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COMPREHENSIVE LONG TERM ENVIRONMENTAL ACTION FINAL SAMPLING AND  
ANALYSIS PLAN SITE 30 AND 31 NAS PENSACOLA FL  
5/1/1993  
ENSAFE/ALLEN AND HOSHALL

**COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION  
FINAL SAMPLING AND ANALYSIS PLAN  
FOR SITES 30 [AND 31]  
BUILDINGS 649, 755 [AND 648]  
NAVAL AIR STATION  
PENSACOLA, FLORIDA**



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NAVAL AIR STATION  
PENSACOLA, FLORIDA**



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

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## 1.0 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 Sites 30 **[and 31]** — Buildings 649, 755, **[and 648]**, located at the Naval Air Station Pensacola (NASP), 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 (SOUTHDIV) under Contract No. N62467-89-D-0318/058.

Primary references for this SAP include: **[the Comprehensive Sampling and Analysis Plan for Naval Air Station Pensacola (CSAP) (E/A&H 1993)]**, the EPA Region IV *Standard Operating Procedures and Quality Assurance Manual* (SOP/QAM), and the *Contamination Assessment/Remedial Activities Investigation Work Plans* for Group E (Site 30) **[and Group M (Site 31)]** completed by Ecology & Environment, Inc. (E&E 1992). References to these documents are made throughout this plan. Primary references should accompany this document during review or use. The investigation of Sites 30 **[and 31]** will be completed to fulfill requirements set forth in the site work plans and this site-specific SAP. **[This investigation]** will be conducted in accordance with the SOP/QAM **[and CSAP]**.

The Sites 30 **[and 31]** RI will assess the nature and extent of contamination identified during field investigations previously conducted by E&E as Phase I of the work plan **[and any additional contamination identified during the RI]**. The RI will also assess the nature and extent of contamination identified by the USEPA during their 1992 investigation and any contamination associated with the former underground storage tank (UST) sites in the vicinity of Buildings 649 and 755 previously investigated by ABB Environmental in 1992.

The results of the previous **[Phase I]** investigations are outlined in the *Interim Data Report (IDR), Contamination Assessment/Remedial Investigation*, for Buildings 649 and 755 (Site 30) (E&E 1991) **[and the Interim Data Report (IDR), Contamination Assessment/Remedial Investigation Building 648 (Site 31)]**, (E&E 1991). Proposed activities to be conducted during the RI have **[considered]** all previous investigations completed at Sites 30 **[and 31]**, including Phase I **[investigations]**.

Field activities to be performed during the RI include a **[well inventory, contaminant source survey, soil gas survey, a Phase I ecological assessment]**, the completion of soil borings and monitoring wells, and the collection of surface water, sediment, soil, and groundwater samples. Chemical analyses will be completed by a **[laboratory that is 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 EPA Level IV protocol.

Upon completion of the investigative work and laboratory analysis, an RI report will be submitted to SOUTHDIV summarizing the activities, results and conclusions of the investigation. The report will provide supporting data for the completion of **[a baseline risk assessment (BRA)]** and FS to be completed at the site.

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

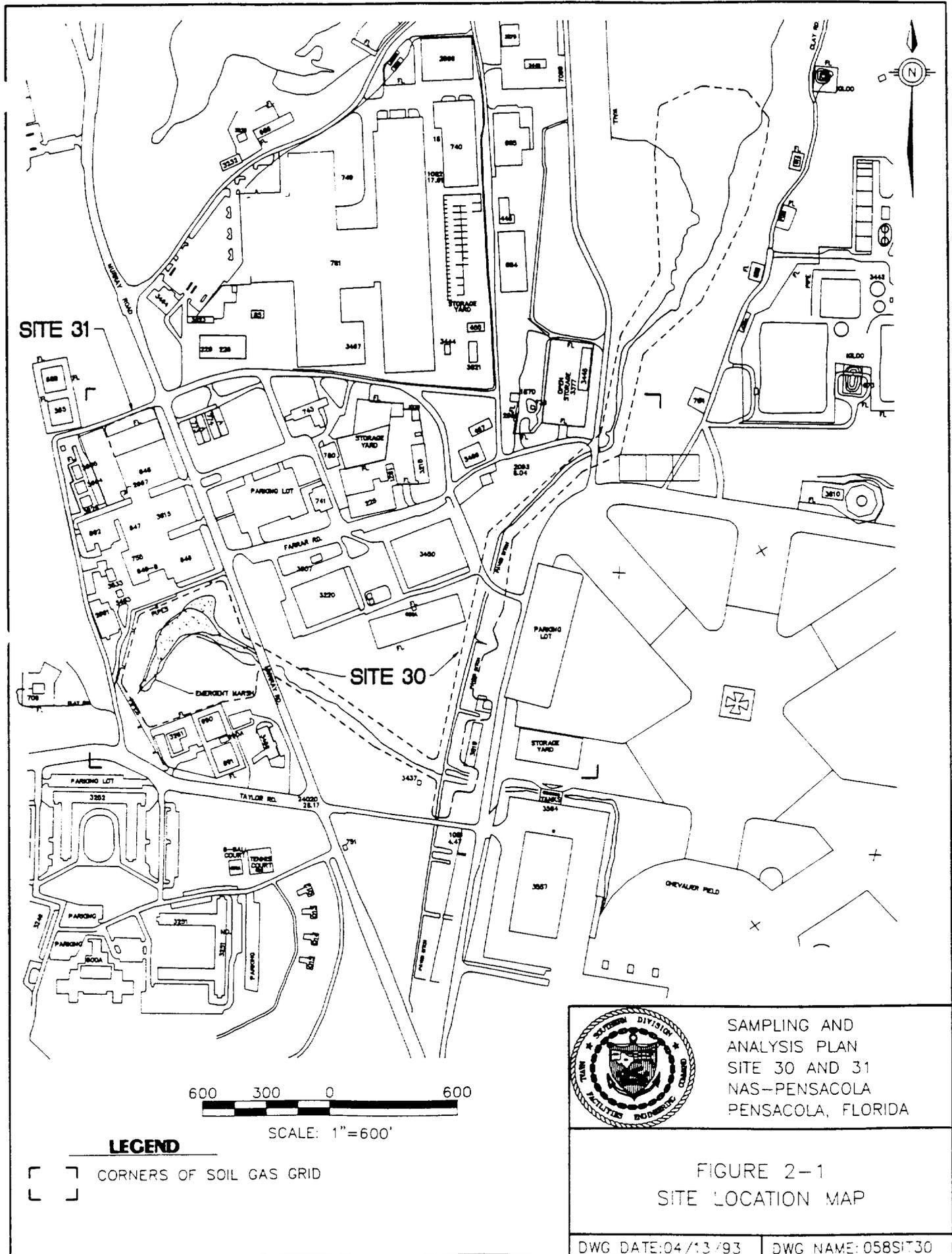
Site 30 consists of Buildings 649 and 755, which were formerly used as metal plating facilities, and an adjacent wetland area. [Site 31 is the soil north of Building 648. The facility has been used for painting operations since 1949.] The sites are located on the eastern portion of NASP, between Murray Road and the golf course and are shown on Figure 2-1.

The wetland area adjacent to Buildings 649 and 755 consists of Wetlands 5A, 5B and 6 (Parsons and Pruitt 1991). Wetland 5A/5B consists of a swampy area immediately west of Murray Road. Wetland 5B continues to the east as a stream flowing under the road and intersecting Wetland 6 immediately west of Chevalier Field. Wetland 6 is a north-south oriented drainage ditch, which begins in an open, grassy field across from the NASP parade ground. The drainage flows north under Murray Road, and passes Chevalier Field where the intersection with Wetland 5B occurs. Wetland 6 continues north to Bayou Grande, where it discharges water into the Yacht Basin via Wetland 7, an emergent wetland at the brackish end of the Yacht Basin. In addition to the discharge from Wetland 5B, there are numerous storm water outfalls which intersect Wetland 6 as it runs its course. Runoff from a number of sites, including Sites 9, 10, 23, 25, 27, and 34, may potentially impact the water quality of Wetland 6 (E&E 1992).

### 2.2 Site History

#### [Site 30]

Both Buildings 649 and 755 have previously been operated as plating shops. Building 649 was utilized as a tin-cadmium plating operation from the 1940s to the 1960s while Building 755 operated during the 1960s and 1970s. Both operations reportedly discharged various metal plating solutions containing tin, cadmium, nickel, silver, lead, chromium, cyanide, and other



metals into the ditch east of the buildings on a monthly basis. Additionally, the tin-cadmium operation at Building 649 was replaced by a magnesium treatment **[in the early] 1960s and [operations continued into the early] 1970s. [Solutions discharged into the drainage ditch included] acids, caustics, de-greasers, [chromate] solutions, [and potassium permanganate].**

**[An investigation completed by the USEPA in the summer of 1992 located a waste-receiving structure in Wetland 5 from which a waste sample was collected with detected concentrations of silver, arsenic, barium, cadmium, cobalt, chromium, copper, nickel, lead, mercury, oil, vinyl chloride, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,1,1-trichloroethane, toluene, m- and/or p-xylene, and o-xylene.]**

**[Site 31**

**Building 648 has been used for painting operations since 1949. Until 1973, paint wastes and spent paint thinner were discarded onto the unpaved area north of the building (Site 31). An estimated 20,000 gallons of waste paint thinner and paint, as well as an estimated 8,600 gallons of paint sludges removed from paint booths, were poured directly onto the ground adjacent to Building 648.**

**Underground Storage Tanks — Sites 30 and 31**

**Both Sites 30 and 31 have been impacted by five underground storage tanks (USTs) located around the building complex. An investigation of the five USTS completed by ABB Environmental in 1992 identified the following contaminants of concern:**

- **1,1,1-Trichloroethane (1,1,1-TCA)**
- **Trichloroethene (TCE)**
- **Tetrachloroethene (PCE)**
- **Chromium**
- **1,1-Dichloroethene (1,1-DCE)**
- **Methylene Chloride**

**The USTs and other potential sources of contamination that may impact the sites will be investigated as part of the RI.]**

A discussion of the historical settings of Sites 30 **[and 31]** is detailed in Section 3 of each associated site work plan (E&E 1992). Previous site activities and investigations are reported as they relate to the existence of known or suspected site contaminants. Additionally, the IDRs for sites 30 **[and 31]** discuss the findings of E&E's 1991 Phase I investigation (E&E 1991).

### **2.3 Physical Setting**

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

### 3.0 PHYSICAL SURVEY

Various physical surveys have been conducted at Sites 30 [and 31] as part of E&E's Phase I activities. [These surveys included aerial photograph reconnaissance, site reconnaissance, habitat/biota survey, surface emissions/particulate air emissions, radiation survey, and a geophysical survey.] Results of the physical surveys can be found in Section 3 of the IDRs (E&E 1991). Relevant information from these surveys has been considered during the planning of this RI. These surveys will not be duplicated during the RI. [Three surveys previously not conducted include a well inventory survey, contaminant source survey, and a soil gas survey. These surveys will be performed before field activities begin.]

#### [Well Inventory

An inventory of existing monitoring wells has been completed at Sites 30 and 31. The well inventory was performed in accordance with Section 3.1 of the CSAP. Monitoring wells that were found in disrepair will be abandoned in accordance with Northwest Florida Water Management regulations.]

#### Contaminant Source Survey

A contaminant source survey will be performed at Sites 30 [and 31] in accordance with [Section 3 of the CSAP].

#### [Soil Gas Survey

A soil gas survey will be performed across Sites 30 and 31 to delineate the extent of the soil gas and groundwater contaminant plume. The soil gas survey results will be used to select the soil and groundwater sampling points in order to monitor the extent and movement of the contaminant plume. A 100-foot interval sampling grid will be established across the site. The corners of the grid were previously shown on Figure 2-1. Based upon the results

of the Phase I investigation, the grid shall extend from west of the building complex to wetland 6 on the east. The grid will extend from north of Site 31 to wetland 5 on the south. The two baselines of the grid will be established by E/A&H personnel using a hand level. The baselines will be flagged at 100-foot intervals. Samples for soil gas analysis will be collected at each of the grid points. At grid points with elevated soil gas readings, a groundwater sample will be collected and analyzed using the heated headspace method. All measurements will be recorded in the field logbook. Areas of elevated soil gas readings will be further investigated by redefining the grid to a 10-foot interval. Additional soil gas readings will then be collected. The baselines and other key elements of the grid will be documented by a Florida registered surveyor for inclusion on report maps. Soil gas sampling procedures will be performed in accordance with Section 3.2 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 groundwater monitoring wells, and collecting surface water, sediment, soil, and groundwater samples using various techniques. **[Removal of the source area (sump) identified by the EPA in July 1992 will be evaluated as part of this investigation. Until an assessment can be made of the damage that will be caused (e.g., destruction of the wetland) and the hazards of removing the source area, it will not be removed. An ecological assessment will also be conducted for Sites 30 and 31.]** The sampling and analytical requirements for this investigation are summarized in Table 4-1, and discussed below. **[For planning purposes, the number of soil and groundwater samples are provided in Table 4-1. Actual numbers of samples may vary based on the results of the soil gas survey. EPA and SOUTHDIV will be apprised of any changes in the number of samples collected.]**

Table 4-1 Sites 30 [and 31] RI Sampling Analytical Requirements				
Medium	No. of Samples <sup>a</sup>	Analytical Parameter	[DQO <sup>b</sup> Level]	Comments
Surface Water	7 (2)	FSA PPW	[IV] [IV]	
Sediment <sup>c</sup>	26 (3)	FSA PPS	[IV] [IV]	
Soil <sup>d</sup>	91 (6) (4)	FSA PPS ST	[IV] [IV] [IV]	-Shelby Tube
Groundwater <sup>e</sup>	47 (8)	FSA PPW	[IV] [IV]	-4 from SWs 4 from IWs
<b>TOTAL</b>	<b>171</b> (19) (4)			

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 Number of sediment samples = 13 sample locations x 2 depth intervals = 26 samples.
- d Number of soil samples = 14 total boring locations; 5 boring locations x 2 depth intervals, 3 boring locations x 3 depth intervals, 6 boring locations x 12 depth intervals = 91 samples; 1 depth interval from 4 intermediate depth wells = 4 samples.
- e Number of groundwater samples = 11 new shallow wells plus 4 new intermediate depth wells plus 32 existing wells = 47 samples.

**Analytical Parameters - Full Scan of Analysis (FSA)**

TCL volatile organic compounds (VOCs); TCL base-neutral/acid extractable organic compounds (BNAs); TCL pesticides and TCL polychlorinated biphenyls (PCBs); TAL metals (total [i.e., unfiltered], water only); and TCL cyanide.

**Physical Parameters - Water (PPW)**

5-day biological oxygen demand (BOD), chemical oxygen demand (COD), hardness, total suspended solids, alkalinity, total phosphorus, nitrate-N, total Kjeldahl nitrogen (TKN), and heterotrophic plate count.

**Physical Parameters - Sediment/Soil (PPS)**

Total phosphorus, nitrate-N, TKN, heterotrophic plate count, total organic carbon, and cation exchange capacity.

**Physical Parameters - Soil (ST)**

[Bulk density, particle size, percent moisture, specific gravity], porosity and permeability (collected with Shelby tube).

- NR = Not required
- SW = Shallow well
- IW = Intermediate depth well

The EPA CLP Target Analyte List/Target Compound List (TAL/TCL) will be used to provide a legally defensible full spectrum of contaminant analysis. Sediment, surface water, soil, and groundwater will be analyzed for the full TAL/TCL list with additional non-CLP analysis also being conducted.

Analyses proposed in this SAP have been organized differently than those in the [site work plans] which are subdivided into "Suites A through E." Proposed analytical parameters are now organized into the four basic subdivisions listed below.

**New Analytical Organization**

- **Full Scan of Analysis (FSA)** — These analyses will be performed on all samples collected for chemical analysis. A full scan consists of analysis for TCL VOCs, base-neutral acid extractables (BNAs), polychlorinated biphenyls (PCBs), pesticides, cyanide, and TAL metals (unfiltered).

- **Physical Parameters, Water (PPW)** — These analyses will be performed on only a portion of the surface water and groundwater samples collected at the site, and are aimed at determining the physical characteristics of these site media for the feasibility study and remediation purposes. The parameters include 5-day biological oxygen demand (BOD), chemical oxygen demand (COD), hardness, total suspended solids, alkalinity, total phosphorus, nitrate-N, total Kjeldahl nitrogen (TKN), and heterotrophic plate count. Samples for these analyses will be collected in addition to the samples collected for the FSA analyses. For groundwater, PPW samples will be collected from all aquifer zones sampled. The locations chosen for the PPW samples will be based on field observations (OVA readings and physical groundwater characteristics), and will be intended to represent the general physical conditions of site surface water and groundwater. Areas representing likely contamination as well as ambient conditions will be targeted.
- **Physical Parameters, Sediment/Soil (PPS)** — These analyses will be performed on only a portion of the sediment and soil samples collected at the site, and will be used to determine the physical characteristics of these site media for the feasibility study and remediation. The parameters include total phosphorus, nitrate-N, TKN, heterotrophic plate count, total organic carbon (TOC), and cation exchange capacity. Samples for these analyses will be collected in addition to the samples collected for the FSA analyses. The locations chosen for the PPS samples will be based on field observations, and will be intended to represent the general physical conditions of sediments and soils at the site. Areas of likely contamination will be targeted.
- **Physical Parameters, Soil (ST)** — These analyses will be performed only on soil collected with a Shelby tube sampler from the first confining/semiconfining unit encountered at the site. It is anticipated that this unit exists at approximately 35 to 50

feet below land surface (bls), immediately below the surficial aquifer zone. These analyses will assess the physical characteristics of the confining unit matrix. Each Shelby tube sample will be analyzed for the following parameters: **[bulk density, porosity, particle size, specific gravity,]** permeability and porosity. Results of the analyses will be used to calculate the potential for contaminant migration between overlying and underlying aquifer zones.

Appendix IX analyses are no longer proposed for this investigation. Additionally, modifications have been made to the list of remediation/physical characteristic parameters proposed in the work plan. 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 surface water, sediment, soil, and groundwater for the feasibility study. Therefore, certain parameters have been omitted from this SAP because they are either redundant with the comprehensive TAL/TCL analytical methods or provide information that is not legally defensible, or of limited use.

Sample locations are presented on Figures 4-1 and 4-2 for Sites 30 **[and 31]**. These locations are not expected to vary as they are based on information obtained during the Phase I investigation. **[Any additional sources or previously not detected contamination will be investigated during Phase II by the collection of additional samples from any given media, sampling of additional media not included in this site-specific SAP, installation of additional monitoring wells to delineate the extent and depth of contaminants, and performance of aquifer response tests to characterize subsurface hydrologic conditions. Prior to the initiation of additional field activities, a field change request will be submitted to Navy for approval with notification to the EPA and FDER.]** A discussion of surface water, sediment,

soil boring and monitoring well location rationale is contained in Section 14.2.2 of the work plans (E&E 1992).

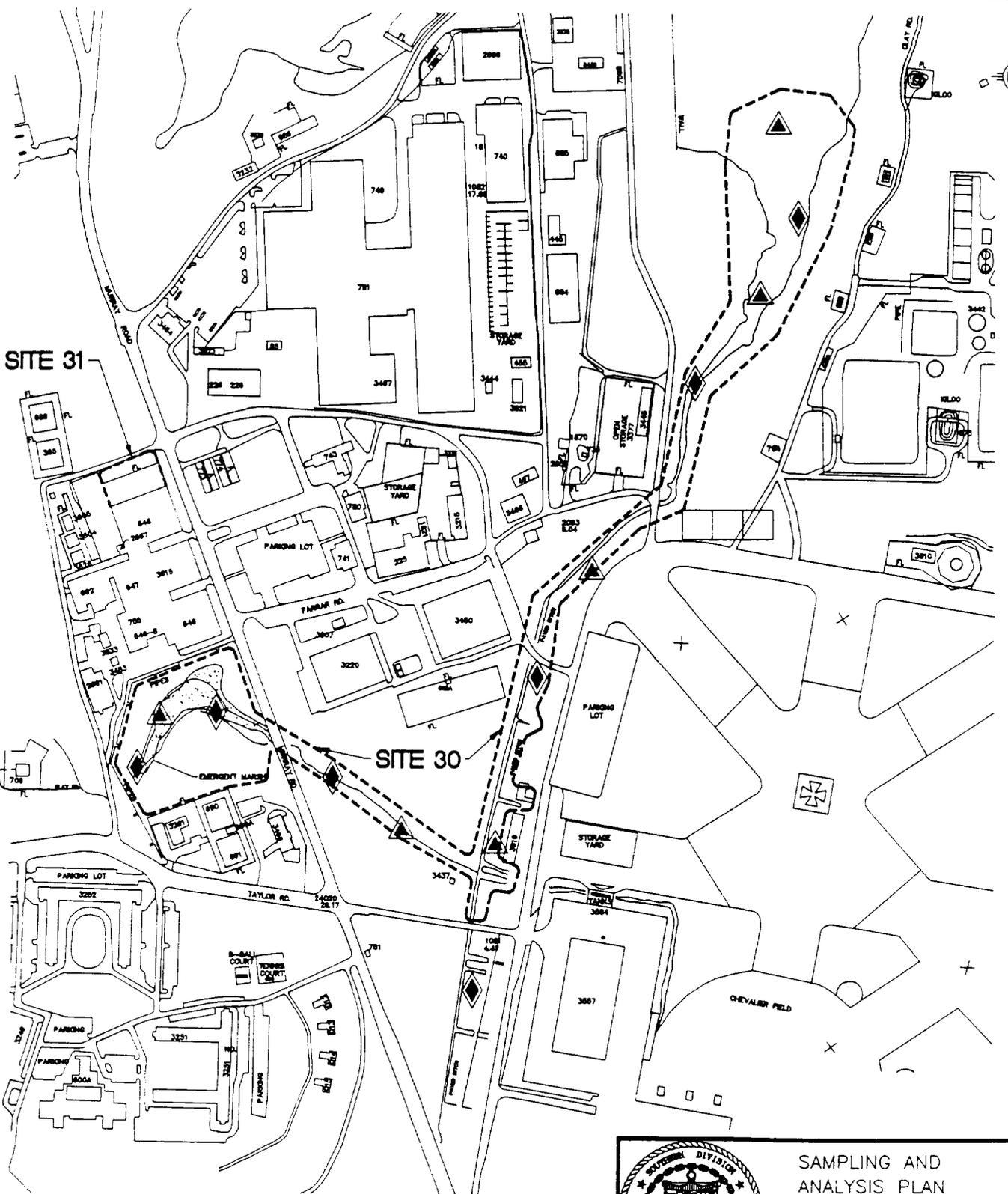
As previously stated, FSA analysis will be conducted on all samples for locations shown on Figure 4-1 and 4-2, regardless of media type, except Shelby tube samples. As previously shown in this section, Table 4-1 summarizes analysis for each media and sample type.

**[Surface Water Samples]** — FSA parameter analysis will be conducted on surface water samples collected from seven sampling locations (see Figure 4-1). PPW parameter analysis will also be conducted on two of the seven surface water samples collected. The specific locations for the PPW samples will be determined in the field based on site observations so that field personnel can identify locations that are most representative of site conditions, including areas of contamination.

**Sediment Samples** — FSA parameter analysis will be conducted on sediment samples collected from 13 sampling locations (see Figure 4-1). Two intervals will be sampled at each sample location yielding a total of 26 sediment samples for FSA analysis. See Section 4.5.2 of this SAP for sediment sampling procedures.

PPS parameter analysis will also be conducted on three of the 26 sediment samples collected. The specific locations and depths for the PPS samples will be determined in the field based on site observations so that field personnel can identify locations that are the most representative of site conditions, including areas of contamination.

**Soil Samples** — FSA parameter analysis will be conducted on soil samples collected from 14 soil boring locations (see Figure 4-2). All boring locations will be sampled **[at the following**



SITE 31

SITE 30



SCALE: 1"=600'

**LEGEND**

- ▲ PROPOSED SEDIMENT SAMPLE
- ◆ PROPOSED SURFACE WATER AND SEDIMENT SAMPLE



SAMPLING AND ANALYSIS PLAN  
 SITE 30 AND 31  
 NAS-PENSACOLA  
 PENSACOLA, FLORIDA

FIGURE 4-1  
 PROPOSED SURFACE WATER AND  
 SEDIMENT SAMPLE LOCATIONS



intervals: 0-1' bls, 1-3' bls, 3-5' bls, etc.] from the land surface to the depth where the water table is encountered. For planning, the depth to water is estimated to vary from approximately 3 to 25 feet bls. It is estimated that three to 12 depth intervals will be sampled per location yielding a total of 91 soil samples for FSA analysis. See Section 4.5.3 of this SAP for soil sampling procedures.

PPS parameter analyses will also be conducted on six soil samples collected from 14 soil borings. The specific locations and depths for the PPS samples will be determined in the field based on site observations so that field personnel can identify locations that are the most representative of site conditions, including areas of contamination.

**Groundwater Samples** — FSA parameter analyses will be conducted on groundwater samples collected from 15 monitoring wells (see Figure 4-2) which will include 11 shallow monitoring wells and four intermediate depth monitoring wells.

PPW parameter analyses will also be conducted on eight of the 15 groundwater samples collected. Groundwater samples for PPW analyses will be collected from four shallow wells and four intermediate depth wells. Specific locations will be based on site observations and determined in the field during FSA groundwater sample collection. In this way, field personnel can identify locations that offer the most representative groundwater conditions and sample in areas of likely groundwater contamination.

**Shelby Tube** — ST parameter analyses will be conducted on samples collected from the first confining/semiconfining unit encountered during drilling with Shelby tube samplers. One Shelby tube sample will be collected [**from boreholes advanced for**] installation of each of the four intermediate depth monitoring wells.

#### **4.1 Sampling Objective**

[The objective of the field sampling plan is to outline a feasible means of sample collection for chemical and physical analysis.]

##### **Objectives of sampling plan:**

- **To delineate the extent of soil, sediment, groundwater, surface water, and air contamination.**
- **To delineate migration pathways of the contaminants.**
- **To identify potential receptors of the contaminants.]**

#### **4.2 General Sampling Requirements**

General sampling requirements [will be performed in accordance with Section 2.2 of the CSAP].

#### **4.3 Sample Processing**

Sample processing [will be performed in accordance with Section 12 of the CSAP].

#### **4.4 Collection of Auxiliary Data**

Auxiliary data [will be collected in accordance with Section 9 of the CSAP. Pumping tests (up to 48 hours) will be performed at all sites requiring groundwater remediation. Prior to initiating the pumping tests, slug tests will be performed at selected monitoring wells. The results of the slug tests will be used to select the appropriate pumping tests. Pumping tests will be performed in accordance with the procedures provided in Section 9.6.2 of the CSAP].

## 4.5 Sampling Procedures

Sampling procedures to be followed are presented in **[Sections 4, 6, and 7 of the CSAP]**. Procedures contained in the **[CSAP]** applicable to this investigation will be referenced in the following subsections. All proposed modifications to **[the CSAP]** procedures, or modifications to procedures contained in the Site 30 **[or 31]** work plans, will be discussed in the following subsections.

### 4.5.1 Surface Water Sampling

Surface water samples will be collected from the seven locations shown on Figure 4-1. **[Surface water samples will be collected using either the submerged bottle technique for water less than 3 feet deep or the Kemmerer sampler for water deeper than 3 feet.]** The sampling procedures to be followed during these activities are contained in **[Section 7.3 of the CSAP]**. However, the modifications outlined below will be made for the Sites 30 **[and 31]** RI.

#### Modifications to Surface Water Sampling:

- Samples will be collected from the locations designated in Section 14.2.2.1 of **[each]** work plan (and shown on Figure 4-1).
- Sampling will be performed once at each sampling location, preferably during low tide to minimize any tidal influence on the creek. Significant tidal influence on the creek is not anticipated.
- At each surface water sampling location in Bayou Grande, the prevailing current direction and velocity, wind direction and velocity, water depth, and tidal phase will be recorded during the time of sample collection. Additionally, these measurements will be recorded at these same locations during high, mid, and low tides.

#### 4.5.2 Sediment Sampling

Sediment samples will be collected from the 13 locations shown on Figure 4-1. Two sediment samples will be collected from each location using a coring type sampling device [**with stainless steel liners**]; one from a 0.0 to 1.0 foot bls depth interval, and the second from a 1.0 to 2.0 feet bls depth interval. [**If the stainless steel liners are ineffective at retaining the sample, the coring type sampling device will be used without stainless steel liners. The samples will then be placed in the sample containers obtained from the laboratory.**] Sediment sampling procedures to be followed during these actives are contained in [**Section 7.2 of the CSAP**].

#### 4.5.3 Soil Sampling

Soil samples will be collected during the installation of 14 soil borings and four intermediate depth monitoring wells at Sites 30 [**and 31**]. Soil boring and monitoring well locations are shown on Figures 4-1 and 4-2. [**Soil borings will be advanced using hollow-stem auger drilling techniques. Soil samples will be collected using stainless steel split-barrel samplers with stainless steel liners in accordance with Section 4.6.1 of the CSAP. Shelby tube samples will be collected in accordance with Section 4.6.2 of the CSAP.**]

It is also proposed that modifications be made to the soil sampling procedures contained in the Sites 30 [**and 31**] work plan. These changes are listed below.

#### Modifications to Soil Sampling:

- One Shelby tube sample will be collected from the first confining/semiconfining unit encountered during the [**the advancement of the boreholes for the**] installation of the intermediate depth monitoring wells as described in [**Section 4.6.2 of the CSAP**]. This modification is proposed to collect information regarding the physical characteristics (i.e., permeability) of this unit.

- Except for Shelby tube samples, **[It is not anticipated that soil samples will be collected]** below the water table. **[If physical evidence of contamination is observed below the water table, a sample will be collected for FSA analyses for characterization and delineation of the source material].**

#### 4.5.4 Monitoring Well Installation

Fifteen monitoring wells will be installed at Sites 30 **[and 31]**. The proposed monitoring well locations are shown on Figure 4-2. Eleven wells will be shallow, completed to a target depth of approximately 15 to 30 feet bls, and four wells will be completed to an intermediate target depth of approximately 35 to 50 feet bls. The 15-foot variation in target depths is due to the site's significantly sloping topography. **[Hollow-stem auger drilling techniques will be used to install the shallow monitoring wells. The intermediate depth monitoring wells will be installed with hollow-stem auger drilling techniques to 25 feet bls, then completed with hydraulic rotary drilling techniques to the completion depth.]** The drilling methods and unconfined monitoring well installation procedures are in accordance with those presented in **[Section 5.2 and 5.3 of the CSAP]**. However, the modifications outlined below will be made to these procedures for the Sites 30 **[and 31]** RI.

#### Modifications to Monitoring Well Installation:

- **[In accordance with Florida Administrative Code Chapter 40A-3, neat cement grout is required in all monitoring well installations. Although bentonite grout might provide a better seal in most areas, it should be avoided in coastal waters such as NAS Pensacola where concentrations of total dissolved solids in groundwater are high.]**

- Intermediate depth wells will be completed into the lower portion of the surficial aquifer zone, immediately above the first confining/semiconfining unit, as stated in Section 14.2.2.3 of the work plans for Sites 30 **[and 31]**.
- **[Permanent]** surface casing will not be used during the installation of intermediate depth monitoring wells at Site 30 **[or Site 31 because the intermediate monitoring wells will be installed above the confining unit. In addition, there is no confining unit between the shallow zone and the intermediate zone.]** Hollow-stem auger techniques will be employed to a depth of approximately 25 feet bls. Drilling will continue using hydraulic rotary **[or hollow stem auger]** techniques inside of the hollow-stem augers to the targeted completion depth of the borehole. This modification is proposed to allow the auger to act as a temporary surface casing during well installation. **[Surface casings will only be used for installation of deep monitoring wells penetrating the confining unit.]**

#### 4.5.5 Groundwater Sampling

Groundwater samples will be collected from the 15 newly installed monitoring wells **[and the existing monitoring wells]** at Sites 30 **[and 31]**. Groundwater sampling will be performed in accordance with **[Section 6 of the CSAP]**.

#### 4.5.6 Hydrologic Assessment

A hydrologic assessment will be performed at Sites 30 **[and 31]** in accordance with **[Section 9.6 of the CSAP]**. The following modifications outlined below will be made to these procedures for the Sites 30 **[and 31]** RI.

**Modifications to Hydrologic Assessment:**

- **[Slug tests and specific capacity tests will be performed at selected monitoring wells. If it is determined that groundwater remediation is required, the results of the slug and specific capacity tests will be used to design the appropriate pumping tests. The EPA and FDER will be kept apprised of the investigation as it progresses, and will be notified prior to conducting full scale pumping tests. The Navy will accept technical responsibility for the design and implementation of these tests. Pumping tests will be performed in accordance with the procedures provided in Section 9.6.3 of the CSAP.]**
- For all inland surface water bodies (creeks and/or streams) on Sites 30 **[and 31]** in which flow is observed, velocity, discharge, and water level elevation data will be recorded at approximately the same time that water levels are measured in the onsite wells. Additionally, a rain gauge will be installed at or near Sites 30 **[and 31]** to regularly monitor site precipitation, as stated in Section 14.2.3 of **[each]** work plan.

**4.5.7 Cadastral Survey**

An cadastral survey will be performed at Sites 30 **[and 31]** as described in **[Section 3.5 of the CSAP]**.

**[4.5.8 Ecological Assessment**

At Sites 30 and 31, a minimum of a Phase I Habitat/Biota survey will be conducted in accordance with Section 8.1 of the CSAP. The toxicity and diversity of the wetland complex (5A, 5B and 6) will be investigated during the RI of Site 41 (NASP Wetlands). Analytical data from sediment samples collected during the Site 30/31 RI will be used to

place the toxicity and diversity sampling locations in Phases II and III of the Site 41 ecological assessment.]

#### **4.6 Decontamination**

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

#### **4.7 Sample Management**

Sample management procedures [**will be performed**] in accordance with [**Section 12 of the CSAP**].

#### **4.8 Sample Custody**

Sample custody [**will be maintained in accordance with Section 12.4 of the CSAP**].

#### **4.9 Investigation-Derived Wastes**

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

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

Quality assurance/quality control (QA/QC) samples will be collected in accordance with the frequency presented in [**Table 15-1 of the CSAP**]. QA/QC procedures to be followed during the investigation are in accordance with [**Section 15.2 of the CSAP**].

## **5.0 ANALYSIS**

The following subsections provide quality assurance objectives for the collection of field measurements and laboratory analysis.

### **5.1 Field Measurements**

Field measurements will be collected at Sites 30 [**and 31**] in accordance with [**Section 10.1 of the CSAP**]. Field measurements will include pH, temperature, specific conductance, salinity, groundwater level, wellhead survey, and organic vapor detection.

### **5.2 Laboratory Analysis**

Laboratory analysis will be conducted in accordance with [**Section 10.2 of the CSAP**].

## **6.0 QUALITY ASSURANCE PLAN**

The Quality Assurance Plan (QAP) [presented in Section 15 of the CSAP will be followed throughout the Sites 30 and 31 RI].

## **7.0 DATA MANAGEMENT PLAN**

The Data Management Plan (DMP) [**presented in Section 14 of the CSAP will be followed during the RI for Sites 30 and 31**].

## 8.0 REFERENCES

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

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

Ecology and Environment, Inc. (1991). *Interim Data Report, Contamination Assessment/Remedial Investigation, Buildings 649 and 755 (Site 30), Naval Air Station Pensacola, Pensacola, Florida.* Ecology and Environment, Inc.: Pensacola, Florida.

**[Ecology and Environment, Inc. (1991). *Interim Data Report, Contamination Assessment/Remedial Investigation, Buildings 648 (Site 31), 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.* EnSafe/Allen & Hoshall: Memphis, Tennessee.]**

Parsons, M. and Pruitt, B.A. (1991). *Pensacola Naval Air Station Wetlands Advanced Identification*, U.S. Environmental Protection Agency, Environmental Services Division, Athens, Georgia.

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.

**9.0 FLORIDA PROFESSIONAL GEOLOGIST SEAL**

I have read and approve of the Final Sampling and Analysis Plan for the Sites 30 and 31 — Buildings 648, 649 and 755 and seal it in accordance with Chapter 492 of the Florida Statutes. In sealing this document, I certify that the geological information contained in it is true to the best of my knowledge and that the geological methods and procedures included in this plan are consistent with currently accepted geological practices.

Name: Brian E. Caldwell  
License Number: 1330  
State: Florida  
Expiration Date: July 31, 1994

BEC Caldwell  
Brian E. Caldwell  
5-7-93  
Date