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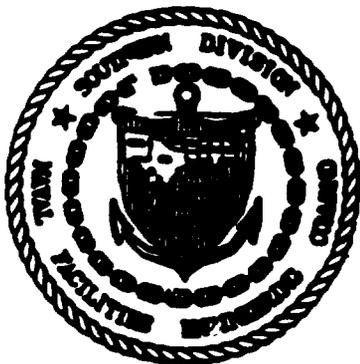
**COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION  
FINAL SAMPLING AND ANALYSIS PLAN  
FOR SITE 3  
CRASH CREW TRAINING AREA  
NAVAL AIR STATION  
PENSACOLA, FLORIDA**



**SOUTHNAVFACENGCOM  
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**Prepared for:**

**COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION NAVY (CLEAN)  
NAVAL SUPPORT ACTIVITY  
NAVAL AIR STATION  
PENSACOLA, FLORIDA**



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**August 25, 1994**

**Release of this document requires the prior notification of the *Commanding Officer* of the Naval Air Station, Pensacola, Florida.**

ERRATA  
FINAL **SAMPLING** AND ANALYSIS PLAN (SAP),  
FOR SITE 3  
NAVAL AIR STATION (NAS) PENSACOLA  
PENSACOLA, FLORIDA  
(10/14/94)

Please make the following additions and/or corrections to the **SAP**.  
[Bold items enclosed in brackets denote changes to the latest draft of document]

Page v. Executive Summary. 3rd and 4th paragraphs

Phase I activities will identify the presence or absence of contaminants at the site. [Phase II sampling will be implemented for plume/soil contamination delineation. During the initial field effort, Phase I activities and Preliminary Phase II activities will be completed concomitantly. Preliminary Phase II activities will include installation of several temporary delineation wells to determine site groundwater flow, identify the existence of groundwater contaminant plume(s) and direct subsequent Phase II and/or Phase III activities. Preliminary Remedial Goals (PRGs) will be established following evaluation of Phase I and preliminary Phase II data for identified contaminants. Additional Phase II assessment activities will be based on whether contaminant concentrations in soil, sediment, and groundwater exceed the applicable PRGs and the necessity for further delineation of contaminant plumes or soil contamination. A technical memorandum summarizing the results of Phase I and preliminary Phase II data, including recommendations for the location of additional Phase II delineation wells and soil borings, will be prepared following receipt and evaluation of the analytical data. Additionally, a technical memorandum will summarize the findings of the Phase II plume/soil contaminant delineation and recommend locations of permanent monitoring wells. Phase III permanent monitoring wells (and soil borings, if required) will replace strategically located temporary monitoring wells and be used to confirm contamination delineation and **risk** assessment.]

Page 2 to 3. Section 1.0 Introduction. 3rd and 4th paragraphs.

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Page 4. Section 2.1 Site Description. Figure 4-1

See attached Figure 2-1.

Page 9. 4.1 Sampling Objectives.

#### 4.1 Sampling Objectives

[The chronology and objectives of the field investigations are as follows:]

[Phase I and Preliminary Phase II]

- Identify potential sources of contamination
- Assess the nature of identified contaminants.
- Establish PRGs for the identified contaminants.
- [• Provide preliminary soil and groundwater contaminant extent to guide subsequent Phase II delineation efforts]

Page 13. Section 4.3. Sample Locations and Rationale. 1st paragraph

The proposed field investigation will consist of a three-phased approach. [Phase I and preliminary Phase II] sampling locations, presented in Figure 4-1, will consist of nine soil borings/temporary monitoring wells [and 10 additional temporary delineation wells.] Soil, groundwater, and sediment samples will be collected for FSA to identify the presence or absence of contaminants at the site. Contaminants identified in this phase will be compared to risk-based PRGs established for each contaminant. The investigation will proceed to delineate extent only if contaminants are found to exceed their respective PRGs. If contaminants are not detected above PRGs, [a delineation phase will not be conducted and the investigation will proceed directly to Phase III.] [Phase III] will consist of installation of permanent monitoring wells (if necessary) to confirm analytical results from the temporary monitoring wells. If contaminants

are detected above PRGs, Phase II sampling will consist of [additional soil boring/temporary monitoring well installation until adequate definition and delineation of contamination is established.]

Page 14. Section 4.3. Sample Locations and Rationale. Figure 4-1

See attached Figure 4-1.

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Field	Group	Sub-Group										

19. Abstract

This Sampling and Analysis Plan (SAP) is written for Site 3, the Crash Crew Training Area. The purpose of this investigation is to delineate nature, extent and magnitude of contaminated soil, groundwater, and sediment.

Investigative work will be completed through a three-phased approach consisting of soil borings, temporary monitoring wells, permanent monitoring wells, and collection of soil, groundwater, and sediment samples for Target Analyte List/Target Compound List (TAL/TCL) using Contract Laboratory Program (CLP) protocol. Except for the omission of a bentonite seal and neat cement grout, temporary monitoring wells will be constructed, developed, and sampled in accordance with the procedures for permanent monitoring wells. Therefore, the necessity for installation of permanent monitoring wells should be evaluated on a site by site basis by the Navy, U.S. Environmental Protection Agency (USEPA) and Florida Department of Environmental Protection (FDEP).

Phase I activities will identify the presence or absence of contaminant at the site. Preliminary remedial goals (PRGs) will be established following evaluation of Phase I data for identified contaminants. Further assessment activities will depend on whether soil, groundwater and sediment samples exceed the applicable PRGs. A technical memorandum summarizing the findings of the first phase of the investigation presenting PRGs and outlining additional work will be prepared following receipt and evaluation of the analytical data.

Phase II of the investigation will be implemented for plume/soil contamination delineation (contaminants above the PRGs) through installation of additional temporary monitoring wells/soil borings. A technical memorandum will summarize the findings of the Phase II plume delineation and recommend locations for permanent monitoring wells. Phase III permanent monitoring wells (and soil borings, if required) will replace strategically located temporary monitoring wells and be used to confirm contamination delineation and risk assessment.

This SAP, in conjunction with the Comprehensive Sampling and Analysis Plan, will provide guidelines for sampling and analytical techniques to be used during the investigation and outline proper documentation procedures for the investigation.

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## List of Acronyms

The following list contains many of the acronyms, **initials**, abbreviations, and units of **measure** used in this report.

bls	below land surface
BNAs	base-neutral/acid extractable organic compounds
<b>CLEAN</b>	Comprehensive Long-Term Environmental Action <b>Navy</b>
CLP	Contract Laboratory <b>Program</b>
CSAP	Comprehensive Sampling and Analysis Plan
<b>DQO</b>	Data Quality Objective
<b>E&amp;E</b>	Ecology and Environment, Inc.
<b>E/A&amp;H</b>	EnSafe/Allen & Hoshall
<b>FDEP</b>	Florida Department of Environmental Protection
FS	Feasibility Study
FSA	Full <b>Scan</b> of Analysis
G&M	Geraghty and Miller, Inc.
GPS	Global Positioning System
GS	Grain <b>Size</b> Analysis
HEX	Hexavalent Chromium Analysis
IAS	Initial Assessment Study
IDR	Interim Data Report
<b>IWTP</b>	Industrial Wastewater Treatment Plant
msl	mean <b>sea</b> level
NAS Pensacola	Naval Air Station Pensacola
<b>NEESA</b>	Naval Energy and Environmental <b>Support</b> Activity
OU	Operable Unit
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PPS	Physical Parameters, <b>Soil</b>
PPW	Physical Parameters, Water
PRGs	<i>preliminary</i> Remedial Goals
PVC	Polyvinyl Chloride
QA	Quality <b>Assurance</b>
QC	Quality <b>Control</b>
RI	<b>Remedial</b> Investigation
<b>SAP</b>	<b>Sampling</b> and Analysis <b>Plan</b>
SOP/QAM	<b>Standard Operating procedures and Quality</b> Assurance Manual
SOUTHNAVFACENGCOM	Southern Division, <b>U.S.</b> Navy, Naval Facilities Engineering Command
<b>ST</b>	Shelby <b>Tube</b>
TAL	Target Analyte List
<b>TCL</b>	Target Compound List

TKN  
TOC  
TRPHs  
USEPA  
VOCS

Total Kjeldahl Nitrogen  
top of casing  
Total Recoverable Petroleum Hydrocarbons  
United States Environmental Protection Agency  
Volatile Organic Compounds

## EXECUTIVE SUMMARY

This Sampling and Analysis Plan (**SAP**) is written for Site 3, the Crash Crew Training **Area**. The purpose of this investigation is to delineate nature, extent and magnitude of contaminated soil, groundwater and sediment.

Investigative work will be completed through a three-phased approach consisting of **soil** brings, temporary monitoring wells, permanent monitoring wells, and collection of **soil**, groundwater, and sediment samples for Target Analyte List/Target Compound **List** (TAL/TCL) using Contract Laboratory Program (CLP) protocol. Except for the omission of a bentonite **seal** and neat cement grout, temporary monitoring wells will be constructed, developed, and sampled in accordance with the procedures for permanent monitoring wells. Therefore, the necessity for installation of permanent monitoring wells should be evaluated on a site by site basis by the Navy, **U.S.** Environmental Protection Agency (**USEPA**) and **Florida** Department of Environmental Protection (**FDEP**).

Phase I activities will identify the presence or absence of contaminants at the site. Preliminary remedial **goals** (PRGs) will be established following evaluation of Phase I **data** for identified contaminants. Further assessment activities will depend on whether soil, groundwater, and sediment samples exceed the applicable **PRGs**. A technical memorandum summarizing the findings of the first phase of the investigation presenting **PRGs** and **outlining** additional work will be prepared following receipt and evaluation of the analytical **data**.

Phase II of the investigation will **be** implemented for plume/soil contamination delineation (contaminants above the **PRGs**) through installation of additional temporary monitoring wells/soil borings. A technical memorandum will summarize the **findings** of the Phase II plume delineation and recommend locations for permanent monitoring wells. **Phase III** permanent monitoring wells (and soil brings, if **required**) will **replace strategically** located temporary monitoring wells and **be** used to confirm contamination delineation and **risk** assessment.

This *SAP*, in conjunction with the Comprehensive Sampling and Analysis Plan, will provide guidelines for sampling and analytical techniques to be used during the investigation and outline proper documentation procedures for the investigation.

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## 10 INTRODUCTION

As part of the U.S. Navy Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, a Remedial Investigation/Feasibility Study (RI/FS) will be completed by EnSafe/Allen & Hoshall (E/A&H) at Site 3 — the Crash Crew Training Area, located at the Naval Air Station Pensacola (NAS Pensacola), Pensacola, Florida. This Sampling and Analysis Plan (SAP) has been developed by E/A&H for this investigation, as tasked by the Southern Division, U.S. Navy, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) under Contract No. N62467-89-D-0318/070.

Primary references for this SAP include the *Comprehensive Sampling and Analysis Plan for Naval Air Station Pensacola* (CSAP) (E/A&H 1993), the United States Environmental Protection Agency (USEPA) Region IV *Standard Operating Procedures and Quality Assurance Manual* (SOP/QAM), and the *Contamination Assessment/Remedial Activities Investigation Work Plan — Group J* completed by Ecology and Environment, Inc. (E&E 1992). References to these documents are made throughout this plan. The investigation of Site 3 will be completed to fulfill requirements set forth in the E&E site work plan (1992) and this site-specific SAP. This investigation will be conducted in accordance with the SOP/QAM and CSAP.

The Site 3 RI will assess the nature of any potential contamination identified during past and proposed field investigations. The results of the previous Phase I investigation are outlined in the *Interim Data Report (IDR), Contamination Assessment/Remedial Investigation, Crash Crew Training Area (Site 3)* (E&E 1992). Before field activities begin, a well inventory, contaminant source survey, and habitat and biota survey will be conducted. Field activities to be performed during the RI include the completion of soil borings, [installation of temporary and permanent] monitoring wells, the collection of soil, groundwater, [and sediment] samples, and a hydrologic and ecologic assessment. Chemical analyses will be completed by a laboratory

approved by the Naval Energy and Environmental **Support** Activity (NEESA) using Contract Laboratory Program (CLP) protocol. Field sampling, analytical **methods, and reporting will** be conducted at USEPA Level IV protocol.

[Investigative work will be completed through a three-phased approach consisting of soil borings, temporary **monitoring** wells, permanent **monitoring** wells, and collection of soil, groundwater and sediment samples for Target Analyte List/Target Compound ~~List~~ (TAL/TCL) using CLP protocol. Except for the omission of a bentonite seal and neat cement grout, temporary monitoring wells will be **constructed, developed, and sampled** in accordance with the procedures for permanent **monitoring** wells. Therefore, the necessity for installation of permanent **monitoring** wells should be evaluated on a site by site basis by the Navy, **USEPA** and **Florida** Department of Environmental Protection (FDEP).

Phase I activities will identify the presence or absence of **contaminants** at the site. Preliminary remedial goals (PRGs) will be established following evaluation of Phase I **data** for identified contaminants. Further assessment activities will depend on whether contaminant concentrations in soil, groundwater, and sediment samples exceed the applicable PRGs. A technical memorandum summarizing the **findings** of the ~~first~~ phase of the investigation presenting PRGs and outlining additional **work** will be prepared following receipt and evaluation of the analytical **data**.

Phase II of the investigation **will** be implemented for plume/soil contamination delineation (contaminants above the PRGs) through installation of additional temporary monitoring wells/soil borings. A technical memorandum will summarize the **findings** of the Phase II plume delineation and recommend locations for permanent monitoring wells. **Phase III** permanent monitoring wells (and **soil** borings, **if required**) will replace strategically located

temporary monitoring wells and be used to confirm contamination delineation and risk assessment.]

Upon completion of the investigative work and laboratory analysis, an RI report will be submitted to the Navy, USEPA, and FDEP summarizing the activities, results and conclusions of the investigation. The report will provide supporting data for the completion of a baseline risk assessment and Feasibility Study (FS) to be completed at Site 3.

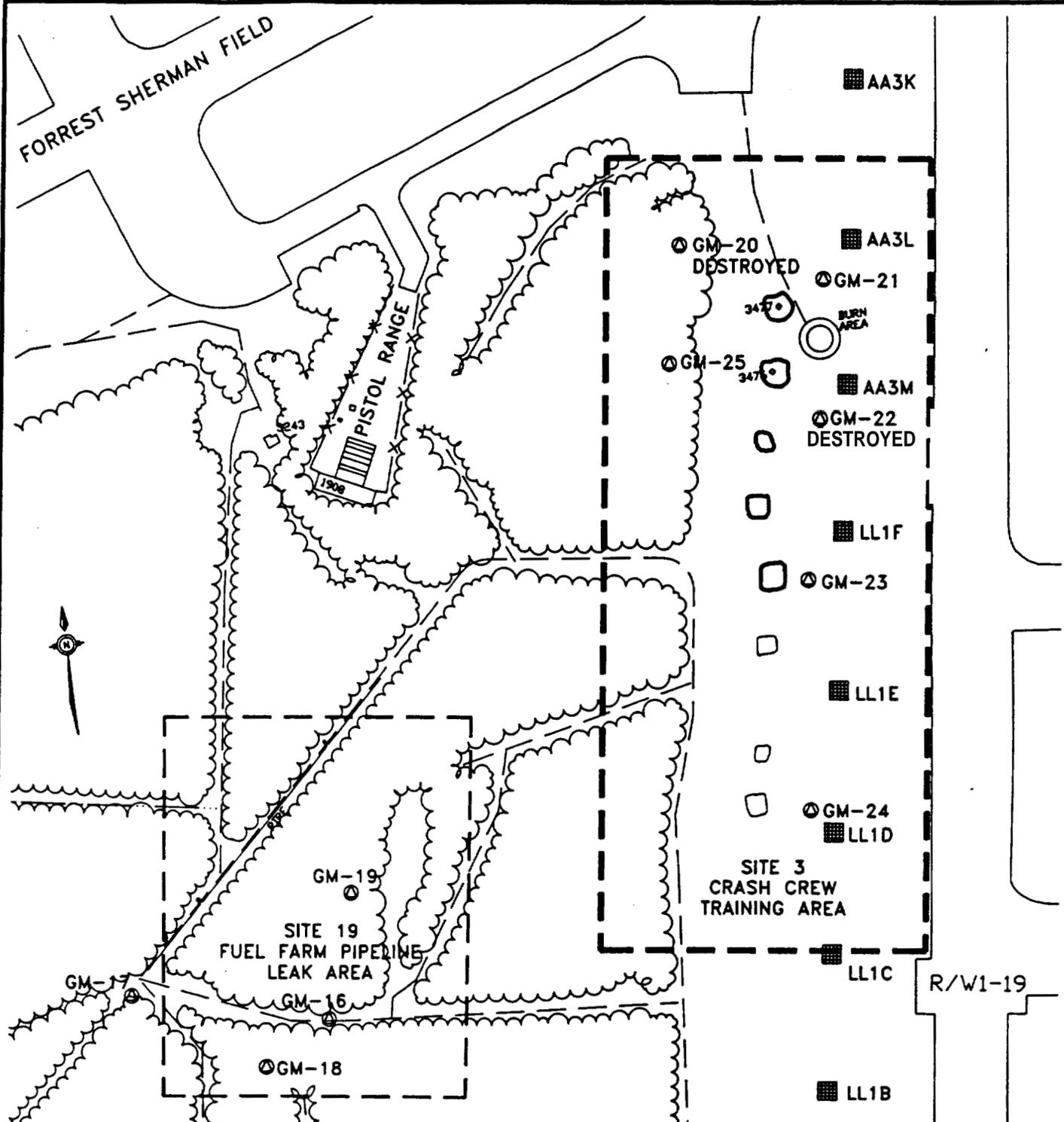
This SAP, in conjunction with the CSAP, will provide guidelines for sampling and analytical techniques to be used during the RI and outline proper documentation procedures for the investigation.

## 2.0 BACKGROUND INFORMATION

### 2.1 Site Description

Site 3 occupies an open area of land approximately 900 feet by 2,300 feet along the southwestern border of Forrest Sherman Field (see Figure 2-1). The site is bounded to the east by aircraft runway 19, to the north by a paved aircraft taxiway, to the west by a scattered brush and woods area, and to the south by an open field. A dirt road trends north-south across the western portion of the site, and connects with several other dirt roads.

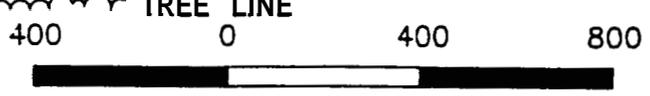
The site area topography is generally flat with elevations ranging from 24 to 29 feet above mean sea level. The site is sandy and well drained; however, excess surface drainage flows into a shallow depression parallel to runway 19. The depression is drained by two separate catch basins which are part of the stormwater drainage system for the airfield. One catch basin near well GM-22 drains to the north toward Bayou Grande; the other catch basin near well GM-23 drains to the south toward Sherman's Inlet.



SOURCE: ECOLOGY AND ENVIRONMENT, 1992

LEGEND

- JEEP TRAIL
- LL1C STORMWATER CATCH BASIN WITH GRATE
- STORMWATER CATCH BASIN DESIGNATION
- BURN AREA
- POSSIBLE FORMER BURN AREA
- GM-16 EXISTING SHALLOW MONITORING WELL/ID
- SITE BOUNDARY
- TREE LINE



GRAPHIC SCALE IN FEET



SAMPLING AND ANALYSIS PLAN  
 NAS PENSACOLA  
 PENSACOLA, FLORIDA

FIGURE 2-1  
 SITE MAP  
 SITE 3

DWG DATE: 09/02/93 | DWG NAME: 70SITE3

Site 3 contains at least eight different bum areas which decrease in age from [south to north]. The two northernmost bum areas are currently used for training exercises. Several others contain miscellaneous pieces of equipment, including a fuel trailer, a cockpit simulator, and other airplane parts. The surficial soil in each of the pits is blackened, and several pits have fuel stains and oily residue.

Six monitoring wells (GM-20, GM-21, GM-22, GM-23, GM-24, and GM-25) were installed onsite by Geraghty and Miller, Inc. (G&M 1984). Two of the wells, GM-20 and GM-22, have been destroyed (E&E 1992). Monitoring well construction details are provided in Table 2-1.

Table 2-1 Construction Details of Monitoring Wells at Site 3					
Well Designation	Surface Elevation (ft msl)	TOC Elevation (ft msl)	Total Depth Drilled (ft)	Screened Interval (ft)	Depth to Filter Pack (ft)
GM-21	25.2	26.3	11.5	9.0-11.5	5.0
GM-23	25.2	26.15	11.5	9.2 - 11.7	5.2
GM-24	24.3	24.77	11.5	9.6-12.1	5.5
GM-25	29.1	30.20	11.5	9.0-11.5	5.0

Source: Geraghty & Miller, Inc., 1984

Notes:

TOC = Top of Casing  
 msl = mean sea level

[Bold items enclosed in brackets denote changes to the first draft of document.]

## 22 Site History

Site 3 has **been** used to train ~~fire~~ fighters for aircraft crash situations since 1955 (NEESA 1983). During training, approximately 30 to 50 gallons of fuel, possibly including JP-4, JP-5, **AVGAS**, or lube oil, is poured into pits or **on** various pieces of equipment and ignited to simulate **aircraft** crash conditions. The northernmost pit has **recently been** lined with **an** impermeable geofabric, however the remaining pits are **unlined**. The **fire** is extinguished using an aqueous **foam**. NEESA has reported as many as five **training fires** may be set at the site each week, using up to 250 gallons of fuel. It **has** been estimated **450** gallons of fuel **per week** **are** actually disposed of onsite (NEESA 1983).

In June 1983, an Initial Assessment Study (IAS) of **29** sites at NAS Pensacola was completed by NEESA. In the **IAS**, Site 3 was evaluated based **on** historical records, field inspections, and NAS Pensacola personnel interviews. No **soil** or water samples were collected at the site; however, based **on** the **data** obtained during the study, NEESA concluded contamination at Site 3 was not sufficient to constitute a threat to human health or the environment (NEESA 1983).

NEESA recommended **no** further study at the site. However, at a November 17, 1983 meeting between the Navy and FDEP, Site 3 was reappointed to the list of sites to be investigated during the Verification Study.

In July 1984, G&M conducted a Verification Study of 18 sites at NAS Pensacola, including Site 3. During the Verification Study, 18 shallow **soil brings** were advanced in an effort to determine whether free-floating product was present in the local groundwater. In addition, **six** shallow monitoring wells were installed. The **soil brings** did not indicate any free product contamination. Groundwater samples collected from each of the **six** monitoring wells were

analyzed for volatile organic compounds (VOCs). Three of the wells (**GM-20, GM-21, and GM-23**) were found to contain low concentrations of **VOCs**.

The Verification Study recommended **no further** studies be conducted at the site (**G&M 1984**); consequently, Site **3** was not included in the Characterization Study.

E&E performed a Phase I investigation of Site **3** to identify [potential **contaminants** and **areas** of concern.] The investigation results are detailed in the **E&E IDR (1992)**. Sediment, soil, and groundwater samples were collected during the investigation and submitted for laboratory analysis. Metals (chromium, lead, cadmium, and **iron**), total recoverable petroleum hydrocarbons (TRPHs), volatile organic compounds (**VOCs**), base-neutral/acid extractable organic compounds (BNAs) including polynuclear aromatic hydrocarbons (**PAHs**) and phenols were detected onsite. Additional assessment was recommended for Site **3**.

### **2.3 Physical Setting**

Climatology, biological resources, surface water hydrology, physiography, and hydrogeology for Site **3** and NAS Pensacola are detailed in Sections **4** through **7** of the E&E site work plan (**1992**).

## **3.0 PHYSICAL SURVEY**

Various physical surveys have **been** conducted at Site **3** as part of **E&E's** Phase I activities. **These** include aerial photograph analysis, site reconnaissance, surface/particulate **air** emissions survey, a habitat and biota survey, and a geophysical survey. Results of the physical surveys are presented in Section **3** of the **IDR (E&E 1992)**. Relevant information **has been** considered during the planning of **this** RI and will not be duplicated. **Three** surveys will be conducted

before field activities **begin**: a well inventory survey, a contaminant **source** survey, and a habitat and biota survey.

### **Well Inventory**

**An** inventory of existing monitoring wells will be completed in **accordance** with Section 3.1 of the **CSAP**.

### **Contaminant Source Survey**

**A** contaminant **source** survey will be conducted to determine any potential sources and any present or past waste streams at the site. The survey will include a review of previous investigative **reports**, interviews with present and former **NAS** Pensacola personnel, aerial photo analysis and a utility survey.

The survey will include the identification of the following:

- e Location of previous and current underground and overhead piping and utilities.
- e Past and present chemicals **used** at the site.
- e Locations of any known surface **spills**.
- Locations of any **known** historical outfalls.
- e Locations and contents of any known present or former underground **storage** tanks.

### **Habitat and Biota Survey**

**A** Phase I habitat **and** biota survey will be **performed in** accordance with Section 8 of the **CSAP**. Data **obtained** during the Site 3 RI will also be **used to assess** ecological **risk to** any onsite or **surrounding** terrestrial and aquatic habitats potentially affected by contaminant migration. **[The complete ecologic assessment of any adjacent wetland complex will be conducted as part of the RI of Site 41 (NAS Pensacola wetlands). If ecological impacts to wetland areas adjacent**

to Site 3 are **suspected** based on Phase I data, **Phase II** sampling will be performed during the Site **41** RI and in accordance with the **Final RI/FS** Work Plan for **OU 41**. If other ecological impacts (terrestrial) are **suspected** at Site 3 after the Phase I survey, Phase II sampling will be implemented as outlined in Section **8** of the **CSAP**. ]

#### **4.0 FIELD SAMPLING PLAN**

The field sampling plan describes the sampling and field measurement procedures to be used during the RI. The field investigation includes advancing soil borings, installing [temporary/permanent] groundwater **monitoring wells**, and **collecting soil**[, groundwater and sediment] samples using various techniques. A hydrologic and **ecologic** assessment **will also** be conducted for Site 3.

##### **4.1 Sampling Objectives**

The objectives of the field sampling effort are to:

###### **Phase I**

- e Identify potential sources of contamination.
- e Assess the nature of identified contaminants.
- e Establish PRGs for the **identified** contaminants.

###### **Phase II**

- e Delineate the extent of sediment, **soil** and groundwater contamination.
- e Delineate migration pathways of the contaminants.
- e Identify potential receptors of the contaminants.

###### **Phase III**

- e Establish permanent monitoring well locations to **confirm** extent delineation and monitor contaminant migration.

## 4.2 Sampling and Analytical Requirements

The sampling and analytical requirements are summarized in Table 4-1 and discussed below. The proposed number of soil, groundwater [ , and sediment] samples is also listed in Table 4-1. The Navy, USEPA, and FDEP will be apprised of any changes in the number of samples collected.

<b>Table 4-1</b>			
<b>Site 3 RI Sampling and Analytical Requirements</b>			
Medium	No. of Samples <sup>a</sup>	Analytical Parameter	DQO <sup>b</sup> Level
Soil <sup>c</sup>	[27]	FSA	IV
Groundwater <sup>d</sup>	[23]	FSA	IV
Sediment <sup>e</sup>	[13]	FSA	IV
	[[13]]	[[GS]]	IV
TOTAL	[71]	FSA	IV
	[13]	[GS]	IV]

Source: Modified from Ecology and Environment, Inc., 1992.

**Notes:**

- a - The number of samples shown in parentheses will be analyzed for the additional parameters indicated.
- b = **DQO** = Data Quality Objective
- c - Total number of soil samples = [9] soil borings x 3 sample intervals = [27] samples.
- d = Total number of groundwater sampler = [23] monitoring wells (4 existing monitoring wells + [19] proposed [temporary] shallow monitoring wells x 1 sample each = [23] sampler,
- e - Total number of sediment samples = [13] locations x 1 sample = [13] samples.

**FSA — Full Sun of Analysis**

Target Compound List (TCL) volatile organic compounds, TCL base-neutral/acid extractable organic compounds (BNA<sub>s</sub>), TCL pesticides, TCL polychlorinated biphenyls (PCBs), Target Analyte List (TAL) metals (unfiltered), and TCL cyanide.

**OS — Grain Size Analysis**

Any additional sources or previously undetected contamination will be investigated by the collection of additional samples from any given media, sampling additional media not included

[Bold items enclosed in brackets denote changes to the first draft of document.]

in **this** site-specific **SAP**, installation of additional monitoring wells to delineate the extent and depth of the contaminant, and performance of additional aquifer response tests to characterize subsurface hydrologic conditions. Before additional field activities **begin**, a field change request will be submitted to the Navy for approval with notification to the **USEPA** and **FDEP**.

The **USEPA CLP** Target Analyte List/Target Compound ~~list~~ (TAL/TCL) will be used to provide a legally defensible **full** spectrum of contaminant analysis. Sediment, **soil**, and groundwater will be analyzed for the **full** TAL/TCL list with additional non-CLP analysis also being conducted when warranted. [**Hexavalent chromium analyses will not be performed on collected samples due to the lack of previous detection during other investigations at NAS Pensacola (OU10, Site 1, and Site 39).**]

**Samples for physical parameters and grain-size analyses will be collected from selected soil and groundwater sampling locations during Phase II. The number of samples will be detailed in the Phase I technical memorandum.]**

Analyses proposed in this **SAP** have been organized different than in the E&E site work plan (1992) which were subdivided into "Suites A through **E.**" **Proposed** analytical parameters **are now** organized into the **six** basic groups listed below.

#### **New Analytical Organization**

- e **Full Scan of Analysis (FSA)** — A full scan consists of analysis for **TCL VOCs**, **TCL** base-neutral/acid extractable organic compounds, **TCL** pesticides, **TCL** polychlorinated biphenyls (**PCBs**), **TAL** metals (unfiltered), and **TCL** cyanide.

- **Physical Parameters, Sediment and Soil (PPS)** — The parameters include total phosphorus, nitrate-N, TKN, heterotrophic plate count, total organic carbon, and cation exchange capacity. Additional sample volume **will** be collected for the **PPS** samples.
- **Physical Parameters, Soil (ST)** — The parameters include bulk density, particle size, percent moisture, specific gravity, porosity, and permeability (**collected** with Shelby tube).
- **Grain Size Analysis (GS)**
- **Physical Parameters, Water (PPW)** — The parameters include 5-day biological oxygen demand, chemical oxygen demand, hardness, total suspended solids, alkalinity, total phosphorus, nitrate-N, total Kjeldahl nitrogen (TKN), and heterotrophic plate count. Additional sample volume will be collected for the **PPW** samples.

Modifications have also been made to the list of remedial/physical characteristic parameters proposed in the E&E site work plan (1992). Changes were made to the proposed analyses to address **CERCLA** rather than RCRA requirements (**i.e.**, the omission of Appendix IX analyses) and to acquire additional information regarding the physical characteristics of site sediment, **soil**, and groundwater if a feasibility study is **required**. Therefore, certain parameters have been omitted from **this SAP** because they **are** either redundant to the comprehensive TAL/TCL analytical methods, provide **[information]** not legally defensible, or have limited use.

### 4.3 Sample Locations and Rationale

[The proposed field investigation will **consist** of a ~~three~~-phased approach. Initial sampling locations, presented in Figure **4-1**, will **consist** of nine soil borings/~~temporary~~ monitoring wells. Soil, groundwater and ~~sediment~~ samples **will** be collected for FSA to identify the presence or absence of contaminants at the site. Contaminants identified in this phase will be compared to risk-based **PRGs** established for ~~each~~ contaminant. The investigation will proceed to delineate extent **only** if contaminants are found to exceed their respective **PRGs**. **If** contaminants are not detected above **PRGs**, Phase **II** **will consist** of installation of permanent monitoring wells (if **necessary**) to **confirm** analytical results from the temporary monitoring wells. If contaminants are detected above **PRGs**, Phase **II** will consist of installation of additional soil borings/~~temporary~~ monitoring wells until adequate definition of contamination is established. Following an evaluation of the data, Phase **III** permanent monitoring wells and soil borings will be installed to replace temporary monitoring wells at locations selected to **confirm** nature and extent of contamination. Permanent wells will be used for possible long-term monitoring and risk assessment; locations will be based on current accessibility, and geometry of the contaminant plume. **If** contamination is not identified **as** a result of initial temporary monitoring wells, they **will** be replaced with permanent wells which will be resampled for FSA. **A** brief description of the sampling program and any proposed modifications to the E&E site work plan (**1992**) are described below.]

**Soil Samples** — **A FSA** will be conducted on approximately [27] **soil** samples collected from [nine] soil **boring** locations. All **boring** locations will be sampled ~~at~~ the following intervals: 0 to 1 feet below land surface (bls), 1 to 3 feet bls, 3 to 5 feet bls, etc. from the land surface to the depth of the water table. The depth to water is estimated to be 5 feet bls.

[Bold items enclosed in brackets denote changes to the first draft of document.]

FORREST SHERMAN FIELD

HELIPAD

PISTOL RANGE

1908

3243

GM-20 DESTROYED

BURN AREA

GM-21

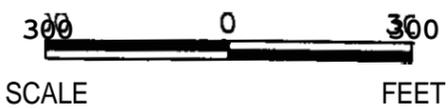
GM-25

GM-22 DESTROYED

GM-23

GM-24

R/W1-19



LEGEND

- - - - - SITE BOUNDARY
- - - - - JEEP TRAIL
- STORMWATER CATCH BASIN WITH GRATE
- STORMWATER CATCH BASIN DESIGNATION
- ACTIVE BURN AREA
- FORMER BURN AREA
- BURN AREA NUMBER
- EXISTING PERMANENT SHALLOW MONITORING WELL
- SOIL BORING AND SHALLOW MONITORING WELL
- TEMPORARY MONITORING WELL ONLY
- A SEDIMENT SAMPLE



SAMPLING AND ANALYSIS PLAN  
NAS PENSACOLA  
PENSACOLA, FLORIDA

FIGURE 4-1  
PROPOSED SAMPLING LOCATIONS  
SITE 3

[Additional soil borings will be installed **if** the contaminants are identified above their respective **PRGs**. Any soil samples collected during Phase **II** **will** not be analyzed for FSA, but for the contaminants positively identified above the **PRGs** in the **first** sampling phase, Confirmatory Phase **III** samples will be analyzed for **FSA**.]

**PPS** analyses [needed for the feasibility study will be conducted during Phase **II** only if the identified contaminants **exceed** the applicable **PRGs**.] **PPS** samples will **be** collected to represent both background and potentially contaminated conditions. **GS** analysis will [also depend on **exceedances** of the **PRGs** and will be conducted] on soil samples representative of the screened interval[s of the monitoring wells.] Results of the **GS** analysis will be used to calculate recovery well specifications if a groundwater remediation program is **required**.

Except for **ST** and **GS** samples, soil samples **are** not anticipated to **be** collected below the water table. If visual or olfactory evidence of contamination is observed below the water table, a sample will be collected for an **FSA** for characterization and delineation of potential contamination.

Groundwater Samples — **A FSA** will **be** conducted on groundwater samples collected from [23] monitoring wells (four existing wells and [19] proposed [temporary shallow] wells). [All] of the proposed wells will be shallow with a target depth of 15 feet **bls**.

[Additional temporary monitoring wells **will** be installed if **contaminants** are identified in groundwater above their respective **PRGs**. Groundwater samples collected during Phase **II** will not be analyzed for **FSA**, but for the contaminants positively identified above the **PRGs** in the **first** sampling phase. Confirmatory Phase **III** samples will be analyzed for **FSA**.

PPW analyses will be conducted during **Phase II** only if the identified contaminants exceed the applicable **PRGs** for groundwater.] Samples collected for **[PPW analyses will]** represent both background and potentially contaminated **conditions**.

[Sediment Samples — A FSA will be conducted on sediment samples collected from 13 sample locations. One 0- to 6-inch depth sample will **be** collected at each location. Samples **will** also be collected for **GS** analysis.]

#### 4.4 Sampling Procedures

Proposed sampling procedures **are** presented in **Sections 4, 5, 6, and 7** of the **CSAP**. General sampling requirements will be performed in accordance with **Section 2.2** of the **CSAP** with sample processing performed in accordance with **Section 12**. A brief description of sampling and any proposed procedure modifications to the **CSAP** or **E&E site work plan (1992)** **are** discussed in the following subsections.

##### 4.4.1 Soil Sampling

**Soil** borings **will** be advanced using hollow-stem auger drilling techniques. **Soil** samples will be collected in accordance with **Section 4.6.1** of the **CSAP**.

##### 4.4.2 Monitoring Well Installation and Development

Monitoring well borings will be advanced using hollow-stem auger **drilling** techniques. Because of possible floating contaminants, [the temporary] **monitoring** wells will **be** installed **so** the well screen brackets the water table. [The temporary wells, with the exception of a bentonite seal and grout, will be constructed in a manner identical to the **permanent** wells.]

Monitoring wells will be developed in accordance with Section **5.4** of the **CSAP**. [Temporary monitoring wells will be developed using peristaltic pumps following an initial purging of coarse sediment-laden water using centrifugal pumps.] Monitoring well development [both temporary and permanent monitoring wells,] will continue until the withdrawn water is free of turbidity based on the geology of the area and pH, temperature and specific conductivity have **stabilized**. These measurements will be **recorded** in accordance with Section 10.1 of the **CSAP**.

#### 4.4.3 Groundwater Sampling

Groundwater sampling will be **performed** in accordance with Section 6 of the **CSAP**. [peristaltic pumps may be used in place of **bailers**. Purge and sample tubing on peristaltic pumps will be constructed of Teflon, and sample collection will take place between the pump and the well **as** outlined in Section **F1.3** of SOP/QAM. To prevent potential degassing of volatile, samples collected for VOCs will be collected by disconnecting the tubing from the pump, and allowing the water in the tube to drain into the sample vials. Groundwater samples collected with a peristaltic pump should be collected **near** the top of the water column and water should be **as** clear **as** possible given the subsurface geology (generally between **10** and **30** NTUs.) Field measurements to be **recorded** during groundwater sampling include pH, temperature, **specific** conductance, groundwater level, [turbidity] and organic vapor detection, in accordance with Section 10.1 of the **CSAP**.

#### [4.4.4 Sediment Sampling

Sediment samples will be collected using **a** Ponar grab sampler, hand auger or **stainless** steel **spoon as** described in Section **7.2** of the **CSAP**.]

#### 4.5 Hydrologic Assessment

[An initial water level assessment will be performed utilizing the temporary wells during the Phase I portion of the investigation to determine shallow groundwater elevations, shallow groundwater flow direction(s), and hydraulic gradient(s).] A hydrologic assessment will be performed [on the permanent monitoring wells installed during Phase III] in accordance with Section 9.6 of the CSAP. Slug tests and/or specific capacity tests will be performed at selected monitoring wells sufficient for site characterization. If groundwater remediation is required, the results of the slug and/or specific capacity tests will be used to design the appropriate pumping tests. The Navy will accept technical responsibility for the design and implementation of these tests. The Navy, USEPA, and FDEP will be kept apprised of the investigation as it progresses, and will be notified before conducting full scale pumping tests. Pumping tests will be performed in accordance with the procedures provided in Section 9.6.2 of the CSAP.

#### 4.6 Ecologic Assessment

A minimum of a Phase I habitat and biota survey will be conducted in accordance with Section 8.1 of the CSAP.

#### 4.7 Geodetic Survey

[A geodetic survey will be performed using a global positioning system (GPS) in accordance with manufacturer's specifications.]

#### 4.8 Decontamination

Decontamination procedures will be performed in accordance with Section 11 of the CSAP.

#### 4.9 Investigation-Derived ~~Wastes~~

[Bold items enclosed in brackets denote changes to the first draft of document.]

Investigation-derived wastes will be handled in accordance with Section **13** of the *CSAP*.

#### **4.10 Field Quality Assurance/Quality Control**

Field quality assurance/quality control (*Q<sub>N</sub>Q<sub>C</sub>*) samples will be collected in accordance with the frequency presented in Table 15-1 of the *CSAP*. QA/QC procedures **will be** in accordance with Section **15.2** of the *CSAP*.

#### **5.0 QUALITY ASSURANCE PLAN**

The Quality Assurance Plan presented in Section **15** of the *CSAP* will be followed during the Site 3 RI.

#### **6.0 DATA MANAGEMENT PLAN**

The Data Management **Plan** presented in Section **14** of the *CSAP* will be followed **during** the Site 3 RI.

## **7.0 REFERENCES**

**Ecology and Environment, Inc. (1992).** *Contamination Assessment/Remedial Activities Investigation Work Plan — Group J, Naval Air Station Pensacola, Pensacola, Florida.* **Ecology and Environment, Inc.: Pensacola, Florida.**

**Ecology and Environment, Inc. (1992).** *Interim Data Report, Contamination Assessment/Remedial Activities Investigation, Crash Crew Training Area (Site 3), Naval Air Station Pensacola, Pensacola, Florida.* **Ecology and Environment, Inc.: Pensacola, Florida.**

**EnSafe/Allen & Hoshall. (1993).** *Comprehensive Sampling and Analysis Plan For Naval Air Station Pensacola, Pensacola, Florida — Draft Final.* **EnSafe/Allen & Hoshall: Memphis, Tennessee.**

**Geraghty and Miller, Inc. (1984).** *Verification Study, Assessment of Potential Groundwater Pollution at Naval Air Station, Pensacola, Florida.* **Geraghty and Miller, Inc.: Tampa, Florida.**

**Naval Energy and Environmental Support Activity (NEESA). (1983).** *Initial Assessment Study of Naval Air Station, Pensacola, Florida.* **NEESA 13-015**

**U.S. Environmental Protection Agency. (1991).** *Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual,* **U.S. Environmental Protection Agency, Region IV: Athens, Georgia.**

**FLORIDA PROFESSIONAL GEOLOGIST SEAL**

I have read and approve of this Final Sampling and Analysis Plan for Site 3 — Crash Crew Training **Area** and seal it in accordance with Chapter **492** of the Florida Statutes. In sealing this document, I certify the geological information contained in it is true to the best of my knowledge and the geological methods and procedures included herein are consistent with currently accepted geological practices.

Name: Steven J. Parker  
License Number: #1651  
State: Florida  
Expiration Date: July 31, 1996

  
\_\_\_\_\_  
Steven J. Parker

\_\_\_\_\_  
8/24/94  
Date