APPENDIX B

FIELD SAMPLING PLAN

FIELD SAMPLING PLAN
PRE-REMEDIAL ACTION SAMPLING
COASTAL SALT MARSH

HAMILTON ARMY AIRFIELD

NOVATO, CALIFORNIA

Final

Prepared by:

US Army Corps of Engineers ®

Sacramento District
Environmental Design Section

June 2004

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

CSM	Coastal Salt Marsh
CSMPAS	Coastal Salt Marsh Pre-remedial Action Sampling
COC	Chain-of-Custody
CWM	Clean Wide-Mouth
DQOs	Data quality objectives
EDS	Environmental Design Section
ELCDDA	East Levee Construction Debris Disposal Area
FSP	Field Sampling Plan
FSTP	Former Sewage Treatment Plant
GPS	Global Positioning System
HAAF	Hamilton Army Airfield
IDW	Investigation-derived waste
mg/kg	milligram per kilogram
MS/MSD	Matrix Spike/Matrix Spike Duplicate
ODD	Outboard Drainage Ditch
QAPP	Quality Assurance Project Plan
QC	Quality control
PCBs	Polychlorinated Biphenyls
SSHP	Site safety and health plan
Total DDTs	Sum of Dichlorodiphenyltrichloroethane, Dichlorodiphenyldichloroethane, and Dichlorodiphenyldichloroethylene (DDT + DDD + DDE)
USACE	U.S. Army Corps of Engineers
WP	Work Plan

FIELD SAMPLING PLAN
PRE-REMEDIAL ACTION SAMPLING
COASTAL SALT MARSH
HAMILTON ARMY AIRFIELD

1. INTRODUCTION

1.1 SCOPE OF PROJECT

This Field Sampling Plan (FSP) describes the work to be performed during the Coastal Salt Marsh Pre-remedial Action Sampling (CSMPAS) at Hamilton Army Airfield (HAAF). The CSMPAS is designed to collect data that will be used to determine the lateral and vertical extent of contamination to determine the size of specific excavations.

The FSP outlines the methods of sampling and analysis of the nine areas. The US Army Corps of Engineers (USACE), Sacramento District is performing the Miscellaneous Site investigations.

1.2 SCOPE OF REPORT

This FSP presents the site investigations sampling and analysis programs, sampling objectives, sampling strategy and rationale, sampling locations, sample collection methods, and sample handling procedures. The FSP is designed to ensure that field procedures and documentation are standardized so that data collected are valid and defensible. All field personnel will become familiar with the FSP prior to conducting fieldwork.

The FSP will be implemented in conjunction with the Quality Assurance Project Plan (QAPP) and the Site Safety and Health Plan (SSHP).

1.3 SITE LOCATION

HAAF is located in Novato, CA. HAAF was a former Air Force Base and Army Airfield. The location of HAAF is shown in Figure 1-1.

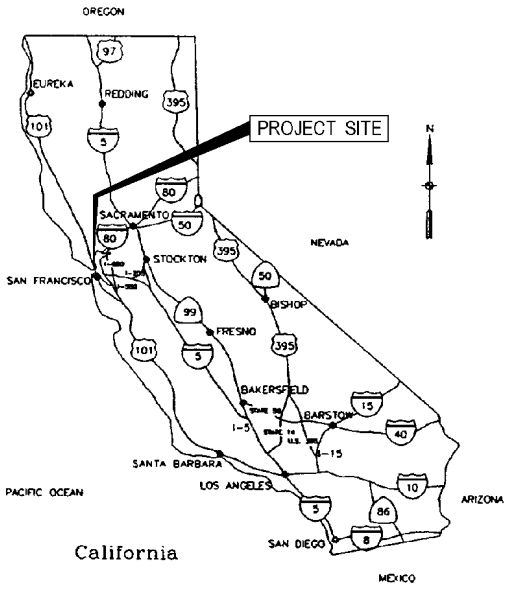

Figure 1-1: Project Location Map

1.4 INVESTIGATION SITES

The nine sites of the CSMPAS are listed below.

- Boat Dock
- Area 14
- Historic Outfall Drainage Ditch (ODD)
- East Levee Construction Debris Disposal Area (ELCDDA)
- ELCDDA – Burn Pit
- Outfall Drainage Ditch (ODD)
- Former Sewage Treatment Plant (FSTP) Outfall Area
- High Marsh
- Antenna Debris Disposal Area

The locations of these sites within the Coastal Salt Marsh are illustrated in Figure 1-2.

1.5 PROJECT STAFFING

This study is being designed and implemented by the Environmental Design Section (EDS), Sacramento District, and USACE under the general supervision of Rick Meagher, Section Chief. The technical design team includes:

Personnel	Responsibility
Kathy Siebenmann	Technical Team Lead
Pamela Amie	Chemist
Tim Crummett	Field Team Lead, Geologist
Donna Maxey	Industrial Hygienist

Each team member provides an integral part in completing this study, including preparation and implementation of the Data Quality Objectives (DQOs) and Work Plan (WP), performing fieldwork, and reporting.

2. SAMPLING

This section provides the sample locations, number of samples, analytical methods, and the rationale for the sampling and analytical program. Investigation and sampling techniques and procedures are discussed in Section 4.0. Overall, the investigative approach includes only soil sampling. All sampling locations will be identified using a Global Positioning System (GPS).

During the performance of fieldwork, sampling locations and depths stated in this FSP might be adjusted and additional samples added based on field observations or conditions.

Please refer to Figure 1-2 while reading the descriptions below.

2.1 BOAT DOCK

The boat dock is located in the southwest portion of the Coastal Salt Marsh. The boat dock and the adjacent channels and turnaround area were previously used by the military for emergency rescue operations in San Pablo Bay. The facility has been abandoned since the early 1970s, and only piers and the main platform remain. Aerial photographs suggest that maintenance of the channel and turnaround areas was discontinued during the 1960s.

2.2 AREA 14

Area 14 was an area identified in a 1941 aerial photograph. The area is located north of the boat dock just east of the east levee. Little is known about this area although it may have been a fill, spoil, disposal, demolition area, or may simply have been seasonal ponding. In aerial photographs taken in 1946, 1952, and 1968, the area does not show and a portion of it was covered when the runway was extended.

2.3 HISTORIC ODD

The historic outfall drainage ditch is located on the coastal salt marsh side of and parallel to the east perimeter levee. It runs from the southern edge of the ELCDDA south to the north side of the runway approach. Prior to construction of the runway extension and the ELCDDA, storm water runoff in the ODD flowed parallel to the east levee until discharge at the boat dock channel area.

2.4 EAST LEVEE CONSTRUCTION DEBRIS DISPOSAL AREA (ELCDDA)

The east levee construction debris disposal area is centrally located and runs from the East Levee Road east to San Pablo Bay. This area was used primarily for disposal of construction debris from 1961to 1972.

2.5 ELCDDA – BURN PIT

The burn pit is located at the eastern end of the ELCDDA. The burn pit area extends out to San Pablo Bay and has a slightly higher elevation than most of the ELDCCA and the CSM. The nature and quantity of wastes burned at the site are not known and the only waste material evident at the surface is construction debris (broken bricks, concrete, etc.).

2.6 OUTFALL DRAINAGE DITCH (ODD)

Airfield storm water is discharged into the Outfall Drainage Ditch during rainstorms. The ODD is located in the marsh about 20 feet from the east perimeter levee. It runs south, parallel to the levee, from the pump stations to the ELCDDA; turns east, and runs in the marsh parallel to the ELCDDA road toward San Pablo Bay. The ditch is considered an accumulation point for wastes associated with airfield storm water runoff.

2.7 FORMER SEWAGE TREATMENT PLANT (FSTP) OUTFALL AREA

The FSTP Outfall Area is a channel that flows from the end of the FSTP outfall pipe to San Pablo Bay. The Army treated sanitary sewer wastes at the FSTP and discharged treated wastewater through the outfall pipe. The FSTP outfall pipe extends across the marsh approximately 445 feet from the east perimeter levee. The Outfall Area channel is approximately 130 feet long.

2.8 HIGH MARSH PLAIN

The High Marsh Plain area is that portion of the CSM dominated by pickleweed and comprises most of the coastal salt marsh. It extends from the northern to the southern BRAC boundaries and east from the ODD nearly to the shoreline. The high marsh is regularly inundated by Bay waters and contains several perched ponds.

2.9 ANTENNA DEBRIS DISPOSAL AREA

Antenna debris piles are located in the northern most portion of the CSM adjacent to the ODD. One debris pile is located on the east side of the ODD, one on the west. Visual inspection of this site suggests discarded material from the former antenna facilities and building demolition was placed here.

3. SOIL SAMPLING

Soil samples will be collected at each site as shown on Figures 2-1 through 2-10. Sample locations may be adjusted based on site conditions and accessibility. Soil samples will be collected from the sample locations at the depths shown in Table 3-1.

During the performance of fieldwork, sampling locations and depths stated in this FSP may be adjusted, deleted, or samples added, based on field observations or conditions. Any changes will be documented in both the field logbook and final reports.

3.1 ANALYTICAL PLAN

The analytes, specific to each CSM site, were selected based on previous analytical results from the marsh. Sediment samples will be analyzed by the following methods:

- Metals: Method SW6010B/SW7471A
- Herbicides: Dichloroprop, MCPP, MCPA: Method SW8151A
- Pesticides: Total DDT, Total Chlordanes, endrin aldehyde, heptachlor, heptachlor epoxide: Method SW8081A
- Total Petroleum Hydrocarbons Extractable (TPH-E): Method SW8015B
- PCB Homologues: Method 1668A
- Phenol and Pentachlorophenol: Method SW8270C
- Dioxin/Furans: Method SW8290.
- Total DDT in Soil Test Kit: Method SW4042

TABLE 3-1: Summary of Proposed Analytical Parameters

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
MISCELLANEOUS SITES	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
Boat Dock – Under the Dock	HAAF-BD-801-0.5 HAAF-BD-802-0.5 HAAF-BD-803-0.5 HAAF-BD-804-0.5 HAAF-BD-967-0.5 (QC) HAAF-BD-805-0.5 HAAF-BD-806-0.5 HAAF- BD-807-0.5 HAAF-BD-808-0.5 HAAF-BD-809-0.5 HAAF-BD-810-1.0 HAAF-BD-990-1.0	9 sidewall (6 inches) and 2 floor (1 foot) samples. Collect sidewall samples midway between surface and proposed excavation depth. See Figure 2-1 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total metals (full suite), total chlordanes, total DDTs, heptachlor epoxide	SW6010B and SW8081A
Boat Dock – In the Channel	HAAF-BD-811-0 HAAF-BD-812-0 HAAF-BD-813-0 HAAF-BD-814-0 HAAF-BD-815-0 HAAF-BD-968-0 (QC)	5 surface samples. Collect sidewall samples midway between surface and proposed excavation depth. See Figure 2-1 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite)	SW6010B
Area 14 – Motor Oil	HAAF-A14-819-2.0 HAAF-A14-969-2.0 (QC) HAAF-A14-820-2.0 HAAF-A14-821-2.0 HAAF-A14-822-2.0 MS/MSD HAAF-A14-823-6.0	1 central (6 feet) and 4 surrounding (2 feet) samples. See Figure 2-2 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	TPH-E (motor oil)	SW8015B
Area 14 – Cobalt	HAAF-A14-824-2.0 HAAF-A14-825-2.0	1 central (surface) and 3 surrounding (2 feet) samples. See figure 2-2 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite)	SW6010B

TABLE 3-1: Summary of Proposed Analytical Parameters

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
MISCELLANEOUS SITES	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
	HAAF-A14-826-2.0 HAAF-A14-827-0				
Historic ODD – northern half of excavation	HAAF-HODD-828-3.0 HAAF-HODD-829-3.0 HAFF-HODD-991-0 HAAF-HODD-992-0 HAAF-HODD-993-0	2 samples (3 feet) at each end of proposed excavation. See Figure 2-3 for sample locations. (-991 – 993, surface and SW6010B only)	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite), dichlorprop	SW6010B and SW8151A
Historic ODD - southern half of excavation	HAAF-HODD-830-1.0 HAAF-HODD-831-1.0 HAAF-HODD-970-1.0 (QC)	2 samples (1 foot) at each end of proposed excavation. See Figure 2-3 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total DDTs	SW8081A
East Levee Construction Debris Disposal Area (ELCDDA) - PCBs	HAAF-CDA-832-0	1 surface sample. This is a confirmation sample. See Figure 2-4 for sample locations. Associated with former sample location CSM-CDA-SD-363.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	PCB Homologues	1668A

TABLE 3-1: Summary of Proposed Analytical Parameters					
SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
MISCELLANEOUS SITES	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
ELCDDA – lead and zinc	HAAF-CDA-833-1.5 HAAF-CDA-834-1.5 HAAF-CDA-835-1.5 HAAF-CDA-836-1.5 HAAF-CDA-971-1.5 (QC) HAAF-CDA-837-1.5 HAAF-CDA-838-1.5 HAAF-CDA-839-1.5 MS/MSD HAAF-CDA-840-1.5 HAAF-CDA-841-1.5 HAAF-CDA-842-1.5 HAAF-CDA-843-2.5 HAAF-CDA-843-BM HAAF-CDA-844-2.5 HAAF-CDA-844-BM HAAF-CDA-972-BM (QC) HAAF-CDA-845-2.5 HAAF-CDA-845-BM HAAF-CDA-846-2.5 HAAF-CDA-846-BM	10 sidewall (0.5 – 1.5 feet in cap material) and 4 floor (1 foot into debris material or at groundwater if <1 ft.) samples. Archive 4 samples from bay mud taken below floor samples. See Figure 2-4 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite)	SW6010B

TABLE 3-1: Summary of Proposed Analytical Parameters

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
MISCELLANEOUS SITES	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
ELLCDDA – Burn Pit	HAAF-BP-851-1.5 HAAF-BP-852-1.5 HAAF-BP-853-1.5 HAAF-BP-854-1.5 HAAF-BP-855-1.5 HAAF-BP-856-1.5 HAAF-BP-857-1.5 HAAF-BP-858-1.5 HAAF-BP-859-3.0 HAAF-BP-860-3.0 HAAF-BP-861-3.0 HAAF-BP-862-3.0 HAAF-BP-1014-0 HAAF-BP-1014-1.5 HAAF-BP-1014-3.0	8 sidewall (1.5 feet), 4 floor (3 feet) and 4 sub floor (1 foot below bay mud contact). See Figure 2-5 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	PCB Homologues, dioxins and furans	1668A and SW8290 (PCP 8270C for 1014 only)
	HAAF-BP-859-1BM HAAF-BP-860-1BM HAAF-BP-861-1BM HAAF-BP-973-1BM (QC) HAAF-BP-862-1BM		2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	TPH-E	SW8015B
	HAAF-BP-1018-0 HAAF-BP-1019-0	2 surface samples stepped out from east and south sides of proposed excavation area. See Figure 2-5 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite)	SW6010B

TABLE 3-1: Summary of Proposed Analytical Parameters

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
MISCELLANEOUS SITES	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
Outfall Drainage Ditch (ODD)	HAAF-ODD-867-2.5 HAAF-ODD-867-ES-2.5 HAAF-ODD-867WS-2.5 HAAF-ODD-868-2.5 HAAF-ODD-868ES-2.5 HAAF-ODD-868WS-2.5 HAAF-ODD-974WS-2.5 (QC) HAAF-ODD-869-2.5 HAAF-ODD-869ES-2.5 HAAF-ODD-869WS-2.5 HAAF-ODD-870-2.5 HAAF-ODD-870ES-2.5 HAAF-ODD-870WS-2.5 HAAF-ODD-871-2.5 HAAF-ODD-871ES-2.5 HAAF-ODD-871WS-2.5 HAAF-ODD-872-2.5 HAAF-ODD-873-2.5 MS/MSD HAAF-ODD-975-2.5 (QC) HAAF-ODD-874-2.5 HAAF-ODD-875-2.5 HAAF-ODD-876-2.5 MS/MSD HAAF-ODD-877-2.5 HAAF-ODD-878-2.5 HAAF-ODD-879-2.5 HAAF-ODD-880-2.5 HAAF-ODD-976-2.5 (QC)	Total of 24 primary samples plus QC samples. 14 sampling locations, for 5 downstream ODD locations of 14 locations - 3 samples per location (1 floor and 2 sidewall) for 10 sidewall (midway between marsh surface and proposed excavation [proposed excavation is 2 feet below bottom of ditch] and 1.5 feet laterally beyond edge of ditch) and 5 floor (2 to 2.5 feet below bottom of ditch) samples. For balance of 9 samples, all collected from bottom of proposed excavation floor (2 to 2.5 feet below bottom of ditch). See Figure 2-6 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite), TPH-E, PCBs Homologues, Pentachlorophenol (PCP), phenol, total DDTs, total chlordanes, endrin aldehyde, MCPP and MCPA	SW6010B, SW8015B, SW8270C, SW8081A and (SW8151A-only samples 878-880) (1668A for samples 867, 869, 871, 873, 875, 877, 879)

TABLE 3-1: Summary of Proposed Analytical Parameters

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
MISCELLANEOUS SITES	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
ODD – Building 39 outfall	HAAF-ODD-881-3.0 HAAF-ODD-977-3.0 (QC) HAAF-ODD-882-3.0 HAAF-ODD-883-3.0 HAAF-ODD-884-1.0 HAAF-ODD-885-1.0	3 sidewall (app. 2.5 – 3 feet) and 2 floor (2 to 2.5 feet) samples. Sidewall samples half the distance between the marsh surface and the bottom of the proposed excavation (excavation is 2 feet below the bottom of the outfall) and laterally 1.5 feet outside the basin. See Figure 2-6A for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite), TPH-E, PCBs Homologues, Pentachlorophenol (PCP), phenol, total DDTs, total chlordanes, and endrin aldehyde	SW6010B, SW8015B, 1668A, SW8270C, and SW8081A
Former Sewage Treatment Plant – Outfall Area	HAAF-FTP-886-0 HAAF-FTP-886-1.5 HAAF-FTP-979-1.5 (QC) HAAF-FTP-887-0 HAAF-FTP-887-2.0 HAAF-FTP-888-0 HAAF-FTP-888-2.0 HAAF-FTP-889-1.5 HAAF-FTP-890-1.5 HAAF-FTP-994-0	4 (surface) samples, 3 samples nearest the outfall pipe collected at 1.5 feet and 2 north of and away from pipeline collected at 2.0 feet. See Figure 2-7 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite), total chlordanes, total DDTs	SW6010B, SW8081A
Former Sewage Treatment Plant - Channel	HAAF-FTP-891-0 HAAF-FTP-891-1.5 HAAF-FTP-995-1.5 HAAF-FTP-980-1.5 (QC)	2 locations, 1 (surface) and 2 (1.5 feet) samples from two channel locations. See Figure 2-7 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite), total chlordanes, total DDTs and PCB Homologues	SW6010B, SW8081A (1668A – 891 and 995 at depth, only)

TABLE 3-1: Summary of Proposed Analytical Parameters

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
MISCELLANEOUS SITES	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
High Marsh Plain – Eastern extension of proposed excavation	HAAF-HM-893-0 HAAF-HM-894 -0 HAAF-HM-895-0 HAAF-HM-981-0 (QC) HAAF-HM-896-0 HAAF-HM-897-0 HAAF-HM-898-0 HAAF-HM-899-0 HAAF-HM-900-0	8 sample locations. 8 surface samples. See Figure 2-6 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite) and PCB Homologues	SW6010B, 1668A – 893, 894, 896, 898, 900, only)
High Marsh Plain - western extension of proposed excavation	HAAF-HM-914-0 HAAF-HM-984-0 (QC) HAAF-HM-915-0 HAAF-HM-916-0 HAAF-HM-917-0 MS/MSD HAAF-HM-918-0 HAAF-HM-919-0	6 locations- 6 surface samples. See Figure 2-6A for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite), TPH-E, PCB Homologues, Pentachlorophenol (PCP), phenol, total DDTs, total chlordanes, and endrin aldehyde	SW6010B, SW8015B, SW8270C, and SW8081A (1668A -914, 916, 918, only)
High Marsh Plain – vertical extension of proposed excavation	HAAF-HM-921-2.0 HAAF-HM-922-2.0 HAAF-HM-923-2.0 HAAF-HM-924-2.0 MS/MSD HAAF-HM-978-2.0 (QC) HAAF-HM-925-3.0 HAAF-HM-926-3.0 HAAF-HM-985-3.0QC)	6 samples, bottom only. Depth varies, see Figure 2-8. See Figure 2-6 for sample locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite) and PCB Homologues	SW6010B and (1668A – 921, 923 and 925, only)

TABLE 3-1: Summary of Proposed Analytical Parameters

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
MISCELLANEOUS SITES	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
High Marsh Grid (ABC 1-9)	HAAF-GRD-938-0 HAAF-GRD-939-0 HAAF-GRD-986-0 (QC) HAAF-GRD-940-0 HAAF-GRD-941-3.0 HAAF-GRD-942-3.0 HAAF-GRD-943-3.0 HAAF-GRD-944-3.0 HAAF-GRD-945-0 HAAF-GRD-946-0 HAAF-GRD-947-3.0 HAAF-GRD-948-3.0 HAAF-GRD-987-3.0 (QC) HAAF-GRD-949-3.0 HAAF-GRD-950-3.0 HAAF-GRD-951-3.0 HAAF-GRD-952-3.0 HAAF-GRD-953-3.0 HAAF-GRD-954-3.0 HAAF-GRD-955-0 HAAF-GRD-956-0 HAAF-GRD-957-0 HAAF-GRD-958-3.0 HAAF-GRD-959-3.0 HAAF-GRD-960-3.0 HAAF-GRD-961-3.0 HAAF-GRD-962-0 HAAF-GRD-962-3.0 HAAF-GRD-963-0 HAAF-GRD-964-0 HAAF-GRD-988-0 (QC)	11 surface and 17 depth samples. Sample IDs indicate which are at surface and which are at 3-foot depth (by the final digits in the labels). Samples arranged in grid with grid nodes 75 feet apart. See Figure 2-9 for sample depths and locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite), total chlordanes, total DDTs, endrin aldehyde, heptachlor, heptachlor epoxide, and PCB Homologues	SW6010B, SW8081A and 1668A

TABLE 3-1: Summary of Proposed Analytical Parameters					
SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
MISCELLANEOUS SITES	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
High Marsh Grid (DE 1-9)	HAAF-GRD-965-0 HAAF-GRD-966-0 HAAF-GRD-996-0 HAAF-GRD-997-0 HAAF-GRD-998-0 HAAF-GRD-999-0 HAAF-GRD-1000-0 HAAF-GRD-1012-0 (QC) HAAF-GRD-1001-0 HAAF-GRD-1002-0 HAAF-GRD-1003-0 HAAF-GRD-1004-0 HAAF-GRD-1005-0 HAAF-GRD-1013-0 (QC) HAAF-GRD-1006-0 HAAF-GRD-1007-0 HAAF-GRD-1008-0 HAAF-GRD-1009-0 HAAF-GRD-1010-0 HAAF-GRD-1011-0	18 surface samples of outer marsh plain within 200 feet of San Pablo Bay. Samples arranged in grid with grid nodes 75 feet apart. See Figure 2-9 for sample depths and locations.	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite), total chlordanes, total DDTs, endrin aldehyde, heptachlor, heptachlor epoxide, and PCB Homologues	SW6010B, SW8081A and 1668A

TABLE 3-1: Summary of Proposed Analytical Parameters

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
MISCELLANEOUS SITES	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
Marsh Plain DDT Survey (A 1-4 to E 1-4)	CSM A-01 CSM A-02 CSM A-03 CSM A-04 CSM B-01 CSM B-02 CSM B-03 CSM B-04 CSM C-01 CSM C-02 CSM C-03 CSM C-04 CSM D-01 CSM D-02 CSM D-03 CSM D-04 CSM E-01 CSM E-02 CSM E-03 CSM E-04	20 surface samples of inner marsh plain within 400 feet of East Perimeter Levee. Samples arranged in rows with 75 to 100 foot spacing. Rows spaced in marsh approximately 600 to 900 feet apart. See Figure 2-10 for sample locations	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	DDTs using Immuno – Assay field test kits.	SW4042

TABLE 3-1: Summary of Proposed Analytical Parameters					
SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
MISCELLANEOUS SITES	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
High Marsh near historical sewage pipeline	HAAF-TWA2-1015-0 HAAF-TWA2-1017-0 (QC) HAAF-TWA2-1016-0	2 locations, 2 surface samples for marsh plain characterization between sample location TWA-SD02 and historical sewage pipeline. Associated with former sample location TWA-SD02 (TWA-SD2).	2 – 4 oz. or 1 – 8 oz. CWM jars with septa lid per sample	Total Metals (full suite), total chlordanes, total DDTs, endrin aldehyde, heptachlor, heptachlor epoxide, and PCB Homologues	SW6010B, SW8081A 1668A

4. SAMPLING EQUIPMENT AND PROCEDURES

The CSMPAS-fieldwork will be conducted in accordance with the SSHP and the QAPP. The Army prepared the SSHP and the QAPP specifically for this investigation.

4.1 INVESTIGATIVE EQUIPMENT AND PROCEDURES

Sediment samples will be collected for chemical analysis. The field crew will remove debris or vegetative cover to access the marsh plain sample locations. A clean spade and scoop will be used to obtain each surface sample (0-2 inches of undisturbed soil). Sample locations at various depths will be accessed using a spade, stainless steel soil auger (hand or power-driven), or pick and digging bar, as field conditions require.

Subsurface samples will be collected by inserting the soil auger or sampling tube to the appropriate sample collection depth. Samples will be collected as close to the defined depth interval as possible (preferably within one inch) and the actual depth of the sample below the ground's surface will be measured and recorded in the field logbook.

A backhoe may be used to remove debris or access sampling locations if necessary.

Samples for offsite analysis will be hand delivered to the laboratory daily or sent via Federal Express under chain of custody.

4.2 QUALITY CONTROL PROGRAM

The purpose of this section is to describe the field quality control (QC) samples that will be included to support the data quality presented in the QAPP. The sampling methodologies, preservation techniques, and decontamination procedures described in this FSP have been selected to ensure appropriate data quality. The appropriateness of the field sampling protocol will be verified by inclusion of QC samples as described below. Specific QC duplicate samples are included in Table 3-1.

4.2.1 Field Duplicates (QC Samples)

QC duplicate samples collected in the field will provide precision information for the entire measurement system, including sample acquisition, homogeneity, handling, shipping, storage, preparation, and analysis. The field duplicates will be placed in a separate sample jar from the normal sample after homogenization of the sample in the mixing bowl. The identity of these samples will be held blind to the analysts and laboratory personnel until the data are in deliverable form. Duplicate analyses will be performed on approximately 10% of the total investigative samples for each method. QC sample locations are defined in this FSP; however, the locations may be adjusted based on information determined in the field. Odors or visual indicators may be used to assist in directing the location of QC samples to areas suspected to have the highest concentrations of the contaminants of interest. Duplicate samples will be analyzed by the laboratory for the same parameters as the primary sample (i.e., the sample that is being duplicated).

4.2.2 Matrix Spike/Matrix Spike Duplicates (MS/MSD)

A Matrix Spike (MS) is an environmental sample to which known concentrations of analytes have been added. The MS is taken through the entire analytical procedure and the recovery of the analytes is calculated. Results are expressed as percent recovery. The MS is used to evaluate the effects of the sample matrix on the accuracy of the analysis.

A Matrix Spike Duplicate (MSD) is an environmental sample that is divided into two separate aliquots, each of which is spiked with known concentrations of analytes. The spiked aliquots are processed separately and the results compared to determine the effects of the matrix on the precision and accuracy of the analysis. Additional soil sample volumes will be collected for MS/MSD analyses in accordance with the QAPP. MSD sample locations are defined in this FSP; however, the locations may be adjusted based on information determined in the field.

4.2.3 Blanks

4.2.3.1 Equipment Blanks

Contamination introduced by sampling equipment can be detected by analyzing equipment blanks. Equipment blanks will be collected for all non-disposable sampling equipment after decontamination has been performed. Equipment blanks will be obtained with reagent grade water that is determined to be free of the analyte of concern. Equipment blanks will be collected by pouring the reagent grade water over the sampling equipment and collecting the water in an amber glass jar. One equipment blank will be collected per method of analysis (SW6010B, SW8270C [modified], and SW8081A) for a total of 3.

4.2.3.2 Temperature Blanks

A small sample container of water will be labeled as a temperature blank. One temperature blank will be included in each cooler. The temperature blank will be packaged and handled in the same manner as the other samples to assure that its temperature is representative of the samples in that cooler. The laboratory will use a calibrated thermometer to directly measure the temperature of this sample. The temperature reading from the temperature blank will be used to determine whether samples were stored under the appropriate thermal conditions.

4.3 EQUIPMENT DECONTAMINATION PROCEDURES

During sampling activities, appropriate decontamination measures will be taken to minimize sample contamination from sampling equipment.

All down-hole sampling equipment (excluding disposable equipment) will be decontaminated as described in the following paragraphs. Decontamination should be executed immediately prior to equipment use. Whenever this is not possible or practical, measures will be taken to assure that contamination of clean equipment will not occur. Clean disposable gloves will be worn while decontaminating sampling equipment and tools. Clean sampling equipment will not be placed on the ground or other contaminated surfaces prior to use. All non-disposable sampling equipment will be constructed of stainless steel and/or Teflon™.

Detergent and reagent grade water rinses are the first steps in the decontamination process. Deionized water will be stored in plastic containers and applied via pump sprayers or decanted directly from the storage container. The waste decontamination fluids will be collected and handled in accordance with Section 6.0.

Decontamination will consist of the following steps:

1) Wash with non-phosphate detergent;
2) Rinse with potable water;
3) Rinse with analyte-free water (type II reagent grade water or equivalent);
4) Air dry;
5) Wrap equipment completely with aluminum foil (shiny side out) and place in a plastic bag to prevent contamination, if equipment is to be stored or transported.

4.4 SAMPLING CONTAINERS AND PRESERVATION

For samples to be shipped offsite, the laboratory performing the analyses will supply sample containers for this project. For samples to be analyzed onsite, the appropriate sample containers will be supplied. A complete set of sampling containers will be prepared for each sample in advance of the sampling event. Containers will be labeled with the date, time, project name, sample number, samplers initials, parameters for analysis, and preservative. Temperature blanks will be used for all coolers containing samples requiring preservation at 4°C ± 2°C.

5. SAMPLING DOCUMENTATION AND HANDLING

5.1 SAMPLE NUMBERING SYSTEM

A unique identification number will be assigned to each sample. The number is typically an alphanumeric sequence or integer that serves as an acronym to identify the sample. Specific sample identification procedures will follow the strategy outlined below:

Primary Sample	HAAF - designator – 8XX and –9XX
Duplicate Sample	HAAF - designator - 98X
	or HAAF- designator - 8XX - MS/MSD
Equipment Blank	HAAF - EB - Sequential Sample Number

Designator	Site Name
BD	Boat Dock
A14	Area 14
HDD	Historic ODD
CDA	ELCDDA
ELBP	ELCDDA – Burn Pit
ODD	ODD
FTP	Former Sewage Treatment Plant (FSTP)
HM	High Marsh Plain
ADE	Antenna Debris Disposal Area - East
ADW	Antenna Debris Disposal Area - West

XX is the sequential sample number, starting at 01. MS/MSD indicates a matrix spike duplicate. EB is the designator for equipment blanks. The equipment blank sequential sample number shall start at 1.

ODD sample identification numbers will be appended with B (bottom or floor of ditch), WS (west side of ditch), and ES (east side of ditch).

5.2 SAMPLE LABELS

The identification number references information pertaining to a particular sample. It is recorded on the sample container, in the field logbook, and on the sample chain-of-custody form. Following sample collection, the sample label is completed in waterproof ink and secured to the sample container with clear tape.

Each sample collected at the site will be labeled with the following information:

- Sample identification number;
- Site name;
- Date and time of collection;
- Name of person collecting the sample;
- Analysis requested;
- Preservation;
- Any other information pertinent to the sample.

5.3 FIELD LOGBOOK

A field notebook bound with serially numbered pages will be used to record personnel on site, sample identification numbers, sampling date and time, and any significant observations or events during field activities. The project name, site location, sampling event, project leader, telephone number and address of contact office (should the book be misplaced or lost) will be listed in ink. The field notebook is intended to record events during sampling in sufficient detail to allow field personnel to reconstruct events that transpired during the project

The Sampling Team Leader, who will sign and date the notebook prior to initiation of fieldwork will maintain the field notebook. If it is necessary to transfer the logbook to alternative personnel during the course of fieldwork, the person relinquishing the logbook will sign and date the logbook at the time the logbook is transferred and the person receiving the logbook will do likewise. Crossing a line through the entry and entering the correct information will make corrections to erroneous data. The correction will be initialed and dated by the person making the entry. Unused portions of logbook pages will be crossed out, signed, and dated at the end of each workday. Logbook entries must be dated, legible, in ink, and contain accurate documentation. Language used will be objective, factual, and free of personal opinions. Hypotheses for observed phenomena may be recorded, however, they must be clearly indicated as such and only relate to the subject observation.

The sample identification number, sample media, number of containers and laboratory analyses to be conducted are recorded with the sample identification number in the field log book and on the chain-of-custody.

The date and time of sample preparation and collection, and the personnel who conducted sampling are recorded with the sample identification number in the field logbook and on the chain-of custody form. The names of visitors and other persons on site are also recorded in the field logbook. Sampling personnel will also record the ambient weather conditions and other conditions at the sampling location that may affect sample collection, the apparent representativeness of the sample, or sample analysis in the field log book.

5.4 SAMPLE PACKAGING AND SHIPPING

Samples will be transported as soon as possible after sample collection for immunoassay field test kit analysis or offsite laboratory analysis. The following procedures are to be used when packing and transporting samples to the offsite laboratory:

- Use rigid plastic coolers;
- Tape the cooler drain closed both inside and out;
- Wrap glass containers with cushioning material;
- Package samples in individual plastic bags and place in cooler;
- Place a temperature blank in the cooler;
- Package ice in double plastic bags and place bags around, among, and on top of the samples;
- Put paperwork (chain-of-custody record, etc.) in a waterproof plastic bag and tape it to the inside lid of the cooler;
- Tape the cooler lid shut with fiber-reinforced tape;
- Place two signed custody seals on cooler, one at the front right and one at the back left of cooler;
- Attach completed shipping label to the top of cooler and ship following the carrier's instructions.

Sample coolers are typically shipped by overnight express carrier to the laboratory. A copy of the bill of lading (air bill) is to be retained and becomes part of the sample custody

documentation. The offsite laboratory will be notified in advance of all shipments, preferably by telephone on the day of shipment and by advanced scheduling.

5.5 CHAIN OF CUSTODY PROCEDURES

Custody of samples must be maintained and documented from the time of sample collection to completion of the analyses. Each sample will be considered to be in the sampler's custody, and the sampler will be personally responsible for the care and custody of the samples until they are delivered to the courier service for delivery to the laboratory. A sample is considered to be under a person's custody if:

- The sample is in the person's physical possession;
- The sample is in view of the person after that person has taken possession;
- The sample is secured by that person so that no one can tamper with the sample; or
- The sample is secured by that person in an area that is restricted to authorized personnel.

All samples will be accompanied to the offsite laboratory by a chain-of-custody (COC) form. For these sampling events the COC record forms will be developed electronically using EPA Superfund program Forms II Lite software. The chain-of-custody form contains the following information:

- Project name;
- Sample numbers;
- Sample collection point;
- Date and time of collection of samples (these must match the date and time recorded on the sample label);
- Sample matrix description;
- Analyses requested for each sample;
- Preservation method;
- Number and type of containers used;
- Any special handling or analysis requirements;
- Signature of person collecting the samples;
- Signature of persons involved in the chain of possession; and

- Names and telephone numbers of the project point of contacts (POCs).

The chain-of-custody record forms will be filled out with ink. Prior to packaging samples for shipment, all samples should be double checked against the chain of custody form. When the samples are transferred from one party to another, the individuals will sign, date, and note the time on the form. A separate COC will accompany each delivery of samples to the laboratory. The chain-of-custody form will be included in the cooler used for preservation and transport of the samples. The sampling personnel will retain a copy of the form.

6. INVESTIGATION-DERIVED WASTE

Expected or potential sources of investigation-derived waste (IDW) for this project include rinse water from decontamination procedures. The waste decontamination fluids will be collected during the decontamination procedures. Rinse water shall be collected in separate buckets during decontamination. All containers shall be Department of Transportation (DOT) approved. Each container shall be labeled with a potential hazardous waste label indicating date sample was collected and Contaminated Waste Water. IDW in each container shall be characterized prior to disposal. If the characterization results indicate the materials in a container are hazardous, the container shall be labeled with a Hazardous Waste Label. USACE will dispose of the small amounts of IDW in accordance with all Federal, state, and local regulations.

Personal Protective Equipment (PPE), including nitrile gloves and tyvex overalls/booties, will be handled as non-hazardous waste.

The field report will document IDW disposal.

7. REFERENCES

CH2MHILL 2003. *Coastal Salt Marsh Focused Feasibility Study Report*, Hamilton Army Airfield, Novato, California. June.

Main Airfield Parcel Record of Decision/Remedial Action Plan, Hamilton Army Airfield, Public Comment Final, August 2003.

U.S. Environmental Protection Agency (EPA), 1996, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods, Third Edition*, December 1996.

U.S. Fish and Wildlife Service Biological Opinion and amending letter, August 2003 and September 2003.