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FINAL DRAFT PRELIMINARY CHARACTERIZATION SUMMARY FOR OPERABLE UNIT 1 (OU 1) NAS JACKSONVILLE FL

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ABB ENVIRONMENTAL

FINAL DRAFT

PRELIMINARY CHARACTERIZATION SUMMARY REPORT

OPERABLE UNIT NO. 1
NAVAL INSTALLATION RESTORATION PROGRAM
JACKSONVILLE NAVAL AIR STATION
JACKSONVILLE, FLORIDA

CONTRACT TASK ORDER NO. 040
NAVY CLEAN - DISTRICT 1
Contract No. N62467-89-D-0317

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FOREWORD

In order to meet its mission objectives, the U.S. Navy performs a variety of operations, some requiring the use, handling, storage or disposal of hazardous materials. Through accidental spills, leaks, and conventional methods of past disposal, hazardous materials may have entered the environment in ways unacceptable by today's standards. With growing knowledge of the long-term effects of hazardous materials on the environment, the Department of Defense (DOD) initiated various programs to investigate and remediate conditions related to suspected past releases of hazardous materials at their facilities.

One of these programs is the Navy/Marine Corps Installation Restoration Program (NIRP). This program complies with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA). The Acts, passed by Congress in 1980 and 1986, respectively, established the means to assess and clean up hazardous waste sites for both private-sector and Federal facilities. These Acts are the basis for what is commonly known as the Superfund Program.

Originally, the Navy's part of this program was called the Navy Assessment and Control of Installation Pollutants (NACIP) Program. Early reports reflect the NACIP process and terminology. The Navy eventually adapted the program structure and terminology of the NIRP.

The NIRP is conducted in several stages:

- The Preliminary Assessment (PA) identifies potential sites through record searches and interviews.

- A Site Inspection (SI) then confirms which areas contain contamination, constituting actual "sites." (Together, the PA and SI steps were called the Initial Assessment Study (IAS) under the Navy's NACIP Program.)

- Next, the Remedial Investigation and the Feasibility Study (RI/FS) together determine the type and extent of contamination, establish criteria for cleanup, identify and evaluate any necessary remedial action alternatives, and develop cost estimates of each alternative. As part of the RI/FS, a Risk Assessment will be made to identify potential effects on human health and the environment in order to help evaluate remedial action alternatives.

- The selected alternative is planned and conducted in the Remedial Design and Remedial Action Stages. Monitoring then ensures the effectiveness of the effort.

The investigation of potential hazardous waste sites at Naval Air Station (NAS) Jacksonville, Florida are presently being conducted under the NIRP and follow CERCLA guidelines. Earlier preliminary investigations had been conducted at NAS Jacksonville, Florida under the Navy's NACIP program. In 1990, in coordination with the U.S. Environmental Protection Agency and the Florida Department of Environmental Regulations, the investigation of hazardous waste sites were formalized under a Federal Facilities Agreement.

NAS Jacksonville, Florida is conducting the investigation and cleanup of hazardous waste sites at their facility by working though the Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM). The U.S. Environmental Protection Agency (USEPA) and the Florida Department of Environmental Regulation (FDER) oversee the Navy environmental program. All aspects of the program are conducted in compliance with State and Federal regulations, as ensured by the participation of these regulatory agencies.

Questions regarding the NIRP Program at NAS Jacksonville, Florida, should be addressed to Mr. Joel G. Murphy, Code 1853, Remedial Project Manger, at (803) 743-0577.

EXECUTIVE SUMMARY

ABB Environmental Services, Inc., under the Comprehensive Long-Term Environmental Action, Navy (CLEAN) Contract, No. N62467-89-D-0317, is conducting a Remedial Investigation/Feasibility Study (RI/FS) on behalf of the U.S. Department of the Navy (USDON) at the Naval Air Station (NAS) Jacksonville, Florida. NAS Jacksonville is located in northwestern Duval County on the west shore of the St. Johns River. NAS Jacksonville is the home of Commander Helicopter Wings Atlantic, Helicopter Antisubmarine Warfare Wing One, Patrol Wing Eleven, the Naval Hospital, the Naval Dental Center and the Naval Aviation Depot. The RI/FS is being conducted in accordance with the Federal Facilities Agreement (FFA) signed by the U.S. Environmental Protection Agency (USEPA), Florida Department of Environmental Regulation (FDER) and USDON on October 23, 1990. This Preliminary Characterization Summary Report (PCSR) presents the findings, conclusions, and recommendations for the RI study at Operable Unit 1 (OU1).

Remedial investigations at NAS Jacksonville commenced in 1982 with an Initial Assessment Study (IAS) conducted to collect and evaluate the evidence that contaminants at sites that were potential sources of contamination (PSC) might pose a health risk to humans and/or adversely affect the environment at locations both on and off-base. A Confirmation Study Ranking System (CSRS) was used to evaluate the IAS data for each site identified by the U.S. Navy as a PSC. The CSRS was similar to the Hazard Ranking System (HRS) currently used by the USEPA to determine if contaminants at a site posed sufficient threat to either human health or the environment. Sites determined by the CSRS or HRS to pose a sufficient threat are placed on the National Priorities List (NPL). To be removed from the NPL, a RI/FS must be conducted to assess the extent and magnitude of contamination and determine whether remedial measures are required to mitigate the threat posed by contaminants. Any identified contaminant must be remediated to the extent that it no longer poses a threat to human health or the environment.

The IAS evaluated a total of 38 PSCs; based on the CSRS, ten of the sites were determined to pose potential threats to human health and the environment. Two of these sites, PSC 26 and PSC 27, were determined to require additional assessment activities and remedial action. PSC 26 was known as the Old Main Registered Area, which received waste oils, solvents, and other materials; and PSC 27 was formerly used to store electric transformers that contained oils with polychlorinated biphenyls (PCBs). Because PSC 26 and PSC 27 are located adjacent to each other and share the same potential fate and transport mechanism for contaminants, the sites are collectively known as Operable Unit 1.

Additional Site Inspection (SI) and Expanded Site Investigation (ESI) studies were conducted during the period between 1983 and 1990 for the purpose of assessing the presence of contaminants in soils, surface, and groundwater at OU1. The studies determined that soils at PSC 27 were contaminated by PCBs. Petroleum hydrocarbons, volatile and semivolatile organic compounds, and metals were determined to be present in surface and groundwater at PSC 26. In addition to these compounds, soils at PSC 26 were determined to also contain PCBs.

Based on the results of the 1983 assessment activities, a remediation system was constructed and operated during the period between 1983 and 1984. The purpose of

the remediation system was to remove free-phase petroleum hydrocarbons discovered in sediments and surface water at PSC 26. The remediation system consisted of the construction of a perimeter drainage ditch system around PSC 26, two underflow weirs, and either pumps or a boom system to collect free-phase hydrocarbons that collected on the upstream side of the weirs. An unknown amount of hydrocarbons were collected during the period the remedial effort was in effect.

The U.S. Army Corps of Engineers (USACE) conducted a cone penetrometer study during 1990 to assess the extent of hydrocarbon contamination remaining in the eastern and southwestern portions of PSC 26. The results of this study provide a qualitative indication of the extent of hydrocarbons in the vicinity of a former waste oil disposal pit. The study also indicated the presence of a "hard" layer approximately 40 feet beneath the land surface at OU1. The "hard" layer was thought to potentially be a confining layer, which may prevent the downward migration of contaminants.

After the USDON, USEPA, and FDER signed the FFA in 1990, a Work Plan was prepared in 1991 to conduct a Remedial Investigation/Feasibility Study (RI/FS) at OU1 as part of the Navy/Marine Corps Installation Restoration Program (NIRP). The purpose of the RI is to collect data to determine: the nature and extent of any releases of site-derived contaminants; potential pathways of migration via soil, sediments, surface water, and groundwater; and risks to human and ecological receptors. The purpose of the FS is to determine necessary remedial measures to mitigate site-derived contamination that presents an adverse threat to human health and the environment.

Data gathering activities for the RI were implemented in December 1991 and consisted of: a seismic study to gather geologic data; soil gas sampling, ambient air quality sampling; collection of sediment, surface water, and soil samples; installation of a piezometer and groundwater quality monitoring well network and collection of groundwater samples; and inventory of aquatic and terrestrial biological communities.

The purpose of the seismic study was to assess whether the "hard" layer identified by the USACE existed beneath OU1. The results of this study did not provide conclusive evidence of the existence of this layer. The layer was determined to not be detected because of either insufficient thickness of the "hard" layer or because the layer did not have sufficient contrast in seismic velocity values between the over and underlying sediments.

The purpose of the soil gas survey was to evaluate the potential that volatile organic compounds have migrated, via soil gas, to areas, which could have an adverse impact on residents in the NAS Jacksonville base housing, located to the east and south of OU1. The results of the study indicate that site-attributable volatile contaminants were not detected at the base housing area. A naturally occurring hydrocarbon compound, terpene, was detected in several of the soil gas samples.

The purpose of the ambient air quality sampling event was to compare general air quality at OU1 with background (upwind) air quality and evaluate the potential for airborne chemicals to migrate to areas that could affect residents of the NAS Jacksonville base housing area. The results of the sampling event indicate the

presence of semivolatile organics (petroleum-related hydrocarbon compounds), PCBs, and metals in the air quality samples. No data is available on the presence of volatile organic compounds. This is due to a problem associated with the volume of the volatile organic air sample collected during the field activities.

The purpose of the surface water and sediment sampling event was to assess whether contaminants have migrated from OU1 via drainage features connected in the past or at present on the site. Volatile organic compounds were detected in some of the surface water samples but not in the sediment samples. Semivolatile organic compounds and pesticides were detected in some of the sediment samples but not in surface water samples. PCBs, metals, and radionuclides were detected in both sediment and surface water samples.

The purpose of the soil sampling event was to determine the horizontal and vertical extent of contamination in soils and to support a preliminary assessment of the site soils to be an exposure pathway to human or ecological receptors. Contaminants detected in the soil samples consist of volatiles and semivolatile organics, pesticides, PCBs, inorganics, dioxins and furans, and radionuclides. The highest concentrations of soil contamination were detected in the vicinity of former solvent and waste oil disposal pit areas. Contaminants also were detected at lower concentrations at surface soil samples (less than 6 inches beneath the land surface) in various portions of OU1.

The purpose of the groundwater sampling event was to determine the current groundwater quality and support a preliminary assessment of groundwater to be an exposure pathway to human or ecological receptors. Contaminants were not detected in the monitoring wells installed in the Intermediate zone of the Hawthorn Formation (115 to 120 feet beneath the land surface. Monitoring wells installed in the surficial aquifer system (10 to 40 feet beneath the land surface) contained concentrations of volatile and semivolatile organics, pesticides, metals, and radionuclides. Free-phase hydrocarbons, which contain PCBs, also were detected in monitoring wells located near the former waste oil disposal pits.

The purpose of the ecological inventory was to characterize the major terrestrial and aquatic ecological communities at, and in the vicinity of, OU1. A second objective of the ecological inventory was to determine whether significant or critical ecological resources at or near OU1 could potentially be adversely affected by the OU1 site-attributable contamination. This data will be used to assess potential and probable pathways by which biological receptors could be exposed to media containing site-related contaminants and to note readily apparent evidence of stress on biological receptors at OU1.

Investigation of the several media (groundwater, surface water, sediment, and soil) indicates that contamination, probably associated with OU1, extends beyond the unit boundaries as they were understood during the development of the Work Plan for OU1 field work (Geraghty & Miller, September 1991). The field work, as originally planned, did not include characterization of offsite areas. Therefore, the original objective of the OU1 field program cannot be met without the acquisition of additional information.

TABLE OF CONTENTS

Preliminary Characterization Summary Report
OU1, NAS Jacksonville, Florida

Section	Title	Page No.
1.0	INTRODUCTION	1-1
1.1	BACKGROUND	1-1
1.2	PURPOSE	1-5
1.3	SCOPE	1-5
2.0	BACKGROUND INFORMATION	2-1
2.1	FACILITY DESCRIPTION	2-1
2.2	EXISTING SITE CONDITIONS	2-1
2.2.1	Geography and Demographics	2-2
2.2.2	Physiography and Topography	2-3
2.2.3	Climate	2-4
2.2.4	Soils	2-4
2.2.5	Regional Geology	2-6
2.2.5.1	Surficial Deposits	2-6
2.2.5.2	Hawthorn Group	2-11
2.2.5.3	Marine Carbonates Sequences (Floridan Aquifer System)	2-11
2.2.6	Regional Hydrology	2-12
2.2.6.1	Surface Water	2-12
2.2.6.2	Surficial Aquifer	2-12
2.2.6.3	Intermediate Hawthorn Aquifer	2-14
2.2.6.4	Floridan Aquifer System	2-14
2.3.1	Operable Unit 1 (OU1) Site History	2-15
2.3.2	Previous Investigations and Remedial Activities at OU1	2-17
3.0	REMEDIAL INVESTIGATION (RI) ACTIVITIES	3-1
3.1	DATA COMPILATION	3-1
3.2	SUMMARY OF EXPLORATION AND SAMPLING PROGRAM	3-2
3.2.1	Geophysical Survey	3-3
3.2.2	Soil Gas Sample Collection	3-3
3.2.3	Ambient Air Sample Collection	3-5
3.2.4	Surface Water and Sediment Sample Collection	3-5
3.2.5	Soil Sample Collection	3-9
3.2.5.1	Shallow/Deep Subsurface Soil Sampling	3-9
3.2.5.2	Subsurface Soil Borings with Continuous Split-Spoon Sampling	3-13
3.2.6	Piezometer and Monitoring Well Installation	3-15
3.2.6.1	Installation of Piezometer Network	3-15
3.2.6.2	Installation of Shallow and Deep Surficial Aquifer Monitoring Wells	3-15
3.2.6.3	Installation of Intermediate Zone Hawthorn Formation Monitoring Wells	3-18
3.2.6.4	Investigation Derived Waste	3-20

TABLE OF CONTENTS (Continued)

Section	Title	Page No.
3.2.7	Groundwater Sampling	3-20
3.2.8	Hydrogeologic Investigations	3-22
3.2.8.1	Geotechnical analysis	3-22
3.2.8.2	Well Location and Elevation Survey	3-22
3.2.8.3	Potentiometric Water Surface Measurements	3-22
3.2.8.4	Aquifer Slug Test	3-23
3.2.9	Ecological Inventory	3-23
3.3	QUALITY CONTROL (QC)	3-27
3.3.1	Field QC	3-27
3.3.1.1	Field QC Samples	3-28
3.3.1.2	Field QC Review	3-28
3.3.2	Laboratory QC	3-46
3.3.2.1	Laboratory QC Samples	3-46
3.3.2.2	Data Quality Review	3-47
3.3.3	Precision	3-48
3.3.4	Accuracy	3-48
3.3.5	Representativeness	3-49
4.0	RI PRELIMINARY FINDINGS	4-1
4.1	GEOLOGY	4-1
4.1.1	Geophysical Survey	4-1
4.1.2	Soil Borings	4-1
4.2	HYDROGEOLOGIC CONDITIONS	4-8
4.2.1	Potentiometric Water Surfaces	4-8
4.2.2	Permeability/Hydraulic Conductivity Test	4-9
4.2.3	Groundwater Flow Velocity	4-11
4.3	RELEASE CHARACTERISTICS	4-12
4.3.1	Soil Gas Sample Results	4-12
4.3.2	Ambient Air Sample Results	4-17
4.3.2.1	Meteorological Conditions	4-17
4.3.2.2	Volatile Organic Compounds (VOCs)	4-18
4.3.2.3	Polychlorinated Biphenyl (PCBs)	4-18
4.3.2.4	Semivolatile Organic Compounds (SVOCs)	4-23
4.3.2.5	Inorganics	4-23
4.3.3	Surface Water and Sediment Sample Results	4-26
4.3.3.1	Volatile Organic Compounds (VOCs)	4-28
4.3.3.2	Semivolatile Organic Compounds (SVOCs)	4-29
4.3.3.3	Pesticides/Polychlorinated Biphenyl (PCBs)	4-31
4.3.3.4	Inorganics	4-33
4.3.3.5	Radionuclides	4-42
4.3.4	Soil Sample Results	4-45
4.3.4.1	Volatile Organic Compounds (VOCs)	4-47
4.3.4.2	Semivolatile Organic Compounds (SVOCs)	4-48
4.3.4.3	Pesticides/Polychlorinated Biphenyl (PCBs)	4-53
4.3.4.4	Inorganics	4-56
4.3.4.5	Dioxins/Furans	4-62
4.3.4.6	Radionuclides	4-64

TABLE OF CONTENTS (Continued)

Section	Title	Page No.
4.3.4	Soil Sample Results	4-45
4.3.4.1	Volatile Organic Compounds (VOCs)	4-47
4.3.4.2	Semivolatile Organic Compounds (SVOCs)	4-48
4.3.4.3	Pesticides/Polychlorinated Biphenyl (PCBs)	4-53
4.3.4.4	Inorganics	4-56
4.3.4.5	Dioxins/Furans	4-62
4.3.4.6	Radionuclides	4-64
4.3.5	Groundwater Sample Results	4-66
4.3.5.1	Volatile Organic Compounds (VOCs)	4-66
4.3.5.2	Semivolatile Organic Compounds (SVOCs)	4-70
4.3.5.3	Pesticides/Polychlorinated Biphenyl (PCBs)	4-70
4.3.5.4	Inorganics	4-72
4.3.5.5	Radionuclides	4-73
4.3.5.6	Free-Phase Hydrocarbons	4-77
4.4	ECOLOGICAL INVENTORY FINDINGS	4-77
4.4.1	Biotic Characterization	4-77
4.4.2	Rapid Bioassessment of Benthic Communities	4-93
4.4.3	Benthic Macroinvertebrate Sampling and Analysis	4-99
4.4.4	Sensitive Environmental Receptors	4-104
4.4.5	Wetland and Aquatic Habitats	4-109
4.4.6	Ecological Stresses	4-109
5.0	CONCLUSIONS AND RECOMMENDATIONS	5-1
5.1	GEOPHYSICAL SURVEY	5-1
5.2	SOIL GAS SAMPLING	5-1
5.3	AMBIENT AIR SAMPLING	5-1
5.4	SURFACE WATER AND SEDIMENT SAMPLING	5-2
5.5	SOIL SAMPLING	5-3
5.6	GROUNDWATER SAMPLING	5-4
5.7	ECOLOGICAL STUDIES	5-4
REFERENCES		
APPENDICES		
Appendix A:	Boring/Well Logs	
Appendix B:	Potentiometric Surface Maps/Geologic Cross Sections	
Appendix C:	Surface Water and Sediment Sample Analytical Results	
Appendix D:	Soil Sample Analytical Results	
Appendix E:	Groundwater Sample Analytical Results	
Appendix F-1:	Flora and Fauna of NAS Jacksonville	
Appendix F-2:	Rapid Bioassessment Protocol	
Appendix F-3:	Benthic Macroinvertebrate Survey	
Appendix F-4:	Rare and Endangered Species	
Appendix F-5:	Pathological Reports	

LIST OF FIGURES

Preliminary Characterization Summary Report
OU1, NAS Jacksonville, Florida

Figure	Title	Page No.
1-1	Facility Location Map, Naval Air Station Jacksonville, Florida	1-2
1-2	Location of OU1, PSC 26, Oil and Solvents Disposal Pit Area, and PSC 27, Former Electrical Transformer Storage Area	1-3
1-3	Disposal Pits Area Including PSC 26, Old Main Registered Area, and PSC 27, Former Electrical Transformer Storage Area	1-4
1-4	Location of OU1, Oil and Solvents Disposal Pits Area, PSC-26 and PSC-27	1-6
2-1	Windrose Diagram, Jacksonville, Florida	2-5
2-2	Soil Series Associations Near OU1	2-7
2-3	Structures Affecting Sediment Deposition	2-8
2-4	Geologic Cross Sections Showing Geologic Formations in Duval and Nassau Counties, Florida	2-9
2-5	Generalized Geologic Column	2-10
2-6	Principal Waterways in the Vicinity of Naval Air Station Jacksonville, Florida	2-13
2-7	Location of Former Disposal Pits at OU1	2-16
2-8	Approximate Location of Oil Plume, 1979	2-19
2-9	1984 Remediation System	2-22
3-1	Seismic Survey Traverse Locations	3-4
3-2	Soil Gas Sample Locations	3-6
3-3	Air Sampling Locations RUN1, RUN2, and RUN3	3-7
3-4	Air Sampling Locations RUN4	3-8
3-5	Surface Water and Sediment Sample Locations	3-10
3-6	Initial Soil Sampling Locations	3-11
3-7	Soil Sample Locations	3-12
3-8	Piezometer and Monitoring Well Locations	3-14
3-9	Typical Piezometer Construction Diagram	3-16
3-10	Typical Monitor Well Construction Diagram, Shallow Zone Surficial Aquifer	3-17
3-11	Typical Monitor Well Construction Diagram, Deep Zone Surficial Aquifer	3-19
3-12	Typical Monitor Well Construction Diagram, Intermediate Zone Hawthorn Formation	3-21
3-13	Aquatic Sampling Locations	3-25
4-1	Seismic Refraction Survey, Line 1	4-2
4-2	Seismic Refraction Survey, Line 2	4-3
4-3	Seismic Refraction Survey, Line 3	4-4
4-4	Seismic Refraction Survey, Line 4	4-5
4-5	Seismic Refraction Survey, Line 5	4-6
4-6	Sample Chromatogram Signature of Sample SG015	4-14
4-7	Sample Chromatogram Signature of Sample SG052	4-15
4-8	Total FID Volatiles	4-16
4-9	Volatile Organic Compounds in Surface Water Samples	4-30
4-10	Semivolatile Organic Compounds in Sediment Water Samples	4-32

LIST OF FIGURES (Continued)

Figure	Title	Page No.
4-11	Pesticides in Sediment Samples	4-34
4-12	PCBs in Surface Water Samples	4-35
4-13	PCBs in Sediment Samples	4-36
4-14	Inorganic Target Analytes in Surface Water Samples	4-43
4-15	Inorganic Target Analytes in Sediment Samples	4-44
4-16	Radionuclides in Surface Water Samples	4-46
4-17	Volatile Organic Compounds in Soil Samples	4-49
4-18	Semivolatile Organic Compounds in Soil Samples	4-54
4-19	Pesticides in Soil Samples	4-57
4-20	Inorganic Compounds in Soil Samples	4-58
4-21	PCBs in Soil Samples	4-63
4-22	Location of Well With Groundwater Which Exceeds Preliminary ARARs	4-67
4-23	Shallow Surficial Monitoring Wells Constituent Concentrations Exceeding Preliminary ARARs	4-69
4-24	Deep Surficial Monitoring Wells Constituent Concentrations Exceeding Preliminary ARARs	4-71
4-25	Radionuclides in Groundwater Gross Alpha (Alpha and Radium-226)	4-74
4-26	Radionuclides in Groundwater Beta Particle (Gross Beta)	4-75
4-27	Radionuclides in Groundwater	4-76
4-28	Free-Phase Hydrocarbon Chromatogram	4-79
4-29	Ecological Communities	4-80
4-30	Pine Flatwood Habitat	4-82
4-31	Old Field Habitat	4-84
4-32	Hardwood Forest Habitat	4-86
4-33	Stream Habitat	4-89
4-34	Forested Swamp Habitat	4-92
4-35	St. Johns River Basin Habitat	4-94
4-36	Aquatic Sampling Locations and Methods	4-97

LIST OF TABLES

Preliminary Characterization Summary Report
OU1, NAS Jacksonville, Florida

Table	Title	Page No.
3-1	Analyte Concentration Via Gas Chromatograph, Flame Ionization Detector, and Electron Capture Detector, Soil Gas Field Control Samples	3-29
3-2	Summary of Positive Detections in Field Quality Control Blanks, Air Sampling	3-31
3-3	Contaminants Detected in the Equipment Rinsate Blank Surface Water and Sediment Sampling Event	3-33
3-4	Contaminants Detected in the Field Blank Surface Water and Sediment Sampling Event	3-34
3-5	Contaminants Detected in the Trip Blanks, Surface Water and Sediment Sampling Event	3-36
3-6	Summary of Positive Detections in Equipment Rinsate, Field, and Trip Blanks, Volatile and Semivolatile Organic Compounds	3-37
3-7	Summary of Positive Detections in Equipment Rinsate and Field Blanks, Inorganics	3-39
3-8	Summary of Positive Detections in Equipment Rinsate and Field Blanks, Radionuclides	3-40
3-9	Analytical Results Report, Contaminants Detected in Equipment Rinsate Blanks	3-42
3-10	Analytical Results Report Contaminants Detected in Field Blanks	3-44
3-11	Analytical Results Report, Contaminants Detected in Trip Blanks	3-45
4-1	Soil Gas Analyte Concentrations by Gas Chromatograph, Flame Ionization Detector, and Electron Capture Detector	4-13
4-2	RUN1 Air Quality Analytical Results	4-19
4-3	RUN2 Air Quality Analytical Results	4-20
4-4	RUN3 Air Quality Analytical Results	4-21
4-5	RUN4 Air Quality Analytical Results	4-22
4-6	Soil Samples With Total PCBs Exceeding USEPA's Preliminary Remediation Goal of 83 μg/kg	4-24
4-7	Free-phase Hydrocarbon Analysis	4-78
4-8	Summary of Benthic Sampling Types, Ecological Assessment	4-96
4-9	Summary of Benthic Macroinvertebrate Sampling Results (a,b), Ecological Assessment	4-101

GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
AEC	Atomic Energy Commission
ARARs	applicable or relevant and appropriate requirements
ASTM	American Society for Testing and Materials
AWQC	Ambient Water Quality Criteria
Ba	barium
bls	below land surface
Cd	cadmium
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
CLEAN	Comprehensive Long-Term Environmental Action, Navy
CLP	contract laboratory program
CNAT	Chief Naval Advanced Training
CNOT	Chief of Naval Operations Training
CPT	cone penetrometer
Cr	chromium
CRDL	contract required detection limits
CRQL	contract required quantitation limit
CSRS	Confirmation Study Ranking System
dbh	diameter at breast height
DOD	Department of Defense
DQOs	Data Quality Objectives
1,1-DCE	1,1-dichloroethene
°C	degrees Centigrade
°F	degrees Fahrenheit
ECD	electron capture detector
ESA	Endangered Species Act
ESI	Expanded Site Investigation
ESP	Environmental and Permitting, Inc.
ESQAs	explosion safety quadrant arcs
FCSLs	Florida Clean Soil Levels
FDER	Florida Department of Environmental Regulation
FDWR	Federal Drinking Water Regulations
FDWS	Florida Drinking Water Standards
FFA	Federal Facilities Agreement
FGFWFC	Florida Fame and Freshwater Fish Commission
FID	flame ionization detector
FNAI	Florida Natural Areas Inventory Program
FSWCS	Florida Surface Water Classification Standards
ft/ft	foot per feet

GLOSSARY (Continued)

g/d/ft	gallons per day per foot
gal	gallons
GC	gas chromatograph
Hg	mercury
HRS	Hazard Ranking System
IAS	Initial Assessment Study
IDW	Investigation-Derived Soil Waste
LCS	Laboratory Control Sample
m^3	cubic meters
Mc	methylene chloride
MDL	method detection limit
mg/ℓ	milligrams per liter
mg/kg	milligrams per kilogram
mgd	million gallons per day
mph	miles per hour
MS/MSD	Matrix Spike/Matrix Spike Duplicate
mℓ/min	milliliters per minutes
μg/ℓ	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
μg/F	micrograms per filter
NACIP	Navy Assessment and Control of Installation Pollutants
NAD	National American Datum
NADEP	Naval Aviation Depot
NARF	Naval Air Rework Facility
NAS	Naval Air Station
NAT	Navy Aviation Trades
NATTC	Naval Air Technical Training Center
Navy	U.S. Navy
NEESA	Naval Energy and Environmental Support Activity
NEPA	National Environmental Policy Act
NIRP	Navy/Marine Corps Installation Restoration Program
NPL	National Priorities List
OU1	Operable Unit 1
PA	Preliminary Assessment
PAHs	polynuclear aromatic hydrocarbons
PARCC	precision, accuracy, representativeness, comparability, and completeness
Pb	lead
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
pCi/ℓ	picocuries per liter
PCSR	Preliminary Characterization Summary Report

GLOSSARY (Continued)

PEI	preliminary ecological inventory
ppm	parts per million
PRGs	preliminary remediation goals
PSAs	Preliminary Site Assessment
PSC	potential sources of contamination
psi	per square inch
%R	Percent Recovery
QA/QC	quality assurance/quality control
QC	quality control
RAGs	Risk Assessment Guidance for Superfund Sites
RASO	Radiological Affairs Support Office
RBP	Rapid Bioassessment Protocol
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RI	Remedial Investigation
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
Schd40	Schedule 40
SCS	Soil Conservation Services
SI	Site Inspection
SQGs	sediment quality goals
TAL	Target Analyte List
TCE	trichloroethane
TCL	Target Compound List
TOC	Total Organic Carbon
TSCA	Toxic Substances Control Act
1,1,2-TCA	1-1,2-trichloroethane
1,1,2,2-TCA	1,1,2,2-tetrachloroethane
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDON	U.S. Department of the Navy
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VC	vinyl chloride
VOCs	volatile organic compounds
WWII	World War II

1.0 INTRODUCTION

This Preliminary Characterization Summary Report (PCSR) presents a summary of field activities, field data, laboratory data, findings, conclusions, and recommendations for the Remedial Investigation (RI) at Operable Unit 1 (OU1) at the U.S. Naval Air Station (NAS) Jacksonville, Florida.

The RI is being conducted in accordance with a Federal Facilities Agreement (FFA) that relates applicable portions of the National Environmental Policy Act (NEPA), the Navy/Marine Corps Installation Program (NIRP), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Resource Conservation and Recovery Act (RCRA) as amended by the Hazardous and Solid Waste Amendments of 1984, and Chapters 376 and 403 Florida Statutes 120.57(3), Florida Administrative Code Rule.

1.1 BACKGROUND. NAS Jacksonville is located on approximately 9 miles south of downtown Jacksonville, Florida, in Duval County (Figure 1-1). The site consists of approximately 3,800 acres and is located along the western bank of the St. Johns River.

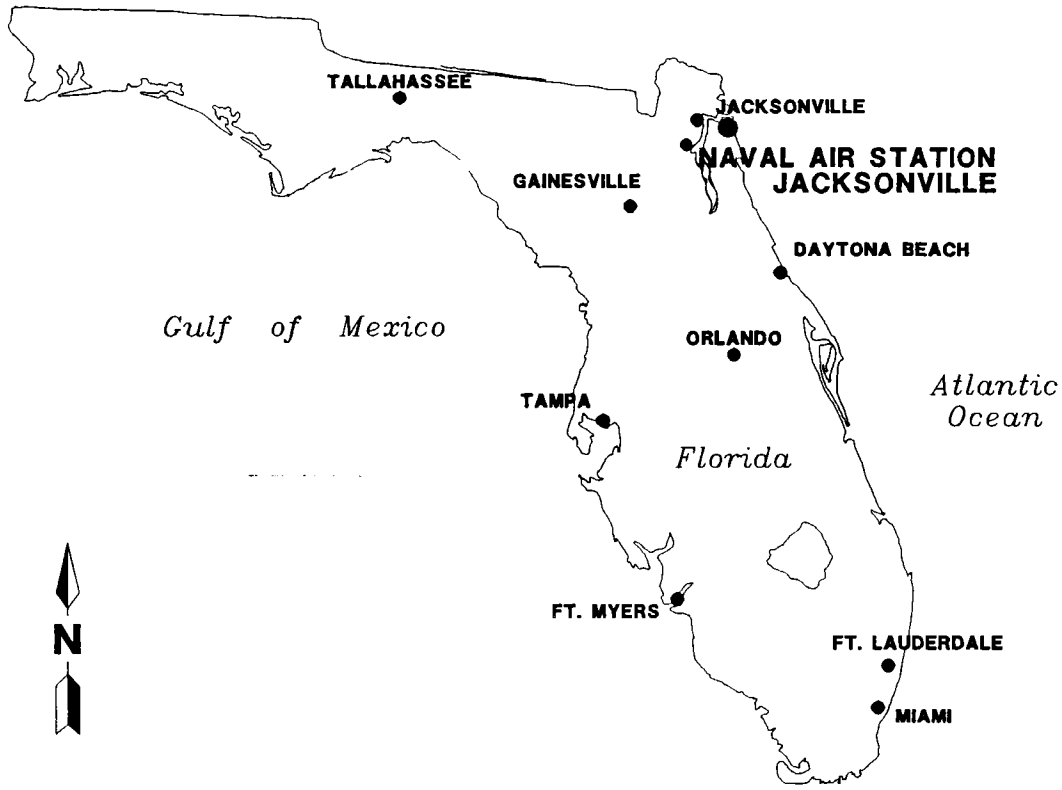
The mission of NAS Jacksonville is to provide facilities, service, and managerial support for the operation and maintenance of naval weapons and aircraft to operating forces of the U.S. Navy (Navy), as designated by the Chief of Naval Operations.

The Navy has taken an active approach in NIRP activities since 1980 by aggressively identifying problems with hazardous waste contamination resulting from past practices at its installations. Identification of hazardous waste areas has been conducted at all Naval installations, including NAS Jacksonville.

The Navy has performed Preliminary Site Assessments (PSAs) at installations identified in the Federal Hazardous Waste Compliance Docket as generating hazardous waste or have reported a release of hazardous waste.

At NAS Jacksonville, contamination problems are being addressed by conducting a Remedial Investigation/Feasibility Study (RI/FS) at OU1, which is located in the south-central portion of NAS Jacksonville (Figure 1-2). OU1 consists of Potential Source of Contamination (PSC) 26, known at the Old Main Registered Disposal Area, and PSC 27, known as the former transformer storage area (Figure 1-3).

PSC 26 was used for disposal of spent solvents, waste oils, paint residues, and radioactive materials. The radioactive material (Radium-226 and 228) was the residue from the painting of luminescent dials for aircraft. PSC 27 was used to store electric transformers which contained oils containing polychlorinated biphenyls (PCBs).



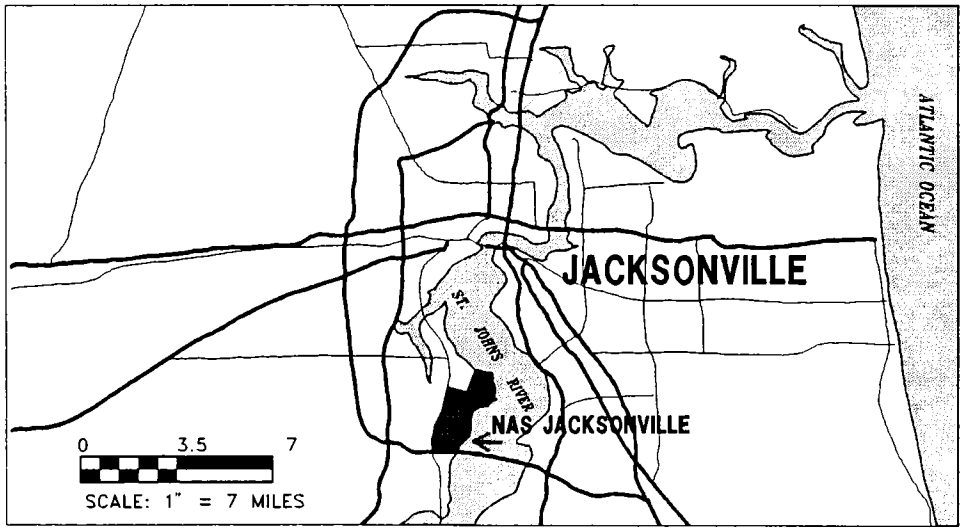


FIGURE 1-1
FACILITY LOCATION MAP
NAVAL AIR STATION
JACKSONVILLE, FLORIDA

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

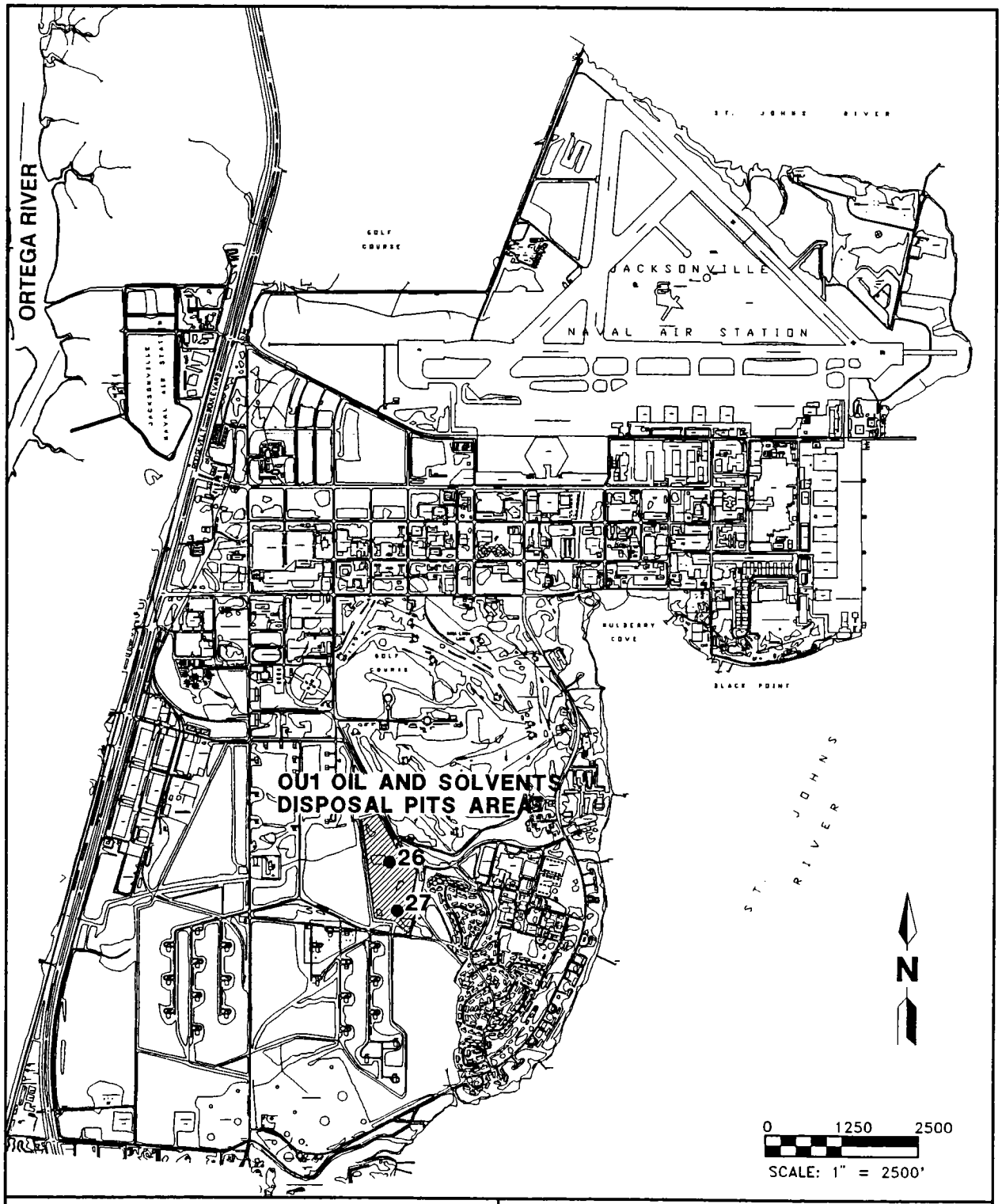


FIGURE 1-2
LOCATION OF OU1, OIL AND SOLVENTS DISPOSAL PITS AREA PSC 26 AND PSC 27

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

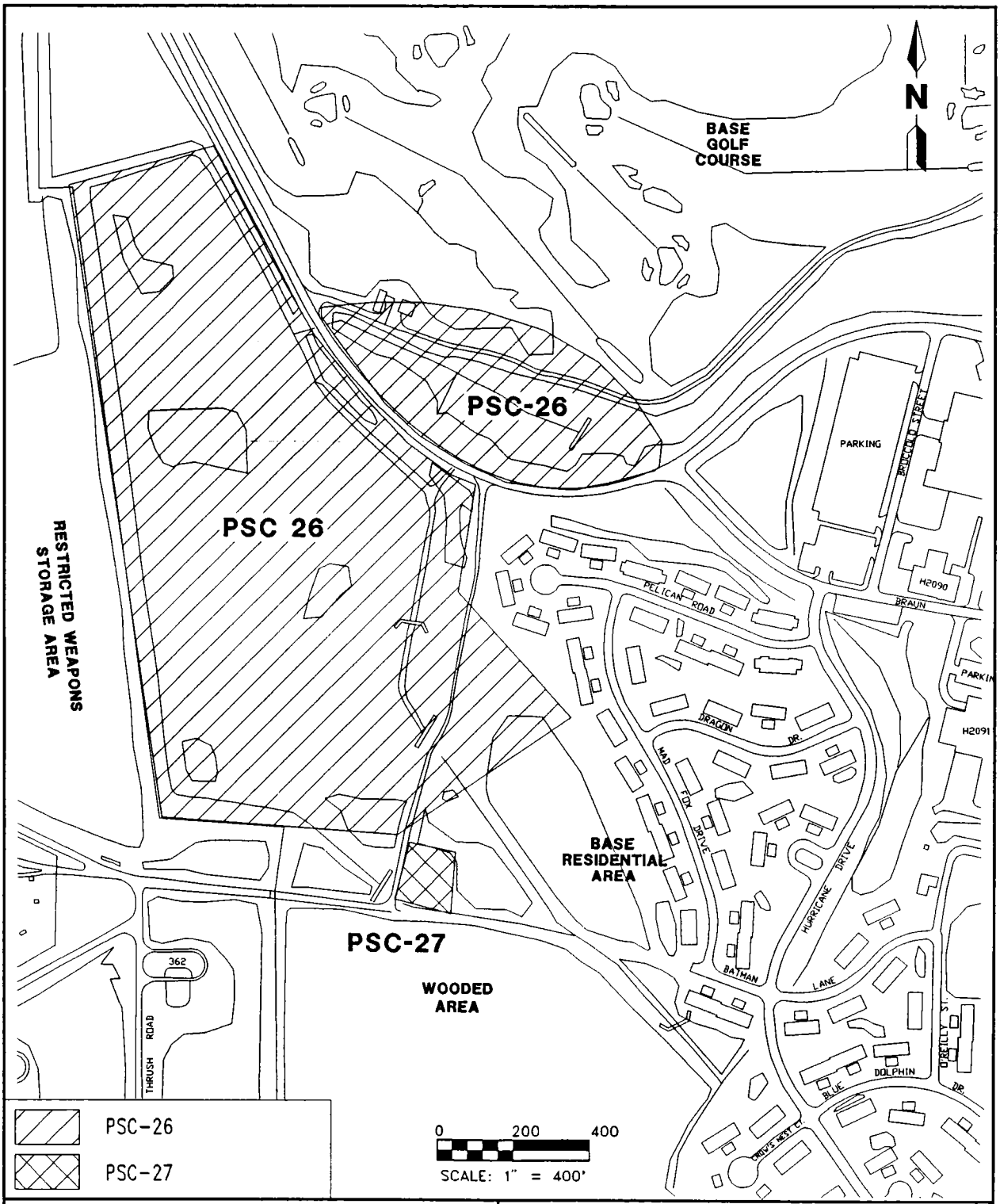


FIGURE 1-3
LOCATION OF OU1 AND SOLVENTS DISPOSAL PITS AREA, PSC-26 AND PSC-27

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

NAS Jacksonville facilities in the vicinity of OU1 are the base golf course to the north, base hospital and residential areas to the east and south, and a restricted area used for weapons storage on the western site boundary (Figure 1-4).

1.2 PURPOSE. The purpose of the RI/FS is to determine the nature and extent of releases and potential pathways of contamination emanating from the site via air, soil gas, soil, sediments, surface water, or groundwater. This PCSR report describes: (1) data gathering activities, (2) sources of possible contaminants, and (3) the nature and extent of hazardous constituents. This data will be used to determine actual or potential receptors, and risk assessment to evaluate the potential impacts of releases of contaminants at OU1 on human and ecological receptors. The data will also be used to assess and design remedial measures to mitigate contaminants that are determined by the risk assessment to present a threat to human health and the environment.

1.3 SCOPE. The RI activities occurred between December 1991 and September 1992. The RI activities included the following tasks:

- soil gas sample collection;
- ambient air sample collection;
- surface soil sample collection;
- borehole soil sample collection;
- surface water and sediment sample collection;
- monitoring well and piezometer installation;
- groundwater sample collection;
- monitoring well, piezometer, and sample location survey;
- in-situ slug testing of aquifer properties at monitoring wells and piezometers;
- laboratory analyses of environmental samples for U.S. Environmental Protection Agency (USEPA) Target Compound List (TCL) organics, Target Analyte List (TAL) inorganics, cyanide, dioxins/furans, and radionuclides; and
- survey of terrestrial and aquatic environments in the vicinity of OU1.

The purpose of conducting these activates is to characterize the nature and extent of, and risk posed by, existing contamination and to evaluate the potential remedial alternatives. This PCSR was prepared from data gathered in accordance with the NIRP Plan for OU1, NAS Jacksonville, Florida entitled, Volume

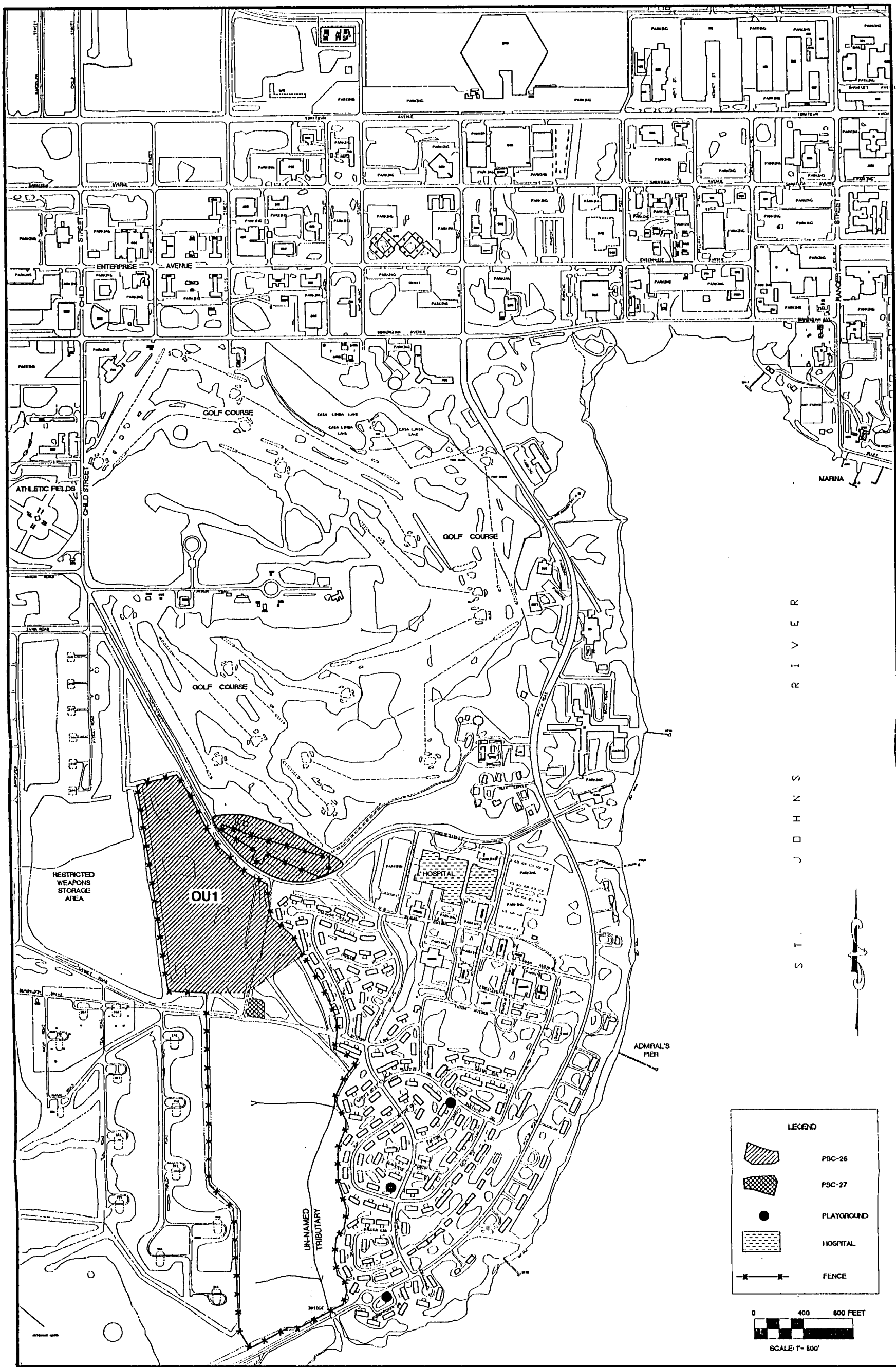


FIGURE 1-4
LOCATION OF OU1, OIL AND SOLVENTS DISPOSAL PITS AREA
PSC 26 AND PSC 27

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

5, Remedial Investigation/Feasibility Study Work Plan for OU1, Oil and Solvents Disposal Pits Area.

To assure that the data collected during the RI meet the investigative objectives, the Naval Energy and Environmental Support Activity (NEESA) Level D Quality Control Summary of Chemical Analyses standards were used for field activities and laboratory analyses. Level D corresponds with CERCLA Level IV data quality objectives, and is recommended for sites that are located near populated areas, are on the National Priorities List (NPL), and have a probability of litigation.

Section 2.0 of the PCSR provides general background information for NAS Jacksonville, Florida. Literature and previous investigation data are presented for regional geography, demographics, climate, soils, geology, and hydrogeology. Much of this information has been previously presented in the RI Workplan (U.S. Navy, 1991a).

Section 3.0 of the PCSR describes the RI field activities that occurred during the period between December 1991 and September 1992. In general, these activities were in accordance with the RI/FS Work Plan (U.S. Navy, 1991a). Variances that occurred are discussed in Section 3.0. Section 3.0 also provides an assessment of data quality based on field quality control (QC) and laboratory performances.

Section 4.0 of the PCSR presents the findings from field measurements and chemical analyses of media samples collected during the RI. This section also presents the investigation-specific findings for geology, hydrogeology, biology, and contamination of soil gas, soil, surface water, sediments, and groundwater.

Section 5.0 of the PCSR summarizes the major findings and presents recommendations for further investigations or corrective measures.

2.0 BACKGROUND INFORMATION

2.1 FACILITY DESCRIPTION. In 1938, the Hepburn board originated the concept of establishing a U.S. Naval Station in Jacksonville, Florida for seaplane support. This operational requirement largely determined the location of the base. The site was located inland along the St. Johns River, southwest of the city of Jacksonville (Figure 1-1), because the 2- to 3-mile-wide stretch of the river permitted easy access for seaplane operations.

NAS Jacksonville was officially commissioned on October 15, 1940. Originally, NAS Jacksonville was used as seaplane support, pilot training, and a Navy Aviation Trades school (NAT). In 1942, the Navy phased out pilot training and the station became the home of Chief of Naval Operations Training (CNOT), the final training phase before fleet assignment for air crews. The NAT became the Naval Air Technical Training Center (NATTC) under the Chief of Naval Air Technical Training, headquartered in Memphis, Tennessee. Coastal protection with seaplanes was maintained at the station. During World War II (WWII), the size of the station doubled to support the war effort. At the end of WWII, NAS Jacksonville was devoted entirely to aviation training.

In 1945, CNOT was redesignated Chief Naval Advanced Training (CNAT), though the mission remained the same. In 1946, The Seventh Naval district was transferred from Miami, Florida, as a joint command with CNAT. In 1948, the CNAT was transferred to Corpus Christi, Texas. Operational squadrons at Corpus Christi were transferred to NAS Jacksonville and the original mission as a Fleet Air Operational Support Base was returned to the station. The NATCC was transferred and consolidated with the Chief of Naval Air Technical Training in Memphis, Tennessee. By 1949, the station mission was to support squadrons assigned to Commander, Naval Air Bases, Sixth District and patrol squadrons assigned to Combat Patrol Wing Eleven.

In 1951, the Navy reactivated the NATCC and Marine Air Division at NAS Jacksonville in support of the Korean Conflict. This joint operational and training status continues to this time.

The Naval Aviation Depot (NADEP) became a major tenant of the station, growing out of the Assembly and Repair Department. In 1967, was is now known as the NADEP became a modern industrial facilities to conduct indepth rework of aircraft (Naval Air Rework Facility [NARF]). Currently, NADEP reworks a variety of aircraft, the A-7 Cosair, P-3 Orion, T-2 Buckeye, S-3 Viking, and F/A-18 Hornet, and aircraft engines including the J-52, TF-41, TF-34, and F-404, as well as other aircraft engine and weapon system components.

2.2 EXISTING SITE CONDITIONS. The following section describes the physical and environmental setting of NAS Jacksonville, the disposal history at OU1, and previous investigations that have been conducted.

2.2.1 Geography and Demographics

Geography. NAS Jacksonville is located on the St. Johns River approximately 24 miles upstream from its confluence with the Atlantic Ocean. Bordering NAS Jacksonville are the St. Johns River on the east, a residential area on the south, U. S. Highway 17 and the Ortega River on the east, and Timmaquana Country Club on the northwest. Across U.S. Highway 17 towards the west is a residential area (Ortega Hills) (Figure 1-2).

OU1 is located in the south-central portion of NAS Jacksonville. OU1 is located on Child Street. Child Street bisects the northeastern-most portion of OU1 (Figure 1-3). OU1 is bordered by a forested area on the north, base housing to the east, a forested area on the south, and a restricted area (weapons storage) on the west (Figure 1-4). Across Child street, towards the north and east, is the base golf course. The base hospital is located on Child Street to the east of OU1. Within the forested area to the south is an unnamed drainage feature which flows south to the St. Johns River. The St. Johns River is located approximately 2,400 feet to the south of OU1.

Demographics. Preliminary demographic information about NAS Jacksonville was obtained during a June 1992 visit by ABB Environmental Services, Inc. (ABB-ES), personnel to the OU1 site. During this visit, information was obtained from interviews with base personnel and from the base Master Plan (February 1988). Information was obtained about locations of base housing (in general and with respect to OU1), a child care center, a hospital, recreational areas, the number of dependents living on base, and general base activities.

A discussion with NAS Jacksonville base housing personnel indicated that the average age on base is approximately 30 to 32 years for adults and up to 21 years for children and young adults. There are approximately 1,300 dependents on base, including some 300 spouses and 1,000 children (approximately 1.3 children per family). On the average, people are stationed at NAS Jacksonville for 2 to 3 years. However, the period people live on base is approximately 2 years because personnel are usually put on a base housing waiting list for 1 year. Approximately 300 housing units are located in the residential area southeast of OU1. This number does not include the officers' quarters, also located southeast of OU1, on Mustin Road.

In the Child Street area directly adjacent to OU1, there are approximately 40 family housing units located along Pelican Road, Mad Fox Drive, Dragon Drive, Hurricane Drive, Shamrock Circle, and Batman Lane (Figure 1-4). Observations during a drive through the Child Street area indicated many young children live there; bikes, dirt bikes, and gym sets were observed in yards.

Accessibility to OU1 is limited on the western side because of the Weapons Storage Area. In the early 1980's, a fence was installed along the western perimeter and portions of the eastern side of OU1 to limit access from Child Street. The fencing was extended in the spring of 1992 from Batman Lane to Mustin Road and along the north side of Mustin Road to an existing fence, which terminates at the southern portion of the restricted weapons storage area. According to Sherleen Baggs, the base housing manager, personnel residing on base

before the installation of the first fence around OU1 are no longer stationed at this base. Evidence of children playing in the area of OU1, primarily in the Former Transformer Storage Area, PSC 27, includes abandoned bikes, balls, tree houses, and campfire remains. In addition, chairs near the fence surrounding OU1 were possibly used by children to get over the fence to play in OU1.

Approximately 10 to 15 home child care providers are located on NAS Jacksonville. There are no schools on the base. A base hospital (approximately 400 beds) is located approximately 1,000 feet east of OU1 (Figure 1-4), in the vicinity of Braun Avenue and Broccolo Street. A child development center is located north of OU1 on the corner of Enterprise Avenue and Child Street (see Figure 1-4). Several playground areas are located from 1,800 to 2,400 feet southeast of OU1 (see Figure 1-4), at the corners of Eagle Run and Hurricane Drive, Woodpecker Drive and Mustin Road, and Blue Dolphin Drive and Falcon Lane. In addition, athletic fields are located north of OU1 near the corner of Akron Road and Child Street (see Figure 1-4).

The base marina on Ranger Road is located approximately 1 mile northeast of OU1. The marina/recreational manager indicated that people fish and net shellfish along the St. Johns River near NAS Jacksonville. Fishing occurs off the marina pier, the admiral's pier, and along the shore behind the officers' homes on Mustin Road. People have also been observed fishing in the unnamed stream area near the Mustin Road Bridge approximately 0.5 mile south/southeast of OU1.

The marina has sailboats, small power boats, canoes (rented, but not for river use), and water skis for rent that may be used on the St. Johns River. However, little water skiing has been observed along the St. Johns River in the area near the marina, probably because the water can be turbulent. The marina/recreational manager also stated that helicopter search and air rescue training exercises are performed northeast of the station on the St. Johns River. The base has no plans to develop beaches along the St. Johns River.

An 18-hole golf course is located northeast of OU1. The southern portion of the golf course is adjacent to the northeast portion of OU1. Contaminated soils and groundwater have been found in the portion of OU1 adjacent to the golf course. Figure 1-4 depicts the location of these areas.

A discussion with the station planning supervisor indicated there are no plans to develop the OU1 site (residential or otherwise) because of the Weapons Storage Area bordering the western side. The explosion safety quadrant arcs (ESQAs) would prohibit development of any building on OU1 in which people may work or reside.

2.2.2 Physiography and Topography NAS Jacksonville is located in the Coastal Plain Physiographic province. In the vicinity of NAS Jacksonville, the Coastal Plain is composed of marine sediments. The sediments were deposited in terraces, which formed during prehistoric fluctuations in the sea level. The terrace deposits are in the form of ridges that tend to parallel the current coastline.

The topography of the terrace deposits is characterized by low relief with flat to gentle slopes. The lithology of sediments, topographic configuration, low

relief, and gentle slopes are a determining factor in surface drainage patterns. As a result of the low relief and shallow slopes, drainage divides are difficult to define.

The topography of the land surface at OU1 varies from approximately 20 feet to about 34 feet above mean sea level. OU1 is located on the northern fringe of an elongated ridge that is oriented in a northeast-southwest direction (Figure 1-2).

The predominant surface drainage features in the vicinity of NAS Jacksonville are the St. Johns River and the Ortega River (Figure 1-2). NAS Jacksonville is situated on the central and eastern portion of a ridgeline between the two rivers. Surface water drainage is directed by topographic features to both the Ortega and St. Johns Rivers. Surface water drainage from OU1 is directed towards a perennial stream (Cowardin et al., 1979), which flows in a southerly direction for approximately 1/2 mile, into the St. Johns River.

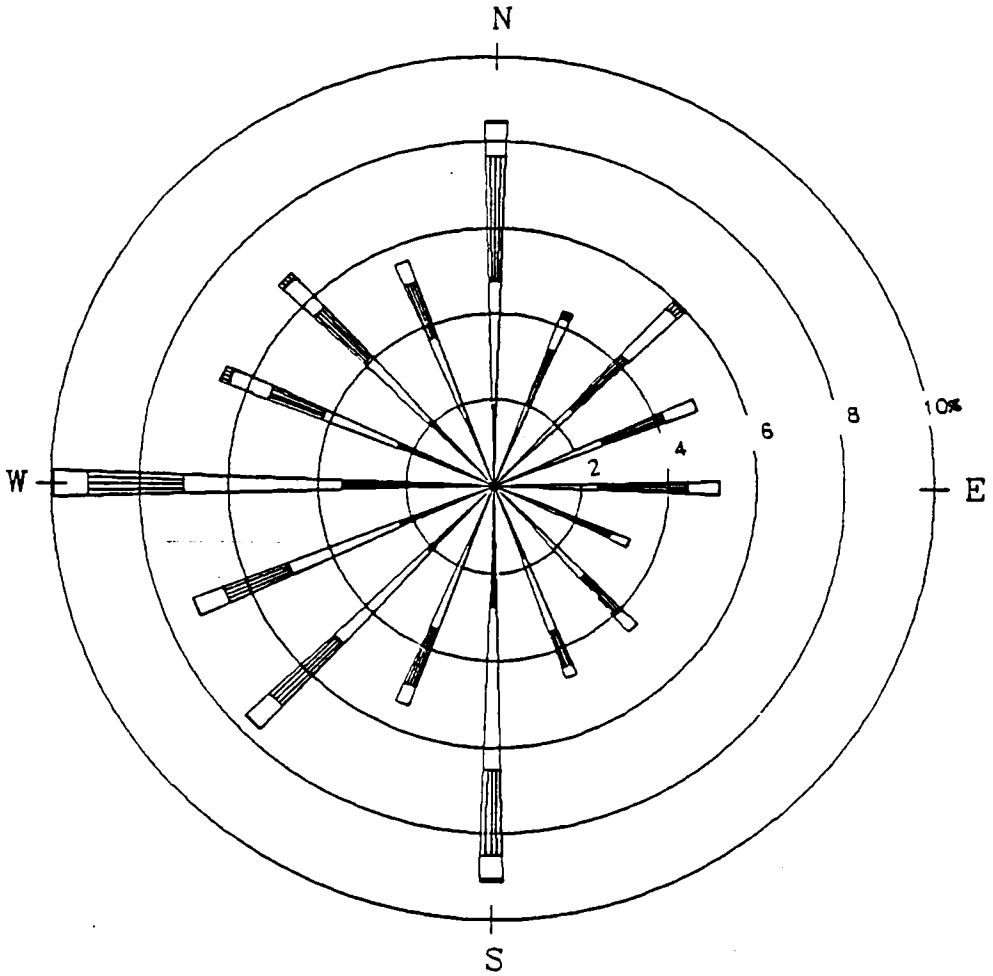
2.2.3 **Climate** NAS Jacksonville is located in a climate that is characterized as humid and semitropical. The average annual temperature is approximately 70 degrees Fahrenheit (°F). The range in average temperatures is approximately 50 °F in January to 80 °F in July. Winds are predominantly from the west and south (Figure 2-1).

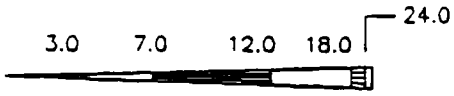
The average annual rainfall is 54 inches. Most of the rainfall occurs from June through September. Winters typically are mild and dry. During the summer months, thunderstorms occur at a frequency of every other day and may yield several inches of rainfall. Rainfall amounts from thunderstorms vary over a wide area. Potential evaporation for the Duval County area is estimated at a maximum value of 46 inches per year based on meteorological factors such as solar radiation, wind movement, air temperature, and humidity.

The Jacksonville area is subject to tropical storms and tornadoes. Tropical storms are likely to occur during the period between June through November. Tornadic activity is associated with both thunderstorms and tropical storms. The greatest impact from tropical storms is from prolonged rains and high tides, which cause flooding. Tropical storms that produce such flooding are considered equivalent to storm events of 100-year frequency. NAS Jacksonville shoreline is most affected by such tropical storms due to exposure to maximum effect winds from the northeast and southeast.

The St. Johns River basin occurs near the boundaries of the southern extent of the "Carolinian" biotic province and the northern boundary of the sub-tropical and southern boundary of the warm temperate regions of the southeastern United States (Cowardin et al., 1979). Biota communities found in the general site area are generally characterized by temperate biota, with seasonal subtropical influences.

2.2.4 **Soils** Soils at NAS Jacksonville developed in marine terrace sediment deposits and are regionally classified by the U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS) as the Pelham-Mascotte-Sapelo soil series association. Soils in this association are characterized as nearly level, poorly





WIND SPEED CLASS BOUNDARIES
(MILES/HOUR)

NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE - WIND IS BLOWING FROM THE NORTH 8.5 PERCENT OF THE TIME.

WINDROSE

STATION NO. 13889
Jacksonville, FL
PERIOD: 1989

SOURCE: GERAGHTY & MILLER, 1991.

FIGURE 2-1
WINDROSE DIAGRAM
JACKSONVILLE, FLORIDA

PRELIMINARY CHARACTERIZATION REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

drained sands to a depth of 20 inches below the land surface, which are underlain by loamy sands (USDA, 1978).

Soil series mapped in the vicinity of OU1 are classified as Albany, Arents, Ortega, Sapelo, and Wescot (Figure 2-2). Albany soil is characterized as gently sloping, poorly drained, and is located on broad ridges and isolated knolls. Arents soil is nearly level, poorly drained soil that has been reworked by earth moving operations. Ortega soil is gently sloping, moderately well drained and is located along broad ridges and isolated knolls. Sapelo soil is nearly level, poorly drained, and is located in broad flatwood areas. Wescot soil is nearly level, very poorly drained, and is found in shallow depressions.

2.2.5 Regional Geology In northeastern Florida, the distribution of sediments is controlled by the Peninsular Arch and the Southeast Georgia Embayment (Figure 2-3). More than 1,500 feet of Eocene and younger age sediments were deposited in the region underlying the station.

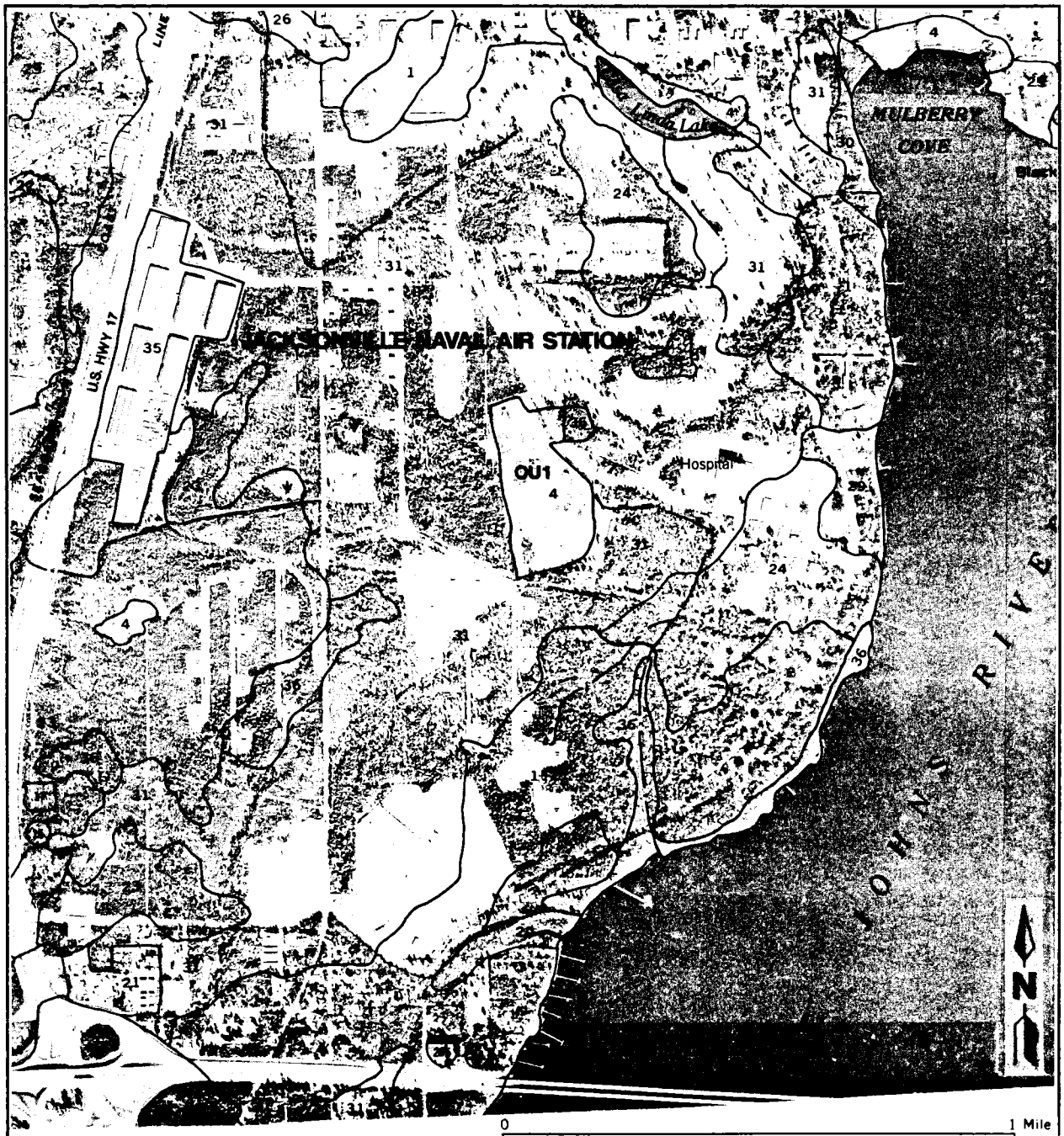
The underlying unconsolidated geologic sequence consists of flat-lying deposits of sands, silts, and clays overlying a thick sequence of marine carbonates (Figure 2-4). Essentially, there are three discernible geologic units underlying the station, as described below (Figure 2-5).

- Surficial deposits form a unit approximately 40 to 100 feet thick and are of late Miocene to Recent age.
- The Hawthorn Group is approximately 300 feet thick and of middle Miocene age.
- Marine carbonate sequences of the Floridan Aquifer System are of Eocene age and comprise a unit greater than 1,000-feet thick.

Limestones of Eocene age compose the Ocala Group, which are the principal consolidated formations near NAS Jacksonville (Figure 2-4). The Eocene Age limestone formations in the western and eastern portions of Duval County slope northeastward and form an irregular trough or basin, which extends from south-central Duval County northeastward into northeastern Nassau County.

These geologic units are described in more detail in the following sections.

2.2.5.1 Surficial Deposits The surficial deposits consist of sediments of upper Miocene age and younger. These deposits can be divided into undifferentiated sediments of Pleistocene and Recent age and sediments of upper Miocene and Pliocene age. These sediments were deposited in lagoon and estuarine environments. The Pleistocene and Recent age sediments extend from the surface to about 40 feet below land surface (bls) and comprise the Surficial Aquifer. These highly variable sediments include sands, shelly sands, coquina, silts, clay, and shell beds. The upper Miocene and Pliocene sediments consist of silty clays, clay, and clayey sands. Iron oxide-cemented (rusty red color hardpan) fine sand sediments are common in the upper portion of the surficial deposits.



1 - ALBANY 31 - SUPELO
4 - ARENTS 36 - WESCOT
24 - ORTEGA 35 - URBAN LAND

SOURCE: USDA, 1978, SOIL SURVEY OF CITY OF JACKSONVILLE DUVAL COUNTY, FLORIDA, MAP 59, MAY 1978.

FIGURE 2-2
SOIL SERIES ASSOCIATION
MAPPED NEAR OU1
NAS JACKSONVILLE

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

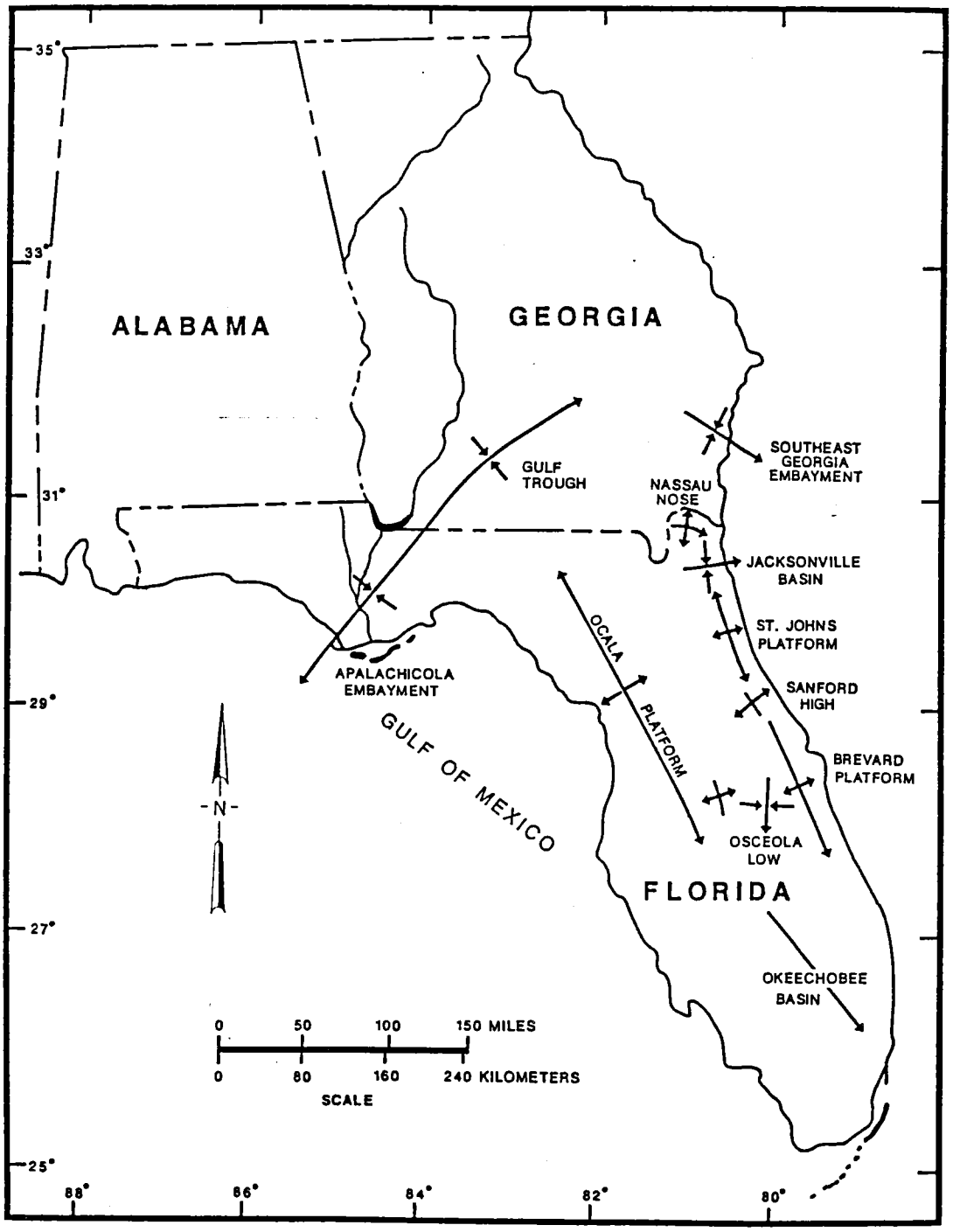
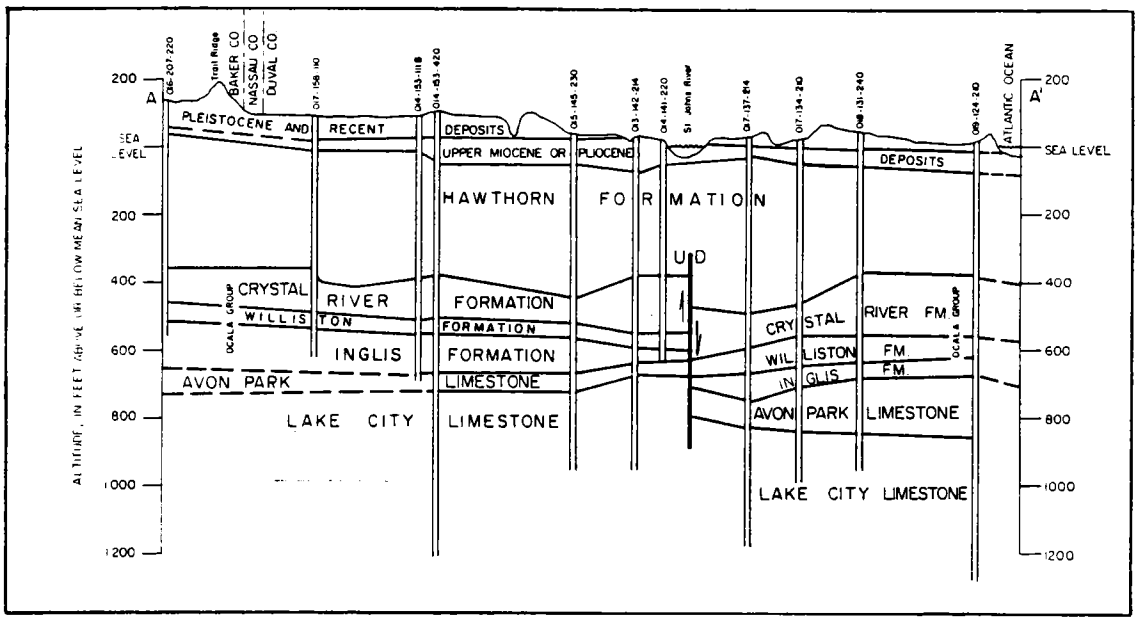
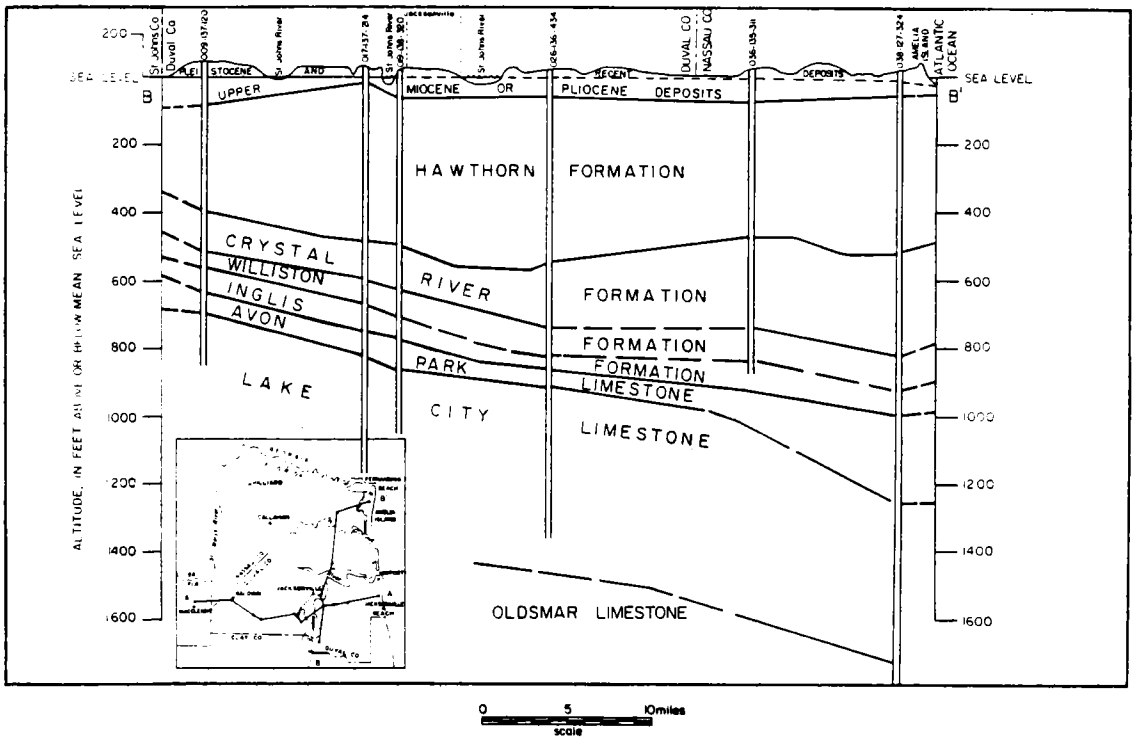


FIGURE 2-3
STRUCTURES AFFECTING SEDIMENT DEPOSITION

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA





0 5 10miles
scale

SOURCE: LEVE, 1966

FIGURE 2-4

GEOLOGIC CROSS-SECTIONS SHOWING GEOLOGIC FORMATIONS IN DUVAL AND NASSAU COUNTIES, FLORIDA

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

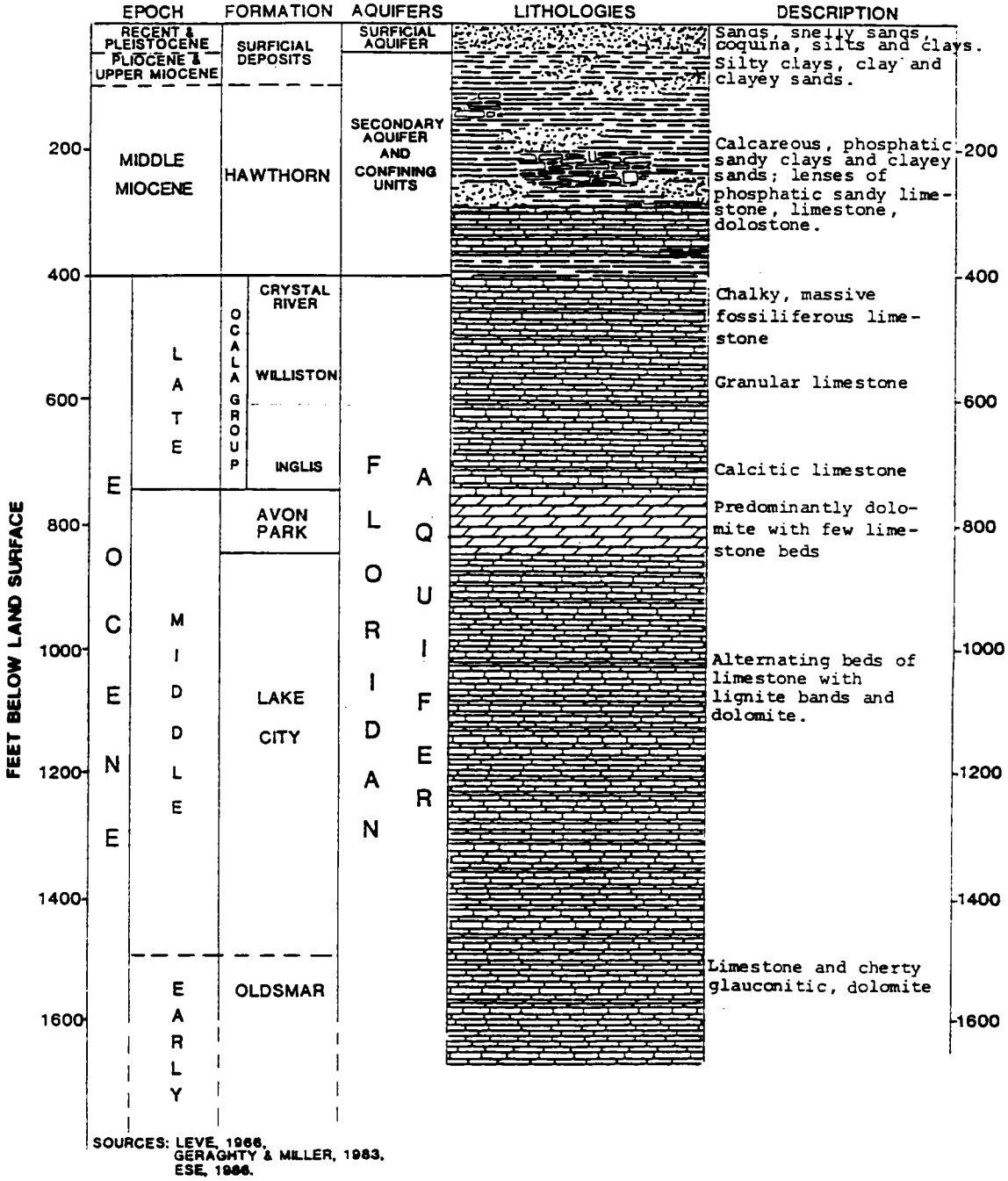


FIGURE 2-5
GENERALIZED GEOLOGIC COLUMN

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

The contact between the upper Miocene and Pliocene deposits and the underlying Hawthorn Group is an unconformity identified by a coarse phosphatic sand and gravel bed (Leve, 1966). When the course phosphatic sand and gravel are not present, the contact is phosphatic sandy clays or clayey sands, dolostone, or a magnesium rich clay.

2.2.5.2 **Hawthorn Group** Lithologically, the Hawthorn Group is quite variable and consists of calcareous, phosphatic sandy clays, and clayey sands interbedded with thin discontinuous lenses of phosphatic sand, phosphatic sandy limestone, limestone, and dolostones. The limestone and dolostone lenses are thicker and more prevalent near the base of the Hawthorn.

Phosphate is present throughout the sediments of the Hawthorn Group, comprising one of the primary lithologic constituents. The most common carbonate components of the Hawthorn Group are dolomite and dolosilt. Clay minerals associated with the Hawthorn Group sediments are smectite, illite, palygorskite, and kaolinite.

Permeable sand and limestone layers within the Hawthorn's confining clays form the secondary or intermediate artesian aquifer. The Hawthorn Group serves as a confining layer that separates the Shallow Aquifer from the underlying Floridan Aquifer System. It lies unconformably above the Ocala Group (Crystal River Formation).

2.2.5.3 **Marine Carbonates Sequences (Floridan Aquifer System)** The marine carbonate sequences that make up the Floridan Aquifer System beneath NAS Jacksonville consists of the following formations in descending order:

- the Ocala Group, which consists of the Crystal River Formation, the Williston Formation, and the Inglis Formation;
- the Avon Park Limestone;
- the Lake City Limestone; and
- the Oldsmar Limestone.

These formations range in age from the late Eocene Crystal River Formation to the early Eocene Oldsmar Limestone.

The Crystal River Formation is a white to cream, chalky, massive fossiliferous limestone and is the youngest Eocene formation underlying NAS Jacksonville. The Williston Formation, which lies conformably between the overlying Crystal River Formation and the underlying Inglis Formation, is a tan to buff granular limestone. The Inglis Formation, of early late Eocene age, is lithologically a tan to buff calcitic limestone that is very similar to the Williston Formation (Leve, 1966).

The Avon Park Limestone, of late middle Eocene age, unconformably underlies the Ocala Group. It consists of alternating beds of tan, hard, massive dolomite, and brown to cream, granular, calcitic limestone. The Lake City Limestone unconformably underlies the Avon Park Limestone and is early middle Eocene in

age. Lithologically, it consists of alternating beds of white to brown, chalky to granular limestone with lignite bands, and gray to tan dolomite. Below the Lake City Limestone is the Oldsmar Limestone of early Eocene age. It consists of a cream to brown, soft, granular limestone and cherty, glauconitic, massive to finely crystalline dolomite (Leve, 1966).

2.2.6 Regional Hydrology

2.2.6.1 Surface Water Two principal surface water features are located in the immediate vicinity of NAS Jacksonville, the St. Johns River, and its tributary, the Ortega River. NAS Jacksonville is situated along the west bank of the St. Johns River (Figure 2-6). Average discharge of the St. Johns River is estimated to be between 6,000 and 8,300 cubic feet per second (cfs), or about 3,900 million gallons per day (mgd) (Heath and Conover, 1981; U.S. Geological Survey [USGS], 1967).

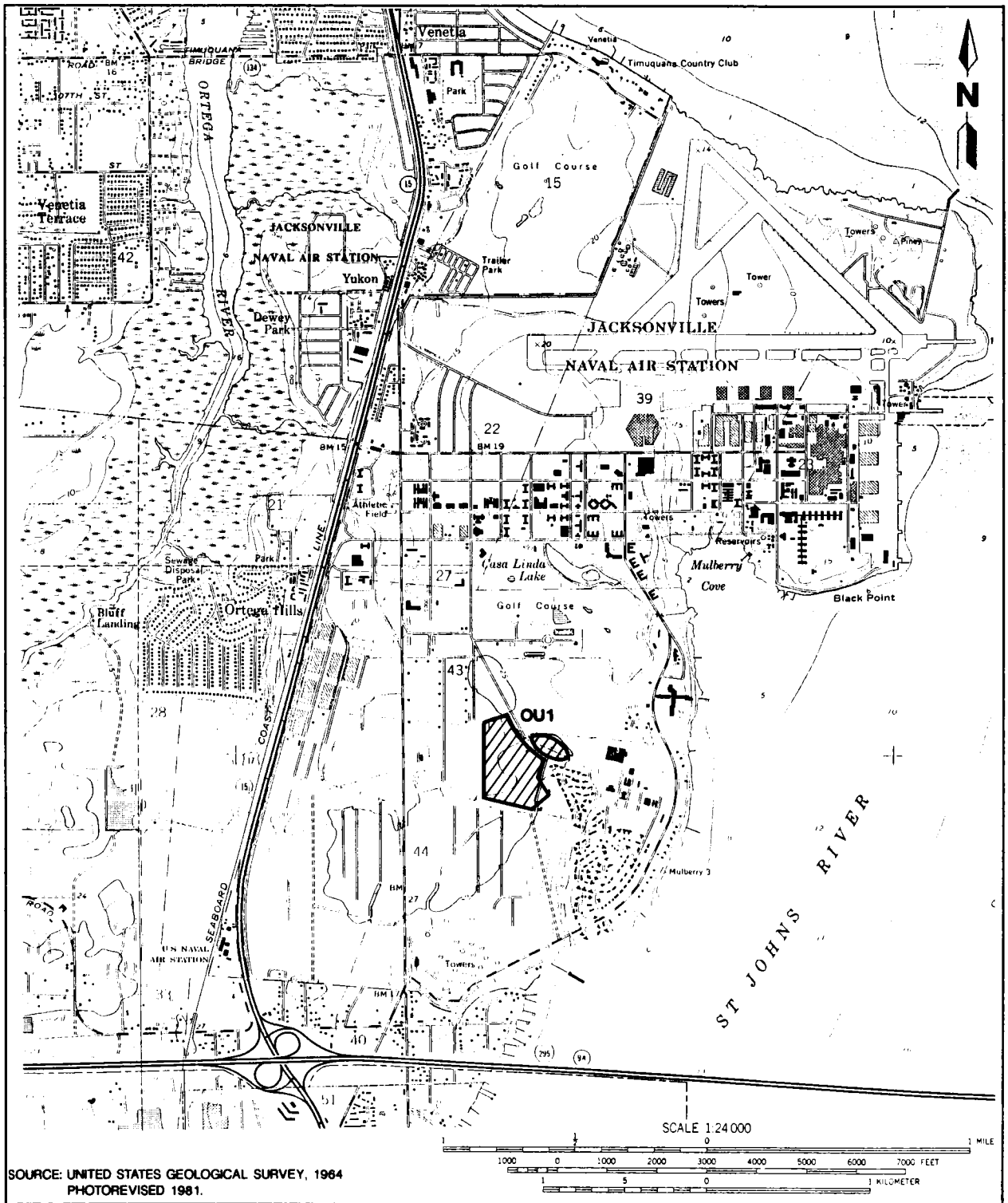
The St. Johns river originates near Ft. Pierce, Florida, approximately 300 miles to the south of NAS Jacksonville. The St. Johns River drains an area of approximately 9,430 square miles. Tidal influence of the St. Johns river ranges from 106 to 161 miles upstream from the mouth. Intrusion of saltwater occurs in the tidal influenced portions of the River.

The St. Johns River is rated by FDER as a Class III waterbody, which is designated for fish and wildlife propagation, and body contact recreational use. The U.S. Geological Survey (USGS) maintains a continuous monitor station at the Main Street Bridge in the City of Jacksonville, located upstream from NAS Jacksonville. Water quality data collected at this sample location indicates that this portion of the St. Johns River meets the Class III Standards, with the exception of occasional dissolved oxygen and total coliform violations. The St. Johns River also appears to have naturally occurring iron levels that exceed the Class III Standards.

The Ortega River is located approximately 1,400 feet to the west of NAS Jacksonville and is approximately 30 miles long. The drainage area for the Ortega River is 28 square miles. Stream gauge data is obtained by the USGS at a location midway between the headwaters and its confluence with the St. Johns River. The average discharge is 42 cfs. Tidal influence on the Ortega River is approximately 10 miles from its confluence with the St. Johns River. The stream gauge location is above the influence of tides.

Limited water quality data is available for the Ortega River. The Ortega River water quality is characterized by low dissolved solids content (70 to 80 parts per million [ppm]), low specific conductance, and low levels of iron.

2.2.6.2 Surficial Aquifer The Surficial Aquifer is comprised of unconsolidated deposits of sand, shells, and clay, which vary in lithology, thickness, and permeability throughout the facility. Causey and Phelps (1978) report that the Surficial Aquifer under most of Duval County is composed of an upper and a lower zone that are separated by deposits of lower permeability at a depth from 25 to 50 feet bls.



SOURCE: UNITED STATES GEOLOGICAL SURVEY, 1964
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FIGURE 2-6
PRINCIPAL WATERWAYS IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

The direction of groundwater flow in the Surficial Aquifer tends to reflect the surface topography of the area. Groundwater generally flows from the higher topographic areas to the lower topographic areas. Throughout much of NAS Jacksonville, surficial groundwater flow of the Surficial Aquifer is generally towards surface water features. These water bodies include the St. Johns River to the north and east, and the Ortega River to the west, and smaller tributaries of the two principal drainage features.

The Surficial Aquifer is recharged by local precipitation. The average annual precipitation for Duval County is 52 inches. Hydrograph of water levels studied by Hendry (1972) indicate that 10 to 16 inches of rainfall recharge the Surficial Aquifer annually. The quantity of recharge was estimated by Hendry using a porosity of 20 percent. Discharge of the Surficial Aquifer occurs by evapotranspiration, seepage into surface water bodies, downward leakage into the underlying Hawthorn aquifer, and well pumpage.

Well yields in the range of 10 to 15 gallons per minute (gpm) have been reported for the Shallow Aquifer (Spechler and Stone, 1982).

2.2.6.3 **Intermediate Hawthorn Aquifer** The Intermediate Hawthorn Aquifer Zone consists of sand and limestone lenses interbedded in the clayey sands and sandy clays of the Hawthorn Group and is situated between the Surficial Aquifer and the underlying Floridan Aquifer System. Spechler (1982) noted that the most productive zone, a limestone layer in the upper part of the Hawthorn, is notably absent in the NAS Jacksonville area. Water levels in the Secondary Artesian Aquifer indicate that groundwater flow in the NAS Jacksonville area is towards the east (Fairchild, 1972).

The Hawthorn Formation is a complex aquiclude that acts as a confining bed to the Floridian aquifer system and prevents the downward percolation of water from the Shallow Aquifer. However, in some areas of Duval County, clean quartz sand and phosphate beds occur intermittently throughout the portions of the Hawthorn Formation at depths ranging from 100 to 250 feet. Private wells (such as those located on Collins Road to the south of NAS Jacksonville) are often completed in these sediments. It has not been determined whether or not these Hawthorn Formation sediments are hydraulically connected to either the Floridian or the Surficial Aquifer System. Recharge to the Intermediate Hawthorn Aquifer Zone is more likely from upward leakage from the Floridian aquifer system rather than downward leakage from the shallow Surficial Aquifer. It should be noted that the potential for the downward leakage of the Shallow Aquifer System is offset by the artesian nature of the Floridian Aquifer System.

2.2.6.4 **Floridan Aquifer System** The Floridan Aquifer System is the principal source of freshwater in northeast Florida. It is comprised by the Oldsmar, Lake City, and Avon Park Limestones; the Ocala Group; and a few discontinuous thin water bearing zones in the lower part of the Hawthorn Group. A generalized geologic column for the northwest Florida region is provided in Figure 2-5.

The Ocala Group is a homogeneous sequence of permeable, hydraulically connected, marine limestone beds that contain few hard dolomite or limestone beds that restrict the vertical movement of water. The Avon Park Limestone consists almost

entirely of hard, relatively impermeable, dolomite beds that restrict the vertical movement of water between the overlying and underlying permeable zones. The Lake City and Oldsmar Limestone each contain alternating hard, relatively impermeable dolomite confining beds and soft, permeable limestone and dolomite water-bearing zones.

Recharge to the Floridan Aquifer is by direct rainfall along the Ocala Uplift where the limestone of the aquifer outcrops at the land surface, approximately 30 miles west of NAS Jacksonville. The top of the Floridan Aquifer in the vicinity of NAS Jacksonville occurs at a depth of about 400 feet bls. Published transmissivities of the Floridan Aquifer in eastern Duval County range from approximately 85,000 to 160,000 gallons per day per feet (g/d/ft) (Leve, 1966).

Geraghty & Miller (1983) report that groundwater in the Floridan Aquifer in the vicinity of NAS Jacksonville is moving southward toward areas of heavy pumpage along the coast. Floridan Aquifer wells in the vicinity of NAS Jacksonville are under sufficient artesian pressure to flow at the surface. Water quality in the Floridan Aquifer System is potable in the NAS Jacksonville area. The concentration of total dissolved solids is approximately 400 milligrams per liter (mg/ℓ) and the concentration of chlorides is around 25 mg/ℓ.

The potentiometric surface of the Floridan Aquifer exists at elevations above land surface, resulting in a net upward hydraulic gradient between the Floridan and Surficial Aquifers (Geraghty & Miller, 1983). This would indicate that the Intermediate Hawthorn Aquifer Zone receives recharge from the Floridan Aquifer System.

2.3 OPERABLE UNIT HISTORY.

2.3.1 Operable Unit 1 (OU1) Site History OU1 is located in the south-central portion of NAS Jacksonville. OU1 is comprised of two potential sources of contamination, PSC 26 and PSC 27 (Figure 1-3). PSC 26 was formerly known at the Old Main Registered Disposal Area and occupies approximately 38 acres. PSC 27 was formerly used to store electric transformers that contained oils with PCBs.

Prior to 1942 and the Navy's operation of NAS Jacksonville, the site was a U.S. Army facility. The U.S. Army is reported to have used portions of OU1 for disposal of non-hazardous debris (primarily a vehicle junkyard).

After 1940, the Navy used PSC 26 for the disposal of household and sanitary waste, liquid industrial waste (oil and solvents), and demolition and construction debris (Figure 2-7). At one time these materials were burned in open pits and trenches and the residues left in place. After the pits were full of the burned residue, they were covered with soil and the area graded to conform to the surrounding topography.

The Navy reportedly disposed of 1,000 gallons (gal) per week of volatile organic waste products over a 40-year period (Jones, Edmunds, and Associates, 1984). Other waste disposed at the site included: approximately 200 gal per week of cold carbon remover residue, 300 gal per week of vapor degreaser, and 600 gal per week of paint shop waste. These wastes consisted of the following organic

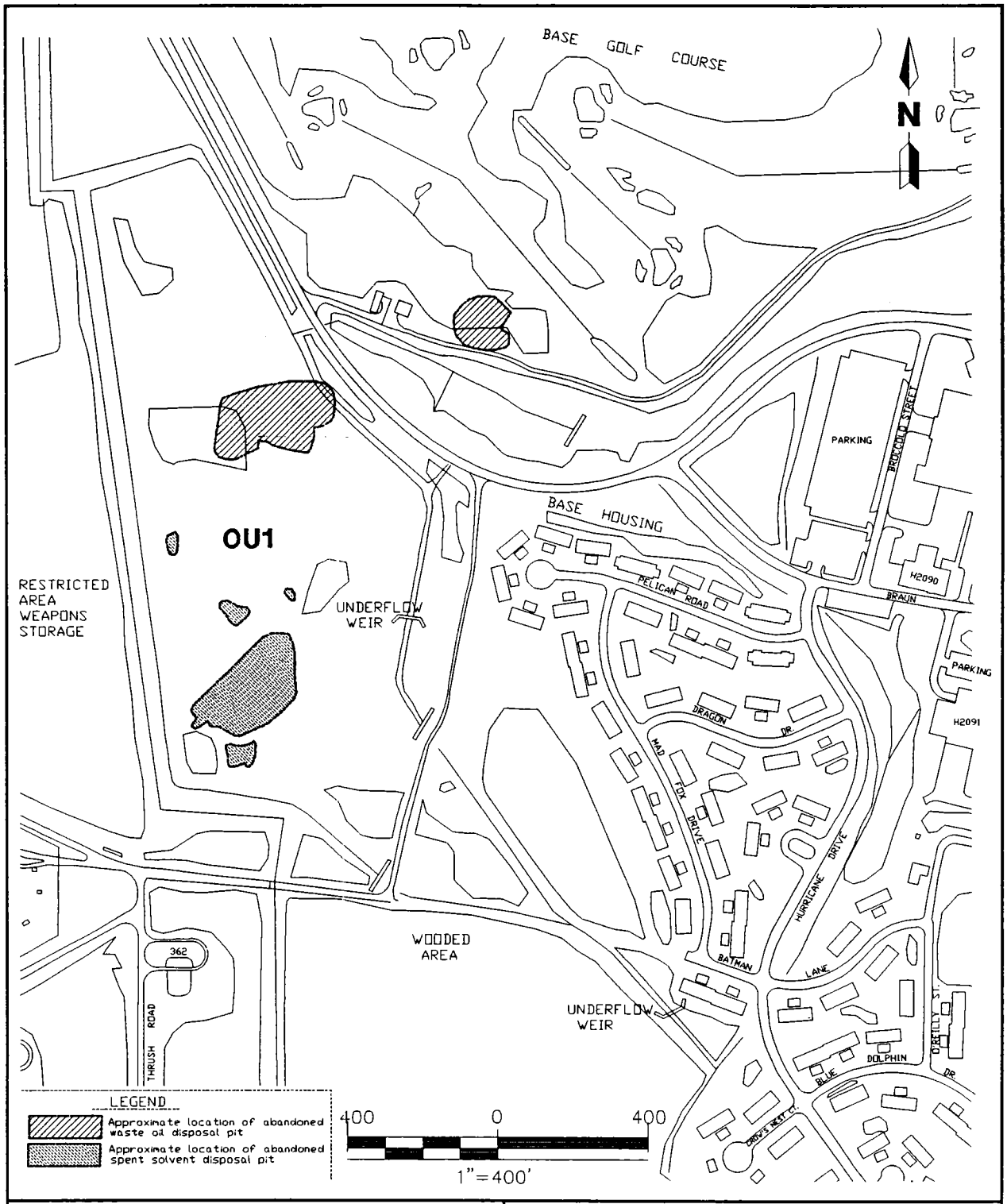


FIGURE 2-7
LOCATION OF FORMER DISPOSAL PITS AT OU1

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

compounds: methylene chloride, methylethyl ketone, ethyl acetate, trichloroethylene, methyl isobutyl ketone, n-butyl acetate, xylenes, and heavy metal salts.

Methylene chloride and methylethyl ketone were utilized during paint stripping operations. Trichloroethylene and methylene chloride were used for degreasing. N-butyl acetate and xylenes were used as painting and lacquer solvents.

Ambient air quality considerations resulted in discontinuing the burning of the waste. Disposal of waste oils, spent solvents, and paint waste continued until 1978.

Low-level radioactive wastes were disposed at PSC 26 during the period between 1940 and 1950. The radioactive waste consisted of Radium-226 and Radium-228 paint waste and luminescent dials during the period in which this material was commonly used.

PSC 27 is located on the southwestern edge of OU1 and occupies an area of approximately 100 feet by 100 feet. Vandalism of the transformers during 1978 reportedly resulted in the discharge of an unknown quantity of transformer oils onto the ground surface. The transformers and some amount of PCB-contaminated soil were removed from the site.

During 1992, a former NAS Jacksonville employee indicated that approximately 100 or more drums containing hazardous materials were deposited in the southern portion of OU1. Currently, this information has not been confirmed.

2.3.2 Previous Investigations and Remedial Activities at OU1 In January 1973, NAS Jacksonville informed the U.S. Navy Radiological Affairs Support Office (RASO), located in Yorktown, Virginia, of the existence of a radioactive disposal area at OU1, which was no longer in use. A map showing the exact location of the radioactive disposal site was not provided in the RASO report. RASO conducted an investigation during February 1973 of the radioactive waste disposal area. RASO obtained and evaluated soil and water samples from the radioactive waste disposal site. Based on the investigation results, RASO indicated that the buried materials present a potentially hazardous situation.

RASO recommended that all radium waste material and contaminated soil be removed and disposed in an Atomic Energy Commission (AEC) approved burial site. During November 1973, RASO provided technical assistance during the waste excavation activities. A total of 501 barrels of contaminated material were removed from OU1. RASO conducted a final survey and indicated that "a radiological hazard no longer exists and the area is acceptable for general use," (RASO, 1974). The results of the RASO assessment are provided in a document entitled *Radiological Affairs Support Office Report of Technical Assistance Visit to Naval Air Station, Jacksonville, Florida on 8-9 January, 20-22 February and 19-30 November 1973, 8 March 1974*.

During 1978, Navy personnel discovered oil seeping into a man-made drainage ditch at PSC 26. The manmade drainage ditch flows into an unnamed creek, which is a tributary of the St. Johns River. The station engineering staff drilled several

boreholes in the area of the waste oil pit and drainage ditch and determined that oil was in the shallow groundwater system.

As a result of that investigation, in 1979 the Navy conducted a more extensive evaluation of waste oil and solvent contamination of soil and groundwater at three disposal pit areas at PSC 26. Additionally, during this investigation, it was discovered that contamination of soils and groundwater by leaking electrical transformers had occurred at PSC 27. The results of this assessment are contained in a document entitled *Contamination of Soil and Ground Water from the Disposal of Oil and Volatile Products Into Pits at the NAS Jacksonville, Florida, May 1980*.

The disposal of oil and solvents in disposal pits at PSC 26 had been conducted by the Navy for several decades. Other pits at PCS 26 were reported to have existed and to have been filled and covered with earth. The disposal pits were reported to have received waste oil, paint shop residues, spent solvents, cold-carbon remover, and liquid and solid (primarily metals) on a periodic basis in the past. The majority of the waste was reported by Navy personnel to have been disposed of in the three disposal areas (Figure 2-7), which were two waste oil disposal pits and one large solvent pit located in the southern portion of PSC 26.

The assessment of the site included the drilling of 21 monitoring wells; 14 wells were drilled near two disposal pits, which were used primarily for solvents, and 7 wells were drilled at the disposal pit used primarily for waste oil. Analysis of water samples from these wells indicated that concentration of volatile organics compounds (VOCs) methyl-ethyl-ketone, trichloroethene, methyl-isobutyl-ketone and xylenes were present. Dissolved metals cadmium (Cd), chromium (Cr), lead (Pb), and mercury (Hg) were also detected at concentrations that exceeded drinking water standards.

Based on the groundwater analytical results, 10 additional monitoring wells were installed in the NAS Jacksonville base housing area. VOCs were not detected in groundwater samples collected from these 10 wells. Concentration of arsenic, cadmium, selenium, and silver were detected, however, but did not exceed the drinking water quality standards.

PCBs were detected in only one groundwater sample from a well located hydraulically downgradient of PSC 27.

The potentiometric surface of the Shallow Aquifer was determined during the investigation. A groundwater high was determined to exist in the central portion of PSC 26 and groundwater flow directions were indicated to flow radially from this potentiometric surface high. A groundwater pumping test was conducted to determine hydraulic properties of the Shallow Aquifer. Based on this test, the transmissivity of the aquifer was calculated to be 1,000 gallons per day per square foot with a seepage velocity of 0.3 feet per day.

Free-phase hydrocarbons were identified in the northeast portion of PSC 26 (Figure 2-8). The source of the oil appeared to be two disposal pits that had been abandoned. The method of abandonment was not reported. The pits are

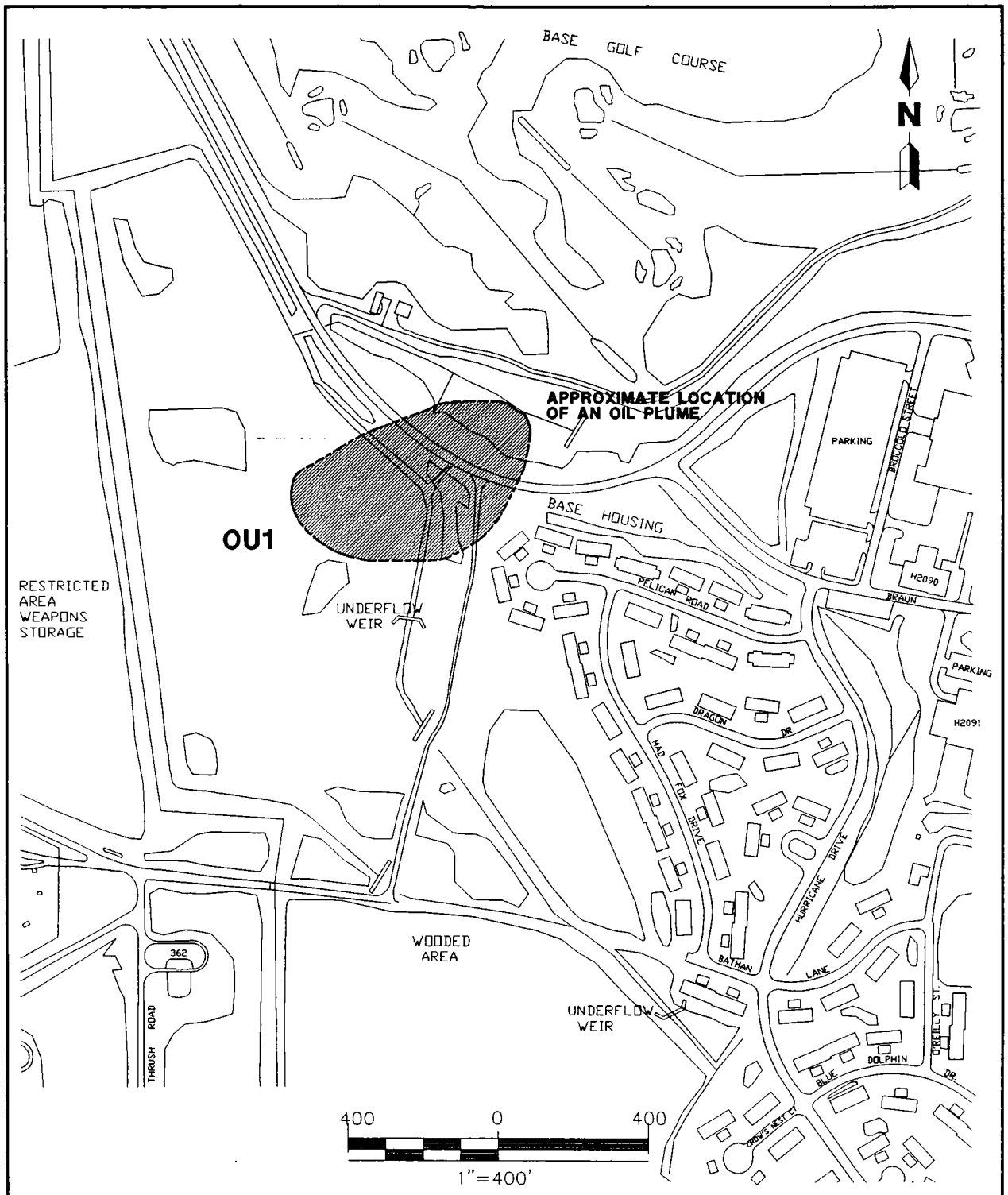


FIGURE 2-8
APPROXIMATE LOCATION OF OIL PLUME 1979

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

located where Child Street bisects a portion of PSC 26. The disposal pits were located on the north and south sides of Child Street.

Two underflow weirs were constructed in the drainage ditch, adjacent to the location of the former waste oil disposal pits (Figure 2-8). The purpose of the underflow weirs was to trap free-phase hydrocarbons on the upstream side of the weirs so removal could be effected with pumps.

Surface water samples were collected from the drainage ditch and from the former waste oil and spent solvent disposal pits, and analyzed for dissolved oil content and VOCs. The surface water sample from the waste oil pit contained the highest detected concentration (17 mg/ℓ) of dissolved hydrocarbons and the spent solvent pit contained 5.8 mg/ℓ of dissolved hydrocarbons.

The surface water samples from the drainage ditch indicated that the concentration of hydrocarbon immediately downstream of Weir B was 8.9 mg/ℓ and was 2.4 mg/ℓ at a location further downstream from Weir B.

VOCs detected in the surface water samples from the waste oil and spent solvents pits consisted of methylene chloride, methylethyl ketone, methyl isobutyl ketone, and xylenes. In addition, the surface water sample from the spent solvent pit contained concentration of ethyl acetate, trichloroethylene, and n-butyl acetate.

Four soil samples were collected from PSC 27 at depths between 6 to 12 inches and analyzed for concentrations of PCBs. Two of the samples did not contain detectable concentrations of PCBs. The other two samples contained PCBs at concentrations of 673 milligrams per kilogram (mg/kg) and 1,592 mg/kg.

Remedial investigations at NAS Jacksonville commenced in 1982 with an Initial Assessment Study (IAS) conducted to collect and evaluate the evidence that contaminants at sites, which were PSCs, might pose a health risk to humans and/or adversely affect the environment at locations both on and off-base. The IAS evaluated a total of 38 PSCs.

Subsequently, a Confirmation Study Ranking System (CSRS) was used to evaluate the IAS data for each site identified by the U.S. Navy as a PSC. The CSRS was similar to the Hazard Ranking System (HRS) currently used by the USEPA to determine if contaminants at a site posed sufficient threat to either human health and the environment. Based on the CSRS, 10 of the sites, including PSC 26 and PSC 27, were determined to pose potential threats to human health and the environment. Because PSC 26 and PSC 27 are located adjacent to each other and share the same fate and transport pathways for contaminants, the sites are collectively known as Operable Unit 1.

Sites determined by the CSRS or HRS to pose a sufficient threat are placed on the NPL. To be removed from the NPL, a RI must be conducted to assess the extent and magnitude of contamination and determine whether remedial measures are required to mitigate the threat.

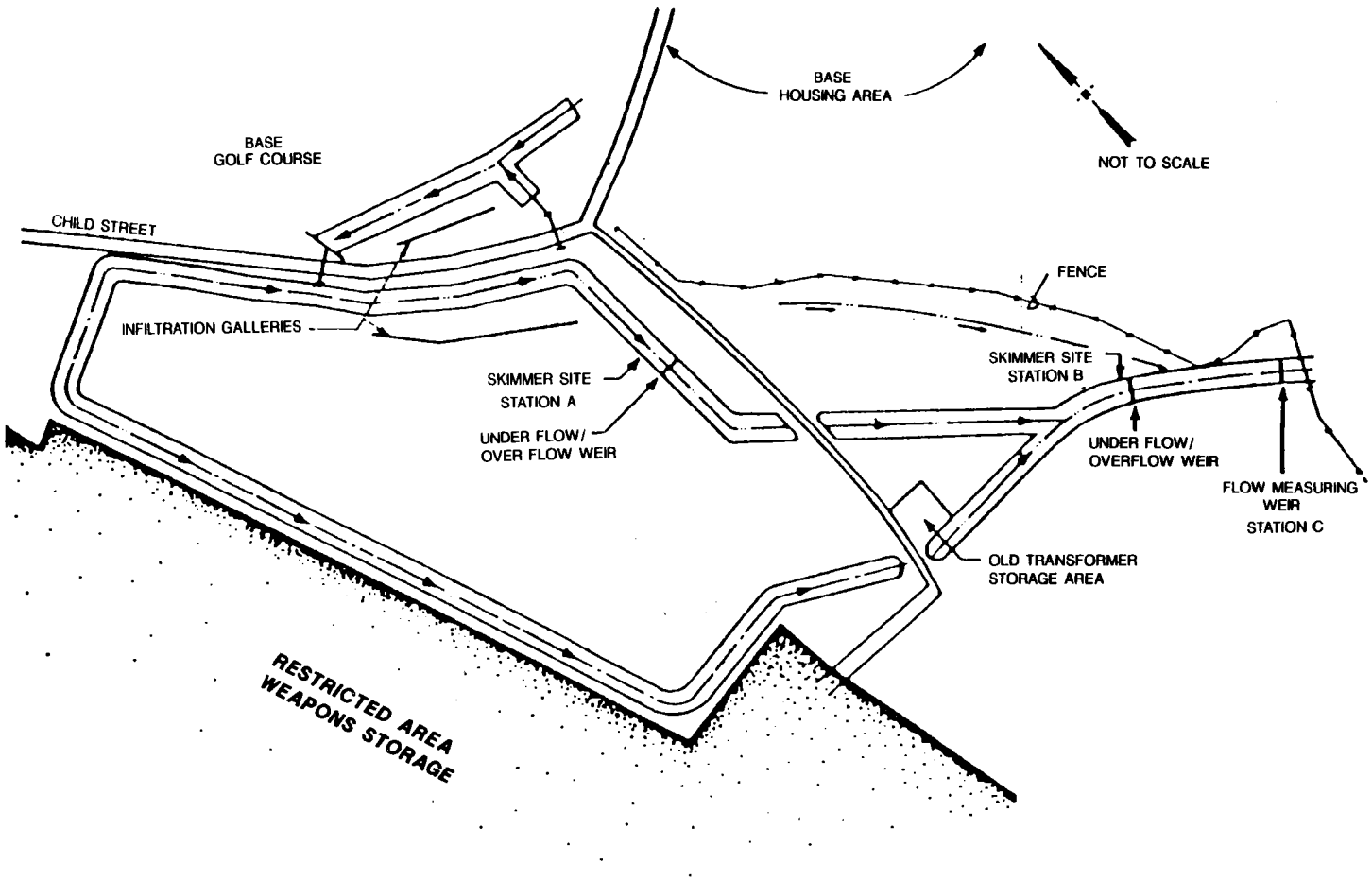
To remove the previously discovered free-phase hydrocarbons, a remediation system was constructed and operated during the period between 1983 and 1984 (Figure 2-9). The purpose of the remediation system was to remove petroleum hydrocarbons discovered in sediments and surface water at PSC 26. The remediation system consisted of the construction of infiltration galleries, a perimeter drainage ditch system around PSC 26, two underflow weirs and a flow measuring weir, and either pumps or a boom system to collect free-phase hydrocarbons that collected on the upstream side of the weirs.

Prior to the construction of the perimeter drainage ditch system, the materials in the three primary disposal pits (Figure 2-7) were excavated to a depth of 8 feet and spread across the surface of OU1. During the excavation of the disposal pits, complaints concerning odor were received from the NAS Jacksonville base housing. Fire-fighting foam was sprayed over OU1 to reduce the odor. Subsequently, the materials excavated during the construction of the perimeter drainage ditch system were blended with sandy fill materials and spread over OU1 to provide a minimum cover of 10 inches. The entire land surface area of OU1 was then graded to drain towards the perimeter drainage ditch system.

The U.S. Army Corps of Engineers (USACE) conducted a cone penetrometer (CPT) study during 1990 to assess the extent of hydrocarbon contamination in the eastern and southwestern portions of PSC 26. The results of this study provide a qualitative indication of the extent of hydrocarbons in the vicinity of a former waste oil disposal pit. The study also indicated the presence of a "hard" layer approximately 40 feet beneath the land surface at OU1. The "hard" layer was thought to potentially be a confining layer, which may prevent the downward migration of contaminants.

After the USDON, USEPA, and FDER signed the FFA in 1990, a work plan was prepared in 1991 to conduct a RI/FS at OU1 as part of the NIRP. The purpose of the RI is to collect data to determine: the nature and extent of any releases of site-derived contaminants; potential pathways of migration via soil, sediments, surface water, and groundwater; and risks to human and ecological receptors. The purpose of the FS is to determine necessary remedial measures to mitigate site-derived contamination that presents an adverse threat to human health and the environment.

The following sections of this report present a summary of the methods used to conduct the RI investigation, deviations from the methods stated in the OU1 RI/FS Work Plan, data quality control and results, conclusions, and recommendations for additional studies.



SOURCE: JONES, EDMUNDS & ASSOCIATES, INC., 1991

FIGURE 2-9
1984 REMEDIATION SYSTEM

PRELIMINARY CHARACTERIZATION REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

3.0 REMEDIAL INVESTIGATION (RI) ACTIVITIES

This section provides a summary of the field activities conducted during the RI. As discussed in Section 1.0, the RI at NAS Jacksonville was designed to: (1) determine the nature and extent of releases from OU1; (2) characterize the potential pathways of contaminant migration in the ambient air, soil gas, soil, sediment, surface water, and groundwater; (3) identify potential receptors; and (4) assess potential risks to human health and the environment.

The RI was planned using existing data. Adjustments in the field to procedures described in the RI Work Plan were made during the RI field activities as additional data became available, or when procedures were modified to meet site-specific field conditions. These modifications were in compliance with standard procedures described in the OU1 RI Work Plan and the Quality Assurance Project Plan (U.S. Navy, 1991b). These modifications are addressed herein.

3.1 DATA COMPILATION. This subsection describes the data collection, management, and assessment process used during the OU1 RI. The goal of the data gathering process is to obtain site characterization data of known quality. These data are used to identify possible hazards and corrective measures, as well as supplement future environmental investigations at NAS Jacksonville. Specific actions and findings are discussed in subsequent sections. The seven basic elements of the data compilation process are:

- background data search,
- field activities,
- laboratory analyses,
- data validation,
- data reduction and organization,
- data analysis and conclusion, and
- report and data presentation.

Background data were collected prior to field activities during the investigation planning phase. Much of this initial information was used to define the scope of the work described in the OU1 RI Work Plan (U.S. Navy, 1991b). Background information was obtained from previous investigative data, technical literature, and regional sources in Federal, State, and local regulatory agencies (i.e., FEMA, FDER, and Duval County agricultural extension service).

Field activities focused on sample collection, measurements, and observations. QC field controls described in the Work Plan were implemented to minimize sampling and measurement errors. Samples were collected and transported via overnight delivery, under chain-of-custody protocol, to the laboratory each day of collection. Field, equipment rinsate, and trip blanks were collected and sent to the laboratory for analysis. Field data were recorded in standardized forms and logbooks.

Environmental samples were sent to a certified laboratory for analysis of USEPA TCL organics and TAL inorganics. Borehole soil samples were also analyzed for physical parameters, such as particle size distribution, total organic content,

Atterburg limits, bulk dry density, moisture content, specific gravity, and vertical hydraulic conductivity.

Modified USEPA Contract Laboratory Program (CLP) Form A data packages obtained from the laboratory were sent to an independent data validator for assessment of laboratory data quality in accordance with NEESA Level D. Data validators manually edited the Form I's for each sample delivery group and provided a narrative describing data validation findings.

Field data, such as borehole and monitoring well construction logs, were reviewed and edited, and a proprietary software package GTGS™ was used to construct final borehole and well construction logs. The proprietary software package AQTESOLV™ was used to analyze slug test data. Laboratory analytical data were uploaded into electronic relational databases (ORACLE™ and LOTUS123™) for future retrieval and manipulation. Base maps were generated (AutoCADD™) using site-specific utility and topographic survey data. Physical files were established and maintained for storage and retrieval of project documents.

Data were analyzed to verify regional and site-specific geology, hydrogeology, and ecological conditions. Validated chemical data were reviewed to confirm data usability. Validated chemical data were assessed to characterize OU1 for extent of contamination. Chemicals-of-concern were identified, and risks associated with expected exposure scenarios were estimated for ecological receptors. Recommendations for future actions were formulated.

Data were complied in a report format incorporating narratives, summary tables, figures, and appendices of supporting information. A multi-disciplined peer review process provided independent critique of the data assessment, findings, conclusions, and recommendations. Corrective measures were implemented and revisions made prior to production of this PCSR.

3.2 SUMMARY OF EXPLORATION AND SAMPLING PROGRAM. To characterize the extent of contamination within the area of OU1 and to identify potential receptors, the investigation included both site-specific and adjacent NAS Jacksonville facility areas. The RI investigation activities focused on defining background levels of contaminants found at OU1, identifying potential receptors, and assessing risks. These activities are discussed further in Section 5.0. The RI exploration and sampling program included the following subtasks:

- geophysical survey;
- soil gas sample collection;
- ambient air sample collection;
- surface soil sample collection;
- borehole soil sample collection;
- surface water sample collection;

- sediment sample collection;
- monitoring well and piezometer installation;
- groundwater sample collection;
- monitoring well, piezometer, and sample location topographic survey;
- in-situ slug testing of aquifer properties at monitoring wells and piezometers;
- laboratory analyses of environmental samples for USEPA TCL organics, TAL inorganics, cyanide, dioxins/furans, and radionuclides; and
- survey of terrestrial and aquatic environments in the vicinity of OU1.

3.2.1 Geophysical Survey The purpose of the geophysical survey was to confirm the existence of a hard (resistant) geologic layer that was thought to exist approximately 40 to 55 feet bls at OU1. The resistant layer was indicated to be present by the USACE in a cone penetrometer study conducted during 1990 and 1991. The CPT study indicated that the hard layer exhibited a resistance of 11,000 pounds per square inch (psi). The USACE indicated that the resistant layer was or could be a clay/shale layer, which may act as a confining unit within the Shallow Aquifer. If present, the clay/shale layer would impede the downward migration of contaminants into the underlying aquifer(s).

The geophysical survey method selected to profile the top of the potential clay/shale layer was seismic refraction. The choice of the seismic refraction technique was based on the assumption that the resistent clay/shale layer would have a different value for the seismic velocity when compared with overlying and underlying sediments.

The geophysical survey was conducted during the period between March 3 and 6, 1992. A Geometrics ES2415F Seismograph was used for the field investigation along with either 800-foot-long seismic spread cables with (nominal) 40-foot spacing between geophones or 400-foot-long seismic spread cables with (nominal) 20-foot spacing between geophones. The energy source was dynamite (Class "A" explosive), as it was felt that for the long spread lengths, other less energetic sources would not be adequate. The locations of the seismic survey traverses are shown in Figure 3-1.

3.2.2 Soil Gas Sample Collection The purpose of the soil gas survey was to evaluate the potential that VOCs have migrated, via soil gas, from OU1 to areas that might adversely impact residents of the NAS Jacksonville base housing located to the east and south of OU1.

The soil gas survey field activities were conducted on February 25 and 26, 1992, by TARGET Environmental Services of Columbia, Maryland. The OU1 RI/FS Work Plan identified 11 permanent and 14 temporary soil gas sample locations in Figure 5-9 of Section 5.5 for sampling and field gas chromatograph (GC) analysis. Based on discussions between the Navy and ABB-ES personnel, it was determined that

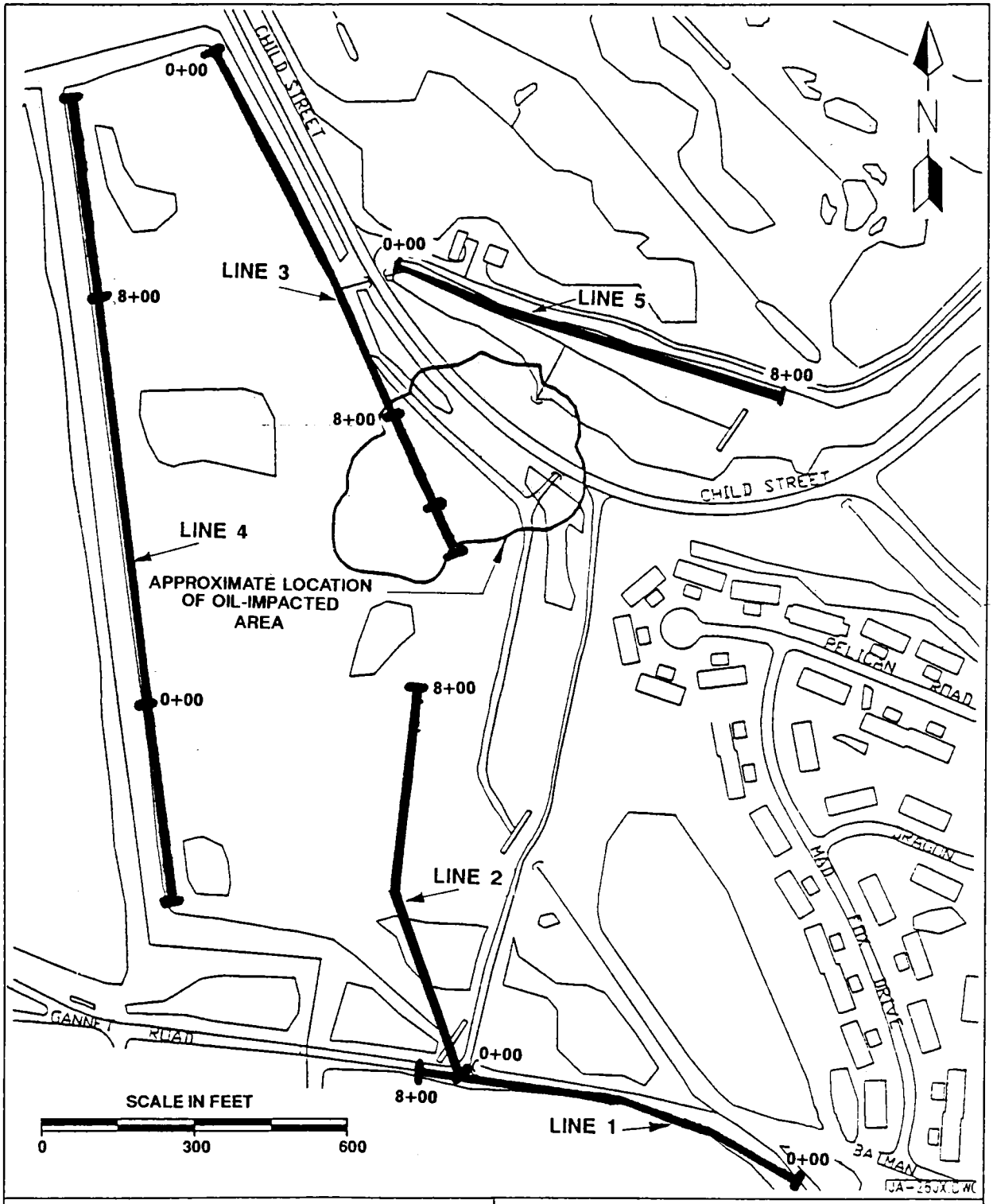


FIGURE 3-1
SEISMIC SURVEY
TRAVERSE LOCATIONS

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

sampling of 11 permanent and 49 temporary locations would best serve the purpose of defining an appropriate soil gas profile for portions of OU1 and adjacent NAS Jacksonville base residential area (Figure 3-2).

Each soil gas sample was analyzed by GC/flame ionization detector (FID) with direct injection for purgeable aromatic compounds (e.g. petroleum related hydrocarbons) and GC/electron capture detector (ECD) with direct injection for purgeable halocarbon compounds.

3.2.3 Ambient Air Sample Collection The purpose of the air monitoring program was to compare general air quality on the site with background (upwind) air quality, and to evaluate the potential for airborne chemicals to migrate to areas that could affect residents of the housing area located east of OU1.

The air sampling field activities were conducted during the week of February 10, 1992. Air monitoring was conducted during 4 consecutive days, 3 days under general ambient conditions and 1 day during a grass cutting operation at OU1. A micrometeorological weather station was utilized to make decisions regarding placement of sampling equipment and to record daily weather conditions.

During the first 3 days of the sampling program, one upwind and three downwind sample collection systems (including a duplicate sample) were constructed to sample air quality. The upwind sample was used to evaluate the downwind samples, which were collected along the OU1 property boundary (Figure 3-3). Duplicate air samples were collected from one of the three sampling systems located (or collocated) near one of the existing downwind sampling locations. The fourth day of the sampling program was conducted during the grass cutting operation at OU1 to assess the potential impacts of routine ground maintenance on air quality. An additional downwind air sampling system was added during the grass cutting operation to augment existing sampling network coverage (Figure 3-4).

The analytical parameters for the air samples consisted of total suspended particulate, metals, BNAs, PCBs and VOCs. A deviation from the OU1 RI/FS Work Plan included the substitution of Supelco Carbotrap™ 300 multi-bed thermal desorption tubes instead of the Tenax™ sorbant. The Supelco tubes would allow the adsorption of low molecular weight VOCs, including OU1 site-attributable contaminants acetone, methylene chloride, and vinyl chloride, which are poorly adsorbed on the Tenax™ sorbant.

A total of four tests were conducted, each on a separate day. Each VOC, TSP, and metals test run was performed over a 4-hour sampling period. The BNA and PCB test were conducted over a 24-hour sampling period. Variations in the test duration for the specific analytical parameters are due to the volume of sample required to achieve the target detection limits. Target detection limits for air samples are provided in the OU1 RI/FS Work Plan in Table 3-3 of Volume 5, Appendix 5.4.1, Section 3.0.

3.2.4 Surface Water and Sediment Sample Collection The overall objective of the surface water and sediment sampling program was to assess the current conditions of both media and the potential for contaminants to migrate from OU1 via surface water drainage and sediment transport.

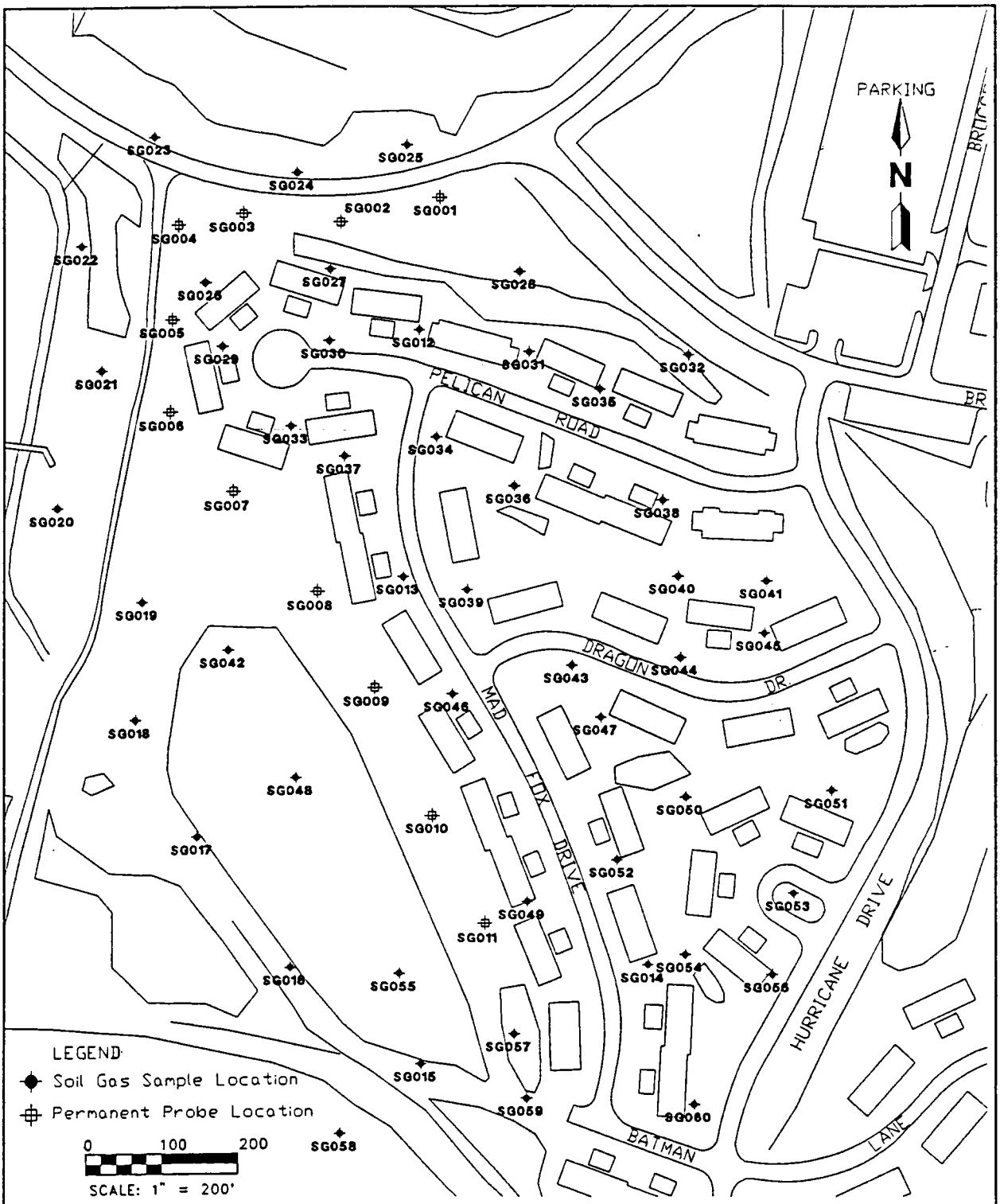


FIGURE 3-2
SOIL GAS SAMPLE LOCATIONS

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

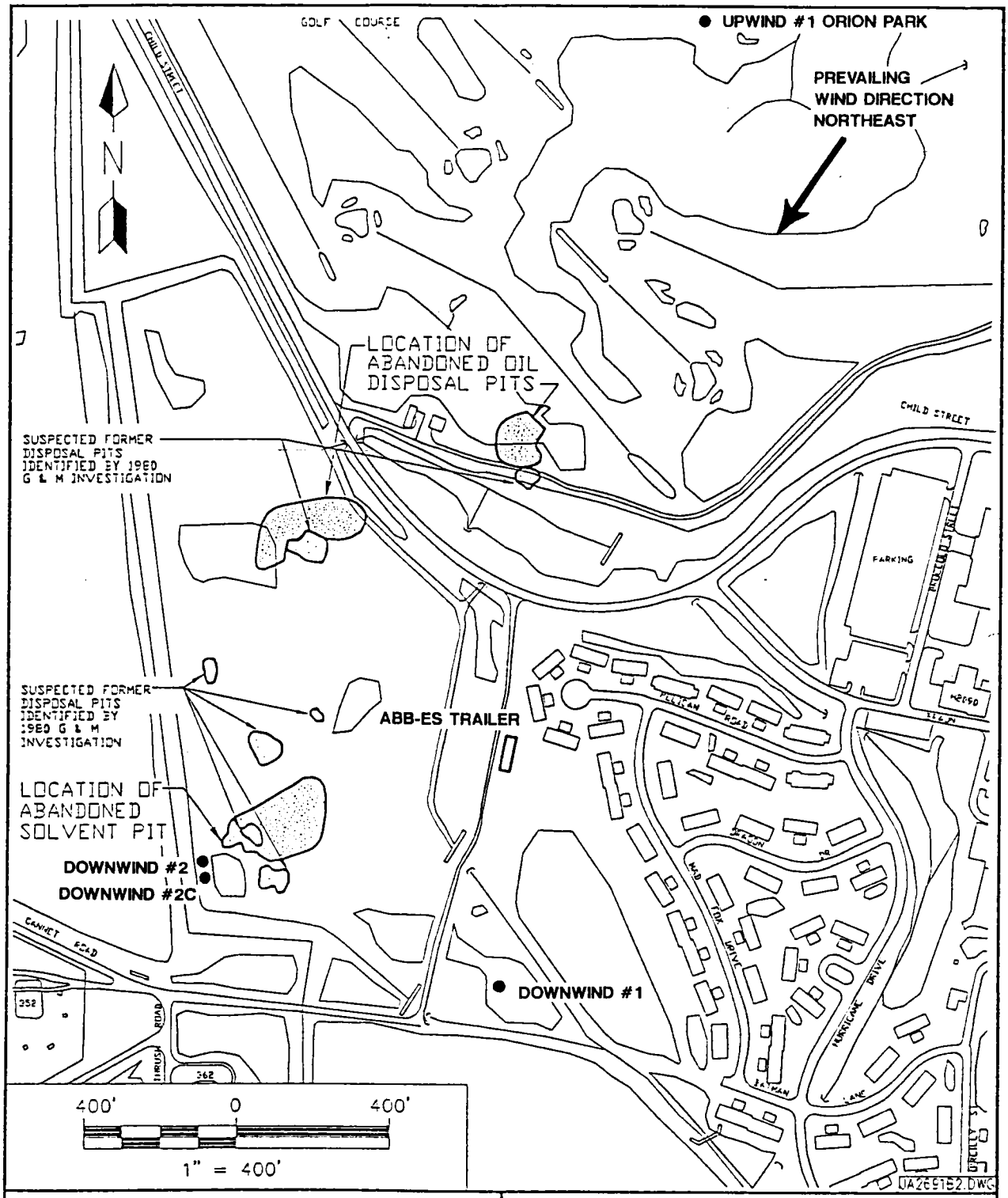


FIGURE 3-3

AIR SAMPLING LOCATIONS RUN1, RUN2, RUN3

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

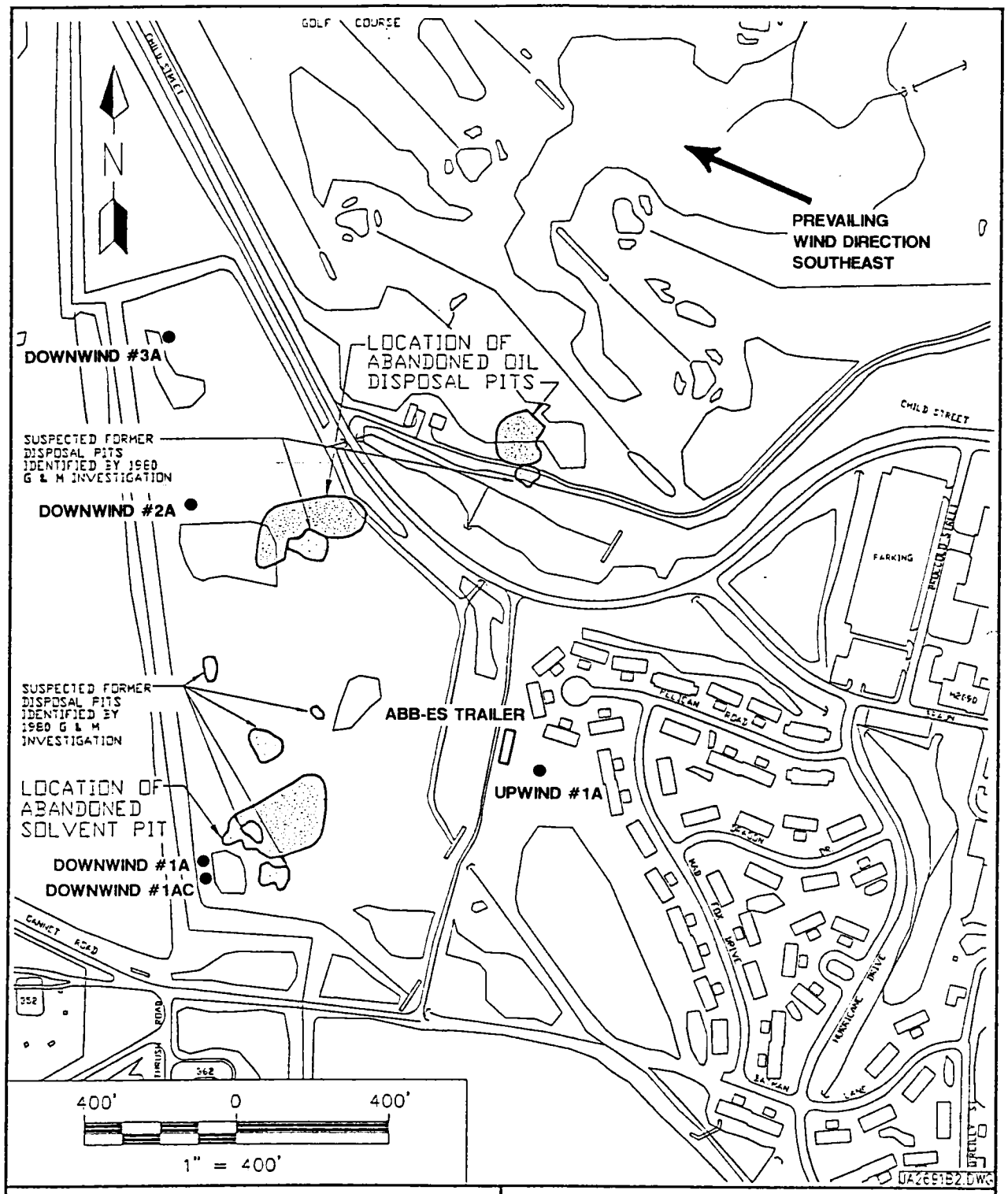


FIGURE 3-4

AIR SAMPLING LOCATIONS RUN4

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

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The OU1 RI/FS Work Plan proposed 29 sample locations for the surface water and sediment sampling. The sample locations were based on the physical characteristics such as flow, depth, substrate, and composition of the macrophytes.

Three additional samples were added to the surface water and sediment sampling program. Two of the samples were to assess the potential for interconnection of the NAS Jacksonville base golf course drainage and the OU1 drainage system. The third additional sample was proposed as a background sample.

Thirty-two surface water and sediment samples were collected between January 29 and February 10, 1992 (Figure 3-5). The surface water and sediment samples were chemically analyzed for USEPA TCL organics (VOCs, BNAs, Pesticides, PCBs) and USEPA TAL inorganics (23 metals and cyanide) and radionuclides (alpha [gross], beta [gross], Radium-226 and Radium-228). Water quality parameters consisting of dissolved oxygen, temperature, salinity, pH, and specific conductance were measured at each surface water sample location.

3.2.5 Soil Sample Collection The purpose of the soil sampling activities was to collect data to be used to: (1) assess risk associated with exposure to contaminants in the soils, (2) determine the horizontal and vertical extent of contaminants, (3) collect background data, and (4) screen potential remedial alternatives that may be appropriate for the individual risks.

3.2.5.1 Shallow/Deep Subsurface Soil Sampling The soil sampling investigation at OU1 was conducted in two separate sampling events. Sampling event No. 1 was completed to assess health and safety requirements for onsite personnel. Sampling event No. 2 was conducted according to the OU1 RI/FS Work Plan. The soil sample locations proposed for events No. 1 and No. 2 are described pictorially in Figure 2-3 of Section 2.0 SAMPLING LOCATIONS in Appendix 5.4.2 OU1 field Sampling Plan of Volume 5 OU1 RI/FS Work Plan. Shallow soil sample collection depths are described in Sections 6.6.2 Shallow Subsurface Soil Sampling and 5.6.3 Deep subsurface Soil Sampling in Volume 5 or the OU1 RI/FS Work Plan.

Sampling event No. 1 was conducted on December 17 and 18, 1991. Fifteen surficial soil samples (locations SL015, SL021, SL040, SL043, SL068, SL070, SL073, SL074, SL101, SL102, SL103, SL104, SL105, SL106, and SL107) were located and collected by ABB-ES personnel (Figure 3-6). The sample collection depth was from land surface to a depth of 3 inches. Additionally, a "worst case" soil sample was collected at location SL040 at a depth of 10 feet beneath the land surface. The worst case sample was collected in an area identified by the USACE during their 1991 investigation as containing the highest concentrations of contaminants at OU1.

Based on the results of sampling event No. 1, 16 additional soil sample locations were identified and proposed for inclusion in the sampling event No. 2. Six of the additional samples designated SL108 through 113 were located in the vicinity of Child Street and the entrance to OU1 and were to assess the potential offsite deposition of PCBs due to OU1 site traffic (Figure 3-7). The other 10 additional samples designated SL114 through SL123 were collected along the housing side of

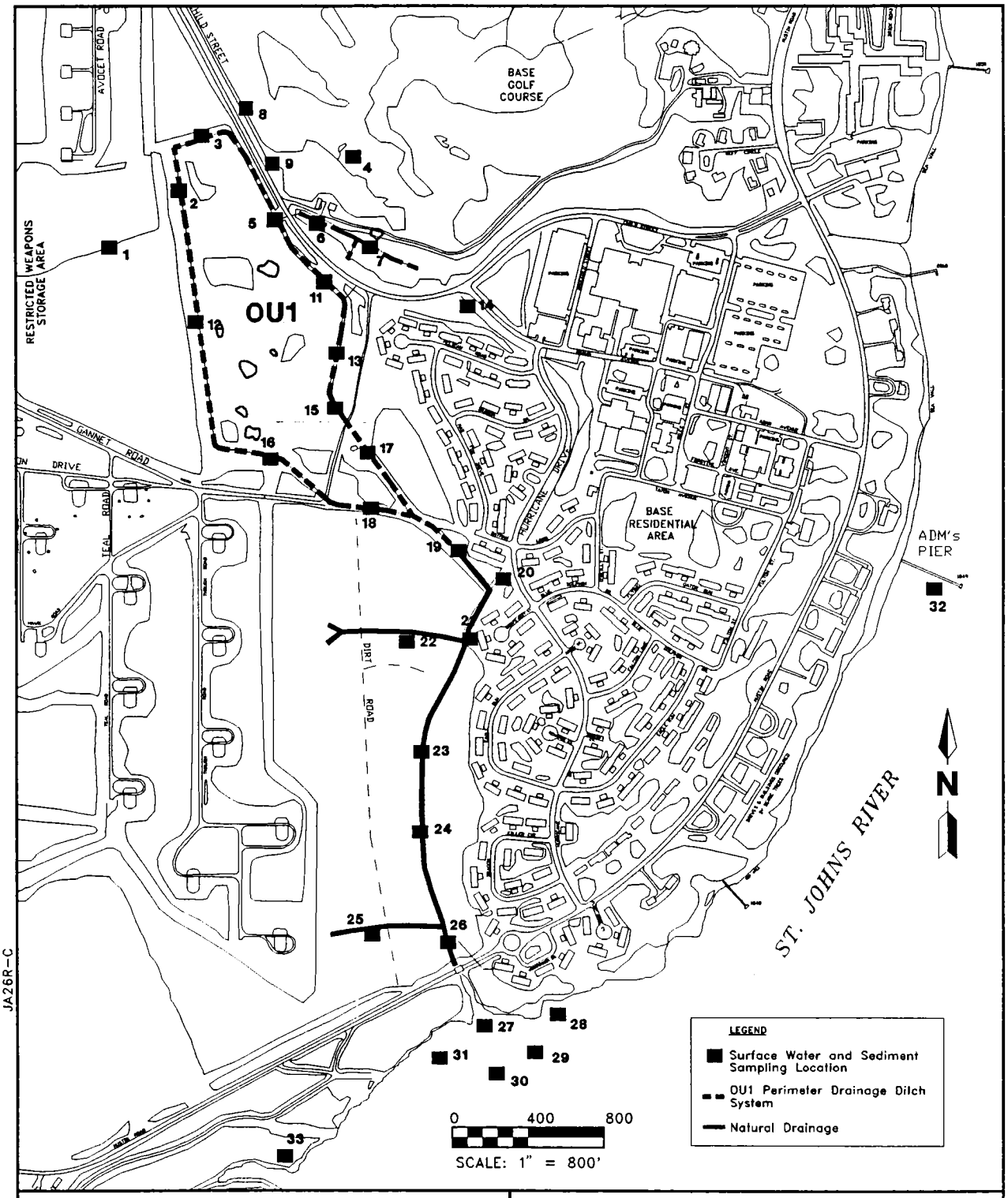

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FIGURE 3-5
SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

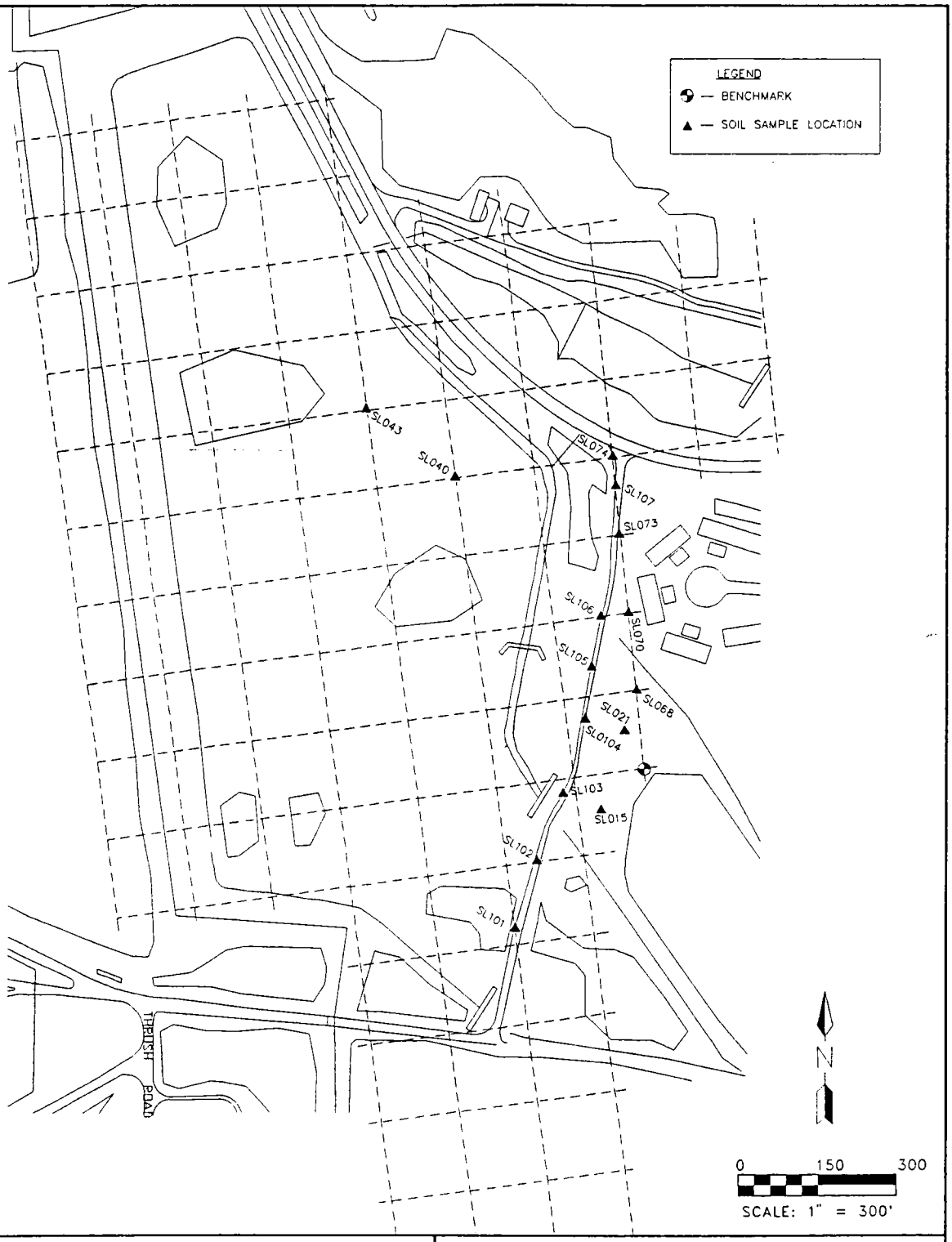

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FIGURE 3-6
INITIAL SOIL SCREENING LOCATIONS

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

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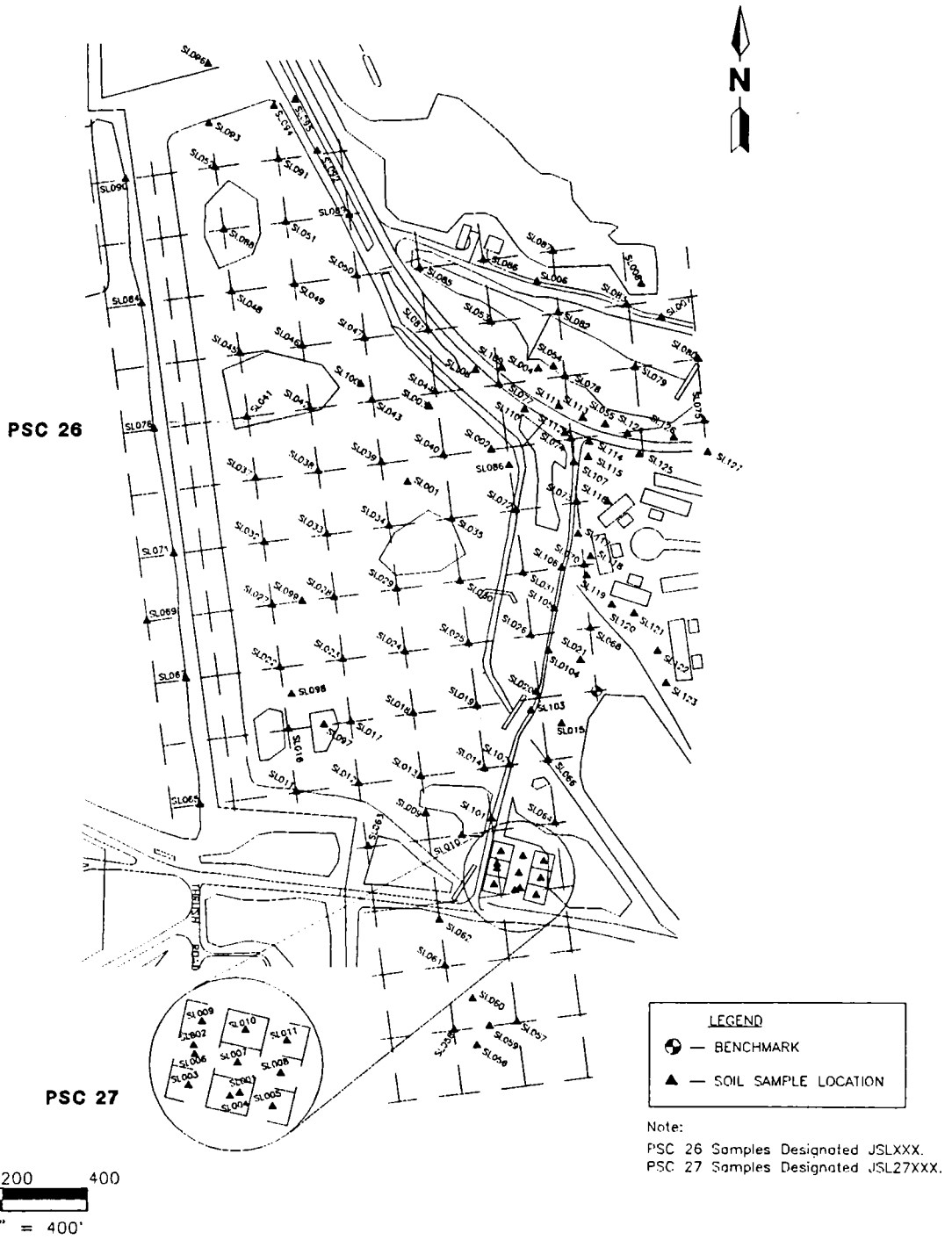

FIGURE 3-7
SOIL SAMPLING LOCATIONS

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

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JACKSONVILLE, FLORIDA

the newly erected fence in the vicinity of the NAS Jacksonville base housing area. The purpose of these soil samples are to assess the potential offsite deposition of PCBs in the vicinity of the NAS Jacksonville base housing area.

Sampling event No. 2 was initiated on February 5, 1992, and completed March 11, 1992. The soil sample locations were surveyed and staked by Atlantic Engineering of Jacksonville, Florida (a State of Florida licensed surveyor) (Figure 3-7). The sample collection technique was modified for sampling event No. 2 based upon information gathered during the collection of the "worst case" soil sample SL040. During sampling operations at SL040 ABB-ES personnel determined that the original hand auger method of soil sampling detailed in Section 4.3.3 of the Field Sampling and Analysis Plan (FSP) in Appendix 5.4.2 of Volume 5 of the OU1 RI/FS Work Plan would not be feasible at the site due to the large amounts of trash and concrete rubble present immediately below the OU1 site surface. Thus, to collect soil samples more efficiently, a drill rig was used for sampling event No. 2.

Boreholes were completed using the hollow stem auger drilling technique as described in Volume 4, Basic Site Work Plan, Section 3.2.4. Soil samples were collected through the hollow stem of the augers using either a split-spoon sampler or a hand auger.

The soil samples were submitted for chemical analysis for the constituents listed in Table 1-1 of Appendix 5.4.1 of Volume 5 of the OU1 RI/Fs Work Plan. These constituents consist of USEPA TCL organics (VOCs, BNAs, Pesticides, PCBs) and USEPA TAL inorganics (23 metals and cyanide), dioxins and furans, and radionuclides (alpha [gross], beta [gross], Radium-226 and Radium-228).

3.2.5.2 Subsurface Soil Borings with Continuous Split-Spoon Sampling The purpose of conducting subsurface soil borings with continuous split-spoon sampling was to characterize the local lithology/stratigraphy of the sediments and evaluate the hydrogeologic conditions of the shallow Surficial Aquifer and the Intermediate Zone of the Hawthorn Formation. Descriptions of the drilling methods for the soil borings is provided in Section 5.7 Soil Boring, Section 5.9 Shallow Surficial Monitor Wells and Section 5.10 Deep Surficial Monitor Wells in Volume 5 of the OU1 RI/FS Work Plan. Continuous split-spoon sampling was to be conducted at the location of each soil boring.

The following deviations from the OU1 RI/Fs Work Plan instituted to gain a more thorough knowledge of the subsurface site conditions and conduct this phase of the OU1 RI investigation in a more efficient manner.

- Drill all five 150-foot deep soil borings prior to collection of geotechnical samples and installation of the Intermediate Zone Hawthorn Formation Monitor wells (locations designated as HMW-1 through HMW-5 (Figure 3-8). The Work Plan called for a second boring to be advanced within a period of 48 hours to collect the geotechnical samples and install the monitor well. The change was made to allow for review of all deep soil boring data at one time, to select samples zones representative of the site stratigraphy for geophysical testing, and to select an optimal permeable zone for the

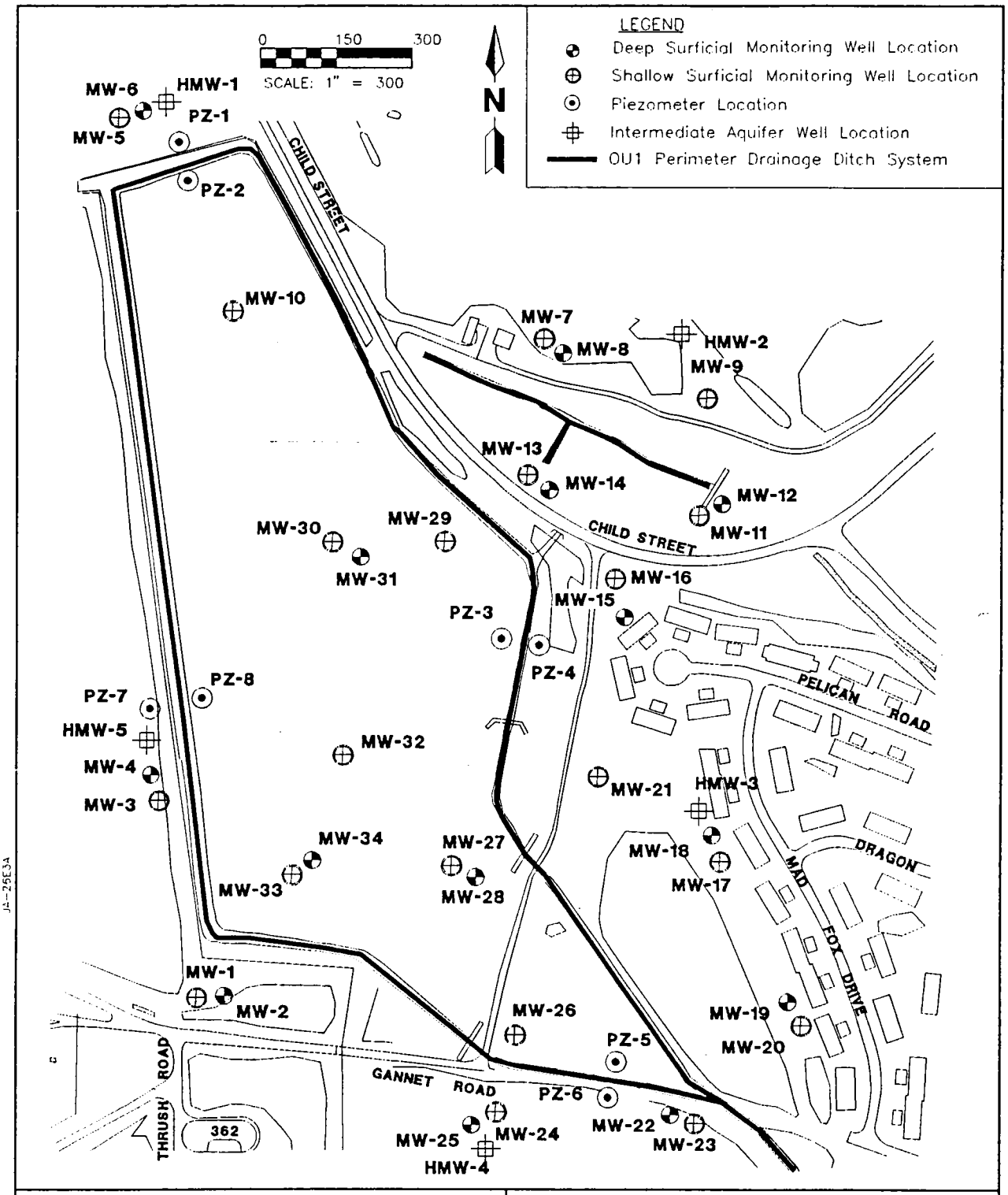

FIGURE 3-8
PIEZOMETER AND MONITORING WELL LOCATIONS

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

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installation of monitoring well screens in the Intermediate Zone of the Hawthorn Formation.

- Because of the inability of the drill rigs to turn the 10.25-inch diameter augers to the proposed depth of 150-feet beneath the land surface, rotary wash drilling was chosen to advance the borings. In addition, temporary 4-inch diameter steel casing was extended through contamination in the Shallow Aquifer to minimize the potential contaminated water to leak from the Shallow Aquifer to the Intermediate zone of the Hawthorn Formation. Each 150-foot deep boring was grouted in one continuous operation from the boring termination depth to the land surface.

- Soil samples were collected at only the deepest boring at each boring/well cluster because variations in the lithology were not anticipated to exist between the borings/wells at a single cluster.

3.2.6 Piezometer and Monitoring Well Installation Piezometers were installed to assess the hydraulic relationship between the Shallow Aquifer System and the perimeter drainage ditch system. Groundwater monitoring wells were installed in shallow and deep portions of the Surficial Aquifer and in the Intermediate Zone of the Hawthorn Formation. Groundwater monitoring wells were installed to: (1) provide current data on groundwater quality, (2) provide current data on the flow characteristics (horizontal and vertical) of the Shallow Aquifer System and the Intermediate Zone of the Hawthorn Formation, and (3) provide data on the hydraulic properties of the Shallow Aquifer and the Hawthorn Formation. The proposed locations of the piezometer and shallow and deep Surficial Aquifer monitoring wells are described pictorially in Figure 2-4 and the Intermediate Zone Hawthorn wells are described pictorially in Figure 2-5 in Section 2.0 SAMPLING LOCATIONS of Appendix 5.4.2 of Volume 5 of the OU1 RI/FS Work Plan. The locations are shown in Figure 3-8 of this document.

3.2.6.1 Installation of Piezometer Network Eight piezometers were installed in four pairs (locations designated PZ-1 through PZ-8, Figure 3-8). The piezometer pairs were placed on opposite sides of the perimeter drainage ditch. In addition, a staff gauge was constructed in the drainage ditch between each piezometer to provide data on the surface water elevation to compare with the groundwater elevations in the piezometers.

The piezometers were installed in conformance with the procedures specified in the OU1 RI/FS, Volume 5, Section 5.8 Piezometer Installation. A diagram of a typical piezometer is provided in Figure 3-9.

3.2.6.2 Installation of Shallow and Deep Surficial Aquifer Monitoring Wells Twenty monitoring wells were installed in the Surficial Aquifer and were screened across the water table (Figure 3-8). The boreholes for the monitoring wells were drilled to the depths proposed in Table 5-2 Section 5.9 Shallow Surficial Monitor Wells of Volume 5 of the OU1 RI/FS Work Plan. The shallow zone Surficial Aquifer monitoring wells were installed in conformance with the procedures described in the OU1 RI/FS, Volume 5, Section 5.9 Shallow Surficial Monitor Wells. A diagram of a typical shallow surficial monitor well in provided in Figure 3-10.

NOTE: SEE WELL CONSTRUCTION DIAGRAMS FOR INDIVIDUAL DEPTHS OF MATERIALS USED TO CONSTRUCT EACH WELL.

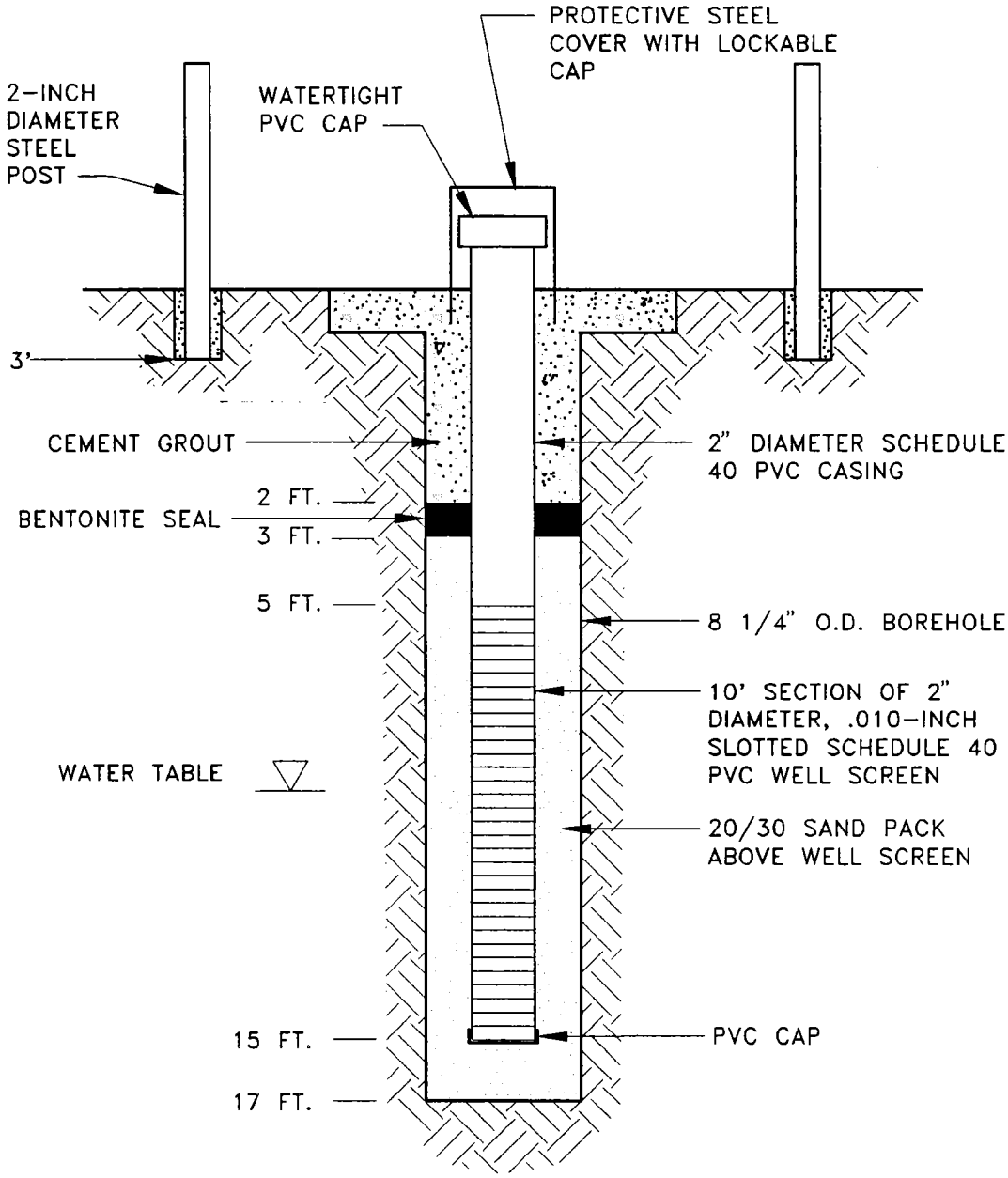

FIGURE 3-9
TYPICAL PIEZOMETER CONSTRUCTION DIAGRAM

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NOTE: SEE WELL CONSTRUCTION DIAGRAMS FOR INDIVIDUAL DEPTHS OF MATERIALS USED TO CONSTRUCT EACH WELL.

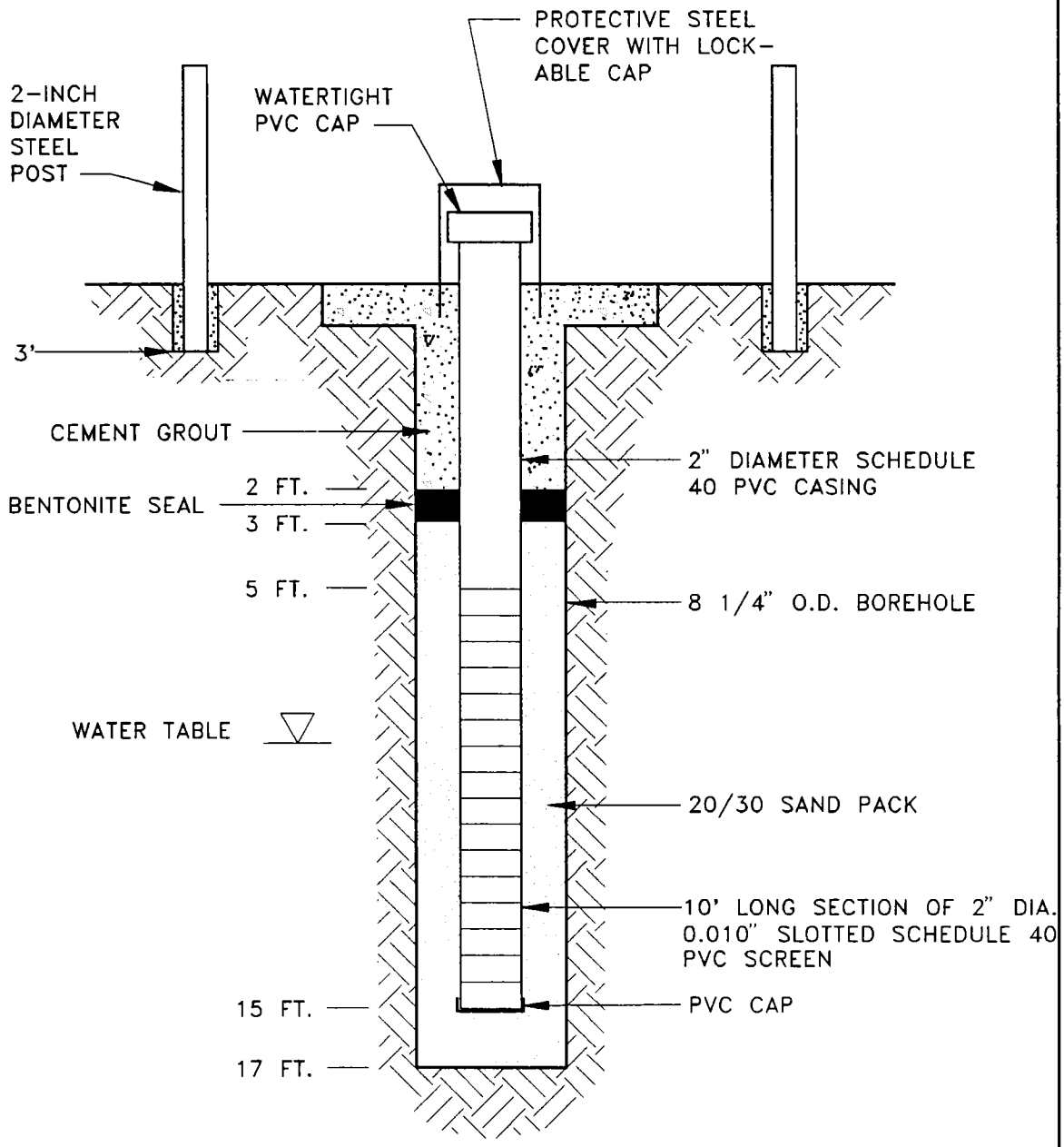

FIGURE 3-10
TYPICAL MONITOR WELL CONSTRUCTION DIAGRAM, SHALLOW ZONE SURFICIAL AQUIFER

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Fourteen monitoring wells were installed in the deep zone of the shallow Surficial Aquifer (Figure 3-8). Volume 5 of OU1 RI/FS Work Plan, Section 5.10 Deep Surficial Monitor Wells specified the fourteen deep Shallow Aquifer monitoring wells were to be drilled using 15-inch and 10.25-inch diameter augers. Field data from the drilling of the deep (150-foot bls) soil borings suggested that the surficial zone of the Shallow Aquifer was adversely impacted by contaminants to an unknown extent. Based this field data, it was decided that both the well installation and drilling methods proposed in the OU1 RI/FS Work Plan may not adequately minimize/prevent the potential for cross-contamination between the shallow and deeper portions of the Surficial Aquifer. This risk includes the collection of groundwater samples that may produce "false positive" detection of contamination. Therefore, a decision was made by ABB-ES to deviate from the proposed well installation and drilling procedures for the deep Shallow Aquifer monitor wells.

The well installation procedure that was used included a permanent 6-inch diameter Schedule 40 (Schd 40) PVC outer casing that extended through potential contaminated portions of the Shallow Aquifer. The well installation procedure using a surface casing is described in Volume 4 Basic Site Work Plan, Section 3.2.4.3 Monitor Wells with Surface Casing. The borehole for the 6-inch diameter Schd 40 PVC well casing was drilled using rotary wash drilling. The rotary wash drilling procedure is described in Volume 4 Basic Site Work Plan, Section 3.2.4.1 Drilling. Upon completion of installation of the 6-inch diameter PVC casing, the grout was allowed to set up a minimum of 48 hours before resuming the drilling activities. The borehole was then drilled to the depths proposed in Table 5-2 Section 5.9 Shallow Surficial Monitor Wells of Volume 5 of the OU1 RI/FS Work Plan. Monitor wells were then constructed as described in Volume 4 Basic Site Work Plan, Section 3.2.4.3 Monitor Wells with Surface Casing. A diagram of a typical deep surficial monitoring well in provided in Figure 3-11.

Each of the deep Surficial Aquifer monitoring wells were developed prior to the placement of grout in the borehole annulus in accordance with methods prescribed in The OU1 RI/FS Work Plan.

3.2.6.3 Installation of Intermediate Zone Hawthorn Formation Monitoring Wells
Five monitoring wells were installed in the Intermediate Zone of the Hawthorn Formation (locations designated as HMW-1 through HMW-5, Figure 3-8). Volume 5 of OU1 RI/FS Work Plan, Section 5.10 Deep Surficial Monitor Wells specified the five borings for the monitoring wells were to be drilled using 15-inch and 10.25-inch diameter augers. Field data from the drilling of the deep (150-foot beneath the land surface) soil borings suggested that the surficial zone of the Shallow Aquifer was adversely impacted by contaminants to an unknown extent. Based this field data, it was decided that the drilling method proposed in the OU1 RI/FS Work Plan may not adequately minimize/prevent the potential for cross-contamination from shallow to deeper portions of the Surficial Aquifer. This risk included the collection of groundwater samples that may have produced "false positive" detection of contamination. Therefore, a decision was made to deviate from the proposed drilling procedure for the monitoring wells installed in the Intermediate Zone of the Hawthorn Formation.

NOTE: SEE WELL CONSTRUCTION DIAGRAMS FOR INDIVIDUAL DEPTHS OF MATERIALS USED TO CONSTRUCT EACH WELL.

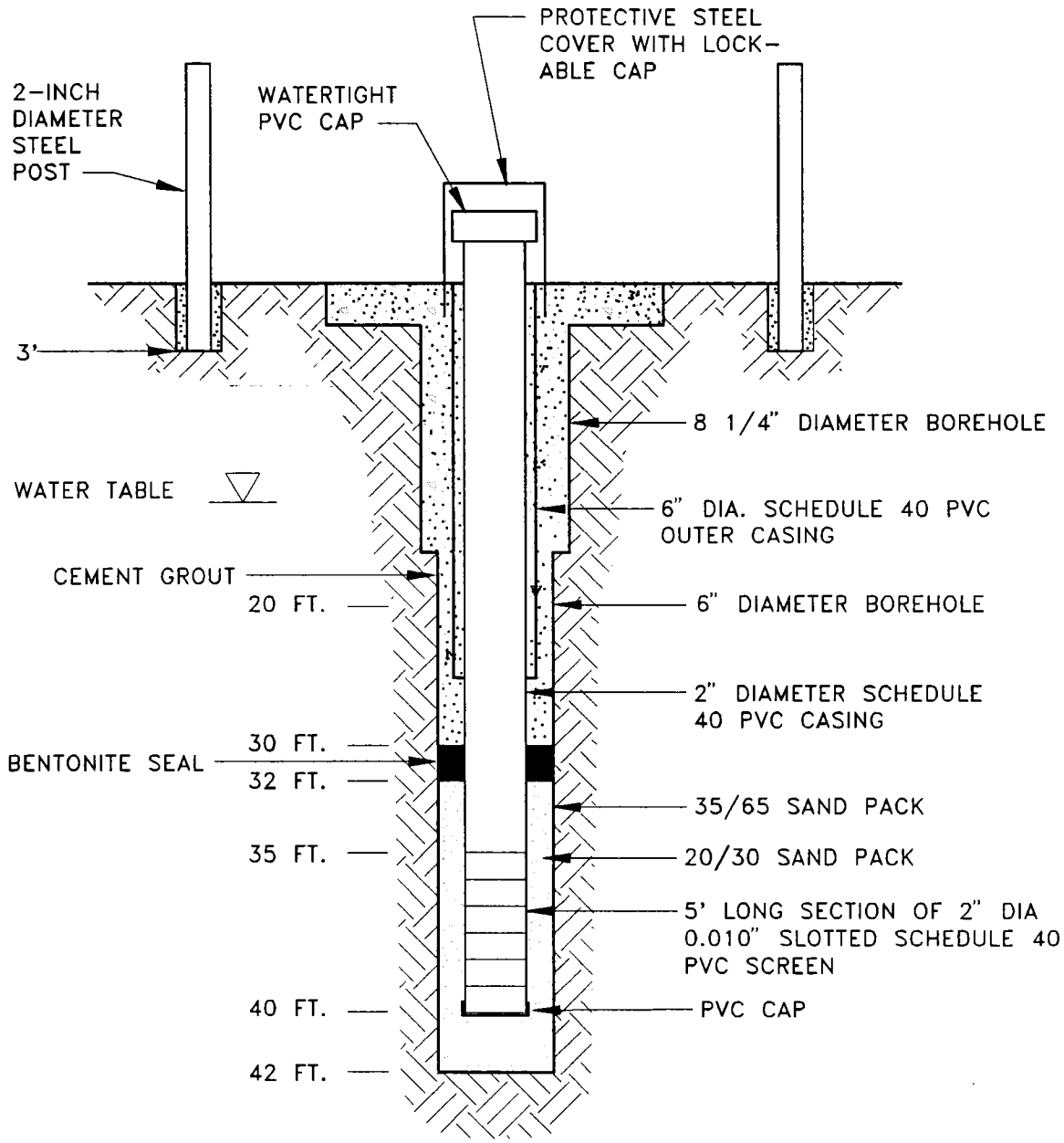

FIGURE 3-11

TYPICAL MONITOR WELL CONSTRUCTION DIAGRAM, DEEP ZONE SURFICIAL AQUIFER

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The initial borehole for the 6-inch diameter steel well casing was drilled using rotary wash drilling. The rotary wash drilling procedure is described in Volume 4 Basic Site Work Plan, Section 3.2.4.1 Drilling. Upon completion of installation of the 6-inch diameter steel casing, the grout was allowed to set for a minimum of 48 hours before resuming the drilling activities. The borehole was then drilled to the depths proposed in Section 5.7.2 Intermediate Monitor Well Drilling and Construction of Volume 5 of the OU1 RI/FS Work Plan. Monitoring wells were constructed as described in Volume 4 Basic Site Work Plan, Section 3.2.4.3 Monitor Wells with Surface Casing. A diagram of a typical monitoring well screened in the Intermediate Zone of the Hawthorn Formation is provided in Figure 3-12.

Each of the monitoring wells installed in the Intermediate Zone of the Hawthorn Formation were developed prior to the placement of grout in the borehole annulus in accordance with methods described in the OU1 RI/FS Work Plan.

3.2.6.4 Investigation Derived Waste Three pits were constructed at OU1 to receive investigation derived waste (IDW) from the drilling activities (soil cuttings and rotary wash drilling fluids) as described in Section 5.15.1 Investigation-Derived Soil Waste of Volume 5 of the OU1 RI/FS Work Plan. A deviation from the described procedure includes the construction of an aluminum frame with canvas cover instead of the Visqueen™ cover. The purpose of the cover was to minimize storm water infiltration and minimize the potential for exposure to the IDW by humans and animals. A 10,000-gallon, three-compartment tanker for liquid IDW as described in Section 5.15.2 Investigation-Derived Water Waste of Volume 5 of the OU1 RI/FS Work Plan was used to contain and transport water from the well development and sampling activities.

3.2.7 Groundwater Sampling The purpose of the groundwater sampling event was to provide data, which will be used to: (1) conduct a current assessment of water quality at and in the vicinity of OU1, (2) support the baseline risk assessment, and (3) develop and screen potential remedial alternatives to address contaminated groundwater.

Water samples were collected from the groundwater monitoring wells during the period between May 26, 1992, to June 6, 1992. The groundwater sampling effort included:

- measurement of the depth of water and free-phase product in each monitoring well and piezometer;
- purging "stagnant" water from each monitoring well to allow water representative of the zone in which the well was screened to enter the well;
- collection of groundwater samples from monitoring wells not containing free-phase product;
- collection of free-phase hydrocarbon samples; and

NOTE: SEE WELL CONSTRUCTION DIAGRAMS FOR INDIVIDUAL DEPTHS OF MATERIALS USED TO CONSTRUCT EACH WELL.

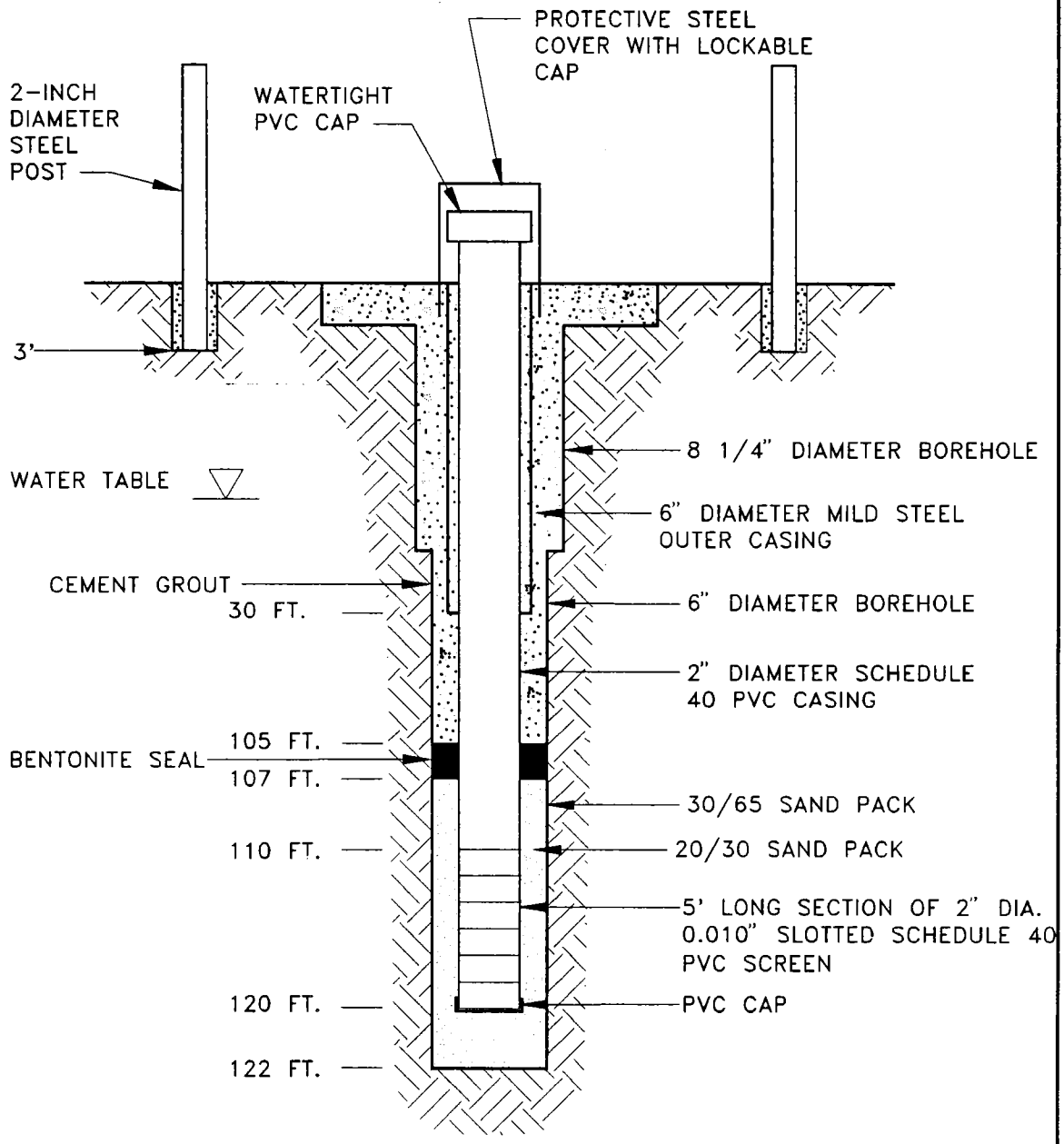

FIGURE 3-12

TYPICAL MONITOR WELL CONSTRUCTION DIAGRAM, INTERMEDIATE ZONE HAWTHORN FORMATION

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

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- shipping the collected samples and associated quality control samples to a chemical analytical laboratory.

The samples were collected from 17 of the 20 shallow Surficial Aquifer zone monitoring wells, 14 deep shallow Surficial Aquifer monitoring wells, and the 5 monitoring wells installed in the Intermediate Zone of the Hawthorn Formation (Figure 3-8). Three of the shallow Surficial Aquifer monitoring wells were not sampled for groundwater because of the presence of free-phase hydrocarbons. Groundwater samples were not collected from the piezometers.

The groundwater samples were submitted for chemical analysis for the constituents listed in Table 1-1 of Appendix 5.4.1 of Volume 5 of the OU1 RI/Fs Work Plan. These constituents consist of USEPA TCL organics (VOCs, BNAs, pesticides, PCBs) and USEPA TAL inorganics (23 metals and cyanide), and radionuclides (alpha [gross], beta [gross], Radium-226 and Radium-228).

3.2.8 Hydrogeologic Investigations Groundwater hydraulic characteristics were investigated by the following methods: (1) collection of geotechnical samples; (2) location and elevation survey of piezometers, monitoring wells, and staff gauges; (3) development of potentiometric surface maps; and (4) "slug" tests to estimate the spatial variability of hydraulic conductivity within the Surficial Aquifer. These investigation methods are described below.

3.2.8.1 Geotechnical analysis Five Shelby tube samples were collected from stratigraphic intervals selected from each of the 150-foot deep soil borings as described in Section 5.7.1 Geotechnical Analysis, Volume 5 of the OU1 RI/FS Work Plan. The Shelby tube samples were analyzed for:

- Atterburg Limits,
- Moisture Content,
- Vertical Hydraulic Conductivity, and
- Dry/Wet Bulk Density.

In addition to these tests, specific gravity and Total Organic Carbon (TOC) were also analyzed. These tests were in addition to the geotechnical analysis specified in the OU1 RI/FS Work Plan.

3.2.8.2 Well Location and Elevation Survey Each of the piezometers, monitoring wells, and staff gauges were located (plus or minus 1 foot) and the topographic elevation of the land surface and water level measuring point reference (plus or minus 0.01 foot) were surveyed relative to the National American Datum (NAD) of 1983. This data is used to convert water level measurement data to a common referenced elevation.

3.2.8.3 Potentiometric Water Surface Measurements Water levels were measured in all newly installed piezometers, monitoring wells, and staff gauges and converted to a common datum (NAD of 1983) (Figure 3-8). Water levels were measured on four separate occasions: May 5, 1992, May 27, 1992, June 6, 1992, and July 2, 1992.

The groundwater levels were measured after each well had reached equilibrium with atmospheric pressure. All wells were typically measured within a 4-hour period in an attempt to minimize tidal and atmospheric influences, if any, on groundwater elevation measurements.

The groundwater elevation was obtained by direct reading from a battery operated measuring tape suspended in the well and read from a designated point marked on the PVC riser (the north side of the riser). Measurements were recorded in a field book. The water indicator probe was decontaminated between each subsequent use as specified in the OU1 RI Workplan.

Groundwater elevation survey data were plotted on maps of OU1 and portions of the NAS Jacksonville facility for each event. Hydraulic gradients ($\Delta H/\Delta L$) also were determined for horizontal and vertical directions.

3.2.8.4 **Aquifer Slug Test** Subsequent to sampling monitoring wells (see Section 3.2.7 Groundwater Sampling), hydraulic conductivity tests (slug tests) were conducted in 8 piezometers and 39 wells to determine the value for radial hydraulic conductivity of the screened interval of each well in the Surficial Aquifer. The aquifer tests for wells screened in the Shallow Aquifer were conducted in conformance with the procedure described in Section 3.2.5 (a) In situ Permeability Tests in Volume 4 of the OU1 RI/FS Work Plan.

A set of three "slug" tests were performed in each well tested. The slug test consists of either the introduction or withdrawal of a slug (PVC tube filled with sand) that displaces a known volume of water and the measurement of the change in water level in the well with respect to time. The rates of recovery were measured with a pressure transducer and a digital data logger. The time versus water level recovery data were then processed by a computer program (AQTESOLV™) that employs the method of Bouwer and Rice (1976) to calculate hydraulic conductivity for unconfined aquifers.

The aquifer test for the monitoring wells screened in the Intermediate Zone of the Hawthorn Formation were conducted in conformance with the procedure described in Section 3.2.5 (b) Specific Capacity Testing in Volume 4 of the OU1 RI/FS Work Plan.

3.2.9 Ecological Inventory The purpose of the ecological inventory was to characterize the major terrestrial and aquatic ecological community types at, and in the vicinity of, OU1. A second objective of the ecological inventory was to determine whether significant or critical ecological resources at or near OU1 could potentially be adversely affected by the OU1 site-attributable contamination. This data will be used to assess potential and probable pathways by which biological receptors could be exposed to media containing site-related contaminants, and to note readily apparent evidence of stress on biological receptors at OU1.

The ecological inventory consisted of a qualitative assessment of the major biotic communities (habitats) present within and adjacent to OU1. Biotic communities were characterized by the type and relative abundance of flora and fauna identified. Undisturbed reference areas with similar biotic potential were

located and used for comparison with resources present within and adjacent to OU1. In addition, stresses to the flora and fauna were noted, if present. The presence of rare, threatened, or endangered species or sensitive communities were obtained from published literature. Uniform procedures for sampling, estimating, and recording field observations within each biotic community type were used throughout the investigation.

The following ecological field investigation activities were conducted during periods between January 16 to February 8, 1992, and May 26 to May 27, 1992:

- general, qualitative inventory of distribution of habitat types, flora, and fauna at, and in the vicinity of, OU1;
- existing data was used to identify 28 onsite impacted aquatic sampling stations, 4 onsite non-impacted aquatic reference stations, and 2 offsite non-impacted aquatic reference stations (Figure 3-13);
- review and evaluation of the validity of onsite reference areas;
- quantitative inventory of the benthic macroinvertebrate community in various substrates and wetland habitats at OU1, at selected sampling stations downgradient from OU1, and at selected onsite and offsite reference stations;
- characterization of aquatic wetland habitats and biotic communities at 12 sampling stations through the use of Rapid Bioassessment Protocol (Plafkin et al., 1989);
- identification and characterization of sensitive habitats and critical receptors, including establishing a baseline transect and field survey of OU1 for burrows of the gopher tortoise (*Gopherus polyphemus*);
- documentation of stressed biological receptors observed onsite, including vegetative stress, and impacts to faunal components of the biotic community; and
- review of available maps, surveys, reports, and scientific literature regarding the ecology and natural history of the Lower St. Johns River Basin.

Small Mammal Collection. In order to conduct a preliminary assessment of the small mammal population in the OU1 old field habitat, a small mammal trapping permit was obtained from the State of Florida Game and Freshwater Fish Commission. Twenty small mammal live box traps (both Sherman Box Traps and "Havahart" traps) were baited with a peanut butter/oatmeal mixture and were set on six successive nights. Set and baited traps were placed in the late afternoon and were checked at dawn; empty traps were tripped and were not left set during warmer daytime hours. In order to assess the small mammal population, traps were set randomly throughout all major habitat-types observed at OU1.

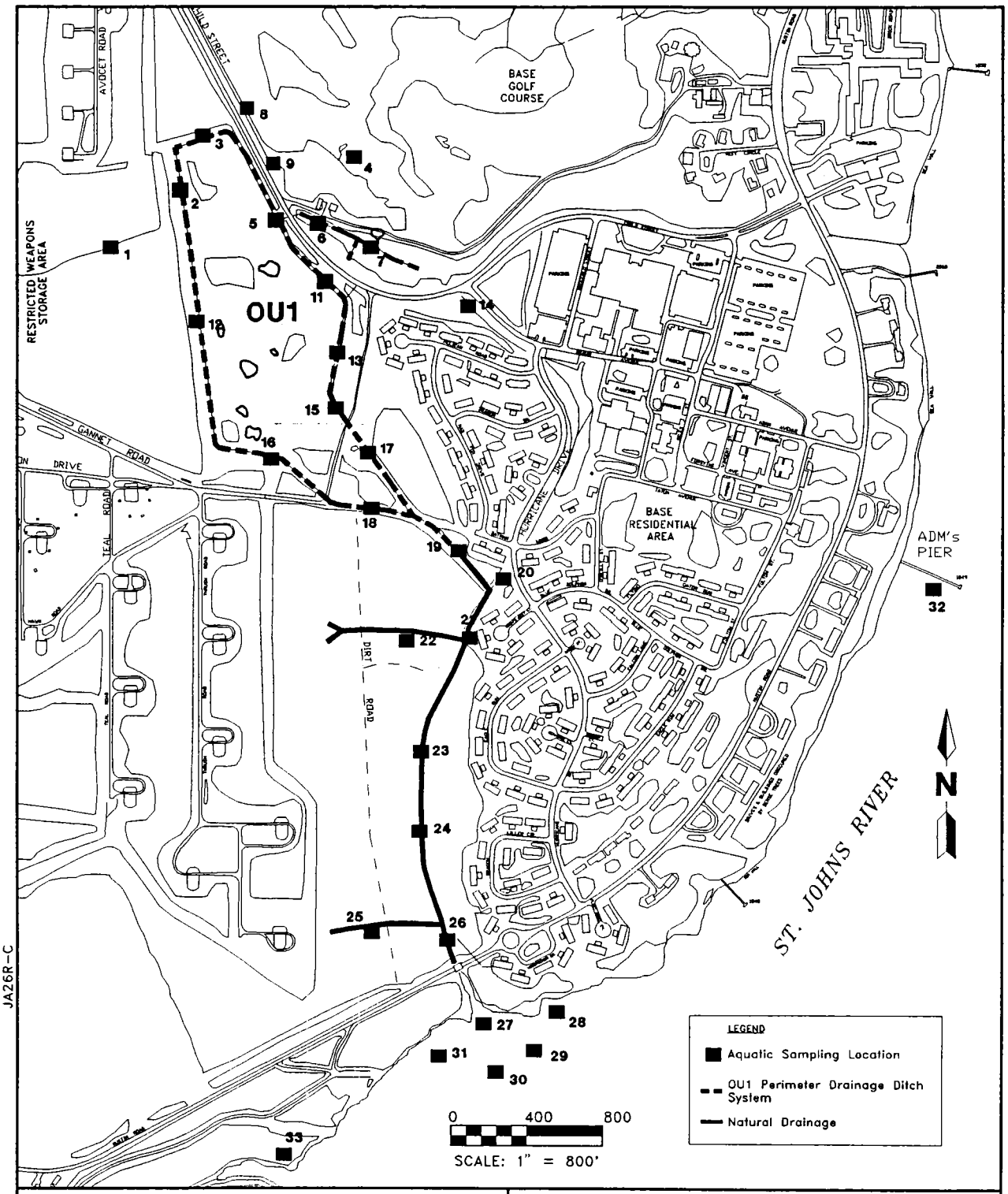

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FIGURE 3-13
AQUATIC SAMPLING LOCATIONS

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Aquatic Specimen Collection. For five successive nights during the field investigation, seven wire mesh minnow traps were placed at sampling stations representing all major aquatic habitats in the vicinity of OU1. Traps were baited with "chunky beef" dog food, and remained in place for 24 hours.

Rapid Bioassessment of Benthic Communities. Plafkin et al. (1989) have developed a practical and cost-effective technique to determine whether or not stream systems are supporting a designated benthic macroinvertebrate community. Referred to as the Rapid Bioassessment Protocol (RBP), these biosurvey and data analysis techniques consist of three basic components: (1) an examination of water quality and physical characteristics, (2) an assessment of available habitat, and (3) biosurvey of benthic macroinvertebrates and/or fish.

Because the benthic macroinvertebrate community frequently reflects the overall ecological integrity of a steam resource area, the RBP can be used to detect impairments to aquatic life and to assess the severity of these impairments. Benthic macroinvertebrate communities are used as indicators of localized environmental conditions. Macroinvertebrate communities frequently reflect the effects of short and long-term environmental variations. Furthermore, examination of the macroinvertebrate community is relatively inexpensive when compared to alternative assessments such as toxicity testing or tissue analysis.

RBP I was used to assess the macroinvertebrate and fish communities and to provide a screening mechanism for identification of biological impairment. RBP I is not intended to quantify the degree of impairment. The data derived from this survey does not allow for a definitive determination of cause and effect. The RBP I survey is used primarily to identify water quality problems and to plan and develop management strategies or more definitive studies. This semi-quantitative technique employs an integrated approach and higher resolution taxonomic analysis to provide comparative analyses of impairment among sites.

For this study, a screening or reconnaissance level bioassessment (RBP I) was used to evaluate the potential for impacts that may be associated with contaminant migration into aquatic habitat at and in the vicinity of OU1. The goals in using RBP I were to characterize the benthic macroinvertebrate fauna, to determine whether the benthic communities were impaired, and to aid in identifying potential source areas responsible for any observed impairment. All RBP I sampling locations were located to provide information regarding the potential site-related impacts to the various aquatic and wetland habitat types represented at OU1. Use of RBP I allows rapid screening of a number of sites, and can identify sites requiring for further study.

It should be noted that the RBP techniques are primarily designed for use in stream systems, and many of the habitat parameters outlined in the RBP habitat assessment matrix would not be expected in the dendritic flatwoods stream system or the perimeter drainage ditch system of OU1.

Benthic Macroinvertebrate Sampling and Analysis. The macroinvertebrate community residing in the benthos in the water bodies associated with OU1 were quantitatively surveyed as part of the RI field activities. Benthic organisms are in intimate contact with contaminants residing in the sediment substrate, and

as a consequence, may be more severely impacted than are other components of the aquatic community. In addition, these organisms are important components of the food web, with key roles in decomposing organic matter (and making this resource available to other organisms) as well as providing a food resource to fish and avifauna. An evaluation of various measures of "community health" of these particular organisms can provide valuable information regarding whether the overall ecosystem associated with this habitat has been adversely impacted by chemical contamination.

Benthic samples were collected from a number of sampling locations in the perimeter drainage ditch system surrounding OU1, in the unnamed stream downgradient of OU1, and in several locations in the St. Johns River (See Figure 3-13).

Sensitive Environmental Receptors. In accordance with Volume 5, Section 5.1 of the RI/FS Work Plan (Geraghty & Miller, 1991), several sets of transects were made through major habitat types at, and in the vicinity of, OU1 in an effort to identify critical habitat and sensitive plant and animal receptors.

3.3 QUALITY CONTROL (QC). This section summarizes the overall quality of the sample results from the RI field investigation and laboratory analyses of environmental samples. In addition, this section describes the field and laboratory quality assurance/quality control (QA/QC) procedures followed during the investigation and provides an overall assessment of data quality based on the data validation process. Data validation is the technical review of individual analytical results relative to the criteria defined by the data quality objectives in the Quality Assurance Project Plan. The data validation process described in this section assessed each data package individually for laboratory performance, but did not evaluate the analytical results relative to other QC samples such as trip, field, or equipment rinsate blanks. The evaluation of the analytical results relative to their applicable QC samples is summarized separately for validated data obtained for specific samples and target compounds.

3.3.1 Field QC Field blank QC samples are used to: (1) assess the existence and magnitude of contaminants introduced during field activities, (2) assess the potential introduction of contaminants during sample storage and transport, and (3) assess the precision and accuracy of the chemical analytical methodology. The three types of field QC samples were equipment rinsate blank, field blank, and travel blank, and are described in Section 3.3.1.1 Field QC Samples. The results of the analysis of the field QC samples is provided in Section 3.3.1.2 Field QC Review.

3.3.1.1 Field QC Samples

- Equipment Rinsate Blank. After a piece of sampling equipment was decontaminated, it was rinsed with organic-free distilled water (American Society for Testing and Materials [ASTM] Type II water). A sample of this rinse water was submitted as an equipment rinsate blank. The purpose of the equipment rinsate blank is to assess the adequacy of decontamination procedures by identifying contaminants that may be introduced because of incomplete decontamination or not allowing the equipment to completely dry. Equipment rinsate blanks are analyzed for each of the chemical analytical parameters as the environmental samples.

- Field Blank. This was a sample of ASTM Type II water that was used to monitor contamination that may have been introduced by ambient conditions in the sample collection environment. The field blank is opened onsite during the sampling event. The purpose of the field blank is to assess ambient conditions that may contribute contamination (target analytical constituents) to the samples.

- Trip Blank. The trip blank is a sample of ASTM Type II water that is prepared and similarly packaged by the laboratory prior to the sampling event and travels with the sampling bottles to the site. The trip blank samples are not opened at the site or at any time prior to laboratory analysis. The purpose of the trip blank is to assess the potential for contamination of samples via VOCs during sample bottle shipment and storage, prior to analysis. One trip blank was included in each shipping container that contained samples for Level C VOC analysis.

3.3.1.2 Field QC Review

Soil Gas Samples. QC samples consisted of field control samples. Field control samples were collected at the beginning of the day's field activities, after the twentieth soil gas sample and at the end of the day's field activities. The field control samples were made by inserting the sampling probe tip into a tube flushed by a flow of pre-purified nitrogen.

Target analytes were not detected in either the field control samples or field samples and corresponding replicate samples (Table 3-1). Total FID volatiles were detected in two of the field samples and replicate sample pairs. The total FID volatiles represent Terpenes which are a naturally occurring hydrocarbon exuded by plants. The total FID volatiles were at similar concentration in the field and replicate sample pairs.

Acetone and isopropyl alcohol peaks were reported to be present in the chromatograms of soil gas samples collected at the locations of soil gas vapor probes SG001 through SG007, SG016, and field control sample SG101. Quantitation values for the concentrations of acetone and isopropyl alcohol could not be reported because calibration standards for these compounds were not analyzed. The source of the acetone and isopropyl alcohol were determined to be from incomplete drying of the equipment during decontamination procedures.

Table 3-1
Analyte Concentration Via Gas Chromatograph, Flame Ionization Detector, and Electron Capture Detector, Soil Gas Field Control Samples

Preliminary Characterization Summary Report
OU1, NAS Jacksonville
Jacksonville, Florida

Sample	MEK	Acetone	Ethylbenzene	MIBK	Toluene	N-Butyl Acetate	Chlorobenzene	Ethylbenzene	Xylenes	Total Fid Volatiles[1]	CH_2CL_2	TCE	PCE
SG100	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
SG101	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
SG0102	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
SG103	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
SG103	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
SG104	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	

[1]Calculated using the sum of the areas of all integrated chromatogram peaks and the instrument response factors for toluene.

Notes: All concentrations are in micrograms per liter ($\mu g/\ell$).
MEK = methyl ethyl ketone.
MIBK = methyl isobutyl ketone.
CH_2CL_2 = methylene chloride.
TCE = trichloroethene.
PCE = tetrachloroethene.

Air Samples. Trip blanks were prepared and collected during the air sampling program and analyzed for the same target compounds for each of the four sampling events (Table 3-2). The air sample trip blanks consisted of the same sample collection media as the field samples for VOC and BNA and inorganic analysis. No air was forced through the trip blanks. The VOC analysis was incomplete (see Section 4.3.2.2 Volatile Organic Compounds). PCB and BNA target analytes were detected in the trip blanks and include Aroclor-1254, bis(2-ethylhexyl)phthalate, naphthalene, and benzoic acid. Aroclor-1254 was detected (0.21 micrograms per filter [μg/F]) in only the sample from RUN1. Bis(2-ethylhexyl)phthalate was detected in two samples, RUN1 at 44.6 μg/F and RUN2 at 11.6 μg/F. Naphthalene was detected each of the four samples, RUN1 at 2,32 μg/F, RUN2 at 2.12 μg/F, and RUN3 and RUN4 at 1.31 μg/F. Benzoic acid was detected in three of the samples, RUN2 at 4.07 μg/F, RUN3 at 11.6 μg/F, and RUN4 at 16.2 μg/F.

Target inorganic analytes detected in each of the field blanks were: aluminum, barium (ba), beryllium, calcium, iron, lead, magnesium, nickel, sodium, and zinc. Target inorganic analytes detected in one or two of the field blank samples were chromium in RUN2 and RUN4, copper in RUN3, and potassium in RUN3 and RUN4. The highest concentrations of target analytes were detected in the trip blank samples for RUN4.

Detected concentrations for aluminum were from 2,860 μg/F in RUN1 to 3,580 in RUN3, and was 7,630 μg/F in the sample for RUN4. Detected concentrations for barium were from 6,600 μg/F in RUN1 to 8,050 in RUN3 and was 16,200 μg/F in the sample for RUN4. Detected concentrations for beryllium were from 1.2 μg/F in RUN1 and RUN2 to 0.91 in RUN3, and was 1.5 μg/F in the sample for RUN4. Detected concentrations for calcium were from 1,690 μg/F in RUN1 to 2,060 in RUN3, and was 4,180 μg/F in the sample for RUN4. Detected concentrations for chromium were 2.6 μg/F in RUN2 and was 5.3 μg/F in the sample for RUN4. The detected concentrations for copper was 2.3 μg/F. Detected concentrations for iron were from 49.9 μg/F in RUN1 to 63.6 in RUN2, and was 104 μg/F in the sample for RUN4. Detected concentrations for lead were from 3.4 μg/F in RUN1 to 3.1 in RUN3, and was 8.8 μg/F in the sample for RUN4. Detected concentrations for magnesium were from 296 μg/F in RUN1 to 1.8 in RUN3, and was 767 μg/F in the sample for RUN4. Detected concentrations for manganese were 1.5 μg/F in RUN2 and was 13.9 μg/F in the sample for RUN4. Detected concentrations for nickel were from 11 μg/F in RUN1 to 15.6 in RUN2 and was 12.7 μg/F in the sample for RUN4. Detected concentrations for potassium were 4,900 μg/F in RUN3 and was 8,920 μg/F in the sample for RUN4. Detected concentrations for sodium were from 13,000 μg/F in RUN1 to 14,900 in RUN2, and was 26,200 μg/F in the sample for RUN4. Detected concentrations for zinc were from 4,600 μg/F in RUN1 to 5,470 in RUN2, and was 11,100 μg/F in the sample for RUN4.

Surface Water and Sediment Samples. Three types of field QC samples were collected for the surface water and sediment sampling event: equipment rinsate blank, field blank and trip blank (Tables 3-3 through 3-5, respectively). The following presents a description of the contaminants detected in each of these blanks.

Equipment Rinsate Blank. Eight equipment rinsate samples were collected for the surface water and sediment sampling event (Table 3-3). Equipment blank

Table 3-2
Summary of Positive Detections in Field Quality Control Blanks, Air Sampling

Preliminary Characterization Summary Report
OU1, NAS Jacksonville
Jacksonville, Florida

Parmaters	RUN1 µg/F	RUN2 µg/F	RUN3 µg/F	RUN4 µg/F
PCBs				
PCB-1254	0.210	–		
Semivolatiles				
bis(2-Ethylhexyl) phthalate	44.6	11.4	–	–
Napththalene	2.32	2.12	1.38	1.31
Benzoic acid	–	4.07	11.6	16.2
TAL Inorganics				
Aluminum	2,860	3,550	3,580	7,630
Barium	6,600	7,700	8,050	16,200
Beryllium	1.2	1.2	0.91	1.5
Calcium	1,690	2,020	2,060	4,180
Chromium	–	2.6	–	5.3
Copper	–	–	2.3	–
Iron	49.9	63.6	60.1	104
Lead	3.4	2.3	3.1	8.8
Magnesium	296	367	373	767
Manganese	1.5	2.2	1.8	13.9
Nickel	11	15.6	15.2	12.7
Potasium	4,140	4,700	4,900	8,920
Sodium	13,000	14,100	14,900	26,200
Zinc	4,600	5,430	5,470	11,100

Notes: All units are in micrograms per filter (µg/F).
– = target analyte not detected.

designator EB001 and EB002 were inadvertently duplicated on sample collection dates January 30, 1992, and February 10, 1992. Target analytes detected in the trip blank consisted of volatile organics, semivolatile organics, and inorganic constituents. The volatile organics consisted of chlorobenzene, which was detected in each of the eight rinsate blank samples, and chloroform, which was detected in five of the eight samples. The concentrations of chlorobenzene ranged from 6 micrograms per liter (μg/ℓ) to 18 μg/ℓ. Chloroform was detected at 1 μg/ℓ (J qualifier).

Only one semivolatile organic compound, bis(2-ethylhexyl)phthalate, was detected in three of the eight samples (Table 3-3). The detected concentrations ranged from 2 μg/ℓ (J qualifier) to 3 μg/ℓ (J qualifier).

The inorganic analytes detected in one or more of the equipment rinsate blank consisted of aluminum, arsenic, beryllium, calcium, chromium, iron, lead, magnesium, manganese, nickel, silver, sodium, and zinc. Aluminum was detected in one sample at a concentration of 21 μg/ℓ (J qualifier). Arsenic was detected in two samples at a concentration of 0.5 μg/ℓ (J qualifier). Beryllium was detected in one sample at a concentration of 0.51 μg/ℓ (J qualifier). Calcium was detected in two samples at concentrations of 116 and 204 μg/ℓ (J qualifier). Chromium was detected in one sample at a concentration of 2.4 μg/ℓ (J qualifier). Iron was detected in two samples at concentrations of 7.7 and 7.8 μg/ℓ (J qualifier). Lead was detected in three samples; two samples contained 0.8 μg/ℓ (J qualifier) and one sample contained 0.83 μg/ℓ (J qualifier). Magnesium, manganese, nickel, and silver were each detected in one sample at concentrations of 15.5 μg/ℓ (J qualifier), 0.67 μg/ℓ (J qualifier), and 7 μg/ℓ (J qualifier), and 0.67 μg/ℓ (J qualifier), respectively. Sodium was detected in two samples at concentrations of 52.3 and 55.3 μg/ℓ (J qualifier). Zinc was detected in four samples at concentration ranging from 6 μg/ℓ (J qualifier) to 7.4 μg/ℓ (J qualifier).

Field Blank. Three field blank samples were collected for the surface water and sediment sampling event (Table 3-4). Target analytes detected in the trip blank consisted of volatile organics, semivolatile organics, and inorganic constituents. Only one volatile organic compound, chlorobenzene, was detected in the three field blank samples. The detected concentrations ranged from 12 μg/ℓ to 17 μg/ℓ. Only one semivolatile organic compound, bis(2-ethylhexyl)phthalate, was detected in two of the three samples. The detected concentrations ranged from 2 μg/ℓ (J qualifier) to 3 μg/ℓ (J qualifier). The inorganic analytes detected in one or more of the field blank consisted of aluminum, arsenic, barium, copper, lead, and thallium. Aluminum was detected in two of the samples at concentrations of 43.2 μg/ℓ and 43.4 μg/ℓ (J qualifier). Arsenic was detected in one sample at a concentration of 1.2 μg/ℓ (J qualifier). Barium was detected in two of the samples at a concentrations of 0.73 μg/ℓ and 0.93 μg/ℓ (J qualifier). Copper was detected in one sample at a concentration of 5.6 μg/ℓ (J qualifier). Lead was detected in two of the samples at concentrations of 0.78 μg/ℓ and 1.6 μg/ℓ (J qualifier). Thallium was detected in one sample at a concentration of 1.6 μg/ℓ (J qualifier).

Table 3-3
Contaminants Detected in the Equipment Rinsate Blank
Surface Water and Sediment Sampling Event

Preliminary Characterization Summary Report
OU1, NAS Jacksonville
Jacksonville, Florida

Sample Number:	EB001	EB002	EB003	EB004	EB005	EB006	EB001	EB002
Date Collected:	1/30/92	1/31/92	2/1/92	2/2/92	2/2/92	2/4/92	2/10/92	2/10/92
Unit:	(µg/ℓ)	(µg/ℓ)	(µg/ℓ)	(µg/ℓ)	(µg/ℓ)	(µg/ℓ)	(µg/ℓ)	(µg/ℓ)
Volatiles:								
Chloroform	1	--	--	1	1	1	--	1
Chlorobenzene	13	12	18	16	17	7	6	15
Semivolatiles								
Bis(2-ethylhexyl) phthalate	--	--	--	--	3	--	3	2
TAL Inorganics								
Aluminum	21	--	--	--	--	--	--	--
Arsenic	--	--	--	--	--	--	0.5	0.5
Beryllium	--	--	--	0.51	--	--	--	--
Calcium	--	--	--	--	--	--	204	116
Chromium	--	--	--	2.4	--	--	--	--
Iron	--	--	--	7.7	--	--	7.8	--
Lead	--	--	0.83	0.8	--	--	0.8	--
Magnesium	--	--	--	--	15.5	--	--	--
Manganese	--	--	--	--	--	--	--	--
Nickel	--	--	--	--	--	0.67 --	--	7
Silver	--	--	--	0.5	--	--	--	--
Sodium	--	--	--	--	--	--	55.3	52.3
Zinc	--	--	7.4	--	6.5	--	6.3	6

Notes: µg/ℓ = micrograms per liter.
-- = target analyte not detected.

Table 3-4
Contaminants Detected in the Field Blank
Surface Water and Sediment Sampling Event

Preliminary Characterization Summary Report
OU1, NAS Jacksonville
Jacksonville, Florida

Sample Number:	FB001	FB002	FB003
Date Collected:	1/30/92	1/31/92	2/1/92
Unit:	(μg/ℓ)	(μg/ℓ)	(μg/ℓ)
Volatiles			
Chlorobenzene	14	12	17
Semivolatiles			
Bis(2-ethylhexyl) phthalate	2	–	3
TAL Inorganics			
Aluminum	43.4	43.2	–
Arsenic	–	–	1.2
Barium	0.73	0.93	–
Copper	–	5.6	–
Lead	–	–	1.6
Thallium	1.6	–	–

Notes: μg/ℓ = micrograms per liter.
– = target analyte not detected.

Trip Blank. Six trip blanks were collected for the surface water and sediment sampling event (Table 3-5). Methylene chloride was detected at a concentration of 9 $\mu g/\ell$ in one of the trip blank samples.

Soil Samples. Three types of field QC samples were collected for the soil sampling event. The three types of field QC samples were equipment rinsate blank, field blank, and trip blank (Tables 3-6 through 3-8, respectively). The following presents a description of the contaminants detected in each of these blanks.

Equipment Rinsate Blank. Target analytes detected in the equipment rinsate blank consisted of volatile organics, semivolatile organics, inorganic constituents, and radionuclides. Three volatile organic compounds, 2-butanone, chlorobenzene, and methylene chloride, were detected in equipment rinsate blanks collected during the soil sampling event (Table 3-6). 2-Butanone was detected in four of the samples at concentrations ranging from 8 $\mu g/\ell$ to 18 $\mu g/\ell$. Chlorobenzene was detected in each equipment rinsate blank sample at concentrations ranging from 4 $\mu g/\ell$ to 16 $\mu g/\ell$. Methylene chloride was detected in only one equipment rinsate blank sample at a concentration of 53 $\mu g/\ell$.

Four semivolatile organic compounds, benzo(k)fluoranthene, chrysene, pyrene, and bis(2-ethylhexyl)phthalate, were detected in the equipment rinsate blanks (Table 3-6). Benzo(k)fluoranthene (2 $\mu g/\ell$, J qualifier), chrysene (2 $\mu g/\ell$, J qualifier), and pyrene (3 $\mu g/\ell$, J qualifier) were each detected as a single occurrence. Bis(2-ethylhexyl)phthalate was detected in five of the eight equipment rinsate blank samples at concentrations ranging from 2 $\mu g/\ell$ (J qualifier) to 16 $\mu g/\ell$.

Each of the equipment rinsate blank samples collected during the soil sampling events contained detectable concentrations of at least one of the TAL inorganics (Table 3-7). Concentrations of the following 14 TAL inorganics were reported: aluminum, arsenic, barium, beryllium, calcium, chromium, copper, iron, lead, magnesium, potassium, sodium, vanadium, and zinc.

Four radionuclides, alpha (gross), beta (gross), radium-226 and radium-228, were detected in equipment rinsate blank samples collected during the soil sampling event (Table 3-8).

Pesticides, PCBs, dioxins, and furans were not detected in any of the equipment rinsate blanks collected during the soil sampling event.

Field Blank. Only one field blank was collected during the soil sampling event. Target analytes detected in the field blank consisted of volatile organics, inorganic constituents and radionuclides (Table 3-6). The volatile organic compounds detected consisted of 2-butanone (16 $\mu g/\ell$) and methylene chloride (53 $\mu g/\ell$). The TAL inorganics detected consisted of iron (7 $\mu g/\ell$) and lead (0.9 $\mu g/\ell$). The radionuclides consisted of alpha (gross) (0.4 picocuries per liter [pCi/ℓ]) and Radium-226 (0.04 pCi/ℓ). Semivolatile organics, pesticides, PCBs, dioxins, and furans were not detected in the field blank sample.

Table 3-5
Contaminants Detected in the Trip Blanks, Surface Water and Sediment Sampling Event

Preliminary Characterization Summary Report
OU1, NAS Jacksonville
Jacksonville, Florida

Sample Number:	TB001	TB002	TB003	TB004	TB005	TB006
Date Collected:	1/30/92	1/31/92	2/1/92	2/2/92	2/2/92	2/4/92
Unit:	(μg/ℓ)	(μg/ℓ)	(μg/ℓ)	(μg/ℓ)	(μg/ℓ)	(μg/ℓ)
Volatiles						
Methylene chloride	--	--	9	--	--	--

Notes: μg/ℓ = micrograms per liter.
-- = target analytes not detected.

Table 3-6
Summary of Positive Detections in Equipment Rinsate, Field, and Trip Blanks, Volatile and Semivolatile Organic Compounds

Preliminary Characterization Summary Report
NAS Jacksonville
Jacksonville, Florida

Volatile Organic Compounds	QC Sample Designation	Sample Collected Prior to QC Sample		Concentration Detected in QC Blank (µg/ℓ)	
		Sample Designation	Sample Depth (feet)		
2-Butanone	SLEB	SL040	7.5-8.5	8	J
	SLEB001	SL035	0-0.25	15	J
	SLEB002	SL035	0-0.25	18	
	SLEB003	SL100	4-6	17	
	SLEB006	SL022	0-0.25	16	J
	SLFB001	NA		16	J
Acetone	SLTB006	NA	NA	12	J
	SLTB007	NA	NA	5	J
	SLTB008	NA	NA	9	J
	SLTB009	NA	NA	7	J
	SLTB010	NA	NA	4	J
	SLTB012	NA	NA	28	J
Chlorobenzene	SLEB001	SL035	0-0.25	14	
	SLEB002	SL035	0-0.25	14	
	SLEB003	SL100	0-0.25	16	
	SLEB004	SL083	0-0.25	7	
	SLEB005	SL074	0-0.25	4	J
	SLEB006	SL022	0-0.25	10	
	SLEB007	SL012	0-0.25	9	
	SLEB008	SL068	0-0.25	9	
Methylene chloride	SLEB006	SL022	0.25	53	
	SLFB001	NA	NA	15	
	SLTB	NA	NA	12	

See notes at end of table.

Table 3-6 (Continued)
Summary of Positive Detections in Equipment Rinsate, Field, and Trip Blanks
Volatile and Semivolatile Compounds

Preliminary Characterization Summary Report
NAS Jacksonville
Jacksonville, Florida

Semivolatile Organic Compounds	QC Sample Designation	QC Sample Taken Prior to Sample Location	Sample Depth (feet)	Concentration Detected in QC Blank (µg/ℓ)
Benzo(k)fluoranthene	SLEB006 RE	SL083	0-0.25	2 J
Chrysene	SLEB007	SL012	0-0.25	2 J
Pyrene	SLEB007	SL012	0-0.25	3 J
bis(2-Ethylhexyl) phthalate	SLEB005	SL074	0-0.25	5 J
	SLEB001	SL035	0-0.25	2 J
	SLEB002	SL100	4-6	4 J
	SLEB004	SL083	0-0.25	16
	SLEB006	SL022	0-0.25	8 J

Notes: QC = quality control.
µg/ℓ = micrograms per liter.
SLEB = equipment rinsate blank designation.
SLTB = trip blank designation.
SLFB = field blank designation.
J = estimated value.
NA = not applicable.Notes: QC = quality control.

Table 3-7
Summary of Positive Detections in Equipment Rinsate and Field Blanks, Inorganics

Preliminary Characterization Summary Report
NAS Jacksonville
Jacksonville, Florida

Inorganic Compounds	QC Sample Designation	Sample Collected Prior to QC Sample: Sample Designation	Sample Collected Prior to QC Sample: Sample Depth (feet)	Concentration Detected in QC Sample (µg/ℓ)	
Aluminum	SLEB	SI040	7.5-8-5	64.6	J
	SLEB004	SL083	0-0.25	16.3	J
	SLEB005	SL074	0-0.25	18.8	J
	SLEB006	SL022	0-0.25	16.5	J
	SLEB008	SL068	0-0.25	49.8	J
Arsenic	SLEB003	SL100	4-6	0.8	J
Barium	SLEB005	SL074	0-0.25	0.42	J
	SLEB006	SL022	0-0.25	0.42	J
Beryllium	SLEB004	SL083	0-0.25	0.69	J
	SLEB005	SL074	0-0.25	0.43	J
	SLEB006	SL022	0-0.25	0.43	J
	SLEB008	SL068	0-0.25	0.69	J
Calcium	SLEB008	SL068	0-0.25	103	J
Chromium	SLEB	SL040	7.5-8.5	4.2	J
Copper	SLEB001	SL035	0-0.25	0.99	J
	SLEB002				
Iron	SLEB001	SL035	0-0.25	6.3	J
	SLEB002	SL035	0-0.25	23.8	J
	SLEB003	SL100	4-6	5.4	J
	SLEB008	SL068	0-0.25	25.5	J
	SLFB-01	NA	NA	7	J
Lead	SLEB001	SL035	0-0.25	0.9	J
	SLEB002	SL035	0-0.25	0.7	J
	SLEB005	SL074	0-0.25	1.1	J
	SLEB006	SL022	0-0.25	1.2	J
	SLEB008	SL068	0-0.25	1.2	J
	SLFB-01	NA	NA	0.9	J
Magnesium	SLEB008	SL068	0-0.25	37.1	J
Potassium	SLEB	SL040	7.5-8.5	241	J
Sodium	SLEB005	SL074	0-0.25	266	J
	SLEB008	SL068	0-0.25	66.4	J
Vanadium	SLEB005	SL074	0-0.25	1.4	J
Zinc	SLEB004	SL083	0-0.25	6	J
	SLEB005	SL074	0-0.25	3.2	J
	SLEB006	SL022	0-0.25	5.7	J
	SLEB007	SL012	0-0.25	1.8	J

Notes: QC = quality control.
µg/ℓ = micrograms per liter.
SLEB = equipment rinsate blank designation.
SLFB = field blank designation.
J = estimated concentration
NA = not applicable

Table 3-8
Summary of Positive Detections in Equipment Rinsate and Field Blanks, Radionuclides

Preliminary Characterization Summary Report
NAS Jacksonville
Jacksonville, Florida

Radionuclide	QC Sample Designation	Sample Collected Prior to QC Sample		Concentration Detected in QC Sample (pCi/ℓ)
		Sample Designation	Sample Depth (feet)	
Gross Alpha	SLEB001	SL035	0-0.25	0.1
	SLEB002			
	SLEB004	SL083	0-0.25	0.4
	SLEB006	SL022	0-0.25	1.9
	SLEB007	SL012	0-0.25	1.2
	SLFB	NA	NA	0.4
Gross Beta	SLEB003	SL100	4-6	0.1
	SLEB006	SL022	0-0.25	3.4
	SLEB007	SL012	0-0.25	0.8
Radium-226	SLEB007	SL012	0-0.25	0.4
	SLFB	NA	NA	0.4
Radium-228	SLEB003	SL100	4-6	0.7
	SLEB004	SL083	0-0.25	0.8

Notes: QC = quality control.
pCi/ℓ = picocuries per liter.
SLEB = equipment rinsate blank.
SLFB = field blank.
NA = not applicable.

Trip Blank. Thirteen trip blank samples were collected for the soil sampling event. Six of the 13 trip blank samples contained detectable concentrations of acetone, ranging from 5 $\mu g/\ell$ to 28 $\mu g/\ell$ (Table 3-6). Only one trip blank sample contained detectable concentrations of methylene chloride (12 $\mu g/\ell$).

Groundwater Samples. Three types of field QC samples were collected for the groundwater sampling event: equipment rinsate blank, and field blank and trip blank. The following presents a description of the contaminants detected in each of these blanks.

Equipment Rinsate Blank. Six equipment rinsate blanks (including filtered and unfiltered samples for inorganic analyses) were collected for the groundwater sampling event (Table 3-9). Target analytes detected in the equipment rinsate blank consisted of two volatile organic compounds, one semivolatile organic compound, and 11 inorganic constituents. Volatile organic compounds chlorobenzene and methylene chloride were each detected in one equipment rinsate blank at concentrations of 12 $\mu g/\ell$ and 7 $\mu g/\ell$ (J qualifier), respectively. The semivolatile organic compound bis(2-ethylhexyl)phthalate was detected (9 $\mu g/\ell$, J qualifier) in one of the rinsate blank samples.

Equipment rinsate blanks for non-filtered (total) inorganic samples contained concentrations of one or more of the following ten TAL inorganics: aluminum, calcium, copper, iron, lead, manganese, nickel, selenium, sodium, and zinc. None of the equipment rinsate blanks for non-filtered inorganic samples contained TAL inorganics at concentrations greater than the contract required detection limit (CRDL).

Equipment rinsate blanks for filtered (soluble) inorganic samples contained concentrations of one or more of the following eleven TAL inorganics: aluminum, arsenic, barium, calcium, chromium, lead, magnesium, nickel, selenium, silver, and vanadium. Only one sample contained TAL inorganics iron (21.2 $\mu g/\ell$) and lead (3.7 $\mu g/\ell$) at concentrations greater than the CRDL.

Field Blank. Only one field blank sample was collected for the groundwater sampling event (Table 3-10). Only one semivolatile organic compound, bis(2-ethylhexyl)phthalate was detected (3 $\mu g/\ell$, J qualifier) in the field blank sample. Volatile organics, pesticides, PCBs, and radionuclides were not detected in the field blank sample.

Trip Blank. Twenty-eight trip blank samples were collected for the groundwater sampling event (Table 3-11). Acetone, carbon disulfide, chloroform, methylene chloride, and toluene were detected in some of the trip blank samples. Acetone was detected in only one trip blank at a concentration of 7 $\mu g/\ell$, J qualifier. Carbon disulfide was detected in 21 of the trip blank samples at concentrations ranging from 2 $\mu g/\ell$ to 3 $\mu g/\ell$, J qualifier. Chloroform was detected in five trip blank samples at concentrations ranging from 1 $\mu g/\ell$ to 3 $\mu g/\ell$, J qualifier. Methylene chloride was detected in five trip blank samples at concentrations ranging from 1 $\mu g/\ell$, J qualifier to 8 $\mu g/\ell$. Toluene was detected in one trip blank sample at a concentration of 1 $\mu g/\ell$, J qualifier.

Table 3-9
Analytical Results Report,
Contaminants Detected in Equipment Rinsate Blanks

Preliminary Characterization Summary Report
Naval Air Station
Jacksonville, Florida

Sample Number Date Unit	EB001 (µg/ℓ)		EB001SOL (µg/ℓ)		EB002 (µg/ℓ)		EB002SOL (µg/ℓ)		EB003 (µg/ℓ)		EB003SOL (µg/ℓ)	
	May 29, 1992				May 30, 1992				May 31, 1992			
Volatile Compounds												
Acetone	12	J	NA		<10		<10		<10		NA	
Chlorobenzene	<5		NA		<5		12		<5		NA	
Methylene Chloride	7	J	NA		<5		<5		<5		NA	
Semivolatile Compounds			NA								NA	
bis(2-Ethylhexyl)phthalate	<10		NA		9	J	<10		<10		NA	
Inorganics												
Aluminum	<28.4		<42.9		<19		<19		<19	UJ	<43.7	
Arsenic	<1		3.1	J	<1		<1		<1		<1	
Barium	<0.66		<0.6		<1.5		<0.73		<0.6		<6.9	
Calcium	<134		149	J	451	J	<155		262	J	<141	
Chromium	<2.1		<2.1		<2.1		<2.1		<2.1	UJ	<2.1	
Copper	<2.1		<2.1		<5.8		<2.7		<15.3		<8.5	
Iron	<13.1		21.2		<12.2		<18		16.5	J	<14.8	
Lead	1.8	R	3.7		2	J	<1.8		<1.8	UJ	<1.3	
Magnesium	<21.3		<21.3		<21.3		<21.3		<21.3		23.4	J
Manganese	<0.51		<0.68		<0.84		<0.75		0.67	J	<2.7	
Nickel	<3.8		5.8	J	<3.8		<3.8		58.6	J	<3.8	
Selenium	2.6	J	3.6	J	<1.9		<1.9		<1.9	UJ	<1.9	
Silver	<1.7		<1.7		<1.7		<1.7		<1.7		<1.7	
Sodium	<616		<609		<563		<581		953	J	<579	
Vanadium	<1.7		<1.7		<1.7		<1.7		<1.7		<1.7	UJ
Zinc	<3		<3.4		<9		<8		23.7	J	<11	

See note at end of table.

Table 3-9 (Continued)
Analytical Results Report
Contaminants Detected in Equipment Rinsate Blanks

Preliminary Characterization Summary Report
Naval Air Station
Jacksonville, Florida

Sample Number	EB004 (µg/ℓ)		EB004SOL (µg/ℓ)		EB005 (µg/ℓ)		EB005SOL (µg/ℓ)		EB006 (µg/ℓ)		EB006SOL (µg/ℓ)	
Date	June 1, 1992				June 2, 1992				June 3, 1992			
Volatile Compounds												
Acetone	<10		NA		4	J	NA	UJ	<10		NA	
Chlorobenzene	<5		NA		<5		NA		<5		NA	
Methylene Chloride	<5		NA		<5		NA		<5		NA	
Semivolatile Compounds			NA				NA				NA	
bis(2-Ethylhexyl)phthalate	<10		NA		<10		NA		<10		NA	
Inorganics												
Aluminum	<46.9	UJ	29.6	J	33.7	J	<36.5		33.4	J	97.6	J
Arsenic	<1		<1		1	R	1.1	J	<1		<1	
Barium	<1		1.2	J	<0.6		0.88	J	<0.6		1.3	J
Calcium	<136	UJ	<150		<333		<272		<228		<408	
Chromium	<2.1	UJ	2.6	J	<2.1		<1.9		<2.1		<2.1	
Copper	<11.9		<6.2		3.3	J	<6.4		13.1	J	<5.6	
Iron	<28.5	UJ	<19.6		31.2	J	<22		19.4	J	<33	
Lead	<1.8		<1.8		1.8	R	<1.8	UJ	<1.8	UJ	<1.8	
Magnesium	<21.3	UJ	<26.6		<21.3		<48.5		<21.3		<26.2	
Manganese	<0.75	UJ	<3		<0.92		<1.6		<0.75		<1.7	
Nickel	<3.8	UJ	<3.8		<3.8	UJ	<3.8		4.5	J	<3.8	
Selenium	<1.9	UJ	<1.9		1.9	R	1.9	R	<1.9		<1.9	
Silver	<1.7	UJ	1.9	J	<1.7		<1.5		<1.7		<1.7	
Sodium	<979	UJ	<745		<821		<1260		<817		<1090	
Vanadium	<1.7	UJ	1.8	J	<1.7		<1.3		<1.7		<1.7	
Zinc	<13.6	UJ	<9.2		<6.9		<7.6		<9.9		<5.7	

Notes: "J" signifies the compound was detected at an estimated concentration.
"UJ" signifies the quantitation limit was estimated.
"R" signifies that the data point was rejected during data validation.
Data validation by Heartland Environmental Services of St. Peters, Missouri (see Appendix D).
NA = not analyzed.
SOL = denotes an equipment blank for soluble (filtered) inorganics.
µg/ℓ = micrograms per liter.

Table 3-10
Analytical Results Report
Contaminants Detected in Field Blanks

Preliminary Characterization Summary Report
Naval Air Station
Jacksonville, Florida

Sample Number Unit	FB001 (µg/ℓ)
Semivolatile Compound	
bis(2-Ethylhexyl)phthalate	3 J

Notes: µg/ℓ = micrograms per liter.
J = Signifies the compound was detected at an estimated concentration.
Data validation by Heartland Environmental Services of St. Peters, Missouri (see Appendix D).

Table 3-11
Analytical Results Report,
Contaminants Detected in Trip Blanks

Preliminary Characterization Summary Report
Naval Air Station
Jacksonville, Florida

Volatile Organic Compound Unit	Acetone (µg/ℓ)	Carbon Disulfide (µg/ℓ)	Chloroform (µg/ℓ)	Methylene Chloride (µg/ℓ)	Toluene (µg/ℓ)
Trip Blank Number					
TB001	<10	2J	<5	<10	<5
TB002	<10	2J	<5	<8	<5
TB002	<10	<5	<5	<5	<5
TB003	<10	2J	2J	<18	<5
TB004	7J	2J	2J	<18	<5
TB005	<10	2J	<5	<9	<5
TB006	<10	2J	1J	<11	<5
TB007	<10	2J	<5	7	<5
TB009	<10	2J	<5	<8	<5
TB010	<10	3J	<5	<8	<5
TB012	<10	2J	<5	<11	<5
TB013	<10	2J	3J	<21	<5
TB014	<10	2J	<5	<9	<5
TB015	<11	2J	2J	<14	<5
TB016	<10	3J	<5	<8	<5
TB017	<10	2J	<5	<9	<5
TB018	<10	1J	<5	7J	<5
TB019	<10	2J	<5	<10	<5
TB019	<10	<5	<5	<5	<5
TB020	<10	<5	<5	<5	<5
TB020	<12	1J	<5	<7	<5
TB021	<10	2J	<5	<8	<5
TB022	<10	<5	<5	<5	<5
TB023	<14	<5	<5	<5	1J
TB024	<10	1J	<5	<10	<5
TB025	<10	<5	<5	1J	<5
TB026	<10	2J	<5	8	<5
TB027	<10	<5	<5	1J	<5

Notes: µg/ℓ = micrograms per liter.
J = Signifies the compound was detected at an estimated concentration.
Data validation by Heartland Environmental Services of St. Peters, Missouri (see Appendix D).

3.3.2 Laboratory QC

3.3.2.1 Laboratory QC Samples

- Replicate Sample. One replicate field sample was collected for every 10 field samples of the same matrix. The replicate sample is collected from the same location and depth interval, as appropriate, of an environmental sample. The purpose of the replicate samples is to assess sample analysis accuracy. The replicate sample is analyzed for the same analytical parameters as the environmental sample.

- Surrogate Spikes. Surrogate spike recoveries served to estimate accuracy and were added to every sample. Surrogate compounds are the structural homologs of target compounds, often with deuterium substituted for hydrogen, and are therefore expected to behave in a similar manner during analysis. Spike recoveries were used to monitor both matrix effects and laboratory performance.

- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Sample. One MS/MSD sample pair was collected for every 10 field samples of the same matrix. The MS/MSD sample pair is collected from the same location and depth interval, as appropriate, of an environmental sample. The purpose of the MS/MSD sample pair is to assess sample analysis accuracy and precision.

- Method Blank and Preparation Blank. The method and preparation blanks are a sample of ASTM Type II water that is prepared by the laboratory at the time of analysis. Method and preparation blanks are treated as a sample in that it undergoes the same analytical process as the corresponding environmental samples. The purpose of the method blank is to assess the potential for contamination of samples via VOCs, BNAs, Pesticides, PCBs, dioxins, furans, and radionuclide parameters during sample analysis. The preparation blank is used to assess the potential contamination of samples via TAL inorganic parameters. The method and preparation blanks are used by the laboratory to monitor analytical performance and are used to assess contamination introduced during the analytical process and to assess the representativeness of the chemical analytical procedure.

- Laboratory Control Sample (LCS). An LCS consists of an ideal matrix (usually ASTM Type II water) that has been spiked with a known amount of the TAL inorganic parameter of interest; the LCS was prepared (digested) and analyzed with the field samples. The LCS is designed to monitor the efficiency of the overall analytical procedure, including sample preparation, and the resulting analyte recoveries must fall within pre-established acceptance limits.

- Spiked Samples. Pre-digestion TAL inorganic parameter spikes are analogous to the MS/MSD spike recovery for organic analyses in that they measure the effects of the sample matrix on the recovery of a known quantity of analyte after both sample preparation and analysis.

If the pre-digestion spike recovery did not fall within the acceptance window of 75 to 125 percent, then a post-digestion spike monitors instrument performance and matrix effects. If both the pre- and post-digestion spike recoveries fell outside the acceptance limits, then the data were flagged to indicate the nonconformance.

3.3.2.2 Data Quality Review Before the analytical results were released by the laboratory, both the sample and QC data were carefully reviewed in order to verify sample identity, instrument calibration, detection limits, dilution factors, numerical computations, accuracy of transcriptions, and chemical interpretations. Additionally, the QC data were reduced and spike recoveries were included in control charts, and the resulting data were reviewed to ascertain whether they were within the laboratory defined limits for accuracy and precision. Any nonconforming data were discussed in the data package cover letter and case narrative.

The Level D data packages were reviewed and validated by Heartland Environmental Services, Inc., Missouri. Data validation is the technical review of a data package using criteria established in the data quality objectives and the quality assurance project plan. The data were reviewed and validated using the NEESA (1988) guidance document 20.2-047B, *Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Program*. The data review and validation process is independent of the laboratory's checks because it is impossible to repeat the laboratory's review as not all the raw data were included in the Level D data packages.

Samples that did not meet the acceptance limit criteria were qualified with a flag, single letter abbreviations that indicate a problem with the data. Flags used in the data summary tables include the following.

U Undetected. The analyte was not detected above the contract required quantitation limit (CRQL). The "U" designator also is used to qualify common laboratory contaminants. The "U" designator is applied to an environmental sample when the common laboratory contaminant is detected in an environmental sample at a concentration less than 10 times the value of the concentration detected in any corresponding field QC blank, method blank, or preparation blanks.

J Estimated. The analyte was present, but the reported value may not be accurate or precise. The "J" designator is used to qualify an analyte that was present at a concentration between the CRQL and method detection limit (MDL) or the data "failed" some of the analytical validation criteria but not sufficient enough to reject the data and when combined with the U designator the quantitation limit is estimated.

R Rejected. Data was rejected by the data validator during comparison of the NEESA Level D data package with the analytical functional guideline criteria. The "R" designator indicates a significant variance in acceptable laboratory performance. Either re-analysis

or re-sampling and analysis would be necessary to determine the presence or absence of the target analyte(s).

Once the data were reviewed and validated according to the guidance presented in NEESA 20.2-047B, the data were evaluated using the precision, accuracy, representativeness, comparability, and completeness (PARCC) criteria included in the Data Quality Objective (DQOs) of the Sampling and Analysis Plan (SAP) or U.S. Navy, 1991b.

3.3.3 **Precision** Precision is a measure of the agreement or repeatability of a set of replicate results obtained from duplicate laboratory analyses of samples collected from the same location/depth interval. Precision was calculated from laboratory analytical data and cannot be measured directly. Precision is expressed as the Relative Percent Difference (RPD) between analytical values for two samples divided by the average of their analytical values. Precision is calculated using the expression:

$$RPD = ((D1-D2)/1/2(D1+D2))) \times 100$$

where

D1 = value for sample 1, and
D2 = value for sample 2.

D1 and D2 are the reported values for the duplicate sample pair. Precision was evaluated using field duplicate samples and laboratory split samples (for example, MS/MSD samples).

The criteria for evaluating precision are presented in Volume 5 RI/FS Work Plan for OU1, Oil and Solvents disposal Pits Area, Appendix 5.4.1 Quality Assurance Project Plan, Section 3.0 Quality Assurance Objectives, Tables 3-1 through 3-4.

The criteria for precision was met for each environmental matrix. However, the goal for the soil samples may not have been realistic because of the natural heterogeneity of the sample matrix; all the soil duplicate results were within a more realistic acceptance window of -50 to +100 RPD.

3.3.4 **Accuracy** Accuracy is a measure of the agreement between an experimental determination and the true value of the parameter being measured. Accuracy can be calculated from the analytical data and was not measured directly. Accuracy is used to identify the bias in a given measurement system (i.e., laboratory conditions, sample matrix, and sampling conditions). Accuracy is assessed by reviewing the Percent Recovery (%R) between the true value of the spike analyte and the actual analytical value. Accuracy is calculated using the equation:

$$\%R = ((A-B)/C) \times 100$$

where

A = measured concentration of the spiked analyte,
B = measured concentration of the spiked compound in the unspiked sample, and
C = true concentration of the spiked analyte.

For the organic analyses, each of the samples was spiked with a surrogate compound; and for inorganic analyses, each sample was spiked with a known reference material before digestion. Each of these approaches provides a measure of the matrix effects on the analytical accuracy.

The criteria for evaluating accuracy are presented in Volume 5 RI/FS Work Plan for OU1, Oil and Solvents disposal Pits Area, Appendix 5.4.1 Quality Assurance Project Plan, Section 3.0 Quality Assurance Objectives, Tables 3-1 through 3-4.

The criteria for accuracy was met for each environmental matrix. Target acceptance ranges for the spike recoveries are included in the analytical method. If the spike recovery fell outside the acceptance windows, then the sample data was qualified as indicated on the data summary tables.

3.3.5 **Representativeness** Representativeness is a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition. Representativeness is a subjective parameter and is used to evaluate the efficacy of the sampling plan design. Representativeness was evaluated using the field and laboratory QC blank sample results. QC blank samples are equipment rinsate blanks, field blanks, trip blanks, laboratory method blanks for organic analysis and laboratory preparation blanks for inorganic analysis. Positive detection of target analytes in the QC blank samples identify contaminants that possibly were introduced to the associated environmental sample during sample collection, transport, or laboratory analysis. The following is a summary of field and/or laboratory contaminants detected in soil gas, air, surface water, sediment, soil, and groundwater samples.

Soil Gas Samples. Laboratory QC samples consisted of laboratory blanks of nitrogen gas (99.999 percent pure). Laboratory blanks were analyzed after the tenth soil gas sample. Target analytes were not detected in laboratory blank samples. The criteria for representativeness was met for the soil gas samples.

Air Samples. Representativeness of the air samples was evaluated using the field blanks. A discussion of the air sample field blanks is provided in Section 3.3.1.2. The air sample data was qualified according to CLP criteria, based on the concentration of contaminants detected in the field blank. The criteria for representativeness was met for PCBs, semivolatile organics, and inorganics for the air samples.

Surface Water and Sediment Samples. Representativeness for the surface water and sediment samples was assessed using equipment rinsate blanks, field blanks, trip blanks, and laboratory method and preparation blanks. Discussion of the contaminants detected in the equipment rinsate, field, and trip blanks is provided in Section 3.3.1.2. None of the Field QC data was used to modify the data validation code assigned by the analytical laboratory.

Contaminants detected in the laboratory method blank included:

volatile organics,

- 2-butanone,
- acetone, and
- methylene chloride; and

semivolatile organics,
- bis(2-ethylhexyl)phthalate,
- di-n-butylphthalate, and
- n-nitroso-di-phenylamene.

Contaminants detected in the laboratory preparation blank included:

- arsenic,
- beryllium,
- calcium,
- iron,
- mercury,
- selenium,
- sodium,
- zinc.
- barium,
- cadmium,
- copper,
- manganese,
- silver,
- potassium,
- vanadium, and

Corrective actions were made for contaminants detected in the laboratory method and preparation blanks of the surface water and sediment sample chemical analytical data during data validation. The corrective action consisted of reporting positive results as non-detections (U qualifier) for values, which were either less than 10 times the value detected in the method blank for common laboratory contaminants (2-butanone, acetone, methylene chloride, and phthalate compounds) or less than 5 times the value for other target analytes in both the laboratory method and preparation blanks.

Soil Samples. Representativeness for the soil samples was assessed using equipment rinsate blanks, field blanks, trip blanks, and laboratory method and preparation blanks. Discussion of the contaminants detected in the equipment rinsate, field, and trip blanks is provided in Section 3.3.1.2. None of the Field QC data was used to modify the data validation code assigned by the laboratory.

Contaminants detected in the laboratory method blank included:

volatile organics,
- 2-butanone,
- acetone, and
- methylene chloride; and

semivolatile organics,
- bis(2-ethylhexyl)phthalate,
- di-n-butylphthalate, and
- n-nitroso-di-phenylamene.

Contaminants detected in the laboratory preparation blank included:

- arsenic,
- cadmium,
- iron,
- silver,
- sodium,
- barium,
- calcium,
- manganese,
- selenium,
- vanadium, and
- beryllium,
- copper,
- mercury,
- potassium,
- zinc.

Corrective actions were made for contaminants detected in the laboratory method and preparation blanks of the soil sample chemical analytical data during data validation. The corrective action consisted of reporting positive results as non-detections (U qualifier) for values that were either less than 10 times the value detected in the method blank for common laboratory contaminants (2-butanone, acetone, methylene chloride, and phthalate compounds) or less than 5 times the value for other target analytes in both the laboratory method and preparation blanks.

Groundwater Samples. Representativeness for the groundwater samples was assessed using equipment rinsate blanks, field blanks, trip blanks, and laboratory method and preparation blanks. Discussion of the contaminants detected in the equipment rinsate, field, and trip blanks is provided in Section 3.3.1.2. None of the Field QC data was used to modify the data validation code assigned by the laboratory.

Contaminants detected in the laboratory method blank included:

volatile organics,
- acetone,
- benzene, and
- methylene chloride; and

semivolatile organics,
- di-n-butylphthalate.

Contaminants detected in the laboratory preparation blank included:

- aluminum,
- barium,
- calcium,
- copper,
- manganese,
- nickel,
- sodium,
- zinc.
- antimony,
- beryllium,
- cobalt,
- iron,
- magnesium,
- silver,
- vanadium, and

Corrective actions were made for contaminants detected in the laboratory method and preparation blanks of the soil sample chemical analytical data during data validation. The corrective action consisted of reporting positive results as non-detections (U qualifier) for values that were either less than 10 times the value detected in the method blank for common laboratory contaminants (acetone, methylene chloride and bis(2-ethylhexyl)phthalate) or less than 5 times the value for other target analytes in both the laboratory method and preparation blanks.

3.3.6 Comparability Comparability is a qualitative measure designed to express the confidence with which one data set may be compared to another. Factors that affect comparability are: sample collection and handling techniques, sample matrix type, and analytical method. Comparability is limited by the other PARCC parameters because only when precision and accuracy are known can data sets be compared with confidence. Comparability of the data was assured by using

standard operation procedures for sample collection, by using standard chemical analytical methods and by reporting of the analytical results in standard units.

3.3.7 Completeness Completeness is defined as the percentage of measurements that are judged to be valid compared to the total number of measurements made. Valid usable data are values that were not qualified as rejected (R qualifier) during data validation. A goal of 96 percent usable data was established in Volume 5 RI/FS Work Plan for OU1, Oil and Solvents disposal Pits Area, Appendix 5.4.1 Quality Assurance Project Plan, Section 3.0 Quality Assurance Objectives, Tables 3-1 through 3-4. Completeness equals the total number of analytes for each matrix minus the total number of rejected analytes divided by the total number of analytes multiplied by 100.

Less than 5 percent of the data for each matrix were rejected during the data review and validation process; therefore, completeness is greater than 96 percent.

4.0 RI PRELIMINARY FINDINGS

4.1 GEOLOGY.

4.1.1 Geophysical Survey The purpose of the seismic study was to assess whether the "hard" layer identified by the USACE existed beneath OU1. The location of the surface geophysical survey lines is provided in Figure 3-1. The results of this study did not provide conclusive evidence of the existence of the "hard" layer. The "hard" layer was determined to either be of insufficient thickness to be detected by the survey method or did not have sufficient contrast in seismic velocity values between the over and underlying sediments to be detected.

The results of the geophysical survey are presented as seismic profiles, Figures 4-1 through 4-5. In these profiles, two seismic layers are defined: (1) the upper surficial layer (Layer #1) varies in thickness from approximately 4 to 19 feet beneath the land surface and has a seismic velocity value that varies from approximately 1,000 feet per second (ft/sec) to 2,300 ft/sec (called V_1); and (2) the deeper layer (Layer #2) is of undefined thickness and has a seismic velocity value that varies from 5,000 to 5,900 ft/sec. Layer #2 exceeds a thickness of 200 feet, assuming that the seismic velocity value of the next deeper layer is 9,000 ft/sec. There is no consistent indication from the seismic refraction data of the presence of Layer #3 in the depth range from approximately 40 to 150 feet beneath the land surface.

The seismic velocity value of Layer #2 varies from approximately 5,000 ft/sec to 5,900 ft/sec. The seismic velocity value for Layer #2 appears to increase slightly as a function of depth, a phenomena that would be predicted for older Coastal plain sediments (in this case Miocene/Pliocene) where there is no wide spread calcareous cementation.

Based on the seismic refraction data, two conclusions can be made, either: (1) the clay/shale layer is not thick enough to be detected as a refractor, or (2) the clay/shale layer has insufficient velocity contrast, relative to its overlying layer to be detected and accurately mapped as a refractor.

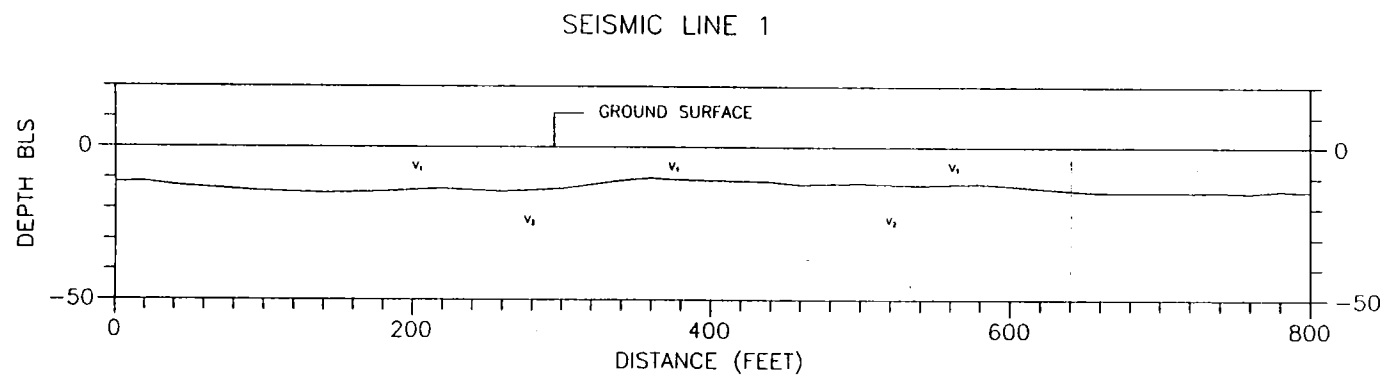
4.1.2 Soil Borings A total of 39 borings were drilled in the study area to define the geology and hydrology of the Miocene to Holocene age deposits and aquifers. Boring/well logs that describe the lithology of the sediments and monitoring well construction are provided in Appendix A. Geologic information generated from these logs were used to construct geologic cross section. The locations of the geologic cross sections are provided in Appendix B, Figures B-1a and B-1b. The geologic cross sections that illustrate the subsurface conditions beneath OU1 are provided in Figures B-2 through B-7. Figures B-2 through B-5 are east-west traverses and Figures B-6 and B-7 are north-south traverses. The geologic cross section traverses reveal three separate geologic/hydrologic zones.

The first zone comprises the Surficial Aquifer and consists of unconsolidated silty sands, which are interlayered or underlain by slightly silty sands, clayey

NOTES: 1) The datum used for all seismic traverses was ground surface. All traverses were located on essentially flat terrain.

2) Seismic interpretation was facilitated by use of SIPT2, a U.S. Geological Survey software program marketed by Rimrock Geophysics, Inc., Lakewood, CO.

3) Tabulated velocity values for V_1 vary from 1460 to 1867 fps (feet per second). Values for V_2 vary from 5633 to 5920 fps.



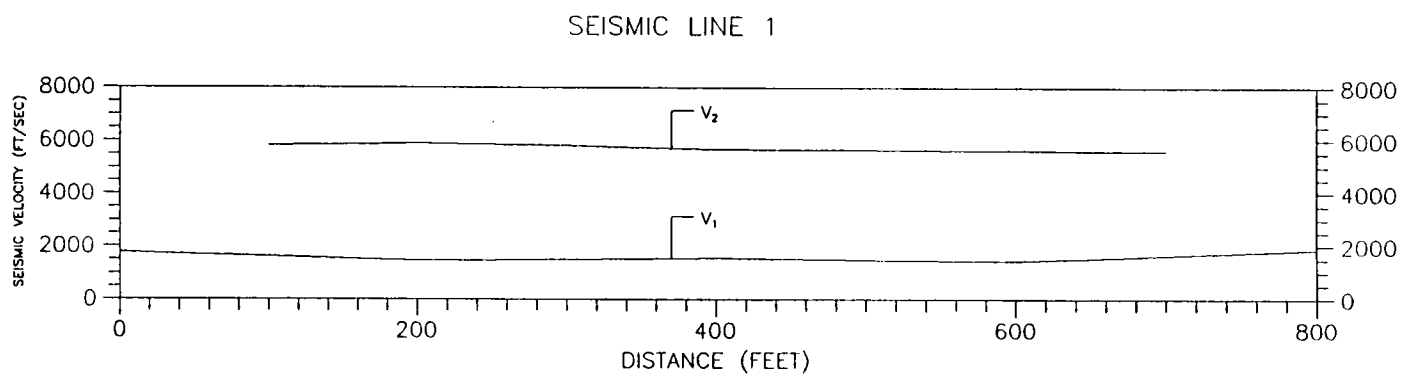


FIGURE 4-1
SEISMIC REFRACTION SURVEY, LINE 1

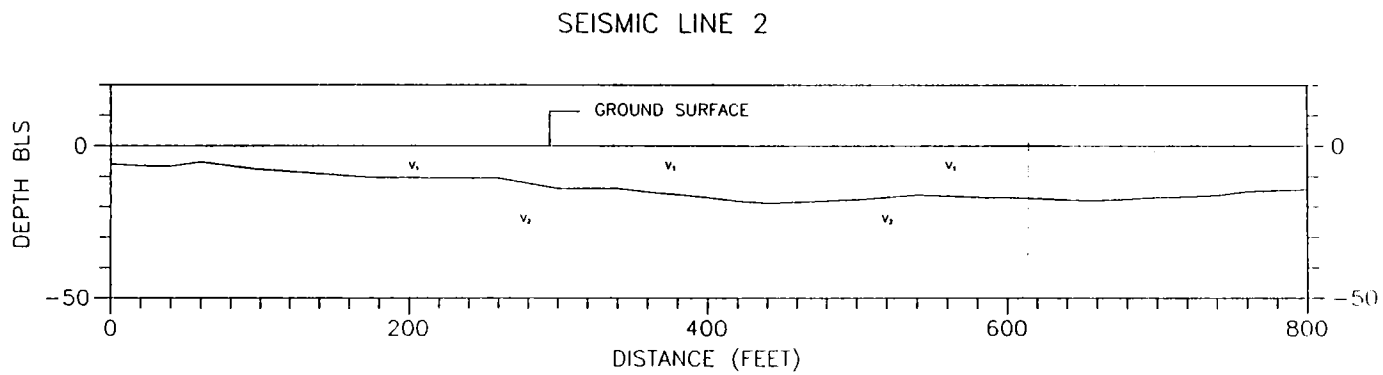
PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

NOTES: 1) The datum used for all seismic traverses was ground surface. All traverses were located on essentially flat terrain.

2) Seismic interpretation was facilitated by use of SIPT2, a U.S. Geological Survey software program marketed by Rimrock Geophysics, Inc., Lakewood, CO.

3) Tabulated velocity values for V_1 vary from 1252 to 1905 fps (feet per second). Values for V_2 vary from 5164 to 5744 fps.



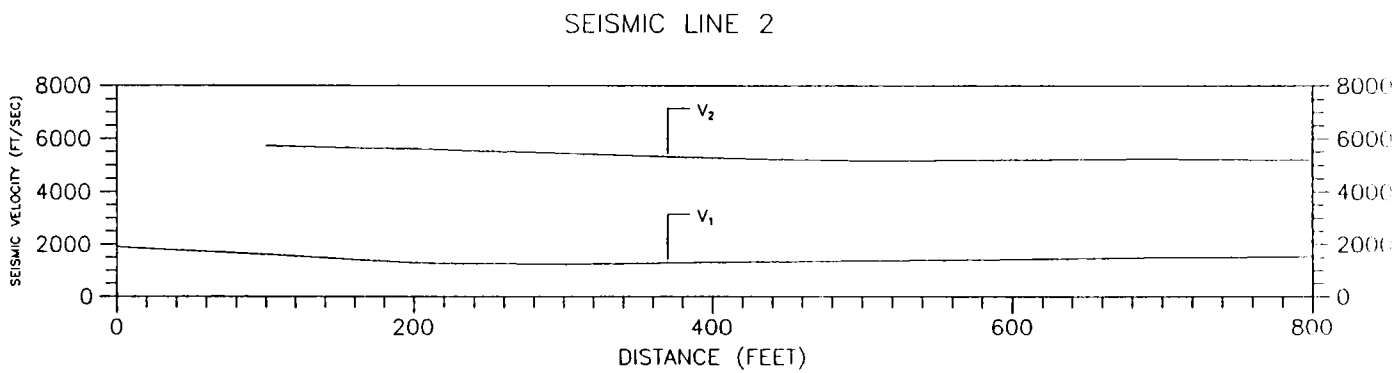


FIGURE 4-2
SEISMIC REFRACTION SURVEY, LINE 2

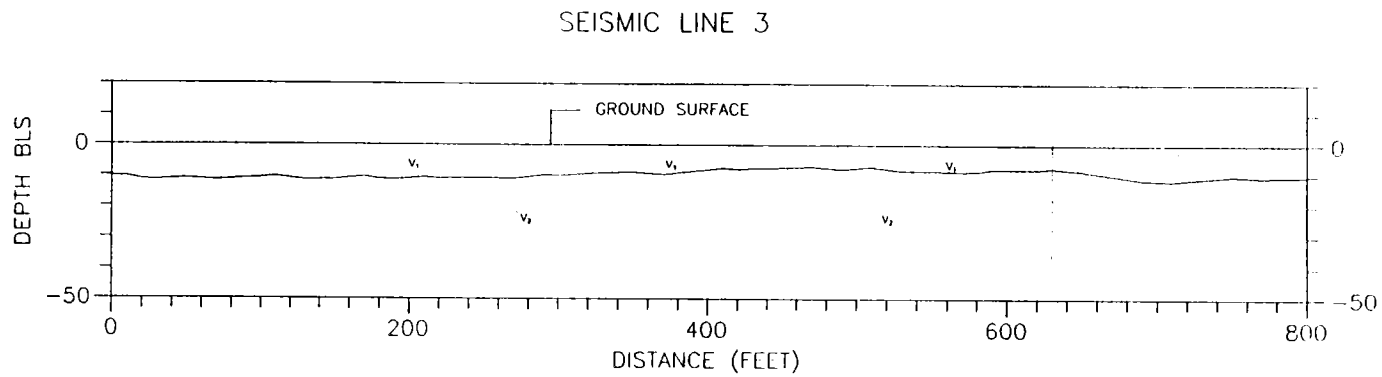
PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

NOTES: 1) The datum used for all seismic traverses was ground surface. All traverses were located on essentially flat terrain.

2) Seismic interpretation was facilitated by use of SIPT2, a U.S. Geological Survey software program marketed by Rimrock Geophysics, Inc., Lakewood, CO.

3) Tabulated velocity values for V_1 vary from 1067 to 1593 fps (feet per second). Values for V_2 vary from 5465 to 5551 fps.



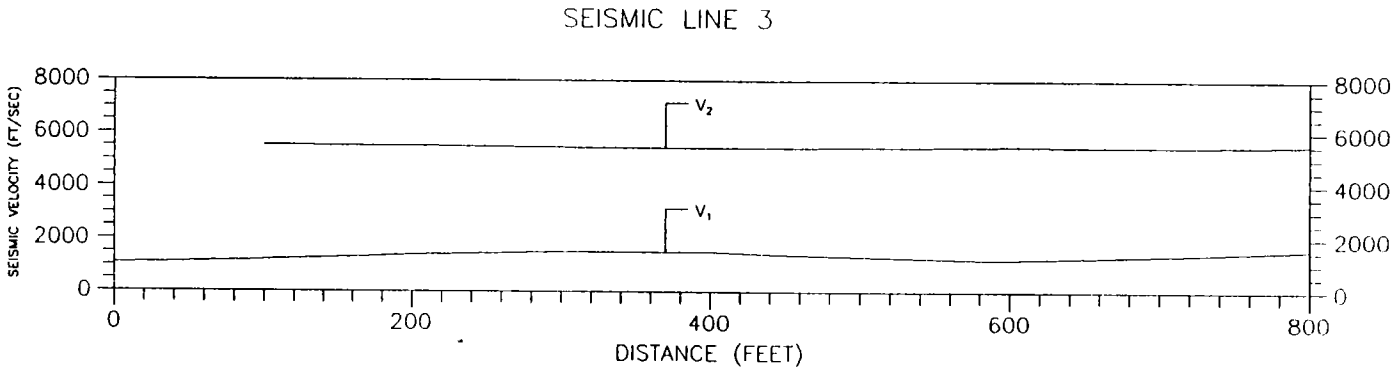


FIGURE 4-3
SEISMIC REFRACTION SURVEY, LINE 3

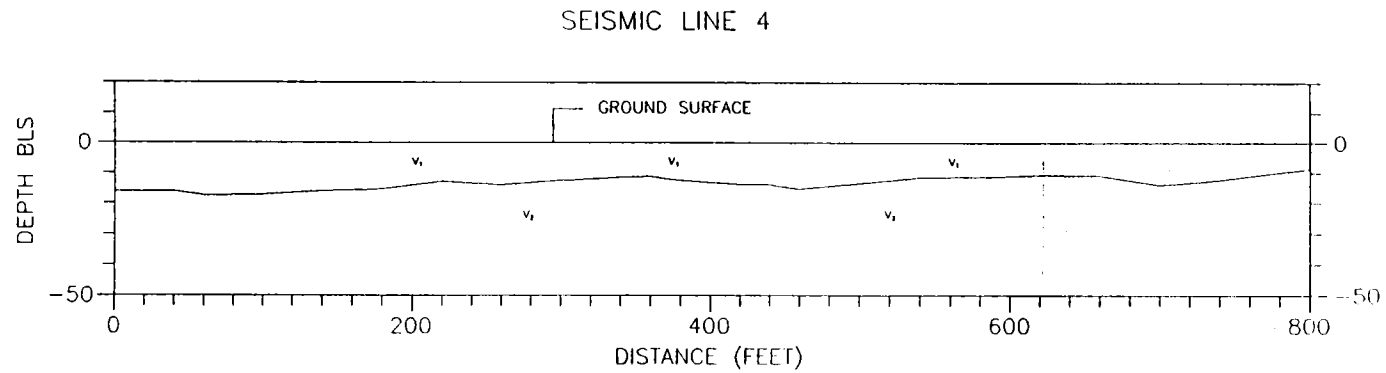
PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

NOTES: 1) The datum used for all seismic traverses was ground surface. All traverses were located on essentially flat terrain.

2) Seismic interpretation was facilitated by use of SIPT2, a U.S. Geological Survey software program marketed by Rimrock Geophysics, Inc., Lakewood, CO.

3) Tabulated velocity values for V_1 vary from 1474 to 2339 fps (feet per second). Values for V_2 vary from 5420 to 5598 fps.



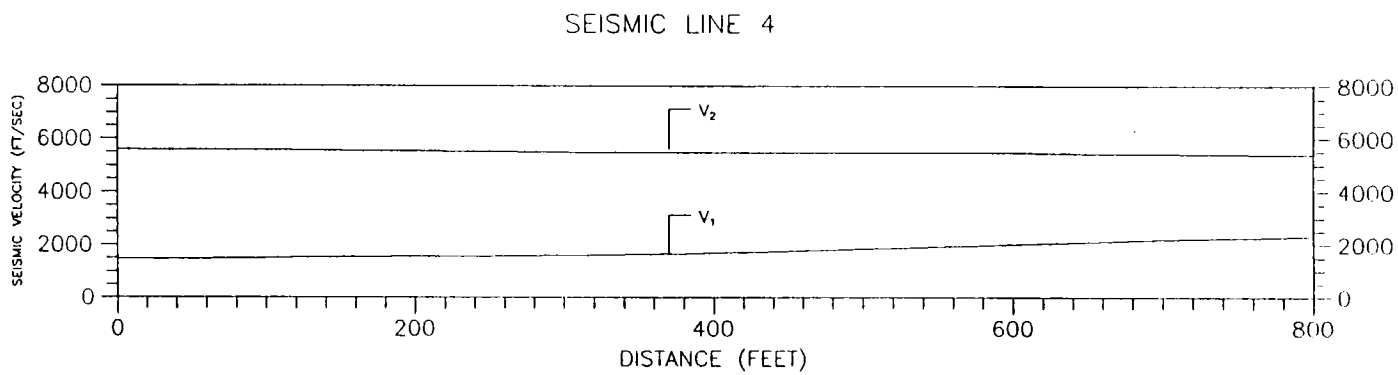


FIGURE 4-4
SEISMIC REFRACTION SURVEY, LINE 4

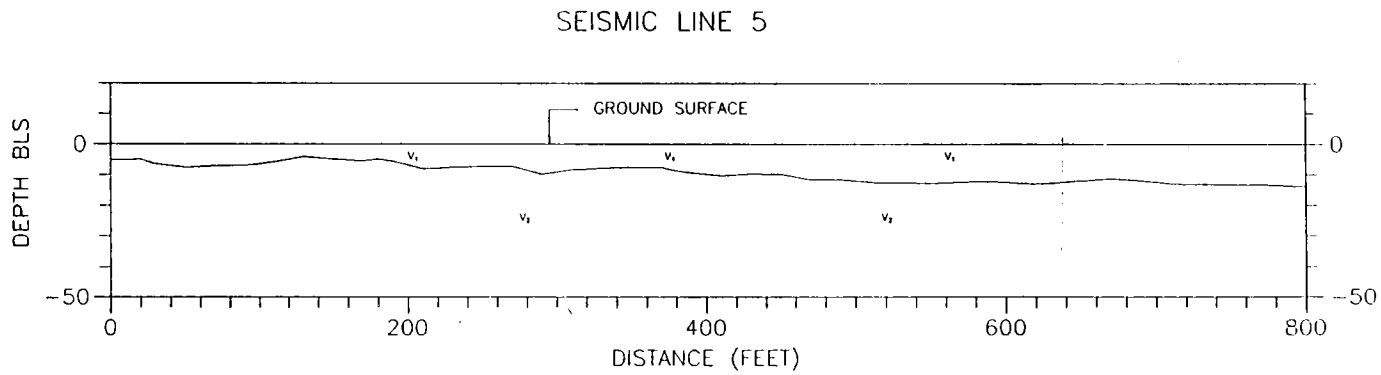
PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

NOTES: 1) The datum used for all seismic traverses was ground surface. All traverses were located on essentially flat terrain.

2) Seismic interpretation was facilitated by use of SIPT2, a U.S. Geological Survey software program marketed by Rimrock Geophysics, Inc., Lakewood, CO.

3) Tabulated velocity values for V_1 vary from 1097 to 1832 fps (feet per second). Values for V_2 vary from 5036 to 5599 fps.



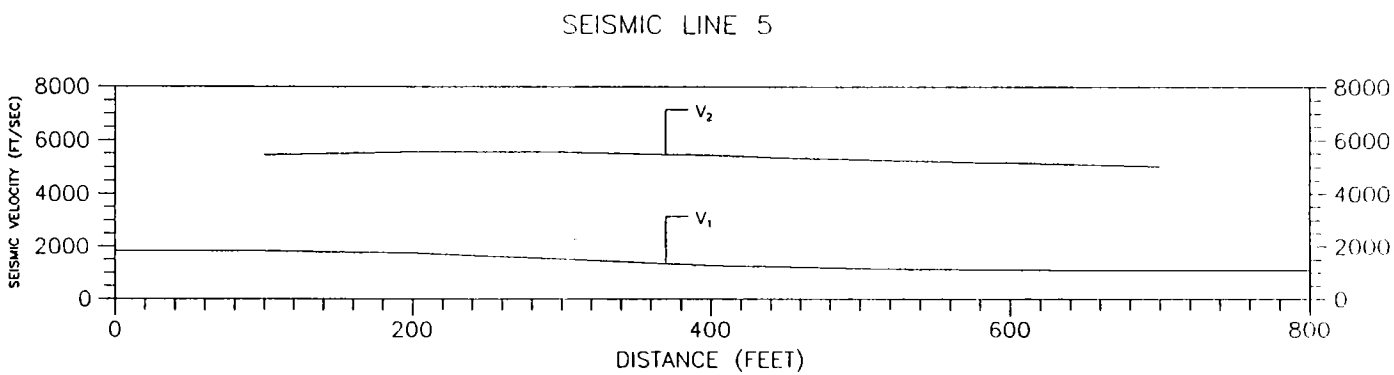


FIGURE 4-5
SEISMIC REFRACTION SURVEY, LINE 5

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

sands, and sandy clays (see Appendix B, Figures B1 through B7). These sediments overly a dolomitic sands and silts and/or magnesium rich clay of the Hawthorn Formation. The second zone is partially consolidated, phosphatic clayey sands, sandy clays, and clays of the Hawthorn Formation. The third zone is the Intermediate Zone of the Hawthorn Formation, which is composed of sands and silty sands that have stringers of coarse clear quartz and phosphate sediments.

The sediments in the first zone consist primarily of yellowish gray to gray silty and grayish orange fine sands (SM), which are subangular to sub-rounded. These sediments were found from the land surface to depths ranging from approximately 21 to 40 feet bls. In site areas near drainage features, the silty sands are overlain by yellowish brown to gray, fine sands, some of which has iron oxide staining. The silty sands are also interlayered or underlain by slightly silty fine sands (SP), fine grained clayey sands (SC), and sandy clays (CL).

Beneath these sediments are deposits of the Hawthorn Formation, which consist of dense, light gray to yellowish gray, dolomitic sand, dolomitic silt, crystalline dolomite, and fossiliferous dolomite. The dolomitic sediments were found to occur at various depth intervals from approximately 21 feet bls (Figure B-5) to 40 feet bls (Figure B-7). Dolomite was not encountered at boring DSMW-2 (monitoring well HMW-2) (Figures B-2 and B-6). The dolomitic layer was approximately 8 feet thick at boring DSB-1. In addition to the dolomitic sediments, at some of the boring locations, a dark gray magnesium rich clay was found above and below the dolomitic sediments. The dolomitic and magnesium rich clay sediments were not contiguous across the site.

The dolomitic sediments are included in the first zone because they are in direct hydraulic connection with the upper sediments. The dolomite and silt and clay sediments are at the base of the Surficial Aquifer, which is composed of both Miocene and Pliocene age sediments.

Additionally, it should be noted that the results of the seismic refraction survey compare well with actual subsurface conditions observed in split-spoon samples collected during the drilling of the soil borings. The dolomite or dolosilt layers are the "hard" clay or shale layer that was previously identified by the USACE.

The second zone consists of other Hawthorn Formation sediments, which include interbedded pale olive, gray, olive and greenish gray fine- to medium-grained silty sands (SM), fine-grained clayey sands (SC), magnesium-rich clayey silts (ML), and sandy magnesium rich clays (CL). The matrix of these sediments are also characterized by the presence of phosphate, which has a fine to medium grained texture. Fossiliferous zones also are intermittently present within the silt and clay sediments.

The third zone also consists of Hawthorn Formation sediments. This zone is the Intermediate Zone Aquifer of the Hawthorn Formation and occurred at depths of approximately 110 feet bls (Figure B-2) to 120 feet bls (Figure B-5). The sediments in this zone consist predominantly of olive to yellow-green silty fine- to medium-grained sands (SM). However, at boring DSB2 (HMW-2), this zone consisted of fine sands (SP). Stringers of clear quartz and phosphate were

characteristic of this zone. At boring locations DSB-2 (HMW-2), DSB-3 (HMW-3), DSB-4 (HMW-4), and DSB-5 (HMW-5) the overlying and underlying sediments were similar to sediments of the second zone. At boring location DSB-1 (HMW-1), the third zone sediments graded from silty sand to very silty sand, which were encountered to the explored depth of 150 feet bls.

4.2 HYDROGEOLOGIC CONDITIONS.

4.2.1 Potentiometric Water Surfaces Water level measurements, free product thickness measurements, and groundwater elevation determinations were recorded from all onsite wells. The purpose of these measurements and calculations were to determine horizontal and vertical flow directions and velocities and calculate groundwater seepage rates across OU1. Four rounds of water level measurements recorded on May 5, 1992, May 27, 1992, June 8, 1992, and July 2, 1992, respectively, were collected from a total of 34 Surficial Aquifer monitoring wells, 8 shallow piezometers, and 5 deep Intermediate aquifer monitoring wells. The water level measurement and elevation data is tabulated in Appendix B in Table B-1. Potentiometric surface maps were constructed from this data and are included in Appendix B, Figures B-8 through B-19.

Where free-phase product was present, a mathematical equation was used to compensate for the depression of the water surface caused by the floating mass of free-phase product so that a true water table elevation could be determined. The formula for this determination was:

$$\text{Water Table Elevation} = TOC - (DTW - [0.85 \times PT])$$

where

TOC = elevation of top of casing (feet mean sea level),
DTW = depth to water (feet), and
PT = free-phase produce thickness (feet).

Only three of the onsite wells, MW-9, MW-13, and MW-29, measured during the four synoptic rounds of water level measurements were found to contain free-phase product. A summary of the recorded water level measurements and groundwater flow direction determinations are presented in Appendix B, Table B-1.

Based on the groundwater level data, groundwater beneath and in the vicinity of OU1 occurs under unconfined and semi-confined conditions. Groundwater in the Surficial Aquifer (zone one sediments) generally occurs under unconfined conditions; however, in localized areas, semi-confined conditions exist. Monitoring wells completed into the Intermediate Zone aquifer of the Hawthorn Formation indicate the aquifer to be under confined conditions.

Depth to groundwater measurements in the Surficial Aquifer ranged from 2.00 feet to 15.75 feet bls with groundwater elevations varied from 12.51 feet to 23.53 feet above mean sea level. Depth to water measurements in the Intermediate aquifer ranged from 13.31 to 15.42 feet below top of casing with groundwater elevations ranging from 12.29 to 13.62 feet above mean sea level.

Hydraulically, water enters a groundwater system in recharge areas, such as at OU1, and flows through the system to discharge areas. Groundwater flow is controlled largely by the hydraulic properties of the geologic strata and occurs in response to hydraulic head differentials. Groundwater flows from areas of high potential energy (low hydraulic head).

The hydraulic gradient (i.e., change in hydraulic head per unit horizontal distance) of shallow sedimentary aquifers in the Coastal Plain is strongly affected by topography. Local groundwater flow patterns of shallow groundwater zones typically are influenced by local topography, impermeable land covers, and surface water features, particularly streams, rivers, and lakes. Groundwater flow generally is from topographically high areas toward stream channels and wetlands.

Water table surface maps for the shallow Surficial Aquifer zone for May 5, 1992, May 27, 1992, June 8, 1992, and July 2, 1992, are presented in Appendix B, Figures B-8, B-11, B-14, and B-17, respectively. These figures indicate that the primary groundwater flow direction is toward the southeast. However, there appears to be a mounding effect located in the north central portion of the site with groundwater flow radiating outward in a north through east and southwest directions. This feature may represent an east-west groundwater divide; however, this cannot be conclusively determined from the available data.

Potentiometric maps for the deep Surficial Aquifer zone for May 5, 1992, May 27, 1992, June 8, 1992, and July 2, 1992, are presented in Figures B-9, B-12, B-15, and B-18, respectively. These figure indicate the major groundwater flow component is toward the southeast with lesser flow components toward the northeast and southwest.

Figures B-10, B-13, B-16, and B-19 present the potentiometric surface contours for the Intermediate aquifer zone of the Hawthorn Formation recorded on May 5, 1992, May 27, 1992, June 8, 1992, and July 2, 1992, respectively. The four figures all indicate a strong groundwater flow component toward the southeast and south-southeast. In addition, similar to the overlying Surficial Aquifer flow zones, a mounding effect is evident with lesser flow components radiating outward toward the northeast and southwest. It should be noted that less confidence is placed in the interpretation of the intermediate flow zone of the Hawthorn Formation than the overlying Surficial Aquifer given that the interpretation is based on a limited number of data points.

4.2.2 Permeability/Hydraulic Conductivity Test

Laboratory Permeability Test. A summary of the geotechnical laboratory analytical results in provided in Appendix B in Table B-2. Twenty Shelby tube samples were evaluated for geotechnical parameters (see Section 3.2.8.1 Geotechnical Analysis). Two samples, IHMW-3 and IHMW-4, were not evaluated due to insufficient sample recovery with the samplers.

The sample results were divided into four separate depth intervals for comparison of similar hydraulic zones. The ranges of calculated coefficient of permeability for the various depth intervals tested are as follows.

- $1.8x10^{-3}$ to $4.5x10^{-6}$ centimeters per second (cm/sec) in the fine sands of the Surficial Aquifer, at depths of between 6 to 18 feet bls;

- $1.1x10^{-6}$ to $1.1x10^{-8}$ cm/sec within the dolosilts, clays, and dolomitic limestone sections at the top of the Hawthorn Group Formation, at depths of between 29 and 40 feet bls;

- $1.2x10^{-6}$ to $5.6x10^{-9}$ cm/sec within the low permeable silts and sandy clays of the Hawthorn Group, at depths of between 40 to 107 feet bls;

- $7.3x10^{-4}$ cm/sec in the producing, phosphatic sand stringers of the Hawthorn Group at a depth of approximately 123 to 126 feet below bls.

Only a single sample was collected from the deepest collection interval, 123 to 126 feet bls; therefore, coefficient of permeability comparisons are not available. However, as indicated above and shown on Table B-2 in Appendix B, the coefficient of permeability ranges between samples of the same depth interval varies considerably (2 to 3 orders of magnitude). This considerable variation is probably a result of a wide range of grain sizes located within different stratigraph horizons.

Hydraulic Conductivity Test. The results of the hydraulic conductivity analysis of all shallow and deep Surficial Aquifer monitoring wells at the NAS Jacksonville OU1 site, as estimated from *in-situ* rising head and falling head slug tests, are presented in Appendix B, Table B-3. The results of the hydraulic conductivity analysis, determined from constant rate pump tests performed on deep Intermediate Aquifer (Hawthorn) monitoring wells, are presented in Appendix B, Table B-4.

The ranges of calculated hydraulic conductivity for the various depth intervals tested are as follows.

- $5.3x10^{-4}$ to $6.45x10^{-5}$ cm/sec in the shallow portions of the Surficial Aquifer (approximately 2 to 16 feet bls),

- $1.35x10^{-3}$ to $5.07x10^{-4}$ cm/sec in the deeper portions of the Surficial Aquifer, which overlie the low permeability sediments of the Hawthorn Group (approximately 25 to 35 feet bls), and

- $2.09x10^{-2}$ to $6.03x10^{-2}$ cm/sec in the phosphatic sand stringers of the Intermediate Hawthorn Group (approximately 115 to 130 feet bls).

It is likely that the considerable variability exists (1 to 2 orders of magnitude) in hydraulic conductivity within both the shallow and deep Surficial Aquifer zones.

Due to stratigraphic heterogeneity and the very limited amount of drawdown produced by slug testing and the relatively rapid recovery of static water levels in the wells, the K values for the materials in which the wells are screened are, at best, qualitative indicators of the characteristics in the immediate vicinity of the wells. Therefore, each individual value for a particular well location

does not necessarily reflect area-wide aquifer properties. ABB-ES estimated values for hydraulic conductivity at OU1, however, are consistent with ranges estimated for typical unconsolidated materials (e.g., sand and gravel mixtures 5 to 100 meters per day or $5x10^{-3}$ cm/sec to $1x10^{-2}$ cm/sec; clay sand, gravel mixtures, $1x10^{-6}$ to $1x10^{-9}$ Kruseman and de Ridder, 1990).

A comparison of the various ranges of hydraulic conductivity between wells within both the shallow Surficial Aquifer and deep Surficial Aquifer zones indicates considerable variation across the site. It is likely that the variations in hydraulic conductivities, which range from one to two orders of magnitude, are a result of the wide range of grain sizes and interbedding characteristics of the Surficial Aquifer, coupled with the limited area of influence of the slug test method.

This conclusion appears consistent with the less variable hydraulic conductivity values reported in wells completed in the deep Intermediate aquifer zone. Hydraulic conductivity values in these wells were determined using the farther reach constant rate pump test.

Transmissivity values calculated for the shallow portions of the Surficial Aquifer ranged from 34 to 631 gallons per day per foot (gpd/ft) using an average aquifer thickness of 25 feet. Transmissivity values calculated for the basal portions of the Surficial Aquifer ranged from 120 to 3,339 gpd/ft using the same average aquifer thickness of 25 feet. Transmissivity values calculated for phosphatic sand zones of the Hawthorn Group ranged from 219 gpd/ft to 631 gpd/ft.

4.2.3 Groundwater Flow Velocity Based on the potentiometric data presented on Figures B-8, B-11, B-14, and B-17, the horizontal gradient for the shallow Surficial Aquifer zone ranges from 0.44 to 0.0089 foot per feet (ft/ft) at OU1, and the average hydraulic gradient is 0.0065 ft/ft. The horizontal hydraulic gradient for the deep Surficial Aquifer wells was similar, with ranges from 0.0048 ft/ft and 0.0071 ft/ft and an average of 0.006 ft/ft. And finally, the horizontal hydraulic gradient for the intermediate zone of the Hawthorn Formation ranged from 0.0004 ft/ft to 0.0011 ft/ft with an average of 0.0006 ft/ft.

Vertical hydraulic gradients exist between the shallow Surficial Aquifer and the deep Surficial Aquifer. Vertical hydraulic gradients (i.e., change in hydraulic head per unit vertical distance at a specific location) between the three flow zones can be evaluated using data from well clusters.

Thirteen well clusters were used for the evaluation of the hydraulic gradient between the shallow Surficial and deep Surficial Aquifer flow zones. Water level measurements were recorded in these well clusters at four separate events: May 5, 1992, May 27, 1992, June 8, 1992, and July 2, 1992. These monitoring well clusters include:

MW-1/MW-2	MW-15/MW-16	MW-27/MW-28
MW-3/MW-4	MW-17/MW-18	MW-30/MW-31
MW-5/MW-6	MW-19/MW-20	MW-33/MW-34
MW-7/MW-8	MW-22/MW-23	
MW-11/MW-12	MW-24/MW-25	

Five of these well cluster locations (MW-30/MW-31, MW-16/MW-15, MW-27/MW-28, MW-11/MW-12, and MW-17/MW-18) consistently indicated a downward vertical gradient for all four water level measurement events. Three of the locations (MW-20/MW-19, MW-23/MW-22, and MW-3/MW-4) consistently indicated an upward vertical gradient for the four measurement events. Five well cluster locations (MW-1/MW-2, MW-7/MW-8, MW-33/MW-34, MW-5/MW-6, and MW-24/MW-25) reported differing gradients fluctuating upward or downward during separate sampling periods.

Four well cluster locations (MW-6/HMW-1, MW-4/HMW-5, MW-25/HMW-4, and MW-18/HMW-3) were used to address the hydraulic gradient between the deep Surficial and the Intermediate Hawthorn groundwater flow zones. All four locations indicated a downward vertical gradient for all four measurement periods ranging from 0.065 ft/ft to 0.110 ft/ft for the four sampling periods averaged together.

4.3 RELEASE CHARACTERISTICS.

4.3.1 Soil Gas Sample Results The purpose of the soil gas survey was to evaluate the potential that volatile organic compounds have migrated, via soil gas, to areas which could have an adverse impact on residents in the NAS Jacksonville base housing located south of OU1. The results of the study indicate that site-attributable volatile contaminants were not detected at the base housing area.

A naturally occurring hydrocarbon compound, terpene, was detected in the soil gas samples. The quantitation limit for soil gas samples analyzed by USEPA Method 602 (Modified) was 1.0 $\mu g/\ell$ for each target analyte. The target analytes were not detected in any soil gas sample at concentrations greater than the quantitation limit (Table 4-1).

The naturally occurring hydrocarbon compound terpene is exuded by plants. Examples of late eluting gas chromatogram peaks, which are representative of Terpenes, is provided in Figures 4-6 and 4-7.

Terpenes are likely the source of the Total FID volatile values, which were determined to be present for each sample (Table 4-1). A contour map of the Total FID volatiles is provided in Figure 4-8.

The quantitation limits for soil gas samples analyzed by USEPA Method 601 (Modified) were 1.0 $\mu g/\ell$ for methylene chloride (MC), 0.1 $\mu g/\ell$ for trichloroethene (TCE), and 0.5 $\mu g/\ell$ for tetrachloroethene (PCE). MC, TCE, and PCE were not detected in the soil gas samples at concentrations that were greater than the quantitation limits (Table 4-1). However, 1,1,1-tetrachloroethane was detected (but not quantified) in Sample SG034. Sample SG034 is located in the

Table 4-1
Soil Gas Analyte Concentrations by Gas Chromatograph, Flame Ionization Detector, and Electron Capture Detector

Preliminary Characterization Summary Report
OU1, NAS Jacksonville
Jacksonville, Florida

Target Analyte	MEK	Acetate	Ethyl-benzene	MIBK	Toluene	N-Butyl Acetate	Chloro-benzene	Ethyl-benzene	Xylenes	Total FID Volatiles[1]	CH_2CL_2	TCE	PCE
Laboratory Duplicate Analysis													
SG010	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
SG010R	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
SG017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
SG017R	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
SG033	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
SG033R	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
SG044	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
SG044R	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
SG048	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
SG048R	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
SG056	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
SG056R	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
Laboratory Blanks													
BMAJF-1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
BMAJF-2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
BMAJF-3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
BMAJF-4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
BMAJF-5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05
BMAJF-6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.05

[1]Calculated using the sum of the areas of all integrated chromatogram peaks and the instrument response factor for toluene.

Notes: All concentrations are in micrograms per liter ($\mu g/\ell$).
MEK = methyl ethyl ketone. TCE = trichloroethene.
CH_2CL_2 = methylene chloride. PCE = tetrachloroethene.

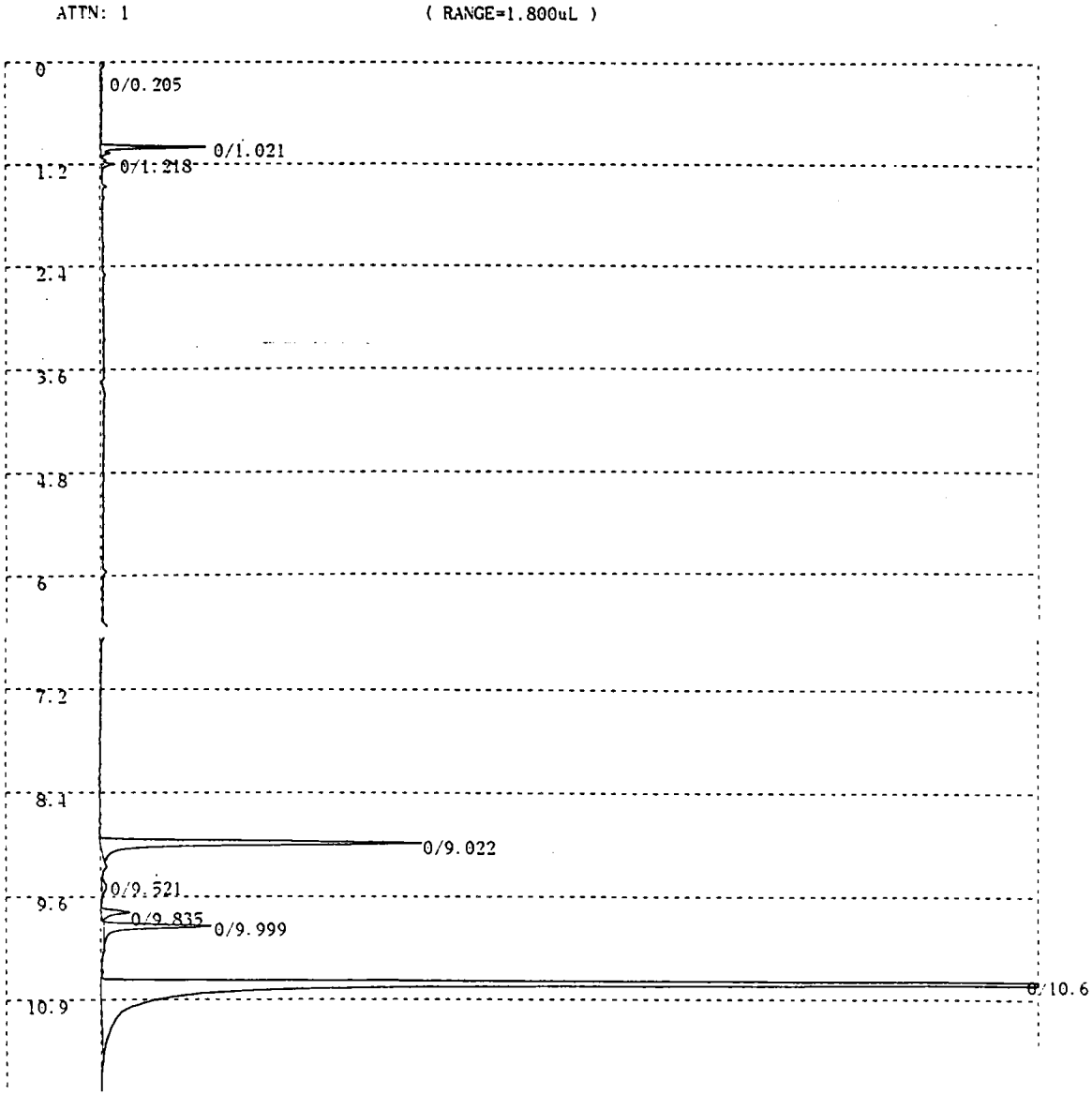


FIGURE 4-6
SAMPLE CHROMATOGRAM SIGNATURE OF SAMPLE SG015

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

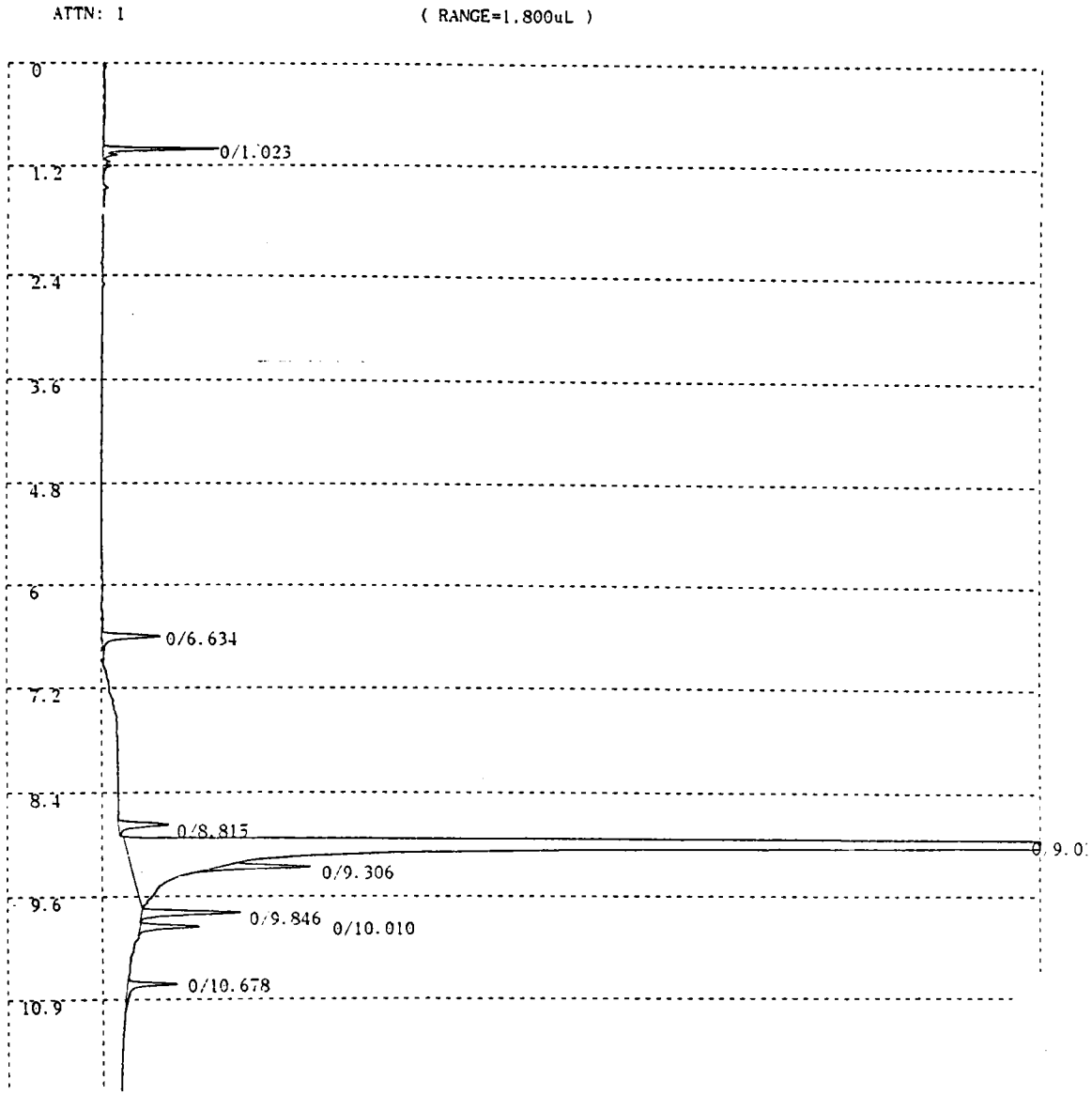


FIGURE 4-7
SAMPLE CHROMATOGRAM SIGNATURE OF SAMPLE SG052

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

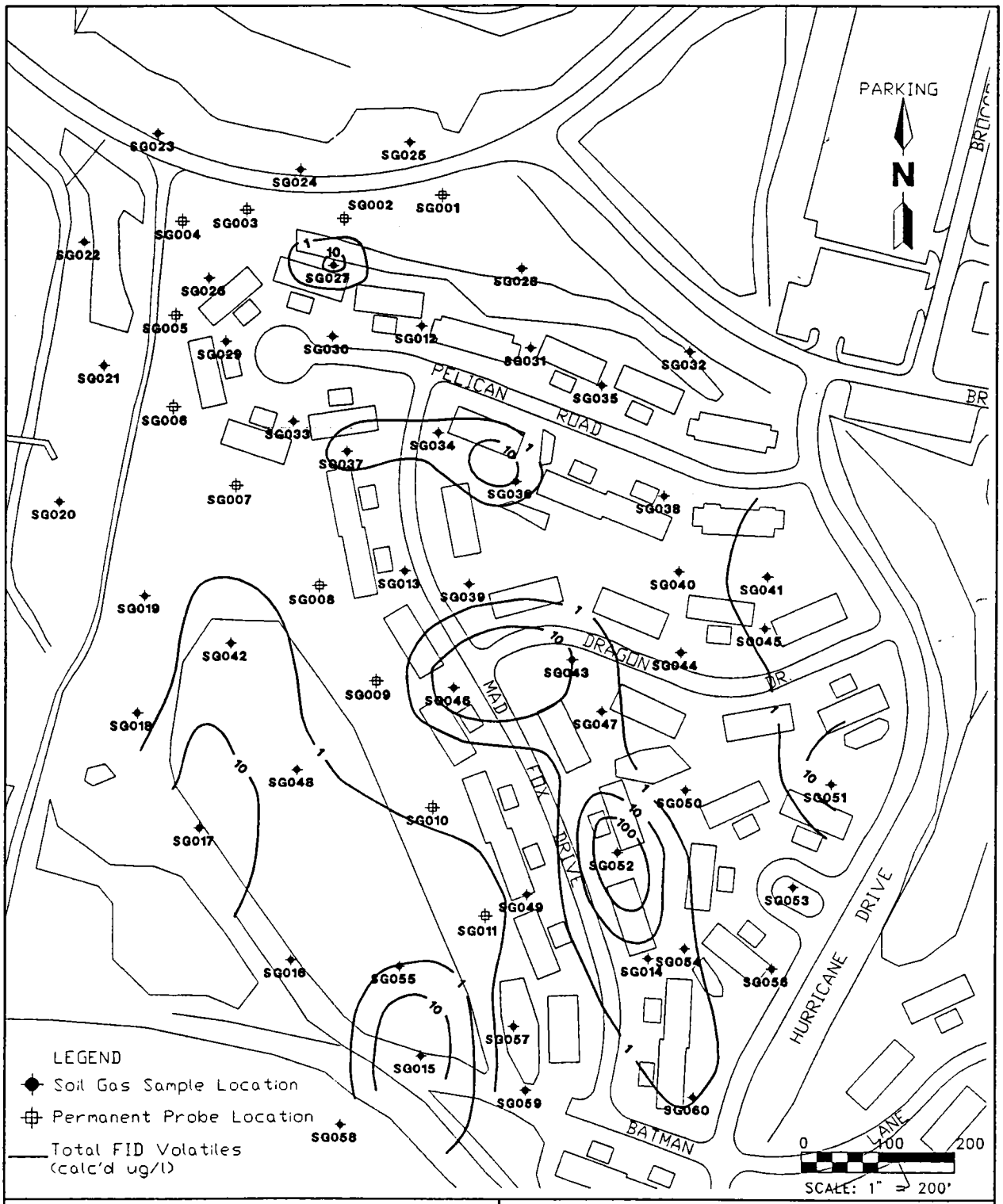


FIG4001

FIGURE 4-8
TOTAL FID VOLATILES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

residential area (Figure 4-8) approximately 90 feet south of the intersection of Pelican Road and Mad Fox Drive.

4.3.2 Ambient Air Sample Results

4.3.2.1 Meteorological Conditions The purpose of the ambient air quality sampling event was to compare general air quality at OU1 with background (upwind) air quality and evaluate the potential for airborne chemicals to migrate to areas that could affect residents of the NAS Jacksonville base housing area. The results of the sampling event indicate the presence of semivolatile organics (petroleum-related hydrocarbon compounds), PCB, and metals in the air quality samples. No data is available on the presence of volatile organic compounds. This is due to problems associated with the duration and volume of the volatile organic air sample during the field activities.

The first ambient air quality sampling test, RUN1, was conducted on February 11, 1992. The local meteorological data collected for test RUN1 indicate that the sky was partly cloudy all day and the prevailing wind direction was toward the southwest. The wind speed was light to moderate with velocities of 3 to 6 miles per hour (mph). The average ambient air temperature was 15.6 degrees Centigrade (°C) or 60 degrees Fahrenheit (°F) and the average soil temperature was 13.8 °C (or 56.8 °F). The air sample stations consisted of one upwind and two downwind locations. An additional sample station was collocated at one of the sample locations to provide a duplicate analytical sample. Locations for the air sampling stations are provided in Figure 3-3.

The second ambient air quality sampling test, RUN2, was conducted on February 12, 1992. The local meteorological data collected for test RUN2 indicate that the sky was clear all day and the prevailing wind direction was toward the northeast. The wind speed was light with velocities of 1 to 4 mph. The average ambient air temperature was 21.3 °C (or 55.1 °F) and the average soil temperature was 13.8 °C (or 59.0 °F). The air sample stations consisted of one upwind and two downwind locations. An additional sample station was collocated at one of the sample locations to provide a duplicate analytical sample. Locations for the air sampling stations are provided in Figure 3-3.

The third ambient air quality sampling test, RUN3, was conducted on February 13, 1992. The local meteorological data collected for test RUN3 indicate that the sky was clear to partly sunny and the prevailing wind direction was toward the northeast. The wind speed was very light with velocities of 0 to 3 mph. The average ambient air temperature was 19.4 °C (or 66.9 °F) and the average soil temperature was 15.3 °C (or 59.5 °F). The air sample stations consisted of one upwind and two downwind locations. An additional sample station was collocated at one of the sample locations. Locations for the air sampling stations are provided in Figure 3-3.

The fourth air quality sampling test, RUN4, was conducted during the grass cutting at OU1 on February 13 and 14, 1992. The local meteorological data collected for test RUN4 indicate that on February 13, 1992, the sky was partly sunny and the prevailing wind direction was toward the east/southeast. The wind speed was light with velocities of 0 to 4 mph. The average ambient air temperature was 22.5 °C (or 72.5 °F) and the average soil temperature was 15 °C (or 59 °F). The weather became mostly cloudy on February 14, 1992, and the winds

continued in an eastern direction. The wind velocity picked up with moderate wind speeds of 4 to 8 mph. The average ambient air temperature was 21.2 °C (or 70.1 °F) and the average soil temperature was 15.5 °C (or 59.9 °F). The air sample stations consisted of one upwind and three downwind locations. An additional sample station was collocated at one of the sample locations. Locations for the air sampling stations are provided in Figure 3-4.

The results of the chemical analysis of the air samples is provided for RUN1 in Table 4-2, RUN2 in Table 4-3, RUN3 in Table 4-4, and RUN4 in Table 4-5.

4.3.2.2 Volatile Organic Compounds (VOCs) To achieve the detection of VOC contaminants, which previously were detected in surface and groundwater samples (see Table 3-5, Section 3.3.1.1 of Volume 5 of the OU1 RI/FS Work Plan), the intended sorbent Tenax™ was replaced with Supelco Carotrap™300 multi-bed thermal desorption tubes. The use of the Carbotrap™ sorbant would allow the adsorption of low molecular weight VOCs acetone, methylene chloride, and vinyl chloride, which are poorly sorbed on the Tenax™ sorbant. Additionally, to achieve the quantitation limits stated in Table 3-3 of Appendix 5.4.1, Volume 5 of the OU1 RI/FS Work Plan, the air flow rates were increased from 100 milliliters per minute (mℓ/min) to 200 mℓ/min. The 200 mℓ/min air flow rate would result in a sample volume of 48 liters (0.048 cubic meters [m^3]) as described in Section 4.1.3 of Appendix 5.4.2 of Volume 5 of the OU1 RI/FS Work Plan.

The increased air flow rate did not take into account that, for optimum recovery of the VOC target constituents, the volume for the Carbotrap™ sorbent should not exceed 0.01 m^3. Because the actual sample volume exceeded 0.01 m^3, excess carbon dioxide was adsorbed by the carbotrap sorbent. During analysis of the VOC air samples, carbon dioxide desorbed in such quantities that it became frozen in the cryogenic focusing apparatus. This condition blocked effective desorption of VOC target constituents that were adsorbed by the carbotrap™ sorbent. Additionally, for VOC compounds that did make it through the cryogenic focusing apparatus to the gas chromatograph/mass spectrometer, the VOC signature response was masked by the carbon dioxide signature response, thus, making analysis of the air samples impossible. Therefore, resampling and analysis will be required to collect VOC air quality data.

4.3.2.3 Polychlorinated Biphenyl (PCBs) The only PCB compound detected in air samples during each of the four air sampling tests was Aroclor-1254 (PCB-1254). The results of RUN1 analysis indicate that PCB-1254 was detected in the downwind air sample Downwind 2 and the collocated air sample Downwind 2C at concentrations of 0.00148 micrograms per cubic meter ($\mu g/m^3$) and 0.0044 $\mu g/m^3$, respectively (Table 4-2). PCB-1254 was not detected in either the upwind or other downwind air samples of RUN1. The analytical blank for RUN1 also contained PCB-1254 at the detection limit.

PCB-1254 was detected in each of the upwind and downwind air samples for test RUN2 and RUN3 (Tables 4-4 and 4-5). The detected concentrations for the upwind air samples were 0.0017 $\mu g/m^3$ and 0.0015 $\mu g/m^3$ for RUN2 and RUN3, respectively. The RUN2 downwind air samples contained PCB-1254 at concentrations of 0.0013

Table 4-2
RUN1 Air Quality Analytical Results

Preliminary Characterization Summary Report
Naval Air Station
Jacksonville, Florida

Analytical Parameter	Upwind 1		Downwind 1		Downwind 2		Downwind 2C		Blank
	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)	(μg/filter)
PCB-1254	--	--	--	--	1.48	0.00148	1.05	0.0044	0.21
Bis(2-ethylhexyl) phthalate	244	0.76	--	--	--	--	2,000	5.9	44.6
Di-n-butylphthalate	2.43	0.0076	2.35	0.0077	--	--	--	--	1.11
1-4, Dichlorobenzene	4.88	0.015	4.74	0.015	4.59	0.014	4.12	0.012	1.11
Diethylphthalate	1.28	0.004	--	--	2.36	0.007	1.28	0.0038	1.11
Di-n-octylphthalate	--	--	--	--	--	--	5.37	0.016	2.67
Flourene	1.39	0.0043	--	--	1.8	0.0053	--	--	1.11
4-Methyl Phenol	2.23	0.007	R	R	3.76	0.011	R	R	2.22
Naphthalene	49.1	0.15	40.1	0.13	44.3	0.13	42.4	0.13	2.32
2-Nitrophenol	8.46	0.026	6.0	0.002	6.98	0.021	6.44	0.9	2.22
Phenanthrene	3.30	0.01	2.17	0.0071	4.57	0.014	2.61	0.0077	1.11
Phenol	3.92	0.012	4.41	0.014	10.0	0.03	4.22	0.012	2.22
Benzoic Acid	47.9	0.15	47.2	0.15	125.0	0.37	56.3	0.17	2.78
2-Methylnaphthalene	23.4	0.073	18.2	0.059	20.6	0.061	21.3	0.063	1.11
Dibenzofuran	2.18	0.0068	1.85	0.0054	2.65	0.0079	2.25	0.0066	1.11
Cadmium	1.2	0.0041	1.4	0.005	--	--	--	--	1.2
Chromium	--	--	--	--	5.0	0.017	--	--	2.4
Copper	29.3	0.092	21.8	0.077	239.0	0.81	8.2	0.031	1.7
Iron	--	--	--	--	773.0	2.6	--	--	49.9
Manganese	--	--	--	--	18.5	0.063	--	--	1.5

Notes: μg/filter = microgram per filter.
μg/m³ = microgram per cubic meter.
-- = analyte not detected.
R = value was rejected.

Table 4-3
RUN2 Air Quality Analytical Results

Preliminary Characterization Summary Report
Naval Air Station
Jacksonville, Florida

Analytical Parameter	Upwind 1		Downwind 1		Downwind 2		Downwind 2C		Blank
	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)	(μg/filter)
PCB-1254	0.554	0.0017	0.373	0.0013	0.951	0.0031	0.854	0.0027	0.21
Di-n-butylphthalate	--	--	--	--	1.35	0.0043	--	--	2.43
1-4, Dichlorobenzene	2.70	0.0085	2.79	0.0095	3.45	0.011	2.27	0.0073	1.11
Diethylphthalate	1.83	0.0058	6.09	0.021	2.74	0.0088	2.76	0.0073	1.11
Flourene	1.15	0.0036	--	--	--	--	--	--	1.11
Naphthalene	32.3	0.1	31.1	0.11	33.0	0.11	27.3	0.087	2.12
Phenanthrene	3.74	0.012	2.19	0.0074	3.07	0.0099	2.26	0.0072	1.11
Phenol	6.33	0.02	5.42	0.018	5.71	0.018	4.01	0.013	2.22
Benzoic acid	50.5	0.16	65.1	0.22	57.9	0.19	50.2	0.16	4.07
2-Methylnaphthalene	17.5	0.055	16.1	0.055	15.6	0.05	12.8	0.041	1.11
Dibenzofuran	1.60	0.005	--	--	--	--	--	--	1.11
Copper	24.1	0.079	12.2	0.041	85.0	0.027	15.5	0.051	1.7
Mercury	--	--	0.06	0.0002	0.13	0.00041	--	--	0.03
Selenium	1.7	0.0056	1.0	0.0034	1.1	0.0035	1.2	0.0039	0.72
Silver	--	--	--	--	1.4	0.0045	--	--	1.4
Sodium	16,600	55	--	--	--	--	--	--	14,100
Vanadium	9.8	0.032	7.0	0.024	--	--	9.0	0.003	1.4

Notes: μg/filter = microgram per filter.
μg/m³ = microgram per cubic meter.
-- = analyte not detected.
R = value was rejected.

Table 4-4
RUN3 Air Quality Analytical Results

Preliminary Characterization Summary Report
Naval Air Station
Jacksonville, Florida

Analytical Parameter	Upwind 1		Downwind 1		Downwind 2		Downwind 2C		Blank
	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)	(μg/filter)
PCB-1254	0.483	0.0015	0.298	0.00099	0.578	0.0019	0.261	0.00085	0.21
Bis(2-ethylhexyl) phthalate	--	--	--	--	50.6	0.17	--	--	2.00
1-4, Dichlorobenzene	2.44	0.0077	5.25	0.018	4.88	0.016	4.91	0.016	1.11
Diethylphthalate	1.17	0.0037	17.7	0.059	5.74	0.019	1.21	0.0039	1.11
Flourene	1.2	0.0038	--	--	1.39	0.0047	1.13	0.0037	1.11
Naphthalene	24.8	0.078	49.5	0.17	43.8	0.15	47.1	0.15	1.38
Phenanthrene	2.86	0.009	2.12	0.0071	3.40	0.011	2.41	0.0079	1.11
Phenol	R	R	3.24	0.011	R	R	2.7	0.0088	2.22
Benzoic acid	R	R	86.3	0.29	R	R	R	R	11.6
2-Methylnaphthalene	13.2	0.042	25.4	0.085	21.5	0.072	23.1	0.075	1.11
Dibenzofuran	1.39	0.0044	1.41	0.0047	1.48	0.005	1.22	0.004	1.11
Cadmium	1.2	0.0044	--	--	1.5	0.0015	--	--	1.2
Calcium	--	--	--	--	1,690	6.8	--	--	2,060
Chromium	--	--	2.6	0.011	6.1	0.025	--	--	2.4
Copper	25.2	0.093	18.1	0.074	65.2	0.26	19.4	0.076	2.3
Manganese	--	--	--	--	11.2	0.045	--	--	1.8
Mercury	--	--	--	--	0.12	0.00048	0.05	0.0002	0.03
Selenium	1.8	0.0067	1.5	0.0061	1.7	0.0068	1.6	0.0063	0.72
Thallium	--	--	1.1	0.0045	--	--	--	--	1.1
Vanadium	--	--	13.0	0.53	19.5	0.079	19.0	0.075	1.4

Notes: μg/filter = microgram per filter.
μg/m³ = microgram per cubic meter.
-- = analyte not detected.
R = value was rejected.

Table 4-5
RUN4 Air Quality Analytical Results

Preliminary Characterization Summary Report
Naval Air Station
Jacksonville, Florida

Analytical Parameter	Upwind 1		Downwind 1		Downwind 2		Downwind 2C				Blank
	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)	(μg/filter)	(μg/m³)			(μg/filter)
PCB-1254	--	--	0.613	0.0019	0.883	0.0027	0.625	0.0018	0.559	0.0017	0.21
Bis(2-ethylhexyl) phthalate	--	--	--	--	--	--	22.4	0.065	107	0.33	2.00
1-4, Dichlorobenzene	1.73	0.0047	1.73	0.0054	--	--	1.35	0.0039	2.68	0.0084	1.11
Diethylphthalate	4.67	0.013	4.01	0.013	2.08	0.0064	1.13	0.0033	--	--	1.11
Flourene	1.47	0.004	1.18	0.0037	--	--	--	--	--	--	1.11
4-Methylphenol	R	R	R	R	R	R	R	R	2.22	0.0069	2.22
Naphthalene	17.5	0.047	31.8	0.099	23.1	0.071	17.1	0.049	23.6	0.074	1.31
Phenanthrene	2.96	0.008	2.98	0.0093	1.95	0.006	2.29	0.0066	1.88	0.0059	1.11
2-Methylnaphthalene	11.4	0.031	15.7	0.049	14.1	0.044	9.85	0.028	11.4	0.036	1.11
Dibenzofuran	1.67	0.0045	1.25	0.0039	1.17	0.0036	--	--	--	--	1.11
Cadmium	--	--	1.9	0.0074	--	--	--	--	--	--	1.2
Copper	50.2	0.18	75.2	0.029	31.9	0.12	40.5	0.15	23.1	0.08	1.7
Mercury	0.12	0.00042	0.04	0.00016	--	--	--	--	--	--	0.03

Notes: μg/filter = microgram per filter.
μg/m³ = microgram per cubic meter.
-- = analyte not detected.
R = value was rejected.

$\mu g/m^3$ for Downwind 1 and 0.0031 and 0.0027 $\mu g/m^3$ for Downwind 2 and Downwind 2C, respectively. The RUN3 downwind air samples contained PCB-1254 at concentrations of 0.0015 $\mu g/m^3$ for Downwind 1, and 0.0019 and 0.0085 $\mu g/m^3$ for Downwind 2 and Downwind 2C, respectively. PCB-1254 was not detected in the analytical blanks for test RUN2 or RUN3.

PCB-1254 was not detected in the upwind air sample for RUN4 (Table 4-6), but was detected in the three downwind air samples and one collocated downwind air sample. The concentrations detected ranged from 0.0017 to 0.0027 $\mu g/m^3$ at locations Downwind 2C and Downwind 1AC.

USEPA Region III has a risk based concentration of 0.0011 $\mu g/m^3$ for a 10^{-6} cancer risk for PCB-1254. This value was exceeded in the upwind air samples from RUN2 and RUN3 and 10 of the downwind air samples:

- RUN1 Downwind 2 and Downwind 2C;
- RUN2 Downwind 1, Downwind 2, and Downwind 2C;
- RUN3 Downwind 2; and
- RUN4 Downwind 1A, Downwind 1AC, Downwind 2A, and Downwind 2AC.

4.3.2.4 Semivolatile Organic Compounds (SVOCs) SVOCs detected in air samples from each of the four air sampling test consist of 1,4-dichlorobenzene, diethylphthalate, fluorene, naphthalene, phenanthrene, 2-methylnaphthalene, and dibenzofuran (Tables 4-3 through 4-6). Other SVOCs that were detected in some of the air samples consist of bis(2-ethylhexyl)phthalate, di-n-butylphthalate, di-n-octylphthalate, 4-methyl phenol, 2-nitrophenol, phenol, and benzoic acid. Except di-n-butylphthalate in RUN1, di-n-butylphthalate in RUN2, bis(2-ethylhexyl)phthalate in RUN3 and RUN4, the SVOC compounds were detected in both the upwind and downwind air samples.

Only one air sample, Downwind 2C, contained concentrations (5.9 $\mu g/m^3$) of bis(2-ethylhexyl)phthalate that exceeded the USEPA Region III risk based concentration of 0.61 $\mu g/m^3$ for air quality.

4.3.2.5 Inorganics

RUN1. Five inorganic analytes were detected in the air samples from RUN1: cadmium, chromium, copper, iron, and manganese (Table 4-3). Cadmium and copper were detected in the upwind air samples. Cadmium was detected at a concentration of 0.0041 $\mu g/m^3$ in the upwind air sample. Copper was detected at a concentration of 0.092 $\mu g/m^3$ in the upwind sample and ranged from 0.031 $\mu g/m^3$ to 0.81 $\mu g/m^3$, respectively in downwind air sample Downwind 2C, which was collocated with Downwind 2. Chromium, iron, and manganese were detected at a concentration of 0.017 $\mu g/m^3$, 2.6 $\mu g/m^3$ and 0.063 $\mu g/m^3$, respectively, in only one downwind air sample Downwind 2.

RUN2. Six inorganic analytes were detected in the air samples from RUN2: copper, mercury, selenium, silver, sodium, and vanadium (Table 4-4). Copper, selenium, sodium, and vanadium were detected in the upwind air samples. Copper was detected at a concentration of 0.079 $\mu g/m^3$ in the upwind sample and ranged from 0.051 $\mu g/m^3$ to 0.27 $\mu g/m^3$, respectively in downwind air sample Downwind 2C,

Table 4-6
Soil Samples With Total PCBs Exceeding
USEPA's Preliminary Remediation Goal of 83 μg/kg

Preliminary Characterization Summary Report
OU1, NAS Jacksonville
Jacksonville, Florida

Depth: 0 to 3 Inches			Depth: 0 to 3 Inches		
Sample ID	Type of PCB	Concentration (μg/kg)	Sample ID	Type of PCB	Concentration (μg/kg)
SL012	Aroclor-1254	340	SL063	Aroclor-1260	320
	Aroclor-1260	830	SL064	Aroclor-1260	2,900
SL013	Aroclor-1260	1,100	SL065	Aroclor-1260	360
SL014	Aroclor-1260	44,000	SL066	Aroclor-1260	7,100
SL015DL	Aroclor-1260	2,700	SL066DL	Aroclor-1260	4,500
SL015	Aroclor-1260	200	SL068	Aroclor-1260	2,000
SL016	Aroclor-1260	230	SL070DL	Aroclor-1260	510
SL017	Aroclor-1260	3,100	SL073DL	Aroclor-1260	710
SL018	Aroclor-1260	770	SL073	Aroclor-1260	310
SL019	Aroclor-1260	1,600	SL074DL	Aroclor-1260	330
SL020	Aroclor-1254	3,600	SL074	Aroclor-1260	130
	Aroclor-1260	5,400	SL075	Aroclor-1260	170
SL021DL	Aroclor-1260	3,700	SL076	Aroclor-1254	130
SL021	Aroclor-1260	2,300	SL079	Aroclor-1260	130
SL022	Aroclor-1260	3,300	SL082	Aroclor-1260	50,000
SL023	Aroclor-1260	1,300	SL083	Aroclor-1260	12,000
SL024	Aroclor-1260	47,000	SL088	Aroclor-1260	510
SL025	Aroclor-1260	2,800	SL089	Aroclor-1254	70
SL026	Aroclor-1260	560		Aroclor-1260	170
SL028	Aroclor-1260	950	SL091	Aroclor-1254	130
SL029	Aroclor-1260	830	SL092	Aroclor-1260	770
SL032	Aroclor-1254	3,700	SL093	Aroclor-1254	130
	Aroclor-1260	1,400	SL095	Aroclor-1254	450
SL033	Aroclor-1260	2,900		Aroclor-1260	480
SL041	Aroclor-1260	960	SL101DL	Aroclor-1260	24,000
L042	Aroclor-1254	590	SL101	Aroclor-1260	27,000
	Aroclor-1260	730	SL102DL	Aroclor-1260	260,000
SL045	Aroclor-1254	200	SL102	Aroclor-1260	5,400
	Aroclor-1260	380	SL103SL	Aroclor-1260	3,300
SL048	Aroclor-1260	6,200	SL103	Aroclor-1260	2,800
SL051	Aroclor-1260	320	SL104DL	Aroclor-1260	2,500
SL057	Aroclor-1260	150	SL104	Aroclor-1260	620
SL062	Aroclor-1260	190	SL105DL	Aroclor-1260	1,700

Table 4-6 (Continued)
Soil Samples With Total PCBs Exceeding
USEPA's Preliminary Remediation Goal of 83 ug/kg

Preliminary Characterization Summary Report
OU1, NAS Jacksonville
Jacksonville, Florida

Depth: 0 to 3 Inches		
Sample ID	Type of PCB	Concentration (µg/kg)
SL105	Aroclor-1260	860
SL106DL	Aroclor-1260	800
SL106	Aroclor-1254	150
	Aroclor-1260	340
SL112	Aroclor-1254	36
	Aroclor-1260	99
SL113	Aroclor-1260	400
SL115	Aroclor-1260	230
SL116	Aroclor-1260	180
SL117	Aroclor-1260	190
SL119	Aroclor-1260	180
SL122	Aroclor-1260	220
SL123	Aroclor-1260	150
SL124	Aroclor-1260	86
SL125	Aroclor-1260	180
SL127	Aroclor-1260	170
SL27001	Aroclor-1260	800
SL27003	Aroclor-1260	5,900
SL27004	Aroclor-1260	2,000
SL27005	Aroclor-1260	3,300
SL27006	Aroclor-1260	140
SL27007	Aroclor-1260	1,200
SL27009	Aroclor-1260	1,500
SL27010	Aroclor-1260	4,700
SL27011	Aroclor-1254	1,800
	Aroclor-1260	1,100
Depth: 1 to 5-Feet		
SL013	Aroclor-1248	3,700
	Aroclor-1260	9,300
SL022	Aroclor-1254	1,900
	Aroclor-1260	1,900
SL024	Aroclor-1260	10,000
SL032	Aroclor-1254	2,800
SL041	Aroclor-1254	1,800

Depth: 1 to 5 Feet		
Sample ID	Type of PCB	Concentration (µg/kg)
SL047	Aroclor-1248	8,800
	Aroclor-1260	4,000
SL048	Aroclor-1260	2,400
SL052	Aroclor-1254	4,200
SL066	Aroclor-1260	600
SL082	Aroclor-1260	2,100
SL097	Aroclor-1248	4,100
	Aroclor-1260	1,000
SL27001	Aroclor-1260	170
SL27002	Aroclor-1260	110
SL27005	Aroclor-1260	360
SL27006	Aroclor-1248	140
SL27007	Aroclor-1260	110
SL27008	Aroclor-1260	240
SL27009	Aroclor-1260	1,500
Depth: 4 to 12-Feet		
SL034	Aroclor-1248	13,000
SL035	Aroclor-1248	700
SL039	Aroclor-1248	28,000
	Aroclor-1260	25,000
SL040DL	Aroclor-1242	3,700
	Aroclor-1260	2,600
SL040	Aroclor-1248	4,200
SL043	Aroclor-1248	5,200
SL044	Aroclor-12648	270,000
	Aroclor-1254	78,000
SL083	Aroclor-1260	3,700
SL097	Aroclor-1254	820
SL098	Aroclor-1248	4,900
SL099	Aroclor-1254	2,200
	Aroclor-1260	390
SL100	Aroclor-1248	5,700
	Aroclor-1260	850

which was collocated with Downwind 2. Mercury was detected in downwind air samples Downwind 1 (0.0002 $\mu g/m^3$) and Downwind 2 (0.00041 $\mu g/m^3$). Selenium was detected at a concentration of 0.0056 $\mu g/m^3$ in the upwind sample and ranged from 0.0034 $\mu g/m^3$ to 0.39 $\mu g/m^3$, respectively, in downwind air samples Downwind 1 and 2C. Silver was detected at a concentration of 0.0045 $\mu g/m^3$ in only one downwind air sample Downwind 2. Sodium was detected (55 $\mu g/m^3$) in only the upwind air sample. Vanadium was detected at a concentration of 0.032 $\mu g/m^3$ in the upwind sample and 0.024 $\mu g/m^3$ and 0.003 $\mu g/m^3$, respectively, in downwind air samples Downwind 1 and 2C.

RUN3. Nine inorganic analytes were detected in the air samples from RUN3: cadmium, calcium, chromium, copper, manganese, mercury, selenium, thallium, and vanadium (Table 4-5). Cadmium, copper, and selenium were detected in the upwind air samples. Cadmium was detected in the upwind (0.0044 $\mu g/m^3$) air sample and one downwind (0.0015) $\mu g/m^3$ air sample, Downwind 2. Calcium, manganese, and mercury were detected at concentrations of 6.8 $\mu g/m^3$, 0.45 $\mu g/m^3$ and 0.0048 $\mu g/m^3$, respectively, in downwind air sample Downwind 2, and thallium was detected at a concentration of 0.0045 $\mu g/m^3$ in sample Downwind 1. Chromium was detected in downwind air samples Downwind 1 (0.011 $\mu g/m^3$) and Downwind 2 (0.025 $\mu g/m^3$). Copper was detected at a concentration of 0.093 $\mu g/m^3$ in the upwind sample and ranged from 0.074 $\mu g/m^3$ to 0.26 $\mu g/m^3$, respectively, in downwind air samples Downwind 1 and Downwind 2. Selenium was detected at a concentration of 0.0067 $\mu g/m^3$ in the upwind sample and ranged from 0.0061 $\mu g/m^3$ to 0.0068 $\mu g/m^3$, respectively, in downwind air samples Downwind 1 and Downwind 2. Vanadium was detected in the three downwind air samples at concentrations ranging from 0.079 $\mu g/m^3$ to 0.53 $\mu g/m^3$, respectively, in downwind air samples Downwind 2 and Downwind 1.

RUN4. Three inorganic analytes were detected in the air samples from RUN4: cadmium, copper, and mercury (Table 4-6). Copper and mercury were detected in the upwind air samples. Cadmium was detected at a concentration of 0.0074 $\mu g/m^3$ in only one sample, Downwind 1A. Copper was detected at a concentration of 0.18 $\mu g/m^3$ in the upwind sample and ranged from 0.08 $\mu g/m^3$ to 0.15 $\mu g/m^3$, respectively, in downwind air samples Downwind 3A and Downwind 1AC.

USEPA Region III has a risk based concentration of 0.0014 $\mu g/m^3$ for a 10^{-6} cancer risk for cadmium and 0.02 $\mu g/m^3$ for chromium VI. The risk value for cadmium was exceeded in each of the samples in which cadmium was detected:

- RUN1, Upwind 1 and Downwind 1;
- RUN2, Cadmium not detected in any samples;
- RUN3, Upwind 1, and Downwind 2; and
- RUN4, Downwind 1A.

The risk value for chromium VI was exceeded in one sample from RUN3, Downwind 2, and one sample from RUN4, Downwind 1A.

<u>4.3.3 Surface Water and Sediment Sample Results</u> The purpose of the surface water and sediment sampling event was to assess the current conditions of both media and the potential for contamination to migrate from OU1 via surface water drainage and sediment transport. Locations of the surface water and sediment samples are illustrated in Figure 3-5. VOCs were detected in some of the surface water samples but not in the sediment samples. SVOCs and pesticides were

detected in some of the sediment samples but not in surface water samples. PCBs, metals and radionuclides were detected in both sediment and surface water samples.

The surface water and sediment sampling event included the collection of two background samples for each matrix, designated as SW022/SD022 and SW025/SD025, respectively, for OU1 and the natural drainage area, and the St. Johns River samples SW032/SD032 and SW033/SD033 (see Figure 3-5). The two background locations receive surface water runoff from the restricted access weapons storage area. Upstream portions of the natural drainage feature in which samples SW022/SD022 were collected has been previously modified (date unknown) to enhance the drainage from the restricted weapons access area. A dirt trail also exist upstream of this sample location. The sample location for SW025/SD025 appeared to be a natural drainage feature. Additionally, a fire lane is maintained along the boundary the forested area and the restricted access area in which these two drainage features are located. This maintenance may provide a source of sediment from erosion of soils along the fire lane. Other sources of potential contaminants to the two background samples are debris piles of unknown character located within the forested area along the fire lane. Additionally, another former solid waste disposal area unrelated to OU1 exist north of sample location SW022/SD022.

Two background samples for each matrix, SW032/SD032 and SW033/SD033, were collected for comparison to samples collected in the St. Johns River at the mouth of the unnamed tributary. However, the two sediment samples may not represent background conditions because of the influence of tide, which causes sediment transport both up and down river from the sample locations.

It should be noted that sediments in the perimeter drainage ditch are not comparable to those of the natural drainage area because: (1) they are not similar environments, and (2) the prior remediation activities (1983 to 1984). These activities represent the excavation of the three main disposal pit areas and the OU1 perimeter drainage ditch and the spreading of these materials over OU1. These excavated materials were graded to drain to the OU1 perimeter drainage ditch. Erosion of these materials into the drainage ditch has occurred. Based on these construction activities, it would be more appropriate to assess the background of sediments in the perimeter drainage ditch by collection of soil samples which are representative of the lithology of the excavated materials.

A preliminary evaluation was made of the chemical analytical results for the surface water and sediment samples with preliminary applicable or relevant and appropriate requirements (ARARs). The ARARs selected for the preliminary evaluation were:

- draft sediment quality goals (SQGs), which are guidelines developed for the Florida Coastal Management Program by McDonald Environmental Sciences, Inc. (McDonald, 1992);

- Florida Surface Water Classification Standards (FSWCS), which are promulgated under Chapter 17.302, Rules and Regulations of the State of Florida;

- Florida Drinking Water Standards (FDWS), which are promulgated under Chapter 17.550, Rules and Regulations of the State of Florida; and

- USEPA Ambient Water Quality Criteria (AWQC), which are guidelines developed for the Clean Water Act, 40 CFR Part 131.

4.3.3.1 Volatile Organic Compounds (VOCs)

Surface Water Samples. Thirty-two surface water samples were collected in the vicinity of OU1. The surface water samples were found to contain concentrations of 11 VOC compounds: acetone, benzene, 1,2-dichloroethene, chlorobenzene, ethylbenzene, 4-methyl-2-pentanone, 1,1,2,2-tetrachloroethene, tetrachloroethene, toluene, trichloroethene, and vinyl chloride. The surface water background samples, SW022 and SW025, both contained acetone at 4 $\mu g/\ell$ and 7 $\mu g/\ell$, respectively. Tabulation of the detected VOC compounds is provided in Appendix C. The distribution of the detected VOCs is provided as the total value for the above compounds in Appendix C, Figure C-1.

Nine of the samples contained acetone, which ranged in concentration from 3 $\mu g/\ell$ (SW018) to 7 $\mu g/\ell$ (SW015 and SW025). Benzene was detected in one surface water sample (SW014) at a concentration of 4 $\mu g/\ell$. 1,2-Dichloroethene was detected in 11 samples at concentrations ranging from 2 $\mu g/\ell$ (SW020 and SW023) to 28 $\mu g/\ell$ (SW011). Chlorobenzene was detected in two samples, SW011 and SW014, at concentrations of 2 $\mu g/\ell$ and 1 $\mu g/\ell$, respectively. Ethylbenzene was detected in one sample, SW014 at a concentration of 2 $\mu g/\ell$. 4-methyl-2-pentanone was detected in only one sample, SW011, at a concentration of 10 $\mu g/\ell$. 1,1,2,2-Tetrachloroethene was detected in two samples, SW019 and SW017, at concentrations of 2 $\mu g/\ell$ and 1 $\mu g/\ell$, respectively. Tetrachloroethene was detected in only one sample, SW003, at a concentration of 17 $\mu g/\ell$. Toluene was detected in only one sample, SW011, at a concentration 2 $\mu g/\ell$. Trichloroethene was detected in five samples at concentrations ranging from 1 $\mu g/\ell$ (SW021) to 37 $\mu g/\ell$ (SW017).

Sediment Samples. Thirty-two sediment samples were collected in the vicinity of OU1. The sediment samples were found to contain concentrations of 11 VOC compounds: acetone, benzene, 2-butanone, 1,2-dichloroethene, carbon disulfide, chlorobenzene, methylene chloride, toluene, trichloroethene, vinyl chloride, and xylenes. The sediment background samples, SW022 and SW025, both contained toluene at 1 $\mu g/kg$ and 3 $\mu g/kg$, respectively and sample SW025 also contained carbon disulfide at 3 $\mu g/kg$. Tabulation of the detected VOC compounds is provided in Appendix C. The distribution of the detected VOCs is provided as the total value for the above compounds in Appendix C, Figure C-2.

Acetone was detected in three samples at concentrations ranging from 63 $\mu g/kg$ (SD014) to 410 $\mu g/kg$ (SD007). The locations at which acetone was detected in surface water samples does not correspond with the sediment sample locations. Benzene was detected in three sediment samples, SD004, SD011, and SD014, at a concentration of 2 $\mu g/kg$, and was also detected in the surface water sample from location SW014. 2-Butanone was detected in three sediment samples at concentrations ranging from 16 $\mu g/kg$ (SD024) to 22 $\mu g/kg$ (SD003 and SD012). 2-Butanone was not detected in the surface water samples. 1-2-Dichloroethene was detected in one sediment sample, SD014, at a concentration of 7 $\mu g/kg$. 1,2-Dichloroethene was also detected in surface water sample SW014. Carbon disulfide was detected in two sediment samples, SD025 and SD031, at

concentrations of 3 μg/kg and 2 μg/kg, respectively, but was not detected in the surface water samples. Chlorobenzene was detected in only one sediment sample, SD011, at a concentration of 4 μg/kg, and was also detected in the surface water sample (SW011). Methylene chloride was detected in only one sediment sample at a concentration of 85 μg/kg, but was not detected in any of the surface water samples. Toluene was detected in 13 of the sediment samples at concentrations ranging from 1 μg/kg (SD022) to 12 μg/kg (SD007). Trichloroethene was detected in one sediment sample (SD019) at a concentration of 5 μg/kg, and was also detected in the surface water sample SW019. Vinyl chloride was detected in only one sediment sample, SD014, at a concentration of 3 μg/kg, and was also detected in surface water sample SW014. Xylenes were detected in four sediment samples at concentrations ranging from 2 μg/kg (SD002, SD004, and SD012) to 6 μg/kg (SD008).

ARARs Comparison. Concentrations of VOC target analytes benzene, trichloroethene (TCE), tetrachloroethene (PCE), vinyl chloride (VC), and 1,1,2,2-tetrachloroethane (1,1,2,2-TCA) were detected in some of the surface water samples in excess of the preliminary ARARS (Figure 4-9). Benzene, TCE, PCE, and VC exceeded the FDWS, which is applied to surface water quality in absence of a FSWCS standard for these compounds and the FSWCS standard for the consumption of fish and water for these compounds. 1,1,2,2-TCA exceeded the FSWCS standard for consumption of fish and water.

Concentrations of VOCs were not detected in excess of the preliminary ARARS in the sediment samples.

4.3.3.2 Semivolatile Organic Compounds (SVOCs)

Surface Water Samples. SVOCs detected in the surface water samples consist of two phthalate compounds, bis(2-ethylhexyl)phthalate and di-n-butylphthalate. Bis (2-ethylhexyl)phthalate was detected at eight sample locations (Appendix C, Figure C-3) and ranged from 3 μg/ℓ (SW009, SW011, SW020, and SW030) to 13 μg/ℓ (SW012). Di-n-butyl phthalate was detected at only one sample location, SW012, at a concentration of 16 μg/ℓ. Tabulation of the detected SVOC compounds is provided in Appendix C.

Sediment Samples. SVOCs detected in the sediment samples consist of three phthalate compounds, bis(2-ethylhexyl)phthalate, diethyl phthalate, and dimethyl phthalate; and eleven polynuclear aromatic hydrocarbons (PAHs), acenaphthene, benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, benzo (g,h,i) perylene, benzo (k) fluoranthene, chrysene, fluoranthene, indeno (1,2,3,cd) pyrene, phenanthrene, and pyrene. SVOCs were not detected in the background surface water samples SW022 and SW025. Tabulation of the detected SVOC compounds is provided in Appendix C. The distribution of the detected SVOCs is provided

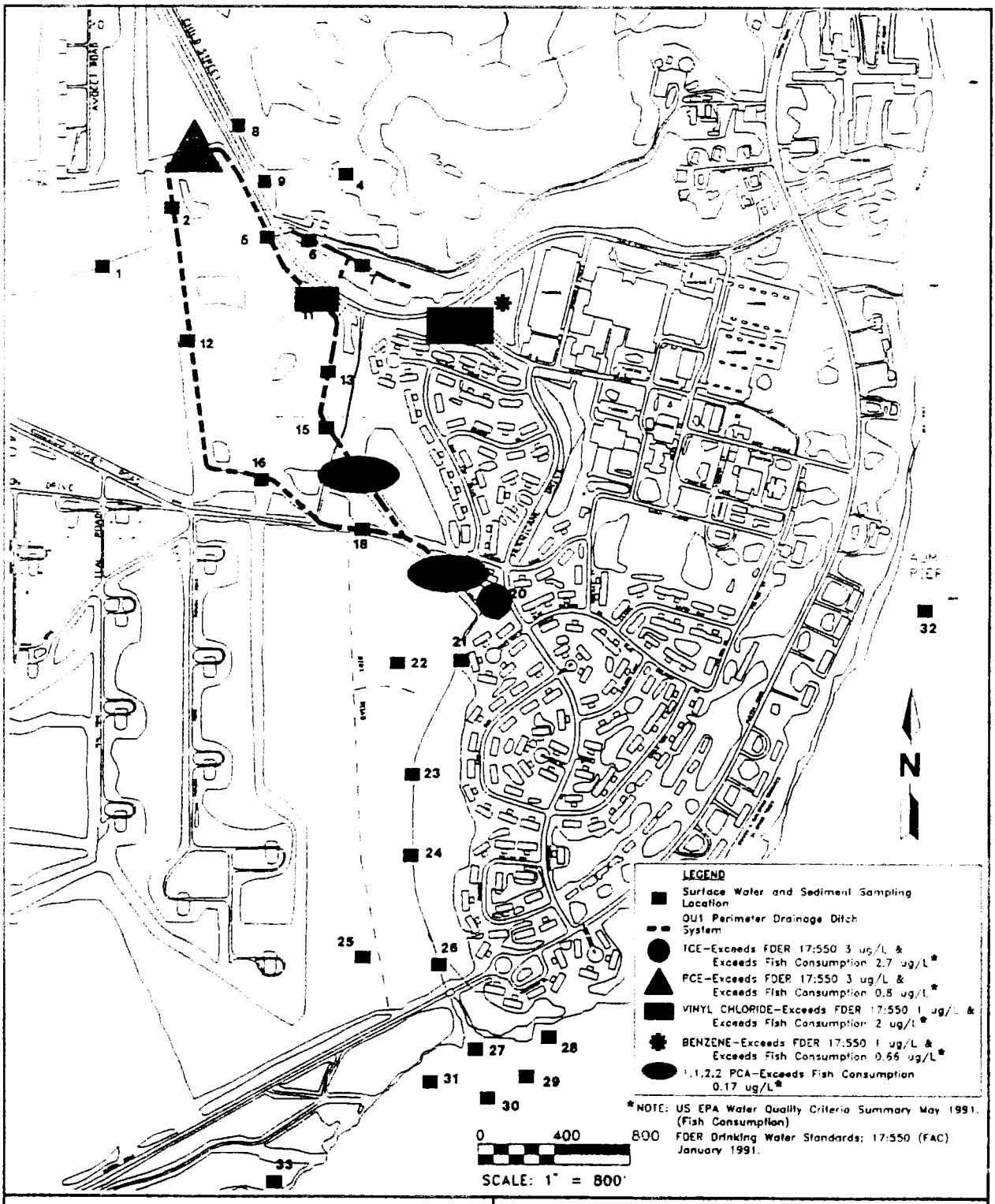


FIGURE 4-9

VOLATILE ORGANIC COMPOUNDS IN SURFACE WATER SAMPLES

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in Appendix C, Figure C-4 which depicts the total value of the PAH compounds detected at each sample location.

Bis(2-ethylhexyl)phthalate was detected at six sample locations, and ranged in concentration from 81 μg/kg (SD006) to 4,100 μg/kg (SD011). Sediment samples that had corresponding detection of bis(2-ethylhexyl)phthalate in surface water samples were SW002, SW011, and SW012. Diethyl phthalate and dimethyl phthalate were each detected at one sample location, SD011, at concentrations of 100 μg/kg, and 160 μg/kg, respectively. These two phthalate compounds were not detected in the surface water samples.

Nine of the PAH compounds, benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, benzo (g,h,i) perylene, benzo (k) fluoranthene, chrysene, fluoranthene, indeno (1,2,3,cd) pyrene, and pyrene, were detected at three sample locations SD006, SD012, and SD014. Six of the PAH compounds, acenaphthene, benzo (a) anthracene, benzo (b) fluoranthene, chrysene, fluoranthene, and pyrene, were detected at sample location SD027. Three of the PAH compounds, benzo (a) anthracene, fluoranthene, and pyrene were detected at sediment sample location SD026. Only pyrene was detected at sample location SD011. PAH compounds were not detected in the corresponding surface water samples.

ARARs Comparison. Concentrations of SVOCs target analytes chrysene, fluoranthene, pyrene, phenanthrene, benzo anthracene, and acenaphthene were detected in some of the sediment samples in excess of the draft SQGs (Figure 4-10).

Concentrations of SVOCs were not detected in surface water samples in excess of the preliminary ARARs.

4.3.3.3 Pesticides/Polychlorinated Biphenyl (PCBs)

Surface Water Samples. Pesticides and PCB compounds detected in the surface water samples consist of 4,4'-DDE and Aroclor-1248, respectively. 4,4'-DDE was detected in only one sample, SW005 at a concentration of 0.015 μg/ℓ. Aroclor-1248 was detected in three samples, SW011, SW013 and SW015, at concentrations of 2 μg/ℓ, 8.4 μg/ℓ, and 0.98 μg/ℓ, respectively. Tabulation of the detected pesticide and PCB compounds is provided in Appendix C. The distribution of the detected Pesticides and PCBs is provided in Appendix C, Figure C-5.

Sediment Samples. Pesticides detected in the sediment samples consisted of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, alpha and gamma chlordane, aldrin, dieldrin, endosulfan sulfate, and gamma-BHC (lindane). Only one PCB compound, Aroclor-1260, was detected in some of the sediment samples. Tabulation of the detected Pesticide and PCB compounds is provided in Appendix C. The distribution of the detected Pesticides is provided in Appendix C, Figure C-6 for DDT and related degradation compounds and Figure C-7 for the other pesticides and the distribution of the PCB compound in the sediments is depicted in Figure C-9.

4,4'-DDT was detected in three sediment samples, SD001, SD005, and SD006, at concentrations of 240 μg/kg, 25 μg/kg, and 12 μg/kg, respectively. 4,4'-DDE was

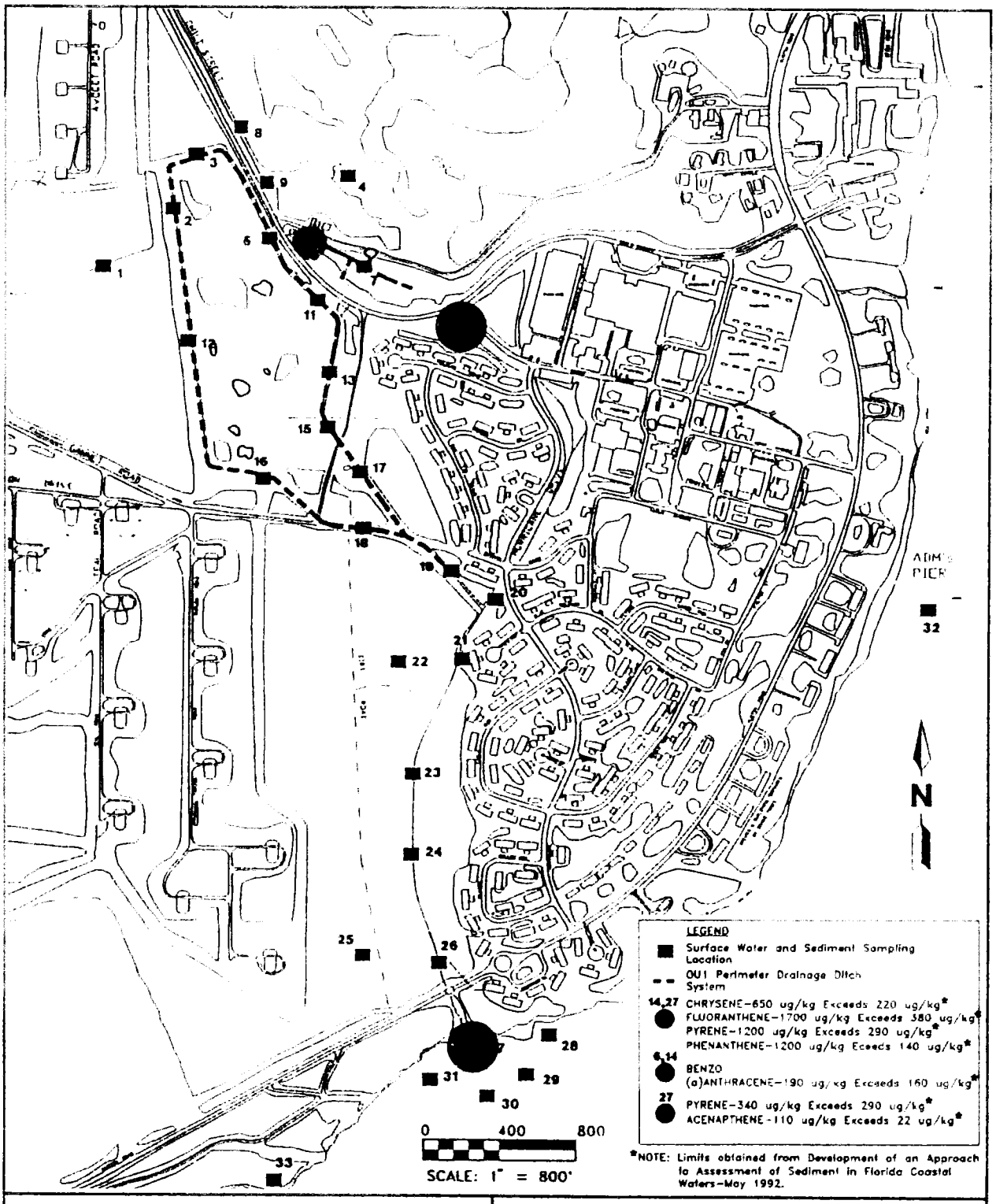

FIGURE 4-10
SEMI-VOLATILE COMPOUNDS IN SEDIMENT SAMPLES

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detected in five sediment samples at concentrations ranging from 3.7 μg/kg (SD007) to 130 μg/kg (SD005). 4,4'-DDD was detected in 12 sediment samples at concentrations ranging from 1.9 μg/kg (SD009) to 120 μg/kg (SD005). The only corresponding location at which a DDT related compound (4,4'-DDE) was detected in both surface water and sediment samples was SD005.

Alpha and/or gamma chlordane were detected at five sample locations SD004, SD011, SD014, SD026, and SD027. Concentrations of alpha chlordane ranged from 2.2 μg/kg (SD011) to 46 μg/kg (SD026). Concentration of gamma chlordane ranged from 2.4 μg/kg (SD004) to 61 μg/kg (SD026). Aldrin was detected at only one sample location, SD015, at a concentration of 6.1 μg/kg. Dieldrin also was detected at only one sediment sample location, SD004, at a concentration of 0.91 μg/kg. Endosulfan sulfate was detected at the sediment sample background location, SD025, at a concentration of 6 μg/kg. Pesticides were not detected in the other sediment background sample SD022. Gamma-BHC was detected at one sample location, SD019, at a concentration of 2 μg/kg.

The PCB compound Aroclor-1260 was detected in 17 of the sediment samples. The detected concentrations ranged from 130 μg/kg (SD014) to 2,200 μg/kg (SD026). PCBs were not detected in the two sediment background samples SD022 and SD025.

ARARs Comparison.

Pesticides. Concentrations of pesticide target analytes 4,4'-DDT and 4,4'-DDE were detected in some of the sediment samples in excess of the draft SQGs (Figure 4-11). Concentration of pesticides were not detected in the surface water samples in excess of the preliminary ARARs.

PCBs. Concentrations of PCB target analytes were detected in some of the surface water and sediment samples in excess of the preliminary ARARs (Figures 4-12 and 4-13, respectively). PCBs detected in the surface water samples exceeded preliminary ARARs for both the FSWCS and FWCS. PCBs in the sediment samples exceeded preliminary ARARs developed as draft SQGs.

4.3.3.4 Inorganics

Surface Water Samples. TAL inorganics detected in the surface water samples consist of aluminum, antimony, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, zinc, and cyanide. Tabulation of the detected TAL inorganics is provided in Appendix C. The distribution of the detected TAL inorganics is provided in Appendix C, Figures C-9 for copper, C-10 for iron, C-11 for lead, C-12 for manganese, C-13 for nickel, C-14 for silver, C-15 for thallium, C-16 for zinc, and C-17 for cyanide.

Aluminum was detected in 31 of the 32 samples, at concentrations ranging from 21 μg/ℓ (SW023) to 1,100 μg/ℓ (SW002). The surface water background samples, SW022 and SW025, contained aluminum at concentrations of 133 μg/ℓ and 696 μg/ℓ, respectively. Only one surface water sample, SW002, contained aluminum at concentrations greater than the two background samples.

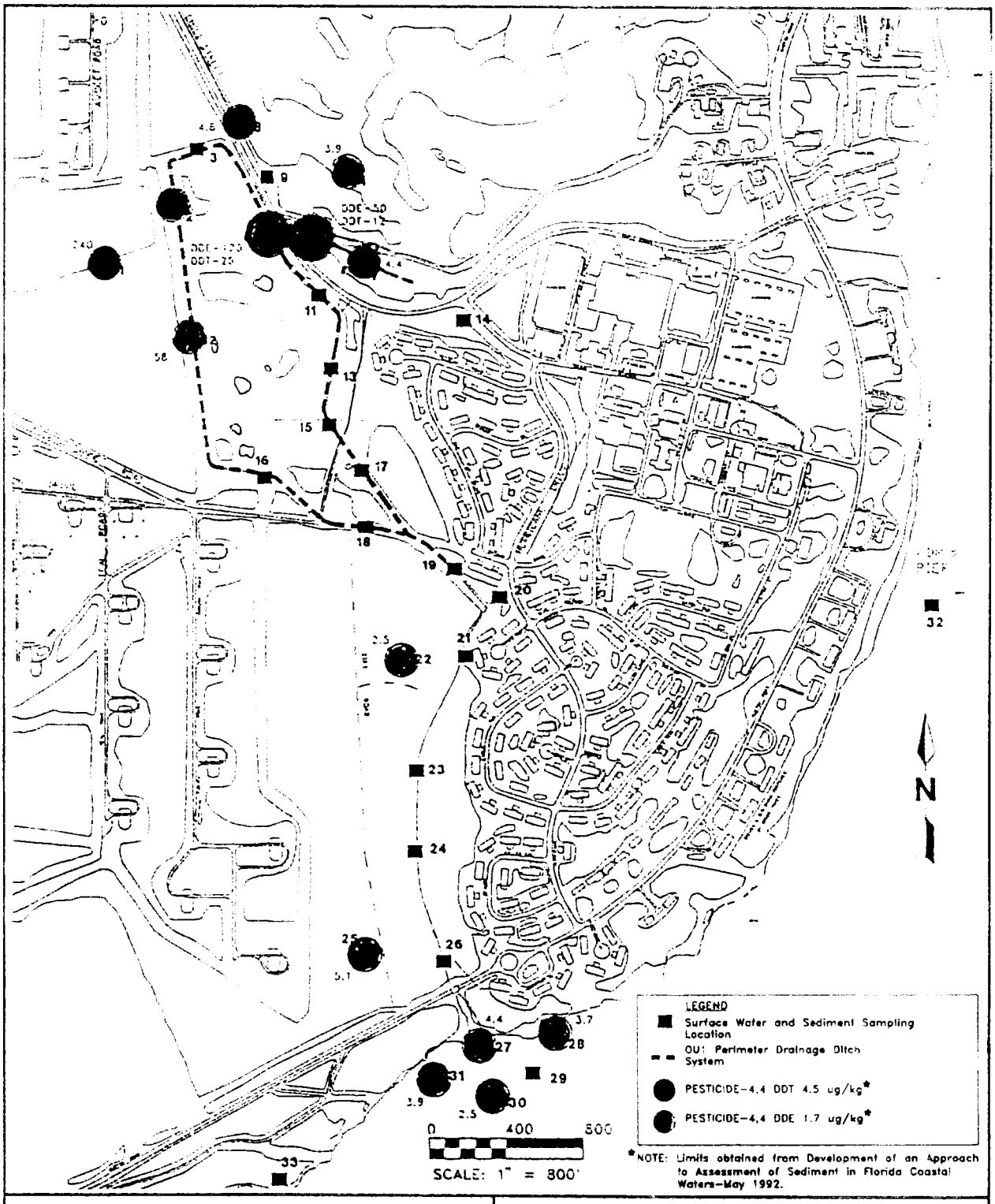

FIGURE 4-11

PESTICIDES IN SEDIMENT SAMPLES

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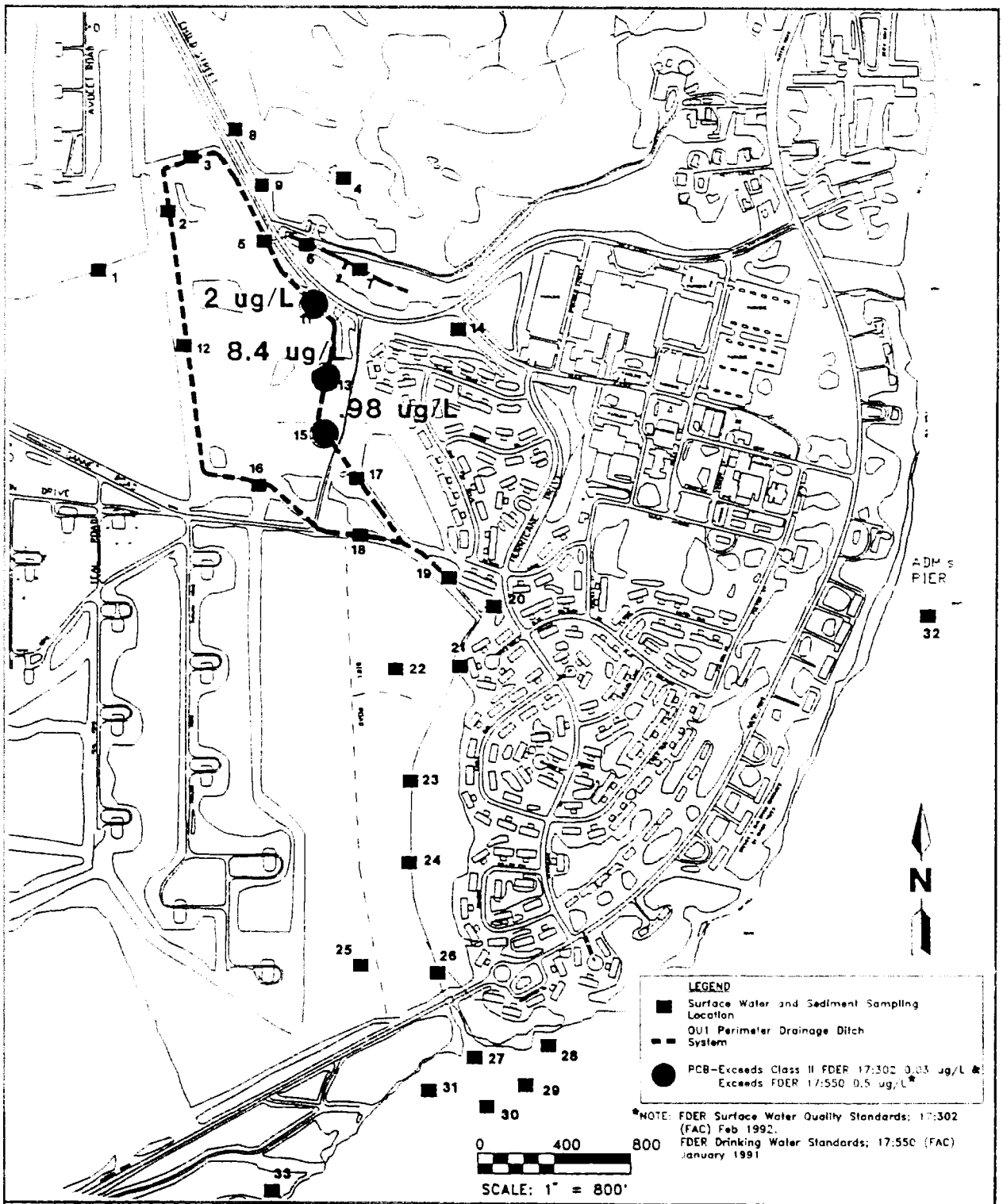

FIGURE 4-12
PCBs IN SURFACE WATER SAMPLES

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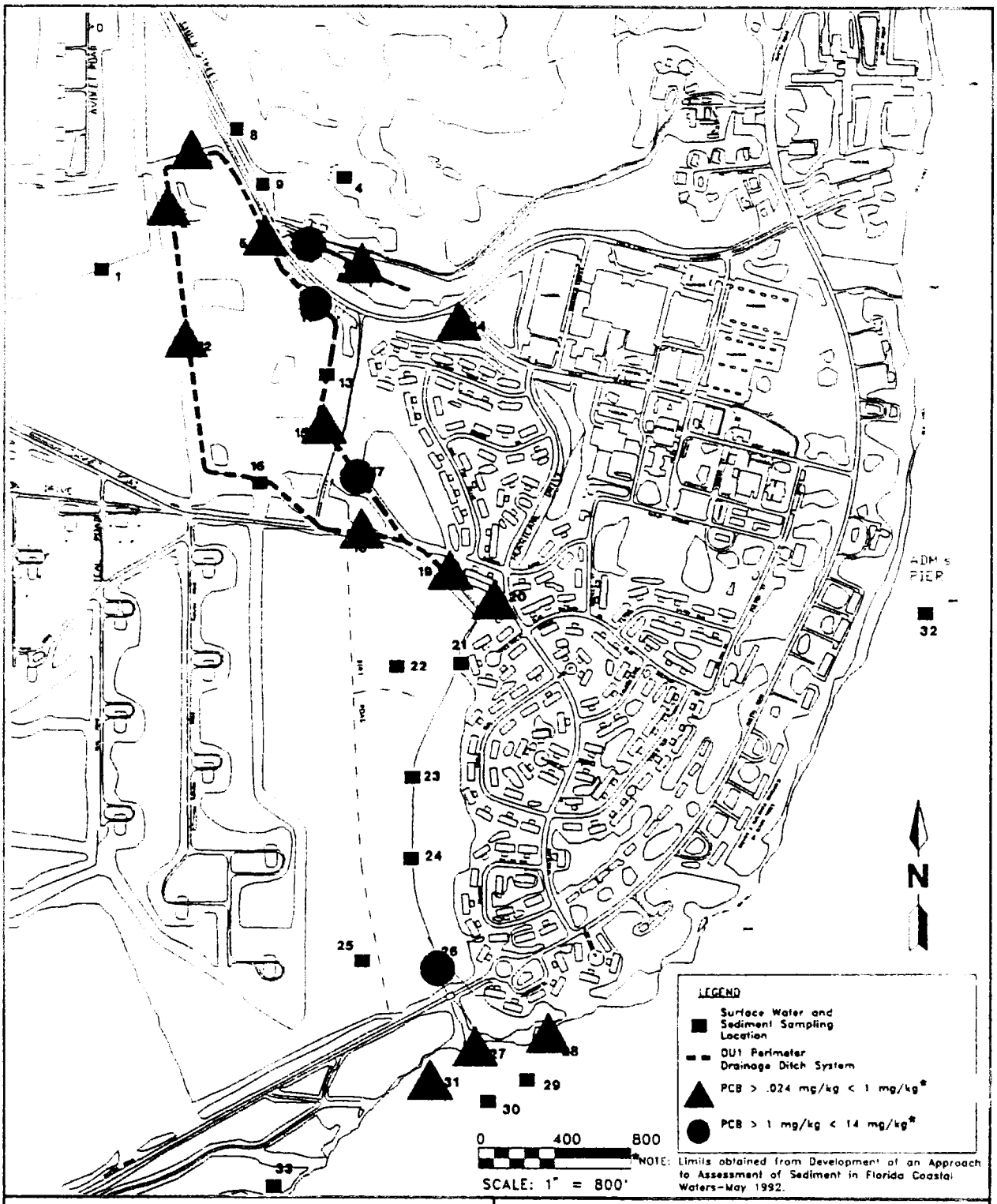

FIGURE 4-13

PCBs IN SEDIMENT SAMPLES

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Antimony was detected in three of the surface water samples, SW015, SW017, and SW030, at concentrations of 12.8 μg/ℓ, 12 μg/ℓ, and 11.5 μg/ℓ, respectively. Antimony was not detected in the two background samples.

Arsenic was detected in 18 of the 32 surface water samples, at concentrations ranging from 0.6 μg/ℓ (SW019) to 23.9 μg/ℓ (SW008). The surface water background samples SW022 and SW025 contained arsenic at concentrations of 0.6 μg/ℓ and 0.9 μg/ℓ, respectively. Ten of the surface water samples contained arsenic at concentrations greater than the two background samples.

Barium was detected in each of the surface water samples, at concentrations ranging from 12.1 μg/ℓ (SW030) to 311 μg/ℓ (SW013). The surface water background samples SW022 and SW025 contained barium at concentrations of 49.3 μg/ℓ and 41.3 μg/ℓ, respectively. Twenty-two of the surface water samples contained barium at concentrations greater than the two background samples.

Cadmium was detected in 10 of the 32 surface water samples, at concentrations ranging from 0.11 μg/ℓ (SW020) to 3.4 μg/ℓ (SW002). Cadmium was not detected in the two background samples.

Calcium was detected in each of the 32 surface water samples, at concentrations ranging from 4,400 μg/ℓ (SW025) to 152,000 μg/ℓ (SW005). The surface water background samples SW022 and SW025 contained calcium at concentrations of 18,200 μg/ℓ and 4,400 μg/ℓ, respectively. The other thirty surface water samples contained calcium at concentrations greater than the two background samples.

Chromium was detected in six of the surface water samples, at concentrations ranging from 2.2 μg/ℓ (SW005) to 5.9 μg/ℓ (SW002). Chromium was not detected in the two background samples.

Cobalt was detected in three of the surface water samples, SW025, SW030, and SW031, at concentrations of 3.3 μg/ℓ, 6.3 μg/ℓ, and 5.5 μg/ℓ, respectively. One surface water background sample, SW025, contained cobalt and the other two samples exceeded the detected background concentration.

Copper was detected in 12 of the surface water samples at concentrations ranging from 1.4 μg/ℓ (SW028, SW029, and SW030) to 4.7 μg/ℓ (SW001) (Figure C-9). Copper was detected in only one of the background samples, SW022, at a concentration of 1.5 μg/ℓ. Six of the surface water samples contained copper at concentrations greater than the background sample.

Iron was detected in each of the 32 surface water samples, at concentrations ranging from 156 μg/ℓ (SW004) to 16,700 μg/ℓ (SW014) (Figure C-10). The surface water background samples SW022 and SW025 contained iron at concentrations of 1,520 μg/ℓ and 4,360 μg/ℓ, respectively. Only three surface water samples contained iron at concentrations greater than the two background samples.

Lead was detected in twelve of the surface water samples at concentrations ranging from 0.7 μg/ℓ (SW030) to 31.4 μg/ℓ (SW002) (Figure C-11). The surface water background samples SW022 and SW025 contained lead at concentrations of 0.8 μg/ℓ and 1 μg/ℓ, respectively. Nineteen surface water samples contained lead at concentrations greater than the two background samples.

Magnesium was detected in each of the 32 surface water samples, at concentrations ranging from 1,560 μg/ℓ (SW025) to 42,2000 μg/ℓ (SW012). The surface water background samples SW022 and SW025 contained magnesium at concentrations of 3,240 μg/ℓ and 1,560 μg/ℓ, respectively. The other thirty surface water samples contained magnesium at concentrations greater than the two background samples.

Manganese was detected in each of the 32 surface water samples, at concentrations ranging from 7 μg/ℓ (SW032) to 258 μg/ℓ (SW003) (Figure C-12). The surface water background samples SW022 and SW025 contained manganese at concentrations of 20.4 μg/ℓ and 38.5 μg/ℓ, respectively. Twenty surface water samples contained manganese at concentrations greater than the two background samples.

Nickel was detected in six of the surface water samples, at concentrations ranging from 5.3 μg/ℓ (SW007) to 11.3 μg/ℓ (SW013) (Figure C-13). Nickel was not detected in the two background samples.

Potassium was detected in each of the 32 surface water samples, at concentrations ranging from 847 μg/ℓ (SW022) to 33,000 μg/ℓ (SW012). The surface water background samples SW022 and SW025 contained potassium at concentrations of 847 μg/ℓ and 1,020 μg/ℓ, respectively. The other thirty surface water samples contained potassium at concentrations greater than the two background samples.

Selenium was detected in only one surface water sample, SW007, at a concentration of 1.4 μg/ℓ. Selenium was not detected in the two background samples.

Silver was detected in eight of the surface water samples at concentrations ranging from 0.2 μg/ℓ (SW025) to 0.34 μg/ℓ (SW020) (Figure C-14). Silver was detected in only one of the background samples, SW025. The other seven samples contained concentrations of silver greater than the background sample.

Sodium was detected in each of the 32 surface water samples, at concentrations ranging from 7,340 μg/ℓ (SW004) to 148,000 μg/ℓ (SW032). The surface water background samples SW022 and SW025 contained sodium at concentrations of 10,500 μg/ℓ and 9,010 μg/ℓ, respectively. Twenty-nine surface water samples contained sodium at concentrations greater than the two background samples.

Thallium was detected in only one surface water sample, SW008, at a concentration of 1.5 μg/ℓ. Thallium was not detected in the two background samples.

Vanadium was detected in 19 of the surface water samples at concentrations ranging from 1.5 μg/ℓ (SW013) to 5.5 μg/ℓ (SW027) (Figure C-15). Thallium was detected in only one of the background samples, SW025, at a concentration of 2.7 μg/ℓ. Twelve samples contained concentrations of vanadium greater than the background sample.

Zinc was detected in 19 of the surface water samples at concentrations ranging from 4.1 μg/ℓ (SW018) to 109 μg/ℓ (SW002) (Figure C-16). The surface water background samples SW022 and SW025 contained zinc at concentrations of 7.1 μg/ℓ and 18 μg/ℓ, respectively. Five surface water samples contained zinc at concentrations greater than the two background samples.

Cyanide was detected in three of the surface water samples, SW005, SW006, and SW012, at concentrations of 3.1 μg/ℓ, 16.7 μg/ℓ, and 2.8 μg/ℓ, respectively (Figure C-16). Cyanide was not detected in the two background samples.

Sediment Samples. TAL inorganics detected in the sediment samples consist of aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc. Tabulation of the detected TAL inorganics is provided in Appendix C.

Aluminum was detected in the 32 sediment samples, at concentrations ranging from 352 μg/kg (SD033) to 9,560 μg/kg (SD011). The sediment background samples SD022 and SD025 contained aluminum at concentrations of 1,880 μg/kg and 1,260 μg/kg, respectively. Twenty two sediment samples contained aluminum at concentrations greater than the two background samples. Aluminum was also detected in the 32 surface water samples.

Antimony was detected in three of the sediment samples, SD001, SD015, and SD021 at concentrations of 8.2 μg/kg, 1,560 μg/kg, and 2.8 μg/kg, respectively. Antimony was not detected in the two background samples. Antimony was also detected in surface water sample SW015.

Arsenic was detected in each of the 32 sediment samples, at concentrations ranging from 0.12 μg/kg (SD017) to 5.2 μg/kg (SD001). The sediment background samples SD022 and SD025 contained arsenic at concentrations of 0.16 μg/kg and 0.72 μg/kg, respectively. Twelve sediment samples contained arsenic at concentrations greater than the two background samples. Arsenic also was detected in 18 of the surface water samples.

Barium was detected in each of the sediment samples, at concentrations ranging from 0.75 μg/kg (SD033) to 58.2 μg/kg (SD012). The sediment background samples SD022 and SD025 contained barium at concentrations of 9.6 μg/kg and 7.5 μg/kg, respectively. Eighteen sediment samples contained barium at concentrations greater than the two background samples. Barium was also detected in each of the surface water samples.

Beryllium was detected in eight of the sediment samples, at concentrations ranging from 0.06 μg/kg (SD007 and SD012) to 3.1 μg/kg (SD028). Barium was not detected in the two back ground samples and also was not detected in surface water samples.

Cadmium was detected in eleven of the sediment samples, at concentrations ranging from 0.35 μg/kg (SD013) to 9.4 μg/kg (SD001). Cadmium was not detected in the two sediment background samples. Corresponding surface water sample locations where cadmium was detected are SW001, SW002, SW014, SW020, SW026, and SW027.

Calcium was detected in each of the sediment samples, at concentrations ranging from 138 μg/kg (SD019) to 11,200 μg/kg (SD014). The sediment background samples SD022 and SD025 contained calcium at concentrations of 1,140 μg/kg and 188 μg/kg, respectively. Twelve sediment samples contained calcium at concentrations greater than the two background samples. Calcium was also detected in each of the surface water samples.

Chromium was detected in each of the sediment samples, at concentrations ranging from 1.8 μg/kg (SD025) to 50.3 μg/kg (SD002). The sediment background samples SD022 and SD025 contained calcium at concentrations of 2.9 μg/kg and 1.8 μg/kg, respectively. Twenty-four sediment samples contained calcium at concentrations greater than the two background samples. Chromium also was detected in six of the surface water samples SW002, SW003, SW005, SW006, SW009, and SW012.

Cobalt was detected in eight of the sediment samples, at concentrations ranging from 0.88 μg/kg (SD017) to 4.1 μg/kg (SD001). Only one sediment background samples SD022 contained cobalt at concentrations of 3 μg/kg. Only one sediment sample SD001 contained cobalt at concentrations greater than the background sample. Cobalt was also detected in surface water sample SW001.

Copper was detected in 25 five of the sediment samples, at concentrations ranging from 1.5 μg/kg (SD003, SD016, SD033) to 1,210 μg/kg (SD002). Copper was not detected in the two background samples. Corresponding locations where copper was detected in surface water samples was SW001, SW013, SW016, SW026 through SW031, and SW033.

Iron was detected in each of the sediment samples, at concentrations ranging from 412 μg/kg (SD008) to 50,300 μg/kg (SD001). The sediment background samples SD022 and SD025 contained iron at concentrations of 819 μg/kg and 1,200 μg/kg, respectively. Twenty sediment samples contained iron at concentrations greater than the two background samples. Iron also was detected in each of the surface water samples.

Lead was detected in each of the sediment samples, at concentrations ranging from 1.6 μg/kg (SD019) to 18.5 μg/kg (SD001). The sediment background samples SD022 and SD025 contained lead at concentrations of 3.6 μg/kg and 3.5 μg/kg, respectively. Twenty-one sediment samples contained lead at concentrations greater than the two background samples. Lead also was detected in twenty-eight of the surface water samples.

Magnesium was detected in each of the sediment samples, at concentrations ranging from 42.8 μg/kg (SD008) to 603 μg/kg (SD027). The sediment background samples SD022 and SD025 contained magnesium at concentrations of 107 μg/kg and 79.8 μg/kg, respectively. Twenty-three sediment samples contained magnesium at concentrations greater than the two background samples. Magnesium also was detected in each of the surface water samples.

Manganese was detected in each of the sediment samples, at concentrations ranging from 0.9 μg/kg (SD009) to 189 μg/kg (SD001). The sediment background samples SD022 and SD025 contained manganese at concentrations of 1.6 μg/kg and 2.2 μg/kg, respectively. The other 30 sediment samples contained manganese at concentrations greater than the two background samples. Manganese also was detected in each of the surface water samples.

Mercury was detected in three of the sediment samples, SD001, SD002, and SD009, at concentrations of 0.048 μg/kg, 0.32 μg/kg, and 0.46 μg/kg. Mercury was not detected in either the background samples or the surface water samples.

Nickel was detected in 12 of the sediment samples, at concentrations ranging from 1.3 μg/kg (SD005) to 75.4 μg/kg (SD001). Only one sediment background sample

SD025 contained nickel at concentrations of 3.4 μg/kg. Five of the sediment samples contained nickel at concentrations greater than the two background samples. Corresponding surface water samples at which nickel also was detected are SW002, SW004, SW005, SW006, SW013, and SW017.

Potassium was detected in 13 of the sediment samples, at concentrations ranging from 85.1 μg/kg (SD033) to 390 μg/kg (SD001). Potassium was not detected in the two sediment background samples. Potassium was detected in each of the surface water samples.

Selenium was detected in seven of the sediment samples, at concentrations ranging from 0.18 μg/kg (SD011) to 0.63 μg/kg (SD004). Selenium was not detected in the sediment background samples. Selenium was detected in only one surface water sample, SW007. Sediment sample SW007 did not contain Selenium. Two sediment samples were collected from location SD011; selenium was detected in only one sample from this location.

Silver was detected in five of the sediment samples, at concentrations ranging from 0.32 μg/kg (SD015) to 4.7 μg/kg (SD002). Silver was not detected in the sediment background samples. There was only one corresponding surface water samples at which nickel also was detected; SW015, however eight other surface water samples contained silver.

Sodium was detected in 25 of the sediment samples, at concentrations ranging from 106 μg/kg (SD011) to 536 μg/kg (SD027). The sediment background samples SD022 and SD025 contained sodium at concentrations of 106 μg/kg and 119 μg/kg, respectively. Sixteen sediment samples contained sodium at concentrations greater than the two background samples. Sodium also was detected in each of the surface water samples.

Thallium was detected in four of the sediment samples, at concentrations ranging from 0.4 μg/kg (SD012) to 0.52 μg/kg (SD002). Thallium was not detected in the sediment background samples. Only one surface water sample, SW008, contained thallium. Sediment sample SD008 did not contain thallium.

Vanadium was detected in 30 of the sediment samples, at concentrations ranging from 1.4 μg/kg (SD015) to 15.9 μg/kg (SD013). The sediment background samples SD022 and SD025 contained vanadium at concentrations of 6.2 μg/kg and 10.7 μg/kg, respectively. Four sediment samples contained vanadium at concentrations greater than the two background samples. Vanadium also was detected in each of the surface water samples.

Zinc was detected in each of the sediment samples, at concentrations ranging from 2.2 μg/kg (SD019) to 361 μg/kg (SD001). The sediment background samples SD022 and SD025 contained zinc at concentrations of 3.1 μg/kg and 4.9 μg/kg, respectively. Twenty-two sediment samples contained zinc at concentrations greater than the two background samples. Zinc also was detected in nineteen of the surface water samples.

<u>ARARs Comparison</u>. Concentrations of inorganic target analytes were detected in surface water samples (lead and cadmium) and sediment samples (cadmium, chromium, copper, mercury, nickel, silver, and zinc) in excess of the preliminary ARARs (Figures 4-14 and 4-15, respectively). In the surface water samples, lead and

cadmium exceeded the Class II FSWCS preliminary ARAR. In the sediment samples, cadmium, chromium, copper, mercury, nickel, silver, and zinc exceeded the draft sediment quality goals.

4.3.3.5 Radionuclides

Surface Water. Radionuclides detected in some of the surface water samples consist of Radium-226, Radium-228, alpha (gross) and beta (gross). Tabulation of the detected radionuclides is provided in Appendix C.

Radium-226 was detected in 26 of the surface water samples, at concentrations ranging from 0.2 pCi/ℓ (SW001) to 2.2 pCi/ℓ (SW019). Only one surface water background sample, SW022, contained Radium-226 at concentration of 0.5 pCi/ℓ. Nineteen of the surface water samples contained Radium-226 at concentrations greater than the background sample.

Radium-228 was detected in 13 of the surface water samples, at concentrations ranging from 0.4 pCi/ℓ (SD001, SW004, SW015, SW028, and SW029) to 1.4 pCi/ℓ (SW017 and SW019). Only one surface water background sample, SW022, contained Radium-228 at concentration of 0.5 pCi/ℓ. Four of the surface water samples contained Radium-228 at concentrations greater than the background sample.

Alpha (gross) was detected in 31 of the surface water samples, at concentrations ranging from 0.1 pCi/ℓ (ten samples SD002, SW006, SW009, SW013, SW016, SW021, SW023, SW027, SW028, and SW031) to 27.9 pCi/ℓ (SW019). Only one surface water background sample, SW025, contained alpha (gross) at a concentration of 9.4 pCi/ℓ. Seven of the surface water samples contained alpha (gross) at concentrations greater than the background sample.

Beta (gross) was detected in 29 of the surface water samples, at concentrations ranging from 4.6 pCi/ℓ (SW027) to 55.8 pCi/ℓ (SW015). Only one surface water background sample, SW025, contained Beta (gross) at a concentration of 15.2 pCi/ℓ. Seventeen of the surface water samples contained Beta (gross) at concentrations greater than the background sample.

Sediment. Radionuclides detected in some of the sediment samples consist of Radium-226, Radium-228, alpha (gross), and beta (gross). Tabulation of the detected radionuclides is provided in Appendix C.

Radium-226 was detected in each of the 32 sediment samples, at concentrations ranging from 0.4 pCi/g (seven samples, SD008, SD009, SD015, SD030, SD031, SD032, and SD033) to 2.8 pCi/g (SD017). The two sediment background samples, SD022 and SD025, contained Radium-226 at a concentration of 0.5 pCi/g and 0.6 pCi/g,

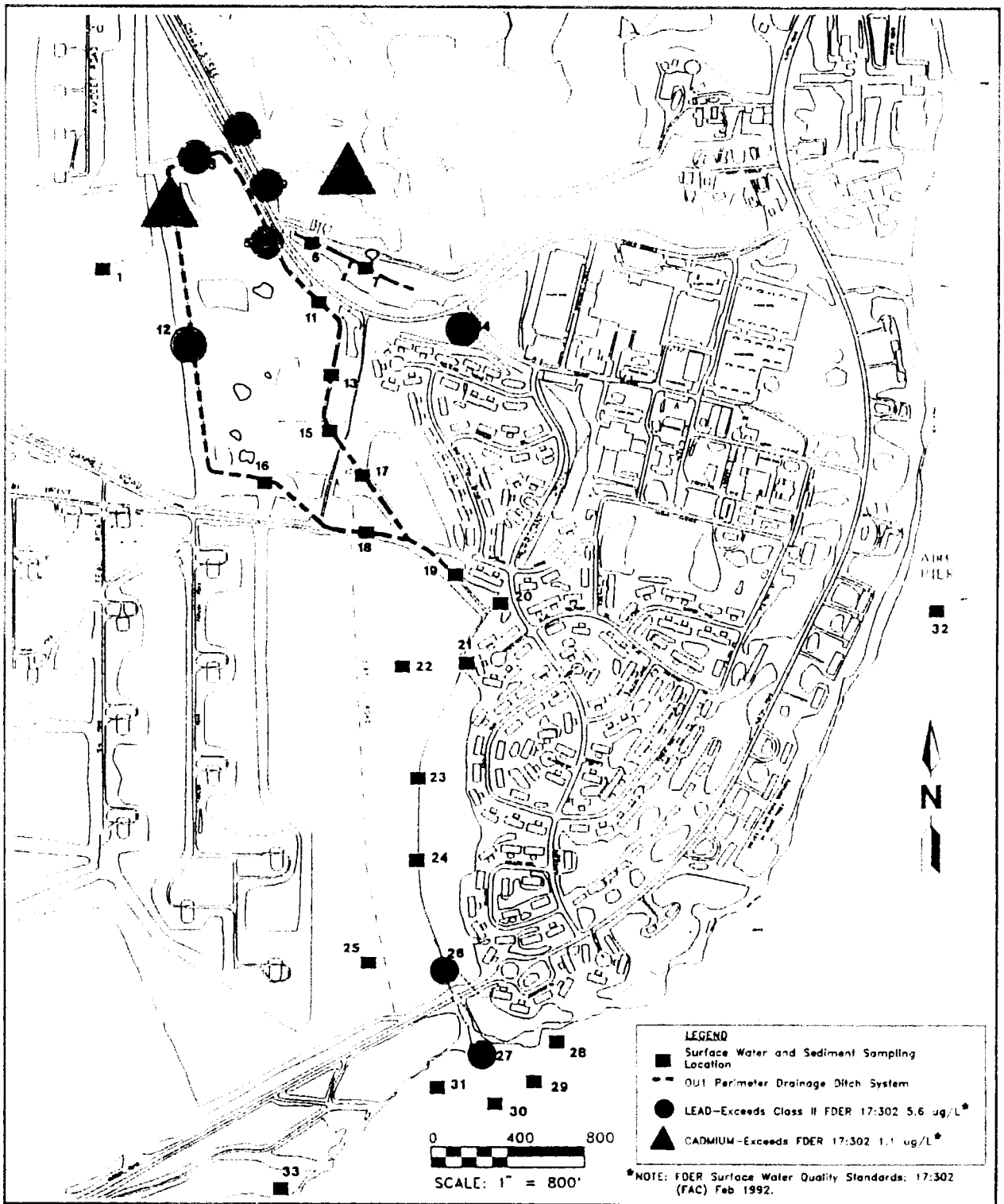

FIGURE 4-14

INORGANIC TARGET ANALYTES IN SURFACE WATER SAMPLES

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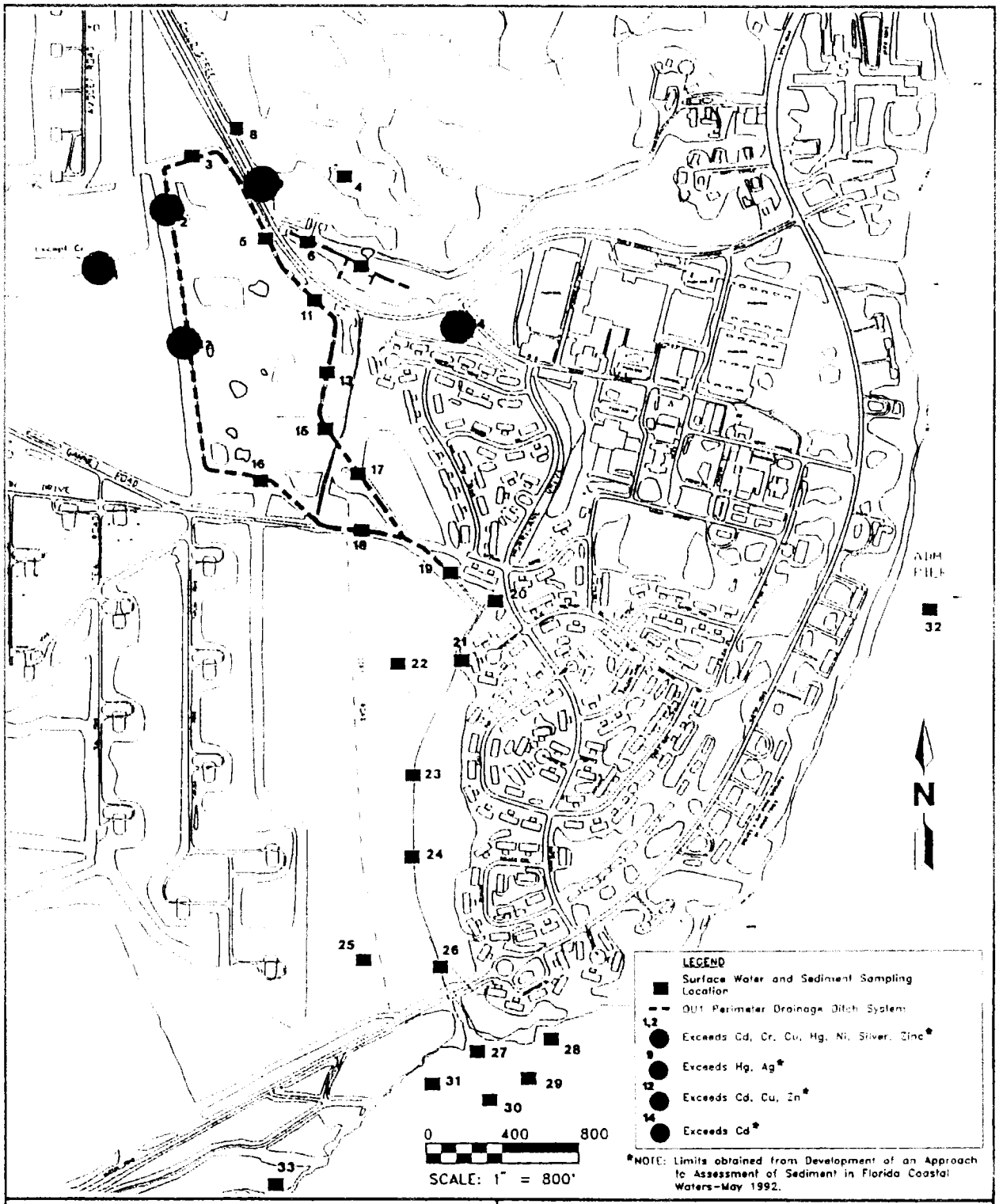

FIGURE 4-15

INORGANIC TARGET ANALYTES IN SEDIMENT SAMPLES

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respectively. Eleven of the sediment water samples contained Radium-226 at concentrations greater than the background sample. Radium-226 was detected in twenty six of the surface water samples.

Radium-228 was detected in seven of the sediment samples, at concentrations ranging from 0.4 pCi/g (five samples SD005, SD016, SD025, SD026, and SD033) to 0.8 pCi/g (SW003). Only one sediment background sample, SD025, contained Radium-228 at a concentration of 0.4 pCi/g. Two of the sediment samples contained Radium-228 at concentrations greater than the background sample. Radium-228 was detected in thirteen of the surface water samples.

Alpha (gross) was detected in 32 of the sediment samples, at concentrations ranging from 0.4 pCi/g (three samples SD012, SD014, and SD015) to 3.5 pCi/g (SW017). The two sediment background samples, SD022 and SD025, contained alpha (gross) at concentrations of 1.5 pCi/g and 1.9 pCi/g, respectively. Nine of the surface water samples contained alpha (gross) at concentrations greater than the background sample.

Beta (gross) was detected in each of the 32 sediment samples, at concentrations ranging from 0.4 pCi/g (SD013 and SD014) to 3.8 pCi/g (SW011). The two sediment background samples, SD022 and SD025, contained Beta (gross) at concentrations of 0.8 pCi/g and 0.9 pCi/g, respectively. Thirteen of the surface water samples contained Beta (gross) at concentrations greater than the background sample.

ARARs Comparison. Radionuclide target constituents (combined values for Radium-226 and alpha [gross], and beta [gross]) were detected in surface water samples in excess of preliminary ARARs (Figure 4-16). Radium-226 plus alpha (gross) and beta (gross) exceeded the FDWS, which was applied to surface water quality in absence of a FSWCS standard. Currently, adequate sediment background data does not exist for comparison to the chemical analytical data. No ARARs exist for radionuclides (Radium-226, Radium-228, alpha [gross], and beta [gross]) in sediments.

4.3.4 Soil Sample Results The purpose of the soil sampling event was to determine the horizontal and vertical extent of contamination of OU1 site soils and to support a preliminary assessment of the potential exposure to human or ecological receptors. Contaminants detected in the soil samples consist of volatiles and semivolatile organics, pesticides, PCBs, inorganics, dioxins and furans, and radionuclides. The highest concentrations of soil contamination were detected in the vicinity of former solvent and waste oil disposal pit areas. Contaminants also were detected at lower concentrations at surface soil samples (less than 6 inches beneath the land surface) in various portions of OU1. Tabulation of the detected TCL and TAL parameters is provided in Appendix D.

Eight soil samples, SL065, SL067, SL071, SL076, SL084, SL090, and SL096, were collected along the western and northern boundary of OU1 for the purpose of providing background chemical analytical data (Figure 3-7). Solid waste materials (glass, metal, etc.) were found to exist along the firelane maintained between the restricted weapons storage area and OU1. Only one sample, SL096, may provide background data; however, volatile organic compounds were detected at this sample location, which may indicate that disposal activities also occurred

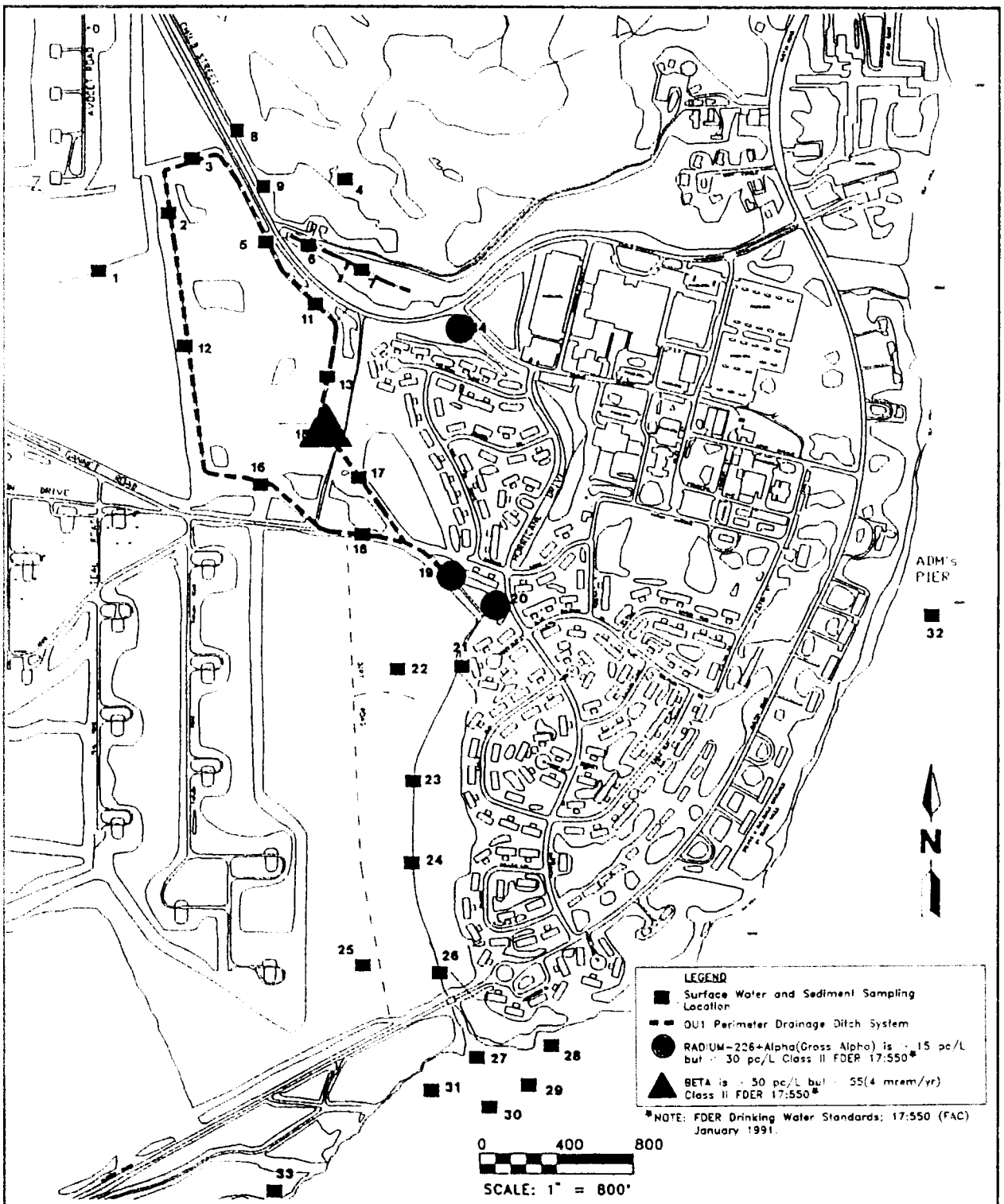

FIGURE 4-16

RADIONUCLIDES IN SURFACE WATER SAMPLES

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The detected VOCs were chlorobenzene, tetrachloroethene, trichloroethene, toluene, and xylenes.

Eight soil samples collected at depths of 4 to 7 feet beneath the land surface contained VOCs (Figure D-3). The soil samples were located in the central and eastern portions of OU1. The highest concentrations (sum of each detected VOC) were from three samples, SL047, SL082, and SL083, at 153,000 μg/kg, 2,690 μg/kg and 10,290 μg/kg, respectively. The detected VOCs consisted of acetone, benzene, chlorobenzene, ethylbenzene, toluene, and xylenes. Two samples, SL043 and SL072, contained VOCs between the range of 10 to 50 μg/kg, total value of each detected VOC. The detected VOCs were benzene, chlorobenzene, trichloroethene, toluene, and xylenes. Three samples contained VOCs in the range of 1 to 10 μg/kg, total value of each detected VOC. The detected VOCs were chlorobenzene and toluene.

Six soil samples collected at depths of 7 to 12 feet beneath the land surface contained VOCs (Figure D-4). The soil samples were located in the central and southern portions of OU1. The highest concentrations (sum of each detected VOC) were from two samples, SL040 and SL044, at 2,000 μg/kg and 912,100 μg/kg, respectively. The detected VOCs consisted of 1,1-dichloroethane, 1,2-dichloroethene, 2-butanone, acetone, benzene, carbon disulfide, chlorobenzene, ethylbenzene, methylene chloride, toluene, trichloroethene, styrene, and xylenes. Two samples, SL039 and SL098, contained VOCs between the range of 10 to 50 μg/kg, sum of each detected VOC. The detected VOCs were 1,2-dichloroethene, benzene, carbon disulfide, chlorobenzene, toluene, trichloroethene, vinyl chloride, and xylenes. Two samples contained VOCs in the range of 1 to 10 μg/kg, sum of each detected VOC. The detected VOCs were benzene, carbon disulfide, and toluene.

ARARs Comparison. The total value, or the sum of volatile organic compound concentrations detected above the CRQL and SQL, exceeded the 50 ▪g/kg clean soil level as defined by the FCSL at soil sampling locations SL022 (2 to 4 feet), SL040 (7.5 to 8.5 feet), SL044 (7 to 9 feet), SL047 (3 to 5 feet), SL072 (0 to 3 inches), SL082 (3 to 5 feet), SL083 (5 to 7 feet), and SL097 (1 to 3 feet) (see Appendix D for specific constituent concentrations and Figure 4-17 for sample locations). None of the VOCs exceed the PRGs calculated in accordance with the USEPA RAGS.

4.3.4.2 Semivolatile Organic Compounds (SVOCs)

Soil Sample Results. SVOCs that were detected in some of the soil samples consist of chlorinated hydrocarbons, benzoic acid, dibenzofuran, n-nitroso-diphenylamine, phthalate esters, polynuclear aromatic hydrocarbons, and phenolic compounds. See Appendix D for analytical results.

The locations of soil samples that contained chlorinated hydrocarbons (1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene), benzoic acid, dibenzofuran, n-nitroso-diphenylamine are described in Figure D-5. The values shown on Figure D-5 represent totals of each SVOC detected at a sample location by depth. The soil samples collected from the land surface to a depth of 3 inches contained benzoic acid (3 samples) and 1,2,4-trichlorobenzene (1 sample). Benzoic acid was detected in samples SL057, SL059,

in the immediate vicinity of this sample location. The other seven samples were collected in areas that are impacted by the deposition of landfilled materials; therefore, these samples cannot be used for background chemical analytical data.

A preliminary comparative evaluation was made of the chemical analytical results for the soil samples with preliminary ARARs. The ARARs selected for the preliminary evaluation were:

- Florida Clean Soil Levels (FCSLs), which are promulgated under Chapter 17.770 Rules and Regulations of the State of Florida; and

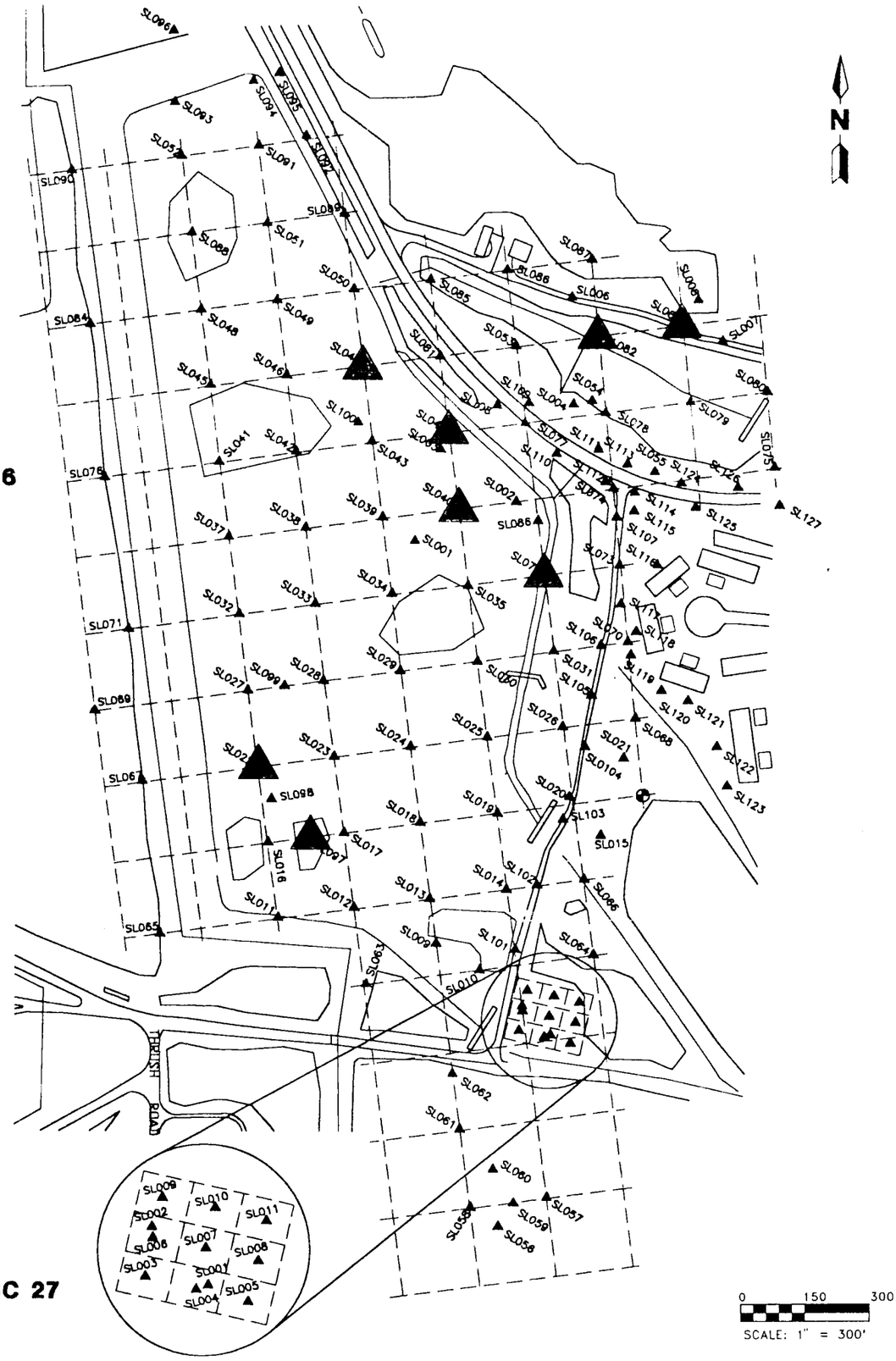
- USEPA preliminary remediation goals (PRGs) calculated using USEPA Risk Assessment Guidance for Superfund Sites (RAGS) at either the 10^{-6} risk or index factor of 1 (USEPA, 1991).

4.3.4.1 Volatile Organic Compounds (VOCs)

Soil Sample Results. VOCs detected in some of the soil samples consist of acetone, benzene, 2-butanone, bromomethane, carbon disulfide, chlorobenzene, 1,1-dichloroethane, 1,1-dichloroethene, 1,1-dichloroethane, 1,2-dichloroethene, ethylbenzene, methylene chloride, tetrachloroethene, toluene, trichloroethene, styrene, vinyl chloride, and xylenes.

Twenty-seven of the soil samples collected from the land surface, to a depth of 3 inches, contained VOCs (Figure D-1). The soil samples that contained VOCs were located along the western site boundary and the restricted weapons storage area and south of PSC-27, the eastern site boundary adjacent to base housing and the eastern side of PSC-26. VOCs were not detected in surficial (land surface to a depth of 3 inches) soil samples located in the central portion of OU1. The highest detected concentration (116 μg/kg, sum of each detected VOC) of VOCs was at location SL072, near the base housing area. The detected constituents were benzene, toluene, ethylbenzene, xylenes, and styrene. The second highest detected concentration (51 μg/kg, sum of each detected VOC) of VOCs was obtained from sample SL068, also located near base housing. The detected constituents were carbon disulfide, methylene chloride, and xylenes. Six samples contained VOCs in the range of 10 to 50 μg/kg, total value of each detected VOC. The detected VOCs in these six samples were acetone, benzene, toluene, xylenes, and carbon disulfide. Nineteen samples contained VOCs in the range of 1 to 10 μg/kg, total value of each detected VOC. The detected VOCs were bromomethane, carbon disulfide, methylene chloride, toluene, and xylenes.

Twelve soil samples collected at depths of 1 to 4 feet beneath the land surface contained VOCs (Figure D-2). The soil samples were located in the northern, western, and southern portions of OU1. The highest concentrations (sum of each detected VOC) were from two samples, SL022 and SL097, at 26,660 μg/kg and 24,220 μg/kg, respectively, collected from the southern portion of OU1. The detected VOCs were 1,1-dichloroethane, 1,2-dichloroethene, acetone, chlorobenzene, ethylbenzene, toluene, trichloroethene, and xylenes. Two samples contained VOCs between the range of 10 to 50 μg/kg, total value of each detected VOC. One sample, SL052, was located in the northern portion of OU1 and the other sample, SL024, was located in the southern portion of OU1. The detected VOCs were chlorobenzene, tetrachloroethene, trichloroethene, and toluene. Eight samples contained VOCs in the range of 1 to 10 μg/kg, total value of each detected VOC.



LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- TOTAL VOLATILE ORGANIC COMPOUNDS > 50 ug/Kg*

*NOTE: FDER 17:1775 CLEAN SOIL LEVEL, MAY 1992.

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FIGURE 4-17
VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES

and SL060 at concentrations of 170 μg/kg, 140 μg/kg, and 1,800 μg/kg, respectively. 1,2,4-trichlorobenzene was detected at sample SL082 at a concentration of 800 μg/kg.

Soil samples collected at depths of 1 to 4 feet contained chlorinated hydrocarbons consisting of 1,2-dichlorobenzene (3 samples), 1,3-dichlorobenzene (2 samples), 1,4-dichlorobenzene (1 sample), and benzoic acid (1 sample), and n-nitroso-diphenylamine (1 sample). 1,2-Dichlorobenzene was detected at sample locations SL013, SL022, and SL097 at concentrations of 120 μg/kg, 43,000 μg/kg, and 3,900 μg/kg, respectively. 1,3-dichlorobenzene was detected at sample locations SL022 and SL097 at concentrations of 4,600 μg/kg and 1,000 μg/kg, respectively. Benzoic acid was detected at sample location SL041 at a concentration of 220 μg/kg. 1,4-dichlorobenzene and n-nitroso-diphenylamine were detected at sample location SL097 at concentrations of 2,400 μg/kg and 2,200 μg/kg, respectively.

Soil samples collected at depths of 4 to 7 feet contained concentrations of chlorinated hydrocarbons, 1,2-dichlorobenzene (1 sample), 1,3-dichlorobenzene (2 samples), 1,4-dichlorobenzene (1 sample), and n-nitroso-diphenylamine (2 samples). 1,2-Dichlorobenzene was detected at sample location SL047 at concentration of 3,500 μg/kg. 1,3-Dichlorobenzene was detected at sample locations SL043 and SL047 at concentrations of 180 μg/kg and 6,400 μg/kg, respectively. 1,4-Dichlorobenzene was detected at sample location SL047 at a concentration of 7,600 μg/kg. N-nitroso-diphenylamine was detected at sample locations SL047 and SL099 at concentrations of 210 μg/kg and 420 μg/kg, respectively.

Soil samples collected at depths of 7 to 12 feet contained concentrations of chlorinated hydrocarbons, 1,2-dichlorobenzene (5 samples), 1,4-dichlorobenzene (1 sample), 1,2,4-trichlorobenzene (1 sample), and benzoic acid (1 sample), and n-nitroso-diphenylamine (3 samples). 1,2-Dichlorobenzene was detected at sample locations SL039, SL040, SL044, SL097, and SL098, at concentrations ranging from 190 μg/kg (SL097) to 92,000 μg/kg (SL040). 1,4-Dichlorobenzene was detected at sample locations SL039 at a concentration of 630 μg/kg. 1,2,4-trichlorobenzene and benzoic acid were detected at sample location SL044 at concentrations of 25,000 μg/kg and 160,000 μg/kg, respectively. N-nitroso-diphenylamine was detected at sample locations SL044, SL097 and SL098 at concentrations of 5,500 μg/kg, 220 μg/kg and 190 μg/kg, respectively.

Phthalate esters detected in the soil samples consist of butylbenzylphthalate, di-n-butylphthalate, diethylphthalate, and bis(2-ethylhexyl)phthalate. The distribution, sum value of the detected phthalate esters, in soil samples at OU1 are provided by the following depth ranges: land surface to 3 inches, Figure D-6; 1 to 4-feet, Figure D-7; 4 to 7 feet, Figure D-8; and 7 to 12 feet, Figure D-9.

Thirty-two samples collected from the land surface to a depth of 3 inches contained phthalate esters, butylbenzylphthalate, di-n-butylphthalate, and bis(2-ethylhexyl)phthalate (Figure D-6). Three of the samples SL27001, SL27004, and SL057 contained butylbenzylphthalate at concentrations of 250 μg/kg, 470 μg/kg, and 85 μg/kg. Four of the samples, SL27005, SL27011, SL070, and SL074 contained di-n-butylphthalate at concentrations of 190 μg/kg, 78 μg/kg, 44 μg/kg, and 50 μg/kg. Thirty-one of the samples contained bis(2-ethylhexyl)phthalate at

concentrations ranging from 42 μg/kg (two samples, SL060 and SL062) to 3,400 μg/kg (SL088). Three samples contained phthalate esters at concentration greater than 1,000 μg/kg, SL067, SL069 and SL086. None of the samples contained phthalate esters in the range of 500 μg/kg to 1,000 μg/kg. Fifteen of the samples contained phthalate esters in the range of 100 μg/kg to 500 μg/kg. Thirteen of the samples contained phthalate esters in the range of 1 μg/kg to 100 μg/kg.

Eighteen of the samples collected from depths of 1 to 4 feet beneath the land surface contained phthalate esters, di-n-butylphthalate, diethylphthalate, and bis(2-ethylhexyl)phthalate (Figure D-7). Di-n-butylphthalate and diethylphthalate were detected at only one location, SL041, at concentrations of 110 μg/kg and 220 μg/kg, respectively. Bis(2-ethylhexyl)phthalate was detected in 18 of the samples at concentrations ranging from 47 μg/kg (SL27011) to 4,300 μg/kg (SL097). Three samples contained phthalate esters at concentrations greater than 1,000 μg/kg, SL022, SL052, and SL097. Three of the samples contained phthalate esters in the range of 500 μg/kg to 1,000 μg/kg, SL024, SL041, and SL048. Eight of the samples contained phthalate esters in the range of 100 μg/kg to 500 μg/kg. Four of the samples contained phthalate esters in the range of 1 μg/kg to 100 μg/kg.

Eight of the samples collected from depths of 4 to 7 feet beneath the land surface contained phthalate esters, di-n-butylphthalate, and bis(2-ethylhexyl)phthalate (Figure D-8). Di-n-butylphthalate was detected in one sample (SL100) at a concentration of 110 μg/kg. Bis(2-ethylhexyl)phthalate was detected in eight samples at concentrations ranging from 42 μg/kg (SL042) to 900 μg/kg (SL072). None of the samples from this depth range contained phthalate esters at concentration greater than 1,000 μg/kg. Two of the samples contained phthalate esters in the range of 500 μg/kg, to 1,000 μg/kg, SL047 and SL072. Four of the samples contained phthalate esters in the range of 100 μg/kg to 500 μg/kg. Two of the samples contained phthalate esters in the range of 1 μg/kg to 100 μg/kg.

Eight of the samples (seven sample locations) collected from depths of 7 to 12 feet beneath the land surface contained only one phthalate ester, bis(2-ethylhexyl)phthalate (Figure D-9). Bis(2-ethylhexyl)phthalate was detected in eight samples at concentrations ranging from 190 μg/kg (SL035) to 15,000 μg/kg (SL044). Four of the sample locations from this depth range contained phthalate esters at concentration greater than 1,000 μg/kg, SL044, SL039, SL040, and SL097. One sample location contained phthalate esters in the range of 500 μg/kg to 1,000 μg/kg, SL098. Two of the samples contained phthalate esters in the range of 100 μg/kg to 500 μg/kg, SL034 and SL035 . None of the sample locations in this depth range contained phthalate esters in the range of 1 μg/kg to 100 μg/kg.

PAH compounds detected in some of the soil samples consisted of acenaphthene, acenaphthalene, anthracene, benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, benzo (g,h,i) perylene, benzo (k) fluoranthene, chrysene, fluoranthene, indeno (1,2,3-cd) pyrene, naphthalene, phenanthrene, and pyrene.

Twenty-one of the soil samples collected from the land surface to a depth of 3 inches contained PAH compounds (Figure D-10). The highest concentration (sum of each PAH compound) was at sample location SL072 (9,090 μg/kg, sum of each constituent). Only one sample (SL095) in this depth range contained PAH compounds in the range of 4,000 μg/kg to 6,000 μg/kg. Two soil samples, SL077

and SL084, in this depth range contained PAH compounds in the range of 2,000 μg/kg to 4,000 μg/kg. Twenty-one soil samples in this depth range contained PAH compounds in the range of 1 μg/kg to 2,000 μg/kg.

Eight of the soil samples, collected from a depth of 1 to 4 feet beneath the land surface, contained PAH compounds (Figure D-11). The highest concentrations (sum of each PAH compound) were detected at two sample locations, SL013 and SL041, at concentrations of 6760 μg/kg and 7,647 μg/kg, respectively. None of the samples in this depth range contained PAH compounds in the range of 4,000 μg/kg to 6,000 μg/kg. Two soil samples, SL022 and SL097, in this depth range contained PAH compounds in the range of 2,000 μg/kg to 4,000 μg/kg. Four soil samples in this depth range contained PAH compounds in the range of 1 μg/kg to 2,000 μg/kg.

Eight of the soil samples collected from a depth of 4 to 7 feet beneath the land surface contained PAH compounds (Figure D-12). The highest concentrations (sum of each PAH compound) were detected at two sample locations, SL040 and SL099, at concentrations of 7,830 μg/kg and 7,230 μg/kg, respectively. One sample in this depth range contained PAH compounds in the range of 4,000 μg/kg to 6,000 μg/kg. None of the soil samples in this depth range contained PAH compounds in the range of 2,000 μg/kg to 4,000 μg/kg. Five soil samples in this depth range contained PAH compounds in the range of 1 μg/kg to 2,000 μg/kg.

Six of the soil samples collected from a depth of 7 to 12 feet beneath the land surface contained PAH compounds (Figure D-13). The highest concentrations (sum of each PAH compound) were detected at four sample locations, SL034, SL035, SL040 and SL044, at concentrations of 6,400 μg/kg, 10,291 μg/kg, 7,830 μg/kg and 37,930 μg/kg, respectively. None of the samples in this depth range contained PAH compounds in the range of 4,000 μg/kg to 6,000 μg/kg. One soil sample, SL039, in this depth range contained PAH compounds in the range of 2,000 μg/kg to 4,000 μg/kg. One soil sample, SL098, in this depth range contained PAH compounds in the range of 1 μg/kg to 2,000 μg/kg.

Phenolic compounds detected in five of the soil samples consisted of four compounds 2,4-dimethyl phenol, 2-methyl-phenol, 4-methyl-phenol, and phenol (Figure D-14). Sample SL082 collected from the land surface to a depth of 3 inches contained a phenolic compound, 4-methyl-phenol, at a concentration of 150 μg/kg. Sample SL022 collected at a depth of 2 to 4 feet beneath the land surface contained each of the four phenolic compounds at concentrations of 2,200 μg/kg, 5,100 μg/kg, 8,800 μg/kg, and 14,000 μg/kg, respectively. Two soil samples, SL043 and SL047, collected at depths of 5 to 7 feet and 3 to 5 feet, respectively, contained 2,4-dimethyl phenol, 2-methyl-phenol, and 4-methyl-phenol. Soil sample SL043 contained these three compounds at concentrations of 900 μg/kg, 270 μg/kg, and 180 μg/kg, respectively. Soil sample SL047 contained these three compounds at concentration of 1,100 μg/kg, 1,100 μg/kg, and 460 μg/kg. Soil sample SL044 collected at a depth of 7 to 9 feet contained each of the four compounds at concentrations of 74,000 μg/kg, 450,000 μg/kg, 100,000 μg/kg, and 110,000 μg/kg.

ARARs Comparison. SVOC concentrations did not exceed any of the PRGs calculated in accordance with USEPA RAGS. Currently, there are no other FDER soil action levels for SVOCs other than those for polynuclear aromatic hydrocarbons (PAHs).

Total PAH values exceed the 6,000 μg/kg clean soil level defined by FCSL at soil sample locations SL013 (2 to 4 feet), SL034 (9 to 11 feet), SL035 (9 to 11 feet), SL040 (9 to 11 feet), SL041 (3 to 4 feet), SL044 (7 to 9 feet), SL047 (3 to 5

feet), SL072 (0 to 3 inches), and SL099 (5 to 7 feet). See Appendix D for individual constituents and concentrations and Figure 4-18 for sample locations. Individual PAH concentrations did not exceed any PRGs calculated in accordance with USEPA RAGS; however, several soil sample locations yielded low level PAH concentrations ranging between 40 μg/kg and 6,000 μg/kg.

4.3.4.3 Pesticides/Polychlorinated Biphenyl (PCBs)

Soil Sample Results.

Pesticides. Pesticides detected in some of the soil samples consist of alpha-BHC, aldrin, alpha and gamma chlordane, heptachlor, heptachlor epoxide, endrin, 4,4'-DDT, 4,4"-DDD, and 4,4'-DDE. PCBs detected in some of the soil samples consist of Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor 1260 (Appendix D.

The distribution of alpha-BHC, alpha and gamma chlordane, heptachlor, and heptachlor epoxide is depicted in Figure D-15. Alpha-BHC was detected in only one sample, SL084, at a concentration of 2.9 μg/kg. Heptachlor and heptachlor epoxide were detected in one sample, SL086, at concentrations of 55 μg/kg, and 180 μg/kg, respectively. Alpha chlordane was detected in six soil samples at concentrations ranging from 6.7 μg/kg (SL073) to 310 μg/kg (SL086). Gamma chlordane was detected at four soil sample locations at concentrations ranging from 4.2 μg/kg (SL061) to 310 μg/kg (SL086).

Endrin was detected at five sample locations, SL035, SL039, SL040, SL043, and SL047 at various depths (Figure D-16). Sample SL047, collected from the land surface to a depth of 3 inches, contained endrin at a concentration of 760 μg/kg. Sample SL043 was collected at a depth of 5 to 7 feet and contained endrin at a concentration of 650 μg/kg. Three samples, SL035, SL039, and SL040, were collected at depths from 9 to 12 feet beneath the land surface and contained endrin at concentrations of 14 μg/kg, 1,200 μg/kg, and 810 μg/kg.

Aldrin was detected at seven sample locations SL039, SL040, SL043, SL047, SL053, SL072, and SL116 at various depths (Figure D-17). Two samples, SL053 and SL116, collected from the land surface to a depth of 3 inches contained aldrin at concentrations of 16 μg/kg and 3.5 μg/kg, respectively. One sample, SL047, collected from a depth of 3 to 5 feet contained aldrin at a concentration of 630 μg/kg. Two samples, SL043 and SL072, collected from depths of 5 to 7 feet beneath the land surface contained aldrin at concentrations of 600 μg/kg, and 2.3 μg/kg, respectively. Two samples SL039 and SL040, collected from depths of 7 to 12 feet beneath the land surface contained aldrin at concentrations of 1,100 μg/kg and 670 μg/kg, respectively.

FIGURE 4-18
SEMI-VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES

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4,4'-DDT, 4,4'-DDD, and 4,4'-DDE were detected in various combinations and concentrations at 44 soil samples collected from the land surface to depths of 3 inches (Figure D-18). Four samples, SL025, SL067, SL069, and SL120 contained the highest detected concentrations of one or more of these pesticides. Sample SL025 contained 4,4'-DDT and 4,4'-DDD at concentrations of 1,100 μg/kg, respectively, and 4,4'-DDE at a concentration of 110 μg/kg. Samples SL067, SL069, and SL120 contained only 4,4'-DDT at concentrations of 20,000 μg/kg, 4,800 μg/kg, and 8,200 μg/kg. None of the samples collected at this depth interval contained these three pesticides (individual value or sum of each constituent) at concentrations in the range of 1,000 μg/kg to 1,900 μg/kg. Seven of the samples contained one or more of theses three pesticides (individual value or sum of each constituent) at concentrations in the range of 100 μg/kg to 1,000 μg/kg. The detected concentrations for this range were from 110 μg/kg at sample SL022 (4,4'-DDE) to 260 μg/kg at sample SL27011 (4,4'-DDT and 4,4'-DDE each at a concentration of 130 μg/kg). Thirty-three of the soil samples contained one or more of these three pesticides at concentrations less than 100 μg/kg.

PCBs. PCBs detected in the soil samples consisted of Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260 (Appendix D).

Seventy-nine soil samples collected from the land surface to a depth of 3 inches contained PCBs (Figure D-20). Two samples, SL082 and SL102, contained PCBs at concentrations equal to, or greater than, 50,000 μg/kg (or 50 mg/kg). Sample SL082 contained Aroclor-1260 at a concentration of 50,000 μg/kg. Sample SL102 contained Aroclor-1260 at a concentration of 260,000 μg/kg. Three samples, SL014, SL024, and SL101, contained PCBs at concentrations between 25,000 μg/kg and 50,000 μg/kg. These three samples contained concentrations of Aroclor-1260 at concentrations of 44,000 μg/kg, 47,000 μg/kg, and 27,000 μg/kg. One sample, SL083, contained PCBs (Aroclor-1260 at a concentration of 12,000 μg/kg) in the range of 10,000 μg/kg to 25 μg/kg. Twenty-five samples contained PCBs in the range of 1,000 μg/kg to 10,000 μg/kg. Forty-eight samples contained PCBs at detectable concentrations less than 1,000 μg/kg.

Nineteen soil samples collected from depths of 1 to 4 feet beneath the land surface contained PCBs (Figure D-21). None of the samples in this depth interval contained PCBs in the range of 25,000 μg/kg to 50,000 μg/kg. Three samples, SL013, SL024, and SL047, contained PCBs in the range of 10,000 μg/kg to 25,000 μg/kg. Sample SL013 contained Aroclor-1248 and Aroclor-1260 at concentrations of 3,700 μg/kg and 9,300 μg/kg, respectively. Sample SL024 contained Aroclor-1260 at a concentration of 10,000 μg/kg. Sample SL047 contained Aroclor-1248 and Aroclor-1260 at concentrations of 8,800 μg/kg and 4,000 μg/kg. Eight samples contained PCBs in the range of 1,000 μg/kg to 10,000 μg/kg. Eight samples contained PCBs at detectable concentrations less than 1,000 μg/kg.

Four soil samples collected from depths of 4 to 7 feet beneath the land surface continued PCBs (Figure D-22). None of the samples from this depth interval contained PCBs at concentrations greater than 10 μg/kg. Two samples, SL043 and SL083, contained PCBs in the range of 1,000 μg/kg to 10,000 μg/kg. Two samples, SL099 and SL100, contained PCBs at detectable concentrations less than 1,000 μg/kg.

Seven soil samples collected from depths of 7 feet to 12 feet beneath the land surface contained PCBs (Figure D-23). Two samples, SL039 and SL044, contained

PCBs at concentrations between 25,000 and 50,000 μg/kg. Sample SL039 contained Aroclor-1248 and Aroclor-1254 at concentrations of 28,000 μg/kg and 25,000 μg/kg, respectively. Sample SL040 contained Aroclor-1248 at concentrations of 42,000 μg/kg. Only one sample, SL034, contained PCBs in the range of 10,000 μg/kg to 25,000 μg/kg. Sample SL034 contained Aroclor-1248 at a concentration of 13,000 μg/kg. Three samples, SL040, SL097, and SL098, contained PCB in the range of 1,000 μg/kg to 10,000 μg/kg. Only one sample, SL035, contained PCBs at detectable concentrations less than 1,000 μg/kg.

ARARs Comparison.

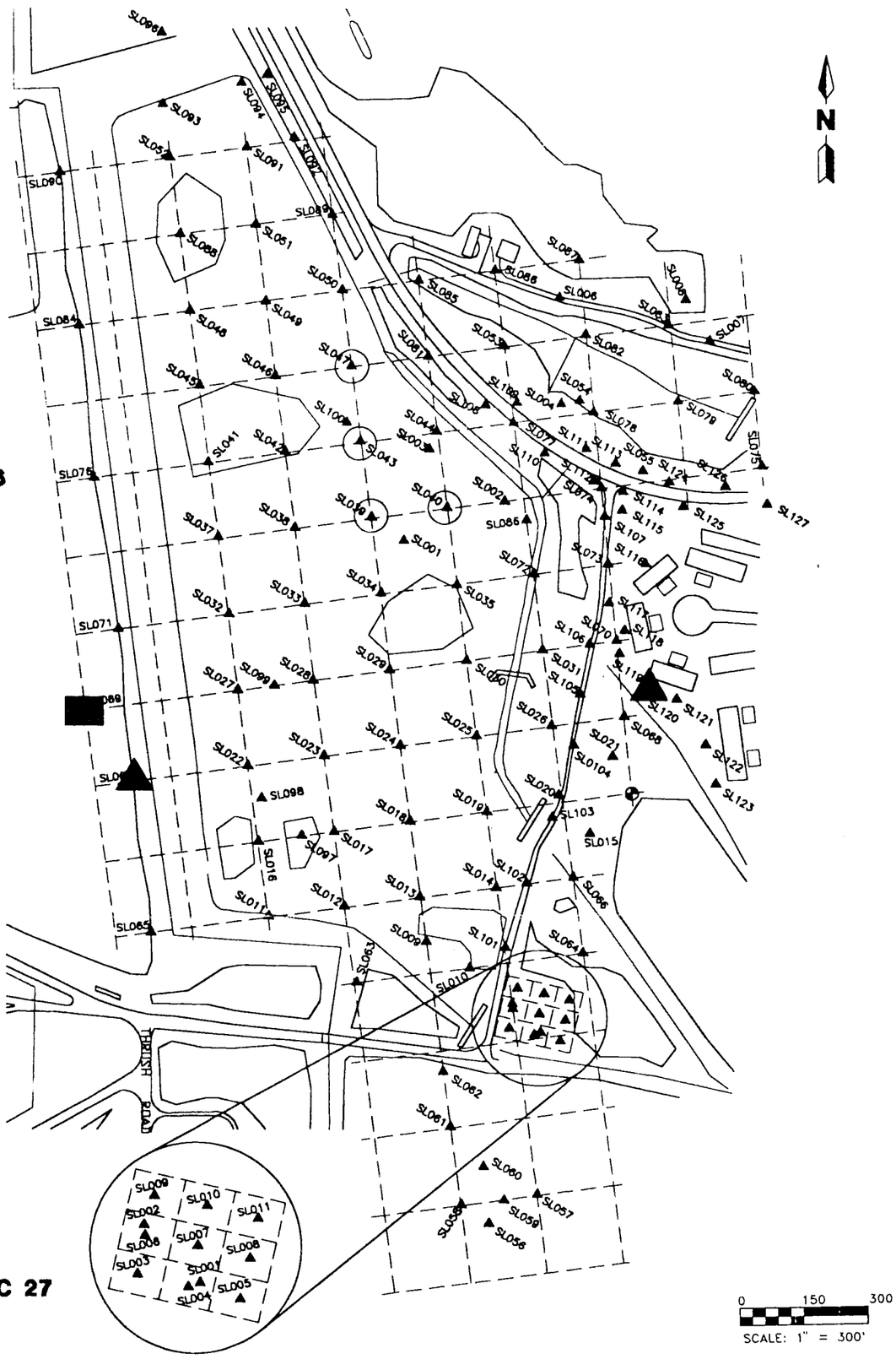
Pesticides. Concentrations of pesticides 4,4'-DDE and 4,4'-DDT exceed the calculated PRG of 1,900 μg/kg at only soil sampling location SL096 (0 to 3 inches) (Figure 4-19). Concentrations of 4,4'-DDT exceeded the USEPA region III 10^{-6} residential risk level of 5,000 μg/kg (Smith, 1992) at two soil sample locations, SL067 (0 to 3 inches) and SL120 (0 to 3 inches). Although not included in the analytical summary table in Appendix D, the Region III risk-based concentrations are provided in Figure 4-19 as an additional comparison for data evaluation.

Concentrations of the pesticide Aldrin exceed the calculated PRG of 38 μg/kg, at soil sample locations SL034 (5 to 7 feet), SL047 (3 to 5 feet), SL039 (10 to 12 feet), and SL040 (9 to 11 feet).

PCBs. PCB concentrations exceeded the 83 μg/kg (or 0.083 mg/kg) PRG calculated using the USEPA RAGs in 130 of the soil samples (Appendix D). The primary Aroclors exceeding the PCB PRGs were Aroclor-1254 and Aroclor-1260 (Table 4-6). Figure 4-20 illustrates the locations where soil samples contained concentrations of PCBs in the range of 1 to 10 mg/kg, 10 to 50 mg/kg, and greater than 50 mg/kg. The concentration ranges bracket the USEPA preliminary remediation goal of 1 mg/kg, the Toxic Substances Control Act (TSCA) non-restricted access limit of remediation to less than 10 mg/kg, and the TSCA criteria requiring disposal of materials contaminated with 50 mg/kg PCBs at TSCA-approved chemical waste landfill. For Superfund sites, the risk remaining after remediation should generally fall within the range of 10^{-4} to 10^{-6} individual excess cancer risk (USEPA, 1990). Based on standard exposure assumptions associated with residential use, concentrations of 0.1 mg/kg to 10 mg/kg fall within the protective range (USEPA, 1990). PCB concentrations that exceed the 10 mg/kg residential use concentration are: SL014 (0 to 3 inches), SL024 (0 to 3 inches), SL034 (9 to 11 feet), SL039 (10 to 12 feet), SL044 (7 to 9 feet), SL082 (0 to 3 inches), SL083 (0 to 3 inches), and SL101 (0 to 3 inches).

4.3.4.4 Inorganics

Soil Sample Results. TAL inorganics detected in the soil samples consisted of aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.



LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- >38 ug/Kg EPA PRG FOR ALDRIN*
- >1900 ug/Kg FOR 4,4-DDE OR 4,4-DDT*
- >5000 ug/Kg FOR 4,4-DDT**

Note:
*EPA PRELIMINARY REMEDIATION GOAL, DEC, 1991.
**EPA REGION III RISK BASED CONCENTRATION FOR 10^{-6} CANCER RISK.

FIGURE 4-19
PESTICIDES IN SOIL SAMPLES

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FIGURE 4-20
PCB's IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

Aluminum was detected in 102 soil samples, at concentrations ranging from 105 mg/kg (SL056) to 18,800 mg/kg (SL041). The soil background samples contained aluminum at concentrations ranging from 1,050 mg/kg (SL067) to 10,500 mg/kg (SL071). Eighty soil samples contained aluminum at concentrations greater than the maximum value detected in the background sample.

Antimony was detected in 24 samples, at concentrations ranging from 3.8 mg/kg (SL022) to 108 mg/kg (SL041) (Figure D-24). The soil background samples contained antimony at concentrations ranging from 5.1 mg/kg (SL096) to 7 mg/kg (SL067). Seven soil samples contained antimony at concentrations greater than the maximum value detected in the background sample.

Arsenic was detected in eighty three soil samples, at concentrations ranging from 0.13 mg/kg (SL2710 and SL27011) to 19.6 mg/kg (SL057). The soil background samples contained arsenic at concentrations ranging from 0.34 mg/kg (SL065) to 12.6 mg/kg (SL076). Only one sample, SL057, contained arsenic at concentrations greater than the maximum value detected in the background sample.

Barium was detected in 101 soil samples, at concentrations ranging from 1.5 mg/kg (SL070) to 3,860 mg/kg (SL040) (Figure D-25). The soil background samples contained barium at concentrations ranging from 12.8 mg/kg (SL096) to 66.3 mg/kg (SL076). Nineteen soil samples contained barium at concentrations greater than the maximum value detected in the background sample.

Beryllium was detected in five soil samples, at concentrations ranging from 0.1 mg/kg (SL27005) to 0.16 mg/kg (SL047 and SL096) (Figure D-26). Beryllium was detected in background sample SL096. No soil samples contained beryllium at concentrations greater than the maximum value detected in the background sample.

Cadmium was detected in 70 soil samples, at concentrations ranging from 0.44 mg/kg (SL27009) to 164 mg/kg (SL096) (Figure D-27). The soil background samples contained cadmium at concentrations ranging from 3.6 mg/kg (SL096) to 164 mg/kg (SL067). No soil samples contained cadmium at concentrations greater than the maximum value detected in the background sample.

Calcium was detected in 102 soil samples, at concentrations ranging from 146 mg/kg (SL083) to 356,000 mg/kg (SL27002). The soil background samples contained calcium at concentrations ranging from 66.3 mg/kg (SL076) to 2,380 mg/kg (SL084). Fifty-three soil samples contained calcium at concentrations greater than the maximum value detected in the background sample.

Chromium was detected in 99 soil samples, at concentrations ranging from 1.1 mg/kg (SL066) to 473 mg/kg (SL044) (Figure D-28). The soil background samples contained chromium at concentrations ranging from 12.6 mg/kg (SL090) to 185 mg/kg (SL067). Five soil samples contained chromium at concentrations greater than the maximum value detected in the background sample.

Cobalt was detected in 38 soil samples, at concentrations ranging from 1.1 mg/kg (SL0083) to 9.2 mg/kg (SL040). The soil background samples contained cobalt at concentrations ranging from 1.6 mg/kg (SL084) to 3.2 mg/kg (SL096). Twelve soil samples contained cobalt at concentrations greater than the maximum value detected in the background sample.

Copper was detected in 76 soil samples, at concentrations ranging from 0.44 mg/kg (SL27006) to 5,840 mg/kg (SL072). The soil background samples contained copper at concentrations ranging from 26 mg/kg (SL096) to 167 mg/kg (SL084). Seven soil samples contained copper at concentrations greater than the maximum value detected in the background sample.

Iron was detected in 102 soil samples, at concentrations ranging from 69.2 mg/kg (SL056) to 59,000 mg/kg (SL041). The soil background samples contained iron at concentrations ranging from 2,280 mg/kg (SL065) to 22,100 mg/kg (SL096). Eight soil samples contained iron at concentrations greater than the maximum value detected in the background sample.

Lead was detected in 102 soil samples, at concentrations ranging from 1.3 mg/kg (SL070) to 2,990 mg/kg (SL27010) (Figures D-29 through D-32). The soil background samples contained lead at concentrations ranging from 45.3 mg/kg (SL096) to 601 mg/kg (SL067). Ten soil samples contained lead at concentrations greater than the maximum value detected in the background sample.

Magnesium was detected in 102 soil samples, at concentrations ranging from 20.1 mg/kg (SL27011) to 2,380 mg/kg (SL27002). The soil background samples contained magnesium at concentrations ranging from 78.4 mg/kg (SL067) to 412 mg/kg (SL084). Twenty-two soil samples contained magnesium at concentrations greater than the maximum value detected in the background sample.

Manganese was detected in 101 soil samples, at concentrations ranging from 1.4 mg/kg (SL27004) to 789 mg/kg (SL041). The soil background samples contained manganese at concentrations ranging from 19.7 mg/kg (SL096) to 136 mg/kg (SL096). Ten soil samples contained manganese at concentrations greater than the maximum value detected in the background sample.

Mercury was detected at 67 soil samples, at concentrations ranging from 0.03 mg/kg (SL27008, SL27011, and SL074) to 2.4 mg/kg (SL035). The soil background samples contained mercury at concentrations ranging from 0.11 mg/kg (SL067 and SL096) to 0.57 mg/kg (SL076). Eight soil samples contained mercury at concentrations greater than the maximum value detected in the background sample.

Nickel was detected in 52 soil samples, at concentrations ranging from 1.5 mg/kg (SL073) to 185 mg/kg (SL040). The soil background samples contained nickel at concentrations ranging from 7.4 mg/kg (SL096) to 64.4 mg/kg (SL067). Three soil samples contained nickel at concentrations greater than the maximum value detected in the background sample.

Potassium was detected in 49 soil samples, at concentrations ranging from 66 mg/kg (SL061) to 787 mg/kg (SL040). Only soil background samples SL084 and SL096 contained potassium at concentrations of 484 mg/kg and 81.8 mg/kg, respectively. Only two soil samples from location SL040 contained potassium at concentrations greater than the maximum value detected in the background sample.

Selenium was detected in 42 soil samples, at concentrations ranging from 0.11 mg/kg (SL070 and SL079) to 0.74 mg/kg (SL040). Only soil background samples SL084, SL090, and SL096 contained selenium at concentrations of 0.14 mg/kg, 0.21 μg/kg, and 0.15 mg/kg, respectively. Twelve soil samples contained selenium at concentrations greater than the maximum value detected in the background sample.

Silver was detected in 48 soil samples, at concentrations ranging from 0.29 mg/kg (SL024) to 48.8 mg/kg (SL040). The soil background samples contained silver at concentrations ranging from 1.6 mg/kg (SL090) to 5.8 mg/kg (SL096). Ten soil samples contained silver at concentrations greater than the maximum value detected in the background sample.

Sodium was detected in 93 soil samples, at concentrations ranging from 68.5 mg/kg (SL27004) to 388 mg/kg (SL27097). The soil background samples contained sodium at concentrations ranging from 95.9 mg/kg (SL065) to 246 mg/kg (SL090). Four soil samples contained sodium at concentrations greater than the maximum value detected in the background sample.

Thallium was detected at two soil sample locations, SL047 and SL097. The concentration of thallium at location SL047 was 0.27 μg/kg (sample depth of 3 to 5 feet beneath the land surface). Two soil samples collected at depths of 1 to 3 feet and 7 to 9 feet from location SL097 contained Thallium at concentrations of 0.21 μg/kg. Thallium was not detected in the soil background samples.

Vanadium was detected in 102 soil samples, at concentrations ranging from 0.47 mg/kg (SL27011) to 32.3 mg/kg (SL040). The soil background samples contained vanadium at concentrations ranging from 1.8 mg/kg (SL070) to 17.5 mg/kg (SL096). Five soil samples contained vanadium at concentrations greater than the maximum value detected in the background sample.

Zinc was detected in 102 soil samples, at concentrations ranging from 0.86 mg/kg (SL070) to 4,380 mg/kg (SL040). The soil background samples contained zinc at concentrations ranging from 19.6 mg/kg (SL070) to 418 mg/kg (SL096). Fifteen soil samples contained zinc at concentrations greater than the maximum value detected in the background sample.

Cyanide was detected in 25 soil samples, at concentrations ranging from 0.18 mg/kg (SL100) to 10 mg/kg (SL039, SL040, SL068, SL070, SL073, and SL074). Only one soil background sample, SL067, contained cyanide at a concentration of 0.37 mg/kg. Seventeen soil samples contained cyanide at concentrations greater than the maximum value detected in the background sample.

ARARs Comparison. Currently, there are no ARARs for aluminum, calcium, cobalt, iron, magnesium, potassium, and sodium. TAL analytes that did not exceed any of the ARARs used for this assessment include arsenic, copper, cyanide, manganese, mercury, nickel, selenium, silver, thallium, and zinc. TAL analytes that did exceed preliminary ARARs were lead, barium, cadmium, chromium, beryllium, and antimony.

Lead. Twenty-eight soil samples collected from depths of 0 to 3 inches contained lead at concentrations exceeding the FCSL of 77 mg/kg. Nine soil samples collected from depths of 1 to 4 feet beneath the land surface contained lead at concentrations greater than the FCSL of 77 mg/kg. Thirteen soil samples collected from depths of 4 to 12 feet beneath the land surface contained lead at concentrations greater than the FCSL of 77 mg/kg. See Appendix D for individual concentrations and Figure 4-21 for sample locations.

Currently, there is not a PRG for lead under USEPA RAGs. Further evaluation of background concentrations for lead would be required to address ranges for ambient lead concentrations.

Barium. Barium exceeded the FCSL level of 2,750 mg/kg in only one soil sample. Two soil samples were collected from location SL040 (7.5 to 8.5 feet). One sample was collected during sampling event No. 1 and contained barium at a concentration of 3,860 mg/kg. The other sample was collected during sampling event No. 2 and contained barium at a concentration of 691 mg/kg. None of the samples exceeded the calculated PRG of 13,500 mg/kg for barium. Barium is not represented on Figure 4-21.

Cadmium. Cadmium concentrations were near or exceeded the FCSL level of 55 mg/kg in soil samples collected from locations SL040 (9 to 11 feet, 56.3 mg/kg), SL041 (3 to 4 feet, 74.6 mg/kg), SL067 (0 to 3 inches, 167 mg/kg), and SL069 (0 to 3 inches, 124 mg/kg) (Figure 4-21). None of the soil samples exceeded the calculated PRG of 135 mg/kg for cadmium.

Chromium. Chromium exceeded the FCSL level of 275 mg/kg in only one soil sample collected at location SL044 (7 to 9 feet, 473 mg/kg) (Figure 4-21). None of the soil samples exceeded the calculated PRG of 135 mg/kg for chromium.

Beryllium. Beryllium exceeded the PRG level of 0.15 mg/kg in two samples, SL047 (0.16 mg/kg, sample at 3 to 5 feet) and SL096 (0.16 μg/kg, sample at 0 to 3 inches). Beryllium is not represented on Figure 4-21.

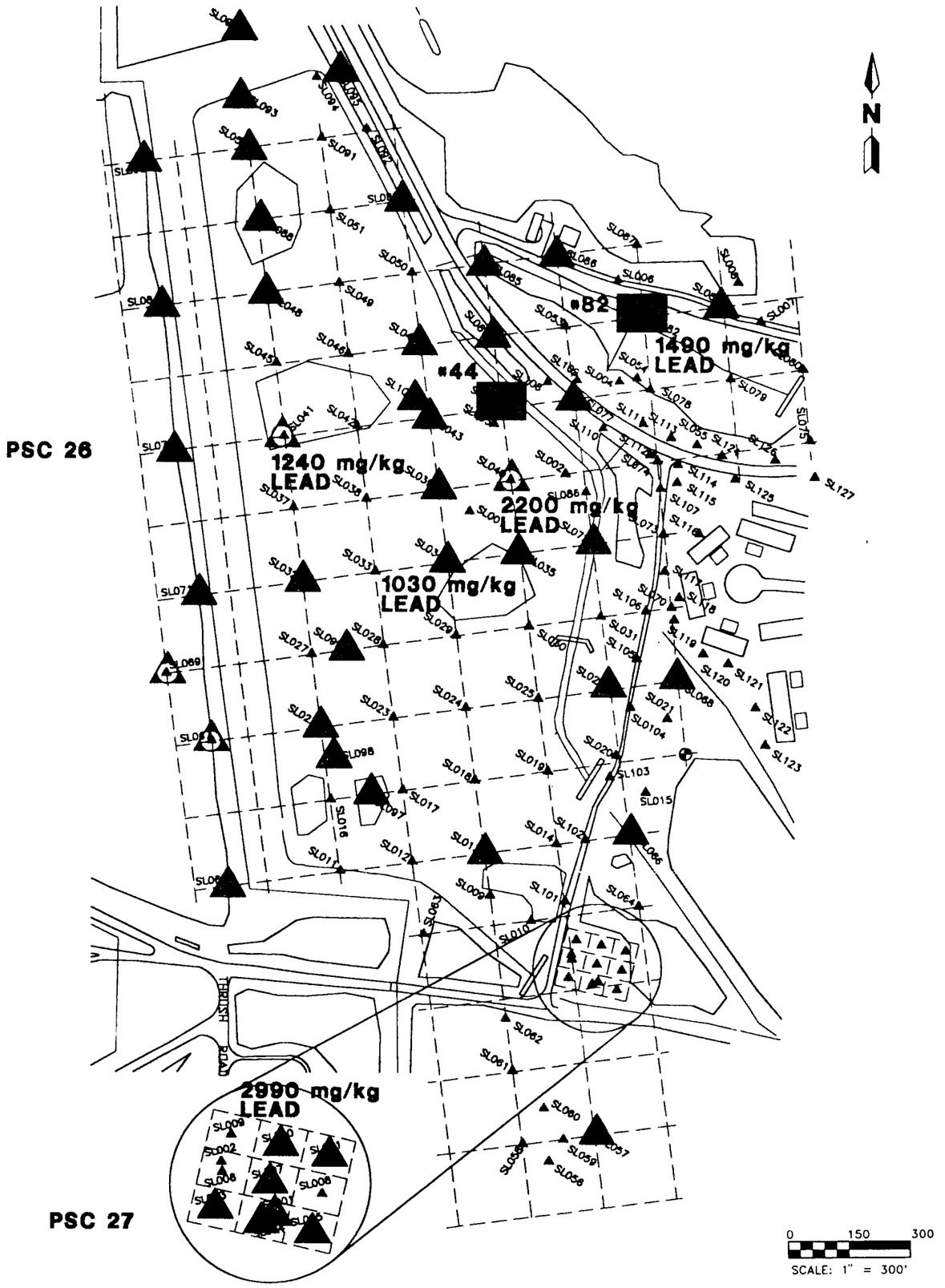
Antimony. Antimony exceeded the PRG level of 108 mg/kg in one sample, SL041 (108 mg/kg, sample at 3 to 4 feet). Antimony is not represented on Figure 4-21.

4.3.4.5 Dioxins/Furans

Soil Sample Results. Dioxins detected in the soil samples consisted of HpCDDs (total), OCDDs (total), and 1,2,3,4,6,7,8-HpCDD and furans consisted of 1,2,3,4,6,7,8-HpCDF.

HpCDDs (total) were detected at eight sample locations (Figure D-33) at various depth intervals. Seven samples collected from the land surface to a depth of 3 inches contained HpCDDs at concentrations ranging from 0.08 μg/kg (SL047) to 3.1 μg/kg. One sample, SL047, collected at depths of 3 to 5 feet beneath the land surface contained HpCDDs at a concentration of 0.15 μg/kg. Four samples collected in the depth range of 7 to 12 feet beneath the land surface contained HpCDDs at concentrations ranging from 1.2 μg/kg to 4.1 μg/kg. HpCDDs were not detected in the background samples.

OCDDs (total) were detected at 10 sample locations (Figure D-34) at various depth intervals. Nine samples collected from the land surface to a depth of 3 inches contained OCDDs at concentrations ranging from 0.24 μg/kg to 9.8 μg/kg. Two



LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- LEAD- > 77 mg/kg*
- CHROMIUM- > 275 mg/kg*
- CADMIUM- > 55 mg/kg*

* NOTE: FDER 17:775 CLEAN SOIL LEVEL, MAY 1992.

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE 4-21
INORGANIC COMPOUNDS IN SOIL SAMPLES

samples, SL096 (background) and SL040, collected at depths of 1 to 4 feet contained OCDDs at concentrations of 0.87 μg/kg and 8 μg/kg, respectively. One sample, SL047, collected at a depth 3 to 5 feet beneath the land surface contained OCDDs at a concentration of 0.96 μg/kg. Four samples collected at depths of 7 to 12 feet beneath the land surface contained OCDDs at concentrations ranging from 3.2 μg/kg (SL040) to 13 μg/kg (SL039).

1,2,3,4,6,7,8-HpCDD was detected at six sample locations (Figure D-35) at various depth intervals. Six samples collected from the land surface to a depth of 3 inches contained 1,2,3,4,6,7,8-HpCDD at concentrations ranging from 0.24 μg/kg (SL043) to 1.6 μg/kg (SL034). Four samples collected in the depth range of 7 to 12 feet beneath the land surface contained 1,2,3,4,6,7,8-HpCDD at concentrations ranging from 0.58 μg/kg (SL034) to 2.2 μg/kg (SL039 and SL040). 1,2,3,4,6,7,8-HpCDD was not detected in the background samples.

1,2,3,4,6,7,8-HpCDF was detected at four sample locations (Figure D-36) at various depth intervals. Three samples, SL034, SL039, and SL068, collected from the land surface to a depth of 3 inches contained 1,2,3,4,6,7,8-HpCDF at concentrations of 0.33 μg/kg, 0.44 μg/kg, and 0.33 μg/kg, respectively. Two samples, SL039 and SL040, collected in the depth range of 7 to 12 feet beneath the land surface contained 1,2,3,4,6,7,8-HpCDF at concentrations of 0.44 μg/kg and 1.7 μg/kg, respectively. 1,2,3,4,6,7,8-HpCDF was not detected in the background samples.

ARARs Comparison. Currently, there are no FDER or USEPA soil action levels for dioxins or furans in soil. Further evaluation of background concentrations, along with ecological and human health risk, will serve to define the significance and/or threat due to any positive detections of these compounds in soil.

4.3.4.6 Radionuclides

Soil Sample Results. Radionuclides detected in the soil samples consisted of alpha emissions, beta emissions, Radium-226, and Radium-228.

Combined values for alpha emissions and Radium-226 detected in soil samples collected at the land surface to a depth of 3 inches is shown in Figure D-37. Forty-nine sample locations from this depth interval contained detectable alpha emissions and Radium-226. Six soil samples had emissions greater than 4.5 pCi/g. Eight soil samples had emissions between the range of 3 to 4.5 pCi/g. Twenty-three soil samples had emissions between the range of 1.5 to 3 pCi/g. Twelve soil samples had emissions between the range of 0 to 1.5 pCi/g.

Combined values for alpha emissions and Radium-226 detected in soil samples collected from depths of 1 to 4 feet beneath the land surface is shown in Figure D-38. Twenty-five sample locations from this depth interval contained detectable alpha emissions and Radium-226. None of the soil samples had emissions greater than 4.5 pCi/g. Five soil samples had emissions between the range of 3 to 4.5 pCi/g. Eighteen soil samples had emissions between the range of 1.5 to 3 pCi/g. One soil sample had emissions between the range of 0 to 1.5 pCi/g.

Combined values for alpha emissions and Radium-226 detected in soil samples collected from depths of 4 to 7 feet beneath the land surface is shown in Figure

D-39. Thirteen sample locations from this depth interval contained detectable alpha emissions and Radium-226. None of the soil samples had emissions greater than 4.5 pCi/g. Five soil samples had emissions between the range of 3 to 4.5 pCi/g. Six soil samples had emissions between the range of 1.5 to 3 pCi/g. Two soil samples had emissions between the range of 0 to 1.5 pCi/g.

Combined values for alpha emissions and Radium-226 detected in soil samples collected from depths of 7 to 12 feet beneath the land surface is shown in Figure D-40. Seven sample locations from this depth interval contained detectable alpha emissions and Radium-226. One soil sample had emissions greater than 4.5 pCi/g. Two soil samples had emissions between the range of 3 to 4.5 pCi/g. Three soil samples had emissions between the range of 1.5 to 3 pCi/g. One soil sample had emissions between the range of 0 to 1.5 pCi/g.

Combined values for Radium-226 and Radium-228 detected in soil samples collected at the land surface to a depth of 3 inches is shown in Figure D-41. Forty-four sample locations from this depth interval contained detectable Radium-226 and Radium-228. Five soil samples had emissions greater than 4.5 pCi/g. Eight soil samples had emissions between the range of 3 to 4.5 pCi/g. Twenty-eight soil samples had emissions between the range of 1.5 to 3 pCi/g. Three soil samples had emissions between the range of 0 to 1.5 pCi/g.

Combined values for Radium-226 and Radium-228 detected in soil samples collected from depths of 1 to 4 feet beneath the land surface is shown in Figure D-42. Twenty-five sample locations from this depth interval contained detectable Radium-226 and Radium-228. None of the soil samples had emissions greater than 4.5 pCi/g. Six soil samples had emissions between the range of 3 to 4.5 pCi/g. Nine soil samples had emissions between the range of 1.5 to 3 pCi/g. Ten soil samples had emissions between the range of 0 to 1.5 pCi/g.

Combined values for Radium-226 and Radium-228 detected in soil samples collected from depths of 4 to 7 feet beneath the land surface is shown in Figure D-43. Thirteen sample locations from this depth interval contained detectable Radium-226 and Radium-228. Two soil samples had emissions greater than 4.5 pCi/g. Three soil samples had emissions between the range of 3 to 4.5 pCi/g. Seven soil samples had emissions between the range of 1.5 to 3 pCi/g. One soil samples had emissions between the range of 0 to 1.5 pCi/g.

Combined values for Radium-226 and Radium-228 detected in soil samples collected from depths of 7 to 12 feet beneath the land surface is shown in Figure D-44. Seven sample locations from this depth interval contained detectable Radium-226 and Radium-226. One soil sample had emissions greater than 4.5 pCi/g. Two soil samples had emissions between the range of 3 to 4.5 pCi/g. Three soil samples had emissions between the range of 1.5 to 3 pCi/g. One soil sample had emissions between the range of 0 to 1.5 pCi/g.

<u>ARARs Comparison</u>. Currently, there are no FDER or USEPA soil action levels for radionuclides (Radium-226, Radium-228, alpha [gross] and beta [gross]) in soil. Further evaluation of background concentrations, along with ecological and human health risk, will serve to define the significance and/or threat due to any positive detections of these compounds in soil.

4.3.5 Groundwater Sample Results The purpose of the groundwater sampling event was to determine the current groundwater quality and support a preliminary assessment of groundwater to be an exposure pathway to human or ecological receptors. Volatile and semivolatile organics and TAL inorganic contaminants were detected in the monitoring wells installed in the Intermediate zone of the Hawthorn Formation (115 to 120 feet beneath the land surface). Monitoring wells installed in the Shallow Aquifer System (10 to 40 feet beneath the land surface) contained concentrations of volatile and semivolatile organics, pesticides, metals, and radionuclides. Analytical results of the groundwater samples is provided in Appendix E. Free-phase hydrocarbons that contain PCBs also were detected in monitoring wells located near the former waste oil disposal pit.

A preliminary evaluation was made of the chemical analytical results for the surface water and sediment samples with preliminary ARARs. The ARARs selected for the preliminary evaluation were:

- Florida Drinking Water Standards (FDWS), which are promulgated under Chapter 17.550 Rules and Regulations of the State of Florida; and

- Federal Drinking Water Regulations and Health Advisories (FDWR), which are either promulgated under the Safe Drinking Water Act 40 CFR 141 or are guidelines for proposed standards.

Locations at which the ARARS were exceeded in the shallow and deep zones of the Surficial Aquifer and locations where free-phase hydrocarbons were found are illustrated in Figure 4-22. None of the TAL/TCL target analytes exceeded preliminary ARARS in the Intermediate Zone of the Hawthorn Formation.

4.3.5.1 Volatile Organic Compounds (VOCs)

Groundwater Sample Results. VOCs detected in the groundwater samples collected from wells screened in the shallow zone of the Surficial Aquifer consist of: 1,1-dichloroethane, 1,2-dichloroethene (total), 2-butanone, 4-methyl-2-pentanone, acetone, benzene, chlorobenzene, toluene, trichloroethene, vinyl chloride, and xylenes. 1,1-Dichloroethane was detected in only one sample, SSMW-033, at a concentration of 1 $\mu g/\ell$. 1,2-Dichloroethene was detected in three samples, SSMW-007, SSMW-017, and SSMW-033, at concentrations of 32 $\mu g/\ell$, 3 $\mu g/\ell$, and 2 $\mu g/\ell$. 2-Butanone was detected in only one sample, SSMW-032, at a concentration of 12 $\mu g/\ell$. 4-Methyl-2-pentanone was detected in two samples, SSMW-020 and SSMW-033, at concentrations of 6 $\mu g/\ell$ and 5 $\mu g/\ell$, respectively. Acetone was detected in three samples, SSMW-001, SSMW-020, and SSMW-027, at concentrations of 4 $\mu g/\ell$, 190 $\mu g/\ell$, and 5 $\mu g/\ell$, respectively. Benzene was detected in two samples, SSMW-007 and SSMW-033, at concentrations of 3 $\mu g/\ell$ and 2 $\mu g/\ell$, respectively. Chlorobenzene was detected in one sample, SSMW-033, at a concentration of 25 $\mu g/\ell$. Toluene was detected in three samples, SSMW-005, SSMW-007, and SSMW-033, at a concentration of 16 $\mu g/\ell$ in SSMW-5 and 2 $\mu g/\ell$ in samples SSMW-017 and SSMW-033. Trichloroethene was detected in two samples, SSMW-017 and SSMW-026, at concentrations of 5 $\mu g/\ell$ and 1 $\mu g/\ell$, respectively. Vinyl chloride was detected

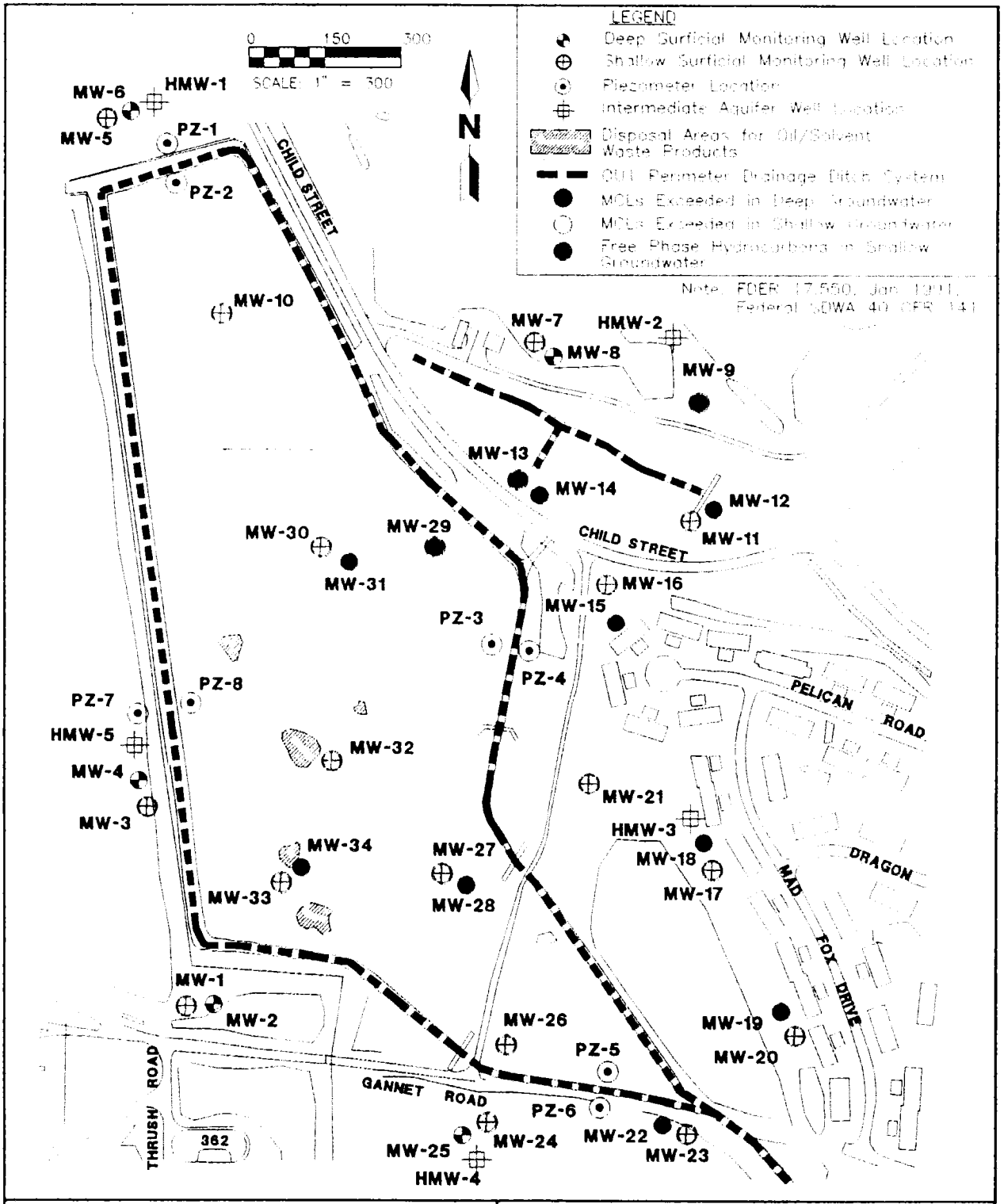


FIGURE 4-22

LOCATION OF WELLS WITH GROUNDWATER WHICH EXCEED PRELIMINARY ARARS

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

in two samples, SSMW-007 and SSMW-033, at concentration of 18 μg/ℓ and 6 μg/ℓ, respectively. Xylenes were detected in two samples, SSMW-007 and SSMW-033, at concentrations of 1 μg/ℓ and 2 μg/ℓ, respectively.

VOCs detected in the groundwater samples collected from the deep zone of the Surficial Aquifer consist of: 1,1-dichloroethane, 1,1-dichloroethene, 1,1,2-trichloroethane, 1,2-dichloroethene (total), 2-butanone, 4-methyl-2-pentanone, acetone, benzene, chlorobenzene, ethylbenzene, methylene chloride, tetrachloroethene, toluene, trichloroethene, vinyl chloride, and xylenes. 1,1-Dichloroethane was detected in four samples, DSMW-012 (15 μg/ℓ), DSMW-018 (1 μg/ℓ), DSMW-028 (1 μg/ℓ), and DSMW-034 (19 μg/ℓ). 1,1-Dichloroethene was detected in five samples at concentrations ranging from 8 μg/ℓ (DSMW-034) to 19 μg/ℓ (DSMW-019). 1,1,2-Trichloroethane was detected in one sample, DSMW-019, at a concentration of 14 μg/ℓ. 1,2-Dichloroethene (total) was detected in nine samples at concentrations ranging from 6 μg/ℓ (DSMW-014) to 1,200 μg/ℓ (DSMW-019). 2-Butanone was detected in two samples, DSMW-025 and DSMW-034, at concentrations of 100 μg/ℓ and 18 μg/ℓ, respectively. 4-Methyl-2-pentanone was detected in three samples, DSMW-014, DSMW-031, and DSMW-034, at concentrations of 4 μg/ℓ, 400 μg/ℓ, and 260 μg/ℓ, respectively. Acetone was detected in eight samples at concentrations ranging from 11 μg/ℓ (DSMW-002) to 12,000 μg/ℓ (DSMW-031). Benzene was detected in five samples: DSMW-012 at 19 μg/ℓ; DSMW-014, DSMW-015, and DSMW-028 at 1 μg/ℓ; and DSMW-034 at 3 μg/ℓ. Chlorobenzene was detected in one sample, DSMW-012, at a concentration of 25 μg/ℓ. Ethylbenzene was detected in two samples, DSMW-012 and DSMW-034, at concentrations of 14 μg/ℓ and 3 μg/ℓ, respectively. Methylene chloride was detected in three samples, DSMW-018-DL, DSMW-019, and DSMW-028, at concentrations of 3 μg/ℓ, 6 μg/ℓ, and 1 μg/ℓ, respectively. Tetrachloroethene was detected in four samples at concentrations ranging from 3 μg/ℓ (DSMW-015 and DSMW-018-DL) to 19 μg/ℓ (DSMW-019). Toluene was detected in two samples, DSMW-012 and DSMW-034, at concentrations of 1 μg/ℓ and 35 μg/ℓ, respectively. Trichloroethene was detected in nine samples at concentrations ranging from 1 μg/ℓ (DSMW-015) to 760 μg/ℓ (DSMW-019). Vinyl chloride was detected in seven samples at concentrations ranging from 3 μg/ℓ to 70 μg/ℓ. Xylenes was detected in two samples, DSMW-012 and DSMW-034, at concentrations of 6 μg/ℓ and 5 μg/ℓ, respectively

VOCs detected in the Intermediate Zone Aquifer of the Hawthorn Formation consisted of: 4-methyl-2-pentanone, ethyl acetate, and n-butyl acetate. 4-Methyl-2-pentanone was detected in one sample, HMW-001, at a concentration of 4 μg/ℓ. Ethyl acetate and n-butyl acetate were detected in one sample, HMW-004, at concentrations of 11 μg/ℓ and 6 μg/ℓ, respectively.

<u>ARARs Comparison</u>. Samples collected from monitoring wells screened in the shallow zone of the Surficial Aquifer contained concentrations of VOC target analytes, benzene, trichloroethene (TCE), vinyl chloride (VC) and 1,2-dichloroethene (1,2-DCE) in excess of the FDWS ARARs (Figure 4-23). Samples collected from wells screened in the deep zone of the Surficial Aquifer contained concentrations of benzene, chlorobenzene, TCE, PCE, toluene, VC, 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethene (1,2-DCE), and 1,1,2-trichloroethane (1,1,2-TCA) in excess of preliminary FDWS ARARs (Figure 4-24).

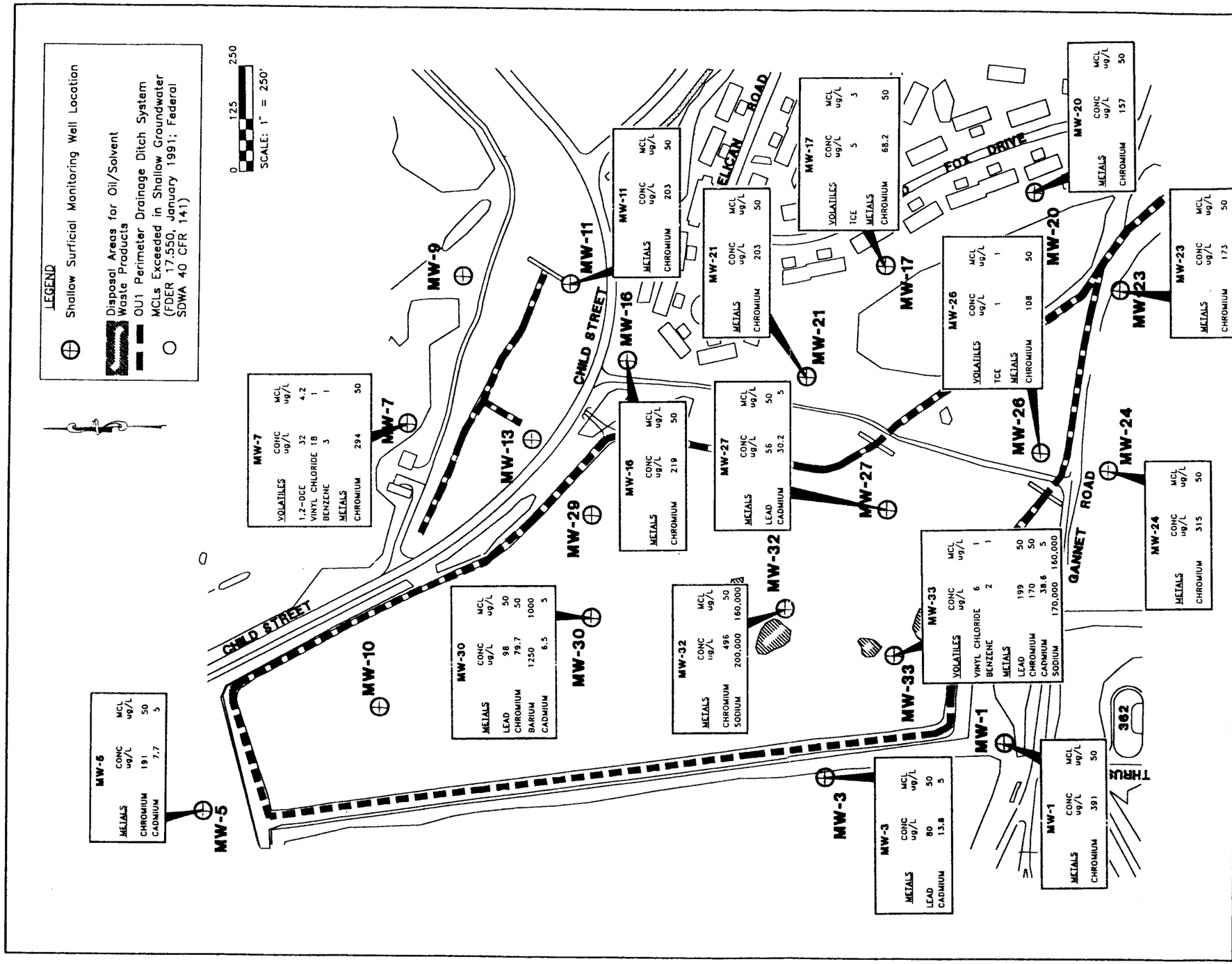


FIGURE 4-23
SHALLOW SURFICIAL MONITORING WELLS CONSTITUENT CONCENTRATIONS EXCEEDING PRELIMINARY ARAR's

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU 1

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JACKSONVILLE, FLORIDA

4.3.5.2 Semivolatile Organic Compounds (SVOCs)

Groundwater Sample Results. SVOCs detected in the groundwater samples collected from wells screened in the shallow zone of the Surficial Aquifer consist of: bis(2-ethylhexyl)phthalate, dibenzofuran, fluorene, and phenanthrene. Bis(2-ethylhexyl)phthalate was detected in four samples: SSMW-003 at 4 $\mu g/\ell$, SSMW-005 at 2 $\mu g/\ell$, and SSMW-024 and SSMW-032 at 3 $\mu g/\ell$. Dibenzofuran, fluorene, and phenanthrene were each detected in sample SSMW-011 at concentrations of 7 $\mu g/\ell$, 4 $\mu g/\ell$, and 3 $\mu g/\ell$, respectively.

SVOCs detected in the groundwater samples collected from the deep zone of the Surficial Aquifer consist of: 1,2-dichlorobenzene, 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 2-methyl-phenol, 2,4-dimethylphenol, 4-methylphenol, benzoic acid, bis(2-chloroethyl)ether, bis(2-ethylhexyl)phthalate, and naphthalene. 1,2-Dichlorobenzene was detected in two samples, DSMW-012 and DSMW-034, at concentrations of 21 $\mu g/\ell$ and 4 $\mu g/\ell$. 1,2,4-Trichlorobenzene was detected in one sample, DSMW-019, at a concentration of 18 $\mu g/\ell$. 1,4-Dichlorobenzene was detected in one sample, DSMW-012 at a concentration of 7 $\mu g/\ell$. 2-Methyl-phenol was detected in one sample, DSMW-034, at a concentration of 30 $\mu g/\ell$. 2,4-Dimethylphenol was detected in two samples, DSMW-012 and DSMW-034, at concentrations of 160 $\mu g/\ell$ and 9 $\mu g/\ell$, respectively. 4-Methylphenol was detected in two samples, DSMW-012 and DSMW-034, at concentrations of 52 $\mu g/\ell$ and 46 $\mu g/\ell$, respectively. Benzoic acid was detected in one sample, DSMW-006, at a concentration of 5 $\mu g/\ell$. Bis(2-chloroethyl)ether was detected in one sample DSMW-012 at a concentration of 38 $\mu g/\ell$. Bis(2-ethylhexyl)phthalate was detected in five samples, DSMW-004, DSMW-012, DSMW-018, DSMW-025, and DSMW-034, at concentrations of 21 $\mu g/\ell$, 3 $\mu g/\ell$, 4 $\mu g/\ell$, 6 $\mu g/\ell$, and 5 $\mu g/\ell$, respectively. Naphthalene was detected in one sample S\DSMW-012 at a concentration of 2 $\mu g/\ell$.

Only two SVOCs, bis(2-ethylhexyl)phthalate and phenol, were detected in samples collected from wells installed in the Intermediate Zone Aquifer of the Hawthorn Formation. The detected concentrations of bis(2-ethylhexyl)phthalate in the samples were 3 $\mu g/\ell$ for samples HMW-001, HMW-002, and HMW-003, 12 $\mu g/\ell$ for sample HMW-004, and 2 $\mu g/\ell$ for sample HMW-005. Phenol was detected in only one sample HMW-001 at a concentration of 8 $\mu g/\ell$.

ARARs Comparison. Only the sample collected from deep surficial monitoring well MW-19 contained a SVOC in excess of the preliminary ARARs. 1,2,4-Trichlorobenzene was detected at a concentration of 18 $\mu g/\ell$, which exceeds a preliminary FDWR ARAR of 9 $\mu g/\ell$ (Figure 4-24). The other groundwater samples from either the shallow or deep zone of the Surficial Aquifer did not contain SVOCs at concentrations that exceeded the preliminary ARARs.

4.3.5.3 Pesticides/Polychlorinated Biphenyl (PCBs)

Groundwater Sample Results. Only one pesticide, 4,4'-DDD, was detected in the groundwater samples collected from wells screened in the shallow zone of the Surficial Aquifer. 4,4'-DDD was detected at a concentration of 0.068 $\mu g/\ell$ in sample SSMW-003. PCB were not detected in the samples collected from wells screened in the shallow zone of the Surficial Aquifer.

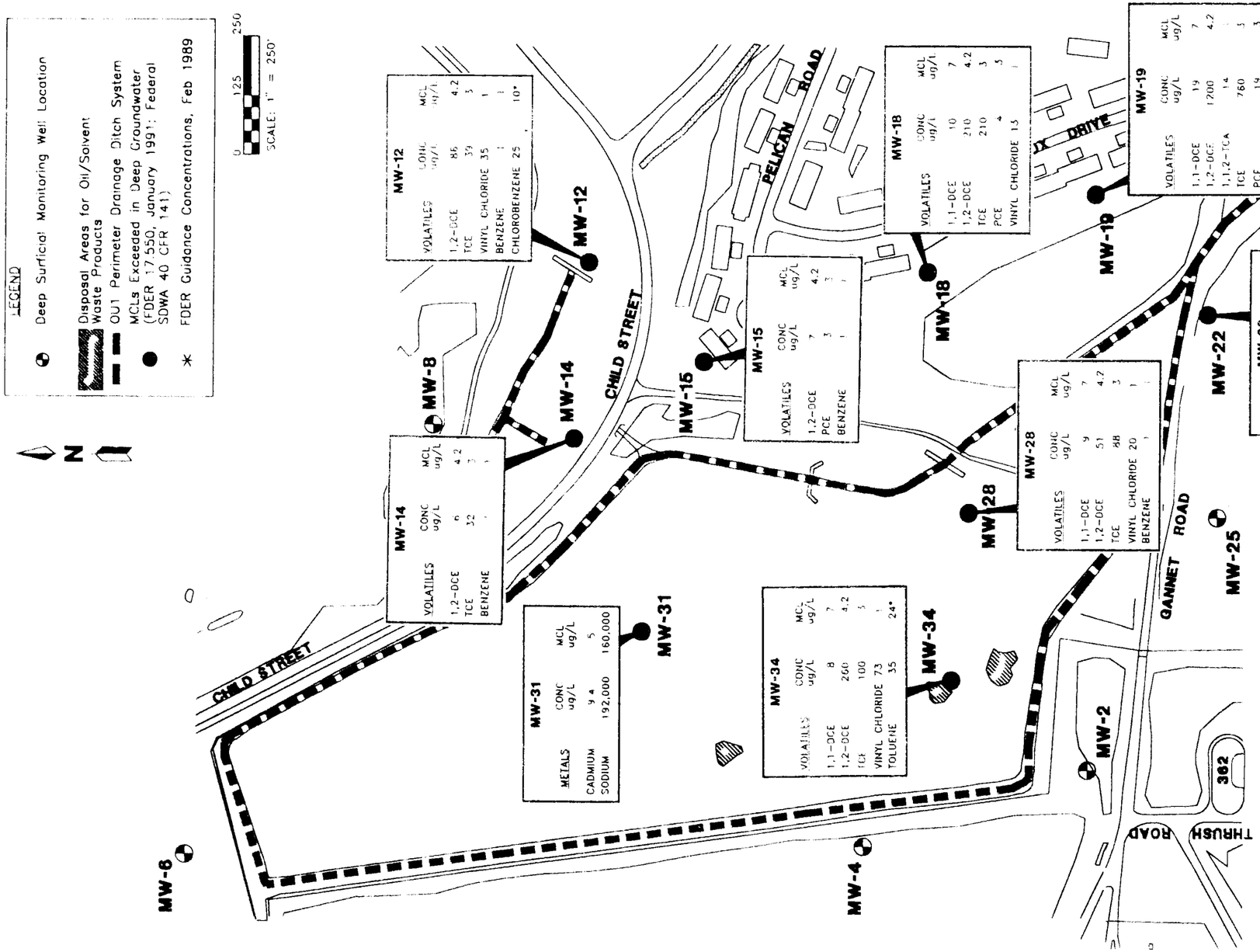

FIGURE 4-24
DEEP SURFICIAL MONITORING WELLS
CONSTITUENT CONCENTRATIONS
EXCEEDING PRELIMINARY ARAR's

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CHARACTERIZATION
SUMMARY REPORT OU1
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Pesticides and PCBs were not detected in wells installed in the deep zone of the Surficial Aquifer or the Intermediate Zone Aquifer of the Hawthorn Formation.

ARARs Comparison.

Pesticides. Only the groundwater sample from shallow surficial monitoring well MW-2 contained a pesticide, 4,4'-DDD, at a concentration of 0.068 $\mu g/\ell$. Currently, no preliminary FDWS or FDWR ARAR has been established for groundwater for this pesticide.

PCBs. PCBs were not detected in any of the groundwater samples.

4.3.5.4 Inorganics

Groundwater Sample Results. Twenty-four TAL inorganics (total) were detected in the groundwater samples collected from wells screened in the shallow zone of the Surficial Aquifer. The TAL inorganics (total) consist of: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, zinc, and cyanide.

Eighteen TAL inorganics (dissolved) were detected in the groundwater samples collected from wells screened in the shallow zone of the Surficial Aquifer. The TAL inorganics (dissolved) consist of: aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, vanadium, and zinc.

Twenty-two TAL Inorganics (total) were detected in the groundwater samples collected from the deep zone of the Surficial Aquifer. The TAL inorganics (total) consist of: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, vanadium, zinc, and cyanide.

Eighteen TAL Inorganics (dissolved) were detected in the groundwater samples collected from the deep zone of the Surficial Aquifer. The TAL inorganics (dissolved) consist of: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc.

Thirteen TAL inorganics (total) were detected in the Intermediate Zone Aquifer of the Hawthorn Formation. The TAL inorganics (total) consisted of: arsenic, barium, calcium, chromium, iron, lead, magnesium, manganese, nickel, potassium, sodium, thallium, and vanadium.

Eight TAL inorganics (dissolved) were detected in the Intermediate Zone Aquifer of the Hawthorn Formation. The TAL inorganics (dissolved) consisted of: antimony, arsenic, barium, calcium, magnesium, potassium, sodium, and thallium.

ARARS Comparison. Samples collected from monitoring wells screened in the shallow zone of the Surficial Aquifer contained concentrations of TAL inorganic analytes (total) in excess of the preliminary ARARs. The TAL inorganics (total) that exceeded preliminary ARARs were: antimony, barium, beryllium, cadmium,

chromium, iron, lead, manganese, nickel, sodium, and zinc. TAL inorganics (dissolved) which exceeded ARARS were iron, manganese, and sodium.

Samples collected from monitoring wells screened in the deep zone of the Surficial Aquifer contained concentrations of TAL inorganic analytes (total) in excess of the preliminary ARARs. The TAL inorganics (total) that exceeded preliminary ARARs were antimony, barium, beryllium, cadmium, iron, manganese, and sodium. TAL inorganics (dissolved) that exceeded ARARS were antimony, iron, manganese, and sodium.

Samples collected from monitoring wells screened in the Intermediate Zone of the Hawthorn Formation contained concentrations of TAL inorganics (dissolved) that exceeded preliminary ARARs. The TAL inorganics (dissolved) that exceeded ARARs are antimony and thallium.

4.3.5.5 Radionuclides

Groundwater Sample Results. Radionuclides detected in the groundwater samples consisted of alpha emissions, beta emissions, Radium-226 and Radium-228.

The range of values for detected radionuclides in the groundwater samples collected from wells screened in the shallow zone of the Surficial Aquifer are as follows: alpha emissions, 36.8 pCi/ℓ to 748 pCi/ℓ; beta emissions, 64.4 pCi/ℓ to 762 pCi/ℓ; Radium-226, 4.3 pCi/ℓ to 27.9 pCi/ℓ; and Radium-228, 0.8 pCi/ℓ to 8.5 pCi/ℓ.

The range of values for detected radionuclides in the groundwater samples collected from wells screened in the deep zone of the Surficial Aquifer are as follows: alpha emissions, 1 pCi/ℓ to 50.1 pCi/ℓ; beta emissions, 1.7 pCi/ℓ to 53.6 pCi/ℓ; Radium-226, 1.1 pCi/ℓ to 9.6 pCi/ℓ; and Radium-228, 0.5 pCi/ℓ to 4.1 pCi/ℓ.

The range of values for detected radionuclides in the groundwater samples collected from wells screened in the Intermediate Zone Aquifer of the Hawthorn Formation are as follows: alpha emissions, 1.1 pCi/ℓ to 9.7 pCi/ℓ; beta emissions, 4.4 pCi/ℓ to 35.3 pCi/ℓ; Radium-226, 0.6 pCi/ℓ to 1.2 pCi/ℓ; and Radium-228, 0.3 pCi/ℓ to 2.7 pCi/ℓ.

ARARs Comparison. Combined values for radionuclide target constituents Radium-226 (Ra-226) and gross alpha were detected in groundwater samples in excess of the preliminary FDWS ARAR of 15 picocuries per liter, pCi/ℓ. Figure 4-25 depicts ranges in combined values for Ra-226 and alpha (gross) and the locations where the preliminary ARAR was exceeded. Values for beta (gross) exceeded the preliminary FDWS ARAR of 50 pCi/ℓ in some of the groundwater samples. Figure 4-26 depicts ranges of values for beta (gross) and the locations where the preliminary ARAR was exceeded. The source of the beta (gross) radiation is currently not known. Combined values for radionuclide target consti//tuents Ra-226 and Ra-228 were detected in groundwater samples in excess of the preliminary FDWS ARAR of 5 pCi/ℓ. Figure 4-27 depicts ranges in combined values for Ra-226 and Ra-228 and the locations where the preliminary ARAR was exceeded.

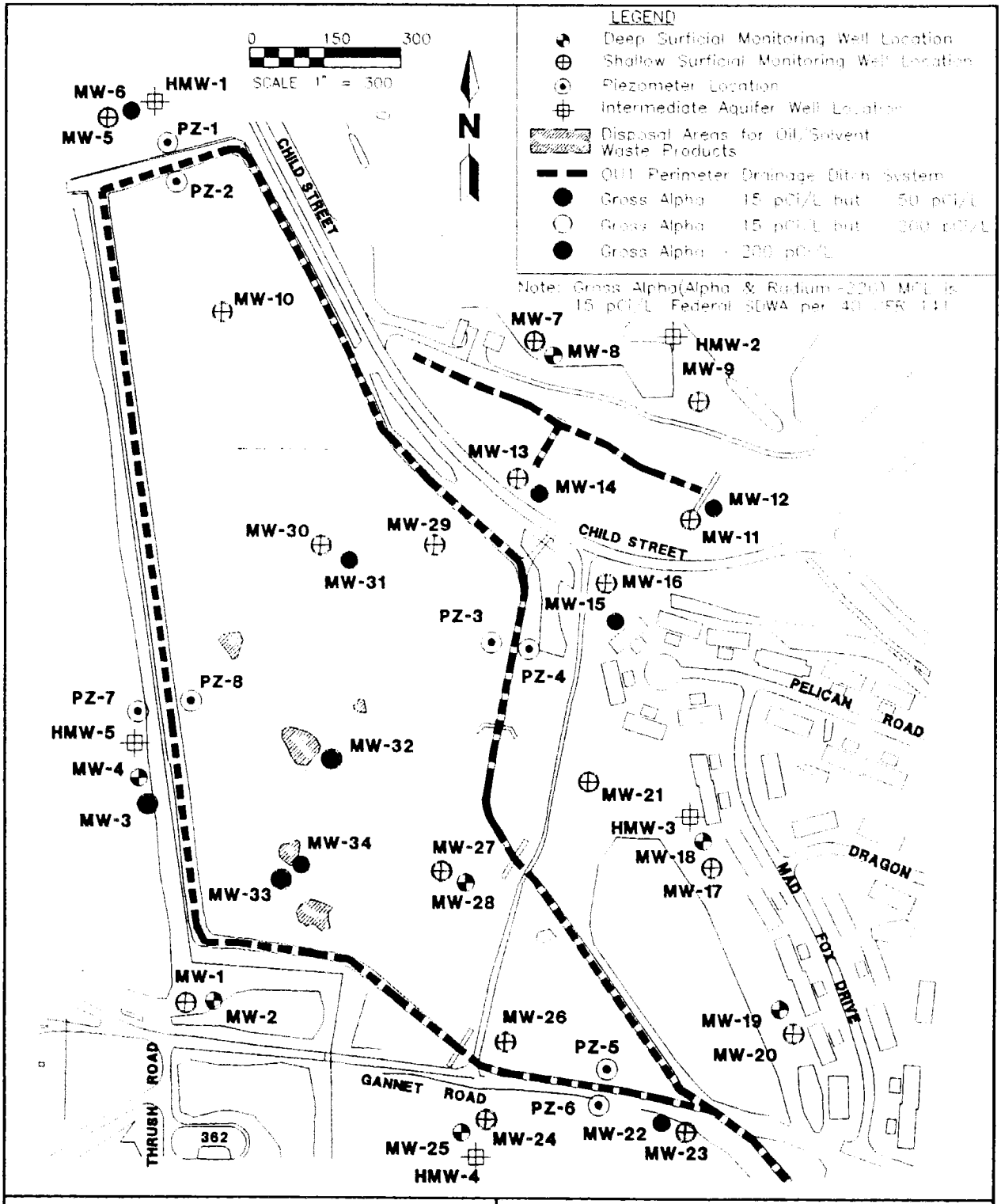

FIGURE 4-25

RADIONUCLIDES IN GROUNDWATER GROSS ALPHA(ALPHA & RADIUM-226)

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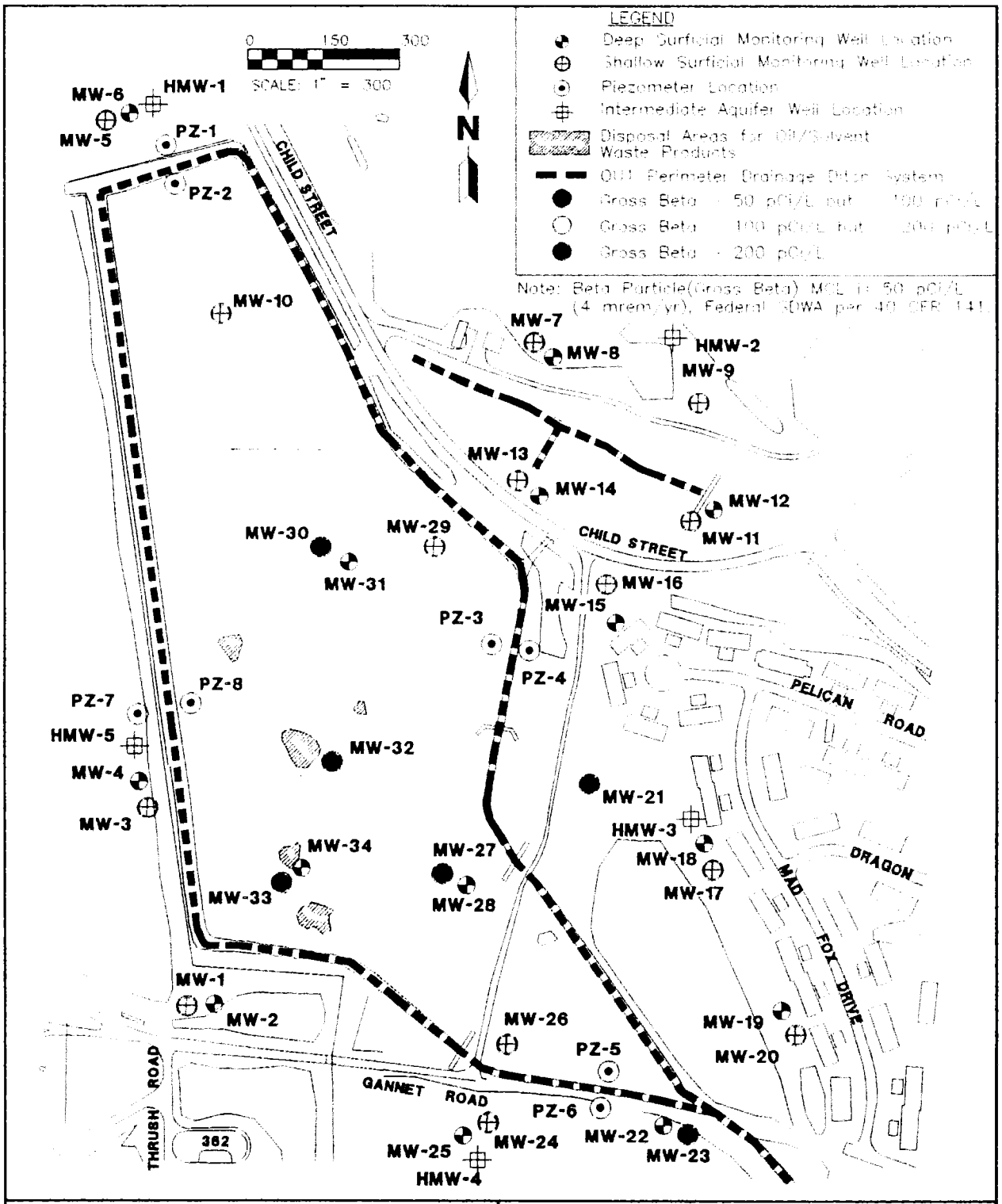

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FIGURE 4-26

RADIONUCLIDES IN GROUNDWATER BETA PARTICLE(GROSS BETA)

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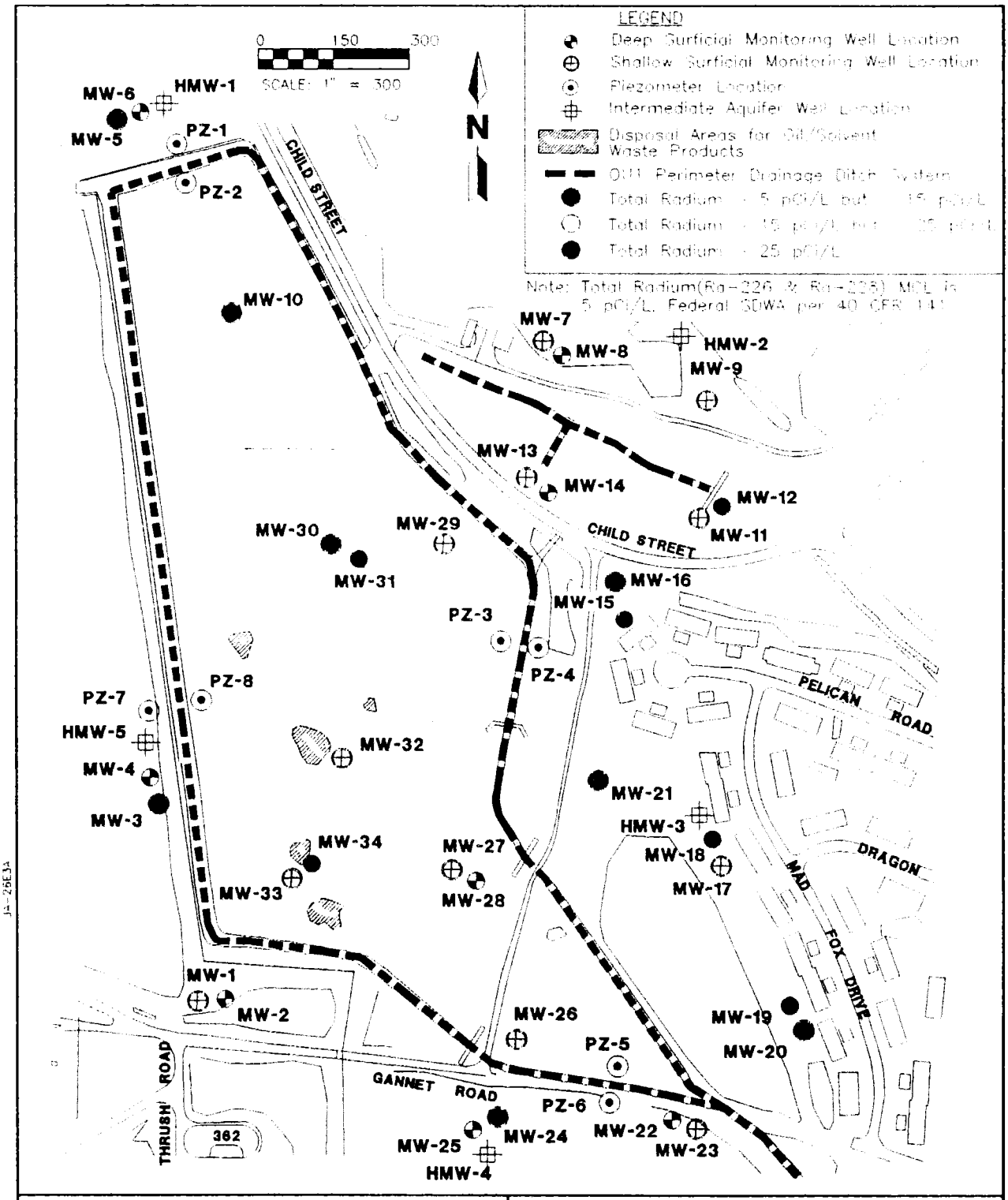

FIGURE 4-27

RADIONUCLIDES IN GROUNDWATER TOTAL RADIUM(Ra-226 & Ra-228))

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Currently, adequate groundwater radiological background data does not exist for comparison of the chemical analytical results to background values.

4.3.5.6 Free-Phase Hydrocarbons

The free-phase hydrocarbons contained concentrations of barium (Ba), cadmium (Cd), chromium (Cr), lead (Pb), mercury (Hg), and PCBs (Table 4-7). The hydrocarbon fuel analysis results indicate that the free-phase hydrocarbons was either a weathered petroleum, a fossil fuel byproduct, or a petroleum product with no VOCs. Figure 4-28 depicts the chromatogram for the two free-phase product samples.

4.4 ECOLOGICAL INVENTORY FINDINGS. A preliminary ecological inventory (PEI) was conducted during the period between January 26, 1991, through February 8, 1992. The PEI was to characterize the major terrestrial and aquatic ecological community types at and in the vicinity of OU1. A second objective of the PEI was to determine whether significant or critical ecological resources at or near OU1 could potentially be adversely affected by the OU1 site-attributable contamination. Information collected in the PEI is essential to the development of the ecological risk assessment at NAS Jacksonville, and to the identification of ARARs for remedial action at OU1.

4.4.1 Biotic Characterization NAS Jacksonville primarily has been developed for military use; however, seven distinct habitats consisting of upland, wetland, and upland/wetland transitional vegetative communities occur in the vicinity of OU1 (Figure 4-29). The seven communities are:

- Pine Flatwood Habitat,
- Old Field Habitat,
- Mesophytic Hardwood Forest Habitat.
- Stream Habitat.
- Perimeter Drainage Ditch Habitat.
- Hydrophytic Forest Habitat. and
- St. Johns River Basin Habitat.

Tabulation of dominant vegetative cover types and lists of birds, mammals, fish, amphibians, and reptiles that occur at NAS Jacksonville are included in Appendix F-1. The following provides a brief description of each community.

Pine Flatwoods Habitat The pine flatwood habitat is the most extensive floral community in the vicinity of the NAS Jacksonville. This habitat dominates the uplands of the Lower St. Johns River Basin (Brody, 1990). Also known as "longleaf pine flatwoods", "pine flats", "low pinelands", or "pine barrens" (Abrahamson and Harnett, 1990), this low flat woodland habitat occurs transitionally between upslope xeric sandhill communities and downslope shrub-dominated evergreen wetlands. Pine flatwoods occur throughout Florida, and northward through the southern coastal plain into Georgia, South Carolina, and North Carolina (Abrahamson and Harnett, 1990).

Table 4-7
Free-phase Hydrocarbon Analysis

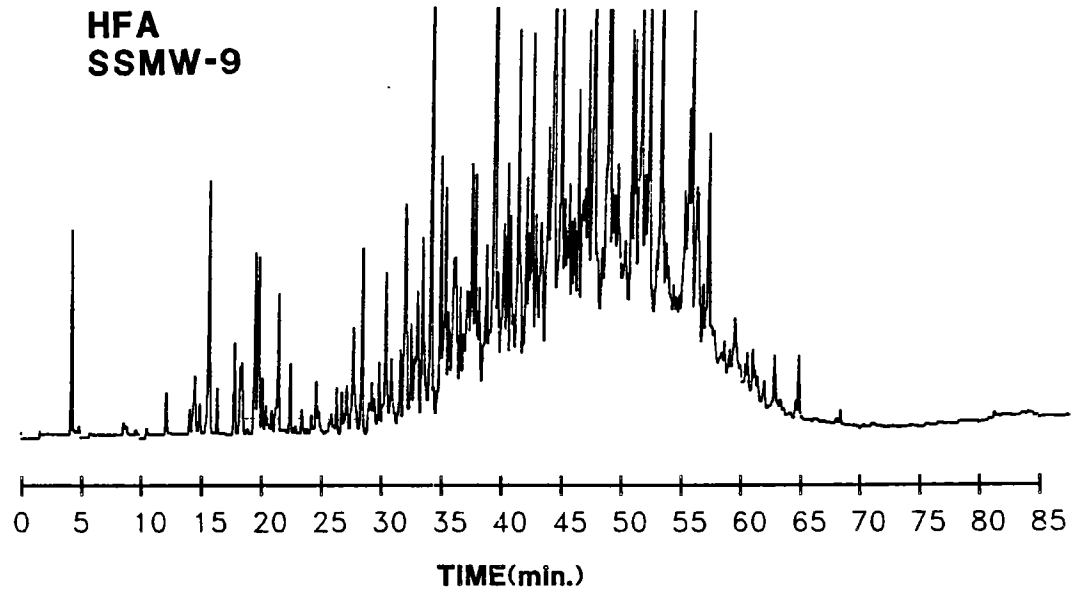
OU1, Naval Air Station
Jacksonville, Florida

	Method (ASTM D808)	Unit (µg/g)	Monitoring Well Identification SSMW-9	SSMW-13	QC Blank
Organics Chloride					
Arsenic	Modified XRF	µg/g	≤3	≤3	≤3
Barium	EPA 7080	µg/g	6.36	4.57	<0.75
Cadmium	EPA 7130	µg/g	1.71	1.92	0.75
Chromium	EPA 7190	µg/g	5.63	67.3	<1.25
Lead	EPA 7420	µg/g	3.42	7.93	<1.25
Mercury	Flameless Atomic Absorption	µg/g	0.14	0.11	<0.10
Selenium	XRF	µg/g	≤3	≤3	≤3
Silver	EPA 7760	µg/g	<0.50	<0.50	<0.50
PCB Compounds					
Aroclor - 1016	USEPA 8080	µg/g	84 U	40 U	4 U
Aroclor - 1221	USEPA 8080	µg/g	210 U	100 U	10 U
Aroclor - 1232	USEPA 8080	µg/g	210 U	100 U	10 U
Aroclor - 1242	USEPA 8080	µg/g	84 U	40 U	4 U
Aroclor - 1248	USEPA 8080	µg/g	40 U	20 U	2 U
Aroclor - 1254	USEPA 8080	µg/g	20 U	10 U	1 U
Aroclor - 1260	USEPA 8080	µg/g	140	280	1 U

Percent Over IBP	Method	SSMW-9 (°F)	SSMW-13 (°F)	Blank
Distillation Range				
IBP	ASTM D86	261	258	N/A
5	ASTM D86	342	340	N/A
10	ASTM D86	385	377	N/A
20	ASTM D86	428	411	N/A
30	ASTM D86	468	442	N/A
40	ASTM D86	503	454	N/A
50	ASTM D86	515	493	N/A
60	ASTM D86	560	495	N/A
70	ASTM D86	584	535	N/A
80	ASTM D86	588	541	N/A
90	ASTM D86	531[1]	493[1]	N/A

[1]Both samples thermally decomposed between 80 percent recovery and 90 percent recovery. According to ASTM D86, distillation was discontinued at this point.

Notes: SSMW = well screened across the water table in the shallow surficial aquifer.
µg/g = micrograms per gram.
XRF = X-ray fluorescence spectrometry.
IBP = initial boiling point.
°F = degrees in Fahrenheit.
U = analyzed for but not detected.
N/A = not analyzed.



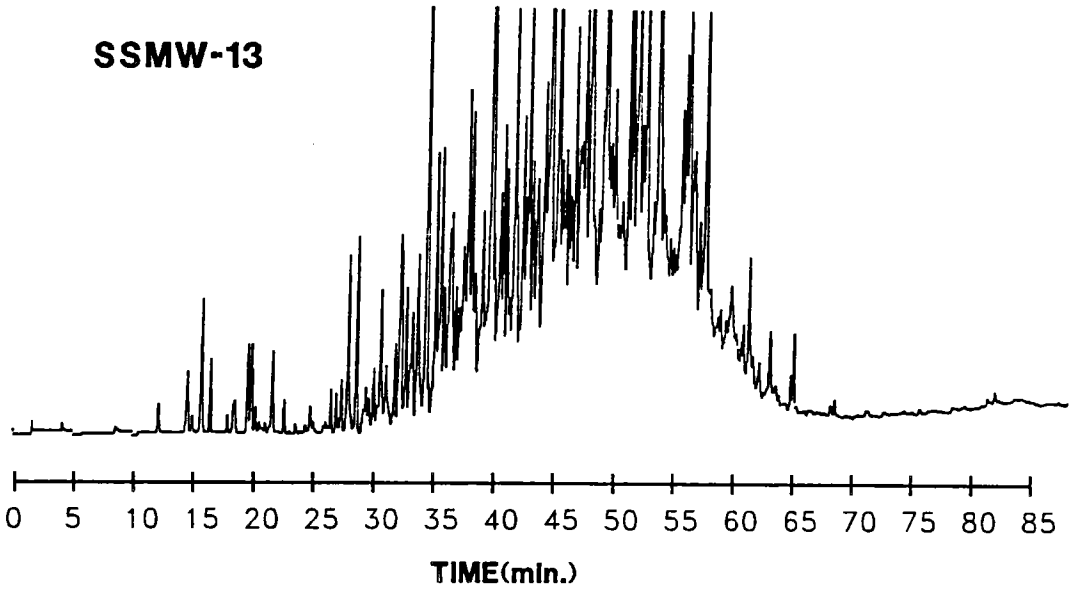


FIGURE 4-28
FREE-PHASE HYDROCARBON CHROMATOGRAMS

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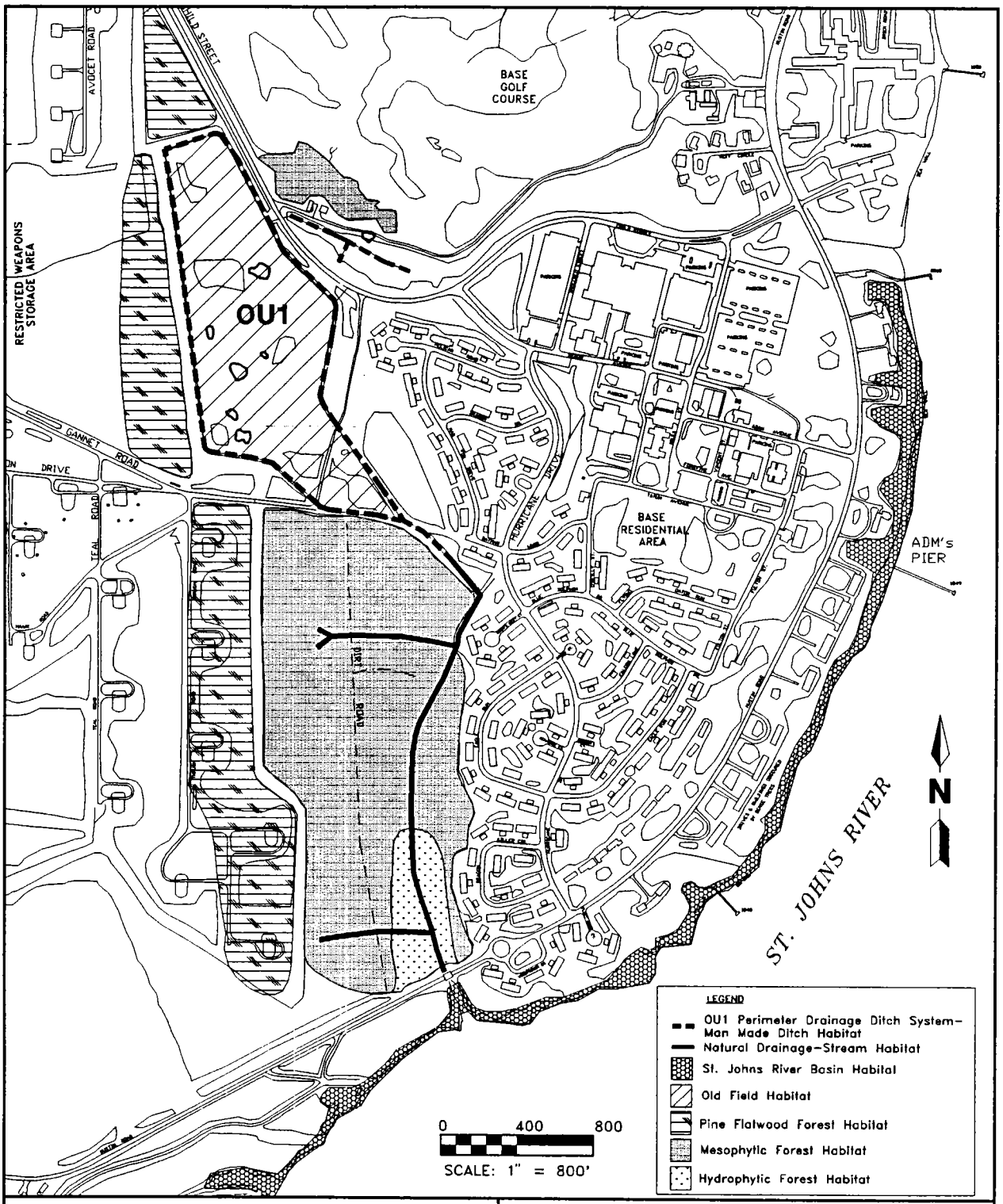

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FIGURE 4-29
ECOLOGICAL COMMUNITIES

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Although pine forest is the dominant vegetative cover type at NAS Jacksonville, this habitat is relatively uncommon in the immediate vicinity of OU1 (Figure 4-30). Regions of secondary growth pine flatwoods were observed in the vicinity of a wooded area north of OU1 and the restricted access area (weapons storage) to the south and west of OU1; this pine flatwood habitat is roughly bounded by the chainlink fence that forms the western perimeter of OU1. No significant regions of pine flatwood habitat occur directly on OU1; therefore, no estimate of the area coverage of this terrestrial ecological community type has not been conducted.

Flora. In general, pine flatwoods are characterized by a relatively open pine overstory, a dense shrub stratum, and a sparse herbaceous layer. The shrubby understory in pine flatwoods varies from sparse to dense, due to a variety of ecological and historical factors (Myers and Ewel, 1990). Frequently, large stands of saw palmetto were observed in the NAS Jacksonville pine flatwoods. Pine is almost always found in association with wiregrass, which dominates the herbaceous community.

The pine flatwood community is fire-adapted and xerophytic (Abrahamson and Harnett, 1990; Wolfe et al., 1988); needle-drop from pines and dried wiregrass are highly combustible fuel sources, and pines are unusual in their ability to survive forest fires both as seedlings and saplings. Both pines and wiregrass are able to obtain moisture in well-drained sandy soils.

Characteristic flora of this community are included in Appendix F-1.

Fauna. The high level of herbaceous primary productivity in the pine flatwood community frequently supports a rich invertebrate faunal community (Wolfe et al., 1988). This invertebrate community often supports a number of insectivorous vertebrates, including 20 to 30 species of reptiles and amphibians (Ashton and Ashton, 1985-1988). Species of mole salamander and newt spend at least part of the year in the pine flatwoods. Salamanders, frogs, toads, lizards, and colubrid snakes also occur in this habitat. The pine flatwoods also provides habitat for the eastern diamondback rattle snake and eastern box turtle.

A number of small mammals inhabit the flatwood community, although no mammal is exclusive to this habitat (Abrahamson and Harnett, 1990). The cotton rat, cotton mouse, short-tailed shrew, and marsh rabbit all abound within pinelands habitat. Many mammalian secondary consumers, such as gray fox, and raccoon, forage within this ecological region. Signs of raccoon and white-tailed deer were observed adjacent to the pine flatwoods community in the north part of PSC 26. Several Sherman's fox squirrels were observed by ABB-ES personnel in grassy clearings surrounded by pine woods, especially in the vicinity of the restricted weapons storage area. Sherman's fox squirrel is a state-listed species of special concern (FGFWFC, 1991).

Depending upon the vegetative association, pine flatwoods provide habitat for a diverse array of avifauna, including insectivorous gleaners of pine needles and bark, flycatchers, a seed eating assemblage, and nocturnal and diurnal aerial predators (Wolfe et al, 1988). Avifauna observed during December 1991 at and in the vicinity of this habitat include northern flica, downy woodpecker, tufted

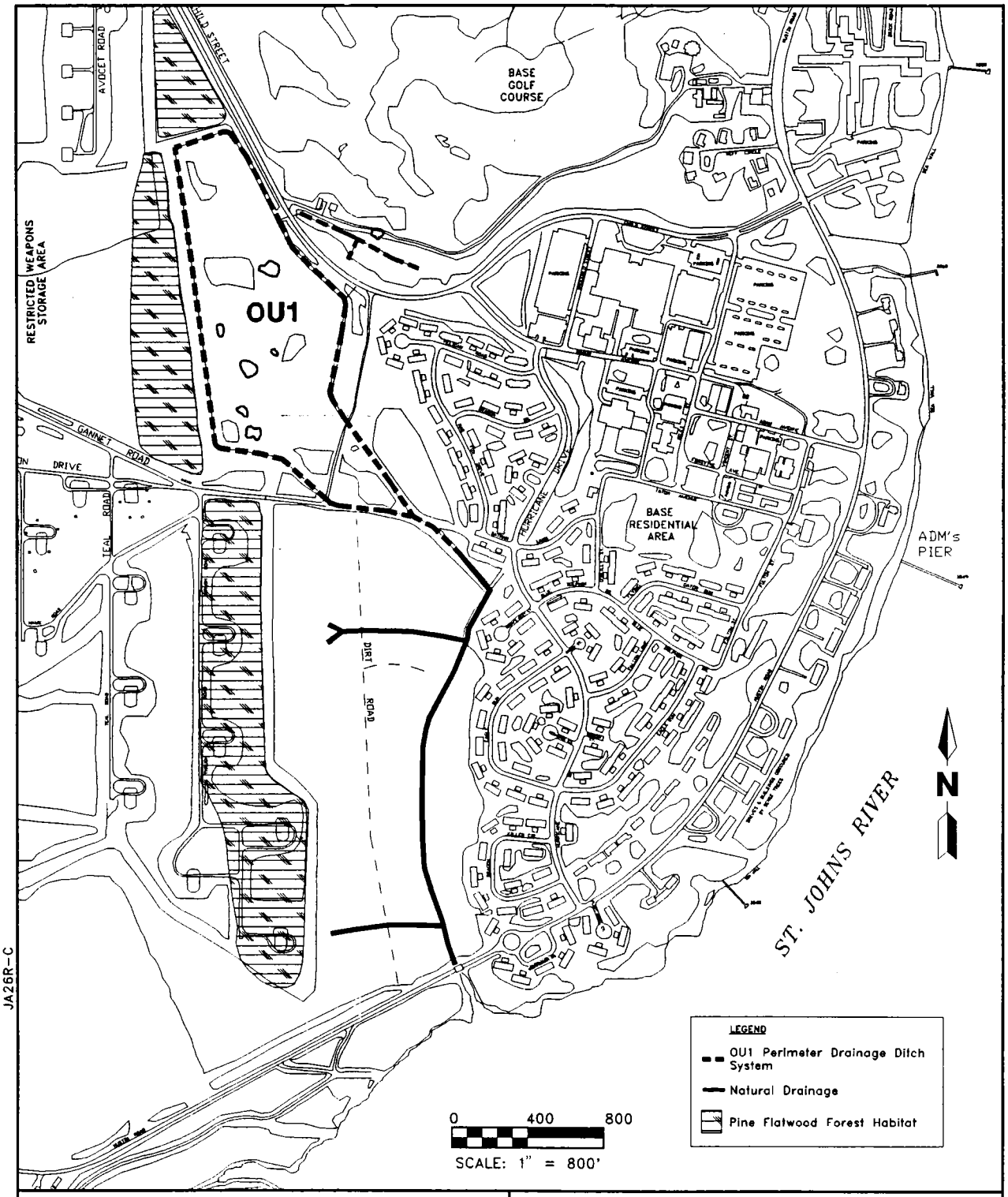

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FIGURE 4-30
PINE FLATWOOD HABITAT

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titmouse, Carolina chickadee, blue-gray gnatcatcher, pine warbler, rufous-sided towhee, and northern cardinal and, during May 1992, include many of the same species and also red-bellied woodpecker and white-eyed vireo.

Characteristic fauna observed or expected in the vicinity of OU1 are included in Appendix F-1.

Old Field Habitat The majority of upland habitat in the northern portion of OU1 is a "degraded" old field habitat dominated by wiregrass, which covers approximately 35 acres (Figure 4-31). Several "islands" of upland woody vegetation occur throughout the old field, which is surrounded by manmade drainage ditches. Several small ponding areas were located in the eastern and central portions of the old field habitat at OU1; the surficial substrate in these wet regions is siltier than elsewhere, and probably represent the varied nature of the unconsolidated material that was spread on OU1 during initial remedial measures construction activities conducted in 1983. These "ponding" areas have wetland hydrology and hydrophytic vegetation and may be considered wetland resource areas that may be protected under State and Federal statutes.

Flora. The vegetative cover in PSC 26 is dominated by graminoid species, with successional shrubby thickets distributed throughout the region. In addition to wiregrass, herbaceous species encountered in PSC 26 included bracken fern, as well as a number of other grasses, sedges, and rushes. Flora observed at OU1 include twig rush, white-braced sedge, panic grass, broom sedge, and soft rush. Other herbaceous plants observed in this habitat include capeweed, ragweed, fleabane, tall white clover, vervain, and dock.

The most common dense vine in the habitat was peppervine, which provided a thick ground and lianoid cover. Other vines and lianas growing in the old field habitat include poison ivy, passion flower, trumpet creeper, and muscadine grapes. Shrubby thickets in the old field habitat contain dense brambles of staghorn sumac, saw palmetto, bristly locust, scrub oaks, and green brier.

Several "islands" of woody vegetation are located throughout PSC 26. These regions contain mature woody vegetation and were probably present prior to the above-described 1983 construction activities. Vegetation noted within these forested areas include slash pine, wax myrtle, oaks, southern red cedar, china berry, white mulberry, carolina laurel cherry, southern prickley ash, blueberry, and winged elm.

Characteristic flora of this community are included in Appendix F-1.

Fauna. A terrestrial invertebrate survey was not undertaken during the PEI investigation; however, a number of insectan species were observed in the old field habitat, including several large orthopterans. It is likely that the insect biomass in this region serves as a forage base for a number of wildlife species, including amphibians, reptiles, birds, and mammals.

The OU1 old field habitat likely supports a number of reptile and amphibian species, although the majority of these animals were not apparent during the December 1991 field investigation. Evidence of historic gopher tortoise activity

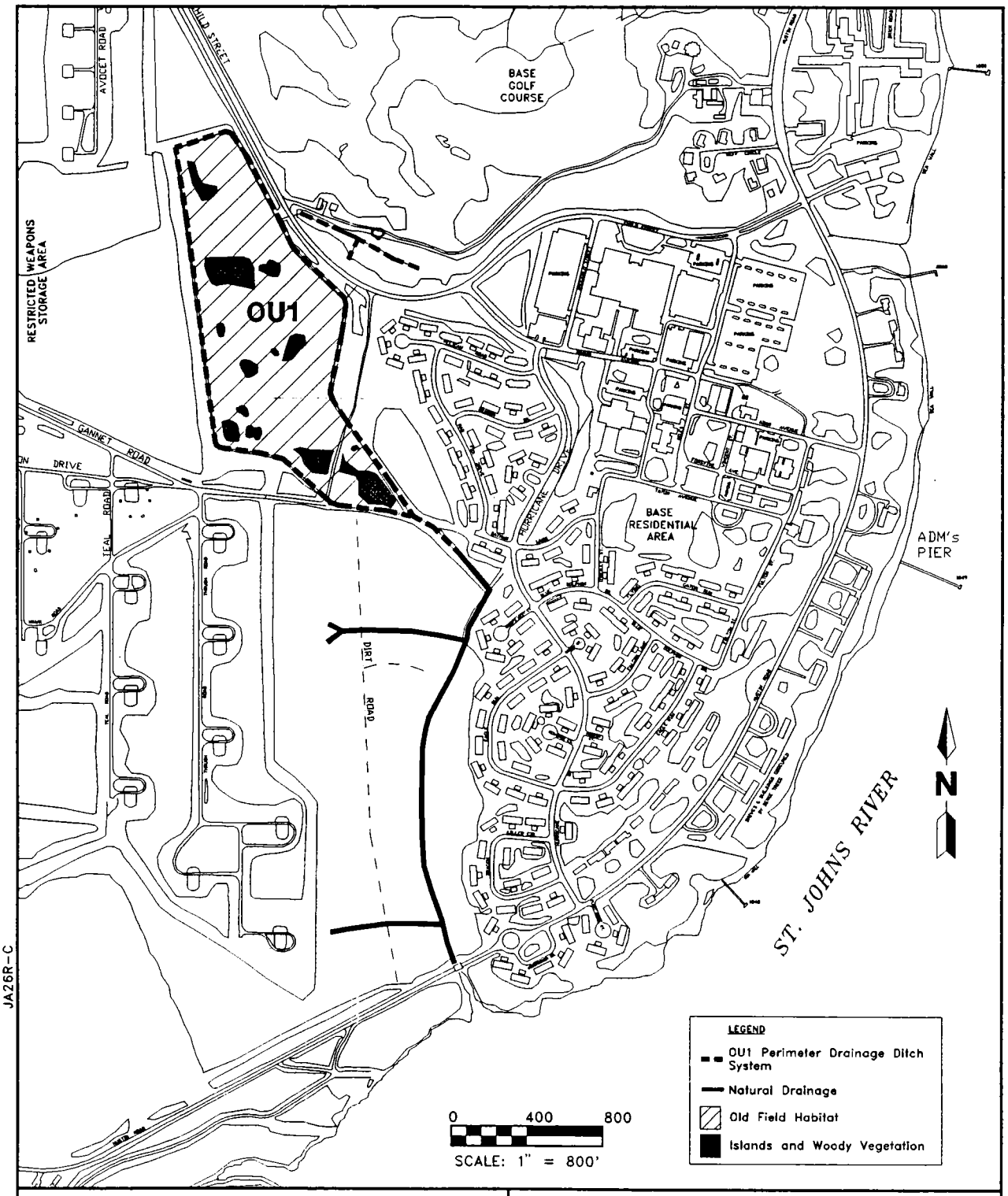

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FIGURE 4-31
OLD FIELD HABITAT

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was observed in the northeastern and northwestern portions of PSC 26. A partially decomposed gopher tortoise carapace was found in the northeastern portion of OU1. A 12- to 15-pound female tortoise was located in May 1992 by ABB-ES personnel. The tortoise was encountered as it wandered along a grassy habitat in the northwestern portion of OU1, adjacent to and west of the western most perimeter drainage ditch. The gopher tortoise is a state-listed species of special concern (FGFWFC, 1991). A solitary specimen of squirrel treefrog and green anoles was located in a wooded habitat in the northwestern corner of OU1.

The isolated wooded regions within OU1 provide considerable wintering songbird foraging activity. Species observed in this region tended to be gleaners of the tree canopies and include tufted titmice, Carolina chickadee, blue-gray gnat catcher, solitary vireo, ruby-crowned kinglet, yellow-rumped warbler, and black and white warbler. Northern mockingbirds and red-bellied woodpeckers were observed around the perimeter of OU1. A single house wren was observed foraging in the underbrush at OU1. Prior to the May 1992 field investigation, the majority of the avifauna had probably fledged their young. Avifauna observed in May 1992 include mockingbirds, cardinals, red-bellied woodpeckers, song sparrows, and a blue grosbeak. A number of chimney swifts were observed flying over OU1 in the early evening. Four or five cattle egrets were frequently observed foraging in the old field habitat at OU1.

Black vultures, turkey vultures, red-tailed hawks, and a red-shouldered hawk were observed soaring over OU1, and an American kestrel was seen on several occasions, perched and foraging in the central portion of PSC 26.

No small mammals were trapped at OU1 during the PEI field investigation. However, many small mammal trails were observed in the interior and around the perimeter of OU1. Some of these trails are likely the work of the eastern cottontail, which was repeatedly observed at the site. The reason behind the relative lack of success trapping small mammals at OU1 is unknown, but may be related to bait preference, seasonality, the use of live box rather than snap traps, the industrial/urban development of the adjacent site areas, or site attributable contamination.

Characteristic fauna observed or expected in the vicinity of OU1 are included in Appendix F-1.

Mesophytic Hardwood Forest Habitat Remnants of the holocene oak forest association are not uncommon in higher elevations of Duval County (Brody, 1991). This habitat, which is more characteristic of the continental U.S. Piedmont region, includes a variety of tree species, such as live oak, black cherry, pignut hickory, and southern magnolia and provides a diverse wildlife value (USFWS, 1988).

Forested areas to the south of OU1, and to the west of the stream, downgradient of OU1, contain many species characteristic of the mesophytic hardwood forest association (Figure 4-32). In the vicinity of OU1, approximately 33 acres of mesophytic hardwood forest occurs mid-slope between the drier pine flatwoods located to the west of OU1, and the hydrophytic forested habitats associated with the site's wetlands (Figure 4-29). Approximately 4 additional acres of this

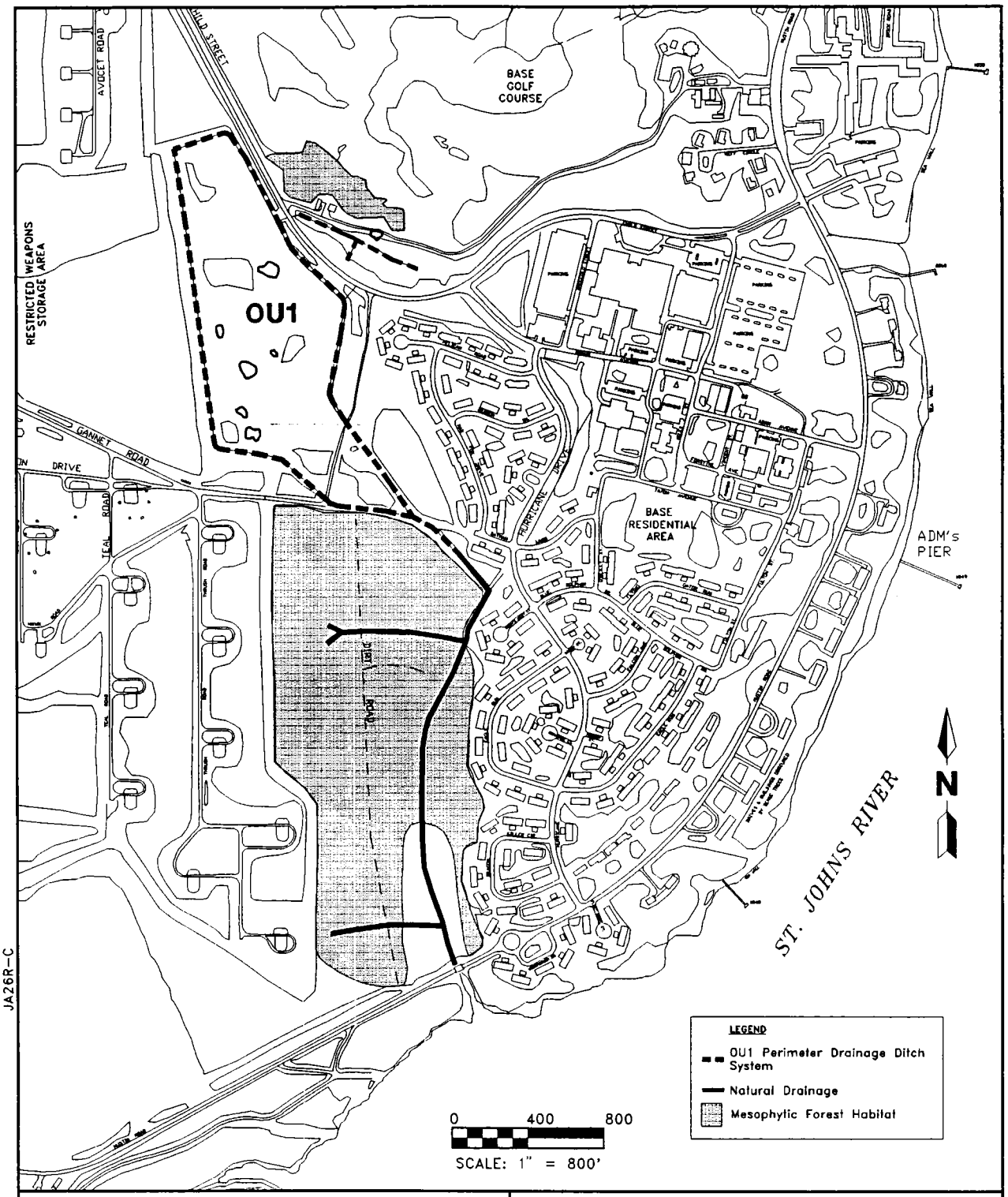

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FIGURE 4-32
HARDWOOD FOREST HABITAT

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habitat are also located on the northern end of OU1, across Child Street from the main portion of the site. This smaller portion of mesophytic forest has been fragmented by golf course operation and road construction and easement maintenance activities.

Flora. The mesophytic hardwood forest at OU1 is characterized by oaks and hickories, with pignut hickory, water oak, and live oak dominating. Occasional slash pine, black cherry, bigleaf magnolia, sweet gum, and other oak species are found in this habitat at OU1. Many of the hardwood trees at OU1 are mature, with occasional live oaks over 3-foot diameter at breast height (dbh). Smaller trees noted in the OU1 mesophytic forest include redbud, hornbeam, flowering dogwood, and American holly. Virginia creeper, poison ivy, greenbriars (i.e., smilax, glauca, and walterii) and grapes are the common vines in this habitat of OU1. The shrub layer includes a number of evergreen and deciduous species, such as saw palmetto, witch hazel, coral bean, devil's walking stick, wax-leaved ligustrum, bayberry, and blueberry. The herbaceous layer in the mesophytic hardwoods at OU1 varies from densely to sparsely covered, and includes a number of different fern species (e.g., bracken fern, partridge berry), and various graminoid species.

Characteristic flora of this community are included in Appendix F-1.

Fauna. Florida's hardwood habitats have varied wildlife value, depending upon condition, maturity, numbers and size of fruit and nut producing trees, etc. (USFWS, 1988). The diverse oak-hickory association provides numerous potential nesting sites for cavity-nesting birds, such as the flicker, Carolina chickadee, tufted titmouse, which were all observed in the mesophytic hardwood habitat. Signs of the pileated woodpecker and yellow-bellied sapsucker were also observed in this portion of the site. Insectivorous gleaners of the tree canopy typically found in this habitat include a number of other passerine songbirds, such as warblers and vireos.

Mast-nesting oak and hickory trees in this habitat provide a valuable food source for wildlife, and it is probable that raccoon, squirrels (including the gray squirrel, and the southern flying squirrel), as well as a number of other small mammals inhabit the site's mesophytic hardwoods. Wild turkey, bobwhite quail, and a number of other birds also depend on the fruits of mast-producing trees. A wild turkey was observed by ABB-ES ecologists in the restricted weapons area directly to the west of OU1 during January 1992. Ephemeral waters in the site's mesophytic hardwoods may provide valuable amphibian habitat for anuran and ambystomid species. A green treefrog and numerous southern and oak toads were observed in this habitat by ABB-ES ecologists, and it is likely that other hylids, chorus frogs, mole salamanders, and true frogs occur in vernal and autumnal pools in this portion of the site. Lastly, it is likely that a diverse assemblage of invertebrates inhabits the mesophytic forest associated with OU1, providing a forage base for primary consumers at OU1.

Characteristic fauna observed or expected in the vicinity of OU1 are included in Appendix F-1.

Stream Habitat The unnamed stream, which runs from OU1 towards the St. Johns River, is classified by the USFWS as a riverine system with an unconsolidated sandy bottom surrounded by palustrine scrub-shrub and forested wetlands (Cowardin et al., 1979) (Figure 4-33). Various waste items, including household, military,

and construction debris were noted in the stream channel and associated wetlands. The approximately 2,200 linear feet of unnamed stream channel is generally poorly defined, and during periods of heavy rainfall surface water flows in a sheet-like fashion through wooded swamp habitat.

Flora. The flora associated with the wooded habitat bordering the stream are discussed with the hydrophytic forest habitat. Herbaceous vegetation noted within the stream channel included soft rush, cinnamon fern, smartweeds, jack-in-the-pulpit, water pennywort, royal fern, and iris, as well as several submerged aquatic macrophytes and non-vascular green algae.

Characteristic flora of this community are included in Appendix F-1.

Fauna. Several fish species were obtained in the stream habitat through the passive fishing technique, including mosquito fish, a killfish, and a goby. The presence of small fish in the OU1 stream system indicates that a forage base exists for piscivorous and omnivorous ecological receptors at the site.

Although no reptiles or mammals were encountered in the stream habitat, a badly decomposed siren (possibly the eastern lesser siren, *Siren intermedia*) was discovered adjacent to the southerly portion of the stream.

Characteristic fauna of this community are included in Appendix F-1.

PERIMETER DRAINAGE DITCH HABITAT A perimeter drainage ditch system was constructed in the early 1980's in the vicinity of OU1 (Geraghty & Miller, 1991) (Figures 1-3 and 2-9). Underflow weirs and automated surface water oil skimmers were constructed at OU1 and were used to remove free-phase oil that discharged from the Surficial Aquifer into the ditch. The system of weirs regulated surface water flow and height in the perimeter drainage ditch system surrounding OU1. Surface water from OU1 flowed from the perimeter drainage ditch system to the downgradient unnamed stream, and ultimately into the St. Johns River. In general, water depths in the eutrophic perimeter drainage ditch system ranges from 1 to 5 feet, with an average depth range of approximately 2 to 3 feet. Approximately 5,800 linear feet of perimeter drainage ditch are located south of Child Street; an additional 900 linear feet of this perimeter ditch system are located to the north of Child Street.

Flora. The banks and shorelines of the perimeter drainage ditch system are populated by a variety of upland and wetland shrubs, including slash pine, smooth sumac, Carolina laurel cherry, dog fennel, wax myrtle, willows, elderberry, gallberry, sweet bay magnolia, and groundsel tree. Emergent aquatic vegetation noted in these habitats included cattail, bulrush, canna, and a variety hydrophytic grasses (Graminaea), sedges, and rushes; dense stands of a panic grass (likely torpedo grass) frequently choke the perimeter drainage ditch channel, especially in vegetative gaps penetrated by sun light. Submerged aquatic species noted in the perimeter drainage ditch system channel include water hyssop, bladderwort, and water milfoil.

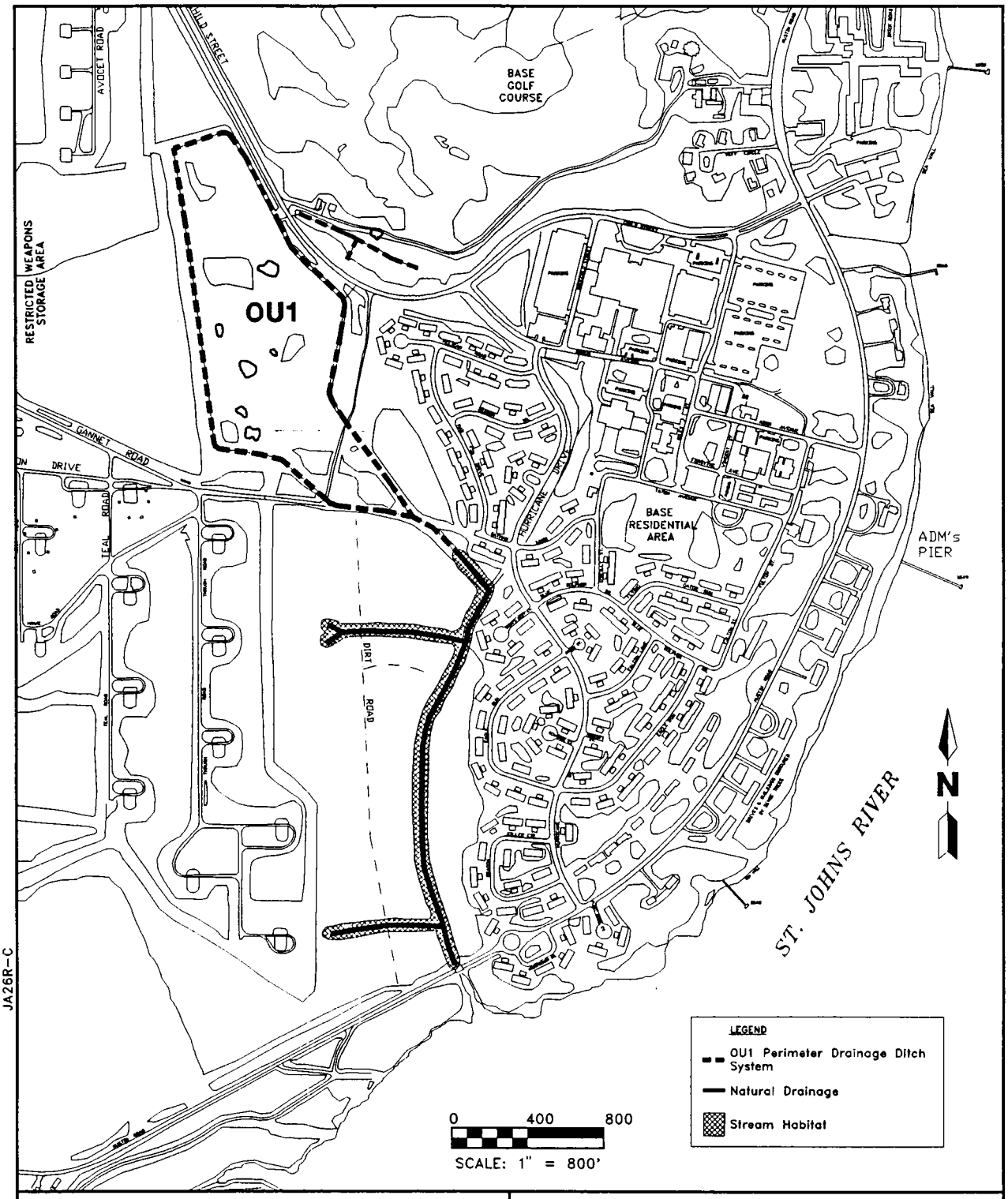

FIGURE 4-33
STREAM HABITAT

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

Characteristic flora of this community are included in Appendix F-1.

Fauna. Despite their degraded condition (i.e., strong odors of petroleum hydrocarbons in sediments, and dense growth of filamentous green algae), the perimeter ditch drainage system currently functions as wetlands and provides limited wildlife and fish habitat.

For two successive nights during the field investigation, seven wire mesh minnow traps were placed at sampling locations in the perimeter ditch at Locations 2, 3, 5, 6, 7, 11, and 13 (Figure 3-13). Specimens of mosquito fish, a juvenile sunfish, a killifish, and a goby were obtained in the OU1 perimeter drainage ditch system through this passive fishing technique. The presence of these fish indicate that a food chain forage base for piscivorous and omnivorous consumers exists at OU1.

Amphibians, particularly in the egg and larval stages, are known to be sensitive environmental receptors and have been proposed as environmental indicators of contaminated conditions (Birge and Black, 1982). Despite the appearance of degraded habitat, amphibians were encountered in the perimeter drainage ditch at OU1. An adult southern leopard frog was collected adjacent to sampling Location 15 (Figure 4-1); not far from this location, unidentified anuran eggs (likely leopard frog) were noted, and in the evenings, a minor chorus of southern leopard frogs was heard adjacent to several sampling locations. Spring peepers were heard vocalizing in swampy areas in the vicinity of OU1, but were not noted in the perimeter drainage ditch system at the site. No reptiles were observed during the winter PEI field investigation in the vicinity of the ditch; however, several Florida red-bellied turtles were observed in perimeter drainage ditch during the spring field activities. This perimeter drainage ditch may also provide habitat for other aquatic reptiles, such as the common snapping turtle, Florida cottonmouth, and the Florida water snake. No signs of American alligator were observed at OU1, and breeding at the site is unlikely due to habitat limitations; however, it is possible that younger alligators may occasionally be found feeding and/or basking in this habitat. The alligator is a state-listed species of special concern (FGFWFC, 1991). It is likely that other predatory reptiles, particularly snakes, from the surrounding old field and pine flatwoods habitats venture into the vicinity of the drainage ditch for hunting and/or fishing, or to bask on exposed banks.

A number of wintering bird species were observed in the vicinity of the perimeter drainage ditch around OU1, including eastern phoebe, belted kingfisher, great blue heron, osprey, and green-backed heron. With the exception of the fly-catching phoebe, it is likely that these bird species are preying upon fish and amphibians from within the perimeter drainage ditch. The insectivorous eastern phoebe may be foraging on insects that spend all or part of their larval life stage in the perimeter drainage ditch system at OU1. Bird-life noted during the Spring by ABB-ES ecologists near the perimeter drainage ditch included cardinals, mockingbirds, and a number of green-backed heron. Several osprey were seen during the spring field investigation; this state-listed species of special concern (FGFWFC, 1991) may be feeding on fish from within the perimeter drainage ditch.

Characteristic flora of this community are included in Appendix F-1.

Hydrophytic Forest Habitat The forested wetland in the southeasterly portion of the NAS Jacksonville stream includes a bald cypress swamp (Figure 4-34). This palustrine needle-leaved deciduous forested wetland (Cowardin et al., 1979) is continuous with the cypress swamps of the St. Johns River, and is adjacent to and becomes flooded during periodic heavy rainfall events as surface water overflows the poorly defined channel of the meandering, dendritic (unnamed) stream, which receives surface water drainage from OU1 and the base residential area (Figure 5-6). Approximately 15 acres of this habitat type occur in the immediate vicinity of OU1.

Flora. The bald cypress is a deciduous conifer, which is most common in swamps with fluctuating water levels (Eyre, 1980). Like many hydrophytic trees, the bald cypress develops buttresses of various shapes and sizes. In addition, cypress trees are notable for their "knees," which are modified lateral roots that assist the tree with respiration. North Florida's cypress swamps are characterized by shallow groundwater and the accumulation of organic matter (Ewel, 1990). The bald cypress forest occurs in a large area that is within tidal fluctuations of the St. Johns River.

The bald cypress swamp dominates the southern portion of the unnamed stream drainage area prior to its confluence with St. Johns River. However, portions of the forested wetland hydraulically downgradient of the old field habitat and hydraulically upgradient of the St. Johns River tidal influx are dominated by other palustrine forest types (Figure 5-4). The bald cypress swamp contains several other tree species, including slash pine, sweet bay, green ash, American elm, red maple, hornbeam, tupelo, water oak, sweetgum, river birch, and black willow.

The understory in the bald cypress swamp is relatively open. Understory shrubs observed in this habitat include sweet bay magnolia), red bay, elderberry, wax myrtle, buttonbush, and large gallberry. Several ericaceous shrubs were noted in this swamp, including fetterbush and blueberry. The herb layer includes a number of ferns, vines, epiphytes, and aquatic plant species, including dense clumps of cinnamon and royal ferns, yellow flag iris, water pennywort, and sphagnum moss.

Characteristic flora of this community are included in Appendix F-1.

Fauna. The shallow water and woody cover in the bald cypress swamp provide likely cover, feeding, and breeding habitat for a number of reptiles and amphibians (Ashton & Ashton, 1991). Although neither reptile nor amphibian species were observed during the PEI field investigation, various species of mole salamander, treefrog, and grass frog probably live in this habitat, and colubrid snakes, as well as pit vipers, are probably also found here.

Birds observed in the site's hydrophytic forest include pine and yellow-rumped warblers, yellow-shafted flicker, and downy woodpecker; a female wild turkey was observed in the adjacent pine flatwood habitat that is west of the forested wetlands on the NAS Jacksonville restricted (weapons storage area) property, and

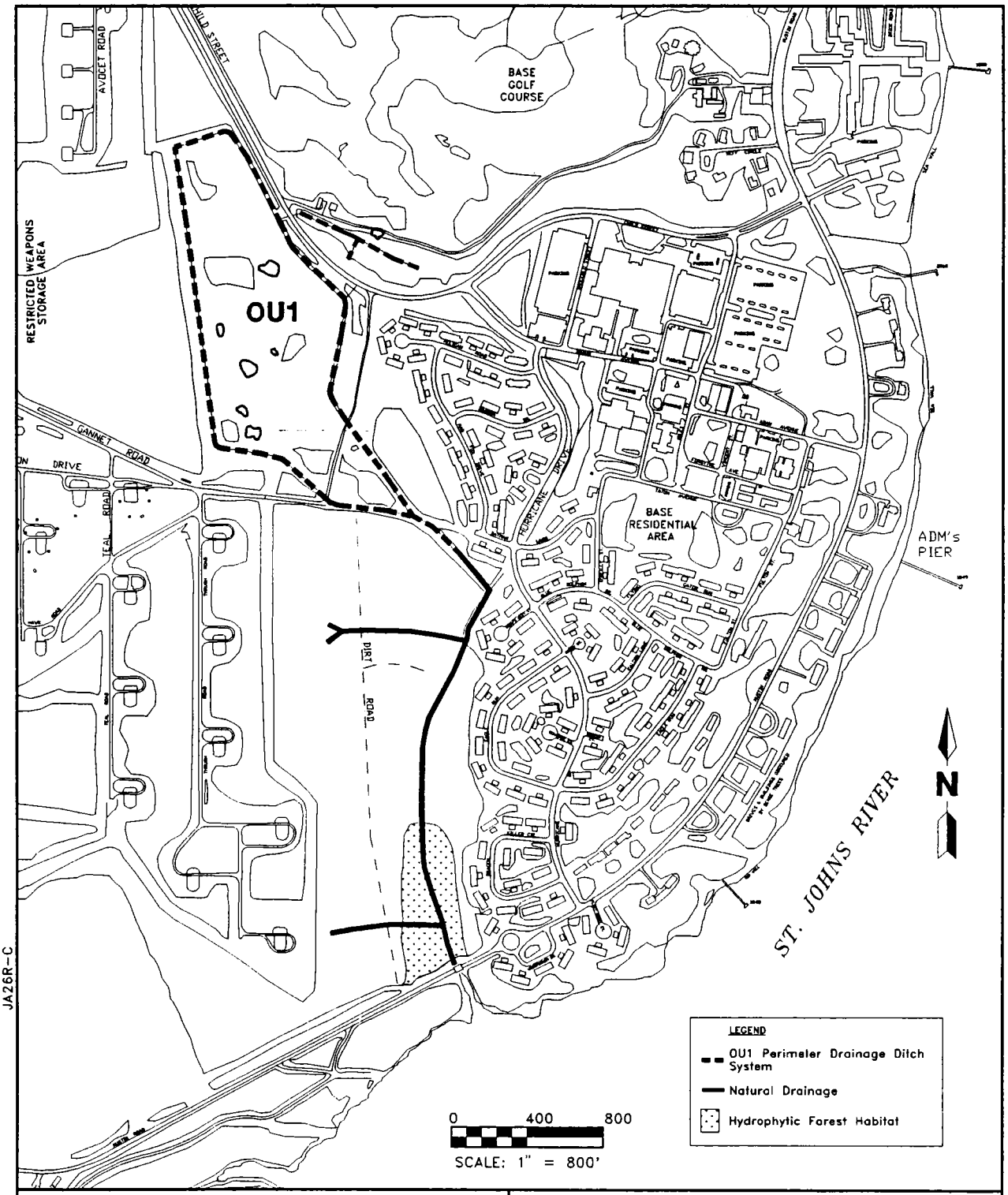

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FIGURE 4-34
FORESTED SWAMP HABITAT

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

signs of yellow-bellied sapsuckers and pileated woodpecker were also noted in the habitat. Although raccoon tracks were observed in the bald cypress swamp, no mammals were encountered. It is likely that a habitat for small mammals such as the opossum, southeastern shrew, and short-tailed shrew exists in the bald cypress swamp.

Characteristic fauna of this community are included in Appendix F-1.

St. Johns River Basin Habitat The unnamed stream, which runs from OU1 and terminates at the St. Johns River, is a marginally brackish, tidal estuary. This area, which contains forested/wetland vegetation, is depicted in Figure 4-35.

Flora. The forested wetland in this habitat contains many of the same woody species noted elsewhere at OU1 (see Section 5.6.1 of this PEI). This swamp is dominated by bald cypress, with occasional red maple, American elm, and green ash. The dominant shrub in this habitat is buttonbush, although false indigo and elderberry were also observed in the shrub layer. Emergent plants noted in the delta of the unnamed stream included cattail, giant bulrush, rushes, and pickerel weed. Aquatic plants observed in this habitat included eel grass, water hyacinth, duckweed, and water lettuce.

Characteristic flora of this community are included in Appendix F-1.

Fauna. Fish found in the St. Johns River, including economically important finfish, have been described by Brody, 1990 (Table A-2). Because the fish fauna have been well characterized, no inventory or characterization of the fish resource adjacent to the stream outfall was undertaken by ABB-ES. Sea turtles such as the Atlantic loggerhead and the Atlantic green turtle may occasionally swim into the lower St. Johns River near NAS Jacksonville.

Avifauna observed in this portion of NAS Jacksonville included double-crested cormorant, blue heron, snowy egret, bufflehead duck, hooded merganser, spotted sandpiper, herring gull, Bonaparte's gull and laughing gull. A population of the West Indian manatee, a state and federal-listed endangered species (FGFWFC, 1991), is known to spend the warmer months at NAS Jacksonville. In June 1992, a manatee was observed by ABB-ES personnel in the vicinity of the Admiral's Pier, to the northeast of the unnamed stream that drains OU1.

Characteristic fauna of this community are included in Appendix F-1.

4.4.2 Rapid Bioassessment of Benthic Communities A screening or reconnaissance level bioassessment (RPB I) (Plafkin *et al.*, 1989) was used to evaluate potential impacts associated with contaminant migration into aquatic habitat at NAS Jacksonville. The goals in using RBP I were to: (1) characterize the benthic fauna, (2) determine whether the benthic communities were impaired, and (3) aid in identifying source areas responsible for any observed impairment.

RBP I Sampling Stations RBP I was conducted at a total of 12 sampling stations, representing the major habitat types in the region of OU1 (Figure 4-36). Habitat types sampled via RBP I include manmade drainage ditches surrounded by old field habitat, manmade drainage ditches in the vicinity of pine flatwoods, and stream

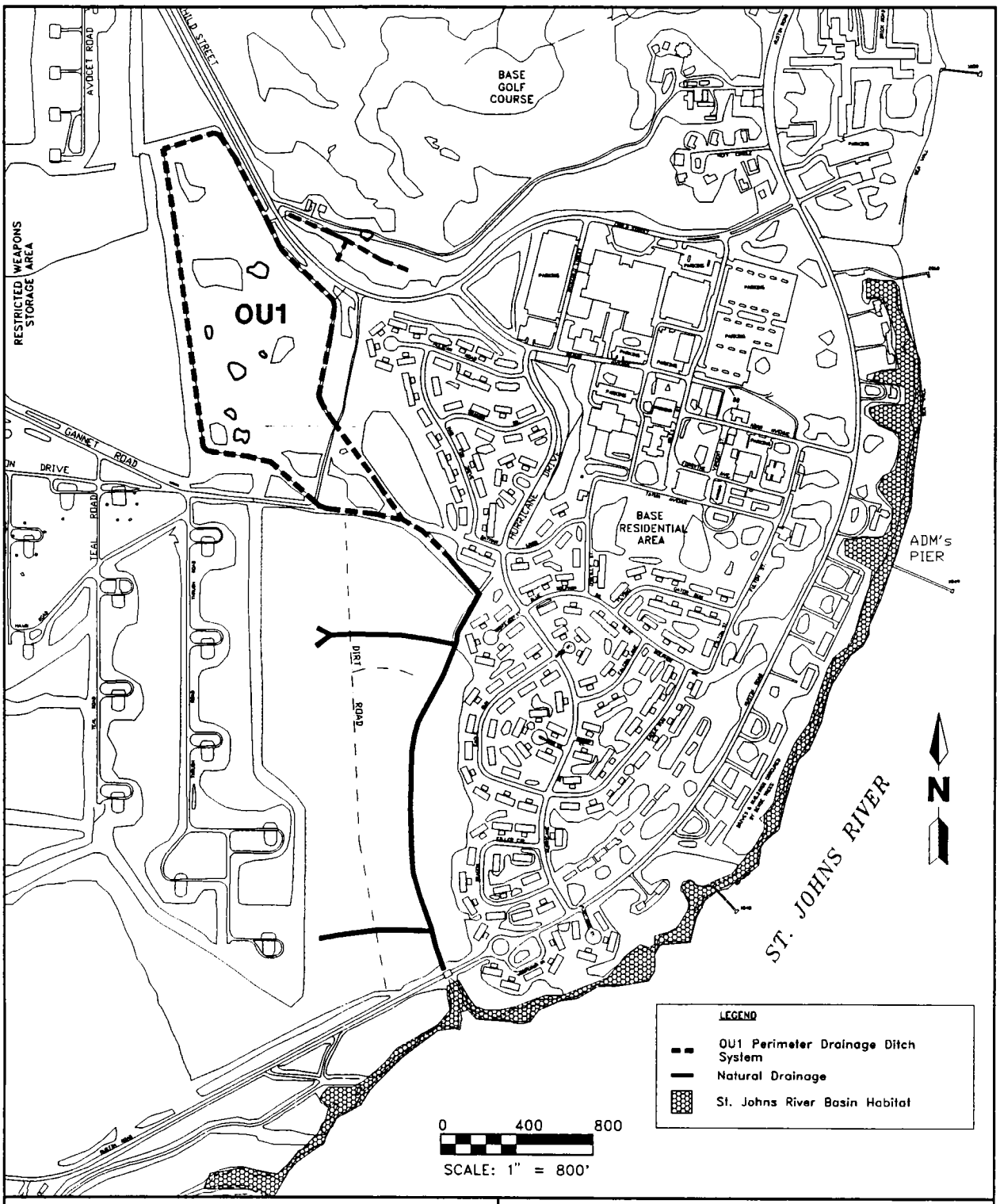

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FIGURE 4-35
ST. JOHNS RIVER BASIN HABITAT

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
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habitat in the forested wetland. The RBP I technique was applied to habitats upgradient and downgradient of the former free-phase petroleum recovery system water outfall. RBP I was conducted at manmade ditches to the north of Child Street at Stations 6, 7, and 9. Stations 2, 3, 5, 11, 12, 13, and 16 represent regions upgradient from the outfall (Geraghty & Miller, 1991), whereas stations 15 and 23 represent downgradient locations (Table 4-8).

Reference stations are not required for RBP I; however, Geraghty & Miller (1991) proposed that Stations 1, 8, 10, 22, and 25 serve as non-impacted RBP I reference locations. Significant differences were found between these stations and the potentially impacted stations during the biological survey, and no suitable reference stations were found during the 1992 NAS Jacksonville PEI field investigation. The reference areas selected by Geraghty & Miller (1991) should be excluded for the following reasons:

Location 1: This proposed sample location is hydraulically connected with the perimeter drainage ditch along the western border of OU1, and may be potentially influenced by contaminants from OU1. Consequently, it is not suitable as a reference location;

Location 8: This drainage ditch had little to no standing or flowing water at the time of the PEI field investigation. Its water flow regime and stream habitat characteristics are unlike any of the sample locations, which had standing and/or flowing water. Therefore, sample location 8 was excluded as a reference site;

Location 10: Sample location 10 is located on a golf course and receives direct surface water runoff from fairways, tees, and greens. Because of documented NAS Jacksonville golf course management practices (i.e., use of pesticides, herbicides, and fertilizers), sample location 10 has potentially been impacted by these practices and is thus not suitable as a reference location;

Locations 22 and 25: These two sample locations are situated in the perimeter drainage ditch that flows into the intermittent stream hydraulically downgradient of PSC 26 and PSC 27. Water flow and stream habitat characteristics of sample locations 22 and 25 are unlike any of the OU1 sample locations and both of these ditches flow from the weapons storage area.

Interpretation of RBP-I Results The taxonomic data collected at each sampling location have been summarized in Appendix F-2, Table F-2-1, and data on abiotic water quality parameters are presented in Table F-2-2 in Appendix F-2. RBP Impairment Assessment Sheets are also included in Appendix F-2.

Stations 6, 7, and 9 were located in the perimeter drainage ditch on the north side of Child Street, which is surrounded by pine flatwood habitat (Figure 4-36). Woody vegetation in the immediate habitat of these sampling locations included live oaks, wax myrtle, shrub oaks, and saw palmetto. Standing water at these three sampling locations ranged from 1.6 to 3.5 feet in depth, with temperatures from 13 to 18 °C, and dissolved oxygen ranging from less than 2 mg/ℓ to 5.1 mg/ℓ.

Table 4-8
Summary of Benthic Sampling Types,
Ecological Assessment

Preliminary Characterization Summary Report
OU1, NAS Jacksonville
Jacksonville, Florida

Area/Location (b)	RBP and QBIS (a)	RBP Only	QBIS Only	(c)
Perimiter Drainage Ditch System				
1				X
2	X			
3		X		
4				X
5	X			
6	X			
7	X			
8				X
9				
10			X	
11	X			
12	X			
13	X			
14				X
15	X			
16	X			
Intermittent Stream				
17				X
18				X
19				X
20			X	
21				X
22				X
23	X			
24				X
25				X
26				X
27				X
St. Johns River				
28			X	
29			X	
30			X	
31				X
32			X	
33			X	

Notes: X - Denotes type of survey at survey location.
(a) Survey types include: Rapid Bioassessment Protocol (RBP) and Quantitative Benthic Invertebrate Survey (QBIS).
(b) Locations are presented in Figure 4-36
(c) Neither RBP or QBIS surveys were conducted at these locations

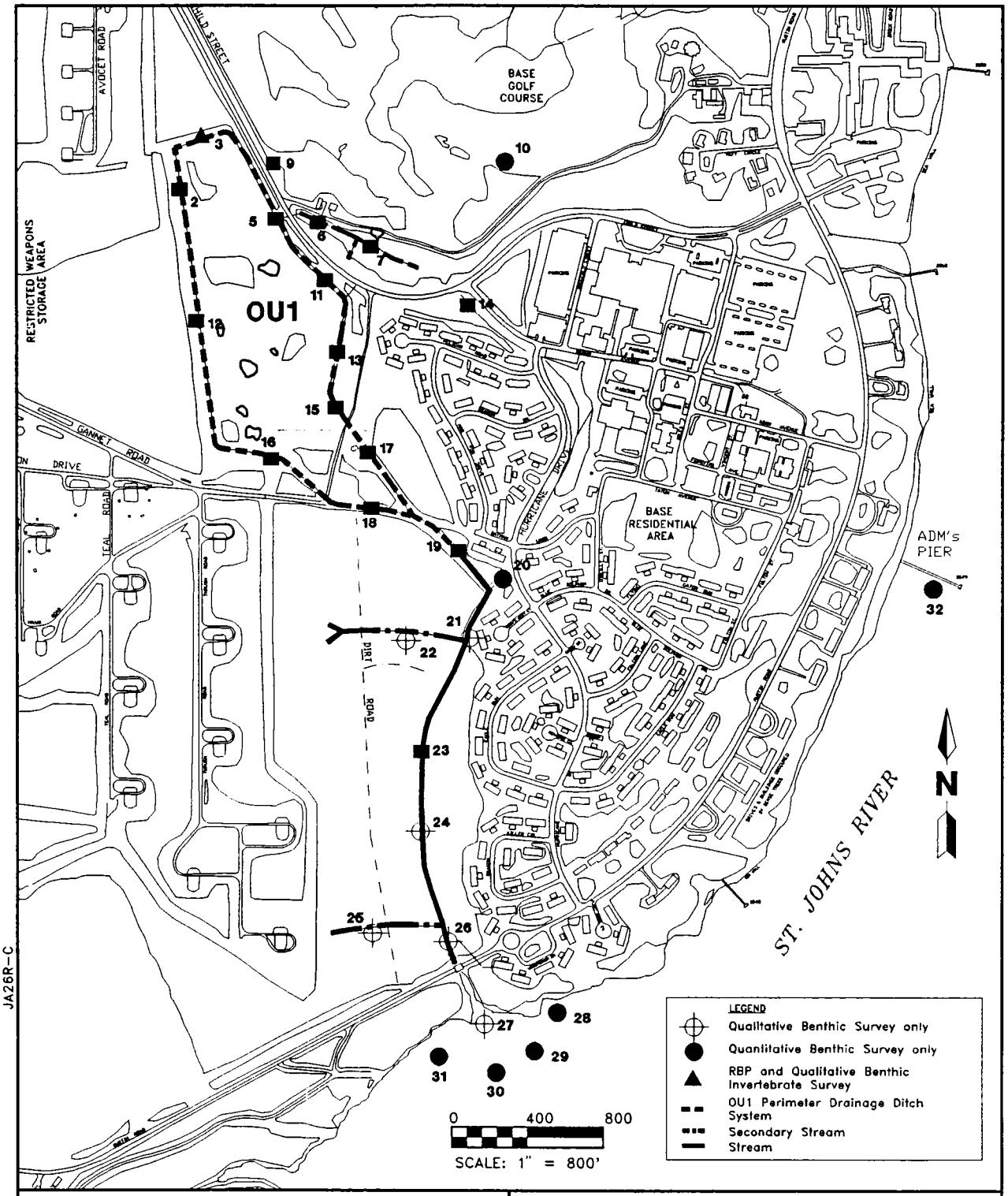

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FIGURE 4-36
AQUATIC SAMPLING LOCATIONS

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

Primary substrate and instream flow parameters all scored poorly in the habitat assessment matrix for these sites, indicating minimal rubble, gravel, or other stable habitat, high concentrations of fine sediments, little bottom scouring, and negligible flow. The habitat in these regions was relatively uniform, the man-made banks were vegetatively stabilized with trees and shrubs.

Fish were common at Location 6, rare at Location 7, and not observed at Location 9. Fish species collected are all classified as intermediately pollution-tolerant (Plafkin et al., 1989). In general, macroinvertebrates were abundant at Locations 6 and 7, and less abundant at Location 9; this relative lack of abundance probably reflects the lack of macrophytic vegetation at Location 9. Pollution-sensitive EPT taxa were rare at all three locations, and pollution-tolerant Oligochaetes and chironomid midge larvae were generally abundant. Gastropods were the dominant taxa at all three locations, with culicids co-dominating at Location 9. With the exception of odonates, other benthic invertebrate taxa were poorly represented at the three locations to the north of Child Street. Based on the qualitative analysis of RBP I, these three locations appear to be either naturally taxa-poor (i.e., exhibit low to moderate species diversity due to habitat limitations such as poor nutrient availability), have been affected by contaminants from OU1, or to have been affected by another unknown factor.

Standing water in the various sampling locations on the perimeter drainage ditch around OU1 ranged from less than 1 foot to greater than 5 feet in depth. Temperature in these wetlands ranged from 10 to 14 °C, and dissolved oxygen ranged from less than 2 milligrams per liter (mg/ℓ) to over 8.0 mg/ℓ. Several of these sample locations were characterized by abundant aquatic macrophytes, including cattails and hydrophytic grasses; these sample locations were generally abutted by either the old field or pine flatwoods habitat. Although no significant flow was observed in the ditch, and the benthic habitat was very uniform, the ditch banks were generally well vegetated, with minimal erosion. Filamentous algae and periphyton were abundant in much of the perimeter drainage ditch, especially in gaps where sun light penetrated the forested overstory, which was minimal to non-existent.

Four species of insectivorous consuming fish with intermediate pollution-tolerance (Plafkin et al., 1989) were encountered in the majority of the perimeter drainage ditch, and a southern leopard frog was netted adjacent to sample Location 15 (Figure 4-36). Although spring peepers were chorusing elsewhere in the vicinity of OU1, none of these tree frogs were encountered in the perimeter drainage ditch. Several Florida red-bellied turtles were observed in the perimeter drainage ditch system. Macroinvertebrates in the perimeter drainage ditch system were common to abundant, with only sample Location 12 scoring poorly in the macroinvertebrate abundance index. Gastropods frequently were the dominant taxa in the perimeter drainage ditch. Pollution-tolerant Oligochaetes were rare to common, whereas chironomid midge larvae were common to abundant. Although pollution-intolerant EPT taxa were never abundant, plecopterans, a pollution intolerant taxa, were common at Locations 3, 5, 15, and 16 (Figure 4-36). Hydrometrid bugs, various odonates, and several beetle species were encountered at several of the perimeter drainage ditch sample locations. Based on the qualitative RBP I survey, the sampling locations within the ditch system appear to be naturally taxa-poor, moderately affected by

contaminants from OU1 (although some pollution-sensitive receptors were noted in this habitat), or affected by other factors.

RBP I was conducted at two downgradient stream sampling locations (Locations 15 and 23) at OU1 (Figure 4-36). Location 15 is located directly to the southeast of the "plugged" drainage ditch, which isolates the perimeter drainage ditch system from the hydraulic downgradient stream habitat. The old field habitat is adjacent to the perimeter drainage ditch at the sample location. Minimal surface water flow was observed at this location during both the winter and spring ABB-ES field activities. Location 23 is located on the small stream in the hydrophytic forest habitat south of OU1. The stream at this sample location is characterized by a poorly defined dendritic channel with occasional ripples in the central dendritic stream. The stream substrate consisted primarily of sand, overlain by fine particulate organic matter. The water temperature of these two locations varied from 11 to 13 °C, and pH ranged from neutral (pH = 7.0) to slightly basic (pH = 7.8). Dissolved oxygen levels at these two locations ranged from 6.0 to 7.4 mg/ℓ.

The majority of primary substrate and instream flow parameters all scored poorly in the habitat assessment matrix at sample Location 15, indicating minimal rubble, gravel, or other stable habitat, as well as high concentrations of fine sediments, little bottom scouring, and negligible flow. The habitat in the perimeter drainage ditch at Location 15 was relatively uniform, the banks were vegetatively stabilized with herbaceous vegetation and occasional shrubs. Location 23 habitat parameters generally were scored slightly higher than Location 15, but still in the "fair" category.

Benthic macroinvertebrates were abundant at Location 15, and included a number of chironomid larvae and gastropods. Pollution-sensitive Plecoptera larvae were commonly encountered at this location, and fish, including mosquito fish, were detected at Location 15 during the RBP I field investigation. Few benthic macroinvertebrates were encountered at Location 23. The dominant taxa included amphipods and decapods, with gastropods and anisoptera both occurring rarely. Several fish were encountered at Location 23, including mosquito fish and gobies. Based on the qualitative analysis of RBP I, the downstream sampling locations appear to be naturally taxa-poor, potentially affected by contamination from OU1 although some pollution-sensitive receptors were noted in this habitat, or affected by some other unknown factor.

In summary, the qualitative analysis of the RBP I results suggest that either the aquatic habitat is naturally taxa-poor, the general aquatic habitat in the vicinity of OU1 is moderately degraded, or that some other factor has caused a general impairment of the aquatic community at this portion of NAS JAX. Although it is possible that these results are indicative of the effects of contaminant-related impacts at these locations, the perimeter drainage ditch habitat itself is probably not supportive of a diverse assemblage of aquatic macroinvertebrates. Comparison of the OU1 perimeter drainage ditch sites with a suitable reference area would provide additional information regarding potential impacts to aquatic resources.

4.4.3 Benthic Macroinvertebrate Sampling and Analysis The macroinvertebrate community residing in the benthos in the water bodies associated with OU1 were quantitatively surveyed for the PEI. Benthic organisms are in intimate contact

with contaminants residing in the sediment substrate, and as a consequence, may be more severely impacted than are other components of the aquatic community. In addition, these organisms are important components of the food web, with key roles in decomposing organic matter (and making this resource available to other organisms) as well as providing a food resource to fish and avifauna. An evaluation of various measures of "community health" of these particular organisms can provide valuable information regarding whether the overall ecosystem associated with this habitat has been adversely impacted by chemical contamination.

Interpretation of Benthic Macroinvertebrate Analysis. The benthic macroinvertebrate ecological investigation has provided baseline information relative to the winter condition of aquatic habitats at OU1. This data will potentially be useful when compared to data collected during any future sampling events. However, in order to provide quantitative comparisons between benthic macroinvertebrate sampling locations, replicated samples are required. Careful attention must also be paid to selection of a reference location(s) to control for the physical and chemical characteristics of the individual sampling locations. Therefore, the following section provides a qualitative analysis of this aspect of the OU1 field investigation.

A summary of the taxa identified at OU1 and the reference locations is presented in Appendix F-3, Table F-3-1. Results of the taxonomic analysis and the Shannon-Wiener Diversity Index are presented in Table F-3-2. Table 4-9 summarizes the data collected from the three major aquatic habitat types at OU1 (also see Figure 4-36). Samples from Locations 2 through 16 represent the perimeter drainage ditch habitat. Locations 20 and 23 were located in the lower order stream surrounded by cypress swamp downgradient from OU1, and samples 28 through 33 were obtained from the St. Johns River estuary (Locations 28, 29, and 30 are adjacent to the mouth of the stream draining OU1, and Locations 33 and 32 represent up and down-river reference locations, respectively) (Figure 4-36). Benthic macroinvertebrate data were also collected from the Julington Creek and Cecil Field locations, as described in Section 7.1 of this PEI.

The Cecil Field location yielded four species of benthic macroinvertebrates, including three species of pollution-tolerant chironomid midge larvae and one species of pollution-sensitive caddisfly (Trichoptera). The estimated total number of individuals per square meter was 1,077, and the Shannon-Wiener Diversity Index was 0.87. ABB-ES ecologists selected the Cecil Field sampling location to serve as an appropriate reference location for the perimeter drainage ditch systems at OU1. However, this black-water stream meanders through developed sections of Cecil Field and is probably not a suitable reference location because: (1) it may be impacted by sources of contamination at Cecil Field; and (2) it does not share many habitat similarities with the OU1 perimeter drainage ditch sampling locations. In addition, low taxa diversity and a low Shannon-Wiener index (Table 4-10), in conjunction with the dominance of pollution tolerant midges, suggest that the Cecil Field location is not a suitable reference location for comparison with OU1 benthic sampling locations.

Table 4-9
Summary of Benthic Macroinvertebrate Sampling Results (a,b), Ecological Assessment

Preliminary Characterization Summary Report
OU1, NAS Jacksonville
Jacksonvile, Florida

Area/Location (c)	Total Number of Species	Total Individuals Per Square Meter	Shannon-Werner Diversity Index	Range of Tolerance Values
Perimiter Drainage Ditch System				
2	12	3,488	2.82	5-10
5	8	5,253	2.06	6-10
6	5	517	1.96	6-10
7	7	1,163	2.42	8-10
9	1	86	0	--
10	1	129	0	--
11	22	11,583	3.39	5-10
12	12	2,627	3.21	6-10
13	13	4,478	2.67	6-10
15	12	2,885	2.4	6-10
16	23	7,622	3.71	5-10
Intermittent Stream				
20	3	388	0.99	10
23	8	947	2.33	6-10
CF*	4	1,1077	0.87	5-10
JC*	16	5,038	3.1	5-10
St. Johns River				
28	11	10,507	2.14	4-10
29	20	5,512	2.79	5-10
30	10	1,809	2.97	6-10
32*	11	3,230	2.81	4-10
33*	8	1,206	2.78	6-10

Notes: (a) Rseults of the Quantitative Benthic Macroinvertebrate Survey.
(b) Taxonomic Data is presented in Appendix F-3, Table C-2.
(c) Locations are preseented in Figure 3-36.
* - Indicates locations not potentially impacted by OU1 contaminants.
CF - NAS Ceicel Field, JC Julington Creek location.

Sixteen species of benthic macroinvertebrates were identified in the sample collected from the Julington Creek location, located in a bald cypress swamp approximately 2 to 3 miles southeast of OU1. This location was to serve as a background reference location relative to the bald cypress swamp just south of OU1 (Figures 4-34 and 4-36). The estimated total number of individuals per square meter at this reference location was 5038, and the diversity index at this reference location was 3.1. The least pollution-tolerant organism detected in this benthic sample was a chironomid midge, *Stenochironomus hilaris*, with an Hilsenhoff (1988) pollution tolerance index of 5. In addition, *Caenis diminuta*, a member of the relatively pollution-sensitive order Ephemeroptera, was present at this sample location. Despite the presences of these two species with intermediate pollution tolerance, this benthic sample was dominated by a number of pollution-tolerant chironomid and oligochaete species. Cypress swamps frequently are dominated by members of the Chironomidae (Ewel, 1990), and the presence of these species at the reference location may be due to the naturally low pH and dissolved oxygen levels of this forested wetland habitat.

The two benthic samples from within the OU1 cypress swamp contained substantially fewer species than the Julington Creek reference location sample. Location 20 had only three species, while Location 23 had 8 species. Shannon-Wiener diversity indices at locations 20 and 23 were 0.99 and 2.33, respectively, and less than 1,000 organisms per square meter were estimated at these two locations (Table 4-9). Organisms from the OU1 cypress swamp benthic sample locations included *Ennallagma signatum* (an odonate species in the family Coenagrionidae), a species of *Chironomus* midge, and several species of oligochaetes. All of the benthic organisms identified at these two sample locations are tolerant of moderate to high levels of organic pollutants (Hilsenhoff, 1988). No pollution-sensitive EPT organisms (Plafkin et al., 1989) were found at the OU1 cypress swamp locations.

The two OU1 cypress swamp sample locations had fewer benthic macroinvertebrates per unit area and lower Shannon-Wiener indices than the Julington Creek reference location. This difference may be due to OU1-related contamination; however, the benthic invertebrate community in cypress swamps is frequently depauperate, and often reflects the spatial variations in cypress swamp water quality parameters (Ewel, 1990). Non-uniform pH, dissolved oxygen levels, and substrate topography may result in patchy distributions of benthic invertebrates in cypress swamps, and more quantitative studies, with replication, would be required to determine if the observed differences are due to either contamination from OU1 or other factors.

No distinct trends were observed at the various sampling locations at the OU1 perimeter drainage ditch system. Samples from Locations 9 and 10 were represented by only one species, an annelid of undetermined pollution tolerance, and densities were low, with only 129 and 90 individuals per square meter, respectively. Samples from Locations 11 and 16 contained 22 and 23 species, respectively. The organisms from these two benthic sample locations ranged from organisms of intermediate pollution tolerance to organisms with high levels of pollution tolerance. A number of chironomid midges and Oligochaetes were found at both sites, and several odonates were found at Location 11. Those locations with dense aquatic macrophytic growth (e.g., Locations 11 through 15) typically had a number of small gastropods, including the snail *Physella cubensis*. Relatively few pollution-tolerant organisms were noted in any of the perimeter

drainage ditch benthic sample locations; however those portions of the ditch with more diverse habitat types and better cover (i.e., overhanging vegetation) tended to yield more taxa. Shannon-Wiener indices associated with the benthic macroinvertebrate fauna at these locations ranged from a low of 0 (only one species per location) to a high of 3.71 (23 species at Location 16) (Table 4-9). Over 11,000 organisms per square meter were estimated at Location 11, and over 7,000 invertebrates per square meter at Location 16.

The perimeter drainage ditch system appears to have a moderate benthic invertebrate community dominated by organisms capable of surviving in low oxygen environments. This may be indicative of either the lack of any flow, agitation, or other physical oxygenating sources, and/or of location-specific water quality limitations. In order to quantitatively determine if differences between the perimeter ditch study locations are due to OU1-related contaminants, a suitable reference area for this habitat must be located and additional studies, with replication, would be required.

Samples from Locations 28, 29, and 30 were collected in the St. Johns River adjacent to the mouth of the unnamed stream, whereas samples from Locations 32 and 33 represent down and up-river reference locations, respectively (Figure 4-36). No distinct differences between Locations 28, 29, and 30 and the two reference locations (32 and 33) were noted. The highest number of macroinvertebrate species obtained was 20 (at Location 29); all other St. Johns River samples contained between 8 and 11 species. Over 10,000 individual organisms per square meter were predicted at Location 28, which had a diversity index of 2.14; however, fewer than 1,900 organisms per square meter were predicted at Location 30, which is located within 10 to 20 meters of Location 28. The Shannon-Wiener Diversity Index of 2.97 for Location 30 is within the same range as Locations 32 and 33 (2.81 and 2.78, respectively).

Macroinvertebrates encountered at the five St. Johns River sampling locations (28, 29, 30, 32, and 33) included several taxa characteristic of estuarine environments, including two pelecypod clams (*Rangia cuneata* and *Polymesoda caroliniana*), an isopod (*Cyathura polita*) and a blue crab (*Callinectes sapidus*). Numerous oligochaetes were encountered at all five sampling locations, and chironomid midge larvae were common in these samples. Few other taxa were noted at any of the five St. Johns River sample locations. Locations 28 and 32 both yielded a *Gammarus* species, an amphipod of low to intermediate pollution tolerance (Hilsenhoff, 1988). Although there does not appear to be a major difference between the potentially impacted and reference locations in the St. Johns River, additional quantitative sampling, with replication, would be required in order to confirm this conclusion.

In summary, the benthic macroinvertebrate study has provided a baseline study of the winter condition at the various aquatic habitats. These data will be useful for comparison to data from any future sampling events. In general, the benthos in aquatic habitats associated with OU1 is characterized by macroinvertebrate species with moderate to high degrees of pollution tolerance. Many of the benthic species observed at the site have the ability to withstand harsh environmental conditions, such as the low dissolved oxygen levels or low pH characteristic of wooded swamps in Florida (Ewel, 1990). It is not known if the dominance of pollution-tolerant species is related to contamination from OU1, to physical and chemical limitations of the habitats, or micro-habitat differences

among sampling locations. In order to provide a statistically valid analysis of the benthic macroinvertebrate population, replicate sampling and comparison with data collected from suitable reference locations for all OU1 habitat types would be necessary.

4.4.4 Sensitive Environmental Receptors In accordance with the RI/FS Work Plan (Geraghty & Miller, 1991), transects were made throughout OU1 in an effort identify critical habitat and sensitive plant and animal receptors. Due to the dormant senescent condition of the majority of the flora in this region, it was not possible to identify any rare and/or endangered plant receptors during the PEI field investigation.

Rare and Endangered Species. The Florida Natural Areas Inventory (FNAI) Program maintains maps and a computerized data-base for known and potential occurrences of natural communities and rare and endangered plants and animals in Florida. In addition, FNAI maintains a county-wide matrix distribution database, which lists rare and endangered species by habitat and seasonality. Although these databases represent a compilation of information from a variety of public and private sources, the data collected by FNAI are generally not the result of comprehensive studies or site-specific field surveys of a given area. "For these reasons, the FNAI cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Florida" and reports from FNAI "should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments" (FNAI, 1992a). Rare and endangered plant and animal species are protected under the Endangered Species Act (ESA) of 1973, which is administered by the USFWS. Animal species are protected in Florida under the authority of the Florida Game and Freshwater Fish Commission (FGFWFC), and plant species are under the jurisdiction of the Florida Department of Agriculture (USFWS, 1988).

FNAI was contacted regarding the presence of any federal or state-listed rare and endangered species that may occur at NAS Jacksonville. The response from FNAI indicates that the FNAI database has no record of known or potential rare or endangered species at the NAS JAX site, however, a pair of bald eagles (*Haliaeetus leucocephalus*) are reported to formerly nest at NAS Jacksonville. The bald eagle is protected under the ESA and is listed by the FGFWFC as a threatened species in Florida. In addition, the FNAI database identifies the following three organisms as possibly occurring in the St. Johns River in the vicinity of NAS Jacksonville: the shortnose sturgeon (*Acipenser brevirostrum*), the sea lamprey (*Petromyzon marinus*), and the West Indian Manatee (*Trichechus manatus*). Information from the FNAI regarding rare and endangered species known or expected to occur in Duval County are attached as Appendix F-4. The shortnose sturgeon and the West Indian Manatee are protected under the ESA and are listed by the FGFW as threatened species in Florida.

In order to obtain additional information regarding rare and endangered species use of the various habitats at NAS Jacksonville, a number of other sources were reviewed, including Environmental Services and Permitting, Inc. (ESP) (1990), USFWS (1988), FGFWFC (1991), and Brody (1990). Table A-7 (Appendix F-1) summarizes the information regarding rare and endangered species known, or believed, to occur in the vicinity of NAS Jacksonville. The following paragraphs provide information on the majority of state and federally listed rare and

endangered species known to (or likely to) occur at NAS Jacksonville (FNAI, 1992).

Fish Species. The Atlantic sturgeon (*Acipenser oxyrhynchus*) and shortnose sturgeon (*Acipenser brevirostrum*), both anadramous fish, have been recorded as a transients in the St. Johns River. The Atlantic sturgeon is a state-listed species of special concern and is proposed for federal listing as a threatened species. The shortnose sturgeon is a state and federally listed endangered species. The Atlantic sturgeon occurs from Florida to Nova Scotia and may grow up to 12 feet in length, whereas the shortnose sturgeon occurs in waters from Massachusetts to Florida and reaches a maximum length of 5 feet. These primitive bottom-feeding fish are primarily at risk from deterioration of water quality, habitat destruction, and impoundment of tidal rivers (USFWS, 1988).

The sea lamprey (*Petromyzon marinus*) is a jawless fish occurring from Greenland to Florida; this species is recorded as an "accidental" occurrence in Florida and is not officially listed as a rare and endangered species (FNAI, 1992). Adult sea lamprey are parasitic and attach to other fish via a sucking-disk mouth structure. No records detailing the occurrence of either sturgeon or sea lamprey at NAS Jacksonville were located.

West Indian Manatee. The state and federally listed endangered species West Indian Manatee (*Trichechus manatus*) is known to occur in the St. Johns River, and has been observed seasonally in the vicinity of NAS Jacksonville. A manatee was observed by ABB-ES field personnel in June 1992, foraging in the St. Johns River, in the vicinity of the Admiral's pier, located approximately 0.5 mile down-river from the mouth of the unnamed stream, which receives surface water from OU1 (Figure 5-1). Manatees range from the Carolinas south to the Florida Keys, and along the coast of the Gulf of Mexico (Burt and Grossenheider, 1976). These large, sluggish aquatic mammals enter several of Florida's rivers on the Gulf and Atlantic coasts during the colder months of the year (Myers and Ewel, 1990), where they congregate in small groups. Manatees feed on aquatic vegetation in shallow water. The North American manatee population is at risk from human use of water control and flow devices (Myers and Ewel, 1990).

Sea Turtles. The Atlantic loggerhead (*Caretta caretta*), Atlantic Green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), and Atlantic Ridley (*Lepidochelys kempii*) sea turtles all may range within the St. Johns River estuary; however, any animals in the vicinity of NAS Jacksonville would be transient individuals, and would not be breeding near the facility (USFWS, 1988). The loggerhead turtle is a state and federally listed threatened species; all other sea turtles are state and federally listed endangered species.

With the exception of their nesting ecology, little is known regarding the behavior and movements of the sea turtles. The Atlantic loggerhead sea turtle may reach a length of 4 feet and may weigh up to 200 pounds. This omnivorous reptile nests on beaches in Florida, with the most successful nesting occurring from Cape Canaveral to Palm Beach (Ashton and Ashton, 1991).

Green turtles occur in the warmer waters of the Atlantic Ocean, in the Gulf of Mexico, and the Caribbean; they may occasionally venture as far north as Massachusetts and as far south as Argentina (Ashton and Ashton, 1991). Although green turtle nesting may have once occurred on many of Florida's beaches, the

only significant nesting areas remaining lie between Cape Canaveral and Palm Beach (Ashton and Ashton, 1991).

The leatherback sea turtle is the largest living species of sea turtle, weighing up to 1,600 pounds and reaching 8 feet in length. The leatherback occasionally nests on Florida's Atlantic Coast, south of St. Augustine (Ashton & Ashton, 1991).

The Atlantic Ridley sea turtle is a comparatively small animal, rarely reaching over 2 feet in length. This species is primarily carnivorous. Juvenile and sub-adult Atlantic Ridley turtles have been observed along the Atlantic Coast. The Atlantic Ridley sea turtle is not known to breed in Florida (Ashton and Ashton, 1991). No records were located by ABB-ES ecologists that detail the occurrence of any of these sea turtles in the St. Johns River in the vicinity NAS JAX.

Gopher Tortoise. The gopher tortoise (*Gopherus polyphemus*), a state-listed species of special concern, is a confirmed resident of NAS Jacksonville (USFWS, 1988) and has been observed at OU1 by ABB-ES ecologists. A 12- to 15-pound female turtle was located in May 1992 by ABB-ES personnel. This turtle was encountered as it wandered along a grassy habitat in the western portion of OU1, adjacent to a drainage ditch. During the same time period, a smaller male gopher tortoise was encountered along the western shore of Casa Linda Lake, approximately 1/2 mile from OU1. Gopher tortoises occur in well-drained sandy soils of pine flatwoods, oak hammocks, sand-hills, beach scrub, and longleaf-pine/oak forests in six states of the U.S. southeastern coastal plain (Auffenberg and Franz, 1982). This herbivorous reptile is known for the burrows that it digs, which may be 30 feet or more in length, and up to 18 feet in depth (Ashton and Ashton, 1991). Movement patterns and home ranges of the gopher tortoise vary seasonally and are determined by social interactions (McRae et al., 1981). Gopher tortoises are primarily at risk from land developmental activities, and it has been estimated that approximately 86 percent of their former habitat has been lost to residential and agricultural use (Burke, 1989). Habitat degradation (e.g., fire exclusion) and human predation have also contributed to the decline of this animal (Diemer, 1986). Relocation of gopher tortoises is one technique currently being used to protect these animals from loss of habitat by developmental activities (Burke, 1989).

Faunal Associates of the Gopher Tortoise. Sixty vertebrate and 302 invertebrate species have been recorded as being associated with gopher tortoise burrows; however, little information regarding the ecology of these faunal associates is available (Witz and Wilson, 1991). The burrows of gopher tortoises create a microclimate free from large fluctuations in temperature and humidity. Tortoise fecal matter, which is cellulose rich, may provide a nutritive base for the invertebrate community which inhabits gopher tortoise burrows. Invertebrate communities which use the fecal matter as a nutritive source include several rare and endangered scarab beetles. Several state-listed vertebrate and invertebrate faunal associates share the burrows created by the gopher tortoise. Species sharing gopher tortoise habitat in the vicinity of OU1 may include: Florida gopher frog (*Rana areolata aesopus*), eastern indigo snake (*Drymarchon corais couperi*), and several species of scarab beetle. When temporary ponds or appropriate breeding pools occur in the vicinity of gopher tortoise burrows, the Florida gopher frog, which is a state-listed species of special concern may occur according to Witz and Wilson, 1991 and Ashton, 1991. This winter-spring breeding

amphibian is frequently found in and around gopher tortoise holes, and uses the holes for protection from predators, as well as for temperature and humidity regulation. Habitat destruction has placed this amphibian at risk in Florida. This frog is a probable resident at NAS Jacksonville (USFWS, 1988). None of these species which are indicated in the literature to cohabit in gopher tortoise burrows were observed in the vicinity of OU1 at NAS Jacksonville.

The eastern indigo snake is the largest non-venomous serpent in the Americas, reaching a length of 104 inches. This reptile is a state and federally listed threatened species. Indigo snakes are encountered in dry habitats in the vicinity of standing water, and are most often found in the vicinity of gopher tortoise holes. The eastern indigo snake species has been threatened by over-collecting for the pet trade and by habitat loss (Ashton and Ashton, 1988). The eastern indigo snake is likely to occur in suitable habitat at NAS Jacksonville, including the pine flatwoods and in the vicinity of the OU1 old field habitat (USFWS, 1988).

American Alligator. The American alligator (*Alligator mississippiensis*) is a confirmed resident at NAS Jacksonville and may periodically be found in wetland and aquatic habitats at OU1 (USFWS, 1988). This well known reptile occurs in bodies of water that are surrounded by marshy or swampy areas. It is a state-listed species of special concern, and is a federally listed, threatened species (FGFWFC, 1991). Although mature alligators tend to stay within a home range, sub-adults may move long distances in search of suitable habitat (Ashton & Ashton, 1991). Young alligators feed on small aquatic invertebrates and other small animals; older animals feed on fish, turtles, snakes, mammals, and small birds. ABB-ES personnel have not observed the American alligator at NAS Jacksonville.

Birds of Prey. The bald eagle (*Haliaeetus leucocephalus*) has nested at NAS Jacksonville as recently as 1979; however, no recent nesting activity has been documented to have occurred at the base (USFWS, 1988). This federally listed endangered species has state listed threatened status in Florida. Information regarding recent history of bald eagle nesting at NAS Jacksonville has been requested from the FGFWFC. Bald eagles range from northern Canada to Florida, and are seldom seen far from water, including the seacoast, rivers, and lakes. Populations of bald eagles nest in Florida during the winter, from November through February, and may migrate northward in spring and summer (Terres, 1980). The bald eagle feeds primarily on fish, small mammals, and carrion. It is likely that non-resident eagles may be encountered on the base during seasonal migrations as they fly along the St. Johns River in the vicinity of NAS Jacksonville.

An American kestrel (*Falco sparverius*) was observed foraging in the open field of OU1 during January 1992. This small falcon occurs throughout the United States (Terres, 1980). American kestrels, which feed on arthropods, small mammals, birds, and other vertebrates, require open grassland habitats. Several sub-species of kestrel winter in Florida, including the state-listed threatened southeastern kestrel (*F. sparverius paulus*), which breeds in South Carolina, Georgia, Alabama, and Florida (FGFWFC, 1992). Because several other sub-species of falcon winter in Florida, including several relatively common northern sub-species, it is not certain that the observed kestrel was a threatened southeastern kestrel. If mating pairs of kestrels were present during spring,

fledged young-of-the-year birds would have possibly been present in the vicinity of OU1. However, no American kestrels were observed at OU1 during the June 1992, ABB-ES ecological site inspection.

ABB-ES ecologists have observed several osprey (*Pandion haliaetus*) at OU1. This bird is listed as a species of special concern by the State of Florida. These piscivorous birds have been observed soaring over the St. Johns River, perched adjacent to the perimeter drainage ditch at PSC 26, and flying over PSC 26 with fish in talons. Osprey are specialized birds of prey that spend much of their time near water. They are found in a variety of fresh and saltwater habitats, and are frequently seen flying above open bodies of water in search of fish (Terres, 1980). When not hunting, osprey will perch on woody snags or rocks near water. Osprey nest singly or in colonies, in living, dead, or partially dead trees, and atop a number of man-made structures. Although osprey have a broad North American range, they are at risk from habitat destruction and contamination of prey.

The burrowing owl (*Athena cunicularia*) inhabits Florida's dry sandy habitats. Preferred habitats include areas of limited growth, including pastures and prairies, and areas of prairie-like growth such as that found around airfields, industrial plants, and landfills (USFWS, 1988). The burrowing owl is a state-listed species of special concern. No records exist of the occurrence at NAS Jacksonville of burrowing owls; however, suitable habitat probably exists in the vicinity of OU1.

Herons and Egrets. No heron or egret colonies are documented to have existed at NAS Jacksonville (USFWS, 1988). ABB-ES ecologists did observe several herons and egrets, including the snowy egret (*Egretta thula*), foraging in the drainage ditch and shallow wetlands associated with OU1. The snowy egret, a state-listed species of special concern, is a widely distributed egret, which feeds on arthropods, small fish, amphibians, and crustaceans. The snowy egret prefers foraging in shallow marshes, flooded ditches, pond edges, and stream banks and has been observed feeding in the shallows at the mouth of the un-named stream downgradient of OU1. Because suitable foraging habitat for this species exists in the drainage ditch around PSCs 26 and 27, it is probable that this species occurs elsewhere in the vicinity of NAS Jacksonville. The snowy egret, as well as the tri-colored heron (*Hydranassa tricolor*) and little blue heron (*Florida caerulea*), all share many similar habitat requirements. It is possible that tri-colored and little blue herons may be occasional visitors to NAS Jacksonville. Both of these birds are state-listed species of special concern.

Limpkin (*Aramus guarauna*) and wood stork (*Mycteria americana*) may also periodically visit NAS Jacksonville to forage in the facility's shallow wetlands. The limpkin (a state-listed species of special concern) has been reported and the presence of the wood stork (a state and federally listed endangered species) has been confirmed in Duval County (FNAI, 1992).

Sherman's Fox Squirrel. Several fox squirrels were observed by ABB-ES ecologists in the vicinity of OU1. All observed fox squirrels were in grassy clearing surrounded by pine flatwoods, in the vicinity of the restricted weapons storage area, immediately to the west of OU1. The Sherman's fox squirrel sub-species is a state-listed species of special concern (FGFWFC, 1991) and is the sole sub-species occurring in northeastern Florida (FNAI, 1992b; Kantola, 1986).

Populations of this animal have recently declined in numbers, primarily due to destruction of oak-pine woodlands, the fox squirrel's preferred habitat (Kantola, 1986).

Rare and Endangered Flora. An endangered plant survey was conducted at U.S. Navy installations in Duval County, Florida including NAS Jacksonville in 1989 (ESP, 1990). Plants considered in this survey included all state and federally listed threatened and endangered species, all candidates proposed for federal listing, and all plants considered rare by the FNAI. Star anise (*Ilicium parviflorum*) was the target species located at NAS Jacksonville. However, the location of this plant at the facility indicated that it probably is not native, but is persisting from an ornamental planting (ESP, 1990). Although Bartram's Ixia (*Salpingostylis coelestina*) was not encountered at NAS Jacksonville, suitable habitat for this species probably exists at the facility (ESP, 1990).

4.4.5 Wetland and Aquatic Habitats Florida Administrative Code 17-301 defines the landward extent of surface waters based primarily on the presence of hydrophytic vegetation. Approximately 15 acres of hydrophytic swamp occur in the vicinity of OU1. This region is also considered a wetland according to Federal criteria (USEPA, 1977). The perimeter drainage ditch system functions as a wetland resource, providing habitat for fish and wildlife. This ditch is hydraulically connected to a more extensive wetland, composed of stream, forested wetland, and riverine habitat (Figure 4-29).

Several fish and amphibian species were observed in aquatic habitat at NAS Jacksonville. Fish and amphibians serve as prey items for a variety of vertebrate predators, thereby, potentially creating an exposure pathway for site-related contaminants. Furthermore, the embryonic and juvenile stages of indigenous wetland and aquatic organisms (i.e., amphibians) are frequently at risk from pollution or toxic stress (Birge and Black, 1982).

4.4.6 Ecological Stresses Several indicators of distressed flora and fauna were observed at OU1.

Floral Stresses. Pursuant to the RI/FS Work Plan, signs of stressed plant growth were assessed at OU1. Signs included yellowing or achloritic vegetation, wilting, premature leaf senescence, insect infestations, and abnormal growth patterns. Although none of these signs were encountered at OU1, distinct and anomalous patterns of plant growth were observed in the old field habitat that dominates the northern portion of OU1. For instance, "islands" of woody vegetation were noted to be distinct from the PSC 26 old field matrix (see Section 4.2 of this PEI). Examination of historic U.S. Navy aerial photographs indicates that these wooded habitats may correspond with solvent and fluid disposal pits that existed at the site prior to the 1983 remedial activities. Several wetland habitats were encountered in the eastern and central portions of the old field habitat at PSC 26. The patchy and uneven distribution of these habitats may correspond with the varying nature of the unconsolidated sand, silt, and clay that were spread over OU1 during remedial activities in 1983.

Faunal Stresses. The following dead animals were encountered at PSC 26 during the course of the PEI field investigation.

(1) A dead juvenile opossum was encountered in the vicinity of Location 7 on January 26, 1992; a pathological examination of this animal revealed that it died of a congenital heart disorder.

(2) On January 27, 1992, a dead sharp-shinned hawk (*Accipiter striatus*) was encountered at the same locality; a pathological examination of this animal revealed that it died of parasitism.

(3) The carapace of a gopher tortoise was found on PSC 26; its cause of death was unknown.

(4) A badly decomposed river otter (*Lutra canadensis*) was discovered in standing water adjacent to Location 5; the otter appeared to have been hit by a motor vehicle.

Appendix F-5 contains pathological reports for the opossum and sharp-shinned hawk.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 GEOPHYSICAL SURVEY.

CONCLUSION. The purpose of the seismic study was to assess whether the "hard" layer identified by the USACE existed beneath OU1. The results of the study did not provide conclusive evidence of the existence of the "hard" layer. The "hard" layer was determined to either be of insufficient thickness to be detected by the survey method or did not have sufficient contrast in seismic velocity values between the over and underlying sediments to be detected.

The results of the seismic refraction survey compare well with actual subsurface conditions observed in split-spoon samples collected during the drilling of the investigative soil borings. Lithologic information from these samples confirmed the presence of a 1- to 6-foot thick layer of a dense dolomite or dolosilt unit at a depth of between 25 to 45 feet beneath the land surface at OU1. The dolomite or dolosilt layer was not contiguous across the site and grades to a magnesium rich silty clay and clayey silt. The dolomite and silt and clay sediments are at the base of the Surficial Aquifer which is composed of Miocene/Pliocene age sediments.

RECOMMENDATION. No additional seismic refraction survey work is planned to delineate the "hard" layer that was initially found by the USACE. However, the actual boundary of OU1 should be delineated using geophysical survey methods such as electromagnetic terrain conductivity and magnetometer.

5.2 SOIL GAS SAMPLING.

CONCLUSION. The quantitation limit for soil gas samples analyzed by USEPA Method 602 (Modified) was 1.0 $\mu g/\ell$ for each target analyte. The target analytes were not detected in any soil gas sample at concentrations greater than the quantitation limit.

A naturally occurring hydrocarbon compound was detected in some of the soil gas samples. The naturally occurring hydrocarbon compound may be a terpene, which is exuded by plants.

The quantitation limits for soil gas samples analyzed by USEPA Method 601 (Modified) were 1.0 $\mu g/\ell$ for methylene chloride (MC), 0.1 $\mu g/\ell$ for TCE, and 0.5 $\mu g/\ell$ for PCE. MC, TCE, and PCE were not detected in the soil gas samples at concentrations that were greater than the quantitation limits (Table 4-2).

1,1,1-tetrachloroethane was detected (but not quantified) in Sample SG034. Sample SG034 is located in the residential area approximately 90 feet south of the intersection of Pelican Road and Mad Fox Drive.

RECOMMENDATION. No additional soil gas sampling is planned. The 1,1,1-TCA detected in the residential area will be addressed during additional groundwater assessment activities.

5.3 AMBIENT AIR SAMPLING.

CONCLUSION. The purpose of the ambient air quality sampling event was to compare general air quality at OU1 with background (upwind) air quality and evaluate the potential for airborne chemicals to migrate to areas that could affect residents of the NAS Jacksonville base housing area. The results of the sampling event indicate the presence of semivolatile organics (petroleum related hydrocarbon compounds), PCB, and metals in the air quality samples.

Only one air sample contained concentrations of bis(2-ethylhexyl) phthalate (5.9 $\mu g/m^3$) that exceeded the USEPA Region III risk-based concentration of 0.61 $\mu g/m^3$ for air quality. The USEPA Region III risk-based concentration of 0.0011 $\mu g/m^3$ for a 10^{-6} cancer risk for PCB-1254 was exceeded in the upwind air samples from RUN2 and RUN3 and ten of the downwind air samples. The USEPA Region III risk-based concentration of 0.0014 $\mu g/m^3$ for a 10^{-6} cancer risk for cadmium was exceeded in each of the samples in which cadmium was detected. The risk value 0.02 $\mu g/m^3$ for chromium VI exceeded in one sample from RUN3, Downwind 2 and one sample from RUN4, Downwind 1A.

No data is available on the presence of VOCs. This is due to problems associated with the duration and volume of the volatile organic air sample during the field activities.

RECOMMENDATIONS. Resampling will be required to obtain air quality data to characterize VOCs, which may be present at or in the vicinity of NAS Jacksonville. The resampling should incorporate additional analysis for SVOCs, PCBs, and metals. The purpose of including SVOCs, PCBs, and metals in the resampling program is to confirm the first set of analytical results and in the case of cadmium the analysis should be conducted at a lower detection limit to further define and evaluate the potential for human health and ecological risk.

5.4 SURFACE WATER AND SEDIMENT SAMPLING.

CONCLUSIONS. The purpose of the surface water and sediment sampling event was to assess the current conditions of both media and the potential for contamination to migrate from OU1 via surface water drainage and sediment transport. Locations of the surface water and sediment samples are illustrated in Figure 3-5. VOCs were detected in some of the surface water samples, but not in the sediment samples. SVOCs and pesticides were detected in some of the sediment samples, but not in surface water samples. PCBs, metals, and radionuclides were detected in both sediment and surface water samples.

The background locations receive surface water runoff from the restricted access weapons storage area. Upstream portions of the natural drainage feature in which background samples were collected have been previously modified (date unknown) to enhance the drainage from the Restricted weapons access area. A dirt trail also exist upstream of this sample location. However, the sample location for SW025/SD025 appeared to be a natural drainage feature. Additionally, a fire lane is maintained along the boundary the forested area and the restricted access area in which these two drainage features are located. This maintenance may provide a source of sediment from erosion of soils along the fire lane. Other sources of potential contaminants to the two background samples are debris piles located within the forested area along the fire lane. Additionally, another former solid waste disposal area unrelated to OU1 exist to the north of sample location SW022/SD022.

Two background samples for were collected in the St. Johns River at the mouth of the unnamed tributary. However, the two sediment samples may not represent background conditions because tidal influence causes sediment transport both up and down river.

It should be noted that sediments in the perimeter drainage ditch are not comparable to those of the natural drainage area because: (1) they are not similar environments, and (2) the prior remediation activities (1983 to 1984). These activities consisted of the excavation of the three main disposal pit areas and the construction of the perimeter drainage ditch and the spreading of these materials over OU1. These excavated materials were graded to drain to the perimeter drainage ditches. Erosion of these materials into the drainage ditch has occurred. Based on these construction activities, it would be more appropriate to assess the background of sediments in the perimeter drainage ditch by collection of soil samples that are representative of the lithology of the excavated materials.

RECOMMENDATIONS. Additional sediment samples need to be collected in the offsite areas that have potentially been influenced by OU1 site-attributable contaminants and in the vicinity of previous sample locations that were found to be impacted by site-attributable contaminants. Additional samples need to be collected in the golf course drainage system adjacent to OU1, drainage area along Hurricane Drive, which in the past connected to drainage from OU1, and in low-lying area adjacent to the unnamed creek. The purpose of the additional samples is to assess site-attributable contaminants that may have impacted the drainage system, conduct the base line risk assessment, and screen treatment alternatives.

Additional background samples need to be collected to adequately assess impacts that may have occurred to the stream and river environments.

5.5 SOIL SAMPLING.

CONCLUSIONS. The purpose of the soil sampling event was to determine the horizontal and vertical extent of contamination of OU1 site soils and to support a preliminary assessment of the site soils and exposure pathways to human or ecological receptors. Contaminants detected in the soil samples consist of volatiles and semivolatile organics, pesticides, inorganics, PCBs, dioxins and furans, and radionuclides. The highest concentrations of soil contamination were detected in the vicinity of former solvent and waste oil disposal pit areas. Contaminants also were detected at lower concentrations at surface soil samples (less than 6 inches beneath the land surface) in various portions of OU1.

Eight soil samples were collected along the western and northern boundary of OU1 for the purpose of providing background analytical data. Solid waste materials (glass, metal, etc.) were found to exist along the firelane maintained between the restricted weapons storage area and OU1. Only one sample, SL096, may provide background data; however, VOCs were detected at this sample location, which may indicate that disposal activities also occurred in the immediate vicinity of this sample location. The other seven samples were collected in areas that are impacted by the deposition of landfilled materials; therefore, these samples cannot be used for background analytical data.

RECOMMENDATIONS. Additional soil samples need to be collected to delineate "hot spots" of PCB contamination in onsite soils, improve the understanding of the boundary between contaminated and "clean" areas, and provide additional data for screening of treatment alternatives. Additional background soil samples need to be collected to better assess the range of naturally occurring TAL inorganics.

5.6 GROUNDWATER SAMPLING.

CONCLUSIONS. The purpose of the groundwater sampling event was to determine the current groundwater quality and support a preliminary assessment of groundwater exposure pathways to human or ecological receptors. Contaminants were not detected in the monitoring wells installed in the Intermediate zone of the Hawthorn Formation (115 to 120 feet beneath the land surface). Monitoring wells installed in the Shallow Aquifer System (10 to 40 feet beneath the land surface) contained concentrations of volatile and semivolatile organics, pesticides, metals, and radionuclides. Analytical results of the groundwater samples are provided in Appendix E. Free-phase hydrocarbons which contain PCBs also were detected in monitoring wells located near the former waste oil disposal pit.

RECOMMENDATIONS. Additional piezometers need to be installed to determine horizontal and vertical groundwater flow characteristics. Additional groundwater quality monitoring wells need to be installed to assess contaminant migration beyond the existing well pattern. The new monitoring wells should be sampled for TAL/TCL constituents. The groundwater sampling and analytical work also includes the resampling of the existing monitor wells in which contaminants were not detected at low concentrations. The purpose of resampling the wells is to conduct additional analysis of the groundwater samples, using analytical methods that would detect constituents at concentrations representative of ARARs.

5.7 ECOLOGICAL STUDIES.

CONCLUSIONS. A number of diverse and productive upland and wetland ecological communities exist at OU1. Upland communities include pine flatwoods, old field habitat, and mesophytic hardwood forest. Wetland habitats include a hydrophytic forest, the perimeter drainage ditch system, a small unnamed tributary to the St. Johns River, and an estuarine wetland associated with the St. Johns River (Figure 4-29).

The macroinvertebrate communities occurring in the OU1 wetlands appear to be moderately degraded according to the bioassessment survey techniques, and were characterized by relatively low taxa richness, a dominance of pollution-tolerant taxa, and a relative lack of pollution-intolerant taxa. However, due to a variety of habitat-related constraints, the site would not be expected to support a diverse assemblage of benthic macroinvertebrates.

Wildlife species representing a broad array of vertebrate taxa are resident at, or use, upland and wetland habitats at, and in the vicinity of, OU1 for various aspects of their life. The faunal assemblage observed at and in the vicinity of OU1 appears to be characteristic of the observed ecological habitats. Wetland complexes at the site support breeding populations of invertebrates, fish, and amphibians. Wetlands and uplands at and in the vicinity of OU1 also support a number of reptilian, avian, and mammalian ecological receptors. Several rare and endangered animals (gopher tortoise, West Indian Manatee, Sherman's fox squirrel,

and the snowy egret) were observed at OU1, and the site provides potential habitat for a number of other critical ecological receptors. Although no evidence of physically stressed vegetation was observed at OU1, four dead vertebrates were encountered at the site. Pathological results on two of these dead animals (opossum and sharp shinned hawk) indicate that they died from non-site-related causes. A gopher tortoise died from unknown causes, and a river otter appeared to have been hit by a motor vehicle.

Information exists to justify collection of additional data to conduct a baseline risk assessment at the site in order to determine if ecological receptors are potentially at risk from any contamination on, or emanating from, OU1. Additional ecological field activities may be necessary at OU1 depending upon future remedial action alternatives and the outcome of the risk management decision-making process.

The results of the PEI can also be used to support development of remedial action alternatives at OU1, or to identify any potential adverse ecological effects that may result from proposed future remedial activities or no-action alternatives.

RECOMMENDATIONS. Additional data needs to be collected to provide sufficient information to conduct a baseline risk assessment at the site in order to determine if ecological receptors are potentially at risk from any contamination on, or emanating from, OU1. Contaminants of concern that may adversely affect ecological receptors are aldrin, alpha-chlordane, 4,4--DDT, 4,4--DDD, 4,4-;DDE, acenaphthene, cadmium, coper, mercury, and Aroclor-1260. This risk assessment should be conducted in accordance with the following USEPA guidance documents: Risk Assessment Guidance for Superfund (RAGS): Volume 2, Environmental Evaluation Manual (USEPA, 1989a); and, Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference (USEPA, 1989b).

Depending upon a number of factors, additional ecological field investigative studies may be required at OU1. Future activities may be necessary depending upon the outcome of the baseline risk assessment, the results of the risk management decision-making process, or as part of interim or final remedial actions. Possible future ecological field activities at the site include the following studies: fish surveys of perimeter drainage ditch system; tissue sampling of OU1 biota for contaminant residues; invertebrate bioaccumulation studies and/or toxicity-growth studies; and delineation of wetlands in accordance with local, State, and/or Federal standards.

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APENDIX A
Boring/Well Logs

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: PZ-01	BORING NO. PZ-01
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/08/92	COMPLTD: 4/08/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 3-13'	PROTECTION LEVEL: D
TOC ELEV.: 29.44 FT.	MONITOR INST.: OVA	TOT DPTH: 15FT.	DPTH TO ▽ 8.46 FT.
LOGGED BY: C. King/A. Cohen	WELL DEVELOPMENT DATE: 4/09/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					SAND: Dark yellowish brown, (10YR, 4/2), fine grain, well sorted, some iron oxide staining.		SP		
5					SILTY SAND: Yellowish gray, (5Y, 7/2), clear quartz when washed, angular to sub-rounded, trace of greasy coating on approx. 3% of grains.		SM		
10									
15					TOTAL DEPTH 15' LITHOLOGICAL DESCRIPTIONS TAKEN FROM DSB-1.				
20									

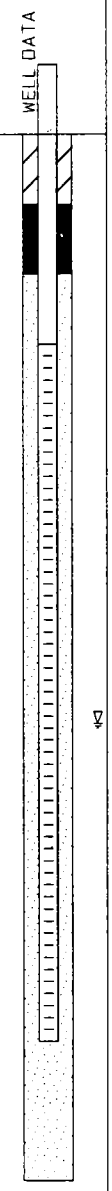
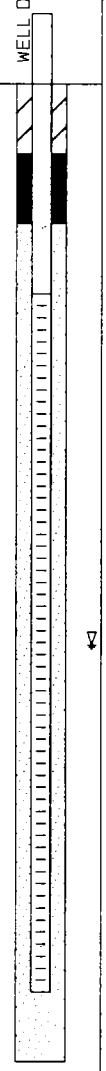


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: PZ-02		BORING NO. PZ-02
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/09/92	COMPLTD: 4/09/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 3-13'	PROTECTION LEVEL: D
TOC ELEV.: 29.02 FT.	MONITOR INST.: OVA	TOT DPTH: 14FT.	DPTH TO ∇ 8.03 FT.
LOGGED BY: C. King/ A. Cohen	WELL DEVELOPMENT DATE: 4/09/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					SILTY SAND: Moderate brown, (5YR, 3/4), very fine grained, well sorted , unconsolidated, non-calcareous.		SM		
5									
10					SILTY SAND: Light gray, (N7), very fine grained, well sorted, unconsolidated, non-calcareous, magnesium rich.				
15					TOTAL DEPTH 14'				
					LITHOLOGICAL DESCRIPTIONS TAKEN FROM AUGER CUTTINGS.				
20									



TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: PZ-03	BORING NO. PZ-03
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/14/92	COMPLTD: 4/14/92
METHOD: H.S.A.	CASE SIZE: 2" / SCREEN INT.: 5-15'	PROTECTION LEVEL: D
TOC ELEV.: 34.92 FT.	MONITOR INST.: OVA / TOT DPTH: 15.5FT.	DPTH TO ∇ 13.8 FT.
LOGGED BY: C. King/ A. Cohen	WELL DEVELOPMENT DATE: 4/14/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
							SM	
5			2/2	10				17,14,7,7
			2/2	15	SILTY SAND: Light gray, (N7), very fine grained, debris scattered throughout.			4,14,7,6
			2/2	0				2,2,2,3
10			2/2	4				3,3,4,8
			2/2	110				6,7,5,5
15					TOTAL DEPTH 15.5'			
					LITHOLOGICAL DESCRIPTIONS TAKEN FROM AUGER CUTTINGS.			
20								

WELL DATA

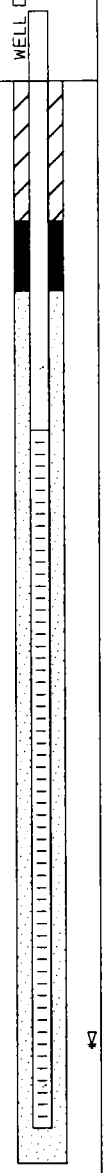


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: PZ-04	BORING NO. PZ-04
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/14/92	COMPLTD: 4/14/92
METHOD: H.S.A.	CASE SIZE: 2" / SCREEN INT.: 3-13'	PROTECTION LEVEL: D
TOC ELEV.: 32.51 FT.	MONITOR INST.: OVA / TOT DPTH: 13.5FT.	DPTH TO ▽ 11.64 FT.
LOGGED BY: C. King/ A. Cohen	WELL DEVELOPMENT DATE: 4/14/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0			SM	posthole
			2/2	0	SILTY SAND: Light gray, (N7), very fine grained, debris scattered, throughout.			7,9,7,6
5			2/2	4				7,5,5,6
			2/2	0				5,5,6,6
			2/2	0	SILTY CLAY: Very light gray, (N8), wet, slightly stiff.		CL	6,6,8,14
10			2/2	0	SILTY SAND: Light gray, (N7), very fine grained, debris scattered throughout.		SM	6,7,10,11
					TOTAL DEPTH 13.5'			
15					LITHOLOGICAL DESCRIPTIONS TAKEN FROM AUGER CUTTINGS.			
20								

WELL DATA

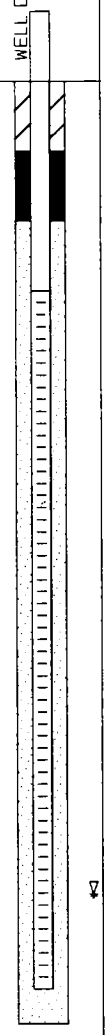


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: PZ-05	BORING NO. PZ-05
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/04/92	COMPLTD: 4/04/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 4-14'	PROTECTION LEVEL: D
TOC ELEV.: 24.84 FT.	MONITOR INST.: OVA	TOT DPTH: 14.5FT.	DPTH TO ▽ 10.48 FT.
LOGGED BY: R. Holloway/P. Craine	WELL DEVELOPMENT DATE: 4/04/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
					SAND: Brownish gray, (5YR, 4/1), fine grained, organic.		SP	
5					SILTY SAND: Pale yellowish brown, (10YR, 6/2), clear quartz when washed, fine grained, well sorted, unconsolidated, sub-angular to sub-rounded, non-calcareous.		SM	
					CLAYEY SAND: Pale yellowish brown, (10YR, 6/2), fine grained, well sorted, non-calcareous.		SC	
10					SILTY SAND: Pale yellowish brown, (10YR, 6/2), clear quartz when washed, fine grained, well sorted, unconsolidated, sub-angular to sub-rounded, non-calcareous.		SM	
15					TOTAL DEPTH 14.5 LITHOLOGICAL DESCRIPTIONS TAKEN FROM AUGER CUTTINGS.			
20								

WELL DATA

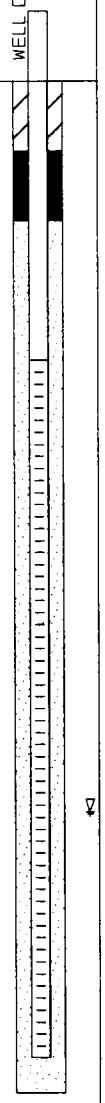


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: PZ-06	BORING NO. PZ-06
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/04/92	COMPLTD: 4/04/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 4-14'	PROTECTION LEVEL: D
TOC ELEV.: 24.31 FT.	MONITOR INST.: OVA	TOT DPTH: 14.5FT.	DPTH TO ▽ 9.83 FT.
LOGGED BY: R. Holloway/P. Craine	WELL DEVELOPMENT DATE: 4/04/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
							SM		
5					SILTY SAND: yellowish gray, (5Y, 7/2), fine to very fine grained, organic between 3 and 4 feet.				
10									▽
15					TOTAL DEPTH 14.5' LITHOLOGICAL DESCRIPTIONS TAKEN FROM AUGER CUTTINGS.				
20									

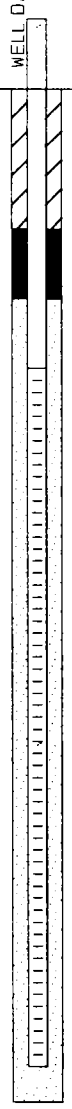


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: PZ-07	BORING NO. PZ-07
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/08/92	COMPLTD: 4/08/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 2-12'	PROTECTION LEVEL: D
TOC ELEV.: 27.02 FT.	MONITOR INST.: OVA	TOT DPTH: 12.5FT.	DPTH TO ▽ 6.02 FT.
LOGGED BY: R. Holloway/P. Craine	WELL DEVELOPMENT DATE: 4/09/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					SILTY SAND: Light gray, (N7), clear quartz when washed, fine to very fine grained, poorly sorted, sub-angular to sub-rounded, non- calcareous, unconsolidated.		SM		
5									
10									
					TOTAL DEPTH 12.5'				
					LITHOLOGICAL DEESCRIPTIONS TAKEN FROM DSB-5.				
15									
20									

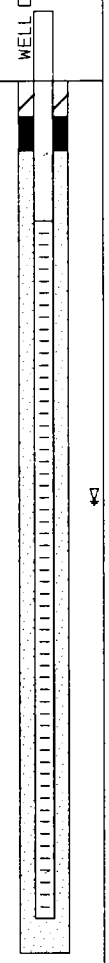


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: PZ-08		BORING NO. PZ-08
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/08/92	COMPLTD: 4/08/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 4.5-14.5	PROTECTION LEVEL: D
TOC ELEV.: 31.11 FT.	MONITOR INST.: OVA	TOT DPTH: 15FT.	DPTH TO ▽ 9.63 FT.
LOGGED BY: A. Cohen/P. Craine	WELL DEVELOPMENT DATE: 4/09/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0	SILTY SAND: Brownish black, (5YR, 2/1), fine to very fine grained, unconsolidated, non-calcareous.		SM	posthole
5				0				2,2,5,8
				0	CLAYEY SAND: Moist.		SC	7,6,5,13
				0	SILTY SAND: Medium dark gray, (N4), fine to very fine grained.		SM	8,11,8,13
10								
15					TOTAL DEPTH 15' LITHOLOGICAL DESCRIPTIONS TAKEN FROM AUGER CUTTINGS.			
20								

WELL DATA

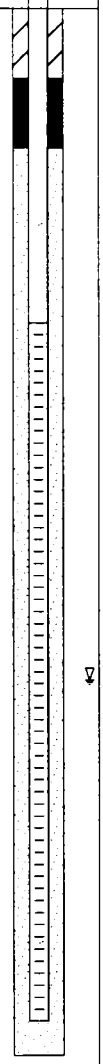


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-1	BORING NO. SSMW-1
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/15/92	COMPLTD: 04/15/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 3'-13'	PROTECTION LEVEL: D
TOC ELEV.: 29.61 FT.	MONITOR INST.: OVA	TOT DPTH: 13.5FT.	DPTH TO ▽ 7.8 FT.
LOGGED BY: C. King/A. Cohen	WELL DEVELOPMENT DATE: 04/15/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				0			SP	POSTHOLE	
				0	SAND: Very light gray, (N8), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, moist at 4'.			POSTHOLE	
5			2/2	0				3,3,4,6	
			2/2	0	VERY SILTY SAND: Very light gray, (N8), clear quartz when washed, very fine grained, sub-angular to sub-rounded, non-calcareous, iron oxide staining.		SM	5,5,5,10	▽
			1.5/2	0				7,7,7,8	
10			2/2	0			CL	6,6,10,11	
			1.8/2	0	VERY SILTY CLAY: Light brown, (5YR 5/6), low plasticity.			5,5,10,10	
15					TOTAL DEPTH 13'				
20									
25									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: DSMW-2	BORING NO. DSMW-2
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 04/22/92	COMPLTD: 05/03/92
METHOD: Mud Rotary	CASE SIZE: 2" / SCREEN INT.: 33'-38'	PROTECTION LEVEL: D
TOC ELEV.: 30.29 FT.	MONITOR INST.: OVA / TOT DPTH: 38.5FT.	DPTH TO ▽ 8.42 FT.
LOGGED BY: C.King/A.Cohen	WELL DEVELOPMENT DATE: 05/03/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0	SAND: Yellowish gray, (5Y 8/1), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, scattered fine phosphatic grains throughout.		SP	POSTHOLE
				0				POSTHOLE
5			1/2	0				3,6,8,11
			2/2	0				8,8,11,15
			1/2	0	VERY SILTY SAND: Yellowish gray, (5Y 8/1), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, scattered fine phosphatic grains throughout.		SM	9,10,10,10
10			1.5/2	0				3,5,7,8
			1/2	0	SILTY SAND: Light olive gray, (5Y 6/1), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, scattered fine phosphatic grains throughout.			6,7,6,10
15			1.5/2	0				8,7,8,8
			1.5/2	0	VERY CLAYEY SAND: Light olive gray, (5Y 6/1), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, scattered fine phosphatic grains throughout.		SC	6,8,8,7
								NO SPOON
20			1/2	0	SILTY SAND: Light olive gray, (5Y 6/1), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, scattered fine phosphatic grains throughout.		SM	8,5,7,7
			1.5/2	0				6,5,5,10
25			1.5/2	0	SAND: Yellowish gray, (5Y 8/1), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, scattered fine phosphatic grains throughout.		SP	8,9,11,16
			1.5/2	0				10,11,14,12
			1/2	0	SILTY SAND: Light olive gray, (5Y 6/1), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, scattered fine phosphatic grains throughout, slight magnesium content, slightly calcareous, with CLAY: Dark greenish gray (5GY 4/1), very soft, medium plasticity, magnesium rich, slightly sandy, in lower .5'.		SM	6,5,11,12
30			1.5/2	0				7,8,8,9
			1.5/2	0				2,1,1,7
35			1.8/2	0	SILTY DOLOMITIC SAND: Light olive gray, (5Y 5/2), fine to coarse grained, magnesium rich, calcareous.		CL	8,18,20,18
			1/2	0	DOLOMITE: Light olive gray, (5Y 5/2), hard, dense.			18,18,9,50
40					TOTAL DEPTH 38'			

WELL DATA

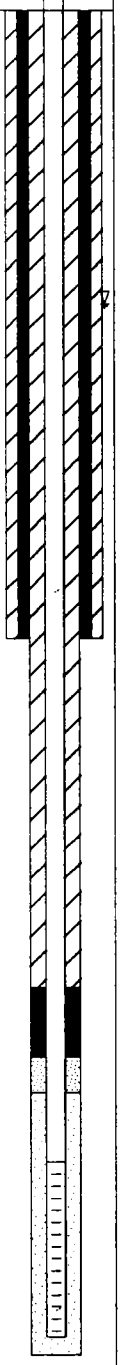


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-3	BORING NO. SSMW-3
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/03/92	COMPLTD: 04/03/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 2.5-12.5'	PROTECTION LEVEL: D
TOC ELEV.: 27.64 FT.	MONITOR INST.: OVA	TOT DPTH: 13FT.	DPTH TO ▽ 6.58 FT.
LOGGED BY: C. King	WELL DEVELOPMENT DATE: 04/03/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
							SM	
5					SILTY SAND: Light gray (N7), clear quartz when washed, fine to very fine grained, poorly sorted, sub-angular to sub-rounded, non-calcareous, unconsolidated.			
10					SILTY SAND: Pale yellowish brown (10YR 6/2), clear quartz when washed, fine to very fine grained, poorly sorted, unconsolidated, sub-angular sub-rounded, non-calcareous.			
15					TOTAL DEPTH 13'			
					LITHOLOGICAL DESCRIPTIONS TAKEN FROM DSB-5.			
20								

WELL DATA

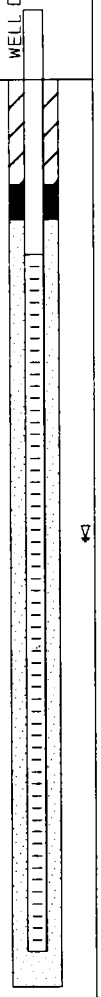


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: DSMW-4	BORING NO. DSMW-4
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/16/92	COMPLTD: 04/28/92
METHOD: H.S.A/Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 25'-30'	PROTECTION LEVEL: D
TOC ELEV.: 26.97 FT.	MONITOR INST.: OVA	TOT DPTH: 32FT.	DPTH TO ▽ 5.29 FT.
LOGGED BY: C.King/A.Cohen	WELL DEVELOPMENT DATE: 04/28/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				N/A			SM	
				N/A				
5				N/A				
				N/A				
				N/A				
10				N/A	SILTY SAND: Light gray, (N7), clear quartz when washed, fine to very fine grained, poorly sorted, sub-angular to sub-rounded, non-calcareous, unconsolidated.			
				N/A				
15				N/A				
				N/A				
				N/A				
20				N/A				
				N/A				
25				N/A	SAND: Light olive gray, (5Y 6/1), clear quartz when washed, fine to very fine grained, poorly sorted, sub-angular to sub-rounded, unconsolidated, non-calcareous.		SP	
				N/A				
				N/A				
30				N/A	DOLOMITIC SAND: Yellowish gray, (5Y 7/2), white when washed, fine to medium grained, calcareous, magnesium rich, phosphhatic.			
					TOTAL DEPTH 30'			
35					LITHOLOGICAL DESCRIPTIONS TAKEN FROM DSB-5.			
40								

WELL DATA

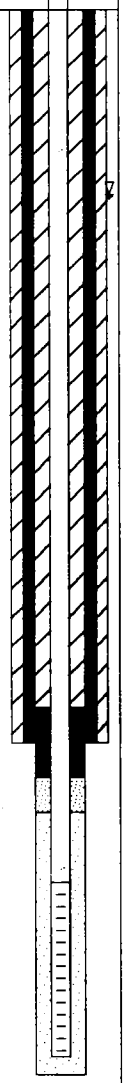


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-5	BORING NO. SSMW-5
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/08/92	COMPLTD: 04/08/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 3'-13'	PROTECTION LEVEL: D
TOC ELEV.: 28.62 FT.	MONITOR INST.: OVA	TOT DPTH: 18FT.	DPTH TO ▽ 7.5 FT.
LOGGED BY: P.Craine/A.Cohen	WELL DEVELOPMENT DATE: 04/09/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				N/A	SAND: Dark yellowish brown, (10YR 4/2), fine grained, well-sorted, some iron oxide staining.		SP	
				N/A				
5				N/A			SM	
				N/A				
				N/A	VERY SILTY SAND: Yellowish gray, (5Y 7/2), clear quartz when washed, fine grained, angular to sub-rounded, trace of organic greasy coating on some grains.			
10				N/A				
				N/A				
15				N/A				
					CLAY: Dusky yellow-green, (5GY 7/2), hard, stiff, low plasticity, at bottom 1'.		CL	
				N/A	VERY SILTY SAND: Pale olive, (10y 6/2), clear quartz when washed, very fine grained, angular to sub-rounded, non-calcareous, magnesium rich.		SM	
20								
					TOTAL DEPTH 13'.			
					LITHOLOGICAL DESCRIPTIONS TAKEN FROM DSB-1.			
25								

WELL DATA

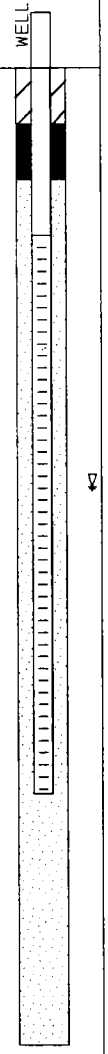


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: DSMW-6	BORING NO. DSMW-6
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/15/92	COMPLTD: 04/28/92
METHOD: H.S.A/Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 22'-27'	PROTECTION LEVEL: D
TOC ELEV.: 28.31 FT.	MONITOR INST.: OVA	TOT DPTH: 28FT.	DPTH TO ▽ 7.22 FT.
LOGGED BY: C.King/A.Cohen	WELL DEVELOPMENT DATE: 04/28/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				N/A	SAND: Dark yellowish brown, (10YR 4/2), fine grained, well-sorted, some iron oxide staining.		SP	
				N/A				
5				N/A			SM	
				N/A				
				N/A	VERY SILTY SAND: Yellowish gray, (5Y 7/2), clear quartz when washed, fine grained, angular to sub-rounded, trace of organic greasy coating on some grains.			
10				N/A				
				N/A				
15				N/A	CLAY: Dusky yellow green, (5GY 7/2), hard, stiff, low plasticity at bottom 1'.		CL	
				N/A	SAND: Pale olive, (10y 6/2), clear quartz when washed, very fine grained, angular to sub-rounded, non-calcareous, magnesium rich.		SM	
20				N/A				
				N/A				
				N/A	CLAY: Dark greenish gray, (5GY 4/1), hard, stiff, low plasticity, mag nesium rich, at bottom 1'.		CL	
25				N/A	CLAYEY SAND: Greenish gray, (5GY 6/1), fine grained, slight magnesium content, with interbedded 3" clay stringers, saturated.		SC	
				N/A			CL	
30					CLAY: Medium dark gray, (N4), hard, stiff, low plasticity, magnesium rich.			
					TOTAL DEPTH 27'			
35					LITHOLOGICAL DESCRIPTIONS TAKEN FROM DSB-1.			
40								

WELL DATA

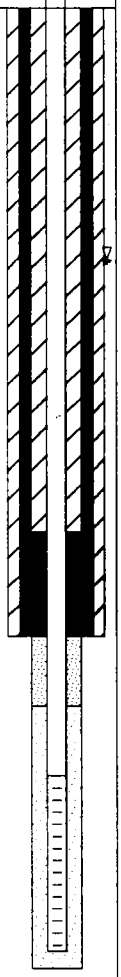


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-7	BORING NO. SSMW-7
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/05/92	COMPLTD: 04/05/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 2.5'-12.5'	PROTECTION LEVEL: D
TOC ELEV.: 27.76 FT.	MONITOR INST.: OVA	TOT DPTH: 13FT.	DPTH TO ∇ 6.88 FT.
LOGGED BY: R.Holloway/P.Craine	WELL DEVELOPMENT DATE: 04/05/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				N/A	SAND: Very light gray, (N8), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, some black staining.		SP		
				N/A			SM		
5				N/A	SILTY SAND: Very light gray, (N8), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, iron oxide staining.				
				N/A					
				N/A					
10							SP		
				N/A	SAND: Pale yellowish orange, (10YR 8/6), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous.				
				N/A					
15					TOTAL DEPTH 12.5'				
					LITHOLOGICAL DESCRIPTIONS TAKEN FROM MW-8.				
20									
25									

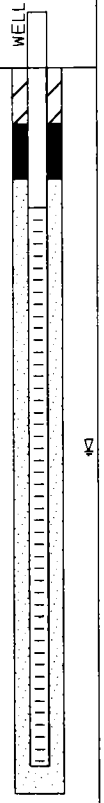


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: DSMW-8	BORING NO. DSMW-8
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/17/92	COMPLTD: 04/29/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 25'-30'	PROTECTION LEVEL: D
TOC ELEV.: 27.63 FT.	MONITOR INST.: OVA	TOT DPTH: 32FT.	DPTH TO ▽ 6.84 FT.
LOGGED BY: C.King/A.Cohen	WELL DEVELOPMENT DATE: 04/29/92		SITE: NAS JAX OU1

DEPTH FT	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0	SAND: Very light gray, (N8), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, some black staining.		SP	POSTHOLE
				0				POSTHOLE
5			2/2	0	SILTY SAND: Very light gray, (N8), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, some iron oxide staining.		SM	6,6,7,6
			2/2	0				4,7,7,10
			1.8/2	0				6,5,6,7
10			1.5/2	0	SAND: Pale yellowish orange, (10YR 8/6), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous.		SP	6,6,8,8
			1.5/2	0				6,7,9,11
15			2/2	0				6,7,7,10
								NO SPOON
			1.8/2	0	CLAY: Light olive gray, (5Y 6/1), soft, medium plasticity, magnesium rich.		CL	4,2,2,3
20			1.8/2	0				2,3,3,3
			1.8/2	0	SAND: Light olive gray, (5Y 6/1), clear quartz when washed, fine to medium grained, sub-angular to sub-rounded, non-calcareous, fine phosphatic grains scattered throughout.		SP	3,6,13,12
25			1.8/2	0				6,10,13,16
			1.5/2	0				11,12,20,23
			1.5/2	0				5,10,18,15
30			1.8/2	0				10,7,4,75
					DOLOMITE: Light gray, (N7), hard, dense, non-calcareous, magnesium rich.			
					SPOON REFUSAL			
35					TOTAL DEPTH 30'			
40								

WELL DATA

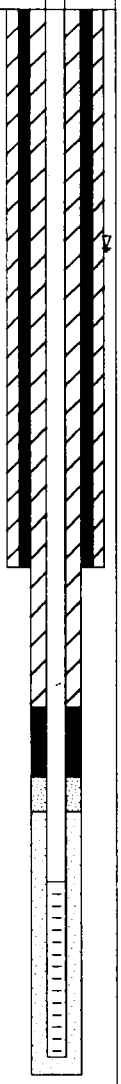


ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-9	BORING NO. SSMW-9
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/05/92	COMPLTD: 04/05/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 3'-13'	PROTECTION LEVEL: D
TOC ELEV.: 29.37 FT.	MONITOR INST.: OVA	TOT DPTH: 14FT.	DPTH TO ▽ 8.86 FT.
LOGGED BY: R.Holloway/P.Craine	WELL DEVELOPMENT DATE: 04/05/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				N/A	SLIGHTLY SILTY SAND: Very light gray, (N8), fine grained, unconsolidated, non-calcareous.		SP		
				N/A					
5				N/A					
				N/A	CLAYEY SAND: Very light gray, (N8), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, iron oxide staining on the clay.		SC		
				N/A					
10				N/A	SILTY SAND: Grayish orange, (10YR 7/4), clear quartz when washed, fine grained well sorted, sub-angular to sub-rounded, unconsolidated, non-calcareous, saturated.		SM		
				N/A					
15					TOTAL DEPTH 13'				
					LITHOLOGICAL DESCRIPTIONS TAKEN FROM DSB-2.				
20									
25									

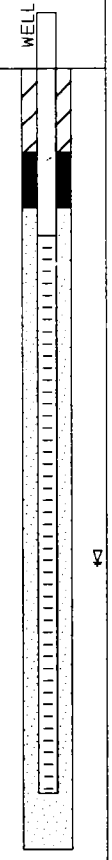


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-10	BORING NO. SSMW-10
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/15/92	COMPLTD: 04/15/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 3'-13'	PROTECTION LEVEL: D
TOC ELEV.: 28.01 FT.	MONITOR INST.: OVA	TOT DPTH: 13.5FT.	DPTH TO ▽ 6.21 FT.
LOGGED BY: C.King/A.Cohen	WELL DEVELOPMENT DATE: 04/15/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0			SM	POSTHOLE
				0	SILTY SAND: Light gray, (N7), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, with SILTY CLAY: Very light gray, (N8), medium plasticity, stiff, at bottom 1'.			POSTHOLE
5			2/2	15				9,15,10,8
			1.8/2	50				10,9,5,14
			2/2	15			CL	35,36,36,36
10			2/2	24	SILTY SAND: Dark yellowish brown, (10YR 4/2), clear quartz when washed, fine grained, sub-angular to sub-rounded, well sorted, non-calcareous.		SM	19,19,13,18
			1.5/2	10				6,14,13,26
15					TOTAL DEPTH 13'			
20								
25								

WELL DATA

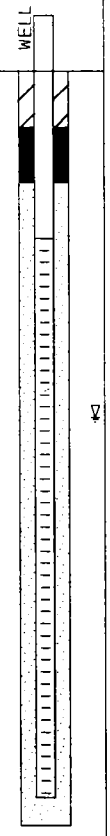


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: SSMW-11	BORING NO. SSMW-11
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/5/92	COMPLTD: 4/5/92
METHOD: H.S.A.	CASE SIZE: 2" / SCREEN INT.: 3-13'	PROTECTION LEVEL: D
TOC ELEV.: 29.96 FT.	MONITOR INST.: OVA / TOT DPTH: 13.5FT.	DPTH TO ▽ 10.48 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/5/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					SAND: Pale yellowish brown (10YR 6/2), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, unconsolidated, non-calcareous.		SP		
5									
					SANDY CLAY: Dark yellowish orange (10YR 6/6), low plasticity, iron oxide staining.		CL		
10									
					SILTY SAND: Pale yellowish brown (10YR 6/2), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, unconsolidated, non-calcareous.		SM		
15									
					TOTAL DEPTH 13.5'				
20					LITHOLOGICAL DESCRIPTIONS TAKEN FROM MW-12.				
25									
30									
35									
40									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: DSMW-12	BORING NO. DSMW-12
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/20/92	COMPLTD: 05/16/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 30-35'	PROTECTION LEVEL: D
TOC ELEV.: 29.33 FT.	MONITOR INST.: OVA	TOT DPTH: 35.5FT.	DPTH TO ▽ 10.02 FT.
LOGGED BY: C.King/R.Holloway	WELL DEVELOPMENT DATE: 05/02/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
			2/2	0			SP	posthole
			2/2	0				posthole
5			1/2	0	SAND: Yellowish brown (10YR 6/2), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, unconsolidated, non-calcareous.			2,10,9,13
			1.8/2					6,6,7,9
			2/2	0	SANDY CLAY: Dark yellowish orange (10YR 6/1), low plasticity, iron oxide staining.		CL	5,9,9,9
10			1.8/2	0				6,8,9,9
			1.8/2	0	SILTY SAND: Pale yellowish brown (10YR 6/2), fine to very fine grained		SM	6,7,5,4
15			1.5/2	0	CLAYEY SAND: Light olive gray (5Y 6/1), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, iron oxide staining.		SC	5,5,6,6
			0/2	0				over drill
			1.9/2	0			SM	6,4,7,9
20			2/2	0				9,9,9,13
			2/2	0				8,8,11,10
			2/2	0				6,10,10,11
25			2/2	0	SILTY SAND: Yellowish gray (5Y 8/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous.			9,9,12,15
			2/2	0				6,11,11,13
30			2/2	0				6,15,22,28
			2/2	0				15,22,33,41
			2/2	0	DOLOMITE: Medium dark gray (N4), sucrocic, magnesium rich, calcareous, some sand and clay interbedded.			29,48,28,100
35								
					TOTAL DEPTH 35.5'			
40								

WELL DATA

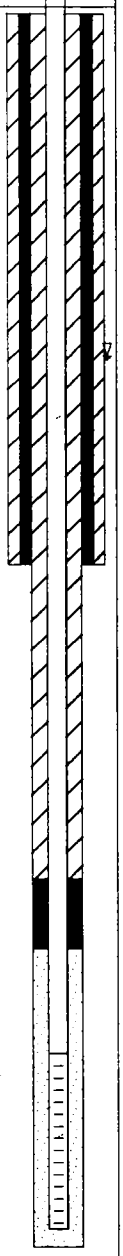


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-13	BORING NO. SSMW-13
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/5/92	COMPLTD: 4/5/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 3.5-13.5'	PROTECTION LEVEL: D
TOC ELEV.: 30.40 FT.	MONITOR INST.: OVA	TOT DPTH: 14FT.	DPTH TO ▽ 9.56 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/4/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
							SM		
5									
					SILTY SAND: Pale yellowish brown (10YR 6/2), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, fine phosphatic grains scattered throughout.				
10									
15									
					TOTAL DEPTH 14'				
20					LITHOLOGICAL DESCRIPTIONS TAKEN FROM MW-14.				
25									
30									
35									
40									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: DSMW-14	BORING NO. DSMW-14
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/20/92	COMPLTD: 5/3/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 35-40'	PROTECTION LEVEL: D
TOC ELEV.: 29.71 FT.	MONITOR INST.: OVA	TOT DPTH: 43FT.	DPTH TO ▽ 8.98 FT.
LOGGED BY: C. King/ R. Holloway	WELL DEVELOPMENT DATE: 5/3/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				0			SM	posthole	
				0				posthole	
5			1/2	0	SILTY SAND: Pale yellowish brown (10YR 6/2), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, fine phosphatic grains scattered throughout.			1,1,2,3	
			1/2	90				3,4,3,3	
			2/2	35				2,2,1,2	
10			1/2	10				1,1,2,5	
			1.5/2	30				5,8,10,10	
15			2/2	30				4,5,5,11	
				NA				No Spoon	
			2/2						
20			2/2	100				5,4,5,5	
			2/2	90				5,5,5,6	
			2/2	50				5,5,9,9	
25			2/2	100				4,4,4,6	
			2/2	270				8,11,11,13	
30			2/2	300				8,16,20,13	
			2/2	190				11,11,11,11	
			2/2	10	CLAY: Brownish black (10YR 4/2), soft, medium plasticity, magnesium rich.		CL	8,18,16,22	
35			2/2	50	SILTY SAND: Dark yellowish brown (10YR 4/2), clear quartz when washed, fine grained, sub-angular to sub-rounded, calcareous, magnesium rich.		SM	16,19,21,26	
			2/2	0				17,16,17,20	
40			2/2	1				11,7,8,9	
			2/2	9	CLAYEY DOLOSILT: Pale olive (10Y 6/2), calcareous, magnesium rich.		ML	11,19,23,31	
				0				10,16,19,20	
45					TOTAL DEPTH 40.5'				
50									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: DSMW-15	BORING NO. DSMW-15
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/21/92	COMPLTD: 4/30/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 40-45'	PROTECTION LEVEL: D
TOC ELEV.: 30.04 FT.	MONITOR INST.: OVA	TOT DPTH: 47FT.	DPTH TO ∇ 9.49 FT.
LOGGED BY: R. Holloway/ C. King	WELL DEVELOPMENT DATE: 5/1/92		SITE: NAS JAX OU1

DEPTH FT	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0	SAND: Very pale orange (10YR 8/2), clear quartz when washed, fine grained, sub-angular to sub-rounded, unconsolidated, non-calcareous.		SP	posthole
				0				posthole
5			1.5/2	0				5,5,7,5
			1.5/2	0	CLAYEY SAND: Light brown (5YR 5/6), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, some iron oxide staining, magnesium rich.		SC	3,3,6,10
			1/2	0				7,10,9,8
10			1.8/2	0				4,3,6,6
			2/2	0			SM	4,9,8,9
15			2/2	0				9,8,8,12
				NA	SILTY SAND: Yellowish brown (10YR 6/2), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, magnesium rich, organic and lignitic from 36' to 45'.			No Spoon
			2/2	0				6,9,10,11
20			2/2	0				10,9,9,9
			2/2	0				8,10,10,9
			2/2	0				7,11,10,8
25			2/2	0				6,6,7,10
			2/2	0				7,9,5,9
30			2/2	0				6,12,15,16
			2/2	0				4,5,8,12
			2/2	0				9,7,4,7
35			2/2	0				5,4,7,10
			2/2	0				7,11,14,14
40			2/2	0				8,10,13,10
			2/2	0				12,21,29,34
			2/2	0				25,34,34,22
45			2/2	0	SILTY CLAY: Dark greenish gray (5GY 4/1), soft, medium plasticity, magnesium rich.		CL	6,3,2,4
					TOTAL DEPTH 45.5'			
50								

WELL DATA

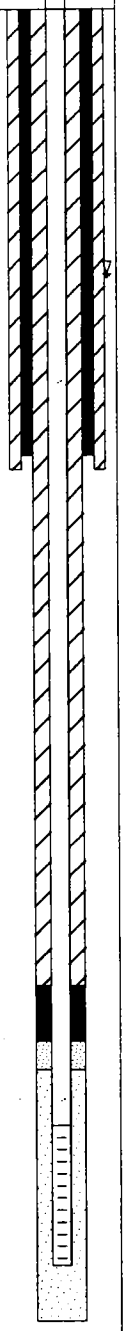


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: SSMW-16		BORING NO. SSMW-16
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/09/92	COMPLTD: 04/09/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 3-13'	PROTECTION LEVEL: D
TOC ELEV.: 29.87 FT.	MONITOR INST.: OVA	TOT DPTH: 13.5FT.	DPTH TO ▽ 9.2 FT.
LOGGED BY: C. King	WELL DEVELOPMENT DATE: 04/09/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					SAND: Very pale orange (10YR 8/2), fine grained, sub-angular to sub-rounded, unconsolidated, non-calcareous.		SP		
5					CLAYEY SAND: Light brown (5YR 5/6), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, iron oxide staining on clay.		SC		
10					SILTY SAND: Yellowish brown (10YR 6/2), fine grained, sub-angular to sub-rounded, non-calcareous, magnesium rich.		SM		
15					TOTAL DEPTH 13.5' LITHOLOGICAL DESCRIPTIONS TAKEN FROM MW-15.				
20									

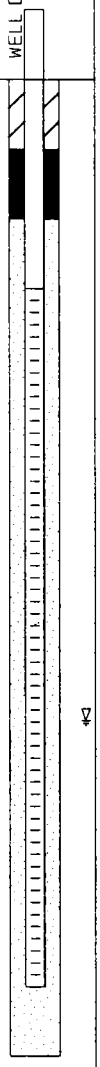


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-17	BORING NO. SSMW-17
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/01/92	COMPLTD: 04/01/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 4-14'	PROTECTION LEVEL: D
TOC ELEV.: 25.78 FT.	MONITOR INST.: OVA	TOT DPTH: 14.5FT.	DPTH TO ▽ 8.5 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 04/03/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0.0	SAND: Medium gray (N-5), fine grained, well-sorted, some black staining.		SP	posthole
				0.0	SAND: As above becoming moderate brown (5YR 4/4).			posthole
5				0.0	SLIGHTLY SANDY CLAY: Dark yellowish orange (10YR 4/4).		CL	2,2,3,3
				0.0	SILTY SAND: Light gray (N7), fine grained, well-sorted.		SM	4,5,4,7
				0.0			SP	3,4,4,4
10				0.0	SAND: Very light gray (N8), fine grained, clear quartz when washed, unconsolidated, saturated.			2,6,5,6
				0.0				2,3,5,5
15				0.0	TOTAL DEPTH 14.5'			10,11,6,6
				0.0	LITHOLOGICAL DESCRIPTIONS TAKEN FROM DSB-3.			7,8,11,11
				0.0				5,4,5,6
20								

WELL DATA

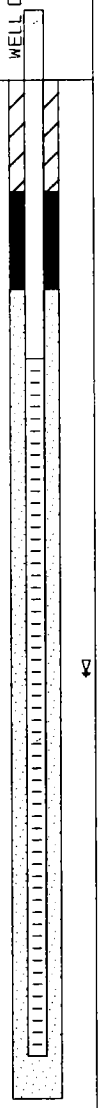


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: DSMW-18	BORING NO. DSMW-18
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 04/16/92	COMPLTD: 04/29/92
METHOD: H.S.A/Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 24'-34'
PROTECTION LEVEL: D		
TOC ELEV.: 26.06 FT.	MONITOR INST.: OVA	TOT DPTH: 35FT.
DPTH TO ▽ 8.95 FT.		
LOGGED BY: C.King/A.Cohen	WELL DEVELOPMENT DATE: 04/29/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
					SAND: Medium gray, (N5), fine grained, well-sorted, some visible black staining.		SP	
5					SANDY CLAY: Dark yellowish orange, (10YR 6/6), iron oxide staining, with SILTY SAND: Light gray, (N7), clear quartz when washed, fine grained, well-sorted, angular to sub-rounded, saturated.		CL SM	
10					SAND: Very light gray, N8), clear quartz when washed, fine grained, unconsolidated, saturated.		SP	
15								
20					SILTY SAND: Dark yellowish orange, (10YR 6/6), clear quartz when washed, fine grained, angular to sub-rounded.		SM	
25					SILTY SAND: Light gray, (N7), clear quartz when washed, angular to sub-rounded, trace of phosphate grains, magnesium rich.		SM	
30					DOLOMITE: Light olive gray, (5Y 6/1), moderate hardness, fossiliferous, coarse, crystalline.			
					DOLOMITIC SAND: Pale olive, (10Y 6/2), fossiliferous, trace of phosphatic grains.			
35					SILTY CLAY: Dusky yellow green, (5GY 5/2), highly calcareous, magnesium rich, trace of phosphatic grains.		CL	
					TOTAL DEPTH 34.5'			
					LITHOLOGICAL DESCRIPTIONS TAKEN FROM DSB-3.			
40								

WELL DATA

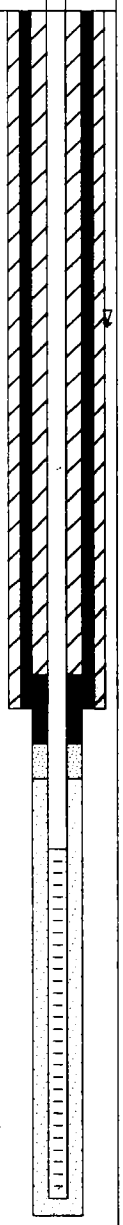


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: DSMW-19	BORING NO. DSMW-19
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/23/92	COMPLTD: 4/23/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 19-24'	PROTECTION LEVEL: D
TOC ELEV.: 16.93 FT.	MONITOR INST.: OVA	TOT DPTH: 26FT.	DPTH TO ▽ 4.24 FT.
LOGGED BY: R. Holloway/ C. King	WELL DEVELOPMENT DATE: 5/1/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0			SM	posthole
				0				posthole
5			1.5/2	0	SILTY SAND: Light olive gray (5Y 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous.			6,9,13,11
			1.5/2	0				7,5,6,9
			1/2	0				6,5,9,10
10			1.5/2	0				4,9,6,5
			1.5/2	0				4,5,5,6
15			1.8/2	0				3,4,3,2
			2/2	0				3,3,4,4
			2/2	0	SILTY SAND: Light olive gray (5Y 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, magnesium rich, calcareous.			4,3,2,1
20			2/2	0				2,3,4,4
			0.4/2	0	DOLOSILT: Yellowish gray (5Y 8/1), magnesium rich, calcareous, last 6" of spoon hard, dense, dry, non-plastic clay.		CL	7,8,17,9
25			0.1/2	0	DOLOMITE: Light gray (N7), hard, dense.			100/4"
30					TOTAL DEPTH 24.5'			
35								
40								

WELL DATA

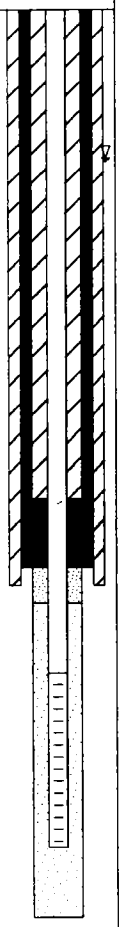


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-20	BORING NO. SSMW-20
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/15/92	COMPLTD: 4/15/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 3-13'	PROTECTION LEVEL: D
TOC ELEV.: 19.33 FT.	MONITOR INST.: OVA	TOT DPTH: 13.5FT.	DPTH TO ▽ 6.82 FT.
LOGGED BY: C. King/ A. Cohen	WELL DEVELOPMENT DATE: 4/16/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
							SM		
5					SILTY SAND: Light olive gray (5Y 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous.				▽
10									
15					TOTAL DEPTH 13.5'				
20					LITHOLOGICAL DESCRIPTIONS TAKEN FROM MW-19.				
25									
30									
35									
40									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: SSMW-21	BORING NO. SSMW-21
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/04/92	COMPLTD: 4/04/92
METHOD: H.S.A.	CASE SIZE: 2" / SCREEN INT.: 4-14	PROTECTION LEVEL: D
TOC ELEV.: 28.85 FT.	MONITOR INST.: OVA / TOT DPTH: 15FT.	DPTH TO ∇ 9.74 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/04/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					SILTY SAND: Light gray, (N7), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous.		SM		
5									
					CLAYEY SAND: Dark yellowish orange, (10YR, 6/6), clear quartz when washed, very fine grained, non-calcareous.		SC		
					SILTY SAND: Pale yellowish brown, (10YR, 6/2), fine to very fine grained, poorly sorted, unconsolidated, non-calcareous.		SM		
10									
15					TOTAL DEPTH 14.5'				
20									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: DSMW-22		BORING NO. DSMW-22
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/21/92	COMPLTD: 5/1/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 25-30'	PROTECTION LEVEL: D
TOC ELEV.: 23.30 FT.	MONITOR INST.: OVA	TOT DPTH: 30.5FT.	DPTH TO ∇ 10.05 FT.
LOGGED BY: R.Holloway/C.King/A.Cohen	WELL DEVELOPMENT DATE: 5/1/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0	SAND: Brownish gray (5YR 4/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous.		SP	posthole
				0				posthole
5			1.5/2	0	CLAYEY SAND: Light olive gray (5Y 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, iron oxide staining on clayey material.		SC	3,3,4,7
			2/2	0			SM	4,9,9,10
			1/2	0				10,14,16,16
10			1.5/2	0				8,10,11,12
			1.5/2	0				8,9,10,13
15			2/2	0	SILTY SAND: Pale yellowish brown (10YR 6/2), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, slight magnesium content, fine phosphatic grains scattered throughout.			8,12,14,14
			2/2	0				10,15,20,20
			2/2	0				3,4,5,4
20			2/2	0				1,1,1,2
			2/2	0				10,16,23,32
25			2/2	0	CLAY: Dark greenish gray (5GY 4/1), soft, slightly plastic, magnesium rich.		ML	13,14,15,28
			1/2	0	DOLOMITE: Very light gray (N8), poorly cemented, loose grained, silty, calcareous, magnesium rich.			3,4,12,8
30			0.4/2	0				100/5"
					TOTAL DEPTH 30.5'			
35								
40								

WELL DATA

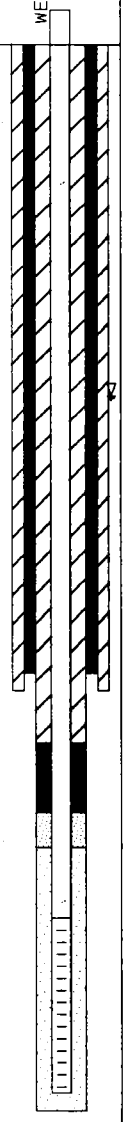


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: SSMW-23	BORING NO. SSMW-23
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/4/92	COMPLTD: 4/4/92
METHOD: H.S.A.	CASE SIZE: 2" / SCREEN INT.: 4-14'	PROTECTION LEVEL: D
TOC ELEV.: 23.50 FT.	MONITOR INST.: OVA / TOT DPTH: 14.5FT.	DPTH TO ∇ 10.34 FT.
LOGGED BY: R. Holloway/ P. Craine	WELL DEVELOPMENT DATE: 4/4/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
					SAND: Brownish gray (5YR 4/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous.		SP	
5					CLAYEY SAND: Light olive gray (5Y 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, iron oxide staining on clayey material.		SC	
10					SILTY SAND: Pale yellowish brown (10YR 6/2), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, slight magnesium content, fine phosphatic grains scattered throughout.		SM	
15					TOTAL DEPTH 14.5'			
					LITHOLOGICAL DESCRIPTIONS TAKEN FROM MW-22.			
20								

WELL DATA

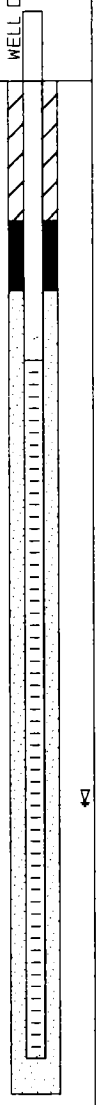


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-24	BORING NO. SSMW-24
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/04/92	COMPLTD: 04/04/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 4-14'	PROTECTION LEVEL: D
TOC ELEV.: 26.91 FT.	MONITOR INST.: OVA	TOT DPTH: 14.5FT.	DPTH TO ▽ 10.59 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 04/04/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
							SM		
5					SILTY SAND: Dark yellowish orange (10YR 6/6), fine to very fine grained, clear quartz when washed, unconsolidated, non-calacareous, poorly sorted, sub-angular to sub-rounded.				
10					SILTY SAND: Very pale orange (10YR 8/2), fine to very fine grained, clear quartz when washed, unconsolidated, poorly sorted, sub-angular to sub-rounded,non-calcareous.				
15					TOTAL DEPTH 14.5'				
					LITHOLOGICAL DESCRIPTIONS TAKEN FROM DSB-4.				
20									

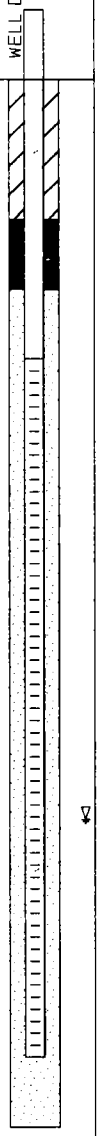


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: DSMW-25	BORING NO. DSMW-25
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/16/92	COMPLTD: 04/29/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 28-33'	PROTECTION LEVEL: D
TOC ELEV.: 27.12 FT.	MONITOR INST.: OVA	TOT DPTH: 33.5FT.	DPTH TO ∇ 10.72 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 04/29/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
							SM	
5					SILTY SAND: Dark yellowish orange (10YR 6/6), fine to very fine grained, clear quartz when washed, unconsolidated, non-calcareous, poorly sorted, sub-angular to sub-rounded.			
10								
15					SILTY SAND: Very pale orange (10Yr 8/2), fine to very fine grained, clear quartz when washed, unconsolidated, poorly sorted, sub-angular to sub-rounded, non-calcareous.			
20								
25					SILTY SAND: As above becoming slightly calcareous, phosphatic and dolomitic.			
30					DOLOMITE: Light gray (10YR 2/1), white when washed, sucrocic, calcareous, magnesium rich.			
35					TOTAL DEPTH 33.5'			
					LITHOLOGICAL DESCRIPTIONS TAKEN FROM DSB-4.			
40								

WELL DATA

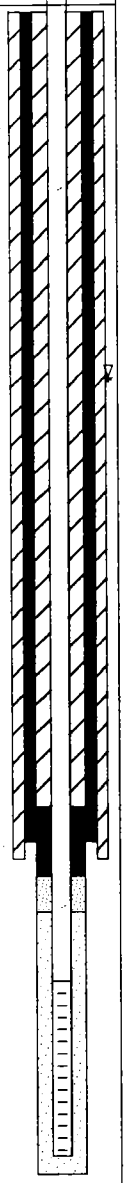


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-26	BORING NO. SSMW-26
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/04/92	COMPLTD: 04/04/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 4-14'	PROTECTION LEVEL: D
TOC ELEV.: 27.38 FT.	MONITOR INST.: OVA	TOT DPTH: 14.5FT.	DPTH TO ∇ 10.41 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 04/04/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
					SILTY SAND: Yellowish gray (5Y 7/2), clear quartz when washed, fine grained, well sorted, unconsolidated, sub-angular to sub-rounded, non-calcareous.		SM	
5					CLAYEY SAND: Sand as above with some clay, iron oxide staining.		SC	
10					CLAYEY SAND: As above with abundant iron oxide staining on the clay.			
15					TOTAL DEPTH 14.5'			
20								

WELL DATA

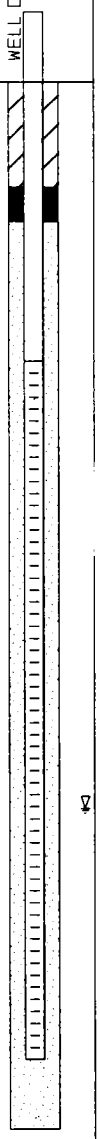


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: SSMW-27	BORING NO. SSMW-27
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/05/92	COMPLTD: 04/05/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 4-14'	PROTECTION LEVEL: D
TOC ELEV.: 30.53 FT.	MONITOR INST.: OVA	TOT DPTH: 14.5FT.	DPTH TO ∇ 10.14 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 04/05/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
					SAND: Very pale orange (10YR 8/2), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, debris fragments encountered throughout, with CLAYEY SAND: Greenish gray (5GY 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, slight magnesium content.		SP	
5								
							SC	
10					SILTY SAND: Light olive gray (5y 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, slight magnesium content, fine posphatic grains scattered throughout.		SM	
15					TOTAL DEPTH 14.5'			
					LITHOLOGICAL DESCRIPTION TAKEN FROM MW-28.			
20								

WELL DATA

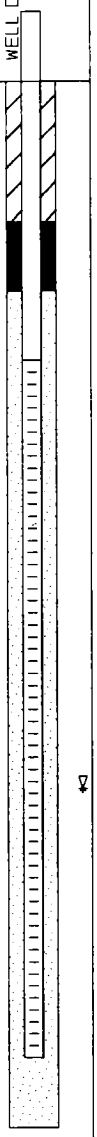


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: DSMW-28	BORING NO. DSMW-28
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/21/92	COMPLTD: 05/02/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 25'-30'	PROTECTION LEVEL: D
TOC ELEV.: 29.93 FT.	MONITOR INST.: OVA	TOT DPTH: 30.5FT.	DPTH TO ▽ 9.84 FT.
LOGGED BY: C. KING	WELL DEVELOPMENT DATE: 05/02/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0	SAND: Very pale orange, (10YR 8/2), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, debris fragments encountered throughout, with CLAYEY SAND: Greenish gray, (5GY 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, slight magnesium content.		SP	POSTHOLE
				0				POSTHOLE
5			1/2	0				5,13,14,16
			2/2	0				13,10,11,10
			2/2	0			SC	5,7,11,11
10			1.5/2	0	SILTY SAND: Light olive gray, (5Y 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, slight magnesium content, fine phosphatic grains scattered throughout.		SM	2,4,6,9
			2/2	0				6,7,9,12
15			1/2	0			SC	8,10,8,6
			1.5/2	0	CLAYEY SAND: Greenish gray, (5GY 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, slight magnesium content.			3,6,5,5
20								NO SPOON
			1/2	0	SILTY SAND: Light olive gray, (5Y 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, slight magnesium content, fine phosphatic grains scattered throughout.		SM	6,7,7,8
			1.5/2	0				6,6,5,6
25			1.5/2	0				5,5,5,5
			1.5/2	0				4,5,3,3
			1/2	0				2,1,SR
30			5/2	0	DOLOMITE: Pale yellowish brown, (10YR 6/2), hard, dense, magnesium rich, calcareous.			6,25,SR
35					TOTAL DEPTH 30.5'			
40								

WELL DATA

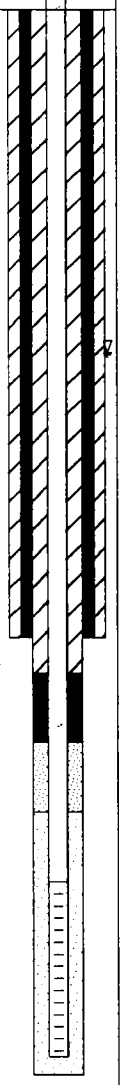


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: SSMW-29	BORING NO. SSMW-29
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/14/92	COMPLTD: 4/14/92
METHOD: H.S.A.	CASE SIZE: 2" / SCREEN INT.: 7-17'	PROTECTION LEVEL: D,C
TOC ELEV.: 36.05 FT.	MONITOR INST.: OVA / TOT DPTH: 17.5FT.	DPTH TO ∇ 13.11 FT.
LOGGED BY: A. Cohen/C. King	WELL DEVELOPMENT DATE: 4/14/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0	SILTY SAND: Light gray, silty to very fine grained, scattered debris (bricks and concrete).		SM	posthole
				0				posthole
5			2/2	0	SILTY SAND: Dark brown, organic material and wood fragments.			3,3,3,5
			2/2	0	SILTY SAND: Light gray, (N7), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, abundance of fragmented debris encountered.			3,3,4,-
					SPOON REFUSAL IN DEBRIS; HOLE AUGERED TO TOTAL DEPTH			
10					TOTAL DEPTH 17.5'			
15					NOTE: INTERMITTENT FID READINGS OF 0-500 PPM IN BREATHING ZONE; HOLE COMPLETED IN LEVEL C.			
20								

WELL DATA

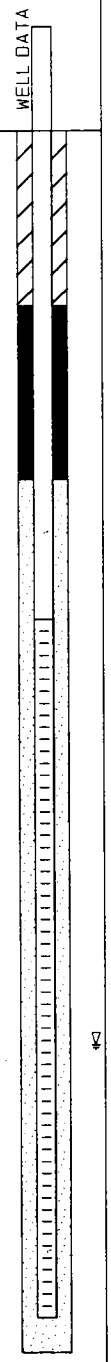


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: SSMW-30	BORING NO. SSMW-30
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/14/92	COMPLTD: 4/14/92
METHOD: H.S.A.	CASE SIZE: 2" / SCREEN INT.: 7-17'	PROTECTION LEVEL: D
TOC ELEV.: 36.67 FT.	MONITOR INST.: OVA / TOT DPTH: 17.5FT.	DPTH TO ∇ 13.38 FT.
LOGGED BY: A. Cohen/ C. King	WELL DEVELOPMENT DATE: 5/3/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				0			SM	posthole	
				0				posthole	
5			2/2	2				6,7,7,6	
			2/2	4				10,6,5,3	
			2/2	0	SILTY SAND: Light gray, (N7), clear quartz when washed, fine grained, sub-angular to sub-rounded, abundance of debris.			1,1,1,2	
10			2/2	0				5,5,8,15	
			2/2	0				6,7,7,12	∇
15			2/2	0				15,9,8,8	
					TOTAL DEPTH 17.5'				
20									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: DSMW-31	BORING NO. DSMW-31
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/22/92	COMPLTD: 5/2/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 31-36'	PROTECTION LEVEL: D
TOC ELEV.: 36.68 FT.	MONITOR INST.: OVA	TOT DPTH: 36.5FT.	DPTH TO ▽ 16.02 FT.
LOGGED BY: C. King/ A. Cohen	WELL DEVELOPMENT DATE: 5/3/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0	SILTY SAND: Olive Black, (5Y 2/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous.		SM	posthole
				0				posthole
5			NA	NA				NA
			NA	NA				NA
			NA	0				NA
10			NA	NA				NA
			NA	NA	NOTE: UNABLE TO RUN SPOONS DUE TO DEBRIS OBSTRUCTION; HOLE AUGERED TO DEPTH OF 20' AND SPOONING RESUMED			NA
15			NA	NA				NA
			NA	NA				NA
			NA	NA				NA
20			1/2	0			SM	10,9,10,11
			1/2	0				11,11,14,16
25			1/2	0	SILTY SAND: Light olive gray, (5Y 2/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous.			10,8,7,4
			0.5/2	0				8,11,13,12
			1/2	0				13,19,14,12
30			1/2	0				9,9,9,14
			1.5/2	0				12,11,12,14
35			1.5/2	0				11,12,14,15
			1.5/2	0	CLAYEY DOLOSILT: Light olive gray, (5Y 2/1), dry, dense, phosphatic grains throughout, magnesium rich, calcareous.		ML	3,-,6,38
40			0.5/1	0				75/6"

WELL DATA

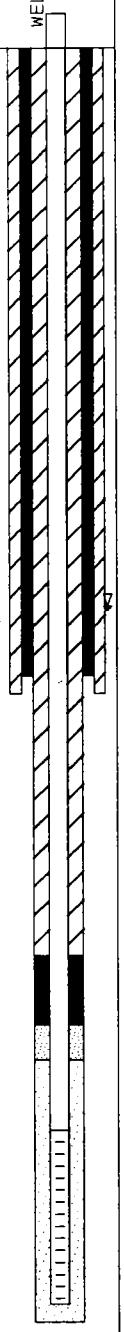


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: SSMW-32	BORING NO. SSMW-32
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/15/92	COMPLTD: 4/15/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 7-17'
PROTECTION LEVEL: D		
TOC ELEV.: 34.04 FT.	MONITOR INST.: OVA	TOT DPTH: 17.5FT.
DPTH TO ▽ 12.58 FT.		
LOGGED BY: C. King/ A. Cohen	WELL DEVELOPMENT DATE: 4/15/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0			SM	posthole
				0				posthole
5			2/2	0	SILTY SAND: Light gray, (N7), fine to very fine grained.			13,16,22,27
			2/2	230				44,21,13,27
			2/2	600				10,8,9,8
10			2/2	500				5,5,5,7
			2/2	15	SILTY CLAY: Very light gray, (N8), stiff, plastic, moist.		CL	4,6,11,13
15			2/2	50	SILTY SAND: Light gray, (N7), fine to very fine grained.		SM	4,8,3,10
					TOTAL DEPTH 17.5'			
20								

WELL DATA

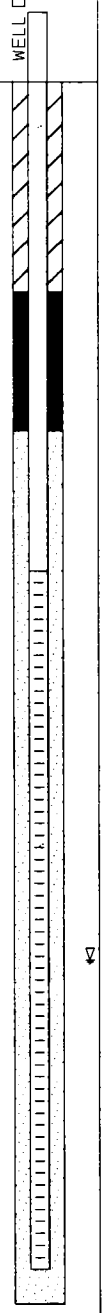


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: SSMW-33		BORING NO. SSMW-33
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/09/92	COMPLTD: 4/09/92
METHOD: H.S.A.	CASE SIZE: 2"	SCREEN INT.: 6-16'	PROTECTION LEVEL: D
TOC ELEV.: 34.53 FT.	MONITOR INST.: OVA	TOT DPTH: 16.5FT.	DPTH TO ▽ 13.04 FT.
LOGGED BY: C. King/ A. Cohen	WELL DEVELOPMENT DATE: 4/09/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				n/a			SM	posthole
				n/a				posthole
5			1.5/2	20				3,5,8,11
			1.5/2	280	SILTY SAND: Dark yellowish brown, (10YR, 4/2), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, slight magnesium content, fine phosphatic grains scattered throughout.			16,19,22,28
			1.9/2	900				14,10,32,63
10			0/1"	n/a				90/1"
15					CLAYEY SAND: Greenish gray, (5GY,6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, magnesium rich.		SC	
					TOTAL DEPTH 16.5'			
					LITHOLOGICAL DESCRIPTIONS TAKEN FROM MW-34.			
20								

WELL DATA

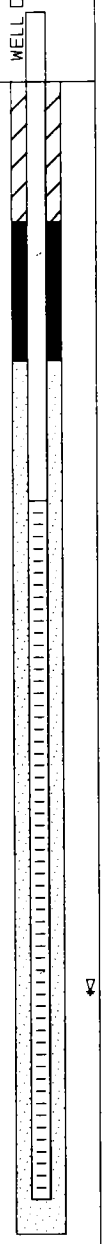
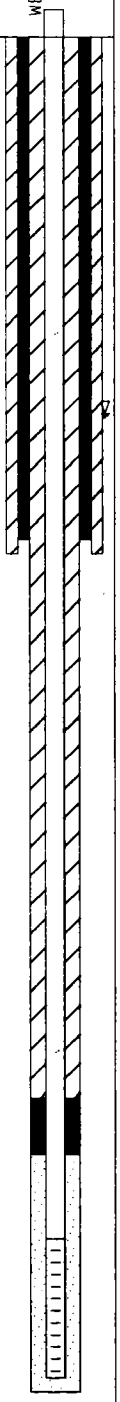


 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: DSMW-34	BORING NO. DSMW-34
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/22/92	COMPLTD: 5/2/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 43-48'	PROTECTION LEVEL: D
TOC ELEV.: 34.81 FT.	MONITOR INST.: OVA	TOT DPTH: 48.5FT.	DPTH TO ▽ 13.5 FT.
LOGGED BY: C. King/ R. Holloway	WELL DEVELOPMENT DATE: 5/3/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0	SILTY SAND: Dark yellowish brown (10YR 4/2), clear quartz when washed, fine to very fine grained, sub-angular to sub-rounded, non-calcareous, slight magnesium content, fine phosphatic grains scattered throughout.		SM	posthole
				0				posthole
5			1.5/2	1400				6,8,12,13
			1/2	200				5,5,4,7
			0.5/2	35				6,7,7,6
10			0/2	NA				3,4,8,10
			0.5/2	9				8,9,7,5
15			1.5/2	1	CLAYEY SAND: Greenish gray (5GY 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, magnesium rich.		SC	5,7,7,7
			1.5/2	3				5,5,5,6
				NA			SM	No Spoon
20			2/2	0	SILTY SAND: Light olive gray (5Y 6/1), clear quartz when washed, fine grained, sub-angular to sub-rounded, slightly calcareous, magnesium rich, fine phosphatic grains scattered throughout.			5,3,3,5
			0/2	0				18,16,15,16
			2/2	0				9,7,8,9
25			2/2	0				8,11,12,12
			2/2	0				10,14,16,20
30			2/2	0				8,11,17,18
			2/2	0				12,5,11,13
			2/2	0				13,13,16,25
35			2/2	0				6,7,8,5
			2/2	0				8,14,15,17
40			2/2	0	SILTY SAND: Medium dark gray (N4), clear quartz when washed, fine to medium grained with some coarse grains, sub-angular to sub-rounded, slightly calcareous, slight magnesium content.			6,14,24,24
			2/2	0				19,36,42,36
			2/2	0				13,13,30,15
45			2/2	2				4,6,5,6
			2/2	30	CLAY: Dusky yellowish green (10GY 3/2), soft, moist, medium plasticity, magnesium rich.		CL	7,15,19,22
50								

WELL DATA



TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-1	BORING NO. DSB-1
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/18/92	COMPLTD: 4/23/92
METHOD: Mud Rotary	CASE SIZE: 2" / SCREEN INT.: 120-130'	PROTECTION LEVEL: C,D
TOC ELEV.: 28.35 FT.	MONITOR INST.: OVA / TOT DPTH: 130.5FT.	DPTH TO ▽ 15.22 FT.
LOGGED BY: C. King/R. Holloway	WELL DEVELOPMENT DATE: 4/23/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0	SAND: Dark yellowish brown (10YR 4/2), fine grained, well sorted, some iron oxide staining.		SP	posthole
				0				posthole
5			1/2	2			SM	5,4,5,4
			1/2	200				5,5,6,7
			1/2	50	SILTY SAND: Yellowish gray (5Y 7/2), clear quartz when washed, angular to sub-rounded, trace of greasy organic coating on approx. 3% of sand.			4,5,7,7
10			1.6/2	0				4,5,8,11
			1.5/2	4				7,9,5,3
15			1.8/2	0				4,8,7,7
							CL	
			1/2	1	SLIGHTLY SANDY CLAY: Dusky yellow green (5GY 5/2), hard, stiff, low plasticity.		SM	3,3,4,5
			1/2	1	VERY SILTY SAND: Pale olive (10Y 6/2), clear quartz when washed, very fine grained, angular to sub-rounded, magnesium rich.		SM	5,6,12,18
20			1.5/2	1	SILTY SAND: Yellowish gray (5Y 7/2), clear quartz when washed, fine to very fine grained, angular to sub-rounded.			4,3,8,11
			1.8/2	0	CLAY: Dark Greenish gray (5GY 4/1), hard, stiff, low plasticity, magnesium rich.		CL	4,2,2,5
25			1.8/2	0	CLAYEY SAND: Greenish gray (5GY 6/1), fine grained, slight magnesium content, saturated, interbedded with 3" clay bands every 1'.		SC	5,6,5,6
			1.9/2	0	CLAY: Medium dark gray (N4), hard, stiff, low plasticity, magnesium rich.		CL	6,6,6,6
30			0.5/2	0				12,10,5,5

WELL DATA

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-1		BORING NO. DSB-1
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/18/92	COMPLTD: 4/23/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 120-130'	PROTECTION LEVEL: C,D
TOC ELEV.: 28.35 FT.	MONITOR INST.: OVA	TOT DPTH: 130.5FT.	DPTH TO ▽ 15.22 FT.
LOGGED BY: C. King/R. Holloway	WELL DEVELOPMENT DATE: 4/23/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 1				
			1.8/2	0	CLAY: Medium dark gray (N4), hard, stiff, low plasticity, magnesium rich.		CL	3,3,4,4	
			1.8/2	0				3,4,4,10	
35			1.5/2	1	SLIGHTLY SANDY DOLOMITE: Light greenish gray (5GY 8/1), coarse, magnesium rich, trace of phosphatic grains.			2,10,16,14	
			1.7/2	0				4,4,13,10	
			0/2	0	DOLOMITE: Yellowish gray (5Y 7/2), hard, dense, magnesium rich, trace of phosphatic grains.			75/3"	
40			0/2	0				14,75/4"	
			0.5/2	0	SILTY SAND: Greenish gray (5GY 6/1), medium grained, magnesium rich, slightly calcareous, some hard dolomite fragments throughout.		SM	75/3"	
45			2/2	0	CLAYEY SILT: Dark greenish gray (5GY 4/1), dry, magnesium rich, calcareous, streaks of marl and phosphatic grains throughout .		ML	14,9,17,16	
			1.8/2	0				11,9,24,50	
			1.8/2	0				30,30,30,60	
50			2/2	0	CLAY: Dark greenish gray (5GY 4/1), very stiff, dense, dry, magnesium rich, streaks of marl and phosphatic grains scattered throughout.		CL	18,23,39,44	
			0.5/2	0				20,75/6"	
55			1/2	0	SILTY SAND: Dark greenish gray (5GY 4/1), fine to medium grained, damp, magnesium rich, streaks of marl and phosphatic grains scattered throughout.		SM	60,80/6"	
			2/2	0	CLAYEY SILT: Pale olive (10Y 6/2), dry, magnesium rich, stiff, brittle, streaks of marl and phosphatic grains scattered throughout.		ML	35,33,31,90	
60			1.8/2	0				44,59,68,73	

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: IHMW-1	BORING NO. DSB-1
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/18/92	COMPLTD: 4/23/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 120-130'	PROTECTION LEVEL: C,D
TOC ELEV.: 28.35 FT.	MONITOR INST.: OVA	TOT DPTH: 130.5FT.	DPTH TO ▽ 15.22 FT.
LOGGED BY: C. King/R. Holloway	WELL DEVELOPMENT DATE: 4/23/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 2				
			1.8/2	0			ML	19,22,39,30	
			1.8/2	0				10,9,11,12	
65			1.8/2	0	CLAYEY SILT: Pale olive (10Y 6/2), dry, magnesium rich, stiff, brittle, streaks of marl and phosphatic grains scattered throughout.			5,13,24,30	
			2/2	0				13,15,29,42	
			2/2	0				12,20,22,29	
70			2/2	0				16,16,19,29	
			2/2	0				17,16,27,32	
75			2/2	0	SILTY CLAY: Dark greenish gray (5GY 4/1), stiff, dry, magnesium rich, streaks of marl and phosphatic grains scattered throughout.		CL	19,21,34,60	
			2/2	0				30,20,23,23	
			2/2	0	SANDY CLAY: Grayish olive (10Y 4/2), stiff, brittle, magnesium rich, non-calcareous, phosphatic grains and nodules scattered throughout.			10,11,12,18	
80			2/2	0				7,7,10,18	
			2/2	0			SC	9,10,17,20	
85			2/2	0	CLAYEY SAND: Grayish olive (10Y 4/2), fine to very fine grained, damp, magnesium rich, non-calcareous, poorly sorted, phosphatic grains scattered throughout.			13,11,11,18	
			2/2	0				12,14,13,29	
90			1/2	0				15,16,30,26	

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: IHMW-1	BORING NO. DSB-1
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/18/92	COMPLTD: 4/23/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 120-130'	PROTECTION LEVEL: C,D
TOC ELEV.: 28.35 FT.	MONITOR INST.: OVA	TOT DPTH: 130.5FT.	DPTH TO ▽ 15.22 FT.
LOGGED BY: C. King/R. Holloway	WELL DEVELOPMENT DATE: 4/23/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 3				
			0.3/2	0			SC	75/6"	
							SM		
			2/2	0				40,75,80/6"	
95			2/2	0				15,29,35,70	
			2/2	0				16,12,16,22	
			2/2	0	SILTY SAND: Dark greenish gray (5GY 4/1), fine to very fine grained, slightly moist, magnesium rich, non-calcareous, fossiliferous, phosphatic grains scattered throughout, pockets of clear quartz sand found between 102' and 104'.			13,14,17,40	
100			2/2	0				13,15,27,33	
			2/2	0				23,30,38,47	
105			0.3/2	0				11,14,16,35	
			1/2	0				33,50,65/6"	
			2/2	0	CLAYEY SILT: Dark greenish gray (5GY 4/1), moist, magnesium rich, non-calcareous, few phosphatic grains scattered throughout.		ML	18,21,51,85	
110			2/2	0			SM	25,23,31,44	
			2/2	0				24,28,36,65	
115			2/2	0	SLIGHTLY CLAYEY SILTY SAND: Pale olive (10Y 6/2), fine to very fine grained, dry, poorly sorted, few phosphatic grains scattered throughout.			13,16,24,37	
			1.5/2	0				11,21,23,35	
			2/2	0				0,0,0,30	
120									

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: IHMW-1	BORING NO. DSB-1
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/18/92	COMPLTD: 4/23/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 120-130'	PROTECTION LEVEL: C,D
TOC ELEV.: 28.35 FT.	MONITOR INST.: OVA	TOT DPTH: 130.5FT.	DPTH TO ▽ 15.22 FT.
LOGGED BY: C. King/R. Holloway	WELL DEVELOPMENT DATE: 4/23/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 4				
			2/2	0	SLIGHTY CLAYEY SILTY SAND: Pale olive (10Y 6/2), fine to very fine grained, dry, poorly sorted, few phosphatic grains scattered throughout.		SM	23,39,67,75	
			2/2	0				29,29,52,75	
125			2/2	0				0,0,48,70	
			2/2	0	SILTY SAND: Grayish olive (10y 4/2), fine to medium grained, poorly sorted, magnesium rich, non-calcareous, very wet, few phosphatic grains scattered throughout.			0,0,16,50	
			2/2	0				40,39,40,63	
130			2/2	0	TOTAL DEPTH OF IHMW-1 IS 130.5'			40,55,66,92	
			2/2	0				27,69,75/6"	
135			1/2	0				0,17,23,33	
			2/2	0				29,30,69,52	
			1.8/2	0				24,33,52,69	
140			2/2	0	VERY SILTY SAND: Dark greenish gray (5GY 4/1), fine grained, poorly sorted, magnesium rich, non-calcareous, moist, few phosphatic grains scattered throughout.			14,26,36,44	
			1.8/2	0				14,18,20,41	
145			2/2	0				7,16,30,35	
			2/2	0				11,9,14,32	
150			2/2	0	TOTAL DEPTH OF DSB-1 IS 150'			10,13,17,33	

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-2	BORING NO. DSB-2
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: 7555-10
CONTRACTOR: Groundwater Protection	DATE STARTED: 04/14/92	COMPLTD: 04/15/92
METHOD: Mud Rotary	CASE SIZE: 2' / SCREEN INT.: 115-125	PROTECTION LEVEL: D
TOC ELEV.: 28.37 FT.	MONITOR INST.: OVA / TOT DPTH: 150FT.	DPTH TO ▽ 15.42 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/15/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
			1.5/2	0	SLIGHTLY SILTY SAND: Very light gray, (N8), fine grained, unconsolidated, non-calcareous.		SP	2,2,1,2
			2/2	0				6,4,4,6
5			1.5/2	0			SC	5,4,6,8
			1.4/2	0	CLAYEY SAND: Very light gray, (N8), clear quartz when washed, fine grained, sub-angular to sub-rounded, non-calcareous, iron oxide stained.			8,7,9,9
			1.6/2	0				6,7,10,10
10			1.0/2	0	SILTY SAND: Grayish orange, (10YR, 7/4), clear quartz when washed, fine grained, well-sorted, sub-angular to sub-rounded, unconsolidated, non-calcareous, saturated.		SM	8,7,7,8
			1.5/2	0				8,6,7,8
15			1.6/2	0				6,8,10,12
			1.9/2	1	SLIGHTLY SILTY SAND: Yellowish gray (5Y, 7/2), clear quartz when washed, fine grained, well-sorted, sub-angular to sub-rounded, unconsolidated, non-calcareous, saturated.		SP	6,9,12,11
			1.9/2	0				4,8,13,10
20			1.6/2	0				5,4,4,6
			1.8/2	0				7,14,14,6
25			1.9/2	0	CLAYEY SAND: Medium dark gray, (N4), fine to very fine grained, sub-angular to sub-rounded, non-calcareous.		SC	3,3,2,4
			1.8/2	0	CLAY: Medium dark gray, (N4), soft, high plasticity, magnesium rich.		CH	2,2,3,3
30			2/2	0				2,2,2,3

WELL DATA

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: IHMW-2	BORING NO. DSB-2
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-10
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/14/92	COMPLTD: 04/15/92
METHOD: Mud Rotary	CASE SIZE: 2'	SCREEN INT.: 115-125	PROTECTION LEVEL: D
TOC ELEV.: 28.37 FT.	MONITOR INST.: OVA	TOT DPTH: 150FT.	DPTH TO ▽ 15.42 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/15/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 1				
			2/2	0			CH	1,19,19,20	
			1.8/2	0	SILTY SAND: Medium dark gray, (N4), clear quartz when washed, fine to medium grained, poorly sorted, slight magnesium content, non-calcareous, sub-angular to sub-rounded, unconsolidated, wet.		SM	3,15,18,29	
35			1.6/2	0				6,4,15,21	
			1.8/2	0	SILTY CLAY: Medium gray, (N5), hard, dry, non-plastic, magnesium rich.		CL	14,19,24,23	
			2/2	0	SAND: Medium dark gray, (N4), fine to medium grained, wet, unconsolidated.		SP	13,14,27,35	
40			2/2	0			CL	12,15,18,36	
			2/2	0	SILTY CLAY: Light olive gray, (5Y 5/2), hard, stiff, dry, dense, magnesium rich, slightly calcareous, with some phosphate.			26,26,27,30	
45			1.0/2	0				43,90/3"	
			.4/2	0	CLAY: Yellowish gray, (5y 7/2), hard, stiff, dry, dense, magneisum rich, slightly calcareous, with some phospatic nodules.			76/6"	
			0/2	0	NO RECOVERY			75/6"	
50			2/2	0			SC	11,18,23,38	
			1.8/2	0				24,29,45,51	
55			1.2/2	0	SILTY CLAYEY SAND: Light olive gray, (5Y, 5/2), white chalky limestone (marl) streaks, magnesium rich, calcareous, some mollusk casts, dry, phosphatic nodules.			18,21,29,25	
			1.4/2	0				17,20,28,38	
60			1.8/2	0				23,30,36,34	

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-2	BORING NO. DSB-2
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: 7555-10
CONTRACTOR: Groundwater Protection	DATE STARTED: 04/14/92	COMPLTD: 04/15/92
METHOD: Mud Rotary	CASE SIZE: 2' / SCREEN INT.: 115-125	PROTECTION LEVEL: D
TOC ELEV.: 28.37 FT.	MONITOR INST.: OVA / TOT DPTH: 150FT.	DPTH TO ▽ 15.42 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/15/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 2				
			1.9/2	0			SC	13,21,26,45	
			1.8/2	0				19,21,24,34	
65			1.5/2	0				26,26,33,29	
			1.6/2	0			CL	42,73,62,50	
			1.9/2	0	SILTY CLAY: Yellowish gray, (5Y 7/2), slight plasticity, abundance of phosphate nodules, slightly calcareous, magnesium rich.			14,17,17,35	
70			1.0/2	0				26,16,15,19	
			1.4/2	0			ML	10,10,10,11	
					SANDY CLAY: Grayish olive, (10Y 4/2), slight plasticity, abundance of phosphatic nodules, magnesium rich, some pockets of sand, moist.				
75			1.7/2	0				10,9,10,9	
			1.7/2	0			SC	7,9,9,10	
			1.8/2	0	CLAYEY SAND: Light olive gray, (5Y, 5/2), fine grained, magnesium rich , phosphatic nodules scattered throughout.			8,9,10,13	
80			2/2	0				7,9,9,14	
			1.9/2	0				9,35,32,34	
85			2/2	0	CLAYEY SAND: As above with some small pockets of clear quartz.			18,25,31,32	
			1.9/2	0				17,22,25,24	
			2/2	0				15,16,19,27	
90									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: IHMW-2	BORING NO. DSB-2
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-10
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/14/92	COMPLTD: 04/15/92
METHOD: Mud Rotary	CASE SIZE: 2'	SCREEN INT.: 115-125	PROTECTION LEVEL: D
TOC ELEV.: 28.37 FT.	MONITOR INST.: OVA	TOT DPTH: 150FT.	DPTH TO ▽ 15.42 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/15/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 3				
			2/2	0			SC	6,3,13,24	
			2/2	0				13,18,27,25	
95			2/2	0				10,18,23,33	
			1.7/2	0	SILTY CLAY: Pale olive, (10Y, 6/2), soft, low plasticity, magnesium rich with pockets of salt & pepper sand.		CL	11,17,24,55	
			1.7/2	0			SC	15,27,27,31	
100			1.9/2	0	SILTY CLAYEY SAND: Pale olive, (10Y, 6/2), fine grained, magnesium rich, slightly calcareous, with streaks of clear quartz sand and phosphatic grains throughout.			9,10,19,27	
			1.8/2	0				18,22,24,26	
105			1.8/2	0				17,25,56,70	
			2/2	0				17,18,24,75	
			1.3/2	0	SILTY CLAYEY SAND: Light olive gray, (5Y, 5/2), very fine grained, magnesium rich, slightly calcareous.			25,46,75/3"	
110			1.9/2	0				14,25,25,54	
			1.8/2	0				15,30,46,75	
115			1.9/2	0	SILTY SAND: Dusky yellow green, (5GY, 5/2), fine grained, magnesium rich, calcareous, marl streaks and phosphatic grains throughout, appears dry.		SM	31,41,42,45	
			1.2/2	0				38,64,75/3"	
			1.5/2	0			SP	16,16,42,58	
120									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: IHMW-2	BORING NO. DSB-2
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-10
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/14/92	COMPLTD: 04/15/92
METHOD: Mud Rotary	CASE SIZE: 2'	SCREEN INT.: 115-125	PROTECTION LEVEL: D
TOC ELEV.: 28.37 FT.	MONITOR INST.: OVA	TOT DPTH: 150FT.	DPTH TO ▽ 15.42 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/15/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 4				
			1.6/2	0	SAND: Dusky yellow green, (5GY 5/2), fine grained with some medium grained, (clear quartz when washed), phosphatic, magnesium rich, very slightly calcareous, unconsolidated, saturated.		SP	45,75,63,75	
			1.2/2	0				16,23,27,33	
125			1.0/2	0	TOTAL DEPTH 125.5'			46,85/3"	
			1.5/2	0	SAND: Dusky yellow green, (5GY 5/2), fine grain with some medium grain, wet, calcareous, magnesium rich, phosphatic.			28,43,38,45	
			1.0/2	0				46,61,40,59	
130			.2/2	0			CL	75/3"	
			2/2	0				14,19,24,25	
135			2/2	0				18,22,30,40	
			2/2	0				35,50,74,75	
			1.4/2	0	SILTY CLAY: Grayish olive green, (5GY 3/2), soft, low plasticity, some small pockets of sand, magnesium rich, non-calcareous.			1,3,7,1	
140			1.9/2	0				3,10,21,28	
			1.6/2	0				13,20,23,29	
145			2/2	0				17,22,21,27	
			2/2	0				16,19,21,27	
			2/2	0	TOTAL DEPTH OF DSB-2 IS 150'			21,23,26,32	
150									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-3	BORING NO. DSB-3
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: 7555-10
CONTRACTOR: Groundwater Protection	DATE STARTED: 04/20/92	COMPLTD: 04/28/92
METHOD: Mud Rotary	CASE SIZE: 2' / SCREEN INT.: 115-125	PROTECTION LEVEL: D
TOC ELEV.: 26.60 FT.	MONITOR INST.: OVA / TOT DPTH: 150FT.	DPTH TO ▽ 14.19 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/28/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				0			SP	posthole
			1.7/2	0	SAND: Medium gray (N5), fine grained to very fine grain, well-sorted, some visible black staining.			posthole
5				0			CL	2,2,3,3
			1.2/2	0	SLIGHTLY SANDY CLAY: Dark yellowish orange, (10YR, 6/6), iron oxide staining.		SM	4,5,4,7
			.1/2	0	SILTY SAND: Light gray (N7), clear quartz when washed, well-sorted, angular to sub-rounded.		SP	3,4,4,4
10			1.8/2	0	SAND: Very light gray (N7), clear quartz when washed, unconsolidated, saturated.			2,6,5,6
			1/2	0				2,3,5,5
15			1/2	0				10,11,6,6
			1/2	1				7,8,11,11
			1/2	0	SILTY SAND: Dark yellowish orange (10YR 6/6), clear quartz when washed, angular to sub-rounded.		SM	5,4,5,6
20			1/2	0	SILTY SAND: Light gray (N7), clear quartz when washed, angular to sub-rounded, trace of posphatic grains, magnesium rich.			7,7,7,6
			1/2	0				4,6,7,10
25			1.5/2	0				10,10,12,12
			2/2	0	VERY SILTY SAND: Dark gray (N3), same as above.			9,6,1,50
			0/2	0	DOLOMITE: Light olive gray (5Y 6/1), firm to hard, fossiliferous, coarse, crystalline.			75/6"
30				0				drill out
			0/2	0	SILTY SAND: Pale olive (10Y 6/2), fossiliferous, trace of posphatic grains, magnesium rich.		SM	30,53,75/"
35			1.9/2	0	SILTY CLAY: Dusky yellow green (5GY 5/2), highly calcareous, trace of phosphatic grains, magnesium rich, mollusk casts, with streaks of marl and phosphatic nodules scattered from 34' to 35'.		CL	20,23,32,32
			1.7/2	0				24,25,28,28
40			1.9/2	0				8,11,20,21

WELL DATA

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: IHMW-3	BORING NO. DSB-3
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-10
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/20/92	COMPLTD: 04/28/92
METHOD: Mud Rotary	CASE SIZE: 2'	SCREEN INT.: 115-125	PROTECTION LEVEL: D
TOC ELEV.: 26.60 FT.	MONITOR INST.: OVA	TOT DPTH: 150FT.	DPTH TO ▽ 14.19 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/28/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 1				
			1.9/2	0			CL	57,50,55,75	
			1.4/2	0				drill out	
45				0	Overdrill while reaming hole, no samples taken from 44' to 52'.			" "	
				0				" "	
				0				" "	
50				0				" "	
			2/2	0			ML	9,11,10,14	
55			2/2	0				16,32,30,30	
			1.7/2	0				14,24,27,57	
			1.9/2	0				13,12,11,20	
60			1.6/2	0				20,28,24,25	
			1.7/2	0				15,17,56,75	
65			1.9/2	0	CLAYEY SILT: Pale olive (10Y 6/2), well indurated, dense, magnesium rich, mollusk casts, with streaks of marl and phosphatic nodules scattered throughout.			29,33,17,45	
			1.9/2	0				20,20,20,22	
			1.4/2	0				20,21,18,15	
70			1.8/2	0				10,10,11,14	
			1.9/2	0				7,9,9,12	
75			1.9/2	0				9,13,16,18	
			1/2	0				13,17,20,17	
			1.3/2	0				34,33,67,73	
80									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: IHMW-3	BORING NO. DSB-3
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-10
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/20/92	COMPLTD: 04/28/92
METHOD: Mud Rotary	CASE SIZE: 2'	SCREEN INT.: 115-125	PROTECTION LEVEL: D
TOC ELEV.: 26.60 FT.	MONITOR INST.: OVA	TOT DPTH: 150FT.	DPTH TO ▽ 14.19 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/28/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 2				
			1.3/2	0			ML	34,33,67,73	
			1.4/2	0				32,31,51,65	
85			1.9/2	0	SILTY SAND: Dusky yellow green (5GY 5/2), fine grained, moist, magnesium rich, slightly calcareous, streaks of marl and phosphatic grains scattered throughout.		SM	9,14,20,43	
			1.7/2	0				22,25,33,54	
			1.5/2	0				14,20,32,26	
90			1.5/2	0				7,13,42,55	
				0	SPOON REFUSAL			dril out	
95			1.6/2	0	SLIGHTLY CLAYEY SILTY SAND: Grayish olive (10Y 4/2), fine grained, magnesium rich, slightly calcareous, with phosphatic grains scattered throughout, fossiliferous.		SM	8,9,12,15	
			1.6/2	0				0,16,17,13	
			1.2/2	0				12,13,17,17	
100			1.8/2	0				9,10,17,17	
			2/2	0				20,25,27,35	
105			1.6/2	0	CLAYEY SAND: Dusky yellow green (5GY 5/2), very fine grained, magnesium rich, slighty calcareous, dry, with small pockets of clear quartz and phosphatic grains.		SC	22,22,28,45	
			1.8/2	0				14,12,21,30	
			1.8/2	0				24,28,33,35	
110			1.8/2	0				10,14,21,32	
			1.5/2	0	SILTY SAND: Dusky yellow green (5GY 5/2), fine grained, magnesium rich, phosphatic grains and clear quartz sand scattered throughout, wet.		SM	17,13,75,40	
115			1.4/2	0				21,45,49,67	
			1.7/2	0				2,4,19,18	
			1.8/2	0				18,28,48,57	
120							ML		

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-3	BORING NO. DSB-3
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: 7555-10
CONTRACTOR: Groundwater Protection	DATE STARTED: 04/20/92	COMPLTD: 04/28/92
METHOD: Mud Rotary	CASE SIZE: 2' / SCREEN INT.: 115-125	PROTECTION LEVEL: D
TOC ELEV.: 26.60 FT.	MONITOR INST.: OVA / TOT DPTH: 150FT.	DPTH TO ∇ 14.19 FT.
LOGGED BY: R. Holloway	WELL DEVELOPMENT DATE: 4/28/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 3				
			1.3/2	0	CLAYEY SILT: Dusky yellow green (5GY 5/2), phosphatic grains and marl scattered throughout, wet.		ML	14,13,68,70	
			1.2/2	0			SM	8,30,55,70	
125			1.3/2	0	TOTAL DEPTH OF IHMW-3 IS 125.5'			53,61,64,116	
			1/2	0	SILTY SAND: Dusky yellow green (5GY 5/2), magnesium rich, phosphatic grains and clear quartz scattered throughtout, streaks of marl.			31,46,40,44	
			1.8/2	0				10,15,21,28	
130			2/2	0				16,28,33,40	
			1.6/2	0	CLAYEY SAND: Grayish olive green (5GY 3/2), fine to very fine grain, magnesium rich, trace of phosphatic grains.		SC	1,1,1,22	
135			1.8/2	0				1,1,1,28	
			1.2/2	0				1,1,27,37	
			1.8/2	0				1,1,23,37	
140			1.3/2	0				12,13,21,33	
			1.8/2	0				130,28,41,71	
145			1.7/2	0	CLAYEY SILT: Grayish olive green (5GY 3/2), hard, dense, magnesium rich, with phosphatic grains scattered throughout.		ML	22,22,32,28	
			2/2	0				23,23,39,44	
			2/2	0	TOTAL DEPTH OF DSB-3 IS 150'			30,20,32,30	
150									
155									
160									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-4	BORING NO. DSB-4
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/21/92	COMPLTD: 4/30/92
METHOD: Mud Rotary	CASE SIZE: 2" / SCREEN INT.: 120-130'	PROTECTION LEVEL: D
TOC ELEV.: 26.66 FT.	MONITOR INST.: OVA / TOT DPTH: 130.5FT.	DPTH TO ▽ 14.33 FT.
LOGGED BY: C. King/R. Holloway	WELL DEVELOPMENT DATE: 4/30/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				0			SM	posthole	
				0				posthole	
5			1.7/2	0	SILTY SAND: Dark yellowish orange (10YR 6/6), fine to very fine grained, clear quartz when washed, unconsolidated, non-calcareous, poorly sorted, sub-angular to sub-rounded.			7,5,6,8	
			2/2	0				8,8,10,11	
			1.8/2	1				12,9,9,11	
10			2/2	0				14,10,9,10	
			1/2	0				5,3,5,6	
15			2/2	1	SILTY SAND: Very pale orange (10YR 8/2), same as above.			11,10,12,17	▽
			1.6/2	0				2,2,8,10	
			1.5/2	0				5,6,12,18	
20			2/2	1				14,13,14,13	
			1.8/2	0	SILTY SAND: As above but slightly calcareous, phosphatic, magnesium rich.			7,4,5,11	
25			1/2	0				9,11,9,8	
			1.2/2	0				2,3,1,3	
			1.8/2	0	DOLOMITE: Light gray (10YR 2/1), white when washed, calcareous, magnesium rich.			14,14,14,23	
30									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-4	BORING NO. DSB-4
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/21/92	COMPLTD: 4/30/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 120-130'
TOC ELEV.: 26.66 FT.	MONITOR INST.: OVA	TOT DPTH: 130.5FT.
LOGGED BY: C. King/R. Holloway	WELL DEVELOPMENT DATE: 4/30/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 1				
			1.9/2	0	DOLOMITE: Light gray (10 YR 2/1), white when washed, calcareous, magnesium rich.			8,11,14,23	
			2/2	0				10,15,15,22	
35			1/2	0				7,50/6"	
			NA	NA				No Spoon	
			NA	NA				No Spoon	
40			2/2	0	SILTY CLAY: Light gray (10YR 7/1), stiff, hard, dry, magnesium rich, non-calcareous, traces of phosphatic grains.		CL	11,14,25,21	
			2/2	0				11,17,20,29	
45			1.9/2	0				16,17,21,24	
			2/2	0	CLAYEY SILT: Dusky yellow green (5GY 5/2), magnesium rich, phosphatic nodules, fossiliferous.		ML	18,19,20,15	
			1.8/2	0				45,30,49,50	
50			1.8/2	0	CLAYEY SAND: Dusky yellow green (5GY 5/2), fine grained, poorly sorted, dry, magnesium rich, non-calcareous, phosphatic grains throughout.		SC	12,13,23,16	
			1.8/2	0				18,23,25,30	
55			1.8/2	0				18,13,19,28	
			1.8/2	0				15,13,15,19	
60			2/2	0				9,10,12,15	

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: IHMW-4	BORING NO. DSB-4
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 4/21/92	COMPLTD: 4/30/92
METHOD: Mud Rotary	CASE SIZE: 2"	SCREEN INT.: 120-130'	PROTECTION LEVEL: D
TOC ELEV.: 26.66 FT.	MONITOR INST.: OVA	TOT DPTH: 130.5FT.	DPTH TO ▽ 14.33 FT.
LOGGED BY: C. King/R. Holloway	WELL DEVELOPMENT DATE: 4/30/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 2				
			2/2	0	CLAYEY SAND: Dusky yellow green (5GY 5/2), fine grained, poorly sorted, dry, magnesium rich, non-calcareous, phosphatic grains throughout.		SC	7,6,9,12	
			2/2	0				72,14,18,16	
65			2/2	0				17,19,16,20	
			2/2	0				14,16,49,66	
			2/2	0			CL	22,7,9,12	
70			2/2	0				15,11,11,15	
			2/2	0				13,9,9,12	
75			2/2	0	SANDY CLAY: Grayish yellow green (5GY 7/2), stiff, dense, dry, magnesium rich, non-calcareous, fossiliferous, phosphatic grains throughout.			7,5,5,7	
			2/2	0				7,5,6,7	
			2/2	0				7,6,7,13	
80			2/2	0				10,9,10,11	
			2/2	0				10,10,16,23	
85			2/2	0			SC	19,12,17,24	
			2/2	0	CLAYEY SAND: Dusky yellow green (5GY 5/2), fine to medium grained, well sorted, magnesium rich, non-calcareous, streaks of marl and phosphatic grains throughout.			13,12,13,10	
90			2/2	0				13,13,13,16	

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-4	BORING NO. DSB-4
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/21/92	COMPLTD: 4/30/92
METHOD: Mud Rotary	CASE SIZE: 2" / SCREEN INT.: 120-130'	PROTECTION LEVEL: D
TOC ELEV.: 26.66 FT.	MONITOR INST.: OVA / TOT DPTH: 130.5FT.	DPTH TO ▽ 14.33 FT.
LOGGED BY: C. King/R. Holloway	WELL DEVELOPMENT DATE: 4/30/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 3				
			2/2	0	CLAYEY SAND: Dusky yellow green (5GY 5/2), fine to medium grained, well-sorted, magnesium rich, non-calcareous, streaks of marl and phosphatic grains throughout.		SC	10,11,14,23	
			2/2	0				12,12,15,16	
95			2/2	0				10,18,19,15	
			2/2	0	SILTY CLAY: Grayish green (10GY 5/2), dense, stiff, dry, magnesium rich, non-calcareous, phosphatic grains throughout.		CL	11,13,18,37	
			2/2	0			SC	20,14,19,25	
100			2/2	0				6,7,8,15	
			2/2	0				12,12,13,19	
105			2/2	0				14,13,14,16	
			2/2	0				10,13,19,21	
			2/2	0	CLAYEY SAND: Dusky yellow green (5GY 5/2), fine to medium grained, well sorted, magnesium rich, non-calcareous, streaks of marl and phosphatic grains throughout.			16,18,36,48	
110			2/2	0				8,14,26,27	
			2/2	0				22,26,39,36	
115			2/2	0				12,24,28,50	
			2/2	0				15,18,30,40	
			2/2	0				11,18,25,30	
120									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-4	BORING NO. DSB-4
CLIENT: SOUTHERN DIVISION, NAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 4/21/92	COMPLTD: 4/30/92
METHOD: Mud Rotary	CASE SIZE: 2" / SCREEN INT.: 120-130'	PROTECTION LEVEL: D
TOC ELEV.: 26.66 FT.	MONITOR INST.: OVA / TOT DPTH: 130.5FT.	DPTH TO ▽ 14.33 FT.
LOGGED BY: C. King/R. Holloway	WELL DEVELOPMENT DATE: 4/30/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 4				
			2/2	0			SC	14,15,25,40	
			2/2	0	SILTY CLAY: Grayish olive green (5GY 5/2), stiff, dense.		CL	11,15,15,56	
125			2/2	0	SILTY SAND: Dusky yellow green (5GY 5/2), fine to medium grained, fossiliferous, magnesium rich, calcareous, wet, streaks of marl, phosphatic grains, and clear quartz scattered throughout.		SM	5,1,3,11	
			2/2	0				23,41,42,42	
			2/2	0				28,37,45,56	
130					TOTAL DEPTH OF IHMW-4 IS 130.5'				
			2/2	0				23,28,19,32	
			2/2	0				18,28,40,43	
135			1.5/2	0			SC	0,6,10,21	
			2/2	0				10,13,18,44	
			2/2	0				9,6,10,20	
140			2/2	0	CLAYEY SAND: Dusky yellow green (5GY 5/2), fine to medium grained, well-sorted, magnesium rich, non-calcareous, streaks of marl and phosphatic grains throughout.			13,11,24,26	
			2/2	0				7,6,7,7	
145			2/2	0				36,41,32,30	
			2/2	0				8,9,14,20	
			2/2	0				15,16,16,26	
150					TOTAL DEPTH OF DSB-4 IS 150'				

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-5	BORING NO. DSB-5
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection	DATE STARTED: 04/20/92	COMPLTD: 04/29/92
METHOD: MUD ROTARY	CASE SIZE: 2" / SCREEN INT.: 115'-125'	PROTECTION LEVEL: D
TOC ELEV.: 26.93 FT.	MONITOR INST.: OVA / TOT DPTH: 150FT.	DPTH TO ▽ 13.6 FT.
LOGGED BY: C. King/A. Cohen	WELL DEVELOPMENT DATE: 04/29/92	SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
				1000			SM	POSTHOLE
				1000	SILTY SAND: Light gray, (N7), clear quartz when washed, fine to very fine grained, poorly sorted, sub-angular to sub-rounded, non-calcareous, unconsolidated.			POSTHOLE
5			1.5/2	N/A				7,5,5,6
			2/2	N/A				2,3,4,6
			2/2	27				5,5,5,8
10			2/2	3				2,6,8,9
			2/2	70				2,6,8,5
15			2/2	0				6,2,8,5
			2/2	0	SILTY SAND: Pale yellowish brown, (10YR 6/2), clear quartz when washed, fine to very fine grained, poorly sorted, unconsolidated, sub-angular to sub-rounded, non-calcareous.			6,6,5,8
			2/2	4				11,6,8,11
20			2/2	0				10,10,8,11
			2/2	2				13,11,6,21
25			1/2	0	SLIGHTLY SILTY SAND: Light olive gray, (5Y 6/1), clear quartz when washed, fine to very fine grained, poorly sorted, sub-angular to sub-rounded, unconsolidated, non-calcareous.		SP	7,9,6,6
			2/2	0				11,12,17,26
			2/2	0				7,54,30,89
30			.4/2	0	DOLOMITIC SAND: Yellowish gray, (5Y 7/2), fine to medium grained, calcareous, phosphatic, magnesium rich.			89,SR
			.5/2	0	SLIGHTLY SANDY CLAY: Pale olive, (10Y 6/2), soft, low plasticity, magnesium rich, slightly calcareous, phosphatic.		CL	4,4,1,5
35			1/2	0				36,30,18,19
			2/2	0	CLAYEY SILT: Pale olive, (10Y 6/2), dry, magnesium rich, with phosphatic grains and marl streaks throughout.		ML	14,12,13,11
40			2/2	0				7,7,10,20

WELL DATA

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: IHMW-5	BORING NO. DSB-5
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/20/92	COMPLTD: 04/29/92
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 115'-125'	PROTECTION LEVEL: D
TOC ELEV.: 26.93 FT.	MONITOR INST.: OVA	TOT DPTH: 150FT.	DPTH TO ▽ 13.6 FT.
LOGGED BY: C. King/A. Cohen	WELL DEVELOPMENT DATE: 04/29/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 1				
			2/2	0	CLAYEY SILT: Pale olive, (10Y 6/2), dry, magnesium rich, with phosphatic grains and marl streaks throughout.		ML	10,8,44,50	
			2/2	0				29,30,49,40	
45			2/2	0				4,5,16,19	
			1.9/2	0	CLAYEY SAND. Dusky yellow green, (5GY 5/2), fine to very fine grained, poorly sorted, damp, magnesium rich, non-calcareous.		SC	13,20,19,44	
			2/2	0				12,11,15,18	
50			2/2	0	CLAYEY SILT: Dark greenish gray, (5GY 4/1), soft, moist, magnesium rich, non-calcareous.		ML	7,10,13,20	
			2/2	0				6,7,14,21	
55			2/2	0				10,9,10,16	
			2/2	0				8,10,15,17	
			2/2	0				13,13,17,32	
60			2/2	0				6,19,19,31	
			2/2	0	SILTY CLAY: Pale olive, (10Y 6/2), stiff, dense, magnesium rich, non-calcareous, with phosphatic grains scattered throughout.		CL	16,24,40,76	
65			2/2	0				12,18,14,23	
			2/2	0				15,17,16,18	
			2/2	0				10,7,8,12	
70			2/2	0				6,6,4,10	
			2/2	0	SANDY CLAY: Grayish olive, (10Y 4/2), slightly siff, slightly dense, magnesium rich, non-calcareous, with phosphatic grains scattered throughout.		CL	8,10,13,17	
75			2/2	0				8,10,15,19	
			1.5/2	0	SILTY CLAY: Pale olive, (10Y 6/2), stiff, dense, magnesium rich, non-calcareous, with phosphatic grains scattered throughout.		CL	10,10,12,15	
			2/2	0				8,10,44,31	
80									

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL	LOG of WELL: IHMW-5		BORING NO. DSB-5
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/20/92	COMPLTD: 04/29/92
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 115'-125'	PROTECTION LEVEL: D
TOC ELEV.: 26.93 FT.	MONITOR INST.: OVA	TOT DPTH: 150FT.	DPTH TO ▽ 13.6 FT.
LOGGED BY: C. King/A. Cohen	WELL DEVELOPMENT DATE: 04/29/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 2				
			2/2	0			CL	6,7,12,20	
			2/2	0			SC	14,18,24,45	
85			2/2	0				15,21,26,31	
			2/2	0				10,11,21,28	
			1.8/2	0				8,14,14,16	
90			2/2	0				9,10,20,29	
			1.8/2	0				5,10,32,47	
95			2/2	0	CLAYEY SAND: Dark greenish gray, (5GY 4/1), fine to very fine grained, dry, fossiliferous, magnesium rich, with phosphatic grains, nodules, and marl streaks scattered throughout.			31,24,33,45	
			2/2	0				16,19,25,45	
			2/2	0				10,11,16,16	
100			2/2	0				16,10,18,37	
			2/2	0				19,18,31,36	
105			1.5/2	0				22,33,63,66	
			2/2	0				33,36,73,78	
			2/2	0				30,15,16,31	
110			1/2	0				20,24,43,58	
			1.5/2	0	SILTY SAND: Dark greenish gray, (5GY 4/1), fine to medium grained, wet, fossiliferous, magnesium rich, with phosphatic grains and clear quartz grains scattered throughout.		SM	36,40,55,65	
115			2/2	0				1,1,0,1	
			2/2	0				13,29,39,63	
120			2/2	0				15,29,60,41	

 ABB ENVIRONMENTAL SERVICES, INC.

TITLE: NAS JACKSONVILLE, Jacksonville, FL		LOG of WELL: IHMW-5	BORING NO. DSB-5
CLIENT: SOUTHNAVFACENGCOM			PROJECT NO: 7555-11
CONTRACTOR: Groundwater Protection		DATE STARTED: 04/20/92	COMPLTD: 04/29/92
METHOD: MUD ROTARY	CASE SIZE: 2"	SCREEN INT.: 115'-125'	PROTECTION LEVEL: D
TOC ELEV.: 26.93 FT.	MONITOR INST.: OVA	TOT DPTH: 150FT.	DPTH TO ▽ 13.6 FT.
LOGGED BY: C. King/A. Cohen	WELL DEVELOPMENT DATE: 04/29/92		SITE: NAS JAX OU1

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
					Continued from PAGE 3				
			1/2	N/A	SILTY SAND: Dark greenish gray, (5GY 4/1), fine to medium grained, wet, fossiliferous, magnesium rich, with phosphatic grains and clear quartz grains scattered throughout.		SM	18,19,44,45	
			2/2	N/A				38,53,60,90	
125			2/2	N/A	TOTAL DEPTH 125'.			50,53,90,92	
			2/2	N/A				40,43,34,33	
			2/2	N/A				60,70,63,70	
130			2/2	N/A	CLAYEY SILT: Grayish olive, (10Y 4/2), dry, magnesium rich, with phosphatic grains and marl streaks scattered throughout.		ML	6,5,12,24	
			2/2	N/A				6,7,9,10	
135			2/2	N/A				8,17,14,26	
			2/2	N/A				19,17,25,26	
			1.5/2	N/A	SILTY CLAY: Grayish olive, (10Y 4/2), dense, dry, brittle, stiff, magnesium rich, non-calcareous.		CL	18,30,19,33	
140			2/2	N/A				16,19,17,26	
			2/2	N/A				12,16,23,34	
145			2/2	N/A				19,15,23,21	
			2/2	N/A				19,20,24,26	
			2/2	N/A				20,25,21,30	
150					TOTAL DEPTH OF BORING DSB-5 IS 150'.				
155									
160									

 ABB ENVIRONMENTAL SERVICES, INC.

Table A – 1
Summary of Well Development Data

Jacksonville Naval Air Station, OU1
Jacksonville, Florida

Well or Piezometer Number	Date	Top of Casing Depth to Water (feet)	Development Method	Gallons Removed	Temper–ature, Celcius	pH	Specific Conduc–tivity	Total Gallons Removed	Total Time to Develop, Minutes
SSMW–01	4/15/92	7.45	Centrifugal pump and steam–cleaned flexible PVC	–	23	6.0	60		
				–	23	6.0	60		
				55	23	6.0	60	55	53
DSMW–02	5/03/92	8.08	Centrifugal pump and steam–cleaned flexible PVC	–	79 F	7.2	402		
				–	79 F	7.4	375		
				90	78.5 F	7.5	370	90	50
SSMW–03	4/03/92	6.14	Centrifugal pump and steam–cleaned flexible PVC	35	23.5	8.0	975		
				–	23.5	7.5	1050		
				–	23.5	7.5	1025		
				40	23.5	7.5	1000	40	70
DSMW–04	4/28/92	5.10	Centrifugal pump and steam–cleaned flexible PVC	–	78.2 F	6.6	185		
				–	75.8 F	6.44	158		
				70	74.6 F	6.36	135	70	30
SSMW–05	4/09/92	7.09	Centrifugal pump and steam–cleaned flexible PVC	–	23.5	6.0	460		
				–	23	6.0	460		
				55	23.5	6.0	470	55	60
DSMW–06	4/28/92	6.61	Centrifugal pump and steam–cleaned flexible PVC	–	85 F	6.54	238		
				–	82 F	7.14	197		
				–	83.5 F	6.71	186		
				60	81.8 F	6.71	181	60	60
SSMW–07	4/05/92	6.52	Centrifugal pump and steam–cleaned flexible PVC	30	22	5.8	170		
				–	23	5.5	160		
				70	24	5.5	120		
				80	25	5.5	160	80	60

See notes at end of table.

Table A – 1
Summary of Well Development Data

Jacksonville Naval Air Station, OU1
Jacksonville, Florida

Well or Piezometer Number	Date	Top of Casing Depth to Water (feet)	Development Method	Gallons Removed	Temper–ature, Celcius	pH	Specific Conduc–tivity	Total Gallons Removed	Total Time to Develop, Minutes
DSMW–08	4/29/92	6.65	Centrifugal pump and steam–cleaned flexible PVC	–	75.5 F	6.44	532		
				–	72.5 F	6.6	443		
				100	71.5 F	6.4	442	100	30
SSMW–09	4/05/92	7.93	Centrifugal pump and steam–cleaned flexible PVC	40	20	6.5	220		
				55	25	6.5	260		
				83	25	6.8	260	83	80
SSMW–10	4/15/92	5.85	Centrifugal pump and steam–cleaned flexible PVC	–	39	7.0	2600		
				–	40	7.0	2600		
				30	40	7.0	2600	30	70
SSMW–11	4/05/92	10.38	Centrifugal pump and steam–cleaned flexible PVC	55	22	5.0	340		
				65	21	5.0	340		
				75	20	5.0	340	75	60
DSMW–12	5/02/92	9.89	Centrifugal pump and steam–cleaned flexible PVC	20	24.2	6.12	1100		
				35	24.9	6.01	1100		
				55	24.8	5.95	1100		
				70	25	5.1	1100		
				80	24.9	5.8	1100		
				100	24.5	5.8	1100	100	45
SSMW–13	4/04/92	9.32	Centrifugal pump, steam–cleaned flexible PVC and air development	40	27	7.0	460		
				–	26	6.5	450		
				–	26	6.5	450		
				–	21	6.8	450		
				80	25	6.5	440	80	165

See notes at end of table.

Table A–1
Summary of Well Development Data

Jacksonville Naval Air Station, OU1
Jacksonville, Florida

Well or Piezometer Number	Date	Top of Casing Depth to Water (feet)	Development Method	Gallons Removed	Temper–ature, Celcius	pH	Specific Conduc–tivity	Total Gallons Removed	Total Time to Develop, Minutes
DSMW–14	5/03/92	8.91	Centrifugal pump, steam–cleaned flexible PVC and air development	15	32.7	6.83	910		
				18	32.1	6.65	1100		
				21	34.2	6.4	1300		
				26	25.4	7.8	1100		
				40	24.5	7.9	1100	40	120
DSMW–15	5/01/92	9.35	Centrifugal pump and steam–cleaned flexible PVC	–	79.9 F	4.91	972		
				–	76.6 F	4.93	935		
				200	76.1 F	4.9	931	200	60
SSMW–16	4/09/92	9.08	Centrifugal pump and steam–cleaned flexible PVC	55	25	7.0	375	55	45
SSMW–17	4/01/92	7.99	Centrifugal pump and steam–cleaned flexible PVC	30	25	7.0	470		
				35	26	6.5	350		
				40	26	7.0	410		
				45	26	7.0	370		
				50	25	6.5	375	50	120
DSMW–18	4/29/92	8.59	Centrifugal pump and steam–cleaned flexible PVC	–	85 F	7.65	600		
				–	81.5 F	8.06	570		
				–	80.7 F	7.37	555		
				45	81.3 F	7.46	560	45	45
DSMW–19	5/01/92	4.01	Centrifugal pump and steam–cleaned flexible PVC	40	22.1	7.0	900		
				50	21.9	7.14	890		
				60	22.5	7.05	890		
				70	22.2	7.0	900		
				100	22.2	7.01	900	100	20

See notes at end of table.

Table A –1
Summary of Well Development Data

Jacksonville Naval Air Station, OU1
Jacksonville, Florida

Well or Piezometer Number	Date	Top of Casing Depth to Water (feet)	Development Method	Gallons Removed	Temper–ature, Celcius	pH	Specific Conduc–tivity	Total Gallons Removed	Total Time to Develop, Minutes
SSMW–20	4/18/92	6.14	Centrifugal pump and steam–cleaned flexible PVC	–	21	6.0	370		
				–	22	6.0	365		
				45	21	6.0	360	45	80
SSMW–21	4/04/92	9.59	Centrifugal pump and steam–cleaned flexible PVC	50	20	6.0	60		
				65	20.5	6.0	60		
				80	20.5	6.5	60		
				100	20.5	6.5	60	100	60
DSMW–22	5/01/92	9.98	Centrifugal pump and steam–cleaned flexible PVC	30	23.9	9.21	385		
				55	22.5	8.16	470		
				70	22.3	7.84	470		
				110	22.8	7.6	470		
				140	22.5	7.51	470		
				170	22.9	7.51	470		
				200	22.4	7.45	470	200	60
SSMW–23	4/04/92	10.41	Centrifugal pump and steam–cleaned flexible PVC	10	22	5.5	245		
				20	22	5.5	220		
				–	22	5.5	230		
				55	22	5.5	230	55	40
SSMW–24	4/04/92	10.51	Centrifugal pump and steam–cleaned flexible PVC	–	21	5.5	180		
				–	21	5.5	160		
				–	20	5.5	150		
				68	20	5.5	150	68	45
DSMW–25	4/29/92	10.58	Centrifugal pump and steam–cleaned flexible PVC	50	70.7 F	6.63	404		
				75	68 F	7.2	418		
				100	66.5 F	7.26	411	100	20

See notes at end of table.

Table A–1
Summary of Well Development Data

Jacksonville Naval Air Station, OU1
Jacksonville, Florida

Well or Piezometer Number	Date	Top of Casing Depth to Water (feet)	Development Method	Gallons Removed	Temper–ature, Celcius	pH	Specific Conduc–tivity	Total Gallons Removed	Total Time to Develop, Minutes
SSMW–26	4/04/92	10.42	Centrifugal pump and steam–cleaned flexible PVC	–	25	6.0	380		
				16.5	21	5.5	340		
				–	20	5.5	350		
				–	19	5.5	420		
				–	21	5.5	500		
				–	21	5.5	450		
				90	21	6.0	600	90	75
SSMW–27	4/05/92	10.12	Centrifugal pump and steam–cleaned flexible PVC	40	22	7.5	800		
				52	21	7.0	790		
				65	21.5	7.0	800		
				78	22	7.0	20		
				90	21.5	7.0	800	90	60
DSMW–28	5/02/92	9.75	Centrifugal pump and steam–cleaned flexible PVC	–	100 F	6.6	1142		
				–	86.8 F	6.3	994		
				50	87.5 F	6.0	1017	50	60
SSMW–29	4/14/92	12.82	Centrifugal pump and steam–cleaned flexible PVC	–	28	7.0	2500		
				–	29	7.0	2500		
				35	29	7.0	2500	35	52
SSMW–30	5/03/92	14.6	Centrifugal pump and steam–cleaned flexible PVC	–	28	8.0	1650		
				–	28	8.0	1600		
				50	28	8.0	1650	50	73

See notes at end of table.

Table A–1
Summary of Well Development Data

Jacksonville Naval Air Station, OU1
Jacksonville, Florida

Well or Piezometer Number	Date	Top of Casing Depth to Water (feet)	Development Method	Gallons Removed	Temper–ature, Celcius	pH	Specific Conduc–tivity	Total Gallons Removed	Total Time to Develop, Minutes
DSMW–31	5/03/92	14.61	Centrifugal pump, steam–cleaned flexible PVC and air development	6	24.9	10.5	900		
				–	24.1	10.11	950		
				–	23.7	10.0	1000		
				–	23.6	9.8	1000		
				10	23.8	9.76	1050		
				–	80 F	7.27	944		
				25	81.5 F	6.76	932		
				–	76.2 F	6.67	877		
				–	74.4 F	6.47	824		
				45	73.4 F	6.11	754	45	2 days
SSMW–32	4/15/92	12.62	Centrifugal pump and steam–cleaned flexible PVC	–	27	7.0	1400		
				–	26	7.0	1400		
				55	26	7.0	1400	55	77
SSMW–33	4/09/92	14.2	Centrifugal pump and steam–cleaned flexible PVC	–	35	7.0	2300		
				–	35	7.0	2400		
				35	35	7.0	2400	35	60
DSMW–34	5/03/92	13.47	Centrifugal pump and steam–cleaned flexible PVC	20	27.7	6.9	900		
				45	27.3	6.1	820		
				50	26.9	5.91	860		
				60	26.9	5.87	820		
				75	27.2	5.88	820		
				85	26.2	5.87	820		
				100	26.3	5.9	800		
				110	26.3	5.9	800	110	60

See notes at end of table.

Table A–1
Summary of Well Development Data

Jacksonville Naval Air Station, OU1
Jacksonville, Florida

Well or Piezometer Number	Date	Top of Casing Depth to Water (feet)	Development Method	Gallons Removed	Temper–ature, Celcius	pH	Specific Conduc–tivity	Total Gallons Removed	Total Time to Develop, Minutes
IHMW–01	4/23/92	15.02	Air development	50	23.6	8.2	575		
				125	23	8.2	495		
				140	23.1	8.3	500		
				180	23.5	8.3	495	180	60
IHMW–02	4/15/92	15.36	Air development	30	25	8.4	385		
				100	25	8.3	335		
				150	25	8.3	340		
				170	23.1	8.2	348		
				200	23.1	8.2	348	200	30
IHMW–03	4/28/92	14.18	Air development	50	25.9	8.2	362		
				80	22.7	8.2	330		
				160	22.2	8.3	322		
				180	22.1	8.4	320		
				225	21.8	8.2	310		
				250	19.6	8.5	15		
				260	21.9	8.5	320	260	105
IHMW–04	4/30/92	14.35	Air development	40	22.5	7.81	370		
				65	22.4	8.18	340		
				110	22.4	8.25	340		
				135	22.3	8.28	48		
				160	22.4	8.27	335		
				195	22.5	8.28	345		
				200	22.5	8.28	345	200	45
IHMW–05	4/29/92	13.50	Air development	30	21.8	8.2	350		
				80	21.3	8.3	348		
				100	21.7	8.4	348		
				130	21.5	8.4	340		
				180	21.6	8.5	340		
				210	21.9	8.4	350		
				250	21.7	8.4	338	250	45

See notes at end of table.

Table A – 1
Summary of Well Development Data

Jacksonville Naval Air Station, OU1
Jacksonville, Florida

Well or Piezometer Number	Date	Top of Casing Depth to Water (feet)	Development Method	Gallons Removed	Temper–ature, Celcius	pH	Specific Conduc–tivity	Total Gallons Removed	Total Time to Develop, Minutes
PZ–01	4/09/92	7.3	Centrifugal pump and steam–cleaned flexible PVC	–	23	7.0	750		
				–	23	7.0	800		
				55	23	7.0	800	55	42
PZ–02	4/09/92	7.18	Centrifugal pump and steam–cleaned flexible PVC	–	21	7.0	900		
				–	21	7.0	950		
				110	21	7.0	900	110	30
PZ–03	4/14/92	12.14	Centrifugal pump and steam–cleaned flexible PVC	–	38	8.0	1350		
				–	38	8.0	1400		
				15	38	8.0	1400	15	150
PZ–04	4/14/92	10.76	Centrifugal pump and steam–cleaned flexible PVC	–	29	7.0	2000		
				–	29	7.0	2000		
				35	29	7.0	2000	35	120
PZ–05	4/04/92	9.96	Centrifugal pump and steam–cleaned flexible PVC	40	23	5.0	200	40	45
PZ–06	4/04/92	10.9	Centrifugal pump and steam–cleaned flexible PVC	–	19	5.5	190		
				–	20	5.5	200		
				–	20	5.5	190		
				53	21	5.5	220	53	60
PZ–07	4/09/92	5.29	Centrifugal pump and steam–cleaned flexible PVC	–	32	7.0	1150		
				–	33	7.0	1125		
				30	33	7.0	1125	30	90

See notes at end of table.

Table A – 1
Summary of Well Development Data

Jacksonville Naval Air Station, OU1
Jacksonville, Florida

Well or Piezometer Number	Date	Top of Casing Depth to Water (feet)	Development Method	Gallons Removed	Temper–ature, Celcius	pH	Specific Conduc–tivity	Total Gallons Removed	Total Time to Develop, Minutes
PZ–08	4/09/92	8.53	Centrifugal pump and steam–cleaned flexible PVC	30	28	7.0	1900	30	70

Notes: F = degrees Fahrenheit.
pH = standard pH units
Specific conductivity is measured in uhmos (micromohs/centimeter).
SSMW denotes a well screened across the water table in the shallow surficial aquifer.
DSMW denotes a well screened in the deep zone of the shallow surficial aquifer.
IHMW denotes a well screened in the Intermediate Zone of the Hawthorn Formation.
A dash ('–') denotes that the value was not measured.

Table A-2
Summary of Monitoring Well Purging Data

OU1, Naval Air Station
Jacksonville, Florida

Well Number	Date	Top of Casing Depth to Water (feet)	Gallons per Well Volume	Purging Method	Gallons Purged	Temper-ature °C	pH	Specific Conduc-tivity	Turbidity (N.T.U.)
HMW-1	5/29/92	15.02	18.48	Submersible pump	19	23.7	11.67	2,050	
					38	24.3	9.31	550	
					57	23.6	9.01	540	
					76	23.0	8.51	510	
					95	23.0	8.29	510	1.7
HMW-2	5/29/92	15.36	17.65	Submersible pump	18	23.7	11.19	1,000	
					36	23.6	9.11	340	
					54	23.4	8.52	340	
					72	23.5	8.40	340	
					90	23.4	8.34	340	0.06
HMW-3	5/29/92	14.18	20	Submersible pump	20	24.6	7.31	370	
					40	23.9	7.47	320	
					60	24.3	6.99	335	
					80	24.1	7.19	320	
					100	24.3	7.37	340	10.3
HMW-4	5/29/92	14.35	20	Submersible pump	20	22.9	9.72	550	
					40	23.5	6.90	300	
					60	23.7	6.68	350	
					80	23.6	6.60	350	
					100	23.7	6.65	300	0.10
HMW-5	5/29/92	13.50	17.8	Submersible pump	18	24.5	10.51	875	
					36	23.6	8.43	320	
					54	23.8	8.22	360	
					72	23.9	8.10	360	
					90	23.6	8.05	360	1.14
SSMW-1	6/2/92	7.45	1.22	Centrifugal pump	2	24.7	6.1	70	
					4	24.3	5.9	60	
					6	25.0	5.9	60	
					8	25.1	6.0	58	>200
DSMW-2	6/2/92	8.08	5.68	Centrifugal pump	6	25.0	6.8	480	
					12	24.2	6.8	470	
					18	25.4	6.7	470	
					24	24.5	6.9	485	
					30	26.7	6.9	485	6.63
SSMW-3	5/30/92	6.14	1.69	Bailer	1.75	23.9	6.98	1,200	
					3.50	22.6	7.56	1,100	
					5.25	23.3	7.26	1,100	
					6	22.6	6.99	1,000	
					7.25	21.8	7.28	900	126.5

See notes at end of table.

Table A-2 (Continued
Summary of Monitoring Well Purging Data

OU1, Naval Air Station
Jacksonville, Florida

Well Number	Date	Top of Casing Depth to Water (feet)	Gallons per Well Volume	Purging Method	Gallons Purged	Temper-ature °C	pH	Specific Conduc-tivity	Turbidity (N.T.U.)
DSMW-4	5/30/92	5.10	4.22	Centrifugal pump		27.9	9.23	270	
					10	26.9	9.43	230	
					15	25.7	8.06	230	
					20	26.5	7.53	220	
					25	27.4	7.40	220	1.87
SSMW-5	6/1/92	7.09	1.43	Centrifugal pump	2	28	6.0	500	
					4	27.5	5.9	440	
					6	27.2	5.9	470	
					8	27.2	5.9	465	>200
DSMW-6	6/1/92	6.61	3.82	Centrifugal pump	4	29.1	6.2	450	
					8	29.2	6.4	310	
					12	29.8	6.7	150	
					16	28.2	6.7	270	
					20	29.5	6.7	130	4.72
SSMW-7	5/31/92	6.52	1.28	Centrifugal pump	2	25.8	6.6	150	
					4	24.7	6.4	130	
					6	24.1	6.2	140	
					8	24.3	6.1	140	
					10	23.5	6.1	135	>200
DSMW-8	5/31/92	6.65	3.94	Centrifugal pump	5	25.1	9.4	500	
					10	24.4	8.3	500	
					15	24.3	7.6	475	
					20	24.8	6.9	475	
					25	24.9	6.8	475	1.2
SSMW-10	6/2/92	5.85	1.70	Centrifugal pump	2	25.1	6.6	230	
					4	24.01	6.3	220	
					6	23.4	6.7	220	
					8	23.9	6.6	220	>200
SSMW-11	5/31/92	10.38	1.09	Centrifugal pump	1	35.1	6.1	NM	
					2	28.2	5.5	NM	
					3	26.5	5.5	NM	
					4	26.0	5.4	NM	
					5	26.1	5.3	NM	NM
DSMW-12	5/31/92	9.89	4.58	Centrifugal pump	5	28.3	5.7	1,275	
					10	31.1	5.7	1,225	
					15	30.0	5.7	1,250	
					20	28.6	5.7	1,200	
					25	28.5	5.7	1,200	1.62

See notes at end of table.

Table A-2 (Continued)
Summary of Monitoring Well Purging Data

OU1, Naval Air Station
Jacksonville, Florida

Well Number	Date	Top of Casing Depth to Water (feet)	Gallons per Well Volume	Purging Method	Gallons Purged	Temperature °C	pH	Specific Conductivity	Turbidity (N.T.U.)
DSMW-14	6/3/92	8.91	5.6	Centrifugal pump	6	32.1	6.5	1,800	
					12	39.7	6.2	1,750	
					18	40.9	6.1	1,600	
					24	41.8	6.1	1,550	
					30	40.8	6.0	1,500	2.81
DSMW-15	5/31/92	9.35	5.78	Centrifugal pump	6	26.0	5.6	1,100	
					12	26.2	5.4	1,100	
					18	27.2	5.4	1,100	
					24	27.1	5.4	1,100	
					30	27.1	5.3	1,100	1.62
SSMW-16	5/31/92	9.08	0.87	Bailer	1	24.8	6.3	330	
					2	23.0	5.9	330	
					3	22.3	5.8	330	
					4	22.6	6.0	330	
					5	22.7	5.9	320	>200
SSMW-17	5/30/92	7.99	1.2	Centrifugal pump	1.5	26.8	6.79	800	
					3	28.0	6.75	800	
					4.5	24.7	6.72	800	
					6	24.0	6.75	700	
					7.5	23.9	6.68	700	108.0
DSMW-18	5/30/92	8.59	4.31	Centrifugal pump	5	21.5	8.13	700	
					10	28.3	7.53	800	
					15	30.7	7.58	700	
					20	30.7	7.50	700	
					25	30.2	7.46	700	6.68
DSMW-19	5/31/92	4.01	3.28	Centrifugal pump	4	24.5	7.2	900	
					8	25.3	7.2	900	
					12	24.1	7.2	900	
					16	22.9	7.0	900	
					20	23.5	6.9	900	1.68
SSMW-20	5/31/92	6.14	1.46	Centrifugal pump	2	30.1	5.8	410	
					4	25.0	5.3	380	
					6	25.0	5.3	380	
					8	25.4	6.5	380	
					10	25.8	6.3	370	120.0
SSMW-21	6/1/92	9.59	1.27	Centrifugal pump	2	33.8	7.9	72	
					4	23.5	5.4	68	
					6	26.0	5.5	70	
					8	24.3	5.2	70	>200

See notes at end of table.

Table A-2 (Continued)
Summary of Monitoring Well Purging Data

OU1, Naval Air Station
Jacksonville, Florida

Well Number	Date	Top of Casing Depth to Water (feet)	Gallons per Well Volume	Purging Method	Gallons Purged	Temper-ature °C	pH	Specific Conduc-tivity	Turbidity (N.T.U.)
DSMW-22	6/1/92	9.98	3.76	Centrifugal pump	4	23.6	6.2	475	
					8	23.4	6.4	470	
					12	23.1	6.5	470	
					16	22.8	6.6	475	
					20	22.7	6.7	475	1.62
SSMW-23	6/1/92	10.41	1.13	Centrifugal pump	2	24.3	4.9	350	
					4	25.6	5.0	320	
					6	25.6	5.0	320	>200
SSMW-24	5/30/92	10.51	0.89	Bailer	1	21	4.58	210	
					2	20.4	4.74	180	
					3	20.7	5.33	180	
					4	21.3	4.98	180	
					4.5	20.8	5.33	170	117.9
DSMW-25	5/30/92	10.58	3.51	Centrifugal pump	4	22	6.14	350	
					8	22.1	6.12	440	
					12	22.7	6.29	440	
					16	23.1	6.50	470	
					20	22.5	6.79	450	1.74
SSMW-26	6/1/92	10.42	1.13	Centrifugal pump	2	28.1	7.2	520	
					4	24.7	6.3	500	
					6	23.8	6.3	600	129.6
SSMW-27	6/2/92	10.12	1.26	Centrifugal pump	2	30.2	6.8	600	
					4	26.0	6.8	600	
					6	25.7	6.7	600	
					8	32.0	6.7	600	>200
DSMW-28	6/2/92	9.75	3.8	Centrifugal pump	4	32	6.5	1,600	
					8	30.1	6.6	1,294	
					12	30.0	6.2	1,200	
					16	30.7	6.2	1,100	
					20	30.2	6.1	1,150	1.63
SSMW-30	6/2/92	13.54	1.03	Bailer	1	24	6.8	1,625	
					2	23.2	6.8	1,500	
					3	23.5	7.4	1,500	
					4	23.2	6.9	800	
					5	23.1	6.7	1,600	>200

See notes at end of table.

Table A-2 (Continued)
Summary of Monitoring Well Purging Data

OU1, Naval Air Station
Jacksonville, Florida

Well Number	Date	Top of Casing Depth to Water (feet)	Gallons per Well Volume	Purging Method	Gallons Purged	Temperature °C	pH	Specific Conductivity	Turbidity (N.T.U.)
DSMW-31	6/2/92	14.93	3.93	Centrifugal pump	4	43.1	7.2	220	
				Bailer	Bailed dry	43.4	6.9	240	
					Bailed dry	44.9	7.2	2,300	
					Bailed dry	38	7.5	2,200	
					6	37.9	7.5	2,100	>200
SSMW-32	6/3/92	12.62	1.2	Bailer	2	22.7	6.4	1,600	
					4	22.6	6.9	1,550	
					6	21.8	6.7	1,525	>200
SSMW-33	6/3/92	13.12	0.92	Bailer	1	21.8	6.0	190	
					2	21.9	5.7	190	
					3	21.6	6.1	180	
					4	21.8	6.1	190	
					5	21.5	6.1	190	>200
DSMW-34	6/3/92	13.47	6.08	Centrifugal pump	6	27.0	5.9	90	
					12	27.4	6.0	90	
					18	26.3	6.2	90	
					24	27.8	5.8	85	
					30	27.9	5.8	85	NM

Notes: °C = degrees Celsius.
pH = standard pH units.
Specific conductivity units are in uhmos (micromhos/centimeters).
N.T.U. = nephelometric turbidity units.
HMW denotes a well screened in the Intermediate Zone of the Hawthorn Formation.
DSMW denotes a well screened in the deep zone of the shallow surficial aquifer.
SSMW denotes a well screened across the water table in the shallow surficial aquifer.
NM = not measured.

Table A-3
Piezometer and Groundwater Monitoring Well Construction Summary

OU1, Naval Air Station
Jacksonville, Florida

Groundwater Monitoring Well Identification	Total Depth (feet, bls)	Screened Interval (feet, bls)	Length of .010 Slot Screen (feet)	Length of 2" PVC Solid Casing (feet)	Length of 6" PVC Double Casing (feet)	Top of Filterpack (feet, bls)	Top of Fine Sand (feet, bls)	Top of Bentonite Seal (feet, bls)
Shallow Surficial Piezometers								
PZ-1	13.5	3-13	10	6	--	2	--	1
PZ-2	13.5	3-13	10	6	--	2	--	1
PZ-3	15.5	5-15	10	8	--	3	--	2
PZ-4	13.5	3-13	10	6	--	2	--	1
PZ-5	14.5	4-14	10	7	--	2	--	1
PZ-6	14.5	4-14	10	7	--	3	--	2
PZ-7	12.5	2-12	10	5	--	1	--	0.5
PZ-8	15	4.5-14.5	10	7.5	--	2	--	1
Shallow Surficial Wells								
MW-1	13.5	3-13	10	6	--	2	--	1
MW-3	13	2.5-12.5	10	5.5	--	2	--	1.5
MW-5	13.5	3-13	10	6	--	2	--	1
MW-7	13	2.5-12.5	10	5.5	--	2	--	1
MW-9	13.5	3-13	10	6	--	2.5	--	1.5
MW-10	13.5	3-13	10	6	--	2	--	1
MW-11	13.5	3-13	10	6	--	2.5	--	1.5
MW-13	14	3.5-13.5	10	6.5	--	3	--	1.5
MW-16	13.5	3-13	10	6	--	2	--	1
MW-17	14.5	4-14	10	7	--	3	--	1.5
MW-20	13.5	3-13	10	6	--	2	--	1
MW-21	14.5	4-14	10	7	--	2	--	1.5
MW-23	14.5	4-14	10	7	--	3	--	2
MW-24	14.5	4-14	10	7	--	3	--	2
MW-26	14.5	4-14	10	7	--	2	--	1.5
MW-27	14.5	4-14	10	7	--	3	--	2
MW-29	17.5	7-17	10	10	--	5	--	2.5
MW-30	17.5	7-17	10	10	--	5	--	3
MW-32	17.5	7-17	10	10	--	5	--	3
MW-33	16.5	6-16	10	9	--	4	--	2
Base Surficial Wells								
MW-2	38.5	33-38	5	36	18	31	30	28
MW-4	30.5	25-30	5	28	21.5	23	22	20
MW-6	27.5	22-27	5	25	18.5	20	18	15
MW-8	30.5	25-30	5	28	16.5	23	22	20
MW-12	35.5	30-35	5	33	16.5	28	27	25
MW-14	40.5	35-40	5	38	16.5	33	32	30
MW-15	45.5	40-45	5	43	16	38	37	35
MW-18	34.5	24-34	10	27	20.5	22	21	19
MW-19	24.5	19-24	5	19	16	17	16	14
MW-22	30.5	25-30	5	28	18	23	22	20
MW-25	33.5	28-33	5	31	24	26	25	23
MW-28	30.5	25-30	5	28	18	23	21	19
MW-31	36.5	31-36	5	34	18	29	28	26
MW-34	48.5	43-48	5	47	18	41	40	38
Hawthorne Sand and Phosphate Wells								
HMW-1	130.5	120-130	10	123	28.5	118	117	115
HMW-2	125.5	115-125	10	118	28	113	112	109
HMW-3	125.5	115-125	10	118	34	113	112	110
HMW-4	130.5	120-130	10	123	33.5	118	117	115
HMW-5	125.5	115-125	10	118	32	113	112	110

Notes: bls = below land surface.
-- = material not present in monitoring well construction.

APPENDIX C
Surface Water and Sediment Sample Analytical Results

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	1,1,2,2-Tetra-chloroethane	1,2-Dichloro-ethene	4-Methyl-2-pentanone	Acetone	Benzene	Chlorobenzene	Ethylbenzene	Tetrachloro-ethene	Toluene
Florida Class II(a)/ Florida MCL(b)	*10.8/ --- ug/L*	*---/ ---*	*---/ ---*	*---/ ---*	*71.28/ 1 ug/L*	*---/ ---*	*---/ ---*	*---/ 3 ug/L*	*---/ ---*
Federal CWA(c)/ Federal MCL(d)	*0.17/ --- ug/L*	*---/ 70 ug/L*	*---/ ---*	*---/ ---*	*0.66/ 5 ug/L*	*50/ 100 ug/L*	*1400/ 700 ug/L*	*0.8/ 5 ug/L*	*14300/ 1000 ug/L*
SW003	–	19	–	–	–	–	–	17	–
SW005	–	4 J	–	–	–	–	–	–	–
SW011	–	28	10	–	–	2 J	–	–	2 J
SW013	–	9	–	–	–	–	–	–	–
SW014	–	12	–	–	4 J	1 J	2 J	–	–
SW015	–	1 J	–	7 J	–	–	–	–	–
SW017	1 J	13	–	4 J	–	–	–	–	–
SW018	–	–	–	3 J	–	–	–	–	–
SW019	2 J	8	–	4 J	–	–	–	–	–
SW020	–	2 J	–	18 J	–	–	–	–	–
SW021	–	4 J	–	4 J	–	–	–	–	–
SW022	–	–	–	4 J	–	–	–	–	–
SW023	–	2 J	–	6 J	–	–	–	–	–
SW025	–	–	–	7 J	–	–	–	–	–
SW026	–	–	–	5 J	–	–	–	–	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.302 Florida Administrative Code (FAC), "Surface Water Quality Standards," February 1992.
(b) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(c) U.S. Environmental Protection Agency, "Water Quality Criteria Summary," Office of Science and Technology, Health and Ecological Criteria Division, Washington, D.C., May 1991.
(d) U.S. Environmental Protection Agency, SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Trichloro-ethene	Vinyl chloride
Florida Class II(a)/ Florida MCL(b)	*80.7/ 3 ug/L*	*---/ 1 ug/L*
Federal CWA(c)/ Federal MCL(d)	*2.7/ 5 ug/L*	*2/ 2 ug/L*
SW003	14	–
SW005	–	–
SW011	1 J	5 J
SW013	–	–
SW014	3 J	7 J
SW015	–	–
SW017	37	–
SW018	–	–
SW019	22	–
SW020	5	–
SW021	1 J	–
SW022	–	–
SW023	–	–
SW024	–	–
SW025	–	–
SW026	–	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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(d) U.S. Environmental Protection Agency, SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Di-n-butyl-phthalate	bis(2-Ethyl-hexyl) phthalate
Florida Class II(a)/	---/	---/
Florida MCL(b)	---	---
Federal CWA(c)/	---/	*360/*
Federal MCL(d)	---	*6 ug/L*
SW002	–	4 J
SW003	–	5 J
SW009	–	3 J
SW011	–	3 J
SW012	16	13
SW013	–	8 J
SW020	–	3 J
SW030	–	3 J

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.302 Florida Administrative Code (FAC), "Surface Water Quality Standards," February 1992.
(b) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(c) U.S. Environmental Protection Agency, "Water Quality Criteria Summary," Office of Science and Technology, Health and Ecological Criteria Division, Washington, D.C., May 1991.
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APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	4,4'-DDE	Aroclor-1248
Florida Class II(a)/	---/	*0.000045/*
Florida MCL(b)	---	*--- ug/L*
Federal CWA(c)/	---/	*0.000079/*
Federal MCL(d)	---	*0.5 ug/L*
SW005	0.015 J	-
SW011	-	2
SW013	-	8.4
SW015	-	0.98

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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(b) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(c) U.S. Environmental Protection Agency, "Water Quality Criteria Summary," Office of Science and Technology, Health and Ecological Criteria Division, Washington, D.C., May 1991.
(d) U.S. Environmental Protection Agency, SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Aluminum	Antimony	Arsenic	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper
Florida Class II(a)/ Florida MCL(b)	1500/ --- ug/L	4300/ 5 ug/L	50/ 50 ug/L	---/ 1000 ug/L	9.3/ 10 ug/L	---/ ---	---/ 50 ug/L	---/ ---	2.9/ 1300 ug/L
Federal CWA(c)/ Federal MCL(d)	---/ ---	30/ 5 ug/L	0.0022/ 50 ug/L	1000/ 2000 ug/L	1.1/ 5 ug/L	---/ ---	---/ 100 ug/L	---/ ---	12/ 1300 ug/L
SW001	86.9 J	–	0.9 J	69.5 J	0.56 J	36300	–	–	4.7 J
SW002	1100	–	6.4 J	167 J	3.4	71000	5.9 J	–	–
SW003	440	–	3.1 J	142 J	–	76100	2.7 J	–	–
SW004	81.6 J	–	12.8	17.9 J	–	41100	–	–	–
SW005	257	–	1.7 J	264	–	152000	2.2 J	–	–
SW006	83.7 J	–	0.76 J	105 J	–	88200	2.9 J	–	–
SW007	126 J	–	–	104 J	–	75500	–	–	–
SW008	211	–	23.9	36.5 J	1	65600	–	–	–
SW009	394	–	8.3 J	94.1 J	–	138000	2.9 J	–	–
SW011	268	–	0.9 J	305	0.31 J	143000	–	–	–
SW012	298	–	14.2	212	–	99100	2.4 J	–	–
SW013	33.1 J	–	1.3 J	311	–	130000	–	–	–
SW014	198 J	–	9.8 J	84 J	0.4 J	17700	–	–	1.5 J
SW015	54.2 J	12.8 J	0.7 J	302	0.12 J	115000	–	–	–
SW016	–	–	–	120 J	0.44 J	80000	–	–	1.7 J
SW017	254	12 J	1.3 J	124 J	–	36600	–	–	–
SW018	74.6 J	–	0.9 J	114 J	–	56300	–	–	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Cyanide	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver
Florida Class II(a)/ Florida MCL(b)	*1/ 200 ug/L*	*300/ --- ug/L*	*5.6/ 50 ug/L*	*---/ ---*	*100/ --- ug/L*	*8.3/ 100 ug/L*	*---/ ---*	*71/ 10 ug/L*	*0.05/ 50 ug/L*
Federal CWA(c)/ Federal MCL(d)	*5.2/ 200 ug/L*	*300/ --- ug/L*	*3.2/ 50 ug/L*	*---/ ---*	*50/ --- ug/L*	*13.4 100 ug/L*	*---/ ---*	*5/ 50 ug/L*	*0.12/ --- ug/L*
SW001	–	928	2.6 J	11900	34.7 J	–	8290	–	–
SW002	–	4310	31.4 J	25600	281	10.2 J	15400	–	–
SW003	–	2610	4 J	25700	258	–	13800	–	–
SW004	–	156 J	1.9 J	8120	131	–	12600	–	–
SW005	3.1 J	1710	22.8 J	38800	218	10 J	19100	–	–
SW006	16.7	1310	1.6 J	21000	129	6.4 J	11500	–	–
SW007	–	495	0.93 J	20600	53	5.3 J	11500	1.4 J	–
SW008	–	166 J	4.7	13400	16.6	–	17300	–	–
SW009	–	5280 J	10.9	37700	174	16.4 J	26500	–	–
SW011	–	1370	2.3 J	39600	170 J	–	20500	–	–
SW012	2.8 J	1490	9.4 J	42200	133	9 J	33000	–	–
SW013	–	502	1 J	40300	210 J	11.3 J	21500	–	0.22 J
SW014	–	16700	4.4	8560	23.9 J	–	1680 J	–	0.33 J
SW015	–	232	0.9 J	40700	86.3 J	–	22500	–	0.26 J
SW016	–	1290	–	36700	140 J	–	25900	–	–
SW017	–	5240	1.2 J	17700	86.6 J	8.1 J	4770 J	–	–
SW018	–	1300	1 J	24600	138 J	–	15400	–	0.25 J

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Sodium	Thallium	Vanadium	Zinc
Florida Class II(a)/ Florida MCL(b)	---/ 160,000 ug/L	48/ 1 ug/L	---/ ---	86/ --- ug/L
Federal CWA(c)/ Federal MCL(d)	---/ ---	---/ 1 ug/L	---/ ---	110/ --- ug/L
SW001	27500	–	2.2 J	14.7 J
SW002	37900	–	4 J	109
SW003	31700	–	–	–
SW004	7340 J	–	–	–
SW005	29800	–	–	–
SW006	19400	–	–	82.8
SW007	19800	–	–	–
SW008	10000 J	1.5 J	–	–
SW009	22000 J	–	3.4 J	–
SW011	31100	–	3.3 J	5.3 J
SW012	75500	–	–	–
SW013	32100	–	1.5 J	4.4 J
SW014	26800	–	3.8 J	9.8 J
SW015	32600	–	2.4 J	5.3 J
SW016	71700	–	3.1 J	18.5 J
SW017	28600	–	–	7.4 J
SW018	57900	–	–	4.1 J

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.302 Florida Administrative Code (FAC), "Surface Water Quality Standards," February 1992.
(b) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(c) U.S. Environmental Protection Agency, "Water Quality Criteria Summary," Office of Science and Technology, Health and Ecological Criteria Division, Washington, D.C., May 1991.
(d) U.S. Environmental Protection Agency, SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Aluminum	Antimony	Arsenic	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper
Florida Class II(a)/ Florida MCL(b)	1500/ --- ug/L	4300/ 5 ug/L	50/ 50 ug/L	---/ 1000 ug/L	9.3/ 10 ug/L	---/ ---	---/ 50 ug/L	---/ ---	2.9/ 1300 ug/L
Federal CWA(c)/ Federal MCL(d)	---/ ---	30/ 5 ug/L	0.0022/ 50 ug/L	1000/ 2000 ug/L	1.1/ 5 ug/L	---/ ---	---/ 100 ug/L	---/ ---	12/ 1300 ug/L
SW019	81.1 J	–	0.6 J	150 J	–	28700	–	–	–
SW020	364	–	–	139 J	0.11 J	32000	–	–	–
SW021	28.5 J	–	–	86.6 J	–	52000	–	–	2.1 J
SW022	133 J	–	0.6 J	49.3 J	–	18200	–	–	1.5 J
SW023	21 J	–	–	72.3 J	–	49800	–	–	–
SW024	54.5 J	–	–	63.8 J	–	44900	–	–	–
SW025	696	–	0.9 J	41.3 J	–	4490 J	–	3.3 J	–
SW026	559	–	–	65.1 J	0.31 J	44600	–	–	3.9 J
SW027	283 J	–	–	49.6 J	0.13 J	44400	–	–	4.2 J
SW028	90.1 J	–	–	13 J	–	34600	–	–	1.4 J
SW029	125 J	–	–	12.3 J	–	34400	–	–	1.4 J
SW030	102 J	11.5 J	–	12.1 J	–	34200	–	6.3 J	1.4 J
SW031	107 J	–	–	12.7 J	–	34400	–	5.5 J	1.7 J
SW032	130 J	–	–	12.3 J	–	36400	–	–	–
SW033	87.2 J	–	–	12.3 J	–	34100	–	–	2.4 J

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.302 Florida Administrative Code (FAC), "Surface Water Quality Standards," February 1992.
(b) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(c) U.S. Environmental Protection Agency, "Water Quality Criteria Summary," Office of Science and Technology, Health and Ecological Criteria Division, Washington, D.C., May 1991.
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APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Cyanide	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver
Florida Class II(a)/ Florida MCL(b)	*1/ 200 ug/L*	*300/ --- ug/L*	*5.6/ 50 ug/L*	*---/ ---*	*100/ --- ug/L*	*8.3/ 100 ug/L*	*---/ ---*	*71/ 10 ug/L*	*0.05/ 50 ug/L*
Federal CWA(c)/ Federal MCL(d)	*5.2/ 200 ug/L*	*300/ --- ug/L*	*3.2/ 50 ug/L*	*---/ ---*	*50/ --- ug/L*	*13.4 100 ug/L*	*---/ ---*	*5/ 50 ug/L*	*0.12/ --- ug/L*
SW019	–	1690	1.1 J	15900	71.6 J	–	4150 J	–	0.26 J
SW020	–	1900	1.7 J	16300	118 J	–	6410	–	0.34 J
SW021	–	1290	–	14700	61.2 J	–	4190 J	–	0.32 J
SW022	–	1520	0.8 J	3240 J	20.4 J	–	847 J	–	–
SW023	–	1080	1.3 J	13300	53.5 J	–	3590 J	–	–
SW024	–	965	1.2 J	11900	36.8 J	–	3110 J	–	–
SW025	–	4360	1 J	1560 J	38.5 J	–	1020 J	–	0.2 J
SW026	–	2160	26.6	12300	40.6 J	–	3100 J	–	–
SW027	–	1310	4.2	14100	49.1 J	–	3860 J	–	–
SW028	–	281	–	14100	8.1 J	–	4350 J	–	–
SW029	–	327	1 J	14200	8.8 J	–	4520 J	–	–
SW030	–	283	0.7 J	14000	7.3 J	–	4360 J	–	–
SW031	–	308	1.2 J	13900	9.7 J	–	4430 J	–	–
SW032	–	316	0.9 J	19800	7 J	–	6140	–	–
SW033	–	264	–	14100	7.4 J	–	4440 J	–	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.302 Florida Administrative Code (FAC), "Surface Water Quality Standards," February 1992.
(b) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(c) U.S. Environmental Protection Agency, "Water Quality Criteria Summary," Office of Science and Technology, Health and Ecological Criteria Division, Washington, D.C., May 1991.
(d) U.S. Environmental Protection Agency, SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Sodium	Thallium	Vanadium	Zinc
Florida Class II(a)/ Florida MCL(b)	---/ 160,000 ug/L	48/ 1 ug/L	---/ ---	86/ --- ug/L
Federal CWA(c)/ Federal MCL(d)	---/ ---	---/ 1 ug/L	---/ ---	110/ --- ug/L
SW019	29900	–	–	9.5 J
SW020	35100	–	2.4 J	5.9 J
SW021	28600	–	1.9 J	18.6 J
SW022	10500	–	–	7.1 J
SW023	24200	–	–	12.6 J
SW024	22400	–	–	9.5 J
SW025	9010	–	2.7 J	18 J
SW026	25300	–	2.5 J	32.6
SW027	38700	–	5.5 J	15.5 J
SW028	95800	–	3.7 J	–
SW029	96900	–	4.1 J	–
SW030	96500	–	4.9 J	–
SW031	94500	–	4.5 J	–
SW032	148000	–	3.7 J	–
SW033	96900	–	3.7 J	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.302 Florida Administrative Code (FAC), "Surface Water Quality Standards," February 1992.
(b) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(c) U.S. Environmental Protection Agency, "Water Quality Criteria Summary," Office of Science and Technology, Health and Ecological Criteria Division, Washington, D.C., May 1991.
(d) U.S. Environmental Protection Agency, SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
RADIONUCLIDES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Gross alpha	Gross alpha (alpha and Radium-226)	Gross beta	Radium-226	Radium-228	Total Radium
Florida Surface Water Class II(a)	---	*15 pCi/L*	*50 pCi/L (b)*	---	---	*5 pCi/L*
SW018	11.3	12.1	43.8	0.8	0.9	1.7
SW019	27.9	30.1	37.7	2.2	1.4	3.6
SW020	17.1	18.6	35.3	1.5	0.9	2.4
SW021	0.1	0.6	–	0.5	–	0.5
SW022	–	0.5	–	0.5	0.5	1
SW023	0.1	0.6	–	0.5	–	0.5
SW024	11.4	12	18.6	0.6	–	0.6
SW025	9.4	9.4	15.2	–	–	–
SW026	3.4	4.2	5.5	0.8	–	0.8
SW027	0.1	0.1	4.6	–	–	–
SW028	0.1	0.1	7.3	–	0.4	0.4
SW029	1.2	1.9	6.5	0.7	0.4	1.1
SW030	0.6	0.6	17.3	–	–	–
SW031	0.1	0.7	14.2	0.6	–	0.6
SW032	3.5	4.4	12.5	0.9	–	0.9
SW033	0.5	1.1	11.2	0.6	–	0.6

Notes:
1. All results are reported in picocuries per liter (pCi/L).
2. The shaded values represent positive detections of a particular radionuclide.
3. The dashed line ('–') represents a non-detection of a radionuclide for a particular sample.

(a) Florida Department of Environmental Regulation Chapter 17.302 Florida Administrative Code (FAC), "Surface Water Quality Standards," February 1992.
(b) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SURFACE WATER ANALYTICAL RESULTS
RADIONUCLIDES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Gross alpha	Gross alpha (alpha and Radium−226)	Gross beta	Radium−226	Radium−228	Total Radium
Florida Surface Water Class II(a)	---	*15 pCi/L*	*50 pCi/L (b)*	---	---	*5 pCi/L*
SW001	1.8	2	12.2	0.2	0.4	0.6
SW002	0.1	0.1	25.9	–	–	–
SW003	4.7	5.2	16.4	0.5	–	0.5
SW004	1.5	2.1	14.6	0.6	0.4	1
SW005	4.4	5	30.4	0.6	–	0.6
SW006	0.1	0.9	19.2	0.8	–	0.8
SW007	1.7	2.1	13.8	0.4	–	0.4
SW008	4.6	4.6	16.2	–	–	–
SW009	0.1	0.6	41.4	0.5	0.5	1
SW011	4.2	4.9	29	0.7	–	0.7
SW012	3.2	4.3	26.1	1.1	–	1.1
SW013	0.1	0.7	14.6	0.6	0.5	1.1
SW014	19.9	21	33.6	1.1	0.7	1.8
SW015	14.5	15.5	55.8	1	0.4	1.4
SW016	0.1	0.5	38.3	0.4	–	0.4
SW017	12.4	14.2	23.5	1.8	1.4	3.2

Notes:
1. All results are reported in picocuries per liter (pCi/L).
2. The shaded values represent positive detections of a particular radionuclide.
3. The dashed line ('–') represents a non–detection of a radionuclide for a particular sample.

(a) Florida Department of Environmental Regulation Chapter 17.302 Florida Administrative Code (FAC), "Surface Water Quality Standards," February 1992.
(b) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	1,2-Dichloro-ethene	2-Butanone	Acetone	Benzene	Carbon Disulfide	Chlorobenzene	Methylene chloride	Toluene	Trichloro-ethene
Florida Sediment Qual. Guideline(a)	---	---	---	---	---	---	---	---	---
SD002	-	-	-	-	-	-	-	-	-
SD003	-	22	-	-	-	-	-	-	-
SD004	-	-	-	2 J	-	-	-	2 J	-
SD007	-	-	410	-	-	-	-	12 J	-
SD008	-	-	-	-	-	-	85	4 J	-
SD011	-	-	73	-	-	-	-	2 J	-
SD011	-	-	-	2 J	-	4 J	-	3 J	-
SD012	-	22	-	-	-	-	-	5 J	-
SD014	7	-	63	2 J	-	-	-	4 J	-
SD015	-	-	-	-	-	-	-	5 J	-
SD017	-	-	-	-	-	-	-	2 J	-
SD019	-	-	-	-	-	-	-	12	5 J
SD020	-	-	-	-	-	-	-	6 J	-
SD022	-	-	-	-	-	-	-	1 J	-
SD024	-	16 J	-	-	-	-	-	2 J	-
SD025	-	-	-	-	3 J	-	-	3 J	-
SD026	-	-	-	-	-	-	-	2 J	-
SD031	-	-	-	-	2 J	-	-	-	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.
(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992.
Currently there are no state regulations or guidelines concerning volatile organic compounds found in sediment.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Vinyl chloride	Xylenes (total)
Florida Sediment Qual. Guideline(a)	---	---
SD002	–	2 J
SD003	–	4 J
SD004	–	–
SD007	–	–
SD008	–	6 J
SD011	–	–
SD011	–	–
SD012	–	2 J
SD014	3 J	–
SD015	–	–
SD017	–	–
SD019	–	–
SD020	–	–
SD022	–	–
SD024	–	–
SD025	–	–
SD026	–	–
SD031	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992. Currently there are no state regulations or guidelines concerning volatile organic compounds found in sediment.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Acenaphthene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene	Diethyl-phthalate	Dimethyl-phthalate
Florida Sediment Qual. Guideline(a)	*22 ug/kg*	*160 ug/kg*	*230 ug/kg*	---	---	---	*220 ug/kg*	---	*ID in low concentrations*
SD002	–	–	–	–	–	–	–	–	–
SD006	–	190 J	160 J	180 J	130 J	160 J	170 J	–	–
SD007	–	–	–	–	–	–	–	–	–
SD011	–	–	–	–	–	–	–	100 J	160 J
SD012	–	100 J	82 J	120 J	100 J	100 J	150 J	–	–
SD014	–	240 J	290 J	530 J	170 J	370 J	650 J	–	–
SD016	–	–	–	–	–	–	–	–	–
SD026	–	–	100 J	–	–	–	–	–	–
SD027	110 J	120 J	–	110 J	–	–	160 J	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Fluoranthene	Indeno (1,2,3-cd) pyrene	Phenanthrene	Pyrene	bis(2-Ethyl-hexyl) phthalate
Florida Sediment Qual. Guideline(a)	*380 ug/kg*	---	*140 ug/kg*	*290 ug/kg*	*ID in low concentrations*
SD002	–	–	–	–	270 J
SD006	130 J	120 J	–	130 J	81 J
SD007	–	–	–	–	170 J
SD011	–	–	–	100 J	4100
SD012	140 J	87 J	–	110 J	490
SD014	1700	220 J	1200	1200	–
SD016	–	–	–	–	380 J
SD026	150 J	–	–	210 J	–
SD027	380 J	–	–	340 J	–

Notes:
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2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	4,4'-DDD	4,4'-DDE	4,4'-DDT (total)	Aldrin	Aroclor-1260	Dieldrin	Endosulfan sulfate	alpha-Chlordane	gamma-BHC (Lindane)	gamma-Chlordane
Florida Sediment Qual. Guideline(a)	*ID in low concentrations*	*1.7 ug/kg*	*4.5 ug/kg*	*ID in low concentrations*	*24 ug/kg Total PCBs*	*ID in low concentrations*	---	---	*ID in low concentrations*	*ID in low concentrations*
SD001	–	–	240	–	–	–	–	–	–	–
SD002	7.9 J	7	–	–	180	–	–	–	–	–
SD003	–	–	–	–	62	–	–	–	–	–
SD004	–	3.9	–	–	–	0.91 J	–	2.3 J	–	2.4 J
SD005	130	120	25	–	200	–	–	–	–	–
SD005DL	100 J	110	–	–	190 J	–	–	–	–	–
SD005DL	100	110 J	–	–	190	–	–	–	–	–
SD006	73	50	12	–	1800	–	–	–	–	–
SD006DL	55 J	35	–	–	1400	–	–	–	–	–
SD007	3.7 J	4.4	–	–	330	–	–	–	–	–
SD007DL	–	5 J	–	–	310	–	–	–	–	–
SD008	–	4.8	–	–	–	–	–	–	–	–
SD009	–	1.6 J	–	–	–	–	–	–	–	–
SD011	–	–	–	–	1200	–	–	–	–	–
SD011	–	–	–	–	830	–	–	2.2 J	–	–
SD012	64	58	–	–	610	–	–	–	–	–
SD012DL	49 J	48	–	–	580	–	–	–	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.
(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992.

APPENDIX C
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PESTICIDES AND POLYCHLORINATED BIPHENYLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	4,4'-DDD	4,4'-DDE	4,4'-DDT (total)	Aldrin	Aroclor-1260	Dieldrin	Endosulfan sulfate	alpha-Chlordane	gamma-BHC (Lindane)	gamma-Chlordane
Florida Sediment Qual. Guideline(a)	*ID in low concentrations*	*1.7 ug/kg*	*4.5 ug/kg*	*ID in low concentrations*	*24 ug/kg Total PCBs*	*ID in low concentrations*	---	---	*ID in low concentrations*	*ID in low concentrations*
SD013	-	2.9 J	-	-	-	-	-	-	-	-
SD014	-	-	-	-	130	-	-	2.9 J	-	2.8 J
SD015	-	-	-	6.1	560	-	-	-	-	-
SD017	-	-	-	-	14000	-	-	-	-	-
SD017DL	-	-	-	-	15000	-	-	-	-	-
SD018	-	-	-	-	310	-	-	-	-	-
SD019	-	-	-	-	290	-	-	-	-	-
SD020	-	-	-	-	600	-	-	-	-	-
SD022	-	2.5 J	-	-	-	-	-	-	-	-
SD025	-	5.1	-	-	-	-	6 J	-	-	-
SD026	-	-	-	-	2200	-	-	46 J	-	61 J
SD027	-	-	-	-	310	-	-	4 J	-	3.3 J
SD028	-	-	-	-	58	-	-	-	-	-
SD029	-	-	-	-	-	-	-	-	2 J	-
SD030	-	2.5 J	-	-	-	-	-	-	-	-
SD031	-	-	-	-	200	-	-	-	-	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.
(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Florida Sediment Qual. Guidelines(a)	---	---	*8 mg/kg*	---	---	*1 mg/kg*	---	*33 mg/kg*	---
SD001	2640 J	8.2 J	5.2	47.5 J	–	9.4	3710	17.1	4.1 J
SD002	3250	–	1.9 J	49.1 J	0.16 J	4	1620	50.3	1.5 J
SD003	2320	–	0.58 J	14.1 J	0.07 J	–	1240 J	4.8	–
SD004	2260 J	–	0.55 J	11.5 J	0.09 J	–	3740 J	4.2	–
SD005	2640 J	–	0.82 J	13 J	0.13 J	–	4310 J	4.9 J	1.2 J
SD006	468 J	–	1.5 J	8.3 J	–	1.2 J	276 J	15 J	–
SD007	6400 J	–	1.1 J	13.6 J	0.06 J	–	798 J	9.3 J	–
SD008	849 J	–	1 J	3.6 J	–	–	579 J	2.9	–
SD009	926 J	–	0.47 J	1.8 J	–	–	285 J	4.9	–
SD011	9560 J	–	0.74 J	19.7 J	–	–	939 J	13	–
SD011	6960	–	0.27 J	13.6 J	0.22 J	–	951 J	9.3	1.2 J
SD012	1510	–	3.5	58.2	0.06 J	3.7 J	4940	17.1	–
SD013	4800 J	–	0.82 J	22.6 J	–	0.35 J	1990	6.7	1.4 J
SD014	1630 J	–	2.1 J	11.4 J	–	2.2	11200	3.1	–
SD015	757 J	1560	0.3 J	5.9 J	–	–	504 J	4.1	–
SD016	5600 J	–	0.53 J	20.7 J	–	–	466 J	6.9	–
SD017	5450 J	–	0.12 J	23.7 J	–	–	140 J	7.4	0.88 J

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular analyte.
3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.
(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
Florida Sediment Qual. Guidelines(a)	*28 mg/kg*	---	*21 mg/kg*	---	---	*0.1 mg/kg*	*trace ID*	---	---
SD001	104	50300	18.5	355 J	189	0.48	75.4	–	0.2 J
SD002	1210	5580	5.7	428 J	35.5	0.32	57.3	301 J	–
SD003	1.5 J	799	4	131 J	5.8	–	–	–	–
SD004	3.3 J	1460	5.9	154 J	5.9	–	3.1 J	–	0.63 J
SD005	–	17100 J	6.7 J	134 J	7.5 J	–	1.3 J	–	–
SD006	11.8 J	1330 J	3.9 J	42.4 J	4.3 J	–	1.4 J	–	–
SD007	6.3 J	6800 J	7.3 J	206 J	10 J	–	4.8 J	–	–
SD008	5 J	412	18.3	42.8 J	8	–	–	–	0.43 J
SD009	–	3160	2.6	46.1 J	0.9 J	0.46	–	–	–
SD011	2.2 J	5520	5.8	354 J	13.8	–	2.1 J	313 J	0.18 J
SD011	2.4 J	2040	4.9 J	232 J	5.6	–	3 J	235 J	–
SD012	40.3	3510	4.2	348 J	31.4	–	6.6 J	–	–
SD013	3.5 J	4840	7.5	340 J	14.4	–	2.3 J	390 J	–
SD014	4.4 J	7920	12.1	162 J	4.1	–	4.7 J	–	–
SD015	6.2 J	477	12.1	85.4 J	3.9 J	–	–	–	–
SD016	1.5 J	1870	4.1	290 J	7.8	–	–	324 J	–
SD017	–	1490	3.2	230 J	4.6	–	1.8 J	196 J	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular analyte.
3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.
(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Silver	Sodium	Thallium	Vanadium	Zinc
Florida Sediment Qual. Guidelines(a)	*0.5 mg/kg*	---	---	---	*68 mg/kg*
SD001	4	158 J	–	6.2 J	361
SD002	4.7	–	0.52 J	7.1 J	164
SD003	–	–	–	–	5.8
SD004	0.5 J	–	–	4.8 J	14.3
SD005	–	–	–	12.2 J	26.1 J
SD006	–	–	–	1.6 J	37.7 J
SD007	–	–	–	15.3 J	22.8 J
SD008	–	–	–	2.4 J	15.2
SD009	0.57	159 J	–	2.5 J	2.6 J
SD011	–	106 J	–	14.3	5.1
SD011	–	128 J	–	9.9 J	2.6 J
SD012	–	–	0.4 J	4 J	147
SD013	–	118 J	–	15.9	9.9
SD014	–	128 J	–	4.7 J	11.9
SD015	0.32 J	100 J	–	1.4 J	11.6
SD016	–	144 J	–	7.1 J	3.6 J
SD017	–	123 J	0.27 J	6.4 J	2.9 J

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular analyte.
3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Florida Sediment Qual. Guidelines(a)	---	---	*8 mg/kg*	---	---	*1 mg/kg*	---	*33 mg/kg*	---
SD018	1000 J	–	0.18 J	3.6 J	–	–	207 J	2 J	–
SD019	618 J	–	0.2 J	3.7 J	–	–	138 J	2.2 J	–
SD020	2930 J	–	0.63 J	13 J	–	0.53 J	453 J	5	–
SD021	5850 J	2.8 J	0.88 J	15.9 J	–	–	1670	8.7	–
SD022	1880 J	–	0.16 J	9.6 J	–	–	1140 J	2.9	3 J
SD023	1370 J	–	0.34 J	14.2 J	–	0.37 J	1490	3.2	–
SD024	1260 J	–	0.35 J	12.9 J	–	0.41 J	1890	2.2 J	–
SD025	1260 J	–	0.72 J	7.5 J	–	–	188 J	1.8 J	–
SD026	1020 J	–	0.76 J	6.1 J	–	0.73 J	748 J	5.6	–
SD027	1770 J	–	0.97 J	10.8 J	–	0.41 J	2010	7.5	1.2 J
SD028	593 J	–	0.42 J	3 J	3.1	–	519 J	3.3	–
SD029	514 J	–	0.34 J	0.76 J	–	–	312 J	2.4 J	–
SD030	364 J	–	0.36 J	0.75 J	–	–	403 J	3	–
SD031	665 J	–	0.51 J	2.8 J	–	–	481 J	4.7	–
SD032	450 J	–	0.35 J	0.77 J	–	–	279 J	2.1 J	–
SD033	352 J	–	0.23 J	0.75 J	–	–	238 J	2.5 J	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular analyte.
3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
Florida Sediment Qual. Guidelines(a)	*28 mg/kg*	---	*21 mg/kg*	---	---	*0.1 mg/kg*	*trace ID*	---	---
SD018	–	574	4.2	57.2 J	4.4	–	–	–	–
SD019	–	470	1.6	40.3 J	3.3 J	–	–	–	–
SD020	1.9 J	5570	6.3	200 J	3.6 J	–	–	–	–
SD021	–	9530	6.2	557 J	11.1	–	–	–	0.52 J
SD022	–	819	3.6	107 J	1.6 J	–	–	–	–
SD023	3.8 J	2710	6.9	188 J	11.4	–	–	–	–
SD024	2.5 J	783	5.5	495 J	11	–	–	–	0.24 J
SD025	–	1210	3.5	79.8 J	2.2 J	–	3.4 J	–	–
SD026	5.9 J	1860	6.4	204 J	5.5	–	–	–	–
SD027	7.1 J	3680	18.6	603 J	17.9	–	–	205 J	0.21 J
SD028	2.4 J	1100	5.7	176 J	6.2	–	–	116 J	–
SD029	3.4 J	499	3.5	138 J	5.6	–	–	100 J	–
SD030	1.7 J	403	2.9	118 J	4 J	–	–	117 J	–
SD031	3 J	985	5.5	186 J	7.7	–	–	125 J	–
SD032	1.8 J	528	2.9	146 J	4 J	–	–	95.1 J	–
SD033	1.5 J	360	2.7	84.8 J	3.7 J	–	–	85.1 J	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular analyte.
3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Silver	Sodium	Thallium	Vanadium	Zinc
Florida Sediment Qual. Guidelines(a)	*0.5 mg/kg*	---	---	---	*68 mg/kg*
SD018	–	118 J	–	1.7 J	8.1
SD019	–	84.7 J	–	2 J	2.2 J
SD020	–	113 J	–	6.7 J	8.3
SD021	–	129 J	–	18	4.6 J
SD022	–	106 J	–	6.2 J	3.1 J
SD023	–	135 J	–	1.9 J	13.7
SD024	–	369 J	–	2 J	8.5
SD025	–	119 J	–	10.7 J	4.9 J
SD026	–	328 J	0.28 J	3.2 J	42.7
SD027	–	536 J	–	4.9 J	38.6
SD028	–	166 J	–	2.8 J	8.7
SD029	–	250 J	–	2.4 J	4.1 J
SD030	–	234 J	–	1.9 J	4.5 J
SD031	–	247 J	–	3 J	12
SD032	–	266 J	–	–	4.9 J
SD033	–	212 J	–	2 J	3.3 J

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular analyte.
3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
RADIONUCLIDES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Gross alpha	Gross alpha (alpha and Radium-226)	Gross beta	Radium-226	Radium-228	Total Radium
Florida Sediment Qual. Guidelines(a)	---	---	---	---	---	---
SD018	0.9	1.6	0.5	0.7	–	0.7
SD019	2.6	3.3	1.2	0.7	–	0.7
SD020	1.6	2.7	1	1.1	–	1.1
SD021	3.3	4.6	1.7	1.3	–	1.3
SD022	1.5	2	0.8	0.5	–	0.5
SD023	2.3	2.9	1.4	0.6	–	0.6
SD024	2.5	3.1	1	0.6	–	0.6
SD025	1.9	2.5	0.9	0.6	0.4	1
SD026	1.5	2	1	0.5	0.4	0.9
SD027	2.3	3.1	3	0.8	–	0.8
SD028	1.9	2.5	1.3	0.6	–	0.6
SD029	1.5	2.1	0.8	0.6	–	0.6
SD030	0.8	1.2	1.3	0.4	–	0.4
SD031	1.9	2.3	1	0.4	–	0.4
SD032	1.1	1.5	0.7	0.4	0.6	1
SD033	1.5	1.9	0.5	0.4	0.4	0.8

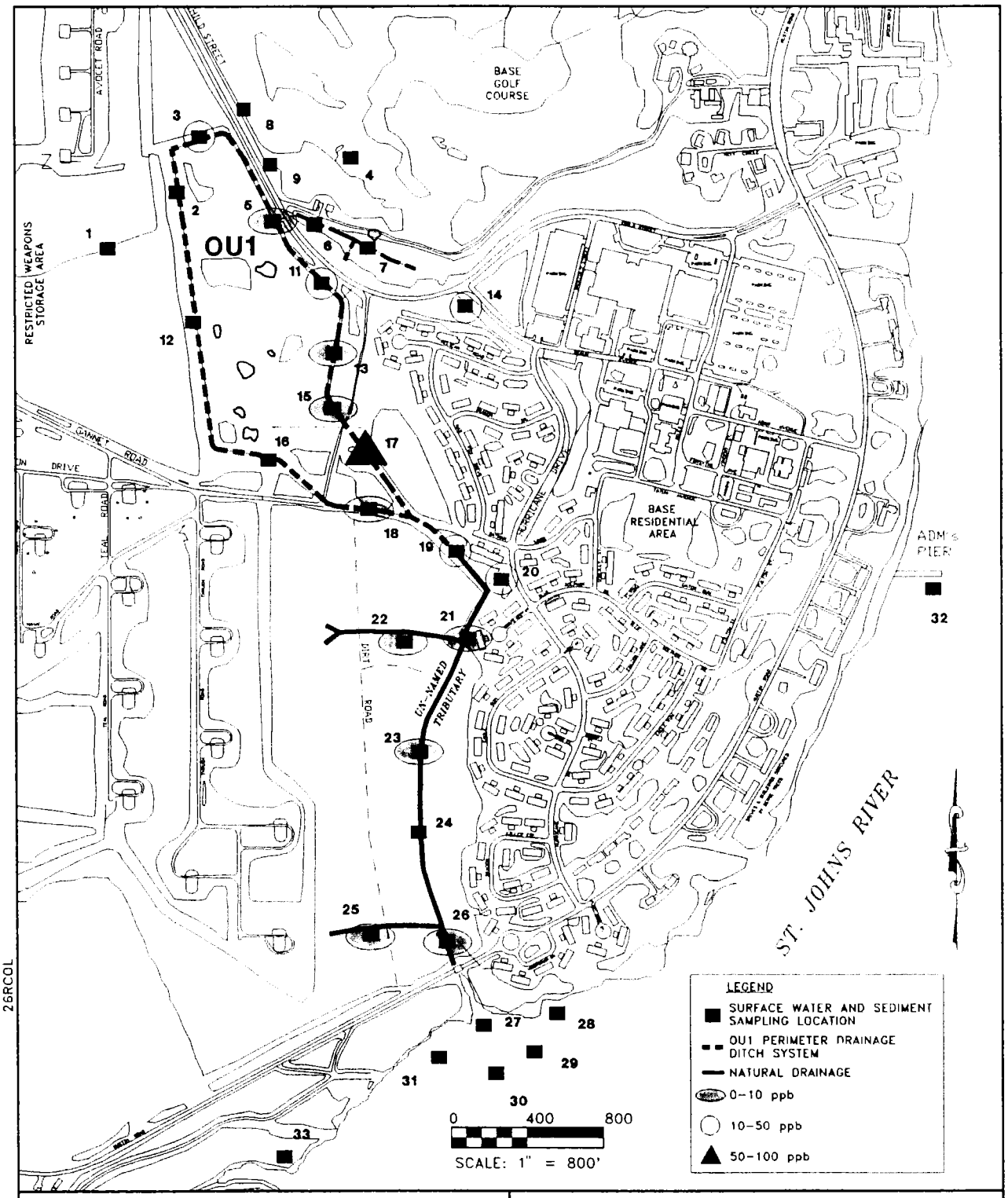
Notes:
1. All results are reported in picocuries per gram (pCi/g).
2. The shaded values represent positive detections of the particular radionuclide.
3. The dashed line ('–') represents a non-detection of a radionuclide in a particular sample.

(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992. Currently there are no state regulations or guidelines concerning radionuclides found in sediment.

APPENDIX C
SUMMARY OF POSITIVE DETECTIONS IN SEDIMENT ANALYTICAL RESULTS
RADIONUCLIDES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
FEBRUARY 1992

Sample ID No.	Gross alpha	Gross alpha (alpha and Radium-226)	Gross beta	Radium-226	Radium-228	Total Radium
Florida Sediment Qual. Guidelines(a)	---	---	---	---	---	---
SD001	0.6	1.3	1.1	0.7	–	0.7
SD002	2.2	3.3	1.9	1.1	–	1.1
SD003	1.7	2.2	0.5	0.5	–	0.5
SD004	1.9	2.4	1.1	0.5	0.8	1.3
SD005	1.7	2.2	1.6	0.5	0.4	0.9
SD006	1	1.6	0.4	0.6	–	0.6
SD007	2	3.5	2	1.5	–	1.5
SD008	1	1.4	1.3	0.4	–	0.4
SD009	1.1	1.5	1.3	0.4	–	0.4
SD011	2.5	3.3	1.8	0.8	–	0.8
SD011	5	6.2	3.8	1.2	–	1.2
SD012	0.4	1	0.4	0.6	–	0.6
SD013	2.3	3.7	2.1	1.4	–	1.4
SD014	0.4	0.9	0.4	0.5	–	0.5
SD015	0.4	0.8	0.4	0.4	–	0.4
SD016	1.2	2	1.4	0.8	0.4	1.2
SD017	3.5	6.3	1.9	2.8	–	2.8

Notes:
1. All results are reported in picocuries per gram (pCi/g).
2. The shaded values represent positive detections of the particular radionuclide.
3. The dashed line ('–') represents a non-detection of a radionuclide in a particular sample.
(a) Florida Department of Environmental Regulation, "Development of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters," May 1992. Currently there are no state regulations or guidelines concerning radionuclides found in sediment.



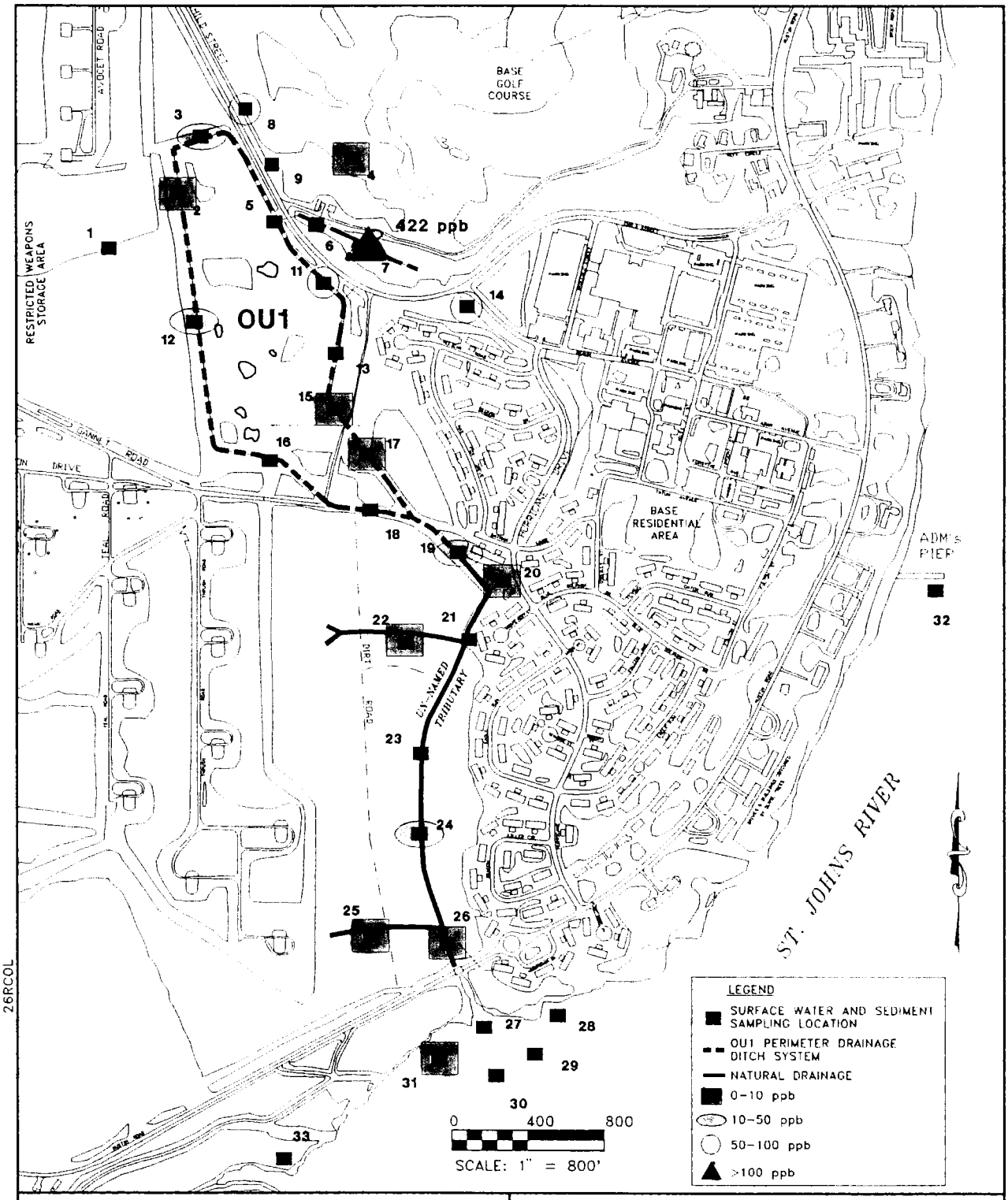
26RCOL

FIGURE C-1

TOTAL VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA



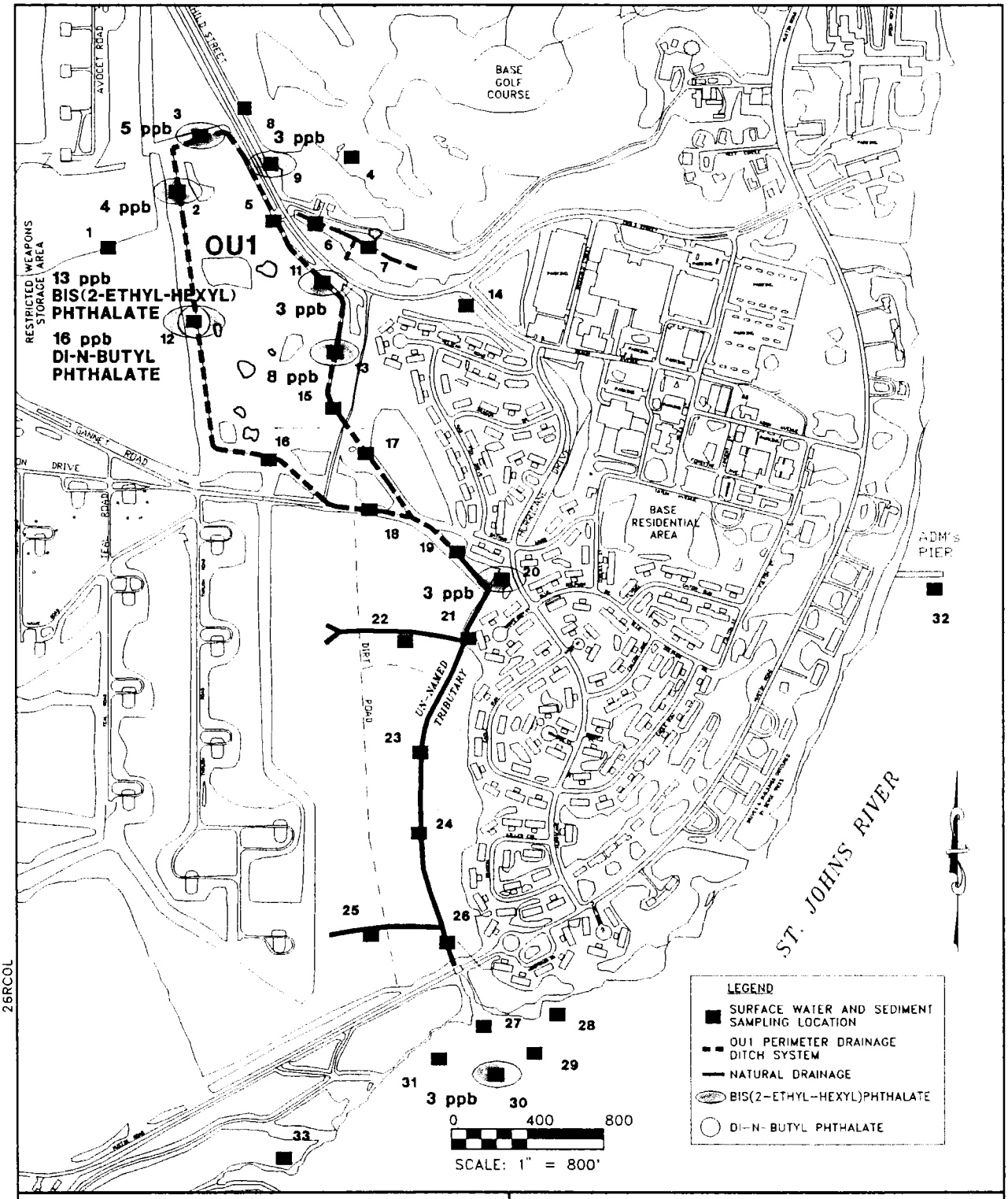
26RCOL

FIGURE C-2

TOTAL VOLATILE ORGANIC COMPOUNDS DETECTED IN SEDIMENT SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE JACKSONVILLE, FLORIDA



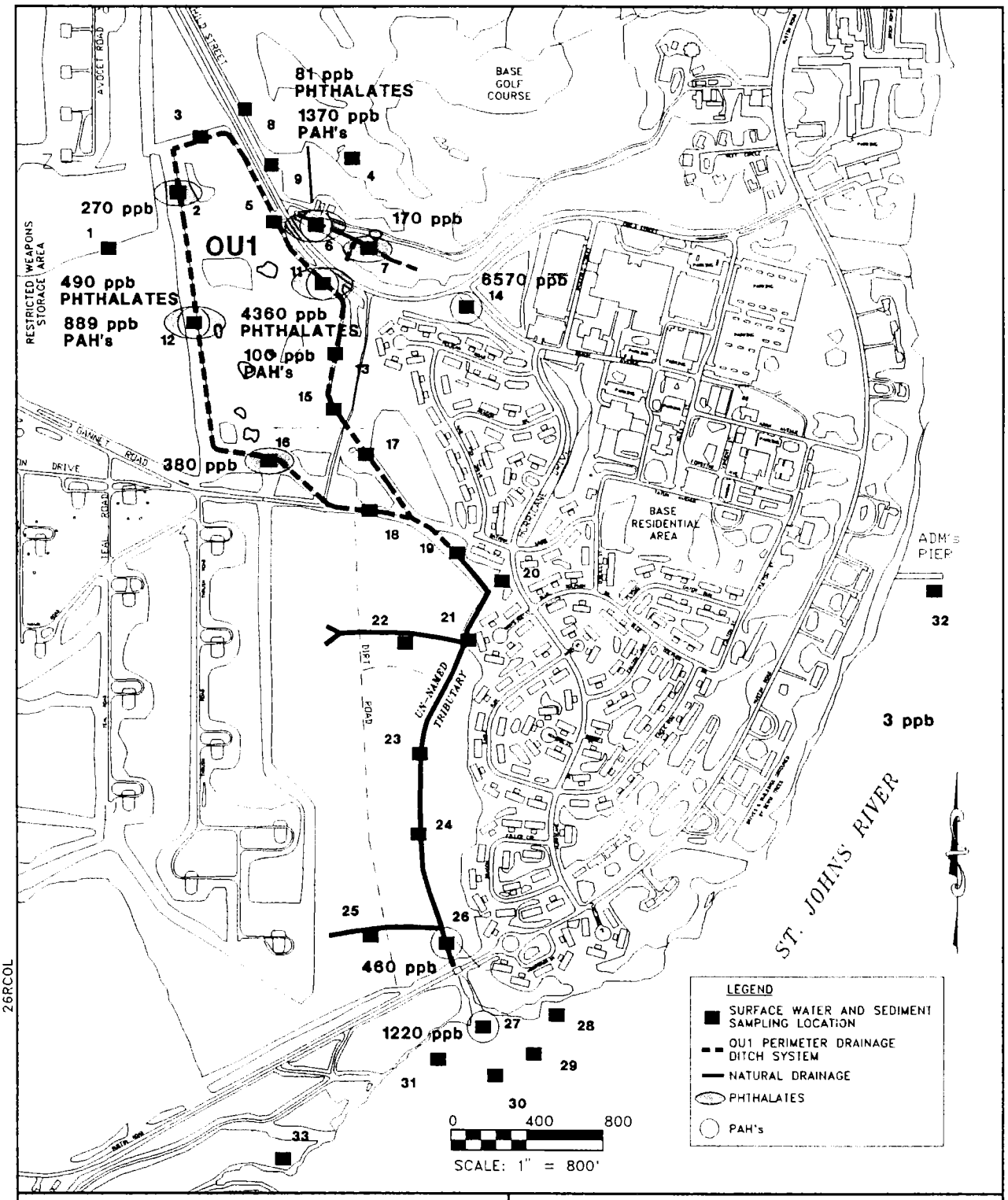
26RCOL

FIGURE C-3

TOTAL PHTHALATES DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA



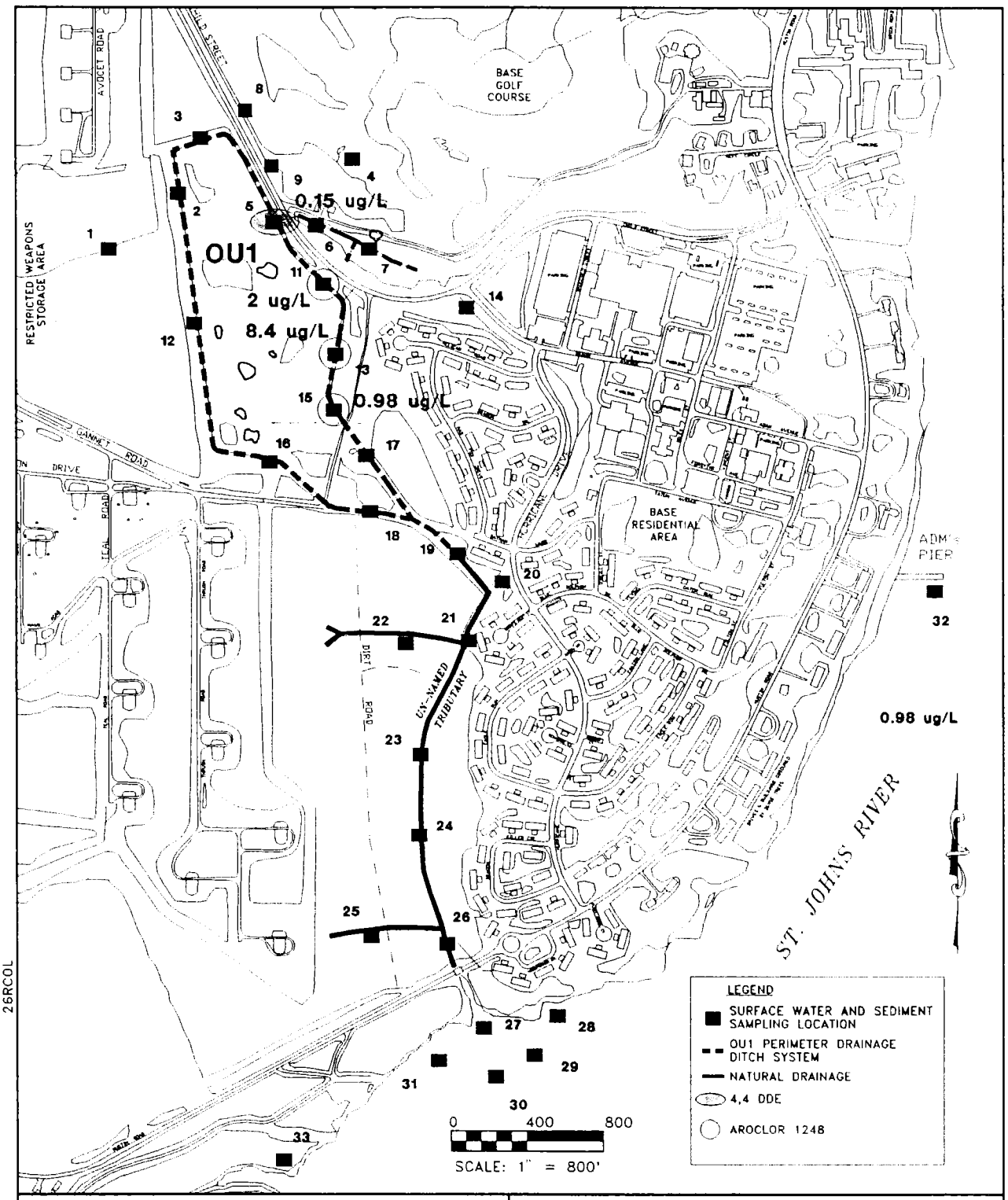
26RCOL

FIGURE C-4

TOTAL PHTHALATES AND PAH's DETECTED IN SEDIMENT SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA



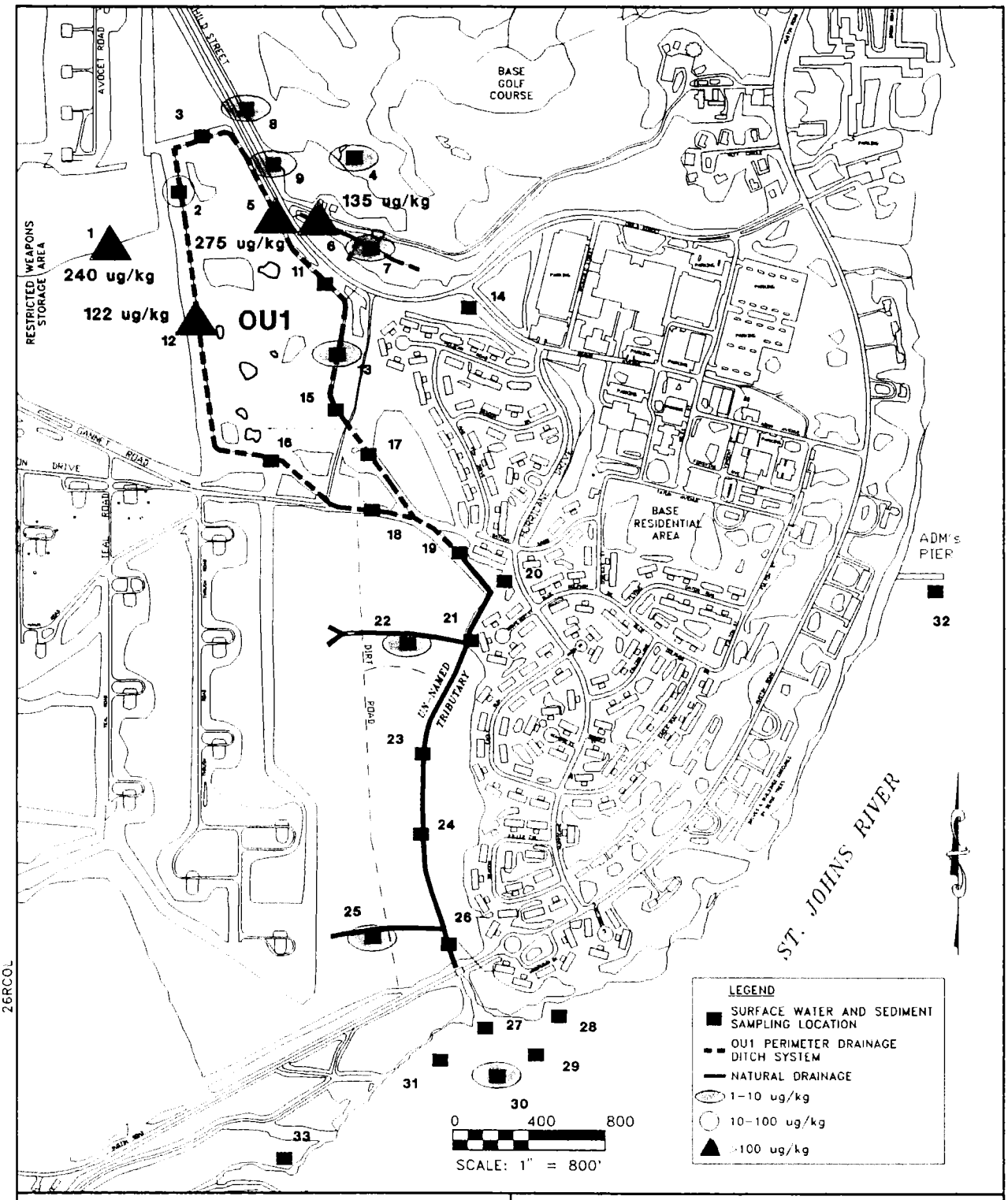
26RCOL

FIGURE C-5

PESTICIDES AND PCB's DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

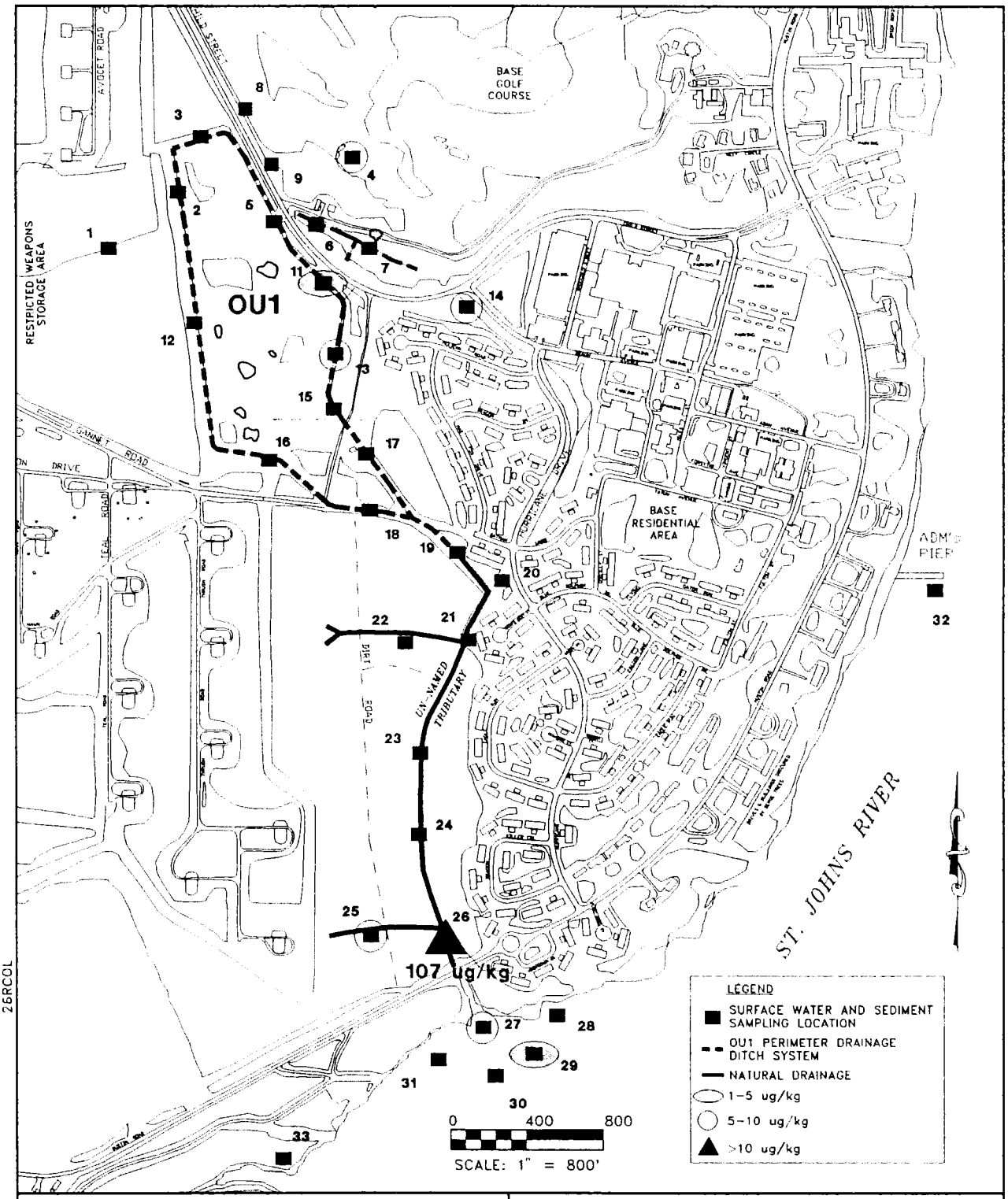


26RCOL

FIGURE C-6
DDD, DDE, AND DDT (TOTAL) VALUES DETECTED IN SEDIMENT SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE JACKSONVILLE, FLORIDA



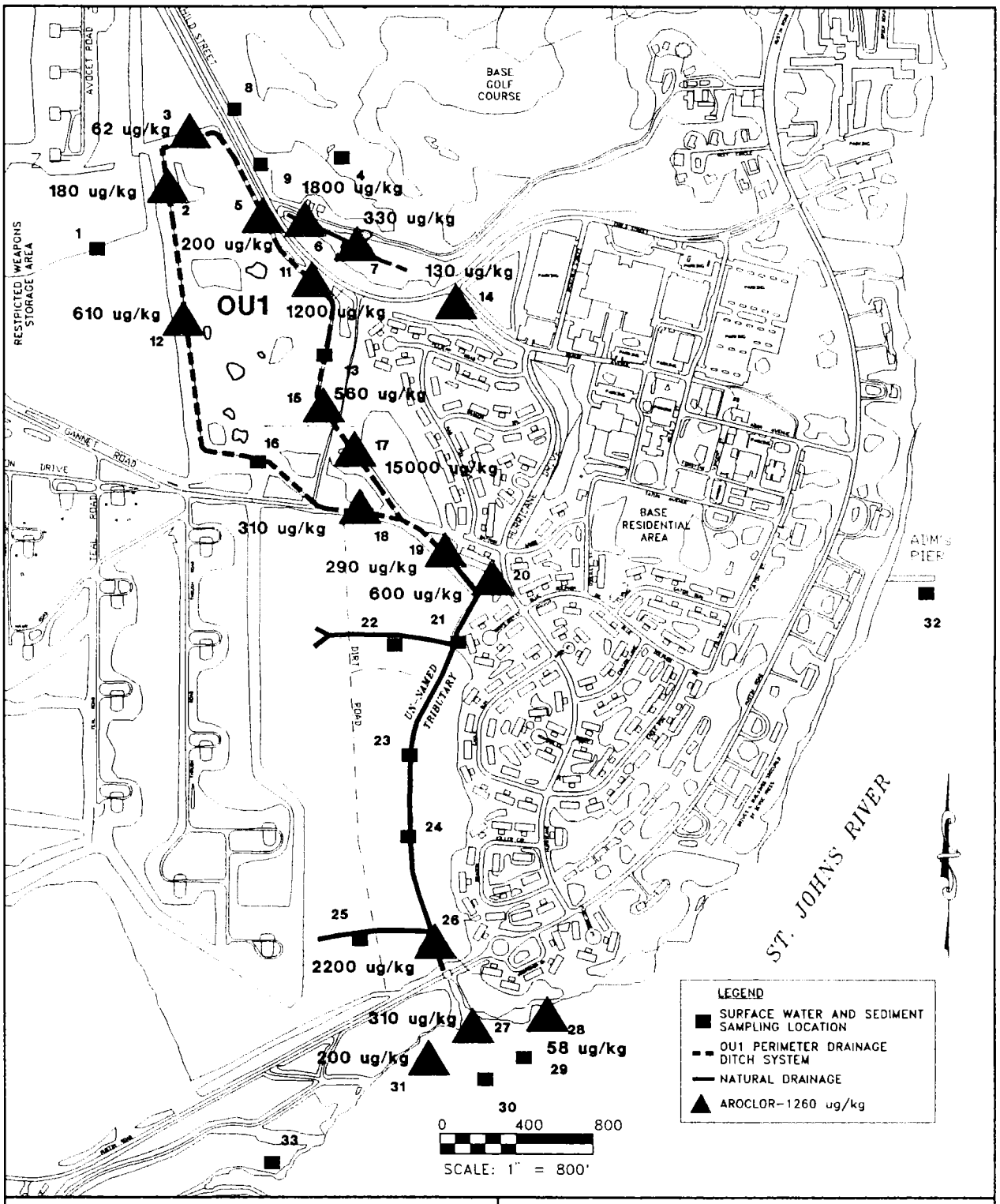
26RCOL

FIGURE C-7

PESTICIDES(MISC.) DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE JACKSONVILLE, FLORIDA



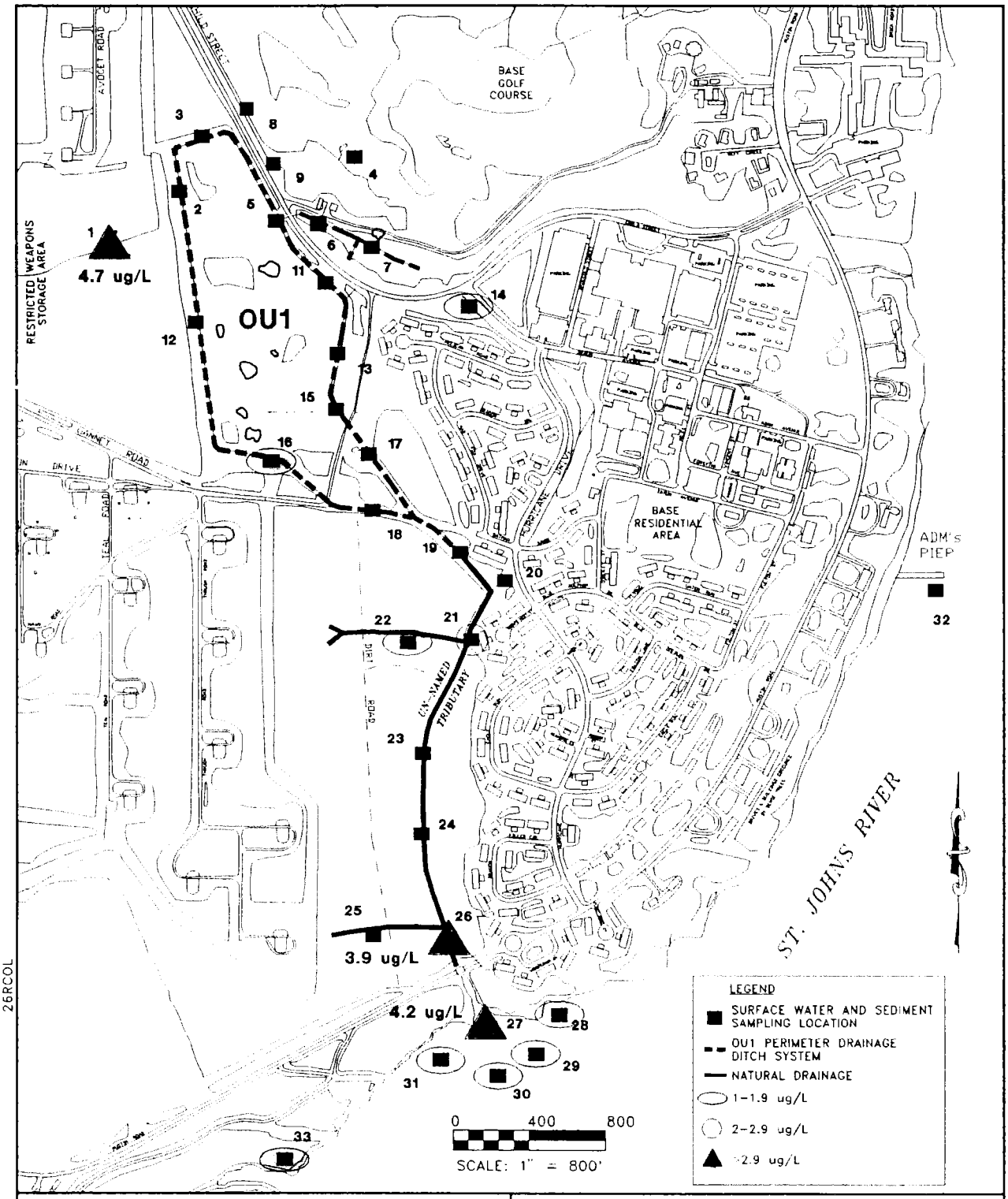
26RCOL

FIGURE C-8

PCB(AROCLOR-1260) DETECTED IN SEDIMENT SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA



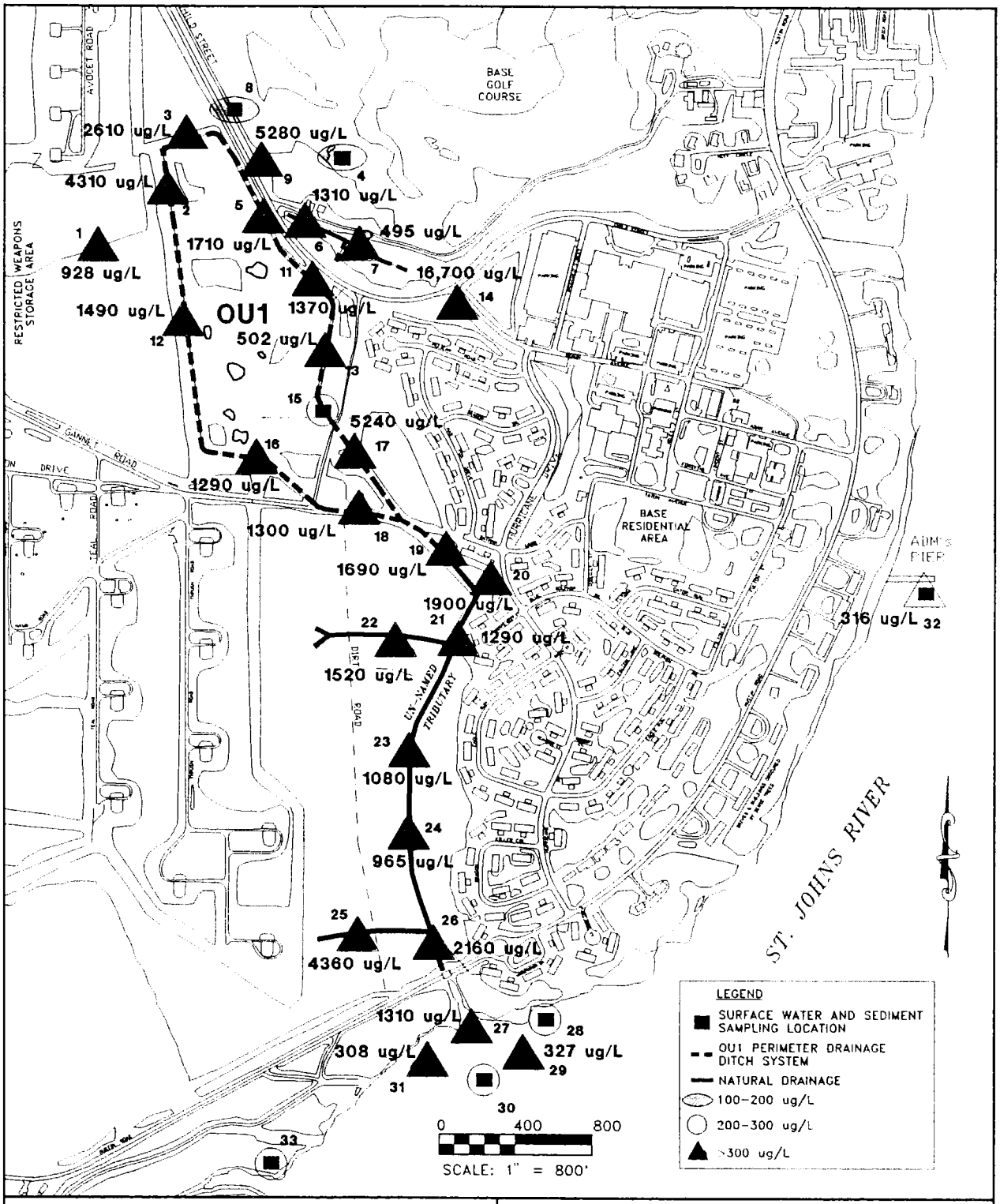
26RCOL

FIGURE C-9

COPPER DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE JACKSONVILLE, FLORIDA



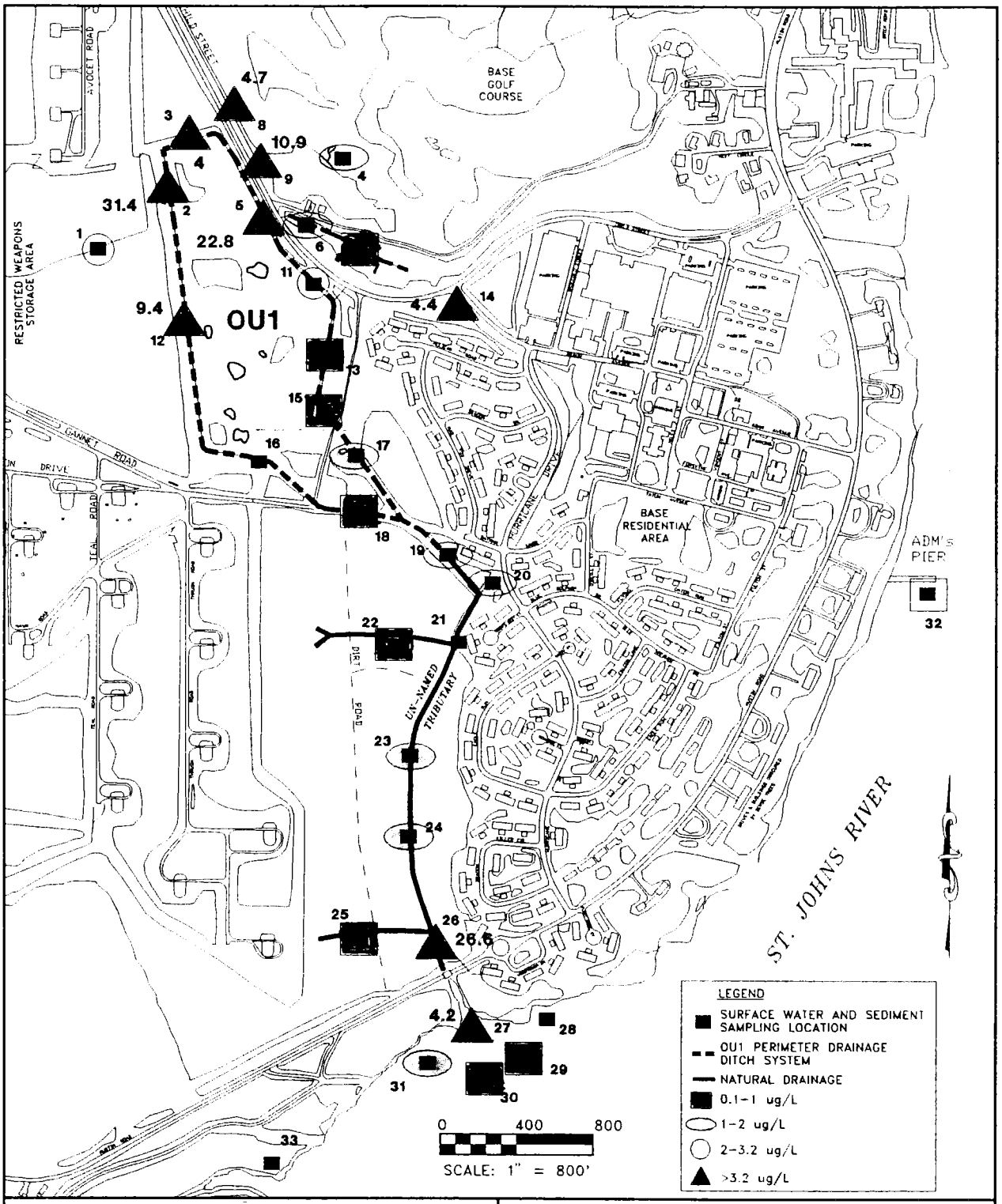
26RCOL

FIGURE C-10

IRON DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE JACKSONVILLE, FLORIDA



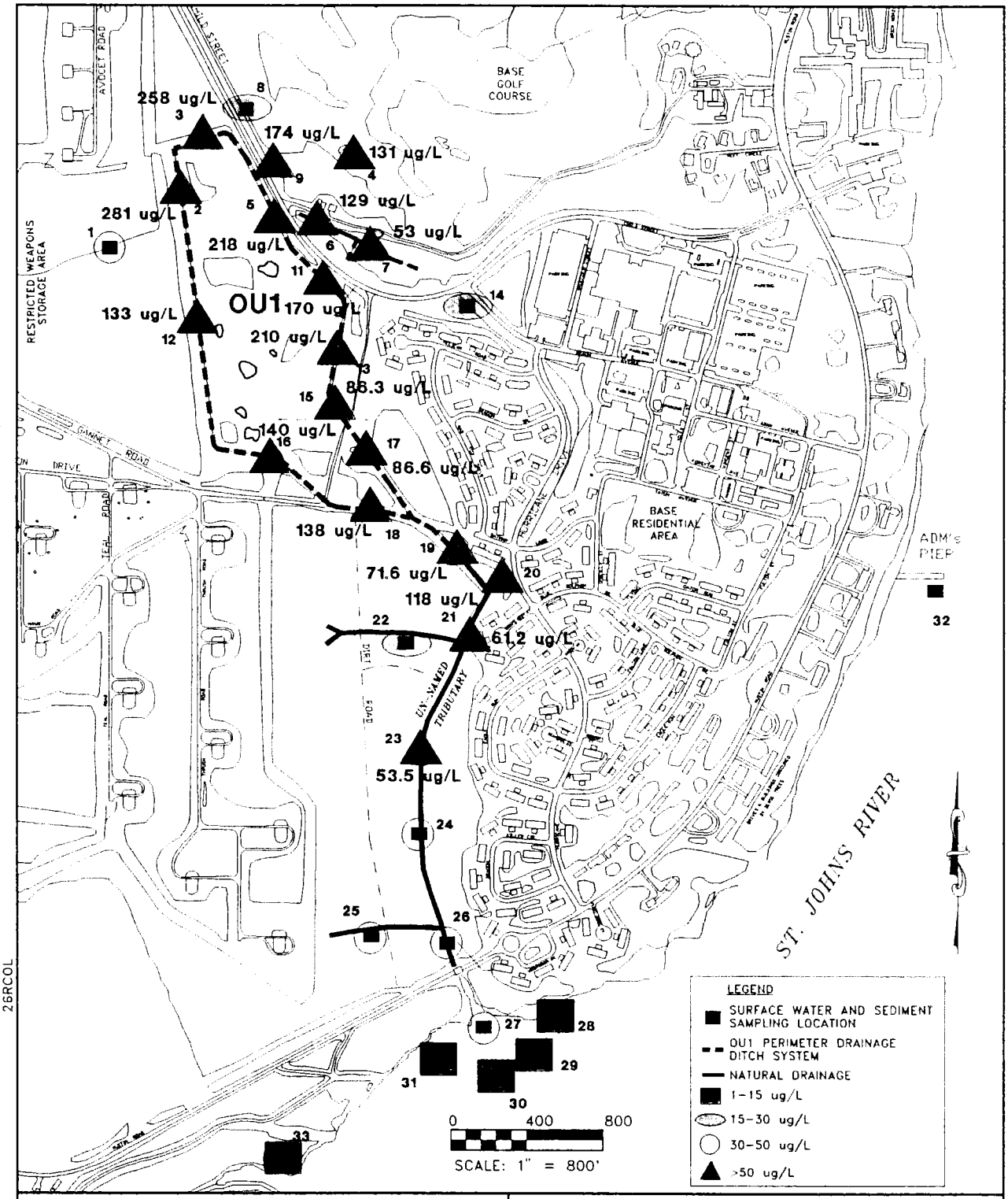
26RCOL

FIGURE C-11

LEAD DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA



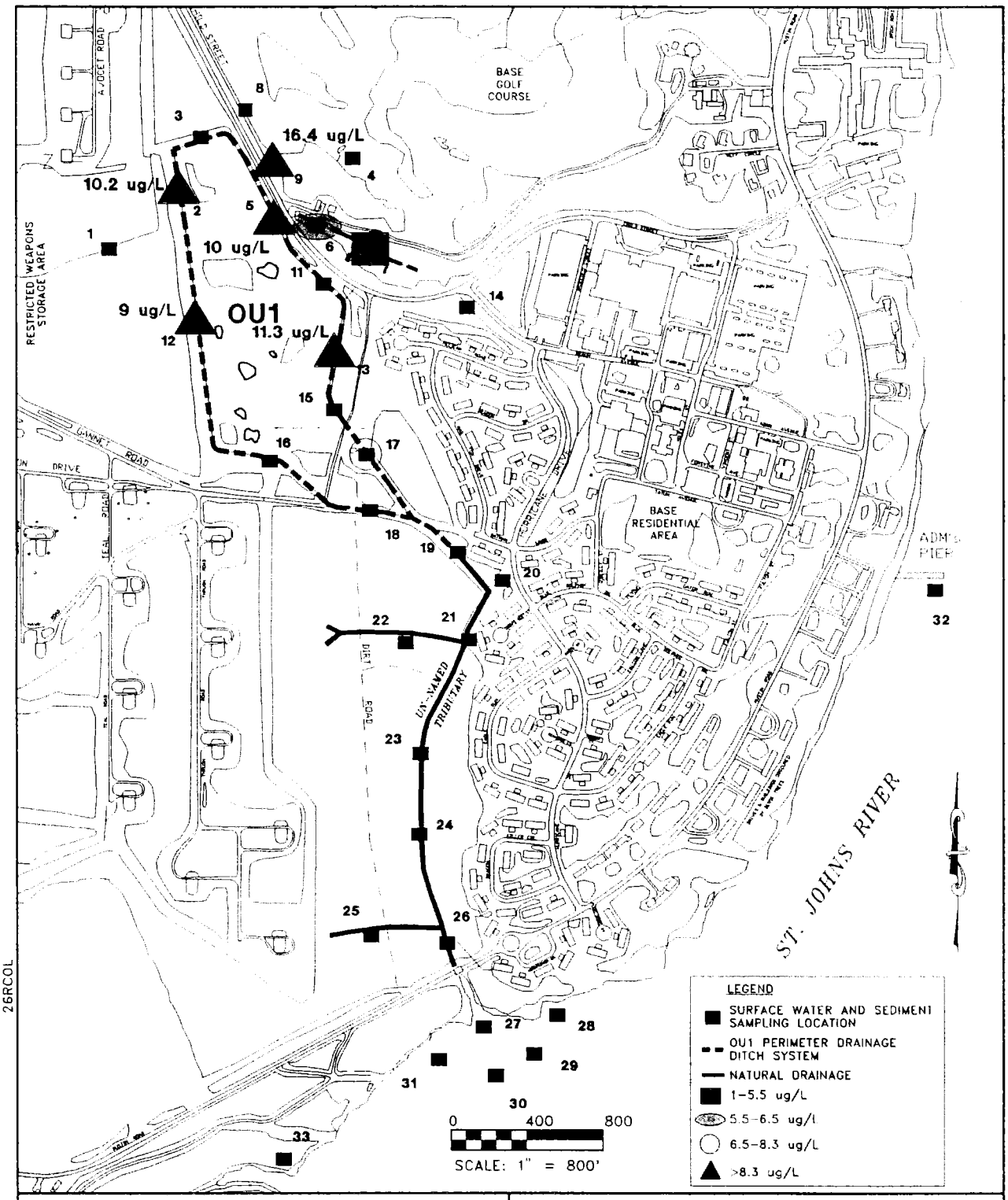
26RCOL

FIGURE C-12

MANGANESE DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

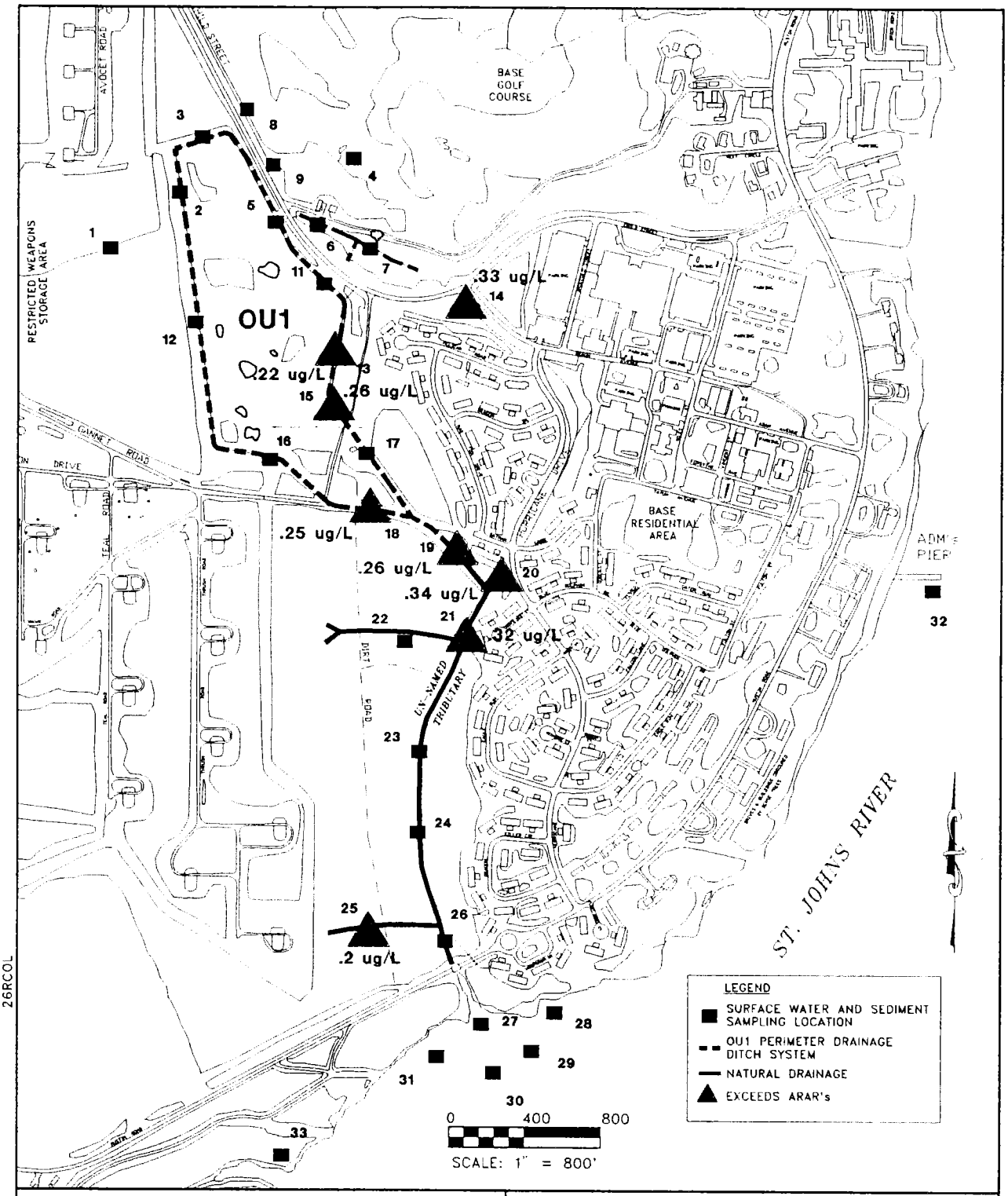


26RCOL

FIGURE C-13
NICKEL DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA



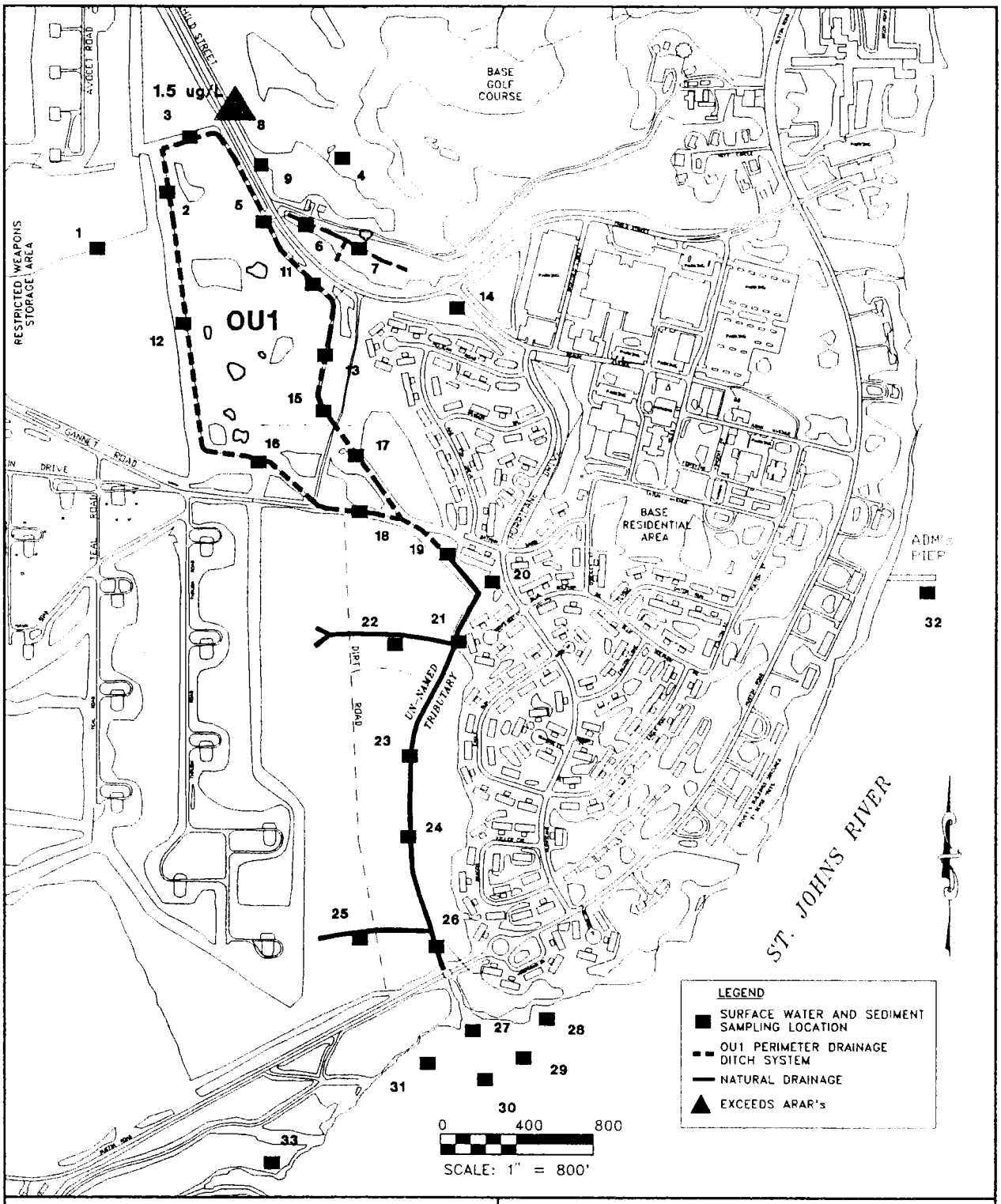
26RCOL

FIGURE C-14

SILVER DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA



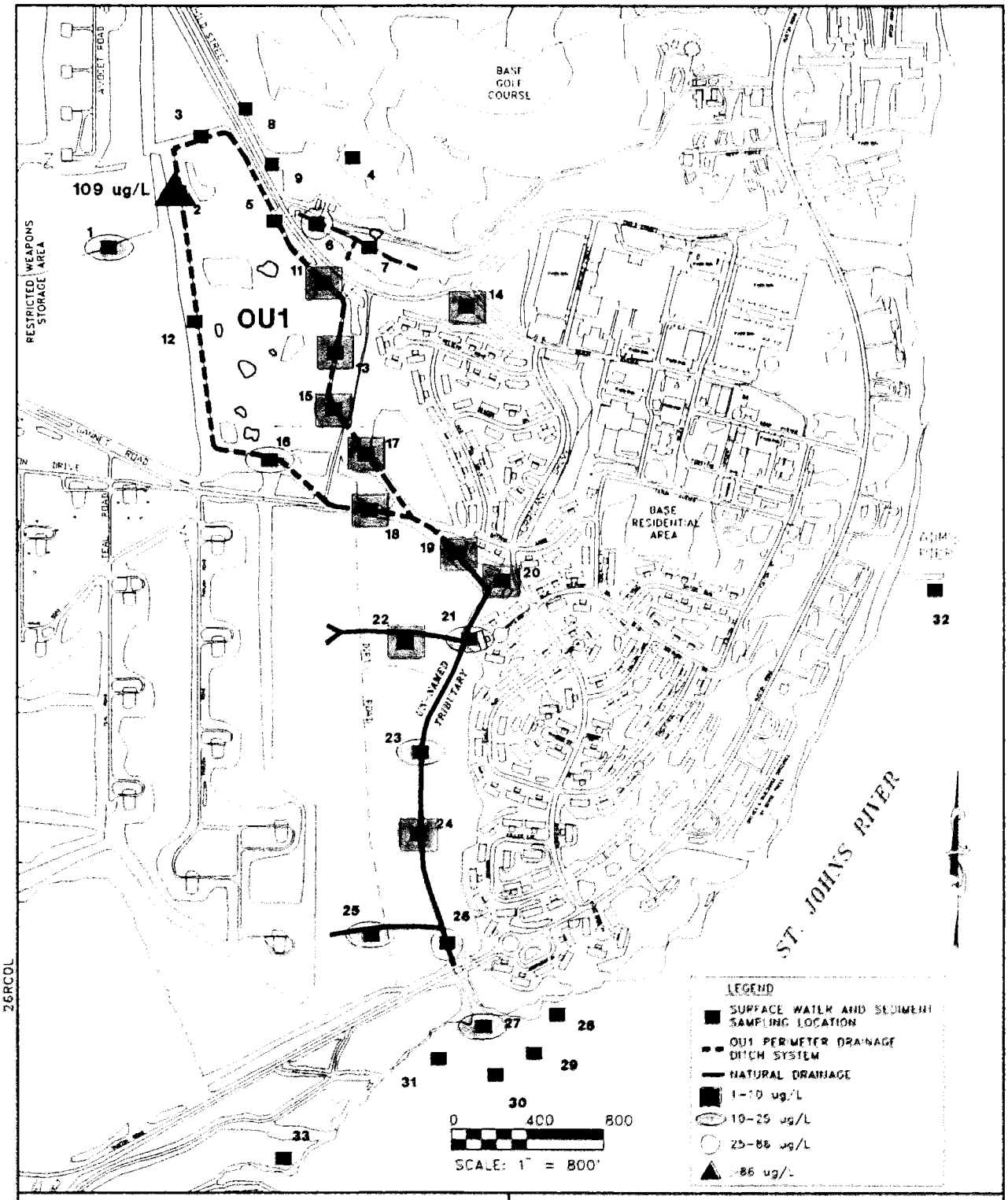
26RCOL

FIGURE C-15

THALLIUM DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA



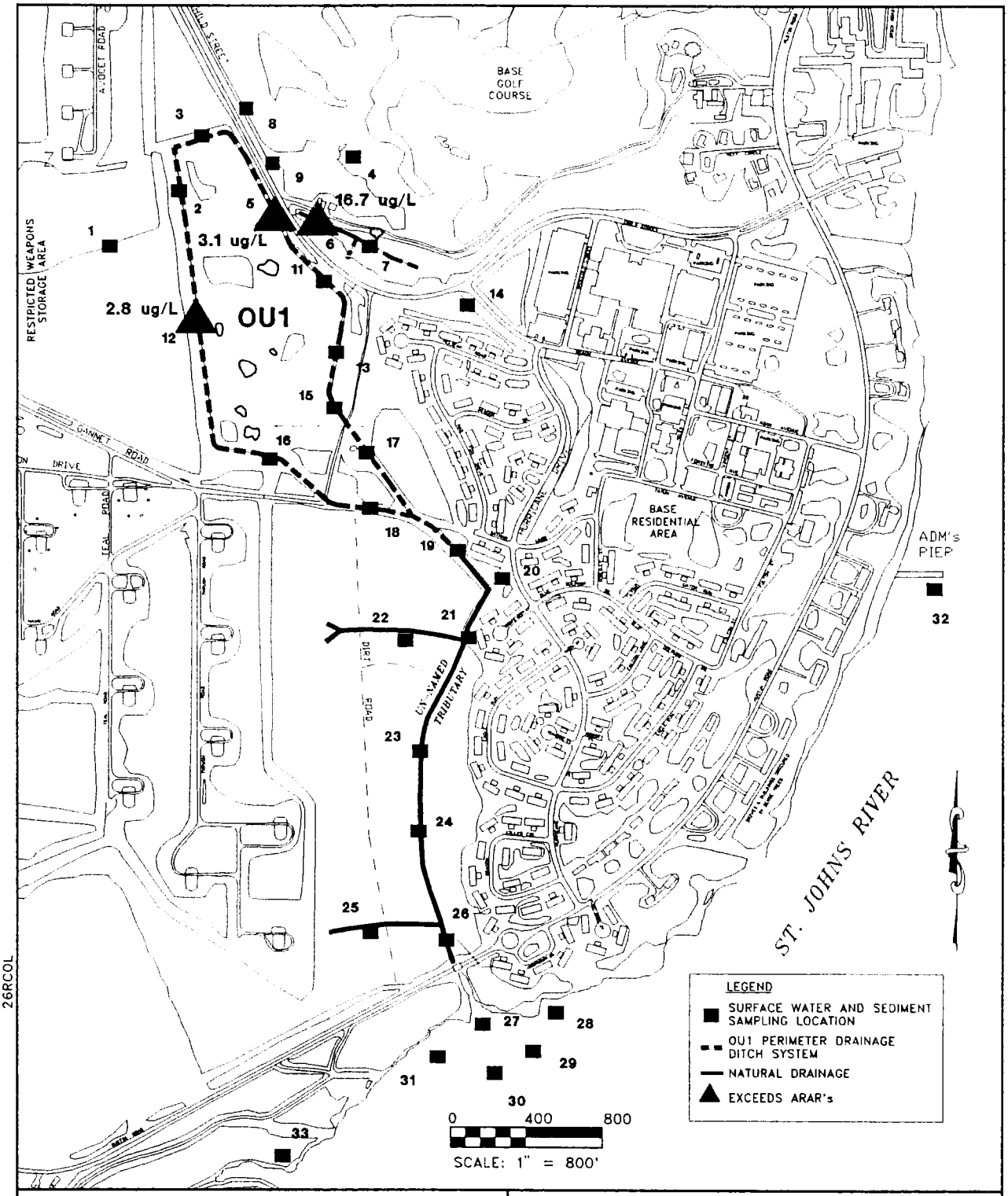
26RCOL

FIGURE C-16

ZINC DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA



26RCOL

FIGURE C-17

CYANIDE DETECTED IN SURFACE WATER SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

APPENDIX D
Soil Sample Analytical Results

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS EPA METHOD 8240 M TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	1,1-Dichloro-ethane	1,2-Dichloro-ethene	2-Butanone	Acetone	Benzene	Bromomethane	Carbon Disulfide	Chloro-benzene	Ethylbenzene
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Re-mediation Goal(b)	*27.0 x 10E6 ug/kg*	*2.7 x 10E6 ug/kg*	*13.5 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	*22.1 x 10E3 ug/kg*	*378.0 x 10E3 ug/kg*	*27.0 x 10E6 ug/kg*	*5.4 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*
SL013 2-4	–	–	–	–	–	–	–	2 J	–
SL022 2-4	–	14000	–	1200 J	–	–	–	350 J	710 J
SL024 2-4	–	1 J	–	–	–	–	–	14	–
SL032 2-4	–	–	–	–	–	–	–	–	–
SL035 9-11	–	–	–	–	3 J	–	2 J	–	–
SL039 10-12	–	–	–	–	7	–	–	6 J	–
SL040 7.5-8.5 (c)	–	–	–	1600	–	–	–	–	–
SL040 9-11	–	–	–	–	7	–	2 J	11	5 J
SL041 3-4	–	–	–	–	–	–	–	–	–
SL043 5-7	–	–	–	–	–	–	–	1 J	–
SL044 7-9	960	5300	9400 J	2800 J	570 J	–	–	6900	30000
SL044 7-9DL	–	10000	–	42000	–	–	–	9100	40000
SL047 3-5	–	–	–	930 J	950	–	–	–	–
SL047 3-5DL	–	–	–	12000 J	1800	–	–	140000	–
SL052 1-2	–	–	–	–	–	–	–	–	–
SL053 4-6	–	–	–	–	–	–	–	–	–
SL056_R 0-3'	–	–	–	–	–	–	2 J	–	–
SL057 0-3'	–	–	–	–	–	–	4 J	–	–
SL058 0-3'	–	–	–	–	–	–	1 J	–	–
SL059 0-3'	–	–	–	–	–	–	5 J	–	–
SL060 0-3'	–	–	–	–	–	–	3 J	–	–
SL061_R 0-3'	–	–	–	–	–	–	4 J	–	–
SL062_R 0-3'	–	–	–	–	–	–	2 J	–	–
SL065 0-3'	–	–	–	–	–	–	–	–	–
SL066 0-3'	–	2 J	–	–	–	–	–	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS EPA METHOD 8240 M TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Methylene chloride	Styrene	Tetrachloro-ethene	Toluene	Trichloro-ethene	Vinyl chloride	Xylenes (total)
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Re-mediation Goal(b)	*85.3 x 10E3 ug/kg*	*21.3 x 10E3 ug/kg*	*12.5 x 10E3 ug/kg*	*54.0 x 10E6 ug/kg*	*58.2 x 10E3 ug/kg*	*0.3 x 10E3 ug/kg*	*540.0 x 10E6 ug/kg*
SL013 2-4	–	–	2 J	2 J	2 J	–	–
SL022 2-4	–	–	–	7000	–	–	4600
SL024 2-4	–	–	–	1 J	–	–	–
SL032 2-4	–	–	–	–	–	–	1 J
SL035 9-11	–	–	–	1 J	–	–	–
SL039 10-12	–	–	–	5 J	2 J	–	8
SL040 0-3' (c)	–	–	–	400 J	–	–	400 J
SL040 9-11	–	–	–	21	1 J	–	45
SL041 3-4	–	–	–	–	2 J	–	–
SL043 5-7	–	–	–	14	6	–	–
SL044 7-9	2700	2900	510 J	–	–	–	–
SL044 7-9DL	27000	–	–	490000	84000	–	210000
SL047 3-5	–	–	–	620 J	–	–	470 J
SL047 3-5DL	–	–	–	–	–	–	–
SL052 1-2	–	–	22	–	7	–	–
SL053 4-6	–	–	–	1 J	–	–	–
SL056_R 0-3'	–	–	–	–	–	–	4 J
SL057 0-3'	–	–	–	2 J	–	–	6 J
SL058 0-3'	–	–	–	–	–	–	3 J
SL059 0-3'	–	–	–	1 J	–	–	5 J
SL060 0-3'	–	–	–	–	–	–	2 J
SL061_R 0-3'	–	–	–	–	–	–	–
SL062_R 0-3'	–	–	–	–	–	–	5 J
SL065 0-3'	3 J	–	–	–	–	–	–
SL066 0-3'	–	–	–	1 J	–	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample taken during health and safety screening in December 1991.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS EPA METHOD 8240 M TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	1,1-Dichloro-ethane	1,2-Dichloro-ethene	2-Butanone	Acetone	Benzene	Bromomethane	Carbon Disulfide	Chloro-benzene	Ethylbenzene
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Re-mediation Goal(b)	*27.0 x 10E6 ug/kg*	*2.7 x 10E6 ug/kg*	*13.5 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	*22.1 x 10E3 ug/kg*	*378.0 x 10E3 ug/kg*	*27.0 x 10E6 ug/kg*	*5.4 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*
SL066 2-4	–	–	–	–	–	–	–	2 J	–
SL067 0-3'	–	–	–	–	–	–	–	–	–
SL068 0-3' (c)	–	–	–	–	–	–	3 J	–	–
SL068_R 0-3' (c)	–	–	–	–	–	–	–	–	–
SL070 0-3' (c)	–	–	–	–	–	–	2 J	–	–
SL070_R 0-3'	–	–	–	11 J	–	–	2 J	–	–
SL071 0-3'	–	–	–	–	–	–	–	–	–
SL072 0-3'	–	–	–	–	43	–	–	–	4 J
SL072 5-7	–	–	–	–	10	–	–	–	–
SL073 0-3' (c)	–	–	–	–	–	–	1 J	–	–
SL073 0-3'	–	–	–	–	22	–	–	–	–
SL074 0-3' (c)	–	–	–	–	–	–	1 J	–	–
SL075 0-3'	–	–	–	–	–	–	–	–	–
SL076 0-3'	–	–	–	–	–	–	–	–	–
SL080 0-3'	–	–	–	–	–	–	–	–	–
SL082 3-5	–	–	–	–	26 J	–	–	–	350
SL082 3-5DL	–	–	–	750 J	–	–	–	–	280 J
SL083 0-3'	–	–	–	–	–	–	–	–	–
SL083 5-7	–	–	–	530 J	–	–	–	180 J	1100
SL084 0-3'	–	–	–	–	–	–	–	–	–
SL085 0-3'	–	–	–	–	–	–	–	–	–
SL086 0-3'	–	–	–	–	–	–	–	–	–
SL087 0-3'	–	–	–	–	–	–	–	–	–
SL095 0-3'	–	–	–	–	–	–	–	–	–
SL096 2-4	–	–	–	–	–	–	–	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS EPA METHOD 8240 M TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Methylene chloride	Styrene	Tetrachloro-ethene	Toluene	Trichloro-ethene	Vinyl chloride	Xylenes (total)
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Re-mediation Goal(b)	*85.3 x 10E3 ug/kg*	*21.3 x 10E3 ug/kg*	*12.5 x 10E3 ug/kg*	*54.0 x 10E6 ug/kg*	*58.2 x 10E3 ug/kg*	*0.3 x 10E3 ug/kg*	*540.0 x 10E6 ug/kg*
SL066 2-4	–	–	–	1 J	–	–	–
SL067 0-3'	4 J	–	–	–	–	–	–
SL068 0-3' (c)	25 J	–	–	1 J	–	–	10 J
SL068_R 0-3' (c)	42 J	–	–	1 J	–	–	8 J
SL070 0-3' (c)	–	–	–	1 J	–	–	7 J
SL070_R 0-3'	–	–	–	–	–	–	5 J
SL071 0-3'	2 J	–	–	–	–	–	–
SL072 0-3'	–	2 J	–	32	–	–	35
SL072 5-7	–	–	–	8	–	–	4 J
SL073 0-3' (c)	–	–	–	–	–	–	5 J
SL073 0-3'	–	–	–	16	–	–	11
SL074 0-3' (c)	–	–	–	1 J	–	–	10
SL075 0-3'	2 J	–	–	–	–	–	–
SL076 0-3'	3 J	–	–	–	–	–	–
SL080 0-3'	2 J	–	–	–	–	–	–
SL082 3-5	–	–	–	75	–	–	1900
SL082 3-5DL	–	–	–	160 J	–	–	1500
SL083 0-3'	–	–	–	2 J	–	–	–
SL083 5-7	–	–	–	180 J	–	–	8300
SL084 0-3'	3 J	–	–	–	–	–	–
SL085 0-3'	3 J	–	–	–	–	–	–
SL086 0-3'	2 J	–	–	–	–	–	–
SL087 0-3'	–	–	–	7 J	–	–	4 J
SL095 0-3'	2 J	–	–	–	–	–	–
SL096 2-4	–	–	2 J	–	2 J	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Samp[illegible] taken during health and safety screening in December 1991.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS EPA METHOD 8240 M TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	1,1–Dichloro–ethane	1,2–Dichloro–ethene	2–Butanone	Acetone	Benzene	Bromomethane	Carbon Disulfide	Chloro–benzene	Ethylbenzene
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Re–mediation Goal(b)	*27.0 x 10E6 ug/kg*	*2.7 x 10E6 ug/kg*	*13.5 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	*22.1 x 10E3 ug/kg*	*378.0 x 10E3 ug/kg*	*27.0 x 10E6 ug/kg*	*5.4 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*
SL097 1–3A	**190** J	**910**	–	**820** J	–	–	–	**15000**	**550** J
SL097 7–9	–	–	–	–	–	–	**3** J	–	–
SL27010 0–3'	–	–	–	–	–	–	–	–	–
SL27010 2–4	–	–	–	–	–	–	–	–	–
SL27011 0–3'	–	–	–	–	–	**8** J	–	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10–6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS EPA METHOD 8240 M TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Methylene chloride	Styrene	Tetrachloro-ethene	Toluene	Trichloro-ethene	Vinyl chloride	Xylenes (total)
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Re-mediation Goal(b)	*85.3 x 10E3 ug/kg*	*21.3 x 10E3 ug/kg*	*12.5 x 10E3 ug/kg*	*54.0 x 10E6 ug/kg*	*58.2 x 10E3 ug/kg*	*0.3 x 10E3 ug/kg*	*540.0 x 10E6 ug/kg*
SL097 1-3A	–	–	–	4300	350 J.	–	3100
SL097 7-9	–	–	–	–	–	–	–
SL27010 0-3'	–	–	–	–	–	–	2 J
SL27010 2-4	–	–	–	–	–	–	2 J
SL27011 0-3'	–	–	–	–	–	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS EPA METHOD 8270 M TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	1,2–Dichloro–benzene	1,4–Dichloro–benzene	2,4–Dimethyl–phenol	Benzoic acid	Phenol	Dibenzofuran	N–Nitroso–diphenylamine (1)	1,3–Dichloro–benzene	1,2,4–Trichloro–benzene
FDER Soil Action Level(a)	---	---	---	---	---	---	---	---	---
EPA Prelim. Re–mediation Goal(b)	*24.3 x 10E6 ug/kg*	*26.7 x 10E3 ug/kg*	*5.4 x 10E6 ug/kg*	*1.08 x 10E9 ug/kg*	*162.0 x 10E6 ug/kg*	---	---	---	*2.7 x 10E6 ug/kg*
SL011 2–4	–	–	–	–	–	–	–	–	–
SL013 2–4	120 J	–	–	–	–	–	–	–	–
SL022 2–4	43000	–	2200 J	–	14000	–	–	4600	–
SL024 2–4	–	–	–	–	–	–	–	–	–
SL026 2–4	–	–	–	–	–	–	–	–	–
SL032 2–4	–	–	–	–	–	–	–	–	–
SL034 9–11	–	–	–	–	–	110 J	–	–	–
SL035 9–11	–	–	–	–	–	–	–	–	–
SL039 10–12	200 J	630 J	–	–	–	–	–	–	–
SL040 7.5–8.5 (c)	–	–	–	–	–	–	–	–	–
SL040 9–11	580 J	–	–	–	–	–	–	–	–
SL041 3–4	–	–	–	220 J	–	–	–	–	–
SL043 5–7	–	–	900	–	–	–	–	180 J	–
SL044 7–9	92000	–	73000	160000	100000	–	5500 J	–	23000
SL044 7–9DL	97000	–	74000	–	110000	–	–	–	25000
SL047 3–5	3500	7600	1100	–	–	–	210 J	6400	–
SL048 1–2	–	–	–	–	–	–	–	–	–
SL050 2–4	–	–	–	–	–	–	–	–	–
SL052 1–2	–	–	–	–	–	–	–	–	–
SL057 0–3' (d)	–	–	–	170 J	–	–	–	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10–6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS EPA METHOD 8270 M TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*
EPA Prelim. Re-mediation Goal(b)	*16.2 x 10E6 ug/kg*	---	*81.0 x 10E6 ug/kg*	---	---	---	---	---	---
SL011 2-4	–	–	–	–	–	–	–	–	–
SL013 2-4	–	–	–	1200	1100	1200	840	1100	1200
SL022 2-4	–	–	–	–	–	–	–	–	–
SL024 2-4	–	–	–	–	–	–	–	–	–
SL026 2-4	–	–	–	91 J	200 J	230 J	250 J	130 J	160 J
SL032 2-4	–	–	–	–	–	–	–	–	84 J
SL034 9-11	140 J	–	420 J	380 J	370 J	380 J	290 J	350 J	510 J
SL035 9-11	91 J	–	180 J	840	950	1600	840	810	920
SL039 10-12	–	–	–	86 J	240 J	160 J	210 J	150 J	170 J
SL040 7.5-8.5 (c)	–	–	–	–	–	–	–	–	–
SL040 9-11	–	–	140 J	520 J	910	1300	390 J	500 J	640 J
SL041 3-4	–	85 J	92 J	850	1300	1400	1200	1400	1100
SL043 5-7	–	–	–	410 J	670 J	640 J	540 J	470 J	500 J
SL044 7-9	–	–	–	3400 J	4000 J	3700 J	–	3500 J	4200 J
SL044 7-9DL	–	–	–	–	4400	4200	–	–	4300
SL047 3-5	–	110 J	–	350 J	570 J	460 J	420 J	540 J	460 J
SL048 1-2	–	–	–	–	85 J	87 J	–	–	–
SL050 2-4	–	–	–	–	–	–	–	–	–
SL052 1-2	–	–	–	–	–	91 J	–	82 J	100 J
SL057 0-3' (d)	–	–	–	110 J	130 J	200 J	100 J	200 J	230 J

Notes:
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(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS EPA METHOD 8270 M TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Dibenz (a,h) anthracene	2-Methylnaph-thalene	2-Methyl-phenol	4-Methyl-phenol	Butylbenzyl-phthalate	Di-n-butyl-phthalate	Diethylph-thalate	bis(2-Ethyl-hexyl) phthalate	Fluorene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	---	---	---	---	---	---	*6000 ug/kg Total PAH*
EPA Prelim. Re-mediation Goal(b)	---	---	*13.5 x 10E6 ug/kg*	*13.5 x 10E6 ug/kg*	*54.0 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	*216.0 x 10E6 ug/kg*	*45.7 x 10E3 ug/kg*	*10.8 x 10E3 ug/kg*
SL011 2-4	-	-	-	-	-	-	-	460 J	-
SL013 2-4	390 J	-	-	-	-	-	-	300 J	-
SL022 2-4	-	830 J	5100	8800	-	-	-	3000 J	-
SL024 2-4	-	-	-	-	-	-	-	610 J	-
SL026 2-4	88 J	-	-	-	-	-	-	130 J	-
SL032 2-4	-	-	-	-	-	-	-	260 J	-
SL034 9-11	-	-	-	-	-	260 J	-	380 J	170 J
SL035 9-11	290 J	-	-	-	-	-	-	190 J	-
SL039 10-12	-	820	-	-	110 J	-	91 J	4700	-
SL040 7.5-8.5 (c)	-	5400 J	-	-	-	-	-	4000 J	-
SL040 9-11	-	1700	-	-	-	-	-	1800	110 J
SL041 3-4	-	190 J	-	-	-	110 J	220 J	760 J	-
SL043 5-7	-	-	270 J	180 J	-	-	-	180 J	-
SL044 7-9	-	21000	-	100000	-	-	-	12000 J	-
SL044 7-9DL	-	23000	450000	100000	-	-	-	15000	-
SL047 3-5	-	1600	1100	460 J	-	-	-	860	-
SL048 1-2	-	-	-	-	-	-	-	570 J	-
SL050 2-4	-	-	-	-	-	-	-	160 J	-
SL052 1-2	-	-	-	-	-	-	-	1600	-
SL057 0-3' (d)	-	-	-	-	85 J	-	-	270 J	-

Notes:
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NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Fluoranthene	Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*
EPA Prelim. Remediation Goal(b)	*10.8 x 10E3 ug/kg*	*1.1 x 10E3 ug/kg*	*1.08 x 10E6 ug/kg*	---	*8.1 x 10E6 ug/kg*
SL011 2-4	–	–	–	–	–
SL013 2-4	1100	770	–	–	1900
SL022 2-4	740 J	–	–	–	620 J
SL024 2-4	–	–	–	–	–
SL026 2-4	120 J	200 J	–	–	140 J
SL032 2-4	110 J	–	–	–	110 J
SL034 9-11	1300	400 J	–	1000	860
SL035 9-11	1500	760 J	–	700 J	1100
SL039 10-12	310 J	220 J	470 J	280 J	270 J
SL040 7.5-8.5 (c)	–	–	–	–	–
SL040 9-11	980	870 J	420 J	460 J	700 J
SL041 3-4	1100	1200	120 J	310 J	970
SL043 5-7	390 J	560 J	–	–	340 J
SL044 7-9	3100 J	2500 J	9100 J	–	2500 J
SL044 7-9DL	–	–	10000	–	–
SL047 3-5	620 J	460 J	6400	–	480 J
SL048 1-2	97 J	–	–	–	96 J
SL050 2-4	–	–	–	–	–
SL052 1-2	–	–	–	–	–
SL057 0-3' (d)	200 J	100 J	–	67 J	220 J

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NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	1,2-Dichloro-benzene	1,4-Dichloro-benzene	2,4-Dimethyl-phenol	Benzoic acid	Phenol	Dibenzofuran	N-Nitroso-diphenylamine (1)	1,3-Dichloro-benzene	1,2,4-Trichloro-benzene
FDER Soil Action Level(a)	---	---	---	---	---	---	---	---	---
EPA Prelim. Re-mediation Goal(b)	*24.3 x 10E6 ug/kg*	*26.7 x 10E3 ug/kg*	*5.4 x 10E6 ug/kg*	*1.08 x 10E9 ug/kg*	*162.0 x 10E6 ug/kg*	---	---	---	*2.7 x 10E6 ug/kg*
SL058 0-3' (d)	-	-	-	-	-	-	-	-	-
SL059 0-3' (d)	-	-	-	140 J	-	-	-	-	-
SL060 0-3' (d)	-	-	-	1800	-	-	-	-	-
SL061 0-3' (d)	-	-	-	-	-	-	-	-	-
SL062 0-3' (d)	-	-	-	-	-	-	-	-	-
SL063 0-3'	-	-	-	-	-	-	-	-	-
SL064 0-3'	-	-	-	-	-	-	-	-	-
SL065 0-3'	-	-	-	-	-	-	-	-	-
SL066 0-3'	-	-	-	-	-	-	-	-	-
SL067 0-3'	-	-	-	-	-	-	-	-	-
SL068 0-3' (c)	-	-	-	-	-	-	-	-	-
SL069 0-3'	-	-	-	-	-	-	-	-	-
SL069 1-2	-	-	-	-	-	-	-	-	-
SL070 0-3' (c)	-	-	-	-	-	-	-	-	-
SL071 0-3'	-	-	-	-	-	-	-	-	-
SL072 0-3'	-	-	-	-	-	-	-	-	-
SL072 5-7	-	-	-	-	-	-	-	-	-
SL073 0-3'	-	-	-	-	-	-	-	-	-
SL073 4-6	-	-	-	-	-	-	-	-	-
SL074 0-3' (c)	-	-	-	-	-	-	-	-	-

Notes:
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NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*
EPA Prelim. Remediation Goal(b)	*16.2 x 10E6 ug/kg*	---	*81.0 x 10E6 ug/kg*	---	---	---	---	---	---
SL058 0-3' (d)	–	–	–	–	–	–	–	–	–
SL059 0-3' (d)	–	–	–	–	–	–	–	–	–
SL060 0-3' (d)	–	–	–	–	–	–	–	–	–
SL061 0-3' (d)	–	–	–	49 J	59 J	74 J	–	93 J	71 J
SL062 0-3' (d)	–	–	–	–	–	–	–	–	–
SL063 0-3'	–	–	–	220 J	–	–	170 J	–	270 J
SL064 0-3'	–	–	–	–	–	–	–	–	–
SL065 0-3'	–	–	–	–	–	–	–	–	–
SL066 0-3'	–	–	–	–	–	–	–	–	–
SL067 0-3'	–	–	–	–	–	–	–	–	–
SL068 0-3' (c)	–	–	–	–	–	–	–	–	–
SL069 0-3'	–	–	–	–	–	85 J	–	–	–
SL069 1-2	–	–	–	–	–	–	–	–	–
SL070 0-3' (c)	–	–	–	–	–	–	–	–	–
SL071 0-3'	–	–	–	180 J	–	–	–	–	–
SL072 0-3'	–	–	210 J	820	760 J	930	670 J	760 J	980
SL072 5-7	–	–	–	190 J	160 J	190 J	140 J	180 J	180 J
SL073 0-3'	–	–	–	–	–	120 J	–	–	–
SL073 4-6	–	–	–	–	–	–	–	–	–
SL074 0-3' (c)	–	–	–	200 J	150 J	160 J	–	160 J	190 J

Notes:
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NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Dibenz (a,h) anthracene	2-Methylnaph-thalene	2-Methyl-phenol	4-Methyl-phenol	Butylbenzyl-phthalate	Di-n-butyl-phthalate	Diethylph-thalate	bis(2-Ethyl-hexyl) phthalate	Fluorene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	---	---	---	---	---	---	*6000 ug/kg Total PAH*
EPA Prelim. Re-mediation Goal(b)	---	---	*13.5 x 10E6 ug/kg*	*13.5 x 10E6 ug/kg*	*54.0 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	*216.0 x 10E6 ug/kg*	*45.7 x 10E3 ug/kg*	*10.8 x 10E3 ug/kg*
SL058 0-3' (d)	-	-	-	-	-	-	-	54 J	-
SL059 0-3' (d)	-	-	-	-	-	-	-	47 J	-
SL060 0-3' (d)	-	-	-	-	-	-	-	42 J	-
SL061 0-3' (d)	-	-	-	-	-	-	-	150 J	-
SL062 0-3' (d)	-	-	-	-	-	-	-	42 J	-
SL063 0-3'	-	-	-	-	-	-	-	-	-
SL064 0-3'	-	-	-	-	-	-	-	84 J	-
SL065 0-3'	-	-	-	-	-	-	-	210 J	-
SL066 0-3'	-	-	-	-	-	-	-	97 J	-
SL067 0-3'	-	-	-	-	-	-	-	2100	-
SL068 0-3' (c)	-	-	-	-	-	-	-	68 J	-
SL069 0-3'	-	-	-	-	-	-	-	1200	-
SL069 1-2	-	-	-	-	-	-	-	200 J	-
SL070 0-3' (c)	-	-	-	-	-	44 J	-	-	-
SL071 0-3'	-	-	-	-	-	-	-	-	-
SL072 0-3'	310 J	-	-	-	-	-	-	130 J	-
SL072 5-7	-	-	-	-	-	-	-	900	-
SL073 0-3'	-	-	-	-	-	-	-	80 J	-
SL073 4-6	-	-	-	-	-	-	-	120 J	-
SL074 0-3' (c)	-	-	-	-	-	50 J	-	85 J	-

Notes:
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NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1

MARCH 1992

Sample ID/ Depth (in feet)	Fluoranthene	Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*
EPA Prelim. Remediation Goal(b)	*10.8 x 10E3 ug/kg*	*1.1 x 10E3 ug/kg*	*1.08 x 10E6 ug/kg*	---	*8.1 x 10E6 ug/kg*
SL058 0-3' (d)	–	–	–	–	–
SL059 0-3' (d)	–	–	–	–	–
SL060 0-3' (d)	–	–	–	–	–
SL061 0-3' (d)	98 J	–	–	–	79 J
SL062 0-3' (d)	–	–	–	–	–
SL063 0-3'	420 J	170 J	–	210 J	370 J
SL064 0-3'	–	–	–	–	–
SL065 0-3'	–	–	–	–	–
SL066 0-3'	–	–	–	–	–
SL067 0-3'	–	–	–	–	–
SL068 0-3' (c)	40 J	–	–	–	–
SL069 0-3'	120 J	–	–	–	110 J
SL069 1-2	–	–	–	–	–
SL070 0-3' (c)	52 J	–	–	–	46 J
SL071 0-3'	420 J	110 J	–	–	260 J
SL072 0-3'	1400	570 J	–	790	1200
SL072 5-7	210 J	120 J	–	–	190 J
SL073 0-3'	–	–	–	–	–
SL073 4-6	–	–	–	–	–
SL074 0-3' (c)	280 J	–	–	55 J	260 J

Notes:

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MARCH 1992

Sample ID/ Depth (in feet)	1,2-Dichloro-benzene	1,4-Dichloro-benzene	2,4-Dimethyl-phenol	Benzoic acid	Phenol	Dibenzofuran	N-Nitroso-diphenylamine (1)	1,3-Dichloro-benzene	1,2,4-Trichloro-benzene
FDER Soil Action Level(a)	---	---	---	---	---	---	---	---	---
EPA Prelim. Remediation Goal(b)	*24.3 x 10E6 ug/kg*	*26.7 x 10E3 ug/kg*	*5.4 x 10E6 ug/kg*	*1.08 x 10E9 ug/kg*	*162.0 x 10E6 ug/kg*	---	---	---	*2.7 x 10E6 ug/kg*
SL076 0-3'	-	-	-	-	-	-	-	-	-
SL077 0-3'	-	-	-	-	-	-	-	-	-
SL077 4-5	-	-	-	-	-	-	-	-	-
SL079 0-3'	-	-	-	-	-	-	-	-	-
SL079 4-6	-	-	-	-	-	-	-	-	-
SL081 3-5	-	-	-	-	-	-	-	-	-
SL082 0-3'	-	-	-	-	-	-	-	-	800
SL082 3-5	-	-	-	-	-	-	-	-	-
SL083 0-3'	-	-	-	-	-	-	-	-	170 J
SL083 5-7	-	-	-	-	-	-	-	-	-
SL084 0-3'	-	-	-	-	-	-	-	-	-
SL085 0-3'	-	-	-	-	-	-	-	-	-
SL086 0-3'	-	-	-	-	-	-	-	-	-
SL088 0-3'	-	-	-	-	-	-	-	-	-
SL089 0-3'	-	-	-	-	-	-	-	-	-
SL091 0-3'	-	-	-	-	-	-	-	-	-
SL092 0-3'	-	-	-	-	-	-	-	-	-
SL093 0-3'	-	-	-	-	-	-	-	-	-
SL095 0-3'	-	-	-	-	-	-	-	-	-
SL096 0-3'	-	-	-	-	-	-	-	-	-

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NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*
EPA Prelim. Remediation Goal(b)	*16.2 x 10E6 ug/kg*	---	*81.0 x 10E6 ug/kg*	---	---	---	---	---	---
SL076 0-3'	–	–	–	130 J	–	–	–	–	140 J
SL077 0-3'	–	–	78 J	–	–	–	250 J	–	–
SL077 4-5	–	–	–	–	–	–	–	–	–
SL079 0-3'	–	–	–	–	–	180 J	–	–	–
SL079 4-6	–	–	–	–	–	–	–	–	–
SL081 3-5	–	–	81 J	–	–	–	200 J	–	–
SL082 0-3'	–	–	–	–	–	76 J	290 J	–	–
SL082 3-5	–	–	–	–	–	–	–	–	92 J
SL083 0-3'	–	–	–	–	81 J	–	160 J	–	–
SL083 5-7	–	–	–	–	–	–	–	–	–
SL084 0-3'	–	–	–	430 J	–	–	–	–	460 J
SL085 0-3'	–	–	–	–	–	89 J	–	–	–
SL086 0-3'	–	–	–	150 J	–	330 J	190 J	170 J	190 J
SL088 0-3'	–	–	–	–	–	–	–	–	–
SL089 0-3'	–	–	–	–	–	–	–	–	–
SL091 0-3'	–	–	–	–	–	–	–	–	–
SL092 0-3'	–	–	–	–	–	–	–	–	–
SL093 0-3'	–	–	–	–	–	–	–	–	–
SL095 0-3'	–	160 J	–	290 J	260 J	740 J	710 J	470 J	390 J
SL096 0-3'	–	–	–	–	–	–	–	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS EPA METHOD 8270 M TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Dibenz (a,h) anthracene	2-Methylnaph-thalene	2-Methyl-phenol	4-Methyl-phenol	Butylbenzyl-phthalate	Di-n-butyl-phthalate	Diethylph-thalate	bis(2-Ethyl-hexyl) phthalate	Fluorene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	---	---	---	---	---	---	*6000 ug/kg Total PAH*
EPA Prelim. Re-mediation Goal(b)	---	---	*13.5 x 10E6 ug/kg*	*13.5 x 10E6 ug/kg*	*54.0 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	*216.0 x 10E6 ug/kg*	*45.7 x 10E3 ug/kg*	*10.8 x 10E3 ug/kg*
SL076 0-3'	-	-	-	-	-	-	-	-	-
SL077 0-3'	130 J	-	-	-	-	-	-	-	-
SL077 4-5	-	-	-	-	-	-	-	42 J	-
SL079 0-3'	-	-	-	-	-	-	-	240 J	-
SL079 4-6	-	-	-	-	-	-	-	61 J	-
SL081 3-5	-	-	-	-	-	-	-	-	-
SL082 0-3'	-	670 J	-	150 J	-	230 J	-	-	-
SL082 3-5	-	-	-	-	-	-	-	-	-
SL083 0-3'	-	130 J	-	-	-	84 J	-	-	-
SL083 5-7	-	1100	-	-	-	-	-	-	-
SL084 0-3'	-	-	-	-	-	-	-	95 J	-
SL085 0-3'	-	-	-	-	-	-	-	-	-
SL086 0-3'	-	-	-	-	-	100 J	-	1500	-
SL088 0-3'	-	-	-	-	-	-	-	3400	-
SL089 0-3'	-	-	-	-	-	-	-	310 J	-
SL091 0-3'	-	-	-	-	-	-	-	170 J	-
SL092 0-3'	-	-	-	-	-	-	-	280 J	-
SL093 0-3'	-	-	-	-	-	-	-	380 J	-
SL095 0-3'	160 J	-	-	-	-	-	-	-	-
SL096 0-3'	-	-	-	-	-	-	-	310 J	-

Notes:
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NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Fluoranthene	Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*
EPA Prelim. Remediation Goal(b)	*10.8 x 10E3 ug/kg*	*1.1 x 10E3 ug/kg*	*1.08 x 10E6 ug/kg*	---	*8.1 x 10E6 ug/kg*
SL076 0-3'	200 J	120 J	–	–	150 J
SL077 0-3'	1200	230 J	–	370 J	960
SL077 4-5	–	–	–	–	–
SL079 0-3'	160 J	–	–	–	190 J
SL079 4-6	–	–	–	–	–
SL081 3-5	440 J	170 J	–	240 J	330 J
SL082 0-3'	84 J	–	–	–	140 J
SL082 3-5	140 J	–	–	–	160 J
SL083 0-3'	99 J	98 J	–	–	120 J
SL083 5-7	–	–	410 J	–	84 J
SL084 0-3'	650 J	360 J	–	–	470 J
SL085 0-3'	94 J	–	–	–	100 J
SL086 0-3'	190 J	180 J	–	77 J	200 J
SL088 0-3'	–	–	–	–	–
SL089 0-3'	–	–	–	–	–
SL091 0-3'	–	–	–	–	–
SL092 0-3'	–	–	–	–	–
SL093 0-3'	–	–	–	–	–
SL095 0-3'	310 J	630 J	–	–	360 J
SL096 0-3'	–	–	–	–	–

Notes:
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NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	1,2-Dichloro-benzene	1,4-Dichloro-benzene	2,4-Dimethyl-phenol	Benzoic acid	Phenol	Dibenzofuran	N-Nitroso-diphenylamine (1)	1,3-Dichloro-benzene	1,2,4-Trichloro-benzene
FDER Soil Action Level(a)	---	---	---	---	---	---	---	---	---
EPA Prelim. Re-mediation Goal(b)	*24.3 x 10E6 ug/kg*	*26.7 x 10E3 ug/kg*	*5.4 x 10E6 ug/kg*	*1.08 x 10E9 ug/kg*	*162.0 x 10E6 ug/kg*	---	---	---	*2.7 x 10E6 ug/kg*
SL096 2-4	-	-	-	-	-	-	-	-	-
SL097 1-3A	3900 J	2400 J	-	-	-	-	2200 J	1000 J	-
SL097 7-9	190 J	-	-	-	-	-	220 J	-	-
SL098 7-9	280 J	-	-	-	-	-	190 J	-	-
SL099 5-7	-	-	-	-	-	-	420 J	-	-
SL099 5-7DL	-	-	-	-	-	-	-	-	-
SL100 4-6	-	-	-	-	-	-	-	-	-
SL27001 0-3'	-	-	-	-	-	-	-	-	-
SL27002 2-4	-	-	-	-	-	-	-	-	-
SL27003 0-3'	-	-	-	-	-	-	-	-	-
SL27004 0-3'	-	-	-	-	-	-	-	-	-
SL27004 2-4	-	-	-	-	-	-	-	-	-
SL27005 0-3'	-	-	-	-	-	-	-	-	-
SL27005 2-4	-	-	-	-	-	-	-	-	-
SL27008 0-3'	-	-	-	-	-	-	-	-	-
SL27008 2-4	-	-	-	-	-	-	-	-	-
SL27009 0-3'	-	-	-	-	-	-	-	-	-
SL27010 0-3'	-	-	-	-	-	-	-	-	-
SL27011 0-3'	-	-	-	-	-	-	-	-	-
SL27011 2-4	-	-	-	-	-	-	-	-	-

Notes:
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NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*
EPA Prelim. Remediation Goal(b)	*16.2 x 10E6 ug/kg*	---	*81.0 x 10E6 ug/kg*	---	---	---	---	---	---
SL096 2-4	–	–	–	–	–	–	–	–	–
SL097 1-3A	–	–	–	–	–	–	–	–	–
SL097 7-9	–	–	–	–	–	–	–	–	–
SL098 7-9	–	–	–	–	–	–	–	–	–
SL099 5-7	540 J	–	–	320 J	250 J	320 J	280 J	240 J	340 J
SL099 5-7DL	–	–	–	–	–	–	–	–	–
SL100 4-6	–	–	–	150 J	150 J	190 J	140 J	150 J	170 J
SL27001 0-3"	–	–	–	–	240 J	230 J	270 J	190 J	–
SL27002 2-4	–	–	–	–	–	–	–	–	–
SL27003 0-3"	–	–	–	–	86 J	83 J	–	–	–
SL27004 0-3"	–	–	–	–	–	–	–	–	–
SL27004 2-4	–	–	–	–	–	–	–	–	–
SL27005 0-3"	–	–	–	–	78 J	–	–	–	–
SL27005 2-4	–	–	–	–	–	–	–	–	–
SL27008 0-3"	–	–	–	–	–	–	–	–	–
SL27008 2-4	–	–	–	–	–	–	–	–	–
SL27009 0-3"	–	–	–	–	–	–	–	–	76 J
SL27010 0-3"	–	–	–	120 J	120 J	130 J	110 J	110 J	160 J
SL27011 0-3"	–	–	–	170 J	170 J	220 J	150 J	190 J	250 J
SL27011 2-4	–	–	–	–	–	–	–	–	–

Notes:
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NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Dibenz (a,h) anthracene	2-Methylnaph-thalene	2-Methyl-phenol	4-Methyl-phenol	Butylbenzyl-phthalate	Di-n-butyl-phthalate	Diethylph-thalate	bis(2-Ethyl-hexyl) phthalate	Fluorene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	---	---	---	---	---	---	*6000 ug/kg Total PAH*
EPA Prelim. Re-mediation Goal(b)	---	---	*13.5 x 10E6 ug/kg*	*13.5 x 10E6 ug/kg*	*54.0 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	*216.0 x 10E6 ug/kg*	*45.7 x 10E3 ug/kg*	*10.8 x 10E3 ug/kg*
SL096 2-4	-	-	-	-	-	-	-	400 J	-
SL097 1-3A	-	1800 J	-	-	-	-	-	4300	-
SL097 7-9	-	-	-	-	-	-	-	2400	-
SL098 7-9	-	-	-	-	-	-	-	620 J	-
SL099 5-7	160 J	-	-	-	-	-	-	250 J	1100
SL099 5-7DL	-	15000	-	-	-	-	-	-	-
SL100 4-6	-	-	-	-	-	110 J	-	-	-
SL27001 0-3'	-	-	-	-	250 J	-	-	150 J	-
SL27002 2-4	-	-	-	-	-	-	-	95 J	-
SL27003 0-3'	-	-	-	-	-	-	-	86 J	-
SL27004 0-3'	-	-	-	-	470 J	-	-	200 J	-
SL27004 2-4	-	-	-	-	-	-	-	190 J	-
SL27005 0-3'	-	-	-	-	-	190 J	-	150 J	-
SL27005 2-4	-	-	-	-	-	-	-	82 J	-
SL27008 0-3'	-	-	-	-	-	-	-	90 J	-
SL27008 2-4	-	-	-	-	-	-	-	39 J	-
SL27009 0-3'	-	-	-	-	-	-	-	-	-
SL27010 0-3'	-	-	-	-	-	-	-	-	-
SL27011 0-3'	-	-	-	-	-	78 J	-	150 J	-
SL27011 2-4	-	-	-	-	-	-	-	47 J	-

Notes:
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NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Fluoranthene	Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*
EPA Prelim. Remediation Goal(b)	*10.8 x 10E3 ug/kg*	*1.1 x 10E3 ug/kg*	*1.08 x 10E6 ug/kg*	---	*8.1 x 10E6 ug/kg*
SL096 2-4	–	–	–	–	–
SL097 1-3A	730 J	–	1200 J	–	–
SL097 7-9	–	–	–	–	–
SL098 7-9	–	–	–	–	130 J
SL099 5-7	710 J	240 J	1800	770 J	650 J
SL099 5-7DL	–	–	–	–	–
SL100 4-6	200 J	140 J	–	–	180 J
SL27001 0-3'	–	220 J	–	–	100 J
SL27002 2-4	–	–	–	–	–
SL27003 0-3'	80 J	–	–	–	85 J
SL27004 0-3'	–	–	–	–	–
SL27004 2-4	–	–	–	–	–
SL27005 0-3'	–	–	–	–	–
SL27005 2-4	–	–	–	–	–
SL27008 0-3'	–	–	–	–	–
SL27008 2-4	–	–	–	–	–
SL27009 0-3'	–	–	–	–	–
SL27010 0-3'	200 J	90 J	–	–	190 J
SL27011 0-3'	250 J	130 J	–	–	250 J
SL27011 2-4	–	–	–	–	–

Notes:
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3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	Dieldrin
EPA Prelim. Remediation Goal(a)	*2700 ug/kg*	*1900 ug/kg*	*1900 ug/kg*	*38 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*40 ug/kg*
EPA August 1990, PCBs(b)	---	---	---	---	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	---
SL011 0-3'	-	-	-	-	-	-	-	-	39
SL011 2-4	-	-	-	-	-	-	-	-	19
SL012 0-3'	-	6.7 J	24 J	-	-	-	340	830	-
SL013 0-3'	-	-	-	-	-	-	-	1100	-
SL013 2-4	-	-	-	-	-	3700	-	9300	-
SL014 0-3'	-	-	-	-	-	-	-	44000	-
SL015 0-3' DL (c)	-	-	-	-	-	-	-	2700 J	-
SL015 0-3'	-	-	-	-	-	-	-	200	-
SL016 0-3'	-	-	-	-	-	-	-	230	-
SL017 0-3'	-	-	-	-	-	-	-	3100	-
SL018 0-3'	-	-	-	-	-	-	-	770	-
SL019 0-3'	99 J	71	76 J	-	-	-	-	1600	-
SL020 0-3'	-	-	-	-	-	-	3600	5400	-
SL021 0-3' DL (c)	-	-	-	-	-	-	-	3700 J	-
SL021 0-3'	-	-	-	-	-	-	-	2300	-
SL022 0-3'	-	110 J	-	-	-	-	-	3300	-
SL022 2-4	-	95	-	-	-	-	1900	1900	-
SL023 0-3'	-	-	-	-	-	-	-	1300	-
SL024 0-3'	-	-	-	-	-	-	-	47000	-
SL024 2-4	300 J	-	-	-	-	-	-	10000	-
SL025 0-3'	1100	110 J	1100	-	-	-	-	2800	-
SL026 0-3'	-	-	-	-	-	-	-	560	-
SL026 2-4	33 J	45	10 J	-	-	-	-	-	-
SL028 0-3'	20 J	40	30 J	-	-	-	-	950	-
SL029 0-3'	45 J	31 J	-	-	-	-	-	830	-

Notes:
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2. The shaded values represent positive detections of the particular compound.
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Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard index of 1 to future site resident.
(b) U.S. Environmental Protection Agency, "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
(c) Sample was taken during health and safety screening in December 1991.
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Endrin	Heptachlor	Heptachlor epoxide	alpha-BHC	alpha-Chlordane	gamma-Chlordane
EPA Prelim. Remediation Goal(a)	*81000 ug/kg*	---	---	---	---	---
EPA August 1990, PCBs(b)	---	---	---	---	---	---
SL011 0-3"	-	-	-	-	16	-
SL011 2-4	-	-	-	-	-	-
SL012 0-3"	-	-	-	-	-	-
SL013 0-3"	-	-	-	-	-	-
SL013 2-4	-	-	-	-	-	-
SL014 0-3"	-	-	-	-	-	-
SL015 0-3" DL (c)	-	-	-	-	-	-
SL015 0-3"	-	-	-	-	-	-
SL016 0-3"	-	-	-	-	-	-
SL017 0-3"	-	-	-	-	-	-
SL018 0-3"	-	-	-	-	-	-
SL019 0-3"	-	-	-	-	-	-
SL020 0-3"	-	-	-	-	-	-
SL021 0-3" DL (c)	-	-	-	-	-	-
SL021 0-3"	-	-	-	-	-	-
SL022 0-3"	-	-	-	-	-	-
SL022 2-4	-	-	-	-	-	-
SL023 0-3"	-	-	-	-	-	-
SL024 0-3"	-	-	-	-	-	-
SL024 2-4	-	-	-	-	-	-
SL025 0-3"	-	-	-	-	-	-
SL026 0-3"	-	-	-	-	-	-
SL026 2-4	-	-	-	-	-	-
SL028 0-3"	-	-	-	-	-	-
SL029 0-3"	-	-	-	-	-	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard index of 1 to future site resident.
(b) U.S. Environmental Protection Agency, "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
(c) Sampl[illegible]s taken during health and safety screening in December 1991.
(d) Sam[illegible] collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	Dieldrin
EPA Prelim. Remediation Goal(a)	*2700 ug/kg*	*1900 ug/kg*	*1900 ug/kg*	*38 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*40 ug/kg*
EPA August 1990, PCBs(b)	---	---	---	---	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	---
SL032 0-3'	-	-	-	-	-	-	3700	1400 J	-
SL032 2-4	-	-	-	-	-	-	2800	-	-
SL033 0-3'	-	-	-	-	-	-	-	2900	-
SL034 9-11	-	-	-	-	-	13000	-	-	-
SL035 9-11	18 J	57	45	-	-	700	-	-	33
SL039 10-12	-	-	1500 J	1100	-	28000	25000	-	-
SL040 7.5-8.5 DL (c)	-	-	-	-	3700 J	-	-	2600 J	-
SL040 9-11	-	-	980 J	670	-	4200 J	-	-	-
SL041 0-3'	-	130	-	-	-	-	-	960	-
SL041 3-4	-	110 J	-	-	-	-	1800	-	-
SL042 0-3'	-	21	17 J	-	-	-	590	730	-
SL043 5-7	-	-	670 J	600	-	5200	-	-	-
SL044 7-9	-	-	-	-	-	270000	78000	-	-
SL045 0-3'	-	23	-	-	-	-	200	380	-
SL047 3-5	-	-	790 J	630	-	8800	-	4000	-
SL048 0-3'	-	-	-	-	-	-	-	6200 J	-
SL048 1-2	-	-	-	-	-	-	-	2400 J	-
SL050 0-3'	-	33	-	-	-	-	-	-	-
SL050 2-4	-	-	11	-	-	-	-	-	-
SL051 0-3'	-	-	-	-	-	-	-	320	-
SL052 0-3'	-	-	-	-	-	-	-	-	9
SL052 1-2	-	-	-	-	-	-	4200	-	-
SL053 0-3'	-	16	130	-	-	-	-	-	-
SL053 0-3' DL	-	13 J	110	-	-	-	-	-	-
SL057 0-3' (d)	14	19	14	-	-	-	-	150	8.2

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
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3. A dashed line ('-') represents a non-detection of a compound in a particular sample.
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(b) U.S. Environmental Protection Agency, "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Endrin	Heptachlor	Heptachlor epoxide	alpha-BHC	alpha-Chlordane	gamma-Chlordane
EPA Prelim. Remediation Goal(a)	*81000 ug/kg*	---	---	---	---	---
EPA August 1990, PCBs(b)	---	---	---	---	---	---
SL032 0-3'	-	-	-	-	-	-
SL032 2-4	-	-	-	-	-	-
SL033 0-3'	-	-	-	-	-	-
SL034 9-11	-	-	-	-	-	-
SL035 9-11	14 J	-	-	-	-	-
SL039 10-12	1200	-	-	-	-	-
SL040 7.5-8.5 DL (c)	-	-	-	-	-	-
SL040 9-11	810	-	-	-	-	-
SL041 0-3'	-	-	-	-	-	-
SL041 3-4	-	-	-	-	-	-
SL042 0-3'	-	-	-	-	-	-
SL043 5-7	650	-	-	-	-	-
SL044 7-9	-	-	-	-	-	-
SL045 0-3'	-	-	-	-	-	-
SL047 3-5	760	-	-	-	-	-
SL048 0-3'	-	-	-	-	-	-
SL048 1-2	-	-	-	-	-	-
SL050 0-3'	-	-	-	-	-	-
SL050 2-4	-	-	-	-	-	-
SL051 0-3'	-	-	-	-	-	-
SL052 0-3'	-	-	-	-	-	-
SL052 1-2	-	-	-	-	-	-
SL053 0-3'	-	-	-	-	-	-
SL053 0-3' DL	-	-	-	-	-	-
SL057 0-3' (d)	-	-	-	-	4.8	4

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
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4. "J" Signifies the compound was detected at an estimated concentration.

(a) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard index of 1 to future site resident.
(b) U.S. Environmental Protection Agency, "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
(c) Sample was taken during health and safety screening in December 1991.
(d) Samp collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	Dieldrin
EPA Prelim. Remediation Goal(a)	*2700 ug/kg*	*1900 ug/kg*	*1900 ug/kg*	*38 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*40 ug/kg*
EPA August 1990, PCBs(b)	---	---	---	---	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	---
SL058 0-3' (d)	-	2.4 J	-	-	-	-	-	-	-
SL059 0-3' (d)	-	22	13	-	-	-	-	58	1.4 J
SL060 0-3' (d)	-	1.6 J	-	-	-	-	-	-	-
SL061 0-3' (d)	-	45	20	-	-	-	-	60	2.7
SL061DL	-	31	-	-	-	-	-	-	-
SL062 0-3' (d)	-	15	5.7 J	-	-	-	-	190	-
SL063 0-3'	-	7	-	-	-	-	-	320	-
SL064 0-3'	-	-	-	-	-	-	-	2900	-
SL065 0-3'	-	-	29	-	-	-	-	360	-
SL066 0-3'	-	-	-	-	-	-	-	7100	-
SL066 2-4	-	-	-	-	-	-	-	600	-
SL067 0-3'	-	-	20000	-	-	-	-	-	-
SL068 0-3' DL (c)	-	-	-	-	-	-	-	4500 J	-
SL068 0-3'	-	-	-	-	-	-	-	2000	-
SL069 0-3'	-	-	4800	-	-	-	-	-	-
SL070 0-3' DL (c)	-	-	-	-	-	-	-	510 J	-
SL071 0-3'	-	10	13 J	-	-	-	51	-	-
SL072 0-3'	-	-	-	-	-	-	-	-	-
SL072 5-7	-	7.9	-	2.3 J	-	-	-	-	-
SL073 0-3' DL	-	-	-	-	-	-	-	710 J	-
SL073 0-3'	-	-	-	-	-	-	-	310	-
SL074 0-3' DL	-	-	-	-	-	-	-	330 J	-
SL074 0-3'	-	-	-	-	-	-	-	130	-
SL075 0-3'	180	5.9 J	-	-	-	-	-	170	-
SL076 0-3'	-	8.1	54	-	-	-	130	-	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard index of 1 to future site resident.
(b) U.S. Environmental Protection Agency, "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

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SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Endrin	Heptachlor	Heptachlor epoxide	alpha-BHC	alpha-Chlordane	gamma-Chlordane
EPA Prelim. Remediation Goal(a)	*81000 ug/kg*	---	---	---	---	---
EPA August 1990, PCBs(b)	---	---	---	---	---	---
SL058 0-3" (d)	-	-	-	-	-	-
SL059 0-3" (d)	-	-	-	-	9.6	7.8
SL060 0-3" (d)	-	-	-	-	-	-
SL061 0-3" (d)	-	-	-	-	13	4.2
SL061DL	-	-	-	-	-	-
SL062 0-3" (d)	-	-	-	-	-	-
SL063 0-3"	-	-	-	-	-	-
SL064 0-3"	-	-	-	-	-	-
SL065 0-3"	-	-	-	-	-	-
SL066 0-3"	-	-	-	-	-	-
SL066 2-4	-	-	-	-	-	-
SL067 0-3"	-	-	-	-	-	-
SL068 0-3" DL (c)	-	-	-	-	-	-
SL068 0-3"	-	-	-	-	-	-
SL069 0-3"	-	-	-	-	-	-
SL070 0-3" DL (c)	-	-	-	-	-	-
SL071 0-3"	-	-	-	-	-	-
SL072 0-3"	-	-	-	-	6.7 J	-
SL072 5-7	-	-	-	-	-	-
SL073 0-3" DL	-	-	-	-	-	-
SL073 0-3"	-	-	-	-	-	-
SL074 0-3" DL	-	-	-	-	-	-
SL074 0-3"	-	-	-	-	-	-
SL075 0-3"	-	-	-	-	-	-
SL076 0-3"	-	-	-	-	-	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	Dieldrin
EPA Prelim. Remediation Goal(a)	*2700 ug/kg*	*1900 ug/kg*	*1900 ug/kg*	*38 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*40 ug/kg*
EPA August 1990, PCBs(b)	---	---	---	---	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	---
SL078 0-3'	35	9.4 J	33 J	-	-	-	-	-	-
SL079 0-3'	-	-	-	-	-	-	-	130	-
SL080 0-3'	-	-	-	-	-	-	-	-	2.2 J
SL082 0-3'	-	-	-	-	-	-	-	50000	-
SL082 3-5	-	-	-	-	-	-	-	2100	-
SL083 0-3'	-	-	-	-	-	-	-	12000	-
SL083 5-7	-	-	-	-	-	-	-	3700	-
SL084 0-3'	8 J	35	25	-	-	-	48	-	-
SL085 0-3'	-	7.1	-	-	-	-	-	-	-
SL086 0-3'	91 J	-	-	-	-	-	-	-	-
SL087 0-3'	-	10 J	-	-	-	-	-	-	-
SL088 0-3'	-	-	-	-	-	-	-	510	-
SL089 0-3'	-	-	-	-	-	-	70	170	-
SL090 0-3'	7.6 J	14	9.7 J	-	-	-	66	-	-
SL091 0-3'	-	-	-	-	-	-	130	-	-
SL092 0-3'	-	-	210	-	-	-	-	770	-
SL093 0-3'	-	-	-	-	-	-	-	130	-
SL095 0-3'	-	-	-	-	-	-	450	480	-
SL096 0-3'	-	5.4 J	-	-	-	-	-	-	-
SL097 1-3A	-	-	-	-	-	4100	-	1000	-
SL097 7-9	-	-	-	-	-	-	820	-	-
SL098 7-9	350	-	-	-	-	4900	-	-	-
SL099 5-7	-	-	-	-	-	-	2200	390 J	-
SL100 4-6	-	-	-	-	-	5700	-	850	-
SL101 0-3' DL (c)	-	-	-	-	-	-	-	24000 J	-

Notes:
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(b) U.S. Environmental Protection Agency, "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
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PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Endrin	Heptachlor	Heptachlor epoxide	alpha-BHC	alpha-Chlordane	gamma-Chlordane
EPA Prelim. Remediation Goal(a)	*81000 ug/kg*	---	---	---	---	---
EPA August 1990, PCBs(b)	---	---	---	---	---	---
SL078 0-3'	-	-	-	-	-	-
SL079 0-3'	-	-	-	-	-	-
SL080 0-3'	-	-	-	-	-	-
SL082 0-3'	-	-	-	-	-	-
SL082 3-5	-	-	-	-	-	-
SL083 0-3'	-	-	-	-	-	-
SL083 5-7	-	-	-	-	-	-
SL084 0-3'	-	-	-	2.9 J	-	-
SL085 0-3'	-	-	-	-	-	-
SL086 0-3'	-	55	180	-	310	310
SL087 0-3'	-	-	-	-	-	-
SL088 0-3'	-	-	-	-	-	-
SL089 0-3'	-	-	-	-	-	-
SL090 0-3'	-	-	-	-	-	-
SL091 0-3'	-	-	-	-	-	-
SL092 0-3'	-	-	-	-	-	-
SL093 0-3'	-	-	-	-	-	-
SL095 0-3'	-	-	-	-	-	-
SL096 0-3'	-	-	-	-	-	-
SL097 1-3A	-	-	-	-	-	-
SL097 7-9	-	-	-	-	-	-
SL098 7-9	-	-	-	-	-	-
SL099 5-7	-	-	-	-	-	-
SL100 4-6	-	-	-	-	-	-
SL101 0-3' DL (c)	-	-	-	-	-	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('-') represents a non-detection of a compound in a particular sample.
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(b) U.S. Environmental Protection Agency, "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
(c) Sample wa[illegible]ken during health and safety screening in December 1991.
(d) Sample [illegible] lected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	Dieldrin
EPA Prelim. Remediation Goal(a)	*2700 ug/kg*	*1900 ug/kg*	*1900 ug/kg*	*38 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*40 ug/kg*
EPA August 1990, PCBs(b)	---	---	---	---	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	---
SL101 0-3'	-	-	-	-	-	-	-	27000	-
SL102 0-3' DL (c)	-	-	-	-	-	-	-	260000 J	-
SL102 0-3'	-	-	-	-	-	-	-	5400	-
SL103 0-3' DL (c)	-	-	-	-	-	-	-	3300 J	-
SL103 0-3'	-	-	-	-	-	-	-	2800	-
SL104 0-3' DL (c)	-	-	-	-	-	-	-	2500 J	-
SL104 0-3'	-	-	-	-	-	-	-	620	-
SL105 0-3' DL (c)	-	-	-	-	-	-	-	1700 J	-
SL105 0-3'	-	7.5 J	-	-	-	-	-	860	-
SL106 0-3' DL (c)	-	-	-	-	-	-	-	800 J	-
SL106 0-3'	-	-	-	-	-	-	-	150	-
SL107 0-3' DL (c)	-	-	-	-	-	-	-	53 J	-
SL107 0-3'	-	-	-	-	-	-	-	72	-
SL108 0-3'	-	8.2	-	-	-	-	-	-	-
SL110 0-3'	-	3.3 J	-	-	-	-	-	-	-
SL111 0-3'	-	11	-	-	-	-	-	340	-
SL112 0-3'	-	-	-	-	-	-	36	99	-
SL113 0-3'	-	34	52	-	-	-	-	400	-
SL114 0-3'	-	-	-	-	-	-	-	78	-
SL115 0-3'	-	4.5 J	-	-	-	-	-	230	-
SL116 0-3'	20 J	15	17 J	3.5 J	-	-	-	180	-
SL117 0-3'	-	-	-	-	-	-	-	190	-
SL119 0-3'	-	11	-	-	-	-	-	180	-
SL120 0-3'	-	-	8200	-	-	-	-	-	-
SL122 0-3'	-	-	-	-	-	-	-	220	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard index of 1 to future site resident.
(b) U.S. Environmental Protection Agency, "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Endrin	Heptachlor	Heptachlor epoxide	alpha-BHC	alpha-Chlordane	gamma-Chlordane
EPA Prelim. Remediation Goal(a)	*81000 ug/kg*	---	---	---	---	---
EPA August 1990, PCBs(b)	---	---	---	---	---	---
SL101 0-3'	-	-	-	-	-	-
SL102 0-3' DL (c)	-	-	-	-	-	-
SL102 0-3'	-	-	-	-	-	-
SL103 0-3' DL (c)	-	-	-	-	-	-
SL103 0-3'	-	-	-	-	-	-
SL104 0-3' DL (c)	-	-	-	-	-	-
SL104 0-3'	-	-	-	-	-	-
SL105 0-3' DL (c)	-	-	-	-	-	-
SL105 0-3'	-	-	-	-	-	-
SL106 0-3' DL (c)	-	-	-	-	-	-
SL106 0-3'	-	-	-	-	-	-
SL107 0-3' DL (c)	-	-	-	-	-	-
SL107 0-3'	-	-	-	-	-	-
SL108 0-3'	-	-	-	-	-	-
SL110 0-3'	-	-	-	-	-	-
SL111 0-3'	-	-	-	-	-	-
SL112 0-3'	-	-	-	-	-	-
SL113 0-3'	-	-	-	-	-	-
SL114 0-3'	-	-	-	-	-	-
SL115 0-3'	-	-	-	-	-	-
SL116 0-3'	-	-	-	-	15 J	15 J
SL117 0-3'	-	-	-	-	-	-
SL119 0-3'	-	-	-	-	-	-
SL120 0-3'	-	-	-	-	-	-
SL122 0-3'	-	-	-	-	-	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard index of 1 to future site resident.
(b) U.S. Environmental Protection Agency, "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
(c) Sample w 'en during health and safety screening in December 1991.
(d) Sample v lected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	Dieldrin
EPA Prelim. Remediation Goal(a)	*2700 ug/kg*	*1900 ug/kg*	*1900 ug/kg*	*38 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*40 ug/kg*
EPA August 1990, PCBs(b)	---	---	---	---	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	---
SL123 0-3'	-	-	-	-	-	-	-	150	-
SL124 0-3'	-	-	-	-	-	-	-	86	-
SL125 0-3'	-	-	-	-	-	-	-	180	-
SL126 0-3'	-	-	-	-	-	-	-	53	-
SL127 0-3'	-	7.1	-	-	-	-	-	170	-
SL27001 0-3'	-	-	-	-	-	-	-	800	-
SL27001 2-4	-	-	-	-	-	-	-	170	-
SL27002 2-4	-	-	-	-	-	-	-	110	-
SL27003 0-3'	-	-	-	-	-	-	-	5900 J	-
SL27004 0-3'	-	-	-	-	-	-	-	2000	-
SL27005 0-3'	-	-	-	-	-	-	-	3300 J	-
SL27005 2-4	-	-	-	-	-	-	-	360	-
SL27006 0-3'	-	-	-	-	-	-	-	140	-
SL27006 2-4	-	-	-	-	-	140	-	-	-
SL27007 0-3'	-	39 J	-	-	-	-	-	1200	-
SL27007 2-4	-	-	9.4 J	-	-	-	-	110	-
SL27008 0-3'	-	-	-	-	-	-	-	760	-
SL27008 2-4	-	-	-	-	-	-	-	240	-
SL27009 0-3'	-	-	-	-	-	-	-	1500 J	-
SL27009 2-4	-	-	-	-	-	-	-	1500 J	-
SL27010 0-3'	-	-	-	-	-	-	-	4700	-
SL27010 2-4	-	-	-	-	-	-	-	75	-
SL27011 0-3'	-	130	130	-	-	-	1800	1100	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard index of 1 to future site resident.
(b) U.S. Environmental Protection Agency, "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS EPA METHOD 8080 TARGET COMPOUND LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Endrin	Heptachlor	Heptachlor epoxide	alpha-BHC	alpha-Chlordane	gamma-Chlordane
EPA Prelim. Remediation Goal(a)	*81000 ug/kg*	---	---	---	---	---
EPA August 1990, PCBs(b)	---	---	---	---	---	---
SL123 0-3"	-	-	-	-	-	-
SL124 0-3"	-	-	-	-	-	-
SL125 0-3"	-	-	-	-	-	-
SL126 0-3"	-	-	-	-	-	-
SL127 0-3"	-	-	-	-	-	-
SL27001 0-3"	-	-	-	-	-	-
SL27001 2-4	-	-	-	-	-	-
SL27002 2-4	-	-	-	-	-	-
SL27003 0-3"	-	-	-	-	-	-
SL27004 0-3"	-	-	-	-	-	-
SL27005 0-3"	-	-	-	-	-	-
SL27005 2-4	-	-	-	-	-	-
SL27006 0-3"	-	-	-	-	-	-
SL27006 2-4	-	-	-	-	-	-
SL27007 0-3"	-	-	-	-	-	-
SL27007 2-4	-	-	-	-	-	-
SL27008 0-3"	-	-	-	-	-	-
SL27008 2-4	-	-	-	-	-	-
SL27009 0-3"	-	-	-	-	-	-
SL27009 2-4	-	-	-	-	-	-
SL27010 0-3"	-	-	-	-	-	-
SL27010 2-4	-	-	-	-	-	-
SL27011 0-3"	-	-	-	-	-	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. A dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard index of 1 to future site resident.
(b) U.S. Environmental Protection Agency, "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
(c) Sample was taken during health and safety screening in December 1991.
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
FDER Soil Action Level(a)	---	---	*55 mg/kg*	*2750 mg/kg*	---	*55 mg/kg*	---	*275 mg/kg*	---
EPA Prelim. Remediation Goal(b)	---	*108 mg/kg*	*81 mg/kg*	*13500 mg/kg*	*0.15 mg/kg*	*135 mg/kg*	---	*1350 mg/kg*	---
SL011 2–4	1900	–	3.1	13.5 J	–	4.2	1530 J	19	–
SL013 2–4	2160	4.3 J	1 J	25.5 J	–	7.5	2160 J	18.2	1.4 J
SL022 2–4	3550	3.8 J	6.4	45.2 J	–	6.3	6650 J	76.6	–
SL024 2–4	2000	–	0.79 J	13.3 J	–	0.72 J	1130 J	10.4	–
SL026 2–4	3700	–	–	19 J	–	0.57 J	922 J	8.8	–
SL032 2–4	2860	11.4 J	7.6	289 J	–	3.6	7760	32.9	2.7 J
SL034 9–11	7310	7.9 J	4.3 J	319 J	–	44.7 J	7810	62.9 J	5.1 J
SL035 9–11	4300	4.5 J	9 J	514 J	–	17.7 J	19100	52.5 J	3.6 J
SL039 10–12	3140	14.9	3.1 J	240 J	0.15 J	13.3 J	17000	144 J	3 J
SL040 7.5–8.5 (c)	7230	–	10.3 J	3860 J	–	36.2 J	12400	76.7 J	3.5 J
SL040 7.5–8.5	5890	–	10.2 J	691 J	–	44.7 J	15300	128 J	3.2 J
SL040 9–11	7320	6.4 J	7.5 J	234 J	0.11 J	56.3 J	17600	238 J	9.2 J
SL041 3–4	18800	108	10.7	466 J	–	74.6	16200	170	8.9 J
SL043 5–7	1400	–	1.6 J	53.3 J	–	18.5 J	11100	95.6 J	1.2 J
SL044 7–9	4470	15	4.4 J	236 J	–	53.7 J	11000	473 J	3.6 J
SL047 3–5	2400	–	6.9 J	96.1 J	0.16 J	17.8 J	13600	69.8 J	2.4 J
SL048 1–2	3460	11.8 J	3	58.2 J	–	12.2	2660	27.4	1.8 J
SL050 2–4	2530	–	–	7.5 J	–	–	1520 J	4.3	–
SL052 1–2	2780	8 J	0.8 J	71.9 J	–	31.1	1450 J	90.1	6 J
SL053 4–6	618	–	0.54 J	74.2	–	–	2170	2.8 J	–
SL056 0–3' (d)	105	–	0.27 J	4.9 J	–	–	272 J	0.47 J	–
SL057 0–3' (d)	3660	–	19.6	70.4	–	2.5	3470	14.6	2.4 J
SL058 0–3' (d)	133	–	0.34 J	8.6 J	–	0.65 J	1760	2.5	–
SL059 0–3' (d)	371	–	–	14.4 J	–	–	2590	3.9	–
SL060 0–3' (d)	662	–	–	3.6 J	–	0.74 J	1730	1.2 J	2.1 J

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10–6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
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APPENDIX D
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INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Copper	Cyanide	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium
FDER Soil Action Level(a)	---	---	---	*77 mg/kg*	---	---	*17 mg/kg*	---	---
EPA Prelim. Re-mediation Goal(b)	*9990 mg/kg*	*5400 mg/kg*	---	---	---	*27000 mg/kg*	*81 mg/kg*	*5400 mg/kg*	---
SL011 2-4	113	-	1330 J	59.9	76.4 J	14.4	0.2	4.6 J	-
SL013 2-4	34.6	-	11700 J	119	127 J	55.5	0.3	7.3 J	89.6 J
SL022 2-4	28.7	-	4770 J	166	272 J	33	0.17	5.3 J	131 J
SL024 2-4	9.2	-	1350 J	15.7	101 J	9.6	0.11	2.5 J	78.5 J
SL026 2-4	4.9 J	-	2130 J	167	201 J	4.5	0.09	-	205 J
SL032 2-4	97.8 J	-	10700 J	762 J	1440	106 J	0.28	15.2	214 J
SL034 9-11	533 J	0.29 J	18300 J	1030	852 J	160 J	1.5	38.3 J	125 J
SL035 9-11	160 J	0.69	15900 J	354	1880	185 J	2.4	25.7 J	366 J
SL039 10-12	147 J	0.5 J	12700 J	376	653 J	171 J	0.86	10.3 J	255 J
SL040 7.5-8.5 (c)	785 J	10	32200 J	2200 J	1940	365 J	0.5	36.5 J	787 J
SL040 7.5-8.5	710 J	10	36700 J	804 J	1190 J	470 J	0.34	38.4 J	682 J
SL040 9-11	1330 J	0.34 J	47100 J	622	798 J	614 J	0.59	185 J	233 J
SL041 3-4	1390 J	0.91	59000 J	1240 J	1200 J	789 J	1.9	96.7	337 J
SL043 5-7	41.9 J	-	7930 J	147	229 J	74.9 J	0.11	5.9 J	-
SL044 7-9	347 J	0.41 J	26500 J	836	550 J	221 J	1.2	25.4 J	228 J
SL047 3-5	84.8 J	-	10500 J	272	481 J	93 J	0.15	6.7 J	176 J
SL048 1-2	109 J	-	6950 J	141 J	339 J	55.2 J	0.48	13.7	159 J
SL050 2-4	2.1 J	-	16400 J	5	170 J	10.9	-	-	-
SL052 1-2	170	-	20000 J	548	289 J	117	1	56.1	119 J
SL053 4-6	17.3 J	-	2690	39.2	79.2 J	65.1	-	-	-
SL056 0-3' (d)	1.9 J	-	69.2	21.7	24.5 J	3.4	-	-	-
SL057 0-3' (d)	12.9	-	42900	368	293 J	150	-	6.6 J	67.4 J
SL058 0-3' (d)	1.6 J	-	109	4.5	45.8 J	11.1	-	-	-
SL059 0-3' (d)	11.2	-	297	15.6	95.6 J	14.4	-	2.2 J	-
SL060 0-3' (d)	1.8 J	-	274	14.1	60.4 J	6.3	-	-	-

Notes:
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2. The shaded values represent positive detections of the particular analyte.
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4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
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APPENDIX D
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INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
FDER Soil Action Level(a)	*165 mg/kg*	*165 mg/kg*	---	---	---	---
EPA Prelim. Remediation Goal(b)	*1350 mg/kg*	*1350 mg/kg*	---	*19 mg/kg*	*1890 mg/kg*	*54000 mg/kg*
SL011 2-4	–	0.54 J	70.7 J	–	3.8 J	383
SL013 2-4	–	1.6 J	106 J	–	7.4 J	140
SL022 2-4	0.16 J	1.3 J	161 J	–	9.1 J	154
SL024 2-4	–	0.29 J	85 J	–	4 J	24.1
SL026 2-4	–	–	83.4 J	–	11.9	20.4
SL032 2-4	0.13 J	0.46 J	109 J	–	8.7 J	1710 J
SL034 9-11	0.17 J	7.5	148 J	–	9.2 J	1210
SL035 9-11	0.33 J	21.5	237 J	–	16.1	666
SL039 10-12	0.13 J	3	201 J	–	7.9 J	748
SL040 7.5-8.5 (c)	0.54 J	18.6 J	–	–	9.4 J	4380
SL040 7.5-8.5	0.74 J	48.8 J	–	–	9.6 J	2680
SL040 9-11	0.31 J	4.4	303 J	–	32.3	1100
SL041 3-4	0.23 J	42.2 J	176 J	–	24.9	2650 J
SL043 5-7	0.18 J	2.1 J	109 J	–	5.6 J	159
SL044 7-9	0.52 J	4	189 J	–	10.2 J	1030
SL047 3-5	0.25 J	1.2 J	153 J	0.27 J	5.4 J	408
SL048 1-2	0.17 J	8.9 J	101 J	–	13.7	270 J
SL050 2-4	–	–	106 J	–	4 J	14.4
SL052 1-2	–	4.6 J	116 J	–	12.1 J	537
SL053 4-6	–	–	82.4 J	–	1.2 J	51.1 J
SL056 0-3" (d)	–	–	184 J	–	1 J	5
SL057 0-3" (d)	–	–	–	–	31.1	212
SL058 0-3" (d)	–	0.55 J	–	–	0.77 J	5.5
SL059 0-3" (d)	–	–	–	–	2.8 J	16.8
SL060 0-3" (d)	–	–	–	–	1.2 J	4.2 J

Notes:
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(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
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SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
FDER Soil Action Level(a)	---	---	*55 mg/kg*	*2750 mg/kg*	---	*55 mg/kg*	---	*275 mg/kg*	---
EPA Prelim. Remediation Goal(b)	---	*108 mg/kg*	*81 mg/kg*	*13500 mg/kg*	*0.15 mg/kg*	*135 mg/kg*	---	*1350 mg/kg*	---
SL061 0–3' (d)	929	–	0.36 J	15.4 J	–	–	3830	4.8	–
SL062 0–3' (d)	655	–	–	9.8 J	–	0.56 J	3510	2.5 J	2.2 J
SL063 0–3'	1110	–	0.33 J	10.6 J	–	1.2	640 J	6	–
SL064 0–3'	3140	–	0.34 J	11.1 J	–	0.41 J	2140	4.4	–
SL065 0–3'	1410	–	0.34 J	33.4 J	–	44.1	1400	19.4	–
SL066 0–3'	1290	–	0.81 J	8.1 J	–	0.76 J	27700 J	4.1	–
SL066 2–4	1180	–	–	2.8 J	–	0.5 J	16100 J	1.1 J	–
SL067 0–3'	1050	7 J	0.55 J	20.7 J	–	164	1380	185	2.4 J
SL068 0–3' (c)	2210	–	0.27 J	7.2 J	–	–	678 J	5.6 J	–
SL068 0–3'	1130	–	0.55 J	4.8 J	–	–	457 J	5.1	–
SL069 0–3'	1880	4.3 J	0.7 J	32.5 J	–	124	2020	199	1.5 J
SL069 1–2	1260	–	1.2 J	18.1 J	–	1.6	368 J	5.2	–
SL070 0–3' (c)	1570	–	0.17 J	9 J	–	–	3880	5.2 J	–
SL070 0–3'	1800	–	–	1.5 J	–	–	322 J	–	–
SL071 0–3'	10500	–	2.2 J	48.2 J	–	13.3	1450	16.8	1.7 J
SL072 0–3'	2830	–	2.5	153 J	–	5.4	2970 J	27.3	1.7 J
SL072 5–7	5770	5.3 J	3.1	179 J	–	27.3	4910 J	35.4	3.5 J
SL073 0–3' (c)	1710	–	0.32 J	8.6 J	–	–	20800	4.9 J	–
SL073 0–3'	1740	–	0.66 J	8.5 J	–	0.56 J	7000 J	5.3	–
SL073 4–6	6100	–	0.95 J	13.2 J	–	–	683 J	11.5	–
SL074 0–3' (c)	2130	–	0.46 J	8.8 J	–	–	21400	8.2 J	–
SL074 0–3'	1460	–	0.34 J	9.1 J	–	–	7280	1.8 J	–
SL074 5–6	1550	–	0.36 J	8 J	–	–	4310	3.4 J	1.2 J
SL075 0–3'	1120	–	0.22 J	6.9 J	–	–	2540	4	–
SL076 0–3'	4380	–	12.6	66.3	–	13.8	1350	19.5	2.6 J
SL077 0–3'	2150	–	0.59 J	16.4 J	–	3.1	3150	5.8 J	–

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10–6 or Hazard Index of 1 to future site resident.
(c) Sample v[illegible]n during health and safety screening in December 1991.
(d) Sample w[illegible]ected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Copper	Cyanide	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium
FDER Soil Action Level(a)	---	---	---	*77 mg/kg*	---	---	*17 mg/kg*	---	---
EPA Prelim. Remediation Goal(b)	*9990 mg/kg*	*5400 mg/kg*	---	---	---	*27000 mg/kg*	*81 mg/kg*	*5400 mg/kg*	---
SL061 0-3' (d)	7.5	–	1050	74.1	296 J	143	–	–	66 J
SL062 0-3' (d)	2.6 J	–	325	15.1	159 J	18.7	–	–	–
SL063 0-3'	8.2	–	1350	44.6	66.9 J	16.7	0.09	2.6 J	–
SL064 0-3'	2.2 J	–	1760	5.3	185 J	7.7	0.05 J	–	–
SL065 0-3'	62.1	–	2280	121	103 J	101	0.23	6.7 J	–
SL066 0-3'	9.3	–	2110 J	160	233 J	32.3	0.09	2.8 J	96.6 J
SL066 2-4	3.7 J	–	459 J	12.5	122 J	8.3	–	–	–
SL067 0-3'	46.4	0.37 J	8590	601	78.4 J	81.9	0.11	64.4	–
SL068 0-3' (c)	–	10	1000 J	34.6 J	137 J	12.1 J	–	–	–
SL068 0-3'	2.7 J	–	665	349	93.7 J	6.6	–	–	–
SL069 0-3'	56.3	–	4040	484	219 J	48.3	0.15	36.1	–
SL069 1-2	13.7	–	4930	49.6	135 J	5.3	–	–	–
SL070 0-3' (c)	–	10	1010 J	25.7 J	143 J	15.5 J	–	2.3 J	–
SL070 0-3'	0.78 J	–	317	1.3	43 J	6.4	–	–	–
SL071 0-3'	58.4	–	6740	125	162 J	60.9	0.25	11.4	–
SL072 0-3'	75.7	–	8650 J	241	298 J	72.9	0.85	11.3	166 J
SL072 5-7	5840	–	31100 J	293	895 J	189	0.24	27.8	190 J
SL073 0-3' (c)	–	10	883 J	47.7 J	213 J	17.1 J	–	1.5 J	–
SL073 0-3'	4 J	–	2040 J	56.7	192 J	14	0.06	–	73.7 J
SL073 4-6	2.4 J	–	12900 J	4.2	128 J	2.5 J	0.07	–	140 J
SL074 0-3' (c)	–	10	1460 J	41.3 J	405 J	24.9 J	–	4.3 J	–
SL074 0-3'	–	–	1040	17.8	174 J	12.6	0.03 J	–	–
SL074 5-6	–	–	1020	10	207 J	15.9	–	–	–
SL075 0-3'	4.1 J	–	774	48.1	111 J	19	0.05 J	–	–
SL076 0-3'	107	–	11400	196	200 J	103	0.57	9.8 J	–
SL077 0-3'	17.1 J	0.98	2680	77	961 J	25.7	0.07	–	–

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
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3. The dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC). Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
FDER Soil Action Level(a)	*165 mg/kg*	*165 mg/kg*	---	---	---	---
EPA Prelim. Remediation Goal(b)	*1350 mg/kg*	*1350 mg/kg*	---	*19 mg/kg*	*1890 mg/kg*	*54000 mg/kg*
SL061 0-3' (d)	–	–	–	–	3.1 J	46.6
SL062 0-3' (d)	–	–	–	–	2.7 J	10.4
SL063 0-3'	–	0.51 J	86.3 J	–	5.2 J	35.5
SL064 0-3'	0.16 J	–	92.2 J	–	5 J	8.3
SL065 0-3'	–	4.9	95.9 J	–	3.8 J	205
SL066 0-3'	–	–	237 J	–	4.5 J	66.1
SL066 2-4	–	0.38 J	209 J	–	1.7 J	14.9
SL067 0-3'	–	2.2 J	122 J	–	6.3 J	217
SL068 0-3' (c)	–	–	–	–	3.2 J	21.6
SL068 0-3'	–	–	104 J	–	2.6 J	23.4
SL069 0-3'	0.13 J	1.9 J	106 J	–	6.3 J	242
SL069 1-2	0.16 J	0.58 J	146 J	–	4 J	12.5
SL070 0-3' (c)	–	–	–	–	1.8 J	19.6
SL070 0-3'	0.11 J	–	107 J	–	2 J	0.86 J
SL071 0-3'	–	9.8	116 J	–	9.4 J	205
SL072 0-3'	–	6 J	113 J	–	17.3	295
SL072 5-7	0.16 J	7.8 J	138 J	–	13.7	1690
SL073 0-3' (c)	–	–	–	–	2.4 J	20
SL073 0-3'	–	–	101 J	–	5.8 J	27.2
SL073 4-6	–	–	99.2 J	–	22	3.7 J
SL074 0-3' (c)	–	–	–	–	4.4 J	55.4
SL074 0-3'	–	–	88.3 J	–	5.7 J	9 J
SL074 5-6	–	–	103 J	–	5.2 J	5.6 J
SL075 0-3'	–	–	109 J	–	3.2 J	24.3
SL076 0-3'	–	4.9	132 J	–	7 J	357
SL077 0-3'	0.14 J	–	74.7 J	–	4 J	150 J

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10^{-6} or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in D[illegible]er 1991.
(d) Sample was collected for determination of fence boundary [illegible]ebruary 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
FDER Soil Action Level(a)	---	---	*55 mg/kg*	*2750 mg/kg*	---	*55 mg/kg*	---	*275 mg/kg*	---
EPA Prelim. Remediation Goal(b)	---	*108 mg/kg*	*81 mg/kg*	*13500 mg/kg*	*0.15 mg/kg*	*135 mg/kg*	---	*1350 mg/kg*	---
SL077 4-5	1180	–	–	2.3 J	–	–	362 J	1.8 J	–
SL079 0-3'	1370	–	0.43 J	20.8 J	–	0.65 J	2810	8.9 J	–
SL079 4-6	655	–	–	2.1 J	–	–	118 J	1.6 J	–
SL080 0-3'	839	–	0.18 J	1.9 J	–	–	104 J	–	–
SL081 0-3'	2470	–	0.34 J	16 J	–	0.46 J	12600	4.3 J	1.4 J
SL081 3-5	1290	–	3.8	221	–	3.8	9830	15.5 J	7.9 J
SL082 0-3'	1480	4.8 J	0.25 J	53.7	–	7.7	537 J	472 J	1.9 J
SL082 3-5	2400	–	–	4.9 J	–	1.3	219 J	6.9 J	–
SL083 0-3'	805	–	–	22.7 J	–	4.2	338 J	213 J	1.1 J
SL083 5-7	3550	–	0.29 J	8.2 J	–	0.64 J	146 J	23.8 J	–
SL084 0-3'	2110	5.6 J	1.3 J	62	–	8.7	2380	25.3	1.6 J
SL085 0-3'	1070	–	1.6 J	54.7	–	2.5	5180	9.8	–
SL086 0-3'	2060	–	1.1 J	36 J	–	7.3	8410	14.5	1.4 J
SL087 0-3'	1120	–	0.22 J	11.6 J	–	–	924 J	8.4	–
SL088 0-3'	2190	–	0.62 J	74.8	–	13.2	2130	74	2.7 J
SL089 0-3'	2680	4.8 J	0.56 J	31.1 J	–	13.6	825 J	22	2.1 J
SL090 0-3'	2170	–	2.9	39.4 J	–	4.1	1060 J	12.6	–
SL091 0-3'	1410	–	0.2 J	8.9 J	–	1.4	199 J	10.9	–
SL092 0-3'	622	–	0.72 J	11.5 J	–	1.3 J	656 J	7.9	–
SL093 0-3'	4660	5.3 J	1.2 J	70.8	–	19.3	4980	32.4	3.3 J
SL094 0-3'	1610	–	–	5 J	–	–	149 J	–	–
SL095 0-3'	1670	–	0.45 J	24.5 J	–	0.48 J	75000	4.3	–
SL096 0-3'	2270	–	0.55 J	12.8 J	0.16 J	3.6	454 J	30.6	–
SL096 2-4	3860	5.1 J	2 J	55.3	–	21.9	1480	74.9	3.2 J
SL097 1-3	4560	6.8 J	2.8 J	338 J	–	13.2 J	3390	70.2 J	3.8 J

Notes:
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3. The dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Copper	Cyanide	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium
FDER Soil Action Level(a)	---	---	---	*77 mg/kg*	---	---	*17 mg/kg*	---	---
EPA Prelim. Re-mediation Goal(b)	*9990 mg/kg*	*5400 mg/kg*	---	---	---	*27000 mg/kg*	*81 mg/kg*	*5400 mg/kg*	---
SL077 4-5	-	-	265	1.9	38.3 J	4.6	-	-	-
SL079 0-3'	7.2 J	-	1100	70.6	185 J	29.5	0.06	-	-
SL079 4-6	-	-	206	2.8	22.5 J	3.4	-	-	-
SL080 0-3'	0.98 J	-	497	8.9	25.6 J	2.1 J	0.05 J	-	-
SL081 0-3'	7.9 J	-	2650	38.7	505 J	21.1	0.07	-	-
SL081 3-5	45 J	0.47 J	79800	403	448 J	361	1.3	13.2	-
SL082 0-3'	22 J	9.1	1150	1490	85.2 J	7.5	0.11	2.3 J	-
SL082 3-5	5.1 J	-	585	21.8	32.7 J	3.5	-	-	-
SL083 0-3'	10.7 J	1.4	782	589	43.8 J	8.7	0.08	-	-
SL083 5-7	-	0.74	5220	70	87.4 J	3.2 J	0.05 J	-	-
SL084 0-3'	167	-	8100	241	412 J	69.8	0.22	12.8	484 J
SL085 0-3'	29.9	-	6810	123	199 J	44.4	-	4 J	-
SL086 0-3'	67	-	5220	258	261 J	50.1	0.41	7.7 J	-
SL087 0-3'	4 J	-	702	39.6	168 J	4.1 J	0.17	-	129 J
SL088 0-3'	73.3	-	4640	222	338 J	64.8	0.34	15.5	238 J
SL089 0-3'	147	-	10300	522	202 J	75.4	0.11	43.9	-
SL090 0-3'	59.3	-	3690	116	280 J	45.8	0.23	17.3	-
SL091 0-3'	10.9	-	982	40.2	51.3 J	5.5	0.11	3.3 J	-
SL092 0-3'	8.1	-	1480	29.4	78.9 J	9.4	0.06 J	-	-
SL093 0-3'	153	-	17900	143	632 J	151	0.31	104	224 J
SL094 0-3'	1.3 J	-	238	3.3	32.8 J	3.3 J	0.05 J	-	-
SL095 0-3'	5.6 J	0.2 J	1220	180	870 J	55.4	-	-	-
SL096 0-3'	26	-	4000	45.3	146 J	19.7	0.11	7.4 J	81.8 J
SL096 2-4	132	-	22100	242	236 J	136	0.55	37.1	-
SL097 1-3	105 J	0.37 J	7410 J	212	422 J	91.7 J	0.67	15.2 J	125 J

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
2. The shaded values represent positive detections of the particular analyte.
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INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
FDER Soil Action Level(a)	*165 mg/kg*	*165 mg/kg*	---	---	---	---
EPA Prelim. Remediation Goal(b)	*1350 mg/kg*	*1350 mg/kg*	---	*19 mg/kg*	*1890 mg/kg*	*54000 mg/kg*
SL077 4-5	–	–	86.5 J	–	1.3 J	4.3 J
SL079 0-3"	0.11 J	–	96.5 J	–	2.9 J	121 J
SL079 4-6	–	–	74 J	–	1 J	5.8 J
SL080 0-3"	–	–	90.9 J	–	3.8 J	2 J
SL081 0-3"	–	–	94.2 J	–	7.3 J	22.5 J
SL081 3-5	–	0.95 J	113 J	–	4.1 J	1010 J
SL082 0-3"	–	1.2 J	108 J	–	7.8 J	656 J
SL082 3-5	0.23 J	–	86.9 J	–	2.6 J	62.1 J
SL083 0-3"	–	0.38 J	94.2 J	–	3.2 J	268 J
SL083 5-7	0.16 J	–	81.1 J	–	10.4 J	43 J
SL084 0-3"	0.14 J	2 J	155 J	–	7.7 J	314
SL085 0-3"	0.14 J	0.58 J	121 J	–	4.7 J	231
SL086 0-3"	–	0.59 J	123 J	–	3.3 J	351
SL087 0-3"	–	–	271 J	–	5.1 J	14 J
SL088 0-3"	0.19 J	4.4 J	175 J	–	6.8 J	263
SL089 0-3"	0.15 J	2 J	112 J	–	3.2 J	364
SL090 0-3"	0.21 J	1.6 J	246 J	–	6 J	306
SL091 0-3"	0.15 J	0.5 J	72.1 J	–	2.8 J	30.9
SL092 0-3"	–	0.78 J	104 J	–	3.1 J	30.4
SL093 0-3"	0.2 J	5.6 J	232 J	–	7.3 J	478
SL094 0-3"	0.15 J	–	76 J	–	2 J	3.1 J
SL095 0-3"	0.12 J	–	162 J	–	5.8 J	65.2
SL096 0-3"	–	1.7 J	105 J	–	4.7 J	70.7 J
SL096 2-4	0.15 J	5.8 J	130 J	–	17.5	418 J
SL097 1-3	0.27 J	20.7	204 J	0.21 J	7.4 J	390

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
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INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
FDER Soil Action Level(a)	---	---	*55 mg/kg*	*2750 mg/kg*	---	*55 mg/kg*	---	*275 mg/kg*	---
EPA Prelim. Remediation Goal(b)	---	*108 mg/kg*	*81 mg/kg*	*13500 mg/kg*	*0.15 mg/kg*	*135 mg/kg*	---	*1350 mg/kg*	---
SL097 7–9	2200	–	0.5 J	32.7 J	–	24.7 J	1900	40.9 J	1.8 J
SL098 7–9	4500	–	1.8 J	64.6 J	–	9.1 J	4610	28 J	3.4 J
SL099 5–7	2070	9.1 J	3.6 J	107 J	–	15.2 J	9250	36 J	2.8 J
SL100 4–6	1550	–	0.83 J	25.2 J	–	3.1 J	3020	46.5 J	–
SL27001 0–3'	659	–	0.37 J	15.4 J	–	0.68 J	6140	18.1	–
SL27001 2–4	1260	–	–	3.6 J	–	–	524 J	2.7	–
SL27002 0–3'	590	–	0.18 J	6.2 J	–	0.56 J	356000	6.4	–
SL27002 2–4	1060	–	–	3.1 J	–	–	21400	1.5 J	–
SL27003 0–3'	725	4.3 J	0.5 J	10.5 J	–	0.73 J	188000	16.9	–
SL27003 2–4	1420	–	–	2.5 J	–	–	608 J	2.1 J	–
SL27004 0–3'	764	–	0.87 J	13.4 J	–	0.93 J	38400	40.8	–
SL27004 2–4	5010	–	–	2.6 J	–	–	2000	2.7	–
SL27005 0–3'	1110	–	0.36 J	8 J	–	0.83 J	4810	15	–
SL27005 2–4	1500	–	0.14 J	9.7 J	0.1 J	–	2070	4.1	–
SL27006 0–3'	838	–	0.29 J	8.4 J	–	0.61 J	312000	6.6	–
SL27006 2–4	2400	–	–	2.5 J	–	–	11300	2.8	–
SL27007 0–3'	382	–	0.75 J	38.7 J	–	1.4	917 J	11.9	–
SL27007 2–4	2850	–	0.16 J	8 J	–	–	703 J	4.8	–
SL27008 0–3'	503	–	0.24 J	8.5 J	–	–	1990	8	–
SL27008 2–4	1630	–	–	4.7 J	–	–	1700	3.1	–
SL27009 0–3'	2910	–	0.79 J	12.6 J	–	0.44 J	120000	5.4	–
SL27009 2–4	1580	–	–	–	–	–	49300	2.2	–
SL27010 0–3'	539	5.6 J	6.4	41.8 J	–	1.4	16300	27.6	1.2 J
SL27010 2–4	1480	–	0.13 J	4.3 J	–	–	524 J	2.1 J	–
SL27011 0–3'	391	4.5 J	0.9 J	52 J	–	1.6	4240	45.7	–
SL27011 2–4	967	–	0.13 J	5 J	–	–	628 J	2.2 J	–

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
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3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10–6 or Hazard Index of 1 to future site resident.
(c) Sample was [illegible] during health and safety screening in December 1991.
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APPENDIX D
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INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Copper	Cyanide	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium
FDER Soil Action Level(a)	---	---	---	*77 mg/kg*	---	---	*17 mg/kg*	---	---
EPA Prelim. Remediation Goal(b)	*9990 mg/kg*	*5400 mg/kg*	---	---	---	*27000 mg/kg*	*81 mg/kg*	*5400 mg/kg*	---
SL097 7–9	22 J	0.34 J	2460 J	91.5	257 J	22.1 J	0.13	34.9 J	128 J
SL098 7–9	97.8 J	0.21 J	5440 J	118	432 J	38.8 J	0.09	30.9 J	269 J
SL099 5–7	92.4 J	0.32 J	12400 J	321	650 J	81.8 J	0.36	13.5 J	481 J
SL100 4–6	19.4 J	0.18 J	1850 J	81.9	175 J	15.9 J	0.09	2.1 J	87.2 J
SL27001 0–3'	11.6	–	2350	177	172 J	22	0.05 J	4.3 J	94.6 J
SL27001 2–4	0.89 J	–	327	7.2	62 J	4.2	–	–	113 J
SL27002 0–3'	1.1 J	–	354	2.6	2380	28.9	–	–	–
SL27002 2–4	1.2 J	–	215	5.2	175 J	5.8	–	–	66.4 J
SL27003 0–3'	5.3 J	–	1320	121	1360	38.7	–	–	123 J
SL27003 2–4	0.52 J	–	202	2.1	34.2 J	3.8	–	–	–
SL27004 0–3'	10.5	0.55	1980	255	287 J	19.7	0.05 J	–	68.8 J
SL27004 2–4	0.46 J	–	156	3.4	35.7 J	1.4 J	–	–	–
SL27005 0–3'	5.1 J	–	1540	113	88.5 J	12.2	0.04 J	–	128 J
SL27005 2–4	1.2 J	–	238	20.7	34.1 J	4.9	0.07	–	80.8 J
SL27006 0–3'	1.4 J	–	632	9.8	2200	35.2	–	–	69.6 J
SL27006 2–4	0.44 J	–	184	2.3	110 J	7.8	–	–	66.3 J
SL27007 0–3'	4.6 J	–	803	133	41.8 J	13.9	0.11	–	68.1 J
SL27007 2–4	0.84 J	–	243	19.1	30.7 J	4.6	0.07	2.2 J	–
SL27008 0–3'	3.6 J	–	1020	71.3	73.3 J	12.2	0.03 J	2.9 J	96.6 J
SL27008 2–4	1.3 J	–	169 J	14.4	32.6 J	2.8 J	–	–	72.9 J
SL27009 0–3'	1.8 J	–	2480 J	8.3	892 J	17.3 J	–	–	159 J
SL27009 2–4	1.3 J	–	816 J	3.1	365 J	14.3 J	–	–	89.9 J
SL27010 0–3'	76.2 J	–	10000 J	2990 J	167 J	61 J	0.05 J	2.4 J	–
SL27010 2–4	1.9 J	–	267 J	38.8	33.6 J	–	–	–	68.7 J
SL27011 0–3'	16.1 J	–	1700 J	620 J	83.7 J	20.5 J	0.06	–	–
SL27011 2–4	0.68 J	–	139 J	3.5	20.1 J	7.4 J	0.03 J	–	74.6 J

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10–6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS TARGET ANALYTE LIST
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
FDER Soil Action Level(a)	*165 mg/kg*	*165 mg/kg*	---	---	---	---
EPA Prelim. Remediation Goal(b)	*1350 mg/kg*	*1350 mg/kg*	---	*19 mg/kg*	*1890 mg/kg*	*54000 mg/kg*
SL097 7-9	0.15 J	4.7	388 J	0.21 J	4.1 J	149
SL098 7-9	0.16 J	2.4	319 J	–	10.5 J	202
SL099 5-7	0.41 J	1.4 J	150 J	–	24.3	479
SL100 4-6	0.23 J	0.5 J	119 J	–	3.5 J	64.7
SL27001 0-3"	–	–	91.9 J	–	1.9 J	139 J
SL27001 2-4	–	–	107 J	–	1.2 J	10.9 J
SL27002 0-3"	–	–	169 J	–	8.6 J	3.8 J
SL27002 2-4	–	–	85 J	–	1.6 J	3 J
SL27003 0-3"	–	–	128 J	–	6.7 J	81 J
SL27003 2-4	–	–	93.3 J	–	1 J	1.2 J
SL27004 0-3"	–	–	87.9 J	–	3.5 J	257 J
SL27004 2-4	0.31 J	–	68.5 J	–	0.87 J	1.7 J
SL27005 0-3"	–	0.38 J	78.3 J	–	3.5 J	140 J
SL27005 2-4	–	–	99.4 J	–	0.74 J	23.3 J
SL27006 0-3"	–	–	142 J	–	9.6 J	10.8 J
SL27006 2-4	–	–	104 J	–	2.2 J	1.2 J
SL27007 0-3"	–	–	101 J	–	2.2 J	321 J
SL27007 2-4	0.17 J	–	90 J	–	1.1 J	33.7 J
SL27008 0-3"	–	–	98 J	–	1.6 J	85.2 J
SL27008 2-4	–	–	109 J	–	0.74 J	13.3 J
SL27009 0-3"	0.18 J	–	124 J	–	10.2 J	27.7 J
SL27009 2-4	0.16 J	–	96 J	–	3.5 J	5.7 J
SL27010 0-3"	–	–	83.6 J	–	2.8 J	409 J
SL27010 2-4	–	–	84 J	–	0.86 J	7.7 J
SL27011 0-3"	–	–	72.1 J	–	2.1 J	2600 J
SL27011 2-4	0.12 J	–	89.2 J	–	0.47 J	69.7 J

Notes:
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4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10^{-6} or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in D[illegible]er 1991.
(d) Sample was collected for determination of fence boundary [illegible]ebruary 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
RADIONUCLIDES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Gross alpha	Gross beta	Radium-226	Radium-228
FDER Soil Action Level(a)	---	---	---	---
EPA Prelim. Remediation Goal(b)	---	---	*2.5 x 10E-5 pCi/g*	*7.7 pCi/g*
SL011 2-4	1	0.8	0.5	-
SL013 2-4	2.4	1.3	0.5	-
SL022 2-4	1.8	1.6	1.1	0.5
SL024 2-4	1.7	0.8	0.6	-
SL026 2-4	2	3.3	1.2	-
SL032 2-4	1.5	1.2	0.8	-
SL034 9-11	2.6	3.9	1.1	-
SL035 9-11	2.2	4	0.7	-
SL039 10-12	1.8	1.1	0.5	0.4
SL040 7.5-8.5 (c)	14.6	4.6	4	0.4
SL040 9-11	1	-	1.2	-
SL041 3-4	2.5	3.9	1.4	-
SL043 5-7	3	2.1	0.3	0.6
SL044 7-9	2	-	0.5	0.4
SL047 3-5	1.6	-	0.4	0.6
SL048 1-2	1.9	2.1	1.3	-
SL050 2-4	2.2	2	0.8	-
SL052 1-2	2.3	2.1	0.9	-
SL053 4-6	0.9	0.7	0.6	-
SL057 0-3" (d)	2.6	5.1	1.3	-
SL058 0-3" (d)	1	0.8	-	-
SL059 0-3" (d)	6.3	1.3	0.4	-
SL060 0-3" (d)	1.5	1	-	-
SL061 0-3" (d)	2.9	2.5	0.6	-
SL062 0-3" (d)	0.5	0.5	0.4	-
SL063 0-3"	2	1.2	0.9	-

Notes:
1. All results are reported in picocuries per per gram (pCi/g).
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4. "J" Signifies the compound was detected at an estimated concentration.

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(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
RADIONUCLIDES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Gross alpha	Gross beta	Radium-226	Radium-228
FDER Soil Action Level(a)	---	---	---	---
EPA Prelim. Remediation Goal(b)	---	---	*2.5 x 10E-5 pCi/g*	*7.7 pCi/g*
SL064 0-3"	1.9	2.1	1	0.5
SL065 0-3"	1.2	1.6	0.7	-
SL066 0-3"	1.6	1.6	1.1	-
SL066 2-4	1.7	0.8	0.5	-
SL067 0-3"	1.7	2.2	1.1	-
SL068 0-3" (c)	0.9	1.7	0.4	0.5
SL068 0-3"	0.8	0.8	0.5	-
SL069 0-3"	2	1.2	0.4	-
SL069 1-2	1.1	0.6	1.1	-
SL070 0-3" (c)	1	0.7	0.4	-
SL070 0-3"	0.7	0.3	0.7	-
SL071 0-3"	1.3	1.7	0.9	-
SL072 0-3"	2.7	1.9	1.4	-
SL072 5-7	2.7	0.9	0.8	-
SL073 0-3" (c)	2.3	-	0.4	-
SL073 0-3"	2.2	0.9	0.9	-
SL073 4-6	2.8	1.9	1.5	0.5
SL074 0-3" (c)	2.6	1	0.4	-
SL074 0-3"	0.7	1.2	0.8	-
SL074 5-6	1.6	1.2	0.9	-
SL075 0-3"	1	1.3	0.8	-
SL076 0-3"	2.4	2.8	0.6	-
SL077 0-3"	1.4	0.6	1	-
SL077 4-5	0.7	-	0.4	-
SL079 0-3"	2.4	2.4	0.4	0.3
SL079 4-6	1.2	1	0.6	-

Notes:
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
RADIONUCLIDES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Gross alpha	Gross beta	Radium-226	Radium-228
FDER Soil Action Level(a)	---	---	---	---
EPA Prelim. Remediation Goal(b)	---	---	*2.5 x 10E-5 pCi/g*	*7.7 pCi/g*
SL080 0-3"	1.1	0.7	0.6	-
SL081 0-3"	2	0.6	1.5	-
SL081 3-5	2	-	1.9	-
SL082 0-3"	8.8	4.4	40.2	0.6
SL082 3-5	2	1.4	0.6	0.5
SL083 0-3"	3.4	1.8	2.7	-
SL083 5-7	3.3	1.5	0.7	0.5
SL084 0-3"	1.7	1.7	1	-
SL085 0-3"	0.6	2.9	0.6	-
SL087 0-3"	2.6	3.4	1	1.2
SL088 0-3"	3.8	2	1.2	-
SL089 0-3"	1.4	1.5	0.9	-
SL090 0-3"	1.7	1.5	0.8	-
SL091 0-3"	1.7	1.5	0.7	-
SL092 0-3"	3.2	4.4	1	-
SL093 0-3"	1.8	2.3	0.6	-
SL094 0-3"	1.8	2	0.9	-
SL095 0-3"	1.6	0.7	0.7	-
SL096 0-3"	2.1	2.2	0.9	0.7
SL096 2-4	2.7	32.2	0.7	-
SL097 1-3A	1.8	1.6		0.5
SL097 7-9	1.2	-	-	0.4
SL098 7-9	3.2	2.3	0.8	0.7
SL099 5-7	1.8	1.9	0.8	-
SL100 4-6	1.9	1	0.6	0.8

Notes:
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
RADIONUCLIDES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Gross alpha	Gross beta	Radium-226	Radium-228
FDER Soil Action Level(a)	---	---	---	---
EPA Prelim. Remediation Goal(b)	---	---	*2.5 x 10E-5 pCi/g*	*7.7 pCi/g*
SL27001 0-3"	-	1.2	0.7	1
SL27001 2-4	0.8	0.5	1.1	-
SL27002 0-3"	16.7	5.2	1	-
SL27002 2-4	0.6	0.5	1	-
SL27003 0-3"	5.6	7.2	0.8	-
SL27003 2-4	1.2	0.7	0.6	-
SL27004 0-3"	3.2	4	0.6	-
SL27004 2-4	1.7	1	0.6	-
SL27005 0-3"	2.3	1.1	0.6	-
SL27005 2-4	1.4	0.8	0.9	-
SL27006 0-3"	0.8	6.5	0.7	-
SL27006 2-4	2	0.9	0.4	-
SL27007 0-3"	1.4	1.1	-	-
SL27007 2-4	1.7	0.8	0.4	-
SL27008 0-3"	0.9	-	0.6	-
SL27008 2-4	1.8	1.3	0.4	-
SL27009 0-3"	-	1.5	0.7	0.5
SL27009 2-4	1.1	0.5	0.4	-
SL27010 0-3"	2.4	1.5	-	-
SL27010 2-4	1.2	-	0.4	-
SL27011 0-3"	0.5	1.5	-	-
SL27011 2-4	1.5	0.9	0.5	-

Notes:
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
DIOXINS AND FURANS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-HpCDF	OCDD	OCDF
FDER Soil Action Level(a)	---	---	---	---
EPA Prelim. Remediation Goal(b)	---	---	---	---
SL034 0-3"	1.6	0.33	9.8	1.5
SL034 9-11	0.58	-	3.6	-
SL039 0-3"	1.4	0.25	9.4 J	1.1 J
SL039 10-12	2.2	0.44	13 J	1.2 J
SL040 7.5-8.5 (c)	2.2 J	1.7 J	17 J	-
SL040 0-3"	0.32	-	1.6 J	-
SL040 9-11	0.84	-	3.2	-
SL040A 0-2 (c)	-	-	8	-
SL043 0-3"	0.24	-	1.2 J	-
SL044 0-3"	1.3	-	9 J	-
SL044 7-9	1.7 J	-	12 J	-
SL047 3-5	-	-	0.96 J	-
SL068 0-3" (c)	0.31	0.33	2.2	2.9
SL070 0-3" (c)	-	-	0.35	-
SL074 0-3" (c)	-	-	0.67	-
SL096 0-3"	-	-	0.24	-
SL096 2-4	-	-	0.87 J	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
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4. "J" Signifies the compound was detected at an estimated concentration.

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Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
DIOXINS AND FURANS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	HpCDDs (total)	HpCDFs (total)	HxCDDs (total)	HxCDFs (total)	PeCDFs (total)	TCDFs (total)
FDER Soil Action Level(a)	---	---	---	---	---	---
EPA Prelim. Remediation Goal(b)	---	---	---	---	---	---
SL034 0-3"	3.1	1.2	0.26	0.27	-	-
SL034 9-11	1.2	-	-	-	-	-
SL039 0-3"	3	0.73	0.55	0.18	-	0.06
SL039 10-12	6.9	1.2	0.69	0.65	0.12	0.084 J
SL040 7.5-8.5 (c)	4.1 J	3 J	-	-	-	-
SL040 0-3"	0.63	-	0.097	-	-	-
SL040 9-11	1.6	-	0.52	-	-	-
SL043 0-3"	0.49	-	-	-	-	0.13
SL044 0-3"	2.6	0.36	0.32	-	-	0.079
SL044 7-9	3.6 J	0.54 J	-	-	-	-
SL047 0-3"	0.08	-	-	-	-	-
SL047 3-5	0.15	-	-	-	-	-
SL068 0-3" (c)	0.56	1.2	-	0.14	-	-
SL096 2-4	0.39	-	-	-	-	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/Depth	2–Butanone	Acetone	Bromomethane	Carbon Disulfide	Chloro–benzene	Chloro–methane	Methylene chloride	Tetrachloro–ethene	Toluene
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Re–mediation Goal(b)	*13.5 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	*378.0 x 10E3 ug/kg*	*27.0 x 10E6 ug/kg*	*5.4 x 10E6 ug/kg*	*49.2 x 10E3 ug/kg*	*85.3 x 10E3 ug/kg*	*12.5 x 10E3 ug/kg*	*54.0 x 10E6 ug/kg*
EB	8 J	–	–	–	–	–	15	–	–
EB001	15 J	–	–	–	14	–	–	–	–
SLEB002	18	–	–	–	14	–	–	–	–
SLEB003	17	–	–	–	16	–	–	–	–
SLEB004	–	–	–	–	7	–	–	–	–
EB005	–	–	–	–	4 J	–	–	–	–
SLEB006	16 J	–	–	–	10	–	53	–	–
SLEB007	–	–	–	–	9	–	–	–	–
SLEB008	–	–	–	–	9	–	–	–	–
SLFB001	16 J	–	–	–	15	–	–	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
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(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10–6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: MATRIX SPIKES, MATRIX SPIKE DUPLICATES, AND REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/Depth	2-Butanone	Acetone	Bromomethane	Carbon Disulfide	Chloro-benzene	Chloro-methane	Methylene chloride	Tetrachloro-ethene	Toluene
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Remediation Goal(b)	*13.5 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	*378.0 x 10E3 ug/kg*	*27.0 x 10E6 ug/kg*	*5.4 x 10E6 ug/kg*	*49.2 x 10E3 ug/kg*	*85.3 x 10E3 ug/kg*	*12.5 x 10E3 ug/kg*	*54.0 x 10E6 ug/kg*
SLMS001 9-11	–	–	–	–	–	–	–	–	–
SLMSD001 9-11	–	–	–	–	–	–	–	–	–
SLMS003 2-4	–	18 J	–	–	–	–	13 J	3 J	–
SLMSD003 2-4	–	15 J	–	–	–	–	15 J	–	–
SL27MS004 2-4	–	–	–	–	–	–	6 J	–	–
SL27MSD004 2-4	–	–	5 J	–	–	12 J	8 J	–	–
SLMS005 1-2	–	–	14 J	–	–	44 J	9 J	–	–
SLMSD005 1-2	–	–	13 J	–	–	41 J	11 J	–	–
SL068_MS (c)	–	4 J	–	–	–	–	11 J	–	–
SL068_MSD (c)	–	10 J	–	–	–	–	12 J	–	–
SLRP001 0-3" (d)	–	–	–	1 J	–	–	–	–	2 J
SLRP001 9-11	–	–	–	–	–	–	–	–	–
SLRP002 0-3"	–	–	–	–	–	–	–	–	–
SLRP003 2-4	–	–	–	–	–	–	–	–	–
SL27RP004 2-4	–	–	–	–	–	–	–	–	–
SLRP005 1-2	–	–	3 J	–	–	–	–	–	–
SLRP006 0-3"	–	–	–	–	–	–	–	–	–
SLRP007 0-3"	–	–	–	–	–	–	2 J	–	–
SLRP008 0-3"	–	–	–	–	–	–	3 J	–	–
RP040 (c)	–	1800	–	–	–	–	–	–	300 J

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: TRIP BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/Depth	2-Butanone	Acetone	Bromomethane	Carbon Disulfide	Chloro-benzene	Chloro-methane	Methylene chloride	Tetrachloro-ethene	Toluene
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Re-mediation Goal(b)	*13.5 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	*378.0 x 10E3 ug/kg*	*27.0 x 10E6 ug/kg*	*5.4 x 10E6 ug/kg*	*49.2 x 10E3 ug/kg*	*85.3 x 10E3 ug/kg*	*12.5 x 10E3 ug/kg*	*54.0 x 10E6 ug/kg*
TB	–	–	–	–	–	–	12	–	–
TB001	–	–	–	–	–	–	–	–	–
SLTB002	–	–	–	–	–	–	–	–	–
SLTB003	–	–	–	–	–	–	–	–	–
SLTB004	–	–	–	–	–	–	–	–	–
SLTB005	–	–	–	–	–	–	–	–	–
SLTB006	–	12 J	–	–	–	–	–	–	–
SLTB007	–	5 J	–	–	–	–	–	–	–
TB007	–	–	–	–	–	–	–	–	–
SLTB008	–	9 J	–	–	–	–	–	–	–
SLTB009	–	7 J	–	–	–	–	–	–	–
SLTB010	–	4 J	–	–	–	–	–	–	–
SLTB011	–	–	–	–	–	–	–	–	–
SLTB012	–	28	–	–	–	–	–	–	–
SLTB013	–	–	–	–	–	–	–	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/Depth	Trichloro-ethene	Xylenes (total)
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Re-mediation Goal(b)	*58.2 x 10E3 ug/kg*	*540.0 x 10E6 ug/kg*
EB	–	–
EB001	–	–
SLEB002	–	–
SLEB003	–	–
SLEB004	–	–
EB005	–	–
SLEB006	–	–
SLEB007	–	–
SLEB008	–	–
SLFB001	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: MATRIX SPIKES, MATRIX SPIKE DUPLICATES, AND REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/Depth	Trichloro-ethene	Xylenes (total)
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Re-mediation Goal(b)	*58.2 x 10E3 ug/kg*	*540.0 x 10E6 ug/kg*
SLMS001 9-11	–	–
SLMSD001 9-11	–	–
SLMS003 2-4	–	–
SLMSD003 2-4	–	–
SL27MS004 2-4	–	–
SL27MSD004 2-4	–	1 J
SLMS005 1-2	–	–
SLMSD005 1-2	–	–
SL068_MS (c)	–	6 J
SL068_MSD (c)	–	9 J
SLRP001 0-3" (d)	–	6 J
SLRP001 9-11	–	–
SLRP002 0-3"	–	–
SLRP003 2-4	2 J	–
SL27RP004 2-4	–	2 J
SLRP005 1-2	–	–
SLRP006 0-3"	–	–
SLRP007 0-3"	–	–
SLRP008 0-3"	–	–
RP040 (c)	–	350 J

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: TRIP BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/Depth	Trichloro-ethene	Xylenes (total)
FDER Soil Action Level(a)	*50 ug/kg Total VOA*	*100 ug/kg Total VOA*
EPA Prelim. Remediation Goal(b)	*58.2 x 10E3 ug/kg*	*540.0 x 10E6 ug/kg*
TB	–	–
TB001	–	–
SLTB002	–	–
SLTB003	–	–
SLTB004	–	–
SLTB005	–	–
SLTB006	–	–
SLTB007	–	–
TB007	–	–
SLTB008	–	–
SLTB009	–	–
SLTB010	–	–
SLTB011	–	–
SLTB012	–	–
SLTB013	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10–6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	2-Methyl-naphthalene	Acenaphthene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*
EPA Prelim. Remediation Goal(b)	---	*16.2 x 10E6 ug/kg*	*81.0 x 10E6 ug/kg*	*1.1 x 10E3 ug/kg*	*0.11 x 10E3 ug/kg*	*1.1 x 10E3 ug/kg*	---	*1.1 x 10E3 ug/kg*	*11.0 x 10E3 ug/kg*
SLEB002	–	–	–	–	–	–	–	–	–
SLEB003	–	–	–	–	–	–	–	–	–
SLEB004	–	–	–	–	–	–	–	–	–
EB005	–	–	–	–	–	–	–	–	–
SLEB006	–	–	–	–	–	–	–	–	–
SLEB006RE	–	–	–	–	–	–	–	2 J	–
SLEB007	–	–	–	–	–	–	–	–	2 J

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS: MATRIX SPIKES, MATRIX SPIKE DUPLICATES, AND REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	2-Methyl-naphthalene	Acenaphthene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*
EPA Prelim. Remediation Goal(b)	---	*16.2 x 10E6 ug/kg*	*81.0 x 10E6 ug/kg*	*1.1 x 10E3 ug/kg*	*0.11 x 10E3 ug/kg*	*1.1 x 10E3 ug/kg*	---	*1.1 x 10E3 ug/kg*	*11.0 x 10E3 ug/kg*
SLMS001 9-11	-	-	190 J	230 J	230 J	250 J	290 J	210 J	280 J
SLMSD001 9-11	-	-	240 J	340 J	450 J	600 J	300 J	280 J	430 J
SLMS003 2-4	-	-	-	-	-	-	-	-	-
SLMSD003 2-4	-	-	-	-	-	-	-	-	100 J
SLMS005 1-2	-	-	-	-	-	140 J	-	83 J	-
SLMSD005 1-2	-	-	-	120 J	160 J	170 J	140 J	180 J	160 J
SLRP001 9-11	-	250 J	860	500 J	310 J	590 J	260 J	340 J	510 J
SLRP002 0-3"	-	-	-	-	-	-	-	-	-
SLRP003 2-4	-	-	-	-	250 J	-	-	-	89 J
SLRP005 1-2	-	-	-	100 J	300 J	360 J	170 J	210 J	140 J
SLRP007 0-3"	-	-	-	120 J	140 J	180 J	130 J	100 J	140 J
SLRP008 0-3"	-	140 J	330 J	710 J	590 J	590 J	400 J	510 J	720 J
RP040 (c)	6500 J	-	-	-	-	-	-	-	-
SL27RP004 2-4	-	-	-	-	-	-	-	-	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Dibenz (a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Phenanthrene	Pyrene	Di-n-butyl-phthalate	Dibenzofuran	bis(2-Ethyl-hexyl) phthalate
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	---	---	---
EPA Prelim. Remediation Goal(b)	*1.1 x 10E3 ug/kg*	*10.8 x 10E6 ug/kg*	*10.8 x 10E6 ug/kg*	*1.1 x 10E3 ug/kg*	---	*8.1 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	---	*45.7 x 10E3 ug/kg*
SLEB002	–	–	–	–	–	–	–	–	2 J
SLEB003	–	–	–	–	–	–	–	–	3 J
SLEB004	–	–	–	–	–	–	–	–	4 J
EB005	–	–	–	–	–	–	–	–	5 J
SLEB006	–	–	–	–	–	–	–	–	16
SLEB006RE	–	–	–	–	–	–	–	–	8 J
SLEB007	–	–	–	–	–	3 J	–	–	–

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS: MATRIX SPIKES, MATRIX SPIKE DUPLICATES, AND REPLICATE SAMPLE
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Dibenz (a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Phenanthrene	Pyrene	Di-n-butyl-phthalate	Dibenzofuran	bis(2-Ethyl-hexyl) phthalate
FDER Soil Action Level(a)	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	*6000 ug/kg Total PAH*	---	---	---
EPA Prelim. Remediation Goal(b)	*1.1 x 10E3 ug/kg*	*10.8 x 10E6 ug/kg*	*10.8 x 10E6 ug/kg*	*1.1 x 10E3 ug/kg*	---	*8.1 x 10E6 ug/kg*	*27.0 x 10E6 ug/kg*	---	*45.7 x 10E3 ug/kg*
SLMS001 9-11	-	750 J	92 J	290 J	540 J	-	490 J	-	360 J
SLMSD001 9-11	-	1000	110 J	250 J	670 J	-	310 J	100 J	490 J
SLMS003 2-4	-	-	-	-	-	-	-	-	6500
SLMSD003 2-4	-	-	-	-	-	-	-	-	420 J
SLMS005 1-2	-	-	-	-	-	-	-	-	410 J
SLMSD005 1-2	-	150 J	-	170 J	-	-	-	-	560 J
SLRP001 9-11	-	3000	330 J	230 J	1800	1600	320 J	160 J	390 J
SLRP002 0-3'	-	-	-	-	-	-	-	-	350 J
SLRP003 2-4	-	-	-	-	-	-	-	-	1700
SLRP005 1-2	-	120 J	-	150 J	-	120 J	-	-	460 J
SLRP007 0-3'	-	170 J	-	110 J	-	170 J	-	-	150 J
SLRP008 0-3'	94 J	1600	140 J	400 J	1200	1300	-	-	1600
RP040 (c)	-	-	-	-	-	-	-	-	3900 J
SL27RP004 2-4	-	-	-	-	-	-	-	-	47 J

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS: MATRIX SPIKES, MATRIX SPIKE DUPLICATES AND REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	4,4'-DDE	4,4'-DDT	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	Heptachlor	Heptachlor epoxide	alpha-Chlordne	gamma-Chlordane
EPA Prelim. Remediation Goal(a)	*1900 ug/kg*	*1900 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	*83 ug/kg*	---	---	---	---
EPA August 1990, PCBs (b)	---	---	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	*10000 ug/kg*	---	---	---	---
SLMS001 9-11	-	-	-	34000	-	-	-	-	-	-
SLMSD001 9-11	-	-	-	16000	-	-	-	-	-	-
SLMS002 0-3"	5.4 J	-	-	-	-	-	-	-	-	-
SLMSD002 0-3"	5.8 J	-	-	-	-	-	-	-	-	-
SLMSD003 3-4	-	-	-	-	-	-	-	-	400	750
SLMS007 0-3"	-	-	-	-	-	140	-	-	-	-
SLMS008 0-3"	-	-	-	-	-	2100	-	-	-	-
SLMS102 0-3"	-	-	-	-	-	6000	-	-	-	-
SLMSD102 0-3"	-	-	-	-	-	5900	-	-	-	-
RP040 (c)	-	-	18000 J	-	-	9100 J	-	-	-	-
SLRP001 9-11	-	-	-	17000	-	-	-	-	-	-
SLRP002 0-3"	5.4 J	-	-	-	-	2400	-	-	-	-
SLRP003 3-4	-	-	-	-	-	13000	-	-	-	-
SLRP007 0-3"	4.4 J	-	-	-	-	130	-	-	-	-
SLRP008 0-3"	-	-	-	-	-	-	350	350 J	480	970
SLRP010 0-3"	-	-	-	-	-	720	-	-	-	-
SLRP011 0-3"	-	-	-	-	-	86	-	-	-	-
SLRP012 0-3"	-	-	-	-	42	-	-	-	-	-
SLRP013 0-3"	-	1400 J	-	-	-	2200	-	-	-	-

Notes:
1. All results are reported in micrograms per kilogram (ug/kg).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('-') represents a non-detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.
(a) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991. Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(b) Environmental Protection Agency (EPA), "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," August 1990.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
FDER Soil Action Level(a)	---	---	*55 mg/kg*	*2750 mg/kg*	---	*55 mg/kg*	---	*275 mg/kg*	---
EPA Prelim. Remediation Goal(b)	---	*108 mg/kg*	*81 mg/kg*	*13500 mg/kg*	*0.15 mg/kg*	*135 mg/kg*	---	*1350 mg/kg*	---
EB	64.6 J	–	–	–	–	–	–	4.2 J	–
SLEB001	–	–	–	–	–	–	–	–	–
SLEB002	–	–	–	–	–	–	–	–	–
SLEB003	–	–	0.8 J	–	–	–	–	–	–
SLEB004	16.3 J	–	–	–	0.69 J	–	–	–	–
EB005	18.8 J	–	–	0.42 J	0.43 J	–	–	–	–
SLEB006	16.5 J	–	–	0.42 J	0.43 J	–	–	–	–
SLEB007	–	–	–	–	–	–	–	–	–
SLEB008	49.8 J	–	–	–	0.69 J	–	103 J	–	–
SLFB001	–	–	–	–	–	–	–	–	–

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10–6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
FDER Soil Action Level(a)	---	---	*55 mg/kg*	*2750 mg/kg*	---	*55 mg/kg*	---	*275 mg/kg*	---
EPA Prelim. Remediation Goal(b)	---	*108 mg/kg*	*81 mg/kg*	*13500 mg/kg*	*0.15 mg/kg*	*135 mg/kg*	---	*1350 mg/kg*	---
SLRP001 0-3' (d)	177	–	0.64 J	10.1 J	–	0.97 J	2050	7.1	1.9 J
SLRP001 9-11	7230	11.6 J	10.8 J	565 J	0.14 J	43.4 J	11100	81.6 J	6.5 J
SLRP002 0-3'	2650	–	0.74 J	13.9 J	–	3.5	446 J	33.5	–
SLRP003 2-4	3820	7.1 J	2.6	56.3	–	21.4	1710	52.3	3.4 J
SLRP005 1-2	2790	–	2.5	51.6 J	–	7.4	2600	25.9	1.8 J
SLRP006 0-3'	808	–	0.18 J	1.8 J	–	–	111 J	–	–
SLRP007 0-3'	1490	–	1.2 J	38.9 J	–	2.5	18600	9.3	–
SLRP008 0-3'	2170	–	1.6 J	37.2 J	–	40.4	13000	15	–

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
FDER Soil Action Level(a)	---	---	*77 mg/kg*	---	---	*17 mg/kg*	---	---	*165 mg/kg*
EPA Prelim. Remediation Goal(b)	*9990 mg/kg*	---	---	---	*27000 mg/kg*	*81 mg/kg*	*5400 mg/kg*	---	*1350 mg/kg*
EB	–	–	–	–	–	–	–	241 J	–
SLEB001	–	6.3 J	0.9 J	–	–	–	–	–	–
SLEB002	0.99 J	23.8 J	0.7 J	–	–	–	–	–	–
SLEB003	–	5.4 J	–	–	–	–	–	–	–
SLEB004	–	–	–	–	–	–	–	–	–
EB005	–	–	1.1 J	–	–	–	–	–	–
SLEB006	–	–	1.2 J	–	–	–	–	–	–
SLEB007	–	–	–	–	–	–	–	–	–
SLEB008	–	25.5 J	1.2 J	37.1 J	–	–	–	–	–
SLFB001	–	7 J	0.9 J	–	–	–	–	–	–

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10–6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
FDER Soil Action Level(a)	---	---	*77 mg/kg*	---	---	*17 mg/kg*	---	---	*165 mg/kg*
EPA Prelim. Remediation Goal(b)	*9990 mg/kg*	---	---	---	*27000 mg/kg*	*81 mg/kg*	*5400 mg/kg*	---	*1350 mg/kg*
SLRP001 0-3' (d)	1.7 J	158	10.9	66.9 J	6.6	–	–	–	–
SLRP001 9-11	524 J	38100 J	801	543 J	212 J	0.42	40.9 J	217 J	0.21 J
SLRP002 0-3'	19.4	2900	50.7	162 J	16.1	0.15	4.9 J	113 J	0.15 J
SLRP003 2-4	121	20000	255	308 J	133	0.59	33.7	76.4 J	0.19 J
SLRP005 1-2	109 J	5920 J	143 J	344 J	50 J	0.76	11	224 J	0.13 J
SLRP006 0-3'	0.88 J	487	9.7	27.1 J	2 J	0.04 J	–	–	–
SLRP007 0-3'	30.5	5050	114	625 J	53.2	0.11	3.5 J	228 J	0.17 J
SLRP008 0-3'	76.7	6860	151	291 J	55.2	0.58	6.5 J	–	–

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Silver	Sodium	Thallium	Vanadium	Zinc
FDER Soil Action Level(a)	*165 mg/kg*	---	---	---	---
EPA Prelim. Remediation Goal(b)	*1350 mg/kg*	---	*19 mg/kg*	*1890 mg/kg*	*54000 mg/kg*
EB	–	–	–	–	–
SLEB001	–	–	–	–	–
SLEB002	–	–	–	–	–
SLEB003	–	–	–	–	–
SLEB004	–	–	–	–	6 J
EB005	–	266 J	–	1.4 J	3.2 J
SLEB006	–	–	–	–	5.7 J
SLEB007	–	–	–	–	1.8 J
SLEB008	–	66.4 J	–	–	–
SLFB001	–	–	–	–	–

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10–6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

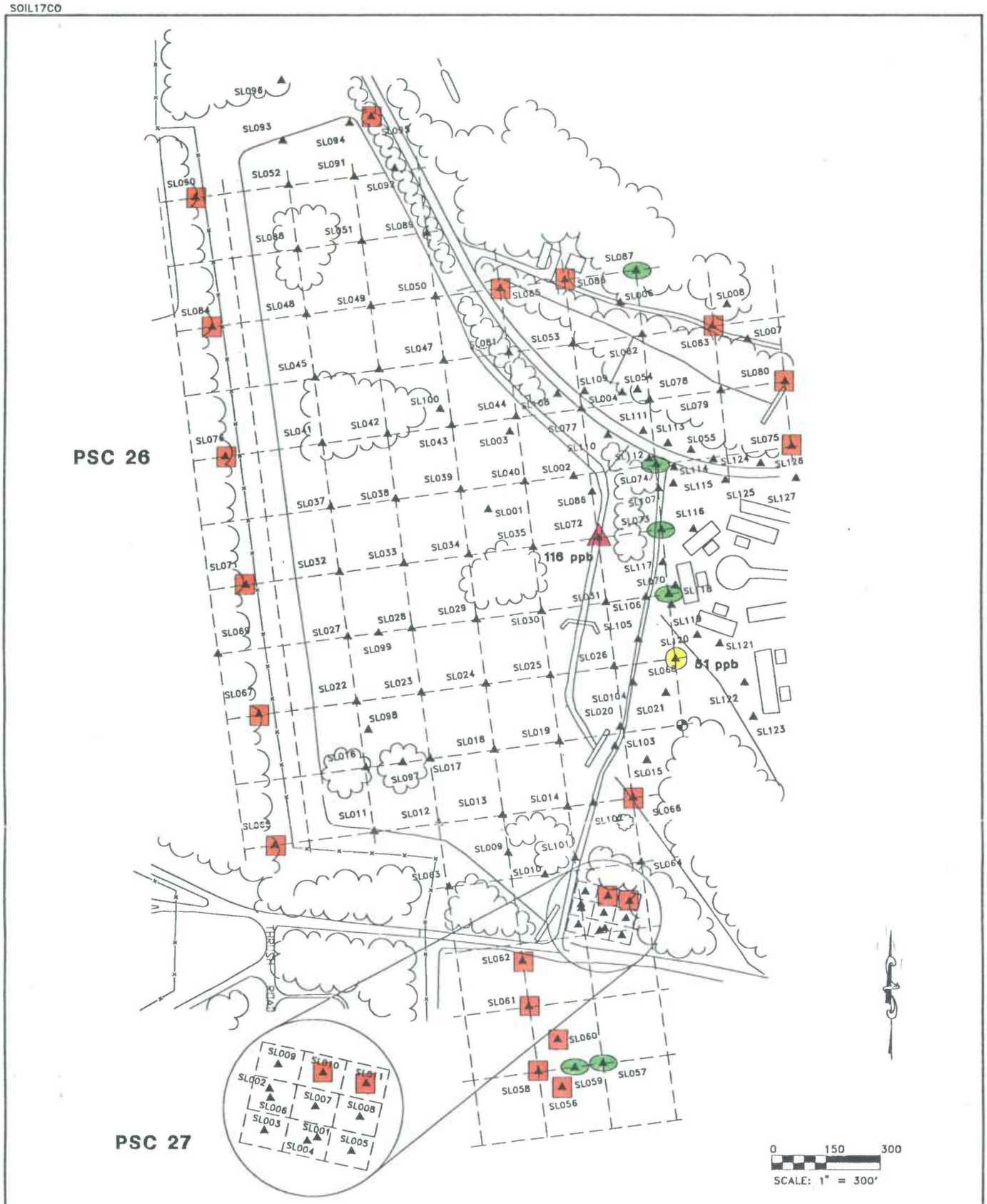
APPENDIX D
SUMMARY OF POSITIVE DETECTIONS IN SOIL ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: MATRIX SPIKES, MATRIX SPIKE DUPLICATES, AND REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MARCH 1992

Sample ID/ Depth (in feet)	Silver	Sodium	Thallium	Vanadium	Zinc
FDER Soil Action Level(a)	*165 mg/kg*	---	---	---	---
EPA Prelim. Remediation Goal(b)	*1350 mg/kg*	---	*19 mg/kg*	*1890 mg/kg*	*54000 mg/kg*
SLRP001 0-3' (d)	–	–	–	1.5 J	4.6 J
SLRP001 9-11	8	190 J	–	10.3 J	1370
SLRP002 0-3'	1.2 J	131 J	–	5.5 J	67.8 J
SLRP003 2-4	5.7 J	138 J	–	16.5	407 J
SLRP005 1-2	4.2 J	111 J	–	12.3 J	256 J
SLRP006 0-3'	–	105 J	–	3.3 J	2.1 J
SLRP007 0-3'	0.52 J	97.8 J	–	4.8 J	192
SLRP008 0-3'	0.36 J	109 J	–	3.7 J	403

Notes:
1. All results are reported in milligrams per kilogram (mg/kg).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.775 Florida Administrative Code (FAC), Petroleum Contaminated Soils, May 1992.
(b) U.S. Environmental Protection Agency, "Risk Assessment Guidance for Superfund," December 1991.
Calculated by Part B methodology to pose cancer risk of 10-6 or Hazard Index of 1 to future site resident.
(c) Sample was taken during health and safety screening in December 1991.
(d) Sample was collected for determination of fence boundary in February 1992.

SOIL17CO



LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- 1–10 ppb
- 10–50 ppb
- 50–100 ppb
- >100 ppb

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

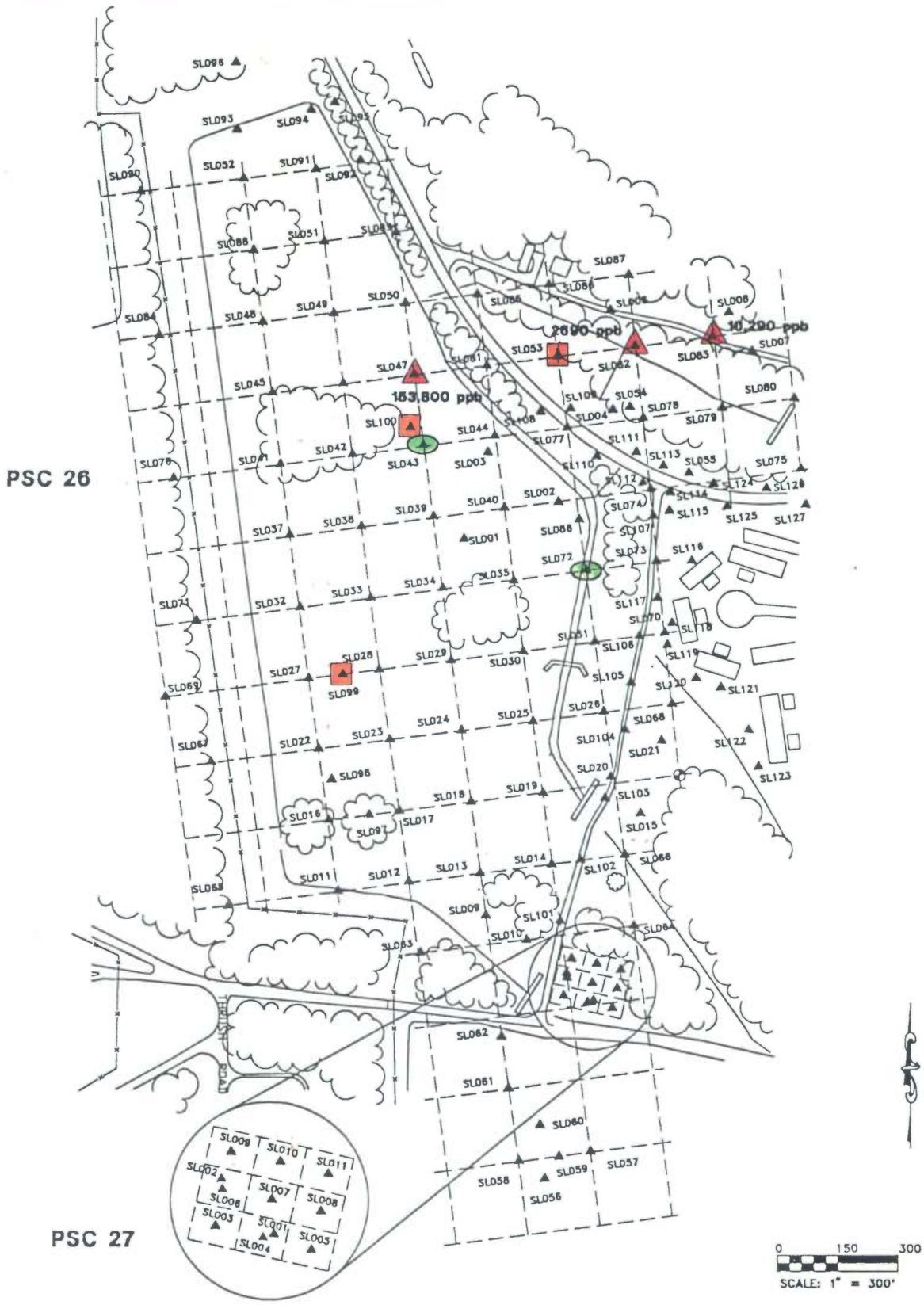
FIGURE D-1
TOTAL VOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES 0'-3'

LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- 1–10 ppb
- 10–50 ppb
- 50–100 ppb
- >100 ppb

FIGURE D-2
TOTAL VOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES 1'-4'

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA



LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- 1–10 ppb
- 10–50 ppb
- 50–100 ppb
- >100 ppb

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE D-3
TOTAL VOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES 4'-7'

FIGURE D-4
TOTAL VOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES 7'-12'

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

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JACKSONVILLE, FLORIDA

SOIL17CO

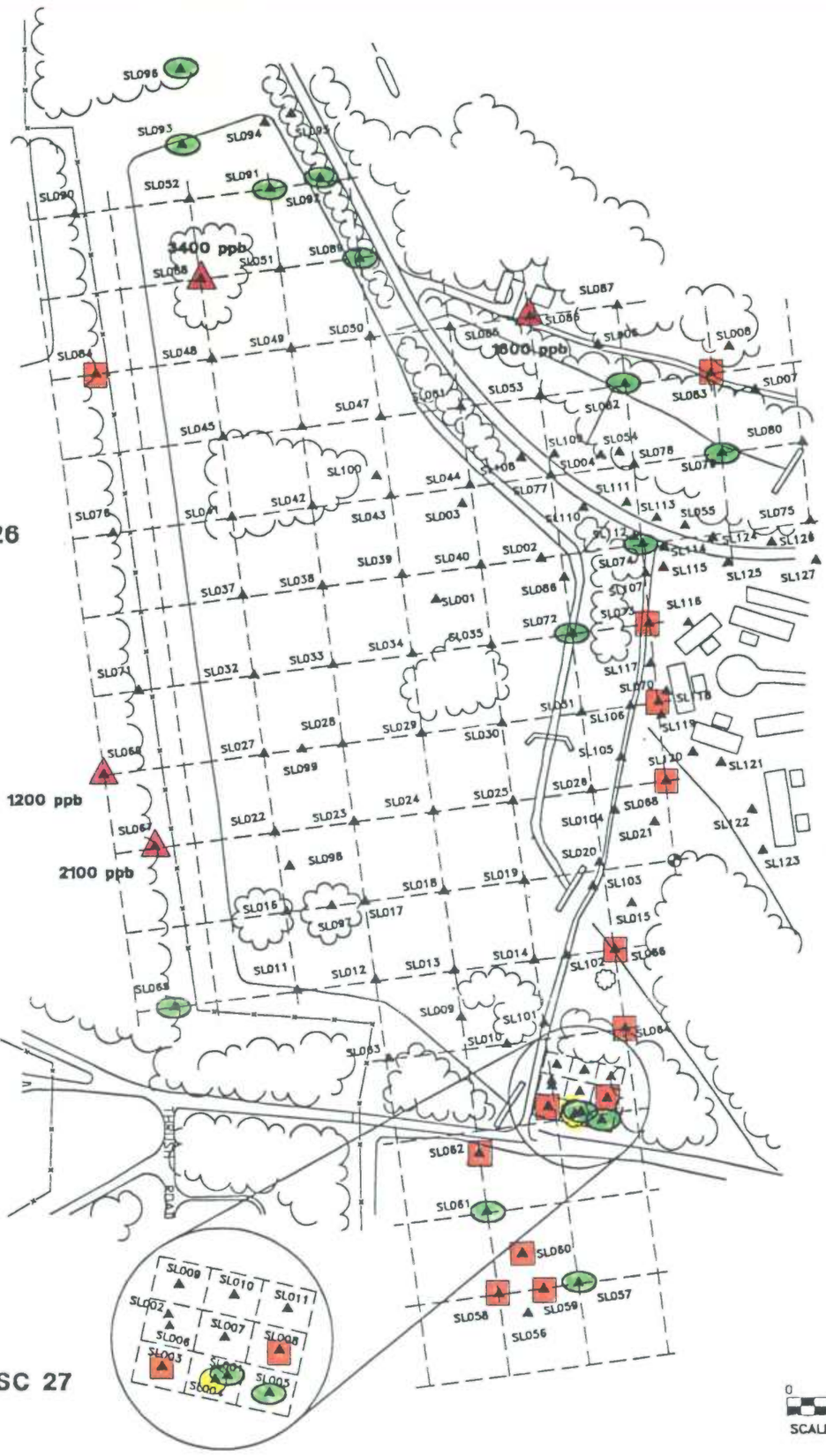
LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- 0"–3"
- 1'–4'
- 4'–7'
- 7'–12'

FIGURE D-5
SEMIVOLATILES(MISC.)
DETECTED IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO



LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- 1–100 ppb
- 100–500 ppb
- 500–1000 ppb
- >1000 ppb

FIGURE D-6
PHTHALATES (TOTAL) DETECTED
IN SOIL SAMPLES 0" - 3"

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17C0

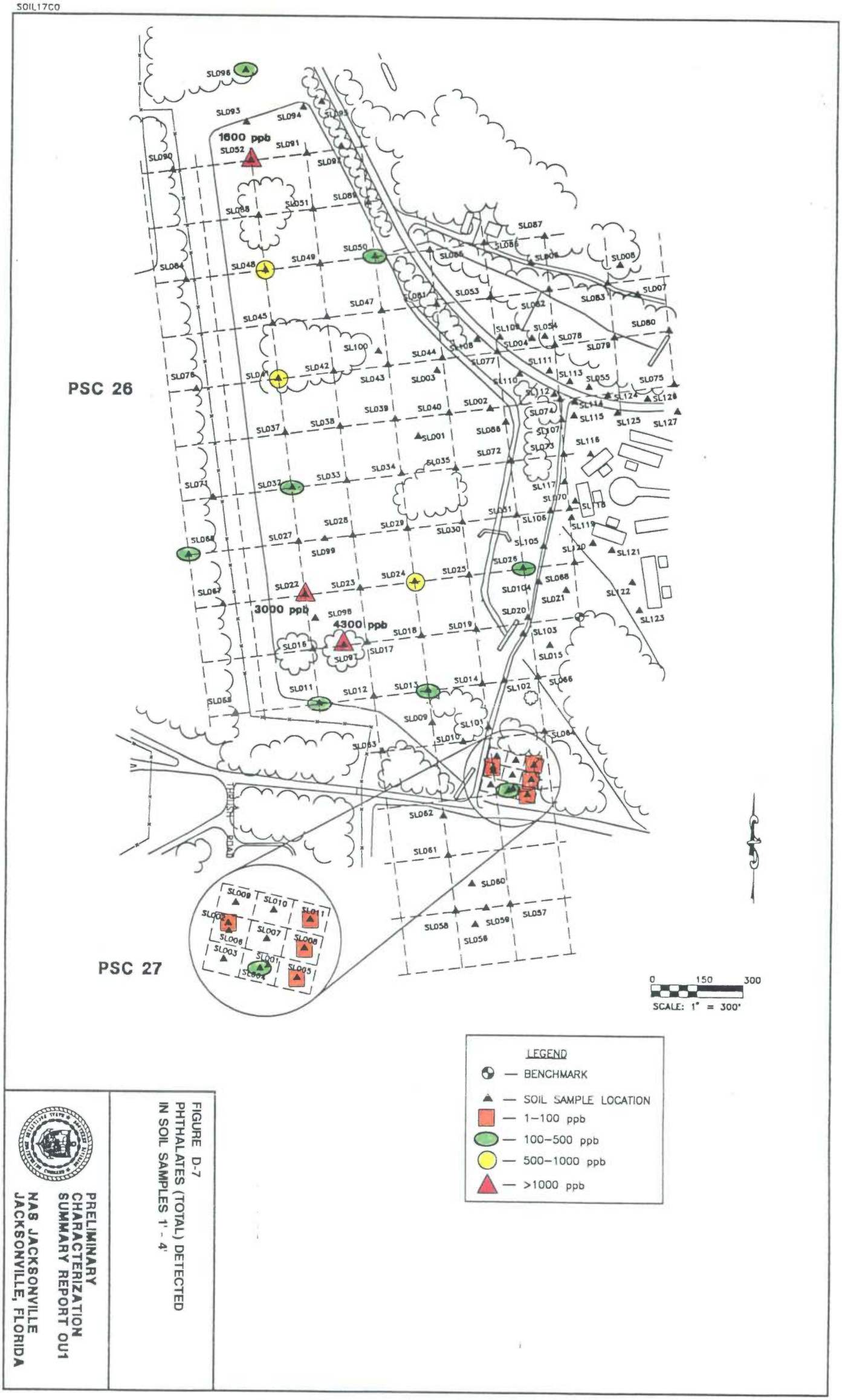


FIGURE D-7
PHTHALATES (TOTAL) DETECTED
IN SOIL SAMPLES 1' - 4'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

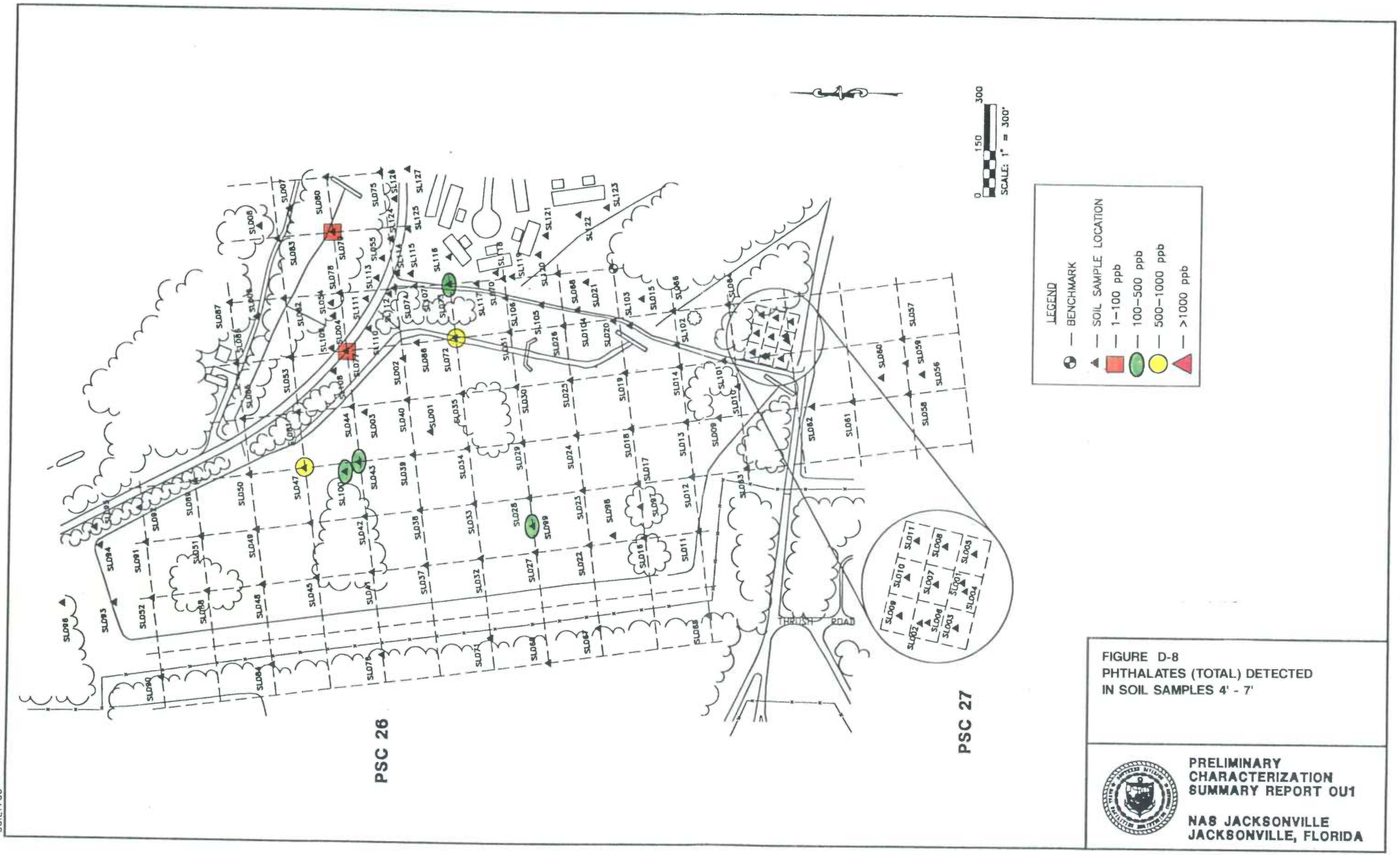


FIGURE D-8
PHTHALATES (TOTAL) DETECTED
IN SOIL SAMPLES 4' - 7'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
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FIGURE D-9
PHTHALATES (TOTAL) DETECTED
IN SOIL SAMPLES 7' - 12'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

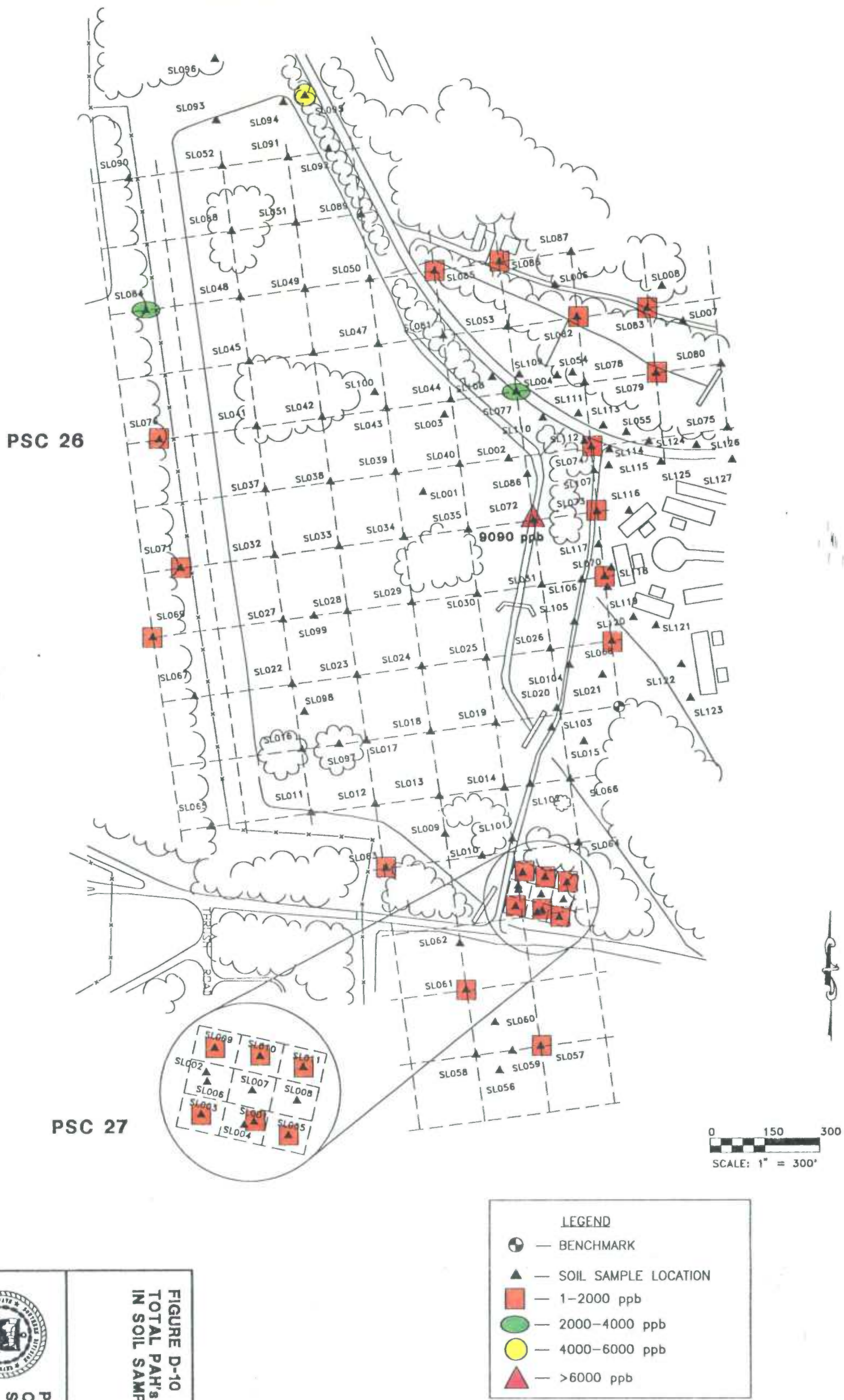

FIGURE D-10
TOTAL PAH's DETECTED
IN SOIL SAMPLES 0'-3'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
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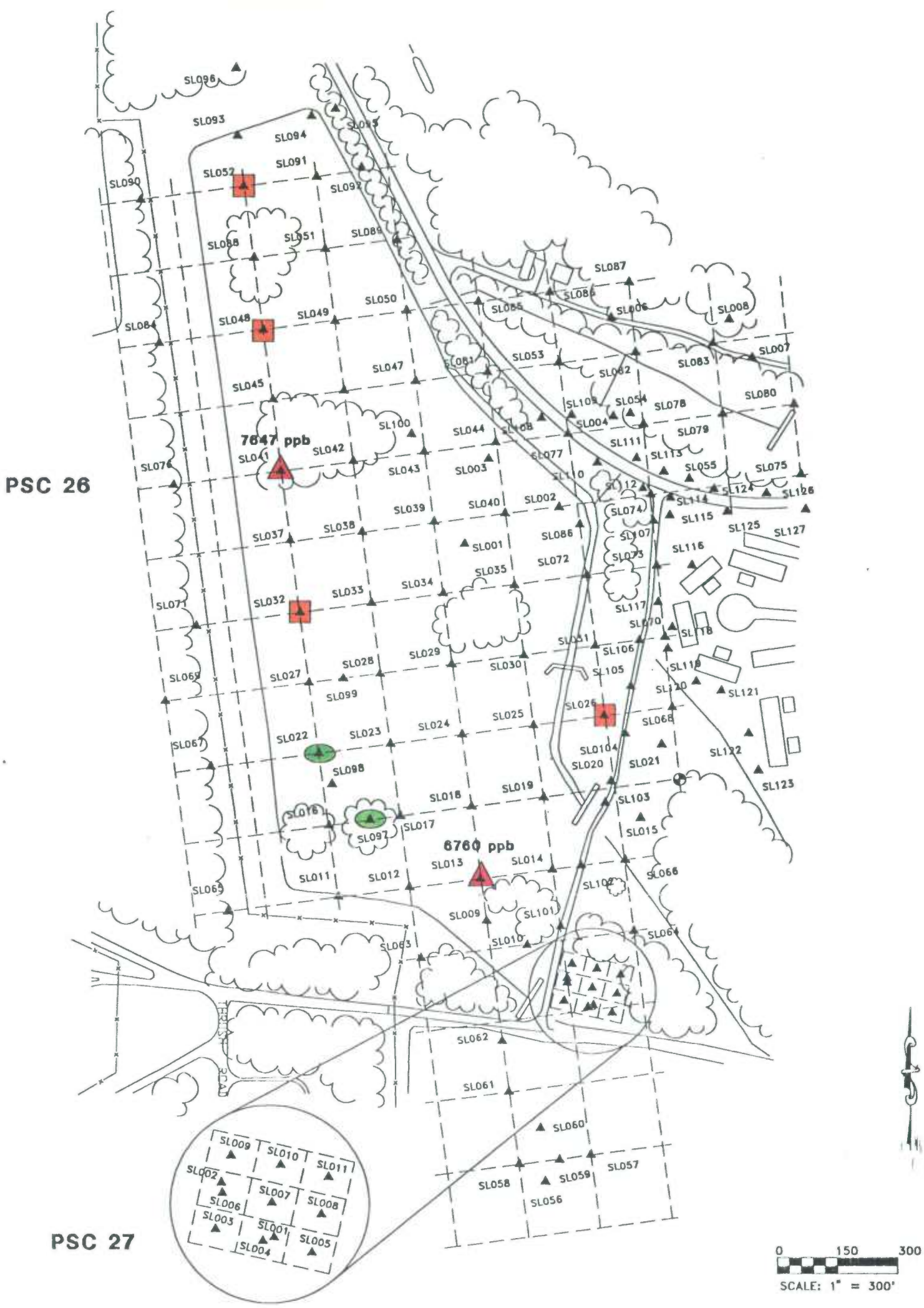
SOIL17CO



LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- 1-2000 ppb
- 2000-4000 ppb
- 4000-6000 ppb
- >6000 ppb

FIGURE D-11
TOTAL PAH's DETECTED
IN SOIL SAMPLES 1'-4'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

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SOIL17CO

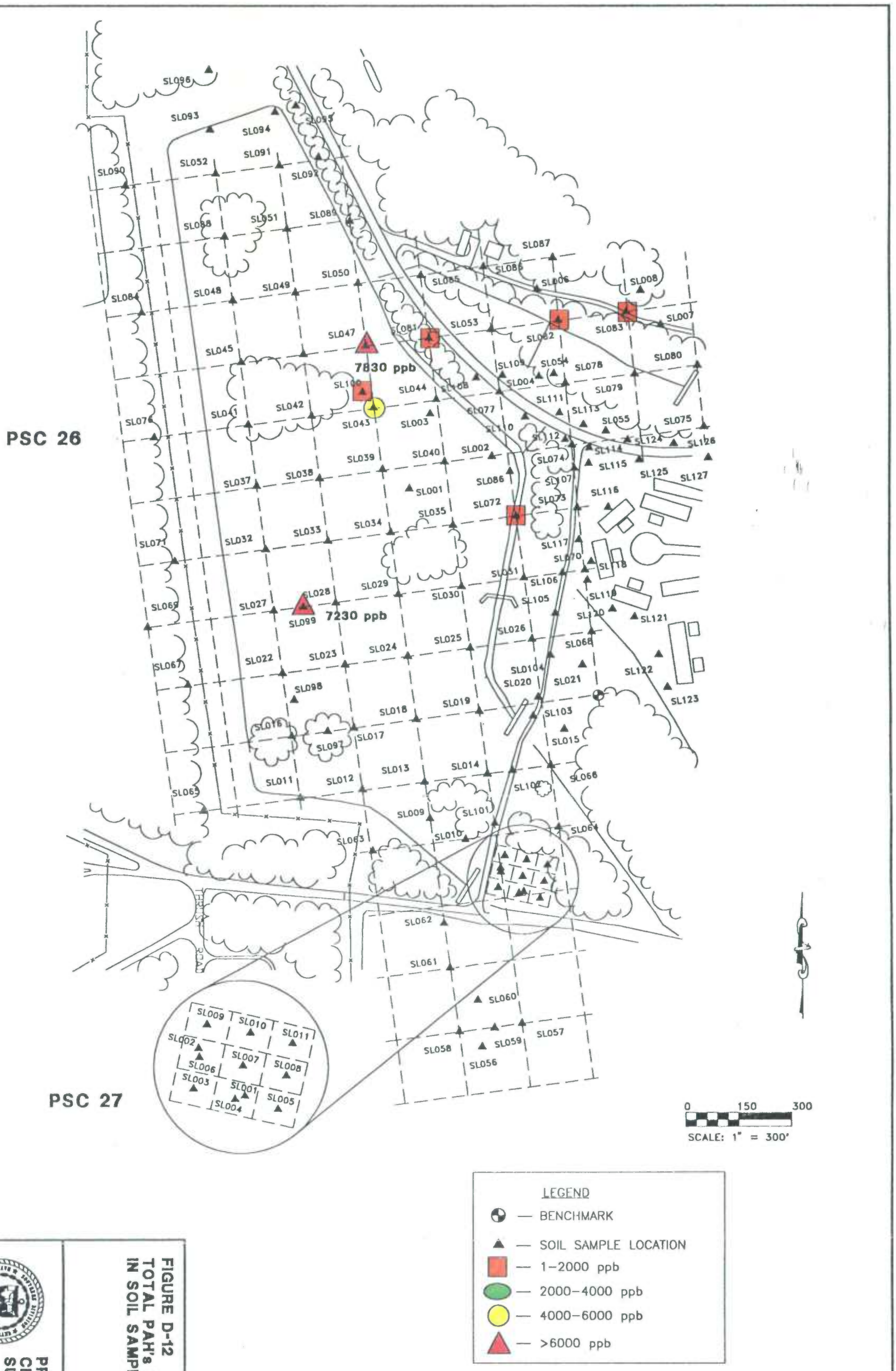

FIGURE D-12
TOTAL PAH's DETECTED
IN SOIL SAMPLES 4'-7'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
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SOIL17CO

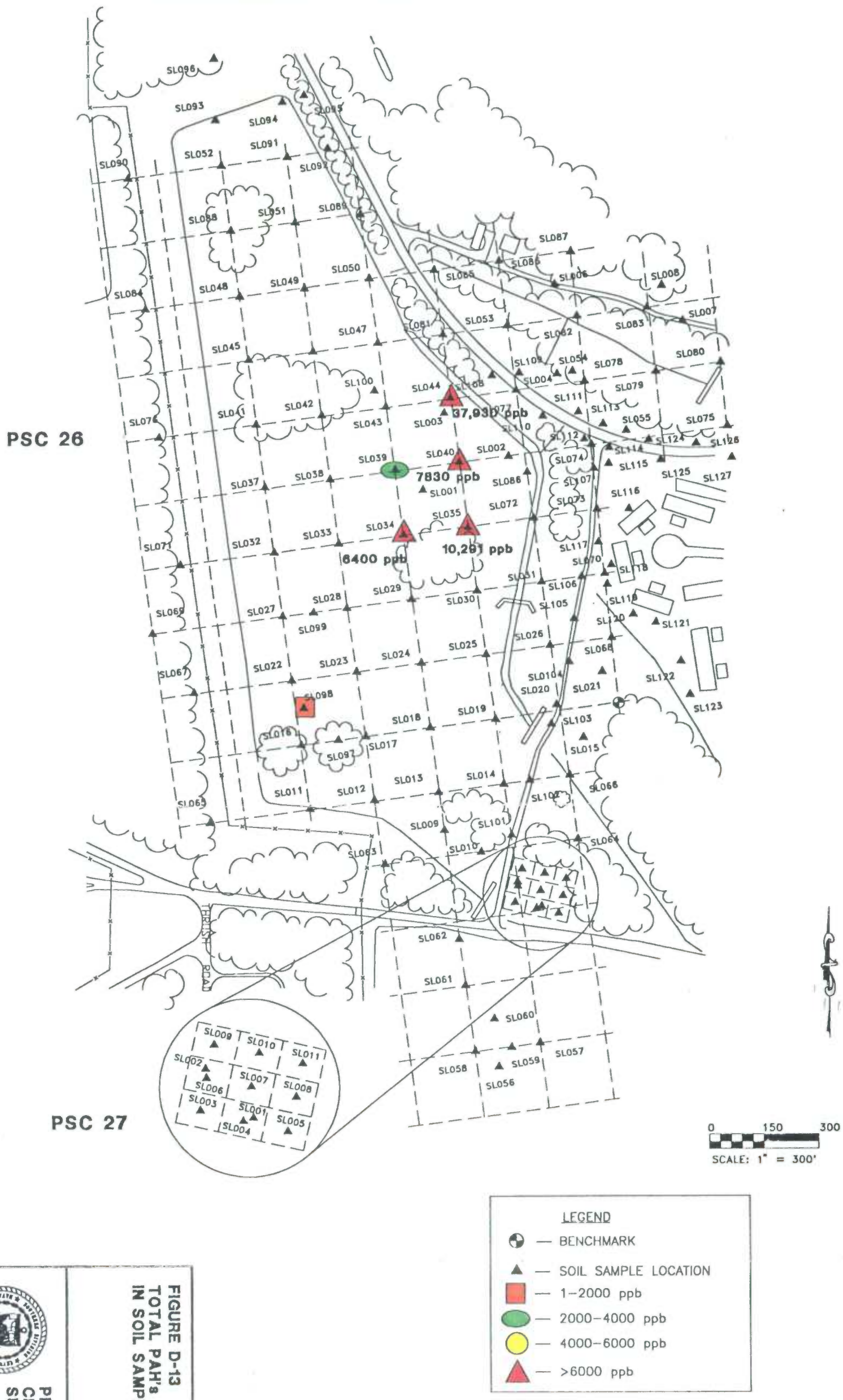

FIGURE D-13
TOTAL PAH's DETECTED
IN SOIL SAMPLES 7'-12'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
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SOIL17CO

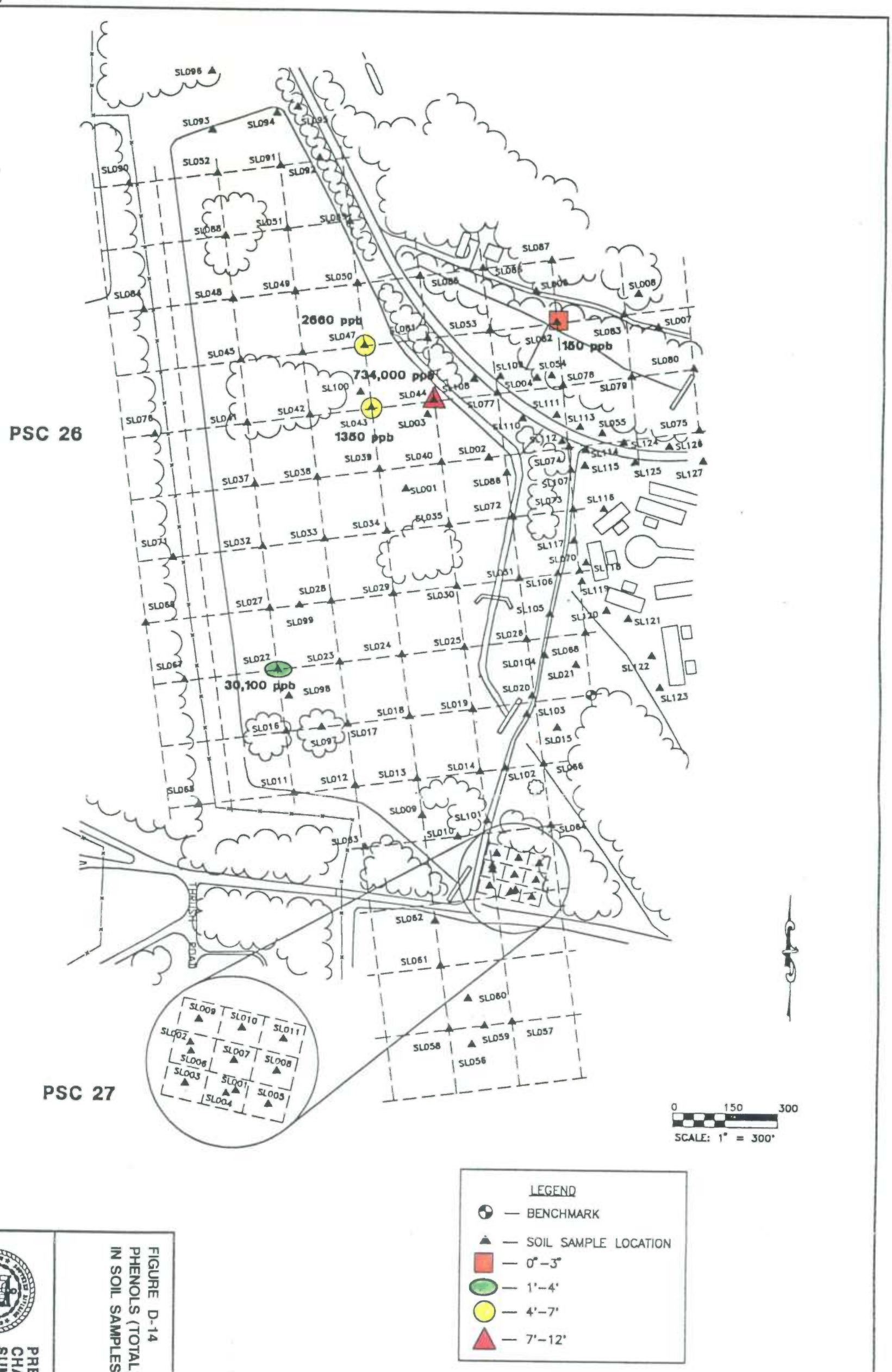

FIGURE D-14
PHENOLS (TOTAL) DETECTED
IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
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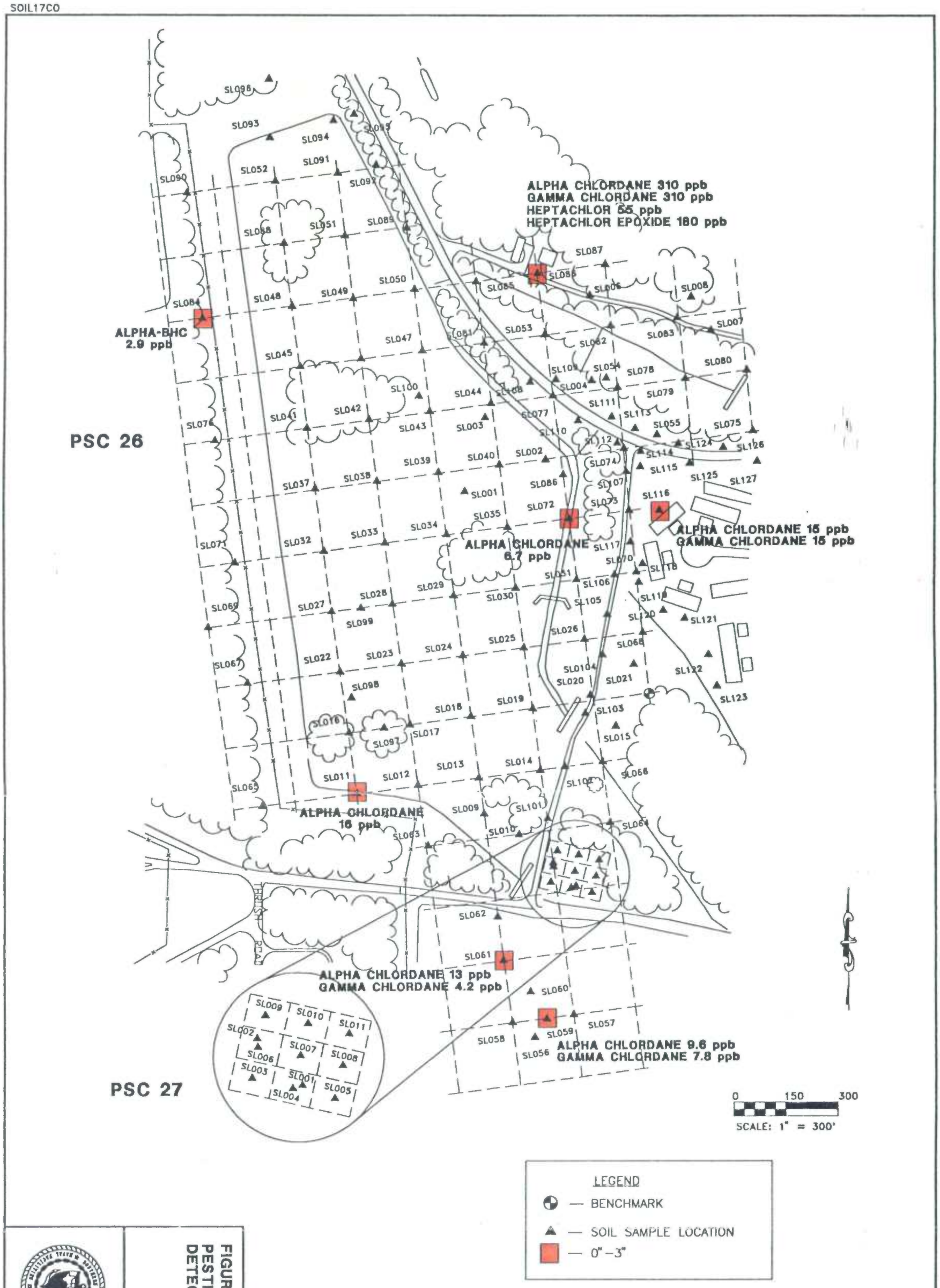

FIGURE D-15
PESTICIDES(MISC.)
DETECTED IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
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FIGURE D-16
ENDRIN DETECTED IN SOIL SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

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FIGURE D-17
ALDRIN DETECTED IN SOIL SAMPLES

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

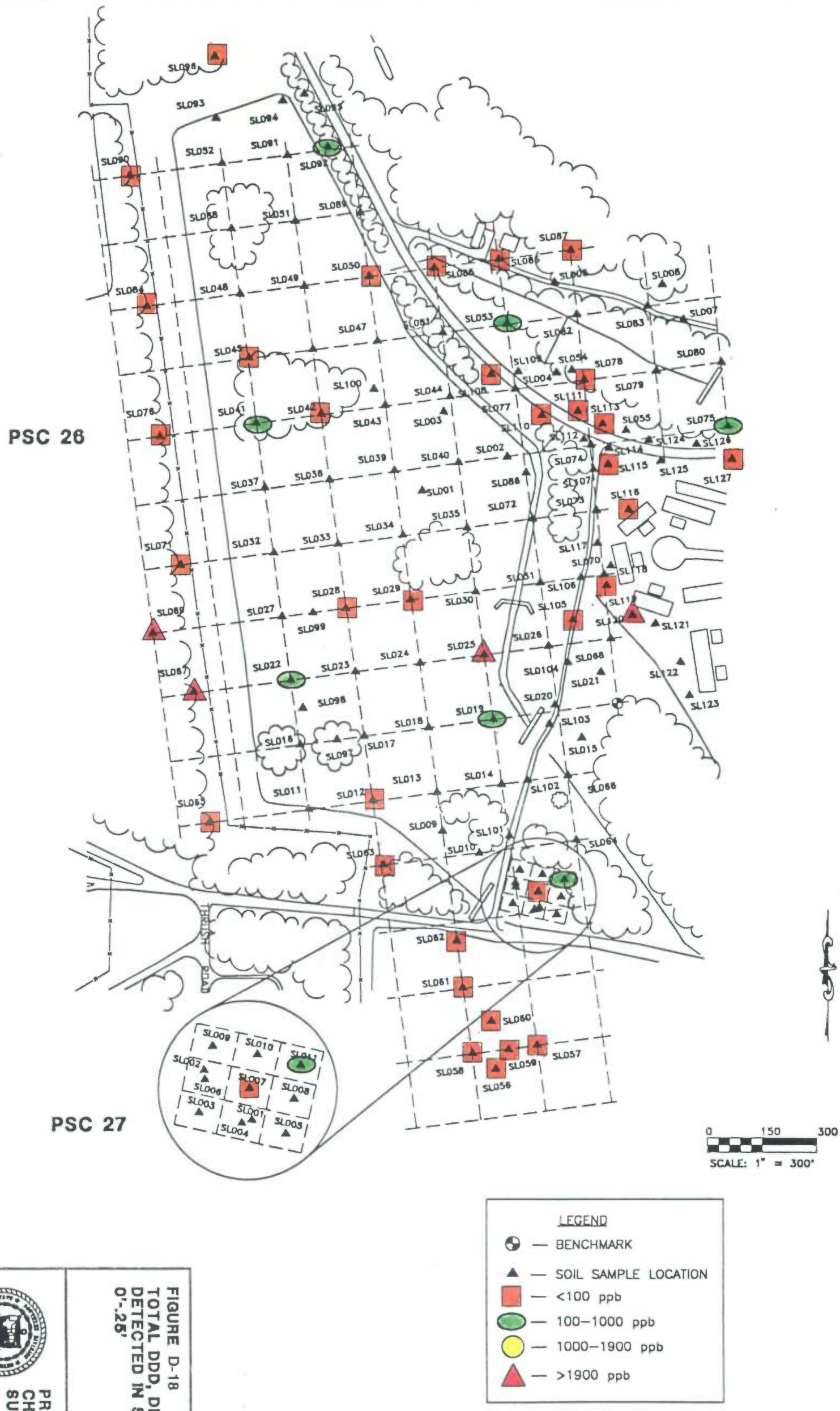

FIGURE D-18
TOTAL DDD, DDE, AND DDT
DETECTED IN SOIL SAMPLES
0'-.25'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

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JACKSONVILLE, FLORIDA

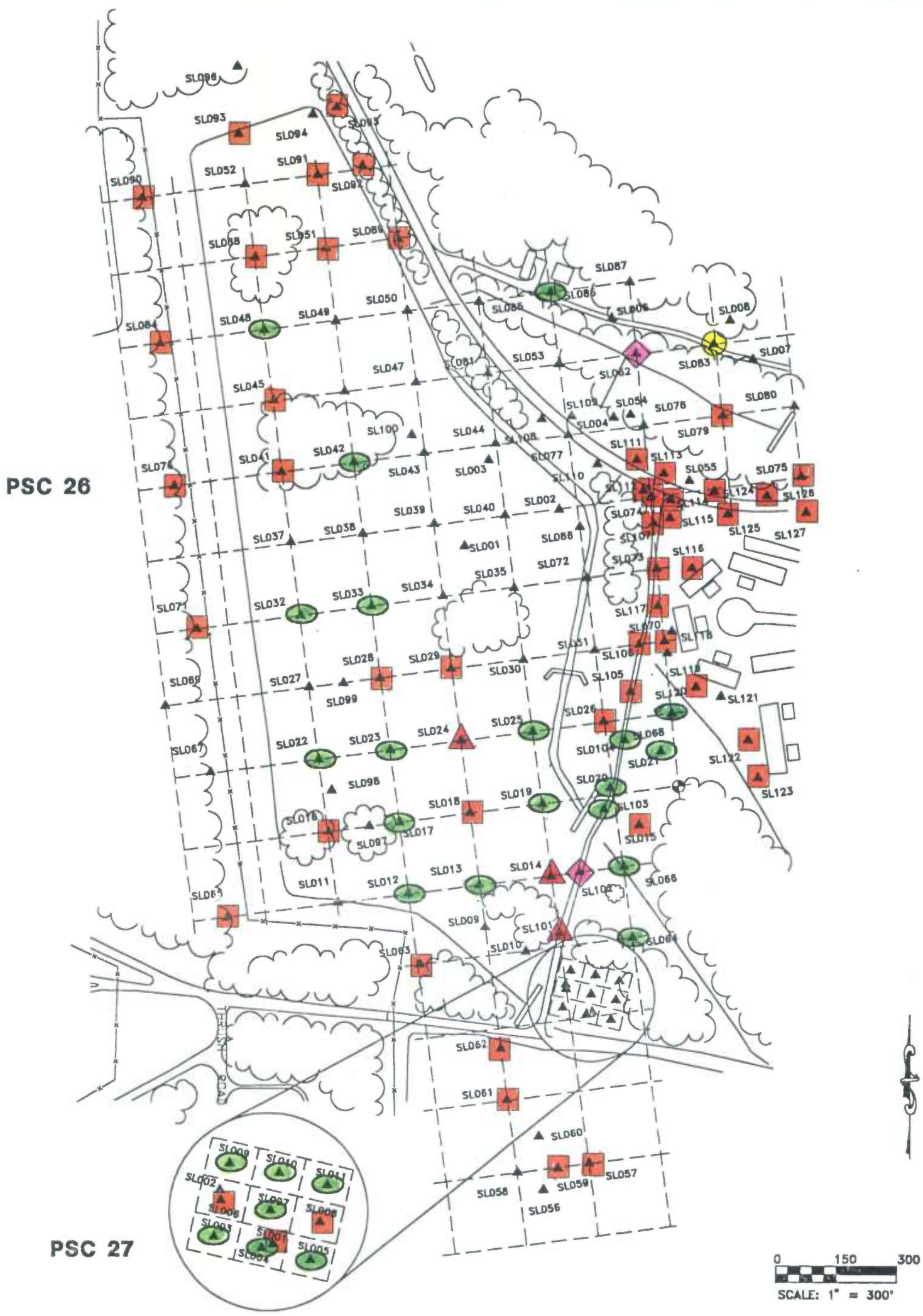
FIGURE D-19
TOTAL DDD, DDE, AND DDT DETECTED IN SOIL SAMPLES 2'-12'

PRELIMINARY CHARACTERIZATION SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

SOIL17CO



LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- <1 ppm
- 1–10 ppm
- 10–25 ppm
- 25–50 ppm
- >50 ppm

FIGURE D-20
PCB's DETECTED IN
SOIL SAMPLES 0'-.25'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

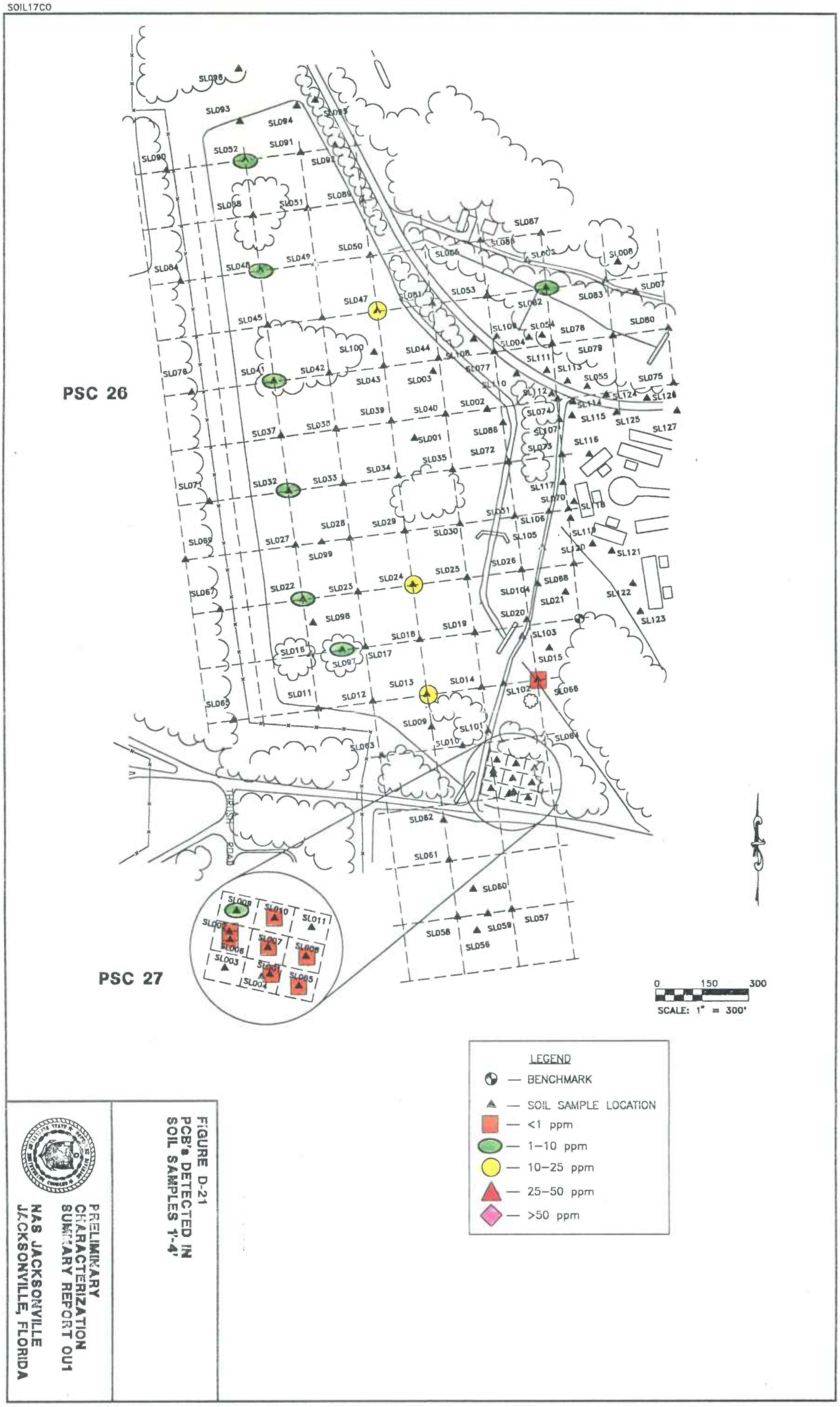


FIGURE D-21
PCB's DETECTED IN
SOIL SAMPLES 1'-4'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

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JACKSONVILLE, FLORIDA

SOIL17CO

LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- <1 ppm
- 1–10 ppm
- 10–25 ppm
- 25–50 ppm
- >50 ppm

FIGURE D-22
PCB'S DETECTED IN
SOIL SAMPLES 4'-7'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

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JACKSONVILLE, FLORIDA

SOIL17CO

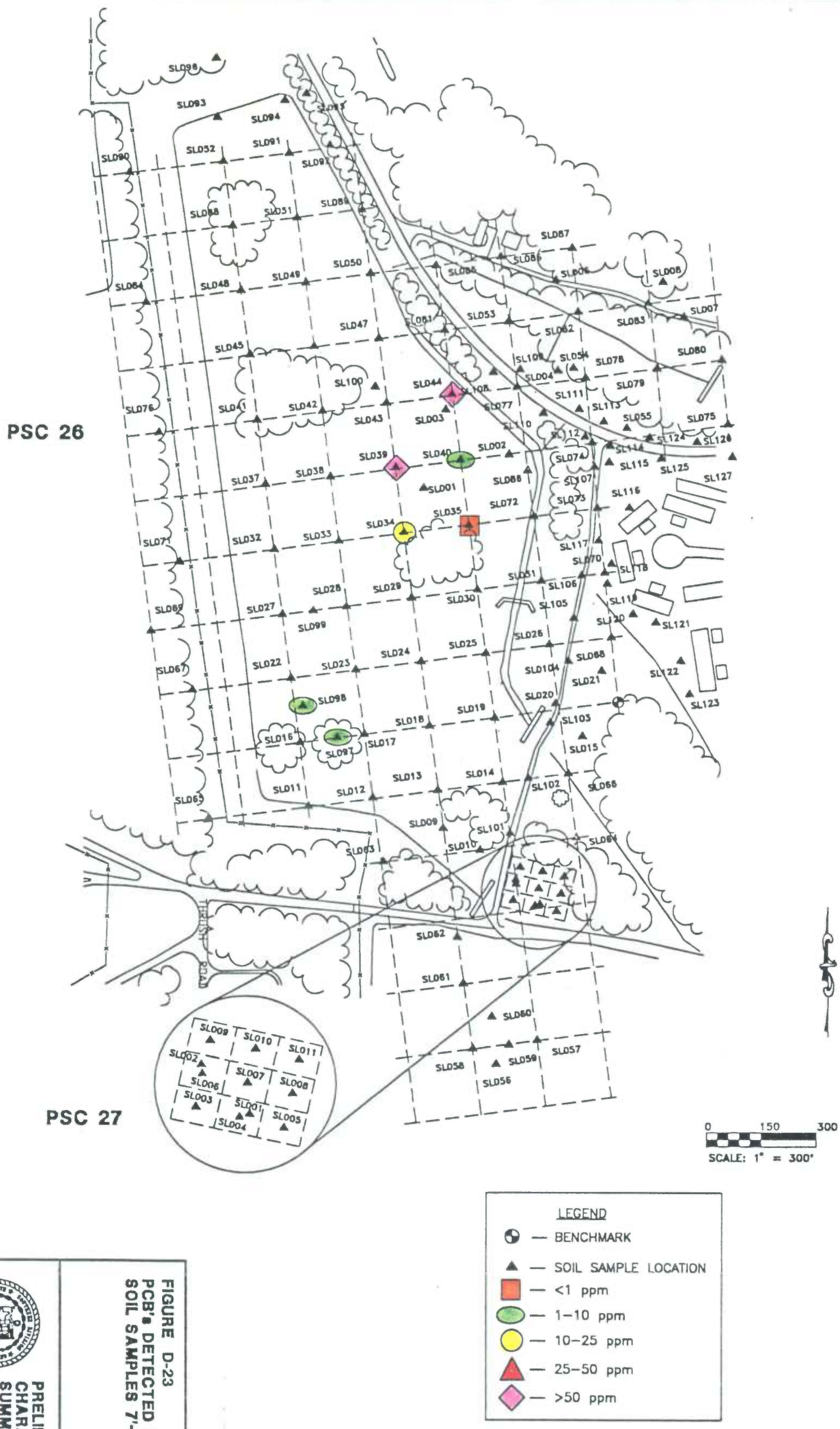


FIGURE D-23
PCB's DETECTED IN
SOIL SAMPLES 7'-12'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

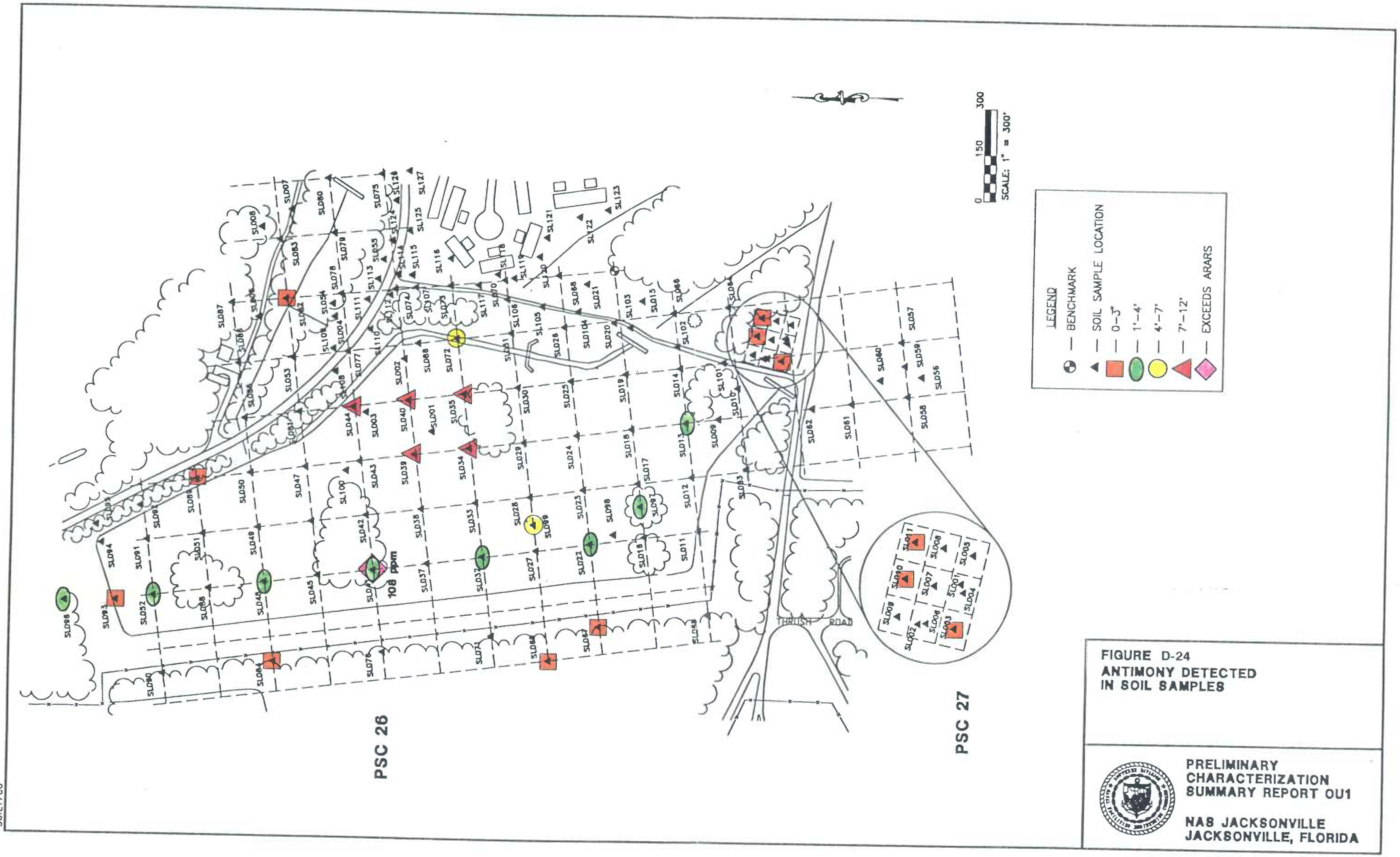
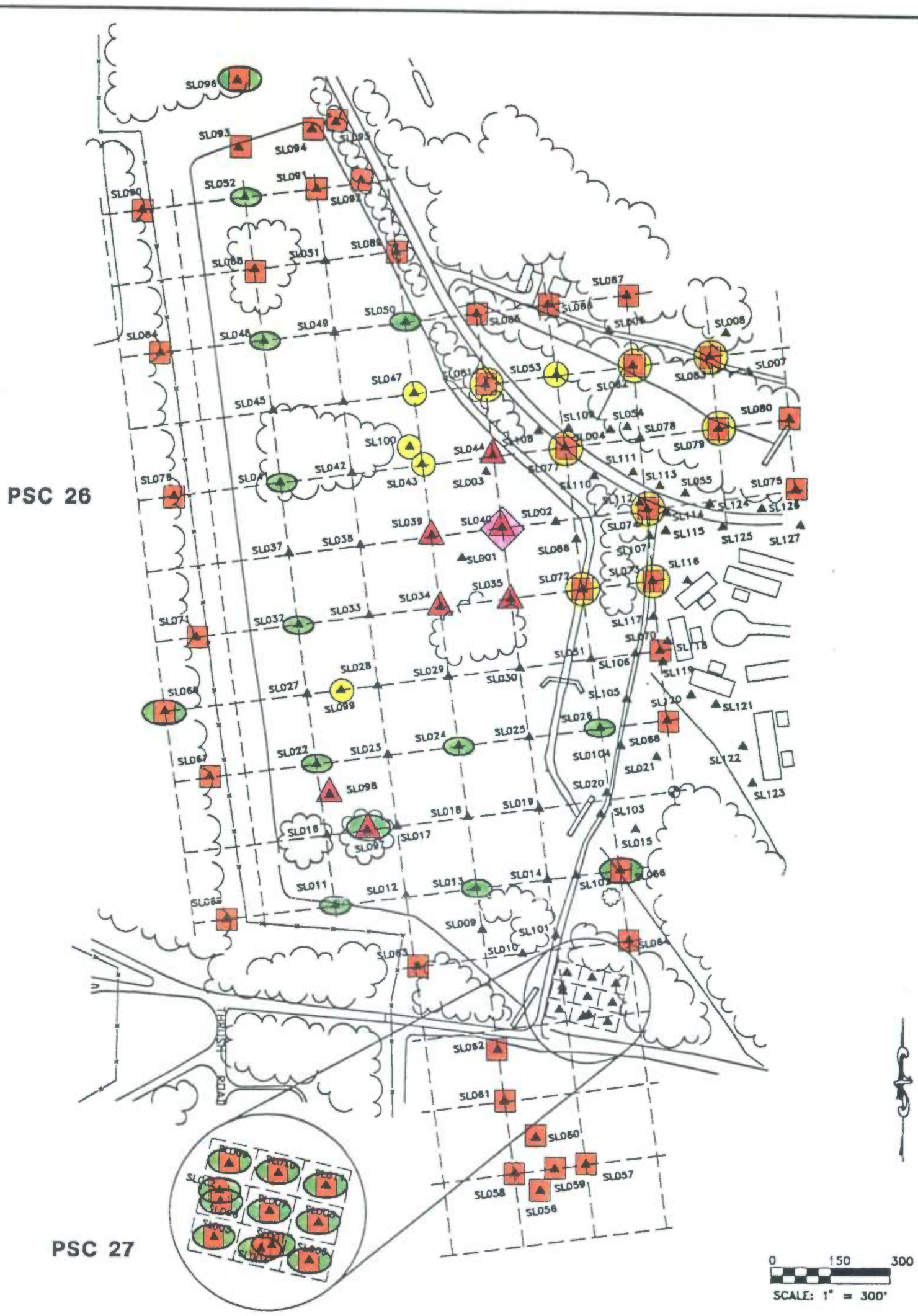


FIGURE D-24
ANTIMONY DETECTED
IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO



LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- 0–3"
- 1'–4'
- 4'–7'
- 7'–12'
- EXCEEDS ARARS

FIGURE D-25
BARIUM DETECTED
IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

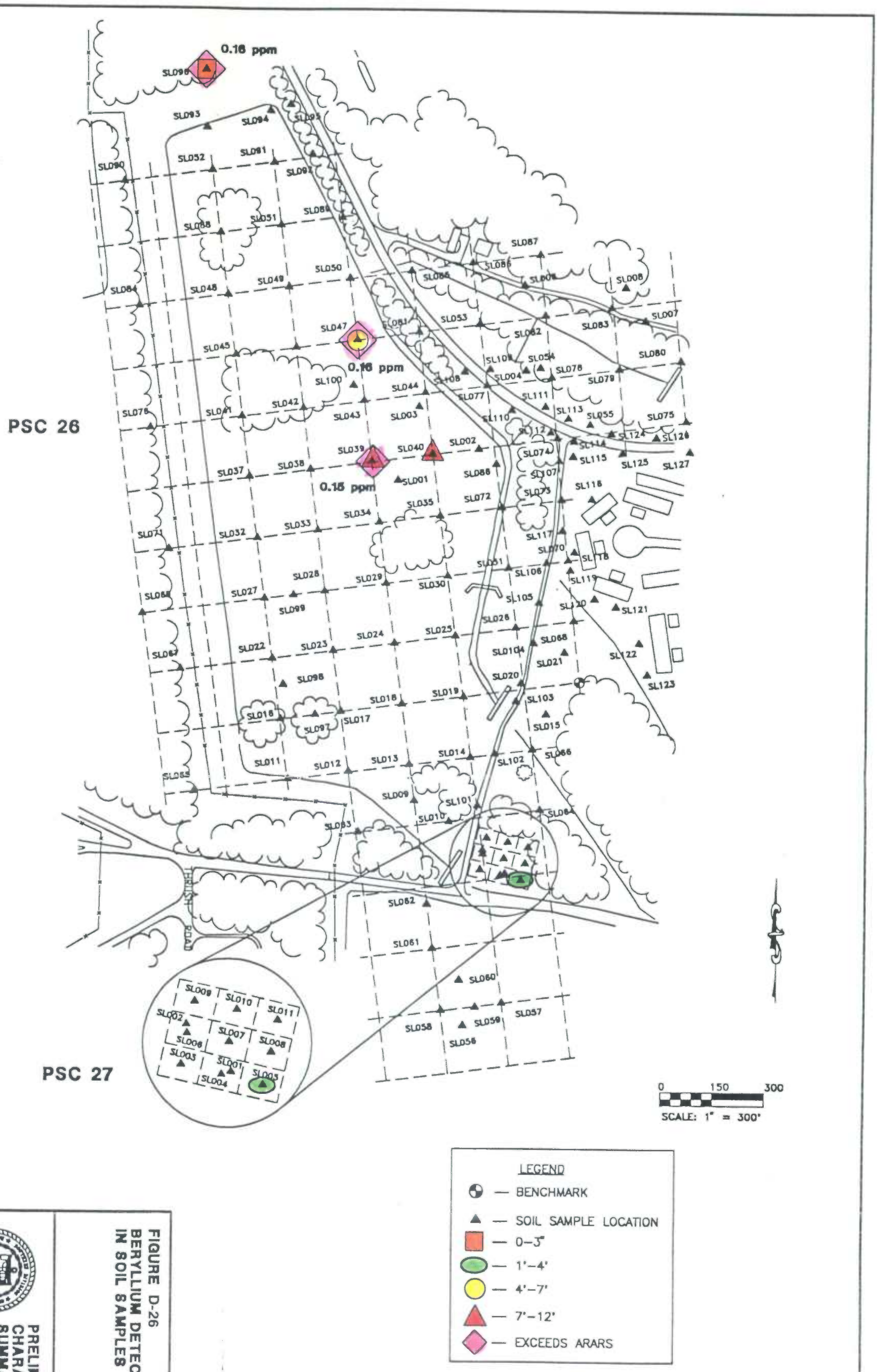


FIGURE D-26
BERYLLIUM DETECTED
IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

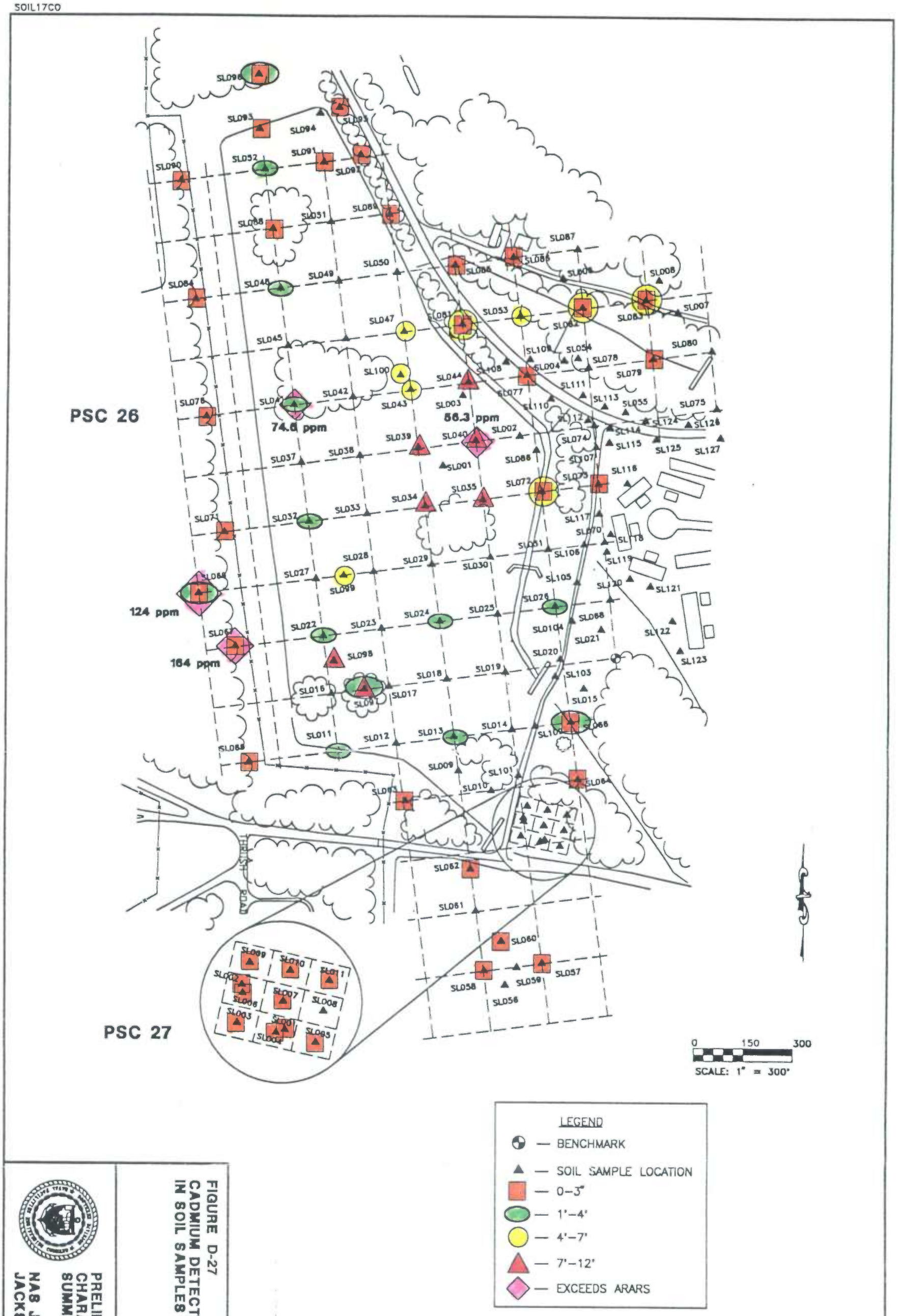


FIGURE D-27
CADMIUM DETECTED
IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

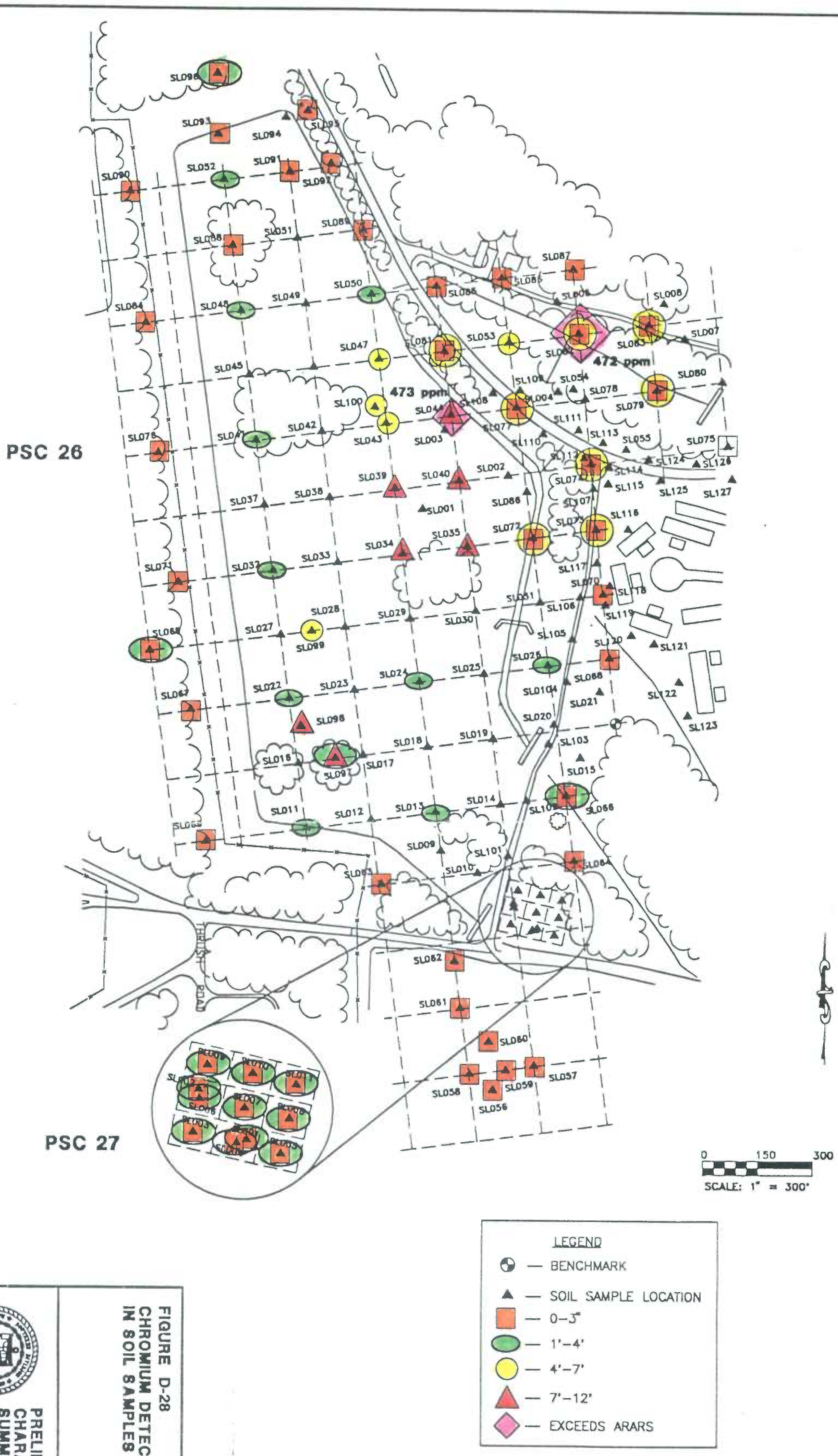


FIGURE D-28
CHROMIUM DETECTED
IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

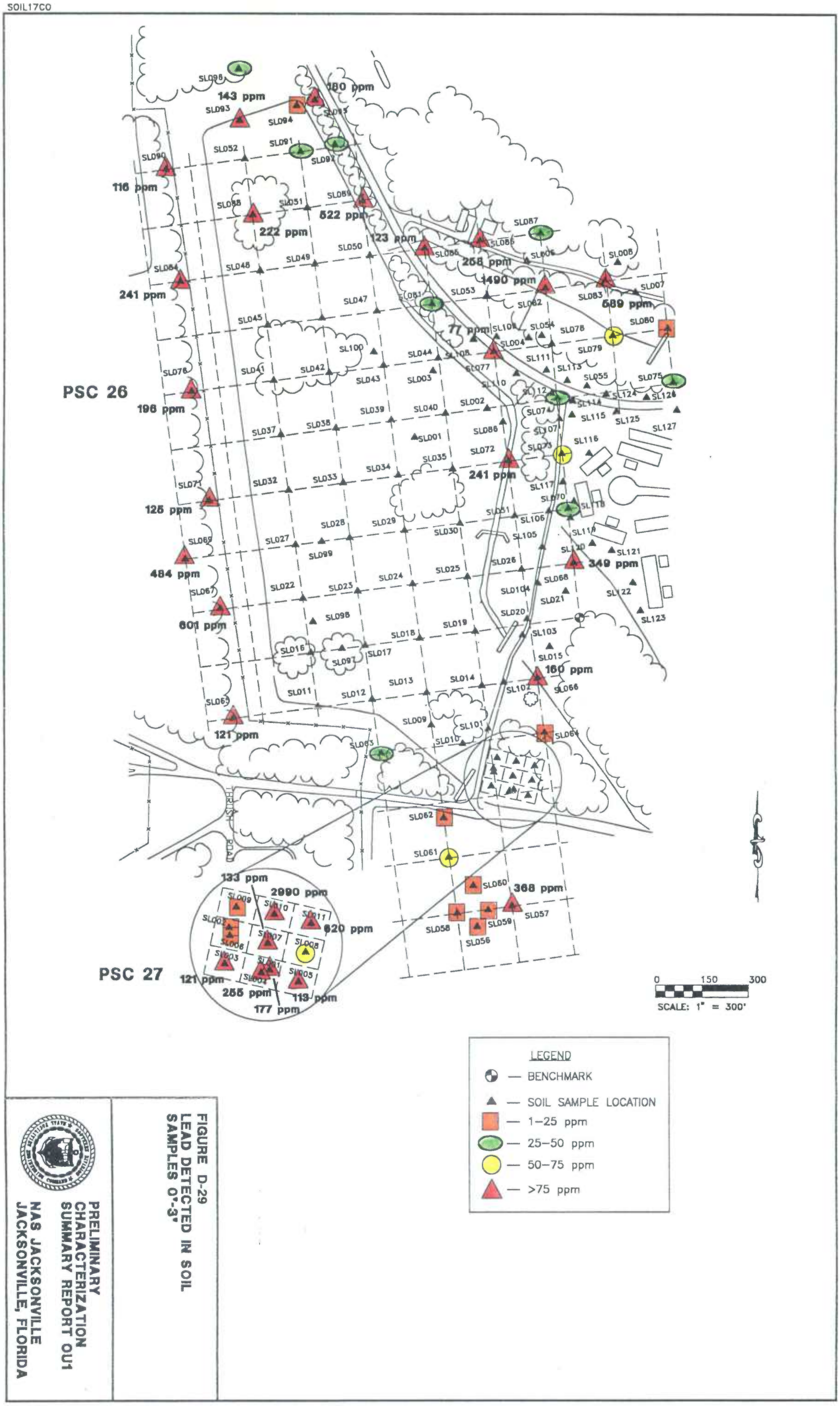


FIGURE D-29
LEAD DETECTED IN SOIL
SAMPLES 0'-3'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

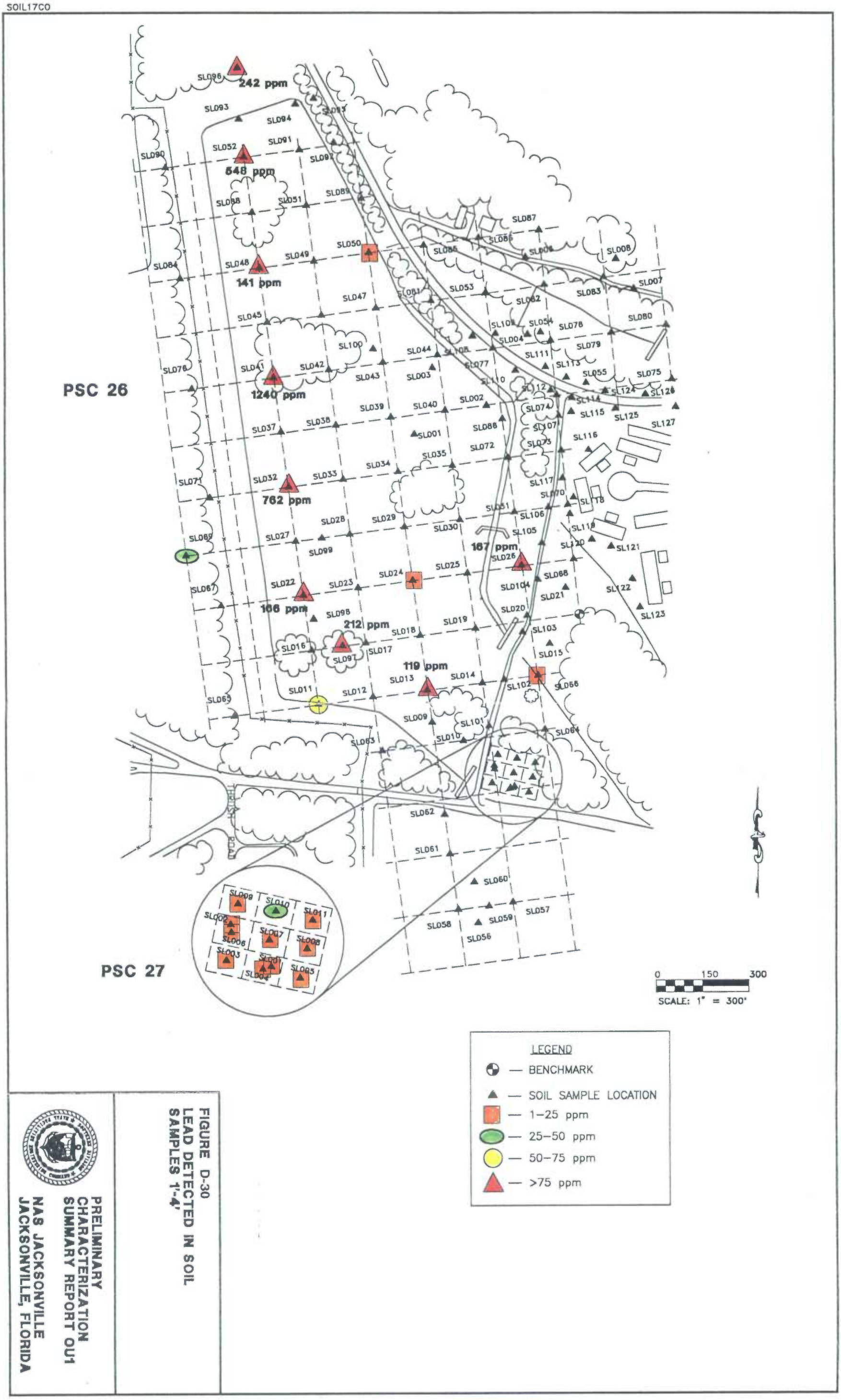
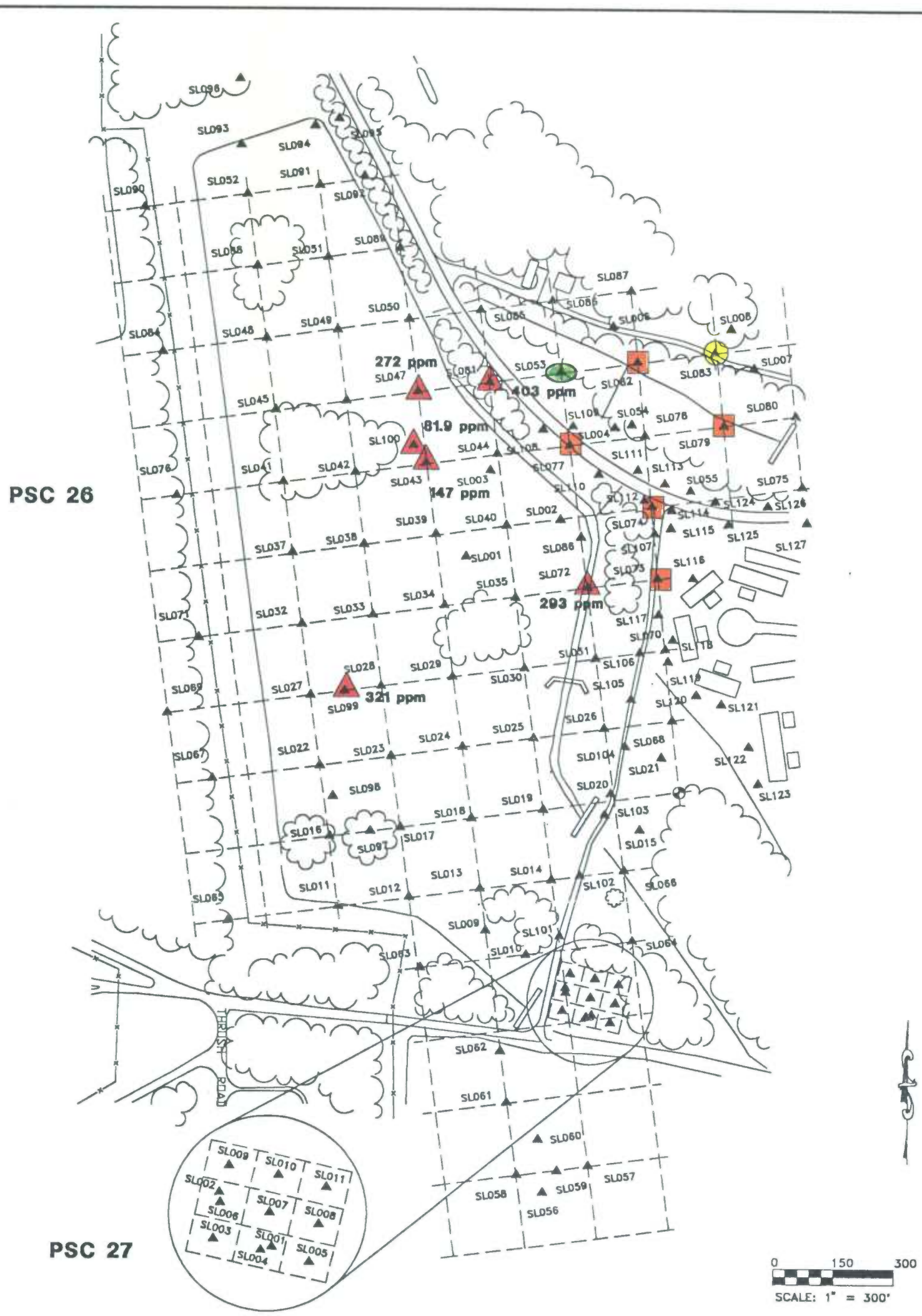


FIGURE D-30
LEAD DETECTED IN SOIL
SAMPLES 1'-4'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO



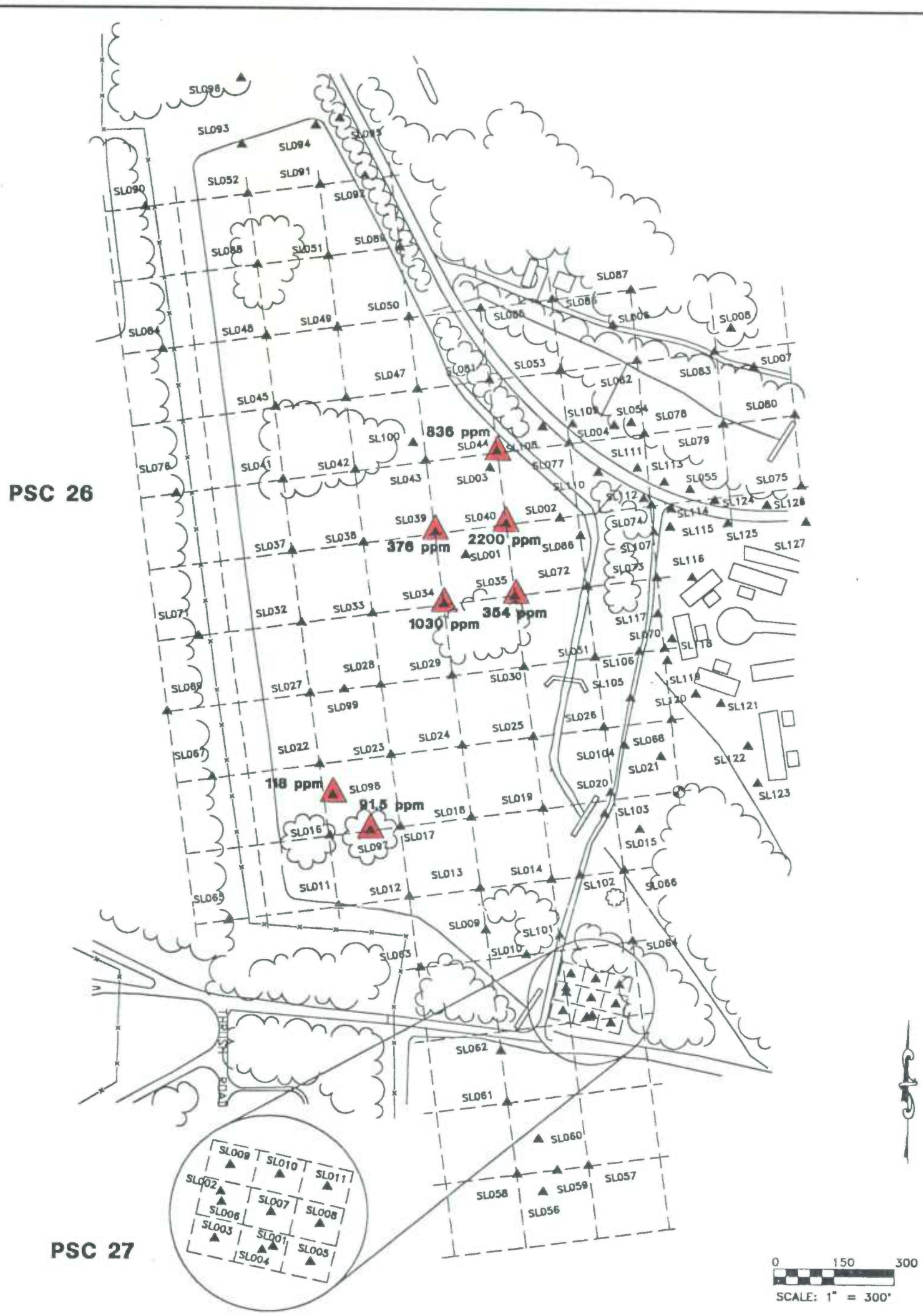
LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- 1–25 ppm
- 25–50 ppm
- 50–75 ppm
- >75 ppm

FIGURE D-31
LEAD DETECTED IN SOIL
SAMPLES 4'-7'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO



LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- 1–25 ppm
- 25–50 ppm
- 50–75 ppm
- >75 ppm

FIGURE D-32
LEAD DETECTED IN SOIL
SAMPLES 7'-12'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE D-33
DIOXINS AND FURANS
HpCDD's (TOTAL)
DETECTED IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

SOIL17C0

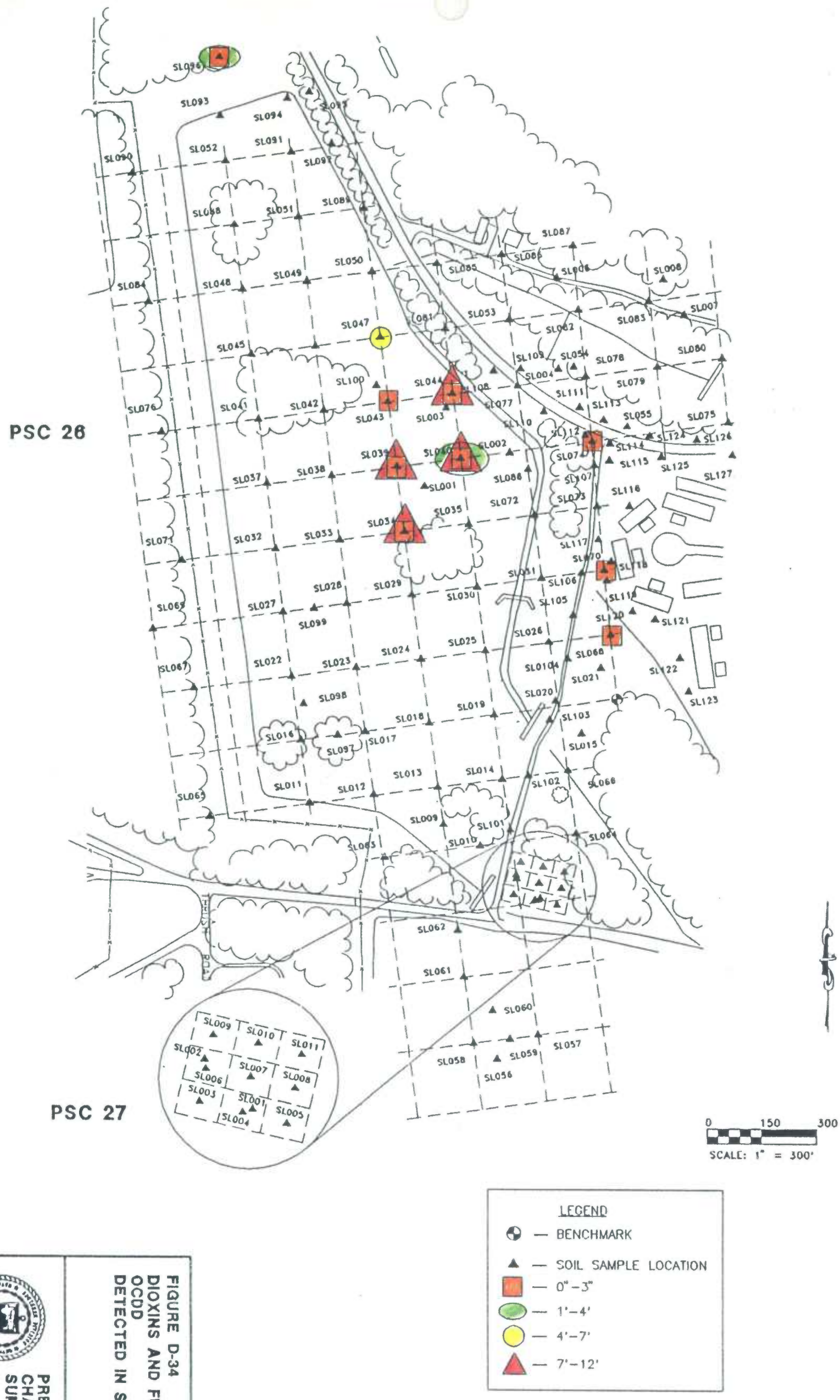


FIGURE D-34
DIOXINS AND FURANS
OCDD
DETECTED IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

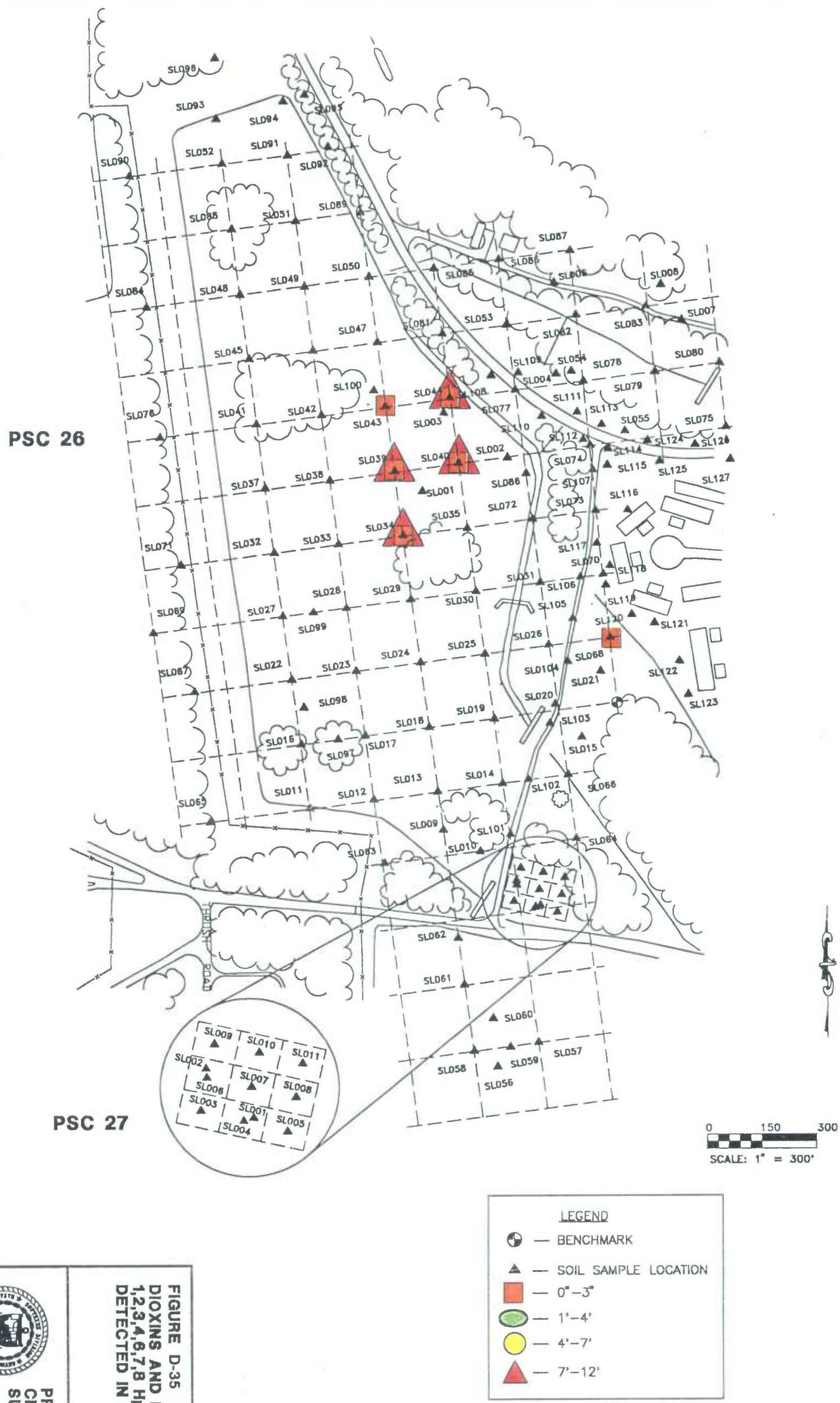


FIGURE D-35
DIOXINS AND FURANS
1,2,3,4,6,7,8 HpCDD
DETECTED IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

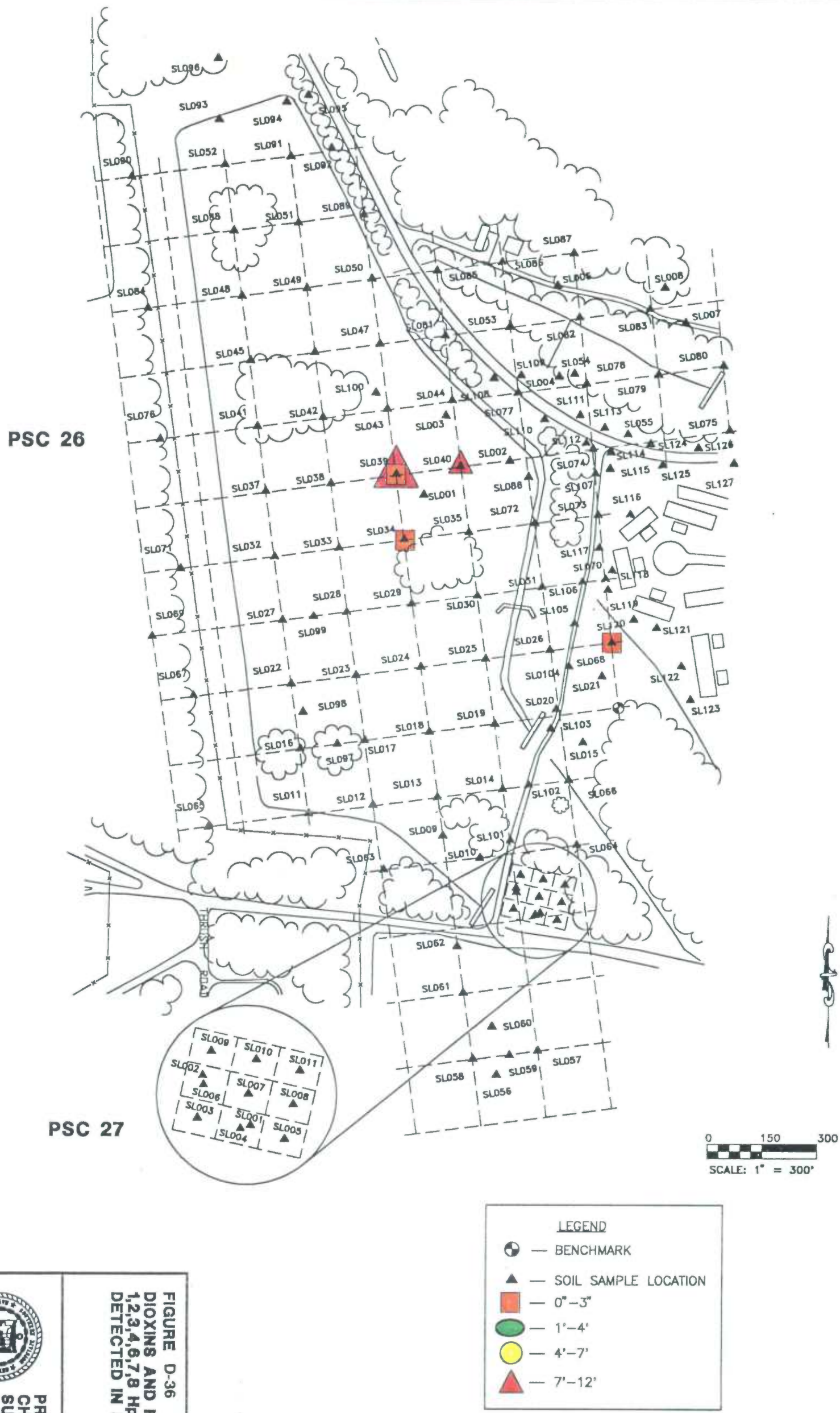
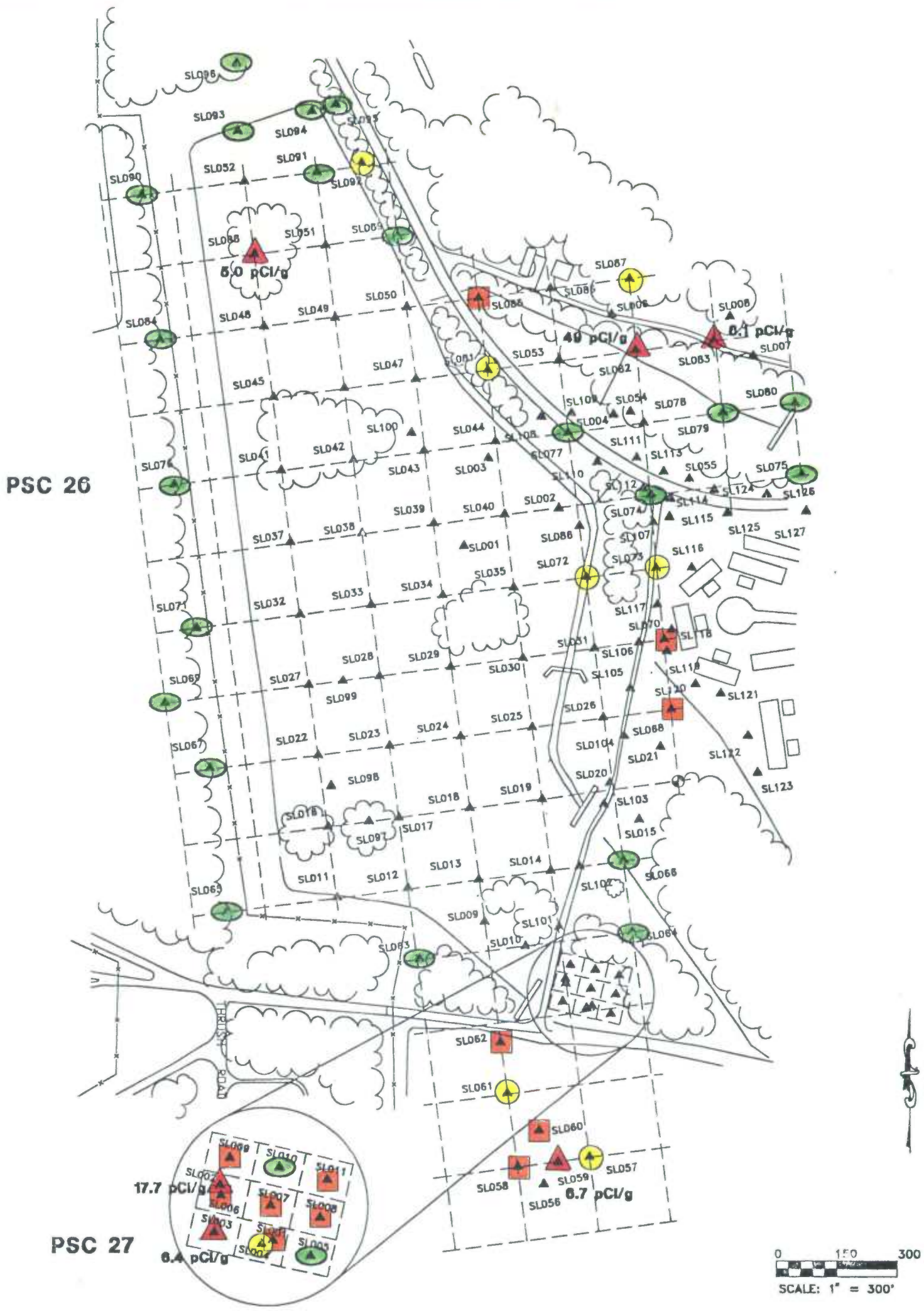


FIGURE D-36
DIOXINS AND FURANS
1,2,3,4,6,7,8 HpCDF
DETECTED IN SOIL SAMPLES

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO



LEGEND

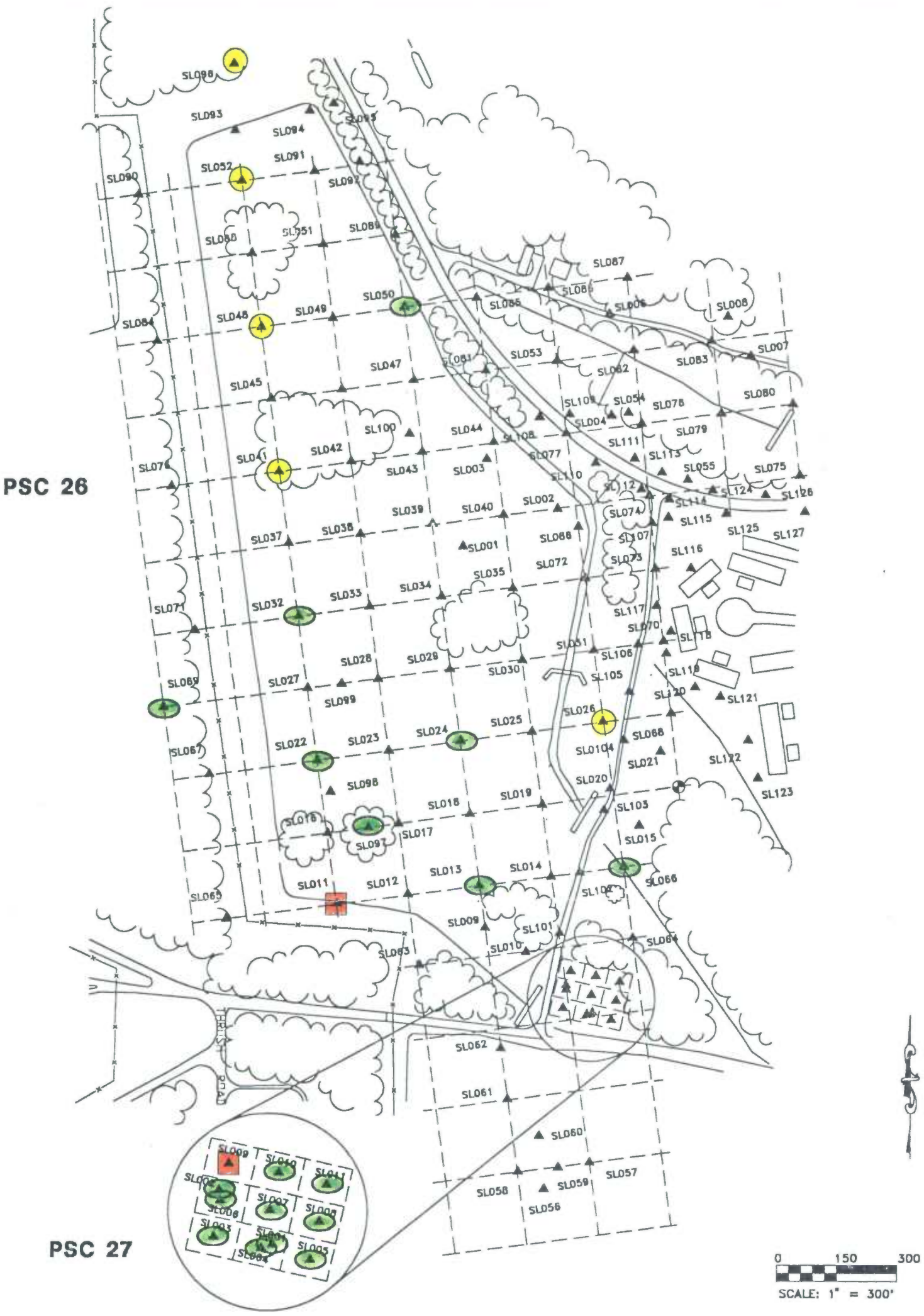
- BENCHMARK
- SOIL SAMPLE LOCATION
- 0–1.5 pCi/g
- 1.5–3.0 pCi/g
- 3.0–4.5 pCi/g
- >4.5 pCi/g

FIGURE D-37
GROSS ALPHA AND
RADIUM 226 (TOTAL) DETECTED
IN SOIL SAMPLES 0" - 3"

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO



LEGEND

- — BENCHMARK
- — SOIL SAMPLE LOCATION
- — 0–1.5 pCi/g
- — 1.5–3.0 pCi/g
- — 3.0–4.5 pCi/g
- — >4.5 pCi/g

FIGURE D-38
GROSS ALPHA AND
RADIUM 226 (TOTAL) DETECTED
IN SOIL SAMPLES 1' - 4'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

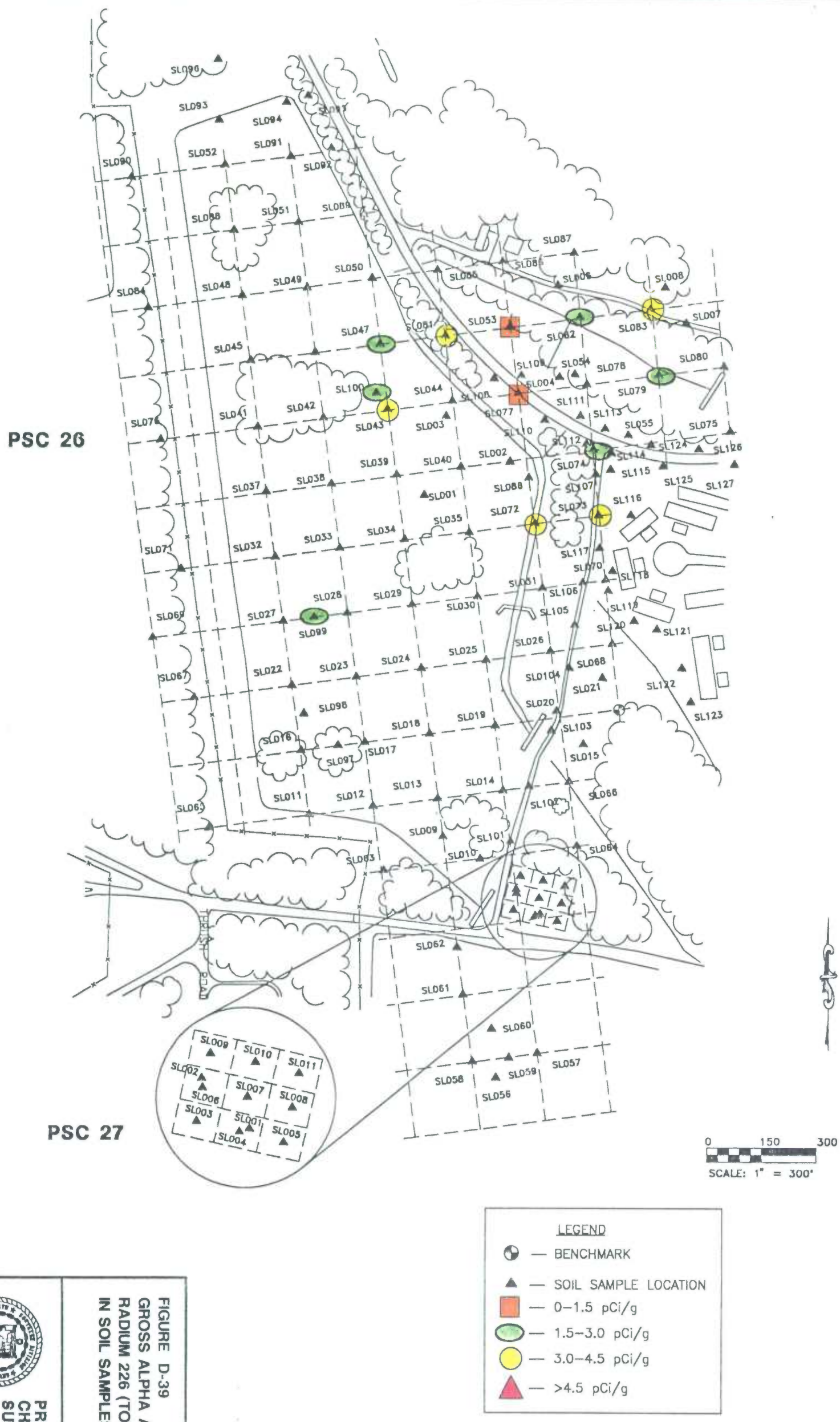


FIGURE D-39
GROSS ALPHA AND
RADIUM 226 (TOTAL) DETECTED
IN SOIL SAMPLES 4' - 7'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

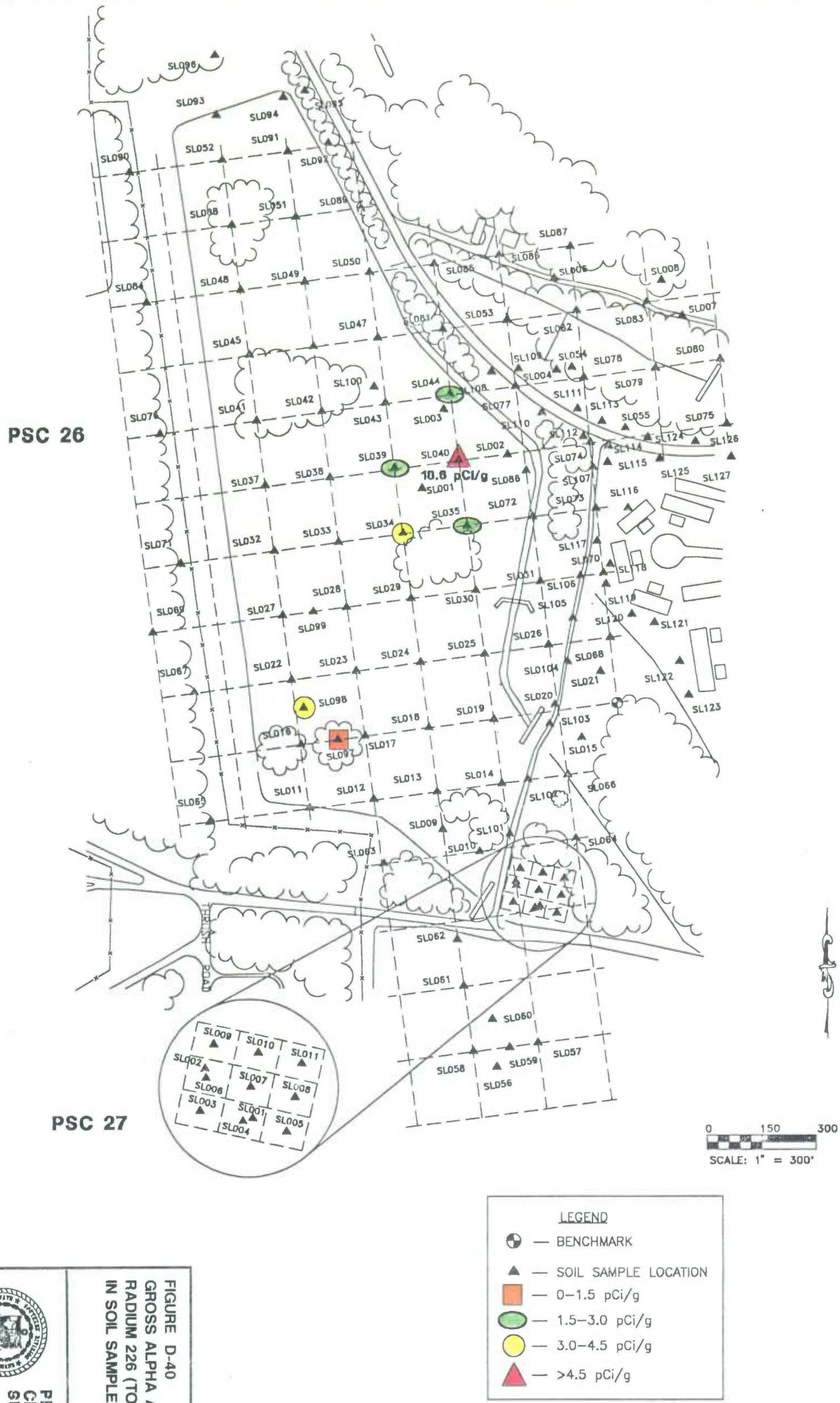


FIGURE D-40
GROSS ALPHA AND
RADIUM 226 (TOTAL) DETECTED
IN SOIL SAMPLES 7' - 12'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

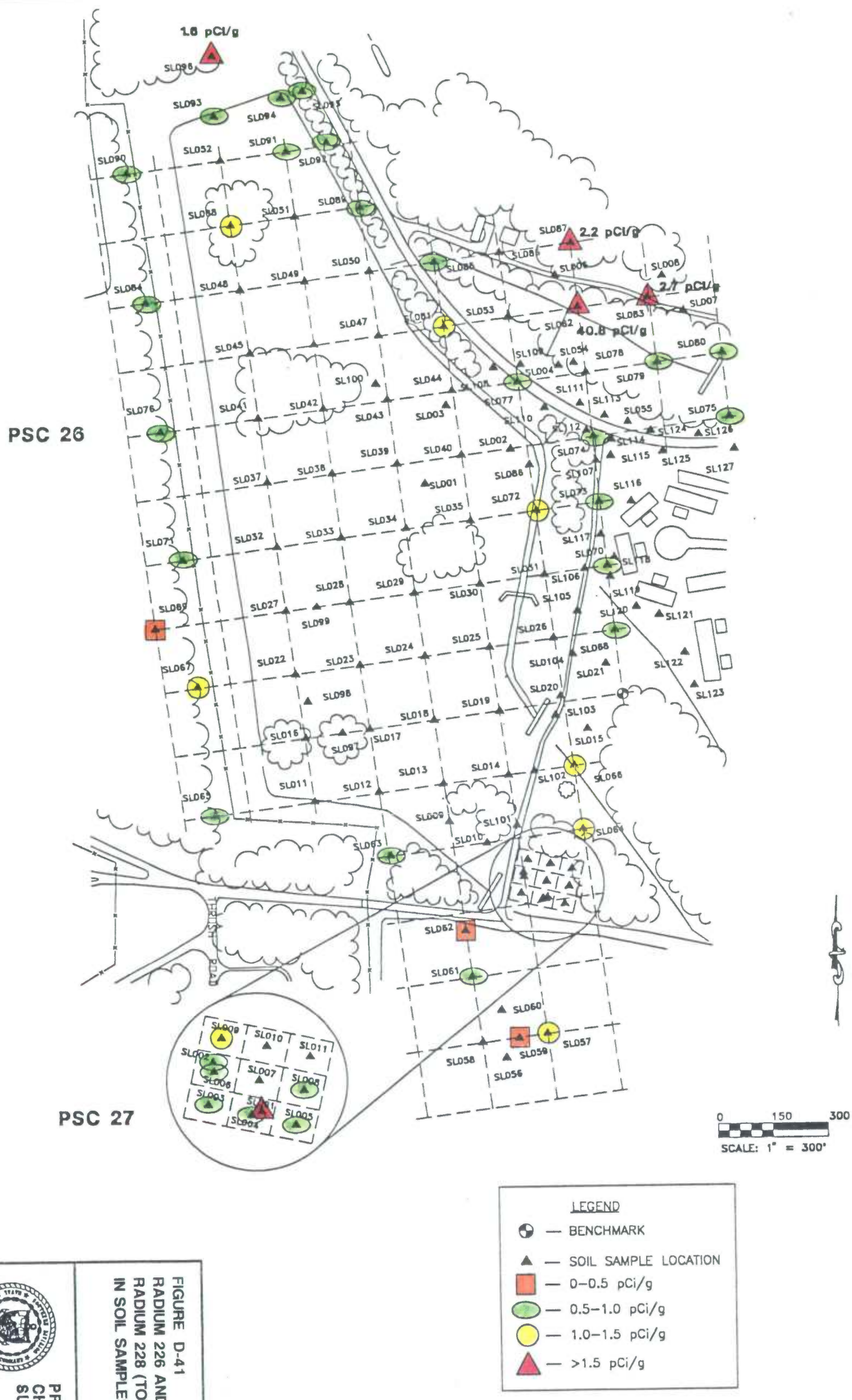


FIGURE D-41
RADIUM 226 AND
RADIUM 228 (TOTAL) DETECTED
IN SOIL SAMPLES 0" - 3"

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE D-42
RADIUM 226 AND
RADIUM 228 (TOTAL) DETECTED
IN SOIL SAMPLES 1' - 4'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

SOIL17CO

FIGURE D-43
RADIUM 226 AND
RADIUM 228 (TOTAL) DETECTED
IN SOIL SAMPLES 4' - 7'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

SOIL17CO

LEGEND

- BENCHMARK
- SOIL SAMPLE LOCATION
- 0–0.5 pCi/g
- 0.5–1.0 pCi/g
- 1.0–1.5 pCi/g
- >1.5 pCi/g

FIGURE D-44
RADIUM 226 AND
RADIUM 228 (TOTAL) DETECTED
IN SOIL SAMPLES 7' - 12'

PRELIMINARY
CHARACTERIZATION
SUMMARY REPORT OU1

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

APPENDIX E
Groundwater Sample Analytical Results

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	1,1–Dichloro–ethane	1,1–Dichloro–ethene	1,1,2–Tri–chloroethane	1,2–Dichloro–ethene (total)	2–Butanone	4–Methyl–2–pentanone	Acetone	Benzene	Chlorobenzene
Florida MCL(a)/ Federal MCL(b)	---/ ---	7/ 7 ug/L	---/ 5 ug/L	---/ 70 ug/L	---/ ---	---/ ---	---/ ---	1/ 5 ug/L	---/ 100 ug/L
Groundwater Guidance Conc.(c)	2400 ug/L	7 ug/L	1 ug/L	8.4 ug/L	170 ug/L	350 ug/L	700 ug/L	1 ug/L	10 ug/L
SSMW–001	–	–	–	–	–	–	4 J	–	–
SSMW–005	–	–	–	–	–	–	–	–	–
SSMW–007	–	–	–	32	–	–	–	3 J	–
SSMW–017	–	–	–	3 J	–	–	–	–	–
SSMW–020	–	–	–	–	–	6 J	190	–	–
SSMW–021	–	–	–	–	–	–	–	–	–
SSMW–023	–	–	–	–	–	–	–	–	–
SSMW–024	–	–	–	–	–	–	–	–	–
SSMW–026	–	–	–	–	–	–	–	–	–
SSMW–027	–	–	–	–	–	–	5 J	–	–
SSMW–030	–	–	–	–	–	–	–	–	–
SSMW–032	–	–	–	–	12	–	–	–	–
SSMW–033	1 J	–	–	2 J	–	5 J	–	2 J	25

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of a particular compound.
3. A dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Ethyl acetate	Ethylbenzene	Methylene chloride	n–Butyl acetate	Tetrachloro–ethene	Toluene	Trichloro–ethene	Vinyl chloride	Xylenes (total)
Florida MCL(a)/ Federal MCL(b)	---/ ---	---/ 700 ug/L	---/ 5 ug/L	---/ ---	3/ 5 ug/L	---/ 1000 ug/L	3/ 5 ug/L	1/ 2 ug/L	---/ 10,000 ug/L
Groundwater Guidance Conc.(c)	100 ug/L	2 ug/L	5 ug/L	43 ug/L	3 ug/L	24 ug/L	3 ug/L	1 ug/L	50 ug/L
SSMW–001	–	–	–	–	–	–	–	–	–
SSMW–005	–	–	–	–	–	16	–	–	–
SSMW–007	–	–	–	–	–	2 J	–	18	1 J
SSMW–017	–	–	–	–	–	–	5	–	–
SSMW–020	–	–	–	–	–	–	–	–	–
SSMW–021	–	–	–	–	–	–	–	–	–
SSMW–023	–	–	–	–	–	–	–	–	–
SSMW–024	–	–	–	–	–	–	–	–	–
SSMW–026	–	–	–	–	–	–	1 J	–	–
SSMW–027	–	–	–	–	–	–	–	–	–
SSMW–030	–	–	–	–	–	–	–	–	–
SSMW–032	–	–	–	–	–	–	–	–	–
SSMW–033	–	–	–	–	–	2 J	–	6 J	2 J

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of a particular compound.
3. A dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: DEEP SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	1,1–Dichloro–ethane	1,1–Dichloro–ethene	1,1,2–Tri–chloroethane	1,2–Dichloro–ethene (total)	2–Butanone	4–Methyl–2–pentanone	Acetone	Benzene	Chlorobenzene
Florida MCL.(a)/ Federal MCL.(b)	---/ ---	7/ 7 ug/L	---/ 5 ug/L	---/ 70 ug/L	---/ ---	---/ ---	---/ ---	1/ 5 ug/L	---/ 100 ug/L
Groundwater Guidance Conc.(c)	2400 ug/L	7 ug/L	1 ug/L	8.4 ug/L	170 ug/L	350 ug/L	700 ug/L	1 ug/L	10 ug/L
DSMW–002	–	–	–	–	–	–	11	–	–
DSMW–012	15	–	–	86	–	–	83	19	25
DSMW–014	–	–	–	6	–	4 J	–	1 J	–
DSMW–015	–	–	–	7	–	–	–	1 J	–
DSMW–018	1 J	12	–	260	–	–	–	–	–
DSMW–018_DL	–	10	–	210	–	–	38	–	–
DSMW–019	–	19 J	14 J	1200	–	–	130	–	–
DSMW–022	–	–	–	22	–	–	140	–	–
DSMW–025	–	–	–	–	100	–	140	–	–
DSMW–028	1 J	9	–	51	–	–	–	1 J	–
DSMW–031	–	–	–	–	–	400 J	12000	–	–
DSMW–034	19	8 J	–	190	18 J	260	340	3 J	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of a particular compound.
3. A dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: DEEP SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Ethyl acetate	Ethylbenzene	Methylene chloride	n–Butyl acetate	Tetrachloro–ethene	Toluene	Trichloro–ethene	Vinyl chloride	Xylenes (total)
Florida MCL(a)/ Federal MCL(b)	---/ ---	---/ 700 ug/L	---/ 5 ug/L	---/ ---	3/ 5 ug/L	---/ 1000 ug/L	3/ 5 ug/L	1/ 2 ug/L	---/ 10,000 ug/L
Groundwater Guidance Conc.(c)	100 ug/L	2 ug/L	5 ug/L	43 ug/L	3 ug/L	24 ug/L	3 ug/L	1 ug/L	50 ug/L
DSMW–002	–	–	–	–	–	–	–	–	–
DSMW–012	–	14	–	–	–	1 J	39	35	6
DSMW–014	–	–	–	–	–	–	32	–	–
DSMW–015	–	–	–	–	3 J	–	1 J	–	–
DSMW–018	–	–	–	–	4 J	–	260 J	17	–
DSMW–018_DL	–	–	3 J	–	3 J	–	210	13 J	–
DSMW–019	–	–	6 J	–	19 J	–	760	37 J	–
DSMW–022	–	–	–	–	–	–	25	3 J	–
DSMW–025	–	–	–	–	–	–	–	–	–
DSMW–028	–	–	1 J	–	–	–	88	20	–
DSMW–031	–	–	–	–	–	–	–	–	–
DSMW–034	–	3 J	–	–	–	35	100	70	5 J

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of a particular compound.
3. A dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: INTERMEDIATE HAWTHORN MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	1,1–Dichloro–ethane	1,1–Dichloro–ethene	1,1,2–Tri–chloroethane	1,2–Dichloro–ethene (total)	2–Butanone	4–Methyl–2–pentanone	Acetone	Benzene	Chlorobenzene
Florida MCL(a)/ Federal MCL(b)	---/ ---	7/ 7 ug/L	---/ 5 ug/L	---/ 70 ug/L	---/ ---	---/ ---	---/ ---	1/ 5 ug/L	---/ 100 ug/L
Groundwater Guidance Conc.(c)	2400 ug/L	7 ug/L	1 ug/L	8.4 ug/L	170 ug/L	350 ug/L	700 ug/L	1 ug/L	10 ug/L
IHMW–001	–	–	–	–	–	4 J	–	–	–
IHMW–004	–	–	–	–	–	–	–	–	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of a particular compound.
3. A dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: INTERMEDIATE HAWTHORN MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Ethyl acetate	Ethylbenzene	Methylene chloride	n–Butyl acetate	Tetrachloro–ethene	Toluene	Trichloro–ethene	Vinyl chloride	Xylenes (total)
Florida MCL(a)/ Federal MCL(b)	---/ ---	---/ 700 ug/L	---/ 5 ug/L	---/ ---	3/ 5 ug/L	---/ 1000 ug/L	3/ 5 ug/L	1/ 2 ug/L	---/ 10,000 ug/L
Groundwater Guidance Conc.(c)	100 ug/L	2 ug/L	5 ug/L	43 ug/L	3 ug/L	24 ug/L	3 ug/L	1 ug/L	50 ug/L
IHMW–001	–	–	–	–	–	–	–	–	–
IHMW–004	11 J	–	–	6 J	–	–	–	–	–

Notes:
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3. A dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS: SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	1,2–Di–chlorobenzene	1,2,4–Tri–chlorobenzene	1,4–Di–chlorobenzene	2–Methyl–phenol	2,4–Di–methylphenol	4–Methylphenol	Benzoic acid	bis(2–Chloro–ethyl) ether	bis(2–Ethyl–hexyl) phthalate
Florida MCL(a)/	---/	---/	75/	---/	---/	---/	---/	---/	---/
Federal MCL(b)	600 ug/L	70 ug/L	75 ug/L	---	---	---	---	---	6 ug/L
Groundwater Guidance Conc.(c)	10 ug/L	140 ug/L	75 ug/L	---	400 ug/L	---	---	10 ug/L	14 ug/L
SSMW–003	–	–	–	–	–	–	–	–	4 J
SSMW–005	–	–	–	–	–	–	–	–	2 J
SSMW–011	–	–	–	–	–	–	–	–	–
SSMW–024	–	–	–	–	–	–	–	–	3 J
SSMW–032	–	–	–	–	–	–	–	–	3 J

Notes:
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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS:
SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY – JUNE 1992

Sample ID No.	Dibenzofuran	Fluorene	Naphthalene	Phenanthrene	Phenol
Florida MCL(a)/ Federal MCL(b)	---/ ---	---/ ---	100/ --- ug/L	---/ ---	---/ ---
Groundwater Guidance Conc.(c)	---	10 ug/L	10 ug/L	10 ug/L	20 ug/L
SSMW-003	–	–	–	–	–
SSMW-005	–	–	–	–	–
SSMW-011	7 J	4 J	–	3 J	–
SSMW-024	–	–	–	–	–
SSMW-032	–	–	–	–	–

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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS: DEEP SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	1,2–Di–chlorobenzene	1,2,4–Tri–chlorobenzene	1,4–Di–chlorobenzene	2–Methyl–phenol	2,4–Di–methylphenol	4–Methylphenol	Benzoic acid	bis(2–Chloro–ethyl) ether	bis(2–Ethyl–hexyl) phthalate
Florida MCL(a)/ Federal MCL(b)	---/ 600 ug/L	---/ 70 ug/L	75/ 75 ug/L	---/ ---	---/ ---	---/ ---	---/ ---	---/ ---	---/ 6 ug/L
Groundwater Guidance Conc.(c)	10 ug/L	140 ug/L	75 ug/L	---	400 ug/L	---	---	10 ug/L	14 ug/L
DSMW–004	–	–	–	–	–	–	–	–	21
DSMW–006	–	–	–	–	–	–	5 J	–	–
DSMW–012	21	–	7 J	–	160	52	–	38	3 J
DSMW–018	–	–	–	–	–	–	–	–	4 J
DSMW–019	–	18	–	–	–	–	–	–	–
DSMW–025	–	–	–	–	–	–	–	–	6 J
DSMW–034	4 J	–	–	30	9 J	47	–	–	5 J

Notes:
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APPENDIX E

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SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS: DEEP SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Dibenzofuran	Fluorene	Naphthalene	Phenanthrene	Phenol
Florida MCL(a)/ Federal MCL(b)	---/ ---	---/ ---	*100/ --- ug/L*	---/ ---	---/ ---
Groundwater Guidance Conc.(c)	---	*10 ug/L*	*10 ug/L*	*10 ug/L*	*20 ug/L*
DSMW–004	–	–	–	–	–
DSMW–006	–	–	–	–	–
DSMW–012	–	–	2 J	–	–
DSMW–018	–	–	–	–	–
DSMW–019	–	–	–	–	–
DSMW–025	–	–	–	–	–
DSMW–034	–	–	–	–	–

Notes:
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3. The dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS: INTERMEDIATE HAWTHORN MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	1,2–Di–chlorobenzene	1,2,4–Tri–chlorobenzene	1,4–Di–chlorobenzene	2–Methyl–phenol	2,4–Di–methylphenol	4–Methylphenol	Benzoic acid	bis(2–Chloro–ethyl) ether	bis(2–Ethyl–hexyl) phthalate
Florida MCL(a)/	---/	---/	75/	---/	---/	---/	---/	---/	---/
Federal MCL(b)	600 ug/L	70 ug/L	75 ug/L	---	---	---	---	---	6 ug/L
Groundwater Guidance Conc.(c)	10 ug/L	140 ug/L	75 ug/L	---	400 ug/L	---	---	10 ug/L	14 ug/L
IHMW–001	–	–	–	–	–	–	–	–	3 J
IHMW–002	–	–	–	–	–	–	–	–	3 J
IHMW–003	–	–	–	–	–	–	–	–	3 J
IHMW–004	–	–	–	–	–	–	–	–	12
IHMW–005	–	–	–	–	–	–	–	–	2 J

Notes:
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SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS:
INTERMEDIATE HAWTHORN MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Dibenzofuran	Fluorene	Naphthalene	Phenanthrene	Phenol
Florida MCL(a)/ Federal MCL(b)	---/ ---	---/ ---	*100/ --- ug/L*	---/ ---	---/ ---
Groundwater Guidance Conc.(c)	---	*10 ug/L*	*10 ug/L*	*10 ug/L*	*20 ug/L*
IHMW–001	–	–	–	–	8 J
IHMW–002	–	–	–	–	–
IHMW–003	–	–	–	–	–
IHMW–004	–	–	–	–	–
IHMW–005	–	–	–	–	–

Notes:
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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
PESTICIDES AND POLYCHLORINATED BIPHENYLS:
SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY – JUNE 1992

Sample ID No.	4,4'-DDD
Florida MCL(a)/ Federal MCL(b)	---/ ---
Groundwater Guidance Conc.(c)	---
SSMW-001	–
SSMW-003	0.068 J
SSMW-005	–
SSMW-007	–
SSMW-010	–
SSMW-011	–
SSMW-016	–
SSMW-017	–
SSMW-020	–
SSMW-021	–
SSMW-023	–
SSMW-024	–
SSMW-026	–
SSMW-027	–
SSMW-030	–
SSMW-032	–
SSMW-033	–

Notes:
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APPENDIX E
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INORGANICS, TARGET ANALYTE LIST: SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Florida MCL(a)/ Federal MCL(b)	---/ ---	5/ 5 ug/L	50/ 50 ug/L	1000/ 2000 ug/L	1/ 1 ug/L	10/ 5 ug/L	---/ ---	50/ 100 ug/L	---/ ---
Groundwater Guidance Conc.(c)	---	29 ug/L	50 ug/L	1000 ug/L	5 ug/L	10 ug/L	---	50 ug/L	---
SSMW-001	299000	23 J	1.3 J	586	7.2	–	25500	391	20 J
SSMW-001SOL	5820	–	–	24.2 J	0.37 J	–	7040	10.3	–
SSMW-003	29500	–	8.5 J	609	1.2 J	13.8	58800	37.4	4.4 J
SSMW-003SOL	–	–	2.2 J	474	–	–	56400	–	–
SSMW-005	153000 J	11.9 J	5.2 J	666 J	3.6 J	7.7	26000 J	191 J	15.2 J
SSMW-005SOL	185 J	–	5 J	208	–	–	18300	2.6 J	3.9 J
SSMW-007	255000 J	11 J	13.8	921	7.6	–	22900	294 J	18 J
SSMW-007SOL	239	–	2.9 J	55.1 J	–	–	6180	–	–
SSMW-010	15600	–	2.9 J	620	0.72 J	–	150000	21.7	5.6 J
SSMW-010SOL	–	–	–	521 J	0.41 J	–	166000	–	–
SSMW-011	164000 J	–	4 J	315	2.7 J	–	4470 J	203 J	6.2 J
SSMW-011SOL	286	–	1.8 J	60.1 J	–	–	2950 J	–	–
SSMW-016	188000 J	–	4.5 J	295	3.4 J	3.8 J	36800	219 J	10.5 J
SSMW-016SOL	–	–	3.6 J	43.5 J	–	–	32600	–	–
SSMW-017	67100	12.6 J	4.6 J	286	2.4 J	–	84200	68.2	3.8 J
SSMW-017SOL	233	–	1.4 J	93.6 J	–	–	44200	–	–

Notes:
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4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
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INORGANICS, TARGET ANALYTE LIST: SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
Florida MCL(a)/ Federal MCL(b)	*1300/ 1300 ug/L*	*---/ ---*	*50/ 50 ug/L*	*---/ ---*	*---/ ---*	*2/ 2 ug/L*	*100/ 100 ug/L*	*---/ ---*	*10/ 50 ug/L*
Groundwater Guidance Conc.(c)	*1000 ug/L*	*300 ug/L*	*50 ug/L*	*---*	*50 ug/L*	*2 ug/L*	*150 ug/L*	*---*	*10 ug/L*
SSMW-001	44.9	117000	17.2 J	15400	103	0.19 J	63.8 J	11100	–
SSMW-001SOL	–	2760	5.6	970 J	6.5 J	–	51.4	–	–
SSMW-003	41.1	36400	80	56000	294	–	11.6 J	22000	–
SSMW-003SOL	–	19500	–	53900	193	–	–	21500	–
SSMW-005	45.3	92900 J	40.7	20600 J	2090 J	–	174	11900	–
SSMW-005SOL	–	30900	–	8430	1390	–	77.3	5400	2.4 J
SSMW-007	57.9	93300 J	43.3 J	19800	111	0.62 J	39.6 J	9440	–
SSMW-007SOL	–	5640	–	3020 J	20.1	–	–	1070 J	–
SSMW-010	28.5	19600	41 J	107000	525	–	18.9 J	56100	–
SSMW-010SOL	–	1040	–	116000	522	–	13.2 J	65900	–
SSMW-011	35.8	58000 J	11.2 J	14800	69.6	–	125	8250	2 J
SSMW-011SOL	–	11800	–	6460	23.2	–	–	2260 J	–
SSMW-016	47.1	99000 J	15.2 J	18900	68.6	–	28.6 J	9470	–
SSMW-016SOL	–	11000	–	10500	19.8	–	5.1 J	2390 J	2.9 J
SSMW-017	26.2	24900	19.7	51200	135	–	22.5 J	8280	–
SSMW-017SOL	–	460	2 J	29000	72.2	–	–	5130	–

Notes:
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4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
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APPENDIX E
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INORGANICS, TARGET ANALYTE LIST: SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Silver	Sodium	Thallium	Vanadium	Zinc	Cyanide
Florida MCL(a)/ Federal MCL(b)	*50/ --- ug/L*	*160,000/ --- ug/L*	*1/ 1 ug/L*	*---/ ---*	*---/ ---*	*200/ 200 ug/L*
Groundwater Guidance Conc.(c)	*50 ug/L*	*160,000 ug/L*	*10 ug/L*	*---*	*5000 ug/L*	*154 ug/L*
SSMW–001	3.6 J	2150 J	–	639	166 J	–
SSMW–001SOL	–	2340 J	–	17.3 J	21.9	
SSMW–003	–	66100	–	46.5 J	361	11.2
SSMW–003SOL	–	75800	–	–	–	
SSMW–005	2.4 J	24200 J	–	199 J	5520 J	2.8 J
SSMW–005SOL	–	22700	–	4.1 J	458	
SSMW–007	–	6770	–	378	218 J	3.8 J
SSMW–007SOL	–	6590	–	1.9 J	–	
SSMW–010	–	152000	–	29.7 J	63.1 J	–
SSMW–010SOL	–	154000	–	–	16.8 J	
SSMW–011	–	37200	–	248	80.1 J	2.2 J
SSMW–011SOL	–	36800	–	–	–	
SSMW–016	–	6840	–	359	126 J	4.2 J
SSMW–016SOL	–	9470	–	–	–	
SSMW–017	–	20800	–	98.3	121	2.4 J
SSMW–017SOL	–	22000	–	2.5 J	20.1	

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INORGANICS, TARGET ANALYTE LIST: SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY – JUNE 1992

Sample ID No.	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Florida MCL(a)/ Federal MCL(b)	---/ ---	5/ 5 ug/L	50/ 50 ug/L	1000/ 2000 ug/L	1/ 1 ug/L	10/ 5 ug/L	---/ ---	50/ 100 ug/L	---/ ---
Groundwater Guidance Conc.(c)	---	29 ug/L	50 ug/L	1000 ug/L	5 ug/L	10 ug/L	---	50 ug/L	---
SSMW-020	102000 J	–	2.6 J	535	5 J	–	4850 J	157 J	8.7 J
SSMW-020SOL	655	–	1.8 J	574	0.59 J	–	2230 J	13.6	28 J
SSMW-021	194000 J	–	3 J	323 J	3.1 J	–	4920 J	203 J	5.3 J
SSMW-021SOL	141 J	–	–	26.7 J	–	–	1960 J	–	–
SSMW-023	158000 J	14 J	1.4 J	786 J	3.5 J	–	4220 J	173 J	5.8 J
SSMW-023SOL	415	–	–	240	–	–	1910 J	–	–
SSMW-024	307000	–	3.4 J	877	6.3	–	3350 J	315	15.8 J
SSMW-024SOL	261	–	–	110 J	–	–	1190 J	–	–
SSMW-026	91500 J	18.8 J	1.1 J	399 J	1.8 J	–	27600 J	108 J	–
SSMW-026SOL	48.9 J	–	–	224	–	–	27500	–	–
SSMW-027	108000	20.2 J	3 J	1560	2.3 J	30.2	113000	124	15.7 J
SSMW-027SOL	–	–	–	772 J	–	–	105000	–	–
SSMW-030	60400	22.8 J	3.7 J	1250	2.6 J	6.5	153000	79.7	7 J
SSMW-030SOL	–	–	2.1 J	993 J	0.25 J	–	120000	–	–
SSMW-032	451000 J	–	3.3 J	599	6.8	–	98700	496	20.9 J
SSMW-032SOL	195 J	–	2.8 J	82.5 J	–	–	77100	2.4 J	5 J
SSMW-033	118000 J	21.6 J	5.4 J	542	2.3 J	38.6	73800	170	14.4 J
SSMW-033SOL	25.2 J	–	3.5 J	267 J	–	–	69900	–	7.4 J

Notes:
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2. The shaded values represent positive detections of a particular analyte.
3. A dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45-micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
5. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
Florida MCL(a)/ Federal MCL(b)	1300/ 1300 ug/L	---/ ---	50/ 50 ug/L	---/ ---	---/ ---	2/ 2 ug/L	100/ 100 ug/L	---/ ---	10/ 50 ug/L
Groundwater Guidance Conc.(c)	1000 ug/L	300 ug/L	50 ug/L	---	50 ug/L	2 ug/L	150 ug/L	---	10 ug/L
SSMW-020	67.4	42800 J	11 J	12600	49.8	–	86	6660	–
SSMW-020SOL	–	5430	–	3600 J	87.2	–	9.4 J	–	–
SSMW-021	39.2	57500 J	13.4	7360 J	40.4 J	–	20.5 J	14600	–
SSMW-021SOL	–	–	–	589 J	–	–	–	8090	–
SSMW-023	40.7	42900 J	13.1	16300 J	34.8 J	0.42	18.1 J	5520	–
SSMW-023SOL	–	11200	–	6900	8.7 J	–	4.7 J	877 J	–
SSMW-024	75	97500	14.2	21100	80.6	0.22 J	51.7	12100	–
SSMW-024SOL	–	6870	4.9	3920 J	5.8 J	–	–	817 J	–
SSMW-026	34	35100 J	13.6	25900 J	37.8 J	–	17.1 J	16300	–
SSMW-026SOL	–	758	–	22500	17.1	–	–	14100	–
SSMW-027	56.2	132000	56 J	13800	1050	0.19 J	62.5 J	7800	–
SSMW-027SOL	–	5040	–	7950	979	–	18.1 J	4180 J	–
SSMW-030	299	43000	98 J	71000	293	–	33.5 J	45500	–
SSMW-030SOL	–	15100	–	72900	206	–	–	51200	–
SSMW-032	83.5	159000	33.4	53200	173	–	65.6	43300	–
SSMW-032SOL	–	7570	–	32200	52.3	–	5.8 J	26100	–
SSMW-033	132	154000	199	64300	385	0.35	43.2	20100	–
SSMW-033SOL	–	109000	–	58800	264	–	–	15000	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of a particular analyte.
3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
5. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
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APPENDIX E
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INORGANICS, TARGET ANALYTE LIST: SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Silver	Sodium	Thallium	Vanadium	Zinc	Cyanide
Florida MCL(a)/ Federal MCL(b)	50/ --- ug/L	160,000/ --- ug/L	1/ 1 ug/L	---/ ---	---/ ---	200/ 200 ug/L
Groundwater Guidance Conc.(c)	50 ug/L	160,000 ug/L	10 ug/L	---	5000 ug/L	154 ug/L
SSMW-020	–	58900	–	180	104 J	–
SSMW-020SOL	2.1 J	62000	–	17.2 J	–	
SSMW-021	–	2510 J	–	302 J	99.3 J	–
SSMW-021SOL	–	–	–	–	–	
SSMW-023	–	27000 J	–	163 J	70.6 J	–
SSMW-023SOL	–	25400	–	–	–	
SSMW-024	–	17200	–	433	152	–
SSMW-024SOL	–	15800	–	–	–	
SSMW-026	–	48400 J	–	141 J	77.4 J	2.2 J
SSMW-026SOL	–	50400	–	1.8 J	–	
SSMW-027	2.9 J	4590 J	–	143	1870 J	–
SSMW-027SOL	3.1 J	4600 J	–	–	280	
SSMW-030	–	70400	–	91.1	249 J	–
SSMW-030SOL	–	90000	–	–	12.2 J	
SSMW-032	–	200000	–	661	273	–
SSMW-032SOL	1.8 J	194000	–	3.7 J	–	
SSMW-033	3.8 J	177000	–	177	812	–
SSMW-033SOL	4 J	169000	–	7.9 J	–	

Notes:
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3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
5. "J" Signifies the compound was detected at an estimated concentration.

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APPENDIX E
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INORGANICS, TARGET ANALYTE LIST: DEEP SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Florida MCL(a)/ Federal MCL(b)	---/ ---	5/ 5 ug/L	50/ 50 ug/L	1000/ 2000 ug/L	1/ 1 ug/L	10/ 5 ug/L	---/ ---	50/ 100 ug/L	---/ ---
Groundwater Guidance Conc.(c)	---	29 ug/L	50 ug/L	1000 ug/L	5 ug/L	10 ug/L	---	50 ug/L	---
DSMW-002	187 J	–	–	40.2 J	0.26 J	–	97200	2.2 J	–
DSMW-002SOL	–	–	–	38.8 J	–	–	92000	–	–
DSMW-004	338	–	1.6 J	18.4 J	–	–	26900	–	–
DSMW-004SOL	–	–	1.4 J	18.4 J	–	–	29700	–	–
DSMW-006	32.7 J	–	2.9 J	14.6 J	–	–	20000 J	2.4 J	–
DSMW-006SOL	–	–	2.3 J	14.9 J	–	–	20900	–	–
DSMW-008	–	–	1.6 J	59.1 J	–	–	58600	–	–
DSMW-008SOL	–	10.9 UJ	1.4 J	59.7 J	–	–	59600	–	–
DSMW-012	–	–	4 J	52.2 J	–	–	53800	–	–
DSMW-012SOL	–	–	3.8 J	51.8 J	–	–	57700	–	4.7 J
DSMW-014	772 J	10.9 J	2.7 J	147 J	–	–	95000	–	–
DSMW-014SOL	108 J	–	2 J	140 J	–	–	90300	–	3.9 J
DSMW-015	–	–	4.3 J	66.6 J	0.31 J	–	47600	–	–
DSMW-015SOL	–	–	4.5 J	64.6 J	0.2 J	–	46600	10	–

Notes:
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2. The shaded values represent positive detections of a particular analyte.
3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
5. "J" Signifies the compound was detected at an estimated concentration.

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APPENDIX E
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INORGANICS, TARGET ANALYTE LIST: DEEP SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
Florida MCL(a)/ Federal MCL(b)	1300/ 1300 ug/L	---/ ---	50/ 50 ug/L	---/ ---	---/ ---	2/ 2 ug/L	100/ 100 ug/L	---/ ---	10/ 50 ug/L
Groundwater Guidance Conc.(c)	1000 ug/L	300 ug/L	50 ug/L	---	50 ug/L	2 ug/L	150 ug/L	---	10 ug/L
DSMW–002	25.9	640	–	2960 J	15.4	–	6.6 J	1130 J	–
DSMW–002SOL	–	571	–	2870 J	15.9	–	–	806 J	–
DSMW–004	–	452	1.9 J	2770 J	5.9 J	–	–	1260 J	–
DSMW–004SOL	–	396	–	3170 J	6.6 J	–	–	1350 J	–
DSMW–006	–	2610 J	–	2820 J	106 J	–	–	3740 J	–
DSMW–006SOL	–	2480	–	2690 J	101	–	–	3470 J	–
DSMW–008	–	2390 J	–	8470	36.2	–	–	4950 J	–
DSMW–008SOL	–	2440	–	8680	40	–	–	4810	–
DSMW–012	–	11100 J	–	27500	106	–	–	2790 J	–
DSMW–012SOL	–	11100	–	29200	110	–	5.9 J	2960 J	–
DSMW–014	6.8 J	7180	–	38300	89	–	89.7	8620	–
DSMW–014SOL	–	6790	–	36800	86.5	–	76.5	7180	–
DSMW–015	–	9740 J	–	16900	88.2	–	7.2 J	3820 J	–
DSMW–015SOL	–	9660	–	16500	88.9	–	18.8 J	3320 J	–

Notes:
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3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
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APPENDIX E
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INORGANICS, TARGET ANALYTE LIST: DEEP SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Silver	Sodium	Thallium	Vanadium	Zinc	Cyanide
Florida MCL(a)/ Federal MCL(b)	50/ --- ug/L	160,000/ --- ug/L	1/ 1 ug/L	---/ ---	---/ ---	200/ 200 ug/L
Groundwater Guidance Conc.(c)	50 ug/L	160,000 ug/L	10 ug/L	---	5000 ug/L	154 ug/L
DSMW-002	–	8200	–	–	22.8 J	–
DSMW-002SOL	–	8770	–	–	26.5	
DSMW-004	2.1 J	8820	–	3.5 J	7.2 J	5.8 J
DSMW-004SOL	–	8990	–	3.5 J	–	
DSMW-006	–	19100 J	–	–	34.9 J	2.2 J
DSMW-006SOL	–	17500	–	–	–	
DSMW-008	–	16700	–	–	–	2.5 J
DSMW-008SOL	–	16800	–	–	–	
DSMW-012	–	119000	–	–	50.8 J	20.3
DSMW-012SOL	–	119000	–	–	43.4	
DSMW-014	–	83900	–	10.8 J	18.7 J	–
DSMW-014SOL	–	82300	–	10.8 J	–	
DSMW-015	–	127000	–	–	68.4 J	8.4 J
DSMW-015SOL	–	123000	–	2.1 J	24.3	

Notes:
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4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
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APPENDIX E
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INORGANICS, TARGET ANALYTE LIST: DEEP SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Florida MCL(a)/ Federal MCL(b)	---/ ---	5/ 5 ug/L	50/ 50 ug/L	1000/ 2000 ug/L	1/ 1 ug/L	10/ 5 ug/L	---/ ---	50/ 100 ug/L	---/ ---
Groundwater Guidance Conc.(c)	---	29 ug/L	50 ug/L	1000 ug/L	5 ug/L	10 ug/L	---	50 ug/L	---
DSMW-018	–	–	–	46.4 J	–	–	53500	–	–
DSMW-018SOL	–	–	1.6 J	43.2 J	–	–	49100	–	–
DSMW-019	1950 J	–	–	88.9 J	–	–	132000	4.3 J	–
DSMW-019SOL	–	–	2.4 J	85.4 J	–	–	125000	–	–
DSMW-022	2830 J	–	–	54 J	–	–	169000 J	15.3 J	–
DSMW-022SOL	44.9 J	–	–	38.6 J	–	–	83700	–	–
DSMW-025	–	–	–	37.3 J	–	–	92000	–	–
DSMW-025SOL	–	–	–	37 J	–	–	90300	–	–
DSMW-028	825	–	1.7 J	68.8 J	0.62 J	–	96600	5 J	4.4 J
DSMW-028SOL	–	–	1.9 J	64.8 J	0.56 J	–	95100	2.9 J	–
DSMW-031	13700	–	4 J	167 J	1.7 J	9.4	54900	32	6.7 J
DSMW-031SOL	–	–	2.6 J	82.3 J	–	–	47400	–	–
DSMW-034	1970 J	–	5.4 J	198 J	0.87 J	–	51700	5.1 J	5.6 J
DSMW-034SOL	73.1 J	–	4.9 J	174 J	–	4.6 J	51200	–	4.7 J

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of a particular analyte.
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4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
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APPENDIX E
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INORGANICS, TARGET ANALYTE LIST: DEEP SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
Florida MCL(a)/ Federal MCL(b)	1300/ 1300 ug/L	---/ ---	50/ 50 ug/L	---/ ---	---/ ---	2/ 2 ug/L	100/ 100 ug/L	---/ ---	10/ 50 ug/L
Groundwater Guidance Conc.(c)	1000 ug/L	300 ug/L	50 ug/L	---	50 ug/L	2 ug/L	150 ug/L	---	10 ug/L
DSMW–018	–	233	–	18700	25.2	–	6.3 J	16200	–
DSMW–018SOL	–	193	–	18400	26.4	–	–	16200	–
DSMW–019	4.6 J	3220 J	2.4 J	30200	53.5	–	8.2 J	6230 J	–
DSMW–019SOL	–	2210	–	30500	50.2	–	–	4550	–
DSMW–022	–	2810 J	1.8 J	8200 J	41.1 J	–	12.8 J	2230 J	–
DSMW–022SOL	–	699	–	6070	27.8	–	–	1360 J	–
DSMW–025	–	750	3.4 J	4050 J	22.2	–	–	1380 J	–
DSMW–025SOL	–	732	2.2 J	3990 J	26	–	–	1020 J	–
DSMW–028	41.6	5830	–	26800	72.7	–	17.4 J	5160	–
DSMW–028SOL	–	5260	–	26300	71.1	–	–	4550 J	–
DSMW–031	54.4	11100	30.5 J	13200	103	–	16.6 J	4360 J	9.5 J
DSMW–031SOL	–	4950	–	11500	74.6	–	14.5 J	3250 J	–
DSMW–034	16.4 J	21000	2 J	22900	75.1	–	8.2 J	4440 J	–
DSMW–034SOL	–	19800	–	22300	70.8	–	7 J	4230 J	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
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3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
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APPENDIX E
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INORGANICS, TARGET ANALYTE LIST: DEEP SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY – JUNE 1992

Sample ID No.	Silver	Sodium	Thallium	Vanadium	Zinc	Cyanide
Florida MCL(a)/ Federal MCL(b)	50/ --- ug/L	160,000/ --- ug/L	1/ 1 ug/L	---/ ---	---/ ---	200/ 200 ug/L
Groundwater Guidance Conc.(c)	50 ug/L	160,000 ug/L	10 ug/L	---	5000 ug/L	154 ug/L
DSMW-018	–	30500	–	–	–	–
DSMW-018SOL	–	30800	–	–	–	
DSMW-019	–	23000	–	3.9 J	–	5.9 J
DSMW-019SOL	–	27200	–	–	–	
DSMW-022	–	8940 J	–	8.1 J	28.9 J	2.3 J
DSMW-022SOL	–	8420	–	–	–	
DSMW-025	–	8160	–	–	–	–
DSMW-025SOL	–	8420	–	–	22.4	
DSMW-028	–	75600	–	5.9 J	45.3	–
DSMW-028SOL	–	75900	–	4.8 J	22.9 J	
DSMW-031	–	192000	–	28.1 J	11.8 J	–
DSMW-031SOL	–	188000	–	1.4 J	94.4 J	
DSMW-034	–	58700	–	9.2 J	26.8	–
DSMW-034SOL	–	57500	–	6.9 J	–	

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of a particular analyte.
3. A dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45-micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
5. "J" Signifies the compound was detected at an estimated concentration.

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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: INTERMEDIATE HAWTHORN MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Florida MCL(a)/ Federal MCL(b)	---/ ---	5/ 5 ug/L	50/ 50 ug/L	1000/ 2000 ug/L	1/ 1 ug/L	10/ 5 ug/L	---/ ---	50/ 100 ug/L	---/ ---
Groundwater Guidance Conc.(c)	---	29 ug/L	50 ug/L	1000 ug/L	5 ug/L	10 ug/L	---	50 ug/L	---
IHMW-001	–	–	2.2 J	33.9 J	–	–	55300	3.4 J	–
IHMW-001SOL	–	–	–	10.9 J	–	–	47000	–	–
IHMW-002	–	–	1.6 J	9.1 J	–	–	31800	–	–
IHMW-002SOL	–	–	–	–	–	–	27300	–	–
IHMW-003	–	–	1.8 J	7.5 J	–	–	31600	–	–
IHMW-003SOL	–	11.8 J	4.5 J	–	–	–	25800	–	–
IHMW-004	–	–	1.4 J	–	–	–	28700	–	–
IHMW-004SOL	–	–	5.8 J	–	–	–	27800	–	–
IHMW-005	–	–	1.4 J	6.7 J	–	–	30100	–	–
IHMW-005SOL	–	–	–	–	–	–	28000	–	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of a particular analyte.
3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
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INORGANICS, TARGET ANALYTE LIST: INTERMEDIATE HAWTHORN MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
Florida MCL(a)/ Federal MCL(b)	1300/ 1300 ug/L	---/ ---	50/ 50 ug/L	---/ ---	---/ ---	2/ 2 ug/L	100/ 100 ug/L	---/ ---	10/ 50 ug/L
Groundwater Guidance Conc.(c)	1000 ug/L	300 ug/L	50 ug/L	---	50 ug/L	2 ug/L	150 ug/L	---	10 ug/L
IHMW–001	–	–	2.2 J	22300	–	–	6.5 J	25900	–
IHMW–001SOL	–	–	–	22700	–	–	–	14300	–
IHMW–002	–	–	–	20300	–	–	–	3600 J	–
IHMW–002SOL	–	–	–	19300	–	–	–	3470 J	–
IHMW–003	–	189	–	21300	4.2 J	–	7.5 J	2610 J	–
IHMW–003SOL	–	–	–	19700	–	–	–	2280 J	–
IHMW–004	–	–	–	18900	–	–	–	3530 J	–
IHMW–004SOL	–	–	–	18700	–	–	–	3760 J	–
IHMW–005	–	–	–	18500	–	–	–	4120 J	–
IHMW–005SOL	–	–	3.2 J	17900	–	–	–	4630 J	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of a particular analyte.
3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
5. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: INTERMEDIATE HAWTHORN MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Silver	Sodium	Thallium	Vanadium	Zinc	Cyanide
Florida MCL(a)/ Federal MCL(b)	50/ --- ug/L	160,000/ --- ug/L	1/ 1 ug/L	---/ ---	---/ ---	200/ 200 ug/L
Groundwater Guidance Conc.(c)	50 ug/L	160,000 ug/L	10 ug/L	---	5000 ug/L	154 ug/L
IHMW-001	–	25300 J	–	–	–	–
IHMW-001SOL	–	22700 J	–	–	–	
IHMW-002	–	16700 J	–	–	–	–
IHMW-002SOL	–	15500 J	2.3 J	–	–	
IHMW-003	–	13100 J	–	2.3 J	–	–
IHMW-003SOL	–	13000 J	–	–	–	
IHMW-004	–	16900 J	–	–	–	–
IHMW-004SOL	–	16800 J	–	–	–	
IHMW-005	–	19200 J	–	–	–	–
IHMW-005SOL	–	18800 J	–	–	–	

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of a particular analyte.
3. A dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
5. "J" Signifies the compound was detected at an estimated concentration.

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(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
RADIONUCLIDES: SHALLOW SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Gross alpha	Sum of alpha and Radium–226	Gross beta	Radium–226	Radium–228	Total Radium
Florida MCL(a)/ Federal MCL(b)	---/ ---	---/ 15 pCi/L	50/ 50 pCi/L	---/ ---	---/ ---	---/ 5 pCi/L
Groundwater Guidance Conc.(c)	---	15 pCi/L	---	---	---	5 pCi/L
SSMW–001	351	369.2	440	18.2	4	22.2
SSMW–003	36.8	42.6	64.4	5.8	1.7	7.5
SSMW–005	78.9	105.2	175	26.3	2.9	29.2
SSMW–007	114	128.1	160	14.1	4.7	18.8
SSMW–010	66.7	71	188	4.3	0.8	5.1
SSMW–011	101	119.4	118	18.4	3	21.4
SSMW–016	110	137.9	86.2	27.9	4.9	32.8
SSMW–017	98.6	113.1	110	14.5	1.7	16.2
SSMW–020	139	147.4	181	8.4	2.6	11
SSMW–021	151	175	210	24	3.6	27.6
SSMW–023	161	181.2	212	20.2	2.7	22.9
SSMW–024	144	170.7	122	26.7	1.2	27.9
SSMW–026	136	151	152	15	2.7	17.7
SSMW–027	159	172.4	213	13.4	3.2	16.6
SSMW–030	152	159.7	217	7.7	2.9	10.6
SSMW–032	748	763.9	762	15.9	4.8	20.7
SSMW–033	209	220.6	224	11.6	8.5	20.1

Notes:
1. All results are reported in picocuries per liter (pCi/L).
2. The shaded values represent positive detections of the particular radionuclide.
3. The dashed line ('–') represents a non–detection of the radionuclide in a particular sample.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
RADIONUCLIDES: DEEP SURFICIAL MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Gross alpha	Sum of alpha and Radium–226	Gross beta	Radium–226	Radium–228	Total Radium
Florida MCL(a)/ Federal MCL(b)	---/ ---	---/ 15 pCi/L	50/ 50 pCi/L	---/ ---	---/ ---	---/ 5 pCi/L
Groundwater Guidance Conc.(c)	---	15 pCi/L	---	---	---	5 pCi/L
DSMW–002	3.9	5.1	4.8	1.2	–	1.5
DSMW–004	2.5	3.6	1.7	1.1	1.1	2.2
DSMW–006	14.8	16.8	14.3	2	0.6	2.6
DSMW–008	7.1	8.4	8.5	1.3	–	1.6
DSMW–012	19.3	27.9	53.6	8.6	4.1	12.7
DSMW–014	30.3	33.6	40.9	3.3	0.7	4
DSMW–015	19.4	26.2	16.7	6.8	3.1	9.9
DSMW–018	7.2	10.2	27.8	3	2.1	5.1
DSMW–019	1	6.5	8.7	5.5	1	6.5
DSMW–022	16.8	18.2	27.1	1.4	0.8	2.2
DSMW–025	2.1	4.3	2.3	2.2	0.5	2.7
DSMW–028	50.1	52.8	49.5	2.7	1.3	4
DSMW–031	35.5	39.8	30	4.3	1.1	5.4
DSMW–034	32.6	42.2	38.1	9.6	4.2	13.8

Notes:
1. All results are reported in picocuries per liter (pCi/L).
2. The shaded values represent positive detections of the particular radionuclide.
3. The dashed line ('–') represents a non–detection of the radionuclide in a particular sample.
(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
RADIONUCLIDES: INTERMEDIATE HAWTHORN MONITORING WELLS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Gross alpha	Sum of alpha and Radium–226	Gross beta	Radium–226	Radium–228	Total Radium
Florida MCL(a)/	---/	---/	50/	---/	---/	---/
Federal MCL(b)	---	15 pCi/L	50 pCi/L	---	---	5 pCi/L
Groundwater Guidance Conc.(c)	---	15 pCi/L	---	---	---	5 pCi/L
IHMW–001	2.3	3.5	35.3	1.2	0.4	1.6
IHMW–002	5.5	6.1	–	0.6	0.3	0.9
IHMW–003	2.9	4.1	6.6	1.2	0.7	1.9
IHMW–004	1.1	2	4.4	0.9	0.3	1.2
IHMW–005	9.7	10.7	13.4	1	2.7	3.7

Notes:
1. All results are reported in picocuries per liter (pCi/L).
2. The shaded values represent positive detections of the particular radionuclide.
3. The dashed line ('–') represents a non–detection of the radionuclide in a particular sample.

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(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: MATRIX SPIKES, MATRIX SPIKE DUPLICATES, AND REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	1,1–Dichloro–ethane	1,1–Dichloro–ethene	1,2–Dichloro–ethene (total)	2–Butanone	4–Methyl–2–pentanone	Acetone	Benzene	Ethylbenzene	Methylene chloride
Florida MCL(a)/ Federal MCL(b)	---/ ---	7/ 7 ug/L	---/ 70 ug/L	---/ ---	---/ ---	---/ ---	1/ 5 ug/L	---/ 700 ug/L	---/ 5 ug/L
Groundwater Guidance Conc.(c)	2400 ug/L	7 ug/L	8.4 ug/L	170 ug/L	350 ug/L	700 ug/L	1 ug/L	2 ug/L	5 ug/L
RP–001	–	–	–	–	9 J	190	–	–	–
RP–001MS	–	–	–	–	7 J	180	–	–	–
RP–001MSD	–	–	–	–	7 J	190	–	–	–
RP–002	–	–	–	–	–	–	–	–	–
RP–002MS	–	–	–	–	–	13	–	–	–
RP–002MSD	–	–	–	–	–	12	–	–	–
RP–003	–	–	–	–	350 J	11000	–	–	–
RP–003MS	–	–	–	–	370 J	11000	–	–	1000
RP–003MSD	–	–	–	–	380 J	11000	–	–	1100
RP–004	23	9 J	260	24 J	330	420	3 J	3 J	–
RP–004MS	19	–	210	–	280	390	–	–	30
RP–004MSD	20	–	210	–	320	400	–	–	30
DSMW–025MS	–	–	–	110	–	130	–	–	–
DSMW–025MSD	–	–	–	110	–	130	–	–	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Acetone	Chlorobenzene	Methylene chloride
Florida MCL(a)/	---/	---/	---/
Federal MCL(b)	---	*100 ug/L*	*5 ug/L*
Groundwater Guidance Conc.(c)	*700 ug/L*	*10 ug/L*	*5 ug/L*
EB–001	12 J	–	7 J
EB–002	–	–	–
EB–002	–	12	–
EB–003	–	–	–
EB–004	–	–	–
EB–005	4 J	–	–
EB–006	–	–	–
FB–001	–	–	–
FB–002	–	12	–

Notes:
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2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: MATRIX SPIKES, MATRIX SPIKE DUPLICATES, AND REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Toluene	Trichloro-ethene	Vinyl chloride	Xylenes (total)
Florida MCL.(a)/ Federal MCL.(b)	---/ *1000 ug/L*	3/ *5 ug/L*	1/ *2 ug/L*	---/ *10,000 ug/L*
Groundwater Guidance Conc.(c)	*24 ug/L*	*3 ug/L*	*1 ug/L*	*50 ug/L*
RP–001	–	–	–	–
RP–001MS	–	–	–	–
RP–001MSD	–	–	–	–
RP–002	20	–	–	–
RP–002MS	–	–	–	–
RP–002MSD	–	–	–	–
RP–003	–	–	–	–
RP–003MS	–	–	–	–
RP–003MSD	–	–	–	–
RP–004	43	130	93	7 J
RP–004MS	–	–	72	7 J
RP–004MSD	–	–	73	7 J
DSMW–025MS	–	–	–	–
DSMW–025MSD	–	–	–	–

Notes:
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3. The dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS: TRIP BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Acetone	Carbon Disulfide	Chloroform	Methylene chloride	Toluene
Florida MCL(a)/ Federal MCL(b)	---/ ---	---/ ---	100/ 100 ug/L	---/ 5 ug/L	---/ 1000 ug/L
Groundwater Guidance Conc.(c)	700 ug/L	---	100 ug/L	5 ug/L	24 ug/L
TB–001	–	2 J	–	–	–
TB–002	–	2 J	–	–	–
TB–003	–	2 J	2 J	–	–
TB–004	7 J	2 J	2 J	–	–
TB–005	–	2 J	–	–	–
TB–006	–	2 J	1 J	–	–
TB–007	–	2 J	–	7	–
TB–009	–	2 J	–	–	–
TB–010	–	3 J	–	–	–
TB–012	–	2 J	–	–	–
TB–013	–	2 J	3 J	–	–
TB–014	–	2 J	–	–	–
TB–015	–	2 J	2 J	–	–
TB–016	–	3 J	–	–	–
TB–017	–	2 J	–	–	–
TB–018	–	1 J	–	7 J	–
TB–019	–	2 J	–	–	–
TB–020	–	1 J	–	–	–
TB–021	–	2 J	–	–	–
TB–023	–	–	–	–	1 J
TB–024	–	1 J	–	–	–
TB–025	–	–	–	1 J	–
TB–026	–	2 J	–	8	–
TB–027	–	–	–	1 J	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
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3. The dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	1,2–Di–chlorobenzene	2–Methyl–phenol	2,4–Di–methylphenol	4–Methylphenol	bis(2–Ethyl–hexyl) phthalate	Di–n–butyl–phthalate
Florida MCL(a)/ Federal MCL(b)	---/ 600 ug/L	---/ ---	---/ ---	---/ ---	---/ 6 ug/L	---/ ---
Groundwater Guidance Conc.(c)	10 ug/L	---	400 ug/L	---	14 ug/L	700 ug/L
EB–001	–	–	–	–	–	–
EB–002	–	–	–	–	9 J	–
EB–002	–	–	–	–	–	–
EB–003	–	–	–	–	–	–
EB–004	–	–	–	–	–	–
EB–005	–	–	–	–	–	–
EB–006	–	–	–	–	–	–
FB–001	–	–	–	–	3 J	–
FB–002	–	–	–	–	–	–

Notes:
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3. The dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY – JUNE 1992

Sample ID No.	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
Florida MCL(a)/ Federal MCL(b)	1300/ 1300 ug/L	---/ ---	50/ 50 ug/L	---/ ---	---/ ---	2/ 2 ug/L	100/ 100 ug/L	---/ ---	10/ 50 ug/L
Groundwater Guidance Conc.(c)	1000 ug/L	300 ug/L	50 ug/L	---	50 ug/L	2 ug/L	150 ug/L	---	10 ug/L
EB-001	–	–	–	–	–	–	–	–	2.6 J
EB-001SOL	–	–	3.7	–	–	–	5.8 J	–	3.6 J
EB-002	–	–	2 J	–	–	–	–	–	–
EB-002SOL	–	–	–	–	–	–	–	–	–
EB-003	–	16.5 J	–	–	0.67 J	–	58.6	–	–
EB-003SOL	–	–	–	23.4 J	–	–	–	–	–
EB-004	–	–	–	–	–	–	–	–	–
EB-004SOL	–	–	–	–	–	–	–	–	–
EB-005	3.3 J	31.2 J	–	–	–	–	–	–	–
EB-005SOL	–	–	–	–	–	–	–	–	–
EB-006	13.1 J	19.4 J	–	–	–	–	4.5 J	–	–
EB-006SOL	–	–	–	–	–	–	–	–	–
FB-001	–	–	–	–	–	–	–	–	–
FB-001SOL	–	–	–	–	–	–	–	–	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45-micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
5. "J" Signifies the compound was detected at an estimated concentration.
(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
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APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
Florida MCL(a)/ Federal MCL(b)	1300/ 1300 ug/L	---/ ---	50/ 50 ug/L	---/ ---	---/ ---	2/ 2 ug/L	100/ 100 ug/L	---/ ---	10/ 50 ug/L
Groundwater Guidance Conc.(c)	1000 ug/L	300 ug/L	50 ug/L	---	50 ug/L	2 ug/L	150 ug/L	---	10 ug/L
RP–001	45.6	39700 J	14.7 J	11000	48.7	0.22 J	36.2 J	5850	–
RP–001SOL	–	5500	–	3670 J	8.3 J	–	8.2 J	1530 J	2.3 J
RP–002	41.9	67400 J	36.4	15600	1600	–	180	9330	–
RP–002SOL	–	32000	–	8930 J	1450 J	–	81.9	5310	–
RP–003	59.5	11500	21.6 J	13100	99.2	–	15.6 J	4690 J	15.8 J
RP–003SOL	60.2	13300	27.4	13900	110	–	27.1 J	4820 J	26.6 J
RP–004	8.3 J	20600	–	22600	72.6	–	7.7 J	4310 J	–
RP–004SOL	–	20000	–	22200	71	–	4.1 J	4070 J	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
5. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
SEMIVOLATILE COMPOUNDS AND POLYNUCLEAR AROMATIC HYDROCARBONS: MATRIX SPIKES, MATRIX SPIKE DUPLICATES, AND REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	1,2–Di–chlorobenzene	2–Methyl–phenol	2,4–Di–methylphenol	4–Methylphenol	bis(2–Ethyl–hexyl) phthalate	Di–n–butyl–phthalate
Florida MCL(a)/ Federal MCL(b)	---/ 600 ug/L	---/ ---	---/ ---	---/ ---	---/ 6 ug/L	---/ ---
Groundwater Guidance Conc.(c)	10 ug/L	---	400 ug/L	---	14 ug/L	700 ug/L
RP–001	–	–	–	–	–	–
RP–001MS	–	–	–	–	–	–
RP–001MSD	–	–	–	–	–	–
RP–002	–	–	–	–	–	–
RP–002MS	–	–	–	–	–	–
RP–002MSD	–	–	–	–	–	–
RP–003	–	–	–	–	3 J	3 J
RP–003MS	–	–	–	–	–	–
RP–003MSD	–	–	–	–	–	–
RP–004	–	31	8 J	49	4 J	–
RP–004MS	6 J	36	10	48	4 J	–
RP–004MSD	6 J	35	10	45	5 J	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular compound.
3. The dashed line ('–') represents a non–detection of a compound in a particular sample.
4. "J" Signifies the compound was detected at an estimated concentration.

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(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY – JUNE 1992

Sample ID No.	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Florida MCL(a)/ Federal MCL(b)	---/ ---	5/ 5 ug/L	50/ 50 ug/L	1000/ 2000 ug/L	1/ 1 ug/L	10/ 5 ug/L	---/ ---	50/ 100 ug/L	---/ ---
Groundwater Guidance Conc.(c)	---	29 ug/L	50 ug/L	1000 ug/L	5 ug/L	10 ug/L	---	50 ug/L	---
EB-001	–	–	–	–	–	–	–	–	–
EB-001SOL	–	–	3.1 J	–	–	–	149 J	–	–
EB-002	–	–	–	–	–	–	451 J	–	–
EB-002SOL	–	–	–	–	–	–	–	–	–
EB-003	–	–	–	–	–	–	262 J	–	–
EB-003SOL	–	–	–	–	–	–	–	–	–
EB-004	–	–	–	–	–	–	–	–	–
EB-004SOL	29.6 J	–	–	1.2 J	–	–	–	2.6 J	–
EB-005	33.7 J	–	–	–	–	–	–	–	–
EB-005SOL	–	–	1.1 J	0.88 J	–	–	–	–	–
EB-006	33.4 J	–	–	–	–	–	–	–	–
EB-006SOL	97.6 J	–	–	1.3 J	–	–	–	–	–
FB-001	–	–	–	–	–	–	–	–	–
FB-001SOL	–	–	–	–	–	–	–	–	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45-micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
5. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY – JUNE 1992

Sample ID No.	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Florida MCL(a)/ Federal MCL(b)	---/ ---	5/ 5 ug/L	50/ 50 ug/L	1000/ 2000 ug/L	1/ 1 ug/L	10/ 5 ug/L	---/ ---	50/ 100 ug/L	---/ ---
Groundwater Guidance Conc.(c)	---	29 ug/L	50 ug/L	1000 ug/L	5 ug/L	10 ug/L	---	50 ug/L	---
RP-001	93100 J	12 J	2.4 J	385	4 J	–	4560 J	133 J	7.4 J
RP-001SOL	763	–	2.8 J	47.9 J	0.41 J	–	2440 J	3.7 J	–
RP-002	106000 J	11.8 J	5.3 J	536 J	2.7 J	–	21400 J	133 J	11.5 J
RP-002SOL	189 J	–	2.1 J	218	–	–	19700	3.3 J	8 J
RP-003	15100	–	3.6 J	157 J	1.6 J	6.2	53500	32.2	5.6 J
RP-003SOL	19300	–	4.9 J	170 J	1.9 J	9.5	57600	37.4	–
RP-004	1510 J	–	5.4 J	195 J	0.66 J	–	51300	4.5 J	5 J
RP-004SOL	79.9 J	–	4.8 J	176 J	–	–	51200	–	–

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45-micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
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(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX E
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: EQUIPMENT BLANKS AND FIELD BLANKS
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY – JUNE 1992

Sample ID No.	Silver	Sodium	Thallium	Vanadium	Zinc	Cyanide
Florida MCL(a)/ Federal MCL(b)	50/ --- ug/L	160,000/ --- ug/L	1/ 1 ug/L	---/ ---	---/ ---	200/ 200 ug/L
Groundwater Guidance Conc.(c)	50 ug/L	160,000 ug/L	10 ug/L	---	5000 ug/L	154 ug/L
EB-001	–	–	–	–	–	–
EB-001SOL	–	–	–	–	–	
EB-002	–	–	–	–	–	–
EB-002SOL	–	–	–	–	–	
EB-003	–	953 J	–	–	23.7 J	–
EB-003SOL	–	–	–	–	–	
EB-004	–	–	–	–	–	–
EB-004SOL	1.9 J	–	–	1.8 J	–	
EB-005	–	–	–	–	–	–
EB-005SOL	–	–	–	–	–	
EB-006	–	–	–	–	–	–
EB-006SOL	–	–	–	–	–	
FB-001	–	–	–	–	–	
FB-001SOL	–	–	–	–	–	

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non-detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45-micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
5. "J" Signifies the compound was detected at an estimated concentration.

(a) Florida Department of Environmental Regulation Chapter 17.550 Florida Administrative Code (FAC), "Safe Drinking Water Act," January 1991.
(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX B
SUMMARY OF POSITIVE DETECTIONS IN GROUNDWATER ANALYTICAL RESULTS
INORGANICS, TARGET ANALYTE LIST: REPLICATE SAMPLES
NAVAL AIR STATION, JACKSONVILLE FLORIDA, OPERABLE UNIT 1
MAY–JUNE 1992

Sample ID No.	Silver	Sodium	Thallium	Vanadium	Zinc	Cyanide
Florida MCL(a)/ Federal MCL(b)	*50/ --- ug/L*	*160,000/ --- ug/L*	*1/ 1 ug/L*	*---/ ---*	*---/ ---*	*200/ 200 ug/L*
Groundwater Guidance Conc.(c)	*50 ug/L*	*160,000 ug/L*	*10 ug/L*	*---*	*5000 ug/L*	*154 ug/L*
RP–001	–	46400	–	156	93.4 J	–
RP–001SOL	–	62800	–	5.4 J	22	
RP–002	1.8 J	19600 J	–	137 J	4410 J	4.8 J
RP–002SOL	–	24100	–	5.9 J	480	
RP–003	–	188000	–	29.4 J	91 J	–
RP–003SOL	–	193000	–	36.4 J	111	
RP–004	–	58000	–	8.1 J	26.3	–
RP–004SOL	2.1 J	57000	–	8.3 J	–	

Notes:
1. All results are reported in micrograms per liter (ug/L).
2. The shaded values represent positive detections of the particular analyte.
3. The dashed line ('–') represents a non–detection of an analyte in a particular sample.
4. The suffix "SOL" denotes a sample that was filtered in the field through a 45–micron screen and preserved with nitric acid to a pH of 2 prior to analysis.
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(b) U.S. Environmental Protection Agency (EPA), SDWA National Primary Drinking Water Regulations per 40 CFR 141: Maximum Contaminant Levels. Last updated on July 17, 1992.
(c) Florida Department of Environmental Regulation (FDER), "Ground Water Guidance Concentrations," February 1989.

APPENDIX F-1
Flora and Fauna of NASJAX: OU1

TABLE A-1
CHARACTERISTIC FLORA OF MAJOR VEGETATIVE COVER TYPES[a]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

SCIENTIFIC NAME	COMMON NAME
PINE FLATWOODS COMMUNITY	
Acer rubrum	Red maple
Andropogon virginiana	Broom sedge
Arisaema triphyllum	Jack-in-the-pulpit
Aristida stricta	Pineland three-awn
Bignonia capreolata	Cross vine
Carya glabra	Pignut hickory
Cephalanthus occidentalis	Buttonbush
Crataegus sp.	Hawthorne
Ilex glabra	Gallberry
Ilex vomitoria	Yaupon
Liquidambar styraciflua	Sweet gum
Lonicera japonica	Japanese honeysuckle
Lonicera sp.	Honeysuckle
Lyonia lucida	Fetterbush
Lyonia mariana	Staggerbush
Magnolia grandiflora	Bigleaf magnolia
Osmunda cinnamonea	Cinnamon fern
Panicum sp.	Panic grass
Parthenocissus quinquefolia	Virginia creeper
Pinus elliottii	Slash pine
Pinus palustris	Longleaf pine
Polypodium polypoides	Resurrection fern
Pteridium aquilinum	Bracken fern
Quercus chapmanni	Chapman oak
Quercus laevis	Turkey oak
Quercus laurifolia	Diamond-leaf oak
Quercus nigra	Water oak
Quercus spp.	Oaks
Rhus coppalina	Shining sumac
Rubus trivialis	Dewberry
Rubus sp.	Bramble
Serenoa repens	Saw palmetto
Smilax bona-nox	Catbriar
Smilax glauca	Greenbriar
Smilax rotundifolia	Bullbriar
Smilax sp.	Greenbriar
Thelypteris kunthii	Fern
Tillandsia usneoides	Spanish moss
Toxicodendron radicans	Poison ivy
Vitis rotundifolia	Muscadine grape
Woodwardia virginica	Virginia chain fern

TABLE A-1
CHARACTERISTIC FLORA OF MAJOR VEGETATIVE COVER TYPES[a]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

SCIENTIFIC NAME	COMMON NAME
MESOPHYTIC HARDWOOD COMMUNITY	
Amphicarpa bracteata	Hog peanut
Aralia spinosa	Devil's Walking stick
Assimina triloba	Pawpaw
Asplenium sp.	Spleenwort
Athyrium filix-femina	Lady fern
Carpinus carolinensis	Hornbeam
Carya glabra	Pignut hickory
Centrosema virginiana	Butterfly pea
Cercis canadensis	Redbud
Cornus florida	Flowering dogwood
Erythrina herbacea	Coral bean
Gaylussacia frondosa	Dangleberry
Hamamelis virginiana	Witch-hazel
Hypericum hypericoides	St. John's-wort
Ilex glabra	Gallberry
Ilex opaca	American holly
Ligustrum lucidum	Wax-leaved ligustrum
Lonicera japonica	Japanese honeysuckle
Lycopodium sp.	Club moss
Lyonia lucida	Fetterbush
Magnolia grandiflora	Magnolia
Mitchella repens	Partridgeberry
Myrica cerifera	Bayberry
Nyssa sylvatica	Black gum
Parthenocissus quinquefolia	Virginia creeper
Pinus elliottii	Slash pine
Pinus palustris	Longleaf pine
Polypodium polypoides	Resurrection fern
Polypodium plumula	Comb fern
Prunus serotina	Black cherry
Pterocaulon pyenostachyum	Blackroot
Quercus hemisphaerica	Laurel oak
Quercus michauxii	Swamp chestnut oak
Quercus nigra	Water oak
Quercus virginiana	Live oak
Serenoa repens	Saw palmetto
Smilax bona-nox	Catbriar
Smilax sp.	Greenbriar
Smilax walterii	Coral greenbriar
Thelypteris quadrangularis	Fern
Ulmus alata	Winged elm

TABLE A-1
CHARACTERISTIC FLORA OF MAJOR VEGETATIVE COVER TYPES[a]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

SCIENTIFIC NAME	COMMON NAME
MESOPHYTIC HARDWOOD COMMUNITY (cont.)	
Vaccinium arboreum	Highbush blueberry
Vaccinium arboreum	Sparkleberry
Vaccinium sp.	Blueberry
Vitis aestivalis	Summer grape
Woodwardia areolata	Netted chain fern
HYDROPHYTIC HARDWOOD COMMUNITY	
Acer negundo	Box elder
Acer rubrum	Red maple
Amorpha fruticosa	False indigo
Ampelopsis arborea	Peppervine
Aralia spinosa	Devils walking stick
Arisaema triphyllum	Jack-in-the-pulpit
Asplenium resiliens	Black-stemmed spleenwort
Athyrium filix-femina	Lady fern
Betula nigra	River birch
Bignonia capreolata	Cross vine
Botrychium virginianum	Rattlesnake fern
Carpinus caroliniana	Hornbeam
Cephalanthus occidentalis	Buttonbush
Cicuta mexicana	Water hemlock
Cladium sp.	Twig rush
Cnidoscolus stimulosus	Nettle
Dichromena sp.	White top sedge
Fraxinus pennsylvanica	Green ash
Gallium sp.	Bedstraw
Hydrocotyle umbellata	Water pennywort
Ilex coriacea	Gallberry
Ilex glabra	Inkberry
Ilex myrtifolia	Myrtle-leaved holly
Iris pseudacoris	Yellow flag
Liquidambar styraciflua	Sweet gum
Lyonia lucida	Fetterbush
Lyonia mariana	Staggerbush
Magnolia virginiana	Sweet bay magnolia
Myrica cerifera	Bayberry
Nyssa sylvatica	Black gum
Osmunda cinnamonea	Cinnamon fern
Osmunda regalis	Royal fern
Orontium aquaticum	Golden club
Peltandra virginica	Green arum
Persea burbonia	Red bay

TABLE A-1
CHARACTERISTIC FLORA OF MAJOR VEGETATIVE COVER TYPES[a]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

SCIENTIFIC NAME	COMMON NAME
HYDROPHYTIC HARDWOOD COMMUNITY (cont.)	
Pinus elliottii	Slash pine
Polygonum sp.	Smartweed
Polypodium polypoides	Resurrection fern
Quercus nigra	Water oak
Quercus phellos	Willow oak
Quercus spp.	Oaks
Quercus virginiana	Live oak
Salix nigra	Black Willow
Sambucus canadensis	Elderberry
Sassafras albidum	Sassafras
Smilax sp.	Greenbriar
Sphagnum spp.	Sphagnum moss
Taxodium distichum	Bald cypress
Thelypteris kunthii	Fern
Toxicodendron radicans	Poison ivy
Ulmus americana	American elm
Utricularia inflata	Bladderwort
Vaccinium arboreum	Sparkleberry
Vaccinium sp.	Blueberry
Vitis rotundifolia	Muscadine grape
Woodwardia areolata	Netted chain fern
Woodwardia virginica	Virginia chain fern
OLD FIELD COMMUNITY	
Albizia julibrissin	Mimosa
Allium canadense	Wild onion
Ambrosia artemissifolia	Ragweed
Ampelopsis arborea	Peppervine
Andropogon virginicus	Broom grass
Asplenium resiliens	Black-stemmed spleenwort
Aster sp.	Aster
Baccharis halmifolia	Groundsel-tree
Bidens pilosa	Spanish needles
Callicarpa americana	Beauty berry
Campsis radicans	Trumpet creeper
Carex sp.	Sedge
Centrosema virginianum	Butterfly pea
Circium sp.	Thistle
Cladium sp.	Twig rush
Clematis crispa	Leather flower
Cnidoscolus stimulosus	Nettle
Commelina erecta	Dayflower

TABLE A-1
CHARACTERISTIC FLORA OF MAJOR VEGETATIVE COVER TYPES[a]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

SCIENTIFIC NAME	COMMON NAME
OLD FIELD COMMUNITY (cont.)	
Crotalaria sp.	Rattlebox
Cuscuta gronovii	Dodder
Daucus carota	Queen Anne's lace
Dichromena sp.	White-bracted sedge
Digitaria sp.	Crab grass
Dioscorea bulbifera	Air yam
Erigeron quercifolius	Fleabane
Eupatorium capillifolium	Dog fennel
Euthamia minor	Flat-topped goldenrod
Geranium carolinianum	Wild geranium
Hedyotis procumbens	Innocence
Hydrocotyle umbellata	Water pennywort
Hypericum gentianoides	St. Johns wort
Hypochoeris radicata	Cat's ear
Ipomoea sp.	Bindweed
Juniperus virginiana	Southern red cedar
Juncus canadensis	Canada rush
Juncus sp.	Rush
Lepidium virginicum	Field peppergrass
Lygodium japonicum	Japanese climbing fern
Melia azedarach	Chinaberry
Meliota alba	Tall white clover
Morus alba	White mulberry
Oenothera laciniata	Primrose
Oxalis sp.	Sorrel
Panicum sp.	Panic grass
Passiflora incarnata	Passion flower
Phorodendron serotinum	Mistletoe
Phyla nodiflora	Capeweed
Prunus caroliniana	Carolina laurel cherry
Pteridium aquilinum	Bracken fern
Quercus myrtifolia	Myrtle oak
Robinia hispidus	Bristly locust
Rhus typhina	Staghorn sumac
Rubus trivialis	Southern dewberry
Rumex crispus	Dock
Sabal palmetto	Sabal palm
Salvia lyrata	Lyre-leaved mint
Sambucus canadensis	Elderberry
Sapium sebiferum	Chinese tallow tree
Seshania sp.	Rattlebox
Solanum carolinense	Horse nettle

TABLE A-1
CHARACTERISTIC FLORA OF MAJOR VEGETATIVE COVER TYPES[a]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

SCIENTIFIC NAME	COMMON NAME
OLD FIELD COMMUNITY (cont.)	
Sonchas asper	Sow thistle
Spiranthes sp.	Orchid
Stachys floridana	Hedge nettle
Tradescantia virginiana	Spiderwort
Trifolium spp.	Clovers
Ulmus alata	Winged Elm
Verbena brasiliensis	Vervain
Vitis rotundifolia	Muscadine grape
Xyris sp.	Yellow-eyed grass
Yucca aloifolia	Spanish bayonnet
Zanthoxylum clava-herculis	Southern prickly ash
PERIMETER DITCH (AND BANK) COMMUNITY	
Baccharis halmifolia	Groundsel-tree
Bacopa sp.	Water hyssop
Canna sp.	Canna
Carex spp.	Sedges
Cyperus sp.	Flat sedge
Eriocaulon sp.	Pipewort
Eupatorium capillifolium	Dog fennel
Fimbristylis sp.	Fringe rush
Ilex glabra	Gallberry
Iris pseudacorus	Yellow flag
Juncus spp.	Rushes
Myriophyllum sp.	Water milfoil
Myrica cerifera	Bayberry
Panicum repens	Torpedo grass
Pinus ellioti	Slash pine
Polygonum spp.	Smartweeds
Populus deltoides	Poplar
Prunus carolina	Carolina laurel cherry
Salix nigra	Black willow
Sambucus canadensis	Elderberry
Scirpus cyperinus	Umbrella sedge
Scirpus sp.	Bulrush
Typha latifolia	Cattail
Utricularia inflata	Bladderwort
Verbena brasiliensis	Vervain
Xyris sp.	Yellow-eyed grass

TABLE A-1
CHARACTERISTIC FLORA OF MAJOR VEGETATIVE COVER TYPES[a]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

SCIENTIFIC NAME	COMMON NAME
ST. JOHNS RIVER ESTUARINE COMMUNITY	
Acer rubrum	Red maple
Amorpha fruticosa	False indigo
Bacopa sp.	Water hyssop
Brasenia sp.	Water shield
Cephalanthus occidentalis	Buttonbush
Cyperus sp.	Flat sedge
Eichhornia crassipes	Water hyacinth
Eleocharis sp.	Spike rush
Fraxinus pennsylvanicum	Green ash
Hibiscus grandiflorus	Big rose-mallow
Hydrocotyle umbellata	Water pennywort
Iris sp.	Iris
Juncus effusus	Soft rush
Juncus spp.	Rushes
Lemna minor	Duckweed
Myriophyllum sp.	Water milfoil
Orontium aquaticum	Golden club
Osmunda cinnamomea	Cinnamon fern
Osmunda regalis	Royal fern
Peltandra virginica	Green arum
Pistia stratiotes	Water lettuce
Polygonum sp.	Smartweed
Pontedaria cordata	Pickerel weed
Salix sp.	Willow
Sambucus canadensis	Elderberry
Scirpus californicus	Giant rush
Scirpus sp.	Bulrush
Taxodium distichum	Bald cypress
Toxicodendron radicans	Poison ivy
Typha angustifolia	Cattail
Ulmus americana	American elm
Utricularia inflata	Bladderwort
Vallisneria americana	Eelgrass
Wolffia sp.	Duckweed

Note:
[a] Sources: ABB-ES site inspection; Godfrey and Wooten (1981); Dressler et al. (1991); Mickel (1979).

TABLE A-2
FISH EXPECTED IN THE ST. JOHNS RIVER IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCES [a]	[b]
ACIPENSERIDAE				
	Acipenser oxyrhynchus	Atlantic sturgeon	X	
	Acipenser brevirostrum	Shortnose sturgeon	X	
AMMIIDAE				
	Amia calva	Bowfin		X
ANGUILLIDAE				
	Anguilla rostrata	American eel	X	X
ARIIDAE				
	Ariopsis felis	Hardhead catfish		X
	Galeichthys felis	Sea catfish	X	
	Bagre marinus	Gafftop	X	X
ATHERINIDAE				
	Labidesthes sicculus	Brook silverside		X
	Menidia beryllina	Inland silverside		X
BALISTIDAE				
	Balistes carolinensis	Gray triggerfish		X
BELONIDAE				
	Strongylura marina	Atlantic needlefish	X	X
BLENNIIDAE				
	Chasmodes bosquianus	Striped blenny		X
BOTHIDAE				
	Citharichthys spilopterus	Bay whiff		X
	Paralichthyes lethostigma	Southern flounder		X
CARANGIDAE				
	Caranx hippos	Jackfish		X
	Oligoplites saurus	Leatherjacket		X
CATOSTOMIDAE				
	Erimyzon sucetta	Lake chubsucker		X
CENTRARCHIDAE				
	Enneacanthus gloriosus	Bluespotted sunfish		X
	Lepomis auritus	Redbreast sunfish		X
	Lepomis gulosus	Warmouth		X
	Lepomis macrochirus	Bluegill		X
	Lepomis microlophus	Redear sunfish		X
	Lepomis punctatus	Spotted sunfish		X
	Micropterus salmoides	Largemouth bass		X
CLUPEIDAE				
	Brevoortia smithi	Yellow menhaden		X
	Dorosoma cepedianum	Gizzard shad		X
	Dorosoma petenense	Threadfin shad		X
CYNOGLOSSIDAE				
	Symphurus plagiosa	Tonguefish		X

TABLE A-2
FISH EXPECTED IN THE ST. JOHNS RIVER IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCES [a]	[b]
CYPRINIDAE				
	Notemigonus crysoleucas	Golden shiner		X
CYPRINODONTIDAE				
	Fundulus seminolis	Seminole killifish		X
	Lucania parva	Rainwater killifish		X
DASYATIDAE				
	Dasyatis sabina	Atlantic stingray	X	X
ELOPIDAE				
	Elops saurus	Ladyfish	X	X
ENGRAULIDAE				
	Anchoa hepsetus	Striped anchovy	X	X
	Anchoa mitchilli	Bay anchovy	X	X
ESOCIDAE				
	Esox americanus	Grass pickerel		X
GERREIDAE				
	Diapterus auratus	Mojarra		X
	Eucinostomus argenteus	Spotfin mojarra		
	Eucinostomus harengulus	Mojarra		X
	Eucinostomus melanopterus	Mojarra		X
	Gerres cinereus	Yellowfin mojarra		X
GOBIIDAE				
	Awaous banana	River goby	X	
	Gobionellus beleosoma	Darter goby	X	
	Gobionellus oceanicus	Sharptail goby		X
	Gobionellus shefeldti	Freshwater goby	X	X
	Gobiosoma bosci	Naked goby	X	
	Gobiosoma robustum	Code goby	X	
	Microgobius gulosus	Clown goby		X
ICTALURIDAE				
	Ictalurus catus	White catfish		X
	Ictalurus natalis	Yellow bullhead		X
	Ictalurus nebulosus	Brown bullhead		X
LEPISOSTEIDAE				
	Lepisosteus osseus	Longnose gar		X
	Lepisosteus platyrhincus	Spotted gar		X
LUTJANIDAE				
	Lutjanus griseus	Gray snapper		X

TABLE A-2
FISH EXPECTED IN THE ST. JOHNS RIVER IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCES [a]	[b]
MUGILIDAE				
	Mugil cerema	White mullet		X
	Mugil cephalus	Striped mullet		X
PETROMYZONTIDAE				
	Petromyzon marinus	Sea lamprey	X	X
POECILIIDAE				
	Gambusia affinis	Mosquitofish		X
	Gambusia holbrooki	Killifish		X
	Heterandria formosa	Least killfish		X
	Poecilia latipinna	Sailfin mully		X
SCIANENIDAE				
	Bairdiella chrysura	Silver perch		X
	Cynoscion nebulosus	Spotted seatrout		X
	Cynoscion regalis	Atlantic weakfish		X
	Leiostomus xanthurus	Spot		X
	Micropogonias undulatus	Atlantic croaker		X
	Sciaenops ocellata	Red drum		X
SOLEIDAE				
	Trinectes maculatus	Hogchoker		X
SPARIDAE				
	Lagodon rhomboides	Pinfish		X
SYGNATHIDAE				
	Sygnathus scovelli	Southern pipefish		X
	Sygnathus lousiana	Louisiana pipefish		X

Notes:

[a] Source: USFWS, 1988. This sources does not present a complete list of St. Johns River fish, but provides indicator species of the estuarine environment in the vicinity of Black Point (approximately) 2 miles north of OU1.

[b] Source: St. Johns River Water Management District (1992); 1990 and 1991 fish sampling results from Julington Creek and Doctors Lake, St. Johns River.

TABLE A-3
AMPHIBIANS EXPECTED OR OBSERVED IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCE [a]	REFERENCE [b]
AMBYSTOMIDAE				
	Ambystoma talpoideum	Mole salamander		X
BUFONIDAE				
	Bufo quercicus	Oak toad	X	X
	Bufo terrestris	Southern toad	X	X
HYLIDAE				
	Acris gryllus dorsalis	Florida cricket frog		X
	Hyla chrysoscelis	Gray treefrog		X
	Hyla avivoca	Bird-voiced treefrog	*	X
	Hyla cinerea	Green treefrog	X	X
	Hyla crucifer bartramiana	Southern peeper	X	X
	Hyla femoralis	Pine woods treefrog		X
	Hyla gratiosa	Barking treefrog		X
	Hyla squirella	Squirrel treefrog	X	X
	Limnaeodus ocularis	Little grass frog	*	X
	Pseudacris nigrita nigrita	Southern chorus frog		X
	Pseudacris ornata	Ornate chorus frog		X
MICROHYLIDAE				
	Gastrophryne carolinensis	Eastern narrowmouth toad		X
PELOBATIDAE				
	Scaphiopus holbrooki	Eastern spadefoot		X
PLETHODONTIDAE				
	Desmognathus auriculatus	Southern dusky salamander		X
	Eurycea quadridigitata	Dwarf salamander	+	X
	Plethodon glutinosus	Slimy salamander	X	X
	Pseudotriton montanus floridanus	Rusty mud salamander		X
RANIDAE				
	Rana areolata aesopus	Florida gopher frog		X
	Rana catesbeiana	Bullfrog		X
	Rana clamitans clamitans	Green frog		X
	Rana grylio	Pig frog		X
	Rana heckscheri	River frog		X
	Rana sphenocephala	Southern leopard frog	X	X
SALAMANDRIDAE				
	Notophthalmus perstriatus	Striped newt		X
	Notopthalmus viridescens louisianensis	Central newt		X
SIRENIDAE				
	Pseudobranchus striatus	Narrow-striped dwarf siren		X
	Siren intermedia	Lesser siren	?	X

Notes:
[a] Observed at OU1 by ABB-ES personnel (tentative identifications were based on auditory (*) or casual siting (+), or examination of decomposed specimen (?)).
[b] Specimen records for Duval County, Florida (Ashton and Ashton, 1988a).

TABLE A-4
REPTILES EXPECTED OR OBSERVED IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCES [a]	[b]
ALLIGATORIDAE				
	Alligator mississippiensis	American alligator		X
CHELYDRIDAE				
	Chelydra serpentina	Snapping turtle		X
COLUBRIDAE				
	Cemophora coccinea copei	Scarlet snake		X
	Coluber constrictor priapur	Southern black racer		X
	Diadophis punctatus punctatur	Southern ringneck snake		X
	Drymarchon corais	Indigo snake		X
	Elaphe guttata	Corn snake		X
	Elaphe obsoleta quadrivattata	Yellow rat snake		X
	Farancia abacura abacura	Mud snake		X
	Farancia erytrogramma	Rainbow snake		X
	Heterodon platyrhinos	Eastern hognose snake		X
	Heterodon simus	Southern hognose snake		X
	Lampropeltis getulus	Common kingsnake		X
	Lampropeltis triangulum	Eastern milk snake		X
	Lampropeltis triangulum elapsoides	Scarlet kingsnake		X
	Masticophis flagellum flagellum	Coachwhip		X
	Nerodia fasciata	Southern water snake		X
	Nerodia rhombifera	Diamondback water snake		X
	Opheodrys aestivus	Rough green snake		X
	Pituophis melanoleucus mugitur	Florida pine snake		X
	Regina alleni	Striped crayfish snake		
	Regina rigida rigida	Glossy crayfish snake		X
	Rhadinaea flavilata	Pine woods snake		X
	Seminatrix pygaea pygaea	North Florida swamp snake		X
	Storeria dekayi victa	Florida brown snake		X
	Storeria occipitomaculata obscura	Southern redbelly snake		X
	Tantilla relicta	Southeastern crowned snake		X
	Thamnophis sauritus sackeni	Southern ribbon snake		X
	Thamnophis sirtalis sirtalis	Eastern garter snake		X
ELAPIDAE				
	Micrurus fulvius fulvius	Eastern Coral snake		X
EMYDIDAE				
	Clemmys guttata	Spotted turtle		X
	Deirochelys reticularia chrysea	Chicken turtle		X
	Pseudemys nelsoni	Florida Redbelly Turtle	X	X
	Pseudemys floridana peninsylaris	Cooter		X
	Terrapene carolina	Eastern box turtle		X

TABLE A-4
REPTILES EXPECTED OR OBSERVED IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCES [a]	[b]
IGUANIDAE				
	Anolis carolinensis	Green anole	X	X
	Sceloporus undulatus undulatus	Southern fence lizard		X
KINOSTERNIDAE				
	Kinosternon subrubrum steindachneri	Eastern mud turtle		X
	Sternotherus minor minor	Loggerhead musk turtle		X
SCINCIDAE				
	Eumeces egregius	Peninsula mole skink		X
	Eumeces inexpectatus	Southeastern five-lined skink	X	
	Eumeces laticeps	Broadhead skink	X	X
	Scincella lateralis	Ground skink		X
TESTUDINIDAE				
	Gopherus polyphemus	Gopher tortoise	X	X
TETIDAE				
	Cnemidophorus sexlineatus	Six-lined racerunner		X
VIPERIDAE				
	Agkistrodon piscivorus caramto	Florida cottonmouth		X
	Crotalus adamanteus	Eastern diamondback		X
	Sistrurus miliarus barbouri	Pigmy rattlesnake		X

Notes:
[a] Observed at OU1 by ABB-ES personnel.
[b] Specimen records for Duval County, Florida (Ashton and Ashton, 1988b and 1991).

TABLE A-5
BIRDS EXPECTED OR OBSERVED IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCE [a]	REFERENCE [b]
ACCIPITRIDAE				
	Accipiter cooperii	Cooper's hawk		X
	Accipiter striatus	Sharp-shinned hawk	X*	X
	Buteo jamaicensis	Red-tailed hawk	X	X
	Buteo lineatus	Red-shouldered hawk	X	X
	Buteo platypterus	Broad-winged hawk		X
	Circus cyaneus	Northern harrier		X
	Elandides forficatus	American swallow-tailed kite		X
	Haliaeetus leucocephalus	Bald eagle		X
	Pandion haliaetus	Osprey	X	X
ALCEDINIDAE				
	Megaceryle alcyon	Belted kingfisher	X	X
ANATIDAE				
	Aix sponsa	Wood duck		X
	Anas americana	American wigeon		X
	Anas clypeata	Northern shoveler		X
	Anas crecca	Green-winged teal		X
	Anas discors	Blue-winged teal		X
	Anas platyrhynchos	Mallard		X
	Anas rubripes	American black duck		X
	Anas strepera	Gadwall		X
	Aythya affinis	Lesser scaup		X
	Aythya americana	Redhead		X
	Aythya collaris	Ring-necked duck		X
	Aythya marila	Greater scaup		X
	Bucephala albeola	Bufflehead	X	X
	Bucephala clangula	Common goldeneye		X
	Lophodytes cucullatus	Hooded merganser	X	X
	Mergus serrator	Red-breasted merganser		X
	Oxyura jamaicensis	Ruddy duck		X
ANHINGIDAE				
	Anhinga anhinga	Anhinga		X
APODIDAE				
	Chaetura pelagica	Chimney swift	X	X
ARAMIDAE				
	Aramus guarauna	Limpkin		X
ARDEIDAE				
	Ardea herodias	Great blue heron	X	X
	Bubulcus ibis	Cattle egret	X	X
	Butorides striatus	Green-backed heron	X	X
	Casmerodius albus	Great egret	X	X
	Egretta thula	Snowy egret	X	X
	Egretta tricolor	Tricolored heron		X
	Egretta caerulea	Little blue heron		X
	Nycticorax nycticorax	Black-crowned night heron		X
	Nycticorax violaceus	Yellow-crowned night heron		X

TABLE A-5
BIRDS EXPECTED OR OBSERVED IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCE [a]	REFERENCE [b]
BOMBYCILLIDAE				
	Bombycilla cedrorum	Cedar waxwing		X
CAPRIMULGIDAE				
	Caprimulgus carolinensis	Chuck-will's-widow		X
	Caprimulgus vociferus	Whip-poor-will		X
	Chordeiles minor	Common nighthawk		X
CATHARTIDAE				
	Cathartes aura	Turkey vulture	X	X
	Coragyps atratus	Black vulture	X	X
CERTHIIDAE				
	Certhia americana	Brown creeper		X
CHARADRIIDAE				
	Charadrius semipalmatus	Semipalmated plover		X
	Charadrius vociferus	Killdeer	X	X
	Pluvialis squatarola	Black-bellied plover		X
COLUMBIDAE				
	Columba livia	Rock dove	X	X
	Columbina passerina	Common ground-dove		X
	Zenaida macroura	Mourning dove	X	X
CORVIDAE				
	Corvus brachyrhynchos	Common crow	X	X
	Corvus ossifragus	Fish crow	X	X
	Cyanocitta cristata	Blue jay	X	X
CUCULIDAE				
	Coccyzus americanus	Yellow-billed cuckoo		X
EMBERIZIDAE				
	Ammodramus henslowii	Henslow's sparrow		X
	Ammodramus leconteii	Le Conte's sparrow		X
	Ammodramus savannarum	Grasshopper sparrow		X
	Cardinalis cardinalis	Northern cardinal	X	X
	Carduelis tristis	American goldfinch		X
	Carpodacus purpureus	Purple finch		X
	Guiraca caerulea	Blue grosbeak	X	X
	Junco hyemalis	Dark-eyed junco		X
	Melospiza georgiana	Swamp sparrow		X
	Melospiza melodia	Song sparrow	X	X
	Passerculus sandwichensis	Savannah sparrow		X
	Passerina ciris	Painted bunting		X
	Pipilo erythrophthalmus	Rufous-sided towhee	X	X
	Pooecetes gramineus	Vesper sparrow		X
	Spizella passerina	Chipping sparrow		X
	Spizella pusilla	Field sparrow		X
	Zonotrichia albicollis	White-throated sparrow		X
FALCONIDAE				
	Falco columbarius	Merlin		X
	Falco peregrinus	Peregrine falcon		X
	Falco sparverius	American kestrel	X	X

TABLE A-5
BIRDS EXPECTED OR OBSERVED IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCE [a]	REFERENCE [b]
GAVIIDAE				
	Gavia immer	Common loon		X
	Gavia stellata	Red-throated loon		X
HIRUNDINIDAE				
	Hirundo rustica	Barn swallow		X
	Iridoprocne bicolor	Tree swallow		X
	Progne subis	Purple martin		X
	Stelgidopteryx seripennis	Northern rough-winged swallow		X
ICTERIDAE				
	Agelaius phoeniceus	Red-winged blackbird	X	X
	Euphagus carolinus	Rusty blackbird		X
	Euphagus cyanocephalus	Brewer's blackbird		X
	Icterus galbula	Northern oriole		X
	Icterus spurius	Orchard oriole	X	X
	Molothrus ater	Brown-headed cowbird		X
	Quiscalus major	Boat-tailed grackle	X	X
	Quiscalus quiscula	Common grackle	X	X
	Sturnella magna	Eastern meadowlark		X
LANIIDAE				
	Lanius ludovicianus	Loggerhead shrike	X	X
LARIDAE				
	Larus argentatus	Herring gull	X	X
	Larus atricilla	Laughing gull	X	X
	Larus delawarensis	Ring-billed gull	X	X
	Larus marinus	Great black-backed gull		X
	Larus philadelphia	Bonaparte's gull	X	X
	Sterna caspia	Caspian tern		X
	Sterna forsteri	Forster's tern		X
	Sterna hirundo	Common tern	X	X
	Sterna maxima	Royal tern		X
MIMIDAE				
	Dumatella carolinensis	Gray catbird	X	X
	Mimus polyglottus	Northern mockingbird	X	X
	Toxostoma rufum	Brown thrasher	X	X
PARIDAE				
	Parus bicolor	Tufted titmouse	X	X
	Parus carolinensis	Carolina chickadee	X	X
PARULIDAE				
	Dendroica coronata	Yellow-rumped warbler	X	X
	Dendroica discolor	Prairie warbler		X
	Dendroica dominica	Yellow-throated warbler		X
	Dendroica palmarum	Palm warbler	X	X
	Dendroica pinus	Pine warbler	X	X
	Geothylpis trichas	Common yellowthroat		X
	Limnothlypis swainsonii	Swainson's warbler	?	X
	Mniotilta varia	Black-and-white warbler	X	X
	Parula americana	Northern parula		X

TABLE A-5
BIRDS EXPECTED OR OBSERVED IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCE [a]	REFERENCE [b]
	Protondtaria citrea	Prothonotary warbler		X
	Seiuris aurocapillus	Ovenbird		X
	Vermivora celata	Orange-crowned warbler		X
PELECANIDAE				
	Pelecanus occidentalis	Brown pelican		X
PHALACROCORACIDAE				
	Phalacrocorax auritus	Double-crested cormorant	X	X
PHASIANIDAE				
	Colinus virginianus	Common bobwhite		X
	Meleagris gallopavo	Wild turkey	X	X
PICIDAE				
	Colaptes auratus	Yellow-shafted flicker	X	X
	Dryocopus pileatus	Pileated woodpecker	X	X
	Melanerpes carolinus	Red-bellied woodpecker	X	X
	Melanerpes erythrocephalus	Red-headed woodpecker		X
	Picoides pubescens	Downy woodpecker	X	X
	Picoides villosus	Hairy woodpecker		X
	Sphyrapicus varius	Yellow-bellied sapsucker	X	X
PLOCEIDAE				
	Passer domesticus	House sparrow	X	X
PODICIPEDIDAE				
	Podiceps auritus	Horned grebe		X
	Podilymbus podiceps	Pied-billed grebe		X
RALLIDAE				
	Fulica americana	American coot		X
	Gallinula chloropus	Common gallinule	X	X
	Porphyrula martinica	Purple gallinule		X
	Porzana carolina	Sora rail		X
	Rallus elegans	King rail		X
	Rallus limicola	Virginia rail		X
	Rallus longrostris	Clapper rail		X
SCOLOPACIDAE				
	Actitis macularis	Spotted sandpiper	X	X
	Arenaria interpres	Ruddy turnstone		X
	Calidris alpina	Dunlin		X
	Calidris canutus	Red knot		X
	Calidris melanotos	Pectoral sandpiper		X
	Calidris minutilla	Least sandpiper		X
	Calidris pusilla	Semipalmated sandpiper		X
	Capella gallinago	Common snipe		X
	Catoptrophorus semipalmatus	Willet		X
	Crocethia alba	Sanderling		X
	Limnodromus griseus	Short-billed dowitcher		X
	Limnodromus scolopaceus	Long-billed dowitcher		X
	Limosa fedoa	Marbled godwit		X
	Numenius phaeopus	Whimbrel		X
	Scolopax minor	American woodcock		X

TABLE A-5
BIRDS EXPECTED OR OBSERVED IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCE [a]	REFERENCE [b]
	Tringa flavipes	Lesser yellowlegs		X
	Tringa melanoleuca	Greater yellowlegs		X
	Tringa solitaria	Solitary sandpiper		X
SITTIDAE				
	Sitta canadensis	Red-breasted nuthatch		X
	Sitta carolinensis	White-breasted nuthatch		X
	Sitta pusilla	Brown-headed nuthatch		X
STRIGIDAE				
	Asio flammeus	Short-eared owl		X
	Bubo virginianus	Great horned owl		X
	Otus asio	Eastern screech owl		X
	Strix varia	Barred owl		X
STURNIDAE				
	Sturnus vulgaris	European starling	X	X
SYLVIIDAE				
	Polioptila caerulea	Blue-gray gnatcatcher	X	X
	Regulus calendula	Ruby-crowned kinglet	X	X
	Regulus satrapa	Golden-crowned kinglet		X
THRAUPIDAE				
	Piranga rubra	Summer tanager		X
THRESKIORNITHIDAE				
	Eudocimus albus	White ibis	?	X
	Plegadis falcinellus	Glossy ibis		X
TROCHILIDAE				
	Archilochus colubris	Ruby-throated hummingbird		X
TROGLODYTIDAE				
	Cistothorus palustris	Marsh wren		X
	Cistothorus platensis	Sedge wren		X
	Thryothorus ludovicianus	Carolina wren		X
	Troglodytes aedon	House wren	X	X
	Troglodytes troglodytes	Winter wren		X
TURDIDAE				
	Catharus guttata	Hermit thrush		X
	Sialia sialis	Eastern bluebird		X
	Turdus migratorius	American robin	X	X
TYRANNIDAE				
	Contopus virens	Eastern wood pewee		X
	Empidonax sp.	Flycatcher	X	
	Empidonax virescens	Acadian flycatcher		X
	Myiarchus crinitus	Great crested flycatcher	X	X
	Sayornis phoebe	Eastern phoebe		X
	Tyrannus tyrannus	Eastern kingbird		X

TABLE A-5

BIRDS EXPECTED OR OBSERVED IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCE [a]	REFERENCE [b]
TYTONIDAE				
	Tyto alba	Common barn owl		X
VIREONIDAE				
	Vireo flavifrons	Yellow-throated vireo		X
	Vireo griseus	White-eyed vireo	X	X
	Vireo olivaceus	Red-eyed vireo		X
	Vireo solitarius	Solitary vireo	X	

Notes:

[a] Observed (or signs observed) at OU1 by ABB-ES ("?" indicates tentative identification).

[b] Regional distribution for northeastern Florida (Peterson, 1980). Many of these birds are regular or occasional visitors during spring and/or fall migration, and are not resident species.

* - A dead specimen found at OU1 adjacent to the golf course on January 28, 1992 by ABB-ES personnel.

TABLE A-6
MAMMALS EXPECTED OR OBSERVED IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (0U1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCE [a]	REFERENCE [b]
CANIDAE				
	Urocyon cinereoargenteus	Gray fox		X
	Canis familiarus	Dog (domestic)		X
CAPROMYIDAE				
	Myocastor coypus	Nutria		X
CERVIDAE				
	Odocoileus virginianus	White-tailed deer	X	X
CRICETIDAE				
	Neotoma floridana	Eastern wood rat		X
	Oryzomys palustris	Marsh rice rat		X
	Peromyscus gossypinus	Cotton mouse		X
	Peromyscus nuttalli	Golden mouse		X
	Peromyscus polionotus	Old field mouse		X
	Reithrodontomys humulis	Eastern harvest mouse		X
	Sigmodon hispidus	Hispid cotton rat	X	X
DASYPODIDAE				
	Dasypus novemcinctus	Nine-banded armadillo	X*	
DIDELPHIDAE				
	Didelphis virginiana	Virginia oppossum	X*	
FELIDAE				
	Lynx rufus	Bobcat		X
	Felis domesticus	Cat (domestic)		X
GEOMYIDAE				
	Geomys pinetis	Southeastern pocket gopher		X
LEPORIDAE				
	Sylvilagus floridanus	Eastern cottontail	X	X
	Sylvilagus palustris	Marsh rabbit		X
MURIDAE				
	Mus musculus	House mouse		X
	Rattus norvegicus	Norway rat		X
MUSTELIDAE				
	Lutra canadensis	River otter	X*	X
	Mephitis mephitis	Striped skunk		X
	Mustela vison	Mink		X
	Spilogale putorius	Eastern spotted skunk		X
PROCYONIDAE				
	Procyon lotor	Raccoon	X	X

TABLE A-6
MAMMALS EXPECTED OR OBSERVED IN THE VICINITY OF NAS JACKSONVILLE

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (0U1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

FAMILY	SCIENTIFIC NAME	COMMON NAME	REFERENCE [a]	REFERENCE [b]
SCIURIDAE				
	Glaucomys volans	Southern flying squirrel		X
	Sciurus carolinensis	Gray squirrel	X	X
	Sciurus niger shermani	Sherman's fox squirrel	X	X
SORICIDAE				
	Blarina brevicauda	Short-tailed shrew		X
	Cryptotis parva	Least shrew		X
	Sorex longirostris	Southeastern shrew		X
TALPIDAE				
	Scalopus aquaticus	Eastern mole		X
TRICHECHIDAE				
	Trichechus manatus	West Indian manatee	X+	X
VESPERTILIONIDAE				
	Eptesicus fuscus	Big brown bat		X
	Lasiurus borealis	Red bat		X
	Lasiurus cinereus	Hoary bat		X
	Lasiurus intermedius	Northern yellow bat		X
	Lasiurus seminolus	Semiole bat		X
	Myotis austroriparius	Southeastern bat		X
	Pipistrellus subflavus	Eastern pipistrelle		X
	Plecotus rafinesquii	Eastern big-eared bat		X

Notes:
[a] Observed (or signs observed) at OU1 by ABB-ES personnel.
[b] Regional distribution for northeastern Florida (Burt and Grossenheider, 1976).
* = Only a dead specimen observed (the armadillo and otter were probably roadkills).
+ = Manatee observed in the vicinity of the Captain's pier on the St. Johns River (approximately 0.5 mile downriver from the unnamed stream discharge) on June 2, 1992 by ABB-ES personnel.

TABLE A-7
FEDERAL AND STATE LISTED THREATENED, RARE, & ENDANGERED SPECIES
THAT OCCUR OR MAY OCCUR
IN THE VICINITY OF NAS JACKSONVILLE[a]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONSVILLE, FLORIDA

SCIENTIFIC NAME	COMMON NAME	RESIDENCE STATUS [b]	FEDERAL STATUS [c]	STATE STATUS [c]
Plants				
Spenostigma coelistinum	Bartram's ixia	PR	UR2	T
Amphibians				
Rana areolata aesopus	Florida gopher frog	LR	UR2	SSC
Birds				
Athena cunicularia	Burrowing owl	PR		SSC
Egretta caerulea	Little blue heron	LM		SSC
Egretta thula	Snowy egret	CM*		SSC
Egretta tricolor	Tricolor heron	LM		SSC
Falco peregrinus	Peregrine falcon	PM	T	E
Falco sparverius paulus	Southeastern sparrow hawk	PR/PM	UR2	T
Haliaeetus leucocephalus	Bald eagle	LM	E	T
Haematopus palliatus	American oystercatcher	LM		T
Mycteria americana	Wood stork	CM	E	E
Pandion haliaetus	Osprey	LR*		SSC
Pelecanus occidentalis	Brown pelican	CM		SSC
Fish				
Acipenser brevirostrum	Shortnose sturgeon	PR/PM	E	E
Acipenser oxyrhynchus	Atlantic sturgeon	PR/PM		SSC
Mammals				
Sciurus niger shermani	Sherman's fox squirrel	CR*	UR2	SSC
Trichechus manatus latirostris	West Indian manatee	CM*	E	E
Reptiles				
Alligator mississippiensis	American alligator	CR	T(S/A)	SSC
Caretta caretta	Atlantic loggerhead	PM	T	T
Chelonia mydas	Altlantic green turtle	PM	E	E
Dermochelys coriacea	Leatherback turtle	PM	E	E
Drymarchon corias couperi	Eastern indigo snake	CR	T	T
Eretmochelys imbricata	Hawksbill sea turtle	PM	E	E

TABLE A-7

FEDERAL AND STATE LISTED THREATENED, RARE, & ENDANGERED SPECIES THAT OCCUR OR MAY OCCUR IN THE VICINITY OF NAS JACKSONVILLE[a]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONSVILLE, FLORIDA

SCIENTIFIC NAME	COMMON NAME	RESIDENCE STATUS [b]	FEDERAL STATUS [c]	STATE STATUS [c]
Gopherus polyphemus	Gopher tortoise	CR*	UR1	SSC
Lepidochelys kempii	Atlantic ridley	PM	E	E
Pituophis melanoleucus mugitus	Florida pine snake	PR	UR2	SSC

Notes:

[a] Sources: Environmental Services and Permitting, Inc. (1990); USFWS (1988); FGFWFC, (19 USFWS (1988); FGFWFC, (1991); Brody (1990); FNAI (1992).

[b] Residence Status (NAS JAX):

CR = Confirmed Resident
LR = Likely Resident
PR = Possible Resident
CM = Confirmed Migrant or Occasional Visitor
LM = Likely Migrant or Occasional Visitor
PM = Possible Migrant or Occasional Visitor
* = Confirmed at OU1 by ABB-ES personnel, 1992.

[c] State and Federal Status:

E = Endangered
T = Threatened
SSC = Species of Special Concern
UR1 = Under review for federal listing, with substantial evidence in existence indicating at least some degree of biological vulnerability and/or threat.
UR2 = Under review for listing, but substantial evidence of biological vulnerability and/or threat is lacking.
T(S/A) = Threatened Due to Similarity of Appearance

PERMIT

Issued Under Authority of the Wildlife Code of the State of Florida
(Chapter 39, Florida Administrative Code) by the

STATE OF FLORIDA GAME AND FRESH WATER FISH COMMISSION
620 South Meridian Street, Tallahassee, FL 32399-1600, 904/488-3831

Permit No.: WV92033 Issuance Date: March 5, 1992 Expiration Date: 3 February 1995

Permit Type: Vouchering/Sampling Specific Rule Authority: 39-9.002, 39-25.002, 39-27.002

Permittee: John A. Bleiler Affiliation: ABB Environmental Services
Corporate Place 128, 107 Audubon Road
Wakefield, MA 01880

Signature: _____

*Signature indicates acceptance and understanding of the provisions/conditions listed below.
Please return a signed copy to this office.

Provisions/Conditions:

1. Small mammals may be live captured by nonharmful trapping in Duval County for sampling and status survey purposes. All set or baited traps are to be checked at least once per day. All specimens captured are to be released immediately at their points of capture upon recording the needed scientific data. Exposed live traps are not to be left set during hot periods of the day, but rather baited and set in late afternoons only and checked and tripped in early mornings. Any captures of species designated by the Game and Fresh Water Fish Commission in Rule 39-27, F.A.C., as endangered, threatened or of special concern must be reported to this office within five days.

2. This permit does not authorize access to any public or private properties. Any required permission for such access must be secured from the appropriate landowners or public agencies prior to undertaking any work on those controlled properties.

3. This permit is nontransferable, but other qualified personnel designated by you may assist in the permitted activities. When any such assistance is to be provided in the absence of your direct supervision, those designations are to be made by letter of authorization from you to each designee, with this office provided a copy of such letter(s).

4. This permit must be readily available for inspection at all times while engaging in the permitted activities. Formally designated assistants are also to be in possession of your letter of authorization and any required federal authorization/permit.

5. A detailed report of all activities engaged in pursuant to this permit must be submitted within 90 days of permit expiration or upon application for permit renewal, whichever is precedent. That report (referencing permit number) should be directed to the attention of the vouchering/sampling permit coordinator, at the above address. Copies of any other reports or publications which result from the work must also be provided upon their availability.

6. This permit is subject to revocation at any time pursuant to Chapter 120, Florida Statutes.

Colonel Robert M. Brantly
Executive Director

By: Frank Montalbano

Frank Montalbano III, Director
Division of Wildlife

W667-4C/sm
LIC 6-1
cc: Colonel Robert Edwards
Lt. Colonel Larry Martin
Mr. Steve Stafford
Mr. Pat Jodice

APPENDIX F-2
Rapid Bioassessment Protocol

TABLE B-1
RESULTS OF RAPID BIOASSESSMENT PROTOCOL (RBP I) [a]
CONDUCTED AT VARIOUS SAMPLING LOCATIONS
IN THE PERIMETER DITCH AND INTERMITTENT STREAM HABITAT

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

	RELATIVE RBP SCORE AT EACH SAMPLING LOCATION [b,c]											
BIOLOGICAL PARAMETERS	2	3	5	6	7	9	11	12	13	15	16	23
Periphyton	-	-	A	-	-	-	-	-	-	-	-	-
Filamentous Algae	A	C	R	R	-	-	C	A	R	C	R	-
Macrophytes	D	D	R	C	C	R	C	C	-	C	C	D
Slimes	-	-	-	-	-	-	-	-	-	-	R	-
Macroinvertebrates	D	-	A	A	A	R	C	R	C	A	-	-
Fish	C	C	C	C	R	-	R	C	C	C	-	A
Porifera	R	R	R	R	R	R	-	-	-	-	-	-
Hydrozoa	R	R	R	R	R	R	-	-	-	-	-	-
Platyhelminthes	R	R	R	R	R	R	-	-	-	-	-	-
Turbellaria	R	R	R	R	R	R	-	-	-	-	-	-
Hirudinea	R	R	R	R	R	R	-	-	-	-	-	-
Oligochaeta	R	C	C	A	C	A	-	R	R	R	R	-
Isopoda	R	R	R	R	R	R	-	R	-	-	-	-
Amphipoda	R	R	R	R	R	R	-	R	-	-	-	-
Decapoda	R	R	R	R	R	R	-	R	-	-	-	-
Gastropoda	R	A	A	D	D	D	D	D	C	A	-	-
Bivalvia	R	R	R	C	R	R	-	R	-	-	-	-
Anisoptera	R	D	D	A	A	R	D	R	D	A	C	-
Zygoptera	R	C	C	C	A	R	A	R	A	A	C	-
Hemiptera	R	R	R	R	R	R	-	R	-	-	-	-
Coleoptera	C	C	C	C	C	R	C	C	A	A	C	-
Lepidoptera	R	R	R	R	R	R	-	R	-	-	-	-
Sialidae	R	R	R	R	R	R	-	R	-	-	-	-
Corydalidae	R	R	R	R	R	R	-	R	-	-	-	-
Tipulidae	R	R	R	R	R	R	-	R	-	-	-	-
Empididae	R	R	R	R	R	R	-	R	-	-	-	-
Simuliidae	R	R	R	R	R	R	-	R	-	-	-	-
Tabanidae	R	R	R	R	R	R	-	R	-	-	-	-
Culicidae	R	R	R	R	R	D	-	R	-	-	-	-
Chironomidae	C	C	C	A	A	R	A	C	A	A	C	-
Plecoptera	R	C	C	R	R	R	-	R	-	C	C	-
Ephemeroptera	R	R	R	R	R	R	-	R	-	-	-	-
Trichoptera	R	R	R	R	R	R	-	R	-	-	-	-
Hydrometridae	R	-	C	-	C	-	C	-	A	C	-	-
Daphnids	R	-	-	-	-	-	-	-	-	A	A	-
Geridae	-	C	-	-	-	-	-	-	-	-	-	-

TABLE B-1
RESULTS OF RAPID BIOASSESSMENT PROTOCOL (RBP I) [a]
CONDUCTED AT VARIOUS SAMPLING LOCATIONS
IN THE PERIMETER DITCH AND INTERMITTENT STREAM HABITAT

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

	RELATIVE RBP SCORE AT EACH SAMPLING LOCATION [b,c]											
HABITAT PARAMETERS	2	3	5	6	7	9	11	12	13	15	16	23
Bottom substrate/available cover	P	P	P	P	F	F	P	F	P	P	P	F
Embeddedness	P	P	P	P	P	P	P	P	P	P	P	F
Flow	P	P	P	P	P	P	P	P	P	P	P	F
Channel alteration	P	P	P	P	P	P	P	P	P	P	P	F
Bottom scouring and deposition	E	E	E	E	E	E	E	E	E	E	E	F
Pool/riffle, run/blend ratio	P	P	P	P	P	P	P	P	P	P	P	G
Bank stability	G	G	G	G	G	G	F	G	F	G	G	G
Bank vegetative stability	E	E	G	G	G	G	G	E	G	G	E	F
Streamside cover	E	F	G	G	E	E	F	F	F	F	G	G
HABITAT ASSESSMENT PARAMETER TOTAL [c]	47	43	45	45	53	53	39	50	39	42	49	63

Notes:
[a] Rapid Bioassessment Protocol I (Plafkin et al., 1989).
[b] Relative abundance scoring criteria as presented in Plafkin et al., 1989.
R = Rare; C = Common; A = Abundant; D = Dominant;; - = None.
[c] Habitat Quality Categories as defined by Plafkin et al., 1989.
E = Excellent; G = Good; F = Fair; P = Poor

TABLE B-2
ABIOTIC WATER QUALITY PARAMETER DATA [a]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

LOCATION	DEPTH (feet)	TEMP (C)	pH	CONDUCTIVITY (us/cm)	SALINITY (ppt)	DO [b] (mg/l)
1	4.0	15	7.2	350	1.0	4(2.5)
2	3.0	14	7.3	600	0.1	6(2.1)
3	2.6	12	-	550	0.1	1.8(1.6)
4	3.6	14	8.4	250	0.0	9(7.2)
5	3.0	14	9.0	800	0.5	4(2.9)
6	3.5	14	7.6	220	0.0	5.1
7	3.5	13	6.4	500	0.0	4
8	0.8	13	7.9	380	0.2	3.4
9	1.6	18	9.0	800	0.2	1.8
11	5.0	14	7.6	900	0.5	6.1(5.2)
12	3.0	14	7.8	950	0.1	6.1(2.1)
13	5.0	13	7.0	880	0.1	5.1(3.9)
14	0.4	18	6.3	310	0.2	2.4
15	3.0	13	7.8	820	0.1	6(6)
16	1.0	11	-	800	1.0	6(3.1)
17	0.5	15	6.2	450	0.2	6
18	0.1	13	6.9	600	0.2	6.2
19	0.2	14	6.9	350	0.1	8.2
20	0.8	10	7.3	430	0.1	8.8
21	1.0	12	7.0	400	0.0	8.6
22	0.8	12	6.7	135	0.0	7.4
23	0.8	11	7.0	350	0.0	7.4
24	0.8	16	7.5	355	0.0	7.8
25	1.0	16	8.2	80	0.0	2.3
26	2.0	18	-	325	0.0	4.8
27	2.0	10	-	700	0.3	10
28	2.0	17	-	700	0.2	10
29	2.0	17	-	700	0.2	10
30	2.0	17	-	700	0.2	10
31	3.0	18	-	700	0.3	10
32	2.0	18	-	700	0.3	9.2
33	2.0	17	-	1100	0.3	9.2

Notes:

[a] Data collected from January 31 to February 4, 1992 by ABB-ES personnel, in accordance with the Work Plan (Geraghty and Miller, 1991).

[b] Dissolved oxygen, measurements taken within the top 6 inches; at the deeper locations, a second reading, in parentheses, was taken within 6 inches of the bottom.

Station 2
NAS Jax: OU1
5 Feb 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: (Impairment detected (Complete items 2-6)) No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates	Other aquatic communities
X absence of EPT taxa	___ Periphyton
X dominance of tolerant groups	X filamentous
___ low benthic abundance	___ other
X low taxa richness	X Macrophytes
___ other	___ Slimes
	X Fish

3. Brief description of problem: OU1 Landfill
   Year and date of previous surveys: —
   Survey data available in: —

4. Cause: (indicate major cause) organic enrichment (toxicants) flow (habitat limitations) other ___

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable: —

6. Suspected source(s) of problem:

   ___ point source discharge (name, type of facility, location)
   ___ construction site runoff
   ___ combined sewer outfall
   ___ silviculture runoff
   ___ animal feedlot
   ___ agricultural runoff
   ___ urban runoff
   X ground water
   X other
   ___ unknown

Briefly explain:
Low taxa richness. Primarily chironomid midges. Man-made ditch habitat is poor for macro-invertebrate taxa richness. + has no flow. Slight H_2O sheen.

Figure 6.1-2. Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

Station 3
NAS JAX : OU1
5 Feb 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: (Impairment detected (Complete items 2-6)) No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates
- ___ absence of EPT taxa
- X dominance of tolerant groups
- X low benthic abundance
- X low taxa richness
- ___ other

Other aquatic communities
- ___ Periphyton
- X filamentous
- ___ other
- X Macrophytes
- ___ Slimes
- X Fish

3. Brief description of problem: OU1 Landfill
Year and date of previous surveys: —
Survey data available in: —

4. Cause: (indicate major cause) organic enrichment (oxicants) flow habitat limitations other ___

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable: —

6. Suspected source(s) of problem:
- ___ point source discharge (name, type of facility, location)
- ___ construction site runoff
- ___ combined sewer outfall
- ___ silviculture runoff
- ___ animal feedlot
- ___ agricultural runoff
- ___ urban runoff
- X ground water
- X other
- ___ unknown

Briefly explain:
No flow in man-made ditch. Low taxa richness, but occasionally Plecoptera (stone-flies). Considerable hydrophytic green growth.

Figure 6.1-2. Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

Station 5
NAS JAX OU1
5 Feb 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: (Impairment detected (Complete items 2-6)) No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates
- ___ absence of EPT taxa
- X dominance of tolerant groups
- ___ low benthic abundance
- X low taxa richness
- ___ other

Other aquatic communities
- X Periphyton
- ___ filamentous
- ___ other
- X Macrophytes
- ___ Slimes
- X Fish

3. Brief description of problem: OU1 Landfill
Year and date of previous surveys: —
Survey data available in: —

4. Cause: (indicate major cause) organic enrichment toxicants flow habitat limitations other ___

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable: —

6. Suspected source(s) of problem:
- ___ point source discharge (name, type of facility, location)
- ___ construction site runoff
- ___ combined sewer outfall
- ___ silviculture runoff
- ___ animal feedlot
- ___ agricultural runoff
- ___ urban runoff
- X ground water
- X other
- ___ unknown

Briefly explain:
Adjacent to plugged culvert, currently Ø flow. Periphyton + macrophytes abundant. Some stonefly (Plecoptera) present.

Figure 6.1-2 Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

Station 6
NAS JAX: OU1
5 Feb 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: Impairment detected (Complete items 2-6) / No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates
- [x] absence of EPT taxa
- [x] dominance of tolerant groups
- [ ] low benthic abundance
- [x] low taxa richness
- [ ] other

Other aquatic communities
- [ ] Periphyton
- [x] filamentous
- [ ] other
- [x] Macrophytes
- [ ] Slimes
- [x] Fish

3. Brief description of problem: OU1 Landfill
Year and date of previous surveys: —
Survey data available in: —

4. Cause: (indicate major cause) organic enrichment toxicants flow habitat limitations other _____

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable: —

6. Suspected source(s) of problem:
- [ ] point source discharge (name, type of facility, location)
- [ ] construction site runoff
- [ ] combined sewer outfall
- [ ] silviculture runoff
- [ ] animal feedlot
- [ ] agricultural runoff
- [ ] urban runoff
- [ ] ground water
- [x] other
- [ ] unknown

Briefly explain:
May also be impacted by adjacent golf course. Low EPT / high Chironomid midge #'s. Numerous annelids. Ø flow. Petroleum odors + sheen present.

Figure 6.1-2. Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

Station 7
NAS JAX: OU1,
5 Feb 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: Impairment detected (Complete items 2-6) — No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates	Other aquatic communities
X absence of EPT taxa	___ Periphyton
X dominance of tolerant groups	___ filamentous
X low benthic abundance	___ other
X low taxa richness	X Macrophytes
___ other	___ Slimes
	X Fish

3. Brief description of problem: OU1 Landfill
Year and date of previous surveys: —
Survey data available in: —

4. Cause: (indicate major cause) organic enrichment toxicants flow habitat limitations other ___

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable: —

6. Suspected source(s) of problem:

___ point source discharge (name, type of facility, location)
___ construction site runoff
___ combined sewer outfall
___ silviculture runoff
___ animal feedlot
___ agricultural runoff
___ urban runoff
X ground water
X other
___ unknown

Briefly explain:
Gastropods + chironomid midges abundant. Ø flow. May be impacted by adjacent golf course. Strong ~~H2S~~ smell of hydrogen sulfide.

Figure 6.1-2. Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

Station 9
NAS Jax: OU1
5 Feb 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: (Impairment detected (Complete items 2-6)) No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates
- [x] absence of EPT taxa
- [x] dominance of tolerant groups
- [ ] low benthic abundance
- [x] low taxa richness
- [ ] other

Other aquatic communities
- [ ] Periphyton
- [ ] filamentous
- [ ] other
- [x] Macrophytes
- [ ] Slimes
- [x] Fish

3. Brief description of problem: OU1 Landfill
Year and date of previous surveys: —
Survey data available in: —

4. Cause: (indicate major cause) organic enrichment toxicants flow habitat limitations other _____

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable: —

6. Suspected source(s) of problem:
- [ ] point source discharge (name, type of facility, location)
- [ ] construction site runoff
- [ ] combined sewer outfall
- [ ] silviculture runoff
- [ ] animal feedlot
- [ ] agricultural runoff
- [ ] urban runoff
- [ ] ground water
- [x] other
- [x] unknown

Briefly explain:
NO EPT but anaerobic Ø flow man-made ditch. Likely too ephemeral for fish

Figure 6.1-2. Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

Station 11
NAS Pax: OU1
6 Feb 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: Impairment detected (Complete items 2-8) — No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates
- X absence of EPT taxa
- X dominance of tolerant groups
- X low benthic abundance
- X low taxa richness
- ___ other

Other aquatic communities
- ___ Periphyton
- ___ filamentous
- ___ other
- X Macrophytes
- ___ Slimes
- ___ Fish

3. Brief description of problem: OU1 Landfill
Year and date of previous surveys: —
Survey data available in: ___

4. Cause: (indicate major cause) organic enrichment toxicants flow habitat limitations other ___

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable: —

6. Suspected source(s) of problem:
- ___ point source discharge (name, type of facility, location)
- ___ construction site runoff
- ___ combined sewer outfall
- ___ silviculture runoff
- ___ animal feedlot
- ___ agricultural runoff
- ___ urban runoff
- ___ ground water
- X other
- X unknown

Briefly explain:
Strong petroleum hydrocarbon odor in H_2O + sediments. Sheen present. Ø flow. No EPT. Gastropods + Culicids dominant.

Figure 6.1-2. Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

station 12
NAS JAX: OU1
5 Feb 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: Impairment detected (Complete items 2-6) No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates
- X absence of EPT taxa
- X dominance of tolerant groups
- X low benthic abundance
- X low taxa richness
- ___ other

Other aquatic communities
- ___ Periphyton
- X filamentous
- ___ other
- X Macrophytes
- ___ Slimes
- X Fish

3. Brief description of problem: OU1 Landfill
Year and date of previous surveys: —
Survey data available in: —

4. Cause: (indicate major cause) organic enrichment toxicants flow habitat limitations other _____

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable: —

6. Suspected source(s) of problem:
- ___ point source discharge (name, type of facility, location)
- ___ construction site runoff
- ___ combined sewer outfall
- ___ silviculture runoff
- ___ animal feedlot
- ___ agricultural runoff
- ___ urban runoff
- ___ ground water
- X other
- X unknown

Briefly explain:
Dense hydrophytic grass growth in channel. Gastropods dominant. Diving beetles + chironomid midge larvae common. Ø flow

Figure 6.1-2. Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

Station 13
NAS JAX: OU1
5 February 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: Impairment detected (Complete items 2-6) / No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates
- X absence of EPT taxa
- X dominance of tolerant groups
- X low benthic abundance
- X low taxa richness
- ___ other

Other aquatic communities
- ___ Periphyton
- X filamentous
- ___ other
- X Macrophytes
- ___ Slimes
- ___ Fish

3. Brief description of problem: OU1 Landfill
Year and date of previous surveys: ___
Survey data available in: ___

4. Cause: (indicate major cause) organic enrichment toxicants flow habitat limitations other ___

5. ~~Estimated areal~~ extent of problem (m^2) and length of stream reach affected (m), where applicable: ___

6. Suspected source(s) of problem:
- ___ point source discharge (name, type of facility, location)
- ___ construction site runoff
- ___ combined sewer outfall
- ___ silviculture runoff
- ___ animal feedlot
- ___ agricultural runoff
- ___ urban runoff
- X ground water
- X other
- ___ unknown

Briefly explain:
Dense algal + macrophyte growth. Slight odor of petroleum hydrocarbons. Five feet (+) deep @ no flow. No EPT / high Chironomid + Diving Beetle abundance.

Figure 6.1-2. Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

Station 15
NAS Jax - OU1,
5 February 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: (Impairment detected (Complete items 2-6)) No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates
- X absence of EPT taxa
- X dominance of tolerant groups
- X low benthic abundance
- X low taxa richness
- ___ other

Other aquatic communities
- ___ Periphyton
- X filamentous
- ___ other
- X Macrophytes
- ___ Slimes
- X Fish

3. Brief description of problem: OU1 Landfill
Year and date of previous surveys: —
Survey data available in: —

4. Cause: (indicate major cause) organic enrichment (toxicants) flow habitat limitations other ___

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable: ___

6. Suspected source(s) of problem:
- ___ point source discharge (name, type of facility, location)
- ___ construction site runoff
- ___ combined sewer outfall
- ___ silviculture runoff
- ___ animal feedlot
- ___ agricultural runoff
- ___ urban runoff
- X ground water
- X other
- ___ unknown

Briefly explain:
Daphnids surprisingly abundant, but no EPT. Minor flow through blocked culvert. Fish common. Water with orange color

Figure 6.1-2. Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

Station 16
NAS JAX: OU1
6 February 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: Impairment detected (Complete items 2-6) / No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates
- ___ absence of EPT taxa
- X dominance of tolerant groups
- X low benthic abundance
- ___ low taxa richness
- ___ other

Other aquatic communities
- ___ Periphyton
- X filamentous
- ___ other
- X Macrophytes
- ___ Slimes
- ___ Fish

3. Brief description of problem: OU1 Landfill
Year and date of previous surveys: ___
Survey data available in: ___

4. Cause: (indicate major cause) organic enrichment toxicants flow habitat limitations other ___

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable: ___

6. Suspected source(s) of problem:
- ___ point source discharge (name, type of facility, location)
- ___ construction site runoff
- ___ combined sewer outfall
- ___ silviculture runoff
- ___ animal feedlot
- ___ agricultural runoff
- ___ urban runoff
- ___ ground water
- X other
- X unknown

Briefly explain:
Channel densely overgrown with hydrophytic grasses. Some Plecoptera present. Oil sheen noted.

Figure 6.1-2. Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

Station 23
NAS JAX: OU1
6 Feb 1992

IMPAIRMENT ASSESSMENT SHEET

1. Detection of impairment: Impairment detected (Complete items 2-6) — No impairment detected (Stop here)

2. Biological impairment indicator:

Benthic macroinvertebrates
- X absence of EPT taxa
- ___ dominance of tolerant groups
- X low benthic abundance
- X low taxa richness
- ___ other

Other aquatic communities
- ___ Periphyton
  - ___ filamentous
  - ___ other
- ___ Macrophytes
- ___ Slimes
- X Fish

3. Brief description of problem: OU1 Landfill
   Year and date of previous surveys: —
   Survey data available in: —

4. Cause: (indicate major cause) organic enrichment toxicants flow habitat limitations other _____

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable: —

6. Suspected source(s) of problem:
   - ___ point source discharge (name, type of facility, location)
   - ___ construction site runoff
   - ___ combined sewer outfall
   - ___ silviculture runoff
   - ___ animal feedlot
   - ___ agricultural runoff
   - ___ urban runoff
   - X ground water
   - X other
   - ___ unknown

Briefly explain:

Station in palustrine forested swamp @ dendritic low flow stream. Decapods + Amphipods common/all other taxa depauperate

Figure 6.1-2. Impairment Assessment Sheet for use with macroinvertebrate Rapid Bioassessment Protocols.

APPENDIX F-3
Benthic Macroinvertebrate Survey

TABLE C-1
PHYLOGENETIC LISTING OF ALL TAXA COLLECTED FROM THE PERIMETER DITCH, ASSOCIATED DRAINAGE AREAS, AND THE ST. JOHNS RIVER [a,b]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

Phylum / Class / Order / Family / *Genus species*	Tolerance Values [c]
Nematoda	-
Bryozoa	
Phylactolaemata	
Plumatellidae	-
Annelida	
Oligochaeta	
Plesiopora	
Enchytraeidae	
Naididae	
Dero digitata	10
D. nivea	10
D. pectinata	10
Nais communis	8
N. variabilis	10
Pristina sp.	8
Tubificidae	
Aulodrilus pigueti	-
Haber cf. *speciosus*	-
Ilyodrilus templetoni	-
Limnodrilus sp.	10
L. angustipenis	10
L. hoffmeisteri	10
Monopylephorus helobius	-
Immature with Capil.Setae	8-10
Immature w/o Capil. Setae	8-10
Unknown Oligochaeta	-
Prosopora	
Lumbriculidae	
Eclipidrilus sp.	-
Polychaeta	
Unknown Polychaeta	-

TABLE C-1 (continued)
PHYLOGENETIC LISTING OF ALL TAXA COLLECTED FROM THE PERIMETER DITCH, ASSOCIATED DRAINAGE AREAS, AND THE ST. JOHNS RIVER [a,b]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

Phylum / Class / Order / Family / *Genus species*	Tolerance Values [c]
Arthropoda	
Crustacea	
Amphipoda	
Gammaridae	
Gammarus (nr. *tigrinus*)	4
Isopoda	
Anthuridae	
Cyathura polita	-
Decapoda	
Cambaridae (female)	-
Portunidae	
Callinectes sapidus	-
Xanthidae	
Rhithropanopeus harrisii	-
Insecta	
Ephemeroptera	
Caenidae	
Caenis diminuta	7
Odonata	
Zygoptera	
Coenagrionidae	
Enallagma signatum	8 [d]
Anisoptera	
Libellulidae	
Erythemis sp.	5
Pachydiplax longipennis	9
Trichoptera	
Leptoceridae	
Oecetis inconspicua	8
Polycentropidae	
Phylocentropus sp.	6
Coleoptera	
Haliplidae	
Peltodytes sp.	-
Hydrophilidae	
Berosus sp.	-

TABLE C-1 (continued)
PHYLOGENETIC LISTING OF ALL TAXA COLLECTED FROM THE PERIMETER DITCH, ASSOCIATED DRAINAGE AREAS, AND THE ST. JOHNS RIVER [a,b]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

Phylum / Class / Order / Family / *Genus species*	Tolerance Values [c]
Diptera	
Ceratopogonidae	
Chironomidae	
Ablabesmyia parajanta	8
Chironomus decorus grp.	10
C. stigmaterus	10
Clinotanypus pigueti	8
Cricotopus bicinctus grp.	7
Cryptochironomus fulvus grp.	8
Dicrotendipes fumidus	8
D. modestus	8
Glyptotendipes lobiferous	10
Goeldichironomus holoprasinus	-
G. natans grp.	-
Kiefferulus dux	10
Larsia decolorata	6
Paramerina sp.	-
Polypedilum halterale	6
P. illinoense	6
Procladius (Holotanypus) sp.	9
Pseudochironomus richardson	5
Rheotanytarsus exiguus	6
Stenochironomus hilaris	5
Tanypus carinatus	10
T. *neopunctipennis*	10
T. *punctipennis*	10
Tanytarsus glabrescens	6
T. sp. IV Rutter	6
T. sp. I Cantrell	6
Thienemanniella nr. *fusca*	6
Tribelos jucundum	5

TABLE C-1 (continued)
PHYLOGENETIC LISTING OF ALL TAXA COLLECTED FROM THE PERIMETER DITCH, ASSOCIATED DRAINAGE AREAS, AND THE ST. JOHNS RIVER [a,b]

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

Phylum / Class / Order / Family / *Genus species*	Tolerance Values [c]
Mollusca	
Gastropoda	
Ancylidae	
Ferrissia hendersoni	6
Laevapex peninsulae	-
Planorbidae	
Gyraulus parvus	8
Planorbella duryi	-
Physidae	
Physella cubensis	8
P. cubensis peninsula	8
Lymnaeidae	
Pseudosuccinea columella	-
Pelecypoda	
Corbiculidae	
Polymesoda caroliniana	-
Mactridae	
Rangia cuneata	-

Notes:

[a] Samples collected via Ekman dredge in January and February, 1992.
[b] Samples identified by Phyllis Guthrie, Invertebrate Taxonomist, Gainsville, FL under subcontract to ABB-ES.
[c] Tolerance values as provided by Plafkin et al., (1989); and Hilsenhoff (1988).
[d] Enallagma congener value.

TABLE C-2

ABUNDANCE DATA FOR BENTHIC MACROINVERTEBRATES COLLECTED FROM THE PERIMETER DITCH, ASSOCIATED DRAINAGE AREAS, AND THE ST. JOHNS RIVER

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

	SAMPLE LOCATION [c]																			
TAXA	CECIL (ref)	JC (ref)	2	5	6	7	9	10	11	12	13	15	16	20	23	28	29	30	32 (ref)	33 (ref)
Nematoda		215							1335		474		43				215		129	
Plumatellidae																	43			
Enchytraeidae		43															86			
Dero nivea			43						560			43	86							
D. digitata									388	86			1120							
D. pectinata									258	215			904							
Nais communis									43											
Nais variabilis				172					43	517		43								
Pristina sp.													43							
Aulodrilus pigueti		388							474						86					
Haber cf. speciosus													388					258	344	
Ilyodrilus templetoni													388		43					
Limnodrilus sp.																215				
L. angustipenis		215											689			4909	431	388	129	301
Limnodrilus hoffmeisteri		603							1938		129				129	2368			86	
Monopylephorus helobius		43											129			517	86	215	474	86
Tubificid Immat. w/o capil.		1378							1895		86	86	646			1895	172	258	1206	172
Tubificid Immat. w/ capil.									43								129			
Unknown Oligochaeta																	43			
Eclipidrilus sp.						43	86	129						301						
Unknown Polychaeta																	86			129
Gammarus (nr. tigrinus)																43			431	
Cyathura polita																43	43	129	129	86
Cambarinae (female)														43	43					
Callinectes sapidus																	43			
Rithropanopeus harrisii																	43			

TABLE C-2

ABUNDANCE DATA FOR BENTHIC MACROINVERTEBRATES COLLECTED FROM THE PERIMETER DITCH, ASSOCIATED DRAINAGE AREAS, AND THE ST. JOHNS RIVER

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

	SAMPLE LOCATION [c]																			
TAXA	CECIL (ref)	JC (ref)	2	5	6	7	9	10	11	12	13	15	16	20	23	28	29	30	32 (ref)	33 (ref)
Caenis diminuta		172																		
Enallagma signatum										43										
Libellulidae									43						86					
Erythemis sp.									43											
Pachydiaplax longipennis			86							129	43									
Oecetis inconspicua		43																		
Phylocentropus sp.	86																			
Peltodytes sp.									43											
Berosus sp.									43											
Ceratopogonidae	43	43							43			43	172							
Ablabesmyia parajanta						86						43								
Chironomus decorus gr.	43	172	215		43	129			2024	431	172	474	1507	43	43	172				
Chironomus stigmaterus			129	2971	86	172			1421	517	1852	1507	431							
Clinotanypus pigueti																				
Cricotopus bicinctus grp.													86			43	560	43		129
Cryptochironomus fulvus grp		86														172			43	
Dicrotendipes modestus			129								560	129	43							
Dicrotendipes fumidus																	86			
Glyptotendipes lobiferous				86																
Goeldichironomus holoprasin			646	517							129									
Goeldichironomus natans gr.			172	646	43					86										
Kiefferulus dux			1335	215	258	388					43	86								
Larsia decolorata									388				43							
Paramerina sp.											43									
Polypedilum halterale		258																		
Polypedilum illinoense																	43			
Procladius (Holotanypus) sp.		86							43				43			129		43		258
Pseudochironomus richardson			86										43				43			

TABLE C-2

ABUNDANCE DATA FOR BENTHIC MACROINVERTEBRATES COLLECTED FROM THE PERIMETER DITCH, ASSOCIATED DRAINAGE AREAS, AND THE ST. JOHNS RIVER

PRELIMINARY ECOLOGICAL ASSESSMENT: OPERABLE UNIT 1 (OU1)
NAVAL AIR STATION (NAS) JACKSONVILLE, JACKSONVILLE, FLORIDA

	SAMPLE LOCATION [c]																			
TAXA	CECIL (ref)	JC (ref)	2	5	6	7	9	10	11	12	13	15	16	20	23	28	29	30	32 (ref)	33 (ref)
Rheotanytarsus exiguus grp.													172				2713	344	172	43
Stenochironomus hilaris		43																		
Tanypus carinatus				560					431	86	129		301							
T. neopunctipennis									43											
T. punctipennis										172										
Tanytarsus glabrescens													43							
Tanytarsus sp. IV Rutter			388	86	86					215	43	86	86							
Tanytarsus sp. I Cantrell													215							
Thienemanniella nr. fusca																	43			
Tribelos jucundum	904	1249																		
Ferrissia hendersoni															43		560			
Gyraulus parvus			43									258								
Physella cubensis			215			301				129	775	86								
Physella cubensis peninsula									43											
Pseudosuccinea columella						43														
Polymesoda caroliniana																	43	86	86	
Rangia cuneata																		43		
Cacidotea sp.															474					
TOTAL NUMBER OF SPECIES	4	16	12	8	5	7	1	1	22	12	13	12	23	3	8	11	20	10	11	8
TOTAL # OF INDIVIDUALS [d]	1077	5038	3488	5253	517	1163	86	129	11583	2627	4478	2885	7622	388	947	10507	5512	1809	3230	1206
DIVERSITY [e]	0.87	3.1	2.82	2.06	1.96	2.42	0	0	3.39	3.21	2.67	2.4	3.71	0.99	2.33	2.14	2.79	2.97	2.81	2.78

Notes: [a] Samples collected by ABB-ES ecologists during January and February 1992.
[b] Samples identified by Phyllis Guthrie, Invertebrate Taxonomist, Gainesville, Florida.
[c] Locations as presented in Figure 6-2 and described in Chapter 7 of the PEA.
[d] Total individuals expressed per square meter
[e] Shannon-Wiener Diversity Index (H')

APPENDIX F-4
Rare and Endangered Species

FLORIDA NATURAL AREAS INVENTORY

1018 Thomasville Road, Suite 200-C • Tallahassee, Florida 32303 • (904) 224-8207

June 4, 1992

ABB Environmental Services, Inc.
Corporate Place 128
107 Audubon Road
Wakefield, Massachusetts 01880
ATTENTION: John Bleiler, Environmental Scientist

Subject: Requested Endangered/Threatened Species Information;
Jacksonville Naval Air Station, Duval County, FL

Dear Mr. Bleiler:

I apologize for the delay in responding to your request. I have examined the FNAI data base with respect to known and potential occurrences of natural communities or rare and endangered species of plants and animals in the vicinity of the Jacksonville Naval Air Station in Duval County, Florida. A search of our maps and computerized data base indicates that we currently have one "Element Occurrence Record" mapped within the specified study area. It is a record for bald eagle, *Haliaeetus leucocephalus*, which has been known to nest at the site. Note, however, that this record has not been updated in our data base since 1988, and before that time nesting at the site had not been confirmed since 1982. You might be able to obtain post-1988 information about the nest site by contacting Steve Nesbitt, of the Florida Game and Fresh Water Fish Commission. His address and phone number are:

Florida Game and Fresh Water Fish Commission
Gainesville Research Lab
4005 South Main Street
Gainesville, FL 32601
Telephone (904) 336-2230

Refer to FGFWFC Nest # DU-02 (N.A.S.).

We also have the following records for the St. Johns River:

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
ACIPENSER BREVIROSTRUM	SHORTNOSE STURGEON	G3	SA	LE	LE
PETROMYZON MARINUS	SEA LAMPREY	G5	SA		N
TRICHECHUS MANATUS	WEST INDIAN MANATEE	G2?	S2?	LE	LE

A listing of Element Occurrence Records for Duval County is enclosed. This list includes those records that we currently have in our computerized data base for the county and may help you arrive at a listing of potential species and natural community occurrences for the site. Please note that these lists will change as we update old records and add new records to the data base. We recently produced county matrices of rare/endangered species with information on habitat and seasonality by species. These county matrices are a subset of a statewide matrix that addresses all FNAI-listed plants and extant vertebrates. I have enclosed the county matrix for Duval County. This matrix should provide you with a good list of rare/endangered species that are of possible occurrence in your area. The matrix also indicates the months when particular species are most identifiable. The statewide matrix is available from FNAI for a nominal fee.

I have also included a copy of our "Element Global Ranking Form" for the southeastern American kestrel, *Falco sparverius paulus*. It may answer some of your questions about the subspecies.

Also enclosed are lists of plants, animals and natural communities which are tracked by our data base, as well as some other explanatory and descriptive information. The data request form (please photocopy as needed) is self-explanatory, and can be used in the future whenever you have a specific need for information from the FNAI data base.

The quantity and quality of data collected by the Florida Natural Areas Inventory are dependent on the research and observations of many individuals and organizations. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Florida have never been thoroughly surveyed. The FNAI data base represents a compilation of information extracted from published and unpublished literature, museums and herbaria, field surveys, personal communications, and other sources. Records for new occurrences of plants and animals are continuously being added to the database and older occurrence records may change as new information is gathered.

For these reasons, the FNAI cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Florida. Florida Natural Areas Inventory reports summarize the existing information known to FNAI at the time of the request regarding the biological elements or locations in question. **They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments.**

Information provided by this data base may not be published without prior written notification to the Florida Natural Areas Inventory, and FNAI must be credited as an information source in these publications. We also request that the above underlined sentence be included in acknowledgements of the data. FNAI data may not be sold for profit.

Thank you for your interest in the Florida Natural Areas Inventory. Please let me know if you have any additional questions. I hope this information proves helpful.

Sincerely,

Stephen M. Jones

Stephen M. Jones
Environmental Reviewer

encls.
SMJ/duvaabb1.pcf

Florida Natural Areas Inventory

February 3, 1992

Element Occurrence Records for DUVAL County currently in the inventory database

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FED STATUS	STATE STATUS	count
FISHES						
PETROMYZON MARINUS	SEA LAMPREY	G5	SA		N	1
AMPHIBIANS						
AMBYSTOMA CINGULATUM	FLATWOODS SALAMANDER	G4	S3?	C2	N	2
NOTOPHTHALMUS PERSTRIATUS	STRIPED NEWT	G3	S3		N	1
RANA AREOLATA	GOPHER FROG	G4	S3	C2	LS	2
REPTILES						
ALLIGATOR MISSISSIPPIENSIS	AMERICAN ALLIGATOR	G5	S4	LT/SA	LS	1
CARETTA CARETTA	LOGGERHEAD	G3	S2	LT	LT	1
CLEMMYS GUTTATA	SPOTTED TURTLE	G5	S3?		N	1
DRYMARCHON CORAIS COUPERI	EASTERN INDIGO SNAKE	G4T3	S3	LT	LT	2
GOPHERUS POLYPHEMUS	GOPHER TORTOISE	G3	S3	C2	LS	7
PITUOPHIS MELANOLEUCUS MUGITUS	FLORIDA PINE SNAKE	G5T3?	S?	C2	LS	2
BIRDS						
AMMODRAMUS MARITIMUS PELONOTUS	SMYRNA SEASIDE SPARROW	G4T2Q	S2?	C2	N	1
ATHENE CUNICULARIA FLORIDANA	FLORIDA BURROWING OWL	G5T3	S3		LS	1
CASMERODIUS ALBUS	GREAT EGRET	G5	S4		N	5
CHARADRIUS MELODUS	PIPING PLOVER	G3	S2	LT	LT	1
CISTOTHORUS PALUSTRIS GRISEUS	WORTHINGTON'S MARSH WREN	G5T3	S2		LS	1
EGRETTA CAERULEA	LITTLE BLUE HERON	G5	S4		LS	1
EGRETTA THULA	SNOWY EGRET	G5	S4		LS	1
EGRETTA TRICOLOR	TRICOLORED HERON	G5	S4		LS	1
EUDOCIMUS ALBUS	WHITE IBIS	G5	S4		N	2
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G3	S2S3	LE	LT	2
IXOBRYCHUS EXILIS	LEAST BITTERN	G5	S4		N	1
MYCTERIA AMERICANA	WOOD STORK	G5	S2	LE	LE	3
PANDION HALIAETUS	OSPREY	G5	S3S4		LS*	1
PICOIDES BOREALIS	RED-COCKADED WOODPECKER	G2	S2	LE	LT	2

Florida Natural Areas Inventory

February 3, 1992

Element Occurrence Records for DUVAL County currently in the inventory database

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FED STATUS	STATE STATUS	count
MAMMALS						
MUSTELA FRENATA OLIVACEA	SOUTHEASTERN WEASEL	G5T4	S3?		N	1
TRICHECHUS MANATUS	WEST INDIAN MANATEE	G2?	S2?	LE	LE	3
URSUS AMERICANUS FLORIDANUS	FLORIDA BLACK BEAR	G5T2	S2	C2	LT*	1
PLANTS						
ARISTIDA RHIZOMOPHORA	FLORIDA THREEAWN	G3	S3		N	1
CHEILANTHES MICROPHYLLA	SOUTHERN LIP FERN	G5	S3		LE	2
PEPEROMIA HUMILIS	TERRESTRIAL PEPEROMIA	G5	S2		LE	1
SALPINGOSTYLIS COELESTINA	BARTRAM'S IXIA	G2	S2	3C	LE	4
SPIRANTHES POLYANTHA	GREEN LADIES-TRESSES	G1G3	S1S2	C2	LE	1
NATURAL COMMUNITIES						
ESTUARINE TIDAL MARSH		G4	S4			1
ESTUARINE UNCONSOLIDATED SUBSTRATE		G5	S5			1
MARINE TIDAL MARSH		G4	S4			1
BLACKWATER STREAM		G4	S2			1
BEACH DUNE		G4?	S2			3
COASTAL GRASSLAND		G3	S2			1
COASTAL STRAND		G3?	S2			3
DRY PRAIRIE		G2	S2			1
MARITIME HAMMOCK		G4	S3			5
SCRUB		G2	S2			4
SHELL MOUND		G3	S2			5
OTHER						
MANATEE AGGREGATION SITE						3

Total items tallied: 44
Total records tallied: 86

STATE

Animals

LE - Listed as Endangered Species by the Florida Game and Fresh Water Fish Commission. An Endangered Species is defined as a species, subspecies, or isolated population which is resident in Florida during a substantial portion of its life cycle and so few or depleted in number or so restricted in range of habitat due to any man-made or natural factors that it is in immediate danger of extinction or extirpation from the state, or which may attain such a status within the immediate future unless it or its habitat are fully protected and managed in such a way as to enhance its survival potential; or migratory or occasional in Florida and included as endangered on the United States Endangered and Threatened Species List. This definition does not include species occurring peripherally in Florida while common or under no threat outside the State.

LT - Listed as Threatened Species by the Florida Game and Fresh Water Fish Commission. A Threatened Species is defined as a species, subspecies, or isolated population which is resident in Florida during a substantial portion of its life cycle and which is acutely vulnerable to environmental alteration declining in number at a rapid rate, or whose range or habitat is declining in area at a rapid rate due to any man-made or natural factors and as a consequence is destined or very likely to become and endangered species within the foreseeable and predictable future unless appropriate protective measures or management techniques are initiated or maintained; or migratory or occasional in Florida and included as threatened on the United States Endangered and Threatened Species List. This definition does not include species occurring peripherally in Florida while common or under no threat outside the State.

LS - Listed as Species of Special Concern by the Florida Game and Fresh Water Fish Commission. A Species of Special Concern is defined as a species, subspecies, or isolated population which warrants special protection, recognition, or consideration because it occurs disjunctly or continuously in Florida and has a unique and significant vulnerability to habitat modification, environmental alteration, human disturbance, or substantial human exploitation which, in the foreseeable and predictable future, may result in its becoming a threatened species unless appropriate protective or management techniques are initiated or maintained; may already meet certain criteria for consideration as a threatened species but for which conclusive data are limited or lacking; may occupy such an unusually vital and essential ecological niche that should it decline significantly in numbers or distribution other species would be adversely affected to a significant degree; or has not sufficiently recovered from past population depletion.

N - Not currently listed, nor currently being considered for listing.

Plants

LE - Listed as Endangered Plants in the Preservation of Native Flora of Florida Act. "Endangered Plants" means species of plants native to the state that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue, and includes all species determined to be endangered or threatened pursuant to the Federal Endangered Species Act of 1973, as amended.

PE - Proposed by the Florida Department of Agriculture as Endangered Plants.

LT - Listed as Threatened Plants in the Preservation of Native Flora of Florida Act. "Threatened plants" means species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in such number as to cause them to be endangered.

PT - Proposed by the Florida Department of Agriculture for listing as Threatened Plants.

CE - Listed as a Commercially Exploited Plant in the Preservation of Native Flora of Florida Act. "Commercially Exploited Plants" means species native to the state which are subject to being removed in significant numbers form native habitats in the state and sold or transported for sale.

PC - Proposed by the Florida Department of Agriculture for listing as Commercially Exploited Plants.

(LT) - Listed threatened as a member of a larger group but not specifically listed by species name.

N - Not currently listed, nor currently being considered for listing.

FLORIDA NATURAL AREAS INVENTORY

Element Rank Explanations

An element is any exemplary or rare component of the natural environment, such as a species, plant community, bird rookery, spring, sinkhole, cave, or other ecological feature. An element occurrence (EO) is a single extant habitat which sustains or otherwise contributes to the survival of a population or a distinct, self-sustaining example of a particular element. The major function of the Florida Natural Areas Inventory is to define the state's elements of natural diversity, then collect information about each element occurrence.

The Florida Natural Areas Inventory assigns 2 ranks for each element. The global element rank is based on a element's worldwide status; the state element rank is based on the status of the element in Florida. Element ranks are based on many factors, the most important ones being estimated number of element occurrences (EOs), estimated abundance (number of individuals for species; area for natural communities), range, estimated adequately protected EOs, relative threat of destruction, and ecological fragility.

Global Element Rank (priority)

- G1 - Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- G2 - Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some biological or man-made factor.
- G3 - Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction because of other factors.
- G4 - apparently secure globally (may be rare in parts of range)
- G5 - demonstrably secure globally
- GH - of historical occurrence throughout range, may be rediscovered (e.g., ivory-billed woodpecker)
- GX - believed to be extinct throughout range
- GXC- extirpated from the wild but still known from captivity/cultivation
- G#? - Tentative rank (e.g., G2?)
- G#G# - range of rank; insufficient data to assign specific global rank (e.g., G2G3)
- G#T# - rank of taxonomic subgroup such as subspecies or variety; numbers have same definition as above (e.g., G3T1)
- G#Q - rank of questionable species - ranked as species but questionable whether it is species or subspecies; numbers have same definition as above (e.g., G2Q)
- G#T#Q - same as above, but validity as subspecies or variety is questioned.
- GU - due to lack of information, no rank or range can be assigned (e.g., GUT2).
- G? - not yet ranked (temporary)

State Element Rank (priority)

Definition parallels global element rank: substitute "S" for "G" in above global ranks, and "in state" for "globally" in above global rank definitions.

Additio[illegible]te element ranks:

SA - accidental in Florida, i.e. not part of the established biota

FEDERAL/STATE LEGAL STATUS

FEDERAL

- LE - Listed as Endangered Species in the List of Endangered and Threatened Wildlife and Plants under the provisions of the Endangered Species Act. An "Endangered Species" is defined as any species which is in danger of extinction throughout all or a significant portion of its range.
- PE - Proposed for addition to the List of Endangered and Threatened Wildlife and Plants as Endangered Species.
- LT - Listed as Threatened Species. A "Threatened Species" is defined as any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
- PT - Proposed for listing as Threatened Species.
- C1 - Candidate Species for addition to the List of Endangered and Threatened Wildlife and Plants, Category 1. Taxa for which the U.S. Fish and Wildlife Service currently has substantial information on hand to support the biological appropriateness of proposing to list the species as endangered or threatened.
- C2 - Candidate Species, Category 2. Taxa for which information now in possession of the U.S. Fish and Wildlife Service indicates that proposing to list the species as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat(s) are not currently available to support proposed rules at this time.
- 3A - Category 3A. Taxa which are no longer being considered for listing as endangered or threatened because of persuasive evidence of extinction.
- 3B - Category 3B. Taxa which are no longer being considered for listing as endangered or threatened because the names do not represent taxa meeting the Endangered Species Act's definition of "species".
- 3C - Category 3C. Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.
- AC - Agency Concern. Species which are not currently listed or candidates, but which are a matter of concern to the U.S. Fish and Wildlife Service.
- LTSA - Threatened due to similarity of appearance.
- N - Not currently listed, nor currently being considered for addition to the List of Endangered and Threatened Wildlife and Plants.

FLORIDA NATURAL AREAS INVENTORY - ELEMENT OCCURRENCE RECORD
06/04/92

scientific name: HALIAEETUS LEUCOCEPHALUS
common name: BALD EAGLE

date last observed: 1988
county name: Duval

quad name: ORANGE PARK

township and range: 003S026E section: 43 precision: M
town/range comments: S2

general desc.:

EO data: NEST: 1980-1983, 1987 ACTIVE, DESTROYED 1984, USURPED BY OWL 1985. FLEDGED YOUNG 1980, 1982, UNKNOWN 1981, 1983-1985. NO DATA 1986, 1988.

managed area name: JACKSONVILLE NAVAL AIR STATION

owner: U.S. DEPT OF DEFENSE, U.S. AIR
owner comments: JACKSONVILLE NAVAL AIR STATION.

best source: FLORIDA GAME AND FRESH WATER FISH COMMISSION. 1988. BALD EAGLE NEST SURVEY SUMMARY.

eonum.: 102

data sens.:

— South of golf course

— refer to FGFWFC nest # DU-Ø2 (N.A.S.)

FLORIDA NATURAL AREAS INVENTORY - ELEMENT OCCURRENCE RECORD
06/04/92

scientific name: PETROMYZON MARINUS
common name: SEA LAMPREY

date last observed: 1978-02-00
county name: Duval, Clay, St Johns , Putnam

quad name: ORANGE PARK, BAYARD, ORANGEDALE, FLEMING ISLAND, JACKSONVILLE, ARLINGTON, TROUT RIVER, EASTPORT, MAYPORT, PICOLATA, GREEN COVE SPRINGS, RIVERDALE, PALATKA , HASTINGS

township and range: 004S026E section: precision: S
town/range comments:

general desc.:

EO data: 1 SPECIMEN COLLECTED BY A COMMERCIAL FISHERMAN (UF-26441) AT BROWN'S LANDING.

managed area name:

owner:
owner comments:

best source: FLORIDA MUSEUM OF NATURAL HISTORY. 1990. COMPILATION OF COMPUTER PRINTOUTS FOR SELECTED FISH RANGE SPECIMENS THROUGH 1989.

eonum.: 001

data sens.:

FLORIDA NATURAL AREAS INVENTORY - ELEMENT OCCURRENCE RECORD
06/04/92

scientific name: TRICHECHUS MANATUS
common name: WEST INDIAN MANATEE

date last observed: 1988
county name: Clay, Duval, St Johns, Seminole, Putnam, Flagler, Volusia, Lake , Marion

quad name: FLEMMING ISLAND, ORANGE PARK, MAYPORT, OSTEEN, TROUT RIVER, EASTPORT, JACKSONVILLE, ARLINGTON, JACKSONVILLE HEIGHTS, BAYARD, MIDDLEBURG, FLEMMING, ORANGEDALE, GREEN COVE SPRINGS, PICOLATA, RIVERDALE, PALATKA, HASTINGS, RODMAN, SATSUMA, SAN MATEO, DINNER ISLAND, LAKE DELANCY, WELAKA, CRESCENT CITY, ST JOHNS PARK, SALT SPRINGS, WELAKA SE, JUNIPER SPRINGS, ASTOR, ALEXANDER SPRINGS, LAKE WOODRUFF, DE LAND, PINE LAKES, ORANGE CITY, SANFORD , OSTEEN

township and range: 005S026E section: precision: SC
town/range comments: ALSO T 1-19S, R 25-31E.

general desc.: LARGEST RIVER IN FL, FLOWS N FROM CENTRAL FL CHAIN-OF-LAKES TO MOUTH ON ATLANTIC; EOR INCLUDES CA. 150 MILE STRETCH OF RIVER AND LAKES AS WELL AS LOWER PARTS OF SOME TRIBUTARIES; TOO SHALLOW ABOVE L. JESSUP FOR MANATEES.

EO data: U74HAR01FL: MANATEES PRESENT IN ST JOHNS RIVER SYSTEM YEAR ROUND, WINTERING IN SOME NATURAL SPRINGS AND MAN-MADE WARM WATER EFFLUENTS; CA. 70 MANATEES INHABIT THIS AREA IN SUMMER, 40 IN WINTER.

managed area name: WEKIVA RIVER AQUATIC PRESERVE , NASSAU RIVER-ST JOHNS RIVER MARSHES AQUATIC PRESERVE

owner: STATE OF FLORIDA?
owner comments: COASTAL WATERS UNDER STATE JURISDICTION.

best source: OSHEA, T. NATIONAL FISH AND WILDLIFE LABORATORY, U.S. FISH AND WILDLIFE SERVICE, 412 NE 16TH AVE, GAINESVILLE, FL 32601. (904)372-2571.

eonum.: 011

data sens.:

FLORIDA NATURAL AREAS INVENTORY - ELEMENT OCCURRENCE RECORD
06/04/92

scientific name: ACIPENSER BREVIROSTRUM
common name: SHORTNOSE STURGEON

date last observed: 1981-12-09
county name: Putnam, St Johns, Volusia , Flagler

quad name: RIVERDALE, HASTINGS, PALATKA, SAN MATEO, DINNER ISLAND, SATUSMA, WELAKA, CRESENT CITY, ST. JOHN'S PARK, WELAKA SE, SALT SPRINGS, ASTER, JUNIPER SPRINGS, PICOLATA, GREEN COVE SPRINGS, MIDDLEBURG, ORANGEDALE, FLEMMING ISLAND, ORANGE PARK, BAYARD, ARLINGTON, JACKSONVILLE, TROUT RIVER, EASTPORT , MAYPORT

township and range: 008S028E section: precision: S
town/range comments:

general desc.: LARGE RIVER SYSTEM.

EO data: 11 SPECIMENS COLLECTED BY VARIOUS INDIVIDUALS BETWEEN 1949 AND 1981. SOME HAVE BEEN DEPOSITED IN THE FMNH, OTHERS WERE CAUGHT AND RELEASED. SEVERAL STURGEON ARE CAUGHT EACH YEAR BY COMMERCIAL FISHERMEN.

managed area name:

owner:
owner comments:

best source: FLORIDA MUSEUM OF NATURAL HISTORY. 1990. COMPILATION OF COMPUTER PRINTOUTS FOR SELECTED FISH RANGE SPECIMENS THROUGH 1989.

eonum.: 001

data sens.:

APPENDIX F-5
Pathological Reports

UNIVERSITY OF FLORIDA VETERINARY MEDICAL TEACHING HOSPITAL
PRIVILEGED INFORMATION - NOT FOR PUBLICATION

081189		N E C R O P S Y R E P O R T	
OWNER:	DR MARLAND DELANEY		
PHONE:	904/656-1293	PATH NO: N92-64	SUBMISSION DATE: 01/23/92
PATIENT NAME:		REF VET:	DR MARLAND DELANEY
SPECIES:	AVIAN	DEPT:	ABB ENVIRONMENTAL SERVICES
BREED:	SHARP SHINNED HAWK	BLDG:	BIRGELY BLDG
SEX:	FEMALE	ADDRESS:	2590 ENVIRONMENTAL CTR CIR EAST
COLOR:	BROWN	CT/ST/ZP:	TALLAHASSEE, FL 32301
AGE:	MATURE	PHONE:	904/656-1293

CLINICAL SUMMARY: This mature female hawk was found dead at a Jacksonville Toxic Waste Removal site and submitted to the VMTH for necropsy and a complete toxicologic study. The bird was submitted 1/23/92 via Greyhound Bus and received at the VMTH the same day at 1515hr by Dr. C. D. Buergelt.

CLINICAL DIAGNOSIS: None given.

GROSS NECROPSY FINDINGS:

GENERAL EXAMINATION: Necropsy is begun at 1530hr and completed at 1600hr on 01/23/92. The body is that of an approximately 100g brown female hawk in good physical condition. Evidence of maggot infestation is associated with the lower conjunctiva of the left eye, slightly bulging the conjunctiva. All organs not described are within normal limits.

INTEGUMENT/SUBCUTIS: Little body fat is present. There is no evidence of trauma.

COELOMIC CAVITY: All organs are within their expected locations.

DIGESTIVE TRACT: The crop and esophagus are free of ingesta; so is the oral cavity. The proventriculus is slightly contracted and does not contain ingesta. The ventriculus contains two nematodes that are curled and measure approximately 1-2cm in length when stretched. The mucosa is covered by reddish tinged, slightly viscous material. There is no evidence of food particles. The entire intestinal tract is distended by reddish viscous fluid. The cloaca is filled with cream colored, opaque, soft material.

BRAIN is bilaterally symmetrical, somewhat soft, and is removed *in toto*.

SPECIAL EXAMINATIONS:

Microbiology: Intestinal contents yielded moderate growth of predominantly *Escherichia coli*. No *Salmonella* sp. isolated.

Parasitology: Fecal flotation analysis reveals no parasitic ova. Nematodes from the gizzard are identified as ascarid nematodes.

RETENTION OF TISSUES: Samples of skeletal muscle, feathers, fat, liver, heart, kidney and lung, as well as contents from the cloaca, are frozen at -20°C for toxicologic analysis.

GROSS DIAGNOSES:

1. Endoparasitism, (*Ascarid* sp.), mild, gizzard.
2. Hemorrhagic gastritis and enteritis, mild to moderate, gastrointestinal tract.

MICROSCOPIC DESCRIPTION:

SLIDE 1 HEART (2 sections)

Occasional myofibers have undergone focal myodegeneration and/or atrophy.

SLIDE 2 LIVER (1 section)

Several granulomas are randomly distributed throughout the parenchyma. These granulomas are characterized by cellular debris in the center and giant cells, heterophils and macrophages in the periphery. Occasional granulomas have cross sections of endoparasitic larvae in the center. Portions of the liver tissue are autolyzed.

SLIDE 2 KIDNEY (2 sections)
Mild autolysis, otherwise no significant lesions.

SLIDE 3 BRAIN (1 section) - No significant lesions.

SLIDE 4 VENTRICULUS (GIZZARD) (1 section) - No significant lesions.

SMALL INTESTINE (1 section)
Mucosa is autolyzed. Mild numbers of plasma cells are in the lamina propria. The lumen contains foci of blood and several adult trematodes (flukes), larvae and fluke eggs.

LARGE INTESTINE (1 section)
Complete autolysis.

SMALL INTESTINE (2 sections)
Complete autolysis.
Clotted blood as well as several endoparasites are within the lumen.

SLIDE 5 PROVENTRICULUS (1 section) - No significant lesions.

LUNG AND AIR SACS (2 sections) - No significant lesions.

SLIDE 6 OVARIES (2 sections)
Mature tissue.

THYROIDS (2 sections) - No significant lesions.

PARATHYROID (1 section) - No significant lesions.

FINAL ANATOMIC DIAGNOSES:
1. Endoparasitism, moderate, intestinal tract and liver (Trematodes and Nematodes sp.).
2. Melena, moderate, intestinal tract.
3. Necrosis, multifocal, mild, myocardium.

COMMENT: The demise of this bird might have been the result of intestinal hemorrhage in conjunction with endoparasitism. It is felt that this bird died of natural causes.

INDEXED DIAGNOSES:
T-50500; M-01310.
T-56000; M-01310.
T-50500; M-37000.

eap:02/04/92
sdk:02/10/92

Claus D. Buerger 2/11/92
Claus D. Buerger, DVM, Veterinary Pathologist /Date

UNIVERSITY OF FLORIDA VETERINARY MEDICAL TEACHING HOSPITAL
PRIVILEGED INFORMATION - NOT FOR PUBLICATION

Path

	081184	NECROPSY REPORT	
OWNER:	DR MARLAND DELANEY	PATH NO: N92-46	SUBMISSION DATE: 01/23/92
PATIENT:	*NO NAME*	REF VET:	DR MARLAND DELANEY
SPECIES:	OTHER MAMMAL	CLINIC:	ABB ENVIRONMENTAL SERVICES
BREED:	OPOSSUM	ADDRESS:	2590 ENVIRONMENTAL CTR CIR EAST
SEX:	MALE	CT/ST/ZP:	BIRGELY BLDG - TALLAHASSEE, FL
COLOR:	WHITE & GREY	PHONE:	904/656-1293 32301
AGE:	ADULT		

CLINICAL SUMMARY: This adult male opossum was found dead at a waste disposal clean up site in Jacksonville, Florida. Dwellers in the vicinity are concerned about toxic problems in the environment. The animal was referred by Dr. Delaney over the telephone, and then transferred by bus to Gainesville, Florida, on 1/23/92.

CLINICAL DIAGNOSIS: None given (death by unknown cause).

GROSS NECROPSY FINDINGS:

GENERAL EXAMINATION: Necropsy is begun at 1500hr and completed at 1530hr on 01/23/92. The body is that of an adult white and grey male opossum in fair physical condition. A small number of maggets are present within the oral cavity. All organs not described are within normal limits.

INTEGUMENT/SUBCUTIS: There is mild, green discoloration to the subcutaneous tissues of the ventral abdomen.

DIGESTIVE TRACT: Gastrointestinal contents were grey and soft. A small number of nematode parasites are present within the stomach.

RETENTION OF TISSUES: Sections of muscle, fat, kidney, liver, lung, heart and brain are frozen at -20°C for toxicologic studies. Heartblood, liver and gastric contents are frozen is frozen at -20°C as well. Brain for rabies testing is frozen at -70°C .

GROSS DIAGNOSES:

1. Endoparasitism, chronic, mild, stomach, (Etiology: Physaloptera sp. nematodes).
2. Autolysis, mild.

MICROSCOPIC DESCRIPTION:

SLIDE 1 KIDNEY (2 section)

The tissue is moderately autolyzed (cortical tubules). Major architectural changes or cellular infiltrates are not present.

SPLEEN (1 section) - No significant lesions.

SLIDE 2 LUNG (1 section)

Interstitial pneumonia, subacute, diffuse, mild, with atelectasis and edeme, acute, multifocal, mild to moderate.

The interstitium and alveolar walls have a mild neutrophilic infiltrate. Many alveoli are partially collapsed and some contain small amounts of eosinophilic proteinaceous fluid. Autolysis has altered the morphology of many of the cells.

HEART (3 sections)

Myocarditis, subacute, multifocal, moderate to severe, with myocardial fiber degeneration, mineralization and interstitial fibrosis, subacute, multifocal, mild to moderate.

The interstitium is multifocally infiltrated by moderate to large numbers of neutrophils and fewer lymphocytes. The infiltrate is sometimes associated with a mild increase in fibrous tissue. Myofibers in the affected regions have slightly increased

eosinophilia and occasionally fragmented cytoplasm and loss of nuclear detail. Many degenerating fibers are mineralized (VonKossa). In some areas, there is a complete loss of myofibers.

SLIDE 3 ADRENAL GLAND (1 section) - No significant lesions; moderate autolysis.

GANGLION AND ADIPOSE TISSUE (1 section) - No significant lesions.

STOMACH (2 sections) - No significant lesions; moderate autolysis.

TUBULAR VISCUS (1 section)
Autolysis precludes evaluation.

SLIDE 4 SKELETAL MUSCLE (1 section) - No significant lesions.

TESTICLE (1 section) - No significant lesions.
Seminiferous tubules are lined by well differentiated germinal epithelium with an orderly maturation and adequate spermatid production.

EPIDIDYMIS (1 section) - No significant lesions.
The ducts are filled with spermatozoa.

SKIN (1 section)
The skin is sparsely haired and has a mild multifocal accumulation of excess keratin on the surface and within a few hair follicles.

SLIDE 5 ADRENAL GLAND (1 section) - Autolysis, moderate.

GANGLION AND ADIPOSE TISSUE (1 section) - No significant lesions.

SLIDE 6 CEREBELLUM (1 section) - No significant lesions.

CEREBRAL CORTEX (3 sections) - No significant lesions.

SLIDE 7 SPLEEN (2 sections) - No significant lesions.

SLIDE 8 LIVER (3 sections)
Periportal lipidosis, chronic, diffuse, mild.

FINAL ANATOMIC DIAGNOSES:

1. Myocarditis, subacute, multifocal, moderate to severe, with myocardial fiber degeneration and mineralization, and interstitial fibrosis, subacute, multifocal, mild to moderate, heart.
2. Interstitial pneumonia, acute, diffuse, mild, with atelectasis and edema, acute, multifocal, mild to moderate, lungs.
3. Periportal hepatic lipidosis, chronic, diffuse, mild, liver.
4. Endoparasitism, chronic, mild, stomach (Etiology: Physaloptera sp. nematodes).
5. Autolysis, mild.

MEDICAL RECORD NUMBER: 081184	VETERINARY MEDICAL TEACHING HOSPITAL
PATHOLOGY CASE NUMBER: N92-46	UNIVERSITY OF FLORIDA
PAGE NUMBER: 3	

COMMENT: This opossum died from a myocarditis that is most likely of an infectious etiology (bacteria or protozoa). We did not identify the agent within the tissues. There was no histologic evidence of toxin exposure.

INDEXED DIAGNOSES:
T-32000; M-40000.
T-28000; M-40000.

Claus D. Buergelt 2/3/92

Claus D. Buergelt, DVM, Veterinary Pathologist /Date
Pamela E. Ginn, DVM, Prosector 904/392-4383

sdk:02/03/92