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LETTER OF TRANSMITTAL AND CHANGE PAGES FOR RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION/REMEDIAL INVESTIGATION WORK PLAN FIR SITE 1 AND SITE 41 MCRD PARRIS ISLAND SC
4/12/1998
BROWN AND ROOT ENVIRONMENTAL

03.01.00.0051

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Brown & Root Environmental

C-49-04-8-070

April 13, 1998

Project Number 7394

Commanding Officer
Department of the Navy
SOUTHNAVFACENGCOM
ATTN: Art Stanford (Code 1862)
2155 Eagle Drive
North Charleston, South Carolina 29406

Reference: Clean III Contract No. N62467-94-D-0888
Contract Task Order No. 0020

Subject: Marine Corps Recruit Depot; Parris Island, South Carolina
RCRA Facility Investigation/Remedial Investigation Work Plan
Sites/SWMUs 1/41
Revised Section 7.0 text; Figures 7-1, 7-2, and 7-3; and Table of Contents

Dear Mr. Sanford:

Please find enclosed the following revised materials for Sites/SWMUs 1/41:

1. Section 7.0 Environmental Sampling.
2. Figures 7-1, 7-2, and 7-3.
3. Table of Contents.

Replace these revised materials in the RFI/RI Work Plan and discard the originals. In addition, as per this letter, we are requesting a well permit for investigations at Site/SWMU 1 - Incinerator Landfill, Site/SWMU 2 - Borrow Pit Landfill, and Site/SWMU 3 - Causeway Landfill.

If you have any questions or concerns regarding the revised materials or the well permit request, please contact myself at (412) 921-8916 or Jason Brown at (412) 921-8401.

Very truly yours,

Mark P. Speranza

Mark P. Speranza, P.E.
Task Order Manager

Enclosure

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7.0 ENVIRONMENTAL SAMPLING

This section outlines the environmental sampling program and describes the sampling procedures for the field investigation at Site 1 - Incinerator Landfill and Site 41 - Former Incinerator.

7.1 SUMMARY OF ENVIRONMENTAL SAMPLING

Tables 7-1 and 7-2 summarize the sampling program for the field investigation at Sites 1 and 41, respectively. Figure 7-1 illustrates the proposed surface water and sediment sampling locations for Sites 1 and 41. Likewise, Figure 7-2 depicts the proposed soil sampling locations, and Figure 7-3 shows the proposed groundwater sampling locations. Proposed sampling locations are contingent upon utility location and clearance with MCRD personnel.

7.2 SAMPLING PROCEDURES

The following sections describe sampling procedures that will be followed during surface water, sediment, soil, and groundwater sample collection. Additionally, the following sections present the proposed sampling locations for field activities. If during field activities, the FOL deems that an area not contained in the Work Plan should be sampled because of surface features (e.g., depressions) that would cause preferential accumulation of contaminants, the location of samples presented in the sampling plan will be altered to include such areas. Additionally, the rationale for the deviation will be documented in the RI/RFI report.

Collection of surface water, sediment, and surface soil samples at Site 1 and surface soil samples at Site 41 will be a priority of the field effort. These results will indicate the presence of dioxin/furan precursors and the possible need for additional sampling for dioxin/furan analysis.

7.2.1 Surface Water and Sediment Sampling

Twelve surface water samples and thirteen sediment samples (which includes three background samples from each media) will be collected for this investigation at locations indicated on Figure 7-1. Based on consultation with the Parris Island Tier I Partnering Team, the three surface water and sediment background samples will be collected at Pickney Island. Two (2) background samples will be collected from the intertidal area and one (1) sample will be collected at a submerged low tide evaluation point. Background sediment samples will be collected at a 0- to 6-inch sample depth. Of the remaining nine sediment samples, eight samples will be collected at a 0- to 6-inch sampling depth to reflect recent offsite migration, and one sample (at PAI-01-SD02) will be collected from the 6- to 12-inch depth to reflect

TABLE 7-1

SUMMARY OF ENVIRONMENTAL SAMPLING
SITE 1 - INCINERATOR LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 6

Sample Location	Sample Designation	Sample Depth (Feet below ground surface)	Sample Analysis								
			TCL VOCs	TCL SVOCs	TAL Metals (Total) and Cyanide	TAL Metals (Filtered)	TCL Pest/ PCBs	TOC, pH, Hardness ($CaCO_3$)	Appendix IX	Hexavalent Chromium	Additional Analysis
SURFACE WATER											
PAI-01-SW01	PAI-01-SW-001-00	Surface	•	•	•	•	•	•		•	Ecological Parameters (1)
PAI-01-SW02	PAI-01-SW-002-00	Surface	•	•	•	•	•	•		•	Ecological Parameters (1)
PAI-01-SW03	PAI-01-SW-003-00	Surface	•	•	•	•	•	•			Ecological Parameters (1)
PAI-01-SW04	PAI-01-SW-004-00	Surface	•	•	•	•	•	•			Ecological Parameters (1)
PAI-01-SW05	PAI-01-SW-005-00	Surface	•	•	•	•	•	•			Ecological Parameters (1)
PAI-01-SW06	PAI-01-SW-006-00	Surface	•	•	•	•	•	•			Ecological Parameters (1)
PAI-01-SW07	PAI-01-SW-007-00	Surface	•	•	•	•	•	•			Ecological Parameters (1)
PAI-01-SW08	PAI-01-SW-008-00	Surface	•	•	•	•	•	•			Ecological Parameters (1)
PAI-01-SW09	PAI-01-SW-009-01	Surface	•	•	•	•	•	•			Ecological Parameters (1)
PAI-01-SW10	PAI-01-SW-010-01	Surface	•	•	•	•	•	•			Ecological Parameters (1)
PAI-01-SW11	PAI-01-SW-011-01	Surface	•	•	•	•	•	•		•	Ecological Parameters (1)
PAI-01-SW12	PAI-01-SW-012-01	Surface	•	•	•	•	•	•			Ecological Parameters (1)

TABLE 7-1

SUMMARY OF ENVIRONMENTAL SAMPLING
SITE 1 - INCINERATOR LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 6

Sample Location	Sample Designation	Sample Depth (Feet below ground surface)	Sample Analysis								
			TCL VOCs	TCL SVOCs	TAL Metals (Total) and Cyanide	TAL Metals (Filtered)	TCL Pest/ PCBs	TOC, pH, Hardness ($CaCO_3$)	Appendix IX	Hexavalent Chromium	Additional Analysis
SEDIMENT											
PAI-01-SD01	PAI-01-SD-001-01	0 - 0.5	•	•	•		•	•(2)		•	Ecological Parameters (3)
PAI-01-SD02	PAI-01-SD-002-01	0 - 0.5	•	•	•		•	•(2)		•	
PAI-01-SD02	PAI-01-SD-002-02	0.5 - 1	•	•	•		•	•(2)			Ecological Parameters (3)
PAI-01-SD03	PAI-01-SD-003-01	0 - 0.5	•	•	•		•	•(2)			Ecological Parameters (3)
PAI-01-SD04	PAI-01-SD-004-01	0 - 0.5	•	•	•		•	•(2)			
PAI-01-SD05	PAI-01-SD-005-01	0 - 0.5	•	•	•		•	•(2)			
PAI-01-SD06	PAI-01-SD-006-01	0 - 0.5	•	•	•		•	•(2)			
PAI-01-SD07	PAI-01-SD-007-01	0 - 0.5	•	•	•		•	•(2)			
PAI-01-SD08	PAI-01-SD-008-01	0 - 0.5	•	•	•		•	•(2)			
PAI-01-SD09	PAI-01-SD-009-01	0 - 0.5	•	•	•		•	•(2)			
PAI-01-SD10	PAI-01-SD-010-01	0 - 0.5	•	•	•		•	•(2)			
PAI-01-SD11	PAI-01-SD-011-01	0 - 0.5	•	•	•		•	•(2)		•	
PAI-01-SD12	PAI-01-SD-012-01	0 - 0.5	•	•	•		•	•(2)			

TABLE 7-1

SUMMARY OF ENVIRONMENTAL SAMPLING
SITE 1 - INCINERATOR LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 3 OF 6

Sample Location	Sample Designation	Sample Depth (Feet below ground surface)	Sample Analysis								
			TCL VOCs	TCL SVOCs	TAL Metals (Total) and Cyanide	TAL Metals (Filtered)	TCL Pest/ PCBs	TOC, pH, Hardness ($CaCO_3$)	Appendix IX	Hexavalent Chromium	Additional Analysis
SOIL											
PAI-01-SS01	PAI-01-SS-001-01	0-1	•	•	•		•				
PAI-01-SS02	PAI-01-SS-002-01	0-1	•	•	•		•				
PAI-01-SS03	PAI-01-SS-003-01	0-1	•	•	•		•				
PAI-01-SS04	PAI-01-SS-004-01	0-1	•	•	•		•				
PAI-01-SS05	PAI-01-SS-005-01	0-1	•	•	•		•				
PAI-01-SS06	PAI-01-SS-006-01	0-1	•	•	•		•				
PAI-01-SS07	PAI-01-SS-007-01	0-1	•	•	•		•	TOC & pH only			•(10)
PAI-01-SS08	PAI-01-SS-008-01	0-1	•	•	•		•			•	
PAI-01-SS09	PAI-01-SS-009-01	0-1	•	•	•		•			•	
PAI-01-SS10	PAI-01-SS-010-01	0-1	•	•	•		•	TOC & pH only			•(4)(10)
PAI-01-SS11	PAI-01-SS-011-01	0-1	•	•	•		•				
PAI-01-SS12	PAI-01-SS-012-01	0-1	•	•	•		•				
PAI-01-SS13	PAI-01-SS-013-01	0-1	•	•	•		•				
PAI-01-SS14	PAI-01-SS-014-01	0-1	•	•	•		•			•	
PAI-01-SB01	PAI-01-SB-001-xx(5)	TBD(11)									•(4)

TABLE 7-1

SUMMARY OF ENVIRONMENTAL SAMPLING
SITE 1 - INCINERATOR LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 4 OF 6

Sample Location	Sample Designation	Sample Depth (Feet below ground surface)	Sample Analysis								
			TCL VOCs	TCL SVOCs	TAL Metals (Total) and Cyanide	TAL Metals (Filtered)	TCL Pest/ PCBs	TOC, pH, Hardness ($CaCO_3$)	Appendix IX	Hexavalent Chromium	Additional Analysis
PAI-01-SB01	PAI-01-SB-001-xx(5)	TBD(7)						TOC & pH only			•(4)(10)
PAI-01-SB02	PAI-01-SB-002-xx(5)	TBD(11)									•(4)
PAI-01-SB02	PAI-01-SB-002-xx(5)	TBD(7)						TOC & pH only			•(4)(10)
PAI-01-SB03	PAI-01-SB-003-xx(5)	TBD(11)									•(4)
PAI-01-SB03	PAI-01-SB-003-xx(5)	TBD(7)						TOC & pH only			•(4)(10)
PAI-01-SB03	PAI-01-SB-003-xx(5)	TBD(12)									•(6)
PAI-01-SB04	PAI-01-SB-004-xx(5)	TBD(11)									•(4)
PAI-01-SB04	PAI-01-SB-004-xx(5)	TBD(7)						TOC & pH only			•(4)(10)
PAI-01-SB05	PAI-01-SB-005-xx(5)	TBD(11)									•(4)
PAI-01-SB05	PAI-01-SB-005-xx(5)	TBD(7)						TOC & pH only			•(4)(10)
GROUNDWATER											
PAI-01-GW04 (existing monitoring well)	PAI-01-GW-004-01	Shallow Surficial	•	•	•	•	•	•			•(8)(9)
PAI-01-GW05	PAI-01-GW-005-01	Shallow Surficial	•	•	•	•	•	•			•(8)(9)
PAI-01-GW06 (Converted from PAI-01-SB01)	PAI-01-GW-006-01	Deep Surficial	•	•	•	•	•	•			•(8)(9)

TABLE 7-1

SUMMARY OF ENVIRONMENTAL SAMPLING
SITE 1 - INCINERATOR LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 5 OF 6

Sample Location	Sample Designation	Sample Depth (Feet below ground surface)	Sample Analysis								
			TCL VOCs	TCL SVOCs	TAL Metals (Total) and Cyanide	TAL Metals (Filtered)	TCL Pest/ PCBs	TOC, pH, Hardness ($CaCO_3$)	Appendix IX	Hexavalent Chromium	Additional Analysis
PAI-01-GW07	PAI-01-GW-007-01	Shallow Surficial	•	•	•	•	•	•		•	•(8)(9)
PAI-01-GW08 (Converted from PAI-01-SB02)	PAI-01-GW-008-01	Deep Surficial	•	•	•	•	•	•			•(8)(9)
PAI-01-GW09	PAI-01-GW-009-01	Shallow Surficial	•	•	•	•	•	•			•(8)(9)
PAI-01-GW10 (Converted from PAI-01-SB03)	PAI-01-GW-010-01	Deep Surficial							•	•	•(8)(9)
PAI-01-GW11	PAI-01-GW-011-01	Shallow Surficial	•	•	•	•	•	•		•	•(8)(9)
PAI-01-GW12 (Converted from PAI-01-SB04)	PAI-01-GW-012-01	Deep Surficial	•	•	•	•	•	•			•(8)(9)
PAI-01-GW13	PAI-01-GW-013-01	Shallow Surficial	•	•	•	•	•	•			•(8)(9)
PAI-01-GW14 (Converted from PAI-01-SB05)	PAI-01-GW-014-01	Deep Surficial	•	•	•	•	•	•			•(8)(9)

1 Dissolved oxygen, salinity, temperature, and Secchi Disk readings.
2 TOC and pH, only.
3 Grain-size analysis, and bulk density.
4 Natural moisture content, grain-size analysis, and Atterberg Limits.
5 XX = Sample depth determined in field.
6 A Shelby Tube will be collected from the Hawthorn Formation to determine vertical conductivity.
7 Sample to be collected from the saturated zone.
8 Turbidity, TDS, TSS, chloride, fluoride, nitrate/nitrite, sulfate, salinity, and dissolved oxygen.
9 Perform slug test, water-level measurements, and tidal influence study.

TABLE 7-1

SUMMARY OF ENVIRONMENTAL SAMPLING
SITE 1 - INCINERATOR LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 6 OF 6

10 Porosity, grain-size analysis, bulk density, and specific gravity.
11 Sample to be collected from the vadose zone.
12 Sample to be collected from the Hawthorn Formation.

TBD = To Be Determined.

TABLE 7-2

SUMMARY OF ENVIRONMENTAL SAMPLING
SITE 41 - FORMER INCINERATOR
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample Location	Sample Designation	Sample Depth (feet below ground surface)	Sample Analysis					
			TCL VOCs	TCL SVOCs	TAL Metals (Total) and Cyanide	TCL Pest/ PCBs	TOC, pH, Hardness ($CaCO_3$)	Additional Analysis
SOIL								
PAI-41-SS01	PAI-41-SS-001-01	0-1	•	•	•	•		
PAI-41-SS02	PAI-41-SS-002-01	0-1	•	•	•	•		
PAI-41-SS03	PAI-41-SS-003-01	0-1	•	•	•	•		
PAI-41-SS04	PAI-41-SS-004-01	0-1	•	•	•	•		

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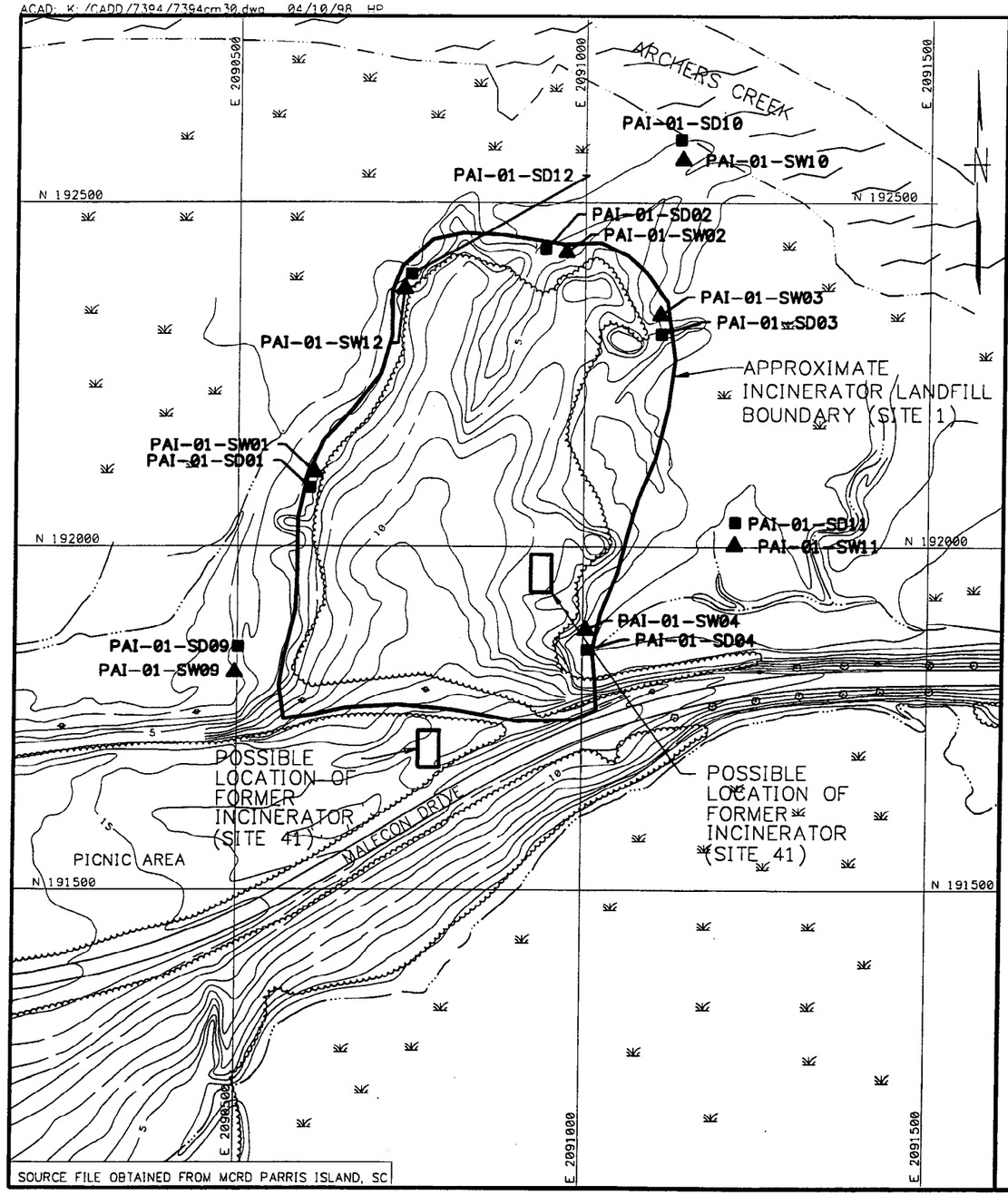

LEGEND

▲ PROPOSED SURFACE WATER SAMPLE LOCATION

■ PROPOSED SEDIMENT SAMPLE LOCATION

▭ POSSIBLE LOCATION OF FORMER INCINERATOR

NOTES:
1. SURFACE WATER AND SEDIMENT SAMPLES TO BE COLLECTED FROM THE SAME LOCATION.
2. AT PAI-01-SD02, ONE SHALLOW AND ONE DEEP SEDIMENT SAMPLE WILL BE TAKEN.
3. SAMPLING LOCATIONS ARE APPROXIMATE AND MAY BE REVISED AS INDICATED IN SECTION 7.2.1.
4. SURFACE WATER AND SEDIMENT SAMPLES PAI-01-SW01, 02, 03, 04, 12 AND PAI-01-SD01, 02, 03, 04, 12 TO BE COLLECTED IN THE INTERTIDAL AREA BETWEEN THE TREELINE AND LANDFILL BOUNDARY.
5. BASED ON CONSULTATION WITH THE PARRIS ISLAND PARTNERING TEAM, THE BACKGROUND SAMPLES PAI-01-SW05, 06, 07 AND PAI-01-SD05, 06, 07 WILL BE COLLECTED AT PICKNEY ISLAND. TWO (2) SAMPLES WILL BE COLLECTED FROM THE INTERTIDAL AREA AND ONE (1) SAMPLE WILL BE COLLECTED AT A SUBMERGED LOW TIDE ELEVATION POINT.
6. SURFACE WATER AND SEDIMENT SAMPLE PAI-01-SW08 AND PAI-01-SD08 WILL BE AN EXTRA SAMPLE TO BE USED AS NECESSARY.
7. SURFACE WATER AND SEDIMENT SAMPLES PAI-01-SW09, 10, 11 AND PAI-01-SD09, 10, 11 WILL BE COLLECTED IN A SUBMERGED LOW TIDE AREA OUTSIDE THE LANDFILL BOUNDARY.

PROPOSED SW/SEDIMENT SAMPLE LOCATIONS
SITE 1- INCINERATOR LANDFILL
SITE 41- FORMER INCINERATOR
MCRD, PARRIS ISLAND, SOUTH CAROLINA

0 200 400
SCALE IN FEET

FIGURE 7-1

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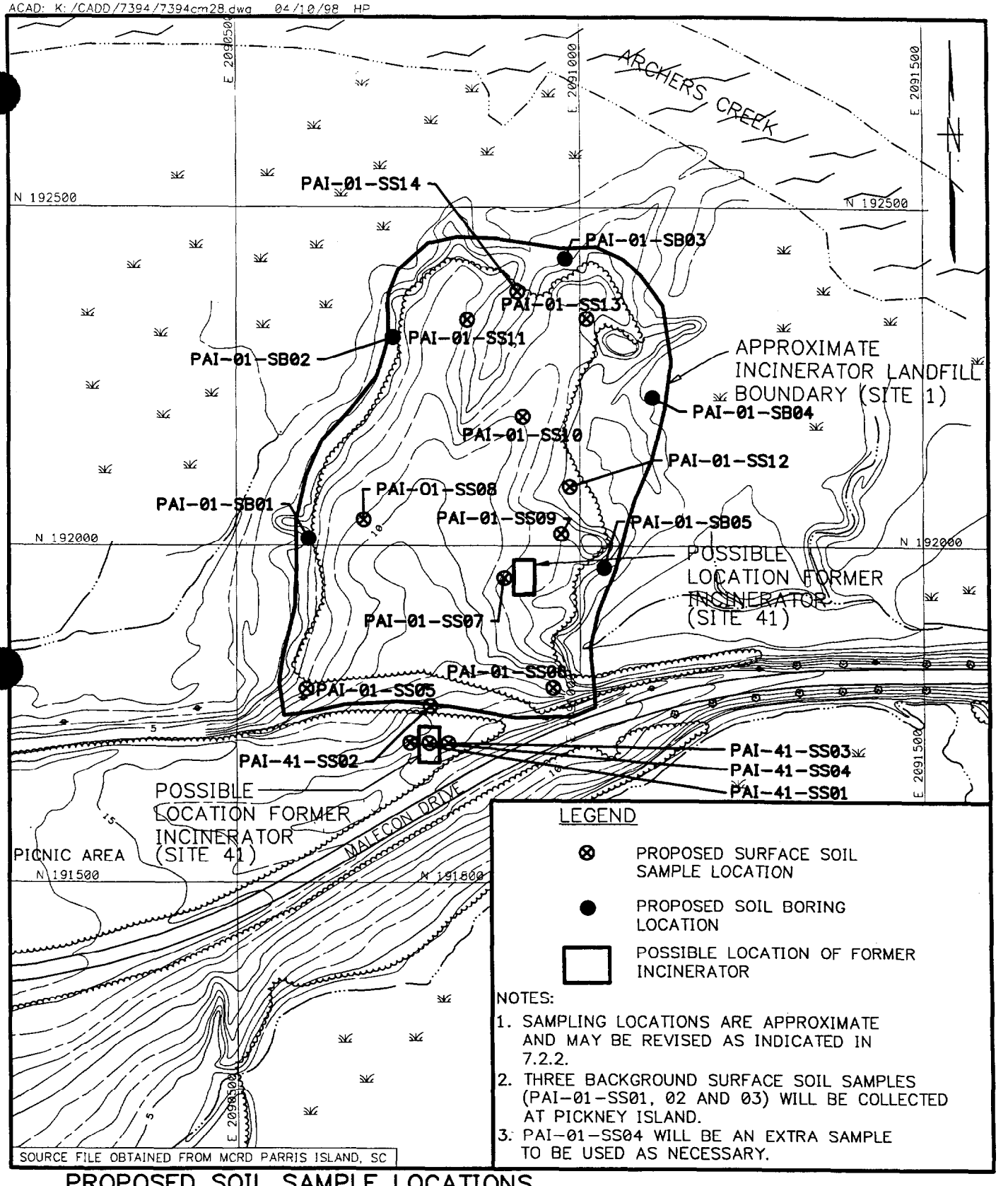

PROPOSED SOIL SAMPLE LOCATIONS
SITE 1 – INCINERATOR LANDFILL
SITE 41 – FORMER INCINERATOR
MCRD, PARRIS ISLAND, SOUTH CAROLINA

FIGURE 7-2

0 200 400
SCALE IN FEET

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069703/P

CTO 0020

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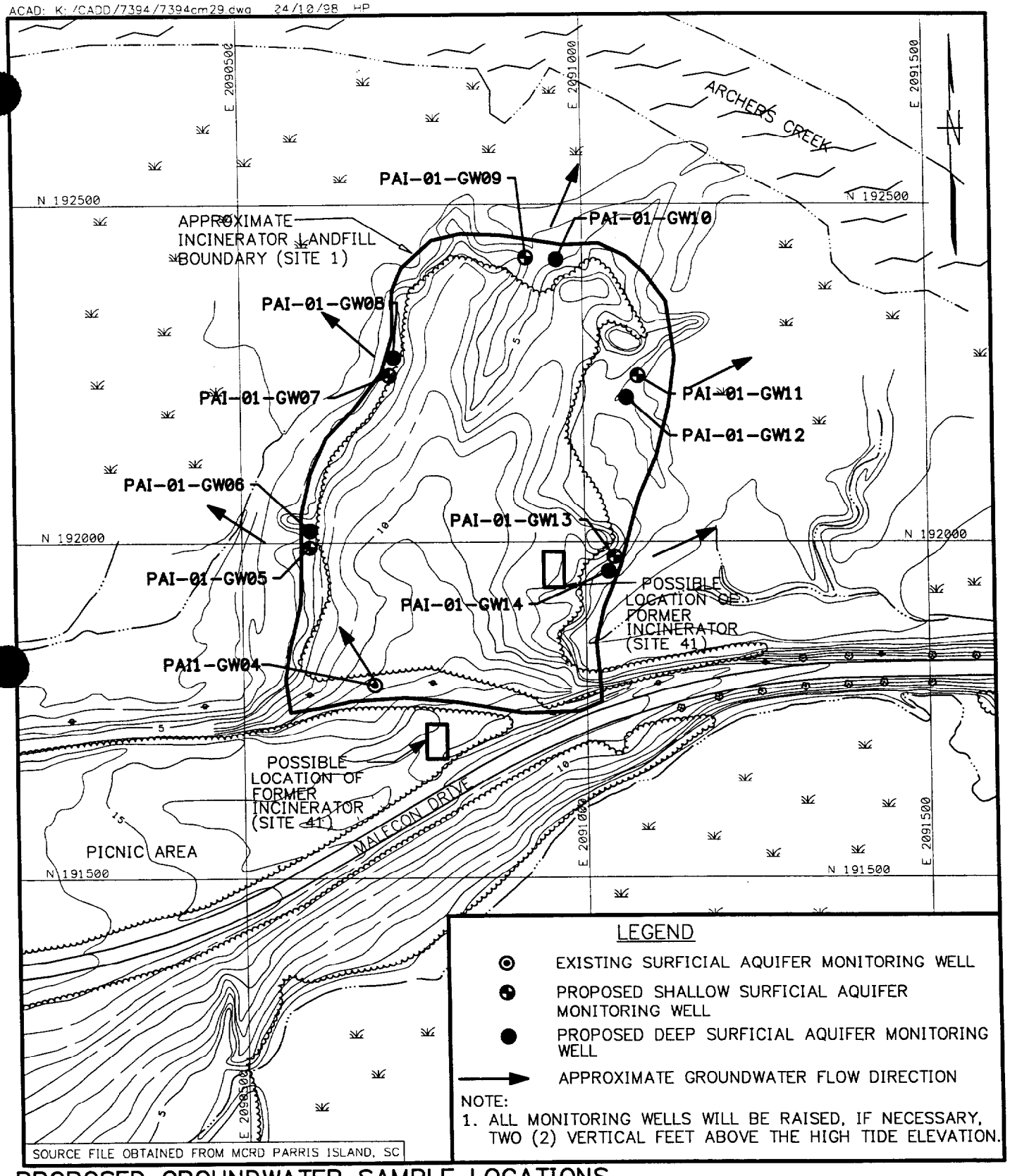

PROPOSED GROUNDWATER SAMPLE LOCATIONS
SITE 1 – INCINERATOR LANDFILL
SITE 41–FORMER INCINERATOR
MCRD, PARRIS ISLAND, SOUTH CAROLINA

0 200 400
SCALE IN FEET

FIGURE 7–3

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historical accumulation. Collection of surface sediments will be biased towards depositional areas. The surface water and sediment samples will be collected in accordance with sampling methodologies described in the Master FSP and B&R Environmental SOP Number SA-1.2, "Surface Water and Sediment Sampling." Each set of surface water and sediment samples will be collected at the same location. At low tide, the proposed surface water and sediment sampling locations are not covered with water. Sediment samples will be collected in the marsh area at low tide as U.S. EPA Region 4 considers exposure to sediments for only those periods that the sediment is not covered with surface water. Surface water samples will be collected at high tide as the surface water begins to recede. Surface water samples will be filtered in the field for dissolved metals analysis in addition to the unfiltered samples collected for total metals analysis.

The upland/wetland boundary is not well defined and will be characterized during field activities. Consequently, proposed sampling locations may be modified as appropriate during the investigation. Any deviation from the proposed locations will be noted in the field and documented in the RI/RFI report.

7.2.2 Surface Soil Sampling

Eighteen surface soil samples (which includes three background samples) will be collected for this investigation at locations shown on Figure 7-2. Ten surface soil samples will be collected from the 0-1 foot sampling interval at Site 1 within the upland portion of the landfill boundary. Once the sample is collected, field personnel will continue to bore into the soil with a hand auger until the top limit of waste is reached. The lithology of these borings will be recorded.

As mentioned previously, the upland/wetland boundary is not well defined and will be characterized during field activities. Consequently, proposed sampling locations may be modified as appropriate during the investigation. Any deviation from the proposed locations will be noted in the field and documented in the RI/RFI report.

In addition to the ten surface soil samples at Site 1, four surface soil samples will be collected at Site 41, and three background surface soil samples will be collected from the 0-1 foot interval at Pickney Island. All surface soil samples will be collected in accordance with the methodologies described in the Master FSP and B&R Environmental SOP Number SA-1.3, "Soil Sampling." Samples will be collected to bias the worst-case scenario based on visual and field instrumentation evaluation.

7.2.3 Subsurface Soil Sampling

Ten subsurface soil samples will be collected for this investigation in accordance with the methodologies described in the Master FSP and B&R Environmental SOP Numbers GH-1.5, "Borehole and Sample

Logging" and GH-1.3, "Soil and Rock Drilling Methods." Two subsurface soil samples will be collected from each proposed boring location that will be converted to a deep surficial aquifer monitoring well. Soil borings where subsurface soil samples will be taken are shown in Figure 7-2. The subsurface soil samples will include one from the vadose zone and one within the aquifer. Soil classification will be conducted on both samples. Groundwater modeling parameters will be determined for the sample taken within the aquifer. Also, a Shelby Tube sample will be collected during the installation of monitoring well PAI-01-GW10 in accordance with the methodologies described in B&R Environmental SOP SA-1.3, Section 5.2.3, "Procedure for Collecting Undisturbed Samples" and Section 6.3 of this Work Plan.

7.2.4 Groundwater Sampling

Eleven groundwater samples will be collected for this investigation at the locations shown in Figure 7-3. The one existing and ten proposed monitoring wells will be sampled during this investigation in accordance with the U.S. EPA Region 4 EISOPQAM and B&R Environmental Number SOP SA-1.1, Section 5.7, "Low Flow Purge and Sampling." Samples will be collected using disposable Teflon bailers at low tide when the dilution is anticipated to be minimized. A portion of each sample will be filtered in the field for dissolved metals analysis.

Background groundwater samples will not be taken at Sites 1 or 41. However, an upgradient groundwater sample will be collected during field activities associated with Site 2 (B&R Environmental, 1998a). The analytical results of this sample will be used to estimate representative upgradient conditions at Sites 1 and 41.

7.3 SAMPLE HANDLING

7.3.1 Sample Containers, Preservation, Holding Times, and Analyses

Sample handling includes proper selection of sample containers, preservation, allowable holding times, and analyses. The site-specific QAPP summarizes the sample handling requirements for this investigation.

7.3.2 Sample Nomenclature

Each sample will be assigned a unique codified sample identification number. The sample nomenclature format described in the Master FSP and B&R Environmental SOP Number CT-04, "Sample Nomenclature," will be used for this investigation. The unique label system established for this sampling event is as follows.

1		2		3		4
AAA-NN	-	AA	-	NNN	-	NN
Site Location and Site Number		Media		Sample Number		Sample Depth

1	PAI - Parris Island 01 - Site 1 41 - Site 41	3	An ascending sequential number of samples collected
2	SW - Surface Water SD - Sediment SS - Surface Soil SB - Soil Boring/Subsurface Soil GW - Groundwater	4	Bottom of sample interval or sample round.

7.3.3 Sample Documentation, Packaging, and Shipping

Matrix-specific sample logsheets will be maintained for each sample collected. In addition, sample collection information will be recorded in field notebooks and the Site Logbook. Further description of sample documentation is provided in the Master FSP and B&R Environmental SOP Number SA-6.3, "Field Documentation."

Samples will be packaged and shipped according the Master FSP and B&R Environmental SOP Number SA-6.1, "Non-Radiological Sample Handling."

7.3.4 Sample Custody

Sample custody will be maintained and documented at all times. Custody begins at the time of collection and ends at the time of disposal by the laboratory. The procedures for custody described in the Master FSP and B&R Environmental SOP Number SA-6.1 will be implemented for this investigation.