The samples were collected by Tetra Tech NUS on December 13 and 14, 1995, and analyzed by Inchcape Testing Services. The volatile, semivolatile, and pesticide/PCB compounds were analyzed under Naval Facilities Engineering Service Center (NFESC). All sample analyses were conducted using the Contract Laboratory Program (CLP) Statement of work (SOW) OLM03.0 analytical and reporting protocols.

The data were evaluated according to the following parameters:

* • Holding times

MEMO TO: D. BRAYACK
DATE: APRIL 13, 1999

*	•	Initial and continuing calibrations
	•	Laboratory and field blank analyses
*	•	Quantitative results

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data usability are discussed below.

Volatiles

All positive results reported at concentrations less than the Contract Required Quantitation Limit (CRQL) were qualified as estimated, (J).

The following volatile compounds were detected in the laboratory method and/or field quality control blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Aqueous Action Level	Soil Action Level
Acetone	3.0 µg/L	30 µg/L	---
Acetone	10 µg/kg	---	100 µg/kg
2-Butanone*	2.0 µg/L	---	20 µg/kg

*Maximum concentration found in the field quality control blank.

Samples Affected: All.

Sample aliquot, dilution factors, and percent solids were taken into consideration during the application of the action level. Positive results for acetone and 2-butanone reported at concentrations below the detection limit were replaced with revised detection limits and qualified as nondetects, (U). Positive results for acetone reported at concentrations above the detection limit were qualified as nondetects, (U). It should be noted that field quality control blanks are not qualified for field quality control blank contamination.

Semivolatiles

All positive results reported at concentrations less than the CRQL were qualified as estimated, (J).

The following semivolatile compounds were detected in the laboratory method blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Aqueous Action Level	Solid Action Level
Bis(2-ethylhexyl)phthalate	120 µg/kg	---	1200 µg/kg
Di-n-butylphthalate	80 µg/kg	---	800 µg/kg

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DATE: **APRIL 13, 1999**

Samples Affected: All

Sample aliquot, dilution factors, and percent solids were taken into consideration during the application of the action level. Positive results for bis(2-ethylhexyl)phthalate and di-n-butylphthalate reported at concentrations below the detection limit were replaced with the revised detection limits and qualified as nondetects, (U). Positive results for bis(2-ethylhexyl)phthalate and di-n-butylphthalate reported at concentrations above the detection limit were qualified as nondetects, (U).

It should be noted that for purposes of quantitation, it was not possible for the laboratory to chromatographically separate benzo[b] and benzo[k] fluoranthene in samples PI-012-03(37), PI-021-01(45), PI-027-01(46), and PI-027-02(47). Therefore, the analytical results are reported as benzo[b]fluoranthene.

Sample PI-012-01(35) was analyzed at a 3.3x dilution.

Sample PI-012-03(37) was analyzed at a 1.2x dilution.

Sample PI-014-03(42) was analyzed at a 10x dilution.

Pesticides

All positive results reported at concentrations less than the CRQL were qualified as estimated, (J).

The following pesticide/PCB compounds were detected in the laboratory method and/or instrument blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Solid Action Level
Endosulfan I[1]	0.092 µg/L	15.3 µg/kg
alpha-Chlordane[1]	0.084 µg/L	13.986 µg/kg
beta-BHC[1]	0.20 µg/L	33.3 µg/kg
Endosulfan II[1]	0.14 µg/L	23.31 µg/kg
Endosulfan sulfate[1]	0.071 µg/L	11.82 µg/kg
4,4'-DDE[1]	0.084 µg/L	13.986 µg/kg
Heptachlor epoxide[1]	0.046 µg/L	7.59 µg/kg
gamma-Chlordane[1]	0.097 µg/L	16.15 µg/kg
4,4'-DDD[1]	0.16 µg/L	26.64 µg/kg
Endrin aldehyde[1]	0.24 µg/L	39.96 µg/kg

[1]Maximum concentration found in the instrument blank.

Samples Affected: All

Sample aliquot, dilution factors, and percent solids were taken into consideration during the application of the action level. Positive results for Endosulfan I, alpha-Chlordane, beta-BHC, gamma-Chlordane, and 4,4'-DDD reported at concentrations below the detection limit were replaced

MEMO TO: D. BRAYACK
DATE: APRIL 13, 1999

with the revised detection limits and qualified as nondetects, (U). Positive results for Endosulfan I, alpha-Chlordane, beta-BHC, 4,4'-DDE, gamma-Chlordane, and 4,4'-DDD reported at concentrations above the detection limit were qualified as nondetects, (U).

The laboratory states that Aroclor 1262 was identified in the pesticide/PCB method blank, yet the results were reported as Aroclor 1260. No action is warranted for this noncompliance because the associated samples did not contain any positive results.

The surrogate percent recovery (%R) fell below 10% for tetrachloro-m-xylene and decachlorobiphenyl on both columns in sample PI-014-03(42). The sample was reanalyzed and the surrogates fell below the lower quality control limit, however they were greater than 10%, so the reanalysis was used for validation purposes. The reanalyzed sample was extracted outside of holding time, therefore, nondetected results were qualified as estimated, (UJ).

The identification summary percent difference (%D) between columns exceeded 100% for 4,4'-DDT and Dieldrin and exceeded the 25% quality control limit for Endrin in sample PI-012-01(35). Positive results for 4,4'-DDT and Dieldrin were rejected (R). Positive results for Endrin were qualified as estimated, (J).

The identification summary %D exceeded 100% for Heptachlor in sample PI-012-03(37). Positive results were rejected, (R).

Aroclor 1254 exceeded the linear calibration range of the instrument in sample PI-012-01-(35). This sample was diluted 50-fold and reanalyzed. The dilution result for this compound only was transposed over to the original sample results and used in validation of this SDG.

Sample PI-012-01(35) was analyzed at a 15x dilution.

Sample PI-027-01(46) was analyzed at a 10x dilution.

Executive Summary

Laboratory Performance: The pesticide surrogate %R fell below 10% for tetrachloro-m-xylene and decachlorobiphenyl on both columns in sample PI-014-03(42). The pesticide identification summary exceeded 100% for 4,4'-DDT, Dieldrin, and Heptachlor and exceeded the 25% quality control limit for Endrin. Acetone was detected in the volatile laboratory method blanks. Bis(2-ethylhexyl)phthalate and di-n-butylphthalate were detected in the semivolatile laboratory method blanks. Aroclor 1260 was detected in the pesticide/PCB laboratory method blanks. Endosulfan I, alpha-Chlordane, beta-BHC, Endosulfan II, Endosulfan sulfate, 4,4'-DDE, Heptachlor epoxide, gamma-Chlordane, 4,4'-DDD, and Endrin aldehyde were detected in the pesticide/PCB instrument blanks.

Other Factors Affecting Data Quality: 2-Butanone was detected in the volatile field quality control blanks.

MEMO TO: **D. BRAYACK**
DATE: **APRIL 13, 1999**

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Organic Data Evaluation" and the NFESC Interim Guidance Document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (February 1996).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Dana L. Pieto

Dana L. Pieto

Tetra Tech NUS
Data Validator

Joseph A. Samchuck

Tetra Tech NUS
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-01-9-181

TO:	D. BRAYACK	DATE:	MARCH 5, 1999
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE

SUBJECT: INORGANIC DATA VALIDATION – TAL METALS
CTO 009 - PARRIS ISLAND
SDG - 55680

SAMPLES: 10/Soils/

PI-012-01(35)	PI-012-02(36)	PI-012-03(37)
PI-013-02(39)	PI-014-03(42)	PI-015A-01(43)
PI-015B-01(44)	PI-021-01(45)	PI-027-01(46)
PI-027-02(47)		

1/Aqueous/

PI-R03-121495

Overview

The sample set for CTO 009, Parris Island, SDG 55680, consists of ten (10) soil environmental samples and one (1) rinsate blank (PI-R03-121495).

The samples were analyzed for Target Analyte List (TAL) metals and cyanide. The samples were collected by Tetra Tech NUS on December 13 and 14, 1995 and analyzed by Inchape Testing Service Environmental Laboratories. Metals analyses were conducted using ILM03.0 methodologies.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
  • Laboratory / Rinsate Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory / Rinsate Blank Analyses:

The following contaminants were found in the laboratory / rinsate blanks at the following maximum concentrations:

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitles "Navy Installation Restoration Laboratory Quality Assurance Guide." (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Control Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-11-9-086

TO:	D. BRAYACK	DATE:	NOVEMBER 19, 1999
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE

SUBJECT: **ORGANIC DATA VALIDATION – VOLATILES, SEMIVOLATILES, PESTICIDES/PCBS AND PAHS**
CTO 020 - MCRD PARRIS ISLAND
SDG – U10244

SAMPLES: 5/Soil/

PAI-02-SB-02A-02
PAI-02-SB-11-02
PAI-13C-SS-DU03-01
PAI-02-SB-10-07
PAI-13C-SS-03-01

3/Sediment/

PAI-05-SD-03-01
PAI-21-SD-DU02
PAI-21-SD-02-01

2/Aqueous/

TB-100599
TB-100699

Overview

The sample set for CTO 020, Parris Island, SDG U10244, consists of eight (8) soil/sediment environmental samples and two (2) rinsate blanks (TB-100599 and TB-100699). Two (2) field duplicate pairs (PAI-13C-SS-03-01 / PAI-13C-SS-DU03-01 and PAI-21-SD-02-01 / PAI-21-SD-DU02) were included within this SDG.

All samples, with exception to samples PAI-21-SD-02-01and PAI-21-SD-DU02 were analyzed for target compound list (TCL) volatile organics. All soil/sediment samples, with exception to sample PAI-21-SD-DU02, were analyzed for TCL semivolatile organics. All soil samples were analyzed for pesticides and PCBs. Samples PAI-21-SD-02-01 and PAI-21-SD-DU02 were analyzed for polynuclear aromatic hydrocarbons (PAHs). The samples were collected by Tetra Tech NUS on October 5 and 6, 1999 and analyzed by Severn Trent Laboratories Chicago. Volatile analyses were conducted using SW 846 method 8260B. Semivolatile analyses were conducted using SW 846 method 8270C. Pesticide analyses were conducted using SW 846 method 8081A. PCB analyses were conducted using SW 846 method 8082. PAH analyses were conducted using SW 846 method 8310.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
• Initial/Continuing Calibrations
• Laboratory Method / Field Quality Control Blanks
• Field Duplicate Results
* • Internal Standard Results
* • Detection Limits

* - All quality control criteria were met for this parameter.

Initial/Continuing Calibrations

The initial calibrations RRFs for acetone and 2-butanone affecting the soil/sediment samples were <0.05. The nondetected results reported for acetone and 2-butanone in the affected samples were qualified as rejected, "UR".

The initial calibrations RRFs for acetone, 2-butanone and 2-hexanone affecting the aqueous samples were <0.05. The nondetected results reported for acetone, 2-butanone and 2-hexanone were qualified as rejected, "UR".

Field Quality Control Blanks

1,2-Dichloroethene was present in TB-100599 at a concentration of 0.6µg/L. However, all results reported for 1,2-dichloroethene were nondetected. Therefore, no validation action was required.

Field Duplicate Results

Field duplicate imprecision (>50%) was noted for 4,4-DDT in field duplicate pair PAI-13C-SS-03-01 / PAI-13C-SS-DU03-01. The positive and nondetected results reported for 4,4-DDT in the affected duplicate pair were qualified as estimated, "J" and "UJ", respectively.

Field duplicate imprecision (>50%) was noted for acenaphthene, benzo(b)flouranthene and pyrene in field duplicate pair PAI-21-SD-02-01 / PAI-21-SD-DU02. The positive results reported for the above listed compounds in the affected duplicate pair were qualified as estimated, "J".

Notes

1,4-Dioxane was not requested for analysis. However, the laboratory reported 1,4-dioxane on the Form 1. It was removed from the electronic spreadsheets.

Several tentatively identified compounds (TICs) were reported with the semivolatile samples and blanks.

Pesticide analyses were conducted at a 10X dilution.

Methylene chloride was present in several samples. It was not detected in the blanks. The raw data for the blanks was reviewed and methylene chloride was not present. This compound was not qualified since it was not present in any method or field quality control blanks. However, it is suspected to be a laboratory contaminant.

The Percent Solids in sample PAI-05-SD-03-01 were <30%. Therefore, the reporting limits were elevated. The nondetected results reported for sample PAI-05-SD-03-01 were qualified as estimated, "UJ".

Samples 13C-SS-03-01 and 13-SS-DU03-01 were reanalyzed due to low internal standard recoveries. The reanalyses also had low internal standard recoveries. The original sample results were used for validation purposes for sample 13SS-DU03-01. The reanalyzed sample results were used for validation purposes for sample 13-SS-03-001 due to the presence of methylene chloride in the original sample results.

Positive results less than the contract required quanitation limits (CRQLs) were qualified as estimated, "J".

Executive Summary

Laboratory Performance: RRFs for acetone, 2-butanone and 2-hexanone were <0.05.

Other Factors Affecting Data Quality: Field duplicate imprecision was noted for several compounds.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Review", February 1994 and the NFESC document entitles "Navy Installation Restoration Laboratory Quality Assurance Guide." (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Gretchen A Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Control Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-11-09-072

TO:	**D. BRAYACK**	**DATE:**	**NOVEMBER 19, 1999**
FROM:	**JENNIFER MALLE**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION-TAL METALS AND TIN**
CTO 020 – MCRD PARRIS ISLAND
SDG – U10244

SAMPLES: 5/Soil/

PAI-02-SB-02A-02 PAI-02-SB-10-07 PAI-02-SB-11-02
PAI-13C-SS-03-01 PAI-13C-SS-DU03-01

2/Sediment/

PAI-05-SD-03-01 PAI-21-SD-02-01

Overview

The sample set for CTO 020, MCRD Parris Island, SDG U10244 consists of five (5) soil environmental samples and two (2) sediment environmental samples. One (1) field duplicate pair (PAI-13C-SS-03-01/PAI-13C-SS-DU03-01) was included within this SDG.

All samples were analyzed for Target Analyte List (TAL) metals. In addition to TAL metals, samples PAI-13C-SS-03-01 and PAI-13C-SS-DU03-01were analyzed for tin. The samples were collected by Tetra Tech NUS on October 5-6, 1999 and analyzed by Severn Trent Laboratories under Naval Facilities Engineering Service Center (NFESC) Interim Guidance Document, "Navy Installation Restoration Laboratory Quality Assurance Guide" (February 1996). All metal, with the exception to mercury, and tin analyses were conducted under SW846 method 6010B. Mercury analyses were conducted under SW846 method 7471.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Initial and Continuing Calibration Recoveries
• Laboratory Blank Analysis
• Field Duplicate Imprecision
* • Sample Quanitation
* • Detection Limits

* - All quality control criteria were met for this parameter.

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Affected samples : All

Analyte	Maximum Concentration	Action Level (soil)
Barium	0.5 ug/L	0.25 mg/kg
Beryllium	2.1 ug/L	1.05 mg/kg
Cadmium	0.5 ug/L	0.25 mg/kg
Calcium	90.9 ug/L	45.45 mg/kg
Iron (1)	4:81 mg/kg	24.1 mg/kg
Magnesium	83.5 ug/L	41.75 mg/kg
Manganese	7.7 ug/L	3.85 mg/kg
Tin (1)	1.05 mg/kg	5.27 mg/kg
Vanadium	7.7 ug/L	3.85 mg/kg
Zinc (1)	0.20 mg/kg	1.0 mg/kg

(1) -Maximum concentration present in a soil preparation blank

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors were taken into consideration in evaluation for blank contamination. Positive results less than the action level for beryllium, calcium, magnesium, manganese, tin and vanadium were qualified as estimated, "U". No validation action was required for the remaining analytes as all of the results reported were greater than the blank action level.

The percent solids in sample PAI-05-SD-03-01 was less than 30%. Positive and nondetected results reported in this sample have been qualified as estimated, "J", and "UJ".

Notes

Several nondetected results were reported as positive on the Electronic Deliverable Data (EDD) for antimony, arsenic, cobalt, nickel, selenium and thallium. The Form 1's correctly reported these analytes as nondetects while the EDD reports these analytes as positive results. The EDD was corrected by the data reviewer to agree with the Form 1's.

The Contract Required Detection Limits (CRDL) Percent Recoveries (%Rs) were less than 80% for iron and sodium. However, no action was required.

The Contract Required Detection Limits (CRDL) Percent Recovery (%R) was greater than 120% for thallium. However, no action was required.

Executive Summary

Laboratory Performance: Several laboratory contaminants were present in the laboratory / preparation blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide " (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Jennifer Malle

Tetra Tech NUS
Jennifer Malle
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-02-0-070

TO: DAVE BRAYACK **DATE:** FEBRUARY 21, 2000

FROM: JUSTIN ORBICH **COPIES:** DV FILE

SUBJECT: ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB/OPEST/HERB
CTO 084, MCRD PARRIS ISLAND
SDG 9912253

SAMPLES: 6/Aqueous

PAI-04-GW-01-01*	PAI-07-GW-04-01*
PAI-07-GW-DU04-01*	PAI-09-GW-01-01
PAI-13C-GW-01-01	TB-121499

OVERVIEW

The sample set for CTO 084, SDG 9912253, Marine Corps Recruit Depot (MCRD) Parris Island consists of six (6) aqueous environmental samples. The samples were analyzed for Target Compound List (TCL) plus Appendix IX volatile, semivolatile, pesticide/PCB, organophosphorous pesticide, and herbicide organic compounds. The samples designated (*) were analyzed for semivolatile, pesticide, herbicide, and organophosphorous pesticide organic compounds. One (1) field duplicate pair (PAI-07-GW-04-01/PAI-07-GW-DU04-01) was included within this SDG.

The samples were collected on December 14th and 16th, 1999 and analyzed by Laucks Testing Laboratories. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria and SW 846 Method 8260B, 8270C, 8081A, 8082, and 8151A. The data in this SDG was validated with regard to the following parameters:

- Data completeness
- Holding times
- Initial/continuing calibrations
- * Laboratory method and field quality control blank results
- Surrogate spike recoveries
- Matrix Spike/Matrix Spike Duplicate Results
- Laboratory Control Sample Results
- Field Duplicate Precision
- * Compound Identification
- * Compound Quantitation
- * Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

VOLATILE FRACTION

The initial calibration Relative Response Factors (RRFs) were below the 0.05 quality control limits for acrolein, acetone, acetonitrile, acrylonitrile, 2-butanone, isobutanol, propionitrile, methacrylonitrile, and 2-hexanone. The nondetected results were qualified as rejected (UR), in all samples.

The continuing calibration RRFs were below the 0.05 quality control limits for vinyl acetate, 4-methyl-2-pentanone, trans-1,4-dichloro-2-butene, acrolein, acetone, acetonitrile, acrylonitrile, 2-butanone, isobutanol, propionitrile, methacrylonitrile, and 2-hexanone on 12/20/99 at 2005. The nondetected results were qualified as rejected (UR), in all samples.

The continuing calibration Percent Differences (%Ds) exceeded the 25% quality control limits for trichlorofluoromethane, carbon disulfide, and 2-chloro-1,3-butadiene on 12/20/99 at 2005. The nondetected results were qualified as estimated (UJ), in all samples.

The Matrix Spike/Matrix Spike Duplicate (MS/MSD) Percent Recoveries (%Rs) were below the quality control limits for carbon disulfide, cis-1,3-dichloropropene, and trans-1,3-dichloropropene. No action is taken on MS/MSD data alone.

The Blank Spike/Blank Spike Duplicate (BS/BSD) %R was below the quality control limit for several compounds. Several Relative Percent Differences (RPDs) exceeded the quality limits. No action is warranted on BS/BSD data alone.

SEMIVOLATILE FRACTION

The initial calibration RRF was below the 0.05 quality control limits for pentachloronitrobenzene and 4-nitroquinoline-1-oxide on 12/16/99. The nondetected results were qualified as rejected (UR), in samples PAI-04-GW-01-01, PAI-07-GW-04-01, and PAI-07-GW-DU04-01.

The continuing calibration %Ds were below the 25% quality control limits for pyridine, 2-chlorophenol, 3-nitroaniline, 1,4-dioxane, N-nitrosomethylethylamine, safrole, 1,4-naphthoquinone, and hexachlorophene on 12/30/99 at 1030. The nondetected results were qualified as estimated (UJ), in samples PAI-04-GW-01-01, PAI-07-GW-04-01, and PAI-07-GW-DU04-01.

The Blank Spike/Blank Spike Duplicate (BS/BSD) %R was below ten percent for benzidine. The nondetected results were qualified as rejected (UR), in samples PAI-04-GW-01-01, PAI-07-GW-04-01, and PAI-07-GW-DU04-01.

The Blank Spike/Blank Spike Duplicate (BS/BSD) %R was below the quality control limit for several compounds. No action is warranted on BS/BSD data alone.

The Tentatively Identified Compounds (TIC), Unknown cyclohexene, was detected in the semivolatile method blank. The presence of this TIC should be considered a false positive.

It should be noted that the laboratory failed to provide the Appendix IX organic compounds on the Form Is. The laboratory was notified and in return provided the Form Is with the Appendix IX compounds.

PESTICIDE/PCB FRACTION

The continuing calibration %Ds exceeded the 15% quality control limits for alpha-BHC and gamma-BHC at 1548 on both columns. The nondetected results were qualified as estimated (UJ), in samples PAI-04-GW-01-01, PAI-07-GW-04-01, and PAI-07-GW-DU04-01.

The continuing calibration %Ds exceeded the 15% quality control limits for beta-BHC on 12/22/99 at 1621 on both columns. The nondetected results were qualified as estimated (UJ), in samples PAI-04-GW-01-01, PAI-07-GW-04-01, and PAI-07-GW-DU04-01.

The continuing calibration %Ds exceeded the 15% quality control limits for Methoxychlor on 12/23/99 at 0007 on both columns. The nondetected results were qualified as estimated (UJ), in samples PAI-04-GW-01-01, PAI-07-GW-04-01, and PAI-07-GW-DU04-01.

The initial calibration Percent Relative Standard Deviations (%RSD) exceeded the 20% quality control limits for Atrazine and Kepone on 12/9/99 on column RTX-35. No action was warranted since only nondetected results reported and that the %RSDs did not exceed the 20% quality control limits on column ZB-5.

The continuing calibration %D exceeded the 15% quality control limit for Kepone on 12/22/99 at 1801 on column ZB-5. Kepone coeluted with another pesticide on column RTX-35, therefore, the nondetected results were qualified as estimated (UJ).

The continuing calibration %D exceeded the 15% quality control limit for beta-BHC on 12/23/99 at 0040 on column ZB-5. No action was warranted since only nondetected results were reported and that the %D did not exceed the 15% quality control limit on column RTX-35.

The continuing calibration %D exceeded the 15% quality control limit for Endrin on 12/22/99 at 0007 on column RTX-35. No action was warranted since only nondetected results reported and that the %D did not exceed the 20% quality control limit on column ZB-5.

ORGANOPHOSPHOROUS PESTICIDE FRACTION

Several MS/MSD RPDs exceeded the quality control limits. No action was taken on MS/MSD data alone.

HERBICIDE FRACTION

The MS/MSD %Rs exceeded the upper quality control limits for 2,4-D and 2,4,5-TP (Silvex). No action was warranted on MS/MSD data alone.

The surrogate %Rs exceeded the upper quality control limit for DCAA in samples PAI-04-GW-01-01, PAI-07-GW-04-01, and PAI-07-GW-DU04-01. No action was warranted since only nondetected results were reported.

Sample PAI-07-GW-DU04-01 was analyzed at a 10X dilution thus causing elevated reporting limits.

MEMO TO: **DAVE BRAYACK**
DATE: **FEBRUARY 21, 2000 – PAGE 4**

EXECUTIVE SUMMARY

Laboratory Performance Issues: Several initial and continuing calibration RRFs were below the quality control limits in the volatile and semivolatile fractions. Several continuing calibration %Ds exceeded the quality control limits in all the fractions. In the pesticide/PCB fraction, samples PAI-07-GW-04-01 and PAI-07-GW-04-01-D were extracted eight days past the collection date. The laboratory failed to provided the extended list of Appendix IX semivolatile compounds on the Form Is.

Other Issues Affecting Data Quality: Several MS/MSD and BS/BSD %Rs and RPDs were outside the quality control limits in all the fractions. In the semivolatile fraction, the TIC, unknown cycloalkane, was detected in the method blank. In herbicide fraction, the surrogate %R for DCAA exceeded the quality control limits.

The data for these analysis were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", February, 1994.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP).

Tetra Tech, NUS

Justin Orbich
Chemist/Data Validator

Tetra Tech, NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

MEMO TO: DAVE BRAYACK
DATE: FEBRUARY 21, 2000 – PAGE 5

TENTATIVELY IDENTIFIED COMPOUNDS (TICS)

Fraction	TIC
Volatiles	Substituted benzene Naphthalene Substituted naphthalene
Semivolatile	Unknown Unknown phthalate Unknown alkylbenzene Tetrahydro-naphthalene Isomer Naphthalene, 1-methyl- Dimethyl benzoic acid isomer Dimethyl-naphthalene isomer Trimethyl benzoic acid isomer Unknown acid Sulfur Substituted indene Benzoic acid ester

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**FEBRUARY 21, 2000**
FROM:	**GRETCHEN A. PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS, TIN, CYANIDE AND TDS**
CTO 084 – MCRD PARRIS ISLAND
SDG – 9912253

SAMPLES: 5/Aqueous/

PAI-04-GW-01-01
PAI-07-GW-DU04-01
PAI-13C-GW-01-01
PAI-07-GW-04-01
PAI-09-GW-01-01

Overview

The sample set for CTO 084, MCRD Parris Island, SDG 9912253, consists of five (5) aqueous environmental samples. One (1) field duplicate pair (PAI-07-GW-04-01 / PAI-07-GW-DU04-01) was included within this SDG.

All samples were analyzed for target analyte list (TAL) metals, cyanide and tin. Sample PAI-13C-GW-01-01 was also analyzed for total dissolved solids (TDS). The samples were collected by TetraTech NUS on December 14 and 16, 1998 and analyzed by Severn Trent Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All metals analyses, with the exception of mercury, were conducted using SW 846 method 6010B. Mercury analyses were conducted using SW 846 method 7071A. Cyanide analyses were conducted using SW 846 method 9010B. TDS analyses were conducted using WPA method 160.1.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
• Calibration Recoveries
• Laboratory Blank Analyses
• Field Duplicate Results
* • Laboratory Control Sample Results
• ICP Interference Check Sample Results
* • Sample Quanitation
* • Detection Limits

* - All quality control criteria were met for this parameter.

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Samples affected: All

Analyte	Maximum Concentration	Action Level
Aluminum	58.4µg/L	292µg/L
Barium[1]	1.800µg/L	9.0µg/L
Calcium[1]	112.100µg/L	560.5µg/L
Cobalt	1.1µg/L	5.5µg/L
Copper[1]	2.800µg/L	14.0µg/L
Iron[1]	268.400µg/L	1342µg/L
Lead	3.6µg/L	18.0µg/L
Magnesium	40.6µg/L	203µg/L
Manganese	4.8µg/L	24.0µg/L
Sodium[1]	512.700µg/L	2563.5µg/L
Vanadium	5.1µg/L	25.5µg/L
Zinc[1]	25.800µg/L	129µg/L

[1] Maximum concentration present in an aqueous preparation blank.

An action level of 5X the maximum concentration were used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into consideration when evaluation for blank contamination. Positive results < the action levels for copper, iron, lead, cobalt, manganese, sodium, vanadium and zinc were qualified as, "U", as a result of blank contamination. No action was taken for the remaining analytes as all results were either greater than the action levels or were nondetected.

ICP Interference Check Sample Results

The interfering analytes calcium and magnesium were present in sample PAI-13C-GW-01-01 at concentrations which were comparable to the levels of calcium and magnesium in the Interference Check Sample (ICS) solution. Several analytes namely antimony, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, potassium, tin and zinc were present in the ICS solution at concentration which exceeded the Instrument Detection Limit (IDL). Interference affects exist for beryllium, cadmium, chromium, lead and nickel in the affected sample. The positive results reported for beryllium, cadmium, chromium and nickel were qualified as estimated, "J". The nondetected result reported for lead was qualified as estimated, "UJ".

Field Duplicate Results

Field Duplicate imprecision (>50%) was noted for aluminum. The positive results reported for aluminum were qualified as estimated, "J".

Notes

A comparison of field duplicate pair (PAI-07-GW-04-01 / PAI-07-GW-DU04-01) is included in Appendix C.

The Contract Required Detection Limit (CRDL) Percent Recoveries (%Rs) for chromium, iron, lead and potassium were outside the 80-120% quality control limit. However, no validation action is required.

The Matrix Spike / Matrix Spike Duplicate Samples, Laboratory Duplicate Sample and ICP Serial Dilution Sample were not analyzed for this SDG.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: The interfering analytes calcium and magnesium were present in sample PAI-13C-GW-01-01. Field duplicate imprecision was noted for aluminum.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide " (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps
Chemist

TetraTech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-02-0-071

TO: DAVE BRAYACK **DATE:** FEBRUARY 28, 2000

FROM: JUSTIN ORBICH **COPIES:** DV FILE

SUBJECT: ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB
CTO 084, MCRD PARRIS ISLAND
SDG 9912254

SAMPLES: 2/Soil and 2/Sediment

PAI-07-SB-01-04
PAI-10-SD-19-01
PAI-07-SB-DU01-04
PAI-10-SD-20-01

6/Aqueous

PAI-09-GW-02-01
PAI-7-GW2-02
TB-121399
PAI-13C-GW-02-01
PAI-7-GW3-02
TB-121799

OVERVIEW

The sample set for CTO 084, SDG 9912254, Marine Corps Recruit Depot (MCRD) Parris Island consists of six (6) aqueous environmental samples, which includes two (2) trip blanks (designated TB) and two (2) soil and sediment environmental samples. The aqueous samples were analyzed for Target Compound List (TCL) volatile organic compounds. The soil and sediment samples were analyzed for TCL volatile, semivolatile, pesticide/PCB organic compounds. The sediment samples were analyzed for PAH organic compounds. One (1) field duplicate pair (PAI-07-SB-01-04/PAI-07-SB-DU01-04) was included within this SDG.

The samples were collected on December 13th, 14th, 15th and, 17th, 1999 and analyzed by Laucks Testing Laboratories. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria and SW 846 Method 8260B, 8270C, 8310 8081A, and 8082. The data in this SDG was validated with regard to the following parameters:

* • Data completeness
* • Holding times
• Initial/continuing calibrations
• Laboratory method and field quality control blank results
* • Surrogate spike recoveries
• Matrix Spike/Matrix Spike Duplicate Results
• Laboratory Control Sample Results
• Internal Standard area Results
* • Field Duplicate Precision
* • Compound Identification
* • Compound Quantitation
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

VOLATILE FRACTION

The initial calibration Relative Response Factors (RRFs) were below the 0.05 quality control limits for acetone, 2-butanone, and 2-hexanone on 9/22/99. The nondetected results were qualified as rejected (UR), in samples TB-121799 and PAI-13C-GW-02-01.

The continuing calibration RRFs were below the 0.05 quality control limits for acetone, 2-butanone, 2-hexanone, and 4-methyl-2-pentanone on 12/29/99 at 0854. The nondetected results were qualified as rejected (UR), in samples TB-121799 and PAI-13C-GW-02-01.

The continuing calibration Percent Difference (%D) exceeded the 25% quality control limits for carbon disulfide on 12/29/99 at 0854. The nondetected results were qualified as estimated (UJ), in samples TB-121799 and PAI-13C-GW-02-01.

The initial calibration Relative Response Factor (RRF) was below the 0.05 quality control limits for acetone on 12/1/99. No action was warranted since acetone was qualified for prior blank contamination.

The continuing calibration Percent Difference (%D) exceeded the 25% quality control limits for 4-methyl-2-pentanone on 12/16/99 at 1028. The nondetected results were qualified as estimated (UJ), in samples PAI-07-SB-01-04 and PAI-07-SB-DU01-04.

The initial and continuing calibration Relative Response Factors (RRFs) were below the 0.05 quality control limits for acetone and 2-butanone. The nondetected results were qualified as rejected (UR), in samples PAI7-GW3-02, PAI7-GW2-02, PAI-09-GW-02-01, and TB-121399.

The continuing calibration RRFs were below the 0.05 quality control limits for acetone, 2-butanone, and 2-hexanone on 12/18/99 at 1905. The nondetected results were qualified as rejected (UR), in sample PAI-7-GW2-02.

The following compounds were detected in the laboratory and field quality control method blanks at the maximum concentrations indicated below:

Compound	Concentration	Soil Action
Acetone	6.0 µg/kg	60.0 µg/kg

Blank Actions

- Value < Reporting Limit (RL); report RL followed by a U.
- Value > RL and < Action level; report value followed by a U.
- Value > RL and > action level; report value unqualified.

Dilution factors, percent moisture, and sample aliquots were taken into consideration during the application of all action levels. Positive results for acetone were qualified as (U) as a result of blank contamination. It should be noted that field quality control blanks are not qualified based on lab method blank contamination.

Several Matrix Spike/Matrix Spike Duplicate (MS/MSD) and Blank Spike/Blank Spike Duplicate (BS/BSD) Percent Recoveries (%Rs) and Relative Percent Differences (RPDs) were outside the quality control limits. No action was warranted on MS/MSD and/or BS/BSD data alone.

The internal standard area fell below the lower control limit for 1,4-dichlorobenzene-d4 in samples PAI-07-SB-01-04 and PAI-07-SB-DU01-04. The samples were reanalyzed with similar results. Therefore, the original analysis were used for validation purposes. No action was warranted since only nondetected results were reported.

It should be noted that the laboratory analyzed for and reported the full TCL volatile compound list plus the additional appendix IX volatile compounds. However, the Chain of Custody (COC) requested only the TCL volatile compounds. The reviewer amended the electronic data to report only the TCL volatile compounds.

SEMIVOLATILE FRACTION

The continuing calibration %Ds were below the 25% quality control limits for 3-nitroaniline on 12/17/99 at 1059. The nondetected results were qualified as estimated (UJ), in samples PAI-07-SB-01-04 and PAI-07-SB-DU01-04.

The continuing calibration %Ds were below the 25% quality control limits for 2-chlorophenol, 3-nitroaniline, and 1,4-dioxane on 12/30/99 at 1030. The nondetected results were qualified as estimated (UJ), in samples PAI-10-SD-19-01 and PAI-10-SD-20-01.

The Tentatively Identified Compounds (TICs), unknown alkane, unknown ketone, unknown, and hexadecanoic acid, were detected in the semivolatile method blank. The presence of these TICs are considered false positives.

The internal standard area exceeded the upper control limits for acenaphthene-d10, phenanthrene-d10, chrysene-d12, and perylene-d12 in the Matrix Spike sample, PAI-07-SB-01-04 and blank spike. No action was warranted since the samples were quality control samples.

The MS/MSD and BS/BSD %Rs were below ten percent for benzidine. The nondetected results were qualified as rejected (UR), in samples PAI-07-SB-01-04, PAI-07-SB-DU01-04, PAI-10-SD-19-01, and PAI-10-SD-20-01.

PAH FRACTION

The PAHs reported from the 8270C analysis of sediment samples were removed from the validated SVOCs since these compounds were reported from the 8310 analysis. The 8310 analysis provided lower reporting limits.

PESTICIDE/PCB FRACTION

The continuing calibration %Ds exceeded the 15% quality control limits for 4,4'-DDT and Methoxychlor on 12/28/99 on both columns. The nondetected results were qualified as estimated (UJ), in samples PAI-10-SD-19-01 and PAI-10-SD-20-01.

The continuing calibration %D exceeded the 15% quality control limit for AROCLOR-1016 on 12/28/99 at 0054 on column ZB-5. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column ZB-35.

The continuing calibration %Ds exceeded the 15% quality control limits for AROCLOR-1016 and AROCLOR-1260 on 12/28/99 at 0542 on column ZB-5. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column ZB-35.

The continuing calibration %D exceeded the 15% quality control limit for 4,4'-DDT on 12/21/99 at 1810 on column DB-5. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column ZB-35.

The continuing calibration %D exceeded the 15% quality control limit for Heptachlor, Endosulfan I, 4,4'-DDT, and Methoxychlor on 12/27/99 at 1720 on column DB-5. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column ZB-35.

The continuing calibration %D exceeded the 15% quality control limit for Heptachlor epoxide, Endosulfan sulfate, and alpha-Chlordane on 12/27/99 at 1755 on column DB-5. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column ZB-35.

The continuing calibration %D exceeded the 15% quality control limit for Endrin aldehyde on 12/21/99 at 0408 on column DB-35. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column DB-5.

The MS/MSD %R exceeded the quality control limit for 4,4'-DDE. No action was warranted on MS/MSD data alone.

NOTE

It should be noted that the sample identification numbers on the COCs were incorrect for samples PAI-07-GW3-02 and PAI-07-GW2-02.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Several initial and continuing calibration RRFs were below the quality control limits in the volatile and semivolatile fractions. Several continuing calibration %Ds exceeded the quality control limits in all the fractions. Acetone was detected as a blank contaminant.

Other Issues Affecting Data Quality: Several MS/MSD and BS/BSD %Rs and RPDs were outside the quality control limits in all the fractions. In the semivolatile fraction, Several TICs were detected in the method blank. The internal standard area exceeded the upper control limits in the volatile and semivolatile fractions.

MEMO TO: DAVE BRAYACK
DATE: FEBRUARY 28, 2000 – PAGE 5

The data for these analysis were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", February, 1994.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP).

Tetra Tech, NUS

Justin Orbich
Chemist/Data Validator

Tetra Tech, NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS

INTERNAL CORRESPONDENCE

TO:	**D. BRAYACK**	**DATE:**	**FEBRUARY 21, 2000**
FROM:	**GRETCHEN A. PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS, TIN, CYANIDE AND MISCELLANEOUS PARAMETERS**
CTO 084 – MCRD PARRIS ISLAND
SDG – 9912254

SAMPLES: 5/Soils/

PAI-07-SB-01-04	PAI-07-SB-DU01-04
PAI-35-SS-04-01	PAI-35-SS-05-01
PAI-35-SS-06-01	

2/Sediments/

PAI-10-SD-19-01	PAI-10-SD-20-01

6/Aqueous/

DECON WATER	PAI-09-GW-02-01
PAI-13C-GW-02-01	PAI-35-GW-01-01
PAI7-GW2-02	PAI7-GW3-02

Overview

The sample set for CTO 084, MCRD Parris Island, SDG 9912254, consists of five (5) soil environmental samples, two (2) sediment environmental samples, five (5) aqueous environmental samples and one (1) DECON WATER sample. One (1) field duplicate pair (PAI-07-SB-01-04 / PAI-07-SB-DU01-04) was included within this SDG.

All soil / sediment samples were analyzed for target analyte list (TAL) metals. The sediment samples and samples PAI-35-SS-04-01, PAI-35-SS-05-01 and PAI-35-SS-06-01 were also analyzed for cyanide. The soil samples were also analyzed for tin. The aqueous environmental samples were analyzed for TAL metals and cyanide. Samples PAI-13C-GW-02-01 and PAI-35-GW-01-01 were also analyzed for tin. The DECON WATER sample was analyzed for cyanide, chemical oxygen demand (COD), oil and grease, sulfide and total dissolved solids (TDS). Sample PAI-35-GW-01-01 was also analyzed for TDS. The samples were collected by TetraTech NUS on December 13-17, 1998 and analyzed by Severn Trent Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All metals analyses, with the exception of mercury, were conducted using SW 846 method 6010B. Mercury analyses were conducted using SW 846 method 7071A. Cyanide analyses were conducted using SW 846 method 9010B. COD analyses were conducted using EPA method 410.1. Oil and grease analyses were conducted using EPA method 413.1. Sulfide analyses were conducted using EPA method 376. TDS analyses were conducted using WPA method 160.1.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
  • Calibration Recoveries
  • Laboratory Blank Analyses
* • Laboratory / Field Duplicate Results
* • Laboratory Control Sample Results
* • ICP Interference Check Sample Results
  • Matrix Spike / Matrix Spike Duplicate Recoveries
  • ICP Serial Dilution Results
* • Sample Quanitation
* • Detection Limits

* - All quality control criteria were met for this parameter.

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Samples affected: Soil/Sediment

Analyte	Maximum Concentration	Action Level
Aluminum	51.8µg/L	25.9 mg/kg
Barium	4.8µg/L	2.4 mg/kg
Beryllium	1.5µg/L	0.75 mg/kg
Cadmium	3.4µg/L	1.7 mg/kg
Calcium	39.0µg/L	19.5 mg/kg
Chromium	5.2µg/L	2.6 mg/kg
Cobalt	5.5µg/L	2.75 mg/kg
Copper	3.0µg/L	1.5 mg/kg
Iron	29.1µg/L	14.55 mg/kg
Manganese	3.8µg/L	1.9 mg/kg
Thallium	102.3µg/L	51.15 mg/kg
Vanadium	3.7µg/L	1.85 mg/kg

An action level of 5X the maximum concentration were used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors were taken into consideration when evaluation for blank contamination. Positive results < the action levels for beryllium, cadmium, cobalt, copper and thallium were qualified as, "U", as a result of blank contamination. No action was taken for the remaining analytes as all results were either greater than the action levels or were nondetected.

Samples affected: Aqueous

Analyte	Maximum Concentration	Action Level
Aluminum	242.8µg/L	1214 µg/L
Barium	2.4µg/L	12.0 µg/L
Beryllium	1.9µg/L	9.5 µg/L
Cadmium	2.4µg/L	12.0 µg/L
Calcium	117.9µg/L	589.5 µg/L
Chromium	4.7µg/L	23.5 µg/L

Cobalt	2.3µg/L	11.5 µg/L
Copper[1]	2.800µg/L	14.0 µg/L
Iron[1]	268.400µg/L	1342 µg/L
Lead	3.6µg/L	18.0 µg/L
Magnesium	116.0µg/L	580 µg/L
Manganese	24.0µg/L	120 µg/L
Nickel	2.7µg/L	13.5 µg/L
Potassium	176.6µg/L	883 µg/L
Silver	2.6µg/L	13.0 µg/L
Sodium[1]	512.700µg/L	2563.5 µg/L
Thallium	6.3µg/L	31.5 µg/L
Vanadium	23.6µg/L	118 µg/L
Zinc[1]	25.800µg/L	129 µg/L
Tin	4.4µg/L	22.0 µg/L

[1] Maximum concentration present in an aqueous preparation blank.

An action level of 5X the maximum concentration were used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into consideration when evaluation for blank contamination. Positive results < the action levels for aluminum, barium, beryllium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, sodium, vanadium and zinc were qualified as, "U", as a result of blank contamination. No action was taken for the remaining analytes as all results were either greater than the action levels or were nondetected.

Matrix Spike / Matrix Spike Duplicate Recoveries

The Matrix Spike / Matrix Spike Duplicate (MS/MSD) Percent Recoveries (%Rs) for antimony affecting the soil / sediment samples were <75% quality control limit. The nondetected results reported for antimony in the affected samples were qualified as estimated, "UJ".

The MS/MDS %Rs for sulfide were >125% quality control limit. The positive result reported for sulfide was qualified as estimated, "J".

ICP Serial Dilution Results

The ICP Serial Dilution Percent Differences (%Ds) for barium, magnesium and manganese affecting the soil/sediment samples were >10% quality control limit. The positive results reported for barium, magnesium and manganese in the affected samples were qualified as estimated, "J".

The ICP Serial Dilution %D for manganese affecting the aqueous samples was >10% quality control limit. The positive results reported for manganese in the affected samples were qualified as estimated, "J"

Notes

A comparison of field duplicate pair (PAI-07-SB-01-04 / PAI-07-SB-DU01-04) is included in Appendix C.

A Continuing Calibration Verification (CCV) Percent Recovery (%R) for sodium was >110% quality control limit. However, no samples from this SDG were bracketed. Therefore, no validaiton action was required.

The Contract Required Detection Limit (CRDL) Percent Recoveries (%Rs) for chromium, mercury, lead, iron and aluminum were outside the 80-120% quality control limit. However, no validation action is required.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: The MS/MSD %R for antimony was <75% quality control limit affecting the soil/sediment samples. The MS/MSD %R for sulfide was >125% quality control limit. The ICP Serial Dilution %Ds for barium, magnesium and manganese affecting the soil/sediment samples were >10% quality control limit. The %D for manganese affecting the aqueous samples was >10% quality control limit.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide " (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps
Chemist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-10-8-70

TO:	**DAVE BRAYACK**	**DATE:**	**NOVEMBER 6, 2000**
FROM:	**JUSTIN ORBICH**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION - VOA/SVOA/PEST/PCB/OPEST/HERB**
CTO 084 – MCRD PARRIS ISLAND
SDG U08494

SAMPLES 2/Aqueous

PAI-04-MW-02-01 TB-082300

OVERVIEW

The sample set for CTO 084, SDG U08494, MCRD Parris Island consists of two (2) aqueous environmental samples, which includes one (1) trip blank (TB). The environmental samples were analyzed for Appendix IX volatile, semivolatile, pesticides/PCB, organophosphorous pesticide, and herbicide organic compounds. The trip blank was analyzed for Appendix IX volatile organic compounds only. No field duplicated pairs were included within this SDG.

The samples were collected by Tetra Tech, NUS on August 23rd, 2000 and analyzed by STL-Chicago. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The volatiles, semivolatiles, pesticide/PCB, and PAHs were analyzed according to SW846 Methods 8260B, 8270C, 8081A, 8082, and 8151A. The data in this SDG were validated with regard to the following parameters:

- * Data Completeness
- * Holding Times
- Initial/continuing calibrations
- * Laboratory method/field quality control blank results
- * Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

VOLATILE FRACTION

The initial and continuing calibration Relative Response Factors (RRFs) were below the quality control parameters for 2-butanone, 2-hexanone, acetone, acetonitrile, acrolein, acrylonitrile, isobutanol, methacrylonitrile, propionitrile, and trans-1,4-dichloro-2-butene. The nondetected results were qualified as rejected, (UR).

It should be noted that methylene chloride was detected as a field quality control blank contaminant. However, field quality control blanks are not used to establish a blank action level.

SEMIVOLATILE FRACTION

The initial and continuing calibration Relative Response Factors (RRFs) were below the 0.05 quality control standards for 1,2,4,5-tetrachlorobenzene and pentachloronitrobenzene. The nondetected results were qualified as rejected, (UR).

PESTICIDE/PCB FRACTION

All data quality parameters were met for this fraction.

ORGANOPHOSPHOROUS PESTICIDE FRACTION

All data quality parameters were met for this fraction.

HERBICIDE FRACTION

All data quality parameters were met for this fraction.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Several initial and continuing RRFs were below the quality control limits in the volatile and semivolatile fractions.

Other Issues Affecting Data Quality: None

MEMO TO: DAVE BRAYACK
DATE: NOVEMBER 6, 2000- PAGE 3

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (October 1999) and the NFESC guidelines "Navy IRCDQM" (September 1999). The text of this report has been formulated to address only those problems affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Justin Orbich

Chemist/Data Validator
Tetra Tech, NUS

Joseph A. Samchuck

Data Validation Quality Assurance Officer
Tetra Tech, NUS

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**OCTOBER 18, 2000**
FROM:	**JENNIFER MALLE**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION-TAL METALS AND CYANIDE**
CTO 084 – MCRD PARRIS ISLAND
SDG – U08494

SAMPLES: 1/Aqueous/

PAI-04-MW-02-01

Overview

The sample set for CTO 084, MCRD Parris Island, SDG U08494 consists of one (1) aqueous environmental sample.

The sample was analyzed for Target Analyte List (TAL) metals and cyanide. The sample was collected by Tetra Tech NUS on August 23, 2000 and analyzed by Severn Trent Laboratories under Naval Facilities Engineering Service Center (NFESC) Interim Guidance Document, "Navy Installation Restoration Chemical Data Quality Manual" (September 1999). All metals, with the exception to arsenic, lead, selenium, thallium and mercury, were conducted using SW846 method 6010B. Arsenic, lead, selenium and thallium were conducting using graphite furnace method SW846 7841. Mercury analyses were conducted under SW846 method 7471. Cyanide analyses were conducted using SW846 method 9010B.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Initial and Continuing Calibration Recoveries
• Laboratory Blank Analysis
* • Sample Quanitation
* • Detection Limits

* - All quality control criteria were met for this parameter.

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Affected samples : All

Analyte	Maximum Concentration	Action Level (aqueous)
Aluminum	82.2 ug/L	411 ug/L
Beryllium	0.7 ug/L	3.5 ug/L
Calcium	105.9 ug/L	529.5 ug/L
Chromium	0.80 ug/L	4.0 ug/L
Iron	43.8 ug/L	219 ug/L
Magnesium	90.5 ug/L	452.5 ug/L
Manganese	3.1 ug/L	15.5 ug/L
Potassium (1)	1118.6 ug/L	5593 ug/L
Sodium	230.2 ug/L	1151 ug/L
Vanadium	3.4 ug/L	17 ug/L
Zinc (1)	1.9 ug/L	9.5 ug/L

(1) -Maximum concentration present in a soil preparation blank

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into consideration in evaluation for blank contamination. No validation action was required for any of the above analytes as all of the results reported were either greater than the blank action level or previously qualified as nondetected by the laboratory.

Notes

The Contract Required Detection Limits (CRDL) Percent Recoveries (%Rs) were less than 80% for iron and sodium. However, no validation action was required as per regional guidelines.

The Contract Required Detection Limits (CRDL) Percent Recoveries (%Rs) were greater than 120% for calcium, potassium and selenium. However, no validation action was required as per regional guidelines.

Executive Summary

Laboratory Performance: Several laboratory contaminants were present in the laboratory / preparation blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy IRCDQM" (NFESC 9/99).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Jennifer Malle
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**NOVEMBER 6, 2000**
FROM:	**JENNIFER MALLE**	**COPIES:**	**DV FILE**
SUBJECT:	**INORGANIC DATA VALIDATION-TAL METALS AND CYANIDE CTO 084 – MCRD PARRIS ISLAND SDG – U08486**		
SAMPLES:	2/Soil/		
	PAI-04-SB-16-2-2.5	PAI-04-SB-17-1.5-2	

Overview

The sample set for CTO 084, MCRD Parris Island, SDG U08486 consists of two (2) soil environmental samples.

All samples were analyzed for Target Analyte List (TAL) metals and cyanide. The samples were collected by Tetra Tech NUS on August 23, 2000 and analyzed by Severn Trent Laboratories under Naval Facilities Engineering Service Center (NFESC) Interim Guidance Document, "Navy Installation Restoration Chemical Data Quality Manual" (September 1999). All metals, with the exception to arsenic, lead, selenium, thallium and mercury, were conducted using SW846 method 6010B. Arsenic, lead, selenium and thallium were conducting using graphite furnace method SW846 7841. Mercury analyses were conducted under SW846 method 7471. Cyanide analyses were conducted using SW846 method 9010B.

The data was evaluated based on the following parameters:

- * Data Completeness
- * Holding Times
- Initial and Continuing Calibration Recoveries
- Laboratory Blank Analysis
- * Sample Quanitation
- * Detection Limits

* - All quality control criteria were met for this parameter.

Calibration Recoveries

Several Continuing Calibration Verification (CCV) Percent Recoveries (%Rs) for calcium bracketing the samples within this SDG were greater than the 110% quality control limit. The positive results reported for calcium were qualified as estimated, "J".

Several Continuing Calibration Verification (CCV) Percent Recoveries (%Rs) for sodium bracketing the samples within this SDG were less than the 90% quality control limit. The positive results reported for sodium were qualified as estimated, "J".

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Affected samples : All

Analyte	Maximum Concentration	Action Level (soil)
Aluminum [1]	12.87 mg/kg	64.35 mg/kg
Arsenic	1.6 ug/L	0.464 mg/kg
Barium	0.9 ug/L	0.261 mg/kg
Beryllium [1]	0.11 mg/kg	0.55 mg/kg
Calcium [1]	5.95 mg/kg	29.75 mg/kg
Chromium [1]	0.07 mg/kg	0.35 mg/kg
Cobalt	1.1 ug/L	0.319 mg/kg
Copper	1.3 ug/L	0.377 mg/kg
Iron	77.8 ug/L	22.56 mg/kg
Magnesium	145.2 ug/L	42.102 mg/kg
Manganese	4.0 ug/L	1.16 mg/kg
Sodium	510.8 ug/L	148.13 mg/kg
Vanadium	3.1 ug/L	0.899 mg/kg
Zinc [1]	0.95 mg/kg	4.75 mg/kg

[1]-Maximum concentration present in a soil preparation blank

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors were taken into consideration in evaluation for blank contamination. Positive results less than the action level for beryllium, cobalt and zinc were qualified as estimated, "U". No validation action was required for the remaining analytes as all of the results reported were greater than the blank action level.

Notes

It should be noted that the preparation for the metals in samples within this SDG is 1.7g/100mL.

The result for antimony in sample PAI-04-SB-17-1.5-2 was reported as positive on the Electronic Deliverable Data (EDD). The Form 1 correctly reported the analyte as a nondetect while the EDD reports this analyte as a positive result. The EDD was corrected by the data reviewer to agree with the Form 1.

The Contract Required Detection Limits (CRDL) Percent Recoveries (%Rs) were less than 80% for iron and potassium. However, no validation action was required as per regional guidelines.

The Contract Required Detection Limits (CRDL) Percent Recoveries (%Rs) were greater than 120% for aluminum and selenium. However, no validation action was required as per regional guidelines.

Executive Summary

Laboratory Performance: Several laboratory contaminants were present in the laboratory / preparation blanks. Calibration noncompliance was noted for calcium and sodium.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy IRCDQM" (NFESC 9/99).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Jennifer Malle

Tetra Tech NUS
Jennifer Malle
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-10-8-70

TO:	**DAVE BRAYACK**	**DATE:**	**NOVEMBER 6, 2000**
FROM:	**JUSTIN ORBICH**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION - VOA/SVOA/PEST/PCB**
CTO 084 – MCRD PARRIS ISLAND
SDG U08486

SAMPLES 1/Aqueous

PAI-04-MW-03-01

2/Soil

PAI-04-SB-16-2-2.5 PAI-04-SB-17-1.5-2

OVERVIEW

The sample set for CTO 084, SDG U08486; MCRD Parris Island consists of one (1) aqueous environmental sample and two (2) soil environmental samples. The environmental samples were analyzed for Target Compound List (TCL) volatile, semivolatile, and pesticides/PCB organic compounds. No field duplicate pairs were included within this SDG.

The samples were collected by Tetra Tech, NUS on August 23rd, 2000 and analyzed by STL-Chicago. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The volatiles, semivolatiles, and pesticide/PCB were analyzed according to SW846 Methods 8260B, 8270C, and 8081A, 8082. The data in this SDG were validated with regard to the following parameters:

- Data Completeness
- * Holding Times
- Initial/continuing calibrations
- Laboratory method/field quality control blank results
- * Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

VOLATILE FRACTION

The aqueous initial and continuing calibration Relative Response Factors (RRFs) were below the 0.05 quality control limit for acetone, 2-butanone, and 2-hexanone. The nondetected results were qualified as rejected (UR), in the aqueous sample.

The soil initial and continuing calibration Relative Response Factors (RRFs) were below the 0.05 quality control limit for acetone. The nondetected results were qualified as rejected (UR), in the soil samples.

The following compounds were detected in the method blank at the maximum concentration indicated below:

Compound	Concentration	Soil/Aqueous Action Level
Toluene	2.0 ug/kg	10.0 ug/kg

Sample aliquot, percent moisture, and dilution factors were taken into consideration during the application of all action levels. The positive results for toluene were qualified as nondetected (U) as a result of blank contamination.

It should be noted that the laboratory analyzed and reported for the full Appendix IX compound list. However, the laboratory specification and Chain of Custody (COC) requested only the TCL.

Sample PAI-04-SB-16-2-2.5 was reanalyzed due to internal standard area below the quality control criteria, however, the reanalysis had similar results. Therefore, the original analysis was used for validation purposes. No qualification was warranted since the SDG was not validated based upon internal standard area performance.

SEMIVOLATILE FRACTION

All quality control parameters were met for this fraction.

PESTICIDE/PCB FRACTION

All quality control parameters were met for this fraction.

ADDITIONAL COMMENTS

Positive results that were reported at concentrations below the Reporting Limits (RLs) were qualified as estimated (J).

EXECUTIVE SUMMARY

Laboratory Performance: Several initial and continuing calibration RRFs were below the quality control limit in the volatile fraction. Toluene was detected a blank contaminant. The laboratory analyzed and reported the full Appendix IX compounds list, however, only the TCL was requested.

Other Factors Affecting Data Quality: None.

MEMO TO: DAVE BRAYACK
DATE: NOVEMBER 6, 2000 – PAGE 3

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (October 1999) and "Navy IRDQCM" (September 1999). The text of this report has been formulated to address only those problems affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Justin Orbich
Chemist/Data Validator
Tetra Tech NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer
Tetra Tech NUS

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCB D% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = % Solid content is less than 30%

DATA QUALIFIER DEFINITIONS:

U	-	Value is a nondetected result as reported by the laboratory and should not be considered present.
J	-	Positive result is estimated as a result of a value below the CRQL or a technical noncompliance.
UR	-	Nondetected result is rejected due to a severe technical noncompliance.

APPENDIX C

FIELD FORMS

C-1 CHAIN OF CUSTODY RECORDS

C-2 MONITORING WELL PERMITS

C-3 SOIL BORING LOGS

C-4 PERMANENT MONITORING WELL CONSTRUCTION SHEETS

C-5 MONITORING WELL DEVELOPMENT SHEETS

C-6 WATER LEVEL MEASUREMENTS

C-7 GROUNDWATER PURGE AND SAMPLE LOG SHEETS

C-8 1999 SOIL AND SEDIMENT LOG SHEETS

C-9 2004 SURFACE WATER AND SEDIMENT SAMPLE LOG SHEETS

C-10 TEST PIT LOG SHEETS

C-1 CHAIN OF CUSTODY RECORDS

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7115 CTO-0009

SITE NAME: PARRIS ISLAND, MCRD

SAMPLERS (SIGNATURE): Terry Rogalo

STATION NO.	DATE 95	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOLATILES 40ml VIAL W/HCL	TCL VOLATILES 4oz JAR	SEMIVOLATILES PESTICIDE/PCBS 16oz JAR	TAL METALS & CYANIDE 16oz JAR	SEMIVOLATILES Qt AMBER	PESTICIDE/PCBS Qt AMBER	TAL METALS 1L PE	CYANIDE 1L PE W/NaOH	REMARKS
T01	12/12	0700		X	PI-T01-121295	2	2								TRIP BLANK
SITE 9	↓	1010		X	PI-009-01(32)	3	–	1	1	1					DO MS/MSD
↓		1035		X	PI-009-02(33)	3	–	1	1	1					
↓		1040		X	PI-009-03(34)	3	–	1	1	1					
SITE 35		1143		X	PI-035-01 (48)	3	–	1	1	1					
↓		1215		X	PI-035-02(49)	3	–	1	1	1					
↓		1225		X	PI-035-03(50)	3	–	1	1	1					
SITE 14		1430		X	PI-014-01 (40)	3	–	1	1	1					
↓		1455		X	PI-014-02 (41)	3	–	1	1	1					
R01	↓	1535		X	PI-R01-121295	8	2	–	–	–	2	2	1	1	RINSATE to ANALIZE

NOTE: TEMPERATURE BLANK IN EACH COOLER.

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Terry R. Rogalo	12/12/95 1800	FEDERAL EXPRESS			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS: SHIPPED to INCHCAPE FOR ANALYSIS	
			12/13/95 0930	FED. EX. AB# 4056784045	

Order No. 70440 (0693)

000003

CHAIN OF CUSTODY RECORD

COPY - ORIGINAL ON FILE
SDG # 55636 ETR # 55418

000003

PROJECT NO.: 7115 CTO-0009
SITE NAME: PARRIS ISLAND, MCRD
SAMPLERS (SIGNATURE): Terry Rigsby

STATION NO.	DATE 95	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOLATILES 40ML VIALS W/HCl	TCL VOLATILES 4oz JAR	SEMIVOLATILES PESTICIDE/PCBS 16oz JAR	TAL METALS & CYANIDE 16oz JAR			REMARKS: TEMPERATURE BLANKS IN EACH COOLER
T02	12/13	0700		X	PI-T02-121395	2	2						TRIP BLANK
SITE 8B	↓	0730		X	PI-008B-01(31)	3	–	1	1	1			
SITE 27		0753		X	PI-027-01(46)	3	–	1	1	1			
"		0800		X	PI-027-02(47)	3	–	1	1	1			
SITE 14		0830		X	PI-014-03(42)	3	–	1	1	1			
SITE 21		0919		X	PI-021-01(45)	3	–	1	1	1			
SITE 13		0955		X	PI-013-01(38)	3	–	1	1	1			
"		1010		X	PI-013-02(39)	3	–	1	1	1			
SITE 8A		1035		X	~~PI-008B~~ (FR) PI-008A-01(30)	3	–	1	1	1			
SITE 5		1100		X	PI-005-01(28)	3	–	1	1	1			
"		1115		X	PI-005-02(29)	3	–	1	1	1			
SITE 15B		1130		X	PI-015B-01(44)	3	–	1	1	1			
SITE 15A		1207		X	PI-015A-01(43)	3	–	1	1	1			
D01	↓	0000		X	PI-D01-121395	3	–	1	1	1			

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Terry Rigsby	12/13/95 1630	FEDERAL EXPRESS			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS: SHIPPED to INCHCAPE FOR ANALYSIS	
		Maureen	12/14/95 1030	AB# 2259721284	

Order No. 70440 (0693)

CHAIN OF CUSTODY RECORD

COPY - ORIGINAL ON FILE
SDG # 55636 ETR # 55678

000004

PROJECT NO.: CTO-0009 7115
SITE NAME: PARRIS ISLAND, MCRD
SAMPLERS (SIGNATURE): Terry Rogal

STATION NO.	DATE 95	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOLATILES 4oz JAR	SEMIVOLATILES PESTICIDE/PCBS 16oz JAR	TAL METALS & CYANIDE 16oz JAR	TCL VOLATILES 40ml VIAB W/HCL	SEMIVOLATILES Qt AMBER	PESTICIDE/PCBS Qt AMBER	TAL METALS 1L PE	CYANIDE 1L PE W/NaOH	REMARKS TEMPERATURE BLANKS IN EACH COOLER
D02	12/13	0900		X	PI-D02-121395	3	1	1	1						
D03	↓	0900		X	PI-D03-121395	3	1	1	1						
R02	↓	1295		X	PI-R02-121395	8	–	–	–	2	2	2	1		RINSATE to "HOLD"

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Terry Rogal	12/13/95 1630	FEDERAL EXPRESS			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): Maureen	DATE / TIME: 12/14/95 1005	REMARKS: SHIPPED to INCHCAPE FOR ANALYSIS AB# 2259721284	

Order No. 70440 (0693)

CHAIN OF CUSTODY RECORD

000005

PROJECT NO.: 7115 CTO-0009

SITE NAME: PARRIS ISLAND, MCRD

SAMPLERS (SIGNATURE): Terry Royal

STATION NO.	DATE 95	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOLATILES 40ml Vial w/HCL	TCL VOLATILES 4oz JAR	SEMIVOLATILES PESTICIDE/PCBS 16oz JAR	TAL METALS & CYANIDE 16oz JAR	SEMIVOLATILES Qt AMBER	PESTICIDE/PCBS Qt AMBER	TAL METALS 1L PE	CYANIDE 1L PE w/NaOH	REMARKS
															TEMP. BLANK IN COOLER
T03	12/14	0700		X	PI-T03-121495	2	2								TRIP BLANK
SITE 12	↓	0850		X	PI-012-01 (35)	3	–	1	1	1					
↓	↓	0905		X	PI-012-02 (36)	3	–	1	1	1					
↓	↓	0920		X	PI-012-03 (37)	3	–	1	1	1					
R03	↓	1015		X	PI-R03-121495	8	2	–	–	–	2	2	1	1	RINSATE to ANALIZE

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Terry Royal	12/14/95	FEDERAL EXPRESS			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS: SHIPPED TO INCHCAPE FOR ANALYSIS	
		Jamund Banks	12/15/95 1345	AB # 4056784152	

Order No. 70440 (0693)

Note: → LAST SHIPMENT FROM TEAM #2

Due 10/25/99

CHAIN OF CUSTODY RECORD

INT COC

99106265 NTESC/CLP-Like

02218

PROJECT NO.: CT084

SITE NAME: Parris Island

SAMPLERS (SIGNATURE): [signature]

	STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC's	TCL SVOC's TCL Metals	TCL PAH's	Tin	TCL PCB's Pest.		REMARKS
001		10/6/99	1300		X	[redacted]	4	3	1					
002			1355		X	[redacted]	1		1	1				
003			1355		X	[redacted]	1			1				
004			1600		X	[redacted]	4	3	X	X	X	X		
005					X	[redacted]	4	3	X	X	X	X		
006						[redacted] Temp Blank		2						Na

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	10/6/99 1900				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[illegible]SHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): [signature]	DATE / TIME: 10-7-99 1530	REMARKS: TCL PAH's added per client	

CHAIN OF CUSTODY RECORD

02227

9912G253

PROJECT NO.: N 0095

SITE NAME: MCRD Parris Island

SAMPLERS (SIGNATURE): Gary Gunter / [illegible]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TAL metals	Chloride	TIN	Tot. Diss. Solids	TCL PCBs	TCL Pesticides	TCL SVOCs	TCL PARs	Add. App IX VOCs	App IX Pest/PCBs	App IX SVOCs	App IX Cyn. Pot	App IX Herbicides	App IX Non-Pet VOCs	REMARKS
1	12/14/99	1155		✓	PAI-35-GW-01-01	3	X	X	X	X											
2	12/14/99	1000		✓	PAI-27-SS-03-01	1					X										
3	12/14/99	1020		✓	PAI-27-SS-04-01	1					X										
4	12/14/99	1010		✓	PAI-27-SS-05-01	1					X										
5	12/14/99	0835		✓	PAI-35-SS-04-01	1	X	X	X												
6	12/14/99	0820		✓	PAI-35-SS-05-01	1	X	X	X												
7	12/14/99	0845		✓	PAI-35-SS-06-01	1	X	X	X												
8	12/15/99	0800		✓	PAI-10-SD-~~18~~ 20 GC-01	1	X	X			X	X	X								
9	12/15/99	0820		✓	PAI-10-SD-19-01	1	X	X			X	X	X								
002 10	12/14/99	1800		✓	PAI-07-GW-04-01	11	X	X	X	~~ADD SVOC~~	X	X		X	X	X	X	X	X	X		X
003 11	12/14/99	1800		✓	PAI-07-GW-DU04-01	11	X	X	X	~~ADD SVOC~~	X	X		X	X	X	X	X	X	X		X
004 12	12/14/99	1345		✓	PAI-04-GW-01-01	11	X	X	X	~~ADD SVOC~~	X	X		X	X	X	X	X	X	X		X
005 13	12/14/99	1400		✓	PAI-13C-GW-01-01		X	X	X	X				X	X							
006 14	12/14/99	–		–	Trip Blank	2								X							

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Gary Gunter	12/14/99 1720				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS: Results & Questions to: Dave Brzyack 412-921-8375	
		[illegible]	12/17/99 1640		

Order No. 70440 (0693)

2.1, 2.4, 2.0

CUSTODY RECORD 99126253 Int COC EDD

02284

PROJECT NO.:	SITE NAME:
N0095	MCRD Parris Island

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TAL metals	TIN	TCL VOCs	ABN	ABP IX VOCs	Cyanide	TCL SVOCs	TCL Pest/PCB			REMARKS
101A-B1	12/14/99	1450		✓	PAI-09-GW-01-01	5	X	X	X	X	X						AQUEOUS
2	12/14/99	1800		✓	PAI7-GW3-02	5	X		X		X						AQUEOUS
3	12/14/99	1550		✓	PAI-09-GW-02-01	5	X		X		X						AQUEOUS
4	12/14/99	1205		✓	PAI-7-GW2-02	5	X		X		X						AQUEOUS
5	12/14/99	0815		✓	PAI-07-SB-01-04	4	X	X	X			X	X				Solid
6	12/14/99	0815		✓	PAI-07-SB-DU01-04	6	X	X	X			X	X				Solid
	12/13/99				Trip Blank												

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
[signature]	12/14/99 1800				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	12-15-99 1400	Result to D. Brayack TENUS 412-921-8375	

Order No. 70440 (0693)

2.3 °C

NFESC / CLP Like

int. COC

EDD

9A086486

STL Committed To *Your* Success

Chicago Laboratory
2417 Bond Street
University Park, IL 60466
Phone: 708-534-5200
Fax: 708-534-5211

Report To:
Contact: David Brayack
Company: Tetra Tech NUS
Address: 661 Andersohr
Pittsburgh, Pa 15220
Phone: 412-921-~~4040~~ 7090
Fax: 412-921-4040
E-Mail: Brayackd@ttnus.com

Bill To:
Contact: David Brayack
Company: Tetra Tech NUS
Address: 661 Anderson Dr.
Pittsburgh, Pa 15220
Phone: 412-921-7090
Fax: 412-921-4040
PO#: ____ Quote: ____

Shaded Areas For Internal Use Only ____ of ____

Lab Lot # ~~20000114~~

Package Sealed (Yes) No	Samples Sealed Yes (No)
Received on Ice (Yes) No	Samples Intact (Yes) No
Temperature °C of Cooler (2.1)(2.3)	
Within Hold Time (Yes) No	Preserv. Indicated (Yes) No NA
pH Check ok (Yes) No NA	Res. Cl_2 Check ok (Yes) No NA
Sample Labels and COC Agree (Yes) No COC not present	

Sampler Name: Nathan Reel
Signature: Nathan Reel
Project Name: Parris Island
Project Number: CT0084
Project Location: Site 4
Date Required Hard Copy: __/__/__ Fax: __/__/__
Lab PM:

Laboratory ID	MS-MSD	Client Sample ID	Sampling Date	Sampling Time	Matrix	Comp/Grab	TAL Metal	TAL CN	TCL VOC	SVOC/Pest/PCB/Metal/CN	App. IX VOC	TCL Pest/PCB	App. IX Pest/PCB	App. IX OP Pest	App. IX Herbicides	TCL SVOC	Additional Analyses / Remarks
Rafrg #																	
# Cont.																	
Volume																	
Preserv																	
501		PA1-04-SB-17-1.5-2	8/23/00	1742	SO	Gr			3	1							
502		PA1-04-SB-16-2.2.5	8/23/00	1855	SO	Gr			3	1							
503		PA1-04-MW-03-01	8/23/00	1740	GW				3							2	
~~004~~		PA1-04-MW 02-01	8/23/00	1940	GW		2	2	3/DUP		3	2	2	2	2	4	
~~005~~		Trip Blank	8/14/00	1315													

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
Nathan Reel	T+NUS	8/23/00	2250	[signature]	STL	8/25/00	1015
RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME

Matrix Key
WW = Wastewater
W = Water
S = Soil
SL = Sludge
MS = Miscellaneous
OL = Oil
A = Air
SE = Sediment
SO = Solid
DS = Drum Solid
DL = Drum Liquid
L = Leachate
WI = Wipe
O = ____

Container Key
1. Plastic
2. VOA Vial
3. Sterile Plastic
4. Amber Glass
5. Widemouth Glass
6. Other ____

Preservative Key
1. HCl, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn Acetate, Cool to 4°
6. Cool to 4°
7. None

COMMENTS:

Date Received __/__/__
Courier: Hand Delivered ☐
Bill of Lading:

TtA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4377 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO-084/0095	MCRD PARRIS ISLAND	Mark Sladic	412-921-7090	KATAHDIN
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		Matt Cochran	412-921-7090	340 COUNTY RD NO. 5
call 412-759-5992 with questions		CARRIER/WAYBILL NUMBER		CITY, STATE
		FEDEX		WESTBROOK ME

STANDARD TAT ☑
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs	SVOCs	METALS	METALS/CYANIDE/WATER CONTENT	TOC	GRAINSIZE	TAL metals + tin	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	P	G	G	G		
PRESERVATIVE USED									HCL	–	HNO3	–	–	–		
9-8	0800	PAI-TB-090804	–	–	–	AQ	G	2	X							
9-8	0930	PAI-13C-SD-01	–	0	6"	SD	G	2				X	X	X		
9-8	1000	PAI-13C-SW-02-01	–	0	6"	SW	C	1							X	
9-8	0950	PAI-13C-SD-02	–	0	6"	SD	G	2				X	X	X		
9-8	1022	PAI-13C-SW-01-01	–	0	6"	SW	C	1							X	
9-8	1515	PAI7-GW3-01	–	–	–	GW	G	6	X	X	X					
9-8	1650	PAI-13C-SW-01-02	–	0	6"	SW	C	1				~~X~~	~~X~~	~~X~~	X	TAL metals + tin only
9-8	1700	PAI-13C-SW-02-02	–	0	6"	SW	C	1				~~X~~	~~X~~	~~X~~	X	" " " "
9-8	1712	PAI7-GW1-01	–	–	–	GW	G	6	X	X	X					
9-9	0950	PAI7-GW2-02	–	–	–	GW	G	6	X	X	X					

JJB 9/8/04
JJB 9/8/04

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
	9-9-04	1800			
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 4380 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N0095	MCRD Parris Island	M. Sladic	412-921-7090	Katahdin Analytical
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		M. Cochran	412-921-7090	340 County Rd, #5
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FEDEX 18455 4237 7371		Westbrook, ME 04092

STANDARD TAT ☑
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TAL Metals + Tin	TCL VOCs	TCL SVOCs						COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									P	G	G						
PRESERVATIVE USED									HNO3	HCL	–						
9/10	0835	PA1-13C-GW-03-01	–	–	–	GW	G	1	X								
9/10	0855	PA1-13C-GW-04-01	–	–	–	GW	G	1	X								
9/10	1020	PA1-13C-GW-05-01	–	–	–	GW	G	1	X								
9/10	1035	PA1-07-GW-05-01	–	–	–	GW	G	1	X								
9/10	0000	PA1-13C-GW-DUP-01	–	–	–	GW	G	1	X	X	X						

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
	9/10/04	1400	FEDEX	9/10/04	1400
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

C-2 MONITORING WELL PERMITS

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

MEMORANDUM

TO: Jerry Stamps, Engineering Associate
Hazardous Waste Permitting Section
Division of Hazardous and Infectious Waste Management
Bureau of Land and Waste Management

FROM: Donald C. Hargrove, Hydrogeologist
Hazardous Waste Section
Division of Hydrogeology
Bureau of Land and Waste Management

DATE: 13 August 1999

RE: Parris Island Marine Corps Recruit Depot (MCRD)
Parris Island, South Carolina
Beaufort County
SC6 170 022 767

FINAL SWMU 21 RI/RFI Work Plan and
SI/CS Work Plan for Site/SWMU 5, Site 9/SWMU 8,
Site 13C/SWMU 13, and SWMUs 27 and 35
(March 1999)

The Division of Hydrogeology has reviewed the Document listed above. This document (dated 11 August 1999) was received on 12 August 1999. It provides a physical description of the Solid Waste Management Units (SWMUs) listed in the title that includes the history of each SWMU. It briefly describes previous studies performed at some of the SWMUs and indicates that the previous studies suffer from outdated information and/or data gaps. This work plan proposes a sample strategy to fill the data gaps in order to fully characterize the nature and extent of contamination at SWMU 21. It also proposes limited Confirmatory Sampling at the other five SWMUs in order to determine the presence or absence of contamination. This document also contains responses to comments generated during review of the DRAFT version of this document (memo: Hargrove to Stamps, 31 March 1999).

This document was reviewed with respect to R.61-79 of the South Carolina Hazardous Waste Management Regulations (SCHWMR), and appropriate guidance documents. Based on this review, the Division of Hydrogeology has determined that MCRD has adequately responded to these comments and sufficiently incorporated them into this FINAL version. It is therefore recommended

that this FINAL version of the RI/RFI, and SI/CS Work Plan can be approved and implemented as written.

This work plan proposes groundwater sampling at three separate SWMUs. As such, separate Monitoring Well Approvals have been written for each SWMU. These approvals are listed below and copies are attached:

Site 9/SWMU-8:	Approval #HW-99-068 for two (2) temporary monitoring wells
Site 13C/SWMU-13:	Approval #HW-99-069 for two (2) temporary monitoring wells
SWMU-35:	Approval #HW-99-070 for one (1) temporary monitoring well

If you have any questions regarding this decision, please call me at (803)896-4033.

Attachments: HW-99-068
HW-99-069
HW-99-070

D H E C
PROMOTE PROTECT PROSPER
2 Bull Street
Columbia, SC 29201-1708

MONITORING WELL APPROVAL

Approval is hereby granted to: Commanding Officer
Department of the Navy
SOUTHNAVFACENGCOM
ATTN: Art Sanford (Code 1862)
2155 Eagle Drive
N. Charleston, SC 29406

Date of Issue: 13 August 1999

Approval Number: HW-99-068

Facility: Marine Corps Recruit Depot
Parris Island, South Carolina
Beaufort County
SC6 170 022 767

For the installation of two (2) temporary monitoring wells at SWMU-8 as follows:

1) Two (2) shallow temporary monitoring wells to be installed at the locations specified on Figure 7-3 (attached), at depths just below the water table.

2) These temporary monitoring wells will be installed only long enough to obtain one (1) ground water sample at each well. Once the groundwater has been sampled, these temporary wells will immediately be abandoned according to R.61-71.10 of the South Carolina Well Standards and Regulations.

Conditions:

1) That a driller certified to operate in the State of South Carolina must install the wells. And that the certified well driller must be present during all phases of drilling, construction, and completion of these monitoring wells.

2) That the latitude, longitude, surveyed elevation, boring and/or geologist logs, and actual (as built) construction details for each monitoring well be submitted to the Department within thirty (30) days after installation of the last well.

3) All monitoring wells must be properly developed until clear, sediment-free water samples are obtained. Specific conductance, temperature, turbidity, and pH

measurements should be taken during development. A log recording the values of these parameters should be maintained during development of the wells. This log should be submitted with the "as-built" construction details required by Condition 2 above.

4) All well construction and sampling derived wastes, including but not limited to, drill cuttings, drilling fluids, development and purge water, must be managed properly and in accordance with all applicable state and federal requirements. If containerized, each vessel shall be clearly labeled with regard to contents, source and date of activity.

5) A minimum of (48) hours prior to initiation of drilling activities, provide notice to James White, District Hydrogeologist, at Low Country District EQC Office (843)522-9097.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and the Department of Environmental Control's Regulation R.61-71.

Approval granted by:

Donald C. Hargrove, Hydrogeologist
Bureau of Land and Waste Management
South Carolina Department of Health and
Environmental Control

Attachment: Figure 7-3, Proposed Monitoring Well Locations

cc: Jerry Stamps, Corrective Action Engineering
James White, Low Country District EQC
Kenneth Lapierre, Federal Facilities Section, USEPA Region IV

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

MEMORANDUM

TO: Jerry Stamps, Engineering Associate
Hazardous Waste Permitting Section
Division of Hazardous and Infectious Waste Management
Bureau of Land and Waste Management

FROM: Donald C. Hargrove, Hydrogeologist
Hazardous Waste Section
Division of Hydrogeology
Bureau of Land and Waste Management

DATE: 2 December 1999

RE: Parris Island Marine Corps Recruit Depot (MCRD)
Parris Island, South Carolina
Beaufort County
SC6 170 022 767

RI/RFI Work Plan Addendum for Field Activities at Sites/SWMUs 4 and 7
(November 1999)

The Division of Hydrogeology has reviewed the Document listed above. This document (dated 16 November 1999) was received on 17 November 1999. It has been submitted as an addendum to the FINAL SWMU 21 RI/RFI Work Plan and SI/CS Work Plan for Site/SWMU 5, Site 9/SWMU 8, Site 13C/SWMU 13, and SWMUs 27 and 35, dated March 1999. This addendum provides a physical description of Solid Waste Management Units (SWMUs) 4 and 7 that includes the history of each SWMU. It briefly describes previous studies performed at some of the SWMUs and indicates that the previous studies suffer from outdated information and/or data gaps. This work plan addendum proposes the sample strategy necessary to fill the data gaps in order to determine the presence/absence of contamination at SWMUs 4 and 7. It also describes the applicability of the RCRA Appendix VIII and IX constituents, given the operational history of MCRD.

This document was reviewed with respect to R.61-79 of the South Carolina Hazardous Waste Management Regulations (SCHWMR), and appropriate guidance documents. Based on this review, the Division of Hydrogeology has determined that this work plan addendum accurately incorporates previous discussions that the Tier I team had concerning these two SWMUs.. It is therefore recommended that this RI/RFI Work Plan Addendum can be approved and implemented as written.

DD990922.DCH

This work plan addendum proposes groundwater sampling at these two SWMUs. One monitoring well approval (HW-99-099) has been written for the two temporary monitoring wells proposed. A copy of the approval is attached:

If you have any questions regarding this decision, please call me at (803)896-4033.

Attachments: HW-99-099

PROMOTE PROTECT PROSPER
)0 Bull Street
Columbia, SC 29201-1708

MONITORING WELL APPROVAL

Approval is hereby granted to:

Commanding Officer
Department of the Navy
SOUTHNAVFACENGCOM
ATTN: Art Sanford (Code 1862)
2155 Eagle Drive
N. Charleston, SC 29406

Date of Issue: 2 December 1999

Approval Number: HW-99-099

Facility: Marine Corps Recruit Depot
Parris Island, South Carolina
Beaufort County
SC6 170 022 767

For the installation of two (2) temporary monitoring wells, one at SWMU-4, and one at SWMU-7 as follows:

1) One (1) shallow temporary monitoring well to be installed at SWMU-4 after the fire training ring has been adequately identified. A general view of SWMU 4 is specified on Figure B-2 (attached), at a depth just below the water table.

2) One (1) shallow temporary monitoring well to be installed at SWMU-7 in the location proposed in Figure B-3, at a depth just below the water table.

3) These temporary monitoring wells will be installed only long enough to obtain one (1) ground water sample at each well. Once the groundwater has been sampled, these temporary wells will immediately be abandoned according to R.61-71.10 of the South Carolina Well Standards and Regulations.

Conditions:

1) That a driller certified to operate in the State of South Carolina must install the wells. And that the certified well driller must be present during all phases of drilling, construction, and completion of these monitoring wells.

2) That the latitude, longitude, surveyed elevation, boring and/or geologist logs, and

actual (as built) construction details for each monitoring well be submitted to the Department within thirty (30) days after installation of the last well.

3) All monitoring wells must be properly developed until clear, sediment-free water samples are obtained. Specific conductance, temperature, turbidity, and pH measurements should be taken during development. A log recording the values of these parameters should be maintained during development of the wells. This log should be submitted with the "as-built" construction details required by Condition 2 above.

4) All well construction and sampling derived wastes, including but not limited to, drill cuttings, drilling fluids, development and purge water, must be managed properly and in accordance with all applicable state and federal requirements. If containerized, each vessel shall be clearly labeled with regard to contents, source and date of activity.

5) A minimum of (48) hours prior to initiation of drilling activities, provide notice to James White, District Hydrogeologist, at Low Country District EQC Office (843)522-9097.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and the Department of Environmental Control's Regulation R.61-71.

Approval granted by:

Donald C. Hargrove, Hydrogeologist
Bureau of Land and Waste Management
South Carolina Department of Health and
Environmental Control

Attachments: Figure B-2
Figure B-3

cc: Jerry Stamps, Corrective Action Engineering
James White, Low Country District EQC
Kenneth Lapierre, Federal Facilities Section, USEPA Region IV

MEMORANDUM

TO: Leon Fulmer, Engineering Associate
Corrective Action Engineering Section
Division of Waste Management
Bureau of Land and Waste Management

FROM: Donald C. Hargrove, Hydrogeologist
RCRA-Hazardous Waste Section I
Division of Hydrogeology
Bureau of Land and Waste Management

DATE: 7 September 2004

RE: Parris Island Marine Corps Recruit Depot (MCRD)
Parris Island, South Carolina
Beaufort County
SC6 170 022 767

FINAL Work Plan Addendum for Sites/SWMUs 7 and 13c,
Appendices D and E
(August 2004)

The Division of Hydrogeology has reviewed the Document listed above. This document (dated 26 August 2004) was received by the Department on 27 August 2004, and by the Division of Hydrogeology on 30 August 2004. These appendices include responses to comments generated during reviews of the DRAFT version.

This document was reviewed with respect to R.61-71 of the South Carolina Well Standards, R.61-79 of the South Carolina Hazardous Waste Management Regulations (SCHWMR), and appropriate guidance documents. The Division of Hydrogeology has determined that MCRD has adequately responded to the previous comments, and has incorporated them into this FINAL document. It is therefore recommended that this document can be approved and implemented as written. Monitoring Well Approval #HW-04-065 and MWA #HW-04-066 have been written for the installation of the proposed new monitoring wells and piezometers, and are being sent under a separate cover (copies attached).

If you have any questions regarding this decision, please call me at (803) 896-4033.

DD040574.DCH

Attached: MWA #HW-04-065
MWA #HW-04-066

MONITORING WELL APPROVAL

Approval is hereby granted to:

Commanding Officer
Department of the Navy
SOUTHNAVFACENGCOM
ATTN: Art Sanford (ES322)
2155 Eagle Drive - 29046
North Charleston, South Carolina 29406

Date of Issue: 7 September 2004

Approval Number: HW-04-065

Facility: Marine Corps Recruit Depot
Parris Island, South Carolina
Beaufort County
SC6 170 022 767

For the installation of one (1) permanent monitoring well at Site/SWMU 7 as follows:

1) One permanent monitoring well, located as specified on the attached figure.
2) The monitoring well will be screened from 3 to 13 feet below ground surface (bgs).

Conditions:

1) That the monitoring well be installed by a well driller certified by the state of South Carolina as a Class A driller, or an Environmental Well Driller-Class B or C. And that the certified well driller must be present during all phases of drilling, construction, and completion of the monitoring well.

2) That investigation derived waste including, but not necessarily limited to, drill cuttings, drilling fluids, development and purge water, be managed properly and in compliance with all applicable requirements. If containerized, each vessel shall be clearly labeled with regard to contents, source, and date of activity.

3) That the latitude, longitude and actual construction details be submitted to the Department within 30 days after installation of the monitoring well.

4) That the monitoring well be labeled with an identification plate constructed of a durable material affixed to the casing or surface pad where it is readily visible. The plate shall

provide the well identification number, date of construction, static water level and driller name and certification number.

5) A minimum of (48) hours prior to initiation of drilling activities, provide notice to Russell Berry, at the Low Country District EQC Office (843) 846-1030, and myself, Don Hargrove, at (803) 896-4033.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and the Department of Environmental Control's Regulation R.61-71.

Approval granted by:

_____

Donald C. Hargrove, Hydrogeologist
Bureau of Land and Waste Management
South Carolina Department of Health and
Environmental Control

Attachment: Site/SWMU 7 Location Map

cc: Leon Fulmer, Corrective Action Engineering
Russell Berry, Low Country District EQC Office
Patricia Goldberg, Federal Facilities Section, USEPA Region IV
File #50492

MONITORING WELL APPROVAL

Approval is hereby granted to:

Commanding Officer
Department of the Navy
SOUTHNAVFACENGCOM
ATTN: Art Sanford (ES322)
2155 Eagle Drive - 29046
North Charleston, South Carolina 29406

Date of Issue: 7 September 2004

Approval Number: HW-04-066

Facility: Marine Corps Recruit Depot
Parris Island, South Carolina
Beaufort County
SC6 170 022 767

For the installation of three (3) permanent monitoring wells and one (1) temporary piezometer at Site 13C as follows:

1) Three permanent monitoring wells, located as specified on the attached figure.
2) These monitoring wells will be screened from 2 to 12 feet below ground surface (bgs)..
3) One temporary Piezometer for groundwater measurements only, located as specified on the attached figure.
4) The Piezometer will be screened from 2 to 12 feet bgs.

Conditions:

1) That the monitoring wells and piezometer be installed by a well driller certified by the state of South Carolina as a Class A driller, or an Environmental Well Driller-Class B or C. And that the certified well driller must be present during all phases of drilling, construction, and completion of these monitoring wells.

2) That investigation derived waste including, but not necessarily limited to, drill cuttings, drilling fluids, development and purge water, be managed properly and in compliance with all applicable requirements. If containerized, each vessel shall be clearly labeled with regard to contents, source, and date of activity.

3) That the latitude, longitude and actual construction details be submitted to the Department

within 30 days after installation of the last monitoring well.

4) That the monitoring wells be labeled with an identification plate constructed of a durable material affixed to the casing or surface pad where it is readily visible. The plate shall provide the well identification number, date of construction, static water level and driller name and certification number.

5) That the temporary piezometer be abandoned within five (5) days after groundwater measurements have been taken. The abandonment must follow R.61-71.H.4.C.

6) A minimum of (48) hours prior to initiation of drilling activities, provide notice to Russell Berry, at the Low Country District EQC Office (843) 846-1030, and myself, Don Hargrove, at (803) 896-4033.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and the Department of Environmental Control's Regulation R.61-71.

Approval granted by:

_____

Donald C. Hargrove, Hydrogeologist
Bureau of Land and Waste Management
South Carolina Department of Health and
Environmental Control

Attachment: Site 13C Location Map

cc: Leon Fulmer, Corrective Action Engineering
Russell Berry, Low Country District EQC Office
Patricia Goldberg, Federal Facilities Section, USEPA Region IV
File #50492

C-3 SOIL BORING LOGS

BORING LOG

Tetra Tech NUS, Inc.

SB-01

PROJECT NAME/No.: Parris Island/0095
BORING NO.: PAI-04-MW-01(S)
GEOLOGIST: –
DATE START: 12/15/99
DRILLER/Co.: Columbia Technology
GEOLOGIST: G Gunter
DRILLING RIG: Hand Auger
DRILLER: Randy Brand

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Time	Remarks	PID/FID Reading (ppm)
1	0-1		1 Ft	1		Gray Brn	F SAND	SP			0
2	1-2		1			Tan	F SAND	SP			0.9
3	2-3		1	3							0.1
4	3-4		1			Tan	Clayey F SAND	SC			0.4
5	4-5		1	4.5							0.2
6	5-6		1								0.1
7	6-7		1								0.2
8	7-8		1								0
9	8-8.5		1	8.5		Gray Brn	F SAND	SP			0

* When rock coring, enter rock brokeness.

Background (ppm): 2

Remarks: 3/4" PVC installed in Hole to Facilitate Infiltration. Temporary well point Abandoned by grouting to Surface AFTER Sampling

Converted to Well: Yes ✓ No _____ Well I.D. #: PAI-04-MW-01(S)

BORING LOG

Tetra Tech NUS, Inc.

PROJECT NAME/No.: Parris Island/0095
GEOLOGIST:
DRILLER/Co.: Columbia Technology
DRILLING RIG: Hand Auger

BORING NO.: PAI-04-SB-02
DATE START: 12/15/99
GEOLOGIST: G. GUNTER
DRILLER: Randy Brand

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Time	Remarks	PID/FID Reading (ppm)
1	0-1		1			Brn	F SAND	SP			0
2	1-2		1	1.5							0
3	2-3		1			Tan	F SAND	SP			0.2
4	3-4		1	4			Clayey F SAND	SC			0.1
5	4-5		0.5	5			Silty F SAND	SM		water @ 5 FT	0

* When rock coring, enter rock brokeness.

Background (ppm): 0.1

Remarks: Boring Abandoned by grouting to surface.

Converted to Well: Yes ____ No X Well I.D. #: —

BORING LOG

Tetra Tech NUS, Inc.

PROJECT NAME/No.: Parris Island / 0095
GEOLOGIST:
DRILLER/Co.: Columbia Technology
DRILLING RIG: Hand Auger

BORING NO.: PAI-04-SB-03
DATE START: 12/17/99
GEOLOGIST: G. Gunter
DRILLER: Randy Brend

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length Ft	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Time	Remarks	PID/FID Reading (ppm)
1	0-1	-	1			Brn	F SAND	SP			0.2
2	1-2	-	1								0.2
3	2-3	-	1	-2.5-		LT Brn	Clay	CL			0.2
4	3-3.5	-	0.5	-3.5-						wet 3-3.5	0.1

* When rock coring, enter rock brokeness.

Background (ppm): 0.2

Remarks: Boring abandoned by grouting to surface.

Converted to Well: Yes ____ No X Well I.D. #: —

BORING LOG

Tetra Tech NUS, Inc.

PROJECT NAME/No.: Parris Island/0095
BORING NO.: PAI-04-SB-04
GEOLOGIST: —
DATE START: 12/17/99
DRILLER/Co.: Columbia Technology
GEOLOGIST: G Gunter
DRILLING RIG: Hand Auger
DRILLER: Randy Brand

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Time	Remarks	PID/FID Reading (ppm)
1	0-1		1			DK Brn	F SAND	SP			.2
2	1-2		1	-1.5		LT Brn	CLAY	CL			.3
3	2-3		1	-3-						wet 2.5-3 FT	.2

* When rock coring, enter rock brokeness.

Background (ppm): 2

Remarks: Boring Abandoned by Grouting to Surface.

Converted to Well: Yes ____ No X Well I.D. #: —

BORING LOG

Tetra Tech NUS, Inc.

PROJECT NAME/No.: Parris Island / 0095
GEOLOGIST: —
DRILLER/Co.: Columbia Technology
DRILLING RIG: Hand Auger

BORING NO.: PAI-04-SB-05
DATE START: 12/17/99
GEOLOGIST: G. Gunter
DRILLER: Randy Brand

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Time	Remarks	PID/FID Reading (ppm)
1	0-1		1			Brn	F SAND	SP			.2
2	1-2		1	-1.5							.1
3	2-3		1			LT Brn	Clayey F SAND	SC			.2
4	3-3.5		.5	-3.5						wet 3-3.5 ft	.2

* When rock coring, enter rock brokeness.

Background (ppm): 0

Remarks: Boring abandoned by grouting to surface.

Converted to Well: Yes ____ No X Well I.D. #: —

BORING LOG

Tetra Tech NUS, Inc.

PROJECT NAME/No.: Parris Island / 0095
BORING NO.: PAI-04-SB-06
GEOLOGIST: —
DATE START: 12/17/99
DRILLER/Co.: Columbia Technology
GEOLOGIST: G. GUNTER
DRILLING RIG: Hand Auger
DRILLER: RANDY Brand

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Time	Remarks	PID/FID Reading (ppm)
1	0-1	- / -	1			Bk Gray	F SAND	SP			.2
2	1-2	- / -	1	2		Brn					.2
3	2-3	- / -	1	3		Brn	Clayey F SAND	SC			.2

* When rock coring, enter rock brokeness.

Background (ppm): 0.2

Remarks: Boring Abandoned by Grouting to Surface.

Converted to Well: Yes ____ No X Well I.D. #: —

BORING LOG

Tetra Tech NUS, Inc.

PROJECT NAME/No.: Parris Island/0095
GEOLOGIST: —
DRILLER/Co.: Columbia Technology
DRILLING RIG: Hand Auger

BORING NO.: PAI-04-SB-07
DATE START: 12/17/99
GEOLOGIST: G. GUNTER
DRILLER: Randy Brand

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Time	Remarks	PID/FID Reading (ppm)
1	0-1	- / -	1	1		Blk	Silty F SAND	SM			.2
2	1-2	- / -	1	2		LT Brn	F SAND	SP			.3
3	2-3	- / -	1	3		Brn	Clayey F SAND	SC			.1

* When rock coring, enter rock brokeness.

Background (ppm): 1

Remarks: Boring abandoned by grouting to surface.

Converted to Well: Yes ____ No X Well I.D. #: —

BORING LOG

Tetra Tech NUS, Inc.

PROJECT NAME/No.: Parris Island / 0095
GEOLOGIST: –
DRILLER/Co.: Columbia Technology
DRILLING RIG: Hand Auger.

BORING NO.: PAI-04-SB-08
DATE START: 12/17/99
GEOLOGIST: G. GUNTER
DRILLER: Randy Brand

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Time	Remarks	PID/FID Reading (ppm)
1	0-1	–	1			Blk Brn	F SAND	SP			.3
2	1-2	–	1	2		Lt Brn					.2
3	2-3	–	1	3		Brn	Clayey F Sand	SC		wet	.2

* When rock coring, enter rock brokeness.

Remarks: Boring Abandoned by Grouting to Surface.

Background (ppm): 0

Converted to Well: Yes ____ No X Well I.D. #: –

BORING LOG

Tetra Tech NUS, Inc.

PROJECT NAME/No.: Parris Island/0095
BORING NO.: PAI-04-SB-09
GEOLOGIST: —
DATE START: 12/17/99
DRILLER/Co.: Columbia Technology
GEOLOGIST: G. GUNTER
DRILLING RIG: Hand Auger
DRILLER: Randy Brand

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Time	Remarks	PID/FID Reading (ppm)
1	0-1	—	1			Gray Brn	F SAND	SP			0
2	1-2	—	1			LT Brn					.1
3	2-3	—	1	2.5 3		Brn	F Sandy Clay	CL		wet	.1

* When rock coring, enter rock brokeness.

Remarks: Boring Abandoned by Grouting to Surface.

Background (ppm): 0

Converted to Well: Yes ____ No X Well I.D. #: —

BORING LOG

Tetra Tech NUS, Inc.

PROJECT NAME/No.: Parris Island/0095
GEOLOGIST:
DRILLER/Co.: Columbia Technology
DRILLING RIG: Hand Auger

BORING NO.: PAI-04-SB-10
DATE START: 12/17/99
GEOLOGIST: G. GUNTER
DRILLER: Randy Brand

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Time	Remarks	PID/FID Reading (ppm)
1	0-1	- / -	1	1		Gray Blk	FSAND	SC		To rBrn Clayey to	
2	1-2	- / -	1	2		Brn	F Sandy Clay	CL		to Clayey FSA	
3	2-2.5	- / -	0.5	2.5		Brn	FSAND	SC		Tr. Clay wet	

* When rock coring, enter rock brokeness.

Remarks: Boring Abandoned by grouting to Surface

Background (ppm): 0

Converted to Well: Yes ____ No X Well I.D. #: —

There are no soil borings associated with IDs PAI-04-SB-11 through PAI-04-SB-14

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: PA1-04-SB-15
DRILLING COMPANY: NA
DRILLING RIG: NA

BORING No.: N0095
DATE: 04/18/00
GEOLOGIST: D. Bragack / J. Brown
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Drilled BZ**
6"-12"						Brown			Natural Soils	8	0		
12"	18"					Brown			Natural Soils	3.5	0		
1.5'	2'					Brown			Natural Soils	0	0		
2.0	2.5'					White	Fine-Grained Sand		Natural Soils	0	0		
2.5'	3.0'					Tan	Silty-clay		Nat. Soils	0	0		
3'	3.5'					Tan	Silty-clay		Nat Soils	0	0		
3.5	4'			Saturated		Tan	Silty-clay		Nat. Soils	0	0		

* When rock coring, enter rock brokenness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: _____

Drilling Area Background (ppm): ____

Converted to Well: Yes _____ No _____ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: N0095
DRILLING COMPANY: NA
DRILLING RIG: NA

BORING No.: PAI-04-SB-16
DATE: 04/18/00
GEOLOGIST: D. Brayack, J. Brown
DRILLER:

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Penetrability, Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Drillers BZ**
0.5'	1.0'						Brown Sand		Natural Soils	0	0		
1.0'	1.5'						Brown Sand		Nat. Soils	0	0		
1.5'	2.0'						Black staining at	bottom of Interval		0	0		
2'	2.5'						Brown Sand - Black		staining	0	0		
2.5'	3.0'						Sand - white/Brow			0	0		
3	3.5'						White Sand			0	0		

* When rock coring, enter rock brokenness.

** Include monitor reading in 6 foot intervals @ boreholes. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes _____ No _____ Well I.D. #: _____

BORING LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME/No.: Parris Island
GEOLOGIST: Nathan Reel
DRILLER/Co.: VeriNet
DRILLING RIG: Mobile DPT

BORING NO.: PAI-04-16-SB
DATE START: 8-23-00
GEOLOGIST: Nathan Reel
DRILLER: Carey

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Time	Remarks	PID/FID Reading (ppm)
		0/6"				lite	Brown Top Soil				0.0
		6"/2				lite	Brown			Slight Stain	0.1
		2/2.5					Stained dirt				0.0
		2.5/6				lite	Gray to Brown				0.0

* When rock coring, enter rock brokeness.

Remarks:

Background (ppm): 0.0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Driller [illegible]

BORING LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME/No.: Parris Island
GEOLOGIST: Nathan Reel
DRILLER/Co.: Vironet
DRILLING RIG: Mobile GeoProbe

BORING NO.: PA1-04-SB-17-01
DATE START: 8-23-00
GEOLOGIST: Nathan Reel
DRILLER: Gorey

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Time	Remarks	PID/FID Reading (ppm)
		0 / 6"		Silty	Sand	Brn					0.0
		6" / 4'		↓	Sand	Light Brn					0.0
		4' / 4.5'			Sand	Brn					0.0
		4.5' / 5'			Sand	Dark Brn	Slightly Stained				0.0
		5' / 8'			Sand	Org					0.0
		8' / 10'			"	"					0.0

* When rock coring, enter rock brokeness.

Remarks: Temp. well

Background (ppm): 0.0

Converted to Well: Yes ✓ No ___ Well I.D. #: PA1-04-MW-03-01

Drilling:

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: N0095
DRILLING COMPANY: NR
DRILLING RIG: NA

BORING No.: PAI-04-SB-18
DATE: 04-18-00
GEOLOGIST: J Brown / A Bryant
DRILLER:

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows/6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
0.5	1.0'						Brown / Orange Sand			0	0		
1.0	1.5						Brown / Orange Sand			0	0		
1.5	2.0						" " with Trace black			0	0		
2.0	2.5						White Sand			0	0		
2.5	3.0						" , some orange			0	0		
3.0	3.5						White Sand with orange staining damp.			0	0		

* When rock coring, enter rock brokeness

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: _____

Drilling Area Background (ppm): _____

Converted to Well: Yes _____ No _____ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Parris Island
PROJECT NUMBER: N0095
DRILLING COMPANY: NA
DRILLING RIG: NA

BORING NUMBER: PAI-04-SB-19
DATE: 04/18/00
GEOLOGIST: D. Bragack / T. Brown
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
0"-6"							Water table reached						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes _____ No _____ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: N0095
DRILLING COMPANY: NA
DRILLING RIG: NA

BORING No.: PAI-04-SB-020
DATE: 4-18-00
GEOLOGIST:
DRILLER: J Brown / D Bropeak

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows/ 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Drilling BZ**
0.5	1.0						Clay - Brown			0	0		
1.0	1.5						"		Very hard	0	0		
1.5	2.0						"		"	0	0		
2.0	2.5						"		"	0	0		
2.5	3.0						"		"	0	0		
3.0	3.4						"		"	0	0		
3.4	3.5						Yellow orange Sand			0	0		
3.5	4.0						Orange/Tan Sand			0	0		

* When rock coring, enter rock brokeness

** Include monitor reading in 5 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes _____ No _____ Well I.D. #:

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: N0095
DRILLING COMPANY: NA
DRILLING RIG: NA

BORING No.: PAI-04-SB-21
DATE: 04/18/04
GEOLOGIST:
DRILLER: J. Brown / D. Bragack

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
0.5	1.0						Clay Brown			0	0		
1.0	1.5						" "			0	0		
1.5	2.0						" "			0	0		
2.0	2.5						" "			0	0		
2.5	3						Clay - Grey			0	0		
3	3.5						Coal type material white - tan Sand		Perhaps old Road	0	0		
3.5	4.0						White - Tan Sand			0	0		

* When rock coring, enter rock brokeness

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: _____

Drilling Area Background (ppm): ____

Converted to Well: Yes _____ No _____ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: N0095
DRILLING COMPANY: NA
DRILLING RIG: NA

BORING No.: PAI-04-SB-22
DATE: 04-18-00
GEOLOGIST:
DRILLER: J. Brown / D. Bragnet

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows/ 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
0.5	1.0						Brown clay		Hard clay	0	0		
1.0	1.5						" "			0	0		
1.5	2.0						" "			0	0		
2.0	2.5						" "			0	0		
2.5	3.0						" "			0	0		
3.0	3.5						Grey-Brown Clay			0	0		
3.5	4.0						Grey Marsh clay			0	0		

* When rock coring, enter rock brokeness

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: _____

Drilling Area Background (ppm): ____

Converted to Well: Yes _____ No _____ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: N0095
DRILLING COMPANY: NA
DRILLING RIG: NA

BORING No.: PAI-04-SB-23
DATE: 04/19/00
GEOLOGIST:
DRILLER: J. Brown / R. Bryant

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Drill BZ
0.5'	1'						Brown Clay			0	0		
1	1.5						" "			0	0		
1.5	2						" "			0	0		
2.0	2.5						" "			0	0		
2.5	3.0						Brown Clay with Black Rock fragments		Possibly old road material	0	0		
3.0	3.5						" "		" "	0	0		
3.5	4.0						Orange Sand			0	0		

* When rock coring, enter rock brokeness

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): ____

Remarks: ____

Converted to Well: Yes ____ No ____ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: N0095
DRILLING COMPANY: NA
DRILLING RIG: NA

BORING No.: PA1-04-SB-24
DATE: 4/19/00
GEOLOGIST:
DRILLER: J. Bow / D. Bragack

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows/ 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Driller BZ
0.5	1						Brown - Clay			0	0		
1	1.5						" "			0	0		
1.5	2						" "			0	0		
2.5	3						" "			0	0		
3	3.5						Orang - Tan Sand			0	0		
3.5	4.0						" "			0	0		

* When rock coring, enter rock brokenness

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes ____ No ____ Well I.D. #:

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: N0093
DRILLING COMPANY: NA
DRILLING RIG: NA

BORING No.: PAI-04-SB-25
DATE: 4/19/00
GEOLOGIST:
DRILLER: J. Brown / D. Brayack

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows/ 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Grab	Sampler BZ	Borehole**	Driller BZ**
0.5	1.0						Clay - Brown			0	0		
1	1.5						"			0	0		
1.5	2						"			0	0		
2.5	3.0						Clay - Brown			0	0		
3.0	3.5						Sand - Brown			0	0		
3.5	4.0						Orange-Tan Sand			0	0		

* When rock coring, enter rock brokenness

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ____ No ____ Well I.D. #:

BORING LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME/No.: Paris Island
GEOLOGIST: Nathan Reel
DRILLER/Co.: VironNet
DRILLING RIG: Mobile GeoProbe

BORING NO.: PA1-04-SB-~~18~~ 26-01
DATE START: 8-23-00
GEOLOGIST: Nathan Reel
DRILLER: Corey Gammell

JTB 12/14/00

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Time	Remarks	PID/FID Reading (ppm)
		0/4			CON	Brn	Silty Sand				0.0
		4/8			CON	Brn	Silty Sand			very little water encountered	0.0
		8/11			CON	Brn	Silty Sand				0.0

* When rock coring, enter rock brokeness.

Remarks: Temp well

Background (ppm): 0.0

Converted to Well: Yes ✓ No ___

Well I.D. #: PA1-04-MW-02-01

Driller: [signature]

LOG OF BORING NO. PAI 4-1

Site 4 - Dredge Spoils Fire Training Area
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 15.3'

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Shear Strength, ksf: Penetrometer (P) Torvane (T)	Shear Strength, ksf: Unconfined Compression	Shear Strength, ksf: Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
			SILTY CLAY, gray									
			- with sand pockets and shell fragments (1.0')									
			SILTY SAND, brown									
5			- with a few ferrous nodules at 3.0'									
			- gray at 6.0'									
10												
			- with a 2" clay seam at 14.0'									
15												
			- with gray, clay seams, 0.1" to 0.2" thick at 17.5'									
			(20.0')									
20												
25												
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 20.0'
Water First Noticed: --
Date: February 25, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: --
Wet Rotary: 0' to 20'
Boring Sealed: Grouted

McCLELLAND ENGINEERS

PLATE >

LOG OF BORING NO. PAI 4-2

Site 4 - Dredge Spoils Fire Training Area
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 15.3'

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Shear Strength, ksf: Penetrometer (P) Torvane (T)	Shear Strength, ksf: Unconfined Compression	Shear Strength, ksf: Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
			SILTY SAND, dark gray									
			- with clay pockets to 2.0'									
			- brown, 2.0' to 5.0'									
5			- gray below 5.0'									
			- with few clay pockets, 8.0' to 12.0'									
10			- with few clay seams, 12.0' to 14.0'									
			- with many clay seams, 14.0' to 16.0'									
15			- with some clay seams below 16.0'									
20			(20.0')									
25												
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 20.0'
Water First Noticed: --
Date: February 25, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J.. Byars
Dry Auger: --
Wet Rotary: 0' to 20'
Boring Sealed: Grouted

McCLELLAND ENGINEERS

PLATE >

LOG OF BORING NO. PAI 4-3

Site 4 - Dredge Spoils Fire Training Area
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 14.3'

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Shear Strength, ksf: Penetrometer (P) Torvane (T)	Shear Strength, ksf: Unconfined Compression	Shear Strength, ksf: Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
			SILTY SAND, brown									
5			- gray below 6.0'									
10			- with some clay pockets, 12.0' to 14.0' and at 16.0'									
15												
20			(20.0')									
25												
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 20.0'
Water First Noticed: --
Date: February 26, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: --
Wet Rotary: 0' to 20'
Boring Sealed: Grouted

McCLELLAND ENGINEERS

PLATE >

LOG OF BORING NO. PAI 4-4

Site 4 - Dredge Spoils Fire Training Area
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 9.0'

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Shear Strength, ksf: Penetrometer (P) Torvane (T)	Shear Strength, ksf: Unconfined Compression	Shear Strength, ksf: Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
			FILL: SILTY SAND, - with clay pockets (1.5')									
			SILTY SAND, brown									
5			- brown and gray, 6.0' to 8.0'									
			- gray at 8.0'									
10												
15			- with some clay seams at 16.0'									
			(20.0')									
20												
25												
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 20.0'
Water First Noticed: --
Date: February 26, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: --
Wet Rotary: 0' to 20'
Boring Sealed: Grout-1

McCLELLAND ENGINEERS

PLATE >

LOG OF BORING NO. PAI 4-5

Site 4- Dredge Spoils Fire Training Area
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 4.5'

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Shear Strength, ksf: Penetrometer (P) Torvane (T)	Shear Strength, ksf: Unconfined Compression	Shear Strength, ksf: Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
			SILTY SAND, brown (2.0')									
			SILTY CLAY, gray (3.5')									
5			SILTY SAND, brown, wet (6.0')									
10			CLAYEY SAND, gray and brown (12.0')									
15			SILTY SAND, gray - with a few 1/2" clay seams to 15.0' - some clayey sand pockets, 15.0' to 17.0' (20.0')									
20												
25												
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 20.0'
Water First Noticed: --
Date: February 25, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: 0' to 20'
Wet Rotary: --
Boring Sealed: Grouted

McCLELLAND ENGINEERS

PLATE >

LOG OF BORING NO. PAI 7-1

Site 7 - Page Field Fire Training Area
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 9.8'

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Penetrometer (P) Torvane (T)	Unconfined Compression	Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
			SILTY SAND, dark brown (1.5')									
			CLAYEY SAND, brown, wet (6.5')									
5												
			SILTY SAND, light brown, wet									
10												
			- gray at 14.0' (15.0')									
15												
20												
25												
30												
35												
40												
45												
50												
55												

Shear Strength, ksf

See Key for Terms and Symbols.

Completion Depth: 15.0'
Water First Noticed: 1.5'
Date: February 27, 2988
Depth to Water: --
Caved: --
Date: --

Job No.: 0501-7007
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: 0' to 15'
Wet Rotary: --
Boring Sealed: Well Installed

McClelland consultants

LOG OF BORING NO. PAI 7-2

Site 7 - Page Field Fire Training Area
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 10.0'

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Shear Strength, ksf: Penetrometer (P) Torvane (T)	Shear Strength, ksf: Unconfined Compression	Shear Strength, ksf: Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
			SILTY SAND, dark brown									
			- with rubble, 2.0' to 2.5'									
			- light brown at 3.0'									
			- wet at 4.0'									
5												
10			- gray at 9.5'									
15			(15.0')									
20												
25												
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 15.0'
Water First Noticed: 4.0'
Date: February 27, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 0501-7007
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: 0' to 15'
Wet Rotary: --
Boring Sealed: Well Installed

McClelland consultants

LOG OF BORING NO. PAI 7-3

Site 7 - Page Field Fire Training Area
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 9.4'

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Shear Strength, ksf: Penetrometer (P) Torvane (T)	Shear Strength, ksf: Unconfined Compression	Shear Strength, ksf: Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
			SILTY SAND, dark brown									
			- brown and gray at 3.0'									
			- wet below 3.0'									
5			- gray at 7.0'									
10												
15			(15.0')									
20												
25												
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 15.0'
Water First Noticed: 3.0'
Date: February 27, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 0501-7007
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: 0' to 15'
Wet Rotary: --
Boring Sealed: Well Installed

McClelland consultants

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: N0095
DRILLING COMPANY: Columbia Technology
DRILLING RIG: DPT

BORING NUMBER: PAI-07-MW-04(S)
DATE: 12/13/99
GEOLOGIST: G. Gunter
DRILLER: R. Brand

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
							Refer to cross section						
							for test pit						
							PAI-07-TP-02						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): ____

Remarks: _____

Converted to Well: Yes _____ No _____ Well I.D. #: _____

BORING LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME/No.: Parris Island/0095
GEOLOGIST:
DRILLER/Co.: Columbia Technology
DRILLING RIG: DPT

BORING NO.: PAI-09-MW-01 (S)
DATE START: 12/14/99
GEOLOGIST: G GUNTER
DRILLER: R. Brand.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Time	Remarks	PID/FID Reading (ppm)
1	0-4	- -	4'	1		Blk	F/Co Sand	SW			.3
		- -		2		Brn	F Sand	SP			
		- -									
		- -									
2	4-8	- -	4'				SAME	SP		Water 4.5 TOB	0
		- -									
		- -		6		Gra	CLAY	CL			
		- -								6" Gr. FSA @ 7 FT	
3	8-12	- -	4'	8			NO RECOVERY	-		SAND in Sleeve	0
		- -									
				12							

* When rock coring, enter rock brokeness.

Background (ppm): 0

Remarks: Converted to Temporary well using 3/4 PVC in DPT boring. Abandoned by grouting to surface AFTER sampling.

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-09-MW-01 (S)

BORING LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME/No.: Parris Island / 0095
GEOLOGIST: —
DRILLER/Co.: Columbia TECHNOLOGY
DRILLING RIG: DPT

BORING NO.: PAI-09-MW-02(S)
DATE START: 12/14/99
GEOLOGIST: GGUNTER
DRILLER: KANDY Brand.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Time	Remarks	PID/FID Reading (ppm)
1	0-4	— —	4'				6" Concrete underlain			Fill	0
		— —		2			by 6" gravel			1FT Gray f/Co SA	0.3
		— —				Brn	F Sand	SP			
		— —	—								
2	4-8	— —	4'				SAME	SP			0.9
										water @ 8'	
3	8-12	— —	4'				SAME	SP			0
		— —									
		— —									
		— —									
				12							

* When rock coring, enter rock brokeness.

Background (ppm): 0

Remarks: Converted to Temporary well using 3/4 PVC in DPT boring. Abandoned by grouting to surface after sampling.

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-09-MW-01(S)

Soil borings were not recorded for temporary wells PAI-13C-MW-01(S) and PAI-13C-MW-02(S).

LOG OF BORING NO. PAI 16-1

Site 16 - Pesticide Rinsate Desposal Area
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: --

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Shear Strength, ksf: Penetrometer (P) Torvane (T)	Shear Strength, ksf: Unconfined Compression	Shear Strength, ksf: Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
			FILL: ASPHALT AND GRAVEL (0.5')									
			SILTY SAND, light brown - with clay seams, 3.5' to 4.0'									
5			(6.5')									
			CLAY, light gray, and brown (7.5')									
10												
15												
20												
25												
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 15.0'
Water First Noticed: --
Date: February 23, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: 0' to 7.5'
Wet Rotary: --
Boring Sealed: Grouted

McCLELLAND ENGINEERS

PLATE >

LOG OF BORING NO. PAI 16-2

Site 16 - Pesticide Rinsate Desposal Area
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: --

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Shear Strength, ksf: Penetrometer (P) Torvane (T)	Shear Strength, ksf: Unconfined Compression	Shear Strength, ksf: Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
			FILL: SAND AND RUBBLE (0.5')									
			SILTY SAND, light brown									
5			- with clayey sand seam, 4.5' to 5.0'									
			- with clayey sand seam, 7.3' to 7.5' (7.5')									
			SANDY CLAY with sand pockets (8.5')									
10												
15												
20												
25												
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 8.5'
Water First Noticed: 3.0'
Date: February 23, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: 0' to 8.5'
Wet Rotary: --
Boring Sealed: Grouted

McCLELLAND ENGINEERS

PLATE >

LOG OF BORING NO. PAI 16-3

Site 16 - Pesticide Rinsate Desposal Area
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: --

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Shear Strength, ksf: Penetrometer (P) Torvane (T)	Shear Strength, ksf: Unconfined Compression	Shear Strength, ksf: Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
			FILL: GRAVEL AND ASPHALT (0.5')									
			SILTY SAND, light brown									
5			(7.5')									
			CLAY, gray, with a few sand pockets (8.0')									
10												
15												
20												
25												
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 8.0'
Water First Noticed: --
Date: February 23, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: 0' to 8'
Wet Rotary: --
Boring Sealed: Grouted

McCLELLAND ENGINEERS

PLATE >

Soil borings were not recorded for temporary well PAI-35-MW-01(S).

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: CTO 084/0095
DRILLING COMPANY: GREGG
DRILLING RIG:

BORING No.: PA107MW05
DATE: 9-8-04
GEOLOGIST: M. G. COCHRAN
DRILLER:

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1			1.0		LT GRY	SAND + GRAVEL	SM	DAMP				
						DK GREY	SILTY SAND	SM	LOOKS LIKE PEAT, ROOT				
S-1			3.0/			DK GREY	SILTY SAND		MTL	0	0	0	0
	4		4.0						SATURATED				
	5			5.0									
						GRN GREY	V. F. SAND TR	SP					
S-2			3.0/				SILT			0	0	0	0
			4.0										
	9												
	10												
						GR	V. F. SAND TR	SP					
S-3			2.8/	12			SILT			0	0	0	0
			4.0			GR	SILTY SAND	SM					
	14						TD 14'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 4 1/4 ID, 8 1/2 OD HSA W MACROCORE
TAPE MEASURE BROKE OFF IN HOLE DURING WELL CONST. OFFSET HOLE + REDRILLED FIRST HOLE FILLED W/ HOLEPLUG

Converted to Well: Yes ✓ No _____ Well I.D. #: PA 107 MW05

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: CTO 084/0095
DRILLING COMPANY: GREGG
DRILLING RIG: RHINO RIG

BORING No.: PAI 13C MW 03
DATE: 9-8-04
GEOLOGIST: MATT COCHRAN
DRILLER: MIKE DAVIS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
						DK BRN	V.F. SAND, TR	SP	DAMP, ROOT MTL, FILL?				
S1			3.2/	1.5 / 2.0		BL	SILT			0	0	0	0
			4.0			GR BRN	V. FINE SAND	SP	LOOKS NATURAL				
	4								SATURATED				
	5												
						LT GREY	V. F. SAND, LITTLE	SP	SATURATED				
S2			2.8/				SILT						
			4.0							0	0	0	0
	9												
	10												
S3			4.0/			LT GREY	V. F. SAND, LITTLE	SP	SATURATED	0	0	0	0
			4.0				SILT						
	14						TD 14'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: MACRO CORE, 4 1/4 ID, 8 1/2 OD HSA

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: PAI13C MW03

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: CTO 084/0095
DRILLING COMPANY: GREGG
DRILLING RIG: RHINO RIG

BORING No.: PAI13C MW04
DATE: 9-8-04
GEOLOGIST: M.G. COCHRAN
DRILLER: MIKE DAVIS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						SEE LOG OF			–	–	0	0
							PAI13C MW03						
							FOR LITHOLOGY						
	5												
	10												
							TD 14'						
	15												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4 1/4 ID, 8 1/2 OD HSA

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: PAI13C MW04

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: CTO 084/0095
DRILLING COMPANY: GREGG
DRILLING RIG: RHINO RIG

BORING No.: PA I13C MW05
DATE: 9-8-04
GEOLOGIST: M. G. COCHRAN
DRILLER: MIKE DAVIS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
						DK BRN	V. F. SAND, LITTLE	SP	LOOKS. NATL DAMP				
						DK BRN	SILT		ROOTS TOP 1'				
S1			2.3/							0	0	0	0
	4		4.0						SATURATED				
	5												
						LT GREY	V. F. SAND, TR.	SP	SATURATED				
S2			1.8/				SILT			0	0	0	0
			4.0										
	9												
	10												
						DK GREY	V. F SILTY SAND	SM					
S3			3.8/							0	0	0	0
			4.0										
	14						TD 14'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4 1/4 ID 8 1/2 OD HSA W MACRO CORE

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: PAI13C MW05

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: CTO 084/0095
DRILLING COMPANY: GREGG
DRILLING RIG: HAND AUGER

BORING No.: PA I13CMW06
DATE: 9-8-04
GEOLOGIST: M. G. COCHRAN
DRILLER: MIKE DAVIS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
						DK BRN	V.F. SAND, LITTLE	SP					
							SILT						
						GREY	V.F. SAND LITTLE	SP					
							SILT						
							TD 6'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: HAND AUGER

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: PAI13CMW06

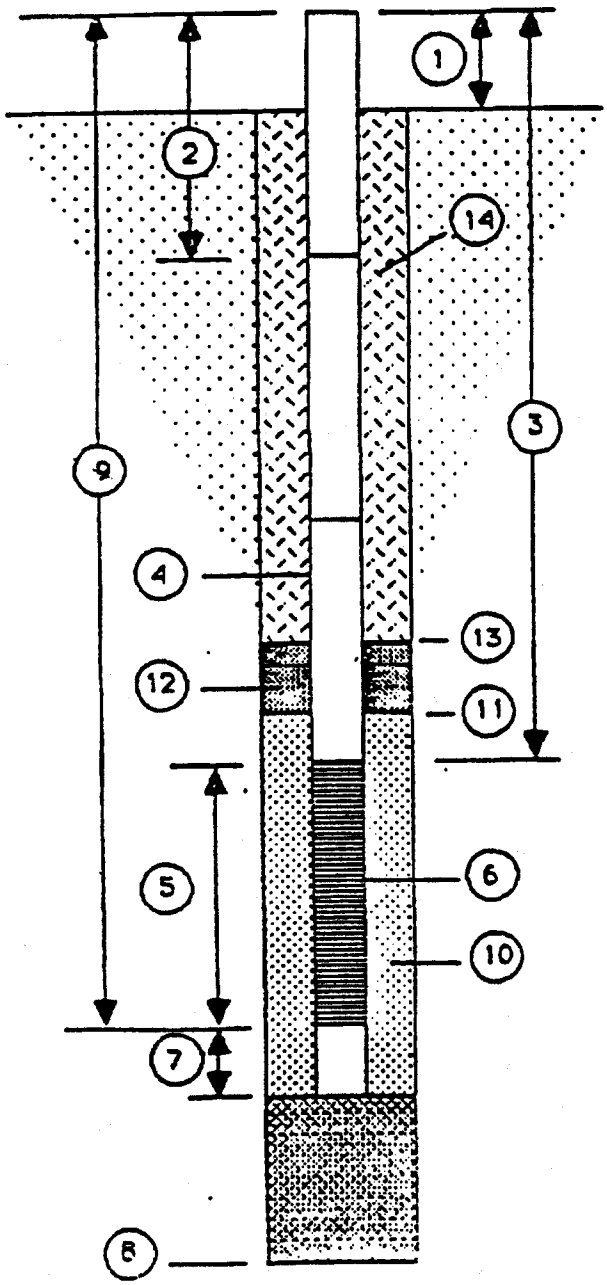
C-4 PERMANENT MONITORING WELL CONSTRUCTION SHEETS

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O BOX 10068
CHARLESTON S C 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER PAI- 7-1

DATE OF INSTALLATION 2-27-88



1. Height of Casing above ground 3.5'
2. Depth to first Coupling 3.0'

   Coupling Interval Depths _____

3. Total Length of Blank Pipe 6.5'
4. Type of Blank Pipe 2" Sch 40 PVC Threaded
5. Length of Screen 10.0'
6. Type of Screen 2" Sch 40 PVC Threaded 0.010"
7. Length of Sump _____
8. Total Depth of Boring 15.0' Hole Diameter 6.0"
9. Depth To Bottom of Screen 13.0'
10. Type of Screen Filter Frac Sand

    Quantity Used 200 LBS Size 16/30 U/C _____

11. Depth To Top of Filter 2.0'
12. Type of Seal Bentonite Pellets

    Quantity Used 25 LB

13. Depth To Top of Seal 0.8'
14. Type of Grout Cement / Bentonite

    Grout Mixture 5/94

    Method of Placement Pour in dry hole

COMMENTS ON INSTALLATION

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR P O BOX 10068
CHARLESTON S C 29411-0068

WELL DATA REPORT

WELL NUMBER PAI-7-1 AREA PAI Site 7

DATE OF INSTALLATION 2-27-88

WELL HOLE DATA

Drill Date 2-27-88 Well Driller J.A. Byars

Depth of Boring 15.0' Purpose of Boring Monitor

Drilling Method Dry Auger Mud Type —

WATER LEVEL DATA (All measurements from top of casing)

Water Level 6.5' Date of Measurement 3-23-88

DEVELOPMENT DATA

Development Method Hand Pump

Length of Time Developed 20 min. - clear, evacuated

LOCATION OF BOREHOLE INFORMATION

Drillers Log ✓ Geophysical Log

Physical Core ✓ Cutting Samples

Water Level Observations 1.5 ft.

DRILLED BY J.A. Byars SCCWD# 588

DEVELOPED BY J.A. Byars SCCWD# 588

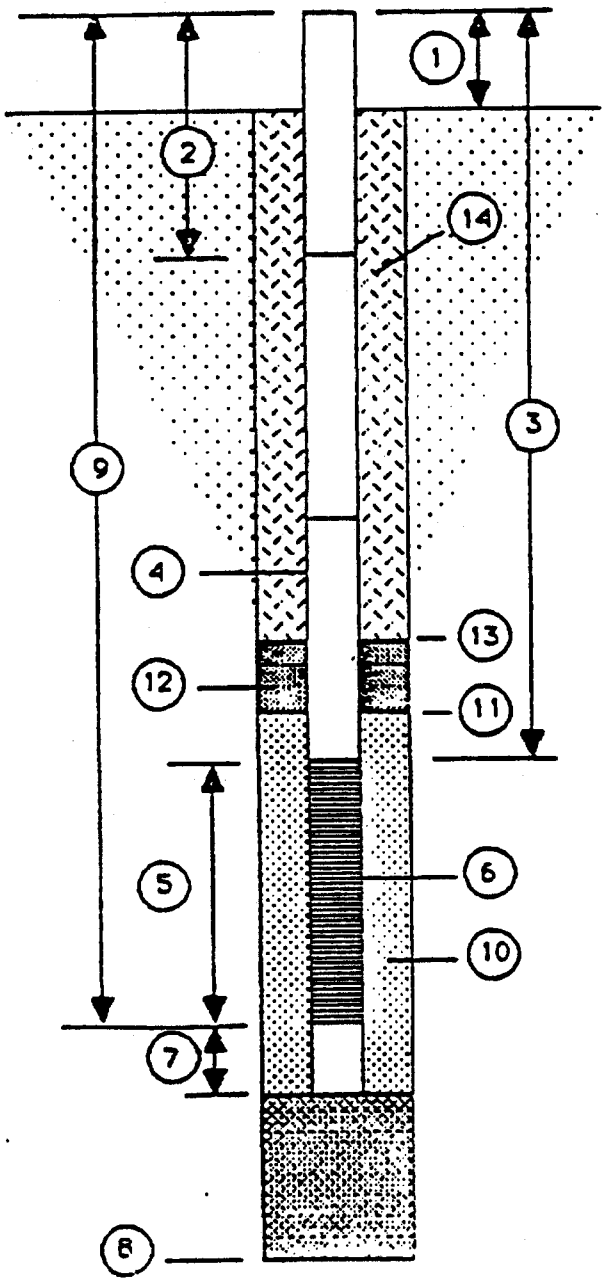
TECHNICAL OVERSIGHT BY

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR. P.O BOX 10068
CHARLESTON S C 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER PAI - 7-2

DATE OF INSTALLATION 2-27-88



1. Height of Casing above ground 3.5'
2. Depth to first Coupling 3.0'

   Coupling Interval Depths _____

3. Total Length of Blank Pipe 6.5'
4. Type of Blank Pipe 2" Sch 40 PVC Threaded
5. Length of Screen 10.0'
6. Type of Screen 2" Sch 40 PVC Threaded 0.010'
7. Length of Sump _____
8. Total Depth of Boring 15.0' Hole Diameter 6.0"
9. Depth To Bottom of Screen 13.0'
10. Type of Screen Filter Frac Sand

    Quantity Used 200 LBS Size 16/30 U/C _____

11. Depth To Top of Filter 2.1'
12. Type of Seal Bentonite Pellets

    Quantity Used 25 LBS

13. Depth To Top of Seal 0.9'
14. Type of Grout Cement / Bentonite

    Grout Mixture 94/5

    Method of Placement Pour in dry hole

COMMENTS ON INSTALLATION.

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR P O BOX 10068
CHARLESTON S C 29411-0068

WELL DATA REPORT

WELL NUMBER PAI-7-2 AREA PAI Site 7

DATE OF INSTALLATION 2-27-88

WELL HOLE DATA

Drill Date 2-27-88 Well Driller J.A. Byars

Depth of Boring 15.0' Purpose of Boring Monitor

Drilling Method Dry Auger Mud Type —

WATER LEVEL DATA (All measurements from top of casing)

Water Level 6.7' Date of Measurement 3-23-88

DEVELOPMENT DATA

Development Method Hand Pump

Length of Time Developed 20 min. - clear, evacuated

LOCATION OF BOREHOLE INFORMATION

Drillers Log ✓ Geophysical Log

Physical Core ✓ Cutting Samples

Water Level Observations 4. ft.

DRILLED BY J.A. BYARS SCCWD# 588

DEVELOPED BY J.A. BYARS SCCWD# 588

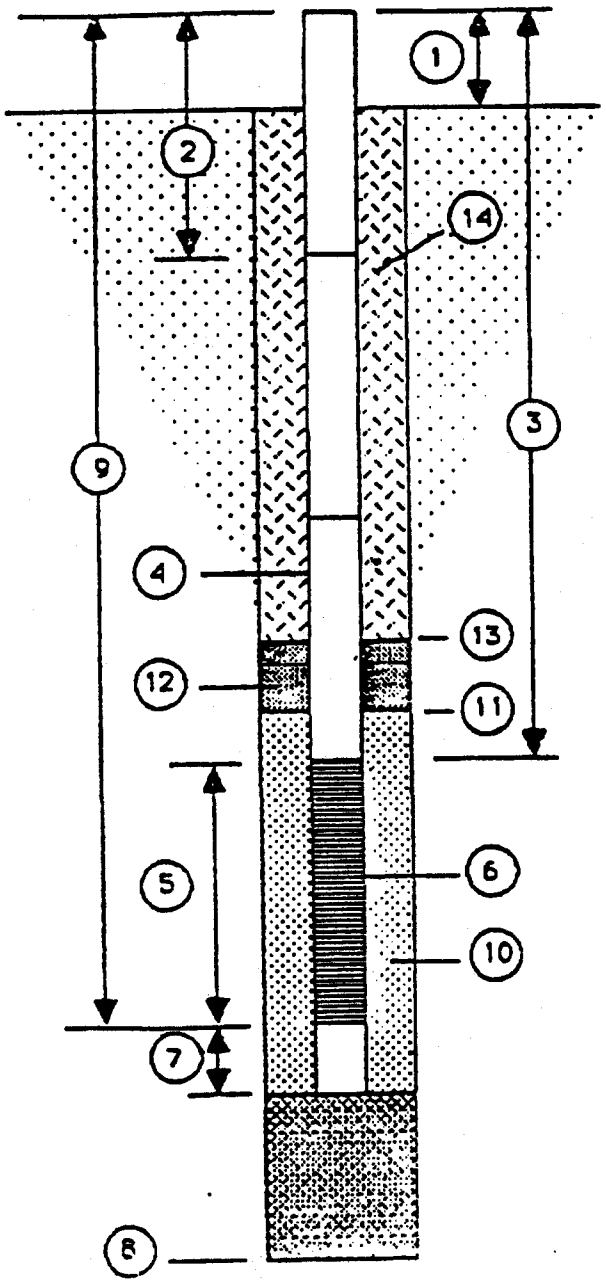
TECHNICAL OVERSIGHT BY

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O BOX 10068
CHARLESTON S C 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER PAI-7-3

DATE OF INSTALLATION 2-27-88



1. Height of Casing above ground 3.5'
2. Depth to first Coupling 3.0'

   Coupling Interval Depths _____

3. Total Length of Blank Pipe 6.5'
4. Type of Blank Pipe 2" Sch 40 PVC Threaded
5. Length of Screen 10.0'
6. Type of Screen 2" Sch 40 PVC Threaded 0.010"
7. Length of Sump _____
8. Total Depth of Boring 15.0' Hole Diameter 6.0"
9. Depth To Bottom of Screen 13.0'
10. Type of Screen Filter Frac Sand

    Quantity Used 200 LBS Size 16/30 U/C _____

11. Depth To Top of Filter 2.0'
12. Type of Seal Bentonite Pellets

    Quantity Used 25 LBS

13. Depth To Top of Seal 0.7'
14. Type of Grout Cement / Bentonite

    Grout Mixture 94/5

    Method of Placement Pour in dry hole

COMMENTS ON INSTALLATION.

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR P O BOX 10068
CHARLESTON S C 29411-0068

WELL DATA REPORT

WELL NUMBER PAI-7-3 AREA PAI Site 7

DATE OF INSTALLATION 2-27-88

WELL HOLE DATA

Drill Date 2-27-88 Well Driller J.A. Byars

Depth of Boring 15.0' Purpose of Boring Monitor

Drilling Method Dry Auger Mud Type –

WATER LEVEL DATA (All measurements from top of casing)

Water Level 5.8' Date of Measurement 3-23-88

DEVELOPMENT DATA

Development Method Hand Pump

Length of Time Developed 20 min. - clear, evacuated

LOCATION OF BOREHOLE INFORMATION

Drillers Log ✓ Geophysical Log

Physical Core ✓ Cutting Samples

Water Level Observations 3 ft.

DRILLED BY J.A. BYARS SCCWD# 588

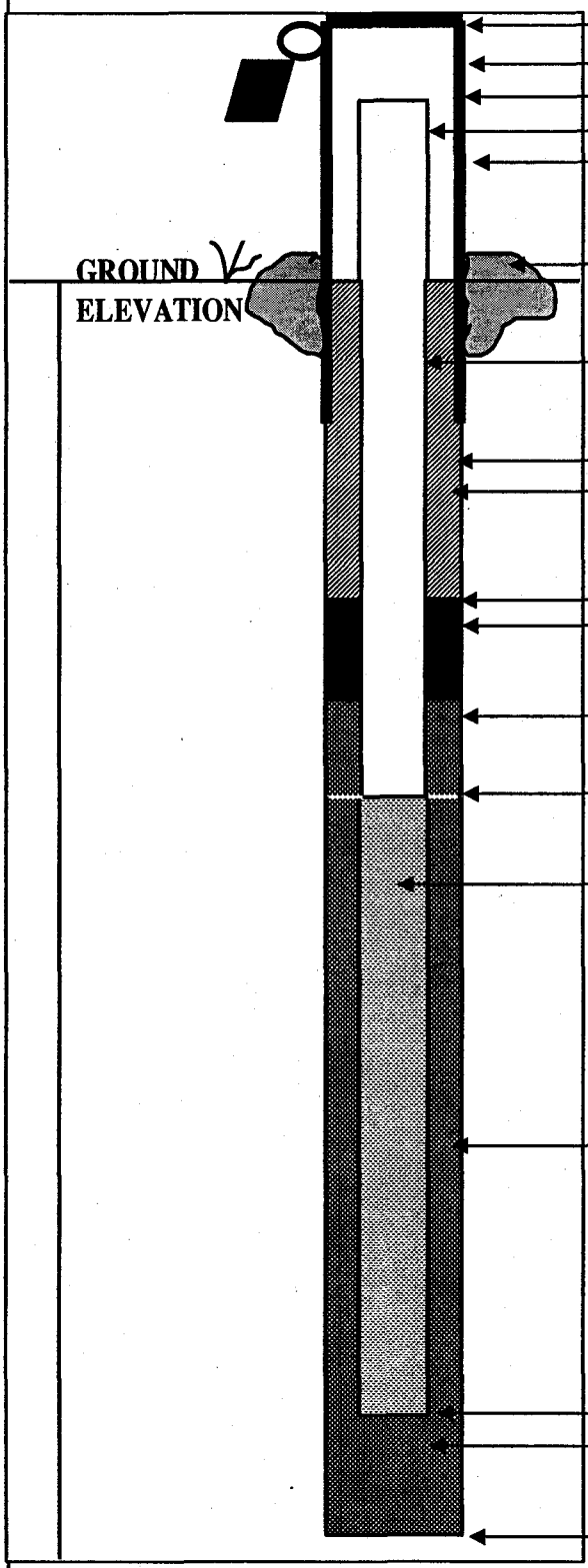
DEVELOPED BY J.A. BYARS SCCWD# 588

TECHNICAL OVERSIGHT BY

BORING NO.: PAI07MW05

Tetra Tech NUS, Inc. **OVERBURDEN MONITORING WELL SHEET**

PROJECT	MCRD PARRIS ISLAND	LOCATION	S.C.	DRILLER	GREGG
PROJECT NO.	0095	BORING	PAI07MW05	METHOD:	HSA
ELEVATION		DATE	9-8-04	DRILLING	
FIELD GEOLOGIST	M.G COCHRAN			DEVELOPMENT	PUMP



ELEVATION OF TOP OF SURFACE CASING: _____

ELEVATION OF TOP OF RISER PIPE: _____

STICK -UP TOP OF SURFACE CASING: _____

STICK-UP RISER PIPE: _____

I.D. OF SURFACE CASING: _____

TYPE OF SURFACE CASING: STEEL

TYPE OF SURFACE SEAL: CONCRETE PAD 3' X 3' W BARRIER POSTS

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC SCH 40

BOREHOLE DIAMETER: 8 1/2"

TYPE OF SEAL: CONCRETE TO 1'

ELEVATION / DEPTH OF SEAL: 1 1

TYPE OS SEAL: HOLEPLUG

DEPTH TOP OF SAND PACK: 2

ELEVATION / DEPTH TOP OF SCREEN: 1 3

TYPE OF SCREEN: PVC SCH 40

SLOT SIZE X LENGTH: .010 X 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA #2

ELEVATION / DEPTHBOTTOM OF SCREEN: 1 13

ELEVATION / DEPTH BOTTOM OF SAND PACK: 1 14

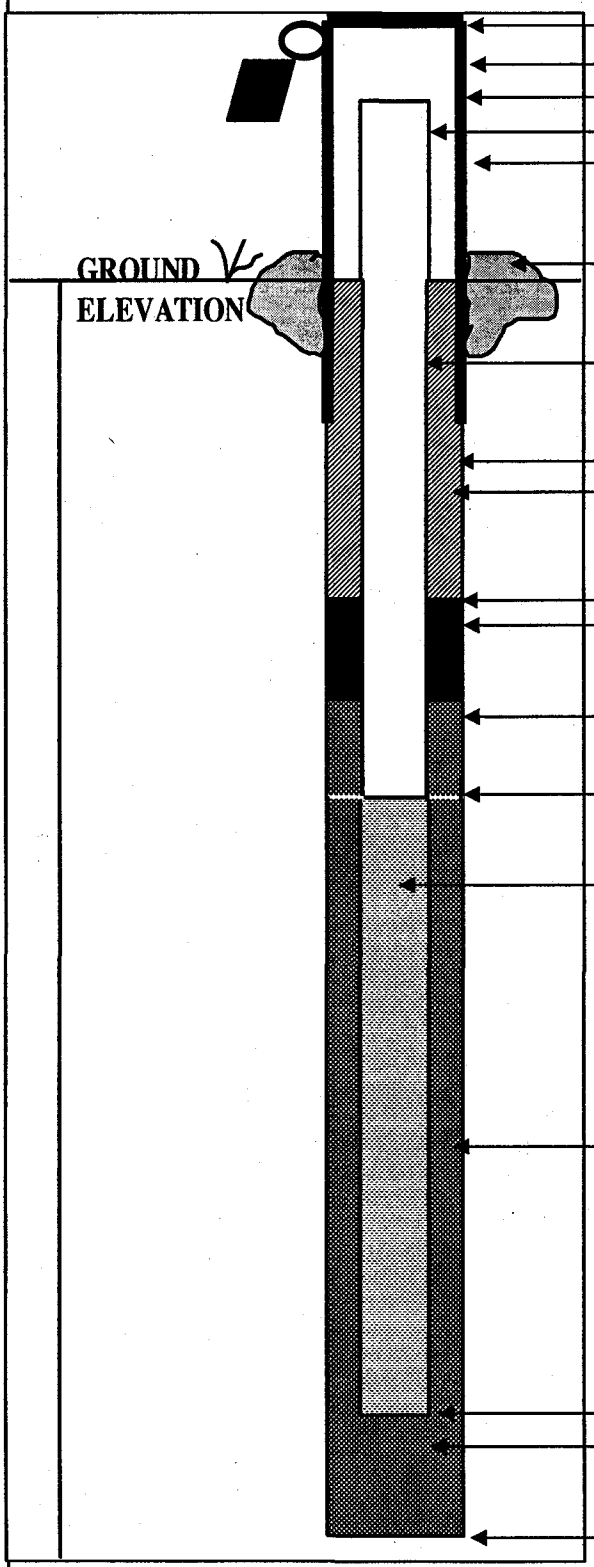
TYPE OF BACKFILL BELOW OBSERVATION WELL: _____

ELEVATION / DEPTH OF HOLE: 1 14

BORING NO.: PAI13CMW03

Tetra Tech NUS, Inc. **OVERBURDEN MONITORING WELL SHEET**

PROJECT	MCRD PARRIS ISLAND	LOCATION	S.C.	DRILLER	GREGG
PROJECT NO.	0095	BORING	PAI13CMW03	METHOD:	HSA
ELEVATION		DATE	9-8-04	DRILLING	
FIELD GEOLOGIST	M. G. COCHRAN			DEVELOPMENT	PUMP



ELEVATION OF TOP OF SURFACE CASING:

ELEVATION OF TOP OF RISER PIPE:

STICK -UP TOP OF SURFACE CASING:

STICK-UP RISER PIPE:

I.D. OF SURFACE CASING:

TYPE OF SURFACE CASING: STEEL

TYPE OF SURFACE SEAL: CONCRETE PAD 3' X 3' W BARRIER POSTS

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 8 1/2

TYPE OF SEAL: CONCRETE TO 1'

ELEVATION / DEPTH OF SEAL: 1 1

TYPE OS SEAL: HOLE PLUG

DEPTH TOP OF SAND PACK: 2

ELEVATION / DEPTH TOP OF SCREEN: 1 3

TYPE OF SCREEN: PVC SLOTTED

SLOT SIZE X LENGTH: .010 X 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA #2 6-BAGS

ELEVATION / DEPTHBOTTOM OF SCREEN: 1 13

ELEVATION / DEPTH BOTTOM OF SAND PACK: 1 14

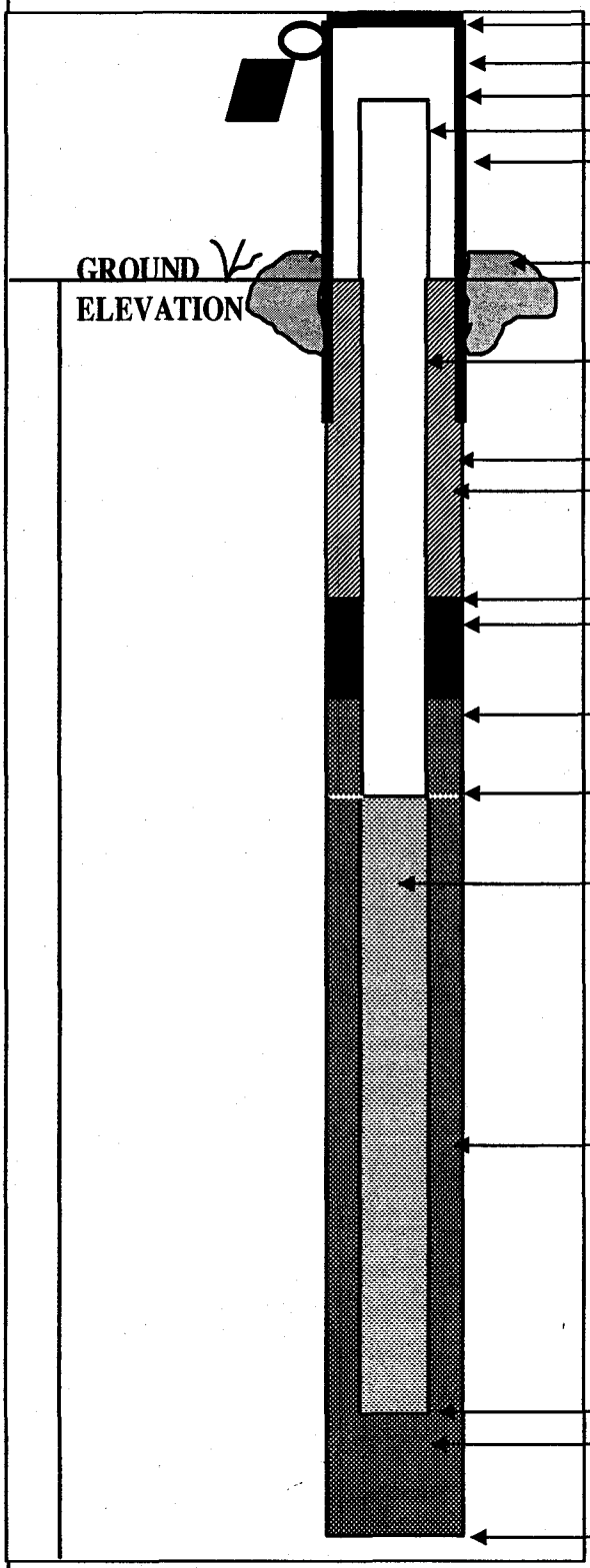
TYPE OF BACKFILL BELOW OBSERVATION WELL: SILICA #2 SAND

ELEVATION / DEPTH OF HOLE: 1 14

BORING NO.: PAI3CMW04

Tetra Tech NUS, Inc. **OVERBURDEN MONITORING WELL SHEET**

PROJECT	MCRD PARRIS ISLAND	LOCATION	S.C	DRILLER	GREGG
PROJECT NO.	0095	BORING	PAI13CMW04	METHOD:	HSA
ELEVATION		DATE	9-8-04	DRILLING	
FIELD GEOLOGIST	M. G COCHRAN			DEVELOPMENT	PUMP



ELEVATION OF TOP OF SURFACE CASING:

ELEVATION OF TOP OF RISER PIPE:

STICK -UP TOP OF SURFACE CASING:

STICK-UP RISER PIPE:

I.D. OF SURFACE CASING:

TYPE OF SURFACE CASING: STEEL

TYPE OF SURFACE SEAL: CONCRETE PAD 3'X3' W. BARRIER POSTS

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: 2" PVC SCH 40

BOREHOLE DIAMETER: 8 1/2"

TYPE OF SEAL: CONCRETE TO 1'

ELEVATION / DEPTH OF SEAL: 1 1

TYPE OS SEAL: HOLEPLUG

DEPTH TOP OF SAND PACK: 2

ELEVATION / DEPTH TOP OF SCREEN: 1 3

TYPE OF SCREEN: PVC SLOTTED SCH 40

SLOT SIZE X LENGTH: .010 X 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA #2 10 BAGS

ELEVATION / DEPTHBOTTOM OF SCREEN: 1 13

ELEVATION / DEPTH BOTTOM OF SAND PACK: 1 14

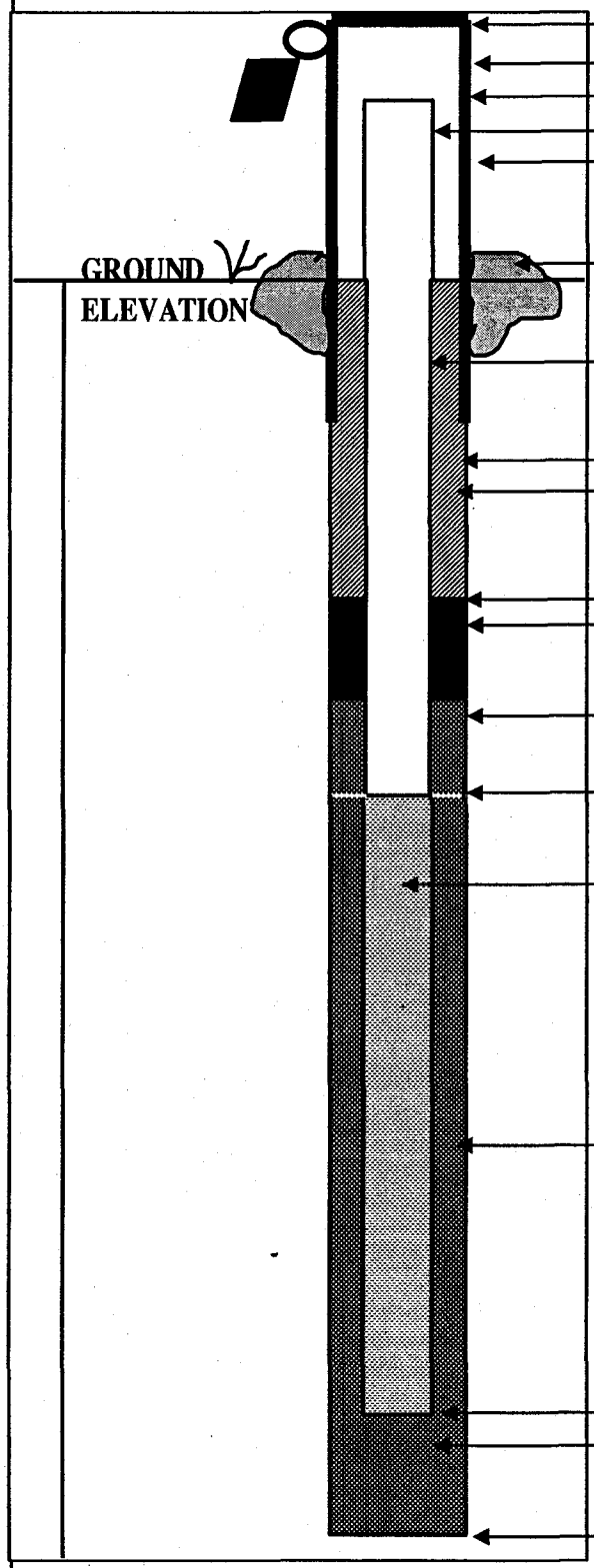
TYPE OF BACKFILL BELOW OBSERVATION WELL:

ELEVATION / DEPTH OF HOLE: 1 14

BORING NO.: PAI3C MW05

Tetra Tech NUS, Inc. **OVERBURDEN MONITORING WELL SHEET**

PROJECT	MCRD PARRIS ISLAND	LOCATION	S C	DRILLER	GREGG
PROJECT NO.	0095	BORING	PAI3C MW05	METHOD:	HSA
ELEVATION		DATE	9-8-04	DRILLING	
FIELD GEOLOGIST	M. G. COCHRAN			DEVELOPMENT	PUMP



ELEVATION OF TOP OF SURFACE CASING: _____

ELEVATION OF TOP OF RISER PIPE: _____

STICK -UP TOP OF SURFACE CASING: _____

STICK-UP RISER PIPE: _____

I.D. OF SURFACE CASING: _____

TYPE OF SURFACE CASING: _____

TYPE OF SURFACE SEAL: CONCRETE

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC SCH 40

BOREHOLE DIAMETER: 8 1/2"

TYPE OF SEAL: CONCRETE TO 1'

ELEVATION / DEPTH OF SEAL: 1 1

TYPE OS SEAL: HOLEPLUG

DEPTH TOP OF SAND PACK: 2

ELEVATION / DEPTH TOP OF SCREEN: 1 3

TYPE OF SCREEN: PVC SLOTTED

SLOT SIZE X LENGTH: .010 X 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA #2

ELEVATION / DEPTHBOTTOM OF SCREEN: 1 13

ELEVATION / DEPTH BOTTOM OF SAND PACK: 1 14

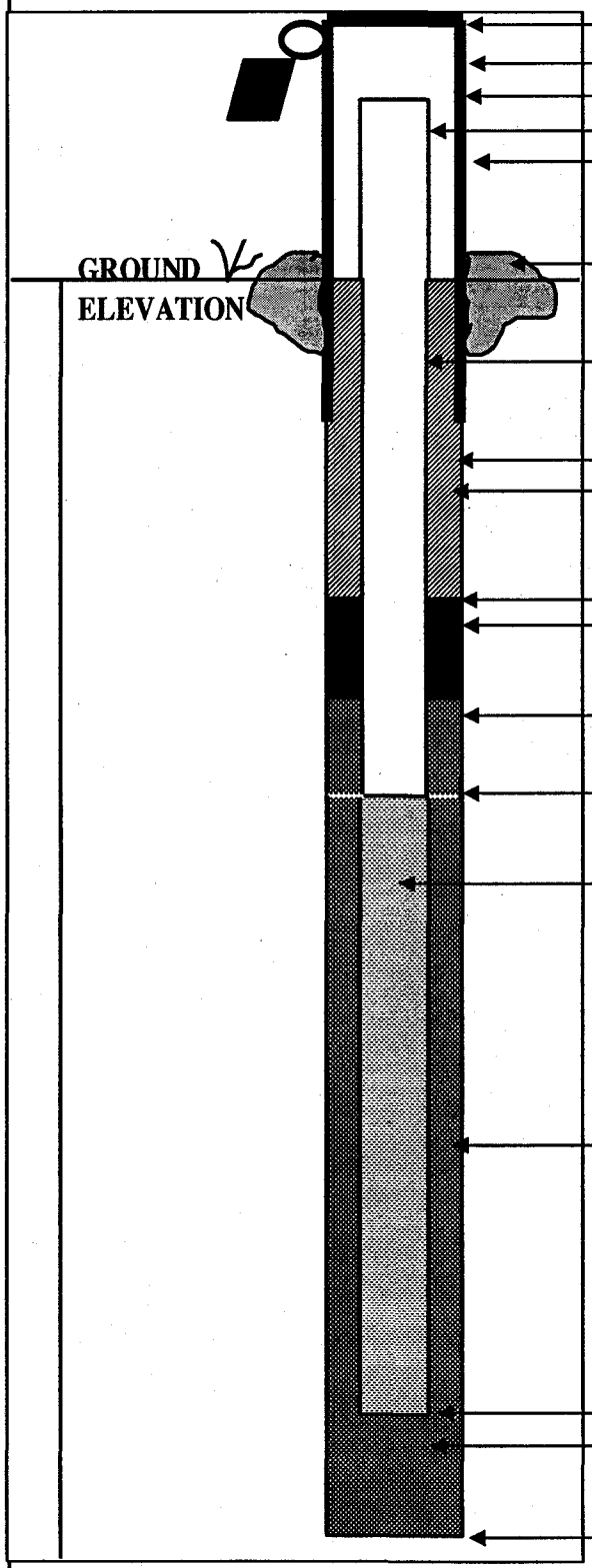
TYPE OF BACKFILL BELOW OBSERVATION WELL: SILICA #2

ELEVATION / DEPTH OF HOLE: 1 14

BORING NO.: PAI13CMW06

Tetra Tech NUS, Inc. **OVERBURDEN MONITORING WELL SHEET**

PROJECT	MCRD PARRIS ISLAND	LOCATION	S.C.	DRILLER	GREGG
PROJECT NO.	0095	BORING	PAI13CMW06	METHOD:	HAND AUGER
ELEVATION		DATE	9-8-04	DRILLING	
FIELD GEOLOGIST	M.G. COCHRAN			DEVELOPMENT	N/A



ELEVATION OF TOP OF SURFACE CASING: NONE

ELEVATION OF TOP OF RISER PIPE:

STICK -UP TOP OF SURFACE CASING: NONE

STICK-UP RISER PIPE: 4'

I.D. OF SURFACE CASING: NONE

TYPE OF SURFACE CASING: NONE

TYPE OF SURFACE SEAL: HOLE PLUG

RISER PIPE I.D.: 3/4"

TYPE OF RISER PIPE: PVC SCH 40

BOREHOLE DIAMETER: 4"

TYPE OF SEAL: HOLE PLUG

ELEVATION / DEPTH OF SEAL: 10

TYPE OS SEAL: HOLEPLUG TO G.S

DEPTH TOP OF SAND PACK: 1

ELEVATION / DEPTH TOP OF SCREEN: 12

TYPE OF SCREEN: JOHNSON CONT. WOUND SCREEN

SLOT SIZE X LENGTH: .010 X 4'

I.D. OF SCREEN: 3/4"

TYPE OF SAND PACK: SILICA #2

ELEVATION / DEPTHBOTTOM OF SCREEN: 16

ELEVATION / DEPTH BOTTOM OF SAND PACK: 16

TYPE OF BACKFILL BELOW OBSERVATION WELL:

ELEVATION / DEPTH OF HOLE: 16

C-5 MONITORING WELL DEVELOPMENT SHEETS

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: PA1-07-MW-05
Site: 7 UB
Date Installed: 9/8/2004
Date Developed: 9/9/04
Dev. Method: Pump + Surge
Pump Type: WHALE

Depth to Bottom (ft.): 12.7
Static Water Level Before (ft.): 2.00
Static Water Level After (ft.):
Screen Length (ft.): 10
Specific Capacity:
Casing ID (in.): 2

Responsible Personnel: F. WUDKWYCH
Drilling Co.: GREGG
Project Name: Parris Island
Project Number: N0095

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1330								START PUMPING
1340		10		27.44	5.48	0.196	999	DARK BROWN/GREY
1345		20		26.60	5.45	0.184	662	
1353		31		26.39	5.49	0.182	184	
1355		36		26.68	5.29	0.181	23	STOP WILL LET RECHARGE
1403		38		↓	↓	↓	↓	BEGIN PUMPING
1408		46						STOP
1410		48		26.30	5.35	0.180	26	
1415		55		26.11	5.36	0.177	20	
1420		60		26.26	5.42	0.179	22	END

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Measurement from stick up

Well: PA1-13C-MW-03
Site: 13C
Date Installed: 9/8/04
Date Developed: 9/9/04
Dev. Method: Well Pump (WHALE)
Pump Type: Pump + Surge

Depth to Bottom (ft.): 17.2
Static Water Level Before (ft.): 8.75
Static Water Level After (ft.): Purged dry
Screen Length (ft.): 10'
Specific Capacity:
Casing ID (in.): 2"

Responsible Personnel: Jason Brown
Drilling Co.: Greg Drill
Project Name: Parris Island
Project Number: N0095

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units S/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0810	–	–	–	–	~~4.6~~	–	–	grey
0825		13 gal	purged dry	23.03	4.6	16.4	129	light grey, cloudy
0925			start pump	23.06	4.6	16.4	149	light grey, cloudy
0930		16 gal	purged dry					
0950			Start pump					
0953		19 gal	purge dry	22.7	4.3	19.1	973	brown/grey cloudy / Finish

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: PAI-13C-MW-04
Site: 13C
Date Installed: 9/8/04
Date Developed: 9/9/04
Dev. Method: WHALE
Pump Type: Pump & Surge

Depth to Bottom (ft.): 17.40
Static Water Level Before (ft.): 8.62
Static Water Level After (ft.):
Screen Length (ft.): 10'
Specific Capacity:
Casing ID (in.): 2"

Responsible Personnel: MG COCHRAN
Drilling Co.: GREGG DRILLING
Project Name: Parris Island
Project Number: N0095

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units S/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0850		1	14.5	22.2	5.7	3.12	71000	brown/gray, cloudy
0855		3	pumped dry					
0913		4	pump start	22.0	6.1	7.90	>1000	brown/gray, cloudy
0920		1	pumped dry					
0934			pump start					
0943		13	pumped dry	21.71	5.9	8.54	389	cloudy
1036		20	pump start	21.73	5.9	8.73	64.0	slightly cloudy
1046								
1049		23	pump dry	21.65	6.0	8.8	60.0	slightly cloudy
1112			pump start	21.72	6.2	7.9	354	
1117		40*	pump dry					Finish

* Visual Estimate

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: PAI-13C-MW-05
Site: 13C
Date Installed: 9/8/04
Date Developed: 9/9/04
Dev. Method: WHALE
Pump Type: Pump + Surge

Depth to Bottom (ft.): 17.2
Static Water Level Before (ft.): 7.74
Static Water Level After (ft.):
Screen Length (ft.): 10
Specific Capacity:
Casing ID (in.): 2"

Responsible Personnel: Jason Brown
Drilling Co.: Arcs Drilling + Testing
Project Name: Parris Island
Project Number: N0095

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units S/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
10:13		—	7.74	23.7	4.3	13.4	71000	grey, cloudy
10:23		11		22.8	4.6	13.1	110	slightly cloudy
10:31		14	purged dry					
11:45								
11:55		24		22.8	4.74	13.6	650	
1205		30		22.8	4.59	14.0	~~14~~ (FG)	30
1211		38		22.8	4.56	13.7	19	
1216		44		22.6	4.55	13.9	17	
1220		47						FINISH

C-6 WATER LEVEL MEASUREMENTS

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: MCRD Parris Island **Project No.:** CTO 084/0095
Location: **Personnel:**
Weather Conditions: **Measuring Device:**
Tidally Influenced: Yes ___ No ___ **Remarks:**

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
PAI-13C-MW-03	9/10	0750			7.72			
PAI-13C-MW-04	9/10	0800			7.85			
PAI-13C-MW-05	9/10	0810			6.40			
PAI-13C-MW-06	9/10	0830			9.85			
~~PAI-07-MW~~								
PAI7-GW1	9/10	917			4.80			
PAI7-GW2	9/10	9:20			6.65			
PAI7-GW3	9/10	9:22			6.10			
PAI-07-MW-05	9/10	9:15			1.97			

* All measurements to the nearest 0.01 foot

TITLE MCRD PI **PROJECT NO.** N5260
WED APRIL 27 2005 **BOOK** 2589

Work continued from Page AT SITE: CD/SJC

AM: SUNNY COOL TO WARM, WINDY
PM: SUNNY WARMER, BREEZY.

0700 AT SITE - PACK UP MORE ITEMS TO SEND TO OFFICE.

0800 CALL FED EX FOR PICK-UP

0900 CALLED TIM H. LEFT MSG - SAID WE WERE FINISHING UP, CLEAN UP - WILL LEAVE 2 EMPTY DRUMS - TO BE CRUSHED. ROLL OFF BOX AND TANKER STILL HERE - TO BE REMOVED WHEN FENN VAC - GENERATES PROFILE.

1100 GO OUT TO SITE 13C HIGH TIDE

MW06	6.71	@ 1150
MW03	6.44	@ 1130
MW04	6.63	@ 1134
MW05	5.48	@ 1137

PACK UP MORE SUPPLIES

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE SJCorte DATE 4/27/05
WITNESS DATE

TITLE MCRD PI **PROJECT NO.** N5260
THURS APRIL 28 2005 **BOOK** 2589

Work continued from Page AT SITE: SJC/CD

AM: SUNNY, COOL
PM: " WARM

0700 AT SITE - FINISH PACKING LAST OF EQUIP AND PAPERWORK

0830 TALKED TO TIM H. TOLD HIM WE WERE FINISHING UP AND THAT WE LEFT TWO EMPTY DRUMS NEAR SHED - BASE WILL TAKE THEM TO BE CRUSHED ROLL OFF - AND TANKER STILL ON SITE - WILL BE TAKEN AWAY WHEN PROFILE IS DONE.

1730 CLEAN OUT SHED - EMPTY GARBAGE CLOSE UP - ROLL OFF AND SECURE LID ON TANKER.

1300 FED EX PICKS UP PACKAGES.

1700 FINAL CLEAN UP OF SITE AND SHED - LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE SJCorte DATE 4/28/05
WITNESS DATE

TITLE MCRD PI **PROJECT NO.** N5260

TUES APRIL 26 2005 **BOOK** 2589

Work continued from Page

AT SITE: SJC/CD.

AM: CLOUDY, WARM
PM: CLOUDY, WARM, BREEZY.

0650 AT SITE - PREPARE FOR WATER LEVELS. UNCAP ALL 53 WELLS FIRST TO ALLOW WELLS TO EQUILABRATE.

0830 START TO TAKE WL @ SITE 45

0930 DONE WITH WL - SEE GW MEAS SHEETS.

1020 REPLACE ALL FLUSH MOUNT CAPS

1030 HEAD OUT TO SITE 13C.

HIGH TIDE

PAI - 13C - MW-06
PAI - 13C - MW-03
PAI - 13C - MW-04
PAI - 13C - MW-05

NO SEE BELOW.

1035 COULD NOT GET ACCESS TO SITE. THE BASE WAS PERFORMING PRACTICE MANEUVERS NEAR OUR SITE WHL

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE S. Conte DATE 4/26/05

TITLE MCRD PI **PROJECT NO.** N5260

TUES (CONT) 2005 **BOOK** 2589

Work continued from Page

HAVE TO GET HIGH TIDE ON WED

1130 RETURN TO SITE 45 - CONTINUE TO CLEAN UP - AND PACK RENTAL EQUIP.

1400 CALLED TOM PATTON - WILL SEND HIM SOME EQUIP BACK - 200' TAPE - 2 ROLLS PE TUBING (100' PER ROLL) 2 UN OPENED SURGICAL GLOVES - 1 EYEWASH, 1 GRAD CYLINDER, 1 ROLL (50') SILICONE TUBING

1600 FED EX PICKS UP PACKAGES

1630 AT SITE 13C. - LOW TIDE

MW-06	6.66	@	1645
MW-03	6.44	@	1631
MW-04	6.72	@	1633
MW-05	5.67	@	1636

1800 LU SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE S. Conte DATE 4/26/05

Saltwater Gear

Tides for Parris Island, Marine Corps Recruit Depot starting with April 25, 2005.

Day		High /Low	Tide Time	Height Feet	Sunrise Sunset	Moon	Time	% Moon Visible
M	25	Low	4:12 AM	-0.3	6:42 AM	Set	7:18 AM	99
	25	High	10:03 AM	7.0	7:59 PM	Rise	9:44 PM	
	25	Low	4:11 PM	-0.3				
	25	High	10:26 PM	8.3				
Tu	26	Low	4:57 AM	-0.3	6:41 AM	Set	7:59 AM	97
	26	High	10:46 AM	6.9	8:00 PM	Rise	10:54 PM	
	26	Low	4:55 PM	-0.3				
	26	High	11:11 PM	8.2				
W	27	Low	5:44 AM	-0.2	6:40 AM	Set	8:48 AM	92
	27	High	11:34 AM	6.7	8:01 PM			
	27	Low	5:42 PM	-0.1				
Th	28	High	12:02 AM	8.0	6:39 AM	Rise	12:03 AM	84
	28	Low	6:34 AM	0.0	8:02 PM	Set	9:47 AM	
	28	High	12:28 PM	6.5				
	28	Low	6:32 PM	0.1				
F	29	High	1:02 AM	7.8	6:38 AM	Rise	1:06 AM	75
	29	Low	7:28 AM	0.3	8:02 PM	Set	10:53 AM	
	29	High	1:29 PM	6.4				
	29	Low	7:29 PM	0.3				
Sa	30	High	2:07 AM	7.5	6:37 AM	Rise	2:00 AM	65
	30	Low	8:28 AM	0.4	8:03 PM	Set	12:03 PM	
	30	High	2:34 PM	6.4				
	30	Low	8:34 PM	0.5				
Su	1	High	3:12 AM	7.4	6:36 AM	Rise	2:46 AM	54
	1	Low	9:32 AM	0.4	8:04 PM	Set	1:14 PM	
	1	High	3:38 PM	6.6				
	1	Low	9:46 PM	0.5				
M	2	High	4:16 AM	7.3	6:35 AM	Rise	3:24 AM	42
	2	Low	10:36 AM	0.3	8:04 PM	Set	2:23 PM	
	2	High	4:41 PM	6.9				
	2	Low	10:57 PM	0.5				
Tu	3	High	5:16 AM	7.3	6:34 AM	Rise	3:58 AM	31
	3	Low	11:34 AM	0.0	8:05 PM	Set	3:29 PM	
	3	High	5:42 PM	7.2				
W	4	Low	12:01 AM	0.3	6:33 AM	Rise	4:28 AM	21
	4	High	6:15 AM	7.3	8:06 PM	Set	4:34 PM	
	4	Low	12:27 PM	-0.3				
	4	High	6:39 PM	7.7				

Return to the S. Carolina selection page, the FAQs/definitions page, the region selection page, the script licensing page, or to the home page.

For information on regulations for fishing in S. Carolina contact: S. Carolina Department of Natural Resources

Typhoons, Hurricanes, etc., are NOT included in the predictions. Tidal current direction changes and tide high and low time predictions can be very different. Tide predictions are PREDICTIONS, they can be wrong so use common sense.

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Sun Tide

C-7 GROUNDWATER PURGE AND SAMPLE LOG SHEETS

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parris Island
Project No.: 0095

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[X] QA Sample Type: DPT-Temporary well

Sample ID No.: PAI-04-GW-01-01
Sample Location: PAI-04-MW01 (C)
Sampled By: GG
C.O.C. No.: 02227
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 12/16/99 Time: 1345 Method: Low Flow	Clear	4.25	11.1	16.8	146	3.68	0.62	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 12/15-16/99								
Method: Low Flow	Initial	4.03	11.3	18.0	>999	3.06	0.63	
Monitor Reading (ppm): -0-	1							
Well Casing Diameter & Material	2		SEE LOW FLOW					
Type: 3/4" Sch 40 PVC	3			PURGE SHEETS				
BGS Total Well Depth (TD): 8.5 FT								
Static Water Level (WL): 5 FT TOC								
One Casing Volume(gal/L): 0.04 g								
Start Purge (hrs): 12/15-16/99								
End Purge (hrs): —								
Total Purge Time (min): 186								
Total Vol. Purged (gal/L): 3.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TAL Metals, Tin	HNO_3	1 L Plastic	✓
Cyanide	NaOH	1-500 ml Plastic	✓
TCL SVOCS	—	2-1LA	✓
TCL Pest/PCB	—	2-1LA	✓
TCL VOCs	HCL	3-40 ml VOA	✓
Add App IX VOCs	HCL		✓
Add App IX Pest/PCBs	—		✓
Add App IX SVOCs	—		✓
App. IX Org. Pest	—		✓
App IX Herbicides	—		✓
App IX Non Hal. VOC	HCL		✓

OBSERVATIONS / NOTES:

Very slow purge due to clays below surface. Bottle requirements verified by Laboratory prior to sampling.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAI-04-MW-01(S)

PROJECT: Parris Island
PROJECT NUMBER: 0095
SITE: Site/Swmu 4

DATE: 12/15-16/99
WEATHER: Sunny & Cool to Cold
PERSONNEL: G Gunter

Well Screen Depth: 3.5 / 18.5 ft.
Initial Water Level: 5.0 TOC @ 1442 hrs.

Pump Type/Material: Peristaltic
Pump Intake Depth: ~6

Total Purge Volume= 3.9 (gal/L) 14.9 Liters
Total Purge Time= 186 (min)

Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected

Time	Water Level feet below TOC	Volume mL	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO mg/L	Turbidity NTU	Salinity ppt	Eh mV	Comments
1442	5.0	—	—	—	—	—	—	—	—	—	—	reduce Flow
1447		600	~120	~1/2	19.0	4.22	11.1	1.50	>999	0.62		" "
1453		600	~100	~1/2	19.0	4.12	11.2	2.92	>999	0.63		
1459		600	~100	~1/3	19.0	4.07	11.3	1.54	759	0.63		
1506		600	~86	~1/3	18.9	4.07	11.3	2.25	270	0.64		
1513		600	~86	~1/3	18.9	4.07	11.3	2.71	358	0.64		
1519		600	100	~1/3	18.9	4.04	11.2	1.26	908	0.63		Reduce Flow
1526		600	~86	~1/3	18.7	4.04	11.4	1.28	386	0.64		Reduce Flow
1533		600	~86	~1/3	18.8	4.03	11.2	1.43	403	0.63		
1540		600	~86	~1/3	18.8	4.03	11.3	0.62	590	0.64		
1547		600	~100	~1/3	18.8	4.04	11.3	1.30	652	0.64		
1553		600	~86	~1/3	18.5	4.03	11.3	1.10	667	0.63		
1600		600	~86	~1/3	18.6	4.03	11.3	0.72	479	0.64		
1607		600	~86	~1/3	18.3	4.04	11.3	2.18	259	0.63		
1613		600	~100	~1/3	18.5	4.03	11.4	1.16	550	0.64		
1621		600	~75	~1/3	18.2	4.03	11.4	0.61	271	0.64		
1629		600	~75	~1/3	18.3	4.02	11.4	0.65	296	0.64		

Water Quality Meter (S/N): Horiba U-10 water Checker
Control Box Type (S/N):
Turbidimeter (S/N):

Notes: Tide coming In. morning 12/15
High ≈ 1340
Tide high 12/16 ≈ 1450

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAF-04-MW-01(S)

PROJECT: Parris Island
PROJECT NUMBER: 0095
SITE: Swmu 4

DATE: 12/15-16/99
WEATHER: Sunny & Cool to Cold
PERSONNEL: G. Gunter

Well Screen Depth: 3.5 / 8.5 ft.
Initial Water Level: 5 Ft @ 1442 hrs.

Pump Type/Material: Peristaltic
Pump Intake Depth: ~6 Ft

Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected

Total Purge Volume= 3.9 (gal) L) 14.9 gal.

Total Purge Time= 186 (min)

Time	Water Level feet below TOC	Volume mL	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO mg/L	Turbidity NTU	Salinity ppt	Eh mV	Comments
1636	—	—	—	—	—	—	—	—	—	—	—	did not record
1643		700	~100	~1/3	18.0	4.03	11.3	3.06	>999	0.63	—	reduced Flow
1653		700	~70	~1/3	18.0	4.03	11.2	0.93	>999	0.63	—	
1700		700	~100	~1/3	17.9	4.04	11.2	1.35	>999	0.63	—	
1707		700	~100	~1/3	17.7	4.04	11.2	1.98	>999	0.63	—	Stop for day
12/16/99												
1254	5.02	—	—	~1/3	—	—	—	—	—	—	—	Start
1259		700	120	~1/3	16.9	4.25	10.9	2.18	90	0.61		
1308		600	~67	1/3	16.4	4.22	11.2	3.86	449	0.63		increased to Full speed
1311				Dry								
1321				Start								
1324		600	200	Full	16.8	4.26	11.1	3.88	621	0.62		
1326				Dry								
1339				Start								
1345		600	100	~1/3	16.8	4.25	11.1	3.68	146	0.62		
1345	Sample											

Water Quality Meter (S/N): Horiba U-10 Water Chek
Control Box Type (S/N):
Turbidimeter (S/N):

Notes:

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Additions - JJB 12/12/00

Page___ of ___

Project Site Name: Parris Island
Project No.: N0095

[] Domestic Well Data
[X] Monitoring Well Data - DPT Temporary well
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: PAI-04-MW-03-01
Sample Location: PAI-04-MW-03-01
Sampled By: MK
C.O.C. No.: 9A08C4860
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 8-23-00								
Time: 1940								
Method: low flow	Clear	5.68	10.9	22.1	10	1.44	0.61	

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 8-23-00								
Method: low flow	0	—	—	—	—	—	—	80ml/min
Monitor Reading (ppm): 0.0	2600ml	5.82	11.0	23.9	27	2.50	0.60	
Well Casing Diameter & Material	3546m	5.70	10.8	22.4	12	2.75	0.61	
Type: 1" Temp well	3946ml	5.75	10.8	22.3	10	2.86	0.61	
Total Well Depth (TD): 11.00	4346ml	5.68	10.9	22.1	10	1.44	0.61	
Static Water Level (WL): 6.59								
One Casing Volume(gal): 0								
Start Purge (hrs): 1430 55								
End Purge (hrs): 1940								
Total Purge Time (min): 310								
Total Vol. Purged (gal): 0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TAL Metals, Tin	HNO_3	1 L Plastic	✓
TCL VOCs + App IX VOCs	HCl	3 - 40 mL VOA	✓
TCL SVOCs + App IX SVOCs	-	2 - 1 L A	✓
TCL Pest/PCBs + App IX	-	2 - 1 L A	✓
App IX organo Pest	-		✓
App IX Herbicides	-		✓
TDS	-		✓
Cyanide	NaOH	1 - 500 mL P	✓

OBSERVATIONS / NOTES:

11.06
6.59

Circle if Applicable:

MS/MSD ✓ Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Additions - SJB 12/12/00

Page___ of ___

Project Site Name: Parris Island
Project No.: N0095

[] Domestic Well Data
[X] Monitoring Well Data - DPT Temporary well
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: PAI-04-MW-03-01
Sample Location: PAI-04-MW-03-01
Sampled By: MR
C.O.C. No.: 9A0264836
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 8-23-00								
Time: 1740								
Method: low flow	clear	5.74	9.2	24.0	50	1.86	0.51	

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 8-23-00								
Method: low flow	0	—	—	—	—	—	—	80 ml/min initial
Monitor Reading (ppm): 0.0	542 ml	5.63	9.2	24.5	999	1.09	0.51	80 ml/min 7.20
Well Casing Diameter & Material	1084 ml	5.74	9.2	24.0	50	1.86	0.51	80 ml/min 7.50
Type: 1" Temp well								
Total Well Depth (TD): 11.00								
Static Water Level (WL): .088								
One Casing Volume(gal/L):								
Start Purge (hrs): 1630								
End Purge (hrs): 1740								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 1084								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCl	3x 40 ml vials	3
TCL SVOC	4°C	2 x 1 liter amber	2

OBSERVATIONS / NOTES:

11.00
6.96
4.04 x 0.0816 = .33 gal / 3.785 = 0.088 liters or 88 ml
88 ml x 3 = 264 ml → 3 well volumes

NO metals taken so turbidity did not have to been below 10 ntus.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: Parris Island.
Project No.: 0095

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PAI7-GW2-02
Sample Location: PAI7-2 (G6)
Sampled By: JRB
C.O.C. No.: 02284
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 12-14-99								
Time: 1205								
Method: Slow Purge Pump	Clear	5.80	0.169	21.3	0	1.37	0.00	

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 12-14-99								
Method: Slow Purge	Initial	5.86	.241	18.9	14	3.89	0.00	
Monitor Reading (ppm): — 0 —	1	5.92	.170	19.9	0	2.81	0.00	
Well Casing Diameter & Material	2	5.80	.169	21.4	0	1.80	0.00	
Type: 2" PVC	3							
Total Well Depth (TD): 16.89								
Static Water Level (WL): 7.25								
One Casing Volume(gal/L): 1.49 16.87								
Start Purge (hrs): 0930								
End Purge (hrs): 1158								
Total Purge Time (min): 148								
Total Vol. Purged (gal/L): 3.5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC x3	HCl	40 ml x3	12-14-99
Metals	HNO3		"
CN	NaOH	250 ml Plastic.	"

OBSERVATIONS / NOTES:

3 gals.

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAI 7-2 66 ~~PAI-72~~

PROJECT: Parris Island
PROJECT NUMBER: 10095
SITE: PAI 7-2

DATE: 12-14-99
WEATHER: Clear High of 69° F
PERSONNEL: J.R. Nill

Well Screen Depth: 6.89 / 16.89 ft.
Initial Water Level: 7.75 @ 0925 hrs.

Pump Type/Material: Geopump 2
Pump Intake Depth: ~11.89

Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected

Total Purge Volume= 3.5 gal. (gal / L)
Total Purge Time= 148 (min)

Time	Water Level feet below TOC	Volume mL/Gal	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO mg/L	Turbidity NTU	Salinity ~~ppt~~ %	Eh mV	Comments
0938	9.00	300 ml	~75		18.9	5.86	.241	3.89	14	0.00		
0950	9.89	2000 ml	~75		19.0	6.00	.177	3.70	0	0.00		
1000	10.35	1/2 gal	~~1/2 gal~~ ~25		19.7	6.00	.173	3.52	0	0.00		
1008	10.55	<3/4 gals	~75 ml		19.9	6.00	.170	3.47	0	0.00		
1019	10.45	<1 gal	~75 ml		19.8	6.00	.170	3.56	0	0.00		
1030	10.47	1 gal	~75 ml		19.9	5.92	.170	2.81	0	0.00		
1039	10.73	1 1/4 gal	~75 ml		20.9	5.90	.167	2.40	0	0.00		
1046	10.80	~1 1/2 gals	~75 ml		21.2	5.86	.167	2.37	0	0.00		
1055	10.81	~1 3/4 gal	~75 ml		21.2	5.86	.168	2.01	0	0.00		
1102	10.85	~2 gals	~75 ml		21.2	5.84	.166	2.05	0	0.00		
1111	10.83	~2 1/4 gals	~75 ml		21.4	5.83	.165	1.86	0	0.00		
1119	10.79	~2 1/2 gal	~75 ml		21.3	5.84	.167	1.71	0	0.00		
1129	10.87	~2 3/4 gal	~75 ml		21.4	5.80	.166	1.43	0	0.00		
1139	10.86	~3 gal	~75 ml		21.4	5.80	.169	1.48	0	0.00		
1149	10.85	~3 1/4 gal	~75 ml		21.4	5.80	.168	1.47	0	0.00		
1158	10.86	~3 1/2 gal	~75 ml		21.3	5.80	.169	1.37	0	0.00		
1205	Sample											

Water Quality Meter (S/N): HORIBA U-10 NUS0007
Control Box Type (S/N): N/A
Turbidimeter (S/N): HORIBA U-10 NUS0007

Notes: Pump keeps stopping because flow is so low.

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GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: Parris Island / Swmu 7
Project No.: 0075

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: PAI7-GW3-02
Sample Location: PAI-7-3
Sampled By: G. GUNTER
C.O.C. No.: 02284
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12/13/99	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1802	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: Low Flow	Clear	5.60	0.212	19.8	1	1.33	0.00	—

PURGE DATA:

Date: 12/13/99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Low Flow	Initial	5.55	0.193	20.1	165	1.16	0.00	
Monitor Reading (ppm): 0	1	5.58	0.206	19.9	17	1.48	0.00	
Well Casing Diameter & Material	2	5.58	0.211	19.8	4	0.71	0.00	
Type: 2" Sch 40 PVC	~~3~~	5.60	0.212	19.8	1	1.33	0.00	
Total Well Depth (TD): 17.77								
Static Water Level (WL): 8.28								
One Casing Volume(gal/L): 1.55								
Start Purge (hrs): 1548								
End Purge (hrs): 1758								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 13.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TAL metals (total)	HNO_3	1-1LP	✓
TCL VOCs	HCL	3-40ml VOAs	✓
Cyanide	NAOH	1-500ml Plastic	✓

OBSERVATIONS / NOTES:

Pumping 2 WC volumes

13.4 L = 3.5 g.

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): G. Gunter

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAE7-3

PROJECT: Parris Island SC
PROJECT NUMBER: 0095
SITE: Swmu 7

DATE: 12/13/99
WEATHER: Cool & Cloudy
PERSONNEL: G. GUNTER

Well Screen Depth: 5 / 15 ft.
Initial Water Level: 8.28 @ 1548 hrs.

Pump Type/Material: Peristaltic
Pump Intake Depth: ~7.5 Ft Bgs

Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected

Total Purge Volume= 13.4 (gal / L) = 3.5 g
Total Purge Time= 130 (min)

Time	Water Level feet below TOC	Volume mL	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO mg/L	Turbidity NTU	Salinity % ~~ppt~~	Eh mV	Comments
1548	8.28				~~20.1~~	~~5.~~	—	—	—	—	—	
1552	10.02	600	150		20.0	5.55	0.193	1.16	165	0.00	—	Rust color Reduced Flow
1557	10.62	700	140		20.0	5.56	0.183	1.12	191	0.00	—	Rust color Reduced Flow
1603	—	Left To check			on Test Pit		No	Reading		~~0.00~~	—	—
1611	12.68	700	~87.5		19.9	5.56	0.189	1.47	143	0.00	—	
1616	13.06	700	~87.5		19.9	5.56	0.194	1.48	126	0.00	—	Rust color Reduced Flow
1620	13.23	700	175		19.9	5.58	0.198	0.59	108	0.00	—	Same
1627	12.65	700	100		19.9	5.56	0.201	0.96	56	0.00	—	Same
1634	12.54	700	100		19.9	5.57	0.203	1.60	30	0.00	—	Sl. Rust Color
1643	12.41	700	~78		19.9	5.57	0.205	0.88	20	0.00		
1650	12.39	700	100		19.9	5.58	0.206	1.48	17	0.00	—	1 Vol
1657	12.33	700	100		19.9	5.55	0.208	1.47	15	0.00	—	
1706	12.27	700	98		19.8	5.59	0.209	0.90	11	0.00	—	
1714	12.25	700	~87.5		19.7	5.59	0.209	1.75	12	0.00	—	
1719	12.25	700	140		19.8	5.61	0.209	2.40	12	0.00	—	Reduced Flow
1727	12.29	700	87.5		19.7	5.60	0.211	0.58	9	0.00	—	
1733	12.31	700	100		19.8	5.58	0.211	1.98	5	0.00	—	

Water Quality Meter (S/N): Horiba U-10 water ckr
Control Box Type (S/N):
Turbidimeter (S/N):

Notes: Need 3.1 gal for 2 vols & drawdown
Very slow Producing well

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAT 7-3

PROJECT: Parris Island
PROJECT NUMBER: 0095
SITE: Swmu 7

DATE: 12/13/99
WEATHER: Cool Cloudy
PERSONNEL: G. Gunter

Well Screen Depth: 5 / 15 ft.
Initial Water Level: 8.28 @ 1548 hrs.

Pump Type/Material: Peristaltic
Pump Intake Depth: 2.5 ft Bgs

Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected

Total Purge Volume= 13.4 (gal/(L))

Total Purge Time= 130 (min)

Time	Water Level feet below TOC	Volume mL	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO mg/L	Turbidity NTU	Salinity ppt	Eh mV	Comments
1739	12.35	700	~117		19.8	5.58	0.211	1.32	5	0.00	—	
1748	12.39	800	~114		19.8	5.58	0.211	0.71	4	0.00		2v.
1751	12.42	800	~160		19.8	5.60	0.211	0.540	3	0.00		
1758	12.43	700	100		19.8	5.60	0.212	1.33	1	0.00		
Sample @ 1802												

Water Quality Meter (S/N): Horiba U-10 water Ckr
Control Box Type (S/N):
Turbidimeter (S/N):

Notes:
17:58
1548
2:10

GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: Parris Island
Project No.: 0095

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temp Well Point
[] QA Sample Type:

Sample ID No.: PAI-07-GW-04-01
Sample Location: PAI-07-MW-04(S)
Sampled By: JRN
C.O.C. No.: 02227
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 12/14/99								
Time: 1800								
Method: Low Flow	Clear	3.91	0.235	19.2	9	1.62	000	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 12.14.99								
Method: Slow Flow Purge	Initial	4.57	1.16	19.3	>999	1.06	0.00	—
Monitor Reading (ppm): - 0 -	1							
Well Casing Diameter & Material	2		SEE Low Flow Purge Data Sheet					
Type: 3/4" ID SS	3	3.91	0.235	19.2	9	1.62	000	—
Total Well Depth (TD): 12.50 TOC								
Static Water Level (WL): 7.07 TOC								
One Casing Volume (gal/L): ~~.35~~ .12								
Start Purge (hrs): 1555								
End Purge (hrs): 1740								
Total Purge Time (min): 105								
Total Vol. Purged (gal/L): 8.35L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Tal metals (TOT), Tin	HNO_3	1-1LP	✓
Cyanide	NaOH	1-500mLP	✓
TCL SVOCs	—	2-1LA	✓
TCL Pest/PCBs	—	2-1LA	✓
~~TCL PAHs~~			
TCL VOCs	HCL	3-40mL VOA	✓
All App IX VOCs	HCL		✓
All App IX Pest/PCB	—		✓
All App IX SVOCs	—		✓
App IX Organo Pest.	—		✓
App IX Herbicides	—		✓
App IX Non Hal.	—		✓

OBSERVATIONS / NOTES:

1600
1740
1555
1:45

$[[.75/12]/2]^2 \pi h\ 7.48 = 1\ vol = 0.12g.$

$.12g = 0.45L$

Circle if Applicable:

MS/MSD

Duplicate ID No.: PAI-07-GW-DU04-01

Signature(s): For Rob Hill

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAI-07-MW-04(S)

PROJECT: Pargis Island.
PROJECT NUMBER: 10095
SITE: Site 7

DATE: 12-14-99
WEATHER: Clear, High of 69°F
PERSONNEL: R. Hill

Well Screen Depth: 9.50 / 12.50 ft.
Initial Water Level: 7.07 @ 1555 hrs.

Pump Type/Material: peristaltic Geopump II
Pump Intake Depth: 11.50

Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected

Total Purge Volume= 8.3 (gal (L))

Total Purge Time= 105 (min)

Time	Water Level feet below TOC	Volume mL	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO. mg/L	Turbidity NTU	Salinity ppt	Eh mV	Comments
1606	9.20	600ml	~75ml		19.3	4.57	1.16	1.06	>999	0.00	–	
1613	9.94	1200ml	~75ml		19.6	4.37	.364	0.79	700	0.00	–	
1620	10.10	1800ml	~75ml		19.7	4.12	.281	1.13	102	0.01	–	
1628	N/A	2400ml	~75ml		19.6	4.02	.255	0.74	43	0.00	–	
1635	10.13	3000ml	~75ml		19.6	3.96	.251	0.75	29	0.00	–	
1642	N/A	3600ml	~75ml		19.6	3.97	.243	.97	20	0.00	–	
1648	N/A	4200ml	~75ml		19.5	3.97	.245	1.12	19	0.00	–	
1654	N/A	4800ml	~75ml		19.2	3.99	.233	1.65	12	0.00	–	
1703	N/A	5400ml	~75ml		19.3	3.99	.244	1.76	15	0.00	–	
1711	"	6000ml	~75ml		19.2	3.97	.239	1.00	12	0.00	–	
1718	"	6600ml	~75ml		19.3	3.95	.244	.91	15	0.00	–	
1726	"	7300ml	~75ml		19.1	3.97	.235	1.21	9	0.00	–	
1734	"	7900ml	~75ml		19.1	3.97	.236	0.96	9	0.00	–	
1740	"	8350ml	~75ml		19.2	3.91	.235	1.62	9	0.00	–	
1800	Sample											

Water Quality Meter (S/N): Horiba U-10 water Checker
Control Box Type (S/N):
Turbidimeter (S/N):

Notes:

GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: Parris Island
Project No.:

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Well Point (Temp)
[] QA Sample Type:

Sample ID No.: PAI-09-GW-01-01
Sample Location: PAI-09-MW-01(S)
Sampled By: JRN
C.O.C. No.: 02284
Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 12-14-99								
Time: 1450								
Method: Pump	Clear	7.01	.202	19.3	8	2.26	0	

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 12-14-99								
Method: Slow Purge.	Initial	6.44	.209	20.2	999	2.20	0	
Monitor Reading (ppm):	1	6.94	.197	19.9	36	2.08	0	
Well Casing Diameter & Material	2	6.92	.197	19.8	8	1.90	0	
Type: 3/4 PVC	3							
Total Well Depth (TD): 9.64'								
Static Water Level (WL): 4.32 TOC								
One Casing Volume(gal/L): 5.32 .0308	.122 gal							
Start Purge (hrs): 1400								
End Purge (hrs): 1450								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L): 2.4 L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOC + Add. Appen IX	HCl	3 x 40 ml	12-14-99
Metals + Tin	HNO3	50 ml plastic	"

OBSERVATIONS / NOTES:

5.32 w.c.
.0308 gal per ft.
x 3 = 0.~~616~~ .19

(3/4 in ÷ 2 ÷ 12)² π 5.32 x 7.48 = 0.122 gal. 1 vol

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):
		for Rob Neal

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAI-09-MW-01(S)

PROJECT: Parris Island
PROJECT NUMBER: 10095
SITE: Site 9

DATE: 12-14-99
WEATHER: Clear High of 69°F
PERSONNEL: R. Hill

Well Screen Depth: 4.64 / 9.64 ft.
Initial Water Level: 4.32 @ 1357 hrs.

Pump Type/Material: Geopump II
Pump Intake Depth: 8.64

Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected

Total Purge Volume= 2400 ml (gal / L)
Total Purge Time= 50 (min)

Time	Water Level feet below TOC	Volume mL	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO mg/L	Turbidity NTU	Salinity ppt	Eh mV	Comments
1408	N/A	600 ml	~75 ml		20.2	6.94	.209	2.20	999	0		
1419	4.66	1200 ml	~75 ml		19.9	6.94	.197	2.08	31	0		
1429	4.66	1800 ml	~75 ml		19.8	6.92	.197	1.90	8	0		
1446	4.66	2400 ml	~75 ml		19.3	7.01	.202	2.26	8	0		

Water Quality Meter (S/N): Horiba U-10 water check
Control Box Type (S/N):
Turbidimeter (S/N):

Notes:

Page ___ of ___

GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: Parris Island
Project No.: 0095

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: DPT
[] QA Sample Type:

Sample ID No.: PAI-09-GW-02-01
Sample Location: PAI-09-MW-02(S)
Sampled By: G Gunter
C.O.C. No.: 02284
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 12/14/99								
Time: 1550								
Method: Low Flow	Clear	7.04	0.187	20.6	1	5.16	0.00	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 12/14/99								
Method: Low Flow	Initial	8.44	0.240	26.3	>999	3.24	0.00	—
Monitor Reading (ppm): - 0 -	1	SEE	LOW	FLOW	PURGE	DATA	SHEET	
Well Casing Diameter & Material	2							
Type: 3/4" PVC	3	7.04	0.187	20.6	1	5.16	0.00	—
Total Well Depth (TD): 11.8	Final							
Static Water Level (WL): 9.35								
One Casing Volume(gal/L): 0.21 L								
Start Purge (hrs): 1409								
End Purge (hrs): 1544								
Total Purge Time (min): 95								
Total Vol. Purged (gal/L): 7.5 L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TAL metals (TOT)	HNO_3	1-1LP	✓
TCL VOCs	HCL	3-40ml VOA	✓
Cyanide	NaOH	1-500ml P.	✓

OBSERVATIONS / NOTES:

$[.75/12/2]^2 \pi h \times 7.48 \times 3.785 = 1 \text{ vol} = .21 \text{ L}$

Circle if Applicable:

MS/MSD	Duplicate ID No.: —

Signature(s): G Gunter

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAI-09-MW-02(S)

PROJECT: Parris Island Sc.
PROJECT NUMBER: 0095
SITE: SWMU-9

DATE: 12/14/99
WEATHER: Clear & Cool
PERSONNEL: G. Bender

Well Screen Depth: 6.8 / 11.8 ft.
Initial Water Level: 9.35 @ 1409 hrs.

Pump Type/Material: Peristaltic
Pump Intake Depth: ≈ 11.6 FT bgs

Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected

Total Purge Volume= ~~9.35 L~~ (gal / L) 7.5 L
Total Purge Time= 95 (min)

Time	Water Level feet below TOC	Volume mL	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO mg/L	Turbidity NTU	Salinity ppt	Eh mV	Comments
1409	9.35											
1415	—	600	100	SL>1/4	21.3	8.44	0.240	3.24	>999	0.00	—	
1423	—	700	87.5	SL>1/4	20.8	7.83	0.204	3.44	>999	0.00		
1432	—	700	78	SL>1/4	21.2	7.98	0.204	5.10	864	0.00		
1446	—	700	50	SL>1/4	20.7	7.82	0.200	5.62	[illegible]	0.00		
1452	Dry	—	—	—	—	—	—	—	—	—		pump stopped in order to reduce speed
1456	—	700	175	SL>1/4	20.9	7.58	0.200	4.24	11	0.00		
1505	—	700	78	SL>1/4	20.9	7.39	0.197	5.83	5	0.00		
1515	—	700	70	SL>1/4	20.8	7.27	0.190	5.24	6	0.00		
1523	—	700	87	SL>1/4	20.8	7.23	0.190	5.38	6	0.00		
1529	—	600	100	SL>1/4	20.8	7.13	0.189	6.06	3	0.00		
1536	—	700	100	SL>1/4	20.6	7.08	0.188	5.11	1	0.00		
1544	—	700	87	SL>1/4	20.6	7.04	0.187	5.16	1	0.00		
1550												

Water Quality Meter (S/N): Horiba NUS0008
Control Box Type (S/N):
Turbidimeter (S/N):

Notes: TD - 11.8, TW going dry
~~[illegible]~~ 1 vol = 0.2 L

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GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: Parris Island
Project No.: 0095

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temp. Well Point
[] QA Sample Type:

Sample ID No.: PAI-13C-MW-01(3)
Sample Location: PAI-13C-GW-01-01
Sampled By: RH
C.O.C. No.: 02227
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 12-16-99								
Time: 1400								
Method: Pump Low Flow	Clear	5.23	17.3	17.7	46	3.46	1.01	

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 12-15-99								
Method: Low Flow	Initial	~~5.2~~	See Low Purge Data Sheet					
Monitor Reading (ppm): 0	1							
Well Casing Diameter & Material	2							
Type: 3/4" Sch 40 PVC	3							
Total Well Depth (TD): 10' TOC								
Static Water Level (WL): 6-3'								
One Casing Volume(gal/L):								
Start Purge (hrs): 1610-12/15								
End Purge (hrs): 1350-12/16								
Total Purge Time (min): 309								
Total Vol. Purged (gal/L): 7L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOA Add. Appen IX	HCl	3 x 40 ml vials	12-16-99
Metals + Hg	HNO3	500 ml Plastic	"
CN	NaOH	250 ml "	"

OBSERVATIONS / NOTES:

Have to keep turning pump on & off to get all of sample bottles
See Low Flow Purge Data Sheet (Back)
Will have to ~~kept~~ keep turning pump on & off

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [illegible] for Rob Hall

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAI-13C-MW-01(S)

PROJECT: Parris Island
PROJECT NUMBER: 0095
SITE: Swmu-13C

DATE: 12-15-99 — 12-16-99
WEATHER: Clear & getting cool
PERSONNEL: RJHIL

Well Screen Depth: 4.0' / 9.0' ft.
Initial Water Level: 6.3 @ 1615 hrs.
Pump Type/Material: peristaltic
Pump Intake Depth:
Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected
Total Purge Volume= 9. (gal / L)
Total Purge Time= 309 (min)

Time	Water Level feet below TOC	Volume mL	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO mg/L	Turbidity NTU	Salinity ppt	Eh mV	Comments
1616	6.3	600 ml	<75 ml		18.5	3.90	17.1	2.18	999	1.0		
1624		1200 ml	"		18.5	3.67	16.9	2.10	999	.99		
1645		1800 ml	"		17.9	3.90	16.9	3.03	999	.99		
1653		2400 ml	"		18.5	3.60	16.6	1.85	999	.97		
1711		3000 ml	"		18.1	3.70	16.7	1.98	999	.98		
12/16/99 0936		3600 ml	"		16.2	4.75	16.8	2.45	535	.98		
1006		4200 ml	"		14.9	5.06	17.2	3.37	180	1.01		
1030		4800 ml	"		15.6	5.26	17.6	3.01	440	1.01		
1107		5400 ml	"		16.9	5.05	17.3	2.74	108	1.01		
1145		6000 ml	"		16.4	4.97	17.2	2.91	122	1.00		
1211		6600 ml	"		16.7	5.27	17.4	3.42	67	1.02		
1245		7200 ml	"		16.2	5.25	17.6	3.23	50	1.03		
1312		7800 ml	"		16.9	5.25	17.3	3.24	65	1.03		
		8400 ml	"		17.5	5.15	17.2	2.92	53	1.01		
1350		9000 ml	"		17.7	5.23	17.3	3.46	46	1.01		
1400	Sample											

Water Quality Meter (S/N): Horiba U-10
Control Box Type (S/N):
Turbidimeter (S/N):

Notes: 1630 Had To Turn pump off Because Well Dry
1654 Well Dry
* See Back for More Notes.

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GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: Parris Island
Project No.:

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: DPT Temp Well Point
[] QA Sample Type:

Sample ID No.: PAI-13-GW-0201
Sample Location: PAI-13C-MW-02(S)
Sampled By: Rob Hill/GG
C.O.C. No.: 02232
Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 12-17-99								
Time: 1330								
Method: Pump	Cloudy	4.11	17.7	13.0	514	4.43	1.03	

PURGE DATA: See Low Flow Purge Sheet

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 12-15-99								
Method: Slow Purge	Initial	2.56	20.1	17.4	999	5.18	1.20	
Monitor Reading (ppm): -0-	1							
Well Casing Diameter & Material	2	SEE		Low Flow		Sheets	-	
Type: 3/4" PVC	3							
Total Well Depth (TD): 10.30	Final	4.11	17.7	13.0	514	4.43	1.03	
Static Water Level (WL): 8.95								
One Casing Volume(gal/L): .09								
Start Purge (hrs): 1500 12/15/99								
End Purge (hrs): ~~0800~~ 1104 on 12/17/99								
Total Purge Time (min): 213								
Total Vol. Purged (gal/L): 1.5L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	3-40mL VOAs	✓
TAL metals (TOTAL)	HNO3	1-1LP	✓
Cyanide	NaOH	1-500 ml P	✓

OBSERVATIONS / NOTES:

Well is 8.5' BLS.

Started 1500 / 12-15-99
Stopped 1529 12-15-99
Start 0800 12-17-99
Stop 1104 12-17-99

0.02 gal = .09 L

$[.75/12/2]^2 \pi L \; 7.48 \cdot 3.785 =$

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Mary Gunter

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAI-13-GW1-0201

PROJECT: Parris Island
PROJECT NUMBER: 0095
SITE: Swmu 13C

DATE: 12-15-99
WEATHER: clear High of 69°F
PERSONNEL: G Gunter / Rob Hill

Well Screen Depth: 3.5 / 8.5 ft.
Initial Water Level: 8.95 @ 0800 hrs. 12/15/99
Pump Type/Material: Peristaltic Geopump 2
Pump Intake Depth: 8.0 ft
Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected
Total Purge Volume= 1.5 (gal / (L))
Total Purge Time= 213 (min)

Time	Water Level feet below TOC	Volume mL	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO mg/L	Turbidity NTU	Salinity ppt	Eh mV	Comments
1529		600 ml	<75ml		17.4	2.56	20.1	5.18	999	1.20		
0929		~~200 ml~~	<75ml		11.3	4.19	18.3	4.80	690	1.07		
1104		1550 ml	<75ml		13.0	4.11	17.7	4.43	514	1.03		
1104												

Water Quality Meter (S/N): Horiba U10 water checker
Control Box Type (S/N):
Turbidimeter (S/N):

Notes:

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GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: Parris Island
Project No.: 0095

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: DPT - well
[] QA Sample Type:

Sample ID No.: PAI-35-GW-01-01
Sample Location: PAI-35-MW-01(S)
Sampled By: G Gunter
C.O.C. No.: 02227
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 12/16/99								
Time: 1155								
Method: Low Flow	Clear	5.03	0.049	20.6	1	4.66	0.00	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 12/16/99								
Method: Low Flow	Initial	5.23	0.201	18.1	>999	4.20	0.00	—
Monitor Reading (ppm): — 0								
Well Casing Diameter & Material		SEE Low Flow Sheet						
Type: 1/2" ID SS								
Total Well Depth (TD): 16.83	Final	5.03	0.049	20.6	1	4.66	0.00	
Static Water Level (WL): 16.61								
One Casing Volume (gal/L): 0.085								
Start Purge (hrs): 1131								
End Purge (hrs): 1153								
Total Purge Time (min): 22								
Total Vol. Purged (gal/L): 4.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TIN & TAL metals (TOTAL)	HNO_3	1-1L P	✓
Cyanide	NAOH	1-500mL P	✓
TDS		1-1L P	✓

OBSERVATIONS / NOTES:

4.4 L = 1.2 gal

.09 L = 1 vol

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Gary Gunter

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAI-35-MW-01(S)

PROJECT: Parris Island
PROJECT NUMBER: 0095
SITE: SWMU 35

DATE: 12/16/99
WEATHER: Cool & Cloudy
PERSONNEL: G. Gunter

Well Screen Depth: 13.83 / 18.83 ft.
Initial Water Level: 16.61 @ 11:26 hrs.

Pump Type/Material: Peristaltic
Pump Intake Depth: ~17.5 ft

Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected

Total Purge Volume= 4.4 (gal) (L)

Total Purge Time= 22 (min)

Time	Water Level feet below TOC	Volume mL	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO mg/L	Turbidity NTU	Salinity ppt	Eh mV	Comments
1131	16.61	–		~~F~~	–	–	–	–	–	–	–	
1134	–	600	200	Full	18.1	5.23	0.201	4.20	>999	0.00	–	
1138	–	800	160	"	19.4	5.05	0.055	4.81	240	0.00	–	
1141	–	600	200	"	20.2	5.03	0.053	4.82	25	0.00	–	
1144	–	600	200	"	20.5	4.99	0.051	4.56	5	0.00	–	
1147	–	600	200	"	20.5	5.02	0.051	4.57	2	0.00	–	
1150	–	600	200	"	20.6	5.01	0.050	4.52	1	0.00	–	
1153	–	600	200	"	20.6	5.03	0.049	4.66	1	0.00	–	
1155	Sample											

Water Quality Meter (S/N): Horiba U10 water checker

Control Box Type (S/N):

Turbidimeter (S/N):

Notes: 1 vol = 0.9 L

Page ___ of ___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[] Domestic Well Data
[✓] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: PAI-7-GW-1-01
Sample Location: PAI 7GW1
Sampled By: FW
C.O.C. No.: 4377
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Sal	ORP
Date: 9-8-04	Visual	Standard	mS/cm	°C	NTU	mg/l	%	(MV)
Time: 1712								
Method: PERISTALTIC	CLEAR	5.99	0.103	25.28	5	0.00	0.00	120

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Sal	ORP
Date: 9-8-04								
Method: PERISTALTIC								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 16.9								
Static Water Level (WL): 4.58								
One Casing Volume(gal/L): 2.0								
Start Purge (hrs): 1603								
End Purge (hrs): 1712								
Total Purge Time (min): 69								
Total Vol. Purged (gal/L): 2.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative		Container Requirements	Collected
VOCs	HCL	4 C	3 X 40 ml vial	✓
SVOCs		4 C	2 X 1 L amber	✓
Metals	HNO3	4 C	500 ml poly	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	PAI-7-GW-DUP-01

Signature(s): [illegible]

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: CTO 084/0095
WELL ID.: PAI 76W1
DATE: 9-8-04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (MV)	Sal. (%)	Comments
1603	4.58									START
1612	5.06	120	5.99	0.125	18	0.95	25.12	110	0.00	
1620	5.16	↓	5.99	0.118	22	0.13	25.17	123	0.00	
1631	5.17		5.98	0.106	16	0.00	25.16	130	0.00	
1640	5.19		5.98	0.103	9	0.00	25.13	123	0.00	
1650	5.22		5.99	0.103	6	0.00	25.15	122	0.00	
1700	5.17	115	5.99	0.103	5	0.00	25.26	123	0.00	
1706	5.17	↓	5.99	0.103	5	0.00	25.28	122	0.00	
1712	5.18		5.99	0.103	5	0.00	25.28	120	0.00	SAMPLE
1805										END

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[] Domestic Well Data
[✓] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: PAI-7-GW-2-01
Sample Location: PAI 7GW7
Sampled By: FCW
C.O.C. No.: 4377
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Sal	ORP
Date: 9-9-04	Visual	Standard	mS/cm	°C	NTU	mg/l	%	(MV)
Time: 0950								
Method: PERISTALTIC	CLEAR	5.58	0.188	23.51	9	0.00	0.01	137

PURGE DATA:

Date: 9-9-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Sal	ORP
Method: PERISTALTIC								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 16.99								
Static Water Level (WL) 6.23								
One Casing Volume(gal/L): 1.7								
Start Purge (hrs): 0807								
End Purge (hrs): 0950								
Total Purge Time (min): 103								
Total Vol. Purged (gal/L): 2.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative		Container Requirements	Collected
VOCs	HCL	4 C	3 X 40 ml vial	✓
SVOCs		4 C	2 X 1 L amber	✓
Metals	HNO3	4 C	1 L ~~500~~ ml poly	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): [signature]

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: CTO 084/0095

WELL ID.: PAI-7GW-2
DATE: 9-9-04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (MV)	Sal. (%)	Comments
0807	6.23									START
0816	7.84	150	5.62	0.209	3	2.12	23.88	215	0.01	
0824	8.78	110	5.65	0.204	3	0.36	23.88	222	0.01	
0834	9.54	100	5.65	0.201	3	0.00	23.87	224	0.01	
0845	10.15	100	5.63	0.200	5	0.00	23.77	224	0.01	
0853	10.59	100	5.62	0.196	10	0.00	23.72	213	0.01	
0901	10.88	100	5.60	0.194	18	0.00	23.66	185	0.01	
0908	11.05	100	5.58	0.192	20	0.00	23.62	174	0.01	
0916	11.24	100	5.58	0.191	17	0.00	23.60	168	0.01	
0924	11.39	100	5.57	0.190	15	0.00	23.55	163	0.01	
0930	11.52	100	5.59	0.188	11	0.00	23.52	153	0.01	
0936	11.59	100	5.58	0.188	10	0.00	23.51	147	0.01	
0942	11.65	100	5.57	0.188	10	0.00	23.50	140	0.01	
0950	11.72	100	5.58	0.188	9	0.00	23.51	137	0.01	SAMPLE
1020										END

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: PAI-7-GW3-01
Sample Location: PAIGW3
Sampled By: FW / JB
C.O.C. No.: 4377
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Sal %	ORP (MV)
Date: 9-8-04								
Time: 1515								
Method: PERISTALTIC	CLEAR	5.71	0.214	23.32	50	0.00	0.01	-19

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Sal	ORP
Date: 9-8-04								
Method: PERISTALTIC								
Monitor Reading (ppm): –								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 16.9								
Static Water Level (WL): 5.50								
One Casing Volume(gal/L): 1.8								
Start Purge (hrs): 1325								
End Purge (hrs): 1515								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 3.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative		Container Requirements	Collected
VOCs	HCL	4 C	3 X 40 ml vial	✓
SVOCs		4 C	2 X 1 L amber	✓
Metals	HNO3	4 C	1 L ~~500~~ ml poly	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
–	–

Signature(s): [illegible]

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: CTO 084/0095
WELL ID.: PAIIGW3
DATE: 9-8-04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (MV)	Sal. (%)	Comments
1325	5.50									START
1335	7.65	220	5.82	0.301	153	1.95	23.43	-7	0.01	
1343	9.20	150	5.76	0.266	182	1.24	23.68	10	0.01	
1352	10.01	120	5.93	0.262	56	0.64	23.39	4	0.01	
1359	10.30	100	5.89	0.254	70	0.00	23.45	0	0.01	
1408	10.52	100	5.86	0.247	47	0.57	23.57	2	0.01	
1417	10.89	110	5.80	0.244	61	0.00	23.37	-2	0.01	
1426	11.09	110	5.77	0.235	58	0.00	23.45	-4	0.01	7840
1432	11.26	110	5.76	0.220	55	0.80	23.40	-2	0.01	8500
1441	11.45	110	5.74	0.218	50	0.00	23.47	-8	0.01	
1451	11.61	110	5.72	0.215	50	0.00	23.41	-11	0.01	
1459	11.76	110	5.71	0.213	50	0.00	23.38	-14	0.01	11,580
1508	11.84	110	5.71	0.213	50	0.00	23.52	-18	0.01	
1515	11.98	110	5.71	0.214	50	0.00	23.32	-19	0.01	SAMPLE
1543										END

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[] Domestic Well Data
[✓] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: PAI-07-GW-05-01
Sample Location: PAI07MW05
Sampled By: FCW
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Sal %	ORP (MV)
Date: 9-10-04								
Time: 1035								
Method: PERISTALTIC	CLEAR	5.34	0.177	26.51	2	5.39	0.01	114

PURGE DATA:

Date: 9-10-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Sal	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): –								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 13.2								
Static Water Level (WL): 1.97								
One Casing Volume(gal/L): 1.8								
Start Purge (hrs): 0920								
End Purge (hrs): 1035								
Total Purge Time (min): 75								
Total Vol. Purged (gal/L): 2.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative		Container Requirements	Collected
VOCs	HCL	4 C	3 X 40 ml vial	✓
SVOCs		4 C	2 X 1 L amber	✓
Metals	HNO3	4 C	1 L ~~500~~ ml poly	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD –

Duplicate ID No.: –

Signature(s): [illegible]

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: CTO 084/0095

WELL ID.: PAI07MW05
DATE: 9-10-09

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (MV)	Sal. (%)	Comments
0920	1.97									START
0927	2.15	120	5.38	0.203	15	3.35	27.09	103	0.01	
0935	2.15	115	5.34	0.189	13	4.20	26.93	110	0.01	
0943	2.16	120	5.31	0.183	9	4.69	26.57	117	0.01	
0950	2.17		5.32	0.180	11	4.94	26.44	118	0.01	
1000	2.18		5.32	0.179	8	5.34	26.40	119	0.01	
1009	2.18		5.33	0.177	4	5.39	26.38	117	0.01	
1018	2.20		5.33	0.177	4	5.37	26.49	115	0.01	
1027	2.20		5.35	0.177	5	5.38	26.50	112	0.01	
1035	2.20	↓	5.34	0.177	2	5.39	26.51	114	0.01	SAMPLE
1100										END

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: PA1-13C-~~MW~~ GW-03-01
Sample Location: PA1-13C MW-03
Sampled By: JJB
C.O.C. No.: 4330
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/10/04	Color	pH	S.C.	Temp.	Turbidity	DO	Sal	ORP
Time: 0835	Visual	Standard	mS/cm	°C	NTU	mg/l	%	(MV)
Method: PERISTALTIC	Clear	5.3	14.1	23.73	0.4	4.5	0.82	118

PURGE DATA:

Date: 9/10/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Sal	ORP
Method: PERISTALTIC								
Monitor Reading (ppm):		See	purge	sheet				
Well Casing Diameter & Material								
Type:								
Total Well Depth (TD): 16.5								
Static Water Level (WL): 7.72								
One Casing Volume(gal/L): 1.4								
Start Purge (hrs): 0750								
End Purge (hrs): 0835								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): ~~1.65~~ 2	1.7							

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative		Container Requirements	Collected
VOCs	HCL	4 C	3 X 40 ml vial	NA
SVOCs		4 C	2 X 1 L amber	NA
Metals + tin	HNO3	4 C	500 ml poly	✓

OBSERVATIONS / NOTES:

NA → Not a required analyte

Circle if Applicable:

MS/MSD	Duplicate ID No.:
	PA1-13C-GW-DUP-01

Signature(s):

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: CTO 084/0095
WELL ID.: PAI-13C-MW-03-01
DATE: 9/10/04

0750 → 7.72 - - - - - - - -

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (MV)	Sal. (%)	Comments Cum vol (L)
0755 ~~0735~~	8.01	200	5.0	14.0	11.1	6.0	23.70	150	0.80	1.0
0805	8.15	150	5.2	13.9	5.1	4.9	23.81	133	0.81	2.6
0815	8.17	130	~~4.~~ 5.2	14.0	0.5	4.7	23.76	125	0.81	3.8
0825	8.20	130	5.3	14.1	0.3	4.6	23.78	120	0.82	5.1
0835	8.21	130	5.3	14.1	0.41	4.5	23.73	118	0.82	6.4

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: PAI-13EGW-4-01
Sample Location: PAI 13GW4
Sampled By: FCW
C.O.C. No.: 4380
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9-10-04	Color	pH	S.C.	Temp.	Turbidity	DO	Sal	ORP
Time: 0855	Visual	Standard	mS/cm	°C	NTU	mg/l	%	(MV)
Method: PERISTALTIC	CLEAR	6.07	7.50	22.87	2	3.79	0.41	116

PURGE DATA:

Date: 9-10-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Sal	ORP
Method: PERISTALTIC								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 16.7								
Static Water Level (WL): 7.85								
One Casing Volume(gal/L): 1.4								
Start Purge (hrs): 0800								
End Purge (hrs): 0855								
Total Purge Time (min): 55								
Total Vol. Purged (gal/L): 1.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative		Container Requirements	Collected
VOCs	HCL	4 C	3 X 40 ml vial	NA
SVOCs		4 C	2 X 1 L amber	NA
Metals + TIN	HNO3	4 C	1 L ~~500~~ ml poly	✓

OBSERVATIONS / NOTES:

NA - Not a required analyte

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): [illegible]

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: CTO 084/0095
WELL ID.: PAI 13C GW4
DATE: 9-10-04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (MV)	Sal. (%)	Comments
0800	7.85									START
0805	7.97	110	6.06	7.61	0	7.63	23.02	127	0.41	
0815	8.04	↓	6.06	7.57	0	5.49	22.84	121	0.41	
0824	8.07	120	6.07	7.52	0	4.63	22.83	119	0.41	
0833	8.11		6.07	7.48	0	4.08	22.70	119	0.41	
0840	8.13	↓	6.07	7.49	0	3.82	22.72	118	0.41	
0848	8.12	110	6.07	7.48	1	3.81	22.88	117	0.41	
0855	8.11	↓	6.07	7.50	2	3.79	22.87	116	0.41	SAMPLE
0905										END

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: PA1-13C-GW-05-01
Sample Location: PA1-13C-MW-05
Sampled By: JJB
C.O.C. No.: 4380
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/10/04	Color	pH	S.C.	Temp.	Turbidity	DO	Sal	ORP
Time: 0934	Visual	Standard	mS/cm	°C	NTU	mg/l	%	(MV)
Method: PERISTALTIC	clear	4.1	13.2	23.08	0.2	4.3	0.76	343

PURGE DATA:

Date:	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Sal	ORP
Method: PERISTALTIC								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type:								
Total Well Depth (TD): 16.15								
Static Water Level (WL): 6.4								
One Casing Volume (gal/L): 1.6								
Start Purge (hrs): 0934								
End Purge (hrs): 1020								
Total Purge Time (min): 46								
Total Vol. Purged (gal/L): 1.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative		Container Requirements	Collected
VOCs	HCL	4 C	3 X 40 ml vial	NA
SVOCs		4 C	2 X 1 L amber	NA
Metals + Tin	HNO3	4 C	500 ml poly	✓

OBSERVATIONS / NOTES:

NA - Not a required analyte

Circle If Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TBD: To Be Determined

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: N0095
WELL ID.: PA1-13C-MW-05
DATE: 9/10/04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments Cum. Vol. (L)
0934	6.4	200	-	-	-	-	-	-	-	
0940	6.55	150	4.2	12.8	0.5	7	23.24	343	0.74	1.2
0950	6.63	150	4.2	13.0	0.3	5.4	23.17	343	0.75	2.7
1000	6.65	150	4.2	13.2	0.2	4.6	23.11	345	0.76	4.2
1010	6.64	150	4.2	13.2	0.2	4.5	23.07	343	0.76	5.7
1020	6.66	150	4.1	13.2	0.2	4.3	23.08	343	0.76	7.2

SIGNATURE(S):

C-8 1999 SOIL AND SEDIMENT LOG SHEETS

Tetra Tech NUS

SAMPLE LOG SHEET

- ☐ Surface Soil
- ☑ Subsurface Soil
- ☐ Sediment
- ☐ Other

oject Site Name Parris Island Site 4 Project Site Number Site 4

&RE Sample Name _____ Sample Source or Location PAI-04-SB-16-2-2.5

JJB 12/14/00
COC #. 9A036486

Sample Method: DPT Core	Sample Date and Time: 8-23-00 1846
Sample Depth:	Color: Stain Black (Brown dirt)
Sampled By (Print): Nathan Reel	Sample Description: Silty Sand
Sampled By (Signatures): [signature]	~~FID~~ PID Reading of Sample (if appropriate): 0.1
Concentration of Sample: ☑ Low ☐ Medium ☐ High	Type of Sample: ☐ Composite ☑ Grab

Observations/Notes:

Analyses

alysis	Bottle Lot #
VOC	
est/PCB	
metals	
oC	

Shipment

Laboratory	Ship Date/Time	Airbill #

Tetra Tech NUS

SAMPLE LOG SHEET

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Other

Project Site Name: Parris Island Site 4

Project Site Number: Site 4

&RE Sample Name:

Sample Source or Location: PAI-04-SB-17-1.5'-2.0'

JJB 12/14/00

COC # 9A086486

Sample Method: DPT Core Sample	Sample Date and Time: 8/23/00 1745
Sample Depth: 1.5'-2.0'	Color: lite brown
Sampled By (Print): Nathan Reel	Sample Description: Silty sand
Sampled By (Signatures):	FID Reading of Sample (if appropriate): 0.0
Concentration of Sample: ☒ Low ☐ Medium ☐ High	Type of Sample: ☐ Composite ☒ Grab

Observations/Notes:

Analyses

Analysis	Bottle Lot #
TCL VOC	
SVOC	

Shipment

Laboratory	Ship Date/Time	Airbill #

SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: PARRIS IS. MCRD

Sample ID No.: PI-005-01(28)

Project No.: 7115 CTO-009

Sample Location: SITE 5

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other _____
- [ ] QA Sample Type: _____

Sampled By: TOM DICKSON / TERRY ROJAHN

C.O.C. No.: 000003

Sample Method: S.S. Trowel

Depth Sampled: 0-6"

Sample Date and Time: 12/13/95 1100

Type of Sample
- [x] Grab
- [ ] Composite
- [ ] Grab-Composite
- [ ] High Concentration
- [x] Low Concentration

Composite Sample Data

Sample	Time	Color/Description
	NA	

Grab Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Yellow BAN → Stained	Fine Grain trace roots

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBs		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map:

Observations/Notes: Sample collected from BANK w/ construction debri to prevent Erosion.
Evidence of dried paint.

Circle if Applicable:

MS/MSD

Duplicate ID No:

Signature(s): Terry Rojahn

SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: PARRIS IS., MCRD

Sample ID No.: PI-005-02 (29)

Project No.: 7115 CTO-009

Sample Location: SITE 5

- ■ Surface Soil
- ☐ Subsurface Soil
- ☐ Sediment
- ☐ Other _____
- ☐ QA Sample Type: _____

Sampled By: TOM DICKSON / TERRY ROJAHN

C.O.C. No.: 000003

Sample Method: S.S. Trowel

Depth Sampled: 0-6"

Sample Date and Time: 12/13/95 1115

Type of Sample
- ■ Grab
- ☐ Composite
- ☐ Grab-Composite
- ☐ High Concentration
- ■ Low Concentration

Composite Sample Data

Sample	Time	Color/Description
	NA	

Grab Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Yellow BRN - Stained	Fine Grain trace roots

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBs		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map:

Observations/Notes: Sample collected from BANK w/ construction debri to prevent erosion.

Evidence of dried paint

Circle if Applicable:

MS/MSD

Duplicate ID No:

Signature(s): [illegible]

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parris Island
Project No.: 0095

Sample ID No.: PAI-05SD-03-01
Sample Location: ~~JRN~~ PAI-05-SD03
Sampled By:
C.O.C. No.: 02218

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-8-99			
Time: 1220	0-1'		
Method: Drag Bucket	~~Dark Gre~~	Grey	silt trace of f. sand
Monitor Reading (ppm):			

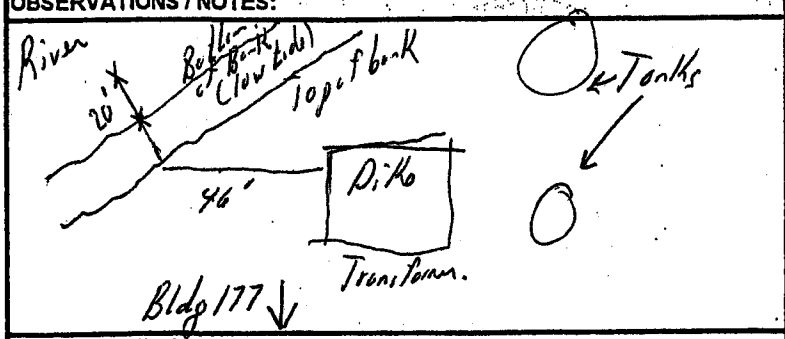
COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	3 - Encore	✓	
TCL SVOCs	1 - 1602	✓	
TAL metals			

OBSERVATIONS / NOTES:



MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island - Site 7
Project No.:

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: PAI-07-SB-01-04
Sample Location: PAI-07-SB-01
Sampled By: J. Brown
C.O.C. No.: 02289

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/14/99			
Time: 0815	3-4' bgs	black	silty-sand
Method:			
Monitor Reading (ppm): 107 ← (in bucket)			

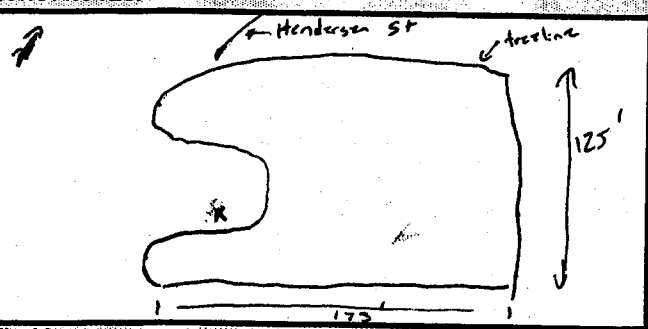
COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs, SVOCs, Pest/PCBs			
TAL metals/CN + tin			

OBSERVATIONS / NOTES:



MAP:

Sample Collected from PAI-07-TP-02. Monitoring well PAI-07-MW-04(S) installed at this location

Circle if Applicable:

MS/MSD	Duplicate ID No.: PAI-07-SB-0001-04

Signature(s):

SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: PARRIS IS., MCRD

Sample ID No.: PI-009-01(32)

Project No.: 7115 CTO-009

Sample Location: SITE 9

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other _____
- [ ] QA Sample Type: _____

Sampled By: TOM DICKSON / TERRY ROJAHN

C.O.C. No.: 000003

Sample Method: S.S. TROWEL

Depth Sampled: 0-6" UNDER CONCRETE PAD

Sample Date and Time: 12/12/95 1010

Type of Sample
- [x] Grab
- [ ] Composite
- [ ] Grab-Composite
- [ ] High Concentration
- [x] Low Concentration

Composite Sample Data

Sample	Time	Color/Description
	NA	

Grab Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
BRN	FINE GRAIN W/ GRAVEL

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBs		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map:

Observations/Notes: CONCRETE 6"
TOTAL DEPTH OF HOLE = 12"

Circle if Applicable:

MS/MSD | Duplicate ID No:

Signature(s): Terry Rojahn

JJB 12/6/00

SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: PARRIS IS., MCRD

Sample ID No.: PI-009-02(33)

Project No.: 7115 CTO-009

Sample Location: SITE 9

- ■ Surface Soil
- ☐ Subsurface Soil
- ☐ Sediment
- ☐ Other _____
- ☐ QA Sample Type: _____

Sampled By: TOM DICKSON/TERRY ROJAHN

C.O.C. No.: 000053

Sample Method: S.S. TROWEL

Depth Sampled: 0-6"

Sample Date and Time: 12/12/95 1035

Type of Sample
- ■ Grab
- ☐ Composite
- ☐ Grab-Composite
- ☐ High Concentration
- ■ Low Concentration

Composite Sample Data

Sample	Time	Color/Description
	NA	

Grab Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
DARK BRN	Fine

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBs		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map:

Observations/Notes:

SAMPLE ON SMALL MOUNDED AREA W/ POSSIBLE DRIED PAINT CHIPS

SAMPLE COLLECTED AGAINST CURB

Circle if Applicable:

MS/MSD

Duplicate ID No:

Signature(s): [signature]

JJB 12/6/00

SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: PARRIS IS. MCRD

Sample ID No.: PI-009-0~~X~~3 (34)

Project No.: 7115 CTO-009

Sample Location: Site 9

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other _____
- [ ] QA Sample Type: _____

Sampled By: TOM DICKSON / TERRY ROJAHN

C.O.C. No.: 000003

Sample Method: (TS) ~~0-6"~~ S.S. Trowel

Depth Sampled: 0-6"

Sample Date and Time: 12/12/95 1040

Type of Sample
- [x] Grab
- [ ] Composite
- [ ] Grab-Composite
- [ ] High Concentration
- [x] Low Concentration

Composite Sample Data		
Sample	Time	Color/Description
	NA	

Grab Sample Data	
Color	Description (Sand, Clay, Dry, Moist, Wet, etc.)
BRN - Yellow Brn	FINE GRAIN some Roots

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBs		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map: Picked out some metalic objects.

Observations/Notes: Sample collected in small drainage swale at the southern most corner

Circle if Applicable:	
MS/MSD	Duplicate ID No:

Signature(s): Terry Rojahn

SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: PARRIS IS., MCRD

Sample ID No.: PI-013-01(38)

Project No.: 7115 CTO-009

Sample Location: SITE 13

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other _____
- [ ] QA Sample Type: _____

Sampled By: TOM DICKSON / TERRY ROJAHN

C.O.C. No.: 000003

Sample Method: S.S. TROWEL

Depth Sampled: 0-6"

Sample Date and Time: 12/13/95 0955

Type of Sample
- [x] Grab
- [ ] Composite
- [ ] Grab-Composite
- [ ] High Concentration
- [x] Low Concentration

Composite Sample Data		
Sample	Time	Color/Description
	NA	

Grab Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Dark Gray	Sandy Clay Moist → Wet

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBs		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map:

Observations/Notes:

SWALE EDGE OF FIRE RING
SPARCE HERB. VEG. UNDER SHRUB CANOPY

Circle if Applicable:

MS/MSD

Duplicate ID No:

Signature(s): Terry Rojahn

SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: PARRIS IS. MCRD

Sample ID No.: PI-013-02(39)

Project No.: 7115 CTO-009

Sample Location: Site 13

Sampled By: TOM DICKSON / TERRY ROJAHN

C.O.C. No.: 0000053

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other _____
- [ ] QA Sample Type: _____

Sample Method: S.S. Trowel

Depth Sampled: 0-6"

Sample Date and Time: 12/13/95 1010

Type of Sample
- [x] Grab
- [ ] Composite
- [ ] Grab-Composite
- [ ] High Concentration
- [x] Low Concentration

Composite Sample Data		
Sample	Time	Color/Description
	NA	

Grab Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
PALE Grey	Sandy Clay Moist - Wet

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBs		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map:

Observations/Notes: WEST END OF FIRE Ring in SWALE
HEAVY
SPARSE VEG. under SHRUB Canopy

Circle if Applicable:

MS/MSD

Duplicate ID No:

Signature(s): Terry Rojahn

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parris Island
Project No.: 0095

Sample ID No.: PAI-13C-SS-03-01
Sample Location: PAF-13C-SS-03
Sampled By: SOO
C.O.C. No.: 02218

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-6-99 Time: 1600 Method: Grab Monitor Reading (ppm): —	0-6"	Gray	Silt & Sand, Dry

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	3 - Encores	✓	
TCL SVOCs	1-16 oz	✓	
TAL Metals			
TIN			
TCL Pest/PCBs			

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: PAI-13C-SS-DU03-01

Signature(s):

SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: PARRIS IS., MCRD

Sample ID No.: PI- 027-01 (46)

Project No.: 7115 CTO-009

Sample Location: Site 27

- ■ Surface Soil
- ☐ Subsurface Soil
- ☐ Sediment
- ☐ Other _____
- ☐ QA Sample Type: _____

Sampled By: TOM DICKSON / TERRY ROJAHN

C.O.C. No.: 000003

Sample Method: S.S. Trowel

Depth Sampled: 0-6"

Sample Date and Time: 12/13/95 0753

Type of Sample
- ■ Grab
- ☐ Composite
- ☐ Grab-Composite
- ☐ High Concentration
- ■ Low Concentration

Composite Sample Data

Sample	Time	Color/Description
	NA	

Grab Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Yellow BRN - DARK (Grey)	Sand trace clay

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBs		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map:

Observations/Notes: Sample collect at an area of broken/missing asphalt within the paved parking lot/yard. Sample may contain deteriorated asphalt.

Circle if Applicable:

MS/MSD

Duplicate ID No:

Signature(s): Terry Rojahn

SINGLE SAMPLE LOG SHEET

Page ____ of ____

Project Site Name: PARRIS IS. MCRD

Sample ID No.: PI-027-02(47)

Project No.: 7115 CTO-009

Sample Location: SITE 27

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other _____
- [ ] QA Sample Type: _____

Sampled By: TOM DICKSON/TERRY ROJAHN

C.O.C. No.: 0000006

Sample Method: S.S. TROWEL

Depth Sampled: 0-6"

Sample Date and Time: 12/13/95 0806

Type of Sample
- [x] Grab
- [ ] Composite
- [ ] Grab-Composite
- [ ] High Concentration
- [x] Low Concentration

Composite Sample Data

Sample	Time	Color/Description
	NA	

Grab Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Dark Grey	Fine Grain Some Roots

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBS		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map:

Observations/Notes: SAMPLE NEAR TRANSFORMER STORAGE AREA IN GRASSY/HERB. VEG. MINOR SWALE OFF ASPHALT LAY DOWN AREA.

Circle if Applicable:

MS/MSD

Duplicate ID No: PI-D01-121395

Signature(s): Tony Rojahn

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parris Island
Project No.: 0095

Sample ID No.: PAI-27-SS-03-0
Sample Location: PAF-27-SS-03
Sampled By: G Gunter
C.O.C. No.: 022217

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/16/99 Time: 1000 Method: Grab Monitor Reading (ppm): -0-	0-1'	Blk	F/Med Sand w/ organics

COMPOSITE SAMPLE DATA:

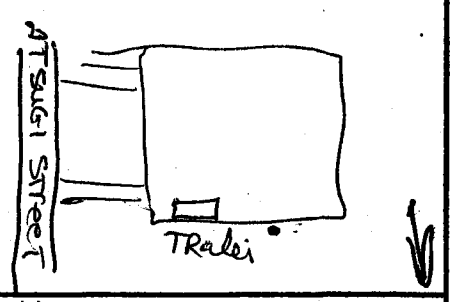
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL PCBs	1-16 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Gary Gunter

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parris Island / Swmu27
Project No.: 0095

Sample ID No.: PAI-27-SS-04-01
Sample Location: PAI-27-SS-04
Sampled By: GC
C.O.C. No.: 02227

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/16/99 Time: 1020 Method: Grab Monitor Reading (ppm): -0-	0 - 1'	Blk	F/med Sand w/ Organics

COMPOSITE SAMPLE DATA:

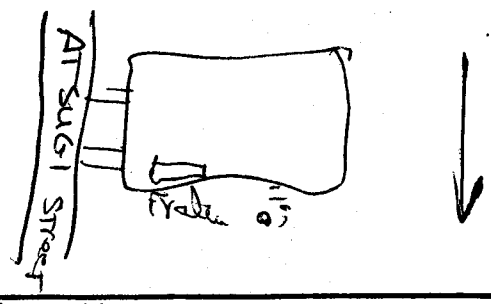
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL PCBs	1 - 16 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parris Island/SWMU 27
Project No.: 0095

Sample ID No.: PAI-27-SS-05-01
Sample Location: PAI-27-SS-05
Sampled By: G. GUNTER
C.O.C. No.: 09227

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/16/99	2"	Brn Blk	Asphalt
Time: 1010	6"		base
Method: Grab	8" - 20'		Brn Blk F/Co Sand
Monitor Reading (ppm): -0-			

COMPOSITE SAMPLE DATA:

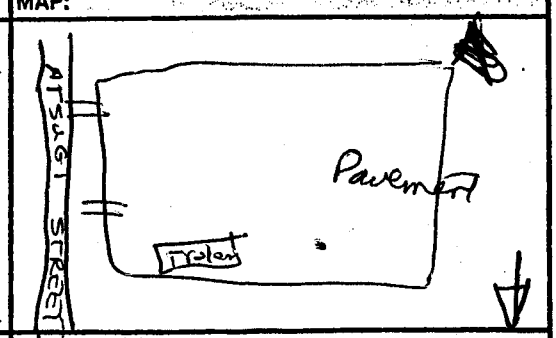
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL PCBs	1-16oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Gary Gunter

SINGLE SAMPLE LOG SHEET

Page ____ of ____

Project Site Name: PARRIS IS., MCRD

Sample ID No.: PI-035-01(49)

Project No.: 7115 CTO-009

Sample Location: SITE 35

Sampled By: TOM DICKSON / TERRY ROJAHN

C.O.C. No.: 000003

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other _____
- [ ] QA Sample Type: _____

Sample Method: S.S. TROWEL

Depth Sampled: 0-6" UNDER ASPHALT

Sample Date and Time: 12/12/95 1143

Type of Sample
- [x] Grab
- [ ] Composite
- [ ] Grab-Composite
- [ ] High Concentration
- [x] Low Concentration

Composite Sample Data

Sample	Time	Color/Description
	NA	

Grab Sample Data

Color	Description: (Sand) Clay, Dry (Moist), Wet, etc.)
DARK BRN	FINE GRAIN

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBs		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map:

Observations/Notes: UNDER 8" OF ASPHALT

Circle if Applicable:

MS/MSD

Duplicate ID No:

Signature(s): [signature]

SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: PARRIS IS., MCRD

Sample ID No.: PI-035-02(49)

Project No.: 7115 CTO-009

Sample Location: SITE 35

- [x] ~~Surface Soil~~ XR.
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other _____
- [ ] QA Sample Type: _____

Sampled By: TOM DICKSON/TERRY ROJAHN

C.O.C. No.: 000003

Sample Method: S.S. TROWEL

Depth Sampled: 0-6"

Sample Date and Time: 12/12/95 1215

Type of Sample
- [x] Grab
- [ ] Composite
- [ ] Grab-Composite
- [ ] High Concentration
- [x] Low Concentration

Composite Sample Data		
Sample	Time	Color/Description
	NA	

Grab Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
YELLOW BRN	(WHITE GRAIN SPECKS) FINE GRAIN

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBs		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map: SOME ROOTS

Observations/Notes:

SAMPLE FROM DRAINAGE DITCH

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No:	

SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: PARRIS IS. MCRD

Sample ID No.: PI-035-03(50)

Project No.: 7115 CTO-009

Sample Location: SITE 35

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other _____
- [ ] QA Sample Type: _____

Sampled By: TOM DICKSON/TERRY ROJAHN

C.O.C. No.: 000003

Sample Method: S.S. Trowel

Depth Sampled: 0-6"

Sample Date and Time: 12/12/95 1225

Type of Sample
- [x] Grab
- [ ] Composite
- [ ] Grab-Composite
- [ ] High Concentration
- [x] Low Concentration

Composite Sample Data		
Sample	Time	Color/Description
	NA	

Grab Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
BRN	FINE GRAIN

Analysis	Container Requirements	Collected (✓)
TCL VOLATILES	2oz JAR	✓
TCL SEMIVOLATILES	(8oz JAR)	✓
TCL PESTICIDE/PCBs		✓
TAL METALS/CYANIDE	8oz JAR	✓

Map:

Observations/Notes: Sample point @ FENCE CORNER IN BOWL/DEPRESSION - RECEIVES RUNOFF FROM PAVED YARD.

Circle if Applicable:

MS/MSD

Duplicate ID No:

Signature(s): Terry Rojahn

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Parris Island / Swamp 35
Project No.: 0095

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: PAI-35-SS-04-01
Sample Location: PAI-35-SS-04
Sampled By: G Gunter
C.O.C. No.: 02227

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/16/99	6"	Black	Asphalt
Time: 0835	8"	Brn	gravel
Method: Grab	14"-26"		F SAND
Monitor Reading (ppm): -0-			

COMPOSITE SAMPLE DATA:

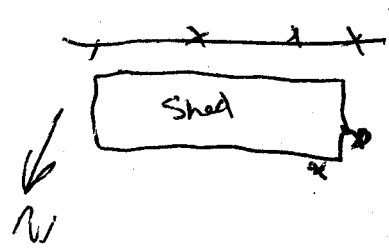
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL Metals.	1 16 oz	✓	
Cyanide			
Tin			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): G Gunter

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parris Island / Sumu 35
Project No.: 0095

Sample ID No.: PAI-35-SS-05-01
Sample Location: PAI-35-SS-05
Sampled By: GG
C.O.C. No.: 02227

[X] Surface Soil
[X] ~~Subsurface Soil~~
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/16/99	0-6"	–	Asphalt
Time: 0820	6"-1'	Black	gravel
Method: Grab	1'-2'	Brn	F Sand
Monitor Reading (ppm): -0-			

COMPOSITE SAMPLE DATA:

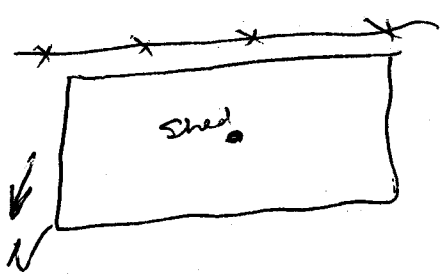
	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL metals, cyanide, Tin	1 - 16 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parris Island / Swamp 35
Project No.: 0095

Sample ID No.: PAI-35-SS-06-01
Sample Location: PAI-35-SS-06
Sampled By: Gantz
C.O.C. No.: 02227

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 12/6/99	0-6"	Blk	Asphalt
Time: 0845	6" - 14"	Brn	gravel
Method:	14" - 26"	Brn	F Sand
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

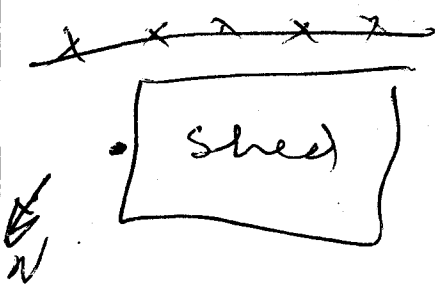
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL metals, Cyanide, Tin	1-1602	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

C-9 2004 SURFACE WATER AND SEDIMENT SAMPLE LOG SHEETS

Bass Pro Shops Saltwater Gear

Tides for Parris Island, Marine Corps Recruit Depot starting with September 5, 2004.

Day		High /Low	Tide Time	Height Feet	Sunrise Sunset	Moon	Time	% Moon Visible
Su	5	High	1:52 AM	6.5	7:01 AM	Set	1:29 PM	65
	5	Low	7:42 AM	0.9	7:42 PM	Rise	11:39 PM	
	5	High	2:15 PM	7.2				
	5	Low	8:23 PM	1.6				
M	6	High	2:42 AM	6.3	7:01 AM	Set	2:27 PM	56
	6	Low	8:30 AM	1.2	7:40 PM			
	6	High	3:05 PM	7.1				
	6	Low	9:19 PM	1.8				
Tu	7	High	3:32 AM	6.1	7:02 AM	Rise	12:21 AM	46
	7	Low	9:24 AM	1.4	7:39 PM	Set	3:23 PM	
	7	High	3:57 PM	7.1				
	7	Low	10:19 PM	1.9				
W	8	High	4:25 AM	6.1	7:02 AM	Rise	1:09 AM	37
★	8	Low	10:22 AM	1.4	7:38 PM	Set	4:15 PM	
★	8	High	4:50 PM	7.1				
	8	Low	11:16 PM	1.8				
Th	9	High	5:18 AM	6.2	7:03 AM	Rise	2:01 AM	28
	9	Low	11:19 AM	1.3	7:36 PM	Set	5:01 PM	
	9	High	5:44 PM	7.2				
F	10	Low	12:08 AM	1.5	7:04 AM	Rise	2:58 AM	20
	10	High	6:11 AM	6.3	7:35 PM	Set	5:43 PM	
	10	Low	12:12 PM	1.1				
	10	High	6:36 PM	7.4				
Sa	11	Low	12:55 AM	1.3	7:04 AM	Rise	3:58 AM	13
	11	High	7:02 AM	6.6	7:34 PM	Set	6:19 PM	
	11	Low	1:02 PM	0.8				
	11	High	7:24 PM	7.7				
Su	12	Low	1:39 AM	1.0	7:05 AM	Rise	4:58 AM	7
	12	High	7:49 AM	6.9	7:32 PM	Set	6:52 PM	
	12	Low	1:49 PM	0.6				
	12	High	8:08 PM	7.9				
M	13	Low	2:21 AM	0.7	7:06 AM	Rise	5:59 AM	2
	13	High	8:32 AM	7.2	7:31 PM	Set	7:22 PM	
	13	Low	2:35 PM	0.5				
	13	High	8:48 PM	8.1				
Tu	14	Low	3:01 AM	0.5	7:06 AM	Rise	7:00 AM	0
	14	High	9:12 AM	7.5	7:30 PM	Set	7:50 PM	
	14	Low	3:20 PM	0.3				
	14	High	9:27 PM	8.1				
W	15	Low	3:41 AM	0.3	7:07 AM	Rise	8:01 AM	0
	15	High	9:50 AM	7.8	7:28 PM	Set	8:18 PM	
	15	Low	4:04 PM	0.3				

	15	High	10:05 PM	8.1				
Th	16	Low	4:20 AM	0.1	7:07 AM	Rise	9:03 AM	2
	16	High	10:29 AM	8.0	7:27 PM	Set	8:47 PM	
	16	Low	4:49 PM	0.3				
	16	High	10:45 PM	7.9				
F	17	Low	5:01 AM	0.1	7:08 AM	Rise	10:07 AM	6
	17	High	11:10 AM	8.1	7:26 PM	Set	9:18 PM	
	17	Low	5:34 PM	0.4				
	17	High	11:28 PM	7.7				
Sa	18	Low	5:43 AM	0.1	7:09 AM	Rise	11:14 AM	12
	18	High	11:57 AM	8.1	7:24 PM	Set	9:55 PM	
	18	Low	6:22 PM	0.5				

Return to the S. Carolina selection page, the FAQs/definitions page, the region selection page, the script licensing page, or to the home page.

For information on regulations for fishing in S. Carolina contact:

S. Carolina Department of Natural Resources

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Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[✓] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: PA113CSW01-01
Sample Location: SITE 13C/BALLAST CREEK
Sampled By: JB/FW
C.O.C. No.: 4377

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other ~~NA~~ TDS
Date: 9-8-04 Time: 1022 Depth: 0-6" Method: DIRECT	CLEAR	5.90	49.1	26.70	62	6.50	3.22	23

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TAL Metals and Tin	HNO3 4 C	1 L ~~500~~ ml poly	✓

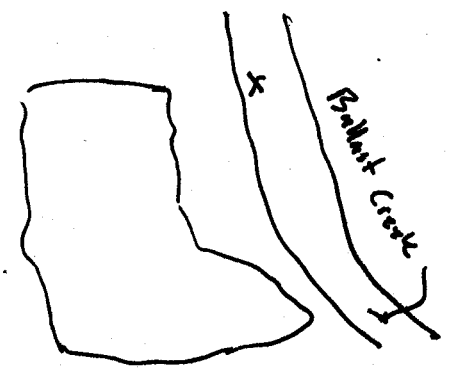
OBSERVATIONS / NOTES:

0930 1ST THIRD
1022 2ND THIRD
1125 3RD THIRD

LOW TIDE @ 1022

width of creek was ~ 10 feet @ low tide

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): JB FW

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: PA1-13C-SW-01-02
Sample Location: PA1-13C-SW-01
Sampled By: JB
C.O.C. No.: 4377

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA TDS
Date: 9-3-04 Time: 1650 Depth: 0-6" Method: Direct	clear	7.7	414.0	23.9	5.8	7.2	2.35	27 g/L

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TAL Metals and Tin	HNO3 4 C	1 L ~~500~~ ml poly	✓

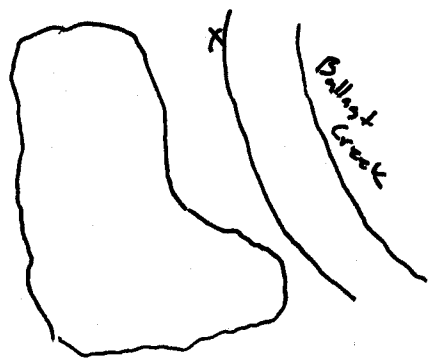
OBSERVATIONS / NOTES:

high tide @ 4:50 pm

Collected 1/3 of sample @ 3:50 pm
collected 1/3 of sample @ 4:50 pm
collected 1/3 of sample @ 5:50 pm

width of creek ~ 20 to 25 yards @ high tide

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[] Surface Soil
[] Subsurface Soil
[✓] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: PA1BCSD01
Sample Location: SITE 13C
Sampled By: JB/FW
C.O.C. No.: 4377

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-8-04	0-6"	DARK GREY/BLACK	SILT + F-SAND
Time: 0930			ROOTS WET
Method: PE TROWEL			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL Metals and Ti			
Conventional Sediment Parameters			

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[✓] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: PA1-13C-SW-02-01
Sample Location: PA1-13C-SW-02
Sampled By: JB/FW
C.O.C. No.: 4377

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other ~~NA~~ TDS
Date: 9-3-04								
Time: 1000								
Depth: 0-6"		6.90	45.0	27.80	356	8.20	2.84	27
Method: Direct								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TAL Metals and Tin	HNO3 4 C	1 L ~~500~~ ml poly	✓

OBSERVATIONS / NOTES:

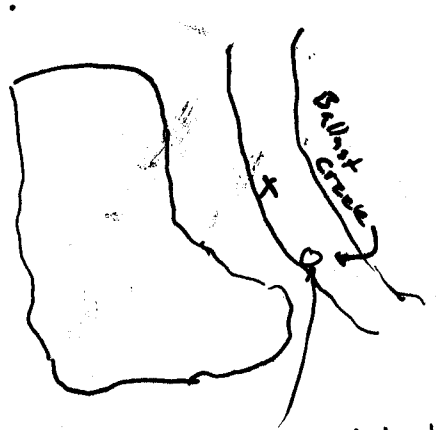
1000 1ST SAMPLE HALF
1145 2ND HALF
At low tide,
ONLY 2" OF WATER IN STREAM/CREEK

CREEK WAS 3' wide @ SAMPLE LOCATION @ low tide

LOW TIDE @ 1022

Moved sample location ~50 ~~feet~~ yards to the north

MAP:



Original location as per work plan. Moved location north due to lack of surface water

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: PAI-13C-SW-02-02
Sample Location: PAI-13C-SW-02
Sampled By: JB
C.O.C. No.: 4377

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 9-8-04 Time: 1700 Depth: 0-6" Method: Direct	clear	7.8	44.2	28.3	3.2	8.0	2.87	27

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TAL Metals and Tin	HNO3 4 C	1 L ~~500~~ ml poly	✓

OBSERVATIONS / NOTES:

high tide @ 4:50 pm

Collected 1/3 of sample @ 4:05 pm

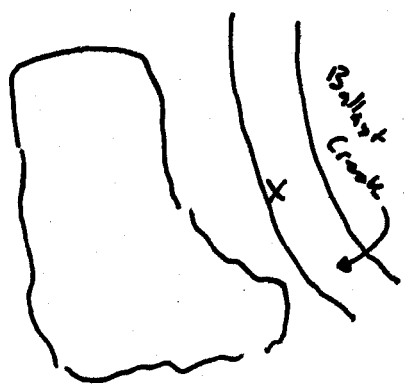
collected 1/3 of sample @ 5:00 pm

Collecte 1/3 of sample @ 5:40 pm

width of creek ~ 20 to 25 yards @ high tide

Moved sample 50 yards to the north to correspond with low tide surface water sample

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: CTO 084/0095

[] Surface Soil
[] Subsurface Soil
[✓] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: PAI13CSD02
Sample Location: BALLAST CREEK
Sampled By: JB/FW
C.O.C. No.: 4377

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-8-04 Time: 0950 Method: PETROWEL Monitor Reading (ppm): —	0-6"	GREY	SILTY CLAY WET

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL Metals and Ti			
Conventional Sediment Parameters			

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Location of PAI-13C-SW-01 and PAI-13C-SD-01 at low tide facing south.

Location of PAI-13C-SW-01 at high tide facing south.

Location of PAI-13C-SC-02 and old location of PAI-13C-SW-02 at low tide

Location of PAI-13C-SD-02 and old location of PAI-13C-SW-02 at low tide facing east.

New location of PAI-13C-SW-02 at low tide facing south.

New location of PAI-13C-SW-02 at high tide facing east.

C-10 TEST PIT LOG SHEETS

TEST PIT LOG

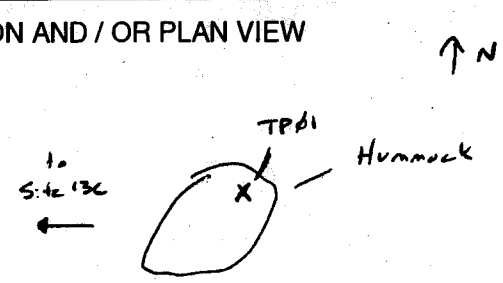
Tetra Tech NUS, Inc.

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: N0095
LOCATION: Site 4

TEST PIT: PAI-04-TP-01
DATE: 12/15/99
GEOLOGIST: G. Gunter / J. Brown

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-1'		Tan fine sand			0	0
1-2'	∇	Tan fine sand			0	0

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: No evidence of soil staining the test pit was approximately 1 foot in diameter and hand dug with a shovel

PHOTO LOG:

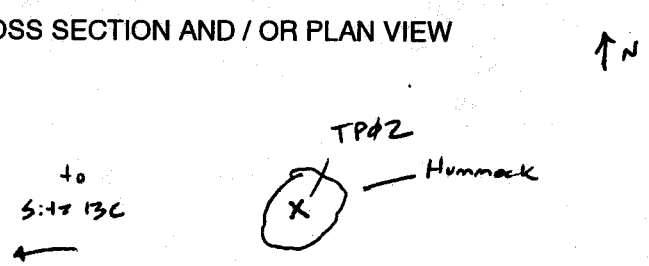
Tetra Tech NUS, Inc.

TEST PIT LOG

PROJECT NAME: MCRD Parris Island
TEST PIT: PAI-04 - TP-02
PROJECT NUMBER: N0095
DATE: 12/15/99
LOCATION: Site 4
GEOLOGIST: G. Gunter / J. Brown

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-1'		Gray Brown fine Sand			0	0
1-2'		tan fine sand			0	0

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: No evidence of stained soil. The test pit was hand dug with a shovel and was approximate 1 foot in diameter

PHOTO LOG:

TEST PIT LOG

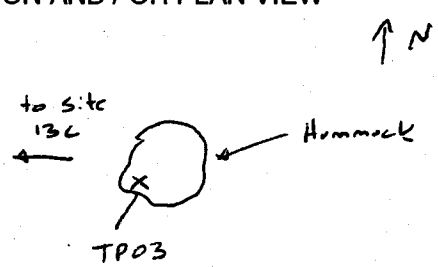
Tetra Tech NUS, Inc.

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: N0095
LOCATION: Site 4

TEST PIT: PA1-04-TP-03
DATE: 12/15/99
GEOLOGIST: J. Brown / G. Gunter

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-1'		Gray brown fine sand			0	0
1-2'		tan fine sand			0	0

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: No evidence of soil staining. The test pit was approximately 1 foot in diameter and was hand dug with a shovel

PHOTO LOG:

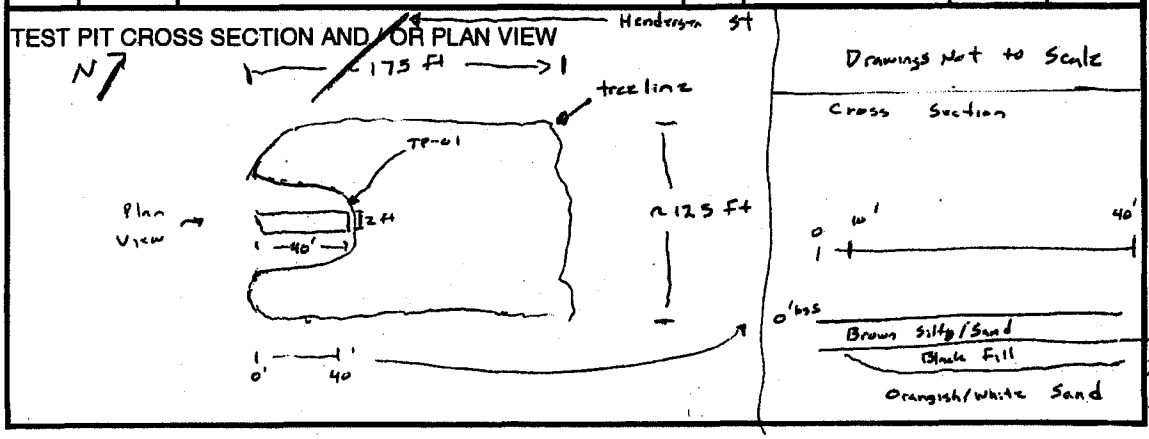
TEST PIT LOG

Tetra Tech NUS, Inc.

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: N0045
LOCATION: Site 7
TEST PIT No.: PAI-07-TP-01
DATE: 12/13/99
~~GEOLOGIST~~ Engineer: J. Brown

Depth (Ft.) bgs	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0	Brown silty sand				0 ppm	0 ppm
0-1½						
1-2½						
2-3½						
3-4½	Black fill	Very cohesive material				
4-5½						
5-6½	White/orangish sand					
6-7½						
7-8½						

TEST PIT CROSS SECTION AND/OR PLAN VIEW



REMARKS: Each scoop of dirt was scanned with a PID. A reading of 0 ppm was observed for each scoop. The PID was checked with calibration gas at end of day.

PHOTO LOG:

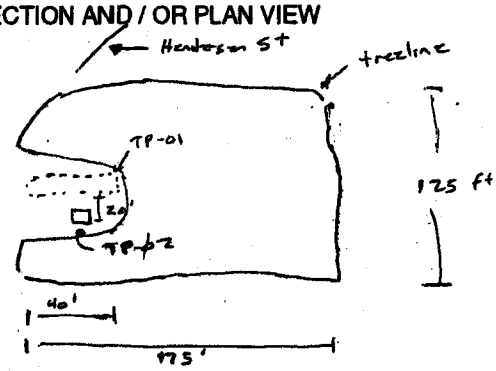
Tetra Tech NUS, Inc.

TEST PIT LOG

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: N00165
LOCATION: Site 7
TEST PIT No.: PAI-07-TP-02
DATE: 12/14/99
~~GEOLOGIST~~ ENGINEER: J. Brown

Depth (Ft.) bgs	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	BZ (ppm)
0-1'		Brown - silty sand			0	0
1-2'		Brown-silty sand			0	0
2-3'		Brown-silty sand			0	0
3-4'		Black fill material encountered / silty-sand		very cohesive material	107	11

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: Sample PAI-07-SB-01-04* is collected from bucket of test pit where 107 ppm PID reading was observed in bucket. Monitoring well PAI-07-MW-04(6) is also placed in this location

*PAI-07-SB-0001-04

PHOTO LOG: