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COMPREHENSIVE LONG-TER...
ENVIRONMENTAL ACTION
FINAL SAMPLING AND ANALYSIS PLAN
FOR SITE 29
SOIL SOUTH OF BUILDING 3460
NAVAL AIR STATION
PENSACOLA, FLORIDA

SOUTHNAVFACENGCOM
CONTRACT NUMBER:
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Prepared for:

COMPREHENSIVE -TERI
1 C NAVY *(CLEAN)*
NAVAL I)RT T I
NAVAL *AIR* STATION
PENS 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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19. Abstract

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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 end recommend locations for permanent monitoring wells. Phase III permanent monitoring walls (and soil borings, if required) will replece strategically located temporary monitoring wells and be used to confirm contamination delineation and risk assessment.

This SAP, in conjunction with the Comprehensive Sampling end Analysis Plan, will provide guidelines for sampling and analytical techniques to be used during the investigation and outline proper documantation 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
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.
GPS	Global Positioning System
GS	Grain Size
HEX	Hexavalent Chromium Analysis
IAS	Initial Assessment Study
IDR	Interim Data Report
IWTP	Industrial Wastewater Treatment Plant
msl	Mean Sea Level
NAS Pensacola	Naval Air Station Pensawla
NEESA	Naval Energy and Environmental Support Activity
OU	Operable Unit
PAHs	polynuclear aromatic hydrocarbons
PCBs	Polychlorinated Biphenyls
PPS	Physical Parameters, Soil
PPW	Physical Parameters, Water
PRGs	Preliminary Remedial Goals
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SOP/QAM	Standard Operating Procedures and Quality Assurance Manual
SOUTHNAVFACENGCOM	Southern Division, U.S. Navy, Naval Facilities Engineering Command
ST	Shelby Tube
TAL	Target Analyte List
TCL	Target Compound List

TKN	Total Kjeldahl Nitrogen
TOC	Top of Casing
TRPHs	Total Recoverable Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
VOCS	Volatile Organic Compounds

EXECUTIVE SUMMARY

This Sampling and Analysis Plan (SAP) is written for Site 29, the Soil South of Building 3460. The purpose of this investigation is to delineate nature, extent and magnitude of contaminated soil and groundwater.

Investigative work will be completed through a three-phased approach consisting of soil brings, temporary monitoring wells, permanent monitoring wells, and collection of soil and groundwater 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 and groundwater 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 brings. 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.

1.0 INTRODUCTION

As part of the U.S. Navy Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, an Remedial Investigation/Feasibility Study (RI/FS) will be completed by EnSafe/Allen & Hoshall (E/A&H) at Site 29 — the Soil South of Building 3460, 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 F completed by Ecology & Environment, Inc. (E&E 1992). References to these documents are made throughout this plan. The investigation of Site 29 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 29 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, Soil South of Building 3460 (Site 29)* (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 and [temporary/permanent] monitoring wells, the collection of soil and groundwater 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 and groundwater 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 and groundwater 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.]

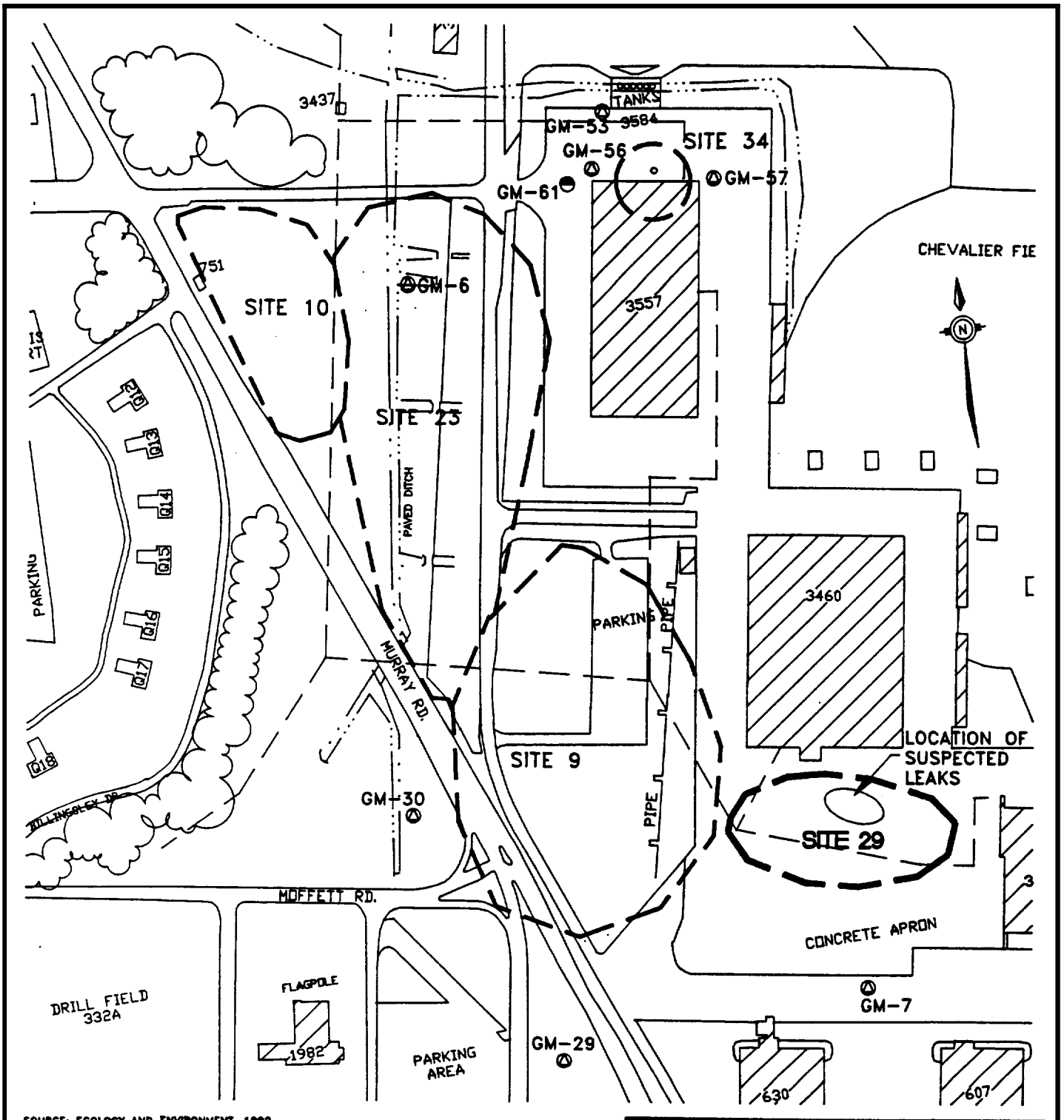
Upon completion of the investigative **work** and laboratory **analysis,** an **RI** report **will be** submitted to the Navy, USEPA, and FDEP **summarizing the** activities, results and conclusions of the investigation. The report will pmvide supporting **data for** the completion of **a** baseline risk assessment and the Feasibility Study (FS) **to** be completed **at** Site *29.*

This *SAP,* in conjunction with the CSAP, **will** pmvide 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 **29** is at the southwestern corner of Chevalier Field approximately **100 feet** south of the southeastern corner of Building **3460** *(see* **Figure** 2-1). The entire **site** is covered **by** the Chevalier Field concrete **apron.** The land **surface** elevation is approximately **7 to 8 feet** above **mean *sea*** level (msl). No groundwater monitoring wells **are** located within the site **boundary;** however, two monitoring wells were constructed **in** the site vicinity. Well **GM-7** is **100** feet from the southern perimeter of Site **29,** and **GM-29** is approximately **600** feet southwest **of** Site **29.** Monitoring well **construction** details **are** presented in Table **2-1.**



SOURCE: ECOLOGY AND ENVIRONMENT, 1992

LEGEND

- 6 — EXISTING SHALLOW MONITORING WELL
- EXISTING DEEP MONITORING WELL
- SITE BOUNDARY
- BUILDING
- INDUSTRIAL WASTE SEWER LINE

300 0 300 600

GRAPHIC SCALE IN FEET

SAMPLING AND ANALYSIS PLAN
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 2-1
SITE MAP
SITE 29

DWG DATE: 09/03/93 DWG NAME 70SITE29

Table 2-1
Construction Details of Monitoring Wells Related to Site 29

Well Designation	Surface Elevation (ft msl)	TOC Elevation (ft msl)	Total Depth Drilled (ft)	Screened Interval (ft)	Depth to Filter Pack (ft)
GM-7	7.6	8.92	11.5	8.8 - 11.3	4.8
GM-29	7.9	7.91	11.5	9.2 - 11.7	5.2

Source: Geraghty & Miller, Inc., 1984

Notes:
TOC = Top of Casing
msl = Mean sea level

2.2 Site History

In the spring of 1981, several workers sustained chemical burns while working in an excavation south of Building 3460. A slimy black substance in the excavation soils was reportedly responsible for the burns. Additionally, NAS Pensacola personnel reported a noticeable odor of "paint stripper" in the excavation (NEESA 1983).

A portion of the industrial wastewater treatment plant (TWTP) sewer line, which began operating in 1971, lies beneath the concrete apron in the vicinity of Site 29. A leak in the industrial waste sewer line may have caused the *reported* contamination at this site; however, the type and extent of contamination is unknown. It is also unknown whether the suspected leak was located and repaired. Industrial wastes disposed of in the sewer reportedly include paint stripper, thinners, chromic acids, phenolic compounds, cyanides, and sulfuric acid (E&E 1992). *At* present, it is suspected the original site contamination encountered still exists. No environmental samples were collected during an Initial Assessment Study completed by NEESA in 1983.

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

A Verification Study conducted by Geraghty and Miller, Inc. (G&M 1984) reported no volatile organic compounds (VOCs) were detected in any of the groundwater samples collected from four nearby monitoring wells '(GM-6, GM-7, GM-29, and GM-30; see Figure 2-1). G&M recommended no further study because the absence of VOCs in the groundwater samples suggested either a localization of contaminants or a purging of the groundwater system. Consequently, Site 29 was not included in the Characterization Study.

E&E performed a Phase I investigation of Site 29 to identify [potential contaminants and areas of concern]. The investigation results are detailed in the E&E IDR (1992). Soil and groundwater samples were collected during the investigation and submitted for laboratory analysis. Metals, total recoverable petroleum hydrocarbons (TRPHs), VOCs, and polynuclear aromatic hydrocarbons (PAHs) were detected onsite, but it was not determined if the source of the contamination is Site 29 or the industrial waste sewer line located in this area.

2.3 Physical Setting

Climatology, biological resources, physiography, and hydrogeology for Site 29 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 29 as part of E&E's Phase I activities. These include aerial photograph analysis, site reconnaissance, and a surface/particulate air emissions 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 identification of the following:

- Location of previous and current underground and overhead piping and utilities.
- Past and present chemicals used at the site.
- Locations of any known surface spills.
- Locations of any known historical outfalls.
- 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 29 RI will also be used to help 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 29 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

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

41. If other ecological impacts (terrestrial) are *suspected* at Site 29 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 [a phased approach consisting initially of] advancing soil borings, installing [temporary, and eventually permanent] groundwater monitoring wells, and collecting soil and groundwater samples using various techniques. A hydrologic and ecologic assessment will also be conducted for Site 29.

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.
- [• Establish PRGs for the identified contaminants.]

[Phase II]

- Delineate the extent of 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 summarized in Table 4-1 are discussed below. The proposed number of soil and groundwater 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.

Table 4-1
Site 29 Phase I RI Sampling and Analytical Requirements

Medium	No. of Samples[a]	Analytical Parameter	DQO[b] Level
Soil[c]	1241	FSA	IV
Groundwater[d]	191	FSA	IV
TOTAL	1331	FSA	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 = [24]; 181 soil borings x 3 sample intervals = 1241 samples.
[d] = Total number of groundwater samples = 9 monitoring wells (1 existing well + 8 proposed shallow [temporary] monitoring wells) x 1 sample each = 9 samples.

FSA — Full Scan of Analysis
Target Compound List (TCL) volatile organic compounds, TCL base-neutral/acid extractable organic compounds (BNAs), TCL pesticides, TCL polychlorinated biphenyls (PCBs), Target Analyte List (TAL) metals (unfiltered), and TCL cyanide.

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 further 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. 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 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 four basic *groups* listed below.

New Analytical Organization

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

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

- **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. Additional sample volume will be collected for the PPS samples.

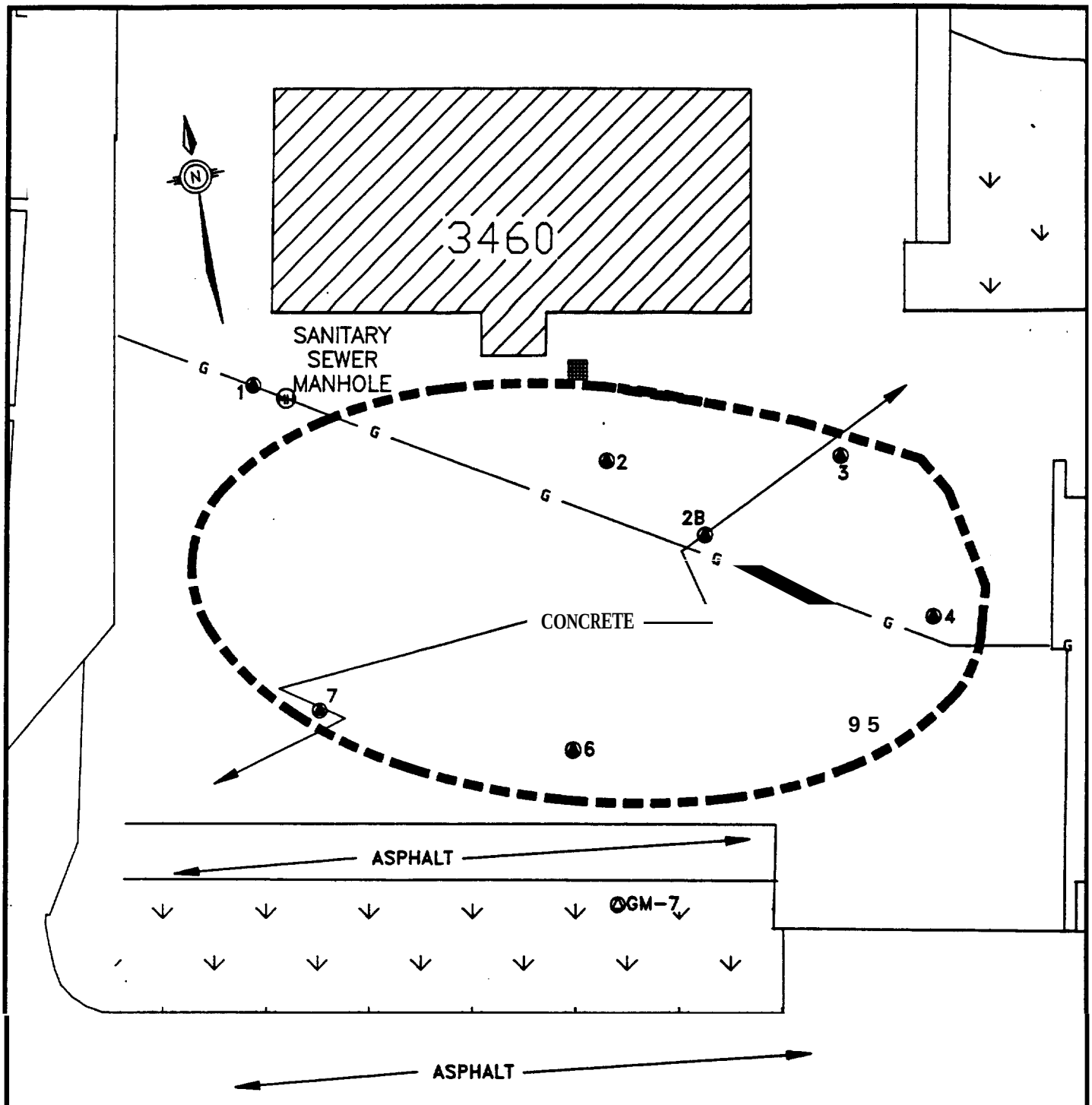
- **Grain Size** Analysis **(GS)**

- **Physical Parameters, Water (PPW)** — The parameters include 5-day biological oxygen demand, chemical oxygen demand, hardness, total suspended solids, alkalinity, total phosphorus, nitrate-N, 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 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 eight soil borings/temporary monitoring wells. Soil and groundwater 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



LEGEND

- 3460 – BUILDING
- – EXISTING SHALLOW MONITORING WELL
- – STORMWATER DRAIN
- – UNPAVED AREA
- – SOIL BORING AND TEMPORARY SHALLOW MONITORING WELL
- – APPROXIMATE SITE BOUNDARY
- G – INDUSTRIAL SEWER, GRAVITY LINE

100 0 100

SCALE FEET

SAMPLING AND ANALYSIS PLAN
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 4–1
PROPOSED PHASE I
SAMPLING LOCATIONS
SITE 29

DWG DATE: 02/14/94 DWG NAME 70SAM29

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 XI 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 111 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, any anticipated construction activities, 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 [24] soil samples collected from [eight] 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, estimated to be 5 feet bls.

[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.]

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

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 two soil samples representative of the screened interval of the shallow monitoring wells. Results of the GS analysis will be used to calculate recovery well specifications if a groundwater remediation program is required.

Except for grain size, 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 nine monitoring wells (one existing well and [eight proposed temporary] wells). The eight proposed [temporary] wells will be shallow with a target depth of [10] 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 contaminants exceed the applicable PRGs for groundwater.] Samples collected for PPW analyses will represent both background and contaminated conditions.

4.4 Sampling Procedures

Proposed sampling procedures are presented in Sections 4, 5, and 6 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 discussed below.

4.4.1 Soil Sampling

Soil brings 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 brings 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 drilling methods and monitoring well installations will be in accordance with Sections 5.2 and 5.3 of the *CSAP*. [The temporary wells, with the exception of a bentonite seal and grout, will be constructed in a manner identical to 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.

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

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 F.13 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 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

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 *(QNQC)* samples will be collected in accordance with the frequency presented in Table 15-1 of the *CSAP*. *QNQC* 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 29 RI.

6.0 DATA MANAGEMENT PLAN

The Data Management Plan presented in Section 14 of the *CSAP* will be followed during the Site 29 RI.

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

7.0 REFERENCES

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

Ecology and Environment, Inc. (1992). *Interim Data Report, Contamination Assessment/Remedial Investigation, Soil South of Building 3460 (Site 29), Naval Air Station Pensacoh, Pensacola, Florida.* Ecology and Environment, Inc.: Pensacola, Florida.

EnSafe/Allen & Hoshall. (1993). *Comprehensive Sampling and Analysis Plan For Naval Air Station Pensacoh, Pensacoh, 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.*

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

FLORIDA PROFESSIONAL GEOLOGIST SEAL

I have read and approve of this Final Sampling and Analysis Plan for Site 29 — Soil South of Building 3460 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