32501.039
05.07.39.0001

N00204.AR.000971
NAS PENSACOLA
5090.3a

FINAL RECORD OF DECISION
SITE 39
NAS PENSACOLA
PENSACOLA, FLORIDA

SOUTHNAVFACENGCOM
Contract Number:
N62467-89-D-0318
CTO-83

Prepared for:

Comprehensive Long-Term Environmental Action Navy (CLEAN)
Naval Support Activity
Naval Air Station
Pensacola, Florida

Prepared by:

EnSafe/Allen & Hoshall
5720 Summer **Trees** Drive, Suite *8*
Memphis, Tennessee 38134
(901) 383-9115

July 31, 1995

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

Report Documentation Page

Form approved
OMB No. 0704-0188

1a. Report Security Classification **Unclassified**	1b. Restrictive Marking NIA
2a. Security Classification Authority NIA	**3. Distribution/Availability of Report** **See Cover Letters**
2b. Declassification/Downgrading Schedule NIA	
4. Performing Organization Report Number(s) NIA	5. Monitoring Organization Report Number(s) **N/A**
6a. Name of Performing Organization **EnSafe/Allen & Hoshall** — **6b. Office symbol *(if applicable)*** **E/A&H**	**7a. Name of Monitoring Organization** **Naval Air Station Pensacola**
6c. Address *(City, State, and ZIP Code)* **5720 Summer Trees Drive, suit. a** **Memphis, Tennessee 38134**	**7b. Address *(City, State and Zip Code)*** **Pensacola, Florida**
8a. Name of Funding/ Sponsoring Organization SOUTHNAVFACENGCOM — 8b. Office **symbol (if applicable)** **N/A**	*8.* **Procurement** Instrument **Identification** Number **N62467-89-D0318/083**
	10. Source *of* Funding Numbers **Program Element** No. — Project **No.** — Task No. — Work Unit **Accession No.**
11. Title *(Include Security Classification)* **Final Record of Decision Site 39, NAS Pensacola, Pensacola, Florida**	
12. Personal Author(s)	
13a. Type of Report **Final** — 13b. Time Coverud From **10/21/92** To **07/31/95**	14. Date of Report *(Year, Month, Day)* **1995, July 31** — 15. Page Count **54**
17. COSATI Coder Field — Group — Sub-Group	18. Subject Terms *(Continue on reverse if necessary and identify by block number)*

19. Abstract

A *mord of* decision was prepared from tho remedial investigation report and proposed remedial action plan for Site 39, tho *Oak* Grow Campground at the Naval Air Station (NAS) Pensacola. The purpose of this Record of Decision was to describe the alternative that the U.S. Navy has selected to address potential groundwater and soil contamination at the site. The following summarizes the record of decision.

- Historical records provided little information regarding tho nature of tho source of tho stained *roil* located *at* tho *Oak* Grove campground. Interviews with naval personnel indicated several possible sources, including disposal *of* construction debris from Building29 demolition (evidenced today by the brick, concrete, nails, and glass at tho site), former stockpiling of railroad ties, and used motor oil dumping by campers using tho campground.

- Analytical results from previous investigations indicate tho stain is petroleum-based. Based on the relatively Limited area of contamination and tho lack *of* suitable habitat described earlier, contaminant effects to biota a n not expected to be a concern. However, specific effects to overall biota within the affected area are unknown. Thio is compounded by tho lack of available data on acute and chronic toxicity in *roil* for tho chemicals *of* concern discussed. Instead of attempting to quantify these effects, it was determined that the most cost-effective and environmentally and aesthetically beneficial remedy was to simply remove and properly dispose of the contaminated soil and replace *it* with clean fill material.

- On tho basis of the groundwater analytical results, Site 39 soil is *not* impacting the groundwater with appreciable amounts of organic compounds and no petroleum-based parameters were detected in tho groundwater. The VOCs tetrachloroethene and 1,1-dichloroethane (first round of sampling) and tetrachloroethene (second round of sampling) won tho *only* organic compounds present in groundwater. These VOCs were detected *only* in tho top *of* tho uppermost aquifer zone; all detected concentrations were below drinking water standards.

  Inorganic compounds exceeding secondary drinking water standard concentrations were aluminum and iron. In addition, arsenic, bonum, calcium, lead, magnesium, and vanadium exceeded their respective NAS Pensacola reference, or background concentrations. In tho bottom *of* the uppermost aquifer, only iron exceeded a secondary drinking water standard. Arsenic and aluminum are potentially related to the marine environment or suspended sediment in samples and are likely not site-related. Arsenic is within the natural range for Escambia County. In addition calcium, iron, magnesium, and sodium are essential nutrients and are only toxic *at* extremely high concentrations.

- Between July 25 and July 29,1994 NAS Pensacola's Public Works Center Environmental Department removed 864 tons of stained roil from Site 39. The roil was tested for the full Toxicity Characteristic Leaching Procedure analysis by the Environmental Department's Laboratory and was negative for all contaminants. The stained *roil* was disposed of at the Escambia County Solid Waste Department's Perdido Landfill, 13009 Beulah Rod, Cantonment, Florida. The excavated roil was replaced with dean fill from NAS Pensacola's backfill stockpile. An analysis *of* this backfill soil showed that *it* was free of any inorganics above the preliminary remediation goals and did not contain any volatiles, semivolatiles, or pesticides/polychlorinated biphenyls.

- Tho human health risk associated with exposure to environmental media at NAS Pensacola Site 39 was assessed for future mite resident.. The exposure media considered in this assessment after tho screening process for selecting chemicals of potential concern (COPCs) did not identify any COPCs in the 0- to 1-foot depth backfill material. It was determined that risk or hazard via the ingestion and inhalation of groundwater for tho groundwater pathway hazard index was 2.0 for the future child resident and 0.9 for tho adult. However, the target organ for each COC is diffennt. Therefore, individual hazard quotients should be considered instead of summing the hazard quotient for all COCs. The two main contributors to tho hazard index of 2 aluminum end arsenic each contribute approximately 1 to tho hazard index. The potential carcinogenic risk was computed to be 1.3E-04.

Due to the limited nature of the contamination found in the remedial investigation and the removal of the stained soil, the site did not warrant the detailed evaluation of remedial alternatives associated with a feasibility study. Tho record of decision presented a no action alternative. Because the no action alternative for roil end groundwater will result in hazardous substances, pollutants or contaminants remaining *at* the site above levels that will allow for unlimited use and unrestricted exposure, the five year review after initiation of tho selected remedial action will be necessary.

Tho U.S. Navy's preferred alternative represents consensus opinion that is fully accepted by the USEPA and tho FDEP. Tho U.S. Navy relied on public comments to ensure that the remedial alternatives being evaluated and selected for its sites are fully understood and that the concerns of the local community have been considered. Tho U.S. Navy held a public comment period from May 30 tc June 30, 1995 to encourage public participation in the selection process. No comments were received and no objections to the remedy were noted.

20. Distribution/Availability of Abstract	21. Abstract Security Classification
■ Unclassified/Unlimited ☐ Same as Rept ☐ DTIC Users	N/A

22a. Name of Responsible Individual	22b. Telephone *(Include Area Code)*	22c. Office Symbol
William Hill	(803) 743-0324	

DD Form 1473, JUN 86 *Previous editions are obsolete.*
S/N 0102-LF-014-6603

Table of Contents

DECLARATION OF THE RECORD OF DECISION vi

1.0 INTRODUCTION 1

2.0 SITE LOCATION AND DESCRIPTION 2

3.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES 7

4.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION 15

5.0 SCOPE AND ROLE OF THE OPERABLE UNIT 16

6.0 SITE CHARACTERISTICS 16

7.0 SUMMARY OF SITE RISKS 25
- 7.1 Chemicals of Concern 25
- 7.2 Exposure Assessment 26
- 7.3 Toxicity Assessment 30
- 7.4 Risk Characterization 31
- 7.5 Risk Uncertainty 33
- 7.6 Ecological Risk Assessment 39

8.0 DOCUMENTATION OF NO SIGNIFICANT CHANGES 39

Lii of Figures

Figure 2-1 Location Map 3
Figure 2-2 Site Map 5
Figure 2-3 Habitat Communities and Surface Features 9
Figure 3-1 Area of Stained Soil and Excavation Extent 13
Figure 6-1 Geologic Cross Sections A-A', B-B', and Map Locations 19
Figure 6-2 Groundwater Flow of the Upper Surficial Zone 21
Figure 6-3 Groundwater Flow of the Lower Surficial Zone 23

List of Tables

Table 7-1 Exposure Pathways Summary 27
Table 7-2 Statistical Analysis of COPCs in Shallow and Intermediate Groundwater . 29
Table 7-3 Parameters Used to Estimate Potential Exposures for Future Land Use Receptors 29

Table 7-4 Chronic Daily Intakes for Potential Future Residents — Ingestion of Shallow and Intermediate Groundwater 30
Table 7-5 Toxicological Database Information for NAS Pensacola, Site 39 32
Table 7-6 Hazard Quotients and Incremental Lifetime Cancer Risks-Potential Future Residents Ingestion of Shallow and Intermediate Groundwater . . . 33

List of Appendices

Appendix A Responsiveness Summary
Appendix B Glossary
Appendix C Florida Professional Geologist Seal

List of Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirements
bls	Below Land Surface
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COPC	Chemical of Potential Concern
E/A&H	EnSafe/Allen & Hoshall
FDEP	Florida Department of Environmental protection
FFA	Federal Facilities Agreement
FS	Feasibility Study
mg/L	Milligrams Per Liter
MSL	Mean Sea Level
NAS	Naval Air Station
NPL	National Priorities List
PCB	Polychorinated Biphenyl
PRAP	Proposed Remedial Action Plan
PRG	Preliminary Remediation Goal
PWC	Public Works Center
RA	Risk Assessment
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SVOC	Semivolatile Organic Compound
TAL/TCL	Target Analyte List and Target Compound List
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compounds
µg/L	Micrograms per Liter

This page intentionally left blank.

DECLARATION OF THE RECORD OF DECISION

Site Name and Location

Site 39, Oak Grove Campground
Naval Air Station Pensacola
Pensacola, Florida

Statement of Purpose

This decision document presents the selected remedial action that the U.S. Navy, as the lead agency in charge of the site, has selected for addressing potential groundwater and soil contamination at Site 39 — Oak Grove Campground. The decision was chosen in accordance with Comprehensive Environmental Response, Compensation, and Liability Act, as amended by Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the Administrative Record for Site 39.

The United States Environmental Protection Agency and the Florida Department of Environmental Protection concur with the selected remedy.

Description of the Selected Remedy

The remedial investigation and the risk assessment conducted for Site 39 support a no action remedial alternative. The RI and RAs addressed all media at the site, and therefore, no other actions will be considered for Site 39.

Declaration Statement

The selected remedy protects human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. Because treatment of the principal threats onsite was not found to be practicable or within the scope of this action, this remedy does not satisfy the statutory preference for treatment as a principal element. Because the remedial action selected will result in hazardous substances, pollutants or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the five year review after initiation of the selected remedial action will be necessary.

Signature (Commanding Officer, NAS Pensacola)

7/31/95
Date

This page intentionally left blank.

10 INTRODUCTION

In December 1989, Naval Air Station (NAS) Pensacola was placed on the U.S. Environmental Protection Agency's (USEPA) National Priorities List (NPL) based on a numerical ranking of 42.4 (out of 100) of the potential hazards it poses to human health and the environment. Although sites added to the NPL are generally called "Superfund sites," Department of Defense sites like NAS Pensacola are cleaned up using Defense Environmental Restoration Account funds.

The Navy is the lead agency responsible for cleanup at NAS Pensacola. The USEPA and the Florida Department of Environmental Protection (FDEP) are the respective federal and state regulatory agencies charged with overseeing the cleanup. Together they work with the Navy through the Federal Facilities Agreement (FFA), an interagency agreement that defines the roles and responsibilities for each agency. The FFA, *Signed* in October 1990, outlines the regulatory path that will be followed at the air station. NAS Pensacola must complete not only the regulatory obligations associated with its NPL listing, but also it must satisfy the ongoing requirements of an environmental permit issued in 1988. That permit addresses the treatment, storage, and disposal of hazardous materials and waste and also the investigation and remediation of any releases of hazardous waste and/or constituents from solid waste management units. The Resource Conservation and Recovery Act (RCRA) governs ongoing use of hazardous materials, and the rules of the operating permit; RCRA and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) investigations and actions are coordinated through the FFA, streamlining the cleanup process.

Site 39 — *Oak* Grove Campground, at NAS Pensacola, has been the subject of a remedial investigation (RI). The feasibility study (FS), which normally develops and examines medial action alternatives for a site, was not completed because a previous removal action reduced risks to human health and the environment so that no further action is necessary. This Record of Decision (ROD) has been prepared to present the Navy's selected medial alternative for Site 39. Section 121(d)(2)(A) of CERCLA incorporates into law the CERCLA *Compliance* Policy which specifies that remedial actions meet any Federal or *State* standards, requirements,

criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). Because the remedial action selected will result in hazardous substances, pollutants or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the five year review after initiation of the selected remedial action will be necessary.

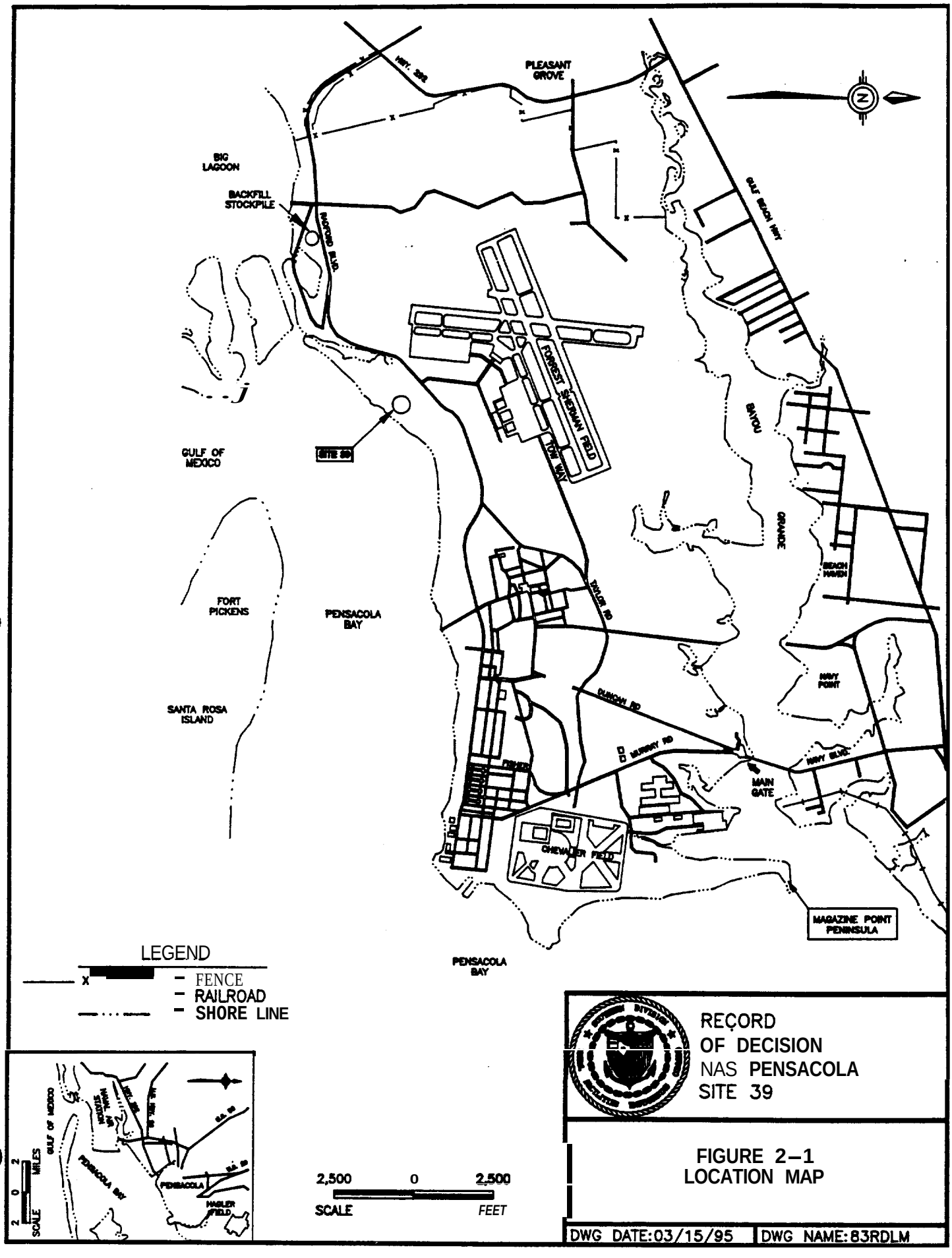
2.0 SITE LOCATION AND DESCRIPTION

This ROD describes the alternative that the U.S. Navy has selected to address groundwater and soil contamination at Site 39 — Oak Grove Campground, NAS Pensacola, Florida.

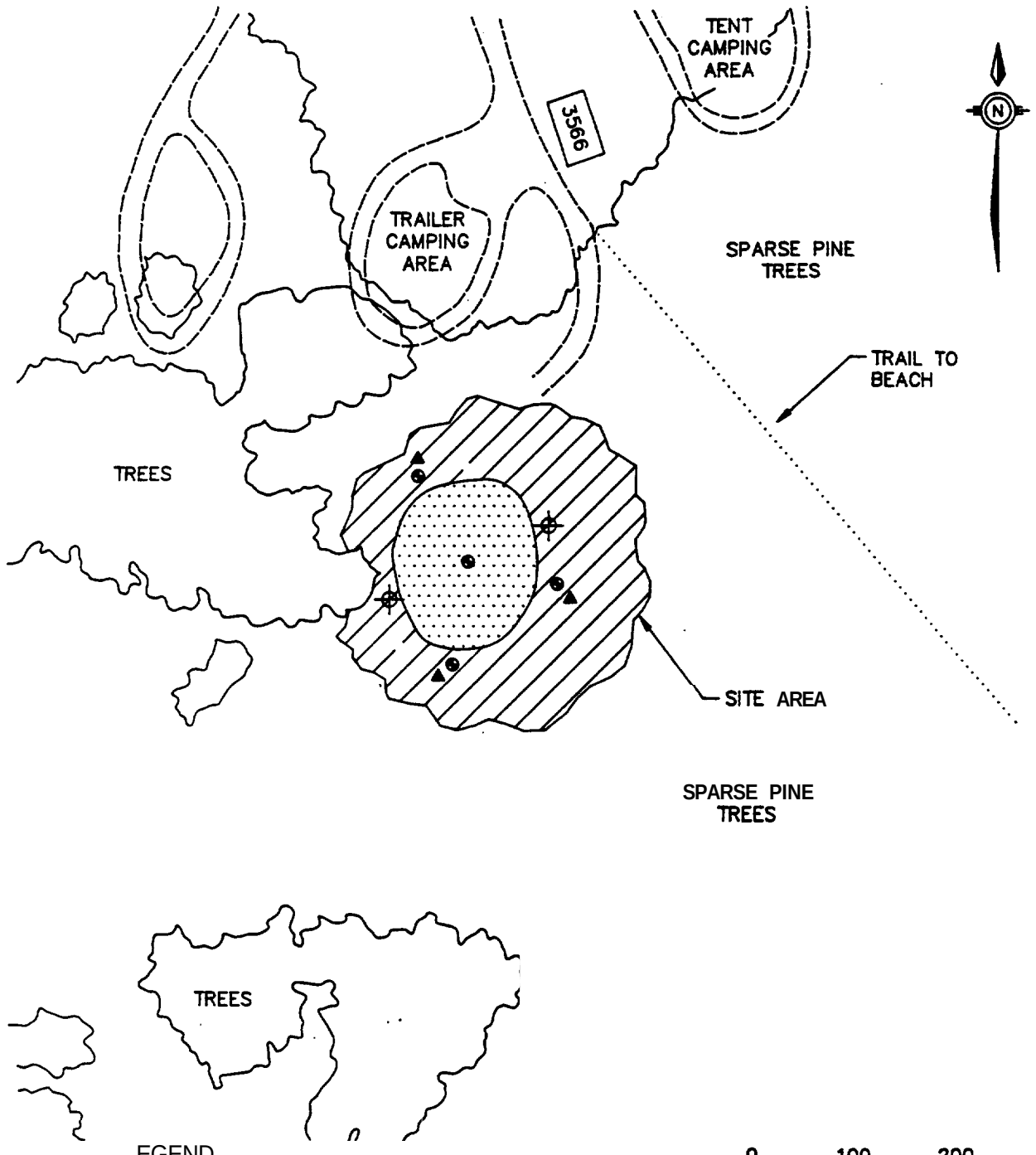
Site 39 is a circular area approximately 300 feet in diameter littered with broken brick, concrete, tile, glass, coal, and nails. Within this area, a zone of darkly stained soil and stressed vegetation measured approximately 60 feet x 80 feet. A 130-foot x 200-foot area of lighter staining and less-distressed vegetation surrounded the darkly stained area.

The site is in the southwestern portion of NAS Pensacola, approximately 2,500 feet south of Forrest Sherman Field and 520 feet northwest of the Pensacola Bay Shoreline, as shown on Figure 2-1. The sandy soil is covered by some grass and brush growth, surrounded by trees. As shown in Figure 2-2, Site 39 is approximately 200 feet south of the Oak Grove trailer campground.

Little is known about Site 39's history. No records indicating the source of the debris and stained soil have been identified. A boiler-powered sawmill was reported in the vicinity of Site 39; however, this has not been confirmed. During the RI, little additional historical information was obtained. Mr. Ron Joyner from Facilities Management Division at NAS Pensacola stated there had not been a sawmill at Site 39. Rather, he said, the site was a disposal area for hardfill debris that resulted from the demolition of Building 29. Mr. Joyner hypothesized that the stained area may have been caused by campers dumping used motor oil onto the ground.


PLEASANT GROVE
BIG LAGOON
BACKFILL STOCKPILE
GULF OF MEXICO
SITE 39
FORREST SHERMAN FIELD
TOW WAY
GULF BEACH HWY
BAYOU GRANDE
BEACH HAVEN
FORT PICKENS
PENSACOLA BAY
SANTA ROSA ISLAND
TAYLOR RD
DUNCAN RD
MURRAY RD
NAVY POINT
NAVY BLVD
MAIN GATE
CHEVALIER FIELD
MAGAZINE POINT PENINSULA
PENSACOLA BAY
LEGEND
FENCE
RAILROAD
SHORE LINE
GULF OF MEXICO
PENSACOLA BAY
PENSACOLA
HAGLER FIELD
SCALE
MILES
2,500 0 2,500
SCALE
FEET
RECORD OF DECISION
NAS PENSACOLA
SITE 39
FIGURE 2-1
LOCATION MAP
DWG DATE:03/15/95
DWG NAME:83RDLM

This page intentionally left blank.



EGEND

- SOIL BORING
- SOIL BORING AND SHALLOW MONITORING WELL
- INTERMEDIATE WELL
- UNPAVED ROAD
- 3566 BUILDING
- AREA OF SCATTERED DEBRIS & LIGHT VEGETATION
- AREA OF STAINED SOILS

0 100 200
SCALE FEET

SOURCE E&E 1991

RECORD OF DECISION
NAS PENSACOLA
SITE 39

FIGURE 2-2
SITE MAP

DATE:

DWG NAME: 83RDSM

This page intentionally left blank.

Mr. James Tucker, caretaker for the Lighthouse Point Oak Grove Rental, said railroad ties were once stockpiled at the site but could provide no information regarding dates or location. The site center is about 6 feet above mean sea level (msl), approximately 520 feet inland (north) of the Intercoastal Waterway (Pensacola Bay) shoreline. The terrain gently slopes downgradient in a south/southeasterly direction. Surface runoff does not flow from the site to the shoreline but infiltrates into the subsurface rapidly through the sandy surface soil. Interdunal depressions immediately downgradient of the site retain water after heavy rains and conduct it vertically into the soil. The terrain begins to flatten southeast of the site. Habitat communities and surface features are shown in Figure 2-3.

To the north, a narrow band of woods separates the site from the campground. Sherman's Inlet is approximately 500 feet southwest of the site center. The east end of Sherman's Inlet contains wetlands 56A/B, as identified by Parsons and Pruitt (1991). A 200-foot-wide band of woods west of the site separates it from Wetland 56A.

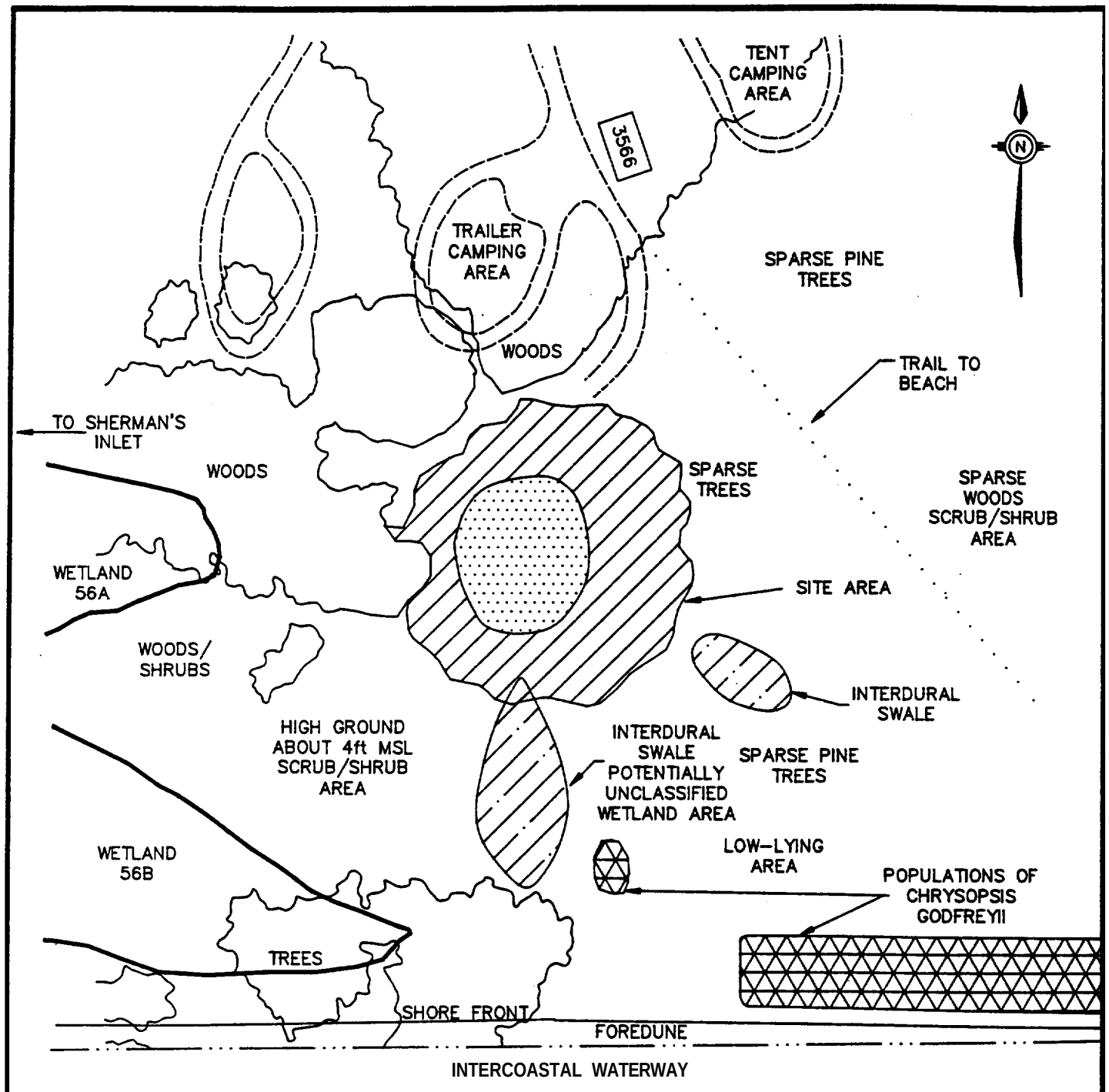
On the basis of the groundwater elevations measured onsite, the flow direction of the surficial zone (both shallow and intermediate depths) generally mimics the topography, flowing south-southeast toward Pensacola Bay. Piezometric maps indicate the water table lies between 3 and 7 feet below land surface (bls) and ranges in elevation from 3.9 to 2.9 feet above msl.

3.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

In the spring of 1990, campers reported stained soil with a hydrocarbon odor south of the campground. NAS Facilities Management personnel collected two grab samples from a depth of 0 to 7 inches bls from the stained soil area at Site 39. Analysis of these samples indicated petroleum contamination.

Site 39 was officially designated a "Remedial Investigation" site upon signature of the FFA in October 1990. Between December 1992 and November 1994, EnSafe/Allen & Hoshall performed

This page intentionally left blank



LEGEND

- UNPAVED ROAD
- STATE IMPERILED SPECIES FOR FLORIDA
- AREA OF SCATTERED DEBRIS & LIGHT VEGETATION
- AREA OF STAINED SOILS

SOURCE E&E 1991

RECORD OF DECISION
SITE 39
NAS PENSACOLA

FIGURE 2-3
HABITAT COMMUNITIES
& SURFACE FEATURES

DATE: 03/14/95 | DWG NAME: 83RDHCSF

a

This page intentionally left blank.

an RI at Site 39 on behalf of the U.S. Navy. The RI involved sampling soil and groundwater to characterize the nature and extent of contamination onsite. The *findings* included:

soil

- The stained soil was limited vertically to the uppermost foot over most of the site with pockets approximately 3 feet deep. Low to moderate concentrations of semivolatile compounds (SVOCs) were identified within the stained area, specifically pyrene at 1.9 milligrams per kilogram (mg/kg), which is commonly found in wood preservatives and waste oil. Low concentrations of volatile organic compounds (VOCs) were found within the *stained* area, specifically trichloroethane and toluene at total concentrations of less than 2 micrograms per kilograms (µg/kg). Specific metal compounds identified at the site above the preliminary remediation goals (PRGs) and NAS Pensacola reference concentrations include aluminum, arsenic, calcium, iron, magnesium, and sodium. All metals detected were within the range typical of the reference concentrations at NAS Pensacola.

Hydrogeology

- Groundwater flows south and southeast, respectively, in the upper and lower portions of the uppermost zone ("surficial zone") of the aquifer. Underlying this uppermost zone is the "low-permeability zone", consisting of clays and silt, which separates the upper water-bearing zone from the "main producing zone" (regional potable water source). Although the entire thickness of the low permeability zone was not investigated at this site, previous investigations conducted at NAS Pensacola have shown the low-permeability zone ranges from 12 to 17 feet thick, and is characterized by low hydraulic conductivities. Hence, potential for flow between the aquifer zones is minimal.

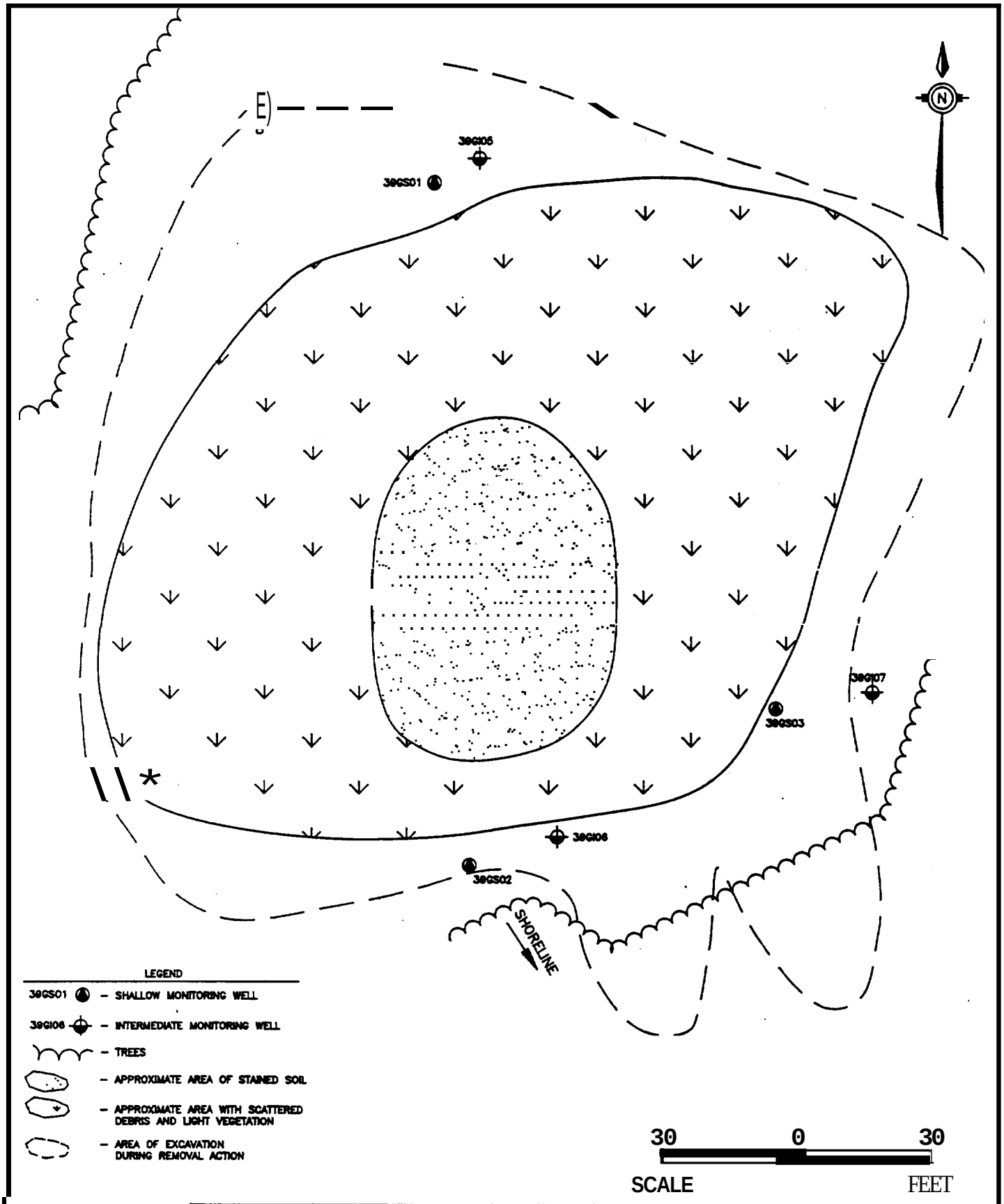
Groundwater

- On the basis of the groundwater analytical results, site 39 soil is not impacting the groundwater with appreciable amounts of organic compounds and no petroleum-based parameters were detected. The VOCs tetrachloroethene and 1,1-dichloroethane (first round of sampling) and tetrachloroethene (second round of sampling) wen the only organic compounds present in groundwater. These VOCs were detected only in the top of the uppermost aquifer zone; all detected concentrati'cm wen below drinking water standards.

  Due to the high turbidity of the groundwater during the initial sampling, the metals data were considered unreliable and a second round of groundwater sampling was undertaken using a low-flow purging and sampling technique. This method reduced turbidity and consequent metals concentrations significantly. Inorganic compounds exceeding secondary drinking water standard concentrations were aluminum and iron. In addition, arsenic, barium, calcium, lead, magnesium, and vanadium exceeded their respective NAS Pensacola reference, or background concentrati'cm. In the bottom of the uppermost aquifer, only iron exceeded a secondary drinking water standard. Arsenic and aluminum are potentially related to the marine environment or suspended sediment in samples and are likely not site-related. Arsenic is within the natural range for Escambia County. In addition calcium, iron, magnesium, and sodium are essential nutrients and are only toxic at extremely high concentrations.

It was determined that the most cost-effective, environmentally and aesthetically beneficial remedy was to remove and properly dispose of the contaminated upper 12 inches of soil and replace it with clean fill material.

Between July 25 and July 29, 1994, NAS Pensacola's Public Works Center (PWC) Environmental Department removed 864 tcm of stained soil from Site 39. Figure 3-1 shows



RECORD OF DECISION
SITE 39
NAS PENSACOLA

FIGURE 3-1
AREA OF STAINED SOIL & EXCAVATION EXTENT

DWG DATE: 03/14/95 | DWG NAME: 83RDSSEE

This page intentionally left blank.

the area of stained soil and the extent of the excavation during the removal action. Approximately 1 foot of soil was removed on the south side of the site and the excavation gradually deepened to 3 feet on the north side. The soil was tested by PWC's Laboratory and determined to be a nonhazardous waste. The removed soil was disposed at the Escambia County Solid Waste Department's Perdido Landfill, 13009 Beulah Road, Cantonment, Florida. Backfill material was obtained from the backfill stockpile. It was analyzed for full Target Analyte List/Target Compound List (TAL/TCL) parameters. The analysis of this soil did not identify any contaminants above the PRGs.

Before backfilling Site 39 four post-removal confirmation samples were taken from the soil. No VOCs were detected in any of these samples. Only one SVOC detected exceeded a PRG. Benzo(a)pyrene slightly exceeded the PRGs in two post-removal samples. The site showed an improvement from pre-removal conditions. After the removal action no pesticide detected exceeded the PRGs. No PCBs were detected in the samples after the removal action. The only inorganic constituent to exceed PRGs in the post-removal samples was arsenic. Arsenic exceeded PRGs in one sampling location, however its concentration is within the range typical of NAS Pensacola. As discussed in the previous Section the entire site was backfilled with 1 to 3 feet of "clean" material after the post-removal confirmation sampling.

4.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Throughout the site's history, the community has been kept abreast of site activities in accordance with CERCLA sections 113(k)(2)(B)(i-v) and 117. During the removal action the local newspaper and television stations covered the removal by visiting the site and speaking with a Navy spokesman. Site related documents were made available to the public in the administrative record at information repositories maintained at the NAS Pensacola Library, the West Florida Regional Library, and the John C. Pace Library of the University of West Florida. Also, all addresses on the Site 39 mailing list were sent a public meeting notice and a summary of the PRAP. The notice of availability of the PRAP and RI document was published in the

"*Pensacola News Journal*" on May 18,1995. A public comment period was held from May 30 to June 30,1995 to encourage public participation in the remedy selection process. In addition, a public meeting was held on June 13, 1995, to respond to questions and to accept public comments on the PRAP for Site 39. The public meeting minutes have been transcribed and a copy of the transcript is available to the public at the aforementioned repositories. A Responsiveness Summary, included as a part of this ROD m Appendix A, has been prepared to respond to the comments, criticisms, and new information received during the comment period.

5.0 SCOPE AND ROLE OF THE OPERABLE UNIT

The proposed remedial action identified m this document is the "No Action Alternative." This decision is the only remedial action identified for Site 39. The previously cited removal action has removed all heavily contaminated soil from the site. Therefore, no further action is proposed for Site 39 because it has been determined not to be a threat to human health and the environment.

Note that Site 39 is one of 37 sites at NAS Pensacola being investigated in accordance with CERCLA. Separate investigations and assessments arc being conducted for these other sites. Therefore, this ROD applies only to Site 39.

6.0 SITE CHARACTERISTICS

The site characteristics related to Site 39 arc summarized below. Site characteristics include land use, meteorology, surface features, hydrology, geology, hydrogeology, and ecology.

No construction of any kind is within the boundaries of Site 39. Oak Grove Campground, a recreational facility, is approximately 200 feet north of Site 39. The campground is the temporary residence for up to 336 people.

NAS Pensacola has a mild, subtropical climate, with average annual temperature ranging from 55°F in the winter to 81°F in the summer. Rainfall averages approximately 60 inches per year, with the highest amounts in July and August when thunderstorms occur almost daily. Rainfall is lowest during spring and fall (4 inches average per month).

Winds, which prevail from the north during the winter and the south during the summer, are generally moderate in velocity except during storms. A difference in the ocean-land temperature produces the sea-breeze effect, a daily clockwise rotation in the direction of the *surface* wind near the coast.

The topography of Site 39 is predominantly flat with the center at about 6 feet msl. From the site's center, the terrain gently slopes downgradient to the south/southeast toward the shore of Pensacola Bay. The terrain begins to flatten southeast of the site.

Sandy soil typifies the NAS Pensacola area. Consequently, most rainfall directly infiltrates the subsurface, resulting in few natural *streams.* At Site 39, surface runoff does not flow from the site to the shoreline. Interdunal depressions retain water after heavy rains and conduct it vertically into the soil (*see* Figure 2-3).

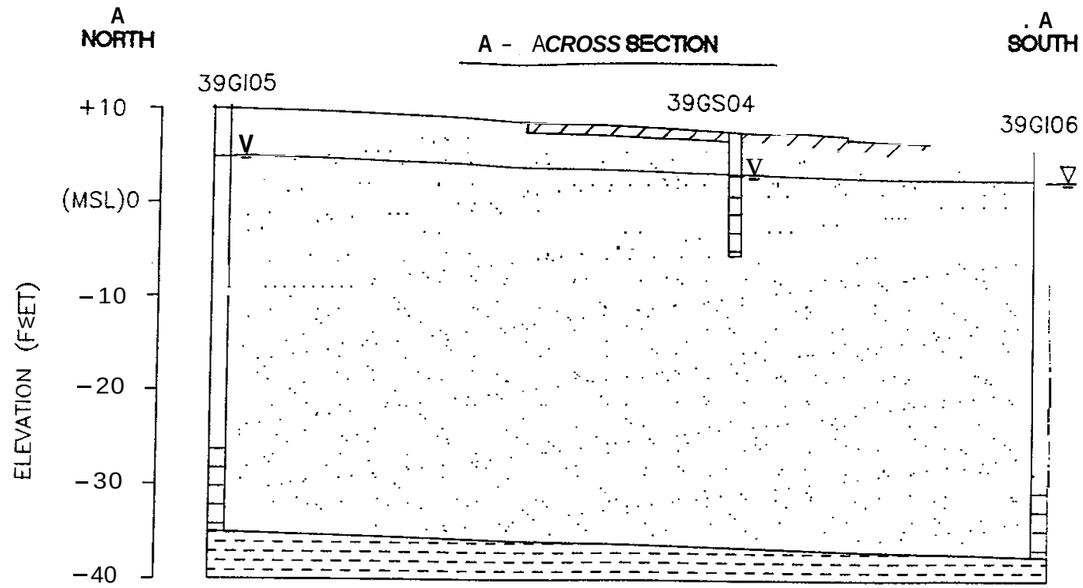
Specifically, the site is underlain by poorly *graded* fine- to medium-grain *quartz* sand from the surface to approximately 43 to 45 feet bls. Drill cuttings from the intermediate depth borings indicated a dark brown, apparently organic-rich pore water within the *sands* at approximately 25 feet bls. The base of the surficial zone is underlain by a low-permeability zone *consisting* of either a soft blue/gray clay or a green silty clay at 43 to 45 feet bls which was encountered at all borings advanced to the appropriate depth. The extremely low hydraulic conductivity characteristic of clay layer and its apparent laterally continuous nature beneath the site indicates the potential for groundwater movement from the surficial zone, through the clay, and into the

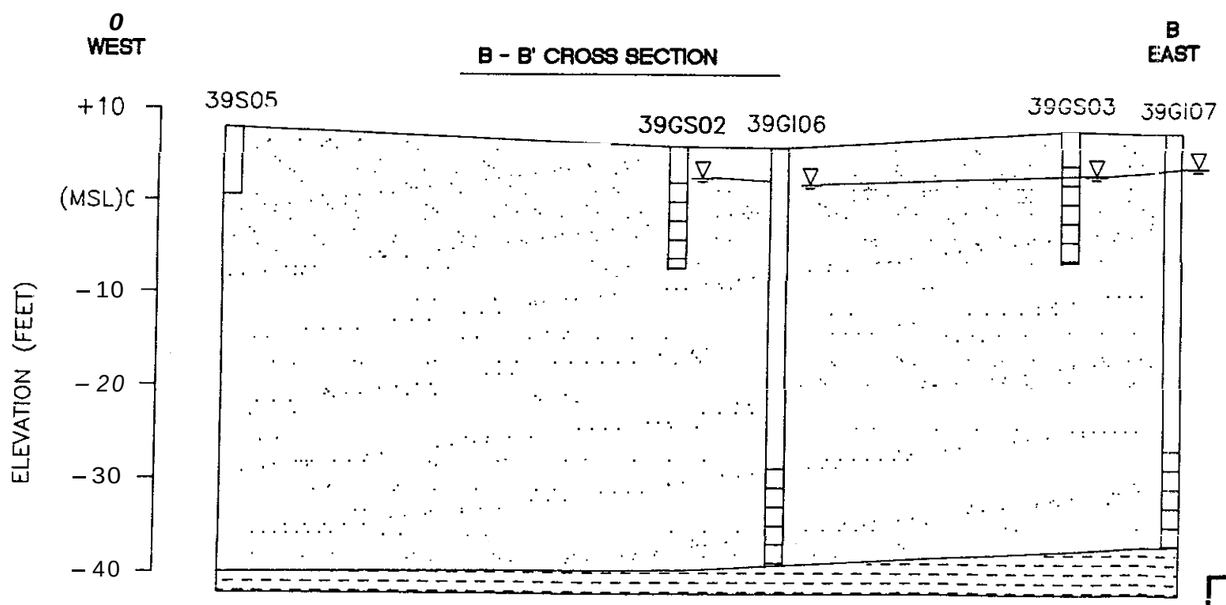
underlying main producing zone to be extremely low. The geologic cross sections constructed using data collected at Site 39 are shown in Figure 6-1.

The 'flow direction of groundwater (both upper and lower surficial zone depths) generally appears to mimic the topography, flowing south-southeast toward Pensacola Bay. The water table lies between 3 and 7 feet bls and ranges in elevation from 3.9 to 2.9 feet above msl. At Site 39, there is an upward potential component of flow that exists between the lower and upper surficial zones. The groundwater flow in the upper and lower surficial zones is illustrated in Figures 6-2 and 6-3, respectively.

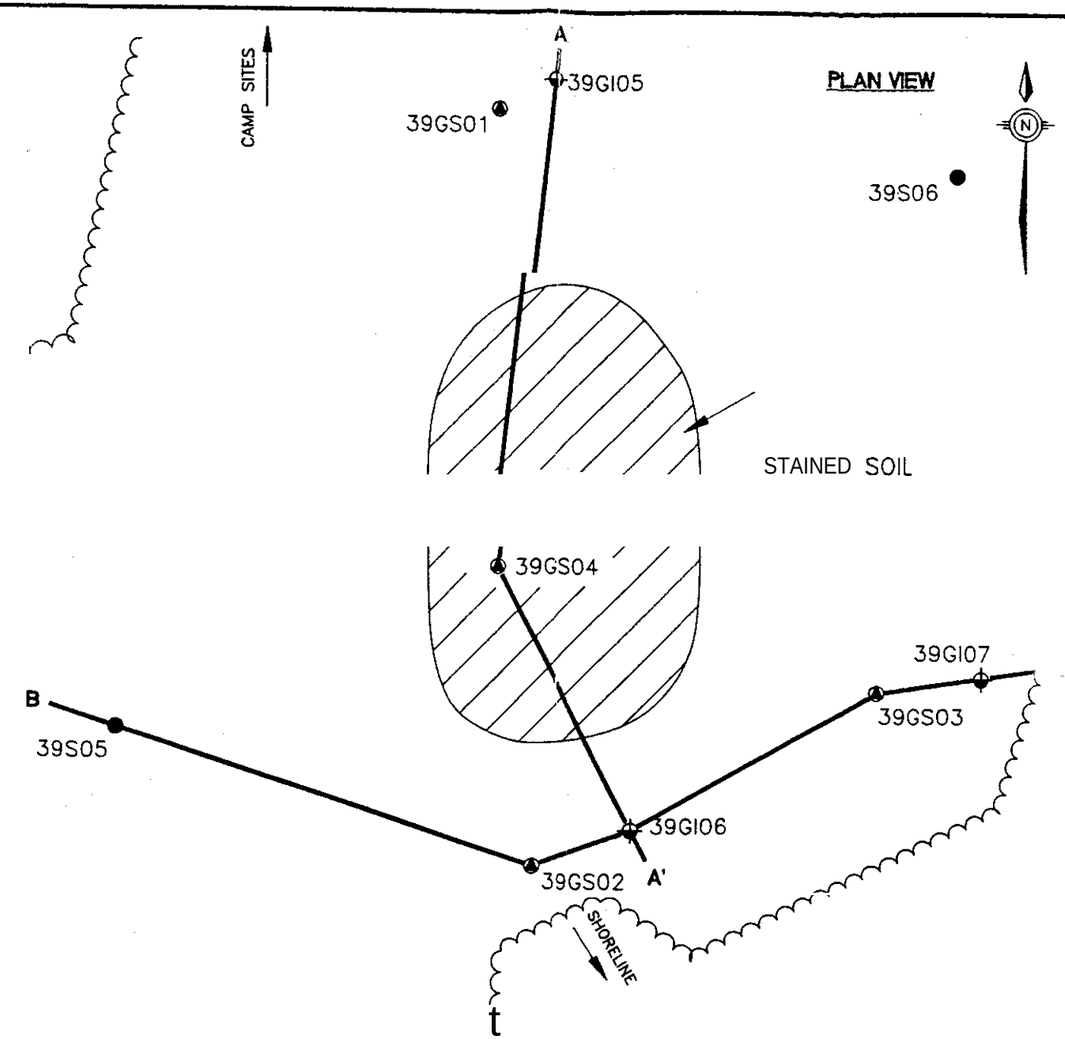
Generally, the area in and around Site 39 is classified as a long-leaf/slash pine community, typical to coastal northwest Florida. Faunal species associated with this back-dune habitat are predominantly small mammals, amphibians, and reptiles. In addition, shorebirds are expected to use this area intermittently.

Vegetation in the immediate site area is limited. It is impossible to ascertain whether this is a result of natural effects, man-induced clearing, or contaminant driven effects. The east end of Sherman's Inlet contains wetlands 56A/B. Wetland 56A, a palustrine emergent wetland at the northeast end of Sherman's Inlet, about 200 feet due west of the site, is dominated by a dense thicket of sawgrass *(Cladium jamaicense)*. The shoreline surrounding this wetland contains slash pines, yaupon, inkberry, wax myrtle, red maple *(Acer rubrum)*, and sweet bay magnolia *(Magnolia virginiana)*. Wetland 56B, a large estuarine emergent wetland at the southeast end of Sherman's Inlet, is approximately 500 feet southwest of the site center. It is dominated by black needle rush *(Juncus roemerianus)*, and the surrounding shoreline contains slash pines and yaupon. Two populations of Godfrey's golden aster *(Chrysopsis godfreyii)* live southeast of the site. *Chrysopsis godfreyii* is listed by the Florida Natural Areas Inventory as a state imperiled species. This is only threatened or endangered species identified near the site.





HORIZONTAL SCALE: 1"=30'
VERTICAL SCALE: 1"= 16'



LEGEND

FINE GRAINED POORLY GRADED Qtz SAND

GRMSH BLUE SANDY CLAY OR GREEN SILTY CLAY

AREA CONTAINING STAINED SOIL

GROUNDWATER ELEVATION ON 08/14/93

39GS01 SHALLOW MONITORING WELL LOCATION/IDENTIFICATION

39GI06 INTERMEDIATE MONITORING WELL LOCATION/IDENTIFICATION

39S05 SOIL BORING LOCATION/IDENTIFICATION

TREES

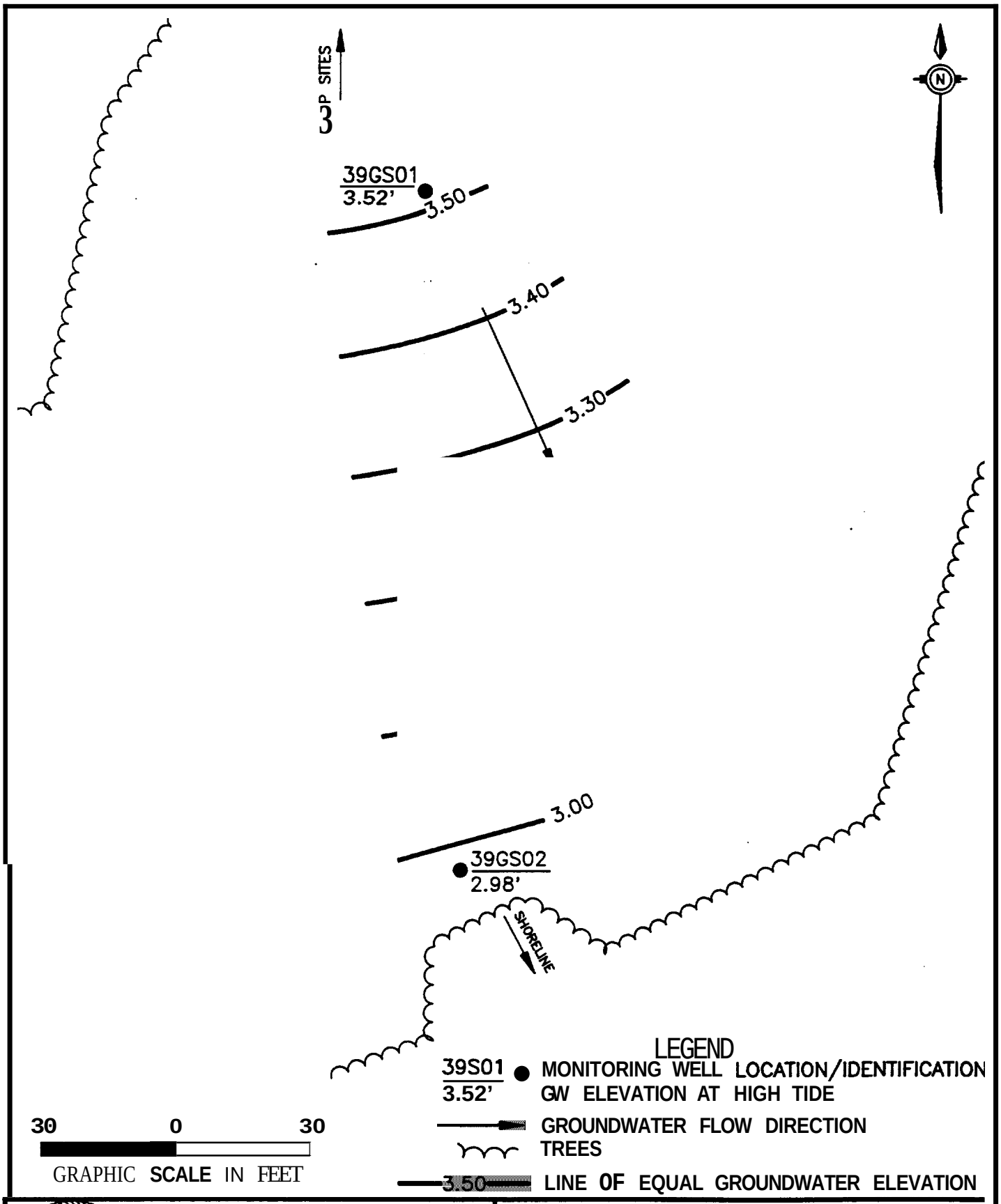
30 0 30

GRAPHIC SCALE IN FEET

RECORD OF DECISION
SITE 39
NAS PENSACOLA

FIGURE 6-1
GEOLOGIC CROSS SECTIONS A-A', B-B' AND MAP LOCATIONS

DWG DATE: 03/14/95 | DWG NAME: 83RDGCSM

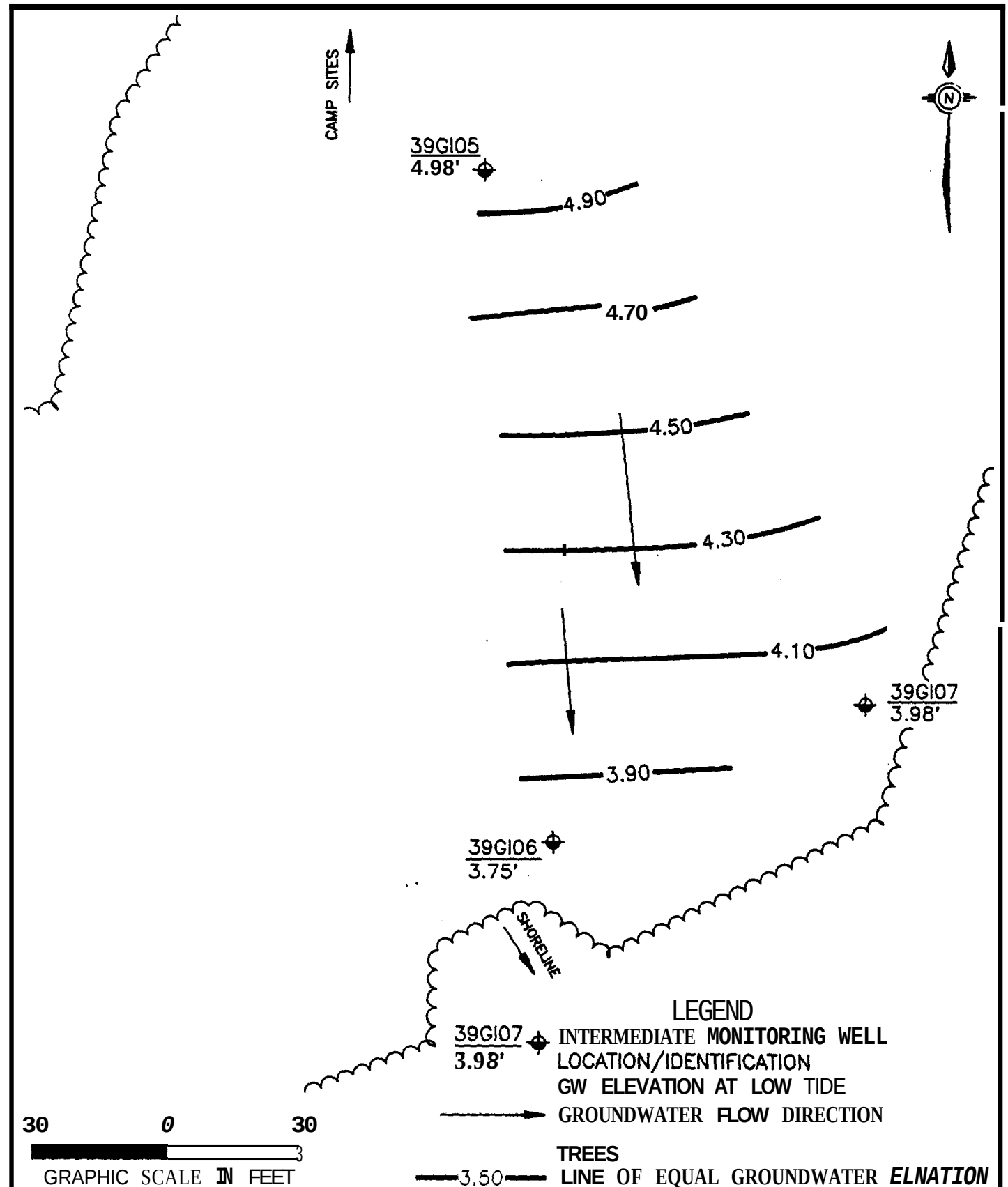


RECORD OF DECISION
SITE 39
NAS PENSACOLA

FIGURE 6-2
GROUNDWATER FLOW OF THE UPPER SURFICIAL ZONE

DWG DATE: 03/27/95 | DWG NAME: B3RDGFUZ

This page intentionally left blank.



RECORD OF DECISION
SITE 39
NAS PENSACOLA

FIGURE 6-3
GROUNDWATER FLOW OF THE LOWER SURFICIAL ZONE

DWG DATE: 03/27/95 | DWG NAME: 83RDGFLZ

This page intentionally left blank.

7.0 SUMMARY OF SITE RISKS

During the RI, a baseline human health risk assessment (RA) and a baseline ecological RA (collectively, the BRAs) were conducted to evaluate the actual or potential risks to human health or the environment resulting from the no action scenario at Site 39. It is incorporated into Chapter 10 of the RI report. The baseline RA represents an evaluation of the no *further* action alternative, in that it identified the risk present if no remedial action is taken. The assessment considers environmental media and exposure pathways that could result in unacceptable level of exposure now or in the foreseeable future. Data collected and analyzed during the RI provided the basis for the risk evaluation. The components of the baseline RA include: identification of chemicals of concern; the exposure. assessment; the toxicity assessment; risk characterization; and risk uncertainty analysis.

7.1 Chemicals of Concern

The objective of chemical identification is to screen the information that is available on hazardous substances present at the site and to identify potential chemicals of concern (COPCs) in order to focus subsequent efforts in the risk assessment process. COPCs are those chemicals selected in consideration of their comparison to screening concentrations (risk-based and reference), intrinsic toxicological properties, persistence, fate and transport characteristics, and cross-media transfer potential. Any COPC that is *carried* through the risk assessment process and found to contribute to a pathway that exceeds a lob risk or hazard index (HI) greater than 1 for any of the exposure scenarios evaluated in the risk assessment and has an incremental lifetime cancer risk (ILCR) greater than 10^{-6} or hazard quotient (HQ) greater than 0.1 is referred to as a chemical of concern (COC). Site 39 surface soil has been removed and replaced with clean fill material. Therefore, soil exposure pathways were excluded from the BRA. During the risk assessment for Site 39, the following chemicals were identified as COPCs in the groundwater: aluminum, arsenic, and tetrachloroethene. The state of Florida does not consider arsenic a COC at this site because arsenic concentrations did not exceed a Florida Primary Drinking Water standard.

7.2 Exposure Assessment

An exposure assessment was conducted to estimate the magnitude of exposure to the contaminants of concern at the site and the pathways through which these exposures could occur. Since clean backfill material comprises the 0- to 1-foot soil depth interval, the potential risk/hazard posed by the soil pathways has not been assessed. Potential risk/hazard posed by groundwater pathways has been assessed assuming a future residential exposure scenario. This approach was selected to provide a conservative but reasonable evaluation of potential future risk within Site 39. The potential pathways of exposure to COPCs identified in the shallow and intermediate groundwater are listed in Table 7-1. Details regarding the rationale for exposure pathway selection/rejection for both the soil and groundwater media are also provided in Table 7-1.

After exposure pathways were developed, the ions at the exposure points were calculated. USEPA Region IV guidance calls for assuming lognormal distributions for environmental data and the calculation of 95 percent of the UCL mean for use in exposure quantification. Exposure point concentrations for soil and groundwater at Site 39 are listed in Table 7-2.

Once exposure point concentrations were developed, the chemical intake at each exposure point was calculated. Assumptions made in quantifying chemical intake are listed in Table 7-3. Age-adjusted ingestion and contact factors were derived for the potential future residential receptors (resident adult and resident child combined) for carcinogenic endpoints. These factors consider the difference in daily ingestion rates for groundwater, body weights, and exposure durations for children (ages 1 to 6 years) and adults (ages 7 to 31 years). The exposure frequency is assumed to be identical for the two exposure groups. These assumptions, along with the exposure point concentrations, are plugged into equations to give the Chronic Daily Intake CDI) for each exposure pathway. The CDIs for groundwater ingestion for the potential future site residents are provided in Table 7-4.

Table 7-1
Exposure Pathways Summary
NAS Pensacola Site 39
Pensacola, Florida

Potentially Exposed Population	Medium and Exposure Pathway	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Current Land Uses			
Recreational Residents (Child and Adult)	Air, Inhalation of gaseous contaminants emanating from soil	No	The gaseous air pathway is not considered due to the absence of significant volatile chemicals in soil.
	Air, Inhalation of chemicals entrained in fugitive dust	No	The sand grains, described as fine-medium grain quartz, are not respirable.
	Groundwater, Ingestion of contaminants during potable or general use	No	Groundwater is not currently used as a source of potable or industrial water at Site 39.
	Groundwater, Inhalation of volatilized groundwater contaminants	No	Groundwater is not currently used as a source of potable or industrial water at Site 39.
	Soil, Incidental ingestion	No	Post-removal soil excluded from the BRA.
	Soil, Dermal contact	No	Post-removal soil excluded from the BRA.
Infrequent Child Trespasser	Air, Inhalation of gaseous contaminants emanating from soil	No	The gaseous air pathway is not considered due to dle absence of significant volatile chemicals in mil.
	Air. Inhalation of chemicals entrained in fugitive dust	No	The sand grains, described as fine-medium grain quartz, are not respirable.
	soil, Incidental ingestion	No	Post-removal mil excluded from the BRA.
	soil, Dermal contact	No	Post-removal mil excluded from the BRA.
Future Land Uses			
Future Site Residents (Child and Adult)	Air, Inhalation of gaseous contaminants emanating from soil	No	The gaseous air pathway is not considered due to the absence of significant volatile chemicals in soil.
	Air, Inhalation of chemicals entrained in fugitive dust	No	The sand grains, described as fine-medium grain quartz, are not respirable.
	Groundwater, Ingestion of contaminants during potable or general use	Yes	The combined shallow and intermediate depth water-bearing zones could hypothetically be used as a residential water source.

Table 7-1
Exposure Pathways Summary
NAS Pensacola Site 39
Pensacola, Florida

Potentially Exposed Population	Medium and Exposure Pathway	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Future Site Residents (Child and Adult)	Groundwater, Inhalation of volatilized contaminants during domestic use	Yes	Groundwater is neither currently used as a source of potable or industrial water at Site 39, nor is this groundwater projected for such uses. However, one volatile contaminant was addressed for the inhalation exposure pathway.
	Soil, Incidental ingestion	No	Post-removal soil excluded from the BRA.
	Soil, Dermal contact	No	Post-removal soil excluded from the BRA.
	Wild game or domestic animals, Ingestion of tissue impacted by media contamination	No	Hunting/taking of game and/or raising livestock is prohibited at all naval bases and air stations.
	Fruits and vegetables, Ingestion of plant tissues grown in contaminated media	No	The potential for significant exposure via this pathway is low; the primary soil contaminants in the potential root zone are gone since the excavation and removal effort
Site Worker	Air, Inhalation of gaseous contaminants emanating from soil	No	The gaseous air pathway is not considered due to the absence of volatile chemicals in soil.
	Air, Inhalation of chemicals entrained in dust resulting from construction activities such as digging	No	The sand grains, described as fine-medium grain quartz, are not respirable.
	Groundwater, Ingestion of contaminants during potable or general use	No	The combined shallow and intermediate depth water-bearing zones are not likely to be used as an occupational water source.
	Soil, Incidental ingestion	No	Post-removal soil excluded from the BRA.
	Soil, Dermal contact	No	Post-removal soil excluded from the BRA.

Note:
Dermal contact exposure pathways for aqueous media were not considered viable.

Table 7-2
Statistical Analysis of COPCs in Shallow and Intermediate Groundwater
NAS Pensacola, Site 39

Natural Log Transformed

Chemical	n	Mean	SD	H Stat	UCL (mg/L)	Maximum Detection (mg/L)	Reference Concentration (mg/L)	EPC (mg/L)
Aluminum	7	-1.20	1.94	6.55	348.15	15	3.88	15
Arsenic	7	-6.27	0.64	2.76	0.005	0.005	2.80	0.005
Tetrachloroethene	7	0.099	0.26	2.07	0.001	0.002	NA	0.002

Notes:
NA = Not Applicable
n = Total number of samples.
Mean = The average of the natural log transformed sample data.
SD = Standard deviation for a sample of a population of data.
H stat = The H=statistic as excerpted from Gilbert, 1987.
EPC = Exposure point concentration; because the number of samples is less than 10, the maximum concentrations detected for the COPCs were used as EPC.
ND = Not detected in reference wells.
UCL = Upper confidence limit.
mg/L = Milligrams per liter.

Table 7-3
Parameters Used to Estimate Potential Exposures for Future Land Use Receptors

Pathway Parameters	Resident Adult	Resident Child	Units
Groundwater Ingestion			
Ingestion Rate	2[a]	1[a]	liters/day
Exposure Frequency	350[b]	350[b]	days/year
Exposure Duration	24[c]	6[c]	years
Exposure Duration$_{LWA}$	24[c]	6[c]	years
Body [illegible] t	70[a]	15[b]	kg
Avenging Time, Non-cancer	8,760[d]	2,190[d]	days
Averaging Time, Cancer	25,550[e]	25,550[e]	days

Notes:
a = USEPA (1989) "Risk Assessment Guidance for Superfund Vol. I, Human Health Evaluation Manual (Part A)."
b = USEPA (1991) "Risk Assessment Guidance for Superfund Vol. I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors, "Interim Final, OSWER Directive: 9285.6-03.EPA/600/8-89/043.
c = USEPA (1991), Risk Assessment Guidance for Superfund: Vol. I — Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals)," OSWER Directive 9285.7-01B.
d = Calculated as the product of ED (years) x 365 days/year.
e = Calculated as the product of 70 years (assumed lifetime) x 365 days per year.
NA = Not applicable.
CSV = Chemical-specific value
In accordance with Supplemental Guidance to RAGS from USEPA Region IV regarding the inhalation of VOCs in groundwater, inhalation CDI is equivalent to ingestion CDI.

Table 7-4
Chronic Daily Intakes for Potential Future Residents — Ingestion of Shallow and Intermediate Groundwater
NAS Pensacola, Site 39

Chemical	Exposure Point Concentration (mg/L)	Future Resident C-CDI (a) (mg/kg-day)	Future Resident Adult H-CDI (mg/kg-day)	Future Resident Child H-CDI (mg/kg-day)
Aluminum	15	2.24E-01	4.12E-01	9.59E-01
Arsenic	0.005	7.45E-05	1.37E-04	3.20E-04
Tetrachloroethene	0.002	2.97E-5	5.48E-5	1.28E-4

Notes:
In accordance with Supplemental Guidance to RAGS from USEPA Region IV regarding the inhalation of VOCs in groundwater, inhalation CDI is equivalent to ingestion CDI for tetrachloroethene; the CDI for tetrachloroethene was used to separately calculate inhalation and ingestion risk and hazard.

a = Carcinogenic chronic daily intake is based on the lifetime weighted average of an adult age 7-31 and a child age 1-6.
CDI = Chronic daily intake in units of mg/kg-day.
C-CDI = CDI for excess cancer risk.
H-CDI = CDI for hazard quotient.
mg/L = Milligrams per liter.
mg/kg-day = Milligrams per kilogram per day.

73 Toxicity *Assessment*

The USEPA has established a classification system for rating the potential carcinogenicity of environmental contaminants based on the weight of scientific evidence Slope factors (SF) have been developed by the USEPA for carcinogenic compounds. The SF is defined as a "plausible upper-bound estimate of the probability of a response (cancer) per unit intake of a chemical over a lifetime."

In addition to potential carcinogenic effects, most *substances* also *can* produce other toxic responses at doses greater than experimentally derived threshold concentrations. The USEPA has derived Reference Dose (RfD) values for these substances. These toxicological values are used in risk formulae to assess the upper-bound level of cancer risk and non-cancer hazard associated with exposure to a given concentration of contamination.

For carcinogens, the potential risk posed by a chemical is computed by multiplying the CDI (as mg/kg-day) by the SF (in reciprocal mg/kg-day). The hazard quotient (for non-carcinogens) is computed by dividing the CDI by the RfD. The USEPA has set standard limits (or points of departure) for carcinogens and non-carcinogens to evaluate whether significant risk is posed by a chemical (or combination of chemicals). For Carcinogens, the point-of-departure range is 10^{-6}.

For non-carcinogens, other toxic effects are generally considered possible if the HQ (or sum of HQs for a pathway — hazard index) exceeds unity (a value of 1). Although both cancer risk and non-cancer hazard are generally additive (within each group) only if the target organ is common to multiple chemicals, a most conservative estimate of each may be obtained by summing the individual risks or hazards regardless of target organ. This approach was used in the BRA. Table 7-5 summarizes toxicological data in the form of RfDs and SFs obtained for each COPC identified in Site 39 groundwater.

It was determined that risk or hazard via the ingestion and inhalation of groundwater for the groundwater pathway hazard index was 2 for the future child resident and 0.9 for the adult.

7.4 Risk Characterization

Risk characterization combines the results of the exposure assessment and toxicity assessment to yield qualitative and quantitative expressions of risk for the exposed receptors. The quantitative component expresses the probability of developing cancer, or a non-probabalistic comparison of estimated dose with a reference dose for non-cancer effects. These quantitative estimates are developed for individual chemicals, exposure pathways, transfer media, and source media, and for each receptor for all media to which one may be exposed. The qualitative component usually involves comparing COC concentrations in media with established criteria or standards for chemicals for which there are no suitable toxicity values.

Exposure to groundwater onsite was evaluated exclusively under a future site resident scenario. Ingestion through potable use and inhalation of volatilized contaminant exposure pathways were evaluated. For non-carcinogenic contaminants evaluated relative to future site residents, hazard

Table 7-5
Toxicological Database Information for NAS Pensacola, Site 39

Chemical	Oral Reference Dose (mg/kg/day)	Inhalation Reference Dose (mg/kg/day)	Oral Cancer Potency Factor [(mg/kg/day)]-1	Inhalation Cancer Potency Factor [(mg/kg/day)]-1	Cancer Classification	Uncertainty Factor Oral	Uncertainty Factor Inhalation
Aluminum	1.0 [b]	ND	ND	ND	ND	ND	ND
Arsenic	0.0003 [a]	ND	1.75 [a]	15.1 [a]	A	3	ND
Tetrachloroethene	0.01 [c]	ND	0.052 [a]	0.00203 [a]	C-B2	1000	ND

Notes:
The ARAR for aluminum (0.05 to 0.2 mg/L) is a water hardness-dependent secondary maximum contaminant level range, and the ARAR for arsenic (0.05 mg/L) is a promulgated maximum contaminant level. The ARAR for tetrachloroethene (0.003 mg/L) is a Florida Primary Drinking Water Standard (FPDWS).

a	=	Integrated Risk Information System (IRIS)
b	=	Oral reference dose provided by USEPA Region IV Risk Assessment Reviewer
c	=	Environmental Criteria and Assessment Office (ECAO)
ND	=	Not determined due to lack of information.
mg/kg/day	=	milligrams per kilogram per day
Cancer Class A	=	Classified as a known, human carcinogen by USEPA
Cancer Class B2-C	=	Classified as a probable to possible human carcinogen by USEPA

was computed separately to address child and adult *exposure.* The shallow and intermediate water-bearing zones monitored *during* the RI were combined for assessment. Table 7-6 presents the computed carcinogenic risks and/or HQs associated with the potable use of shallow and intermediate groundwater for drinking water.

The computed hazard indices for *ingesting* of shallow and intermediate groundwater used as a potable source for the future child and adult resident were 2 and 0.9, respectively. Arsenic aluminum, and tetrachloroethene were identified as groundwater COCs. Arsenic and aluminum were the primary contributors to the hazard indices for the child and adult receptors, and arsenic was the primary contributor to the total carcinogenic risk. The state of Florida does not consider arsenic a COC because arsenic concentrations did not exceed the Florida primary Drinking Water standard. Inhalation and ingestion risk and hazard results calculated for tetrachloroethene,

a volatile organic compound, are shown separately in Table 7-6. Tetrachloroethene was a minor contributor to risk and hazard, having a hazard quotient less than 0.1 and an ILCR less than 2E-6 for each receptor type and exposure pathway. As shown in Table 7-6, the incremental excess carcinogenic risk for the future site resident via the shallow and intermediate groundwater ingestion/inhalation pathway was calculated to be 1.3E-04.

Table 7-6
Hazard Quotients and Incremental Lifetime Cancer Risks-Potential Future Residents Ingestion of Shallow and Intermediate Groundwater NAS Pensacola, Site 39

Chemical	Slope Factor Used [(mg/kg-day]-1	Reference Dose Used (mg/kg-day)	Future Resident Adult Hazard Quotient (mg/kg-day)	Future Resident Child Hazard Quotient (mg/kg-day)	Future Resident ILCR lwa (a) [(mg/kg-day)]-1
Aluminum	ND	1.0	0.4	1.0	ND
Arsenic	1.75	0.0003	0.5	1.1	1E-04
Tetrachloroethene (ingestion)	0.052	0.01	0.005	0.01	1E-6
Tetrachloroethene (inhalation)	0.00203	0.01	0.005	0.01	6E-8
Hazard Indices/Total Cumulative Risks			0.9	2	1E-04

Notes:
1 = Incremental lifetime cancer risk (ILCR) is based on the lifetime weighted average (lwa) of an adult age 7-31 and a child age 1-6.
ND = Not determined due to lack of available information.
mg/kg/day = Milligrams per kilogram per day.

7.5 Risk Uncertainty

Exposure Pathways and Contaminants

Chemicals present in site samples (CPSSs) were initially eliminated from the BRA based on the criteria agreed on by USEPA, FDEP, and the Navy. The risk/hazard thresholds of 1E-6 and 0.1 were selected to account for potential cumulative effects of various chemicals, and the maximum concentration detected was compared to the corresponding screening value. As discussed previously in the BRA, the comparison was made using the most conservative

screening value provided by USEPA Region III, USEPA Region IV, and FDEP for each exposure medium. Although some uncertainty exists regarding potential cumulative effects, the fact that maximum concentrations detected were used m the screening comparison in concert with low range risk/hazard thresholds alleviates much uncertainty. A large number (i.e., greater than 10) of constituents would have to be present at near-RBC concentrations to elicit a concern for cumulative effects. However, the target organ for each COC is different and the hazard quotient should be considered individually. The potential carcinogenic risk was computed to be 1.3E-04 due! to arsenic concentrations. Customarily a hazard index of 1 and carcinogenic risk range of 1E-04 to 1E-06 is considered acceptable by the USEPA while FDEP point of departure is 1E-06 excess cancer risk. Arsenic and aluminum are potentially related to saltwater intrusion or suspended sediment in samples ami are likely not site-related. In addition, the arsenic and tetrachloroethene exposure point concentrations (i.e., the maximum concentration detected) of 0.005 mg/L and 0.002 mg/L respectively, were below the corresponding state and federal drinking water standards of 0.05 mg/L and 0.003 mg/L, respectively. The state of Florida does not consider arsenic a COC at this site because the arsenic concentrations did not exceed a Florida primary Drinking Water standard. While the aluminum exposure point concentrati'on of 15 mg/L exceeds the EPA secondary drinking water standard of .05 to .2 mg/L, this standard is not health based but applies to the taste, odor, color and certain other non-aesthetic effects of drinking water. EPA recommends these guidelines as reasonable goals, but federal law does not require strict compliance with them. Moreover as previously outlined, aluminum is potentially related to saltwater intrusion or suspended sediment in samples.

Comparison to Reference Concentrations (Background)

Because the intent of the BRA is to estimate the excess cancer risk or health hazard posed by COPCs, a comparison to reference concentrations was performed subsequent to comparison to screening values. The maximum concentrati'on detected for each chemical that exceeded its corresponding screening value was compand to two-times the mean reference concentration, if a reference concentrati'on was available. Because low frequency of detection could indicate a

contaminant should not be addressed in the BRA, all detected chemicals that failed the screening comparisons were evaluated with respect to frequency of detection and consistency of detection in two or more sampled environmental media. This approach was selected as a conservative screening approach.

Additional uncertainty is introduced by a comparison of site data to non-specific screening reference data. Although the reference concentrations are specific to NAS Pensacola, they are not site-specific.

Comparison to USRDA

Due to the proximity of Pensacola Bay, it is possible that occasional saltwater intrusion in the groundwater sampled at Site 39 is the primary source for the essential nutrients detected. As listed in The *Chemistry of Natural Waters*, essential nutrients arsenic, potassium, sodium, and iron are components of seawater. These essential nutrients are also naturally occurring in soil. In an effort to focus this risk assessment on any dominant risk/hazards present at Site 39, essential nutrient information was used as part of the screening process to further reduce the number of CPSSs evaluated.

In order to assess the potential for toxic effects due to excessive doses of essential nutrients, the maximum detected concentrations of essential nutrients were compared to USRDAs. In addition, as RAGS Part A suggests, arsenic was retained as a COPC in groundwater since acceptable dietary concentrations associated with arsenic are not well established.

In groundwater, arsenic, iron, and magnesium were the only essential nutrients with maximum detections exceeding screening and reference criteria. Iron and magnesium were eliminated from the quantitative risk assessment because at the 2 L/day groundwater ingestion rate, 17.2 mg of iron, 96 percent of the USRDA, and 6.8 mg of magnesium, 0.017 percent of the USRDA, would be ingested.

Characterization of Exposure Setting and Identification of Exposure Pathways

Uncertainty in the exposure setting and pathways *exists* due to the highly conservative assumptions (i.e., future residential *use)* recommended by USEPA Region IV when assessing potential future and current exposure. As previously discussed, no potable (or industrial water) wells exist at Site 39, and none arc projected for installation.

Determination of Exposure point Concentrations

Based on the guidance provided by USEPA, EPCs *arc* those concentrations used to estimate CDI. The uncertainty associated with EPC primarily stems from their *statistical* determination or imposition of maximum concentrations, described below.

Statistical **Estimation of Exposure Point Concentrations**

USEPA provided supplemental guidance which outlines a statistical estimation of EPC. These calculated concentrations are 95 percent UCL which arc based on certain assumptions. USEPA assumes that most (if not all) environmental data are lognormally distributed. Uncertainty exists in this assumption because *many* environmental data *arc* neither normally nor lognormally distributed.

The UCL calculation is provided in the *Supplemental Guidance* to *RAGS: Calculating the Concentration Term*, May 1992. This calculation includes a statistical value, *the* H statistic, is based on the number of samples analyzed for each COPC and the standard deviation of the results. To obtain this number, a table must be referenced, and the value must be interpolated (an estimation) from the table. The equation for the H-statistic bas not been provided in the supplemental guidance, nor does the document referred to in the guidance provide the equation. Although the statistic appears to be non-linear, a linearity assumption was made to facilitate interpolation of the statistic for *each* COPC addressed m the BRA.

Linear interpolation is a good estimate of H; however, it is important to note that the formula and H are natural log values, and H is applied as a multiplier. The effect of multiplying natural log numbers is not equivalent to multiplying untransformed values. While data are log transformed, adding two numbers is the equivalent of multiplying the two numbers if they were not transformed. The effect of multiplying a number while in log form is exponential, and H is applied as a multiplier. In *summary,* using this method to calculate the UCL includes much uncertainty (an overestimation of risk/hazard), and often provides concentrations greater than the maximum detected onsite. The calculated UCL for aluminum, arsenic, and tetrachloroethene are greater than or approximately equal to the maximum concentrations detected, and the number of samples was less than 10. Therefore, the maximum concentrations detected were used as EPC.

Although RAGS advocates using neither worst-case scenarios nor maximum concentrations as EPCs, the use of the H-statistic often necessitates using the reported maximum concentration as EPC. The lesser of the maximum concentration and the UCL is used as the EPC. Summation of risk based on maximum concentrations leads to overestimating risk/hazard, especially in the case of low detection frequency or spatially segregated COPCs. This concept is further discussed below.

Frequency of Detection and Spatial Distribution

Because of the influence of standard deviation on EPC, low frequency of detection *can* cause COPCs to be inappropriately addressed in the risk assessment. More specifically, COPCs detected only once or twice in all samples analyzed (having concentrations exceeding the RBCs and reference concentrations) would be expected to have relatively higher standard deviation as concentration variability or range widens. Higher standard deviation results in a high H statistic, and this typically leads to a UCL greater than the maximum concentration detected onsite. If that is the case, then using the UCL or maximum concentration detected as EPC (or possibly

the inclusion of the COPC m question) may not be appropriate when EPC is assumed to be ubiquitous.

The spatial distribution of chemicals detected in groundwater does not indicate the presence of an identifiable source at the 39GS04 shallow zone monitoring well at Site 39 (i.e., within the former stained soil area). The concentrations detected at the location in question would be expected to be elevated when compared to data corresponding with surrounding monitoring wells. However, groundwater data are not elevated at this location (39GS04) relative to other Site 39 monitoring wells. The spatial distribution of COPCs is described below for second phase groundwater data. Tetrachloroethene was detected in well 39GS01 (the upgradient well). Aluminum was detected in two shallow wells and one intermediate well, 39GS03, 39GS04, and 39GI05, respectively. The highest concentration was detected in 39GS03. Arsenic, an element associated with seawater, was detected in the two downgradient shallow wells, 39GS02 and 39GS03 (i.e., closest to the bay). The highest concentrati'on of arsenic was detected in 39GS02. The gradient and groundwater flow onsite is generally toward the bay. The groundwater flow gradient at Site 39 is low. As a result of the limited gradient and potential tidal influences, the pattern of transport from the former suspected source area would have been controlled by diffusivity. The random distributions observed in the RI groundwater data are not indicative of diffusion froma concentrated source area.

Due to the abundant supply of good quality water in the deeper main producing zone groundwater from the surficial zone of the Sand-and-Gravel Aquifer is not used as potable water in Southern Escambia County nor is it anticipated to be used for that purpose in the future. Furthermore, groundwater at the site and at NAS Pensacola is highly turbid and contains ambient iron and manganese concentrations exceeding Florida's secondary drinking water standard concentrati'on. The data from this investigation suggest that the site has not degraded the quality of the aquifer; instead, the metal concentrations found are typical of the Sand-and-Gravel Aquifer as a whole.

Currently there are no full time residents nor potable water wells at Site 39 therefore, there are no human receptors for the Site 39 groundwater, and consequently no current exposure. The hazard index is based on a summation of the hazard quotients for all of the COCs for a future child resident. However, the target organ for each COC is different. Therefore, individual hazard quotients should be considered instead of summing the hazard quotient for all COCs. If a hazard index of 1 was selected for a cleanup threshold, only arsenic (1.1) slightly exceeds that threshold for a future child resident. The aluminum and arsenic found in Site 39 groundwater is typical of the concentrations found throughout NAS Pensacola and should be considered background levels of these inorganic compounds.

7.6 Ecological Risk Assessment

An ecological risk assessment was performed to determine the actual or potential effects of Site 39 on the surrounding ecosystem. Based on the relatively limited area of contamination and the lack of suitable habitat onsite, effects from the site contaminants are not expected to be a concern. However, specific effects to overall biota within the affected area are unknown. This is compounded by the lack of available data on acute and chronic toxicity in soil for the chemicals of concern discussed. Instead of attempting to quantify these effects, it was determined that the most cost-effective and environmentally and aesthetically beneficial remedy was to simply remove and properly dispose of the contaminated soil and replace it with clean fill material.

8.0 DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Navy presented a PRAP for Site 39 on June 13,1995. The no action remedy consisted of the same components described in this ROD. No significant changes have been made to the no action remedy described in the proposed plan and presented to the public. .

N:\WP51\ALD\PCOLA\CTO.083\ROD

This page intentionally left blank

Appendix A

Responsiveness *Summary*

RESPONSIVENESS SUMMARY

overview

At the time of the public comment period, the U.S. Navy had selected a preferred remedy to address soil and groundwater contamination at Site 39 on NAS Pensacola. This preferred remedy was selected in coordination with the USEPA and the FDEP. The NAS Pensacola Restoration Advisory Board, a group of community volunteers, reviewed the technical details of the selected remedy and no fundamental objections to its selection have been raised.

The sections below describe the background of community involvement on the project and comments received during the public comment period.

Background of Community Involvement

Throughout the site's history, the community has been kept abreast of site activities through press releases to the local newspaper and television stations which reported on site activities. Site related documents were made available to the public in the administrative record at information repositories maintained at the NAS Pensacola Library, the West Florida Regional Library, and the John C. Pace Library of the University of West Florida.

In May of 1995, newspaper announcements were placed to announce the date and location of the public meeting to present the proposed remedial action plan (PRAP), the public comment period (May 30 through June 30, 1995) and included a short synapses of the proposed plan. These adds ran in the *Pensacola News Journal* on May 18, 1995 and in the *Pensacola* Voice and the *New American* Press during the week of May 18, 1995 through May 24, 1995. In conjunction with these newspaper announcements, addresses on the Site 39 mailing list were sent a technical *summary* of the PRAP and notice of the public meeting. A public meeting was held at the Pensacola Junior College Warington Campus on June 13, 1995. Approximately 25 people attended the public meeting.

Summary of Comments Received During the Public Comment Period

During the public meeting on June 13, 1995 the proposed plan was presented to the public and the floor was opened for comments. No oral or written comments were received at this time. Comment cards were provided at the public meeting and with the mailed announcements. During the public comment period of May 30 through June 30,1995 no comments were received on the Site 39 Proposed Remedial Action Plan.

m

Appendix B
Glossary

This glossary defines terms used in this record of decision describing CERCLA activities. The definitions apply specifically to this record of decision and may have other meanings when used in different circumstances.

ADMINISTRATIVE RECORD: A file which contains all information used by the lead agency to make its decision in selecting a response action under CERCLA. This file is to be available for public review and a copy is to be established at or near the site, usually at one of the information repositories. Also a duplicate is filed in a central location, such as a regional or state office.

AQUIFER: An underground formation of materials such as sand, soil, or gravel that can store and supply groundwater to wells and springs. Most aquifers used in the United States are within a thousand feet of the earth's surface.

BASELINE RISK ASSESSMENT: A study conducted as a supplement to a remedial investigation to determine the nature and extent of contamination at a Superfund site and the risks posed to public health and/or the environment.

CARCINOGEN: A substance that can cause cancer.

CLEANUP: Actions taken to deal with a release or threatened release of hazardous substances that could affect public health and/or the environment. The noun "cleanup" is often used broadly to describe various response actions or phases of remedial responses such as Remedial Investigation/Feasibility Study.

COMMENT PERIOD: A time during which the public can review and comment on various documents and actions taken, either by the Department of Defense installation or the USEPA. For example, a comment period is provided when USEPA proposes to add sites to the National Priorities List.

COMMUNITY RELATIONS: USEPA's, and subsequently Naval Air Station Pensacola's, program to inform and involve the public in the Superfund process and respond to community concerns.

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act created a special tax that goes into a trust fund, commonly known as "Superfund," to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Under the program the USEPA can either:

- Pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work.

- Take legal action to force parties responsible for site contamination to clean up the site or pay back the federal government for the cost of the cleanup.

DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT (DERA): An account established by Congress to fund DOD hazardous waste site cleanups, building demolition, and hazardous waste minimization. The account was established under the Superfund Amendments and Reauthorization Act.

DRINKING WATER STANDARDS: Standards for quality of drinking water that are set by both the USEPA and the FDEP.

EXPLANATION OF DIFFERENCES: After adoption of final remedial action plan, if any medial or enforcement action is taken, or if any settlement or consent decree is entered into, and if the settlement or decree differs significantly from the final plan, the lead agency is required to publish an explanation of any significant differences and why they were made!.

FEASIBILITY STUDY: See Remedial Investigation/Feasibility study.

GROUNDWATER: Water beneath the earth's surface that fills pores between materials such as sand, soil or gravel. In aquifers, groundwater occurs in sufficient quantities that it can be used for drinking water, irrigation, and other purposes.

HAZARD RANKING SYSTEM (HRS): A scoring system used to evaluate potential relative risks to public health and the environment from releases or threatened releases of hazardous substances. USEPA and states use the HRS to calculate a site score, from 0 to 100, based on the actual or potential release of hazardous substances from a site through air, surface water, or groundwater to affect people. This score is the primary factor used to decide if a hazardous site should be placed on the NPL.

HAZARDOUS SUBSTANCES: Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.

INFORMATION REPOSITORY: A file containing information, technical reports, and reference documents regarding a Superfund site. Information repositories for Naval Air Station Pensacola are located at the West Florida Regional Library, 200 W. Gregory Street, Pensacola, Florida; The John C. Pace Library, University of West Florida; and the NAS Pensacola Library, Building 633, Naval Air Station, Pensacola, Florida.

MAXIMUM **CONTAMINANT LEVEL:** National standards for acceptable concentrations of contaminants in drinking water. These standards are legally enforceable standards set by the USEPA under the Safe Drinking Water Act.

MONITORING **WELLS:** Wells drilled at specific locations on or off a hazardous waste site where groundwater can be sampled at selected depths and studied to assess the groundwater flow direction and the types and amounts of contaminants present, etc.

NATIONAL PRIORITIES LIST (NPL): The USEPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response using money from the trust fund. The list is based primarily on the score a site receives on the Hazard Ranking System. USEPA is required to update the NPL at least once a year.

PARTS PER BILLION (ppb)/PARTS PER MILLION (ppm): Units commonly used to express low concentrations of contaminants. For example, 1 ounce of trichloroethylene in a million ounces of water is 1 ppm; 1 ounce of trichloroethylene in a billion ounces of water is 1 ppb. If one drop of trichloroethylene is mixed m a competition-size swimming pool, the water vvill contain about 1 ppb of trichloroethylene.

PRELIMINARY REMEDIATION GOALS: Screening concentrations that are provided by the USEPA and the FDEP and are used m tlk assessment of the *site* for Comparative purposes prior to remedial goals being set during the baseline risk assessment.

PROPOSED PLAN: A public participation requirement of SARA in which the lead agency summarizes for the public the preferred cleanup strategy, and the rationale for the preference, reviews the alternatives presented in the detailed analysis of the remedial investigation/feasibility study, and presents any waivers to clean up standards of Section 121(d)(4) that may be proposed. This may be prepared either as a fact sheet or as a separate document. In either case, it must actively solicit public review and *comment* on all alternatives under agency consideration.

RECORD OF DECISION (ROD): A public document that explains which cleanup alternative(s) will be used *at NPL* sites. The Record of Decision is based on information and technical analysis generated *during* the remedial investigation/feasibility study and consideration of public comments and community concerns.

REMEDIAL ACTION (RA): The actual construction or implementation phase that follows the remedial design and the selected cleanup alternative at a site on the NPL.

REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS): Investigation and analytical studies usually performed at the same time in an interactive process, and together referred to as

the "RI/FS." They are intended to: (1) gather the data necessary to determine the type and extent of contamination at a Superfund site; (2) establish criteria for cleaning up the site; (3) identify and screen cleanup alternatives for remedial action; and (4) analyze in detail the technology, and costs of the alternatives.

REMEDIAL RESPONSE: A long-term action that stops or substantially reduces a release or threatened release of hazardous substances that is serious, but dose not pose an immediate threat to public health and/or the environment.

REMOVAL ACTION An immediate action performed quickly to address a release or threatened release of hazardous substances.

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA): A federal law that established a regulatory system to track hazardous substances from the time of generation to disposal. The law requires safe and *secure* procedures to be used in treating, transporting, storing, and disposing of hazardous substances. RCRA is designed *to* prevent new, uncontrolled hazardous waste sites.

RESPONSE ACTION: As defined by Section 101(25) of CERCLA, means remove, removal, remedy, or remedial action, including enforcement activities related thereto.

RESPONSIVENESS SUMMARY: A summary of oral and written public comments received by the lead agency during a comment period on key documents, and the response to these comments prepared by the lead agency. The responsiveness *summary* is a key part of the ROD, highlighting community concerns for USEPA decision-makers.

SECONDARY DRINKING WATER STANDARDS: *secondary drinking* water regulations are set by the USEPA and the FDEP. These guidelines are not designed *to* protect public health, instead they are intended to protect "public welfare" by providing guidelines regarding the taste, odor, color, and other aesthetic aspects of *drinking* water which do no present a health risk.

SUPERFUND: The trust fund established by CERCLA which can be drawn upon to plan and conduct clean ups of past hazardous waste disposal sites, and current releases or threats of releases of non-petroleum products. Superfund is often divided into removal, remedial, and enforcement components.

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA): The public law enacted on October 17,1986, to reauthorize the funding provisions, and to amend the authorities and requirements of CERCLA and associated laws. Section 120 of SARA requires that all federal facilities "be subject to and comply with, this act in the same manner and to the same extent as any non-governmental entity."

SURFACE WATER: Bodies of water that are above ground, such as rivers, lakes, and streams.

VOLATILE ORGANIC COMPOUND: An organic (carbon-containing) compound that evaporates (volatizes) readily at room temperature.

Appendix C

Florida Professional Geologist seal

FLORIDA PROFESSIONAL GEOLOGIST SEAL

I have read and approve of this Record of Decision for Site 39 and seal it in accordance with Chapter 492 of the Florida Statutes.

Name:	Brian E. Caldwell
License Number:	#1330
State:	Florida
Expiration Date:	July 31, 1996

B E Caldwell

Brian E. Caldwell

7/12/95

Date