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FINAL RECORD OF DECISI
OPERABLE **UNIT** *6* (SITES 9 AND 29)
NAS PENSACOLA
PENSACOLA, FLORIDA

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NAS PENSACOLA
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SOUTHNAVFACENGCOM
Contract Number:
N62467-89-D-0318
CTO-083

Prepared for:

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

Prepared by:

EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901) 372-7962

The Contractor, EnSafe Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0318 is complete, accurate, and complies with all requirements of the contract.

Date: September 7, 1999
Signature: Allison Harris
Name: Allison Harris
Title: Task Order Manager

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List of Abbreviations

The following list contains many of the abbreviations, acronyms, and symbols used in this document. A glossary of technical terms is provided in Appendix A.

ARAR	Applicable or Relevant and Appropriate Requirement
BRA	Baseline Risk Assessment
BRAC	Base Closure and Realignment Act
CDI	Chronic Daily Intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CG	Cleanup Goal
CGL	Cleanup Goal Leaching
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CPSS	Chemical Present in Site Sample
cy	Cubic yard
FDER	Florida Department of Environmental Regulation (since renamed Florida Department of Environmental Protection [FDEP])
FFA	Federal Facilities Agreement
FGGC	Florida Groundwater Guidance Concentration
FPDWS	Florida Primary Drinking Water Standard
FSDWS	Florida Secondary Drinking Water Standard
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HQ	Hazard Quotient
HRS	Hazard Ranking System
IAS	Initial Assessment Study
ILCR	Incremental Lifetime Cancer Risk
IRIS	Integrated Risk Information System
IWTP	Industrial Wastewater Treatment Plant
MCL	Maximum Contaminant Level
msl	mean sea level
NADEP	Naval Aviation Depot
NAS	Naval Air Station
NATTC	Naval Air Technical Training Center
NCP	National Oil and Hazardous Substances Pollution Contingency Plan

List of Abbreviations (Continued)

NEESA	Naval Energy and Environmental Support Activity
NFESC	Naval Facilities Engineering Service Center
NPL	National Priorities List
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbon
PRG	Preliminary Remediation Goal
RAB	Restoration Advisory Board
RBC	Risk-based Concentration
RCRA	Resource Conservation and Recovery Act
RDA	Recommended Dietary Allowance
RfD	Reference Dose
RGO	Remedial Goal Option
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SF	Slope Factor
SMCL	Secondary Maximum Contaminant Level
SQAG	Sediment Quality Assessment Guideline
SSL	Soil Screening Level
SWMU	Solid Waste Management Unit
TRC	Technical Review Committee
TRPH	Total Recoverable Petroleum Hydrocarbon
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound

DECLARATION OF THE RECORD OF DECISION

Site Name and Location

Operable Unit 6
Naval Air Station Pensacola
Pensacola, Florida

Statement of Purpose

This decision document (Record of Decision), presents the selected remedy for operable Unit 6 at Naval Ait Station Pensacola, Pensacola, Florida, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. § 9601 *et seq.*, and to the extent practicable, the National Contingency Plan (NCP), 40 Code of Federal Regulations Patt 300. This decision is based on the administrative record fot Operable Unit 6 at the Naval Air Station Pensacola.

The U.S. Environmental Protection Agency and the Florida Department of Environmental Protection concur with the selected temedy.

Description of the Selected Remedy

This action is the first and final action planned for the operable unit. The temoval actions and remedial investigation, including the human health and ecological tisk assessments, support a no-action alternative for Operable Unit 6. The remedial investigation and baseline risk assessment addressed all environmental media within Operable Unit 6; therefore, no other remedial actions will be considered for the site.

Statutory Determinations

No further remedial action is necessary to ensure protection of human health and the environment at Operable Unit 6. The removal actions petformed at Operable Unit 6 eliminated the heed to conduct additional remedial action. The selected remedy complies with federal and state requirements that are legally applicable or televant and appropriate to the remedial action and is cost-effective.

Because this remedy will not tesult in hazardous substances remaining onsite above health-based levels, the five year teview will not apply to this action.

Randal L. Bahr

Captain Randal L. Bahr, Commanding Officet, NAS Pensacola

7 Sep 99

Date

1.0 SITE LOCATION AND DESCRIPTION

Operable Unit (OU) 6 consists of the following sites:

- Site 9 — Navy Yard Disposal Area
- Site 29 — Soil South of Building 3460

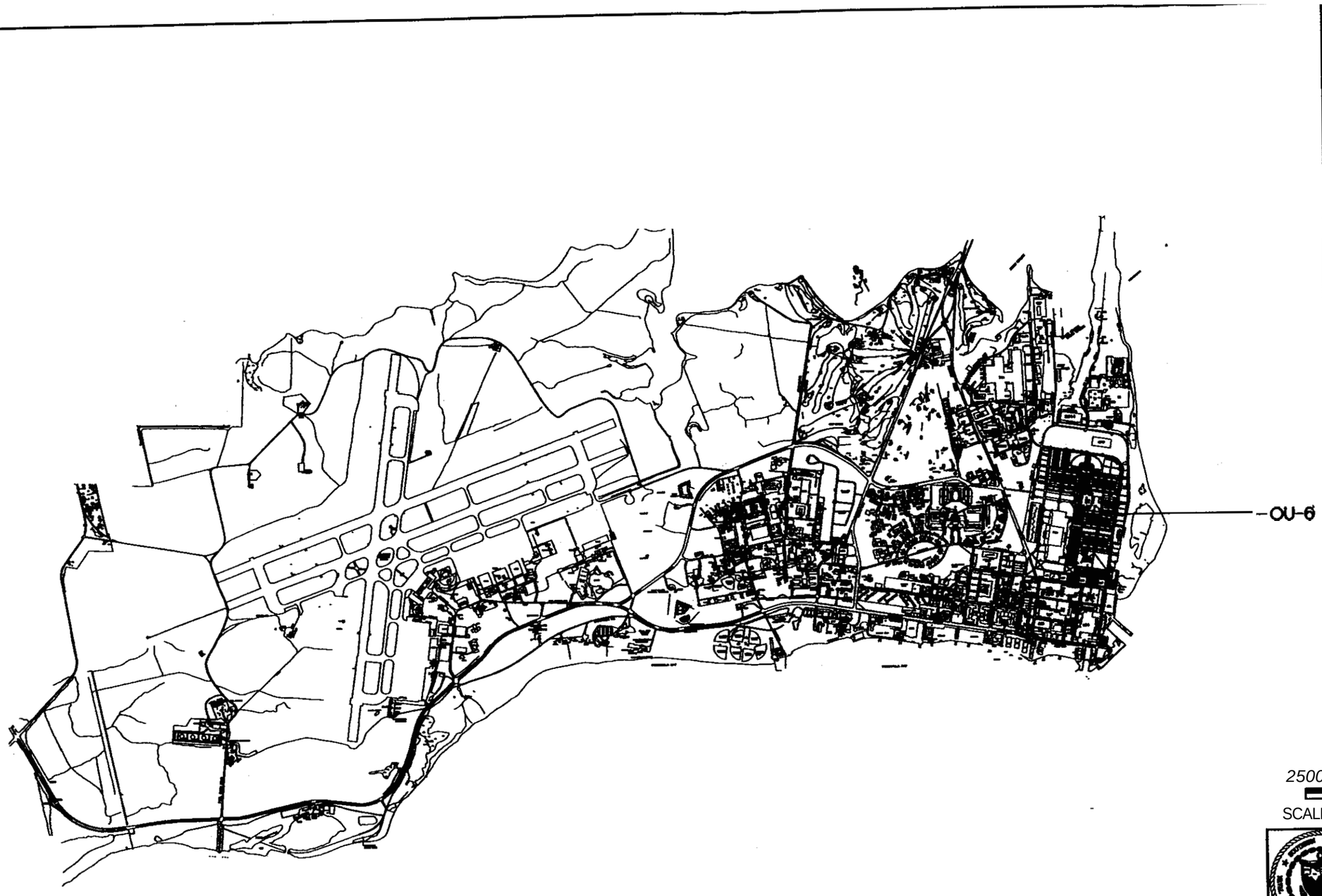
OU 6 is near the southwest portion of Chevalier Field as shown on Figure 1-1, Site Location Map and Figure 1-2, Site Distribution Map. Now the site of the Naval Air Technical Training Center (NATTC), this area was once used by the Naval Aviation Depot (NADEP) to rebuild, repair, and paint aircraft. Helicopter airframe work was conducted in two large hangars (Buildings 3460 and 3557) near the investigation area. The hangars were surrounded by a concrete aircraft parking apron, a grassy field, and asphalt parking lots.

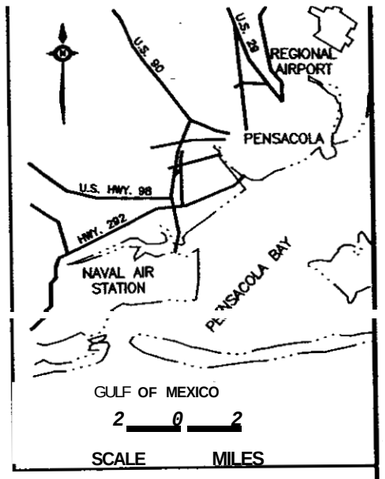
Beginning in 1995, the area was changed radically. Under the Base Closure and Realignment Act (BRAC), NADEP was closed, and the NATTC current campus was constructed. During BRAC construction, Building 3557 was razed and Building 3460 was incorporated into what is now known as the NATTC's Consolidated Training School. The concrete aircraft parking apron was removed from the site area, and the surrounding areas altered to incorporate new roadways, parking lots, and landscaping. Other than Building 3460 and some hangars south of the site area, nothing remains of the former NADEP facilities at Chevalier Field.

The OU 6 sites are described below:

Site 9

The Navy Yard Disposal Area, used for trash and refuse disposal from 1917 until the early 1930s, includes the large grassy area and parking lot west of Building 3460, along with portions of the concrete apron next to Building 3460. The land surface at Site 9 is approximately 5 feet above mean sea level (msl). The terrain is relatively flat.





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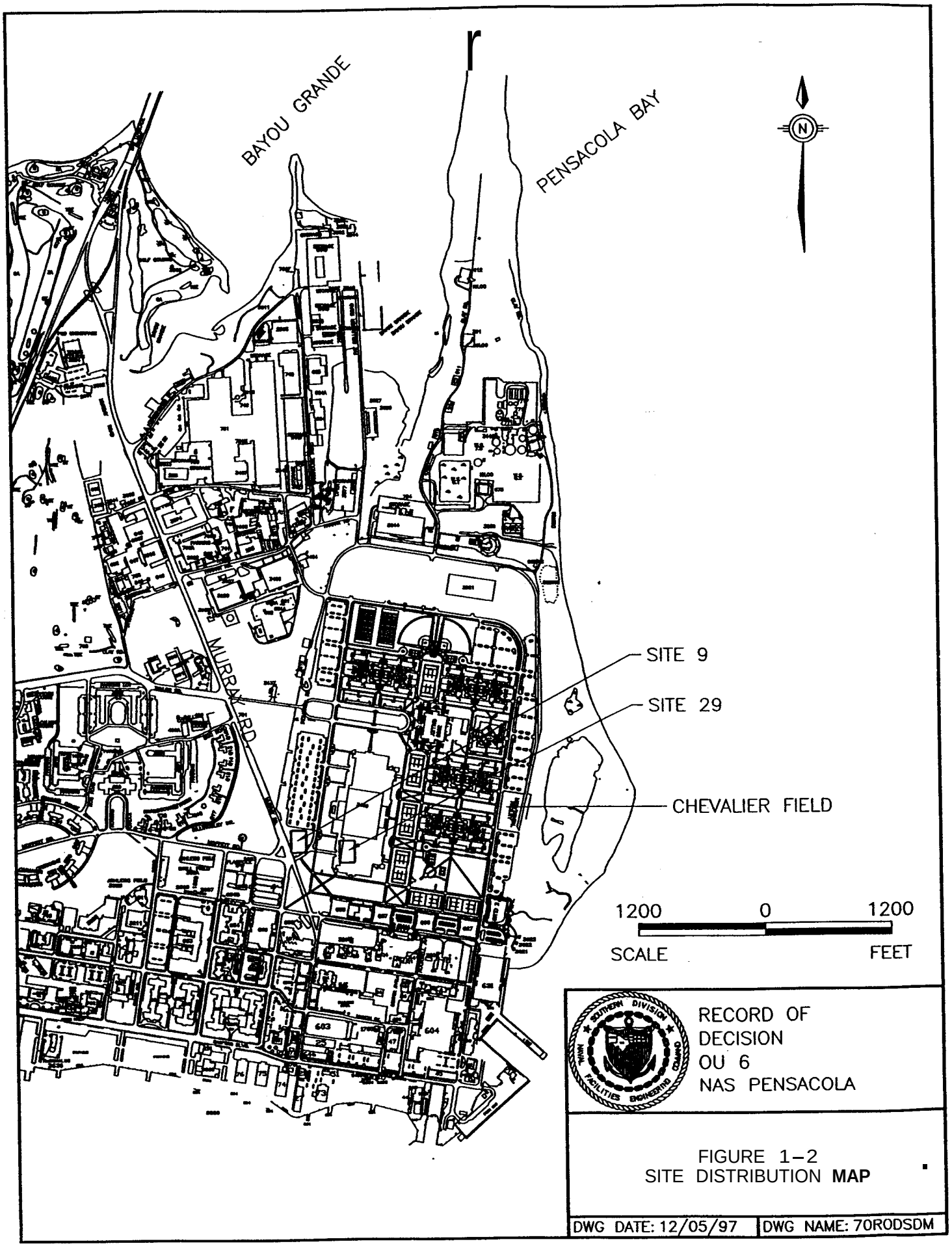
RECORD OF DECISION
OU 6
NAS PENSACOLA

FIGURE 1-1
SITE LOCATION MAP

DWG DATE: 12/05/97 DWG NAME: 70RODSLM


BAYOU GRANDE
PENSACOLA BAY
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MURRAY RD
SITE 9
SITE 29
CHEVALIER FIELD
1200
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1200
SCALE
FEET
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
RECORD OF
DECISION
OU 6
NAS PENSACOLA
FIGURE 1-2
SITE DISTRIBUTION MAP
DWG DATE: 12/05/97
DWG NAME: 7ORODSDM

Before BRAC construction, the site's northeast corner had a picnic shelter (Building 3615). An aboveground steam pipeline originated near this shelter and crossed the eastern portion of the site, northeast to southwest, where it re-entered the ground. The site's northeast portion included a parking lot, while its northwest and southern portions were mostly unpaved areas of sandy soil landscaped with grass. The site's southeast corner included a portion of the concrete apron that surrounded Building 3460. The west and southwest portions of the site encompassed those areas near Industrial, Murray, and Moffett roads, and Ellyson Avenue.

Currently, Site 9 consists of the soils underlying a new parking lot for the Consolidated Training School and a grassy area between the parking lot and the drainage ditch that traverses the western edge of the site. This drainage ditch is known as Wetland 6.

Site 29

Before BRAC construction, most of Site 29 (the Soil South of Building 3460) consisted of the concrete aircraft parking apron on the southern side of the Building 3460. A small portion of the site's western side included a part of the flat grassy field described for Site 9. Activities surrounding the site included those described for Building 3460. To the east was Building 3588 where airframes were painted. To the south are Building 607, which was used for general maintenance and repair of helicopters, and Building 630. A fenced outside storage area north of Building 630 was used to store helicopter rotor blades and fuel tanks. Immediately north of this former storage area was an automobile parking area used by NADEP employees. An industrial wastewater treatment plant (IWTP) sewer line crosses the site.

Site 29 currently lies beneath the south wing of the Consolidated Training School. During BRAC construction, Building 3460 was expanded, incorporating most of the area investigated for the site.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 General Site History

In December 1989, the base was placed on the U.S. Environmental Protection Agency's (USEPA) National Priorities List (NPL). A Federal Facilities Agreement (FFA) signed in October 1990 outlines the regulatory path to be followed at NAS Pensacola. NAS Pensacola must not only meet its regulatory obligations associated with its NPL listing, but also satisfy the ongoing requirements of a Resource Conservation and Recovery Act (RCRA) permit issued in 1988. That permit addresses the treatment, storage, and disposal of hazardous waste and also the investigation and remediation of any releases of hazardous waste and/or constituents from Solid Waste Management Units (SWMUs). RCRA and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) cleanup activities are coordinated through the FFA, streamlining the remediation process.

2.2 Site-Specific History

2.2.1 General History

Site 9

This site, which was used for trash and refuse disposal between 1917 and the early 1930s, is shown on several old maps as the Navy Yard Dump or the Warrington Village Dump. Part of Site 9 was excavated in the late 1960s during trenching for an industrial wastewater sewer. Glass, scrap metal, and debris were unearthed, but no unusual odor was reported.

Site 29

According to an Initial Assessment Study (IAS) performed by the Naval Facilities Engineering Service Center (NFESC, formerly the Naval Energy and Environmental Support Activity [NEESA]) in 1981, workers received minor skin burns while excavating a trench to repair a 16-inch water main south of Building 3460. These injuries were attributed to a unknown black, oily liquid mixed with soil floating on water in the trench. When the water was pumped out, a

residue coated the sides of the trench and pipe, and the workers noticed an odor similar to paint remover. Because of the proximity of the excavation site to the sewer line crossing the site, industrial waste from the line is suspected to have leaked into the surrounding soil.

A second leak in the industrial sewer line was repaired in September 1986. This leak was under the grassy portion of the site immediately west of Building 3460, beneath the aboveground steamline system. The leak occurred along a portion of the industrial waste sewer line about 7.2 feet bls and approximately 3 to 4 feet below the top of the saturated zone.

2.2.2 Chronology of Events and Previous Investigations

This section summarizes previous work with a connection to the OU 6 sites.

1983 – IAS

The IAS conducted by the NFESC (formerly NEESA) identified sites posing a potential threat to human health or the environment due to contamination from past hazardous materials operations. Historical records, aerial photographs, field inspections, and personnel interviews were used to identify 29 potentially contaminated sites at NAS Pensacola. Sites 9 and 29 were among those identified for evaluation by this study. According to the IAS report, Site 9 was used only to dispose of domestic trash and refuse, and not hazardous waste. Also according to the report, there is no danger to human health or the environment from Site 9, and no further study at the site was recommended. Because several workers received minor skin burns from contact with an unknown chemical during excavation, it was concluded that Site 29 constitutes a potential threat to human health. Further study was recommended for Site 29.

1984 – Verification Study

During the 1984 Verification Study, the OU 6 sites were further examined through the installation of four monitoring wells along the southwest perimeter of Chevalier Field. Piezometric data from

these wells indicated that groundwater moved toward the paved ditch west of Chevalier Field. Samples of groundwater from these wells and surface water from a downstream ditch were analyzed for volatile organic carbons (VOCs). No VOCs were present in groundwater samples in concentrations at or above method detection limits, although surface water samples contained low VOC concentrations. The study suggested that contaminants were very localized or had been purged from the shallow aquifer. No further inquiry was recommended for Sites 9 and 29.

1991 — Contamination Assessment/Remedial Activities Investigation

Phase I contamination assessments were conducted at 22 Installation Restoration Program sites at NAS Pensacola to identify principal areas and primary contaminants of concern at each site and to recommend any subsequent investigations. Fieldwork included site reconnaissance, surface emission surveys, particulate air screening, utilities surveys, collection of soil and groundwater samples, and hydrologic assessments. Sites 9 and 29 were included in these investigations. It should be noted that the laboratory analyses were conducted as screening *analyses* intended only to focus additional investigations. Findings were presented in Interim Data Reports for each site and are summarized below:

- **Site 9 —** The Site 9 Phase I investigation identified soil and groundwater contaminated primarily with total recoverable petroleum hydrocarbons (TRPHs) and polynuclear aromatic hydrocarbons (PAHs). Low amounts of radiation were also identified at the site. The report referred to repeated soil disturbance from grading, backfilling, and construction, and how these activities have most likely affected the redistribution of contaminants. Low concentrations of metals such as lead and arsenic were widespread. The distribution of these metals in the unsaturated zone was attributed to localized sources of contamination and redistribution of soil. Concentrations of TRPHs were identified in soil along the site's perimeter and near the point where the industrial waste sewer line crosses the site. PAHs were present at twice the detection limit at one location.

Groundwater was contaminated mostly with metals, primarily lead. The scattered distribution of elevated lead in the saturated zone was attributed to localized contaminant sources, the extensive redistribution of soil from construction and earth moving, and/or leakage from the industrial waste sewer line. Further investigation was recommended at and near Site 9.

- **Site 29** – The Site 29 Phase I investigation indicated the presence of metals, TRPHs, PAHs, and VOCs. TRPHs appeared to be limited to soil in the northern area of the site and along the section of the industrial waste sewer line passing through the site. The northern concentration of TRPHs indicated a potential local source of contaminants. PAHs present in a single sample from the eastern part of the site also suggested a local contaminant source. Higher concentrations of metals were in groundwater samples collected along the sewer line than in samples from other locations on the site. However, arsenic was present above Florida Primary Drinking Water Standards (FPDWS) in a groundwater sample from the southern edge of the site. Methylene chloride from an unknown source was present in a groundwater sample from the western part of the site. The report concluded that further investigation was required at and near Site 29.

1992 – Data Summary/Preliminary Scoping Report for Ecological Assessment Work Plans

This report documented data for the scoping of work plans and outlined the need for risk assessment studies at various sites including Bayou Grande. Sites 9 and 29 were among 11 contributing sources that potentially discharge into the Bayou Grande yacht basin via groundwater migration and surface runoff. The report suggested that an ecological risk assessment was warranted for the yacht basin due to the high risk quotients associated with contaminants in the sediments, surface waters, and multiple contributing sources.

1994 – Phase I/II Remedial Investigation for Sites 9 and 29

The OU 6 remedial investigation (RI) occurred several months before the NADEP facilities at Chevalier Field were demolished and the NATTC was built. Analytical data for soils at these sites were initially compared to risk-based, surface soil preliminary remediation goals (PRGs) exclusively. Analytical data for each site are summarized below:

- **Site 9 –** Site 9 contained localized concentrations of arsenic and manganese above PRGs in soil. In soil in the site's central portion, apparently near the former dump, inorganics and PAHs exceeded PRGs. Isolated soil PAH constituents were found in other places onsite and were attributable to pavement runoff, nearby road construction, and vehicle activity. Pesticide constituents were localized in soil in a manner consistent with surface application. Groundwater contained inorganic constituents above PRGs (but mostly below NAS Pensacola groundwater reference concentrations) consistent with the general quality of groundwater at NAS Pensacola and the Sand-and-Gravel aquifer in southern Escambia County. No PAHs or pesticides were detected in site groundwater. An isolated lead exceedance in groundwater during the first sampling phase was not confirmed in a subsequent sample.

- **Site 29 –** Site 29 soil contained localized manganese concentrations exceeding its PRG in soil. Localized surface and subsurface soil dieldrin and PAH contamination was determined to result from previous grading, backfilling and construction (and consequent soil redistribution) in the area. Groundwater contained ubiquitous inorganic constituents as Site 9 did. Cyanide was also detected above its primary drinking water standard in a single groundwater sample on the south side of the site but did not exceed its drinking water standard during a subsequent resampling. The cyanide did not appear to be related to any soil source at the site, and no history of cyanide existed where this constituent was

found. An isolated dieldrin exceedance in groundwater during the first sampling phase was not confirmed by a subsequent sample.

The soil and groundwater contamination on these sites was considered delineated. The main areas of soil contamination for each site (pre-interim removal) included: (1) the presumed former dump at Site 9, and (2) dieldrin and PAH contamination at Site 29. No correlation was determined between the distribution and inorganic concentrations above PRGs in soil and inorganics above PRGs in groundwater. Groundwater concentrations were typically below NAS Pensacola reference concentrations. Also, comparison with groundwater inorganics at other NAS Pensacola sites did not indicate anything unusual. Further delineation and assessment in the area surrounding Sites 9 and 29 were considered unwarranted. Because of the subsequent removals, an FS detailing suggested remedial alternatives was not completed, and no further action was recommended.

1995 – Interim Removal Actions

To accommodate the BRAC construction scheduled to begin on Chevalier Field in early 1995, several soil interim removal actions were performed on Sites 9 and 29 commensurate with NADEP demolition and new construction work. These interim soil removals are described in the Soil Removal Summary Report. The removal actions are briefly summarized as follows:

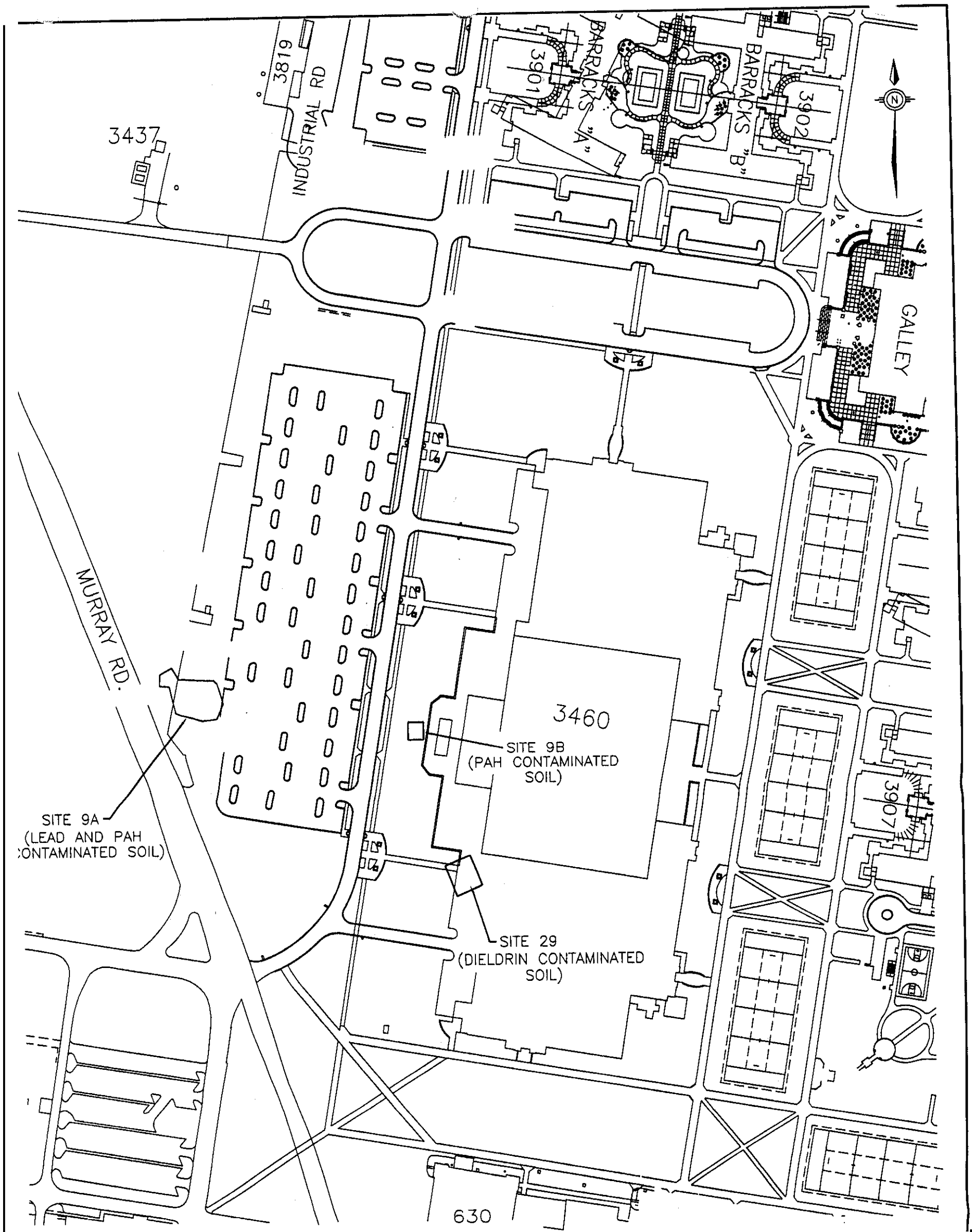
- Site 9 – This site was divided into two areas for removal, Sites 9A (lead and PAH contamination in the west-central portion of the site), and 9B (PAH contamination in and around boring location 09S06). Approximately 215 cubic yards (cy) of PAH-contaminated soil was excavated from Site 9B. The removal at Site 9A was conducted in January 1998. Currently, Site 9A is in a landscaped area between the parking lot of the Consolidated Training School, and the drainage ditch west of the site. Site 9B lies beneath concrete adjacent to the air conditioning cooling towers for the school.

- **Site 29** – About 422 cy of dieldrin-contaminated soil was removed from this site. Currently, Site 29 lies beneath the foundation of the Consolidated Training School's south wing.

Figure 2-1 shows the location of the OU 6 Interim Soil Removals. Post-removal confirmation samples collected from Site 9B (the area in and around boring 09S06) showed only dieldrin slightly above the USEPA soil screening level (SSL). No PAHs above PRGs were found in the confirmation samples. At Site 29, confirmation samples revealed dieldrin above the SSL at two locations. Note, however, that no dieldrin was found in groundwater samples from Site 29.

1998 – Interim Removal Actions

The interim removal action for Area 9A was conducted in January 1998 when an estimated 802 tons of lead and PAH-contaminated soil were excavated from this area. Confirmation samples collected at the extent of the excavation indicated that the soil remaining were below PRGs.



LEGEND

SITE – INTERIM SOIL REMOVAL LOCATION

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RECORD OF DECISION
OU 6
NAS PENSACOLA

FIGURE 2–1
INTERIM SOIL REMOVAL LOCATIONS

DWG DATE: 12/05/97 DWG NAME: 7ORODISF

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Throughout the site's history, the community has been kept abreast of activities in accordance with CERCLA Sections 113(k)(2)(B)(i-v) and 117. In January 1989, a Technical Review Committee (TRC) was formed to review recommendations for and monitor the investigation and remediation progress at NAS Pensacola. The TRC was made up of representatives of the Navy, USEPA, Florida Department of Environmental Regulation, and the local community. In addition, a mailing list of interested community members and organizations was established and maintained by the NAS Pensacola Public Affairs Office. In July 1995, a Restoration Advisory Board (RAB) was established as a forum for communication between the community and decision-makers. The RAB absorbed the TRC and added members from the community and local organizations. The RAB members work together to monitor progress of the investigation and to review remediation activities and recommendations at NAS Pensacola. RAB meetings are held regularly, advertised, and are open to the public.

Before the removal action occurred at Site 17, a public notice was placed in the ***Pensacola News Journal*** on January 8, 1998. After finalizing the RI, the preferred alternative for OU 6 was presented in the Proposed Remedial Action Plan, also called the Proposed Plan. Everyone on the NAS Pensacola mailing list was sent a copy of the Proposed Plan. The notice of availability of the Proposed Plan, RI, and FFS documents was published in the ***Pensacola News*** Journal on December 11, 1997. A public comment period was held from December 8, 1997 to January 22, 1998 to encourage public participation in the remedy-selection process. In addition, the opportunity for a public meeting was provided during the comment period. Responses to comments received during the comment period are contained in Appendix B.

4.0 SCOPE AND ROLE OF THE OPERABLE UNIT

This selected remedy is the first and final remedial action for the site. The no-action alternative is selected for **OU** 6 due to the lack of any unacceptable risk to human health or the environment. This is the **only** Record of Decision **(ROD)** contemplated for **OU** 6. **OU 6,** which consists of Sites 9 and 29, is one of 13 operable units within NAS Pensacola. The purpose of each operable unit is defined in the *FY* 1997 ***Site Management Plan*** **(SOUTHNAVFACENGCOM,** ***1996)*** for **NAS** Pensacola, which is in the administrative record. Separate investigations and assessments are being conducted for the other operable units at **NAS** Pensacola in accordance with **CERCLA.** Therefore, this **ROD** applies only to OU 6.

5.0 SITE CHARACTERISTICS

This section of the ROD presents an overview of the nature and extent of post-removal contamination at OU 6 with respect to known or suspected sources of contamination, types of contamination, and affected media. This discussion presents original sampling locations and compares the analytical results to current PRGs. Known or potential routes of contaminant migration also are discussed.

5.1 Nature and Extent of Contamination

The OU 6 area has been subject to extensive demolition and construction since the 1994 field investigation. Before construction, areas of contaminated soil discovered during the field investigation were subjected to interim removal actions. Even though different portions of the site were graded, backfilled, paved, sodded, and constructed over, original surface soil sample results were compared to surface soil PRGs. This was done regardless of whether any particular sampling location was covered by fill, sod, pavement, or construction. This discussion does not, however, include borings within areas subject to interim removals. These areas were considered remediated as described in Section 2, above.

Comparison to PRGs

The following general and site-specific PRGs were used for the current conditions comparison:

Soil

- USEPA risk-based concentrations (RBCs) soil ingestion scenario for residential soil (surface soil) and SSLs transfer scenario from soil to groundwater (subsurface soil)

- Florida Department of Environmental Protection (FDEP) Selected Cleanup Goals (CGs), considering residential cleanup goals for surface soil, and leachability goals (CGLs) for subsurface soil

- USEPA, Office of Solid Waste and Emergency Response draft, revised, ***Interim Soil Lead Guidance***

Groundwater

- USEPA Maximum/Secondary Maximum Contaminant Levels (MCLs/SMCLs)
- USEPA Tapwater RBCs
- FPDWS/FSDWS and Florida Groundwater Guidance Concentrations (FGGC)

Sediment

- USEPA Sediment Screening Values
- FDEP Sediment Quality Assessment Guidelines (SQAGs), Threshold Effects Levels

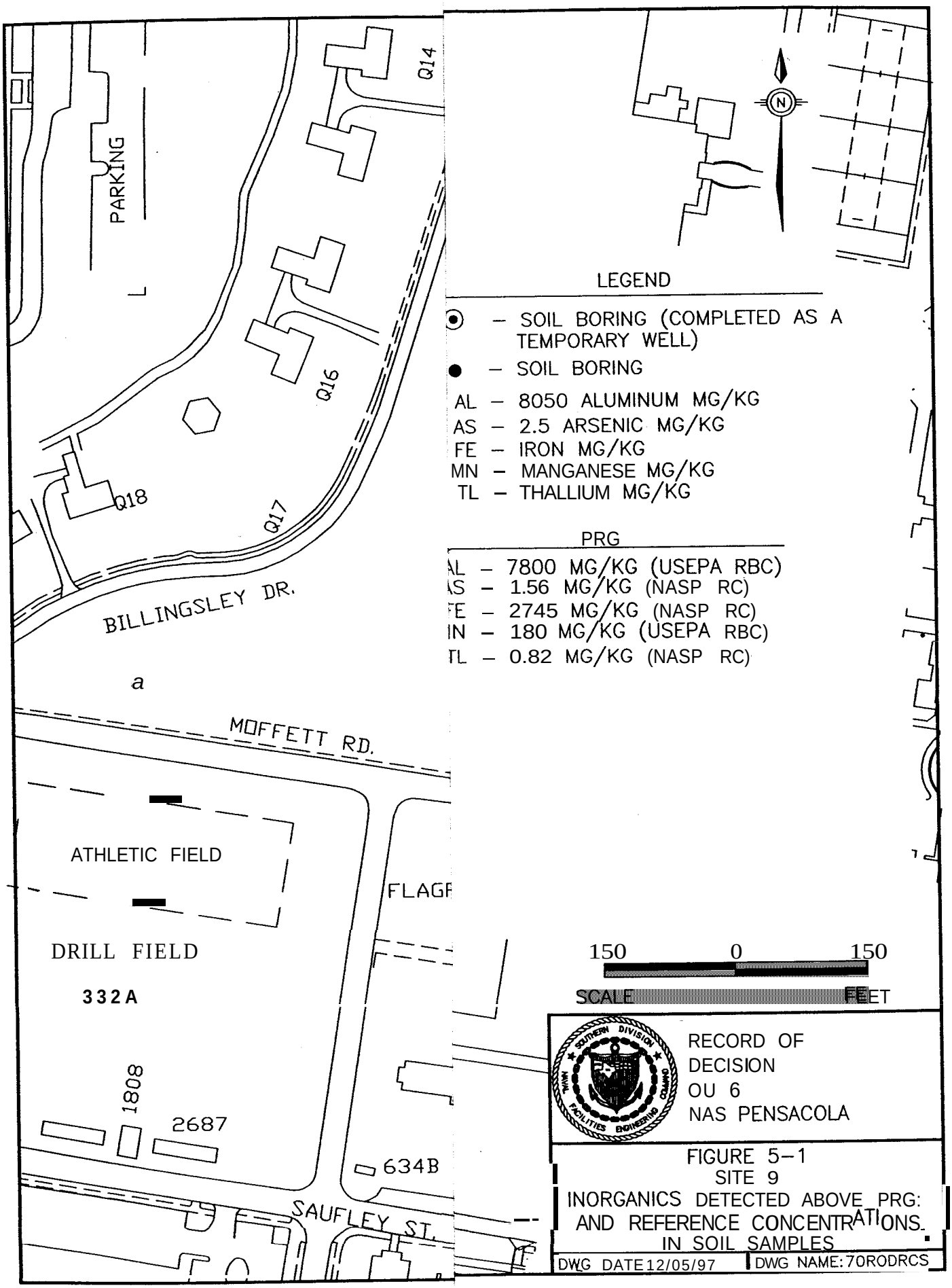
In addition, soil and groundwater were compared to NAS Pensacola-specific reference concentrations, developed by the Navy during the Site 1 investigation. These concentrations are equal to two times the detected mean for any given parameter.

5.1.1 Site 9

5.1.1.1 Soil Contamination Assessment

Figure **5-1** diagrams soil inorganics that exceeded PRGs and reference concentrations detected at Site 9. Surface soil constituents above these standards include aluminum, arsenic, iron, manganese, and thallium. Aluminum at boring 09S04 (8,050 mg/kg) and thallium at boring 09S20 (1 mg/kg) each exceeded their lowest PRGs and reference concentrations.

Only two arsenic concentrations above PRGs (borings 09S02 and 09S04), were also above the NAS Pensacola reference concentration for arsenic (1.56 mg/kg). Three of the four iron concentrations above PRGs (borings 09S02, 09S04, and 09S07) also exceeded the iron reference concentration (2,745 mg/kg).


PARKING
Q14
Q16
Q17
Q18
BILLINGSLEY DR.
MOFFETT RD.
ATHLETIC FIELD
DRILL FIELD
332A
FLAGP
1808
2687
634B
SAUFLEY ST.
N
LEGEND
– SOIL BORING (COMPLETED AS A TEMPORARY WELL)
– SOIL BORING
AL – 8050 ALUMINUM MG/KG
AS – 2.5 ARSENIC MG/KG
FE – IRON MG/KG
MN – MANGANESE MG/KG
TL – THALLIUM MG/KG
PRG
AL – 7800 MG/KG (USEPA RBC)
AS – 1.56 MG/KG (NASP RC)
FE – 2745 MG/KG (NASP RC)
IN – 180 MG/KG (USEPA RBC)
TL – 0.82 MG/KG (NASP RC)
150 0 150
SCALE FEET
RECORD OF DECISION
OU 6
NAS PENSACOLA
FIGURE 5-1
SITE 9
INORGANICS DETECTED ABOVE PRG: AND REFERENCE CONCENTRATIONS IN SOIL SAMPLES
DWG DATE 12/05/97
DWG NAME: 7ORODRCS

Organics

Figure 5-2 diagrams soil organics detected above PRGs on Site 9. Boring 09S17 had surface soil benzo(a)pyrene above the PRG, and subsurface benzo(a)anthracene, chrysene, and phenanthrene above either the SSL or CGL. The boring location has been covered by approximately 2 feet of fill and a road. The benzo(a)pyrene detection is below its subsurface PRG.

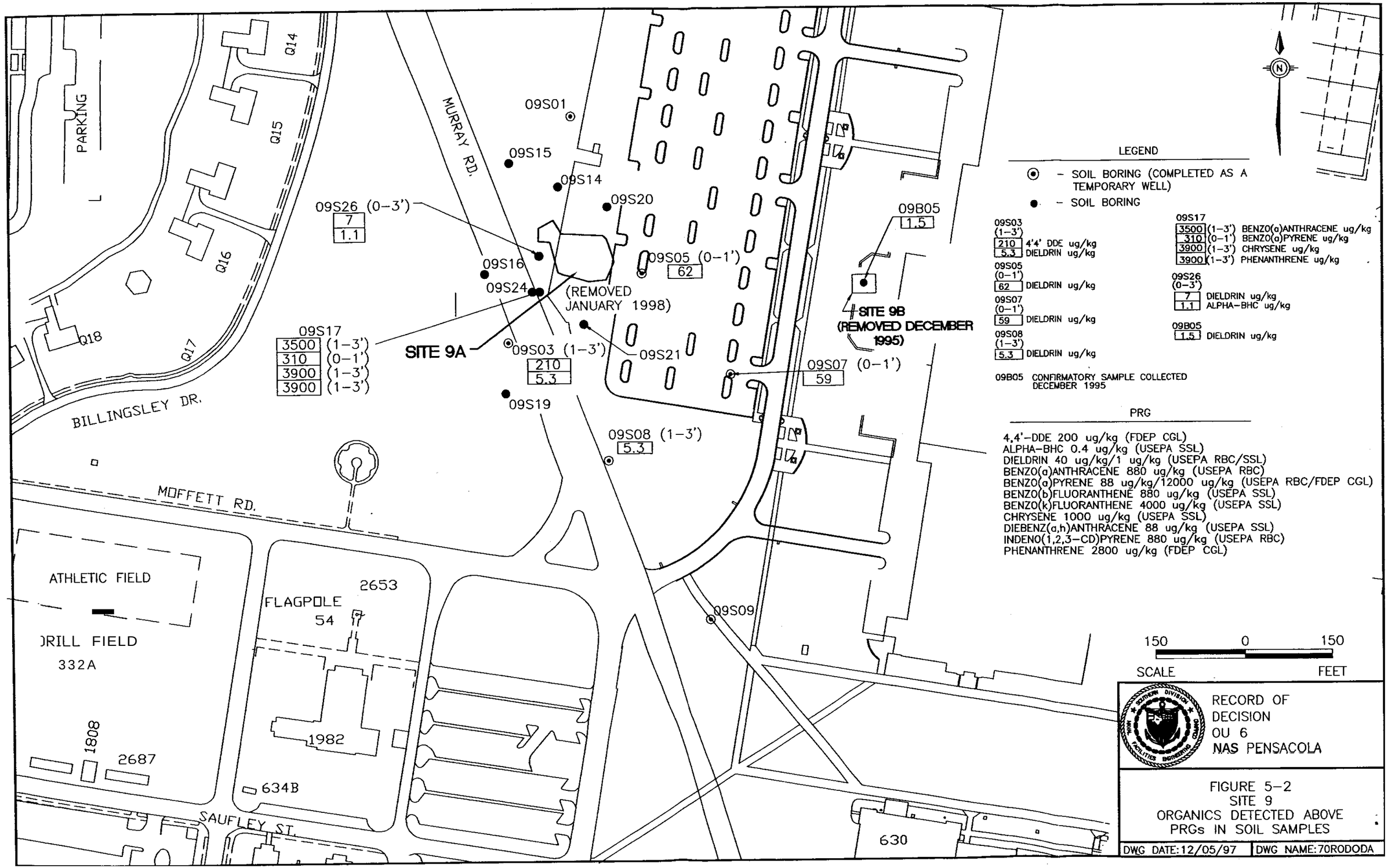
Pesticide constituents above PRGs are surface soil dieldrin above the **RBC** at borings 09S05 and 09S07. Subsurface pesticides, including dieldrin, **4'4'-** DDE, and alpha-BHC above either the SSL or CGL, are widely distributed among several borings, however, the parameters were not detected in groundwater indicating that the concentrations in soil are protective of groundwater.

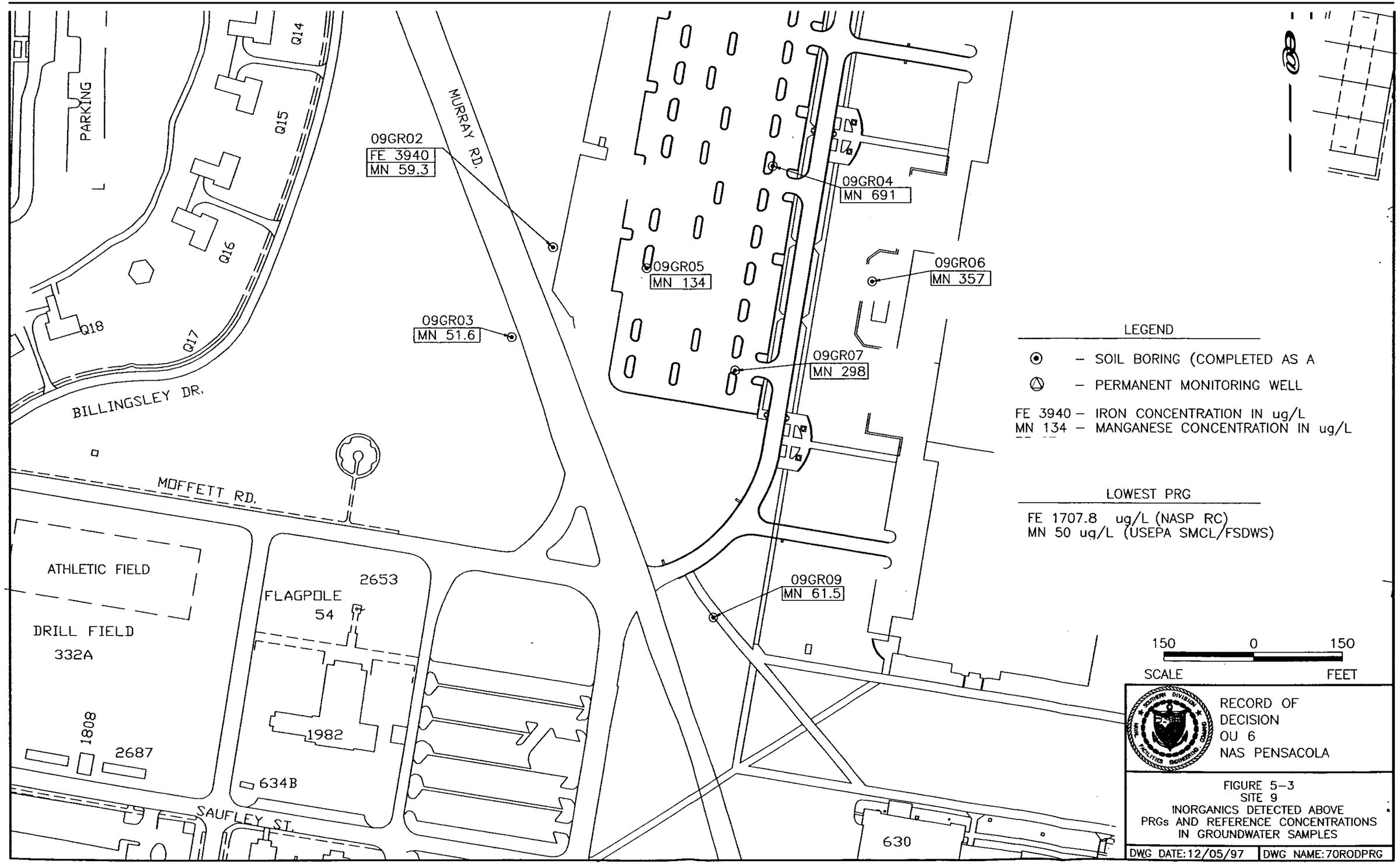
5.1.1.2 Groundwater Contamination Assessment

Analysis of groundwater samples collected at Site 9 revealed certain inorganic constituents above groundwater PRGs. No organic compounds were detected above standards.

Inorganics

Figure 5-3 maps inorganics exceeding PRGs and reference concentrations in Site 9 groundwater. Though aluminum exceeded the SMCL/FSDWS (50-200 μg/L) in nine Phase I groundwater samples (ranging from 258 μg/L to 2,050 μg/L), none of these concentrations exceeded the NAS Pensacola groundwater reference concentration for aluminum (3,882.8 μg/L). Likewise, 10 Phase I groundwater samples also exceeded secondary standards for iron (300 μg/L). However, nine samples (ranging from 318 to 1,300 μg/L) were below the NAS Pensacola both the PRG and reference concentration. Manganese exceeded both the PRG (50 μg/L) and reference concentration (22 μg/L) in seven Phase I groundwater samples (ranging from 59.3 to 691 μg/L). Lead exceeded its MCL/FPDWS (15 μg/L) at a single sampling location (09GR02) at a concentration of 27 μg/L. During the Phase II investigation, temporary well 09GR02 was


PARKING
Q14
Q15
Q16
Q17
Q18
BILLINGSLEY DR.
MURRAY RD.
MOFFETT RD.
SAUFLEY ST.
ATHLETIC FIELD
DRILL FIELD
332A
FLAGPOLE
54
2653
1982
1808
2687
634B
630
09S01
09S15
09S14
09S20
09S26 (0-3')
7
1.1
09S16
09S24
(REMOVED JANUARY 1998)
09S05 (0-1')
62
09S17
3500 (1-3')
310 (0-1')
3900 (1-3')
3900 (1-3')
SITE 9A
09S03 (1-3')
210
5.3
09S21
09S19
09S08 (1-3')
5.3
09S09
09B05
1.5
SITE 9B
(REMOVED DECEMBER 1995)
09S07 (0-1')
59
N
LEGEND
- SOIL BORING (COMPLETED AS A TEMPORARY WELL)
- SOIL BORING
09S03 (1-3')
210 4'4' DDE ug/kg
5.3 DIELDRIN ug/kg
09S05 (0-1')
62 DIELDRIN ug/kg
09S07 (0-1')
59 DIELDRIN ug/kg
09S08 (1-3')
5.3 DIELDRIN ug/kg
09B05 CONFIRMATORY SAMPLE COLLECTED DECEMBER 1995
09S17
3500 (1-3') BENZO(a)ANTHRACENE ug/kg
310 (0-1') BENZO(a)PYRENE ug/kg
3900 (1-3') CHRYSENE ug/kg
3900 (1-3') PHENANTHRENE ug/kg
09S26 (0-3')
7 DIELDRIN ug/kg
1.1 ALPHA-BHC ug/kg
09B05
1.5 DIELDRIN ug/kg
PRG
4,4'-DDE 200 ug/kg (FDEP CGL)
ALPHA-BHC 0.4 ug/kg (USEPA SSL)
DIELDRIN 40 ug/kg/1 ug/kg (USEPA RBC/SSL)
BENZO(a)ANTHRACENE 880 ug/kg (USEPA RBC)
BENZO(a)PYRENE 88 ug/kg/12000 ug/kg (USEPA RBC/FDEP CGL)
BENZO(b)FLUORANTHENE 880 ug/kg (USEPA SSL)
BENZO(k)FLUORANTHENE 4000 ug/kg (USEPA SSL)
CHRYSENE 1000 ug/kg (USEPA SSL)
DIEBENZ(a,h)ANTHRACENE 88 ug/kg (USEPA SSL)
INDENO(1,2,3-CD)PYRENE 880 ug/kg (USEPA RBC)
PHENANTHRENE 2800 ug/kg (FDEP CGL)
150 0 150
SCALE FEET
RECORD OF DECISION
OU 6
NAS PENSACOLA
FIGURE 5-2
SITE 9
ORGANICS DETECTED ABOVE PRGs IN SOIL SAMPLES
DWG DATE: 12/05/97
DWG NAME: 70RODODA


PARKING
Q14
Q15
Q16
Q17
Q18
BILLINGSLEY DR.
MOFFETT RD.
MURRAY RD.
09GR02
FE 3940
MN 59.3
09GR03
MN 51.6
09GR04
MN 691
09GR05
MN 134
09GR06
MN 357
09GR07
MN 298
09GR09
MN 61.5
ATHLETIC FIELD
DRILL FIELD
332A
FLAGPOLE
54
2653
1982
1808
2687
634B
SAUFLEY ST.
630
LEGEND
– SOIL BORING (COMPLETED AS A
– PERMANENT MONITORING WELL
FE 3940 – IRON CONCENTRATION IN ug/L
MN 134 – MANGANESE CONCENTRATION IN ug/L
LOWEST PRG
FE 1707.8 ug/L (NASP RC)
MN 50 ug/L (USEPA SMCL/FSDWS)
150 0 150
SCALE FEET
RECORD OF
DECISION
OU 6
NAS PENSACOLA
FIGURE 5-3
SITE 9
INORGANICS DETECTED ABOVE
PRGs AND REFERENCE CONCENTRATIONS
IN GROUNDWATER SAMPLES
DWG DATE:12/05/97
DWG NAME:7ORODPRG

resampled for metals only to further clarify the lead contamination found in the Phase I groundwater sample from this well. Lead was not detected in the second sample.

5.1.1.3 Sediment Analysis

A single sediment sample was collected from the drainage ditch west of Site 9 to evaluate potential contaminant migration from the site to downgradient wetlands. A more complete investigation Oof this possibility will be forthcoming in the Site 41 (NAS Pensacola wetlands) investigation. All PRGs exceeded were FDEP values. Lead was present at 38.8 mg/kg in this sample. Pesticides exceeding PRGs included 4'4-DDD, 4'4-DDE, and 4'4-DDT. PAHs exceeding the PRGs were benzo(a)anthracene, benzo(a)pyrene, chrysene, fluoranthrene, and pyrene.

5.1.1.4 Summary and Conclusions – Site 9

The investigation data shows a wide distribution of pesticides slightly above SSLs or CGLs at Site 9. Most of the borings containing pesticides were in sodded areas maintained by NAS Pensacola landscaping contractors, and that the low levels of pesticides encountered appear consistent with current application. Notably, of the pesticides and PAHs exceeding standards in surface or subsurface soils at Site 9, none were detected above PRGs in site groundwater. Groundwater contamination was otherwise limited to inorganics above PRGs (secondary standards for aluminum, iron, and manganese). However, all aluminum and most iron concentrations exceeding PRGs were below the reference concentrations for these analytes. A lead concentration found in a Phase I groundwater sample was not confirmed in a subsequent resampling.

5.1.2 Site29

5.1.2.1 Soil Contamination Assessment

Organics

Figure 5-4 diagrams soil organics at Site 29 which exceeded PRGs. Subsurface dieldrin above the SSL (1 pglkg), ranging from 2.3 to 45 pglkg, was in five samples collected from the northwest portion of the site area (borings 29S08 and 29S10; confirmatory samples 29S14, 29S15, and 29317).

Inorganics

No inorganic compounds exceeded PRGs and reference concentrations in site surface or subsurface soils.

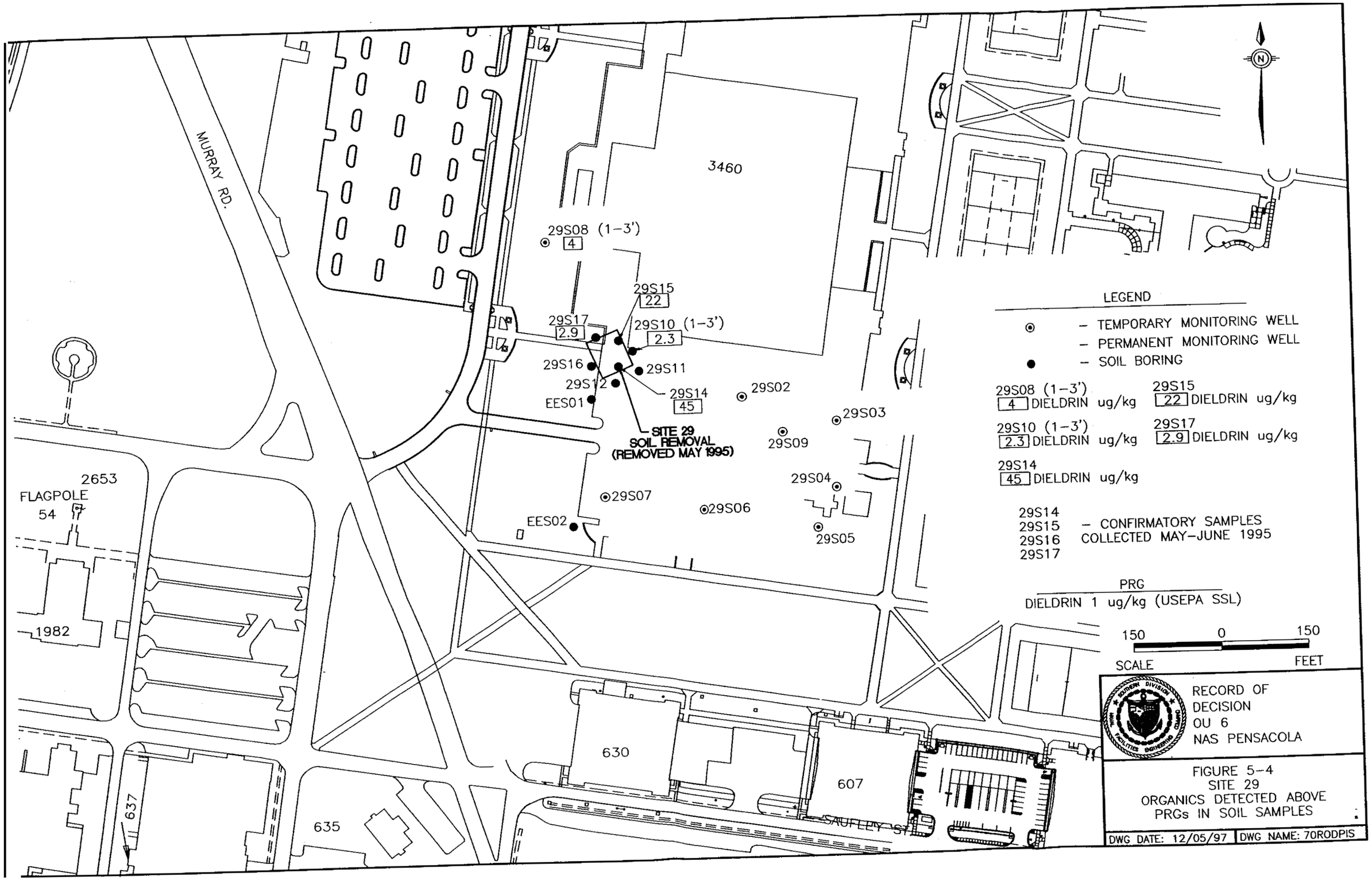
5.1.2.2 Groundwater Contamination Assessment

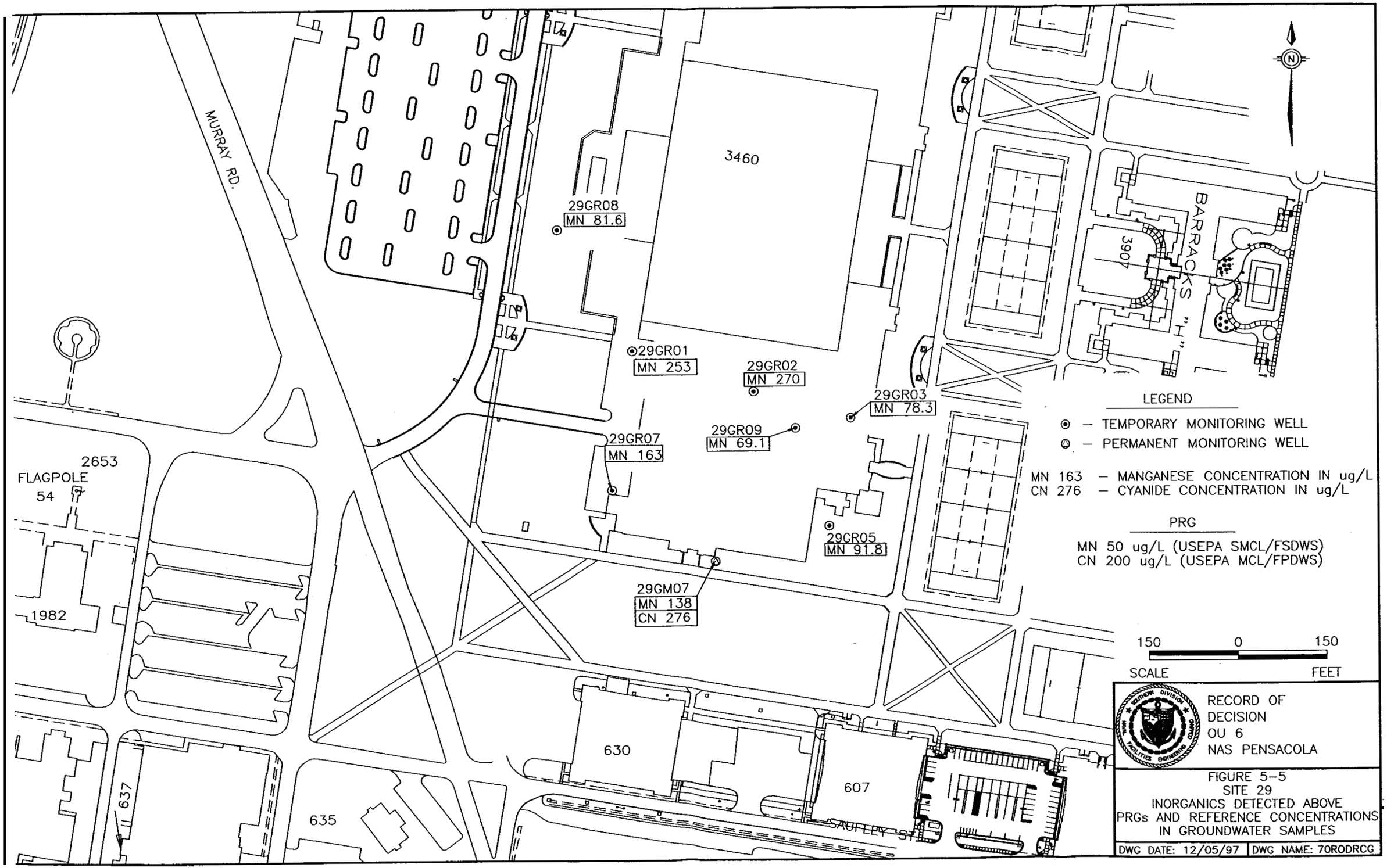
Inorganics

Figure 5-5 depicts the inorganics above PRGs and reference concentrations in Site 29 groundwater samples. Site wide, aluminum (ranging from 203 μg/L to 2,060 μg/L) exceeded the lowest PRG (50 μg/L) in seven of eleven site groundwater samples. Iron (ranging from 740 μg/L to 1,400 μg/L) exceeded the lowest PRG (300 μg/L) in three samples (29GR01, 29GR08, 29GM07). However, all aluminum and iron samples were below their respective NAS Pensacola groundwater reference concentrations. Manganese (ranging from 69.1 μg/L to 270 μg/L) exceeded the lowest PRG (50 μg/L) and groundwater reference concentration (22 μg/L) in eight of eleven site groundwater samples. Cyanide exceeded its drinking water standard (200 μg/L) in one sample location at a concentration of 276 μg/L, but the exceedance was not confirmed in a subsequent resampling when cyanide was detected at 5.2 ppb.

Organics

Dieldrin at 0.13 μg/L (above the FGGC) was in Phase I sample 29GR01. During the Phase II investigation, temporary well 29GR01 was resampled for pesticides to confirm the Phase I finding for dieldrin. No dieldrin was detected in the Phase II sample.


MURRAY RD.
3460
29S08 (1-3')
4
29S15
22
29S17
2.9
29S10 (1-3')
2.3
29S16
29S11
29S12
29S14
45
EES01
29S02
29S03
SITE 29
SOIL REMOVAL
(REMOVED MAY 1995)
29S09
29S04
29S07
29S06
EES02
29S05
2653
FLAGPOLE
54
1982
630
607
637
635
SAUFLEY ST.
N
LEGEND
– TEMPORARY MONITORING WELL
– PERMANENT MONITORING WELL
– SOIL BORING
29S08 (1-3')
4 DIELDRIN ug/kg
29S15
22 DIELDRIN ug/kg
29S10 (1-3')
2.3 DIELDRIN ug/kg
29S17
2.9 DIELDRIN ug/kg
29S14
45 DIELDRIN ug/kg
29S14
29S15
29S16
29S17
– CONFIRMATORY SAMPLES
COLLECTED MAY-JUNE 1995
PRG
DIELDRIN 1 ug/kg (USEPA SSL)
150
0
150
SCALE
FEET
RECORD OF
DECISION
OU 6
NAS PENSACOLA
FIGURE 5-4
SITE 29
ORGANICS DETECTED ABOVE
PRGs IN SOIL SAMPLES
DWG DATE: 12/05/97
DWG NAME: 70RODPIS


MURRAY RD.
3460
29GR08
MN 81.6
29GR01
MN 253
29GR02
MN 270
29GR03
MN 78.3
29GR09
MN 69.1
29GR07
MN 163
29GR05
MN 91.8
29GM07
MN 138
CN 276
3907
BARRACKS "H"
2653
FLAGPOLE
54
1982
637
635
630
607
SAUFLEY ST.
N
LEGEND
– TEMPORARY MONITORING WELL
– PERMANENT MONITORING WELL
MN 163 – MANGANESE CONCENTRATION IN ug/L
CN 276 – CYANIDE CONCENTRATION IN ug/L
PRG
MN 50 ug/L (USEPA SMCL/FSDWS)
CN 200 ug/L (USEPA MCL/FPDWS)
150 0 150
SCALE FEET
RECORD OF
DECISION
OU 6
NAS PENSACOLA
FIGURE 5-5
SITE 29
INORGANICS DETECTED ABOVE
PRGs AND REFERENCE CONCENTRATIONS
IN GROUNDWATER SAMPLES
DWG DATE: 12/05/97
DWG NAME: 70RODRCG

5.1.2.3 Summary and Conclusions – Site 29

No inorganic constituents exceeded PRGs in site soil samples. Organic soil contamination is limited to subsurface dieldrin in the northwest portion of the site. Though found in one Phase I groundwater sample, a Phase II resampling from the same well showed no dieldrin. Groundwater contamination was limited to inorganics above secondary standards (aluminum, iron, and manganese, along with one cyanide concentration that was detected below standards in a subsequent resampling). However detected concentrations are below reference concentrations for aluminum and iron.

5.2 Contaminant Migration

5.2.1 Leaching of Soil Constituents to Groundwater

Contaminant leaching from soil to groundwater may be facilitated via rainwater percolating to the water table or direct continual contact between soil and groundwater. Although soil within the site area is very permeable, resulting in quick infiltration and minimal contact time between percolating water and soil above the water table, the relative absence of most contaminants in OU 6 groundwater indicates that leaching is not significant. To facilitate the assessment of the *potential* for leaching, this section discusses parameters that exceeded both surface PRGs and subsurface PRGs (leachability-based).

Site 9

Before the 1998 interim removal action, Site 9A and vicinity contained the highest concentrations of inorganic and organic constituents above PRGs. Parameters of concern in surface soil were aluminum, antimony, arsenic, barium, cadmium, copper, iron, lead (copper and lead were considerably above PRGs), manganese, and zinc above respective PRGs and reference concentrations. Leachability PRGs were exceeded for barium, cadmium, nickel, lead and thallium in subsurface soil. Several PAH compounds were also present in subsurface soils at the site, as well as occasional subsurface soil pesticides. Groundwater samples from the nearest well

downgradient from Site 9A (09GR02) indicated the presence of aluminum, iron, and manganese, with an absence of the remaining parameters. Given that aluminum, iron, and manganese occur at significant levels under ambient conditions, it is difficult to quantify any derived from Site 9 soil. The potential for leaching of the remaining soil contaminants at harmful levels is clearly minimal.

Site 29

No soil inorganics exceeded PRGs and reference concentrations at Site 29. Phase 1 soil organics were limited to an isolated area of subsurface dieldrin above leachability PRGs, however, this area was subject to interim removal. Groundwater inorganics above PRGs were limited to aluminum, iron, and manganese, along with one cyanide exceedance that was not confirmed in a subsequent resampling. Again, without a clear soil/groundwater exceedance connection established in the analytical data, empirical evidence suggests that leaching of inorganics is not substantial.

5.2.2 Surface Water Transport

The OU 6 area contains landscaped and sodded-over sandy soil, occasional patches of open ground, and impervious surfaces, all affect the transport of surface water in different ways. Recent construction of the new training facility has resulted in increased fill, pavement, and sod over the area. This has decreased the potential for surface water contact with previous site surface soil, thus surface water transport concerns focus on stormwater drainage from paved and filled areas. Several drainage conduits receive surface runoff from the western Chevalier Field area and convey it into a channelized drainage ditch (Wetland 6) west of the site complex. Since the construction of the NATTC, much of Site 9 is now a paved parking lot and an adjacent landscaped/sodded area. Surface runoff that does not percolate through the sod cover on Site 9 is conducted toward the channelized drainage ditch west of the site area. Site 29 is now largely covered by the south wing of the NATTC's Consolidated Training School. The site also has no storm-drains or conduits for surface runoff, however the soil and groundwater are protected

beneath building foundation and surrounding pavement. Surface runoff from Site **29** is conducted across the Site 9 area, to the drainage ditch. In summary, given the construction-minimized potential for contact between surface water and previous site surface soil, surface water transport of documented surface soil constituents is negligible.

5.2.3 Groundwater Transport

The direction of groundwater flow is westerly at Site 29. Travel time for constituents directly west of Site 29 to the drainage ditch (approximately 710 feet to the west) would be about 4.7 years, assuming the rate of migration is equal to groundwater velocity of 0.410 ft/day (i.e., advective transport only). With an average calculated groundwater flow of 0.304 ft/day, constituents from the eastern portions of Site 9 would take about 5.7 years ***to*** travel roughly 630 feet to the drainage ditch. These travel times assume advective transport only. Considering retardation and dispersion (which would increase travel time and decrease endpoint concentrations), this is a very conservative transport determination.

5.3 Current and Potential Receptors

The primary receiving aquifer within the OU 6 area is the surficial zone of the Sand-and Gravel Aquifer which naturally contains aluminum and iron concentrations exceeding SMCLs/FSDWS. Because of these natural qualities, the surficial zone of the Sand-and-Gravel aquifer **is** not considered suitable as a drinking water supply without treatment for these constituents, and is currently not used as such at **NAS** Pensacola. Further, the sources for organic and lead contamination in OU-6 groundwater have been mitigated by past removal actions. However, for the purpose of identification, the ***potential*** receptors of groundwater contamination are:

- The main producing zone of the Sand-and-Gravel Aquifer, which underlies the surficial zone (separated from it by a confining unit), and **is** used as a potable water source in Escambia County.

- The tile-lined drainage ditch, also known as **NAS** Pensacola Wetland **6,** which traverses the western portion **of** the site area.

- Bayou Grande, which receives runoff from the tile-lined drainage ditch.

The low permeability clay layer between the surficial and main producing zones of the Sand-and-Gravel aquifer functions as a confining unit, and generally inhibits any downward contaminant migration into the deeper groundwater below the clay. **As** for Bayou Grande, the coastal waters of surrounding **NAS** Pensacola have been classified by FDEP as Class III water, indicating their use for recreation and maintenance of a well-balanced fish and wildlife population. **The** low concentrations of contaminants and the amount of dilution they are likely to undergo before reaching Wetland *6* and Bayou Grande minimizes their impact to nearby coastal waters. Potential ecological impacts on these receptors will be addressed in separate upcoming RI/FSs for Bayou Grande (Site 40), and the **NAS** Pensacola Wetlands (Site **41).**

6.0 SUMMARY OF SITE RISKS

Section **10** of the RI report details the results of the Baseline Risk Assessment (BRA) for OU **6** which are summarized in this section. A BRA analyzes the potential adverse effects of hazardous substance releases on actual or hypothetical human and ecological receptors should no remedial actions be taken to reduce a site's environmental contamination. This BRA is divided into two subsections — the first addresses human health risk, and the second assesses ecological risk. Those risks are summarized here.

6.1 Human Health Risk Assessment

6.1.1 Identification of Exposure Pathways

Table **6-1** identifies the potential pathways of exposure to chemicals of potential concern (COPCs) identified in shallow and intermediate groundwater and details the rationale for exposure pathway selection/rejection.

6.1.2 Identification of Chemicals of Concern (COCs)

Because of the extensive grading, filling, construction work, and soil removals in OU **6** before and during BRAC construction, no populations were identified which would be exposed to site soils other than the hypothetical site residents. However, the soil pathway is considered to be incomplete because of the cover placed on the OU **6** land surface (i.e., buildings, parking lots, clean fill covered with sod). The only population that would be exposed to site soils would be the future hypothetical site residents. The current land use is for military training. Hypothetical future site residents could be exposed ***to*** groundwater, only if the residents choose to derive potable water from a well in the surficial aquifer rather than using the existing base/municipal water supply. Only groundwater COPCs were evaluated during this assessment.

Chemicals present in site samples (CPSSs) were evaluated as potential COPCs based on their intrinsic toxicological properties, persistence, fate and transport characteristics, and cross-media transfer potential. To focus the risk assessment, reported CPSS concentrations were used

Table 6-1
Exposure Pathways Summary
NAS Pensacola OU 6 Sites

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 construction activities generally included the covering of site surface soils with clean fill, sod, concrete, asphalt paving, or buildings. Interim removal of known areas of soil contamination also occurred (removal of Site 9A is scheduled for 1997). Consequently, the soil exposure pathway is incomplete.
	Air, Inhalation of chemicals entrained in fugitive dust	No	The construction activities generally included the covering of site surface soils with clean fill, sod, concrete, asphalt paving, or buildings. Interim removal of known areas of soil contamination also occurred (removal of Site 9A is scheduled for 1997). Consequently, the soil exposure pathway is incomplete.
	Groundwater, Ingestion of contaminants during potable or general use	No	NAS Pensacola obtains potable water from an off-base source. Because of this and the propensity for salt water intrusion of the surficial aquifer at OU 6, the groundwater beneath OU 6 is currently not used as a water source.
	Groundwater, Inhalation of volatilized groundwater contaminants	No	NAS Pensacola obtains potable water from an off-base source. Because of this and the propensity for salt water intrusion of the surficial aquifer at OU 6, the groundwater beneath OU 6 is currently not used as a water source.
	Soil, Incidental ingestion	No	The construction activities generally included the covering of site surface soils with clean fill, sod, concrete, asphalt paving, or buildings. Interim removal of known areas of soil contamination also occurred (removal of Site 9A is scheduled for 1997). Consequently, the soil exposure pathway is incomplete.

Table 6-1
Exposure Pathways Summary
NAS Pensacola OU 6 Sites

Potentially Exposed Population	Medium and Exposure Pathway	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Current Land Uses			
Recreational Residents (Child and Adult)	Soil, Dermal contact	No	The construction activities generally included the covering of site surface soils with clean fill, sod, concrete, asphalt paving, or buildings. Interim removal of known areas of soil contamination also occurred (removal of Site 9A is scheduled for 1997). Consequently, the soil exposure pathway is incomplete.
Infrequent Child Trespasser	Soil, Dermal contact	No	The construction activities generally included the covering of site surface soils with clean fill, sod, concrete, asphalt paving, or buildings. Interim removal of known areas of soil contamination also occurred (removal of Site 9A is scheduled for 1997). Consequently, the soil exposure pathway is incomplete.
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. In addition, construction activities generally included the covering of site surface soils with clean fill, sod, concrete, asphalt paving, or buildings.
	Air, Inhalation of chemicals entrained in fugitive dust	No	The sand-grains, described as fine-medium grain quartz, are not respirable. In addition, construction activities generally included the covering of site surface soils with clean fill, sod, concrete, asphalt paving, or buildings.
	Groundwater, Ingestion of contaminants during potable or general use	Yes	Required to be evaluated under the National Contingency Plan.

Table 6-1
Exposure Pathways Summary
NAS Pensacola OU 6 Sites

Potentially Exposed Population	Medium and Exposure Pathway	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Future Land Uses			
Future Site Residents (Child and Adult)	Groundwater, Inhalation of volatilized contaminants during domestic use	No	Required to be evaluated under the National Contingency Plan.
	Soil, Incidental ingestion	**No**	The construction activities generally included the covering of site surface soils with clean fill, sod, concrete, asphalt paving, or buildings. Interim removal of known areas of soil contamination also occurred (removal of Site 9A is scheduled for 1997). Consequently, the soil exposure pathway is incomplete.
	Soil, Dermal contact	No	The construction activities generally included the covering of site surface soils with clean fill, sod, concrete, asphalt paving, or buildings. Interim removal of known areas of soil contamination also occurred (removal of Site 9A is scheduled for 1997). Consequently, the soil exposure pathway is incomplete.
	Wild game or domestic animals, Ingestion of tissue impacted by media contamination	**No**	Hunting/taking of game and/or raising livestock is prohibited at **NAS** Pensacola.
	Fruits and vegetables, Ingestion of plant tissues grown in contaminated media	No	The potential for significant exposure via this pathway is low. The construction activities generally included the covering of site surface soils with clean fill, sod,
Site Worker	Groundwater, Ingestion of contaminants during potable or general use	No	**NAS** Pensacola obtains potable water from an off-base source. Because of this and the propensity for salt water intrusion of the surficial aquifer at OU 6, the groundwater beneath OU 6 is currently not used as a water source.

Table 6-1
Exposure Pathways Summary
NAS Pensacola OU 6 Sites

Potentially Exposed Population	Medium and Exposure Pathway	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Future Land Uses			
Site Worker	Soil, Incidental ingestion	No	The construction activities generally included the covering of site surface soils with clean fill, sod, concrete, asphalt paving, or buildings. Interim removal of known areas of soil contamination also occurred (removal of Site 9A is scheduled for 1997). Consequently, the soil exposure pathway is incomplete.
	Soil, Dermal contact	No	The construction activities generally included the covering of site surface soils with clean fill, sod, concrete, asphalt paving, or buildings. Interim removal of known areas of soil contamination also occurred (removal of Site 9A is scheduled for 1997). Consequently, the soil exposure pathway is incomplete.

in three comparisons. First, the maximum concentrations of CPSSs detected during the June 1994 groundwater sampling round were compared to the lesser of up to four screening values: RBCs, MCLs, SMCLs, and FPDWS/FSDWS which were taken together as the groundwater PRGs for OU 6. Inorganic CPSSs with maximum detected concentrations exceeding their corresponding groundwater PRG were then compared to reference concentrations established for the OU 6 sites (see Table 6-2). Twice the reference criterion was used to compare inorganic concentrations onsite to those in reference samples. It was assumed that organic compounds were not present in these reference samples. This comparison assists in accounting for naturally occurring chemicals ubiquitous in nature such as aluminum. Finally, essential elements potentially toxic only at extremely high concentrations were compared to their respective U.S. Recommended Dietary Allowance (RDA).

Table 6-2
Reference Concentrations — Shallow Groundwater
NAS Pensacola OU 6

Chemical	01GS67 (µg/L)	01GI69 (µg/L)	01GS69 (µg/L)	01GI70 (µg/L)	Average Concentration (µg/L)	2X Average Concentration (µg/L)
Aluminum	***4,240***	146.5 U	***3,270***	109 U	***1,941.4***	***3882.8***
Arsenic	1.4 U	1.4 U	1.4 U	1.4 U	1.4	2.8
Barium	5.5 U	6.75 U	9.45 U	4.75 U	6.6	13.2
Cadmium	1.7 U	1.7 U	1.7 U	1.7 U	1.7	3.4
Calcium	17,800	5,670	6,300	5,350	8,780	17,560
Chromium	4.85 U	2.6 U	59.9	2.6 U	16.9	34
Cobalt	2.05 U	2.05 U	2.05 U	2.05 U	2.05	4.1
Copper	5.4 U	5.4 U	16.2	5.4 U	8.1	16.2
Iron	***677***	***942***	***1,770***	26.65	***853.9***	***1,707.8***
Lead	0.8 U	0.8 U	0.8 U	0.8 U	0.8	1.6
Magnesium	795 U	665 U	1,255 U	3,030	1,256.25	2,512.5
Manganese	5.7	8.9	26.7	1.55 U	11.0	22
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1	0.2
Nickel	19.95 U	19.95 U	19.95 U	19.95 U	19.95	39.9
Potassium	13,300	1,275 U	6,560	3,200	6,083.8	12,167.6
Sodium	10,700	8,350	7,830	9,810	9,172.5	18,345
Vanadium	7.9	3.75 U	3.75 U	3.75 U	4.8	9.6
Zinc	8.75 U	3.9 U	290	3.75 U	75.3	**150.6**

Notes:
µg/L = Micrograms per liter.
U = Chemical not detected, value reported equals one-half detection limit.
Bold Italics = The reported value exceeds the Florida Secondary Drinking Water Standard (FSDWS).
One-half the lowest reported detection limit or the lowest positive detection, whichever was lower, was used in the calculation of the average concentration.
Shallow and intermediate well results were combined to evaluate shallow groundwater reference.
Monitoring wells 01GS67 and 01GS69 (shallow depth) and 01GI68/69 and 01GI70 (intermediate depth) were resampled using low-flow purge methods to reduce turbidity suspected to have been a source for elevated metal concentrations in the initial groundwater reference sampling round.

Tables **6-3** and **6-4** list the Sites **9** and 29 maximum detected concentrations **of CPSSs** in shallow groundwater with their corresponding chemical-specific concentrations, as well as the PRGs and reference criteria. **CPSSs** that exceed the lowest of the **PRGs** and reference concentrations are denoted with the symbol **"*"** next to the chemical name, to identify them as **COPCs. CPSSs** with concentrations below these criteria are eliminated from further consideration in the BRA and are denoted in the tables by the numerical symbols of "1," and "2," respectively. **A COPC** carried through the risk assessment process becomes a **COC** if it contributes: **(1)** to a pathway that exceeds a 10^{-6} incremental lifetime cancer risk **(ILCR);** or (2) a hazard index **(HI)** greater than 1 for any exposure scenario; or **(3)** has an individual risk greater than 10^{-6} or hazard quotient **(HQ)** greater than 0.1.

As indicated in Table **6-3,** arsenic, lead, and manganese were identified as **COPCs** in Site 9 groundwater. Sites 29's screening evaluation, shown in Tables 6-4, identified cyanide, dieldrin, and manganese as **COPCs** for Site 29. These chemicals were further evaluated in this risk assessment.

Table 6-3
Chemicals Detected in Site 9 Groundwater

Chemical	Frequency of Detection	Range of Detected Concentrations	Average of Detected Concentrations	Screening Value	Source	Reference Concentration	Notes
Aluminum	10/12	221 - 2,050	606	3,800	RBC r	3,882.8	1 2
*Arsenic	2/12	6.6 - 10.2	8.4	0.038	RBC r	2.8	
Barium	9/12	15.4 - 129	41	260	RBC r	13.2	1
Calcium	12/12	3,600 - 36,100	15,618	NA		17.560	
Copper	4/12	4.6 - 5.9	5.5	140	RBC r	16.2	1 2
Iron	11/12	318 - 3,940	1,239	NA		1,707.8	
*Lead	8/12	2 - 27	6	15	TT	1.6	
Magnesium	12/12	1,340 - 5,210	2,574	NA		2,512.5	
*Manganese	12/12	10.8 - 691	147	18	RBC r	22	
Potassium	12/12	601 - 2,550	1,555	NA		12,167.6	2
Selenium	2/12	5.2 - 6.1	5.65	18	RBC r	NA	1
Sodium	12/12	2,430 - 20,000	8,054	NA		18,345	
Zinc	10/12	11 - 75.1	40.74	1,100	RBC r	150.6	1 2

Notes:

*	=	Retained as a chemical of potential concern based on comparison to the most conservative screening tool.
1	=	Does not exceed the screening value.
2	=	Does not exceed the reference concentration.
CG and/or RBC	=	Residential screening value from FDEP or USEPA Region III Screening Concentration Table (March 1994).
TT	=	Treatment technique action level for lead in tap water.
r	=	Residential Risk Based Screening Value.
CG	=	FDEP Residential Soil Screening Value; excerpted from July 1994 CG table.

Table 6-4
Chemicals Detected in Site 29 Groundwater

Chemical	Frequency of Detection	Range of Detected Concentrations	Average of Detected Concentrations	Screening Value	Source	Reference Concentration	Notes
Aluminum	7/10	203 - 2,060	704	3,800	RBC r	3,882.8	1 2
Barium	1/10	53.6	53.6	260	RBC r	13.2	1
Calcium	10/12	19,900 - 36,900	30,200	NA		17,560	
*Cyanide	1/10	216	216	73	RBC r	NA	
*Dieldrin	1/11	0.13	0.13	0.0042	RBC r	NA	
Iron	8/10	39.1 - 1.400	521	NA		1,707.8	2
*Lead	4/10	4.1 - 9.2	6.4	15	TT	1.6	1
Magnesium	10/10	631 - 1,840	1,212	NA		2,512.5	2
*Manganese	8/10	69.1 - 270	143	18	RBC r	22	
Potassium	10/10	1.250 - 15,600	1,461	NA		12,167.6	
Silver	1/10	3.9	3.9	18	RBC r	NA	1
Sodium	10110	2,210- 10,000	5,243	NA		18,345	2
Vanadium	9/10	4.4 - 7.6	6.2	26	RBC r	9.6	1 2
zinc	5/10	4.2 - 22.1	1.33	1.100	RBC r	150.6	1 2

Notes:
* = Retained as a chemical of potential concern based on comparison to the most conservative screening tool.
1 = Does not exceed the screening value.
2 = Does not exceed the reference concentration.
CG and/or RBC = Residential screening value from FDEP or USEPA Region III Screening Concentration Table (March 1994).
TT = Treatment technique action level for lead in tap water.
r = Residential Risk Based Screening Value.
CG = FDEP Residential Soil Screening Value; excerpted from July 1994 CG table.

6.1.3 Carcinogenicity and Noncancer Effects

The **USEPA** has established a classification system for rating the potential carcinogenicity of environmental contaminants based on the weight of scientific evidence. The cancer classes are described below. Cancer weight-of-evidence class "**A**" (human carcinogens) means that human toxicological data have proven a correlation between exposure and the onset **of** cancer. The "B1" classification indicates some human exposure studies have implicated the compound as a probable carcinogen. Weight-of-evidence class "B2" indicates a possible human carcinogen, a description based on positive laboratory animal data (for carcinogenicity) in the absence of human data. Weight-of-evidence class "C" identifies possible human carcinogens, and class "D" indicates a compound not classifiable with respect to its carcinogenic potential. The **USEPA** has established slope factors (SF) 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. **A** chronic RfD is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure concentration for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime." These toxicological values are used in risk formulae to assess the upper-bound level of cancer risk and noncancer hazard associated with exposure to a given concentration of contamination.

For carcinogens, the potential **risk** posed by a chemical is computed by multiplying the chronic daily intake (CDI [as mg/kg-day]) by the SF (in reciprocal mg/kg-day). The hazard quotient (for noncarcinogens) is computed by dividing the CDI by the RfD. The **USEPA** has set standard limits (or points of departure) for carcinogens and noncarcinogens to evaluate whether significant risk is posed by a chemical (or combination of chemicals). For carcinogens, the point-of-departure

range is 10^{-6}, with a generally accepted range of 10^{-4} to 10^{-6}. These risk values correlate with 1 in 10,000 and 1 in 1,000,000 excess incidence of cancer resulting from exposure to xenobiotics (all pathways). The FDEP risk threshold is 10^{-6}.

For noncarcinogens, 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 noncancer 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 BRA has taken the universal summation approach for each class of toxicant. The FDEP hazard threshold is 1.

Critical studies used in establishing toxicity classifications by USEPA are shown in the Integrated Risk Information System (IRIS) database (primary source) and/or Health Effects Assessment Summary Tables (HEAST) Fiscal Year 1994 (secondary source). In addition, the USEPA Region 111, Risk-based Concentration Tables, Third Quarter 1994, contained toxicological values not listed in primary or secondary sources. Where applicable, these values were also included in the database for this BRA. Table 6-5 summarizes toxicological data in the form of RfDs and SFs obtained for each COPC identified in OU 6 shallow and intermediate groundwater.

6.1.4 Risk Summary

The human health risk associated with exposure to environmental media at NAS Pensacola OU 6 was assessed for hypothetical future site residents. Extensive grading, backfilling, paving, and construction, along with the interim removal of contaminated soils occurred at these sites as a result of BRAC construction. Therefore, no soil exposure pathway is complete at OU 6, and soil exposure was not addressed in this BRA.

Table 6-5
Toxicological Database Information for NAS Pensacola, OU 6
Pensacola, Florida

[	Oral Reference Dose (g kg/ y)	Oral Cancer Slope Factor [(mg/kg/day)]-1	Cancer Classificatio	Uncertainty Factor/Modifying Factor Oral
Arsenic	0.0003 [a]	1.75 [a]	A	1000 / 3
Cadmium	0.0005 [a]	NA	D	10 / 1
Cyanide	0.02 [a]	NA	D	100 / 5
Dieldrin	0.00005 [a]	16	B2	100 / 1
Lead	NA	NA	B2	NA
Manganese	0.005 [a]	NA	NA	1 /1
Naphthalene	0.04 [d]	NA	D	see note ([d])

Notes:
ARARs for the COPCs above are discussed in Section **6.1.6.**

a	=	Integrated Risk Information System (IRIS)
b	=	Oral reference dose provided in a meeting with Julie Keller, USEPA Region IV Office of Health Assessment
c	=	Environmental Criteria and Assessment Office (ECAO)
d	=	This reference dose has been withdrawn from IRIS/HEAST; the uncertainty and modifying factors are unknown
NA	=	Not applicable
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

The theoretical future risk posed by arsenic at Site **9** ($1x10^{-4}$) exceeds the FDEP and USEPA point of departure ($1x10^{-6}$). However, the maximum groundwater concentrations reported for arsenic at Sites 9 and 29 do not exceed the ARAR, 0.05 mg/l (MCL/FPDWS). The only reported concentration for dieldrin (0.00013 mg/l) is approximately equal to the FDEP ARAR (0.0001), and this compound was not detected in the confirmatory sampling effort.

Although the calculated risk exceeds the FDEP and USEPA threshold, the frequency of detection of dieldrin and comparison of reported concentrations to ARARs support a no-action conclusion for groundwater based on risk.

The shallow/intermediate groundwater pathway hazard indices were found to be **9** and **4** for the future child resident and **4** and 2 for the adult at Sites 9 and 29. The primary contributor to hazard at all sites is manganese. However, it is important to note that the future land use of these sites will be that of a military operations school and training facility. The aquifer is not used as a potable or nonresidential water supply, and will not be used based on the Navy's future plans for the sites. It should also be noted that the contaminants which resulted in the risk values discussed above are all contained in water table wells and are not found in wells screened in the deeper zones within which any future potable water wells would also be expected to be screened. Finally, water for the military operations school is supplied by Corry Station. Based on the lack of aquifer usage, no further action is recommended for groundwater at the **OU 6** sites.

6.1.5 Remedial Goal Options

Remedial goal options (RGOs) are chemical concentrations computed to equate with specific risk and/or hazard goals that may be established for a particular site. Based on the algorithms described in this risk assessment, COCs were identified which required calculation of RGOs. **In** accordance with USEPA Supplemental RGO Guidance, RGOs were calculated at $1x10^{-4}$, $1x10^{-5}$, and **1x10"** risk levels for carcinogenic COCs and **HQ** goals of 10, **1,** and 0.1 for noncarcinogenic COCS. RGOs for carcinogens were based on the lifetime weighted average, and RGOs for noncarcinogens were based on the child exposure assumptions.

Shallow/Intermediate Groundwater RGOs

Tables **6-6** and **6-7** provide RGOs for the shallow/intermediate groundwater ingestion pathway for Sites 9 and 29. As shown in the tables, the RGOs for arsenic and dieldrin are below the ARAR. In addition, the RGOs based on a hazard quotient of **1** are slightly above ARARs for manganese and cyanide. However, the cyanide concentration decreased to below the ARAR in a subsequent resampling.

6.2 Ecological Risk Assessment

The purpose of the ecological risk assessment is to assess the actual or potential effects to ecological receptors due to contamination at the OU **6** sites.

OU **6** is within the confines of the southwest portion of the former Chevalier Field. The general area mostly encompasses the NATTC in the vicinity of the Consolidated Training School, and the entry promenade to the NATTC. No natural plant or animal habitats are present onsite, which consists of weedy, ruderal habitat outside **of** developed or landscaped areas. During the work week, the area is heavily trafficked by people on foot and by vehicles. The shoreline of Pensacola Bay lies approximately 2,700 feet east of the site's center, and shore birds are often observed near Chevalier Field. These sightings are normally associated with wetlands east of Chevalier Field, and the drainage ditch to the west. However, this does not mean that shorebirds do not visit the site area during periods of reduced human activities (i.e., weekends and after working hours). The lack of natural habitat within the OU **6** area will likely limit faunal use of the immediate area.

The Ecological Risk Assessment in the RI report did not identity any unacceptable ecological risk at or resulting from OU **6.** Further, Wetland **6,** downstream wetlands, and Bayou Grande will be screened in depth during the Sites 40 and **41** investigations. These investigations are expected to more thoroughly study the nature and extent of contamination in the Wetland 6 and downstream areas, and confirm if the OU *6* sites are sources contributing to potential contamination there.

Table 6-6
Remedial Goal Options for Site 9 Groundwater COCs

	Risk-Based RGOs			Hazard-Based RGOs						
Chemical	**1E-4**	**1E-5**	**1E-6**	**10**	**1**	**0.1**	**Exposure** Point **Concentration**	Reference **Concentration**	**ARAR**	**Source**
Arsenic	0.0038	0.00038	0.000038	0.047	0.0047	0.00047	0.0049	0.0028	0.05	MCL/FPDWS
Manganese	NA	NA	NA	0.78	0.078	0.0078	0.605	**0.022**	0.05	SMCL/FSDWS

Notes:
RGO = Remedial Goal Option
MCL = Maximum Contaminant Level
FPDWS = Florida Primary Drinking Water Standard
FSDWS = Florida Secondary Drinking Water Standard
SMCL = Secondary Maximum Contaminant Level
NA = Not Applicable
– Risk-based RGOs are based on the lifetime weighted average adult and child exposure.
– Hazard-based RGOs are based on childhood exposure.

Table 6-7
Remedial Goal Options for Site 29 Groundwater COCs

	Risk-Based RGOs			Hazard-Based RGOs						
Chemical	1E-4	1E-5	1E-6	10	1	0.1	Exposure Point Concentration	Reference Concentration	ARAR	Source
Cyanide	NA	NA	NA	3.129	0.3129	0.03129	0.248	NA	0.2	MCL/FPDWS
Dieldrin	0.00042	4.2E-05	4.2E-06	0.00782	0.000782	7.82E-05	4.6E-05	NA	0.1	FDEP (carc)
Manganese	NA	NA	NA	0.78	0.078	0.0078	0.27	0.022	0.05	SMCL/FSDWS

Notes:
RGO = Remedial Goal Option
MCL = Maximum Contaminant Level
FPDWS = Florida Primary Drinking Water Standard
FSDWS = Florida Secondary Drinking Water Standard
SMCL = Secondary Maximum Contaminant Level
NA = Not Applicable
FDEP (carc) = carcinogenic value calculated for FDEP.
– Risk-based RGOs are based on the lifetime weighted average adult and child exposure,
– Hazard-based RGOs are based on childhood exposure.

7.0 THE SELECTED REMEDY

Based upon consideration of the requirements of **CERCLA,** the NCP, the human health and ecological risks associated with **OU 6,** and public and state comments, the Navy has selected the no-action alternative as the preferred remedial action alternative for OU **6.** Based on the results of the RI and baseline risk assessment, no remedial action is necessary to control residual risks associated with OU **6** because of the lack of groundwater usage. Due to interim removals conducted for BRAC construction at the site, existing conditions (i.e., buildings, parking lots, fill, and sod) are protective of human health and the environment. In addition, the selected alternative attains all federal and state ARARs, except for manganese, is cost-effective, and uses permanent solutions to the extent practicable. The shallow groundwater is not used as a potable source because better quality water is available from the Main Producing Zone and there is a potential for salt water intrusion during pumping. Because the no-action alternative is the only alternative considered, the nine criteria analysis does not apply. Because hazardous substances do not remain onsite, the five-year review does not apply.

8.0 DOCUMENTATION OF NO SIGNIFICANT CHANGES

The proposed plan for OU 6 released on December 8, 1997 identified the no-action alternative as the preferred alternative. There have been no significant changes since that time. The no-action alternative presented in the proposed plan is the same as the no-action alternative described in this Record of Decision. No comments were received during the public comment period.

9.0 REFERENCES

Ecology & Environment, Inc. (1992). *Interim Data Report, Contamination Assessment/Remedial Investigation, Navy Yard Disposal Area (Site 9), Naval Air Station, Pensacola, Florida.* Ecology & Environment, Inc. Pensacola, Florida.

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

EnSafe/Allen & Hoshall. (1996). *Soil Removal Summary Report,* Naval Air Station, Pensacola, Florida.

EnSafe/Allen & Hoshall. (1996). *Final Remedial Investigation Report – Site 1,* NAS Pensacola, Florida. Memphis, Tennessee, January 5.

Florida Department of Environmental Protection. (1988). *Water Quality Standurds, Classijication of Groundwater, Usage, Reclassification.* Chapter 17-3.403, Florida Administrative Code.

Florida Department of Environmental Protection. (1994a). *Groundwater Guidance Concentrations,* FDEP Division of Water Facilities, Bureau of Drinking Water and Groundwater Resources, Tallahassee, Florida, June.

Florida Department of Environmental Protection. (1994b). *Approach to the Assessment of Sediment Quality in Florida Coastal Waters,* FDEP Office of Water Policy, Tallahassee, Florida, November.

Florida Department of Environmental Protection. (1995). ***Memorandum-Soil Cleanup Goals for Florida.*** FDEP Division of Waste Management, Tallahassee, Florida, September 29, 1995.

Florida Department of Environmental Protection. (1996). ***Applicability of Soil Cleanup Goals for Florida,*** FDEP Division of Waste Management, Tallahassee, Florida, January 19, 1996.

National Research Council. (1989). ***Recommended Dietary Allowances,*** **10th ed.** National Academy Press, Washington, D.C. 1989.

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

Naval Energy and Environmental Support Activity. (1988). Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program. (NEESA 20.2-047B).

U.S. Environmental Protection Agency. (1994a). ***Draft Revised Soil Interim Lead Guidance.*** USEPA Office of Solid Waste and Emergency Response, Washington, D.C., May 27.

U.S. Environmental Protection Agency. (1996b). ***Risk-Based Concentration Table.*** USEPA Region III, Office of RCRA, Philadelphia, PA.

U.S. Environmental Protection Agency. (1996c). ***Drinking Water Regulations and Health Advisories.*** USEPA Office of Water, Washington, D.C., February (EPA-8-22-R-96-001).

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Appendix A

Glossary

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 that 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 Department of Defense 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 remedial 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.

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 at The John **C.** Pace Library at the University of West Florida and the **NAS** Pensacola Library in Building **633** on the Naval Air Station, Pensacola, Florida.

MAXIMUM CONTAMINANT LEVEL: National standards for acceptable concentrations of contaminants in drinking water. These 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 in a competition-sizeswimming pool, the water will contain about 1 ppb of trichloroethylene.

PRELIMINARY REMEDIATION GOALS: Screening concentrations that are provided by the USEPA and the FDEP and are used in assessing the site for comparative purposes before remedial goals are 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 cleanup 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 ROD 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 does 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 not present a health risk.

SUPERFUND: The trust **fund** established **by CERCLA** which can be drawn upon to plan and conduct cleanups of past hazardous waste disposal sites, and current releases or threats of releases of nonpetroleum 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 aboveground, such as rivers, lakes, and streams.

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

Appendix B

Responsiveness Summary

RESPONSIVENESS SUMMARY

Overview

During the public comment period, the U.S. Navy proposed a no-action alternative at Operable Unit 6 on NAS Pensacola. This preferred remedy was selected in coordination with the USEPA and the FDEP. The NAS Pensacola RAB, a group of community volunteers, reviewed the technical details of the selected remedy. 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 that 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 and The John C. Pace Library of the University of West Florida.

On December 11, 1997, newspaper announcements were placed to announce the public comment period (December 8, 1997, through January 22, 1998) and included a short description of the proposed plan. The announcement appeared in the ***Pensacola News Journal.*** In conjunction with the newspaper announcement, copies of the proposed plan were mailed to addresses on the IRP mailing list. The opportunity for a public meeting was provided.

Summary of Comments Received During the Public Comment Period

No comments were received during the public comment period.