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Comprehensive Long-Term
Environmental Action
Final Sampling and Analysis Plan
for Site 17
Transformer Storage Yard
Naval ~~Air~~ Station
Pensacola, Florida

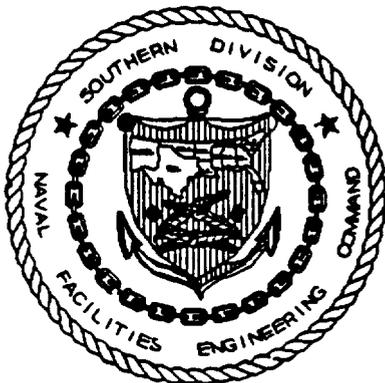
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19. Abstract

This Sampling and Analysis Plan is for Site 17, the Transformer Storage Yard. The purpose of this investigation is to delineate extent, magnitude, and to the greatest degree possible extent of contaminated soil, groundwater and **sediment** and to assess the need for site remediation.

Investigative work will be completed through a three-phased approach consisting of field screening activities, soil borings, temporary monitoring wells, permanent monitoring wells, and collection of soil, groundwater, and sediment samples for Target Analyte List/Target Compound List using Contract Laboratory Program protocol. In addition, Special Analytical Services on specific analytes may be performed to achieve lower quantitation limits as needed. Field screening results for **PCBs** will be used to determine optimal soil boring and temporary well locations prior to the collection of **TAL/TCL** samples. Except for the omission of a neat cement grout collar, 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 site by site by the Navy, U.S. Environmental Protection Agency and Florida Department of Environmental Protection.

Phase I activities will identify if contaminants are present at the site. The detected concentrations will be compared to the preliminary remedial goals established for NAS Pensacola. The detected concentrations of soil contaminants will be compared to both the risk-based concentrations for residential land (developed by EPA Region 11) and the risk-based cleanup goals for Florida (developed by FDEP September 29, 1995). The most recent **RBC** tables are used, these are January-June, 1996. Groundwater contaminants will be compared to the lower of the Florida Drinking Water Standards and Guidance Concentrations or the Safe Drinking Water Act Maximum Concentration Levels. If groundwater contamination, or the potential exists for soil contaminants to leach to groundwater, site-specific soil actions levels will be developed for each contaminant. Further assessment activities will depend on whether soil, groundwater, and sediment samples exceed the applicable PRGs. A brief data presentation 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 data presentation will summarize the findings of the Phase II plume delineation and recommend locations for permanent monitoring wells, as required. 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 Sampling and Analysis Plan, 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, abbreviations, and units of measure used in this report.

bls	below land surface
CG	Cleanup Goal
CLEAN	Comprehensive Long-Term Environmental Action
	Navy
CLP	Contract Laboratory Program
CSAP	Comprehensive Sampling and Analysis Plan
DQO	Data Quality Objective
E/A&H	EnSafe/Allen & Hoshall
E&E	Ecology and Environment, Inc.
FDEP	Florida Department of Environmental Protection
FS	Feasibility Study
FSA	Full Scan of Analysis
G&M	Geraghty and Miller, Inc.
GS	Grain Size
IAS	Initial Assessment Study
MCL	Maximum Contaminant Level
NAS Pensacola	Naval Air Station Pensacola
NEESA	Naval Energy and Environmental Support Activity
NFESC	Naval Facilities Engineering Service Center (formerly NEESA)
PCBs	Polychlorinated Biphenyls
ppm	parts per million
PPS	Physical Parameters, Soil
PPW	Physical Parameters, Water
PRGs	Preliminary Remediation Goals
QA	Quality Assurance
QC	Quality Control
RBC	Risk Based Concentrations
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
SDWA	Safe Drinking Water Act
SOP/QAM	Standard Operating Procedures and Quality Assurance Manual
SOUTHNAVFACENCOM	Southern Division, U.S. Navy, Naval Facilities Engineering Command
SVOCs	Semivolatile Organic Compounds
TAL	Target Analyte List
TCL	Target Compound List
TKN	Total Kjeldahl Nitrogen
USEPA	United States Environmental Protection Agency
VOCS	Volatile Organic Compounds

EXECUTIVE SUMMARY

This Sampling and Analysis Plan is for Site **17**, the Transformer Storage Yard. The purpose of this investigation is to delineate extent, magnitude, and to the greatest degree possible extent of contaminated soil, groundwater and sediment and to **assess** the need for site remediation.

Investigative work will be completed through a three-phased approach consisting of field screening activities, soil borings, temporary monitoring wells, permanent monitoring wells, and collection of soil, groundwater, and sediment samples for Target **Analyte List/Target Compound List** using Contract Laboratory Program protocol. In addition, Special Analytical Services on specific analytes may be performed to achieve lower quantitation limits as needed. Field screening results for PCBs will be used to determine optimal soil boring and temporary well locations prior to the collection of TAL/TCL samples. Except for the omission of a neat cement grout collar, 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 site by site by the Navy, **U.S. Environmental Protection Agency** and Florida Department of Environmental Protection.

Phase I activities will identify if contaminants are present at the site. The detected concentrations will be compared to the preliminary remedial goals established for NAS Pensacola. The detected concentrations of soil contaminants will be compared to both the risk-based concentrations for residential land (developed by EPA Region 111) and the risk-based cleanup goals for Florida (developed by FDEP September **29, 1995**). The most recent RBC tables are usedm these are January-June, **1996**. Groundwater contaminants will be compared to the lower of the Florida Drinking Water Standards and Guidance Concentrations or the Safe Drinking Water Act Maximum Concentration Levels. If groundwater contamination, or the potential exists for soil contaminants to leach to groundwater, site-specific soil actions levels will be developed for each contaminant. Further assessment activities will depend on whether soil, groundwater, and sediment samples exceed applicable PRGs. The findings of the first phase of the investigation will be prepared following receipt and evaluation of the analytical data. It will present the PRGs and outline additional work.

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Phase I 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** data presentation will summarize the findings of **the Phase II** plume delineation and recommend locations for permanent monitoring wells, **as** required. **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 Sampling and Analysis Plan, 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.

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 Site 17 — the Transformer Storage **Yard**, 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-0318/071.

Primary references for this *SAP* include the *Comprehensive Sampling and Analysis Plan for Naval Air Station Pensacola (CSAP)* (E/A&H 1994), 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 R* (Site 17) completed by Ecology & Environment, Inc. (E&E 1992). References to these documents are made throughout this plan. The investigation of Site 17 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 17 RI will assess the nature of any potential contamination identified during the proposed field investigation and [the need for site remediation.] A well inventory, contaminant source survey, and habitat and biota survey will be conducted before field activities begin. Field activities to be performed during the RI include [**immunoassay** field] screening for polychlorinated biphenyls (PCBs), the completion of soil borings, [installation of **temporary** and permanent] monitoring wells, the collection of sediment, soil, and groundwater samples, and a hydrologic and Phase I ecologic assessment [**as** defined in the **CSAP**]. Chemical analyses will be completed by a laboratory approved by the Naval Facilities Engineering Service Center

(**NFESC**) 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 field screening activities, 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. In addition, Special Analytical Services (SAS) on specific analytes may be performed to achieve lower quantitation limits **as** needed. Except for the omission of a neat cement grout collar, temporary monitoring wells will be constructed, developed, and sampled in accordance with the procedures for permanent monitoring wells. Therefore, the need for permanent monitoring wells should be evaluated site by site by the Navy, USEPA and Florida Department of Environmental Protection (FDEP).

Phase I activities will identify if contaminants are present at the site. The detected concentrations will be compared to the preliminary remedial goals (PRGs) established for NAS Pensacola. The detected concentrations of soil contaminants will **be** compared to both the risk-based concentrations for residential land (developed by EPA Region III) and the risk-based cleanup goals for Florida (developed by FDEP September **29, 1995**). The most recent RBC tables are used, these are January-June, 1996. Groundwater contaminants will be compared to the lower of the Florida Drinking Water Standards and Guidance Concentrations or the Safe Drinking Water **Act Maximum** Concentration Levels. If groundwater contamination, or the potential exists for soil contaminants to leach to groundwater, site-specific soil actions levels will be developed for each contaminant. Further assessment activities will depend on whether contaminant concentrations in **soil**, groundwater, and sediment samples exceed the applicable PRGs. The findings of the **first**

groundwater, and sediment samples exceed the applicable PRGs. The findings of the first phase of the investigation **will be** presented, along With PRGs and **an** outline of additional work after 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. The findings of the Phase II plume delineation will **be** summarized and the recommended 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.]

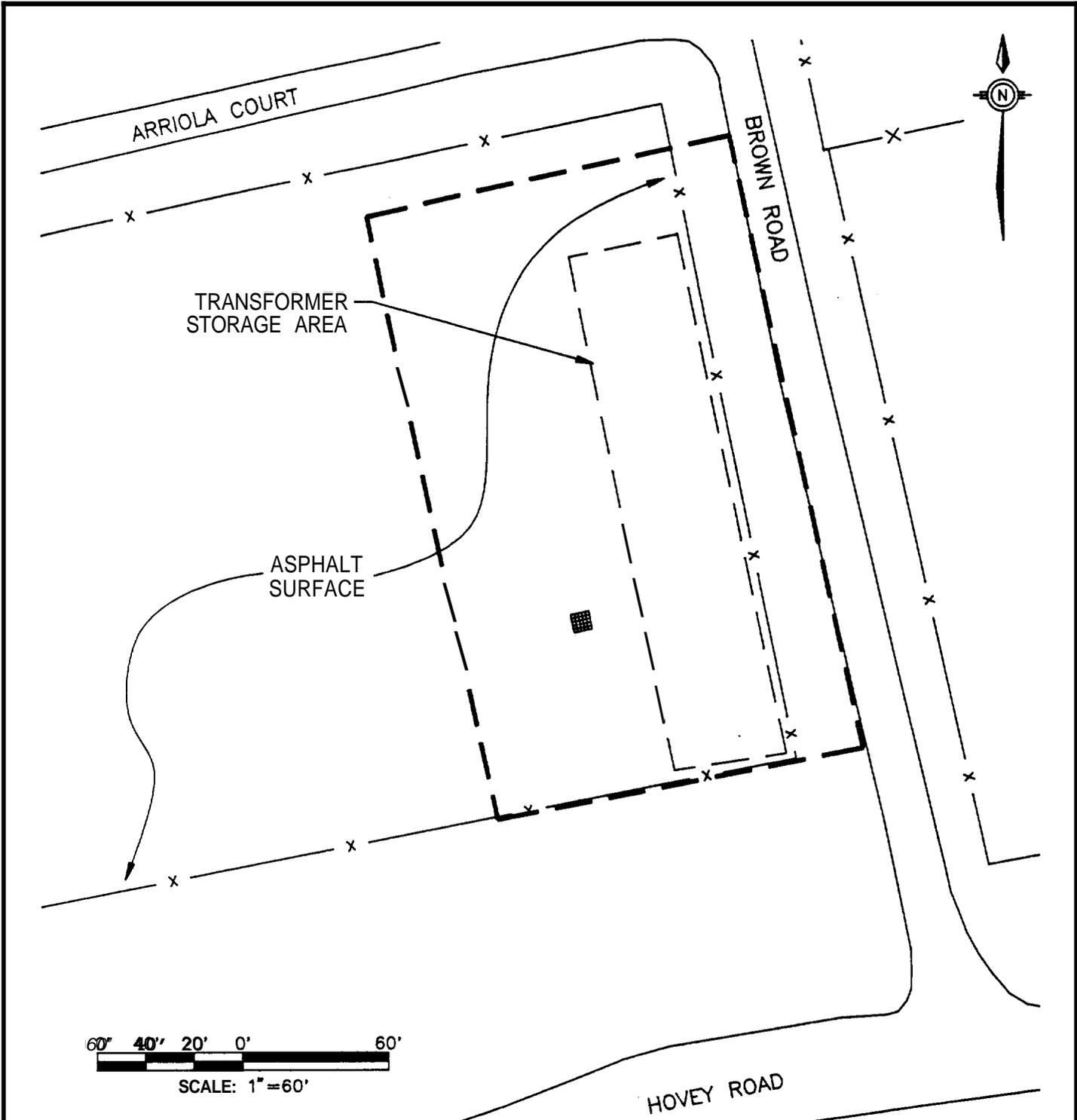
Upon completion of the investigative work and laboratory analysis, an **RI** report [including the baseline risk assessment] will be submitted to the USEPA and Florida Department of Environmental Protection (FDEP) summarizing the activities, results and conclusions of the investigation. The report will provide supporting data for the completion of a baseline risk assessment and the feasibility study (**FS**) to be completed for Site 17.

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 17 is an area approximately 150 feet by 250 feet along the eastern side of the fenced machinery storage yard (see Figure 2-1), along the southern side of Arriola **Court** and the western side of Brown Road. **A** storm drain, connected to the storm water runoff system, is



- LEGEND**
- APPROXIMATE SITE BOUNDARY
 - STORM DRAIN
 - x-x- FENCE



SAMPLING AND ANALYSIS PLAN
 NAS-PENSACOLA
 PENSACOLA, FLORIDA

FIGURE 2-1
 SITE MAP
 SITE 17

DATE: 02/21/95

DWG. NAME: 71SIT17A

approximately 20 feet west of the transformer storage area inside the site. **Site 17** is paved entirely with asphalt except for a 20-foot wide strip of **grass** in the eastern portion. No monitoring wells or surface water bodies **[are]** in the immediate site vicinity. NAS Pensacola Supply Well No. 3 is approximately 2,500 feet west of Site **17**.

The site is generally flat with land surface elevations averaging **20** to 25 feet above mean sea level. NAS Pensacola Sites **8** and **22** are approximately 2,000 feet and **1,700** feet northeast of Site **17**, respectively.

2.2 Site History

Site **17** was used by the NAS Pensacola Public Works Center Utilities Department for **12** years (**1964** to **1976**) to openly store used transformers containing PCB and non-PCB transformer oil. As many as 200 to 300 transformers were contained in the area at one time. Some may have leaked oil (E&E **1992**).

An Initial Assessment Study (IAS) of Site **17** was completed in June **1983** by NEESA. The IAS was based on historical records, field inspections, and interviews with NAS Pensacola personnel. **[Analysis of]** of black oily residue **[indicated that it contained]** 70,000 parts per million (ppm) of Aroclor **1260**, as well as other PCB compounds and chlorinated hydrocarbons. The IAS recommended further study of the site and the removal of the asphalt and any contaminated soil.

[In] a Verification Study performed by Geraghty and Miller, Inc. (G&M) in July **1984**, three shallow borings were advanced to a depth of **2** feet through the asphalt. Aroclor **1260** was detected at 9 ppm in one soil sample collected near the onsite storm drain. Based on the Verification Study results, G&M recommended no further action at Site **17**.

2.3 Physical Setting

Climatology, biological resources, physiography, and hydrogeology for Site **17** 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 will be conducted at Site **17** including a well inventory, contaminant source survey, and a habitat and biota survey. These surveys will be conducted before field activities begin.

Well Inventory

Existing monitoring wells will be inventoried 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 photograph analysis, and a utility survey.

The survey will include, to the greatest extent possible, 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 known surface spills.
- e Locations of known historical outfalls.
- e Locations and contents of 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 17 RI will also be used to help assess ecological risk to any onsite terrestrial and aquatic habitats, or any surrounding habitats potentially affected by contaminant migration. If ecological impacts [(terrestrial)] are suspected at Site 17 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 [immunoassay screening for PCBs,] 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 17.

4.1 Sampling Objectives

The objectives of the field sampling effort are to:

Phase I

- Identify potential sources of contamination.
- Assess the nature of identified contaminants.

Phase II

- Delineate, [to the greatest degree practicable,] the extent of sediment, soil and groundwater contamination.
- Delineate migration pathways of the contaminants.
- Identify potential receptors of the contaminants.

Phase III

- **(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 sediment, soil, and groundwater samples is also listed in Table 4-1. The USEPA and FDEP will be apprised of any changes in the number of samples collected.

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

[Immunoassay field] screening will be conducted across the site to identify any areas of PCB contaminated soil. **[Soil samples will be analyzed in accordance with the manufacturer's specifications. Areas with detected concentrations will be marked for further sampling.]**

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. **[Collected samples will not be analyzed for hexavalent**

Table 4-1 Site 17 RI Sampling and Analytical Requirements			
Medium	No. of Samples^a	Analytical Parameter	DQO^b Level
Sediment ^c	1 (1)	FSA GSKOC	IV IV
Soil ^d	24 25	Immunoassay FSA	II IV
Groundwater ^e	5	FSA	IV
TOTAL	24 31 (1)	Immunoassay FSA GSKOC	II IV 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 sediment samples = 1 sample location x 1 sample interval = 1 sample.
- d Total number of soil samples = [24 screening locations x 1 interval = 24 samples.] 5 soil borings x 5 sample intervals = 40 samples.
- e Total number of groundwater samples = [5] proposed [temporary] shallow monitoring wells x 1 sample each = [5] samples.

Immunoassay • PCB testing with immunoassay field testing kit

FSA • Full Scan of Analysis

Target Compound List (TCL) volatile organic compounds, TCL semivolatile organic compounds (SVOCs), TCL pesticides, TCL polychlorinated biphenyls (PCBs), Target Analyte List (TAL) metals (unfiltered), and TCL cyanide.

GS/TOC • Grain Size Analysis/Total Organic Carbon

chromium analyses due **to** the lack of previous detection during other investigations at NAS Pensacola (**OU10**, Site 1, and Site 39, and evidence from the site **history** indicating that it is not a parameter of concern). Additional samples for physical parameters and grain-size analyses will be collected from selected **soil** and groundwater sampling locations during Phase **11**. The number of samples **will be** detailed in the **Phase I** Data Presentation.]

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

New Analytical Organization

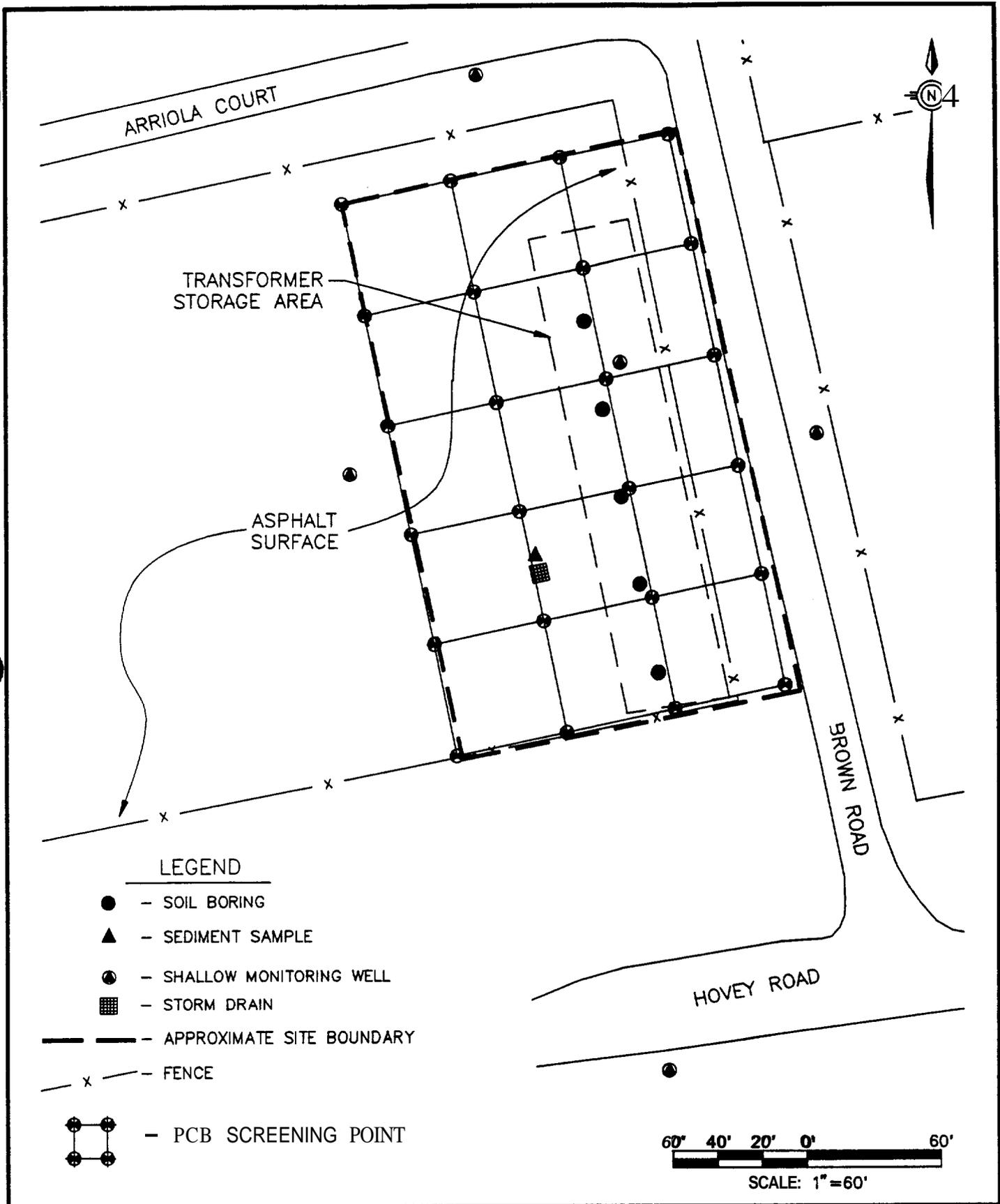
- e [Immunoassay Screening for PCBs]
- Full Scan of Analysis (**FSA**) — A full scan consists of analysis for TCL volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), TCL pesticides, TCL polychlorinated biphenyls (PCBs), TAL metals (unfiltered), and TCL cyanide.

- e Physical Parameters, Soil (**PPS**) — The parameters include total phosphorus, nitrate-N, total Kjeldahl nitrogen (TKN), heterotrophic plate count, total organic carbon, and cation exchange capacity. [Samples for these analyses will **be** collected during Phase II.]
- Grain Size Analysis (GS) — [Samples for these analyses will **be** collected during Phase II.]
- e Physical Parameters, Water (**PPW**) — The parameters include 5-day biological oxygen demand, chemical oxygen demand, hardness, total suspended solids, alkalinity, total phosphorus, nitrate-N, TKN, and heterotrophic plate count. [Samples for these analyses will be collected during Phase II.]

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 field screening locations, soil borings, temporary monitoring wells, and sediment sampling. The exact number of soil borings and temporary wells for full TAL/TCL analysis during Phase I will **be** based on field screening results. 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 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



SAMPLING AND
ANALYSIS PLAN
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 4-1
PROPOSED SAMPLING LOCATIONS
SITE 17

DATE: 02/23/95

DWG NAME: 71SIT17B

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 may be replaced with permanent wells which will be resampled for FSA. The sampling program and any proposed modifications to the **E&E** site work plan (1992) are described below.]

Sediment Samples — FSA [and **GS/TOC** analysis] will **be** conducted on one sediment sample collected from the storm drain.

Soil Samples — [For immunoassay screening, an approximately 250-foot x 150-foot grid, with grid nodes at 50-foot spacing will be established across the site (Figure 4-1). In addition, samples will be collected for screening from the soil beneath significant flaws in the asphalt, through which PCBs may have migrated. Soil samples will be collected at each grid node location from the 0 to 1-foot interval by hand auger.] FSA will be conducted on soil samples collected from soil borings advanced at [field] screening locations identified as having PCB contamination. [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.**]

If the [field] screening does not identify locations with **PCB** contamination, five soil borings will be advanced within the Transformer Storage Area. Soil samples will **be** collected from the five soil boring locations for FSA. All boring locations will **be** sampled at the following intervals:

0 to 1 feet below land surface (bls), [1 to 3 feet bls, 5 to 7 feet bls, 9 to 11 feet bls, etc.] from the land surface to the depth of the water table, which is estimated to be 15 feet bls.

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 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 — FSA will be conducted on groundwater samples collected from [five temporary] shallow monitoring wells. The wells will be completed to a target depth of 20 to 25 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.

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**. Sampling and any proposed procedure modifications to the **CSAP** or E&E site work plan (**1992**) are described in the following subsections.

4.4.1 Sediment Sampling

Sediment samples will be collected using a hand auger. If insufficient volume is present for the hand auger, a spoon and bowl will be used. Sediment sampling will be performed in accordance with Section 7.2 of the **CSAP**.

4.4.2 Soil Sampling

Soil samples collected for **[field]** screening will be collected with a **[stainless-steel]** hand auger in accordance with Sections **4.4** and **4.5** of the **CSAP**. Soil borings will be advanced using either hollow-stem auger drilling techniques **[or hand augers, as appropriate]**. Soil samples **[from drilled boreholes]** will be collected using split-barrel samplers in accordance with Section **4.6.1** of the **CSAP**. **[Samples from hand augered boreholes will be collected directly from the auger bucket with stainless-steel bowls and spoons].**

4.4.3 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, except for **a** grout collar, will be constructed in a manner identical to the permanent wells.] In accordance with Florida Administrative Code Chapter 40A-3, neat cement grout is required **in** all [permanent] monitoring well installations.

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 [**as** free of turbidity **as** possible] based on the [lithology of the screened interval] and pH, temperature and specific conductivity have stabilized. These measurements will **be** recorded in accordance with Section 10.1 of the CSAP.

4.4.4 Groundwater Sampling

Groundwater will be sampled 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 **F.1.3** of SOP/QAM. To prevent potential degassing of volatiles, 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**.

4.5 Hydrologic Assessment

[An initial water level assessment **will** be performed using 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 [characterization] 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 [where allowable]. The Navy will accept technical responsibility for the design and implementation of these tests. The 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 Cadastral Survey

[A geodetic survey will be performed using a global positioning system 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

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 (QA/QC) 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 17 RI.

6.0 DATA MANAGEMENT PLAN

The Data Management Plan presented in Section **14** of the **CSAP** will be followed during the Site 17 RI.

7.0 REFERENCES

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

EnSafe/Allen & Hoshall. **(1994)**. *Comprehensive Sampling and Analysis Plan For Naval Air Station Pensacola, Pensacola, Florida — 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: Tampa Bay, 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.

Appendix A
Florida Professional Geologist Seal

FLORIDA PROFESSIONAL GEOLOGIST SEAL

I have read **and** approve of this Sampling and Analysis Plan, NAS Pensacola Site **17**, 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: Brian E. Caldwell
License Number: #1330
State: Florida
Expiration Date: July 31, 1998

B Caldwell
Brian E. Caldwell

10/21/96
Date 1