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NAVY INSTALLATION RESTORATION PROGRAM PLAN
NAVAL AIR STATION
JACKSONVILLE, FLORIDA

VOLUME 1
Organization and Planning

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ACRONYM LIST

ACS - American Chemical Society.

AI - Adsorption Isotherm.

AOC - Area of Contamination.

AQA/LCP - Analytical Quality Assurance/Laboratory Control Program.

ARAR - Applicable or Relevant and Appropriate Requirement.

ASTM - American Society for Testing and Materials.

ATSDR - Agency for Toxic Substances and Disease Registry.

BCF - Bioconcentration Factor.

BLS - Below Land Surface.

BNA - Base-Neutral and Acid Extractable Organic Compounds.

BSAP - Basic Sampling and Analysis Plan.

CAA - Clean Air Act.

CCS - Contract Compliance Screening.

CEC - Cation Exchange Capacity.

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act.

CFR - Code of Federal Regulations.

CLP - Contract Laboratory Program.

CNO - Chief of Naval Operations.

COC - Chain-of-Custody.

CR - Complex Resistivity.

CRAVE - Carcinogen Risk Assessment Verification Endeavor.

CRQL - Contract Required Quantitation Limit.

CSRS - Confirmation Study Ranking System.

CWA - Clean Water Act.

DGP - Data Gathering Plan.

DMP - Data Management Plan.

DOD - Department of Defense.

DQO - Data Quality Objectives.

DQCR - Data Quality Control Report.

DRMO - Defense Reutilization and Marketing Office.

DVRS - Data Validation Report Sheets.

ECAO - Environmental Criteria and Assessment Office.

EEM - Environmental Evaluation Manual.

EIS - Environmental Impact Study.

ELCR - Excess Lifetime Cancer Risk.

EM - Electromagnetic.

EPA - Environmental Protection Agency.

ESI - Extended Site Inspection.

FDER - Florida Department of Environmental Regulation.

FAC - Florida Administrative Code.

FDVC - Field Data Validation Checklist.

FFA - Federal Facilities Agreement.

FID - Flame Ionization Detector.

FIFRA - Federal Insecticide, Fungicide and Rodenticide Act.

FS - Feasibility Study.

FSP - Field and Sampling Plan.

FWQC - Federal Water Quality Criteria.

GPR - Ground Penetrating Radar.

HA - Health Advisory.

HASP - Health and Safety Plan.

HEAST - Health Effects Assessment Summary Table.

HI - Hazard Index.

HQ - Hazard Quotient.

HRS - Hazard Ranking System.

IAS - Initial Assessment Study.

IR - Installation Restoration.

IRIS - Integrated Risk Information System.

IRP - Installation Restoration Program.

LDP - Laboratory Data Package.

LL - Liquid Limit.

LOAEL - Lowest Observed Adverse Effect Level.

LOQ - Limit of Quantitation.

LTO - Laboratory Task Order.

MCL - Maximum Contaminant Level.

MCLG - Maximum Contaminant Level Goal.

MDL - Method Detection Limit.

MF - Modifying Factor.

MPR - Monthly Progress Report.

MSL - Master Sample List.

NAAQS - National Ambient Air Quality Standards.

NACIP - Naval Assessment and Control of Installation Pollutants.

NADEP - Naval Aviation Depot.

NAS - Naval Air Station.

NAT - Navy Aviation Trade.

NCP - National Oil and Hazardous Substances Contingency Plan.

NEESA - Naval Energy and Environmental Support Activity.

NOAA - National Oceanographic and Atmospheric Administration.

NOAEL - No Observed Adverse Effect Level.

NOEL - No Observed Effect Level.

NPDES - National Pollutant Discharge Elimination System.

NPL - National Priority List.

NRMC - Naval Regional Medical Center.

NTGS - National Technical Guidance Series.

O&M - Operation and Maintenance.

OSWER - Office of Solid Waste and Emergency Response.

OTA - Office of Technology Assessment.

OU - Operable Unit.

OVA - Organic Vapor Analyzer.

PA - Preliminary Assessment.

PCBs - Polychlorinated Biphenyls.

PI - Plasticity Index.

PID - Photoionization Detector.

PL - Plastic limit.

POL - Petroleum, Oil and Lubricant.

PQL - Practical Quantitation Limit.

PSC - Potential Source(s) of Contamination.

PVC - Polyvinylchloride.

PWO - Public Works Officer.

QA - Quality Assurance.

QAO - Quality Assurance Officer.

QAPP - Quality Assurance Program Plan.

QAPjP - Quality Assurance Project Plan.

QC - Quality Control.

QCS - Quality Control Summary.

QCSR - Quality Control Summary Report.

RASO - Radiological Affairs Support Office.

RCRA - Resource Conservation and Recovery Act.

RfD - Reference Dose.

RI - Remedial Investigation.

RME - Reasonable Maximum Exposure.

ROD - Record of Decision.

RPD - Relative Percent Difference.

SARA - Superfund Amendments and Reauthorization Act of 1986.

SAS - Special Analytical Services.

SCBA - Self Contained Breathing Apparatus.

SDWA - Safe Drinking Water Act.

SEAM - Superfund Exposure Assessment Manual.

SI - Site Inspection.

SIP - Spectral Induced Polarization.

SMP - Site Management Plan.

SP - Spontaneous Potential.

SQL - Sample Quantitation Limit.

SSHO - Site Safety and Health Officer.

SSHS - OU-Specific Safety and Health Supervisor.

TAG - Technical Assistance Grant.

TBC - To Be Considered.

TCE - Trichloroethene.

TCLP - Toxicity Characteristic Leaching Procedure.

TEM - Transient Electromagnetics.

TIC - Tentatively Identified Compounds.

TOC - Total Organic Carbon.

TRC - Technical Review Committee.

TSCA - Toxic Substances Control Act.

UF - Uncertainty Factor.

USACE - U.S. Army Corps of Engineers

USCS - Unified Soil Classification System.

USDA - United States Department of Agriculture.

USGS - United States Geological Survey.

VOA - Volatile Organic Aromatic.

VOC - Volatile Organic Compound.

INSTALLATION RESTORATION PROGRAM PLAN
NAVAL AIR STATION
JACKSONVILLE, FLORIDA

VOLUME 1
ORGANIZATION AND PLANNING

RECORD OF DOCUMENT CHANGES

Date	Section	Page	Summary of Change

EXECUTIVE SUMMARY

Volume 1 of the Installation Restoration Program Plan (IRPP), entitled Organization and Planning, defines the project management procedures for implementing the Navy's Installation Restoration Program at the Naval Air Station (NAS) in Jacksonville, Florida. It includes the Program Management Plan, which describes data management goals and plan implementation, document and correspondence control, field and laboratory documentation, and data reduction and presentation. Volume 1 also includes descriptions of the potential sources of contamination (PSCs) at the NAS, the environmental setting of the NAS, the PSC prioritization plan, and IRP events scheduling.

1.0 INTRODUCTION

The Navy has been actively engaged in installation restoration (IR) activities since 1980 and has taken an aggressive approach to the problem of hazardous waste contamination resulting from past practices at its installations. Identification of waste areas has taken place at all Naval installations, including the Naval Air Station (NAS) in Jacksonville, Florida. The Navy has also performed Preliminary Assessments (PAs) for all its installations listed in the Federal Hazardous Waste Compliance Docket, which identifies installations that generate hazardous waste or have reported waste releases. Response actions addressing potential contamination problems at Naval installations are presently in either the planning or implementation phase. The Navy is committed to compliance with its legal and community obligations to protect public health and the environment.

1.1 The CERCLA Process

In 1980, Congress passed the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The Act, commonly referred to as "Superfund", required funds be set aside for the investigation and remediation of hazardous waste sites. In addition, CERCLA required the U.S. Environmental Protection Agency (EPA) establish a National Priority List (NPL) of facilities requiring further action. The EPA uses the NPL to prioritize the facilities which require further investigation and remediation.

The original 1980 CERCLA Legislation did not apply to federal facilities. Therefore, the Department of Defense (DOD) established its own environmental program in 1980, which was adopted by each branch of the services. The Navy adopted this DOD program by creating the Navy Assessment and Control of Installation Pollutants (NACIP) Program. Once CERCLA was re-enacted in 1986 under the Superfund Amendments and Reauthorization Act (SARA), Superfund

stipulated that the DOD and other federal facilities meet all CERCLA requirements. The NACIP Program was subsequently discontinued in 1986 and replaced by the IR Program (IRP).

The IRP is not an all-encompassing environmental program. It focuses on the remediation of contamination from past hazardous waste operations. Specific eligibility criteria include the following:

- The IRP is intended to address the remediation of contamination and damage resulting from past, rather than current, disposal operations. In most cases, the cut-off date distinguishing past from current operations is January 1, 1981, the first day of the first month after the enactment of CERCLA.

- The IRP is primarily intended to remediate hazardous substances. However, it may address pollutants and contaminants that are not hazardous substances, but which have the potential of endangering public health, welfare, or the environment. This category of substances may include petroleum, oil and lubricant (POL) products and materials associated with unexploded ordnance detection and range clearance efforts.

- The IRP addresses both installations that have been placed on the EPA's NPL and unlisted installations.

- The IRP addresses properties currently owned or leased by the Navy in the United States, its territories, or possessions.

The IRP consists of three levels of actions. The first involves the identifying areas that are potential sources of contamination (PSCs) and confirming the presence of constituents of

concern in those areas; the second consists of defining the nature and extent of contamination and developing remedial alternatives; and the third involves designing and implementing selected remedial actions. After remedial actions are implemented, they require long-term maintenance and continued monitoring. A more detailed explanation of the three levels of IRP actions follows.

1. Preliminary Assessment/Site Investigation (PA/SI) Study

The PA/SI involves a record review at the facility and elsewhere; interviews with former and present long-term employees concerning past activities and waste disposal practices; and ground-water and soil sampling and analysis for suspected constituents of concern.

2. Remedial Investigation/Feasibility Study (RI/FS)

The RI is conducted to determine the nature and extent of contamination through extensive sampling and analysis. The FS is conducted to develop, screen, and evaluate remedial alternatives. Remedial alternatives are screened based on nine criteria, including protection of human health and the environment, community acceptance, regulatory compliance, effectiveness, implementability, and cost. Based on the RI/FS, the Navy and presiding State and/or Federal regulatory agencies select a cost-effective remedial plan to mitigate and protect public health, welfare, and the environment. The selected remedial plan is recorded in a Record of Decision (ROD). At NAS Jacksonville, the Navy, the FDER, and the EPA must agree on a chosen remedial action. The EPA has final authority in the decision-making process.

3. Remedial Design/Remedial Action (RD/RA)

The RD/RA involves implementation of the remedial action alternative selected during the RI/FS process and recorded in the ROD. Implementation of remedial action includes design and construction of the remediation system at the PSC. Long-term maintenance and monitoring may be conducted after the system is in place.

1.2 Regulatory Background - NAS Jacksonville

Remedial investigations at NAS Jacksonville ("Site") commenced in 1982 with an Initial Assessment Study (IAS) conducted to collect and evaluate evidence that constituents of concern detected at selected PSCs might pose a health risk to people on or off the Site. The IAS evaluated PSCs using a Confirmation Study Ranking System (CSRS) developed by the Naval Energy and Environmental Support Activity (NEESA). Developed to systematically evaluate a PSC's potential hazard to human health and the environment, the CSRS was similar to the Hazard Ranking System (HRS) used by EPA under CERCLA.

The IAS evaluated a total of 38 PSCs; two (PSC 26 and PSC 27) required prompt remedial action. Further investigation activities and interim remedial actions were performed at PSC 26 and PSC 27 prior to the conclusion of the IAS. Based on CSRS scores, the IAS identified an additional ten PSCs that posed potential threats to human health or the environment.

In 1983, the Navy retained Geraghty & Miller, Inc. to conduct a Confirmation Study to assess the ten additional PSCs identified in the IAS. The Confirmation Study was divided into two parts, a verification study and a characterization study. The verification study was conducted to confirm the presence or absence of constituents of concern in soil, ground water, and surface water at

each of the ten PSCs. The verification study results were used to identify PSCs requiring additional study (i.e., a characterization study) to evaluate the nature and extent of contamination present.

The management of hazardous wastes at DOD installations was not covered by CERCLA (and was, therefore, not under EPA's jurisdiction) when these initial PSC studies were conducted at NAS Jacksonville. However, the scope and objectives of the IAS, the verification study, and the characterization study were similar to the Preliminary Assessment (PA), Site Inspection (SI), and Extended Site Inspection (ESI) investigations required by EPA for preliminary investigations of CERCLA sites. Therefore, the IAS, verification study, and characterization study serve as the PA, SI, and ESI, respectively, for the Site. The PA, SI, and ESI are discussed in more detail in Sections 3.1.3 and 3.1.4.

In December 1989, NAS Jacksonville was placed on the EPA's NPL. In November 1990, a Federal Facilities Agreement (FFA) was signed between the EPA, the Florida Department of Environmental Regulation (FDER), and the Navy to coordinate IRP actions at NAS Jacksonville. As part of DOD, the Navy is responsible for the investigation and remediation of the Site.

The Navy and its contractors have prepared the Navy IRP documents for management of IR activities at NAS Jacksonville. The documents are listed below.

- Volume 1, Organization and Planning
- Volume 2, No Further Action Plan
- Volume 3, Site Screening Plan
- Volume 4, Basic Site Work Plan
- Subsequent volumes, Operable Unit (OU)-Specific RI/FS Work Plans.

Volume 1 of the IRP, Organization and Planning, includes information for completing the IRP at NAS Jacksonville. Volume 1 addresses program management, identifies the 45 PSCs being managed in accordance with the IRP, describes the environmental setting, groups PSCs into OUs proposed for the RI/FS process, and presents an events schedule for IRP implementation.

Appendices to Volume 1 include background documents on NAS Jacksonville. These background documents serve as the PA, SI, and ESI for the Site (Appendices 1.1, 1.2, and 1.3, respectively). The Community Relations Plan (Appendix 1.4) provides guidance for public relations management during implementation of the IRP. The Health and Safety Plan (HASP) (Appendix 1.5) will be implemented during Site investigations. The Site Management Plan (SMP) (Appendix 1.6) identifies activities and schedules for work planned for the current year at those PSCs which need to undergo the RI/FS process.

Volume 2, No Further Action Plan, and Volume 3, Site Screening Plan, will address the management of PSCs (or portions of PSCs) not selected to undergo the RI/FS process. Existing information pertaining to these PSCs is sufficient to enable the Navy, FDER, and the EPA to determine appropriate management requirements. The No Further Action Plan will present receptor analyses confirming that the PSCs in this group do not present unacceptable risks to human health or the environment. Volume 2 and Volume 3 are to be developed in accordance with a schedule based on PSC prioritization requirements.

Volume 4, the Basic Site Work Plan, identifies potential field investigations, including sampling and analytical methods, for all environmental investigations at the Site. Volume 4 also outlines the procedures for CERCLA remedial activities including the RI, Baseline Risk Assessment, Treatability Studies, and FS. In addition, Volume 4 contains guidelines for preparing reports to

document CERCLA remedial activities. CERCLA remedial activities pertain only to those PSCs selected to undergo the RI/FS process.

The appendices to Volume 4 provide additional information pertaining to the RI/FS process. Appendix 4.1 is the Quality Assurance/Quality Control (QA/QC) Plan, which documents the procedures for execution of the RI/FS work plans. Appendix 4.2 is the Data Analysis Plan, which outlines data validation procedures and supports information provided in Appendix 4.4. Appendix 4.3 is the QA/QC Final Product/Report Plan. The Navy will use Appendix 4.3 to review the Final RI/FS Work Plans, RI Reports, FS Reports, and any Treatability Studies for completeness. Appendix 4.3 includes checklists for each of the documents generated from implementation of the RI/FS Work Plan. Appendix 4.4 is the Basic Sampling and Analysis Plan (BSAP) consisting of Appendix 4.4.1, the Quality Assurance Program Plan (QAPP), and Appendix 4.4.2, the Basic Field Sampling Plan (BFSP). Appendices 4.4.1 and 4.4.2 provide information on the collection and analysis of data obtained during remedial investigations.

The remaining volumes of the IRP are the OU-specific RI/FS work plans. Appendices to these documents include additional PSC background information; an OU Sampling and Analysis Plan (SAP), including a Quality Assurance Project Plan (QAPjP) and a Field Sampling Plan (FSP); and supplemental Health and Safety requirements.

2.0 PROGRAM MANAGEMENT

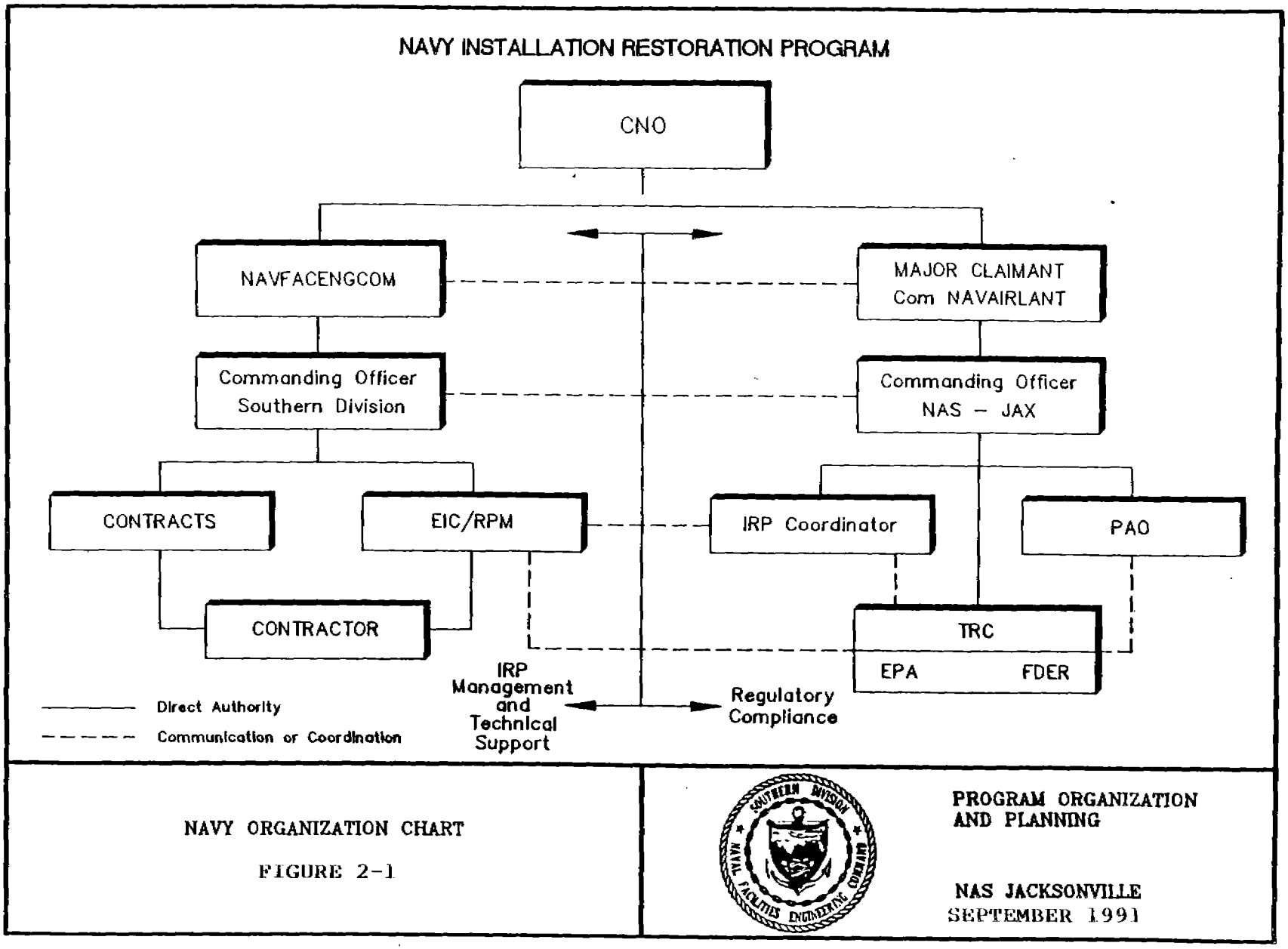
2.1 Program Organization

The Navy is the lead agency responsible for implementing the IRP at NAS Jacksonville. An organization chart for the Navy is presented in Figure 2-1. The chart shows the relationship between the technical and regulatory groups at the Department of the Navy and the Southern Division, Naval Facilities Engineering Command. The chart also highlights the responsibilities of the Public Affairs Office at NAS Jacksonville.

An organizational chart for the Navy's contractors performing the majority of the work is presented in Figure 2-2. The architect/engineering contractor currently selected for the IRP is Geraghty & Miller, Inc. The Geraghty & Miller organizational chart indicates the members of the professional staff responsible for Project Management, Engineering, Hydrogeology/Modeling, Health and Safety/Community Relations, QA/QC, and Risk Assessment/ARARs.

2.2 Data Management Goals and Plan Implementation

The Data Management Plan (DMP) is presented in five main sections. This section (Section 2.2, Data Management Goals and Plan Implementation) discusses the objective of, and regulatory basis for the DMP and identifies the individuals responsible for plan implementation. Section 2.3, Document and Correspondence Control discusses the handling of materials and reports generated during work plan development and final report preparation. Progress reports of IRP activities to be submitted to Navy by its contractors are also discussed in Section 2.3. Section 2.4, Field and Laboratory Documentation, discusses the procedures for



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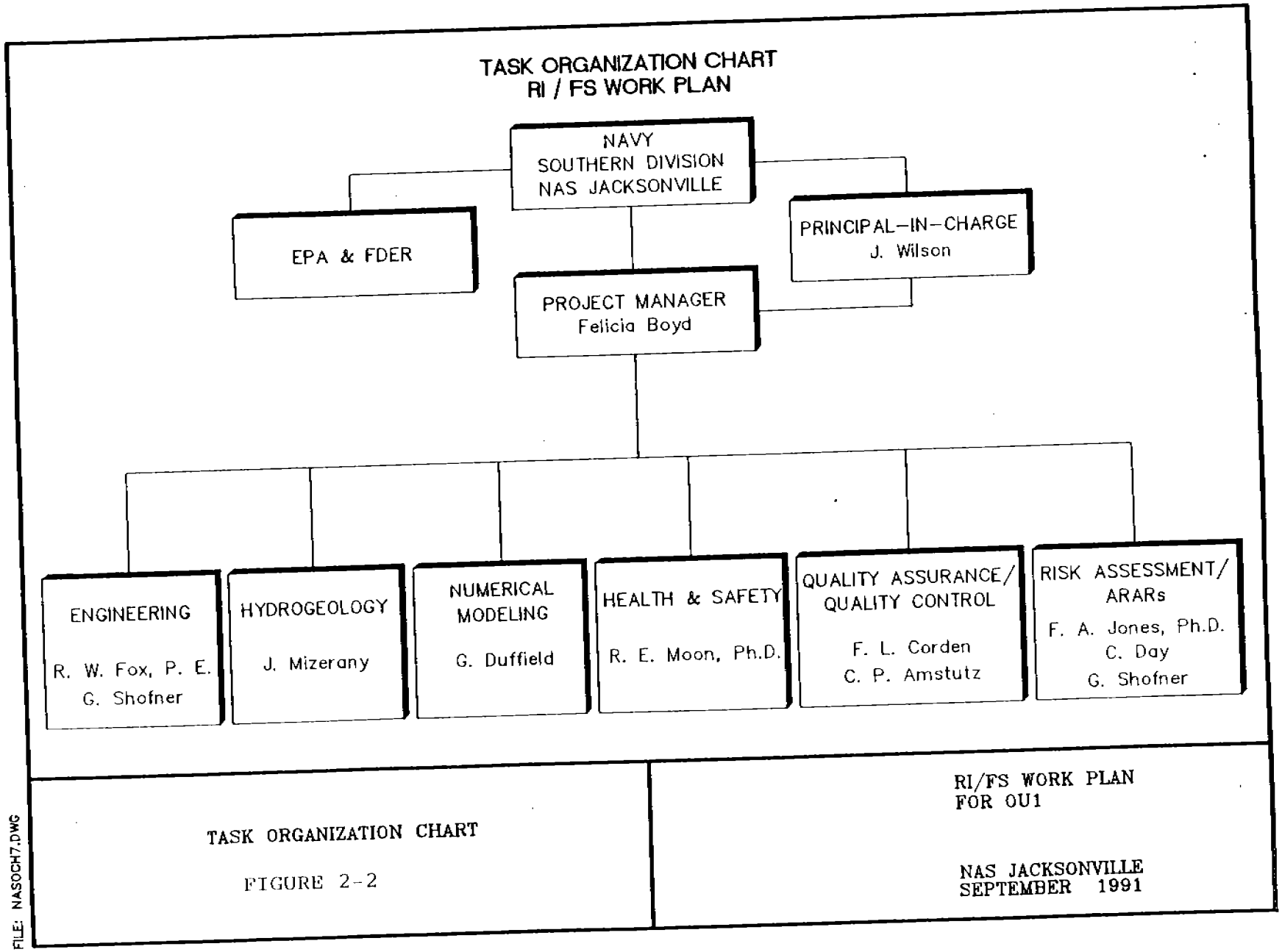

TASK ORGANIZATION CHART
RI / FS WORK PLAN
NAVY
SOUTHERN DIVISION
NAS JACKSONVILLE
EPA & FDER
PRINCIPAL–IN–CHARGE
J. Wilson
PROJECT MANAGER
Felicia Boyd
ENGINEERING
R. W. Fox, P. E.
G. Shofner
HYDROGEOLOGY
J. Mizerany
NUMERICAL MODELING
G. Duffield
HEALTH & SAFETY
R. E. Moon, Ph.D.
QUALITY ASSURANCE/ QUALITY CONTROL
F. L. Corden
C. P. Amstutz
RISK ASSESSMENT/ ARARs
F. A. Jones, Ph.D.
C. Day
G. Shofner
TASK ORGANIZATION CHART
FIGURE 2-2
RI/FS WORK PLAN
FOR OU1
NAS JACKSONVILLE
SEPTEMBER 1991
FILE: NASOCH7.DWG

generation, transmittal, review, and storage of field records and laboratory reports. Section 2.5, Data Reduction and Presentation, presents the general procedures for condensing the raw data generated during the IRP and provides examples of typical figures and tables that may be produced for the IRP Reports.

2.2.1 Plan Objective

The DMP presents guidance for controlling inventory and tracking and retrieving field records and logs, laboratory data, project correspondence, and documents prepared as part of the IRP reports at the PSCs. The objective of the DMP is to define in detail the policies and procedures that will be followed to assure that information generated during the IRP is maintained and presented in a scientifically representative and legally defensible manner.

The regulatory requirement for a DMP is presented in Section 3.5.1 of "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA, October 1988, OSWER Directive 9355.3-01). This guidance document discusses the practical necessity for establishing data review, management, and filing systems to maintain the integrity of the large volumes of information generated during an IRP. Implementation of a data management system, as outlined by EPA, is necessary to facilitate efficient, effective regulatory review of Navy IRP efforts and assure the integrity of the data for litigation purposes.

2.2.2 Personnel Responsible for Plan Implementation

The Navy shall designate a Records Custodian for this project. The Records Custodian will be directly supervised by the Project Manager and will be responsible for logging, filing, and distributing records generated during the IRP process. The Records

Custodian also is responsible for the security of original materials and the master project files. Copies of original materials will be forwarded to the Navy in accordance with the IRP events schedule and at the Navy's request. At project completion, all original records will be forwarded to the Navy. The Navy's contractor shall act as the Records Custodian.

2.2.3 Records Repository Organization and Location

The filing system to be used during this project is outlined in Table 2-1. The document organization scheme used in this IRP is based on the filing system presented in Section 3.5 of the CERCLA guidance document referenced above (EPA, 1988). The master project file will be retained by Geraghty & Miller at 14497 North Dale Mabry Highway, Tampa, Florida, until such time as the Navy requests transfer of the files. Prior to finalization, each IRP document is internal, proprietary information and will not be available for public scrutiny. An NAS Jacksonville Public Affairs Representative will file all final documents at the repository located in the Webb Wesconnet Branch of the Jacksonville Public Library on 103rd Street. These final records will be available for public review.

Each document will be dated upon receipt or transmittal and assigned a unique identification number. The identification number will reference the general file to which the document is assigned and will include a sequential number documenting the order in which document/record was transmitted or received. A master list of identification numbers and the document name will be maintained as part of the project file.

All original documents will be kept in the master project files in locked cabinets. The keys for the files will be available to the Project Officer, Project Manager, and the Records Custodian. When documents are removed from the master project files, they will be signed out on a log sheet maintained by the Records Custodian.

Table 2-1. General File Organization for the IRP at the Naval Air Station, Jacksonville, Florida

Files	Code/Log #
General Files	
Historical Reports	Gen-Historical-XXX
Contracts	Gen-Contracts-XXX
Modifications	Gen-Modifications-Number
Correspondence	Gen-Correspondence-XXX
Telephone Logs	Gen-Telephone-XXX
Progress Reports	Gen-Progress Rpts-XXX
QA Reports	Gen-QA Reports-XXX
TRC Meeting Notes	Gen-TRC Meeting Notes-XXX
Imagery	
Photographs	Gen-Photographs-XXX
CADD Files	Gen-CADD Files-XXX
Graphics	Gen-Graphics-XXX
Work Plan (Draft)	
	WP-Drft Otlns-XXX
Meeting Minutes	WP-Drft Mtg Mins-XXX
Draft Document	WP-Drft Docmt-XXX
Correspondence	WP-Drft Corresp-XXX
Telephone Logs	WP-Drft Telephone-XXX
Notes/Memos	WP-Drft Notes/Memos-XXX
Work Plan Final	
	WP-Drft Finl-XXX
Navy Correspondence	WP-Drft Finl Navy Corresp-XXX
Regulatory Correspondence	WP-Drft Finl Reg Corresp-XXX
Navy Telephone Logs	WP-Drft Finl Telephone-XXX
Regulatory Telephone Logs	WP-Drft Finl Reg Telephone-XXX
Final Work Plan	WP-Drft Finl WP-XXX
OU-Specific Investigations (SSI)	
Work Plan	
	SPI Drft WP-XXX
Correspondence	SPI Drft WP Corresp-XXX
Telephone Logs	SPI Drft WP Telephone-XXX
Notes/Memos	SPI Drft WP Notes/Memos-XXX
	SPI Drft Fnl WP-XXX
Navy Correspondence	SPI Drft Fnl Corresp-Nvy-XXX
Regulatory Correspondence	SPI Drft Fnl Corresp-Reg-XXX
Navy Telephone Logs	SPI Drft Fnl Telephone Nvy-XXX
Regulatory Telephone Logs	SPI Drft Fnl Telephone Reg-XXX
Final Work Plan	SPI Fnl WP

Table 2-1. General File Organization for the IRP at the Naval Air Station, Jacksonville, Florida

Files	Code/Log #
Data	
Field Documents	SPI Field Dcmts
Well Construc/Boring Logs	SPI Well Cnstrc/Brg Logs-XXX
Chain-of-Custody Forms	SPI COC Forms-XXX
Field Notes	SPI Fld Notes-XXX
Sampling Logs	SPI Smplg Logs-XXX
Daily Quality Control Rpts	SPI Dly Qlty Ctrl Rpts-XXX
Electronic Data	SPI Elec Data-XXX
Laboratory Data	SPI Lab Data-XXX
Sample Data	SPI Sample Data-XXX
QA Data	SPI-QA Data-XXX
QCSR	
	SPI Drft QCSR-XXX
Final QCSR	SPI Fnl QCSR-XXX
Correspondence	SPI QCSR Corresp-XXX
Telephone Logs	SPI QCSR Telephone-XXX
Notes/Memos	SPI QCSR Notes/Memos-XXX
RI/FS Report Draft (RI/FS Rpt Drft)	
	SPI Drft RI/FS Rpt-XXX
Correspondence	SPI Drft RI/FS Corresp-XXX
Telephone Logs	SPI Drft RI/FS Telephone-XXX
Notes/Memos	SPI Drft RI/FS Notes/Memos-XXX
RI/FS Report Final (RI/FS Rpt Finl)	
	SPI Drft Finl RI/FS Rpt-XXX
Navy Correspondence	SPI Drft Finl RI/FS Nvy Corresp-XXX
Regulatory Correspondence	SPI Drft Finl RI/FS Reg Corresp-XXX
Navy Telephone Logs	SPI Drft Finl RI/FS Nvy Telephone-XXX
Regulatory Telephone Logs	SPI Drft Finl RI/FS Reg Telephone-XXX
Final RI/FS Report	SPI Final RI/FS Report-XXX

It is the responsibility of the Records Custodian for distributing copies of original documents to the appropriate individuals involved in the project. A flow chart indicating the steps involved in records and document filing and distribution system is shown in Figure 2-3.

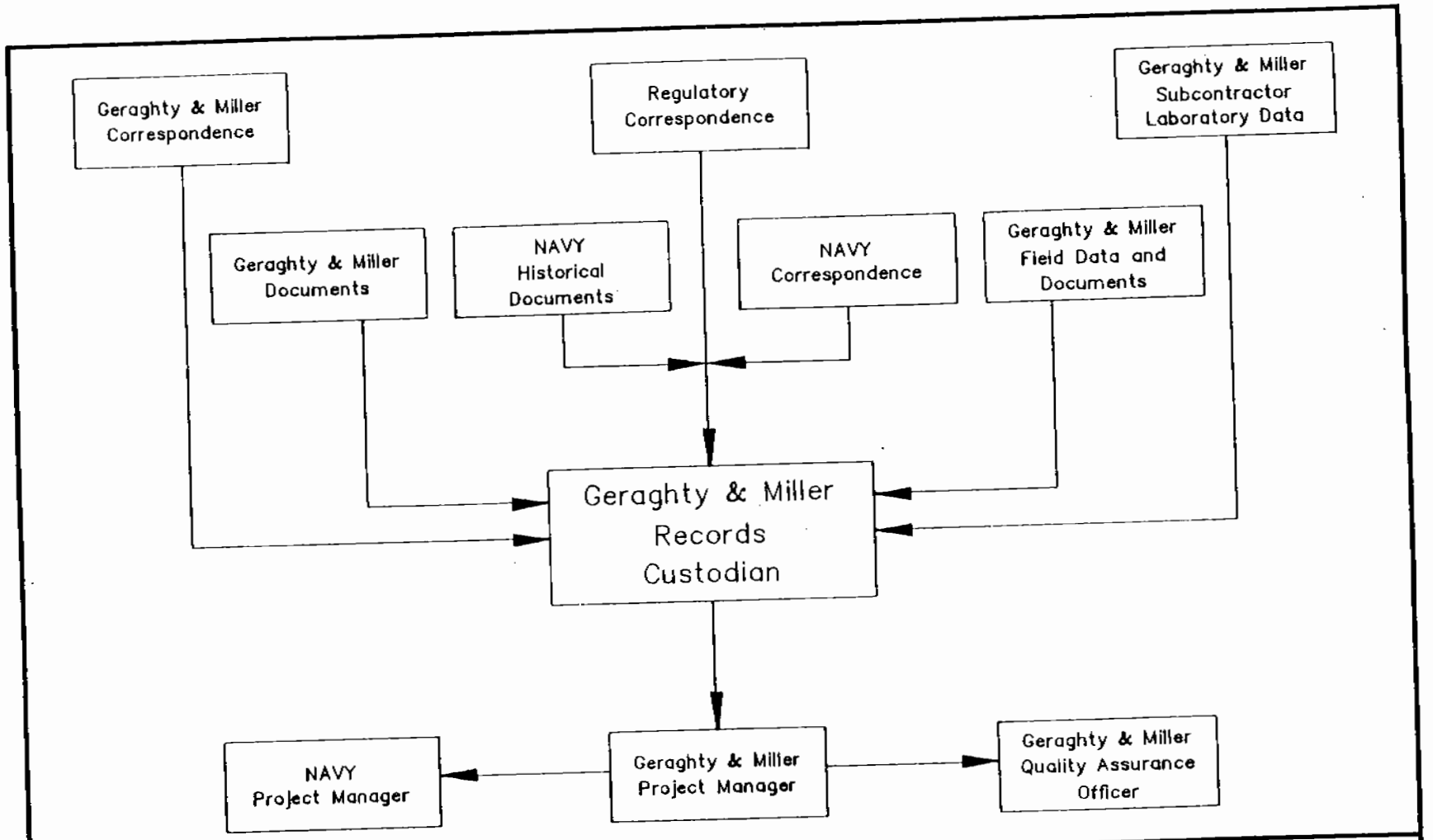
2.3 Document and Correspondence Control

The project tasks in which reports are generated are the IRP work plans and reports preparation. Documents generated are subject to review by the Technical Review Committee (TRC) prior to finalization.

2.3.1 Correspondence

As indicated in Section 2.2.3, each correspondence transmitted or received will be assigned a unique identification number and filed in the master project file. Correspondences include letters, facsimile documents, telephone conversation logs, and meeting minutes. The correspondence files will include Site and OU-specific categories of documents. Each of these file categories will be further subdivided into communications associated with draft documents and communications pertaining to final documents. Quality assurance communications pertaining to a PSC or PSCs at the Site will be maintained in a Site wide quality assurance file as well as in the correspondence file for the specific PSC referenced in the communication. Confidential communications between Geraghty & Miller and the Navy will be segregated from other communications.

The Record Custodian will be responsible for assuring that copies of the correspondences are distributed to the appropriate individuals. The Project Manager will receive a copy of all correspondences.



RECORDS AND DOCUMENTS FILING SYSTEM AND DISTRIBUTION FLOW-CHART

FIGURE 2-3

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

FILE: NASOCH4

2.3.2 Progress Reports

Progress reports will be prepared to provide a written record of project events that have transpired within discrete time periods. Progress reports pertaining to activities at a specific PSC or PSCs will be filed in the master project file and also in the appropriate PSC correspondence files. Monthly progress reports will be submitted to the Navy. The monthly progress reports will include the following items:

1. Date of the reporting period;

2. A running narrative of previous activities;

3. A narrative of activities conducted during the reporting period;

4. A description of problems encountered during the field activities and their solution;

5. A list of activities planned for the next reporting period;

6. A discussion of potential problems and possible solutions; and

7. A scheduling update.

2.4 Field and Laboratory Documentation

During implementation of the OU-specific RI/FS Work Plans, the Navy and its contractors will generate a substantial quantity of data. This section will define the data review and transfer procedures that will be used to assure accurate and timely delivery of the information to the project manager.

2.4.1 Field Log Books and Records

The primary record for documenting field activities is the field log book. A cloth bound and paginated field log book will be maintained by each field team while working at the Site. The field log book will be completed each day by the field team coordinator at the field trailer. Entries will be made in permanent water proof ink and will include a record of weather conditions in the field including temperature, wind, and humidity; a detailed description of the day's activities; an inventory of samples collected; a description of sample collection techniques and/or drilling techniques employed; a listing of personnel at the PSC; and a record of unusual occurrences noted and/or modifications to the procedures specified in the IRP work plans and their appendices.

In addition to the field log book, contractors may use a number of logs and forms to facilitate the collection and recording of field data and information in a uniform manner. These logs include the following:

- Water Sampling Log
- Air Sampling Log
- Soil/Sediment Sampling Log
- Boring Log
- Drilling and Sampling Checklist
- Well Construction Log
- Daily Quality Control Report (DQCR)
- Sample Label
- Chain-of-Custody Form

Examples of the field sampling logs, sample label, chain-of-custody form, and the DQCR are presented in the Quality Assurance Program Plan (QAPP) (Appendix 4.4.1) of the Basic Site Work Plan (Volume 4). Each field team leader is responsible for completing the field

log book. The field well construction log, the sample cover log/boring log and the drilling and sampling checklists are presented in Figures 2-4 to 2-7.

Field records will be dated and signed legibly by the individual completing the record. Any errors on the field records will be crossed out with a single line, the correct information will be entered, and the change will be initialed and dated by the individual making the correction.

The leader of the contractor's field team will contact the Navy's Project Manager twice daily during each day of field work. The field team leader will advise the Project Manager of the proposed schedule of field work each morning. The Project Manager will be advised of the daily progress at the conclusion of each day. The field records will be secured in the field trailer at the end of each work day by the field team leader to prevent loss or damage. At the completion of the field work, field records will be submitted to the Records Custodian. Upon receipt of the field records, the Records Custodian will file the records in the appropriate PSC file. Additional copies of field records will be generated and distributed to the Project Manager and the project Quality Assurance Officer, as necessary.

2.4.2 Laboratory Data

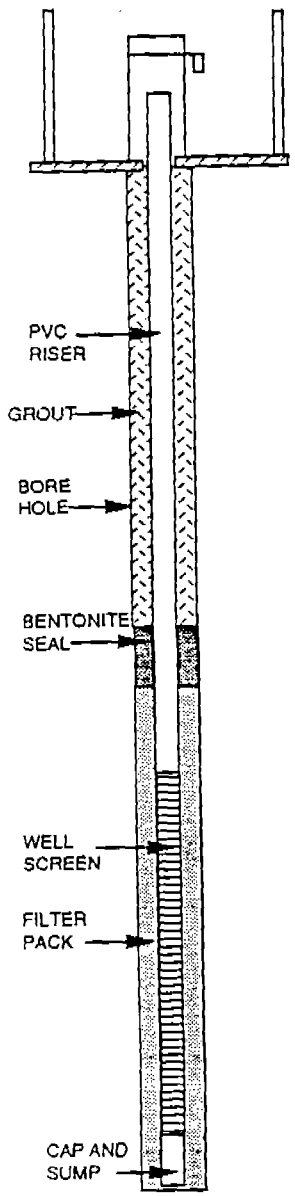
The contracted laboratory must submit the analytical results for each batch of samples to the contractor within 30 days of sample collection. The laboratory data package will include the results of analyses, a quality control narrative documenting analytical difficulties, and the quality control data required to validate the sample results. The required sample and quality control information is presented in the Data Analysis Plan (Appendix 4.2 of the Basic Site Work Plan, Volume 4).

WELL CONSTRUCTION LOG

Project Name:_____ Well:_____

Location:_____ Site I.D.:_____

Client:_____ Prepared By:_____



Drilling Summary

Total Depth bls: _____ Drilling Contractor: _____

Borehole Diameter(s): _____ Drillers: _____

_____ Drilling Method: _____

Drilling Fluid (Amount/Type): _____

Elevations (Surveyed)/Datum:

Land Surface _____

Top of Well Casing _____

Depth to Water first encountered _____

static _____

Well Design

Surface Casing: Material PVC

Manufacturer_____

Diameter _____

Length _____

Setting _____

Screen: Material PVC

Manufacturer _____

Diameter _____

Slot _____

Setting _____

Casing: Material PVC

Diameter _____ I.D. _____

Length _____

Setting _____

Filter Pack: Material _____

Setting _____

Amount _____

Grout: Type _____

Setting: _____

Amount :_____

Seals: Type _____

Setting _____

Amount _____

Well Protection: _____

Time Log:	Started	Completed
Drilling:	_____	_____
Installation:	_____	_____
Development:	_____	_____

Well Development:

Method/Equipment: _____

Static DTW _____ Pumping DTW _____ (ft below MP)

Pumping Rate: _____ gpm Pumping Duration: _____

Specific Capacity: _____ gpm/ft Water Removed During Development ____ gallons

pH: _____ Conductivity: _____ (umhos/cm)

Temp oC: _____ Nephlemetric Turbidity: _____

Remarks: _____

_____

_____

WELL CONSTRUCTION LOGS

FIGURE 2-4

RI/FS WORK PLAN
FOR OU1

NAS JACKSONVILLE
SEPTEMBER 1991

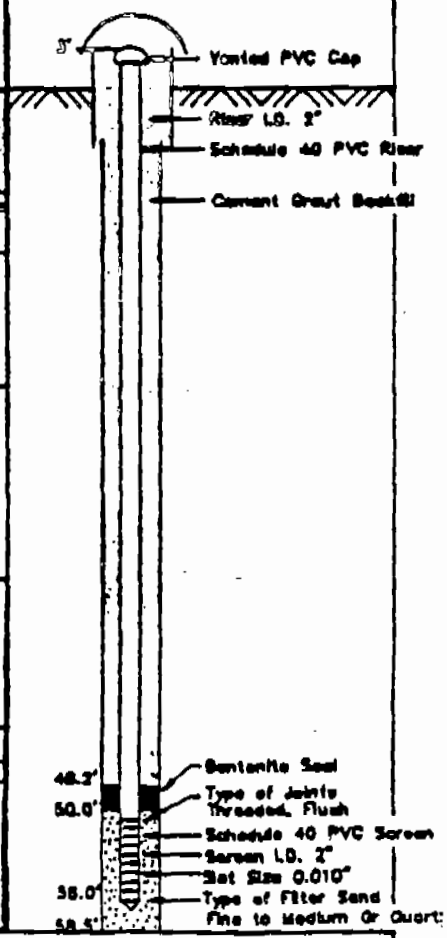
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION EXAMPLE OF A COMPLETED WELL SHEET

LOG OF BORING NO. _____ LOG OF WELL NO. _____

DEPTH IN FEET	SYMBOL	SAMPLES	MATERIAL DESCRIPTION
			SAND, dark to light brown, fine grained
10			CLAY, gray, soft with sand pockets and [illegible]
			SAND, gray, fine grained, silty with shell fragments
20			CLAY, gray, firm
30			
			SAND, gray, silty, fine grained with greenish gray seams and sandy clay pockets
40			
			CLAY, greenish gray, scattered shell and sand pockets
			Phosphatic zone ? Weathered limestone ?
50			LIMESTONE with numerous shells, weak to medium strong
			T.D. = 58.5 Ft.

WELL CONSTRUCTION



Boring Completion Date:
Well Completion Date:
Well Development Date:
Drilling Method:
Depth to Water:

Boring Diameter:
Ground Elevation:
Top of Casing Elevation:
Driller:

SAMPLE CORE/SOIL BORING LOG

FIGURE 2-5

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG (Cont.d)

Boring/Well _____ Page _____ of _____

Prepared By _____

Sample/Core Depth (Feet below land surface) From	To	Core Recovery (feet)	Type/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description

SAMPLE CORE/SOIL BORING LOG

FIGURE 2-5 (Cont'd)

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

GERAGHTY & MILLER, INC.
Ground-Water Consultants

DRILLING & INSTALLATION OF MONITORING WELLS DAILY CHECKLIST

PROJECT: _____ WELLS/BORINGS: _____

LOCATION: _____ DATE: _____

G&M PERSONNEL ON SITE: _____ TIME: _____

CHECKED BY: _____

ITEMS	OK/NA	COMMENTS
PRIOR TO DRILLING:		
Contractor has checked for underground utilities		
Well locations staked		
Well drilling permits secured		
G&M QA Manual/QA plan available		
Health & Safety plan (HASP) available		
Safety equipment on site		
Contractor equipment adequate		
Drilling equipment steam cleaned		
Drilling water source approved/sampled		
Drilling equipment water sample taken		
Drilling mud & additives approved		
Sand or gravel pack sample approved		
Grout composition approved		
DURING INSTALLATION:		
Formation samples properly taken and bottled or bagged		
Rock color chart used		
OVA monitoring during drilling & sampling		
Cores properly marked and stored		
Hard hat worn		
Proper safety procedures followed		
Hazardous soil, mud or water properly handled*		
Daily Log kept		
Sample/Core Log form filled out		
Well Construction Log prepared		
Materials/Cost Log prepared		
Location Sketch made		
Tremie pipe used in grouting		
Abandoned well/boring grouted & staked		
Protective casing/well cap/lock installed		
Well identification no. attached		
Well development adequate		
Well elevation and location surveyed in		

*See QA Manual, Drilling and Installation of Monitoring Wells, Sect. 2.16.2.

Instructions: Original to Field Project File; copy to Project Manager and to QA Representative.

JUNE 1986

DRILLING AND INSTALLATION OF MONITORING WELLS DAILY CHECKLIST

FIGURE 2-6

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLING OF MONITORING WELLS
DAILY CHECKLIST

PROJECT: _____ WELL(S): _____

LOCATION: _____ DATE: _____

G&M PERSONNEL ON SITE: _____ TIME: _____

CHECKED BY: _____

ITEMS	OK/NA	COMMENTS
PRIOR TO DRILLING: Health & safety precautions (HASP) received; equipment ready.		
Sample containers, coolers, received from laboratory; ice or ice packs ready.		
Sampling equipment and supplies inventoried, clean and operational.		
Check in with client at site.		
Integrity of well noted.		
Well area prepared for sampling; plastic placed around well; gasoline-powered pumps placed downwind.		
Well and water-level measurements made and recorded along with other pertinent field information on water sampling log.		
Field instruments calibrated.		
Sample containers labelled; preservatives added, if necessary.		
DURING AND AFTER SAMPLING: Well purged three to five times its volume.		
Sample collected using a bailer or pump as per sampling plan.		
Measurement of field parameters recorded on sampling log.		
Sample containers filled according to collection protocol of analyses.		
Field and trip blanks collected; replicates or split samples collected as per sampling plan.		
Samples stored at 4°C in coolers for transport to lab.		
Water sampling log and chain-of-custody form completed.		
Reusable equipment decontaminated; non-reusable equipment disposed of in appropriate manner.		
Well secured and locked.		
Laboratory contacted to confirm receipt and condition of samples.		

Additional Comments:

Instructions: Original to Field Project File; copy to Project Manager and to QA Representative.

G&M Form [illegible]

[illegible]

SAMPLING OF MONITORING WELLS
DAILY CHECKLIST

FIGURE 2-7

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

Upon receipt, the data package will be logged in by the Records Custodian and delivered to the project Quality Assurance Officer (QAO). The project QAO will organize the package by PSC and verify that the appropriate sample results have been provided and that the invoice is correct. The project QAO will generate two copies of the sample data and a single copy of all the quality control data. The original data is filed according to PSC in the master project files. One copy of the sample data is forwarded to the Project Manager. The second copy of the data, along with the copy of the quality control data, is retained by the project QAO.

2.4.3 Data Review

Field records and laboratory data will be reviewed and validated by the project QAO or his designee according to the procedures presented in the Data Analysis Plan (Appendix 4.2, Volume 4). Field records will be evaluated for legibility, accuracy, and completeness. Deviations from procedures presented in the IRP will be noted and reasons for the changes will be documented. Sample handling and chain-of-custody records will be reviewed carefully to assure compliance with procedures presented in the QAPP (Appendix 4.4.1 of Volume 4) and to verify the integrity of the samples from a legal perspective.

Laboratory data will be reviewed by the project QAO to confirm the samples were properly identified, handled, and analyzed by the methods specified in the QAPP. In addition, the laboratory quality control information will be used to verify that the analyses were conducted within the specified control limits for precision, accuracy, and completeness and that the detection limits presented in the QAPP were achieved.

The validation and review process uses a number of forms to evaluate the field and laboratory data and determine the usefulness

of the data. Examples of these forms are presented in the Data Analysis Plan (Appendix 4.2, Volume 4). Forms used in the validation process will be filed with the appropriate analytical data package.

After completion of an OU-specific investigation, the contractor will prepare a draft Quality Control Summary (QCS) for review by the Navy. The report will summarize the findings of the review of field and laboratory records associated with a specific OU and will provide copies of pertinent field logs and laboratory data. A detailed summary of the specific contents of the QCS is presented in the Data Analysis Plan (Appendix 4.2, Volume 4).

The Navy will give the QCS for each OU to the Records Custodian for filing in the master project files. Responses will be prepared to the Navy's comments. Upon securing the Navy's approval of the responses, a final QCS document will be generated. The final QCS original will be a permanent component of the master project file.

2.4.4 Electronic Data Management

When possible, field data will be organized/managed using a PC-based, commercially available software package. Hard copy printouts of the data will be produced concurrently with the electronic copy. A hard copy will be retained by the field team until the data can be hand delivered to the Records Custodian. The Records Custodian will include diskette copies of electronic data in the master project file.

The contract laboratories shall supply analytical results in a personal computer readable format concurrent with submittal of hard copy data. Upon receipt of the information, the Records Custodian will generate a backup copy of the laboratories' original submittal. The original data will be logged into the master

project file as a permanent entry. The laboratory results then will be directly incorporated into the PSC-and OU-specific data bases.

When possible, the electronic data will be manipulated and loaded into the data base via a batch program or an equivalent technique. Prior to use, the data base will be spot-checked against the hard copy of the data to assure that translation errors have not occurred.

2.5 Data Reduction and Presentation

2.5.1 Data Base Format

Field and laboratory data generated during this investigation will be compiled into separate data bases. Each data base will contain related information and will be organized for ease of data manipulation and compatibility between the data bases. The data base will be in a format consistent with EPA Region IV's Environmental Data Reporting format.

2.5.1.1 Station Data. This data base will contain basic information about monitoring station location and type. The data base will include the following information:

- Location Identification;
- Type of Sampling Point (Soil, Surface Water, Monitor Well, etc.);
- State Plane Coordinates (1983);
- Ground Surface Elevation;
- Date of Establishment;
- Total Depth of Boring/Excavation;
- Screen Interval for Monitor Wells;

- o Strata at Screen Interval; and
- o Materials used for sampling.

2.5.1.2 Well Data. This data base will contain information about construction and characteristics of ground-water monitoring stations. This data base will include the following information:

- o Location Identification;
- o Type of Sampling Point;
- o Aquifer Code;
- o Total Depth of Borehole;
- o Method of Drilling;
- o Well Diameter, Depth, and Screened Interval; and
- o Well Use

2.5.1.3 Sample Data. This data base will contain basic information about the collection and characteristics of samples. This data base will contain the following information:

- o Location Identification
- o Sample Identification
- o Sample Matrix
- o Date of Collection
- o Collection Method
- o Water Levels

2.5.1.4 Parameter Data. This data base contains measured values and reporting units for specific parameters. The data base will contain the following information:

- o Location Identification;
- o Type of Sampling Point;
- o Parameter Identifier (CAS Number);
- o Qualifier Code;
- o Reported Analytical Result for the Chemical;

- Units of Measurement;
- Detection Limit; and
- Analytical Laboratory.

2.5.2 Data Reduction

After data has been entered into the comprehensive data base, the contractor will use a variety of commercially available software packages to reduce and interpret the significance of the data generated. The reduction of the data will generally take the form of data modeling and statistical analysis. The data reduction software packages likely to be used during the IRP along with their general capabilities are presented in Table 2-2.

2.5.3 Data Presentation

The IRP Reports require the contractor use different kinds of figures and tables to present the different kinds of data concisely and meaningfully. The following sections illustrate the various kinds of data and the current format for presenting each kind.

- Site Geology
  - Well Log — Figure 2-8
  - Geologic Cross-Section — Figure 2-9
- Site Hydrology
  - Water Level Elevation and Flow Direction — Figure 2-10
  - Water Level Data — Figure 2-11
- Chemical Characterization
  - Concentration Isopleth — Figure 2-12
  - Three Dimensional Concentration Contour — Figure 2-13

Table 2-2. Computer Programs Expected To Be Used During Data Reduction at the Naval Air Station, Jacksonville, Florida

Program	Use
dBase III+	General data base management program to be used as the primary storage format for data generated at the facility.
Lotus 123/Excel	General spreadsheet programs that will be used for data presentation and for generation of various types of graphs.
Lotus Manuscript	Limited spreadsheet program that will be used to generate tables suitable for presentations and final reports.
SPSS/PC+	Statistical software package that can be used to perform complex parametric and non-parametric analyses. This program enables the user to generate the appropriate computer code specific to each test and data base.
MODFLOW	Three dimensional finite-difference ground-water flow model that will be used to estimate the ground-water flow characteristics at each site.
Model CAD	Input data set generator for use with MODFLOW. This program can be used with a digitized CAD map of the site to help design and then prepare the generated data for use.
SWIFT	A solute transport model that may be used to estimate the migration rates for various constituents of concern detected at the site.
PHREEQE	General geochemical model that may be used to estimate the percent saturation and stability of ground water at the site. This program may be used to predict the behavior of mixtures of waters of varying water quality.
MINTEQ	General geochemical model that is useful for determining the stability of ground waters of varying quality in the presence of different surface media.

TF533\VOL1\TABLE2-2.W51

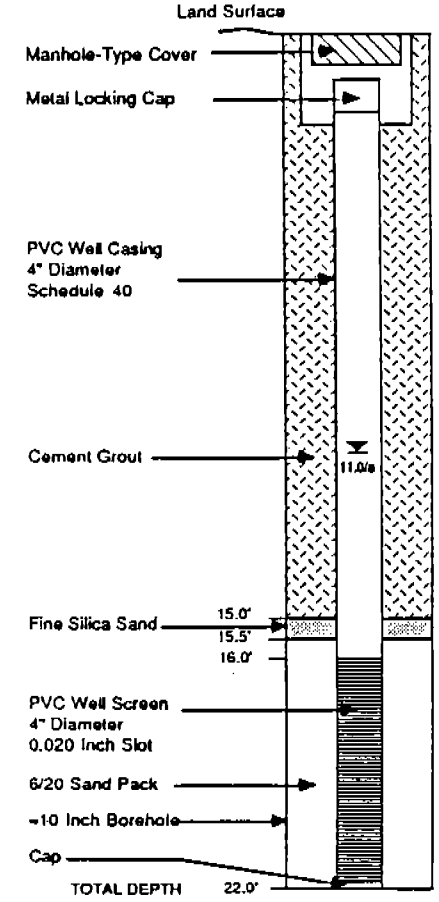
Table 2-2. Computer Programs Expected To Be Used During Data Reduction at the Naval Air Station, Jacksonville, Florida

Program	Use
ISC Long Term	An air quality model that uses the principles of conservative mixing and meteorological data to estimate the average annual exposure of receptors at specific locations to constituents of concern.
ISC Short Term	An air quality model similar to ISC Long Term, except that this model can generate one hour, eight hour and 24 hour maximum exposures at specific locations.

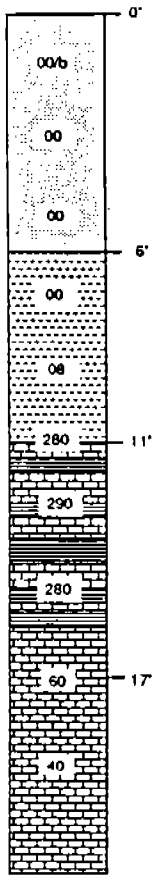
MONITOR WELL NO. GM-4	WELL LOG	NAS JACKSONVILLE REMEDIAL INVESTIGATION/ FEASABILITY STUDY

LOCATION		WATER-LEVEL MEASURED	CASING ELEVATION
		6-6-89	61.70 NGVD
GEOLOGIST	SAMPLE INTERVAL	SAMPLE TYPE	TOTAL DEPTH
	Continuous	Split-spoon	22 ft bls
DRILLER	DRILLING CONTRACTOR	DRILLING METHOD	DATE WELL COMPLETED
		Hollow-Stem Auger	6-1-89

WELL CONSTRUCTION



BORING LOG



SAND, quartz, fine- to medium grained, light grey/brown; trace organic matter; trace silt and clay; dry.

SANDY CLAY, green, mottled light brown; trace limestone fragments; moist.

LIMESTONE/CLAY, interbedded, white, moist; wet = 16 ft.

LIMESTONE, white, semi-consolidated, grainy; wet.

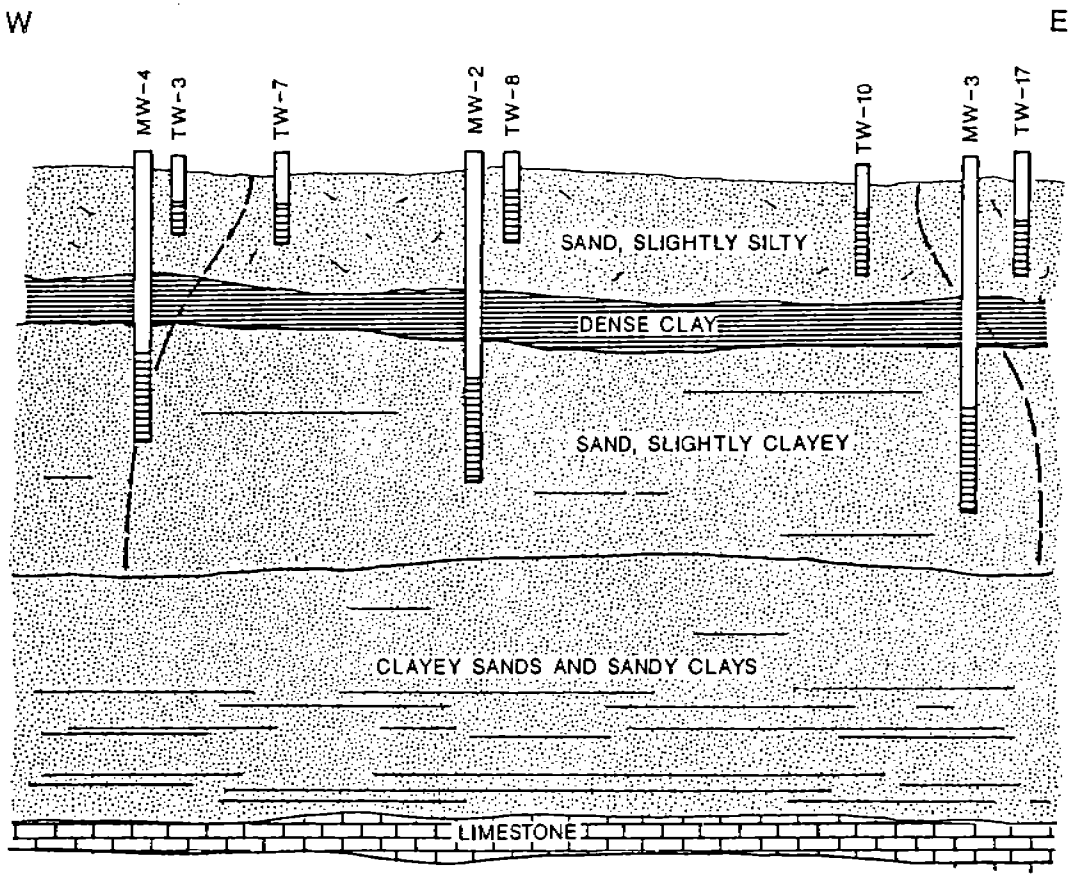
/a ▼ Depth to Water (ft) NOT TO SCALE /b = OVA reading (ppm)

WELL LOG

FIGURE 2-8

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

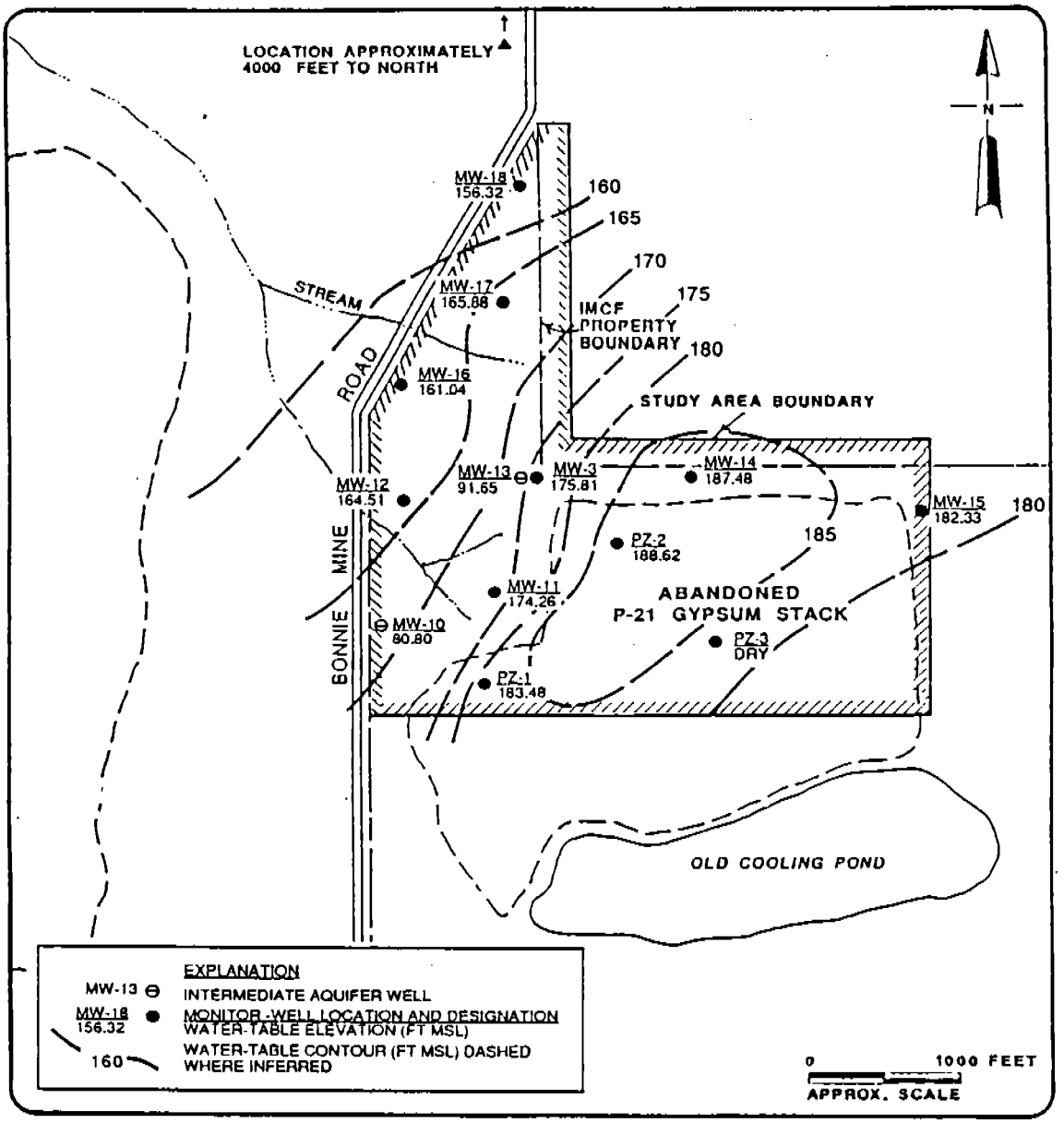


GEOLOGIC CROSS-SECTION

FIGURE 2-9

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



WATER-TABLE ELEVATION AND FLOW DIRECTION DIAGRAM

FIGURE 2-10

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

WATER LEVEL/PRODUCT MEASUREMENTS

JOB NO.: TF29307 FACILITY NO.: 374561
MEASURED BY: P.W. DATE/TIME: 04/26/90

MEASUREMENT METHOD	WELL NUMBER	DEPTH TO PRODUCT (FT)	DEPTH TO WATER (FT)	PRODUCT THICKNESS (FT)	MEASURING PT. ELEVATION (FT/MSL)	WATER-TABLE ELEVATION (FT/MSL)	TOTAL DEPTH OF WELL (FT)	COMMENTS
S	TV-1		39.78	0.00	227.43	187.65		
S	TV-2		39.61	0.00	227.43	187.82		
S	TV-3		39.15	0.00	226.91	187.76		
S	TV-4		39.04	0.00	226.64	187.60		
S	TV-5		39.34	0.00	226.49	187.15		
S	TV-6		15.66	0.00	226.91	211.25		
S	TV-7		39.27	0.00	226.99	187.72		
S	TV-8				226.89			1/
S	TV-9				227.18			DRY
S	TV-10		38.93	0.00	226.51	187.58		
S	TV-11		38.92	0.00	226.29	187.37		
S	TV-12		38.71	0.00	226.11	187.40		

Water/Product level measurements should be recorded to 1/8-inch or 0.01 foot accuracy.

Measurement Method - (S) - Electrical Sounder
(T) - Tape with Finder-Paste
(B) - Bailer (no water level taken)

REMARKS

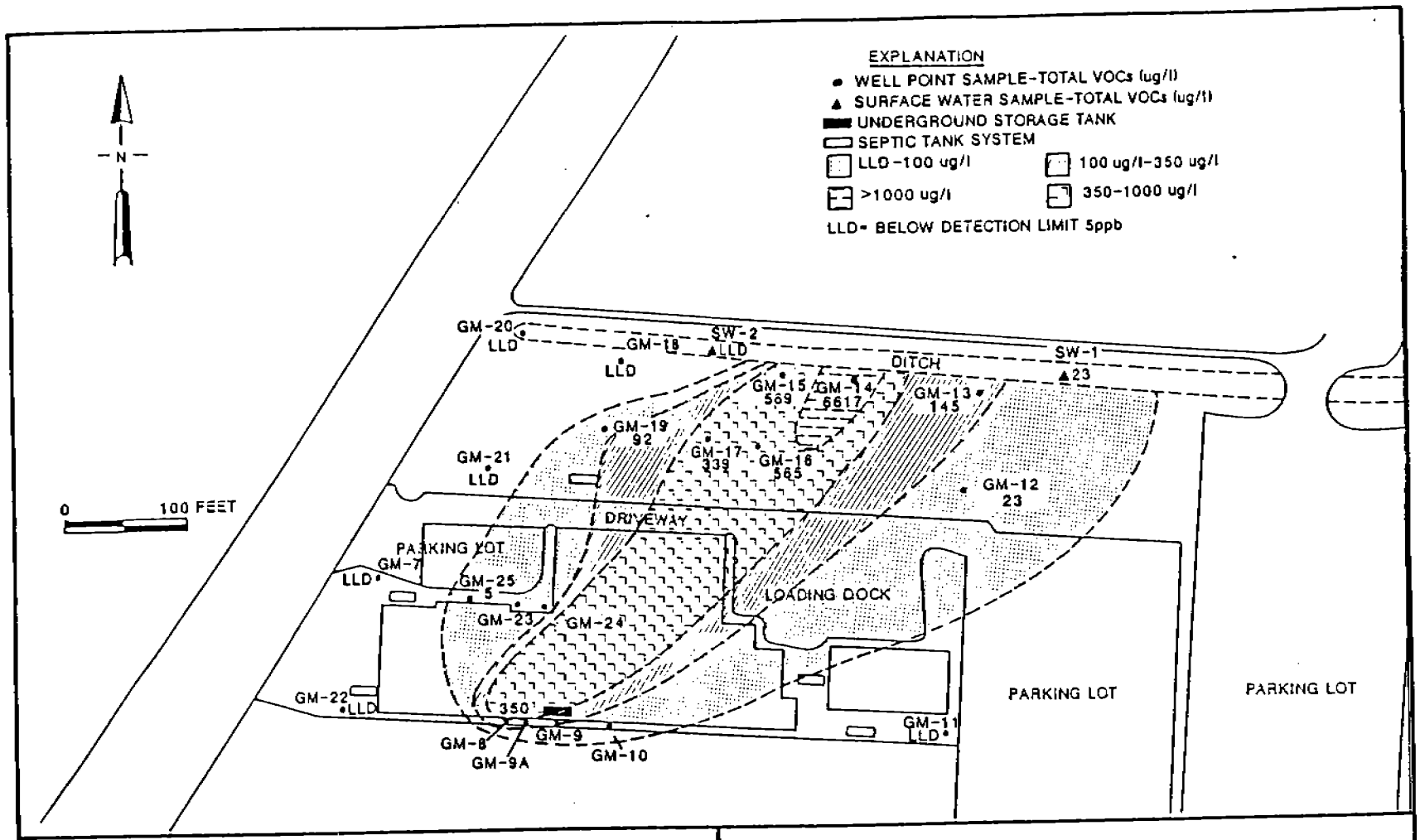
1/ WELL INACCESSIBLE

WATER-TABLE DATA

FIGURE 2-11

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

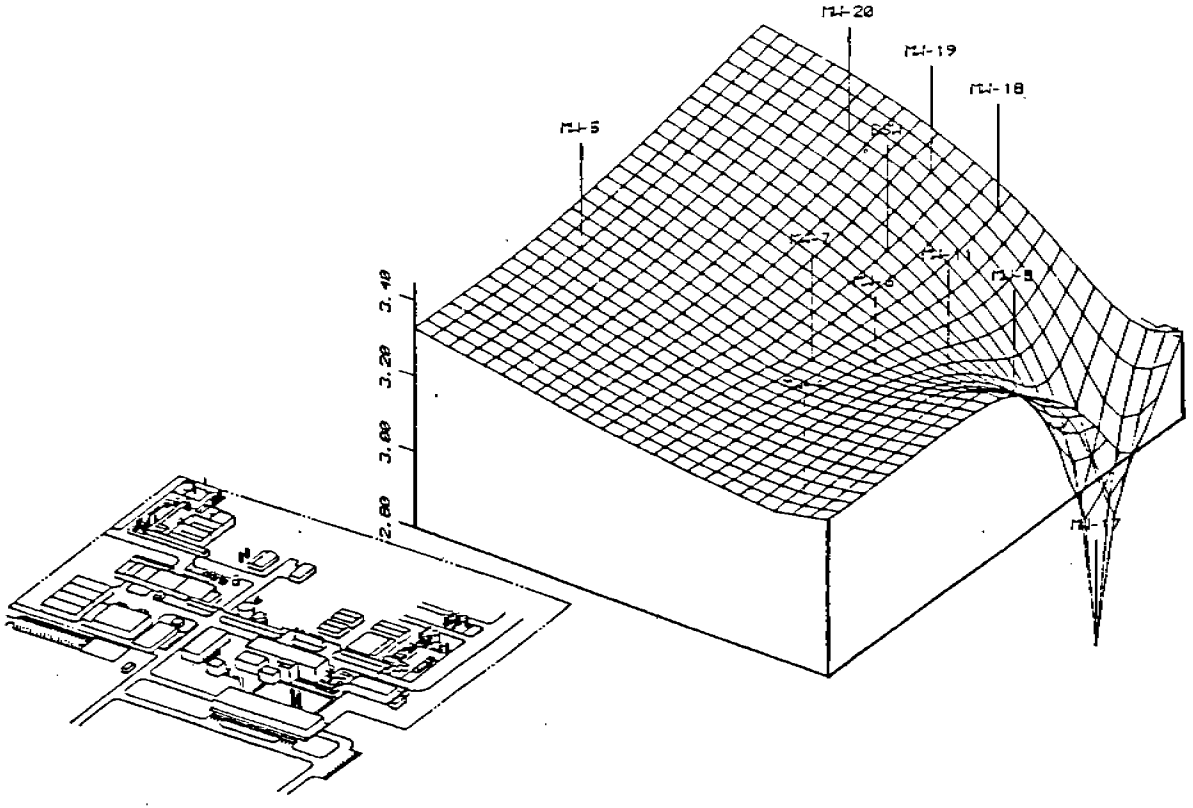


CONCENTRATION ISOPLETH DIAGRAM

FIGURE 2-12

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



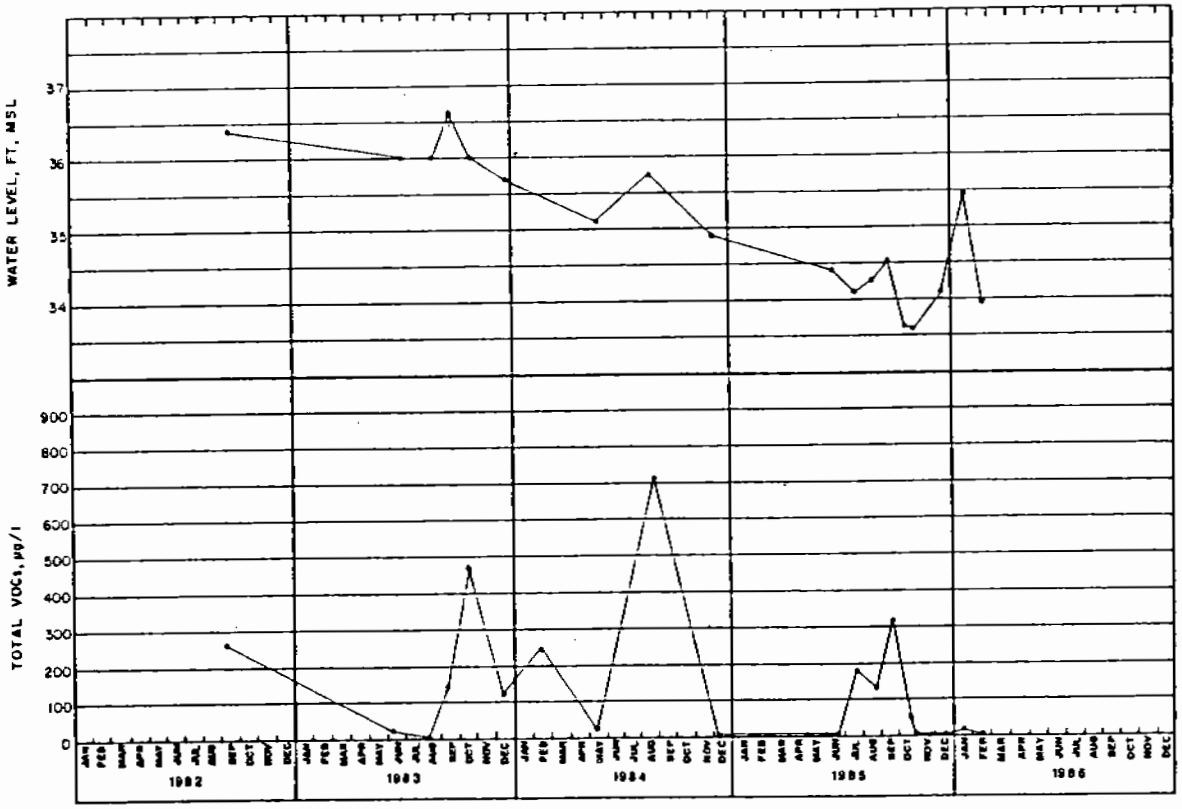
THREE DIMENSIONAL CONCENTRATION
CONTOUR DIAGRAM

FIGURE 2-13

PROGRAM ORGANIZATION
AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

Variation in Concentration with Time	Figure 2-14
Variation in Concentration with Distance	Figure 2-15
Comparison of Concentration of two Chemicals	Figure 2-16
Results for a Single Sampling Event	Figure 2-17
Results for a Location at Different Times	Figure 2-18

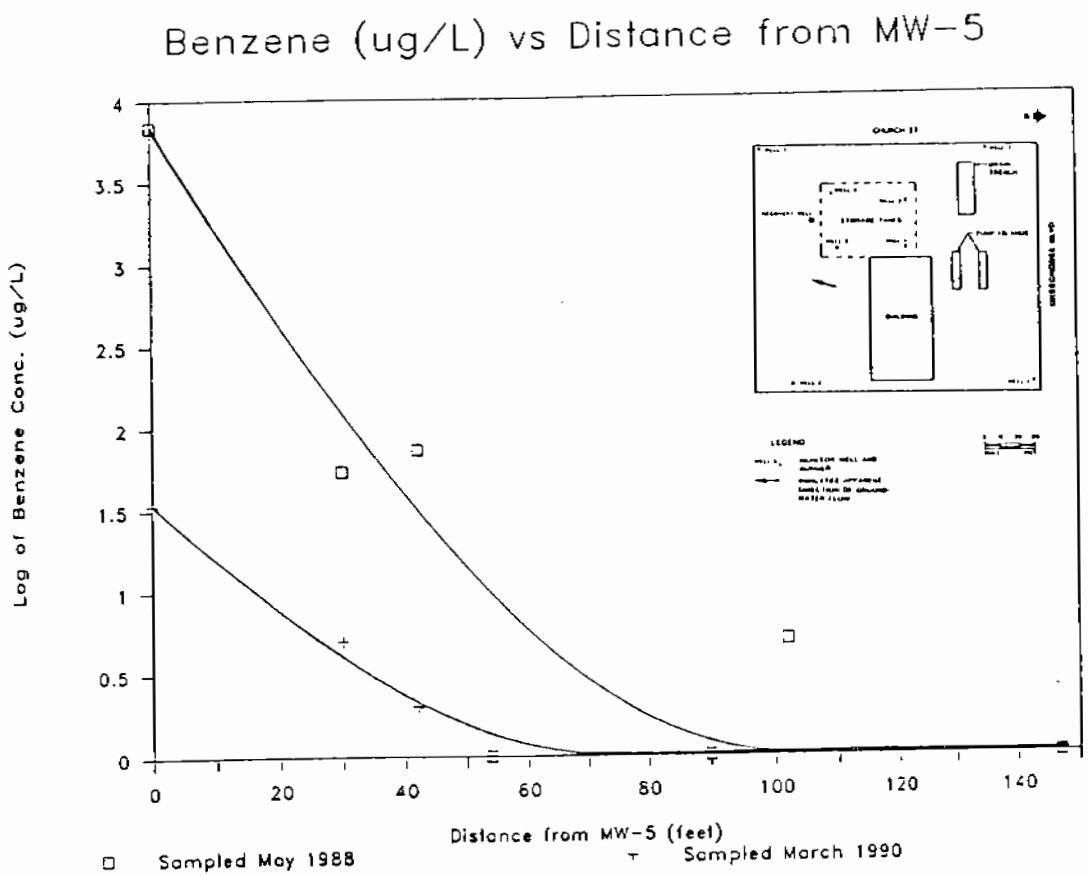


VARIATION IN CONCENTRATION WITH TIME

FIGURE 2-14

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

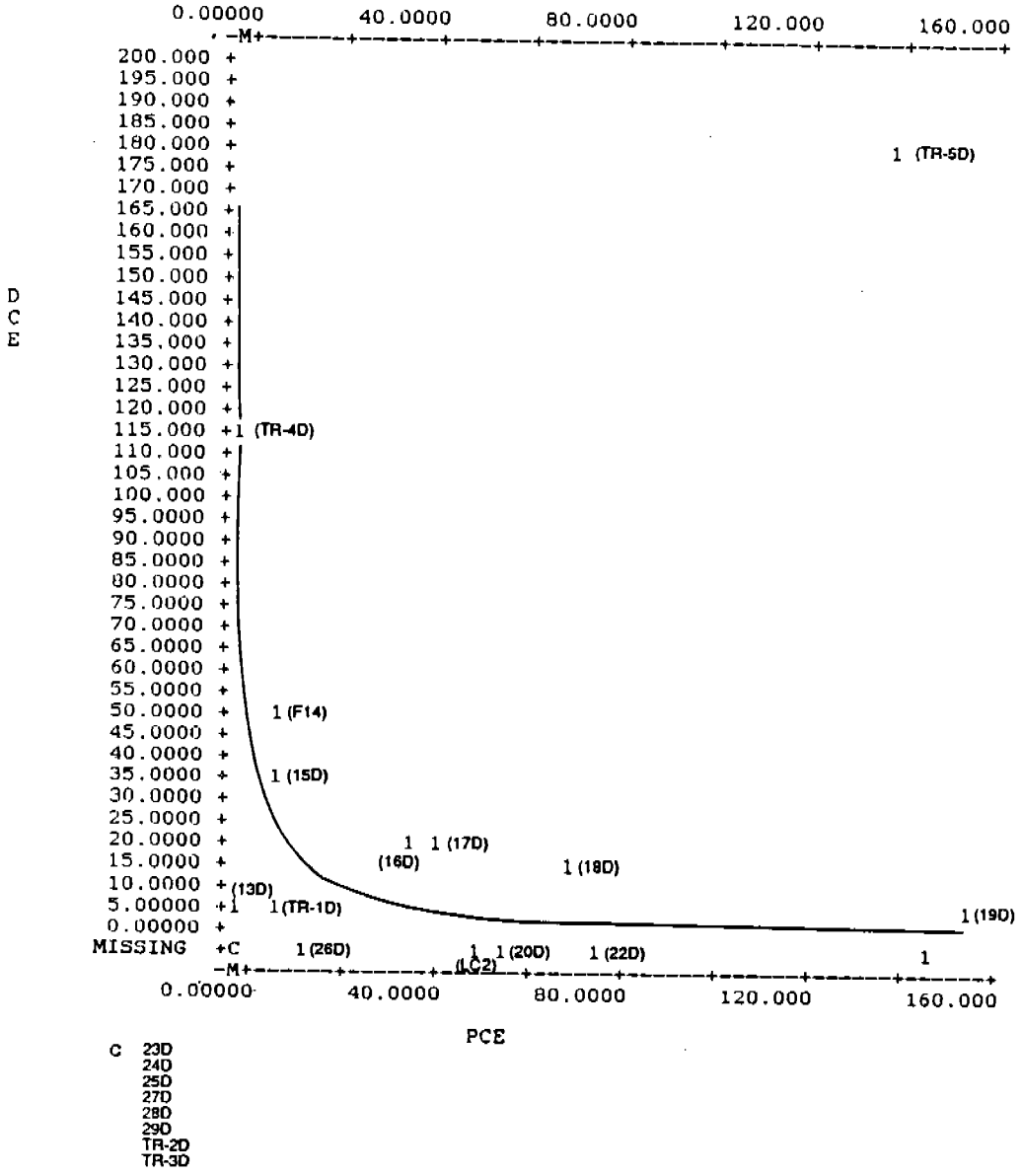


VARIATION IN CONCENTRATION
WITH DISTANCE

FIGURE 2-15

PROGRAM ORGANIZATION
AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



COMPARISON OF CONCENTRATION OF TWO CHEMICALS

FIGURE 2-16

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

ANALYTICAL RESULTS OF GROUND-WATER SAMPLES
COLLECTED IN 1989 FROM TEMPORARY MONITOR WELLS AT THE
POL BULK FUEL STORAGE AREA (SP-4)

		LOCATION							
CONSTITUENTS a/	UNITS	TW-2	TW-3	TW-6	TW-13	TW-16	TW-17	TW-18	TW-19
VOLATILE ORGANICS	ug/L								
Benzene		--	--	[14]	--	--	--	--	--
Ethylbenzene		[39]	--	[15]	--	--	15	--	--
Xylene (total)		--	--	33	--	--	[3.4]	--	--
BASE/NEUTRAL EXTRACTABLE ORGANICS	ug/L								
Acenaphthene		--	--	--	--	--	[5.9]	--	--
bis(2-Ethylhexyl)phthalate		150	188	255	--	--	--	--	--
Fluoranthene		--	--	--	--	--	[7.9]	--	--
Naphthalene		1030	56	573	--	--	19	--	--
Phenanthrene		--	--	--	--	--	14	--	--
Pyrene		--	--	--	--	--	[7.5]	--	--
C8-C20 HYDROCARBONS (total)	ug/L	117000	25600	36800	--	--	2580	--	--
Total BTEX b/	ug/L	NA	NA	NA	--	--	NA	--	--

EXPLANATION:

a/ Constituents not detected in any samples are not shown
b/ Total Benzene, Toluene, Ethylbenzene, and Xylenes measured in the field with a portable HNU-321 Gas Chromatograph
[ ] Value is between level of quantitation and instrument detection limit
-- Concentration below detection limit
NA Not analyzed

SP4TEMP.DOC

RESULTS FOR A SINGLE
SAMPLING EVENT

FIGURE 2-17

PROGRAM ORGANIZATION
AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

CLIENT NAME
Facility Address:

Project Number:
Facility Number:

TREATMENT SYSTEM INFLUENT

WATER ANALYSES
EPA Method No. 602 Purgeable Aromatic Hydrocarbons

Concentration units: ppb
0 = Below Detection Limit

Date Sampled	Sample I.D.	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Methyl tert-butyl ether	Total VOA
26-Sep-85	OCINF-1	13260	14800	2070	7780	6913	37910
09-Oct-85	OCINF-2	13270	15440	1938	7470	6554	38118
22-Nov-85	OCINF-3	22050	19850	2278	8920	8261	53098
10-Jan-86	OCINF-4	14830	14820	2049	7990	5183	39689
11-Feb-86	OTINF-5	8959	8643	905	4309	3244	22816
11-Mar-86	OCTIN-6	15287	17647	1784	7239	4643	41957
17-Apr-86	OCTIN-7	14020	15115	2381	10375	4392	41891
02-May-86	OCTIN-8	5108	9114	2012	9441	3893	25675
18-Jul-86	OCINF-10	10000	16000	2600	11900		40500
13-Aug-86	OCINF-11	11000	12000	1700	7000		31700
07-Sep-86	OCINF-12	12000	13000	1800	7300		34100
17-Mar-87	OCINF-13	16000	18000	3500	14400		51900
23-Apr-87	OCINF-14	14000	18000	2200	9200		43400
11-May-87	OCINF-15	20000	33000	2900	12900		68800
03-Jun-87	OCTIN-16	20000	26000	3400	15100		64500
01-Jul-87	OCTIN-17	12000	17000	2300	10400		41700
21-Aug-87	OCTIN-18	14000	21000	2500	11900		49400
14-Sep-87	OCTIN-19	14000	20000	2900	12300		49200
13-Oct-87	OCTIN-20	13000	14000	2400	9700		39100
12-Nov-87	OCTIN-22	12000	11000	1800	6700		31500
08-Dec-87	OCTIN-23	13000	11000	2500	9700		36200
08-Jan-88	OCTIN-24	7600	6300	1500	5800		21200
05-Feb-88	OCTIN-25	9300	7100	1600	6000		24000
18-Feb-88	OCTIN-26	9400	10000	2800	12800		35000

RESULTS FOR A LOCATION AT DIFFERENT TIMES

FIGURE 2-18

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

3.0 SITE DESCRIPTION

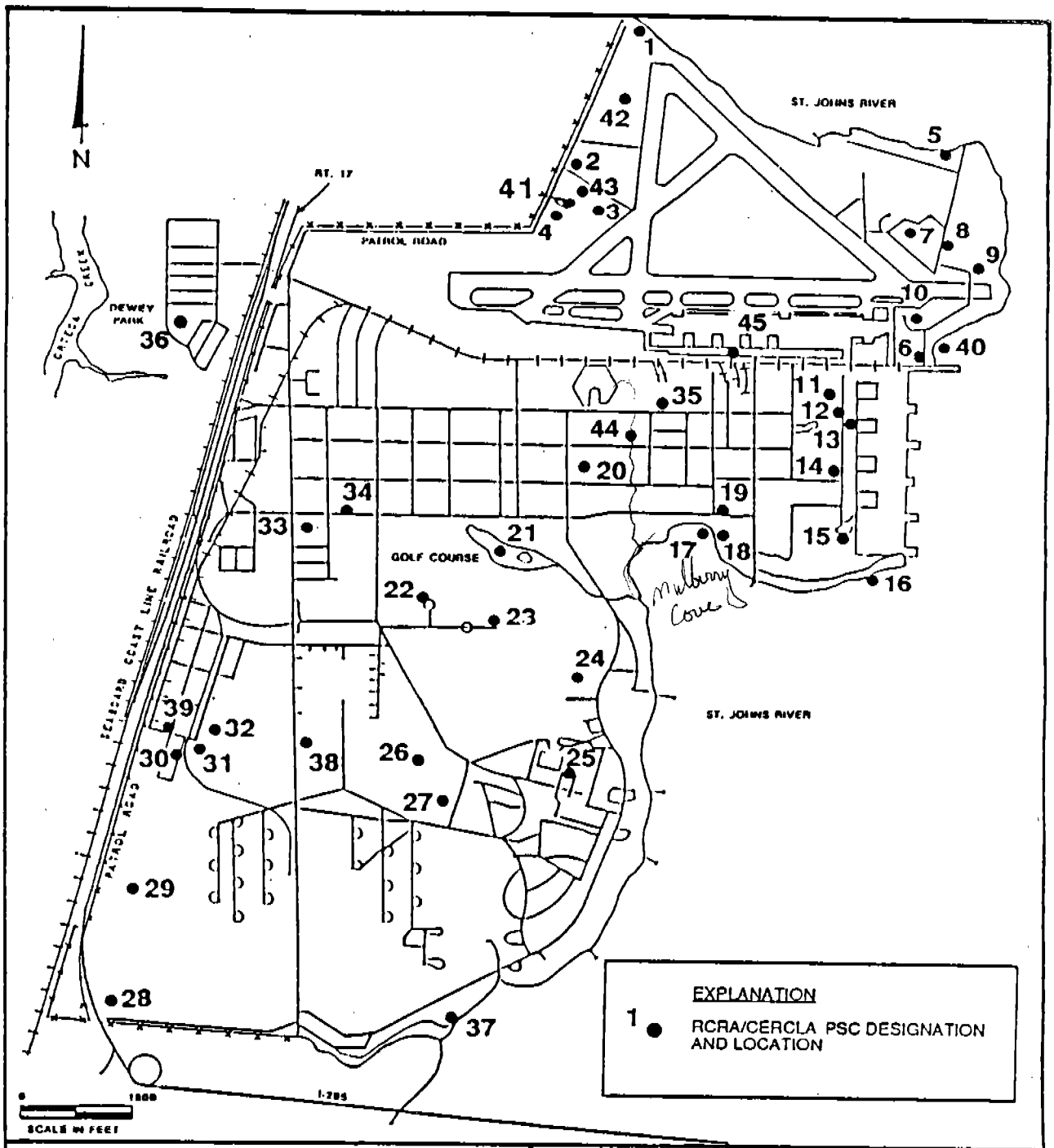
The purpose of this section is to present existing information on the location of the Site, the nature and extent of the environmental problems, potential sources of contamination (PSCs), and history of regulatory actions. The information in this section is derived from documents generated by previous investigations. These previous investigations serve as the PA, SI, and ESI, and are included in Appendices 1.1, 1.2 and 1.3, respectively.

3.1 Background

3.1.1 Location and Organization

NAS Jacksonville, the Site, is located in southern Duval County approximately nine miles south of downtown Jacksonville. The Site occupies approximately 3,800 acres on the west bank of the St. Johns River upstream from downtown Jacksonville. The operating portion of the Site lies between U.S. Highway 17 and the St. Johns River; however, the Site also occupies 515 acres (included in the 3,800 acres) west of U.S. Highway 17, adjacent to the Ortega River (Figure 3-1). A USGS topographic map of the Site (Figure 3-1A) is in a folder at the end of Volume 1.

The primary mission of the Site is to provide a work place, service, and managerial support for the operation and maintenance of naval weapons and aircraft to activities and units of the operating forces as designated by the Chief of Naval Operations. The Site has five major tenants: the Naval Aviation Depot (NADEP) (formerly the Naval Air Rework Facility [NARF]), the Naval Hospital, the Naval Regional Supply Center, Patrol Wing Eleven, and Helicopter Antisubmarine Wing One.



PSC LOCATIONS

FIGURE 3-1

RI/FS WORK PLAN
FOR OU1

NAS JACKSONVILLE
SEPTEMBER 1991

The NADEP is a major command within the Site. The mission assigned to NADEP is to perform a complete range of depot-level rework operations on designated naval aircraft, engines, their components and accessories, and equipment; provide engineering services in the development of changes in hardware design; and furnish technical services on aircraft maintenance and logistic problems. The NADEP consists of approximately 50 buildings.

The Naval Hospital exists as an entirely separate command. The mission assigned to the Naval Hospital is to provide general, clinical and hospitalization services for active duty and retired military personnel and their dependents; to cooperate with military and civil authorities in matters pertaining to health, sanitation, local disaster and other emergencies; and to fulfill a number of other specific functions. The Naval Hospital achieves this mission through services provided at a 400-bed hospital and support buildings.

Patrol Wing Eleven consists of six squadrons, 54 aircraft, and approximately 2,500 men and women. The Wing provides long range antisubmarine reconnaissance utilizing the P-3C Orion.

Helicopter Antisubmarine Wing One provides antisubmarine protection for aircraft carriers and other high value logistic support units. The eight squadrons of the Wing also perform search and rescue missions for both military and civilian operations.

Naval Supply Center, Jacksonville, is the principal Navy supply point for the Southeastern United States, the Caribbean, the Gulf of Mexico, the Panama Canal Zone, Guantanamo Bay, and Puerto Rico. The Supply Center operates as the principal commercial interface within this large geographic region for most categories of supplies and services required by the Navy.

3.1.2 History

In 1938, the Hepburn Board originated the concept for an NAS located in Jacksonville. The Site was designed for seaplane support. This operational requirement largely determined its final location because the Site adjoins a two- to three-mile wide stretch of the St. Johns River at Black Point, just south of Jacksonville. Officials of Duval County offered to donate the land required for the station and, upon acceptance by the Navy Department, County bonds were marketed and the land was acquired. Additional usable land was developed by hydraulically filling marshes along the St. Johns River in the northeastern part of the area.

When conceived, the station included facilities for pilot training and a Navy Aviation Trades School (NAT) for ground crewmen. The Site was commissioned on October 15, 1940. With the advent of World War II, the physical size of the Site more than doubled, and military functions supported the war effort. During 1942, the Navy phased out pilot training, and the station became the headquarters for the Chief of Naval Operational Training, the final training phase before fleet assignment. The NAT School became the Naval Air Technical Training Center under the Chief of Naval Air Technical Training, NAS Memphis. The operational areas of the station still maintained coastal protection with seaplanes. The Site reached a peak of 42,000 naval personnel and 11,000 civilians by 1946.

At the end of World War II, the Site was devoted entirely to aviation training. In 1945, Chief of Naval Operational Training was redesignated Chief Naval Air Advanced Training, but this mission, and that of the station, remained basically the same. In July 1946, the Seventh Naval District was transferred from Miami, Florida to the Site, as a joint command with Chief Naval Air

Advanced Training. On April 5, 1948, the Navy announced the transfer of Chief Naval Air Advanced Training and all training facilities to NAS Corpus Christi, Texas; the move was completed on November 15, 1948. The Naval Air Technical Training Center was transferred and consolidated with the Naval Air Technical Training Center at NAS Memphis.

Due to this relocation, some doubt arose concerning the continued need for the Site. The Office of the Chief of Naval Operations, however, made the decision to return to the originally planned concept of a Fleet Air Operational Support Base. Therefore, as Chief of Naval Operational Training activities moved to NAS Corpus Christi, operational squadrons replaced them. By January 1949, the station's mission was to support the operational carrier squadrons with fleet squadrons assigned to Commander, Naval Air Bases, Sixth District and patrol squadrons assigned to Combat Patrol Wing Eleven. On January 1, 1951, the Navy reactivated the Naval Air Technical Training Center and Marine Air Division activities in support of the Korean build-up of facilities. This joint operational and training status continues to this time.

The Naval Aviation Depot (NADEP) has been a major tenant of the Site since 1940 when it operated as an Assembly and Repair Department of NAS Jacksonville. Its mission has been to provide a full range of the highest quality maintenance, engineering, logistic, and support services to the fleet at a competitive price. On April 1, 1967, it became one of six modern industrial facilities (Naval Air Rework Facilities) commissioned by the Navy to perform in-depth rework, repair, and modification of aircraft, engines, and aeronautical components. In April 1987, the name was changed to Naval Aviation Depot (NADEP), Jacksonville.

Peak workload at the NADEP occurred in 1945 when 7,300 employees, including 3,500 military personnel worked around the

clock to return aircraft to Allied lines. Since then, the production shops have turned out almost every type of Navy aircraft, including fighter and attack planes, patrol, antisubmarine, reconnaissance, transport, trainer, special configuration, and helicopters. The overall workload has also expanded to include the rework of engines, components, and ground support equipment, plus other support functions to the Fleet.

During fiscal year 1990, the Depot reworked 130 aircraft, including 21 A-7 Corsair light attack aircraft, 26 P-3 Orion antisubmarine patrol planes, 27 S-3 Viking carrier-based antisubmarine patrol planes, 27 T-2 Buckeye basic jet trainers, and 29 F/A-18 Hornet strike fighters. In addition during that period, the Depot reworked nearly 500 engines of various types and some 38,000 components and avionics.

Continued change and improvement have marked the Depot's 50-year history. Today, the NADEP occupies 102 acres on the St. Johns River and contributes a $106.3 million payroll to the Jacksonville economic community. With a workforce of over 3,300 civilian employees, the NADEP is the largest tenant command aboard NAS Jacksonville and the largest industrial employer in Northeast Florida and Southeast Georgia.

3.1.3 Preliminary Assessment

As directed by the Chief of Naval Operations (CNO), the Naval Energy and Environmental Support Activity (NEESA), in conjunction with the Ordnance Environmental Support Office, conducted the PA to collect and evaluate evidence that constituents of concern directed at selected PSCs might pose a health risk for people located on or off the Site. The PA is included in Appendix 1.1. The PA was the first phase of the Navy Assessment and Control of Installation Pollutants (NACIP) program. The objective of this

program was to identify, assess, and control environmental contamination from past hazardous materials storage, transfer, processing, and disposal operations. The Site was designated for the PA by the CNO in a letter dated August 3, 1981. The on-site phase of the PA was conducted from June 28 to July 2, 1982.

The NACIP team reviewed records, performed interviews, and conducted PSC inspections. A total of 38 PSCs were identified at the Site, of which 10 were concluded to pose a potential threat to human health or the environment. Two of the PSCs (26 and 27) were determined to require prompt remedial action. Further investigation activities and interim remedial actions were performed at PSC 26 and PSC 27 prior to the conclusion of the PA.

All known or suspected hazardous waste disposal sites identified by the PA team were evaluated using a Confirmation Study Ranking System (CSRS) developed by NEESA for the NACIP Program. The system is a two-step procedure for systematically evaluating a PSC's potential hazard to human health and the environment based on evidence collected during the IAS. The CSRS was similar to the HRS, currently used by EPA.

Initially, a flow chart was prepared that eliminated innocuous PSCs from further consideration. Step two utilized the CSRS and assigned a numerical score, within a range of 0 to 100, to indicate the potential severity of each PSC. The scores were a reflection of the characteristics of the wastes disposed at a PSC, contaminant migration pathways, and potential contaminant receptors on and off the Site. CSRS scores and engineering judgment were then used to evaluate the need for an SI. Ten PSCs were identified as posing a potential threat to human health or the environment, based on their CSRS scores. These PSCs were selected for the SI/ESI evaluation.

3.1.4 Site Inspection/Extended Site Inspection

In August 1983, Geraghty & Miller, Inc., was retained by the Southern Division Naval Facilities Engineering Command to assist the Navy in performing the SI study. The SI was conducted to determine the presence or absence of contamination in the soil, surface water or ground water at each of the 10 PSCs. Based on the findings of the SI, an ESI was implemented at those PSCs requiring additional study to identify the nature and extent of the contamination.

The SI (Appendix 1.2) was initiated in August 1983 to assess the potential environmental impacts of the 10 PSCs previously identified during the PA. In October 1983, the FDER (Florida Department of Environmental Regulation) reviewed the PA and a Plan-of-Action prepared for the SI (August 15, 1983). FDER suggested five PSCs for additional investigation (four new PSCs and expanded scope of work for PSC No. 29). Additionally, as a result of newly acquired information in March 1985, four additional PSCs were added for consideration under the SI. The Navy also added two additional PSCs (PSC No. 39 and PSC No. 40). Subsequently, a SI was conducted at 18 PSCs.

The SI concluded that twelve of the 18 PSCs had not received wastes in many years and the potential ground-water contaminants had been attenuated by the processes of biodegradation, evaporation, adsorption, dilution, or dispersion (Geraghty & Miller, 1985). Nine of the eighteen studied PSCs were recommended for further investigation in the ESI.

The ESI (Appendix 1.3) was conducted at the nine selected PSCs to gather additional data to assess the extent of contamination. The results of the ESI suggested that only areas located within the NADEP (PSC Nos. 11, 12, 14, 15, and 16) warranted remedial action considerations. ESI results also indicated that the soil at PSC No. 28 should be resampled for polychlorinated biphenyls (PCBs). Based on the data collected during the SSI, the remaining PSCs (PSC Nos. 29, 30, and 32) were not recommended for future investigation.

3.2 Problem Summary

This section provides a description of the operations at the Site that use hazardous materials. The descriptions focus on the following types of operations: torpedo maintenance, hazardous and nonhazardous waste generating operations, low level radiological activities, hazardous materials storage, and waste disposal. In addition to describing the various operations, this section also identifies the wastes generated by each operation and the method of disposal.

Past and present Site operations have been the source of hazardous and non-hazardous materials. The NADEP operates the Site's primary industrial operation. Other Site operations include vehicle, ground support equipment, and aircraft maintenance shops; boiler and power plants; incinerators; defense reutilization and marketing; pest control shops; and activities of the Naval Hospital.

Past Site operations fall into the following three categories: torpedo maintenance, hazardous and non-hazardous, and low-level radiological operations. Torpedo maintenance operations generated a minor quantity of waste torpedo propellant known as Otto fuel. Hazardous and non-hazardous operations generated waste solvents, oil and fuel, paint wastes, and aqueous wastes containing toxic

heavy metals, acids and caustics, cyanide, paint stripper wastes containing chlorinated solvents and phenolics, metal scrap and other inert materials. Aircraft repair and maintenance operations in the past generated low-level radioactive radium paint wastes. Vacuum tubes and other aircraft instrument parts with ionizing radiation sources and luminous instrument dials were also disposed. Wastes from current medical radiological programs include biological specimens contaminated with low levels of radioisotopes.

3.2.1 Torpedo Maintenance

The Torpedo Rework Facility is located within the weapons area. Activities at this facility include the repair and cleaning of propulsion systems, addition of Otto fuel to torpedoes, and inspection of torpedoes. Personnel with the Ordnance Environmental Support Office reported that the Navy generates approximately one 55-gallon drum of solid waste material (i.e., rags and gloves containing Otto fuel) per day. It was also reported that these drums have always been disposed of offsite.

3.2.2 Hazardous and Non-Hazardous Waste Generation

Waste generating operations at the Site primarily involve maintenance and support activities. The following is a summary of the twenty-four non-ordnance waste generating activities at the Site.

3.2.2.1 Vehicle Maintenance Shop. The vehicle maintenance shop is located in Building 105. The shop's primary mission is to rebuild, repair, and maintain automobiles, trucks, and heavy equipment. The Navy stores waste oils and solvents in 55-gallon drums which are hauled offsite by a private contractor. Until 1976 these waste materials were disposed of in the waste oil and solvent pits in the Old Main Registered Disposal Area, PSC No. 26.

3.2.2.2 Pest Control Shop. The Disease Vector Ecology and Control Center, occupies Building 937 (since 1978), and has been a tenant of the Site since 1949. The Center is used for the storage and mixing of pesticides and herbicides used at the Site. Typical materials stored in the Center included: malathion, chlordane, aldrin, dieldrin, lindane, and diazinon.

3.2.2.3 Fleet Imaging Center. This photographic shop provides photographic services to all of the Site's departments and tenant commands. The services provided by the photography shop include still and high speed photography. The liquid wastes generated by the photography shop include bleach and developer/fixers. In the past, Navy personnel disposed of these waste streams in shop drains. Currently, they are disposed of in the sewer and routed to the domestic sewage treatment plant. A silver recovery process, installed at the shop in 1972, reduced the quantity of this metal discharged. Silver levels in treated waste water are in compliance with the Site's discharge permit.

3.2.2.4 Wastewater Collection and Treatment. In 1940, the Navy constructed two trickling filter plants for treatment of wastes (combined domestic and industrial). The west side plant is located north of the center of the main east-west runway. The east side plant (no longer in existence) was located south of the east end of the main runway. In 1972, the east side plant was taken out of service and the flow directed to the west side plant. The west side plant was expanded to 2.25 million gallons per day capacity and upgraded to activated sludge with aerobic sludge digestion in 1972.

Until 1961, there were no industrial wastewater treatment facilities at the Site. Prior to 1972, the Navy treated industrial wastes reaching the east side plant initially by settling (for paint chip removal) and skimming for removal of oils and solvent,

and disposed of these wastes at the Old Main Registered Disposal Area (PSC No. 26). Effluent from settling/skimming was treated in the trickling filter plant before discharge to the St. Johns River. Trickling filter sludges were disposed elsewhere on the Site.

The west side plant became active as a wastewater treatment facility in 1974. Subsequently, it was supplemented with a chromium reduction/precipitation and cyanide reduction/oxidation facility for pretreatment of chromium and cyanide bearing plating wastes. The upgraded plant was fully operational in 1981.

3.2.2.5 Fire-Fighting Training. The fire-fighting companies at the Site provide fire protection for the Site's general activities and aircraft operations. The Site's fire department conducts fire-fighting training exercises at a site adjacent to the industrial wastewater treatment plant (IWTP). The fire department sprays empty tanks with JP-5 or waste oil and ignites them to simulate aircraft crashes. Prior to use of the current area, Navy personnel used PSC No. 28 on the southeast corner of the Site for fire-fighting training. When the old fire-fighting training area was in operation, Navy personnel used a mixture of flammable materials as fuel. Reportedly, waste oils and lubricants were dumped in the pits and burned.

3.2.2.6 Incinerators. An incinerator plant on the station had three boilers that burned paper and non-hazardous waste and fuel oil. The plant is no longer operational.

3.2.2.7 Fuel Farms/Gas Stations. The old gas station (Building 48) is currently out of service and now houses the Base garden center. The underground gasoline storage tanks, which had a total capacity of 16,000 gallons, were removed in 1986.

The existing Base service station (Building 429) has had a fuel leak. Approximately 2,000 gallons of gasoline leaked from an underground pipe fitting and infiltrated the sewer system allowing gasoline vapors to migrate in the sewer line to lavatory receptacles within a nine-block area of the service station. An interim Remedial action under the Underground Storage Tank program in accordance with Chapter 17-770, FAC, was conducted. An investigation of the entire PSC is currently underway.

All petroleum facilities are entirely on shore (except for Fuel Docks) and consist of storage and transfer of aviation, automotive, heating, and waste fuels. The handling of waste oil and fuels are the responsibility of the NAS Supply Department. The Site's petroleum product storage facilities consisted of approximately twenty-five underground tanks and seven aboveground tanks, with capacities ranging from 1,500 to 567,000 gallons.

The bulk fuel storage facility, Building No. 159, is located at the northeast end of the station adjacent to Catapult Road. The bulk fuel storage facility consists of eleven underground storage tanks. The tanks were constructed at ground level with earth covering to form a large mound. This facility handles approximately 60 million gallons annually. Fuel deliveries are via barge.

The Fuel/Lube Oil Storage Facility (Facility 119) consists of seven underground storage tanks which were used to store Aviation Lube Oil, No. 2 Fuel Oil, motor fuel (MO-GAS), aviation gas (AV-GAS), and Waste Oil. Fuel/Storage/Transfer areas also exist at Facilities 120, 120A, 650A, 650B, H-2032, 1987, 1988, and 1963.

3.2.2.8 Non-Hazardous Solid Waste Generation. A refuse collection contractor collected the majority of solid waste generated on the base and disposed of it offsite. The Public Works

Department collected items that were not acceptable for the contractor collection system. Other unacceptable items were hauled to the station disposal area by the organizations that generated the wastes. Approximately 330 cubic yards of waste per week were disposed of at a disposal area (PSC No. 32) operated by the Public Works Department. The Public Works Department maintained a supervisor at the PSC to ensure that Navy personnel disposed of combustible material only and that refuse was placed in piles to facilitate burning, consolidation, and covering. Generally, Navy personnel burned waste every Friday. The burned and semi-burned material was then pushed over an embankment formed by previously covered refuse and ash. The new material was then covered. Additionally, organic waste and debris was disposed of at PSC No. 29.

The Navy collected liquid waste, including sludge from grease traps, oil sumps, and waste chemicals in 400- to 750-gallon tank trailers. The Navy disposed liquid waste products including cleaning solvents, paint thinners, heavy petroleum products sludge, and galley grease trap sludge at a holding tank at the sewage treatment plant or at a slurry pit located next to the Old Main Registered Disposal Area (PSC No. 26). The Navy hauled part of the liquid waste generated at the NADEP activities to the sewage treatment plant holding area. The majority of the NADEP waste and all of the sludge generated at other activities, was hauled to the slurry pit located on PSC No. 26.

The majority of the waste petroleum products generated were recycled. Waste oils and contaminated aircraft fuels were placed in holding tanks located throughout the site for collection by the site refueling contractor.

3.2.2.9 Defense Reutilization and Marketing Office. The Defense Reutilization and Marketing Office (DRMO) is located offsite. The DRMO facility arranges for sale or disposal of "used" or surplus items from the Site.

3.2.2.10 Naval Aviation Depot. The NADEP, one of the major tenant activities at the Site, employs approximately 3,000 workers in stripping, testing, and refitting long-range anti-submarine and ground support aircraft. The work begins with removal of engines and other components (propellers, control surfaces, etc.). After workers have removed these components, the airframe is stripped of paint and sprayed with corrosion inhibitors before inspection and repainting. Components are also stripped of paint, sprayed, and inspected before being repainted and installed on the airframe. Engines are disassembled, inspected, and moving parts are inspected for cracks and, if necessary, electroplated before assembly and installation in the airframe.

In addition to direct aircraft-related operations, the NADEP operations include support functions, such as battery repair for fork lifts, crating and carpentry, and riggers shops.

3.2.3 Radiological Operations

Sources of low level ionizing radiation have been used at the Site, primarily in the form of luminous instrument dials, since the origin of the station. Low level radioisotopes and ionizing radiation sources are also present at the Naval Hospital.

3.2.3.1 Aircraft Operations. With the development of aircraft came the need to produce gauge and dial faces that the pilot would be able to read during night-time operations. Luminous paints utilized in the watch and clock industry were ideal for this application and thus found direct and immediate application into

the aircraft gauge and dial industry. Luminous paints consist of a compound capable of emitting light (a phosphor) when energy is imparted to it by a source of energy. The source of energy was usually radium-226.

The NADEP overhauls and maintains naval aircraft. Several of the shops in NADEP have handled aircraft instruments with radium dials. Aircraft instrument dial stripping operations took place during and after World War II. A review of records and interviews with station personnel during the PA indicated that Navy personnel used, maintained, repaired, stored, and calibrated these gauges and dials in various shops in NADEP. In the period during and after World War II, paint wastes and instrument dials were disposed at two locations on the Site. The Radiological Affairs Support Office (RASO) in Yorktown, Virginia handled later disposal. These materials were then packaged and shipped to an off-site disposal area.

3.2.3.2 Naval Hospital. The Nuclear Medicine Department of the Naval Hospital uses various radioisotopes and possesses equipment which are sources of ionizing radiation. The Nuclear Medicine Department stores various radiochemicals. The department has a licensed "hot sink" for disposal of low levels of radioactive wastes. Navy personnel dispose of approximately 2 millicuries per month of Iodine-125 from radioimmunoassays and 3 picocuries per month of Cobalt-57 to the sanitary sewer, in accordance with NRC (Nuclear Regulatory Commission) regulations.

The Naval Hospital also conducts a drug screening program which results in the generation of water contaminated with radioactive isotopes such as Iodine-125. Currently Navy personnel drum and dispose this material offsite. Low level radioactive

waste was stored in drums in Building No. 2038 (PSC No. 25) until the building was demolished in 1989 during Naval Hospital expansion.

3.2.4 Hazardous Materials Storage Operations

The Navy stores hazardous materials in a number of areas. The Navy limits storage of all chemicals to several days. An area near the industrial pretreatment lift station is used for this purpose. Paint waste drums are located outside hangars and buildings where aircraft and aircraft parts are painted. These storage areas are secured and labelled with hazard warning signs. A Navy contractor collects the paint wastes for disposal offsite.

Prior to 1982, waste solvents generated by NADEP were placed in a 27,200-gallon underground storage tank 119K (PSC-10). A waste collection contractor, collected approximately 50,000 gallons annually in 5,000-gallon increments. The waste solvents contained methylene chloride, methylethylketone, ethylacetate, trichloroethylene, methyl isobutyl ketone, n-butylacetate, and xylene. This tank was removed in 1986.

3.2.5 Waste Disposal Operations

The PA identified and assessed areas posing a potential threat to human health or to the environment due to contamination from past waste disposal operations at the Site. The PA identified a total of 38 CERCLA sites at the Site through an extensive records search, interviews with Site personnel, retirees, and previous reports. Seven additional PSCs have since been added to the list for a total of 45 PSCs. A majority of the sites do not pose a significant threat to public health or the environment. Table 3-1 is a complete listing of these sites.

Table 3-1. Summary of Potential Sources of Contamination (PSC)

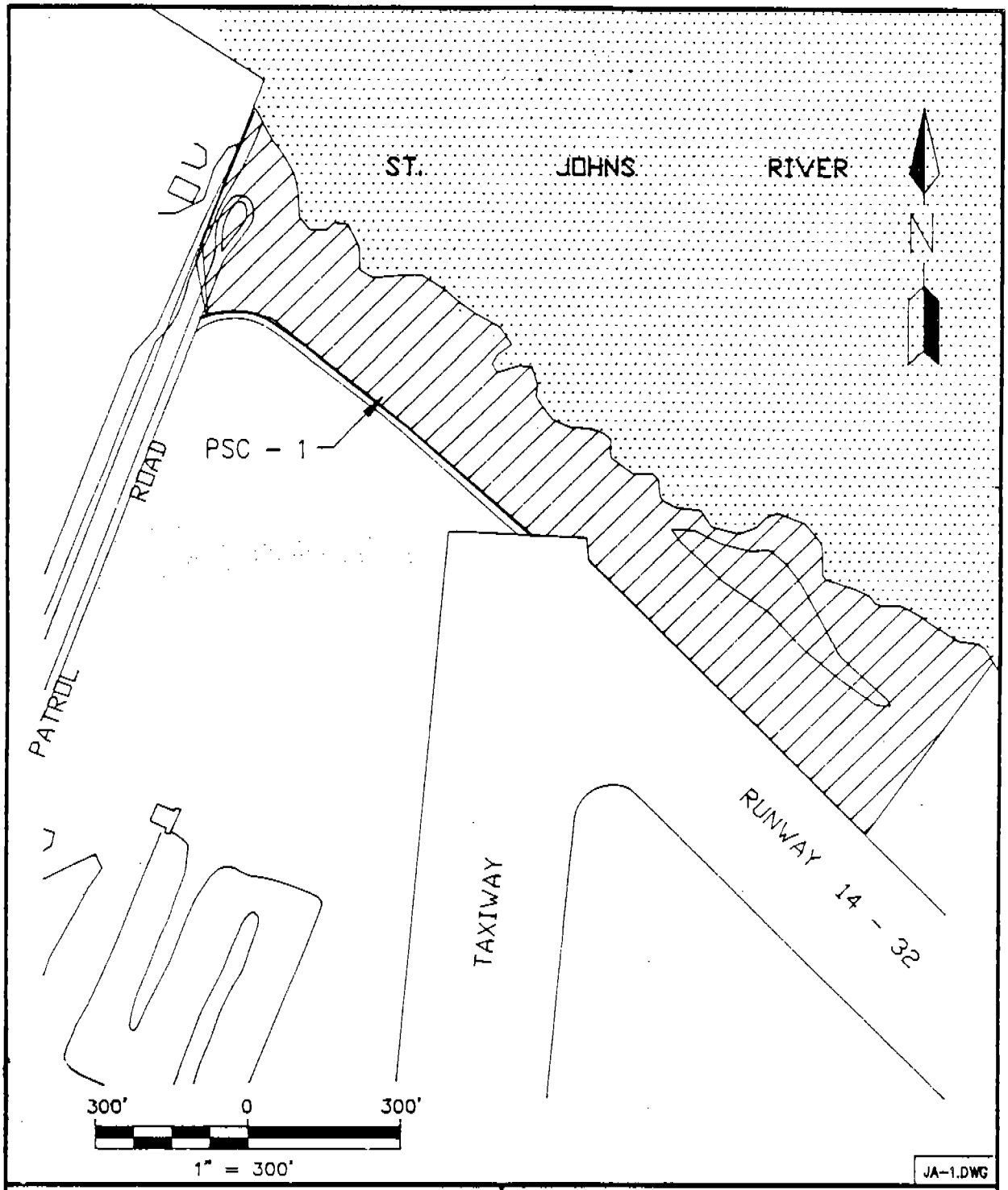
1.	Patrol Road Turn Around Area
2.	Present Fire Fighting Training Area
3.	WWTP Ex-Sludge Disposal Area
4.	Pine Tree Planting Area
5.	Shoreline Fill, West of Fuel Barge Dock Area
6.	Fuel Farm (Steam Pit)
7.	Gas Hill
8.	Vacant Lot, Fuel Farm Area
9.	Old Disposal Area (East of Fuel Farm)
10.	Tank 119 K
11.	Hanger Building 101
12.	Old Test Cell Building
13.	Radium Paint Disposal Pit
14.	Battery Shop
15.	Solvent and Paint Sludge Disposal Area
16.	Storm Sewer Discharge-Black Point
17.	Glass Bead Disposal Area
18.	Radioactive Waste Disposal Area
19.	Old Gas Station
20.	Solid Waste Incinerator
21.	Golf Course (Casa Linda Lake)
22.	"Fort Dix"
23.	Old Skeet Range
24.	Scrap Metal Disposal Area
25.	Former Building No. 2038, (Naval Hospital, Ex-Radioactive Waste Storage Area)
26.	Old Main Registered Disposal Area
27.	Ex-PCB Transformer Storage Area
28.	Ex-Fire Fighting Training Area
29.	Organic Disposal Area
30.	Old Drum Lot
31.	Asphalt Mix Area
32.	Ex-Base Landfill
33.	Base Service Station
34.	Former Transformer Storage Building
35.	Former Temporary PCB Storage Area
36.	Dewey Park
37.	Ex-Power Barge Dock Area
38.	Torpedo Rework Facility
39.	Possible Transformer Burial Area
40.	Ex-East IWTP Discharge Area
41.	Domestic Waste Sludge Drying Beds
42.	Polishing Pond for WWTP Effluent
43.	Industrial Waste Sludge Drying Beds
44.	Drainage Ditch, West of Ajax Street, from Yorktown Avenue to Mulberry Cove
45.	Building 200 Wash Rack Waste Disposal Pit

3.2.5.1 PSC No. 1-Patrol Road Turnaround Area. This PSC is located north of the patrol road turn-around along the shoreline of the St. Johns River (Figure 3-2). The Navy has used this area periodically for the disposal of construction debris to reclaim land and provide shoreline protection. The PSC contains rubble, consisting mostly of concrete and asphalt. The PSC is approximately 50 feet (ft) wide by 300 ft long. The specific date(s) of disposal and quantities disposed are not available.

3.2.5.2 PSC No. 2-Present Fire Fighting Training Area. This PSC is located in the immediate vicinity north of the sewage treatment plant (Figure 3-3). The PSC occupies an area approximately 100 ft wide by 100 ft long and is used for fire fighting training. Over the years, training personnel have ignited mock airplane forms using JP-4, JP-5, AV-GAS, or spent oil as fuel. This area has been used for training from 1966 to the present. The Navy estimates that approximately 6,000 gallons of fuel have been burned at this site annually. The area immediately surrounding the PSC shows visible evidence of fire damage.

3.2.5.3 PSC No. 3-Wastewater Treatment Plant (WWTP) Ex-Sludge Disposal Area. This PSC is located just east of the sewage treatment plant (Figure 3-4). The area of the sludge disposal PSC is approximately 15 acres. The Navy dumped approximately 20,000 tons of sewage sludge containing metals and organics here from 1962 to 1980.

3.2.5.4 PSC No. 4-Pine Tree Planting Area. This PSC is located approximately 200 ft south of the sewage treatment plant (Figure 3-5). Until 1975, the Navy reportedly used this area for the disposal of paint shavings, sewage sludge, asbestos, oil and other petroleum products. Paint shavings and sewage sludge are visible at various locations at the PSC.



PSC - 1
PATROL ROAD TURN AROUND AREA
FIGURE 3-2

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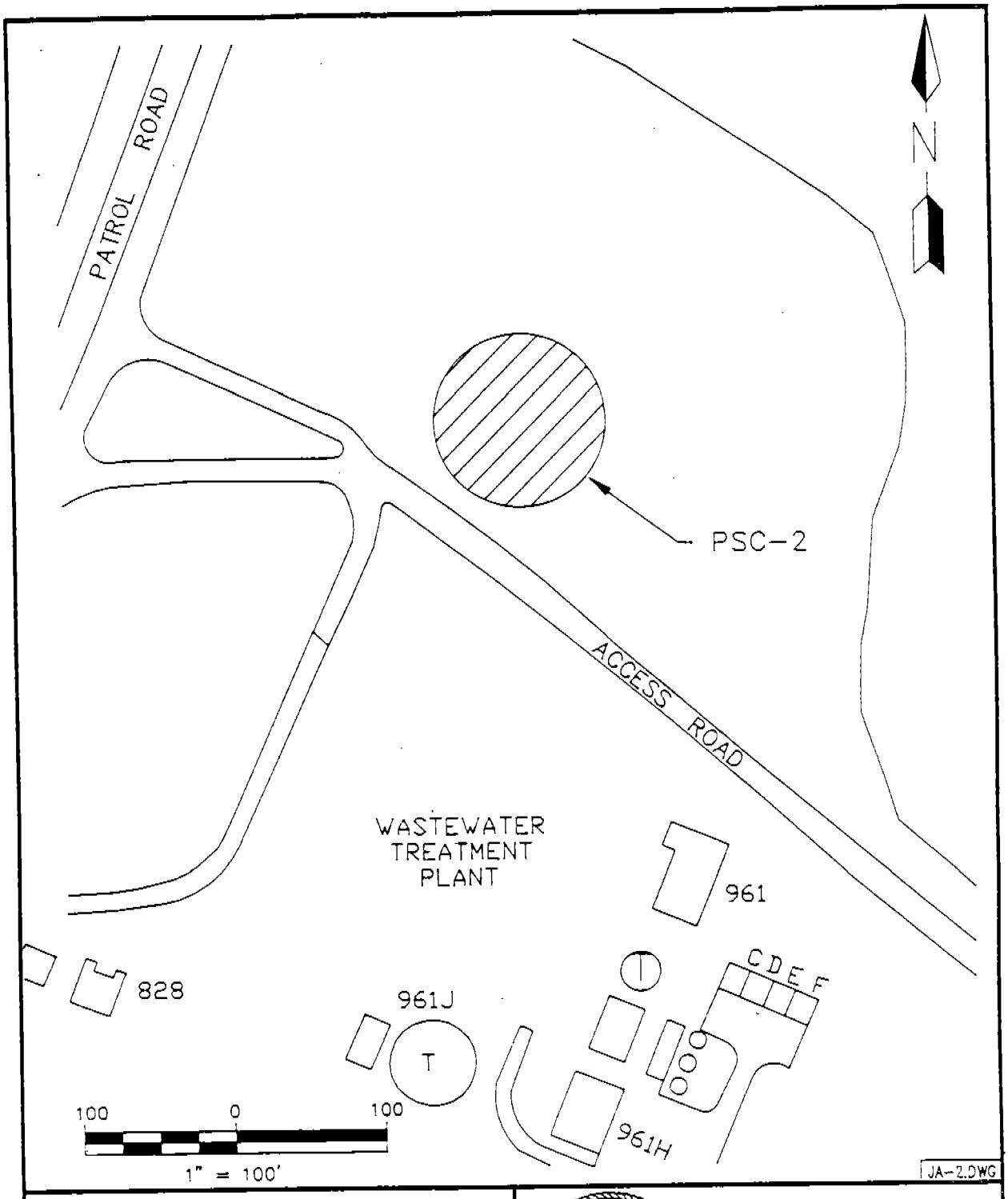

PSC-2
PRESENT FIRE FIGHTING TRAINING AREA

FIGURE 3-3

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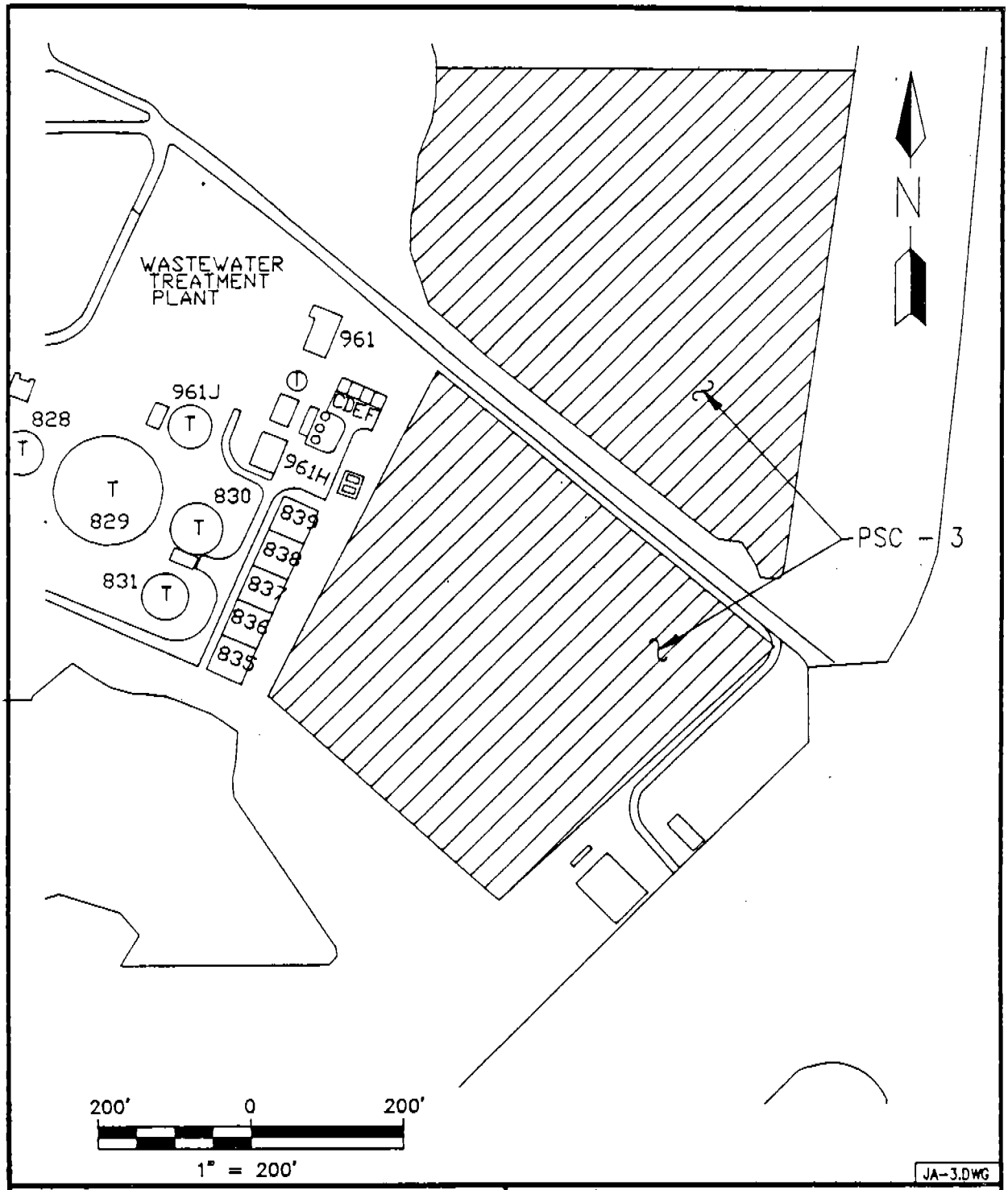

PSC – 3

WWTP EX-SLUDGE DISPOSAL AREA

FIGURE 3-4

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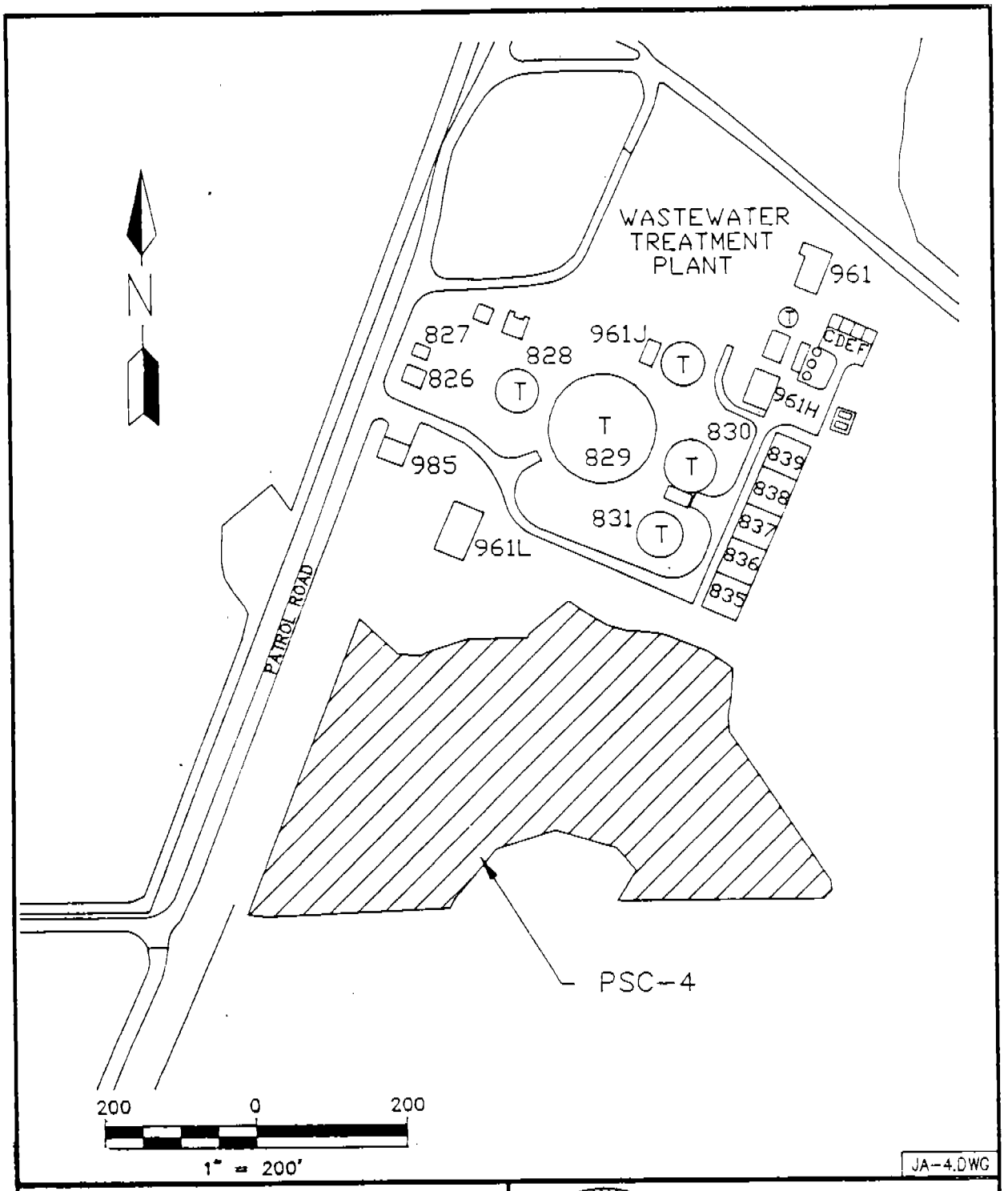

PSC-4

PINE TREE PLANTING AREA

FIGURE 3-5

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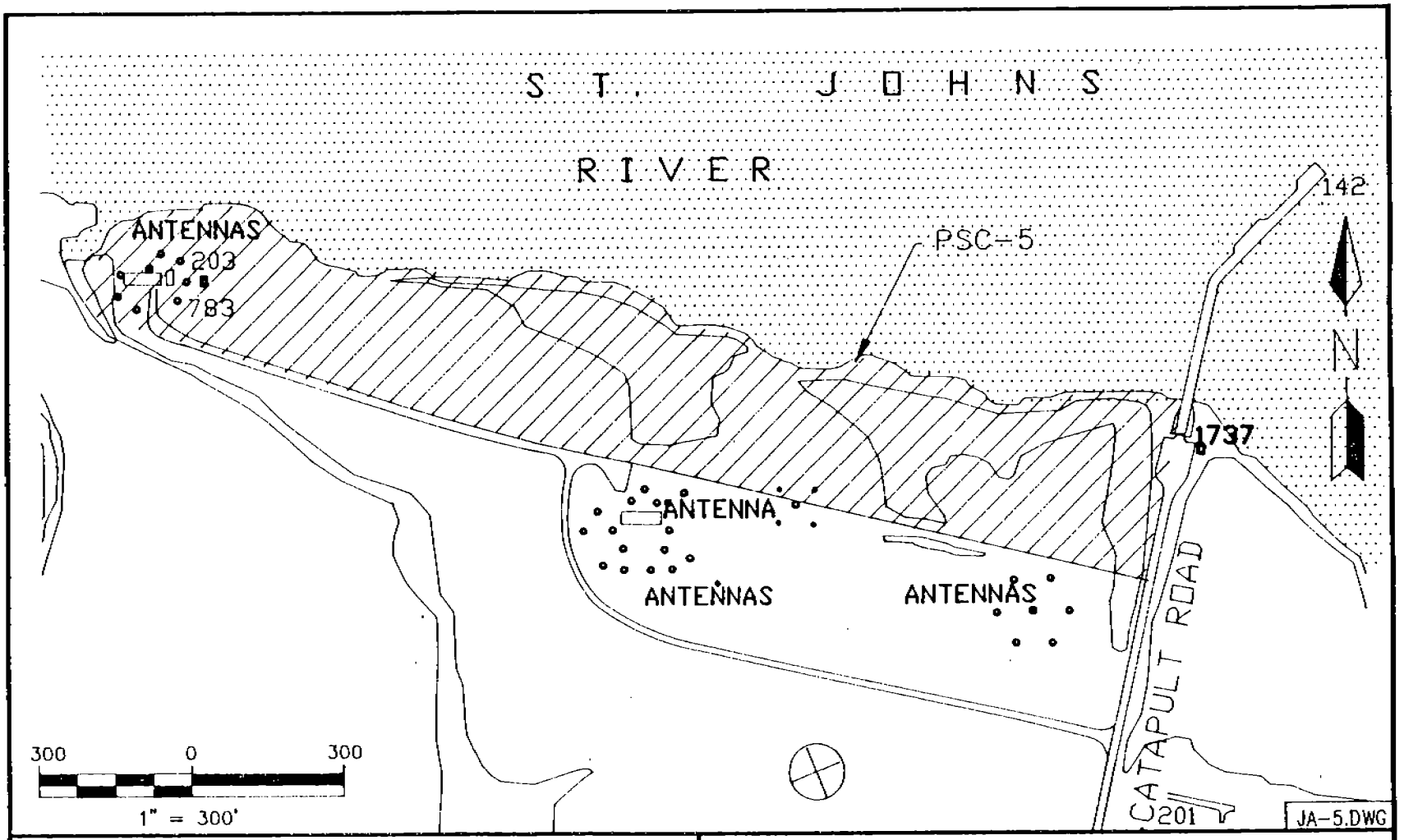
3.2.5.5 PSC No. 5-Shoreline Fill, West of Fuel Barge Dock Area. This area, used in the 1940s for waste disposal, is approximately 200 ft wide by 600 ft long (Figure 3-6). Visual inspection reveals that the materials disposed in this area were largely concrete runway debris.

3.2.5.6 PSC No. 6-Fuel Farm (Steam Pit). A fuel oil leak (No. 6 fuel oil) occurred in a steam pit pipe at a fuel pipeline connection (Figure 3-7). An unknown quantity of fuel oil leaked into the underground concrete lined steam pit which contained some water. Reportedly, the fuel oil floated on the surface of the water and was contained within the concrete pit. Subsequently, the Navy pumped the fuel oil out of the pit.

3.2.5.7 PSC No. 7-Gas Hill. This area is located west of Catapult Road (Figure 3-8). Reportedly, explosions involving underground tanks occurred in this area in 1978 and 1979. In 1978, lightning caused an explosion and fire in an underground tank. The residual fuel, not consumed by fire, was pumped into tank trucks and transported offsite for disposal as spent oil. It is known that leaks from some existing tanks and their associated piping exist. The leaks are being investigated under the Underground Storage Tanks Program in accordance with Chapter 17-770, FAC.

3.2.5.8 PSC No. 8-Vacant Lot, Fuel Farm Area. This area, approximately 200 ft by 100 ft, is located adjacent to the east side of Catapult Road (Figure 3-9). As indicated by an aerial photo dated September 1976, the Navy used the area for parking approximately five fighter planes. Inspection of the PSC reveals four piles of material, possibly abrasive blast grit, and two disintegrated plastic bags of fine granular materials.

3.2.5.9 PSC No. 9-Old Disposal Area (East of Fuel Farm). This PSC is approximately 200 ft wide by 400 ft long and located east of Catapult Road along the shoreline of the St. Johns River



PSC-5

SHORELINE FILL, WEST OF FUEL BARGE DOCK AREA

FIGURE 3-6

REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
WORK AND PROJECT
MANAGEMENT PLAN

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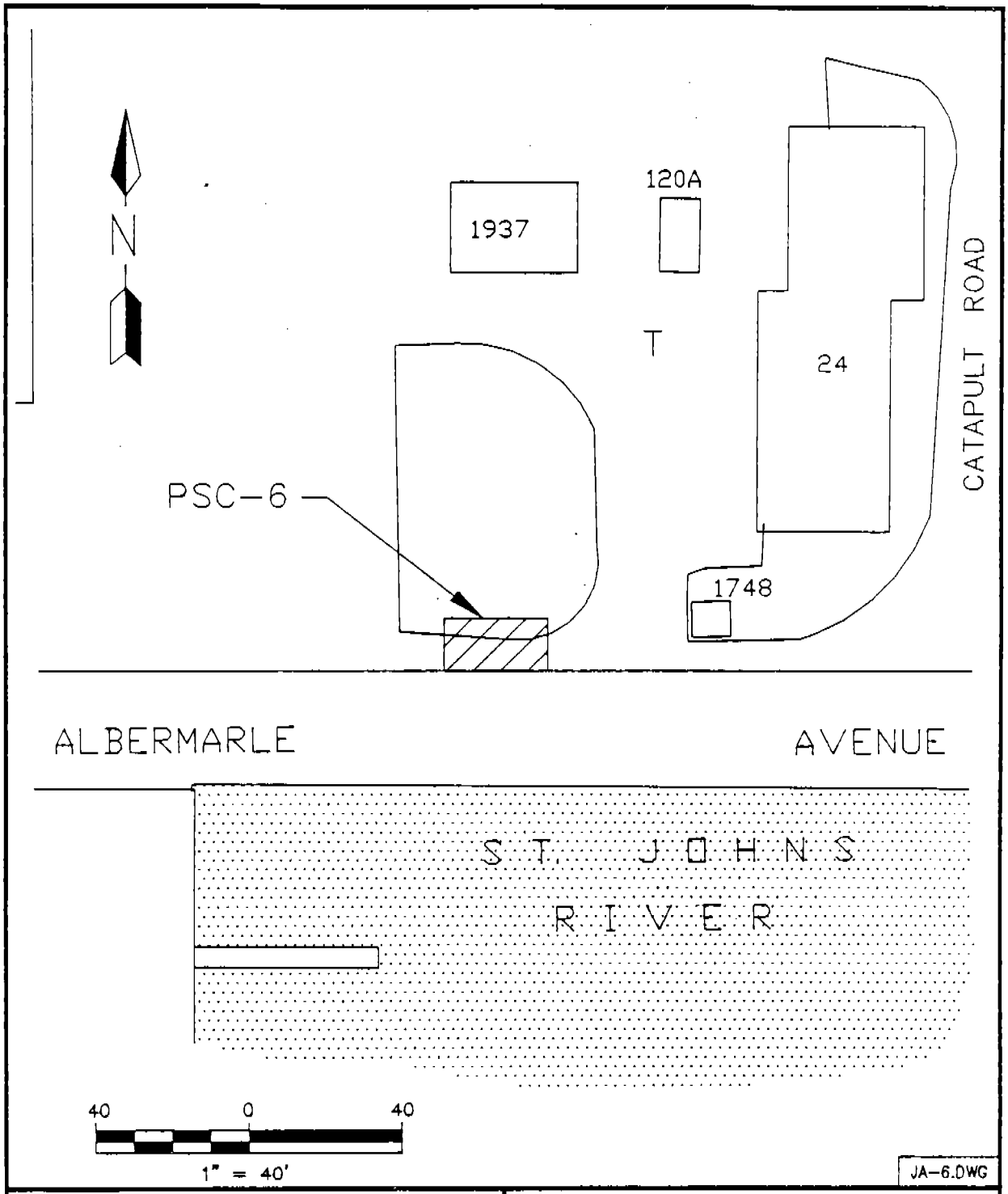

PSC-6

FUEL FARM (STEAM PIT)

FIGURE 3-7

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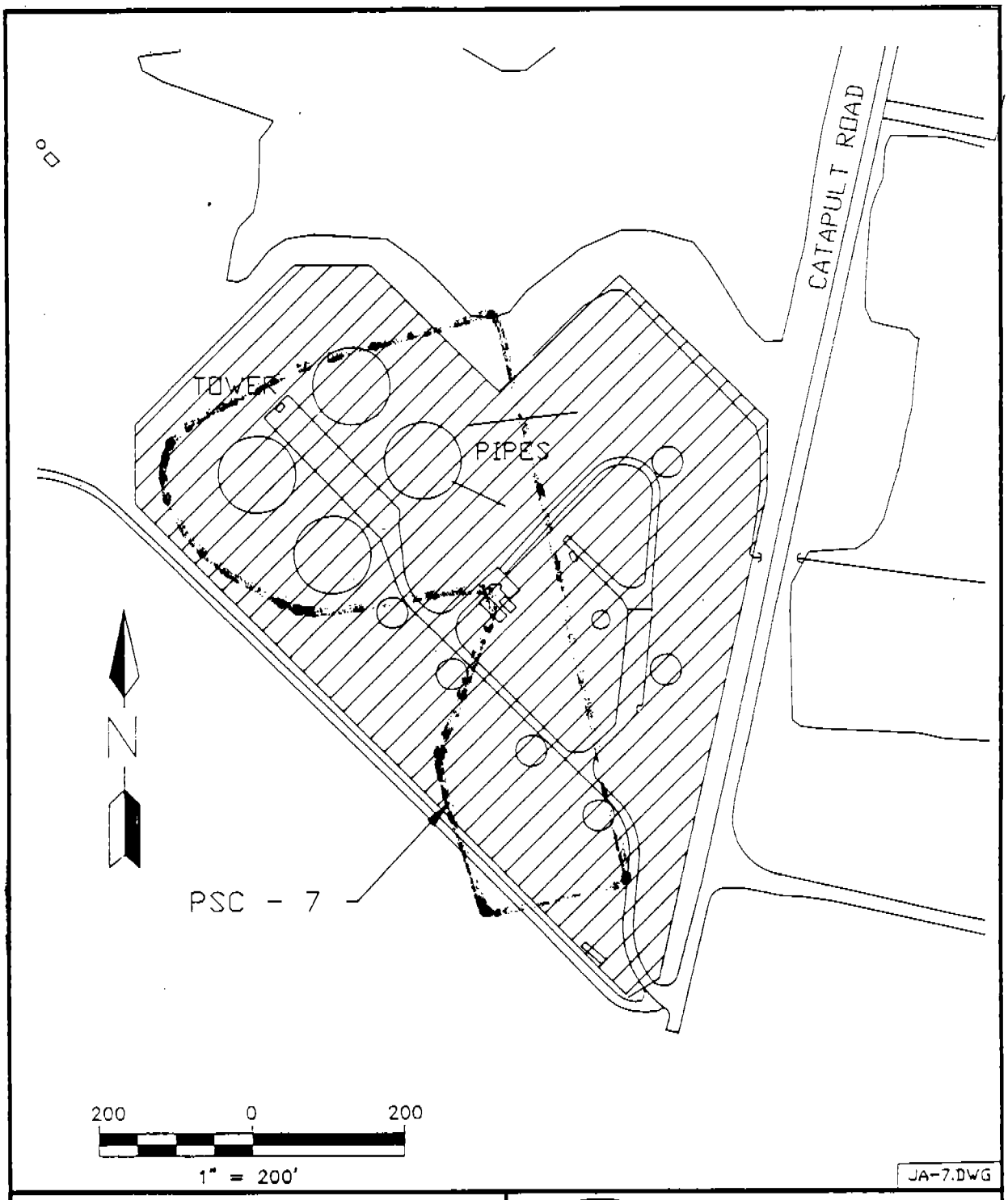

PSC - 7
GAS HILL
FIGURE 3-8

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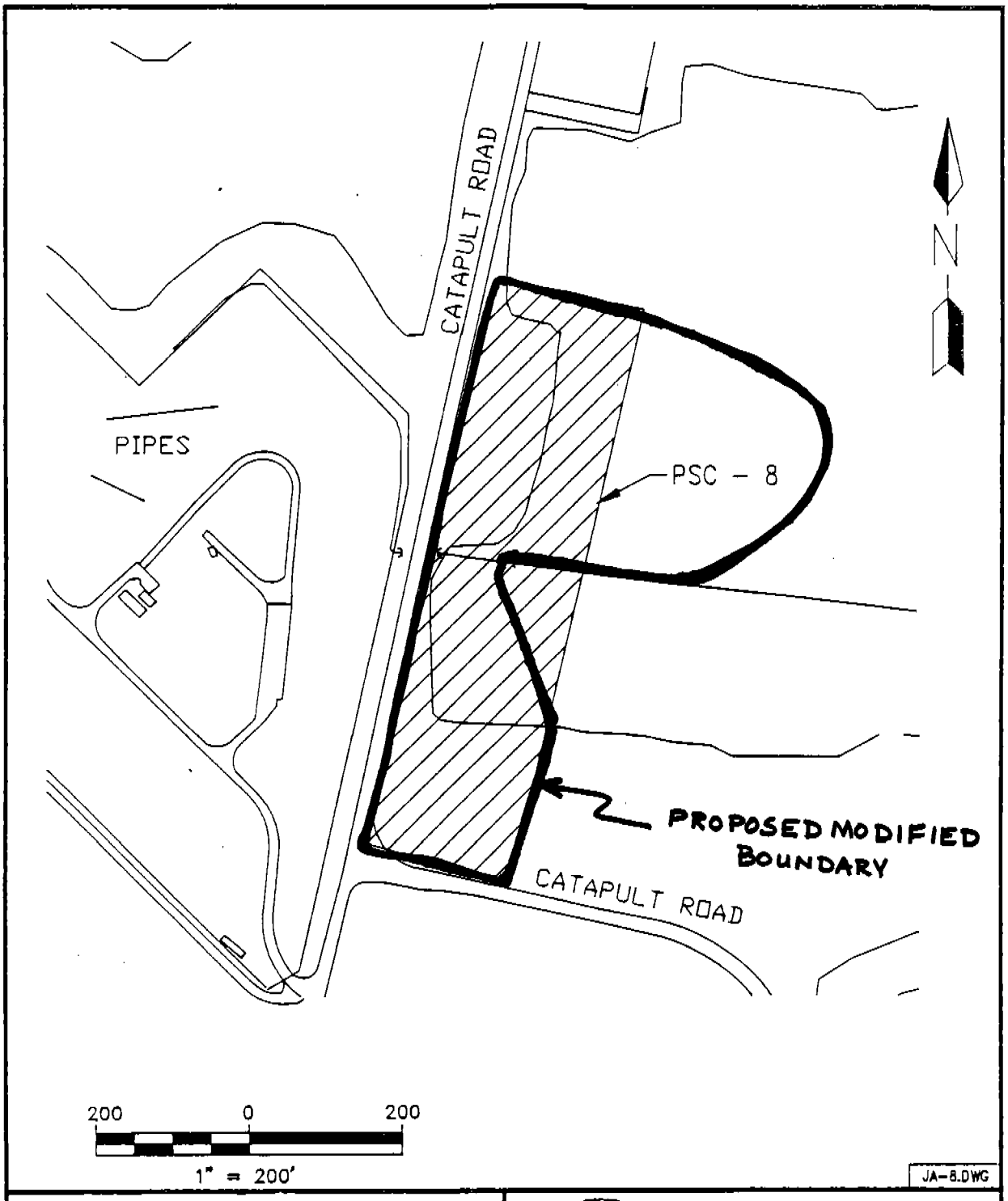

PSC - 8

VACANT LOT, FUEL FARM AREA

FIGURE 3-9

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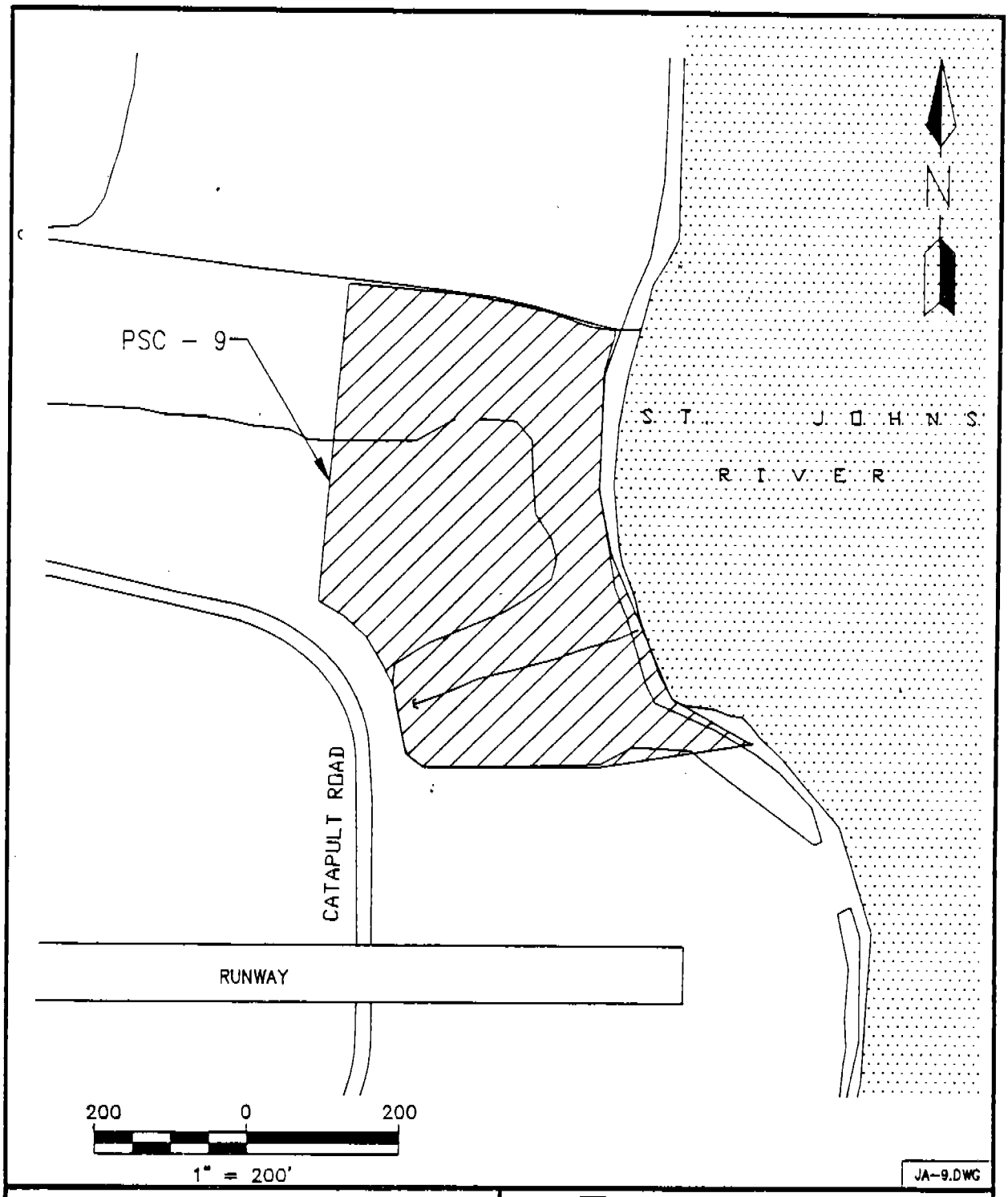
SEPTEMBER 1991

(Figure 3-10). This PSC contained construction debris, and a few 55-gallon drums. The Navy disposed of this material for approximately one year from 1977 to 1978.

3.2.5.10 PSC No. 10-Tank 119 K. The Navy stored hot stripper, MIL-R-81835 or Turco 3823 in an underground steel tank (capacity 25,000 gallons) at Tank No. 119 K located near Building 119 (Figure 3-11). A Navy contractor disposed of the contents of the tank offsite and the tank was removed in 1983.

3.2.5.11 PSC No. 11-Hangar Building 101. The floor of the main hangar section of Building 101 (Figure 3-12) is constructed of 6-inch thick reinforced concrete. Reportedly, unauthorized disposal of spent solvents (approximately 2,000 gallons) and other materials into abandoned hydraulic lift shafts occurred for many years. These shafts were concrete pits constructed in the floor of the hanger and covered with steel grates. Infiltration of spent solvents and other flammable liquids from deteriorated industrial sewer lines or disposal may also be responsible for the presence of flammable materials under the hangar floor. Information about specific waste materials is not available; however, chemicals used in Building 101, such as trichloroethene (TCE) and oils, might potentially reach this area. In addition, a spill of more than 150 pounds of mercury also occurred in the "old pump shop" in Building 101. Although the Navy removed most of the spilled mercury and sent it to reclaiming, reportedly, some mercury was not removed and remains at the PSC.

3.2.5.12 PSC No. 12-Old Test Cell Building. There were interconnections of the storm and sanitary sewers with the building roof drains in the vicinity of the old test cell area and Building 101 K (Figure 3-12). In addition, numerous spills of chemicals reportedly occurred at this PSC. In 1989, all of the cross connections were removed.



PSC – 9

OLD DISPOSAL AREA (EAST OF FUEL FARM)

FIGURE 3-10

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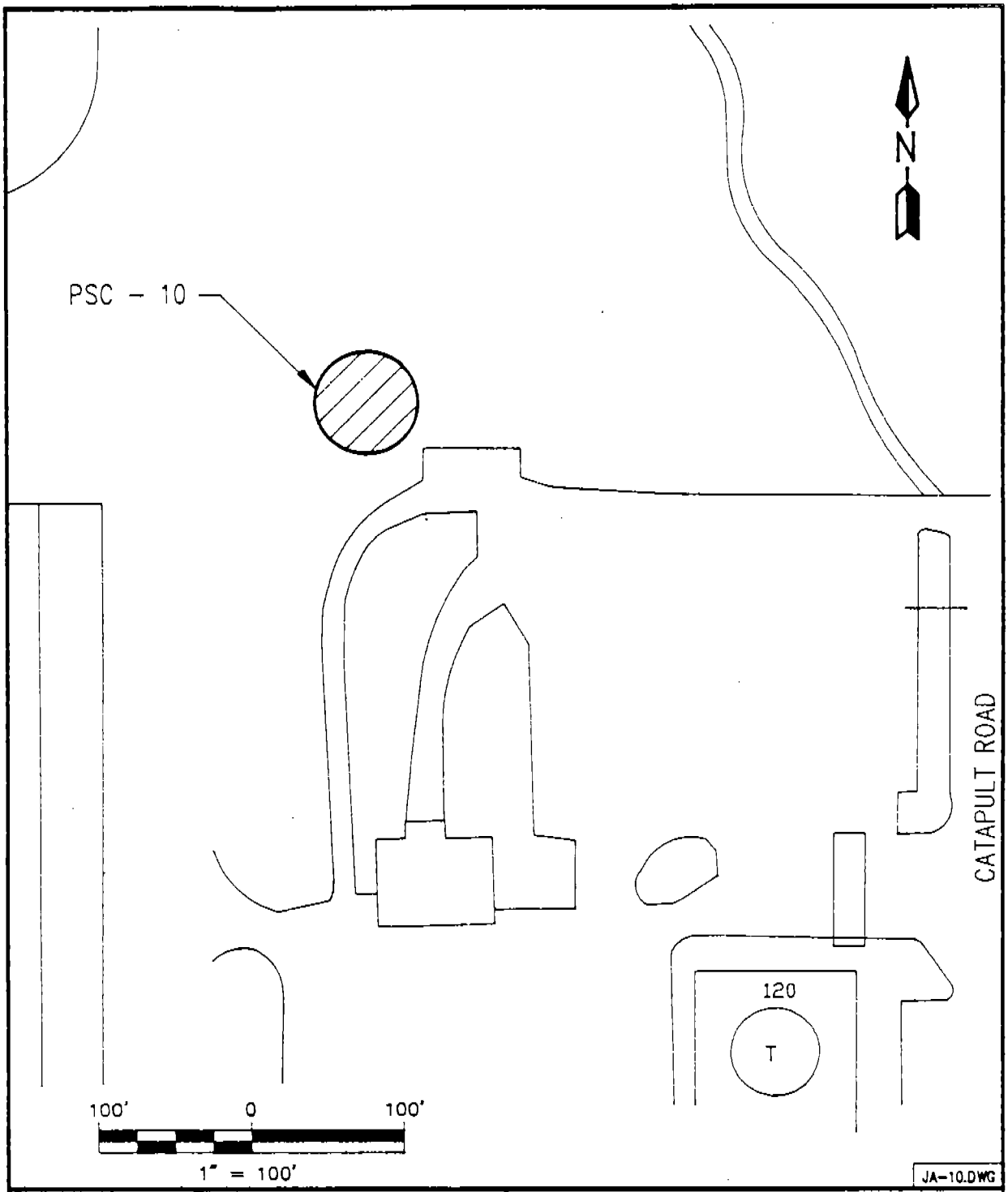
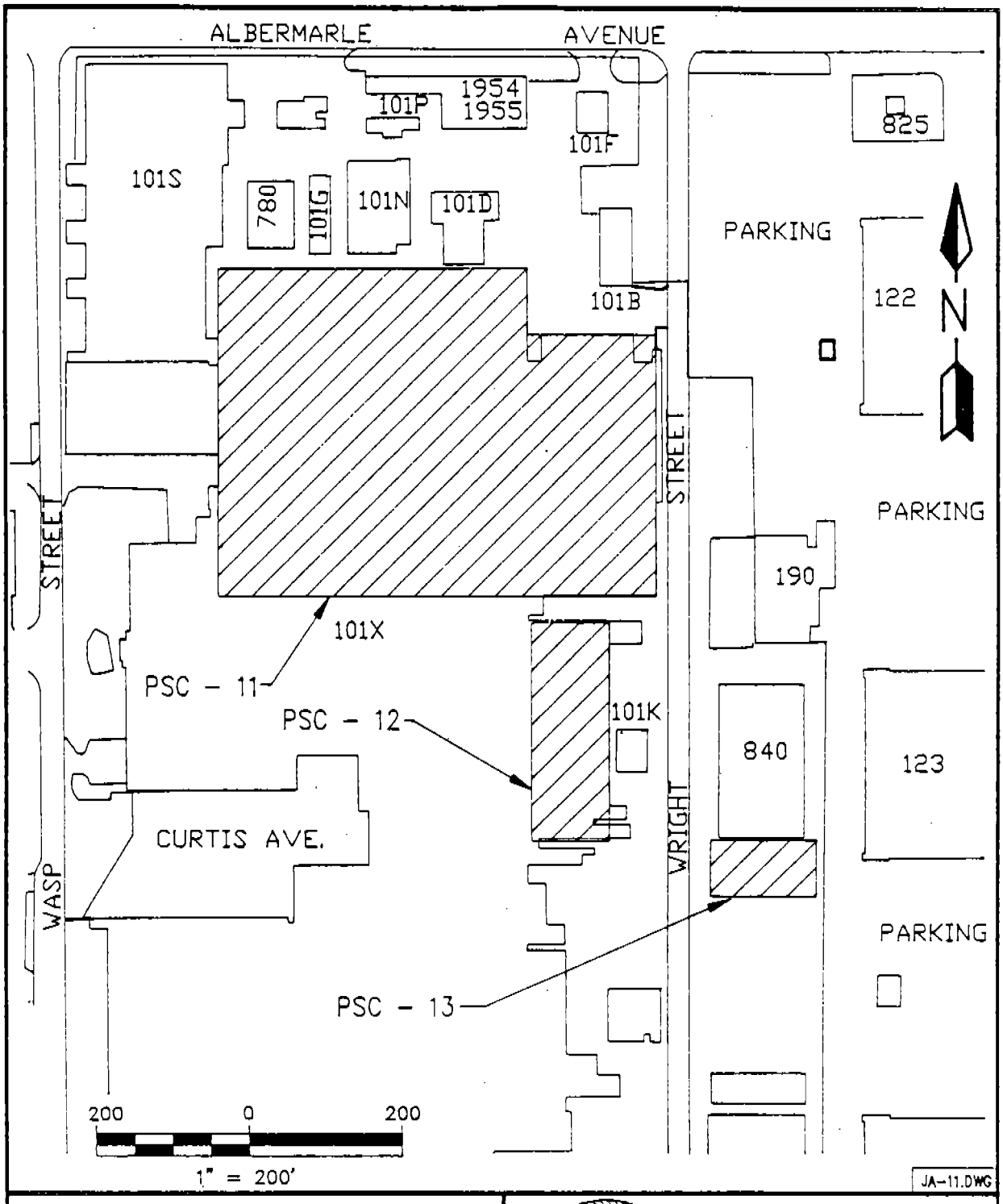


PSC - 10
TANK 119 K
FIGURE 3-11

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



PSC-11: HANGER BUILDING 101
PSC-12: OLD TEST CELL BUILDING
PSC-13: RADIUM PAINT DISPOSAL PIT
FIGURE 3-12

PROGRAM ORGANIZATION AND PLANNING

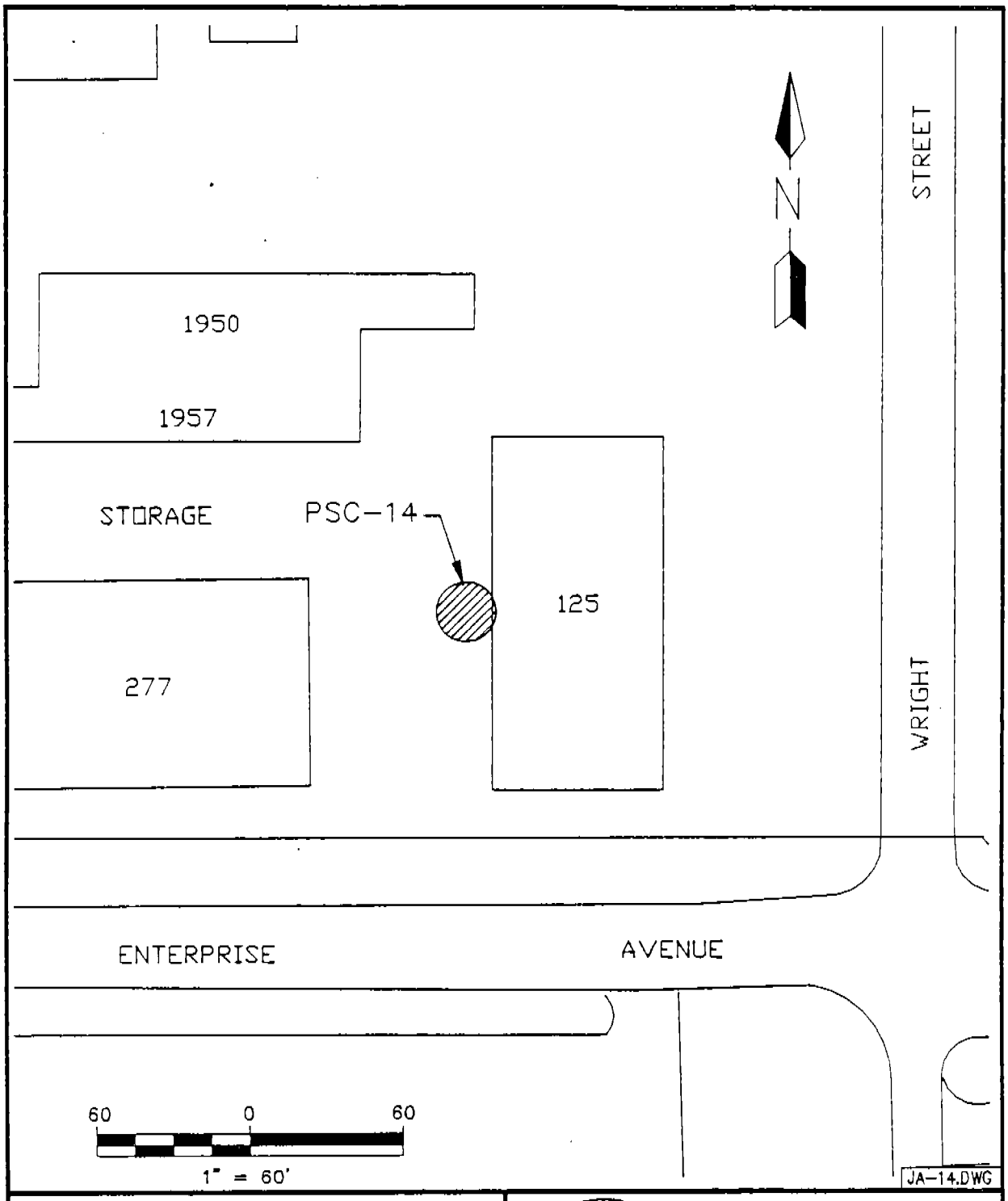
NAS JACKSONVILLE
SEPTEMBER 1991

3.2.5.13 PSC No. 13-Radium Paint Disposal Pit. The Navy used the area north of former Building 167 (Figure 3-12) for the disposal of radioactive radium paint waste from aircraft instrument dial painting operations which took place at NADEP during and shortly after World War II and continuing through the late 1950s. The Navy disposed of these wastes into a burial pit approximately 40 ft by 50 ft and less than a foot deep. The burial pit contained the paint wastes mixed with soil. This PSC was excavated in the late 1950s. At the time of excavation, radioactivity readings at the surface taken with a radiation survey meter were in the range of 3 to 5 millirems per hour (mR/hr) above background. The Navy reportedly moved the contaminated soil to the Radioactive Waste Fill Area, PSC No. 18.

3.2.5.14 PSC No. 14-Battery Shop. The battery shop is located in Building 125 (Figure 3-13). The shop contains a seepage pit where the Navy disposed of approximately 100 gallons of waste acid from lead-acid batteries from 1959 to 1982.

3.2.5.15 PSC No. 15-Solvent and Paint Sludge Disposal Area. This area is approximately 100 ft by 100 ft and is located south of the paint shop (Building 868) (Figure 3-14). The Navy used the area for disposal of solvents and paint sludges as recently as 1978. Materials Engineering Laboratory tested soil at the PSC and test findings reported the presence of "solvents of all types."

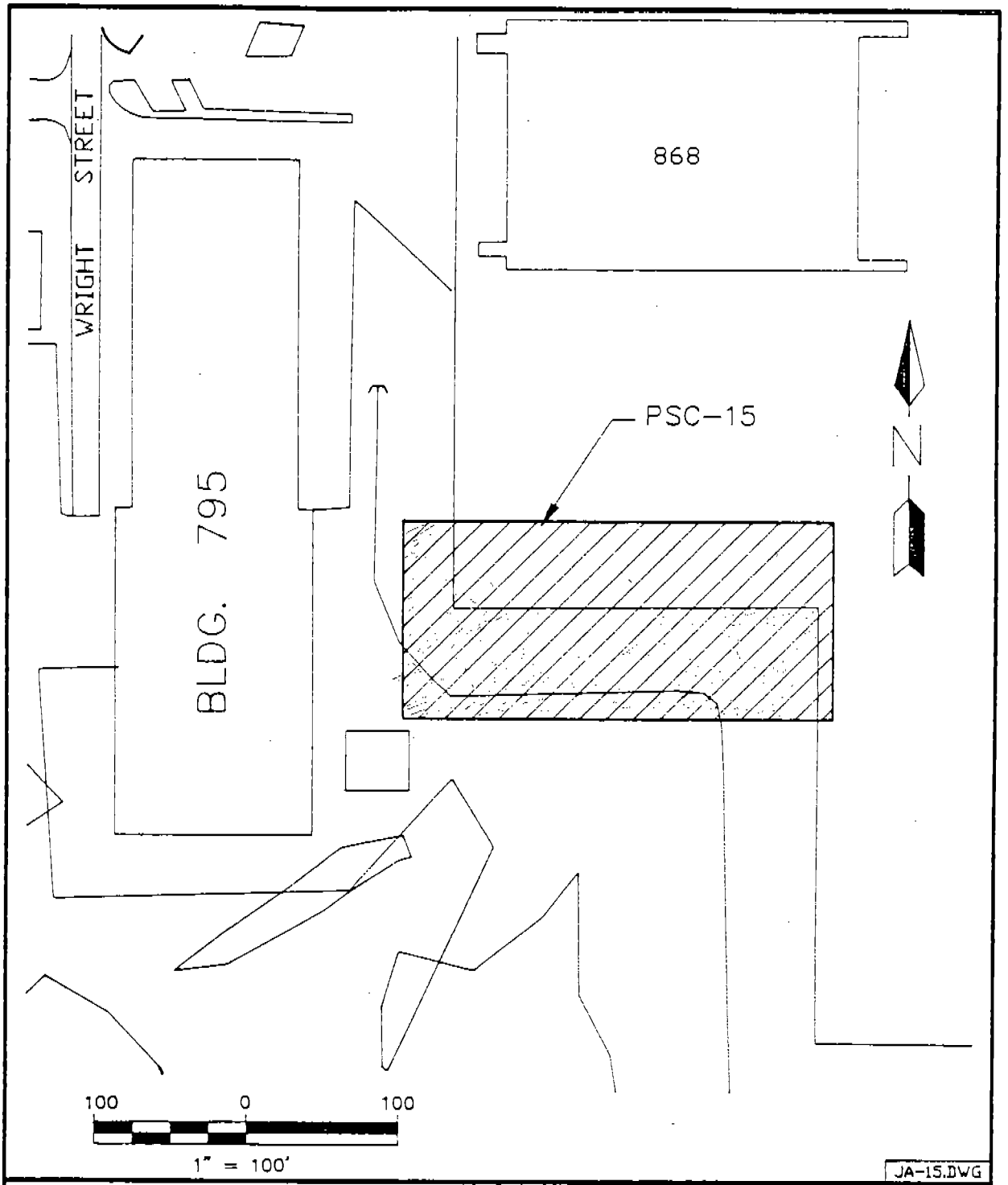
3.2.5.16 PSC No. 16-Storm Sewer Discharge - Black Point. A storm sewer is located along Buildings 101, 50, 795, and discharges at Black Point (Figure 3-15). Over the years, various chemical wastes drained into the storm sewer system through cross connections within the sanitary sewer system. These cross connections no longer exist. It is difficult to estimate the volume of material disposed in this way. The PSC is the outfall or discharge point.



PSC-14
BATTERY SHOP
FIGURE 3-13

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



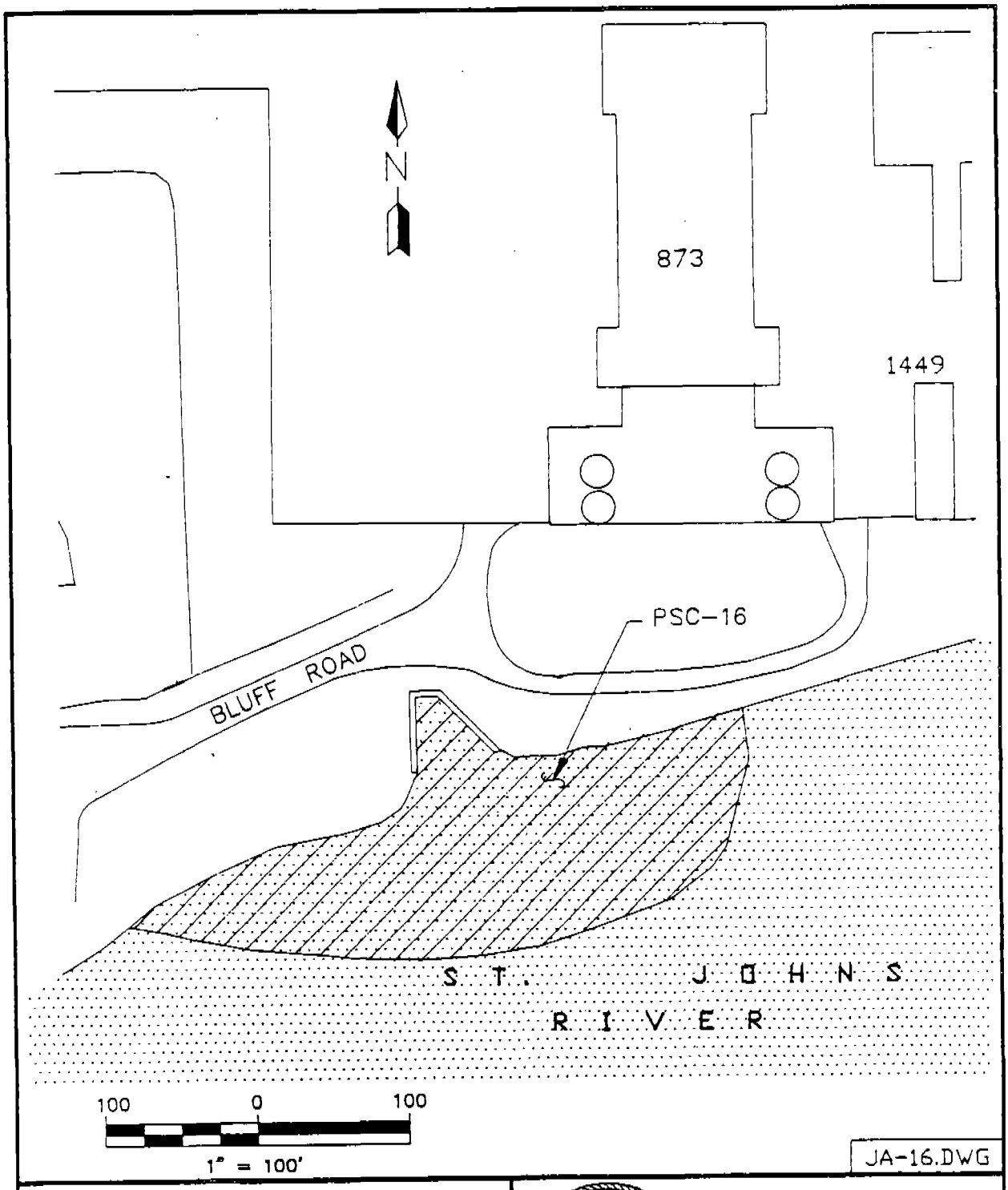
PSC-15

SOLVENT & PAINT SLUDGE DISPOSAL AREA

FIGURE 3-14

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



PSC-16

STORM SEWER DISCHARGE – BLACK POINT

FIGURE 3-15

PROGRAM ORGANIZATION AND PLANNING

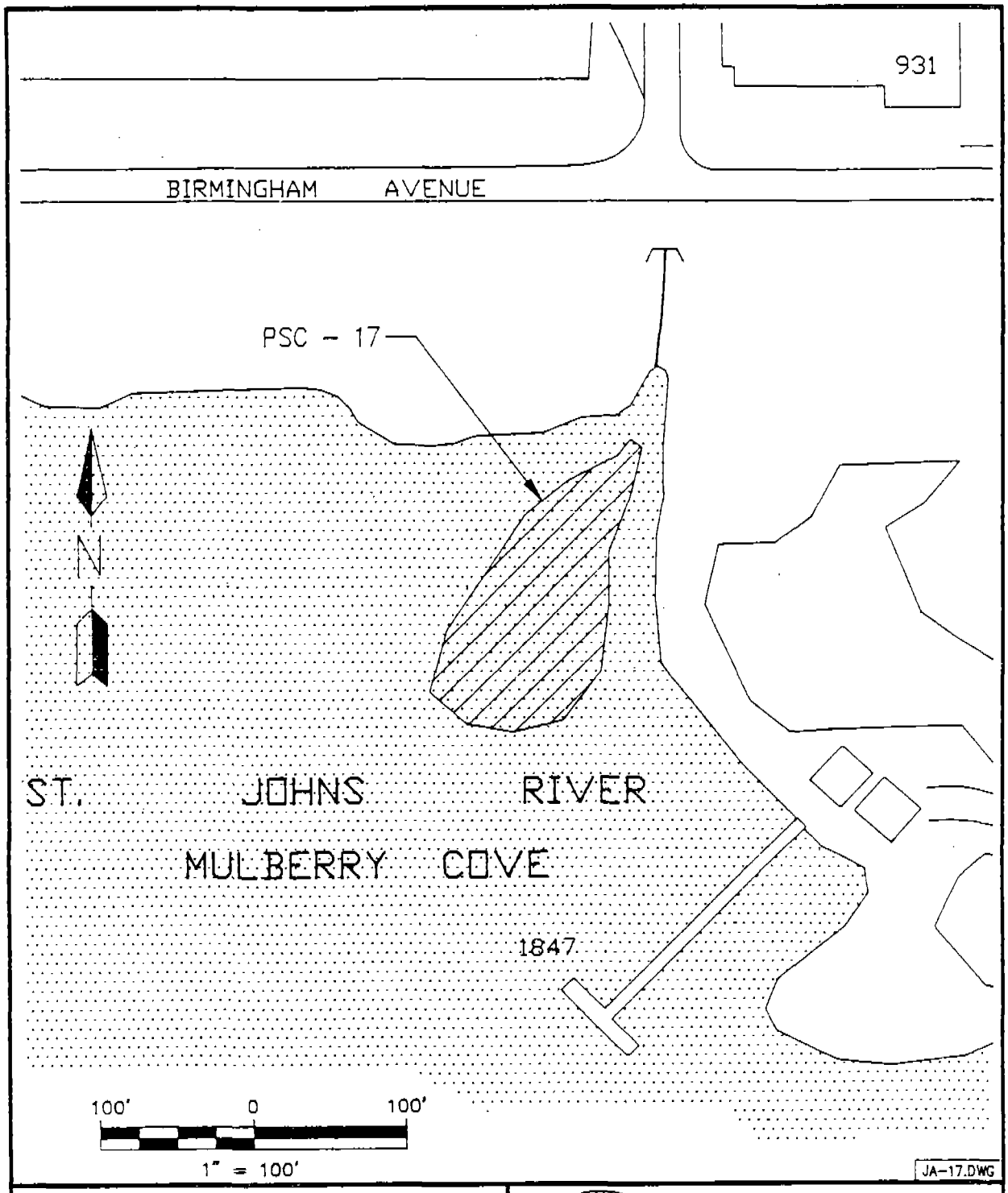
NAS JACKSONVILLE
SEPTEMBER 1991

3.2.5.17 PSC No. 17-Glass Bead Disposal Area. This area is located in Mulberry Cove (Figure 3-16). The Navy used the area for the disposal of spent glass beads used in the abrasive blasting operations conducted at NADEP. Disposal of the spent glass beads in this off-shore area began in 1965 and stopped in January 1981. There is visible evidence of a "glass bead bar" that has been created as a result of off-shore dumping.

3.2.5.18 PSC No. 18-Radioactive Waste Disposal Area. The Navy placed radioactive radium paint wastes from aircraft instrument dial stripping operations at NADEP during and after World War II in a burial site (PSC No. 13) until the late 1950s. Reportedly, when this operation ceased, the PSC was excavated. The Navy disposed of this excavated contaminated soil, approximately 1500 cubic feet, at PSC No. 18 located near the shoreline in the vicinity of Building 48 (Figure 3-17). This area was originally at water level, but was built up 3 to 5 feet by the fill material. When excavated, radiation measurements of the soil (using a radiation survey meter) were reportedly 3 to 5 mR/hr. At the time of the Site visit, surface measurements of radiation using a survey meter (NUCOR CRM 595 with CP 595 probe) were not significantly above background readings (0.15 mR/hr).

3.2.5.19 PSC No. 19-Old Gas Station. The old gas station was located at Building 48 (Figure 3-18). Formerly, the PSC contained two buried gasoline storage tanks that were in close proximity to a potable water well. The tanks leaked gasoline and were later abandoned. The potable water well was also abandoned. Response actions are being performed by the UST Program, in accordance with Chapter 17-770, FAC.

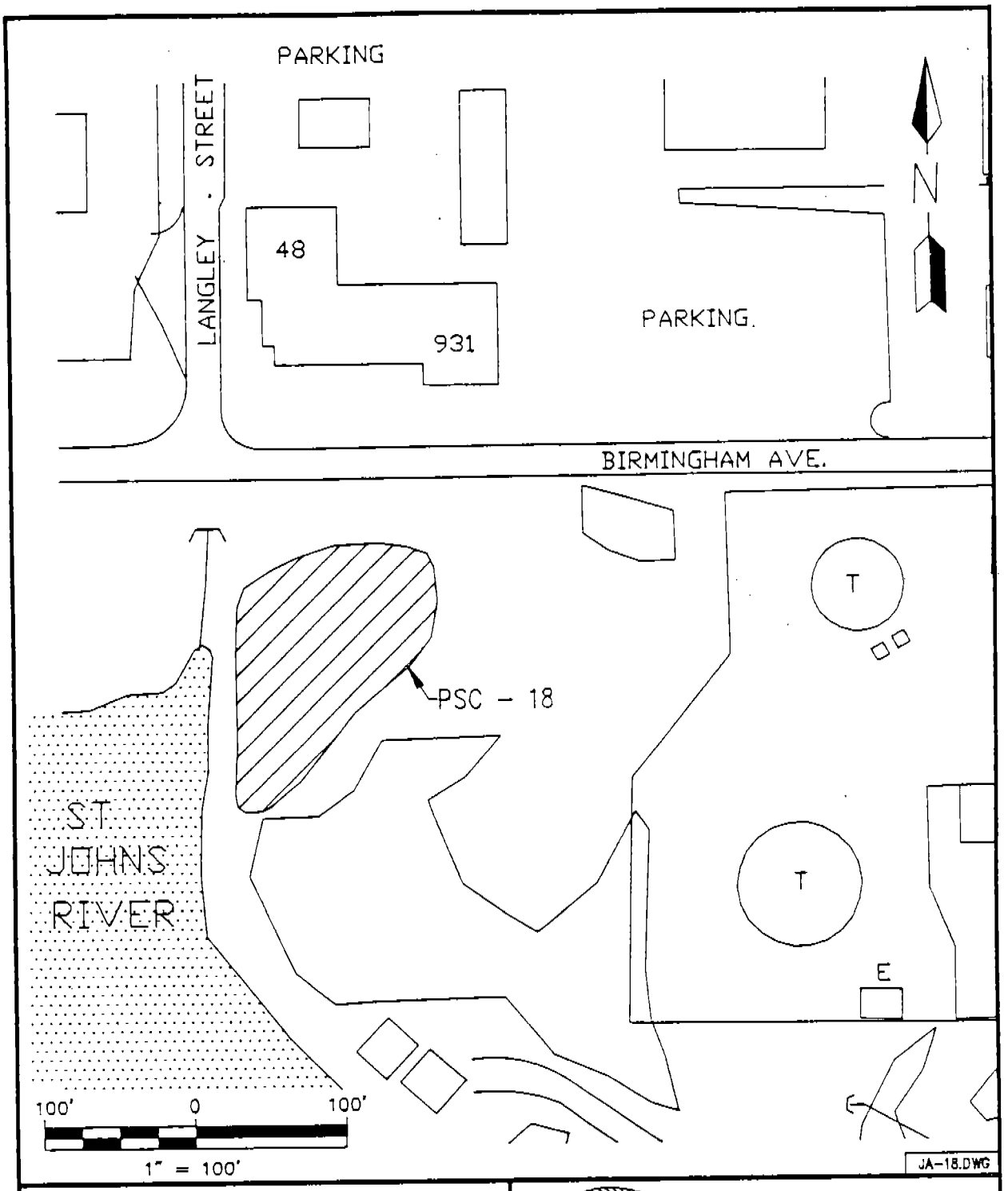
3.2.5.20 PSC No. 20-Solid Waste Incinerator. The solid waste incinerator was located in Building 952 (Figure 3-19). The ash and solid residues resulting from incineration were taken to the Clay County Landfill. There is no evidence of hazardous wastes being either spilled or disposed at this PSC.



PSC - 17
GLASS BEAD DISPOSAL AREA
FIGURE 3-16

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



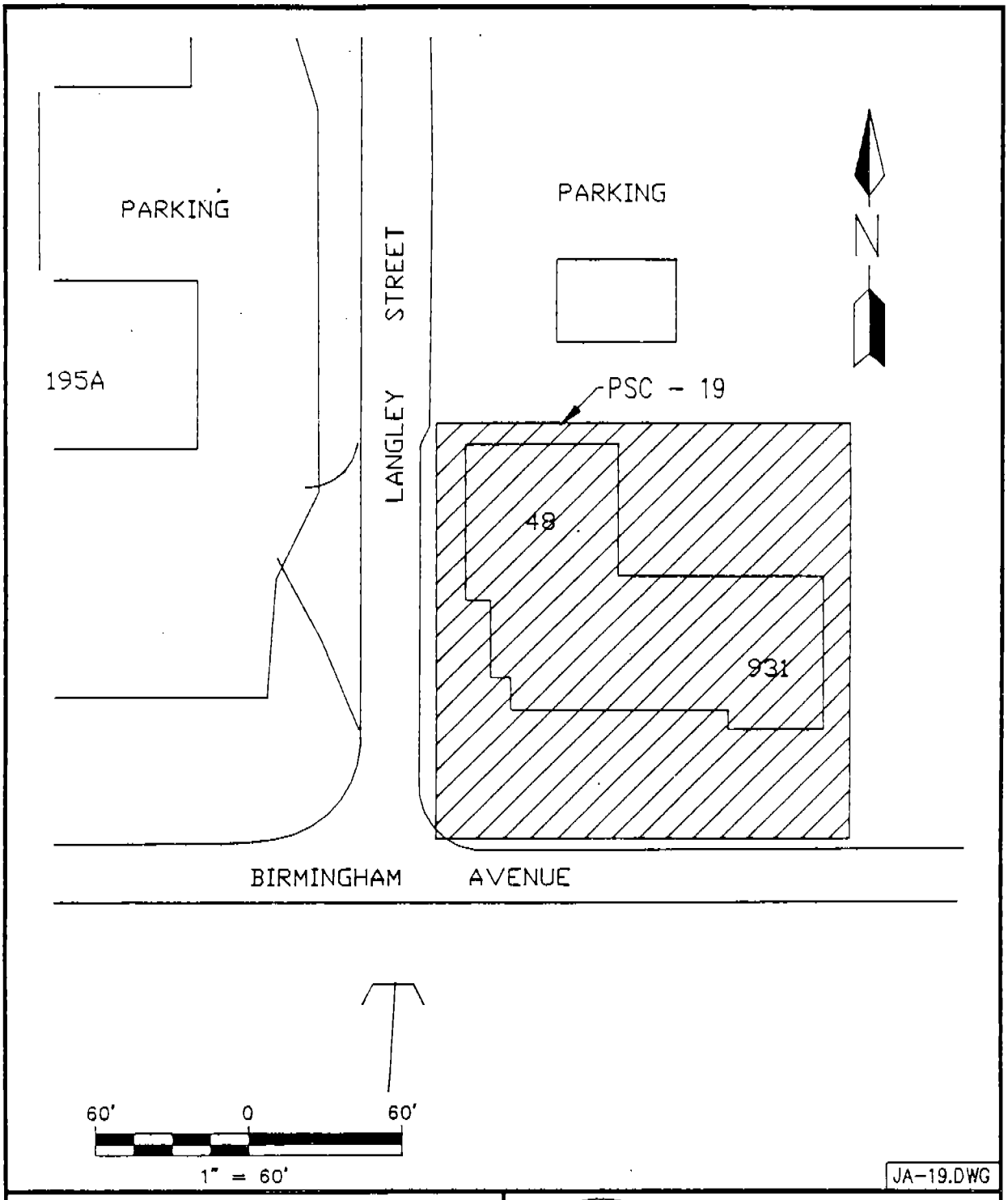
PSC - 18

RADIOACTIVE WASTE DISPOSAL AREA

FIGURE 3-17

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



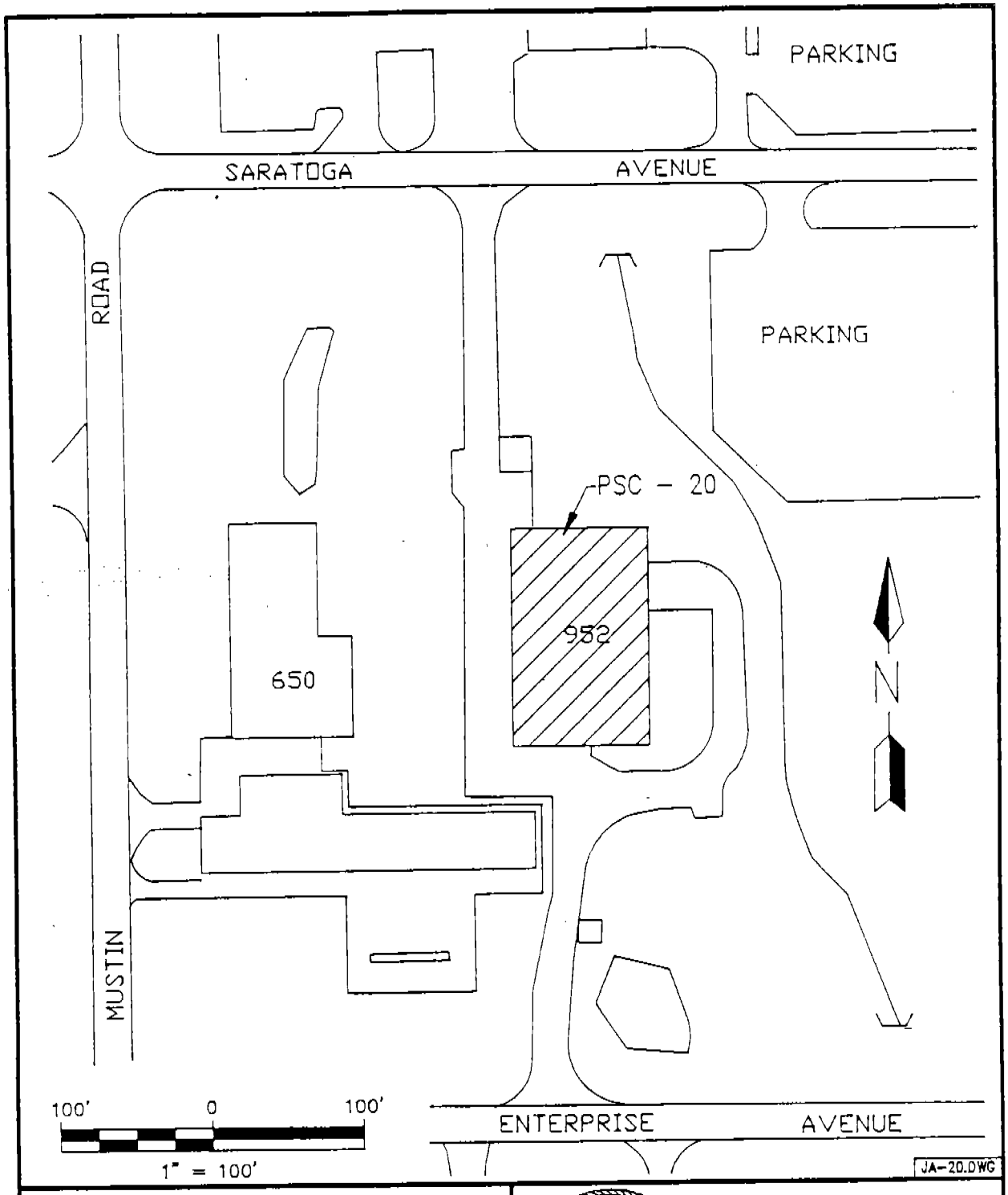
PSC - 19

OLD GAS STATION

FIGURE 3-18

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



PSC - 20

SOLID WASTE INCINERATOR

FIGURE 3-19

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

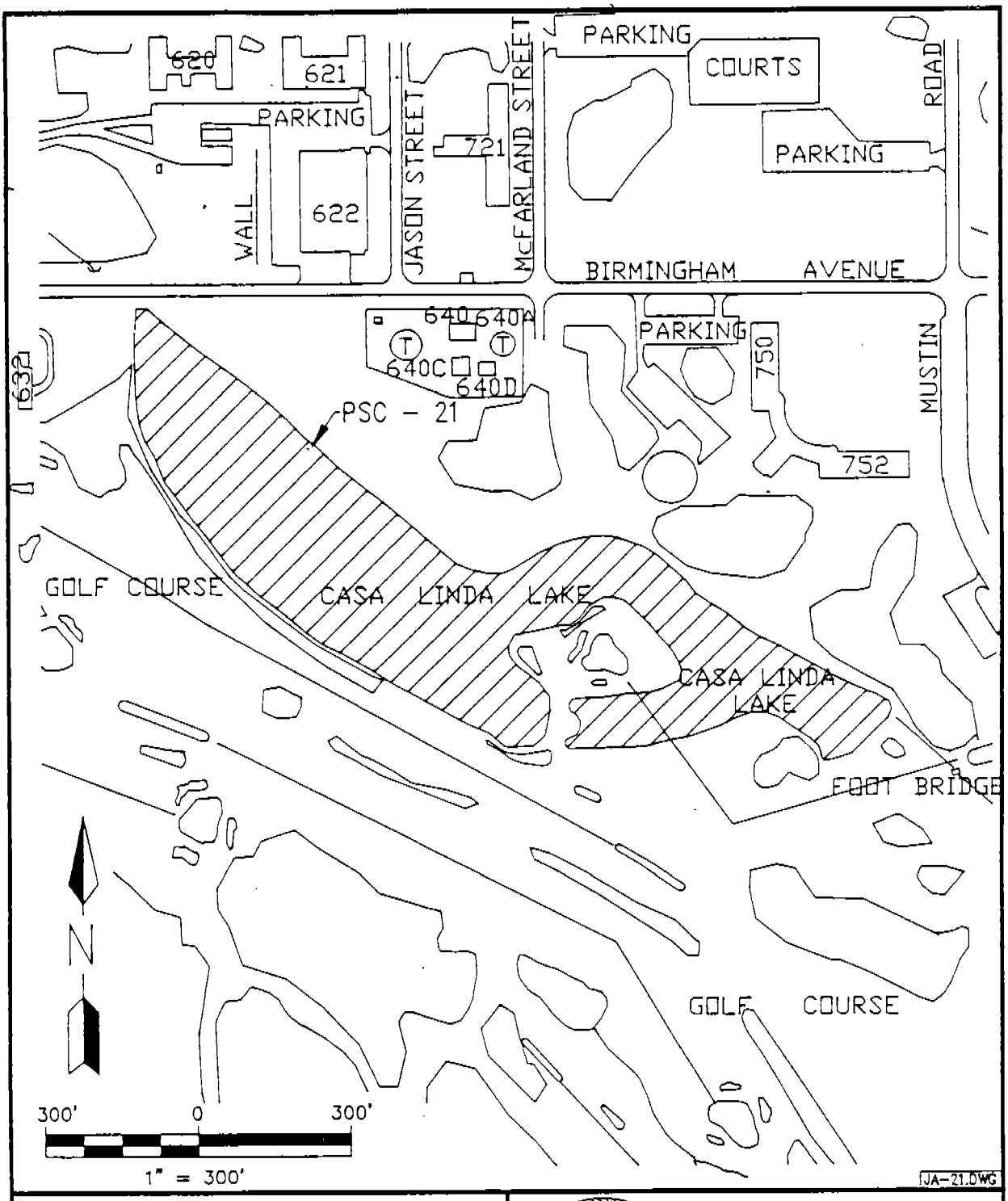
3.2.5.21 PSC No. 21-Golf Course (Casa Linda Lake). The pesticide Dasanit™ was occasionally applied to the golf course greens to control mole crickets (Figure 3-20). On April 30, 1979, the Navy applied this pesticide to the greens. On May 6, 1979, a fish kill resulted following several days of heavy rain. The fish kill in Casa Linda Lake later was attributed to runoff of pesticides into the lake. This was an isolated incident.

3.2.5.22 PSC No. 22-"Fort Dix". Reportedly, the Navy used the area known as Fort Dix (Figure 3-21) as a small arms ammunition disposal area for the target or skeet ranges. There was no visible evidence of disposal during the Site inspection.

3.2.5.23 PSC No. 23-Old Skeet Range. This area appears to be an old sand pit. It is approximately 500 ft long by 100 ft wide and is located adjacent to the golf course (Figure 3-22). Cinder piles and disturbed ground, a few empty drums and engine containers that were pushed over an embankment, and two two-inch white PVC standpipes are visible at the PSC.

3.2.5.24 PSC No. 24-Scrap Metal Disposal Area. The scrap metal disposal area was located beneath the Housing Institute (Figure 3-23) which the Navy constructed as a training center for housing management at this PSC. There was scrap metal piled in the area along with assorted junk truck parts and empty drums. It is assumed that scrap metal was disposed offsite.

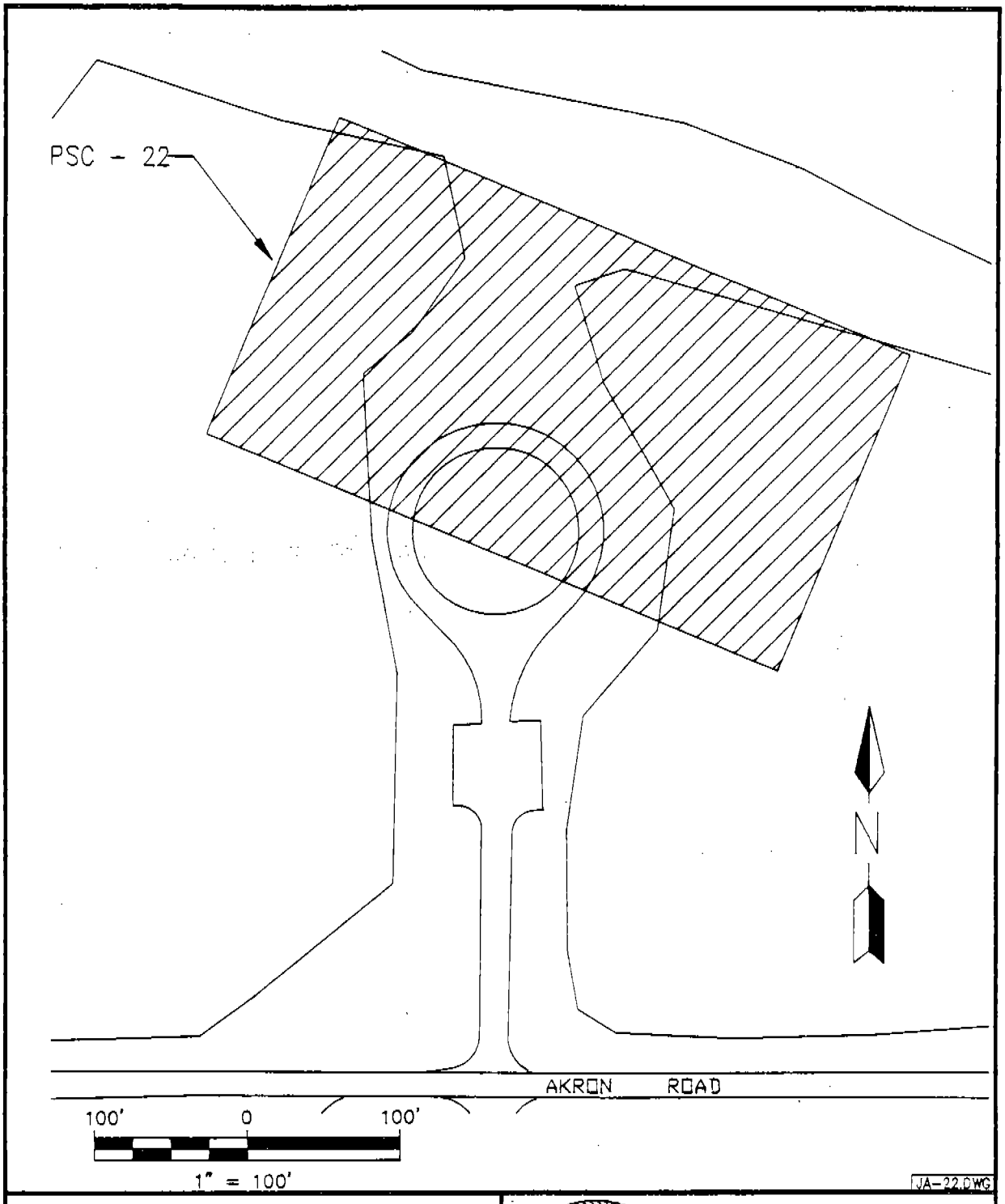
3.2.5.25 PSC No. 25-Former Building No. 2038 (Naval Hospital, Ex-Radioactive Waste Storage Area). The Navy used this area, adjacent to Building 2038 (Figure 3-24), for the storage of hospital wastes containing radioactive iodine (I_{25}) and other radioisotopes. The site was cleaned by a contractor, surveyed, and determined to be free of radiation. Building 2038 was subsequently demolished.



PSC - 21
GOLF COURSE
(CASA LINDA LAKE)
FIGURE 3-20

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



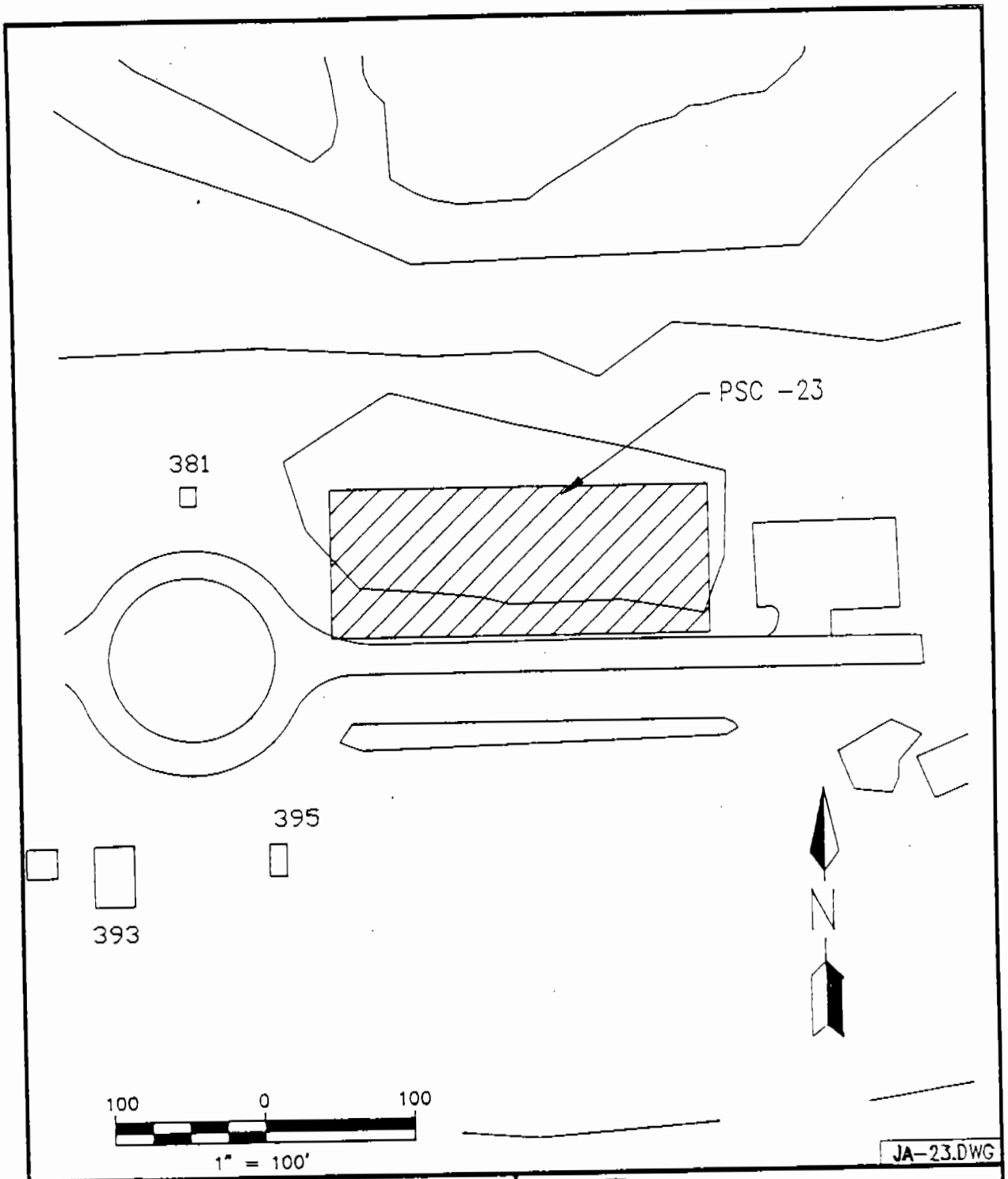
PSC - 22

"FORT DIX"

FIGURE 3-21

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



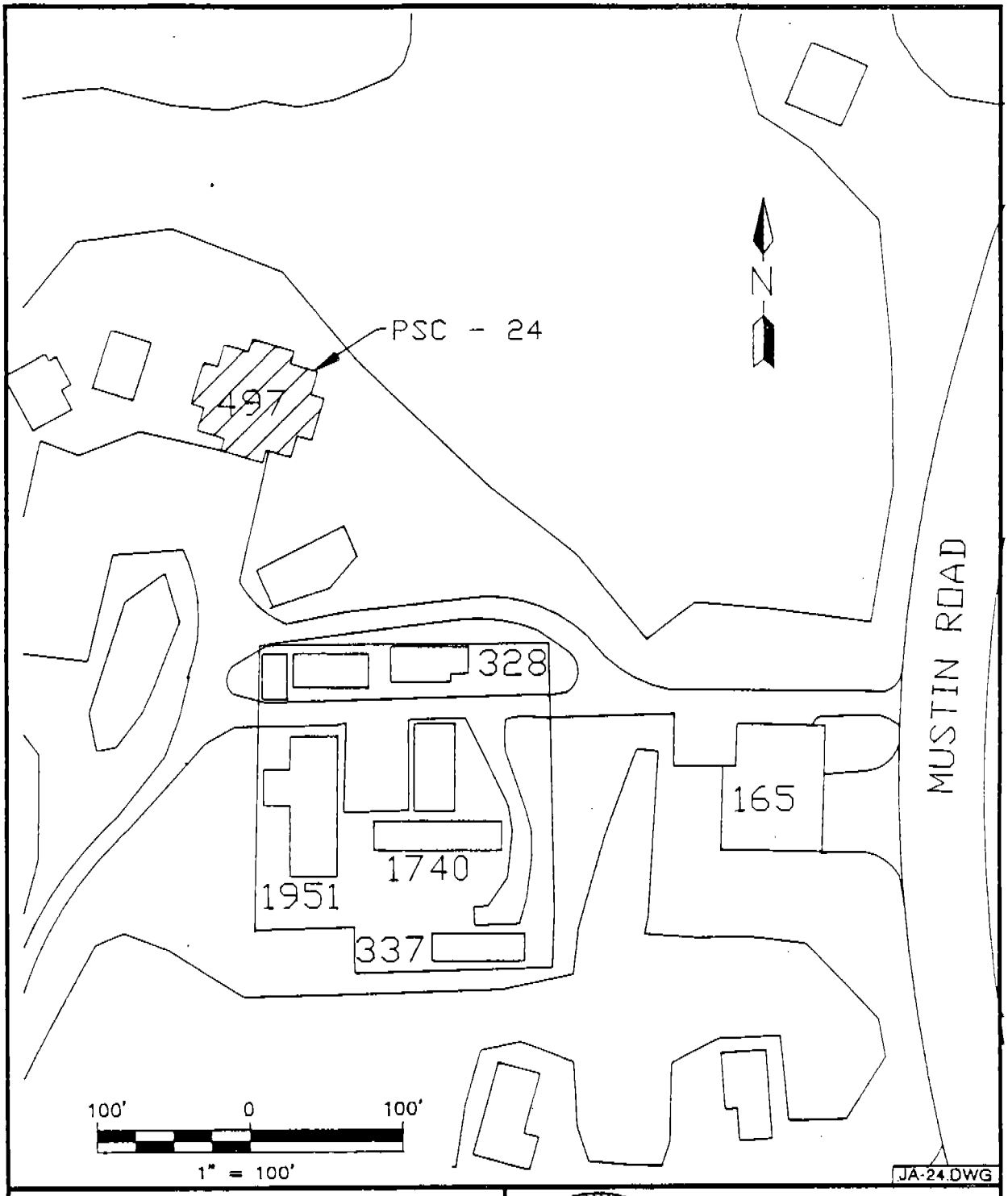
PSC-23

OLD SKEET RANGE

FIGURE 3-22

PROGRAM ORGANIZATION AND PLANNING

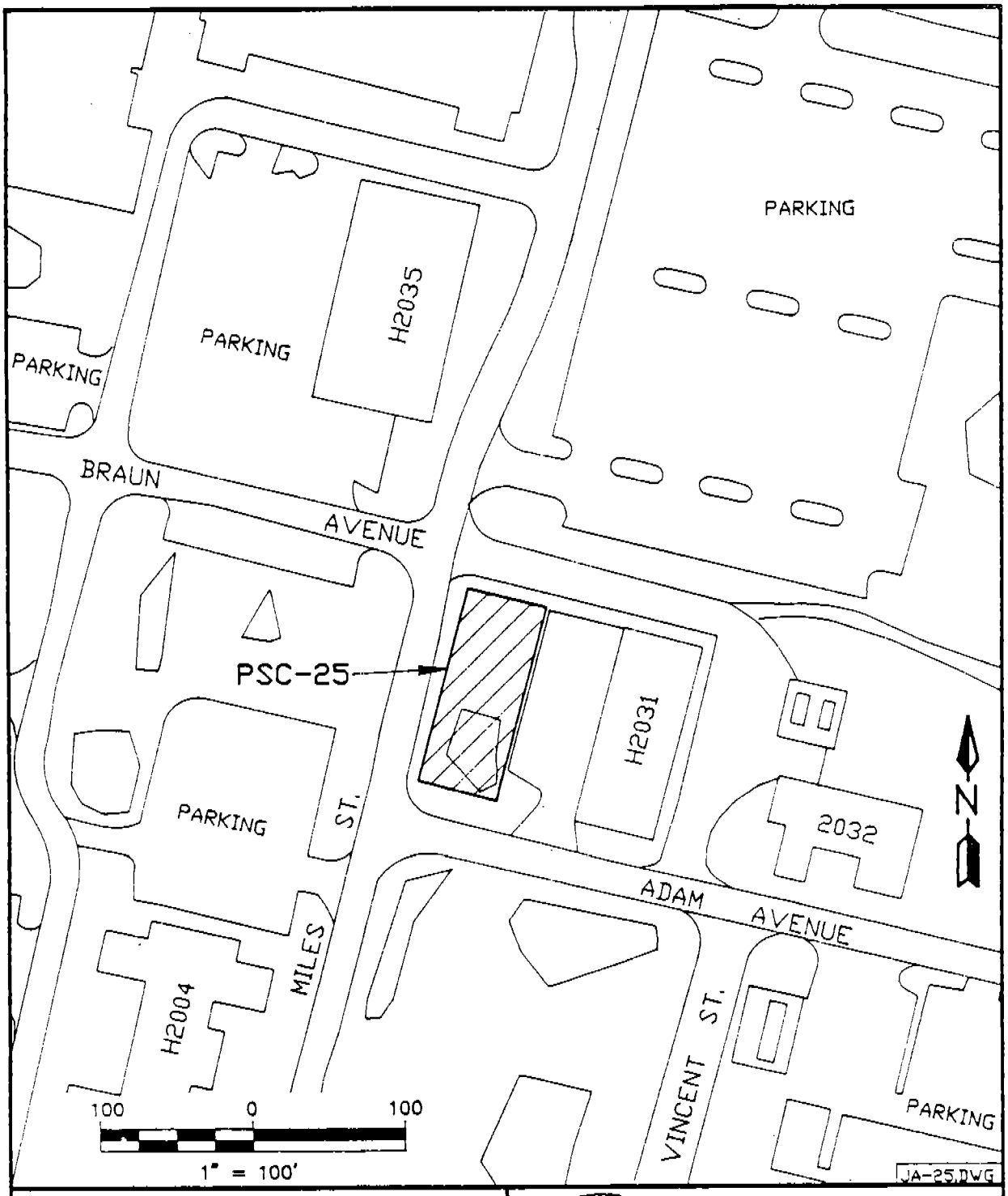
NAS JACKSONVILLE
SEPTEMBER 1991



PSC - 24
SCRAP METAL DISPOSAL AREA
FIGURE 3-23

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



PSC – 25
FORMER BUILDING NO. 2038
NAVAL HOSPITAL
(EX-RADIOACTIVE WASTE STORAGE AREA)

FIGURE 3-24

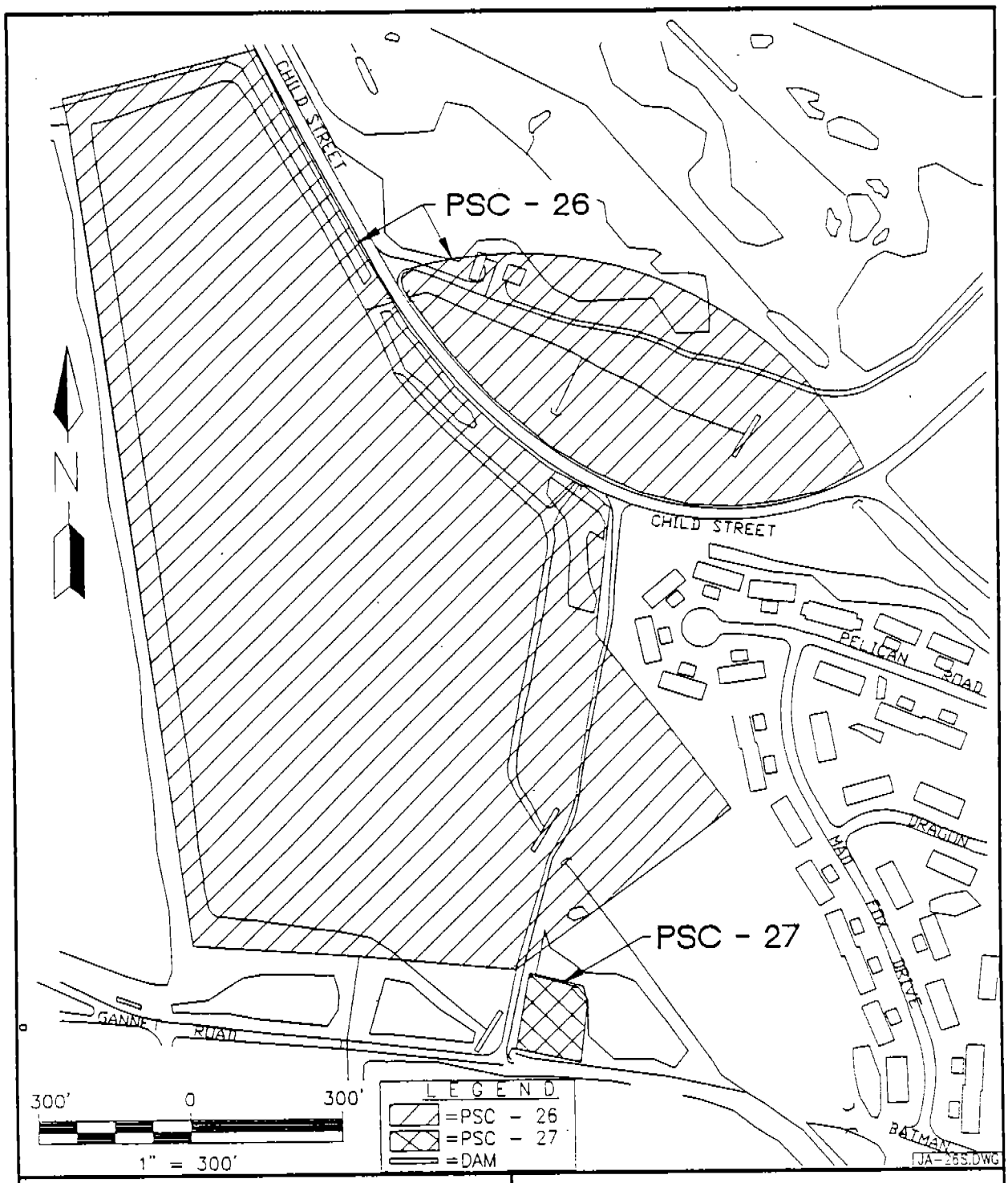
PROGRAM ORGANIZATION
AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

3.2.5.26 PSC No. 26-Old Main Registered Disposal Area. The Navy used this area for the disposal of a variety of wastes, including spent solvents and spent oils. Before 1940, the U.S. Army controlled and utilized the PSC (Figure 3-25) for disposal of debris. From 1940 to 1968, the Navy operated the PSC as a disposal area for solid waste, demolition and construction debris, and spent solvents and oil. The Navy burned these wastes at the edge of trenches and pits, with the remains bulldozed into the trenches and pits and covered. Air pollution control requirements halted burning, and the solid wastes were then hauled offsite by a contractor. However, the Navy continued to dump spent solvents and oil in the pits. The Navy officially closed the PSC on January 15, 1979.

The Navy also used a portion of the disposal area for the disposal of low level radioactive wastes during World War II and until 1955. Instruments with radium dials and other low-level radioactive wastes were probably disposed at PSC No. 26. Although the Navy did not consider the radiation levels measured at the time of disposal significant, the area was decontaminated. A contractor for the Navy excavated and placed dirt in approximately 500 steel drums for disposal at an approved facility in Barnwell, South Carolina.

3.2.5.27 PSC No. 27-Ex-PCB Storage Area. The Navy used this area, approximately 100 ft by 100 ft, for the outdoor storage of transformers containing PCBs (Figure 3-25). The transformers were vandalized in 1978 resulting in the spillage of transformer fluids on the ground. The Navy removed the transformers and the PCB-contaminated soil was removed and disposed offsite.



PSC-26
OLD MAIN REGISTERED DISPOSAL AREA
AND PSC-27
FORMER PCB STORAGE AREA
FIGURE 3-25

RI/FS WORK PLAN
FOR OU1

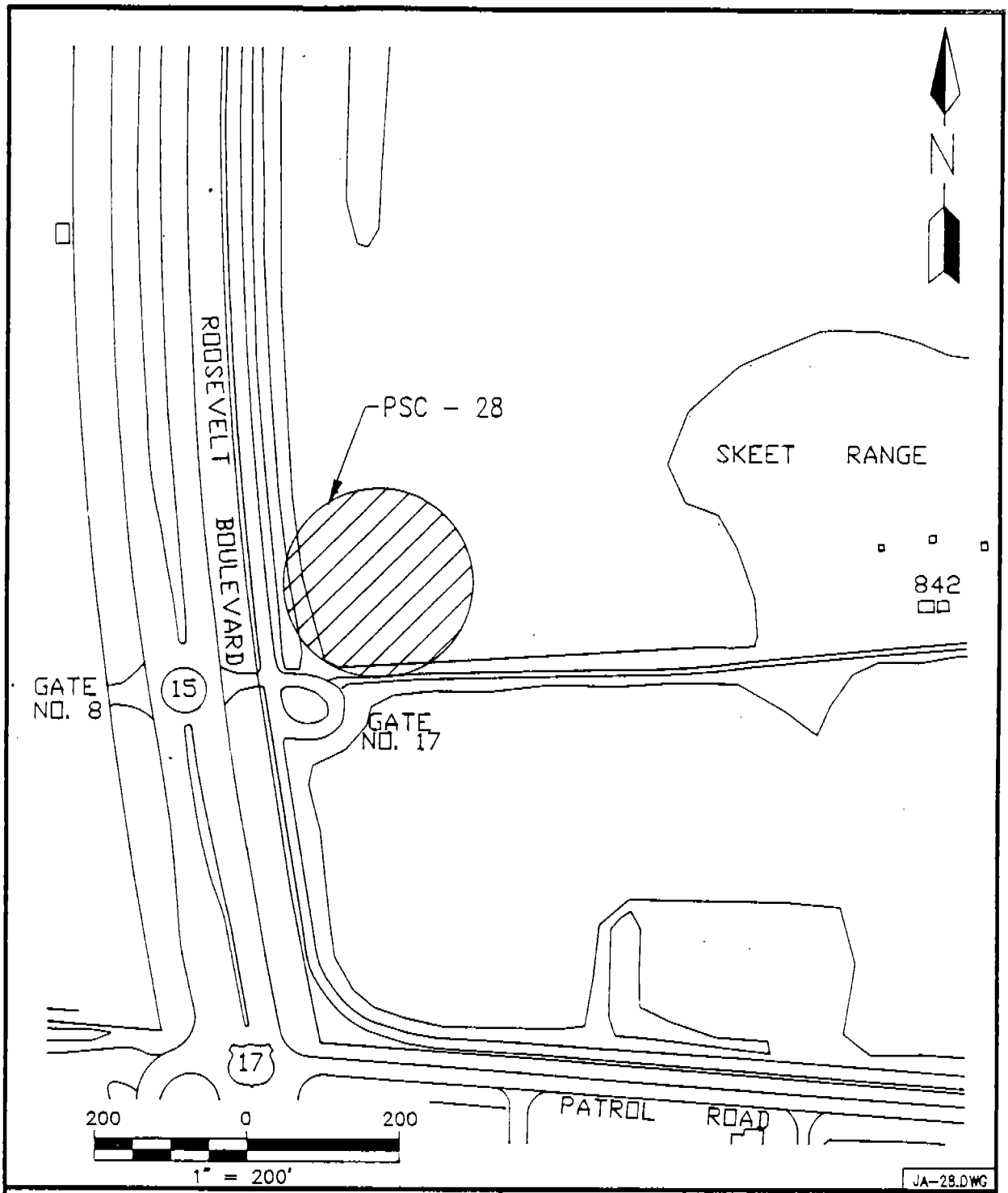
NAS JACKSONVILLE
SEPTEMBER 1991

3.2.5.28 PSC No. 28-Ex-Fire Fighting Training Area. This site was a former fire fighting training area. The fire pit was located in the vicinity of the patrol road turnaround (Figure 3-26). Approximately 5 to 10 gallons/day of spent oil was placed in the pit and burned from 1946 to 1952. There was no visible evidence of the pit during the site survey conducted during the week of January 21, 1990.

3.2.5.29 PSC No. 29-Organic Disposal Area. The Navy used the area (Figure 3-27) for the disposal of organic debris (wood, grass clippings, etc.). Reportedly the Navy disposed of materials other than organic debris in this area. Inspection of the PSC shows evidence of approximately one dozen crushed drums, construction debris, discolored soil, and scrap metal. Historically, the disposal area may have been used as a borrow pit. Quantities, types of wastes, and dates of disposal are not known.

3.2.5.30 PSC No. 30-Old Drum Lot. The Navy used this site (Figure 3-28) for the storage of drums containing raw products; the Navy stored the drums on Marsden Matting. The Navy stored approximately 10,000 drums at this PSC from 1955 to 1967. Although there is no visible evidence of environmental impairment at this PSC, it has been reported that on occasion drums containing hazardous materials have corroded and leaked their contents onto the ground.

3.2.5.31 PSC No. 31-Asphalt Mix Area. This PSC is located at the Public Works Materials Lay Down Area (Figure 3-29). The Navy was reported to have stored leaking drums containing asphalt mix materials in this area. There is no visible evidence of contamination. The area is presently used by the public works department for storage of equipment, materials, and old vehicles.



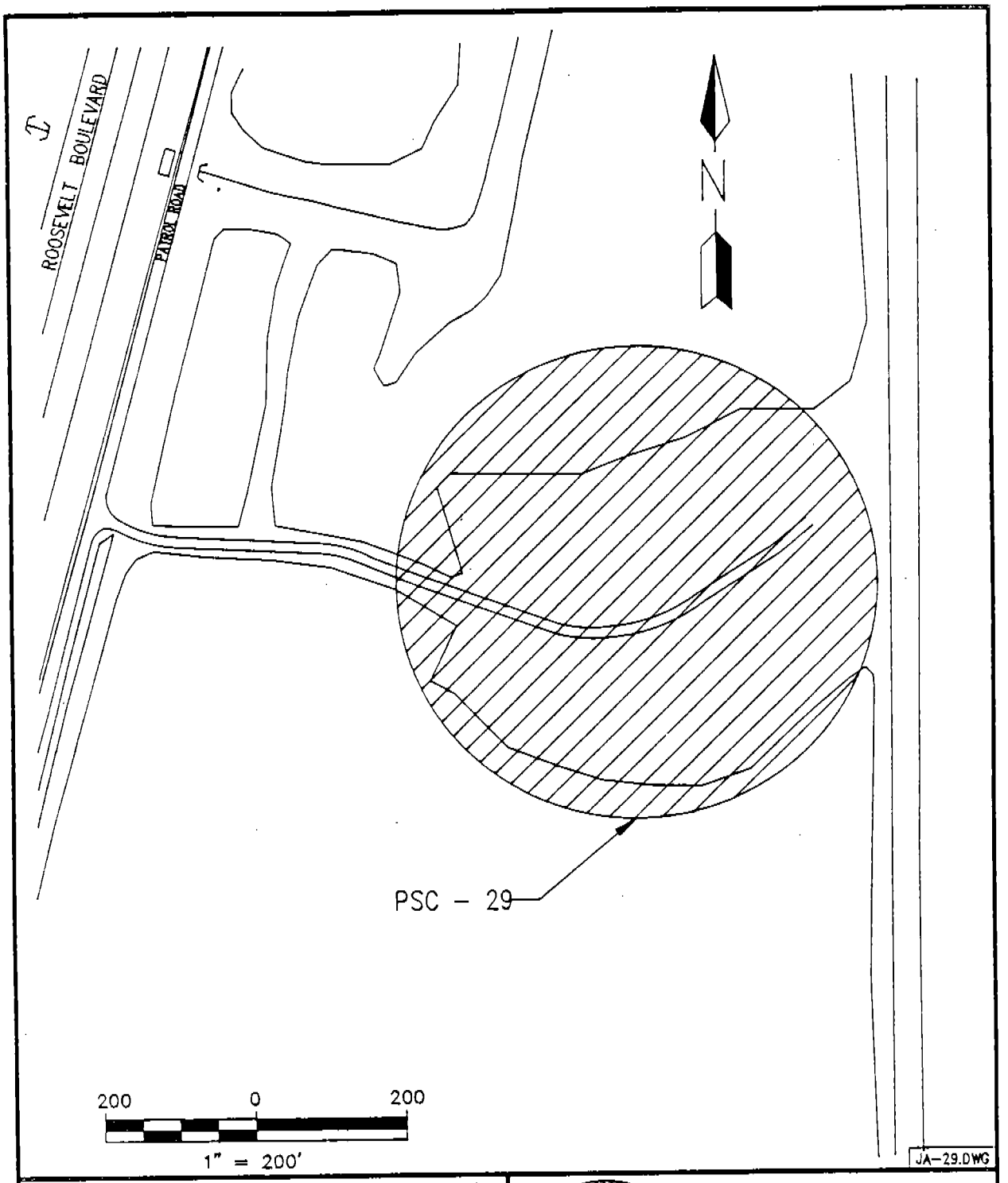
PSC - 28

EX - FIRE FIGHTING TRAINING AREA

FIGURE 3-26

PROGRAM ORGANIZATION AND PLANNING

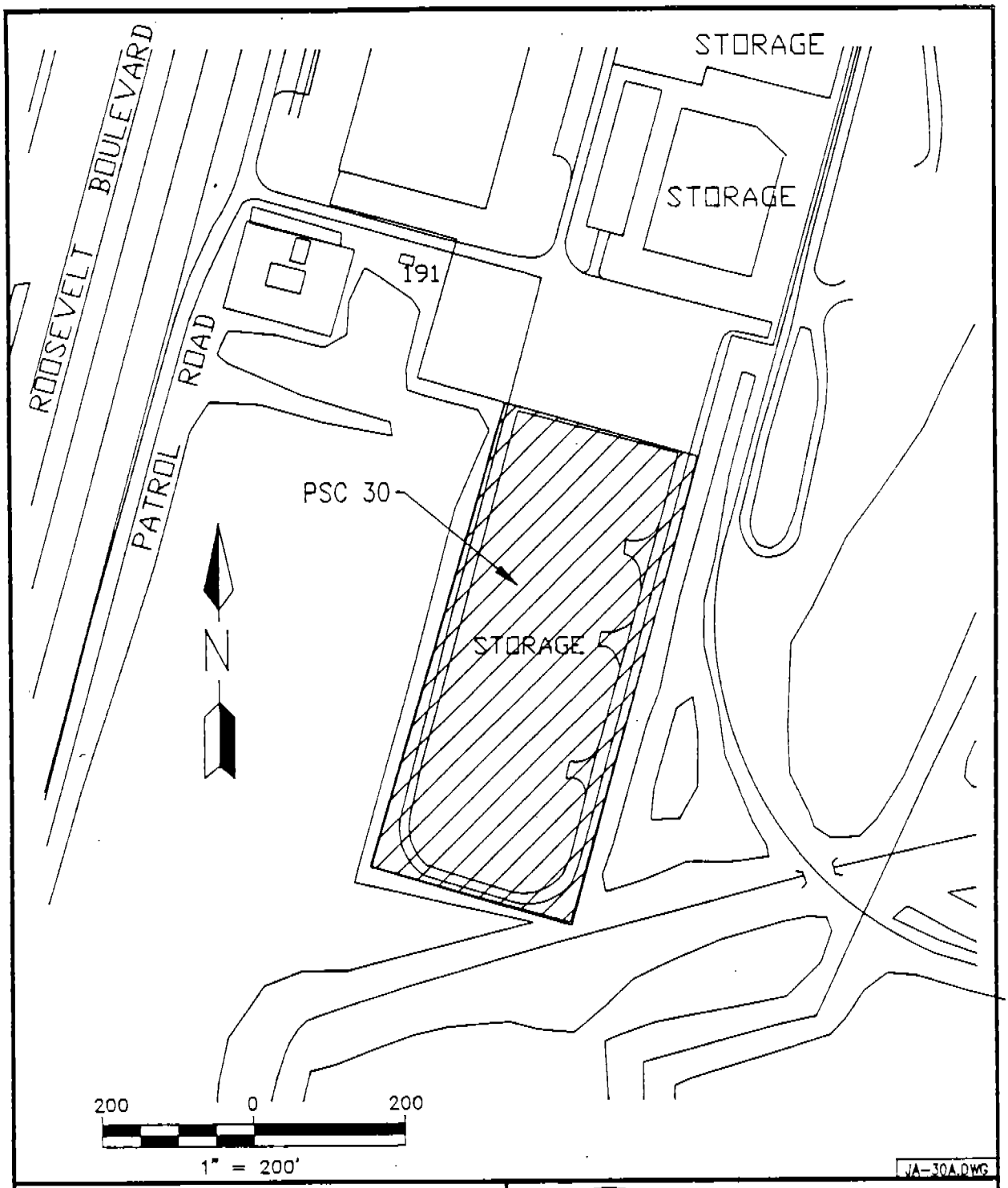
NAS JACKSONVILLE
SEPTEMBER 1991



PSC - 29
ORGANIC DISPOSAL AREA
FIGURE 3-27

PROGRAM ORGANIZATION AND PLANNING

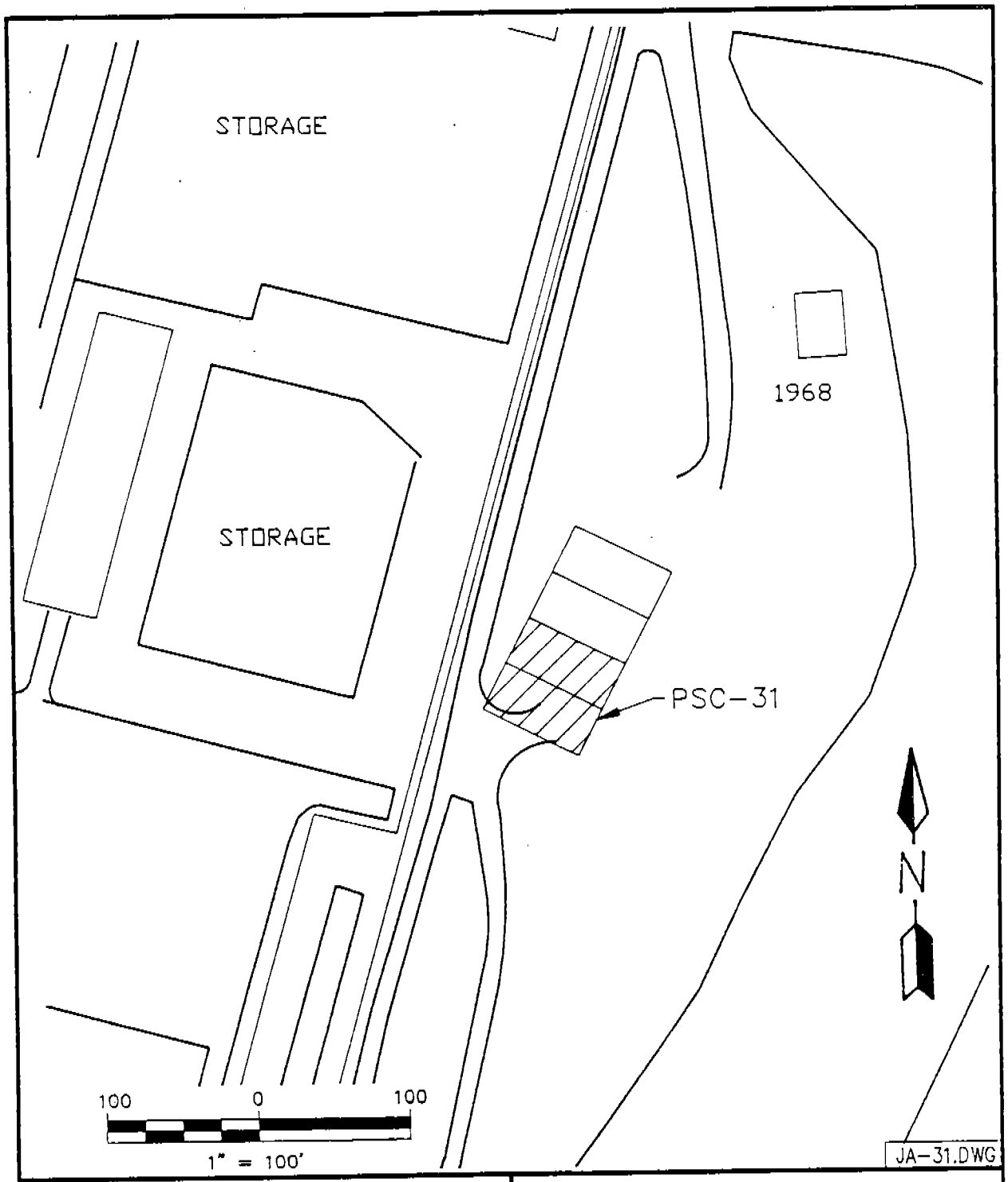
NAS JACKSONVILLE
SEPTEMBER 1991



PSC - 30
OLD DRUM LOT
FIGURE 3-28

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



PSC-31
ASPHALT MIX AREA
FIGURE 3-29

PROGRAM ORGANIZATION
AND PLANNING

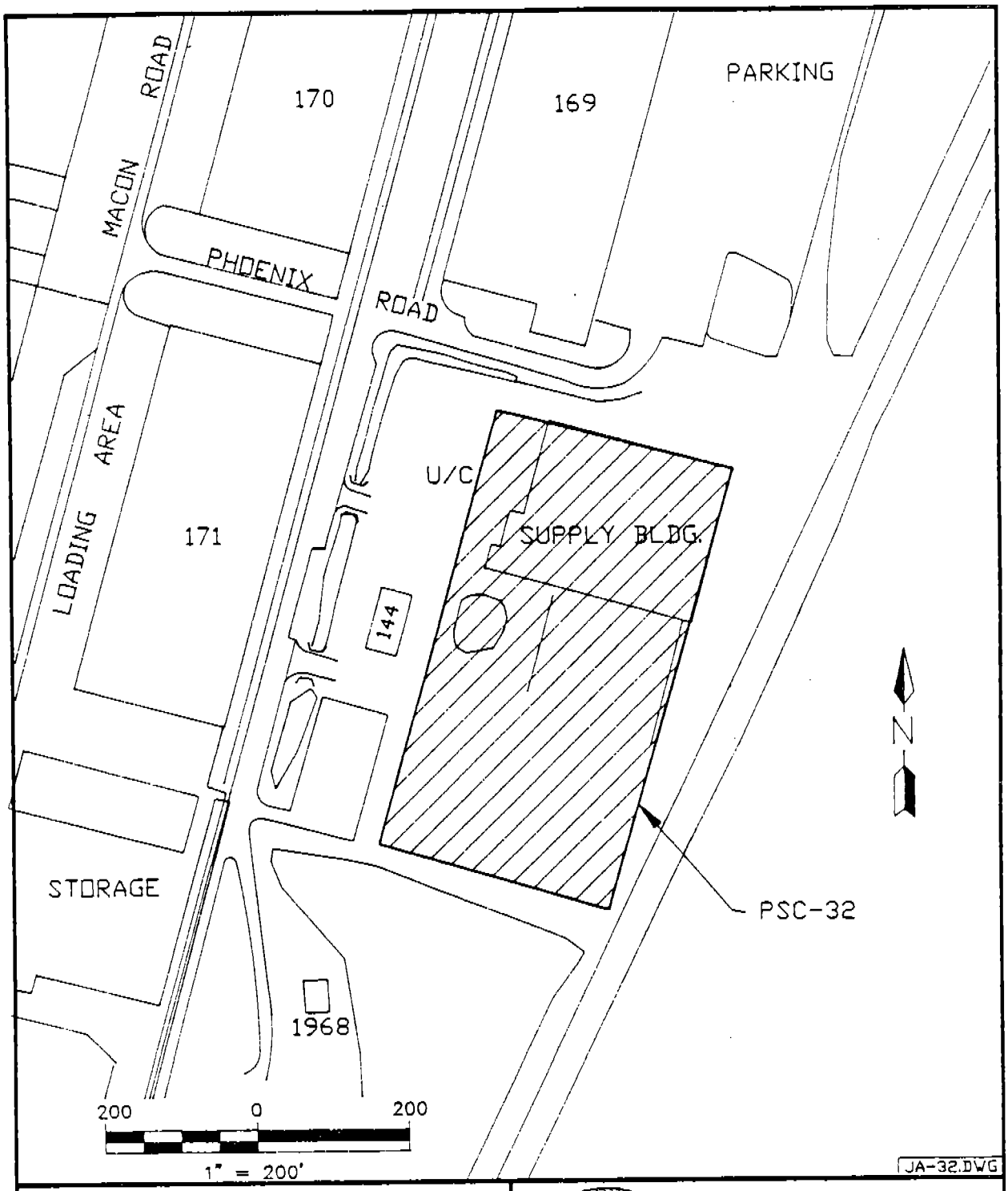
NAS JACKSONVILLE
SEPTEMBER 1991

3.2.5.32 PSC No. 32-Ex-Base Landfill. The Navy used the old Base landfill (Figure 3-30) during the 1960s for disposing of soil, refuse, construction debris, old vehicles, and household refuse (in dumpsters). This PSC covers approximately five acres.

3.2.5.33 PSC No. 33-Base Service Station. The base service station is located at Building 429 (Figure 3-31). There was an occurrence of gasoline leakage from this station as recently as June 1982. The total loss of fuel was approximately 2,000 gallons. The Navy identified the source of the problem and remedial action pursuant to Chapter 17-770 FAC is currently underway.

3.2.5.34 PSC No. 34-Former Transformer Storage Building. Formerly, the Navy used Building 525 to store transformers (Figure 3-32). This building and the adjacent building (No. 951) today serve as the base commissary. Building 525 was originally a warehouse. According to interviews with Base personnel, the building was demolished and a new commissary was built on this PSC in 1978. Reportedly, hazardous materials originally stored in the building were moved to PSC No. 27.

3.2.5.35 PSC No. 35-Former Temporary PCB Storage Area. The Navy used Building 480 (Figure 3-33) for the temporary storage of PCB oil. In July 1981, the EPA inspected and approved temporary storage of PCBs. In 1980, a Navy contractor removed asbestos pipe insulation from a building and deposited the asbestos in Building 480. A Navy contractor removed the bulk material and decontaminated the building after dust samples indicated that the area was contaminated.

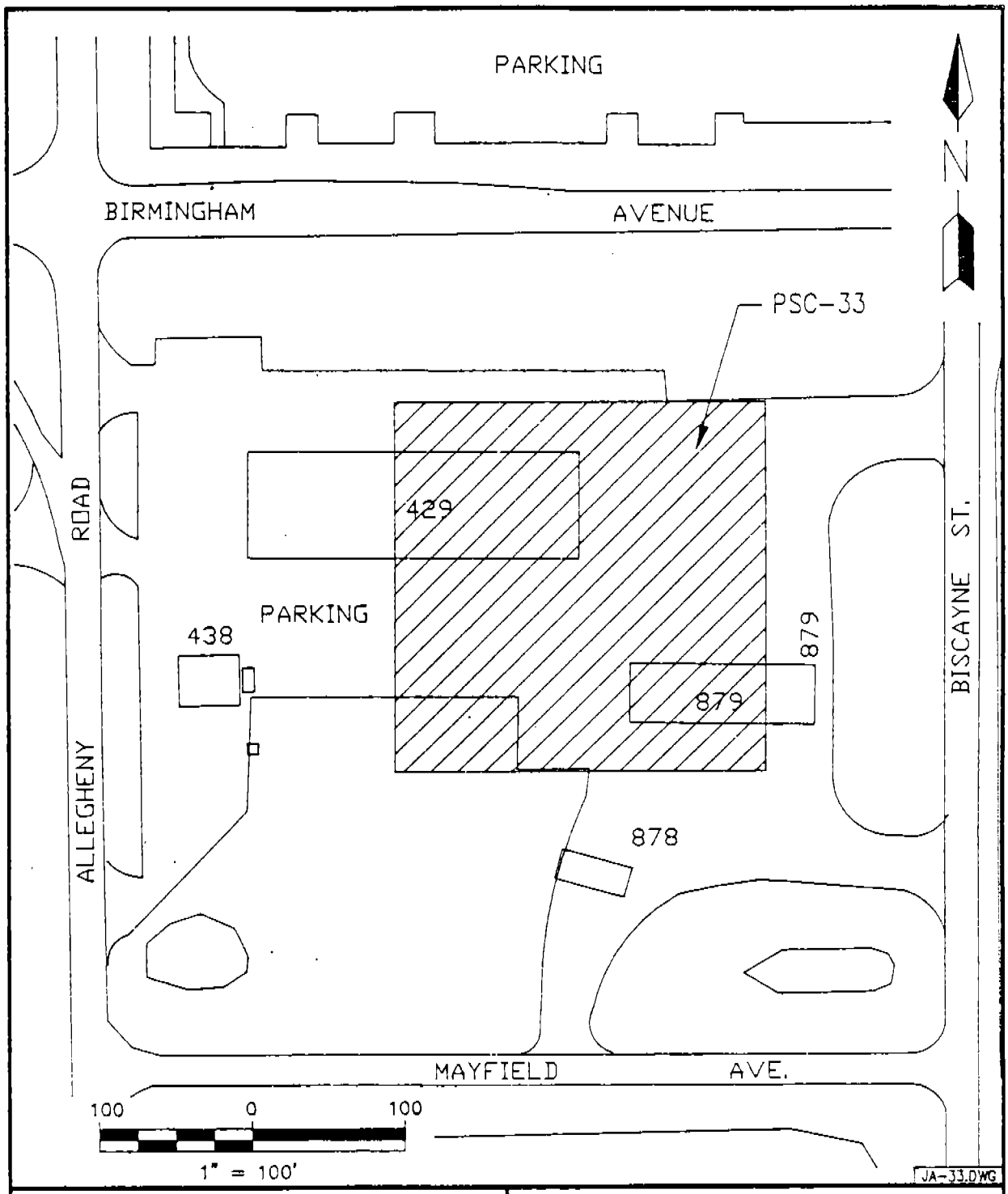


PSC-32
EX - BASE LANDFILL
FIGURE 3-30

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



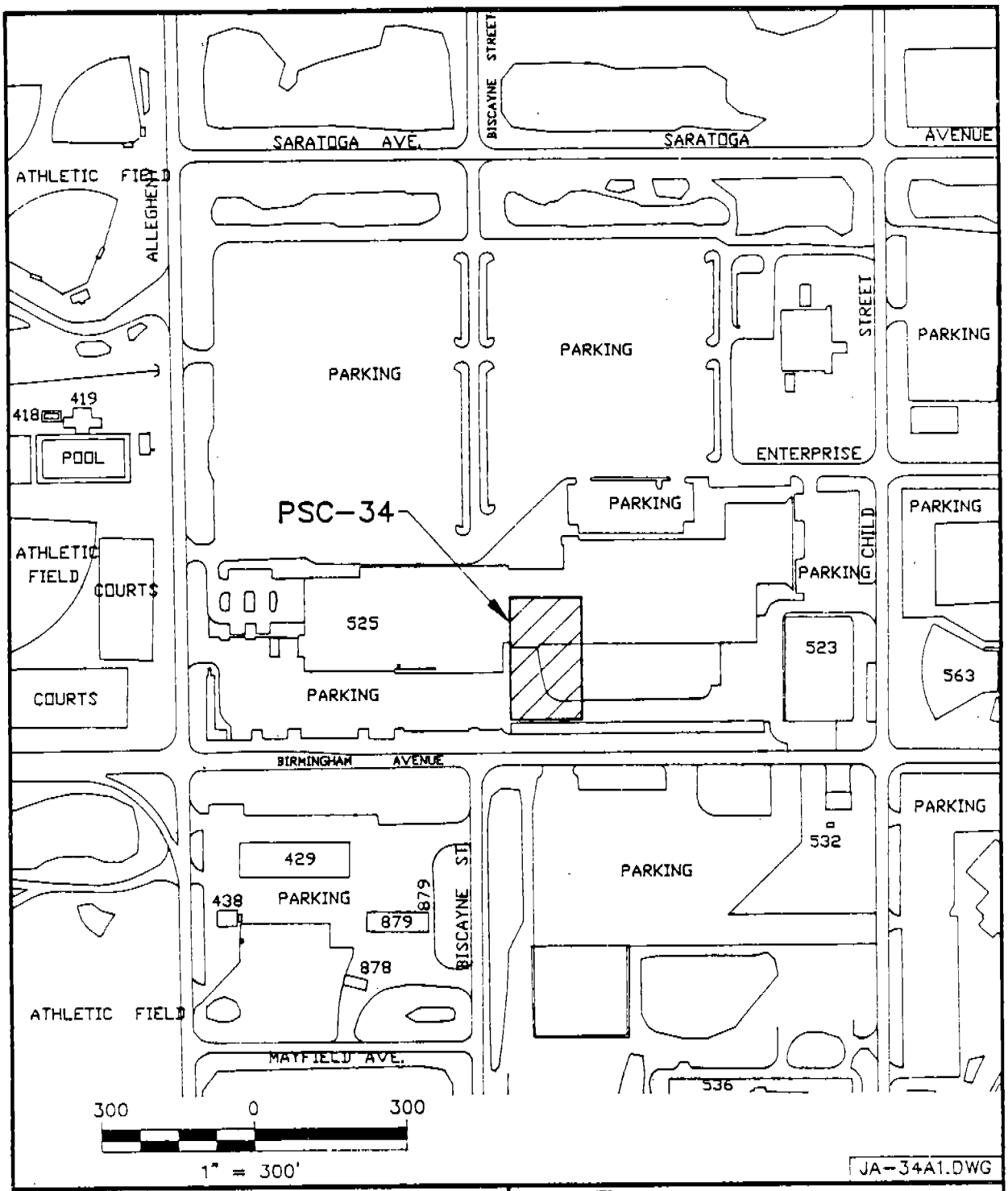
PSC-33

BASE SERVICE STATION

FIGURE 3-31

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

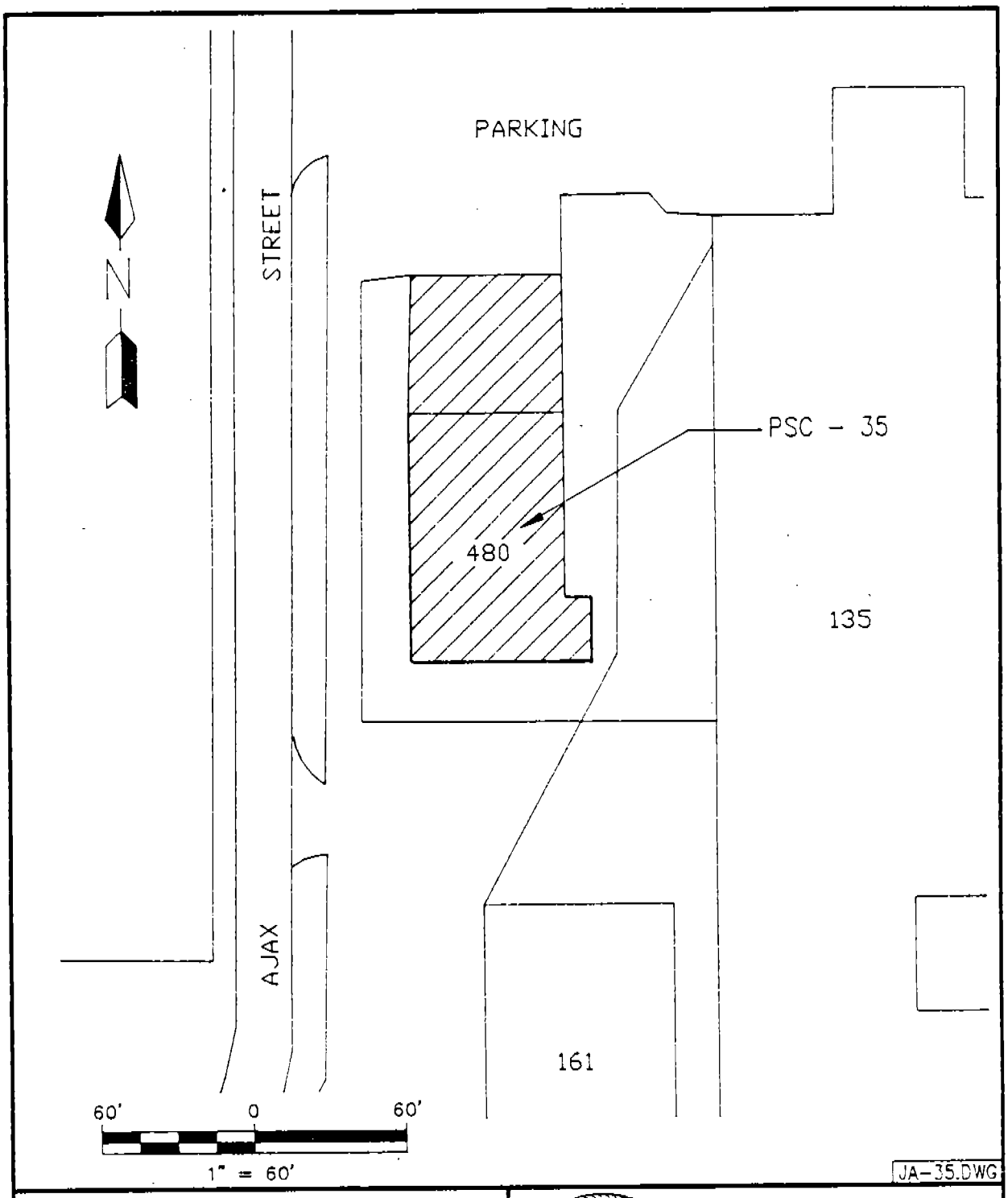


PSC-34
FORMER TRANSFORMER
STORAGE BUILDING

FIGURE 3-32

PROGRAM ORGANIZATION
AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



PSC-35
FORMER TEMPORARY
PCB STORAGE AREA

FIGURE 3-33

PROGRAM ORGANIZATION
AND PLANNING

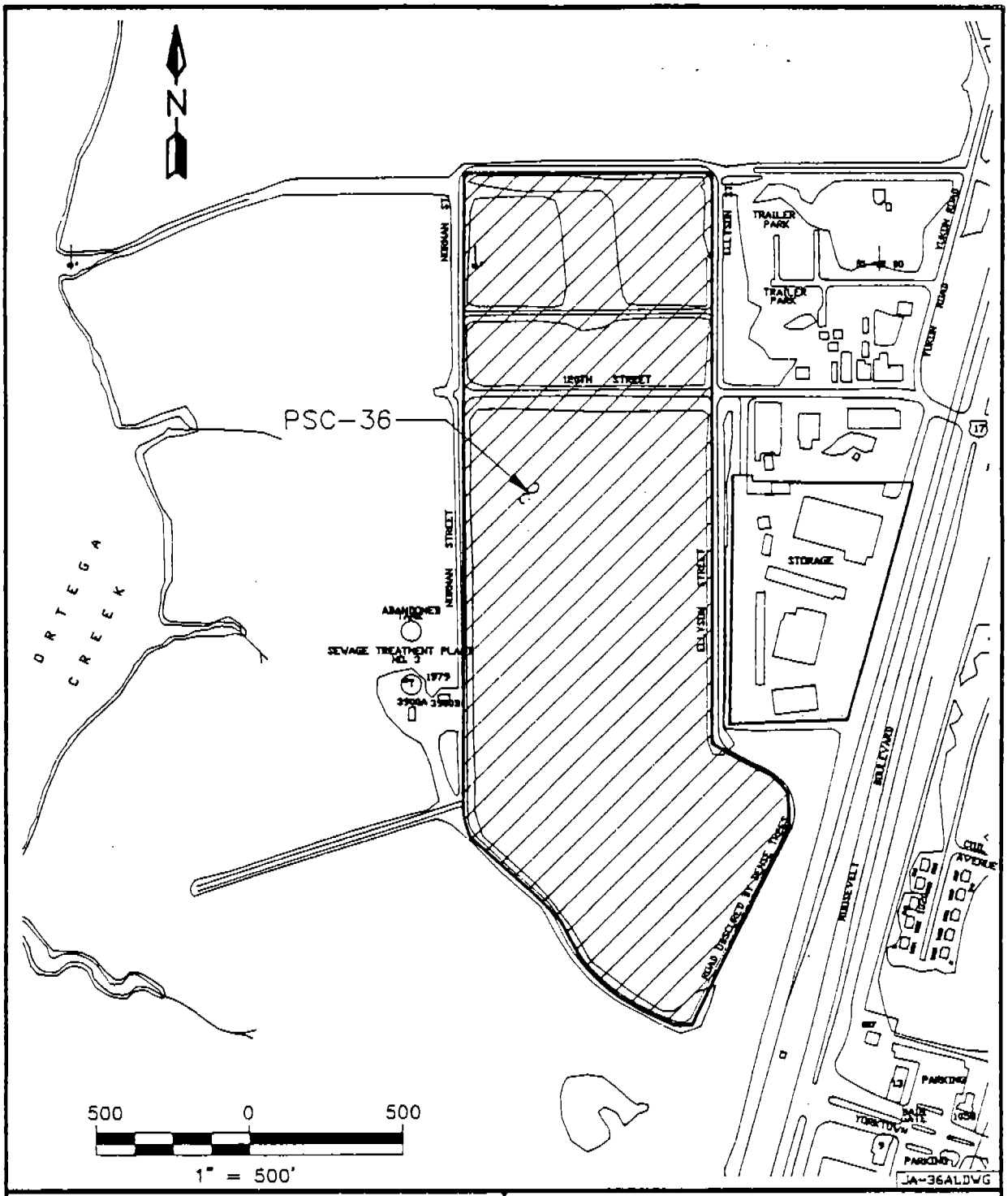
NAS JACKSONVILLE
SEPTEMBER 1991

3.2.5.36 PSC No. 36-Dewey Park. This area is located west of Gate 3 south of the Dewey Park Water Plant (Figure 3-34). The PSC contains construction debris and materials from fire damaged buildings. The PSC occupies an area approximately two acres in size in a clearing in a wooded area. Access to this area is through Dewey Park; however, the PSC spans the border of the Site property.

3.2.5.37 PSC No. 37-Ex-Power Barge Dock Area. Reportedly, an explosion of a transformer had occurred on the shore in the vicinity of the power barge dock (Figure 3-35) when the barge was in operation. Investigation of this issue revealed that all transformers were located on the barge and that no explosions occurred.

3.2.5.38 PSC No. 38-Torpedo Rework Facility. PSC No. 38 is located within the restricted magazine area of the Site (Figure 3-36). Interviews with Base and Ordnance Environmental Support Office (OESO) personnel revealed that the Navy generates approximately one 55-gallon drum of solid waste materials (i.e., rags and gloves containing Otto Fuel) each day which is disposed offsite. In addition, two sumps exist behind Building 327 which may have received waste.

3.2.5.39 PSC No. 39-Possible Transformer Burial Area. A retired Public Works Department employee reported that the Navy buried hundreds of old and new transformers (which may have contained PCB oils), east of warehouse building No. 164 during 1943 through 1945 (Figure 3-37). The retired employee believed that a 10-foot wide by 5-foot deep ditch, between the warehouse building and the railroad tracks to the east, is the probable burial spot of the transformers.



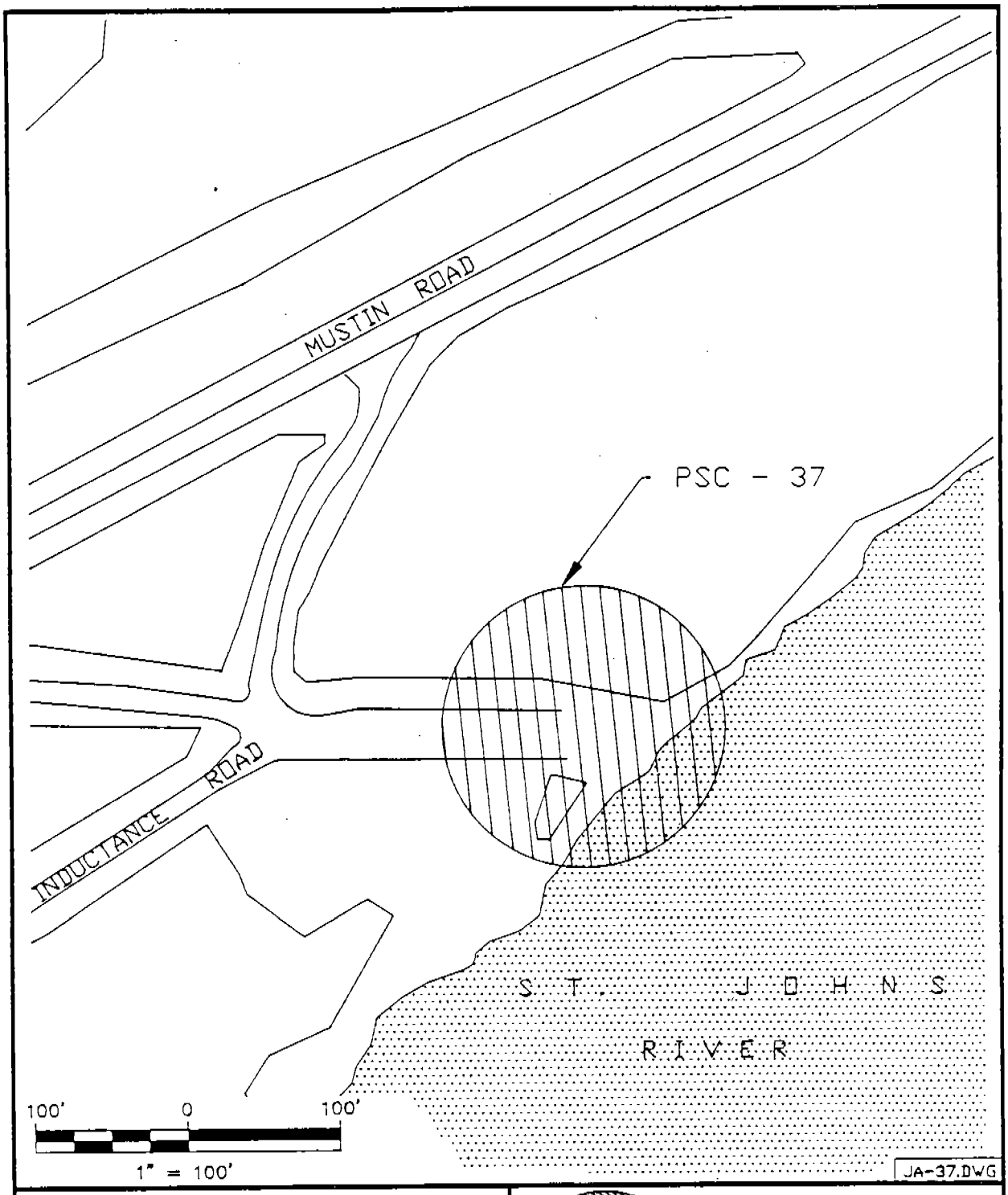
PSC-36

DEWEY PARK

FIGURE 3-34

PROGRAM ORGANIZATION AND PLANNING

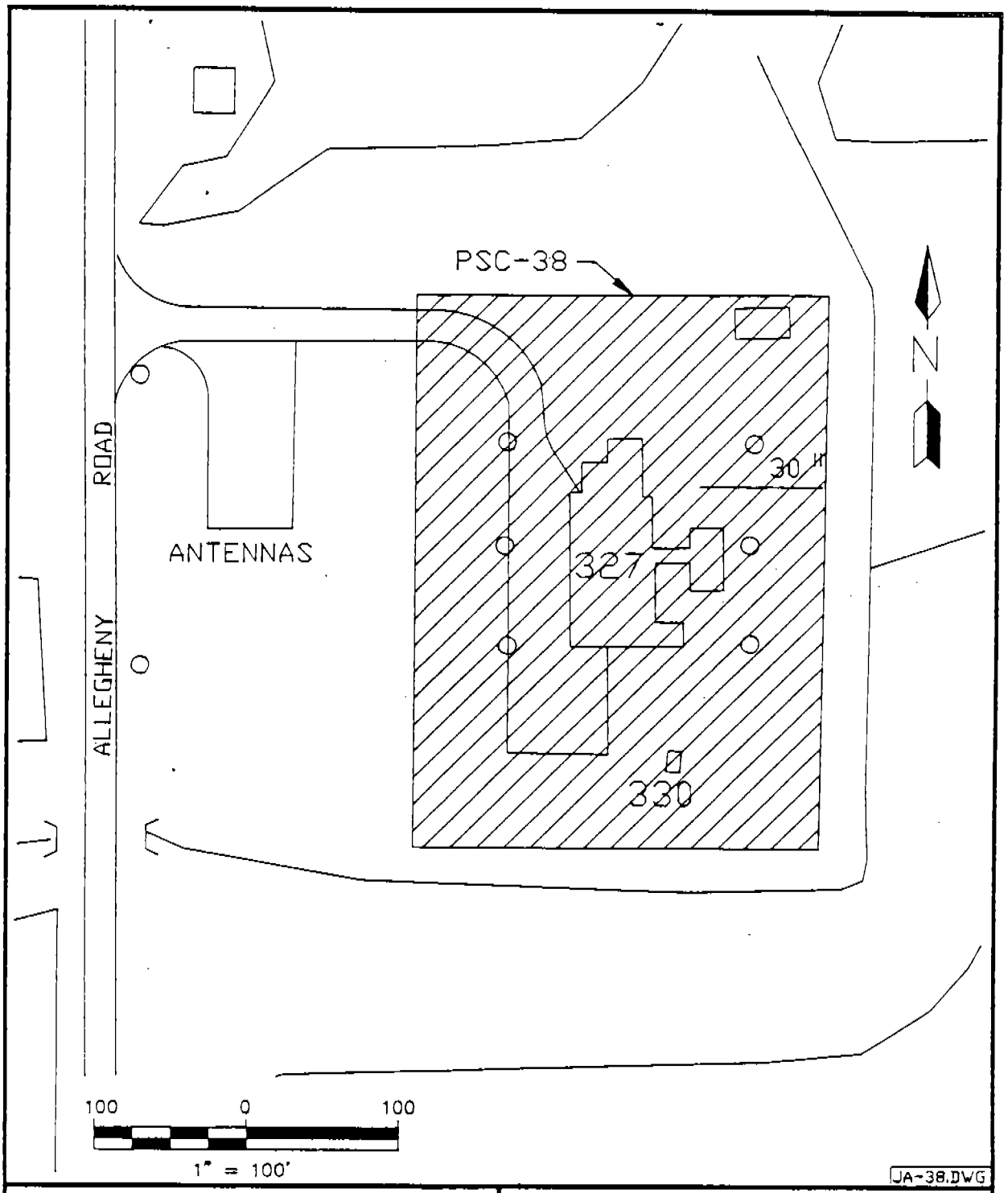
NAS JACKSONVILLE
SEPTEMBER 1991



PSC - 37
EX - POWER BARGE DOCK AREA
FIGURE 3-35

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



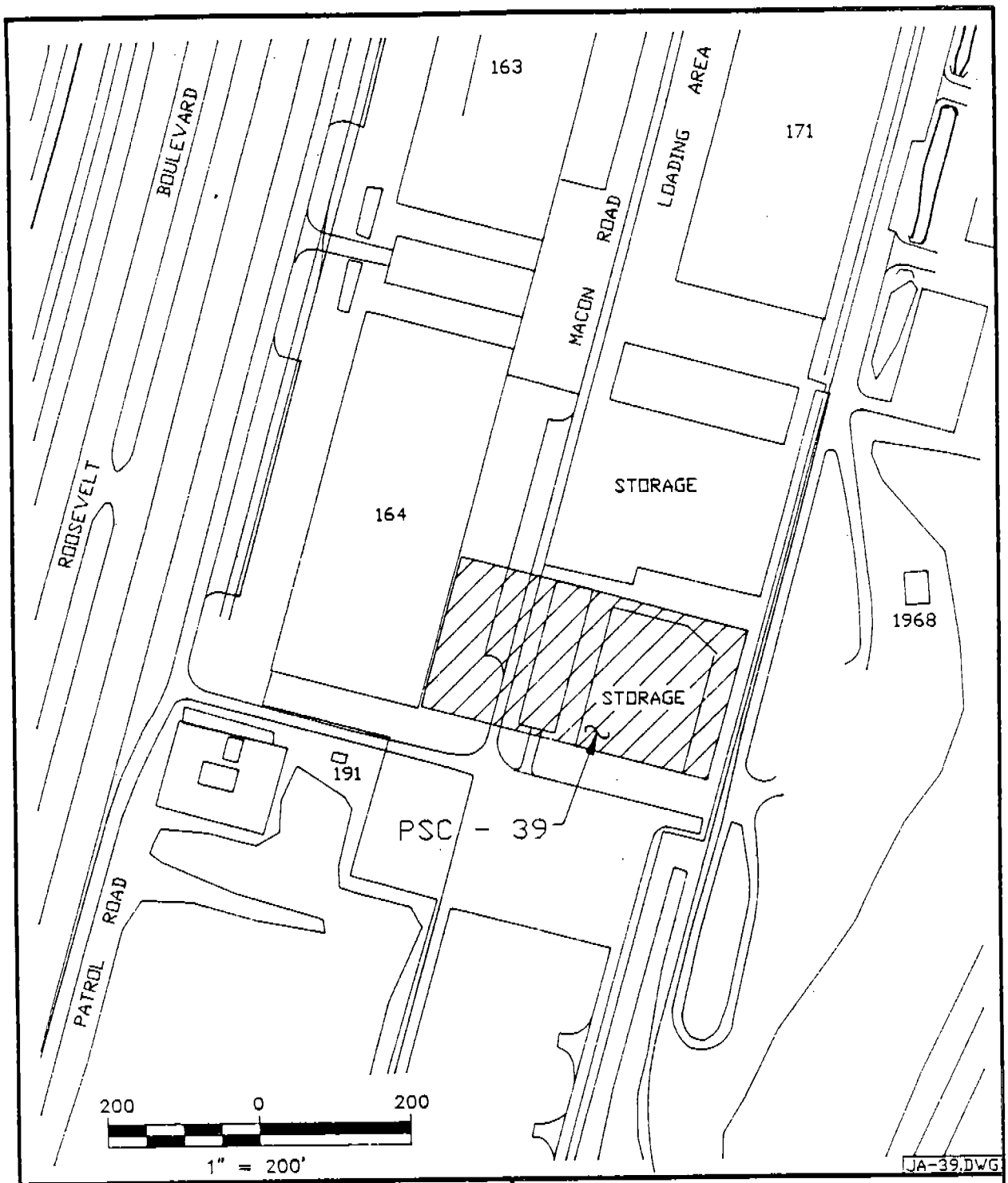
PSC – 38

TORPEDO REWORK FACILITY

FIGURE 3-36

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991



PSC - 39

POSSIBLE TRANSFORMER BURIAL AREA

FIGURE 3-37

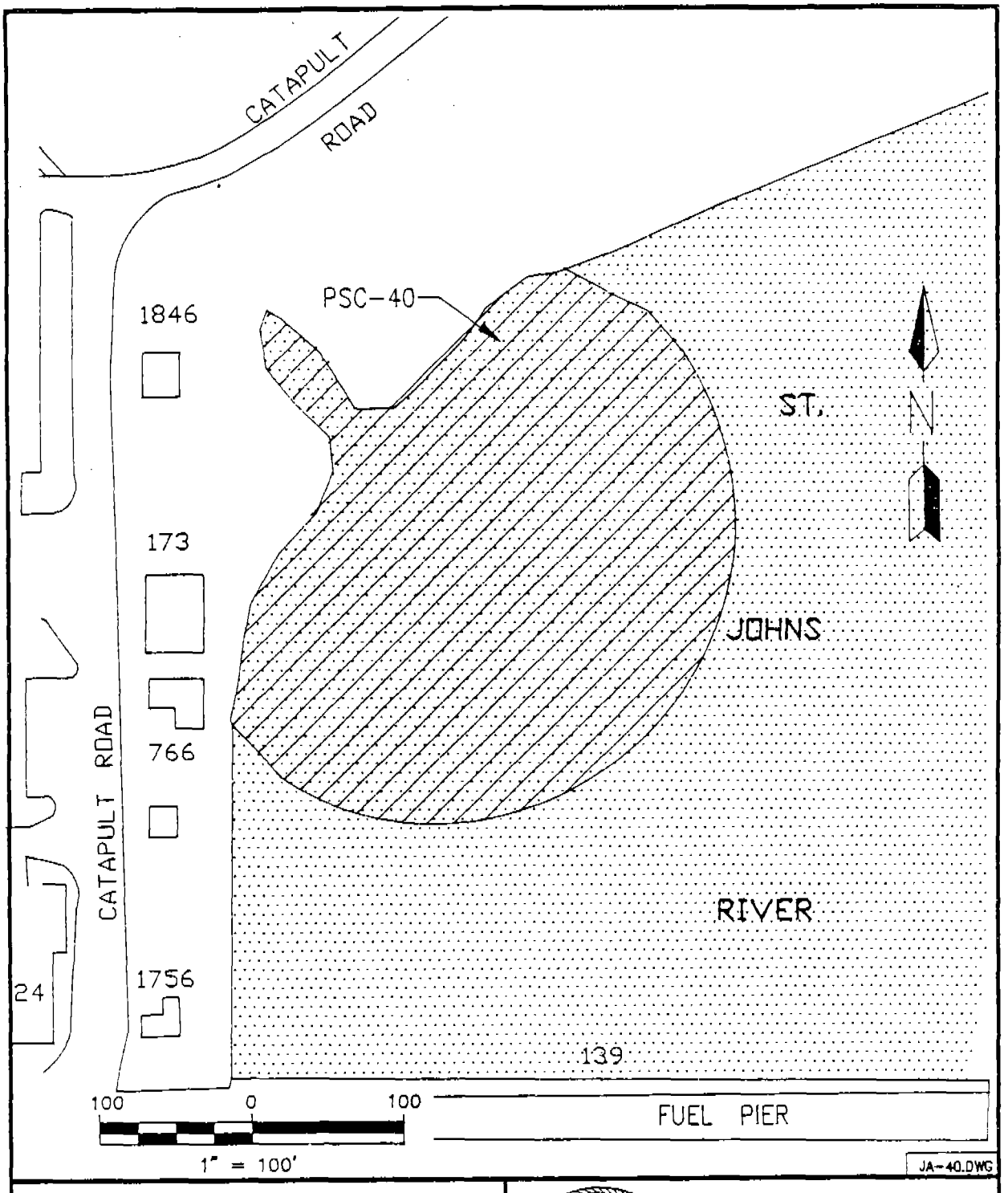
PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

3.2.5.40 PSC No. 40-Ex-East IWTP Discharge Area. Prior to 1972, a wastewater treatment plant was located near the main runway (Figure 3-38). Primary wastewater treatment included settling for removal of solids and skimming for removal of oils and solvents. Secondary treatment was provided by trickling filter units. Effluent from the plant was discharged to the St. Johns River. Reportedly, the discharge to the river resulted in a build-up of sediments in the cove east of runway 27. The Navy removed the east side plant from service in 1972 and the waste stream was diverted to the west side plant.

3.2.5.41 PSC No. 41-Domestic Waste Sludge Drying Beds. The EPA classified the domestic sludge drying beds (Figures 3-39) as surface impoundments operated to treat RCRA hazardous wastes F006 and F019. An average of 90 gallons per day of sludge was dewatered in domestic sludge drying beds during the operation. These sludges may potentially contain heavy metals.

3.2.5.42 PSC No. 42-Polishing Pond for the WWTP Effluent. The EPA classified the Polishing Pond (Figure 3-40) as a surface impoundment operated to treat RCRA hazardous wastes F006 and F019. The Polishing Pond received 2.3 million gallons per day of treated effluent from the wastewater treatment plant for final clarification before chlorination and discharge to the St. Johns River.



PSC-40

EX - EAST IWTP DISCHARGE AREA

FIGURE 3-38

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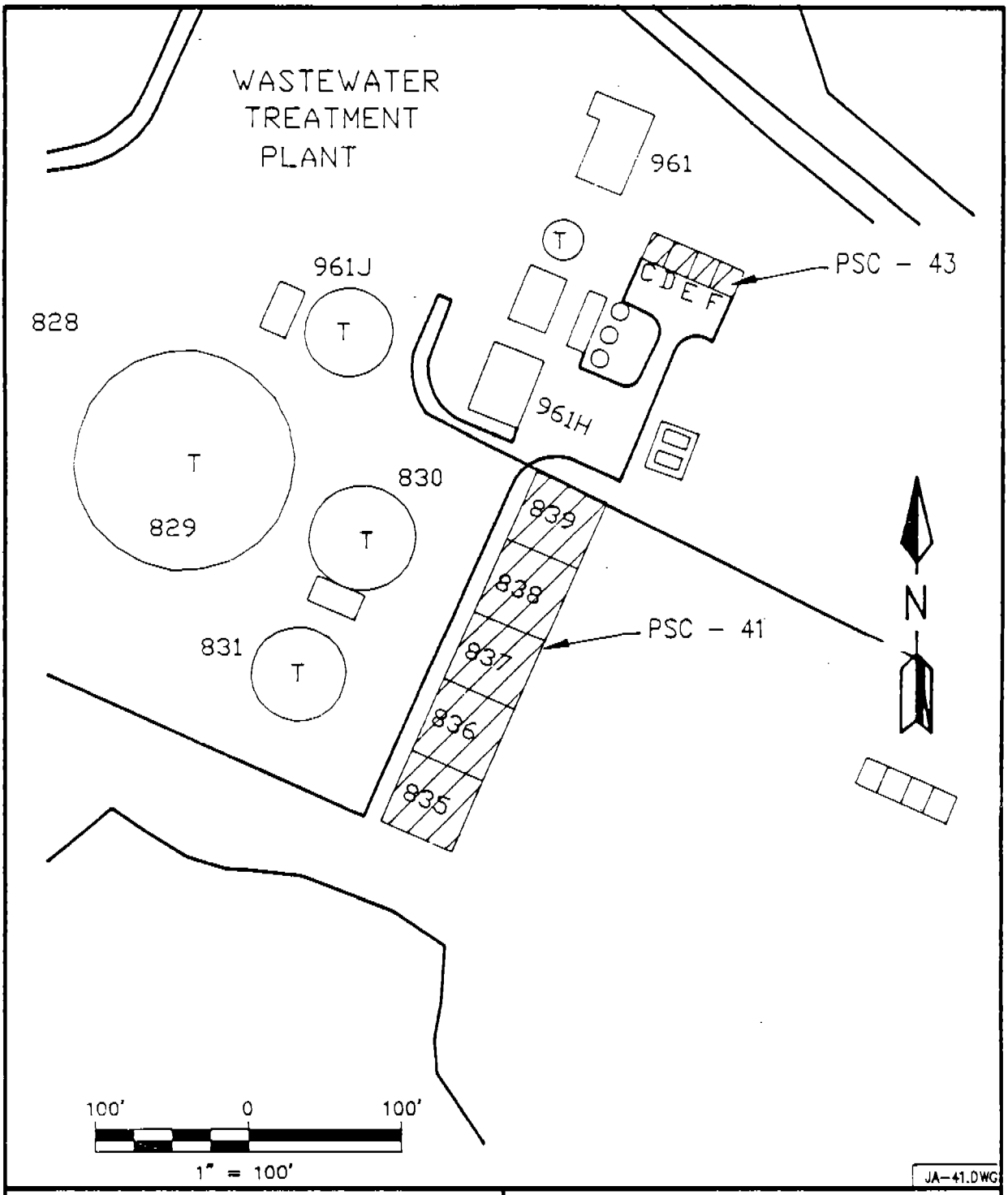

PCS-41: DOMESTIC WASTE SLUDGE DRYING BEDS

PCS-43: INDUSTRIAL WASTE SLUDGE DRYING BEDS

FIGURE 3-39

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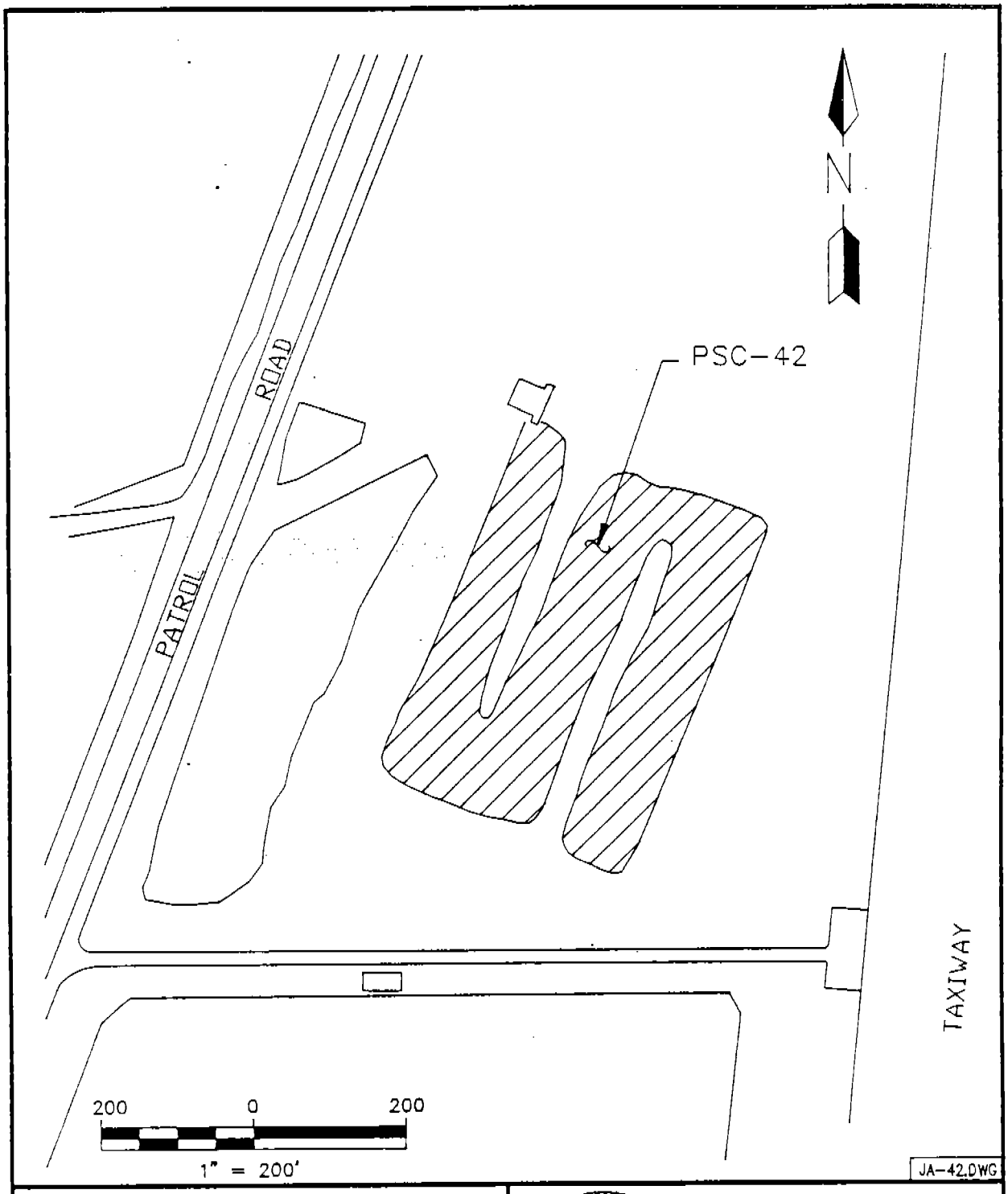

PSC-42
POLISHING POND FOR WWTP EFFLUENT
FIGURE 3-40

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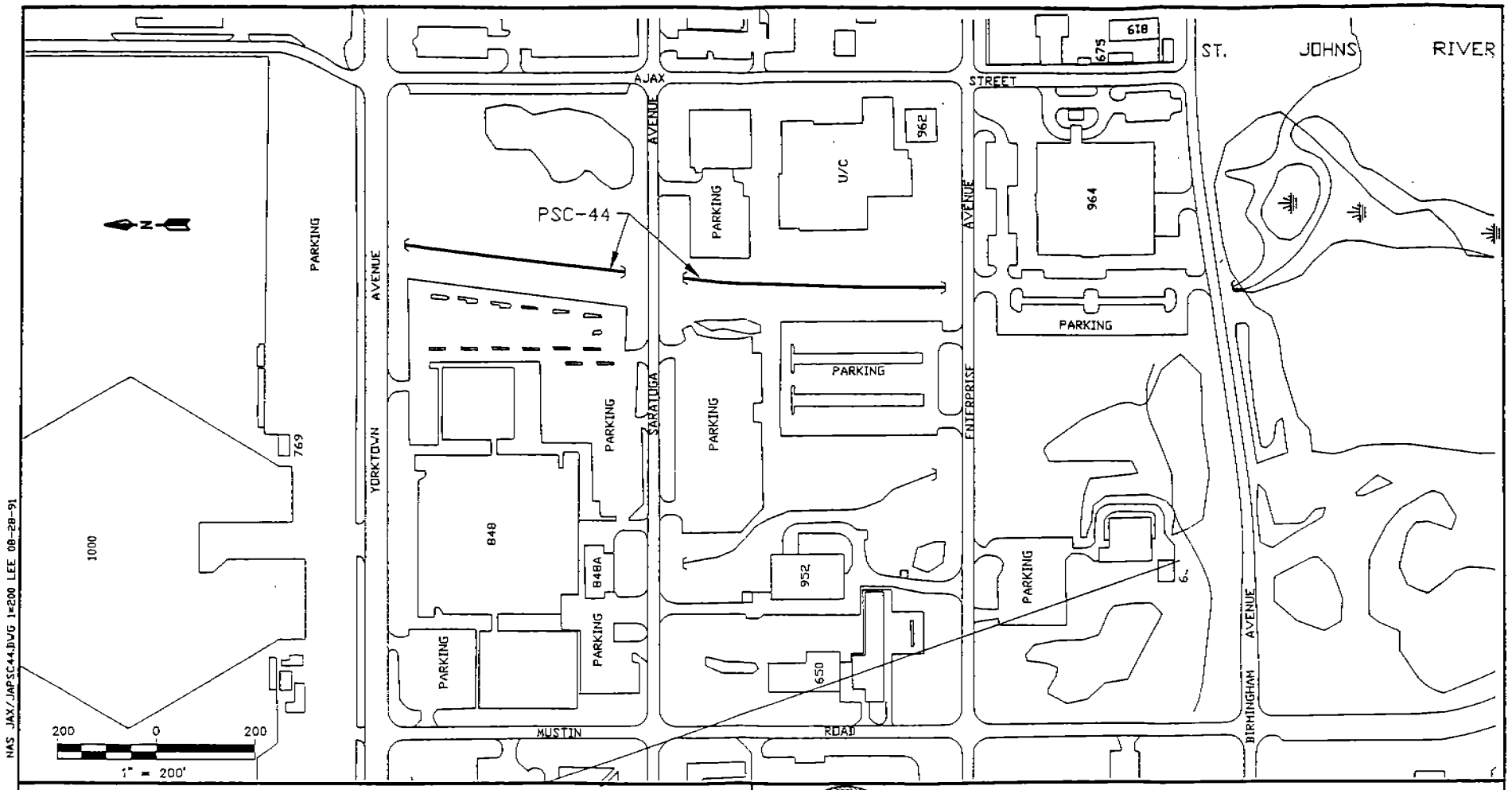
3.2.5.43 PSC No. 43 - Industrial Waste Sludge Drying Beds. The industrial waste sludge drying beds (Figure 3-39) were constructed in 1980 and operated to dewater metal hydroxide sludges from electroplating operations (RCRA F001-F006, F019). Between 1980 and 1988, approximately 8,250 gallons of dried sludges were excavated and removed from the surface impoundment annually. The sludges may have contained heavy metals and organic solvents. In 1988, the industrial waste sludge drying beds were taken out of service and all sludge was removed. The underlying drainage sand and filter underdrains were left in place. By September 30, 1991, FDER will issue a RCRA Closure permit to close the industrial sludge drying beds under CERCLA.

3.2.5.44 PSC No. 44 - Drainage Ditch, West of Ajax Street, from Yorktown Avenue to Mulberry Cove. PSC No. 44 is an open-channel drain (Figure 3-41), situated west of and running approximately parallel to Ajax Street between Buildings 852 and 966, that discharges to the St. John's River at NPDES Discharge Point Source 004. Sediments in the channel are potentially contaminated with metals and organics. The source of the contamination was the overflow of the hazardous-waste storage tank system (Tanks A and B) located in the keyway of Hangar 1000. Tanks A and B received waste solvents and other substances through drain lines from the waste sinks in Hangar 1000. Due to a cross connection between the 4-inch drain line from Tank A and a nearby 20-inch storm drain line, discharge of hazardous waste into the storm sewer that drains into PSC No. 44 occurred during periods of heavy precipitation. The last known discharge of waste into the tanks occurred in November 1987. Since then, the drain lines to the tanks have been capped and the tanks have not been used. The tanks are regularly inspected and the accumulated rain water that surcharges into Tank A via the storm drain line is pumped out as necessary. The Navy is currently developing a RCRA Closure Plan for the tank system, per a Consent Order issued by FDER in October 1988 and amended in December 1990.



PSC-44
DRAINAGE DITCH, WEST OF AJAX STREET,
FROM YORKTOWN AVENUE TO MULBERRY COVE

FIGURE: 3-41

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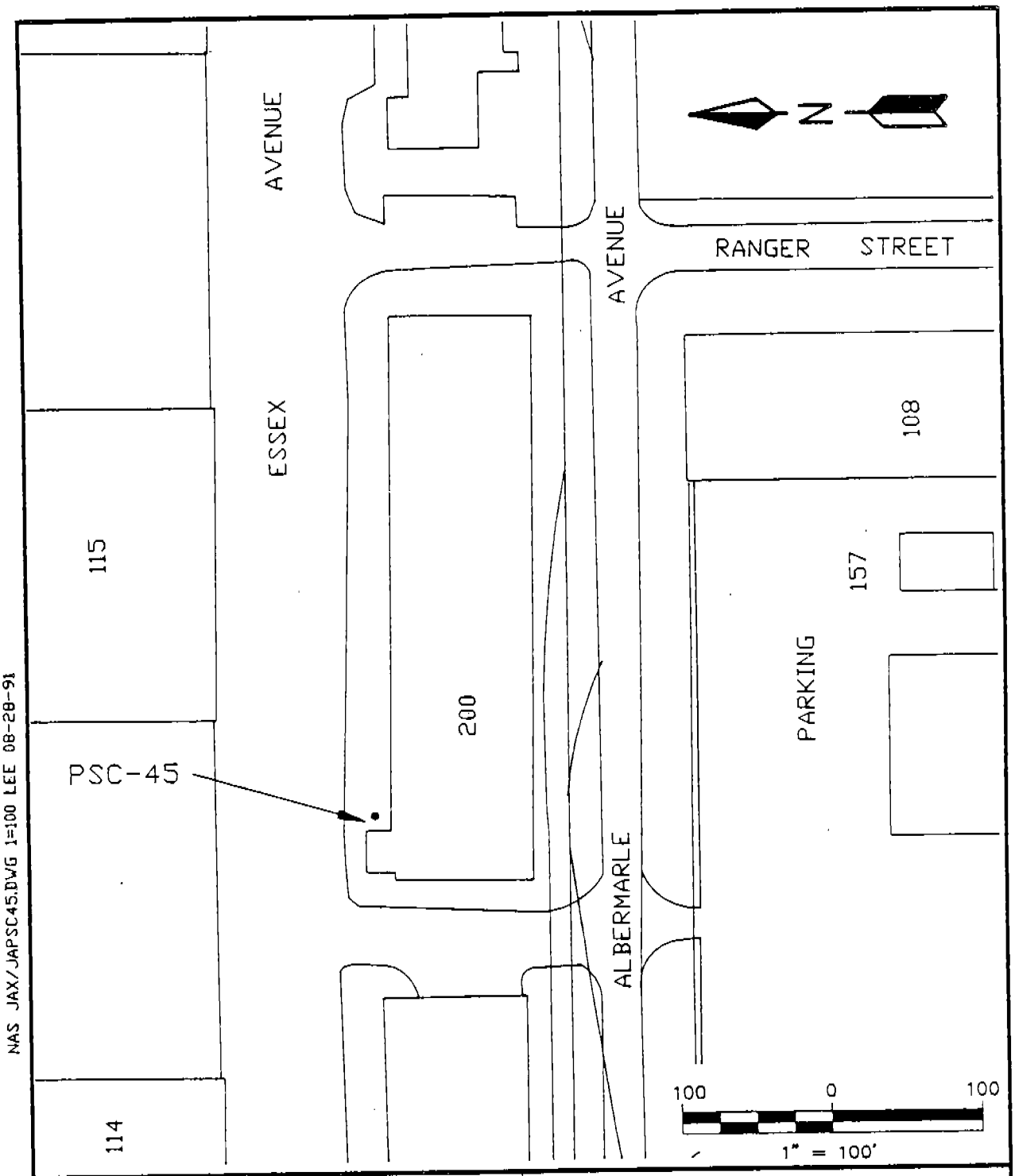
3.2.5.45 PSC No. 45 - Building 200 Wash Rack Waste Disposal Pit. PSC No. 45 is an open-bottom pit (Figure 3-42), approximately 4 feet in diameter, with concrete walls about 5 feet deep. The pit was recently discovered during repair work to correct plumbing problems at Building 200. For an unknown period of time, the overflow from an oil/water separator in Building 200 flowed into the pit. The oil/water separator served a wash rack where ground-support equipment cleaning and paint-stripping operations took place. The drain to the pit has since been plugged. Accumulated waste to a depth of approximately 6 to 8 feet below land surface (bls) was pumped out of the bottom of the pit into 55-gallon drums and disposed of as hazardous waste. The removal of the concrete walls of the pit is scheduled to occur in October 1991.



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PSC-45
BUILDING 200 WASH RACK
WASTE DISPOSAL PIT

FIGURE: 3-42

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4.0 ENVIRONMENTAL SETTING

The purpose of this section is to present pertinent environmental information of the Site. Information regarding the physiography, geology, and hydrogeology are in this section. It consists of a compilation of literature and data which describes the environmental setting locally and regionally.

4.1 Physiography

4.1.1 Regional Physiography

The topography in northeast Florida is low, gentle to flat, and composed of a series of ancient marine terraces. These terraces were formed in the Pleistocene glacial period when the sea was relatively stationary at various higher levels than the present sea level. When the sea dropped to a lower level, the sea floor emerged as a level plain or terrace and the landward edge of each terrace became an abandoned shoreline, which is generally marked by a low escarpment.

The highest altitude in Duval County is about 190 feet above mean sea level (ft msl) in the extreme southwest corner of the county, along the eastern slope of a prominent topographic feature known as "Trail Ridge." Trail Ridge is a remnant of the highest ancient marine terrace (Cohaire) in Duval County. The terraces parallel the present Atlantic shoreline and become progressively lower from west to east (Fairchild, R.W., 1972).

Surface drainage in the area is controlled by the terrace. Each terrace is bounded along its east seaward edge by remnants of a beach ridge parallel to the ancient shore line. These ridges direct runoff so that the streams flow parallel to the ancient shorelines (e.g., St. Johns River at the Site). A feature of this

topography, in the flat marshy areas northeast of Jacksonville, is that drainage is sluggish and the streams often form a dendritic pattern. Because of the low relief over much of the area, drainage divides are often difficult or impossible to define. The terraces also play a significant role in determining the configuration of the water table surface of the shallow aquifer system. The water table surface, based on water levels in wells that penetrate the shallow aquifer system, roughly parallel the contour of the land surface. As a result, the water table surface is highest where the terraces are highest and lowest where they are lowest.

4.1.2 Local Physiography

Topographic information can be obtained from the USGS topographic map (Figure 3-1A) provided in the folder at the end of this Volume. The elevation of the land surface at the Site varies from a high of about 35 ft msl near the center of the southern portion of the Facility at the former main registered disposal site, to a low of 0 ft msl at the St. Johns River. This topographic high forms an elongated ridge oriented in a northeast-southwest direction (Figure 3-1A). The land slopes gradually away from the topographic high in all directions with the greatest slope occurring toward east-southeast.

4.2 Geology

4.2.1 Regional Geology

The majority of the Florida Peninsula is made up of Eocene and Oligocene aged limestones and dolomites. Except for the more central and western portions of Florida, these older carbonate rocks were covered by Miocene and more recent aged phosphatic sandy clays, coarse to fine sand, shell and friable limestone beds. The more recent unconsolidated deposits form the aquicludes and shallow

aquifer systems in Duval County, including the Site. Table 4-1 lists the stratigraphic units and aquifer systems of Duval County and surrounding areas, and Figure 4-1 shows a generalized geologic cross-section for the area.

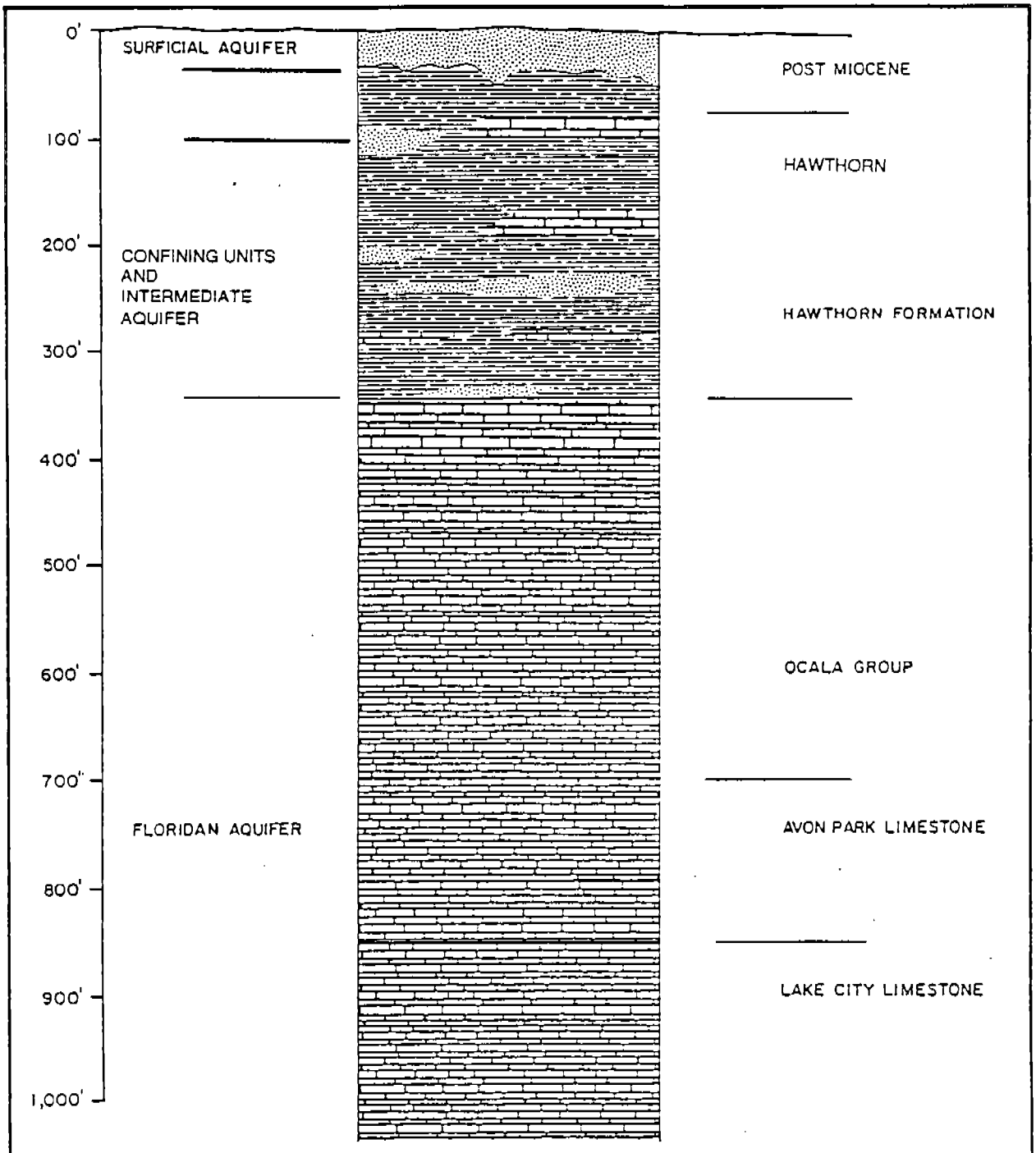
In most areas of northeastern Florida, the top of the Ocala Group generally corresponds to the top of the Floridan Aquifer. Thus, the structure contours for the top of the Ocala Group also approximately represent the top of the Floridan Aquifer. In the vicinity of the Site, the top of the Ocala Group is at a depth of approximately 300 ft below land surface (bls). The top of the Ocala Group generally dips to the northeast forming a wide basin in Duval County.

Erosion formed the many irregularities in the surface of this aquifer before the younger Miocene sediments were deposited and some irregularities were formed by collapse as a result of solution of rock material by circulating ground water (Leve, 1968). Although sinkholes are fairly common to the central and western part of northeastern Florida none have been reported near the Site.

As shown in Figure 4-2, a fault occurs in the vicinity of the Facility, beneath the St. Johns River. The top of the Ocala Group is displaced about 100 ft along this fault plane. This fault cannot be traced through the Hawthorn Formation or into the Pleistocene deposits and therefore would be considered inactive, at least prior to the Pleistocene (greater than 20,000 years ago). This fault would not be expected to have any significance to ground-water flow, as it is discontinuous through the Hawthorn Formation.

Table 4-1. Stratigraphic Units and Aquifer Systems in Duval County and Surrounding Areas.

Geologic age	Stratigraphic unit	Approximate thickness (feet)	Lithologic character	Aquifer systems	Water-bearing properties
Recent and Pleistocene	Recent and Pleistocene deposits	0-150	Soil, muck, coarse to fine sand, shell, and some clayey sand	Shallow aquifer system	Surficial sand yields small amounts of water. Sand and shell bed along coast yields moderate quantities.
Pliocene?	Pliocene or Upper Miocene deposits	20-110	Gray-green calcareous, silty clay and clayey sand; contains shell beds and white soft, friable limestone beds		Limestone, sand, and shell bed near base of deposits yield moderate to (locally) large amounts.
Miocene	Hawthorn Formation	260-490	Gray to blue-green calcareous phosphatic, sandy clays and clayey sands; contains fine to medium phosphatic sand lenses and limestone and dolomite beds, particularly near the base of the formation	Aquiclude and intermediate aquifer system	Relatively impermeable clays and marls in both the late Miocene or Pliocene deposits and the Hawthorn Formation confines the artesian water in the Eocene limestone and in the limestone and shell beds above the Eocene limestone. Yields small to moderate supplies.
Eocene	Ocala Group: Crystal River Formation	50-300	White to cream chalk, massive fossilliferous marine limestone.	Floridan aquifer system	Marine limestone formations utilized as the primary source of water in the area.
	Ocala Group: Williston Formation	20-100	Tan to buff granular, marine limestone		
	Ocala Group: Inglis Formation	40-120	Tan to buff granular, calcitic, marine limestone; contains thin dolomite lenses and zones of Miliolidae foraminiferal coquina		
	Avon Park Limestone	50-250	Alternating beds of brown to tan hard, massive dolomite, brown finely crystalline dolomite, and granular calcitic limestone	Aquiclude	Massive dolomite beds restrict vertical movement of water.
	Lake City Limestone	425-500+	White to brown, purple-tinted lignitic, granular limestone and gray hard, massive dolomite; contains lignite beds and zones of Valvulinidae foraminiferal coquina		Limestone and porous dolomite beds yield large to very large quantities of water. Hard dolomite and limestone beds restrict vertical movement of water within certain zones. Potentially the greatest source of water in the area.
	Oldsmar Limestone	846	Cream to brown massive to chalky, granular limestone and tan to brown massive to finely crystalline dolomite		



GENERALIZED CROSS SECTION OF SEDIMENTS AT THE SITE

FIGURE 4-1

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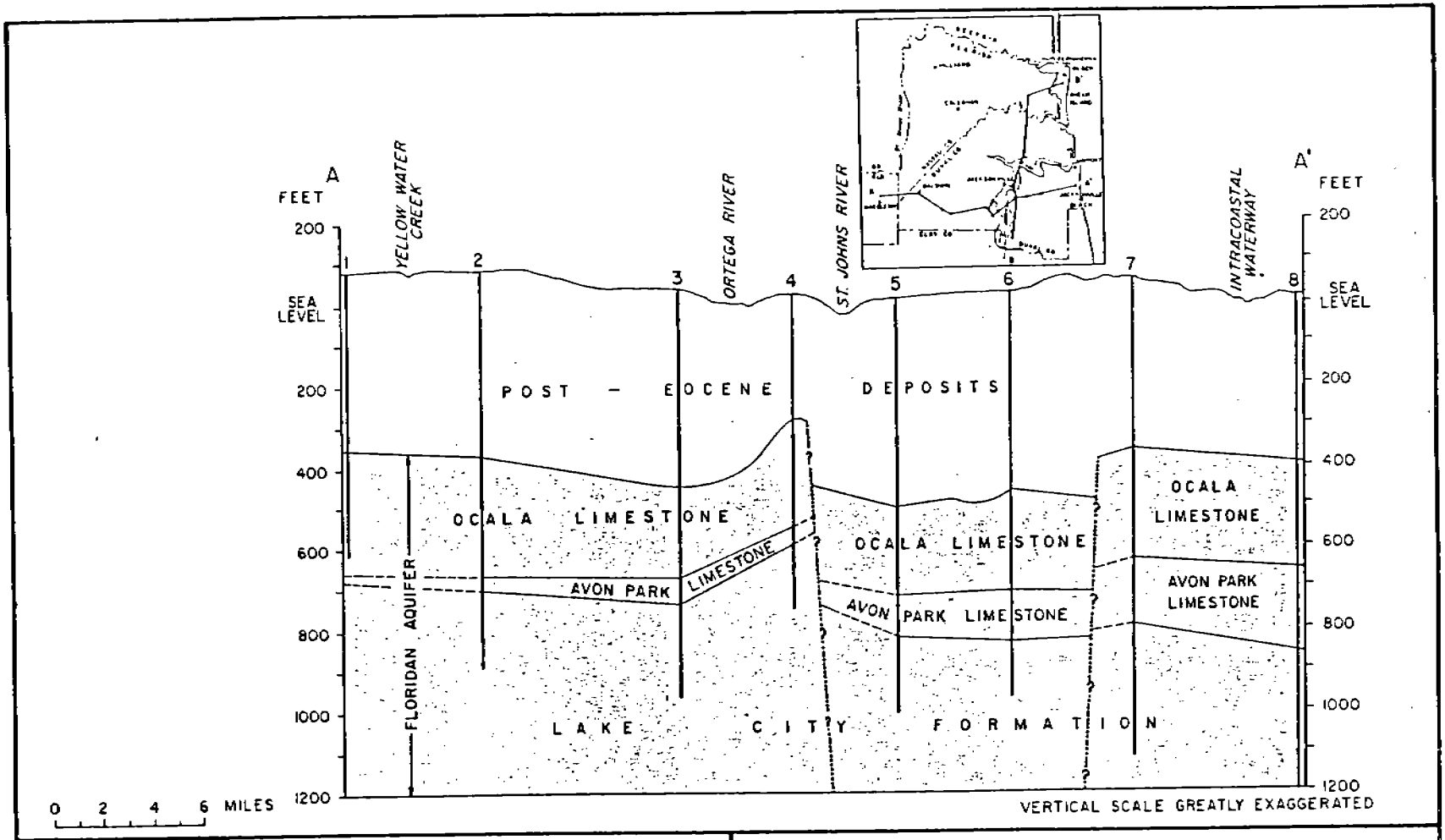

LOCATIONS OF FAULTS IN EOCENE AND MIOCENE FORMATIONS

FIGURE 4-2

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4.2.2 Local Geology

The surficial sediments consist of Recent, Pleistocene, and upper Miocene or Pliocene deposits in Duval County. The Recent and Pleistocene sediments overlie the upper Miocene or Pliocene sediments and were deposited over a slightly undulating surface. The thickness of the Recent and Pleistocene deposits ranges from less than 10 ft in the St. Johns River valley to about 100 ft in western Duval County. The deposits are thickest below the ridges and where they overlie depressions in the upper surface Miocene or Pliocene deposits (Fairchild, 1972). These deposits consist primarily of medium- to fine-grained quartz sand and discontinuous sandy clay beds which, in places, contain mollusk shells.

The upper Miocene or Pliocene deposits consist of sand, shells, sandy clay, and limestone. The sediments generally can be distinguished from the Hawthorn Formation by their lack of phosphate and by their lighter colors, usually tan, buff, or light gray (Fairchild, 1972). The thickness of these sediments ranges from as little as 10 ft in the extreme southwest part of Duval County to as much as 130 ft in the west-central part of the county. Differences in thickness are the results of deposition of these deposits on the irregular surface of the Hawthorn Formation. These sediments are thickest over lower areas of the Hawthorn Formation and thinnest over the higher surfaces.

4.3 Hydrogeology

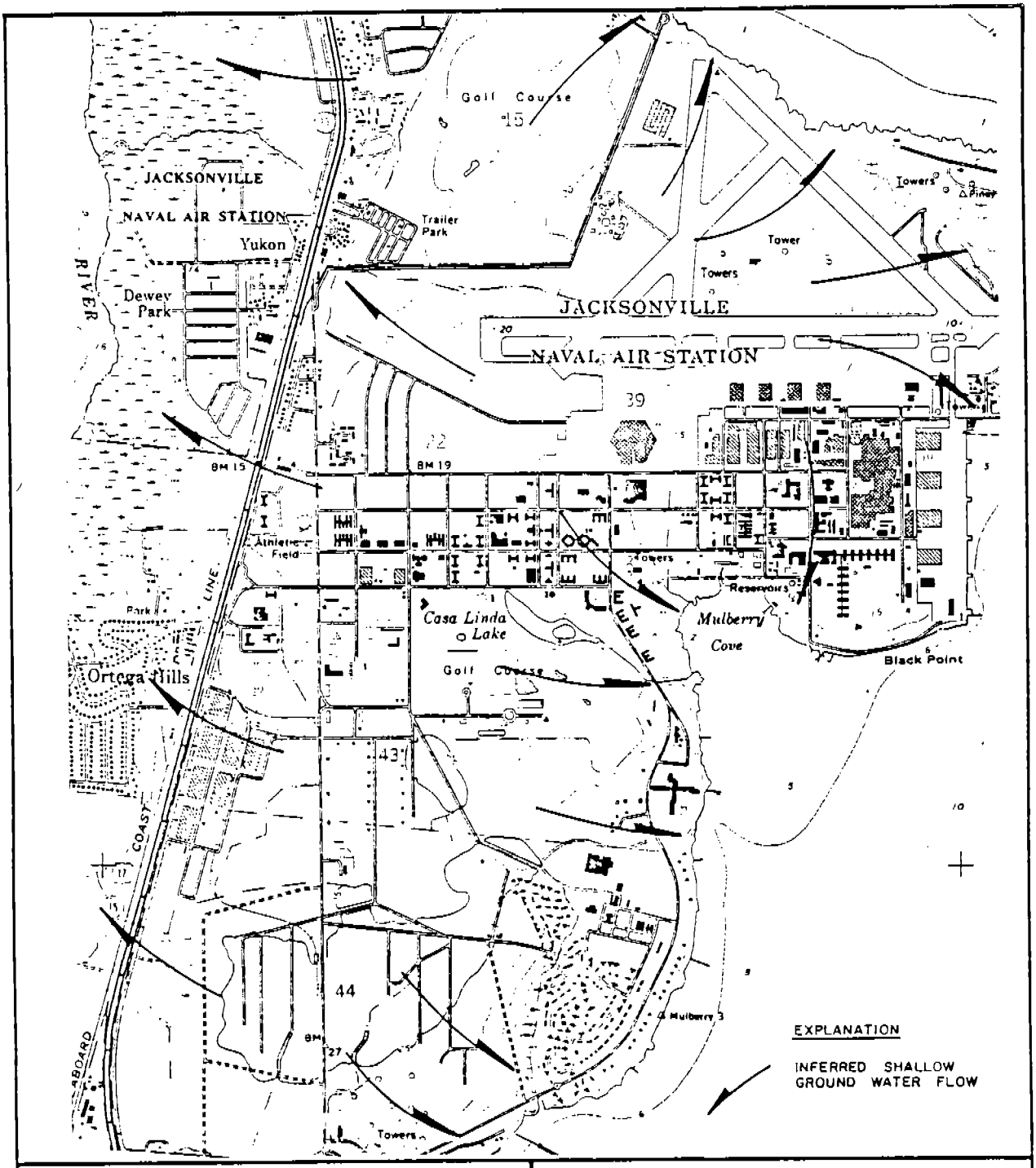
Three aquifer systems have been identified in the northeast Florida, Duval County area. In descending order they are the surficial aquifer, the Intermediate aquifer, and Floridan aquifer systems.

4.3.1 The Surficial Aquifer

The surficial aquifer generally ranges from 10 to 90 ft in thickness and is comprised of unconsolidated sands, with varying amounts of silt and clay. These sediments are generally saturated with ground water from 3 to 8 ft below land surface and the ground water exists under water-table conditions. The primary source of recharge for surficial aquifer is precipitation. Due to the presence of lower permeability, clayey sands and clays of the Hawthorn Formation, ground-water movement in surficial sediments primarily is horizontal. The shallow ground water moves predominantly from topographic highs to areas of discharge, such as ditches, streams, rivers, or surface-water bodies. Accordingly, Figure 4-3 shows the inferred direction of shallow ground-water flow at the Site.

Figures 4-4, 4-5, and 4-6 are geologic cross-sections showing the uppermost sediments at the Site. Most of the lithologic logs used to construct the cross-sections are from wells installed during the verification study. In some areas of the Site, notably the NADEP area, the surficial sand consists of hydraulically-filled dredge spoil from the St. Johns River.

In an investigation by Geraghty & Miller, Inc. (1980), Geraghty & Miller determined the horizontal hydraulic conductivity of the surficial aquifer north of the former Gannet Road area. In this study, transmissivities of 780 and 3600 (gallons per day per foot) (gpd/ft) were determined from pumping tests at two different sites. Also, laboratory permeability tests of undisturbed sediment samples collected at the wastewater treatment plant polishing pond and industrial sludge-drying beds determined the vertical hydraulic conductivity. The estimated hydraulic conductivities determined from these tests ranged from 1.6×10^{-3} to 2.7×10^{-6} (centimeters per second) (cm/sec).



INFERRED DIRECTION OF GROUND-WATER FLOW IN THE WATER-TABLE AQUIFER AT THE SITE
FIGURE 4-3

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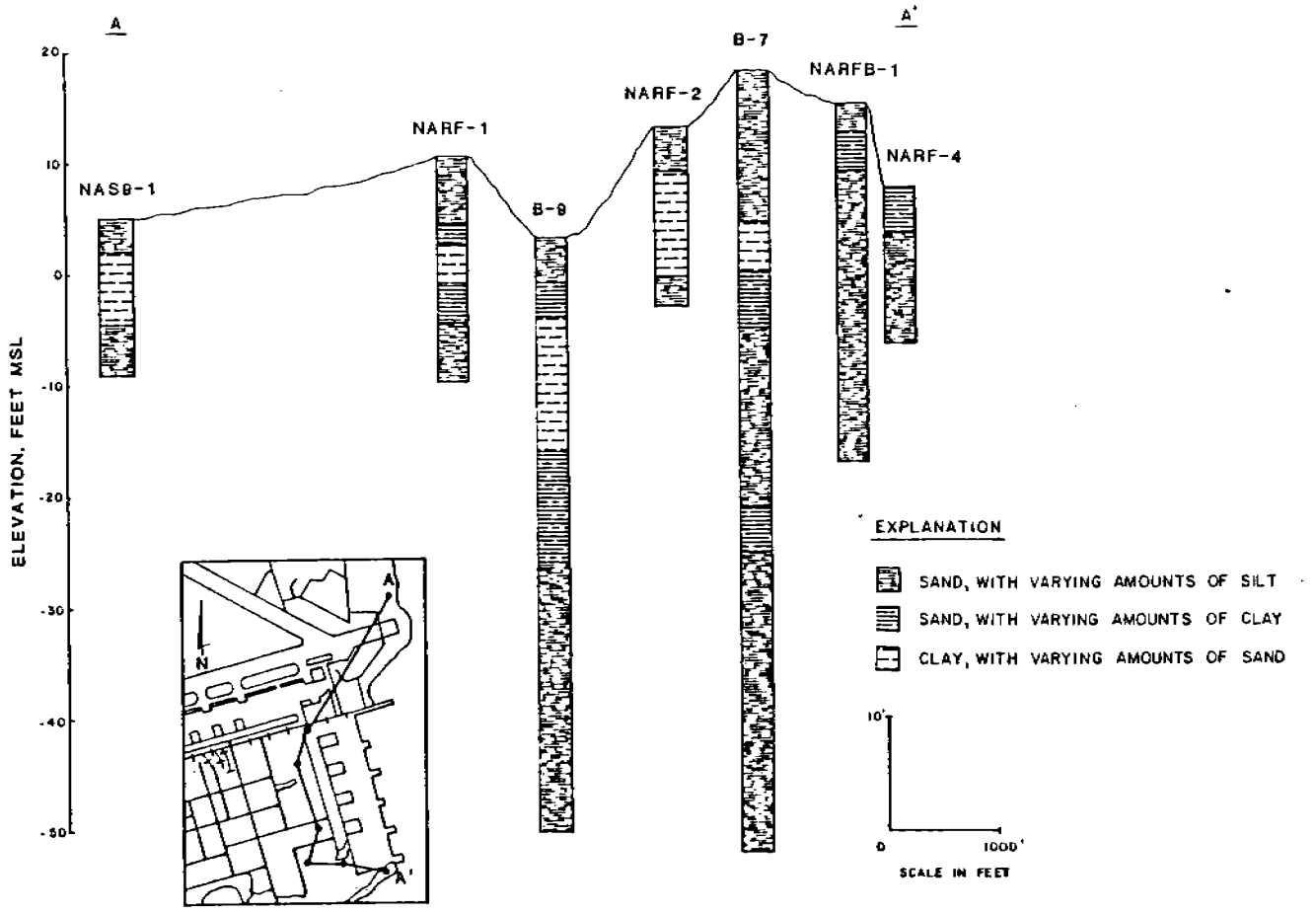

GEOLOGICAL CROSS-SECTION OF SEDIMENTS AT THE SITE

FIGURE 4-4

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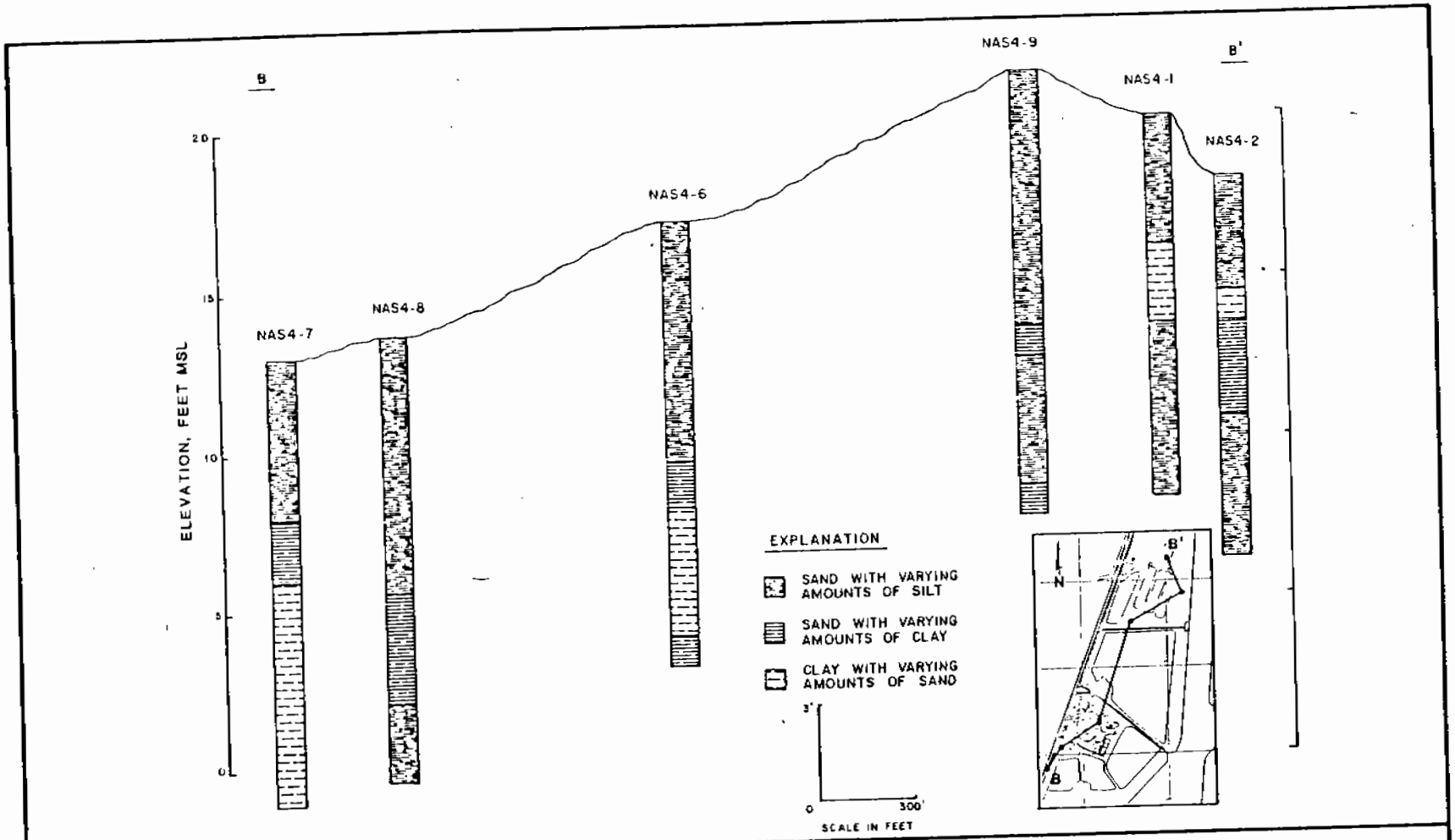

GEOLOGICAL CROSS-SECTION OF SEDIMENTS AT THE SITE

FIGURE 4-5

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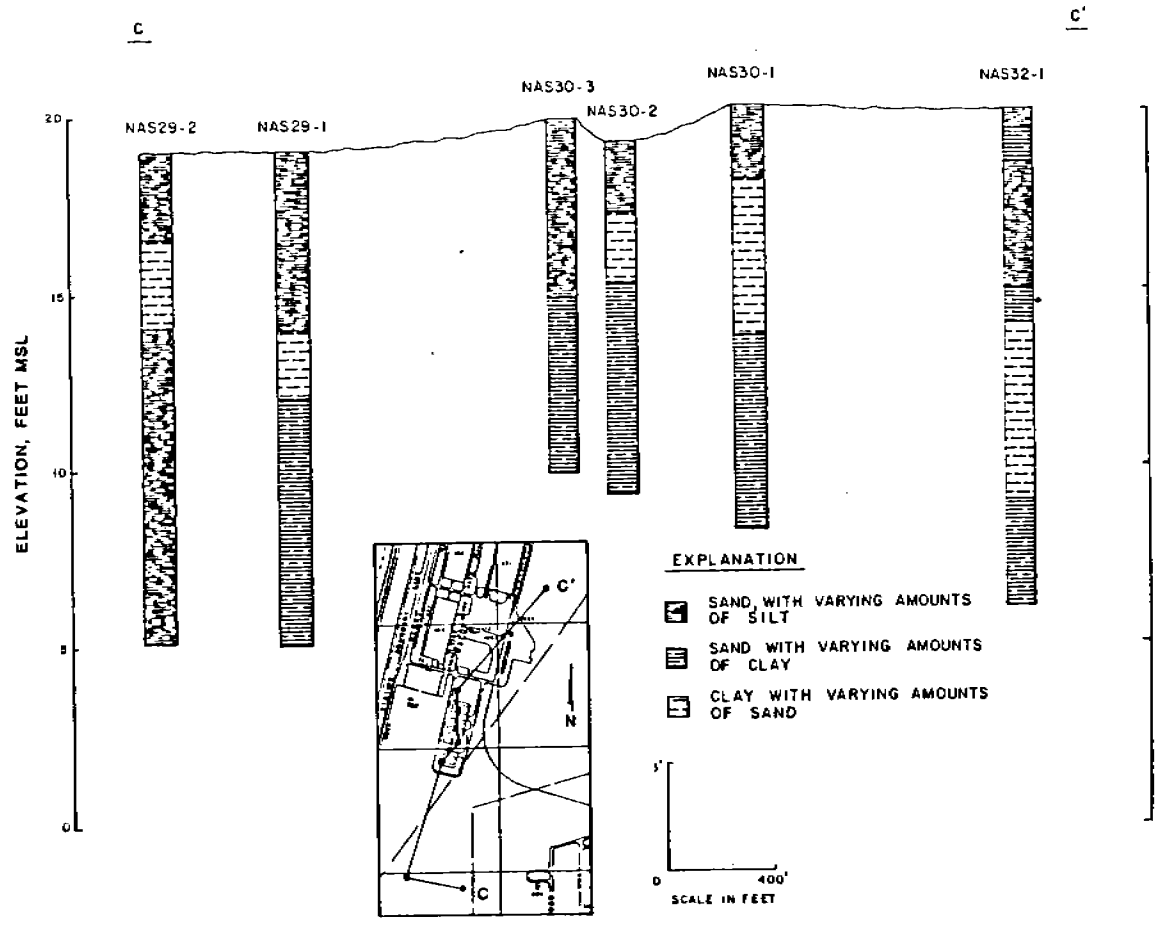

GEOLOGICAL CROSS-SECTION OF SEDIMENTS AT THE SITE

FIGURE 4-6

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4.3.2 The Intermediate Aquifer

The Intermediate Aquifer system occurs in the deposits of the Hawthorn Formation. The Hawthorn Formation, of middle Miocene age, consists mainly of dark gray and olive-green sandy to silty clay, clayey sand, clay and sandy limestone, all containing moderate to large amounts of black phosphate sand, granules and pebbles. In most places the upper surface of the Hawthorn is marked by the presence of phosphate-rich sediments (Fairchild, 1972). Throughout most of northeast Florida the clay and silty clay within the Hawthorn Formation serves as a confining layer that retards upward movement of water from the underlying artesian Floridan aquifer and downward movement of water from the surficial aquifer. The Hawthorn ranges in thickness from about 250 ft to as much as 500 ft in Duval County (Leve, 1966).

Presently, little information on the intermediate aquifer is available. Its areal and vertical characteristics are highly variable due to changes in lithology, but the majority of water is present in the basal limestone and dolomite units.

4.3.3 The Floridan Aquifer

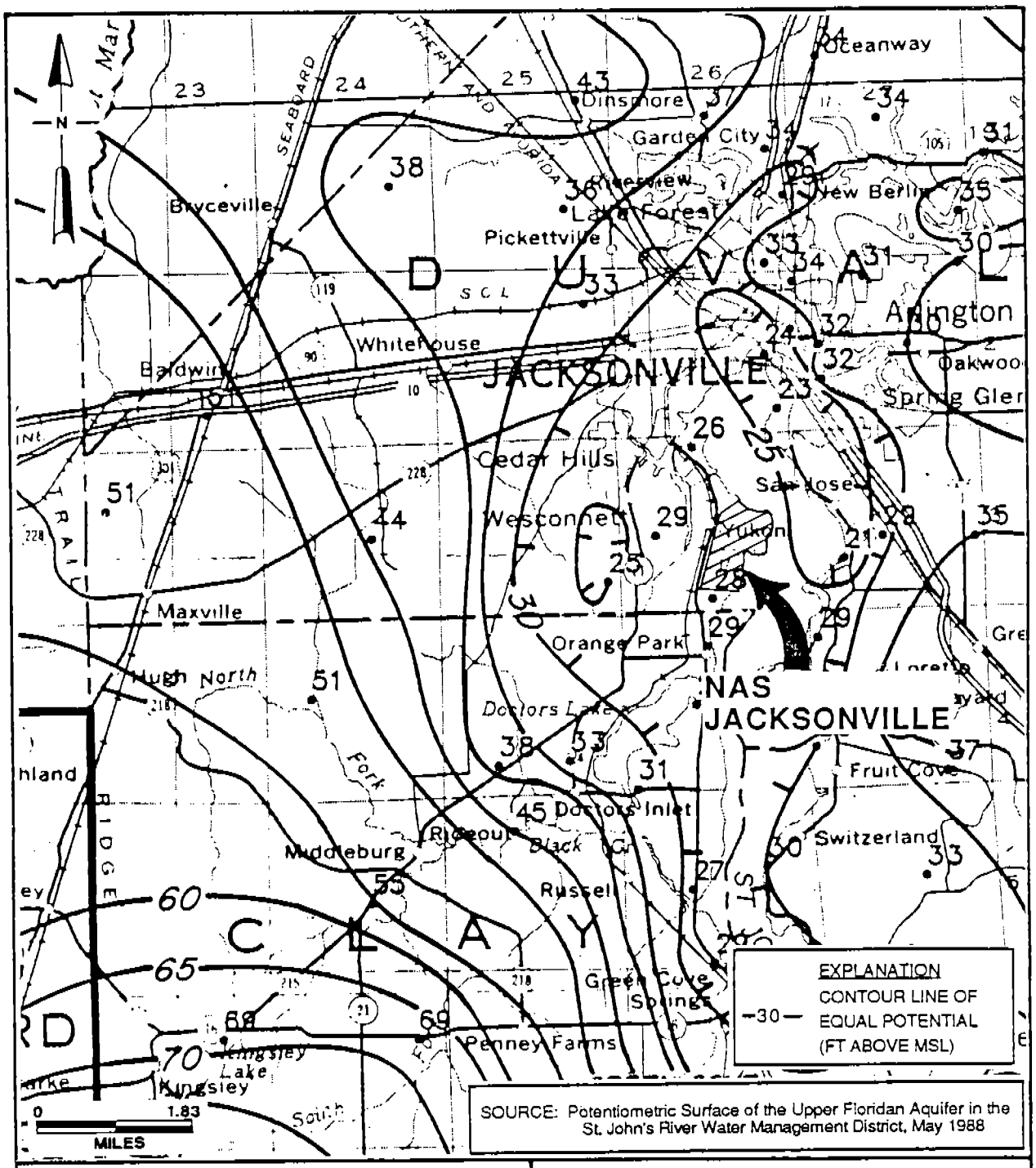
The Floridan Aquifer system is the principal source of potable water in northeast Florida and Duval County. It includes, in ascending order, the Oldsmar, Lake City, and Avon Park Limestones, the Ocala Group (all of Eocene age), and lower units of the Hawthorn Formation that are hydraulically connected to the Floridan. The water-bearing zones within the Floridan Aquifer system consist of soft, porous limestone and dolomite beds. The hard limestone and dolomite beds are relatively impermeable and act as confining beds that restrict the vertical movement of water. Where the confining beds are continuous for a considerable distance, they isolate these water-bearing zones (Leve,1966).

The Ocala Group is one homogeneous sequence of permeable hydraulically connected marine limestone beds. 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 Limestones each contain alternating hard, relatively impermeable dolomite beds and soft permeable limestone and dolomite water-bearing zones (Leve, 1966).

The potentiometric surface elevations of the Floridan Aquifer in the vicinity of the Site is approximately 30 ft msl (Figure 4-7). The elevation of the Site ranges from approximately 0 ft to 35 ft msl. The potentiometric surface map indicates that the regional ground-water flow of the Floridan Aquifer is to the east, northeast. Many of the wells finished in the aquifer flow freely at land surface. This upward hydraulic gradient combined with the thick confining beds within the Hawthorn Formation prevents significant downward migration of water from the surficial aquifer system.

A majority of the recharge to the Floridan Aquifer system occurs outside of Duval County. Regional recharge/discharge maps for the aquifer show that the eastern half of the county is a discharge area with ground-water flow to the ocean and to major wellfield areas. The western portion of the county receives slight to moderate amounts of recharge from downward leakage from overlying aquifer systems.

Aquifer tests have shown the coefficient of transmissivity to vary from 50,000 gpd/ft to 1,000,000 gpd/ft and averages 275,000 gpd/ft. The coefficients of storage ranges from 1.6×10^{-2} to 1.5×10^{-6} and averages 9.4×10^{-4} (Leve, 1968). Wells drilled through this entire sequence of the aquifer may produce potable water from a zone 1,000 to 1,800 ft in thickness.



POTENTIOMETRIC SURFACE MAP
OF THE UPPER FLORIDAN AQUIFER

FIGURE 4-7

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4.4 Hydrology

4.4.1 Rivers

Two principal waterways are located in the immediate vicinity of the Site, the St. Johns River and its tributary, and the Ortega River (Figure 3-1). The St. Johns River forms the eastern boundary of the Site while the Ortega River is located approximately one-half mile west of the Site. The St. Johns River originates in a marsh near Fort Pierce, Florida, 312 miles to the south from its mouth near Mayport, Florida. At Mayport, the river discharges to the Atlantic Ocean. The St. Johns River drains an area of 9,430 square miles, nearly one sixth of the land area of Florida (Anderson and Goolsby, 1973). The portion of the St. Johns from Lake George (106 miles upstream from the ocean) to the Atlantic Ocean is under the influence of tides and salt water intrusion from the ocean, and is therefore considered an estuary. Occasionally, tidal effects are noted as far as 161 miles upstream (Anderson and Goolsby, 1973).

Jacksonville is situated on the St. Johns River approximately 21 miles upstream from the ocean. At the Main Street Bridge in Jacksonville, the river is about 1,250 ft in width. Between Jacksonville and the ocean, the river becomes as wide as 2 miles. At low water, open water areas of the entire river total more than 300 square miles.

Flow records for the St. Johns River in the Jacksonville area are obtained at stage monitoring stations near the Main Street Bridge in downtown Jacksonville and from other monitoring stations located in Duval County. The channel of the St. Johns estuary above Jacksonville is capable of storing large amounts of water, and rising tides force large amounts of water upstream past Jacksonville. As the tide falls, much of the water flows back past

Jacksonville as tidal flows, averaging 87,000 cubic ft per second (cfs) with peak flows commonly exceeding 150,000 cfs. The average tidal flow is more than seven times the average freshwater flow (Anderson and Goolsby, 1973).

Although tides exert the greatest influence on the flow regime of the St. Johns River at Jacksonville, a number of other non-tidal factors, such as wind, runoff, channel storage, rainfall, and evapotranspiration can affect flow volumes in the St. Johns (Anderson and Goolsby, 1973). Typically, these factors can superimpose their combined effect on the tidal flow regime, moderating and augmenting the net tidal effect.

4.4.2 Floodplains

The Florida Department of Transportation Environmental Impact Study (EIS) (1982) outlines the 100-year flood information for the Jacksonville area, based on a Flood Insurance Study for the City of Jacksonville by the Federal Insurance Administration. The 100-year flood elevation in the area is 6 ft msl and would be the result of hurricane surge flooding. The Master Plan for the Site reports that the 100-year flood level for the Site is 5 ft msl.

The Ortega River is approximately 30 miles long. It receives runoff from the western portion of the Site. Stream gauge data is collected on the Ortega River midway between the headwaters and the mouth of the river at the 103rd Street Bridge in Jacksonville. The gauge station is above the influence of tidal action, which extends approximately 10 miles up the river from the confluence with the St. Johns. As reported by Anderson (1972) the drainage area for the Ortega River gauge station is 28 square miles, the average discharge is 42 cfs, with a minimum discharge of 0.20 cfs, and a maximum discharge of 2,950 cfs. Limited water-quality data has also been reported for the Ortega River gauge station by Fairchild

and Leve (1973). The results indicate that the Ortega River (above the tidal portion) is characterized by low dissolved solids content (70 to 80 parts per million [ppm] range), low specific conductance (less than 160 micromhos/cm), and low iron. Below the zone of tidal influence, the Ortega is expected to respond similarly to the St. Johns River, and exhibit extremely variable dissolved solids content.

4.5 Meteorological Study

The climate of the Jacksonville area is humid subtropical. Typically the summers are long, hot and humid and the winters are short and mild, with occasional frost from November through February. The Atlantic Ocean and the Gulf Stream have a moderating influence on both the minimum and maximum temperatures. The average annual temperature is approximately 70 degrees Fahrenheit ranging from the mid 50s in January to the low 80s in July. The area has an average annual rainfall of approximately 53 inches with a majority of the precipitation falling between June and September. Most of the summer rain comes from short duration thunderstorms that occur almost every other day. These showers are often extremely heavy and can cause localized flooding and runoff problems. The mean annual lake evaporation in the Jacksonville area is approximately 45 inches (U.S. Weather Bureau, 1946-1955).

The Jacksonville area is subject to tropical storms and tornadoes, but major hurricanes are relatively rare events. Most occur in August, September, and October, but the six-month period after June 1 to November 30 is considered the Atlantic hurricane season. On the average, six Atlantic hurricanes occur each year, but there have been significant deviations from the average.

Passing hurricanes and tropical storms have their greatest impact through prolonged rains and high tides causing flooding problems that are usually considered equivalent to 100-year storm

events. The Site's shoreline is most affected by such storms due to the exposure to the maximum effect of winds from the northeast and southeast. Table 4-2 lists selected meteorological data collected at the Site.

A general windrose figure from the National Weather service Station in Jacksonville, Florida, is presented in Figure 4-8. The figure shows the predominant wind direction to be from west to east.

4.6 Ecological Features

The Site is located in the flatwoods section of Duval County. This area is composed of an intricate pattern of low ridges interspersed with ponds, swamps and occasional knolls. The central feature of this portion of the county is the St. Johns River. Various habitats at the Site include terrestrial, wetland and aquatic ecosystems. These ecosystems support a great variety of trees, vegetation, and wildlife.

Previously, it was reported in the PA that an active bald eagle nest existed at the Site, but that cannot currently be verified. However, gopher turtles, an endangered Florida species, are known to live throughout the Site.

Table 4-2. Climatological Summaries for NAS Jacksonville

		ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FLIGHT CONDITIONS % OF THE TIME	VFR	92.3	84.2	86.8	91.4	95.3	96.8	97.1	98.3	96.6	95.2	92.3	88.5	84.9
	IFR	7.7	15.8	13.2	8.6	4.7	3.2	2.9	1.7	3.4	4.8	7.7	11.5	15.1
	300' AND/OR 1 MI OR LESS	1.9	5.2	3.0	2.1	.8	.6	.4	.2	.6	.6	1.3	3.0	4.6
SKY CONDITIONS % OF THE TIME TENTHS OF COVERAGE	CLEAR (<.1)	18.65	23.27	23.89	21.80	25.69	18.53	11.79	7.23	8.49	10.09	22.93	26.98	23.49
	SCT (.1-.5)	28.73	23.10	22.79	26.41	28.46	32.68	31.69	32.80	34.68	32.80	29.46	25.40	24.38
	BKN (.6-.9)	29.64	22.38	22.69	24.85	44.34	30.88	38.17	42.36	39.82	35.36	26.39	24.16	22.36
	OVERCAST (1.0)	22.96	31.29	30.33	27.08	19.94	17.93	18.34	17.56	17.03	21.73	21.26	23.49	29.78
FREQUENCY OF WIND DIRECTION % OF THE TIME	N	8.0	13.2	9.9	6.7	4.7	3.9	3.2	2.3	4.1	8.6	16.3	15.2	15.4
	NNE	7.0	8.3	8.6	5.5	4.3	4.1	4.3	1.8	4.6	9.0	14.2	10.4	8.9
	NE	6.0	4.7	5.6	5.5	5.0	5.7	5.3	3.4	5.8	10.0	11.0	5.7	4.5
	ENE	4.3	1.9	2.8	3.3	4.1	5.0	5.6	3.4	5.3	9.2	5.7	3.1	2.0
	E	6.3	2.5	3.6	5.1	6.7	8.9	9.4	6.6	8.1	11.1	6.6	4.3	2.6
	ESE	5.7	2.5	3.3	5.1	8.2	9.4	8.1	7.0	7.3	7.3	3.7	3.3	2.6
	SE	5.3	3.3	3.6	5.7	7.5	7.7	7.4	7.6	7.3	5.2	2.4	3.2	3.0
	SSE	5.7	4.4	4.7	6.3	6.9	8.4	7.2	9.0	7.3	4.8	2.6	3.2	3.3
	S	8.1	8.4	8.7	9.7	8.4	9.0	9.0	11.6	9.4	5.3	3.5	6.0	8.3
	SSW	5.2	4.0	4.4	5.1	5.5	5.5	7.1	10.5	8.0	3.9	1.9	3.4	3.6
	SW	5.7	4.4	5.8	6.2	6.6	6.3	8.2	9.6	7.3	3.6	2.4	3.8	3.9
	WSW	6.4	6.0	7.3	7.3	8.4	7.4	7.8	9.0	6.5	3.8	3.6	4.4	5.1
	W	7.2	8.8	8.4	8.9	8.1	7.0	7.3	7.5	6.5	4.5	5.3	7.2	7.5
	WNW	4.1	6.8	6.2	5.5	4.7	3.0	2.5	2.5	2.5	2.1	3.4	4.8	5.6
	NW	4.1	6.4	5.5	4.5	3.9	2.4	1.9	1.6	2.2	2.8	4.5	6.2	7.1
	NNW	4.7	7.0	5.6	4.2	3.6	2.8	2.0	1.6	2.2	3.5	7.6	8.9	7.9
	CALM	5.5	7.4	5.9	5.5	3.6	3.5	3.8	5.0	5.4	5.2	5.4	6.9	8.6
FREQUENCY OF WIND SPEED % OF THE TIME	1-6 KNOTS	51.3	48.5	44.9	44.7	45.6	50.4	54.6	59.8	61.8	54.7	48.5	49.0	49.5
	7-10 KNOTS	29.2	27.6	30.5	30.8	33.8	34.1	31.2	28.4	25.5	26.4	28.5	27.4	25.7
	11-16 KNOTS	11.9	13.9	15.4	16.3	14.9	10.9	8.9	6.4	6.1	11.3	15.2	14.1	13.5
	17-21 KNOTS	1.5	1.6	2.4	2.4	1.5	.7	.8	.3	.4	2.1	2.0	1.4	1.5
	22-33 KNOTS	0	0	.4	.2	0	0	.1	0	0	.1	.3	0	.2
	34-40 KNOTS	0	0	0	0	0	0	0	0	0	0	0	0	0
	OVER 40 KNOTS	0	0	0	0	0	0	0	0	0	0	0	0	0
PREVAILING WIND DIRECTION		N	N	N	S	WSW	ESE	E	S	S	E	N	N	N
AVERAGE MONTHLY SPEED		7.8	7.8	7.9	7.5	7.0	7.1	7.4	6.5	6.0	6.8	8.5	8.0	8.1
PEAK GUSTS RECORDED (YEAR)		SSE 98 (83)	W 47 (59)	SSE 98 (83)	W 55 (48)	SSW 52 (53)	WSW 57 (48)+	NNE 62 (59)	NW 69 (47)	ESE 66 (49)	N 70 (64)	NE 67 (50)	SW 47 (55)	SW 42 (45)
WEATHER % OF THE TIME	R,RW,L	6.5	7.6	8.3	6.5	4.4	4.4	5.8	6.3	7.0	8.8	6.5	5.6	7.1
	A	0	0	0	0	0	0	0	0	0	0	0	0	0
	THUNDER	1.6	.1	.4	.9	1.0	2.0	3.1	4.2	3.9	1.8	.6	.3	.3
	FOG	10.1	16.7	13.5	9.9	6.6	5.7	4.7	3.9	6.3	8.1	12.6	15.4	17.2
	SMOKE,HAZE	14.0	15.8	14.7	11.9	9.4	12.9	14.3	11.4	12.1	14.9	17.3	16.4	17.1
	NO WEATHER	67.8	59.8	63.1	70.8	78.6	75.0	72.1	74.2	70.7	66.4	63.0	62.3	58.3
AVERAGE NUMBER OF DAYS WITH THUNDER OR THUNDERSTORMS		72	1	2	3	4	7	12	17	14	8	2	1	1
AVERAGE NUMBER OF DAYS WITH PRECIP. (.01 OR MORE)		114	8	8	8	6	8	12	15	15	13	9	7	7
AVERAGE NUMBER OF DAYS WITH FOG		139	15	12	12	10	10	8	6	10	11	14	15	16

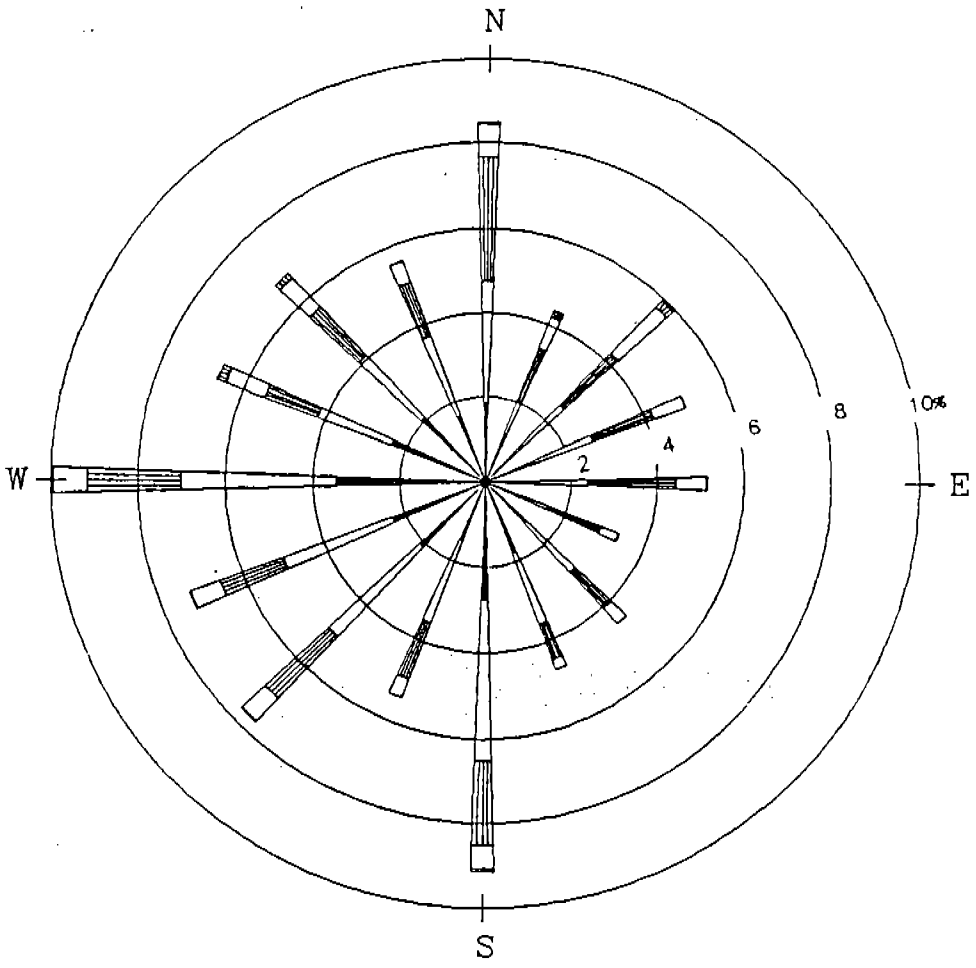
Table 4-2. (continued)

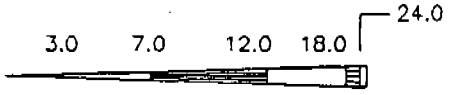
		ANNUAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VISIBILITY	<= 3 NM	3.8	9.7	6.5	3.7	1.8	1.4	1.2	.7	1.4	1.9	3.5	6.2	8.5
% OF THE TIME	<= 1 NM	1.3	3.6	1.9	1.4	.6	.4	3	.1	.3	.4	.8	2.1	3.5
	<= 1/4 NM	.4	1.3	.8	.5	.2	.1	0	0	0	0	.3	.7	1.3
CEILING	<= 1000 FT	6.2	17.8	10.9	6.5	3.9	2.3	2.2	1.2	2.7	3.8	6.0	8.7	11.8
% OF THE TIME	<= 300 FT	1.3	3.9	2.2	1.6	.7	.2	.2	.1	.3	.4	.9	2.1	3.2
	<= 100 FT	.4	1.7	.8	.5	.2	.1	0	0	0	0	.7	.7	1.3
PRECIPITATION	AVERAGE	64.4	2.7	3.1	3.7	2.6	3.5	5.1	6.0	7.0	6.2	3.4	1.9	2.4
(INCHES)	EXTREME MAX	67.7	7.4	6.2	11.2	6.8	13.1	12.5	11.4	17.9	13.6	11.0	7.4	7.1
	(YEAR)	(47)	(79)	(87)	(48)	(83)	(59)	(67)	(57)	(68)	(79)	(56)	(87)	(83)
	EXTREME MIN	28.15	.02	40	.24	.42	.61	1.4	1.9	2.5	.19	.05	.02	TR
	(YEAR)	(54)	(59)	(45)	(45)	(86)	(60)	(70)	(54)	(78)	(52)	(74)	(67)	(62)
TEMPERATURE	AVERAGE	70	56	58	64	70	76	81	83	83	80	72	64	57
(DEGREES F)	AVERAGE MAX	79	65	68	74	80	85	89	91	90	87	80	73	67
	AVERAGE MIN	61	45	47	53	59	66	72	74	74	72	63	54	47
	EXTREME MAX	102	87	89	92	95	100	102	102	102	98	96	89	87
	(YEAR)	(87+)	(74)	(62)	(74)	(86)	(45)	(85)	(87)	(87)	(58)	(86)	(86)	(77)
	EXTREME MIN	9	9	24	23	34	47	49	64	60	49	37	21	14
	(YEAR)	(85)	(85)	(58)	(80)	(87)	(89+)	(84)	(80)	(79)	(81)	(89)	(50)	(83)
AVERAGE NUMBER OF DAYS MAX TEMP 90 OR ABOVE		75	0	0	*	1	8	15	21	19	10	1	0	0
AVERAGE NUMBER OF DAYS MIN TEMP 30 OR BELOW		4	2	1	*	0	0	0	0	0	0	0	*	1
RELATIVE HUMIDITY PERCENTAGE	AVG. 0100R	81.6	79.1	77.4	77.7	78.4	80.2	83.5	84.8	86.0	85.2	83.4	82.1	81.0
	0700R	84.8	82.1	81.5	81.5	83.1	84.0	86.1	87.4	89.3	88.9	86.5	84.3	83.3
	1300R	56.9	58.0	54.9	51.2	49.1	51.5	57.1	60.3	61.6	63.1	59.2	57.3	59.2
	1900R	69.8	68.6	64.3	61.8	60.8	64.2	61.1	73.7	76.2	76.7	74.5	72.9	72.3

PERIOD OF RECORD 1945-1988

NOTE: + PLUS OTHER YEARS

CSNASJAX.DOC





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

WINDROSE DIAGRAM
JACKSONVILLE, FLORIDA
FIGURE 4-8

RI/FS WORK PLAN
FOR OU1

NAS JACKSONVILLE
SEPTEMBER 1991

5.0 PSC PRIORITIZATION

5.1 Purpose of the PSC Prioritization

The prioritization of PSCs is based on the potential risk posed to human health and the environment by each PSC. The purpose of prioritization is to determine the PSCs that pose the greatest risk, so that these PSCs will be the first scheduled for remedial investigations/actions.

For the purpose of prioritization, each PSC has been classified into one of the following four group categories: 1) No Further Action, for PSCs having minimal waste activities, minimal environmental impacts, and/or no immediate human health risks; 2) Site Screening, when additional investigative work is necessary to determine or confirm existing Site conditions; 3) Petroleum Hydrocarbon, for PSCs with common Hydrocarbon waste constituents, including those already being assessed in accordance with Chapter 17-770, FAC; and 4) PSCs selected to undergo the RI/FS process in compliance with CERCLA guidelines. A summary of the PSCs, types of wastes, affected media, and response actions is provided in Table 5-1.

5.2 No Further Action Group

Eighteen PSCs have been preliminarily identified as the No Further Action Group. Volume 2, the No Further Action Plan, will address this group and provide a No Further Action concept. PSCs requiring no further action pose no immediate health risk to humans or the environment and require no additional assessments beyond those conducted as part of the PA, the SI, the ESI. Volume 2, to be developed, will outline the procedures used to identify the No Further Action PSCs and will present information justifying implementation of the No Further Action alternative.

Table 5-1. Summary of PSCs, Types of Wastes, Affected Media, and Response Actions

PSC Name Number & Location	Type of Waste	Hazardous YES/NO	Type of Storage/Disposal and release	Possibly Affected Media 1/	History of Response Actions	Environmental Conditions
1. Patrol Road Turnaround Area A,B-11	Rubble, concrete & asphalt.	NO	Waste was disposed on land surface along shoreline.	Soil, G.W., S.W.	I.D* by the PA-recommended no further action.	No evidence of environmental risk.
2. Present Fire Fighting Training Area D-10	JP-5 & waste oil.	YES	Fuel is sprayed on the ground and burned during training exercises.	Soil., G.W.	ID by the PA-FDER requested more information. SSI study found nothing, recommended no further action.	Sampling conducted, no constituents detected.
3. Sludge Disposal Area/West WWTP EX-Area D-10	Sludge containing toxic metals.	YES	Dumped from 1962-1980 over 15 acres South East of IWTP.	Soil, G.W.	ID by the PA- recommended no further action.	Sludge not hazardous.
4. Pine Tree Planting Area E-10	Paint shaving, sewage sludge, asbestos, oil, other petroleum products.	YES	Dumped over a 1 acre site. Paint shavings noticeable, sewage sludge present.	Soil, G.W.	ID by PA-recommended for the confirmation study. SSI study recommends no further action.	TCE present in G.W. Sample (45 ppb), low levels present in soils. Little to no potential for constituent migration
5. Shoreline Fill, West of Fuel Barge Dock (Pier 142) C-15,16	Concrete runway debris, paint shavings, paint remover, solvents, and radioactive paint.	YES	Paint & solvents disposed in 1945-1946 below grade, covered with concrete and runway debris.	Soil, G.W., S.W, Sed	ID by the PA-no further action, SSI recommended by NAS JAX. SSI recommended no further action.	One well sampled at site: No VOCs, Barium @ .28 ppm., Radium 226 & gross beta levels were below background.
6. Fuel Farm	Fuel oil	YES	Fuel leak at connection of pipeline to tank was contained in the steam pit.	Soil, G.W.	ID by the PA-no further action.	No evidence of environmental risk.
7. Gas Hill E-15	JP-4	YES	Explosion involving underground tanks.	Soil, G.W.	ID by the PA-confirmation study requested by NAS JAX.	Fire contained in underground tanks. Little to no potential for constituent migration or contact.
8. Vacant Lot, Fuel Farm Area E-16	Abrasive blast grit.	NO	Material disposed on ground.	Soil	ID by the PA-no further action.	No evidence of environmental risk.
9. Old Disposal Area (East of Fuel Farm) E-16	Garbage, construction debris, 55 gal drums, sludges.	YES	Waste was disposed on ground, and stored in 55 gallon drums.	Soil, G.W.	ID by the PA-recommended for confirmation study. Considered complete by SSI study.	Low levels of VOCs (methylene Chloride, TCE, trans-1,2-DCE), metals were BDL. Little to no potential for constituent migration or contact.
10. Tank 119 K (A-T) G-15	Hot stripper MIL-R-81835 or Turco 3823.	YES	27,000 gallon underground tank: No release reported.	Soil, G.W.	ID by the PA-no further action. FDER requested further testing of the tank.	Hazardous waste was stored temporarily in tank. Tank has since been removed.
11. Hangar Building 101 H-13,14	Waste solvents, mercury.	YES	Solvents released to soil & G.W. From leaky sewer systems located below hanger floor.	Soil, G.W.	ID by the PA-recommended for confirmation study. Recommended for additional remedial action, additional assessment performed 1988.	Low to high levels of VOC present in the G.W.

PSC Name Number and Location	Type of Waste	Hazardous YES/NO	Type of Storage/Disposal and release	Possibly Affected Media	History of Response Actions	Environmental Conditions
12. Old Test Cell Building H-14	Solvents, hazardous waste.	YES	Spills and leaks from old drums discharged to storm/-industrial sewer system.	Soil, G.W., S.W.	ID by the PA-recommended for confirmation study. Recommended for additional remedial action-additional assessment performed 1988.	Low to high levels of VOCs present in the G.W.
13. Radium Paint Disposal Pit H-14	Radioactive paint waste.	YES	Waste was mixed with soil in a pit 40' X 50' X 1'.	Soil, G.W.	ID by PA-not recommended for further action. Additional work requested by FDER-no action recommended by SSI study.	Radium 226 exceeded FDER Drinking Water Standards. No VOCs. Gross alpha also exceeded Drinking Water Standards.
14. Battery Shop I-14	Lead acids, waste, battery acids.	YES	Acids were dumped in seepage pit which is connected to storm/industrial sewer system.	Soil, G.W.	ID by PA-not recommended for further action. Additional work requested by FDER-no action recommended by SSI study.	Contamination is present but not defined.
15. Solvent and Paint Sludge Disposal Area J-14	Waste solvents and paint sludges.	YES	Paint and sludge were disposed on the ground and mixed with soil. Visible at land surface.	Soil, G.W.	ID by the PA-recommended for confirmation study. ESI & SSI performed. Additional remedial action-additional assessment performed.	Contamination is present but not defined.
16. Storm Sewer Discharge -Black Point K-14	Discharge point for sewers located along Wright St (NARF).	YES	Waste was discharged through the sewer system to St. Johns River & to G.W.	G.W., S.W.	ID by the PA-recommended for confirmation study. ESI & SSI performed. Additional remedial action-additional assessment performed.	Contamination is present but not defined.
17. Glass Bead Disposal Area J-12	Spent glass beads containing metals.	YES	Disposal of beads offshore in the river. Stored in drums, removed by a private contractor. A glass bead bar has developed in St. Johns River.	Sed, S.W.	ID by the PA-recommended for SSI & ESI by FDER. Closure not conducted. No further action.	Contamination by metals is reportedly not present.
18. Radioactive Waste Disposal Area J-12	Radioactive radium paint wastes.	YES	Waste mixed with soil; possibly leaching to G.W.	Soil, G.W.	ID by the PA-FDER recommended additional work; site excavated and remediated. No further action.	Contamination is reportedly not present after remediation
19. Old Gas Station J-12	Gasoline, and diesel fuels.	YES	Underground storage tanks 4-10,000 gallons, no release documented.	Soil, G.W.	ID by the PA-additional work recommended by FDER.	Tanks have been abandoned in accordance with F.A.C. 17-61.
20. Solid Waste Incinerator I-10	Ash and solids.	NO	Waste was burned, no release documented.	Soil, Air	ID. By the PA-not recommended for confirmation. No further action.	Ash and solids were disposed in Clay County Landfill.
21. Golf Course J-8,K-9	Pesticides, Diazonon herbicides, Roundup.	YES	Pesticides were applied on golf course near lake.	Soil, G.W., S.W.	ID by the PA-not recommended for confirmation study. No further action.	Pesticides washed into lake; fish kill was an isolated incident.
22. "Fort Dix" K-7	Small arms & ammo disposal area.	NO	N/A No release documented.	N/A	ID by the PA-no further action recommended/required.	No evidence of environmental risk.
23. Old Skeet Range L-8	Miscellaneous	NO	N/A No release documented.	N/A	ID by the PA-no further action recommended/required.	No evidence of environmental risk.
24. Scrap Metal Disposal Area M-10	Scrap metal, assorted junk.	NO	Pile on ground No release documented.	N/A	ID by the PA-no further action recommended/required.	No evidence of environmental risk.

PSC Name Number and Location	Type of Waste	Hazardous YES/NO	Type of Storage/Disposal and release	Possibly Affected Media	History of Response Actions	Environmental Conditions
25. Building No. 2038 Naval Hospital EX-Radioactive Waste Storage Area O-10	Hospital waste containing radioactive iodine.	YES	Stored in drums No release documented.	N/A	ID by the PA-no further action recommended/ required.	Site cleaned by subcontractor -300 barrels disposed off-site in 1982 under the direction of Radiological Affairs Support Office
26. Old Main Registered Disposal Area N,J-8 O-7,8	Trash, garbage, waste, oil, solvents, radium contaminated paint stripper.	YES	Waste materials buried/ disposed in trenches and pits. Leaching to G.W. And surface water	Soil, G.W, S.W., Sed	ID prior to PA. Assessment performed in 1979-1980. Remedial action performed	Interim remedial actions at the PSC included excavation of radioactive waste and interceptor trenches built to recover waste oil.
27. EX-PCB Storage Area O-7,8	Transformers containing PCB oils.	YES	Outdoor storage of transformers. Transformers were vandalized-PCB leaked on the ground.	Soil, G.W.	ID prior to PA, assessment performed in 1979-1980. Subsequent remedial action performed.	Interim remedial action at the PSC included excavation of PCB contaminated soil.
28. EX-Fire Fighting Training Area	Waste oil, PCB oils.	YES	Waste oil placed in pit and presumably burned.	Soil, G.W.	ID by PA-NAS JAX recommended further work at the site after the discovery of PCB in the soil. Confirmation studies required.	G.W. Contained low levels of VOCs (TCE) and the soil contained PCBs. Little to no potential for constituent migration or contact.
29.Organic Disposal Area O,P-3	Organic debris (wood, cuttings) PVC casing, construction debris, scrap metal, drums trash & garbage, creosote wood blocks.	YES	Waste was disposed on ground and graded for access. No release documented.	Soil, G.W.	ID by the PA-SSI & ESI completed-No further action.	Metals were below standards, low levels of VOCs present in GW/Soil.
30. Old Drum Lot O-3	Solvents, metal containing sludges.	YES	Stored approximately 10,000 drums.	Soil, G.W.	ID by the PA-SSI & ESI recommended removal of additional soil. Not completed.	Low levels of VOCs present in G.W. Stained soil visible.
31. Asphalt Mix Area N-4	Asphalt mixing material.	NO	Piles of asphalts and drums reported to be present	Soil, G.W.	ID by the PA-no further action recommended.	No visible evidence of contamination.
32. EX-Base Landfill M-4	Soil, refuse, junk vehicles.	NO	Landfill. No release documented.	Soil, G.W.	ID by the PA-FDER recommended for confirmation study. SSI performed, no further action.	No visible/laboratory evidence of contamination.
33. Base Service Station J-5	Gasoline diesel fuels.	YES	Underground storage tanks.	Soil, G.W.	ID by the PA-no further action recommended.	Explosive vapors detected in sewer line within 9 block area of station.
34. Old Transformer Storage Building J-6	Transformers (PCB oil).	YES	Warehouse. No release documented.	N/A	ID by the PA-no further action recommended.	No evidence of environmental risk.
35. Temporary PCB Storage Area H-11	PCB oil, asbestos.	YES	Asbestos debris stored in building along with transformer containing PCBs.	Air	ID by the PA-no further action recommended.	Temporary storage area for PCB oil-asbestos was cleaned up and area decontaminated by Navy.
36. Dewey Park H-3,4	Construction debris, materials from fire damaged buildings.	NO	Disposed on a two-acre area of ground.	Soil, G.W.	ID by the PA-no further action recommended.	No evidence of environmental risk.

PSC Name Number and Location	Type of Waste	Hazardous YES/NO	Type of Storage/Disposal and release	Possibly Affected Media	History of Response Actions	Environmental Conditions
37. EX-Power Barge Dock Area R-8	Transformers, PCBs.	YES	Barge Area. No release documented.	S.W.	ID by the PA-no further action recommended.	Reportedly a transformer exploded on the shore, but no explosion or release could be documented.
38. Torpedo Rework Facility N-6,7	Rags and gloves containing otto fuel-dibutyl civa-cate, nitryl diamene	YES	Drums used for storing waste No release documented.	N/A	ID by the PA- no further action recommended.	Waste is disposed offsite.
39. Possible Transformer Burial area N-3	Transformers possibly containing PCB oils.	YES	Buried transformers- No release documented.	Soil, G.W.	ID by the PA-NAS JAX recommended SI. No further action recommended by ESI study.	No evidence of disposal found during SI study.
40. EX-East IWTP Discharge Area G-15	Waste water recovered from skimming, paint chips and waste oil.	N/A	Waste water was discharged to St. Johns River.	S.W., Sed.	ID by the PA-NAS JAX recommended SI. No further action recommended by ESI study.	Sediment sample collected from the cove did not indicate any contamination.
41. Domestic Waste Sludge Drying Beds	Domestic Sludge.	NO	Sludge stored in Concrete Drying Beds. Possible leaching to G.W.	Soil, G.W.	ID by NAS JAX	No evidence of environmental risk.
42. Polishing Pond for WWTP Effluent	Effluent water contains VOCs and heavy metals.	NO	Effluent stored in Pond might leach to G.W, Soil, or discharge to G.W.	Soil, G.W., S.W.	ID by NAS JAX	Discharge of possible contaminanted water to St. Johns River.
43. Industrial Waste Sludge Drying Beds	Sludge containing toxic metals and organic solvents.	Yes	Sludge stored in concrete drying beds. Possible leaching to G.W.	Soil, G.W.	ID by NAS JAX	Possible contamination of soil and ground water in the vicinity.
44. Drainage Ditch, West of Ajax Street, from Yorktown Avenue to Mulberry Cove	Stormwater contaminated with over-flow from a hazardous-waste storage tank.	Yes	Stormwater Drainage Ditch. Hazardous waste storage tank overflowed into the storm sewer during periods of heavy precipitation.	S.W., Sed.	ID by NAS JAX	Possible contamination of surface water and sediments in the ditch.
45. Building 200 Wash Rack Waste Disposal Pit	Overflow from an oil\water separator.	Yes	Wastes drawn from the top of the oil/water separator released to an open-bottom, concrete-walled pit.	Soil, G.W.	ID BY NAS JAX	Possible contamination of soil and ground water in the vicinity.

* = Identified
1/ GW = Ground Water
SW = Surface Water
SED = Sediment

ENVIRONM.DOC

The preliminary justification for inclusion of each of the 18 PSCs in the No Further Action Group is below:

PSC 1 - Patrol Road Turnaround

The PSC was identified during the PA. Disposal was limited to inert materials such as concrete construction debris; no hazardous wastes were disposed at PSC 1.

PSC 6 - Fuel Farm

A fuel leak from a pipe connection was contained in the concrete containment pit. No evidence that fuel escaped the pit was discovered during the PA.

PSC 9 - Old Disposal Area (East of Fuel Farm)

The concentrations of selected volatile organic compounds (VOCs) detected in ground-water samples collected at the PSC during the PA were below proposed ARARs. The proposed ARARs will be identified in the No Further Action Plan.

PSC 10 - Tank 119-K

Hazardous waste was stored temporarily in this underground tank in accordance with Temporary Operation Permit #HT 16-68225. No leak or long-term disposal of wastes at PSC 10 was reported. Subsequently, the tank was removed in accordance with The Closure Plan approved by the FDER on November 20, 1986. Soil samples were collected from the

excavation during closure and analyzed with a HNU Photoionization Detector meter. No evidence of soil contamination was detected.

PSC 17 - Glass Bead Disposal Area

Analytical results of samples collected during the PA indicated that detected metals are bound to the sediments and are not present in concentrations characteristic of a hazardous waste.

PSC 20 - Solid Waste Incinerator

Ash and solid waste were generated at the PSC and disposed in the Clay County Landfill. No evidence of disposal or contamination at PSC 20 was detected.

PSC 21 - Golf Course

An isolated fish kill occurred after a pesticide (Dasinit™) was applied to the golf course near Casa Linda Lake. No additional environmental impacts have been reported.

PSC 22 - "Fort Dix"

Small arms and ammunition casings may have been disposed at PSC 22. No evidence of disposal was identified during the PA; no further action was recommended.

PSC 23 - Old Skeet Range

No evidence of hazardous waste disposal was discovered during the PA.

PSC 24 - Scrap Metal Disposal Area

No evidence of waste burial at PSC 24 was detected during the PA. A small pile of scrap metal was temporarily stored there and subsequently removed.

PSC 25 - Building No. 2038 (Naval Hospital Ex-Radioactive Waste Storage Area)

Radioactive iodine disposed at the PSC was removed and the PSC was subsequently found to be free of radiation. Building 2038 was later demolished during the Naval Hospital expansion.

PSC 31 - Asphalt Mix Area

No visible evidence of contamination at the PSC was discovered during the PA and no further action was recommended.

PSC 32 - Ex-Base Landfill

Additional PA work was conducted at FDER's request. The analytical results of the additional ground-water sampling did not indicate evidence of contamination.

PSC 34 - Former Transformer Storage Building

There were no confirmed reports of transformer disposal or leaks from transformers stored at PSC 34. The PA concluded no further action was necessary.

PSC 35 - Former Temporary PCB Storage Area

The PSC was cleaned after being used for temporary storage of asbestos pipe insulation. No leaks from transformers

temporarily stored at the PSC were reported and no evidence of such leaks was identified.

PSC 37 - Ex-Power Barge Dock Area

The report of an explosion of a PCB transformer was not confirmed during the PA.

PSC 39 - Possible Transformer Burial Area

No evidence of reported disposal of transformers and electrical components at PSC 39 was discovered during a soil boring study conducted during the SI. The lithologic logs of the study are included in Appendix 1.2 of Volume 1.

PSC 40 - Ex-East IWTP Discharge Area

Analysis of samples collected during the PA indicate the sediments are not characteristic of hazardous waste.

5.3 Site Screening Group

Eleven PSCs have been identified for Site Screening analysis. Additional investigative work will be conducted at these PSCs to verify the presence or absence of selected constituents in soil, sediment, surface water and/or ground water and to determine if any of the PSCs qualify for a different group classification. The PSCs in the Site Screening Group are grouped according to the types of work proposed:

- Sampling and analysis of ground water via sampling probe in accordance with the procedures described in the Basic Site Work Plan and/or analysis of selected soil samples. The PSCs in this group include PSC 5-Shoreline Fill, West of Fuel Barge Dock; PSC 8-Vacant Lot, Fuel Farm; PSC 29-Organic Disposal Area; PSC 30-Old Drum Lot; PSC 36-Dewey Park; PSC 38-Torpedo Rework Facility; and PSC 45-Building 200 Wash Rack Waste Disposal Pit.

  PSC 5 is included in this group due the low concentrations of constituents detected in a ground-water sample collected from Monitor Well NAS 5-1. These concentrations may not be representative of actual water-quality conditions at the PSC. Additional ground-water samples will be collected near the center of the PSC and analyzed to confirm the presence or absence of selected constituents.

  PSC 8 is included in this group, although its precise boundaries have not yet been defined. Empty 55-gallon drums were found nearby as reported by Mr. Joel Murphy, Southern Division, and Mr. Tim Curtin, Public Works, NAS Jacksonville. It is not known if the drums contained liquids or were empty at the time they were buried. Additional sampling and analyses are needed to determine if possible leakage from the drums has impacted ground water or soil in the vicinity.

  PSC 29 is included in this group since additional sampling and analyses are needed to evaluate the possible impacts from the disposal of organic debris, including crushed drums. Ground-water samples must be collected to confirm the presence or absence of VOCs and selected metals. Soil samples should be collected and submitted for TCLP analysis to determine if soils at the PSC constitute a hazardous waste.

PSC 30 is included in this group because soils containing metals at concentrations exceeding Toxicity Characteristic Leaching Procedures (TCLP) values may remain at the PSC after soil remediation. In addition, TCE was detected in a ground-water sample at a concentration exceeding the FDER Drinking Water Standard (3 parts per billion [ppb]).

PSC 36 was identified during the SI. Although the area was utilized for disposal of construction debris, no samples have been collected to confirm the presence or absence of constituents.

PSC 38 is included in this group because of a history of past disposal into two gravel pits on the PSC. Additional sampling and analyses are needed to determine if leakage from the gravel pits has impacted ground water or soil in the vicinity.

- PSC 45 is included in this group since the pit had no bottom and received drainage from a wash rack where ground-support equipment cleaning and paint-stripping operations took place. Additional sampling and analyses are needed to determine if wastes discharged to the pit have impacted ground water or soil in the vicinity.

- Sediment and surface-water sampling in accordance with the procedures described in the Basic Site Work Plan. This group consists of PSC 16-Storm Sewer Discharge-Black Point and PSC 44-Drainage Ditch, west of Ajax Street, from Yorktown Avenue to Mulberry Cove.

44 →

PSC 16 is included in this group since the collection of sediment and surface water samples are needed to determine possible impacts resulting from storm-water discharges generated from NADEP.

PSC 44 is included in this group because hazardous waste from the storage-tank system located in the Keyway of Hangar 1000 may have overflowed into the storm sewer that drains into PSC 44 during periods of heavy precipitation. The collection of sediment and surface water samples are needed to determine possible impacts resulting from these releases.

- Collection of ground-water samples from an existing well. The group includes PSC 18 - Radioactive Waste Disposal Area only. Ground-water samples must be collected from Monitor Well NAS 18-1 to confirm low levels for gross alpha activity and other radionuclides.

- Collection of ground-water samples from existing well(s) and/or analysis of selected soil samples. The group includes PSC 28 - Ex-Fire Fighting Training Area

  PSC 28 is included in this group since additional sampling and analyses are needed to determine possible impacts from disposal of oils that may have contained PCBs. Ground-water samples must be collected from Monitor Well NAS 28-1 to confirm the presence or absence of constituents including polychlorinated biphenyls (PCBs), TCE, and VOCs. The collection of soil samples is needed to determine if PCBs are present in the soils at PSC 28.

5.4 Petroleum Hydrocarbon Group

PSCs in this group will be investigated in accordance with Chapter 17-770, FAC entitled "Petroleum Contamination Site Cleanup Criteria." This group includes the following three PSCs: PSC 7-Fuel Farm Area, PSC 19-Old Gas Station, and PSC 33-Base Service Station. Underground petroleum storage tanks are located at each of these PSCs. Investigations concerning the potential for

at each of these PSCs. Investigations concerning the potential for releases are most efficiently addressed under existing State regulations. Some work at these PSCs has already begun in accordance with FAC 17-770.

5.5 RI/FS Investigations Group

Thirteen PSCs have been identified as requiring RI/FS investigation. Existing data indicate contamination may be present or a potential for contamination exists at these PSCs, due to the nature of the disposal activities. The following PSCs are included in this category: PSC 2-Present Fire Fighting Training Area; PSC 3-Sludge Disposal Area; PSC 4-Pine Tree Planting Area, PSC 11-Hangar Building 101; PSC 12-Old Test Cell Area; PSC 13-Radium Paint Waste Disposal Pit; PSC 14-Battery Shop; PSC 15-Solvent and Paint Sludge Disposal Area; PSCs 26 and 27-Oil and Solvents Disposal Pits Areas; PSC 41-Domestic Sludge Drying Beds; PSC 42-Polishing Ponds; and PSC 43-Industrial Waste Sludge Drying Beds.

The Basic Site Work Plan (Volume 4) describes PSC characterization investigations that may be conducted at these PSCs, including soil, sediment, and hydrogeologic investigations. PSC characterization activities are selected based on the nature of the disposal activities, constituents of concern, and anticipated lithologic conditions. PSC characterization will begin at selected OUs after approval of the Basic Site Work Plan and OU Specific RI/FS Work Plans by the TRC.

5.5.1 Identification of Operable Units

There are three components of OU identification: (1) defining an OU, (2) determining the application of OUs at the Site, and (3) making OU assignments to cover PSCs, multiple PSCs, or identified groupings of portions of PSCs.

5.5.1.1 Definition of an OU. An OU, as defined in the Federal Facilities Agreement (FFA), is:

> "a discrete action that comprises an incremental step toward comprehensively addressing site problems. Each OU manages migration, or eliminates/mitigates a release, threat of release or pathway of exposure. OUs may address specific geographical portions of the site, specific site problems, or initial phases of a response (removal/remedial) action or may consist of any set of actions performed over time or any actions that are concurrent but located in a different parts of the site. OUs will not impede implementation of subsequent actions, including final response actions at the Site."

OUs were developed to promote the responsiveness and efficiency of the Superfund program by encouraging remedial actions prior to or concurrent with the RI/FS process. Identification of OUs may streamline the RI/FS process by categorizing Site problems into manageable groups, in which the lengthy RI/FS process is not required. Remedial actions may be implemented for OUs that do not require completion of the entire RI/FS process. OU actions may address a specific geographical portion of the Site or PSC, a specific problem characteristic of one or more PSCs, or the entire scope of the remedial program.

In the Federal Register, Volume 53, Number 245, the EPA lists circumstances indicating that use of OUs for streamlining the CERCLA analyses is appropriate. These circumstances include the following:

1) cases requiring straightforward waste management strategies, in which the evaluation of a full range of remedial alternatives is not appropriate;

2) situations requiring prompt action;

3) cases where ARARs, guidance, or program precedent limit the range of appropriate actions;

4) cases where available remedial action options are limited, due to implementability considerations or prohibitive costs; and

5) situations where the no further action alternative and/or minimal site screenings are sufficient to protect human health and the environment.

5.5.1.2 Strategy/Application. An individual PSC or a number of PSCs may be categorized into an OU based on common site and waste characteristics. The PSCs comprising the OU will be investigated utilizing similar methodologies and, if necessary, managed by similar remedial technologies. Interim RODs will be issued for OUs managed at NAS Jacksonville.

The procedure for grouping PSCs into OUs is presented in detail in the Site Management Plan (SMP) (Appendix 1.6). As stated in the SMP, PSCs are grouped into OUs based on the following eight criteria:

1) geographic proximity of sites;
2) similar contaminant types;
3) similar aquifer contamination zones;
4) similar potential investigation methods;
5) potential scope and complexity of the investigation;
6) mission impact of remedial activities;
7) regulatory concerns; and
8) similarity of potential remedial actions.

5.5.1.3 OUs at NAS Jacksonville. The PSCs at NAS Jacksonville have been grouped into three RI/FS OUs (OU1, OU2, and OU3) in accordance with the eight criteria listed above. The OUs

proposed for the RI/FS at NAS Jacksonville and the rationale are outlined below:

- OU1, the Oil and Solvent Disposal Pits Area, including PSC 26 and PSC 27: Common constituents have been detected in soil and ground water at these PSCs. It is not anticipated that a distinction can be made between ground-water plumes, if they exist, that may be emanating from these PSCs. Both PSCs are located immediately west of Navy Housing.

- OU2, the Wastewater Treatment Area, including PSC 2, PSC 3, PSC 4, PSC 41, PSC 42, and PSC 43: The waste materials at these PSCs are JP-5 fuel, spent oil, sludge, and paint shavings. Common constituents that may leach from these waste materials are heavy metals, purgeable organics, and semi-purgeable organics. The potential exposure pathways at the six PSCs are similar because all are located in the northern area of the Site.

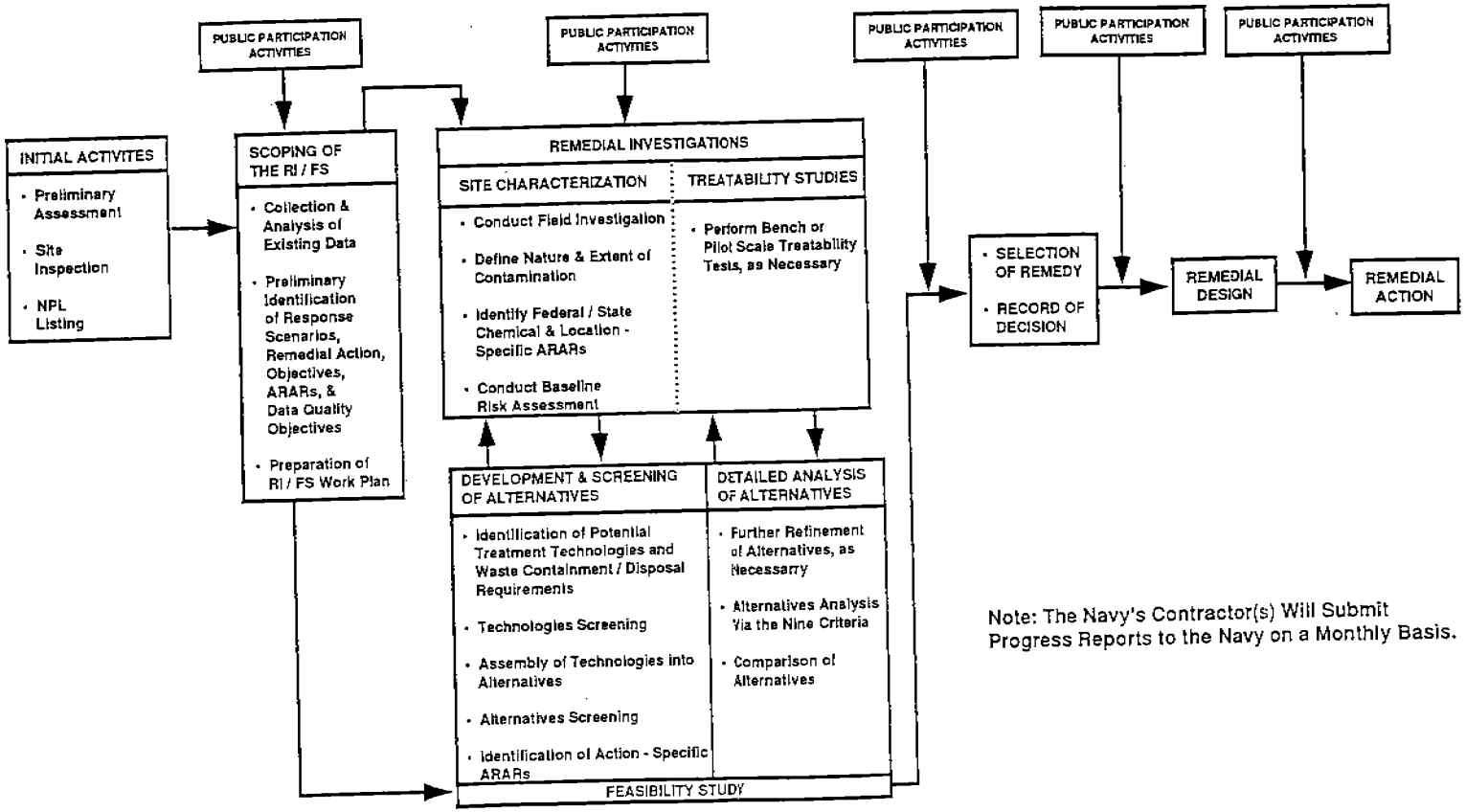
- OU3, the Industrial Area, including PSC 11, PSC 12, PSC 13, PSC 14, and PSC 15: These PSCs are grouped into an OU because of their common location within the NADEP (i.e., along Wright Street). The same access restrictions apply to each PSC within NADEP and all have common exposure pathways.

OU remedial activities may be phased, based on investigation and hazard priorities, schedule effectiveness, and task management. Due to the large number of PSCs on the Site, overall, the number of PSCs in each RI/FS OU, and the aggregate complexity of the contamination problem at each OU, the commencement of work at all OUs concurrently is not feasible; therefore, a phased approach has been implemented. Present management plans, based on hazardous assessment, are to proceed with RI/FS OU1 first, then activate RI/FS OU2, and then commence RI/FS OU3. The scheduled staggering provides for a coherent effort by the investigative and engineering

team enabling a higher quality assessment of the problem and more accurate identification of a suitable remedial response action.

6.0 SEQUENCE OF CERCLA EVENTS

Figure 6-1 is the sequence of events for the CERCLA/IR program. The events represent tasks to be completed for each RI/FS OU at the Site. The actual timing of each event is provided in the Site Management Plan (Appendix 1.6). The order and timing of the specific tasks for an OU are provided in the OU-specific work plans.



STEPS IN RI/FS PROCEDURE

FIGURE 6-1

PROGRAM ORGANIZATION AND PLANNING

NAS JACKSONVILLE
SEPTEMBER 1991

INITIAL ASSESSMENT STUDY

NAVAL AIR STATION, JACKSONVILLE, FLORIDA

UIC NO. N00207

NAVAL FUEL DEPOT, JACKSONVILLE, FLORIDA

UIC NO. N62566

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NAVY ASSESSMENT AND CONTROL OF INSTALLATION POLLUTANTS (NACIP) DEPARTMENT

Naval Energy and Environmental Support Activity (NEESA)
Port Hueneme, California 93043

March 1983

Naval
Environmental
Protection
Support
Service

FOREWORD

The Navy initiated the Navy Assessment and Control of Installation Pollutants (NACIP) program in OPNAVNOTE 6240 ser 45/33503 of 11 September 1980. The purpose of the program is to systematically identify, assess, and control contamination of the environment resulting from past hazardous materials management operations.

An Initial Assessment Study (IAS) was performed at the Naval Air Station (including the Fuel Depot), Jacksonville, Florida by a team of specialists from the Fred C. Hart Associates, Inc., New York, New York. Further Confirmation Studies under the NACIP program were recommended at several areas at the activity. Discussions dealing with significant findings, conclusions, and recommendations are presented in the earlier sections of the report. The later technical sections provide more in-depth discussion on important aspects of the study.

Questions regarding the NACIP program should be referred to the NACIP Program Director, NEESA (Code 112N), Port Hueneme, CA 93043, AUTOVON 360-3351, FTS 799-3351, or commercial (805) 982-3351.

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William Roche, Environmental Coordinator, Public Works (NAS)
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EXECUTIVE SUMMARY

The Initial Assessment Study (IAS) was performed for the Naval Air Station (NAS) Jacksonville, Florida and the Naval Fuel Depot (NFD) Jacksonville, Florida as part of the Navy Assessment and Control of Installation Pollutants (NACIP) program, which has the objective of identifying, assessing and controlling environmental contamination resulting from past hazardous materials management.

The environmental setting at NAS Jacksonville and NFD Jacksonville is characterized by geologic and hydrologic conditions favoring the movement of pollutants with groundwater and migration of pollutants to the St. Johns River. In areas adjacent to both bases, groundwater is extensively used for both public and private water supply.

Operations at NAS Jacksonville are primarily focused on providing services and materials to support operation of aviation activities. The operations generating significant quantities of hazardous wastes, in general, are confined to the Naval Air Rework Facility (NARF). Operations at NFD Jacksonville are focused on storage and supply of fuels. Hazardous waste generating operations are confined to tank cleaning.

Based on information from historical records, aerial photographs, field inspections and personnel interviews, a total of 43 potentially contaminated sites were identified by the IAS study team at NAS Jacksonville and NFD Jacksonville. These sites include landfill areas, past storage areas, and disposal sites. Each of the sites was evaluated with regard to contamination characteristics, migration pathways and pollutant receptors.

The study concludes that, while none of the sites pose an immediate threat to human health or the environment, 11 warrant further investigation under the NACIP Program, to assess potential long-term impacts. The sites recommended for further investigation have been listed because of potential impacts on groundwater or surface water quality and consequent potential effects on human health or aquatic life in the St. Johns River.

A Confirmation Study, involving actual sampling and monitoring of the 11 sites, is recommended to confirm or deny the existence of the suspected contamination and to quantify the extent of any problems that may exist. The results of the Confirmation Study will be used to evaluate the necessity of conducting mitigating actions or clean-up operations.

NAVY ASSESSMENT AND CONTROL
OF INSTALLATION POLLUTANTS:

Initial Assessment Study
of
Naval Air Station
Naval Fuel Depot
Jacksonville, Florida

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INITIAL ASSESSMENT STUDY
OF
NAVAL AIR STATION, JACKSONVILLE, FLORIDA
AND
NAVAL FUEL DEPOT, JACKSONVILLE, FLORIDA

SECTION 1
INTRODUCTION

1.1 PURPOSE OF INITIAL ASSESSMENT STUDY

As directed by the Chief of Naval Operations (CNO), the Naval Energy and Environmental Support Activity (NEESA), in conjunction with the Ordnance Environmental Support Office (OESO), conducts Initial Assessment Studies (IASs) to collect and evaluate evidence that indicates the existence of pollutants that may have contaminated a site and that pose a potential health hazard for people located on or off the installation. The IAS is the first phase of the Navy Assessment and Control of Installation Pollutants (NACIP) program. The objective of this program is to identify, assess and control environmental contamination from past hazardous materials storage, transfer, processing and disposal operations. The NACIP program was initiated by OPNAVNOTE 6240 ser 45/733503 of 11 September 1980 and Marine Corps Order 6280.1 of 30 January 1981.

1.2 SCOPE

The Jacksonville Naval Complex is comprised of several activities. The activities included in the scope of this IAS are the Naval Air Station (NAS) Jacksonville, and the Naval Fuel Depot (NFD) Jacksonville. The Naval activities located at the Naval Station Mayport and the NAS Cecil Field are not discussed in this IAS. Of the several tenants at the NAS Jacksonville only those that are believed to have engaged in activities that involve the past storage or disposal of hazardous materials have been included in this study. These tenants are the Naval Regional Medical Center (NRMC) and the Naval Air Rework Facility (NARF). The remaining tenants at NAS, Jacksonville such as the Armed Forces Reserve Center and the Naval Air Reserve Training Unit, are training groups that would not be expected to handle hazardous materials and therefore have not been included in this IAS.

1.3 SEQUENCE OF EVENTS

1. The NAS Jacksonville was designated for an IAS by CNO letter ser 451/397464 of 3 August 1981.

2. The Commanding Officer of NAS was notified via Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), by NEESA of the selection of NAS Jacksonville for an IAS. The NACIP Program Management Plan and Activity Support Requirements for the IAS were forwarded to the installation to outline assessment scope, provide guidelines to personnel, and request advance information for review by the IAS team.

3. NAS Jacksonville and NFD Jacksonville personnel were briefed by NEESA Environmental Engineer Jeffery C. Heath.

4. Various government agencies were contacted for documents pertinent to the IAS effort. Agencies contacted included:

a. NEESA Information Management Department

b. NEESA Information Services Department

c. NAVFAC Historian
Naval Construction Battalion Center (NCBC)
Port Hueneme, California

d. Southern Division Naval Facilities Engineering Command
Charleston, South Carolina

e. Federal Records Center, East Pt., Georgia

f. Mr. John Cannon
Jacksonville Area Planning Board
330 East Bay Street
Room 401, Courthouse
Jacksonville, Florida 32202

g. Mr. Jay R. Carver
State of Florida
Department of Environmental Regulation
St. Johns River Subdistrict
3426 Bills Road
Jacksonville, Florida 32207

h. Ms. Ann Shipiro
State of Florida
Game and Freshwater Fish Commission
Gainesville, Florida

i. Mr. W. E. Keeler
State of Florida
Department of Transportation
P.O. Box 1089
Lake City, Florida 32055

j. Northeast Florida Regional Planning Council
8641 Baypine Road
Deerwood Center
Jacksonville, Florida

5. The on-site phase of the IAS was conducted from 28 June to 2 July 1982. The information presented in this report is current as of the date of the on-site visit. The following personnel were assigned to the NACIP team and participated in the site visit:

Ms. Elizabeth B. Luecker, NEESA Contract Coordinator

Mr. Wayne K. Tusa, Project Director, Fred C. Hart Associates (FCHA),

Mr. Richard C. Dorrler, Team Leader, Hydrogeologist, FCHA

Mr. Steven D. Caretsky, Environmental Engineer, FCHA

Mr. W. Scott Butterfield, Biologist, FCHA

Mr. James E. Shirk, P.E., Environmental Engineer, FCHA

Dr. Barry North, Public Health Specialist, FCHA

Mr. William Hudgins, Technical Consultant, Naval Operations - NAS Jacksonville

6. In addition to record reviews, interviews were conducted with present long-term and former employees. Ground and aerial tours of the installation were made and photographs were taken. Where possible, information received from an interview was generally verified with one or more additional interviewers, or by comparison with documented data.

1.4 SUBSEQUENT NACIP STUDIES

The next phase of the NACIP Program is the Confirmation Study. During Confirmation Studies, extensive sampling and monitoring is conducted to confirm or refute the existance of suspected contamination at sites identified during an IAS. If significant contamination exists, the Confirmation Study recommends the types of remedial actions to be implemented. A Confirmation Study is conducted only if the IAS concludes that:

1. Sufficient evidence exists to suspect that the installation has contaminated areas, and

2. The potential contamination may present a danger to:

   a. The health of civilians in adjoining communities or personnel within the base fenceline, or to

   b. The environment within or outside the installation.

Further studies are not conducted under the NACIP program if these criteria are not met.

this section applies - background info NFD.

SECTION 2

SIGNIFICANT FINDINGS

2.1 GENERAL

Significant findings relevant to potentially contaminated areas at Naval Air Station Jacksonville and Naval Fuel Depot Jacksonville have been catagorized as follows: (1) background conditions; (2) site operations; (3) waste disposal/spill sites; and (4) potential impacts.

2.2 BACKGROUND

The important background conditions with respect to hazardous waste management at NAS Jacksonville and NFD Jacksonville are summarized below in discussions of the following: (1) soils and geology; (2) water resources; (3) ecology; and (4) population and land use. More detailed information on these subjects can be found in Section 5 of this report.

2.2.1 Soils and Geology

The highly permeable nature of the sandy soils found at the NAS and the NFD allow contaminants to migrate rapidly to the groundwater. The groundwater of the shallow aquifer is found at a depth of less than 10 feet below most disposal sites.

A complex aquiclude, known as the Hawthorn Formation, acts as a confining bed to the deeper Floridan Aquifer and prevents downward percolation of contaminants from the shallow aquifer systems.

2.2.2 Water Resources

The principal source of water throughout the Jacksonville area is the Floridan Aquifer. Both the NAS and the NFD, as well as private and public water systems in the Jacksonville area, receive their potable water supplies from this deep artesian aquifer.

At the NAS and vicinity, both the surficial sand and the porous limestone portions of the shallow aquifer are tapped as sources of domestic water supply (i.e., outdoor and/or indoor water use). Due to use as a potable water supply in some residences immediately off-base, and potential for contamination, the shallow aquifer is considered the one of primary concern for the purpose of this initial assessment study.

At the NFD, the shallow aquifer is no longer utilized as a source of water. There are no known wells tapping the shallow aquifer, nor any residences in the vicinity of the NFD. For these reasons the shallow aquifer is not of concern at the NFD.

2.2.3 Ecology

The NAS and NFD at Jacksonville are both located in the "flatwoods" section of Duval County where the predominant natural vegetation is

Other site operations that were considered in this initial assessment study included vehicle maintenance shops, boiler and power plants, incinerators, defense property disposal, pest control shops and the activities of the Naval Regional Medical Center (NRMC). Additional information on these operations can be found in Sections 6.2, 6.3 and 6.4 of this report.

2.3.2 Naval Fuel Depot

The Government owns 149.88 acres at Jacksonville Navy Fuel Depot (NFD) and has a permanent easement on 30.88 acres. The NFD has 13 storage tanks ranging from 20,000 to 85,000 barrels with a total capacity of 880,000 barrels assigned as follows: JP-4, one 80,000 barrel; JP-5, five 80,000 barrels for a total of 400,000 barrels; DFM, one 80,000, two 85,000 and two 55,000 for a total of 360,000 barrels; JP-8, one 20,000 barrel; and waste oil, one 20,000 barrel. There is an anti-pollution "L" shaped fuel wharf with 34 feet of water capable of accomodating military and commercial tankers up to 38,000 dead weight tons while simultaneously performing barge operations on the opposite face of the pier. Also located on the station is a tank car loading rack with facilities for 12 cars and a 100 tank car classification yard. In addition, there are two truck loading racks. The administration buildings, warehouse, shops, tanks, pipelines, pumping stations, loading facilities, pier and railroad trackage are permanent structures. The remaining structures are temporary.

2.4 WASTE TYPES AND DISPOSAL SITES

2.4.1 Waste Types

Wastes from non-ordnance operations include waste solvents, oil and spilled fuel, paint wastes and aqueous wastes containing toxic heavy metals, acids and caustics, cyanide, paint stripper wastes containing chlorinated solvents and phenolics, metal scrap and other inert materials. Ordnance operations generate a relatively minor quantity of waste and include rags and gloves containing Otto fuel.

Aircraft repair and maintenance operations in the past generated low-level radioactive radium paint wastes. Vacuum tubes and other aircraft instrument parts with ionizing radiation sources and luminous instrument dials were also disposed. Wastes from current medical radiological programs include biological specimens contaminated with low levels of radioisotopes.

2.4.2 Disposal Sites

Two waste disposal sites were previously identified and investigated by NAS Jacksonville personnel (Sites 26 and 27). The NACIP Team has identified an additional 41 sites of concern (36 at NAS Jacksonville and 5 at NFD Jacksonville). Therefore a total of 43 sites have been identified through an extensive records search and interviews with station personnel and retirees. The histories of site use, the types of waste disposed, the methods of disposal, the magnitude of spill incidents, and other characteristics related to the 41 sites not previously studied were investigated in detail. A description of waste disposal activities at each site is presented in Section 6.6 and an evaluation of potential human health and environmental threats from contamination is presented in Section 3.3.

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SECTION 3

CONCLUSIONS

3.1 GENERAL

The principal conclusion to be drawn from the review of records, interviews and site inspections by the NACIP Team is that the range of environmental problems at NAS Jacksonville and NFD Jacksonville is limited. The locations of the 43 sites identified during the IAS activities at the NAS and NFD are shown in Figures 3.1-1 and 3.1-2 respectively. There were a total of 38 sites identified at the NAS of which 10 are concluded to pose a potential threat to human health or the environment. Two sites (No. 26 and 27) were recommended for a Confirmation Study prior to this IAS and are in the process of clean-up. In addition, 5 sites were identified at the NFD of which 1 was concluded to pose a potential threat to human health and the environment.

3.2 WASTE DISPOSAL SITES

All known or suspected hazardous waste disposal sites identified by the IAS team were evaluated using a Confirmation Study Ranking System (CSRS) developed by NEESA for the NACIP program. The system is a two-step procedure for systematically evaluating a site's potential hazard to human health and the environment based on evidence collected during the IAS.

Step one of the system is a flowchart that eliminates innocuous sites from further consideration. Step two is a ranking model that assigns a numerical score, within a range of 0 to 100, to indicate the potential severity of a site. Scores are a reflection of the characteristics of the wastes disposed of at a site, contaminant migration pathways and potential contaminant receptors on and off the installation. CSRS scores and engineering judgment are then used to evaluate the need for a Confirmation Study based on the criteria stipulated in Section 1.3. CSRS scores assigned to sites recommended for Confirmation Studies also assist Navy managers to establish priorities for accomplishing the recommended actions.

A more detailed description of the Confirmation Study Ranking System is contained in NEESA Report 20.2-042.

3.3 SITES RECOMMENDED FOR CONFIRMATION

The sites discussed in this section, and listed on Table 3.2-1, have been recommended for confirmation based on the criteria presented in Section 1.4. These conclusions are based on the NACIP team's thorough evaluation of information obtained from a review of records, interviews and site inspections.

3.3.1 NAS Jacksonville

3.3.1.1 Site No. 4, Pine Tree Area

This site is located approximately 200 feet southeast of the sewage treatment plant chemistry laboratory, Building No. 261L. From

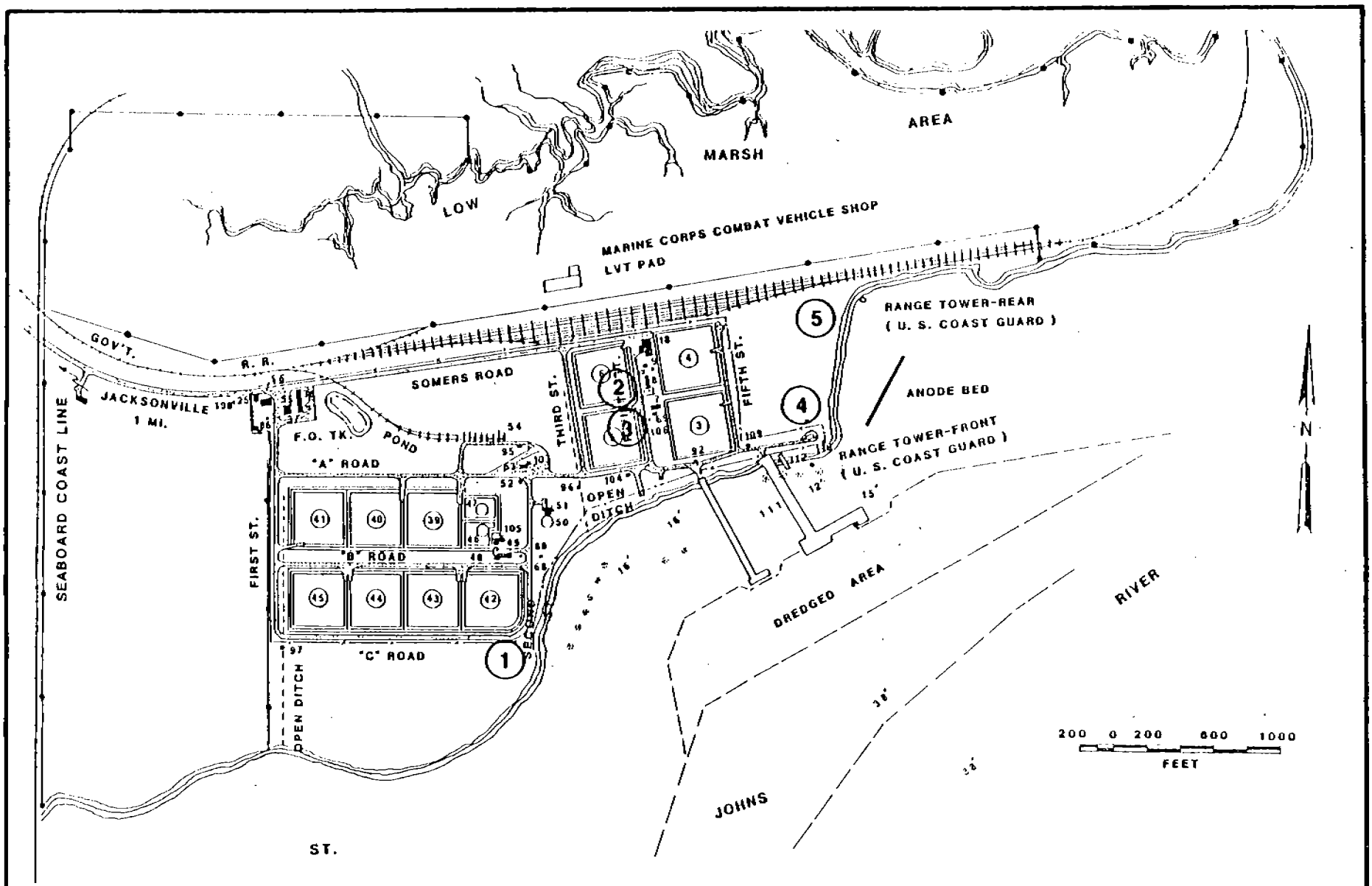

Figure 3.1-2 SPILL/DISPOSAL SITES IDENTIFIED BY IAS TEAM AT NFD JACKSONVILLE.

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dominated by pine trees. The natural vegetative communities on both sides have been significantly altered by past development and present forest management practices. Small but significant areas of wetlands occur on each site; freshwater tidal swamps and marshes on the NAS and salt marsh on the NFD.

Both sites provide relatively good habitat for small mammals, birds, reptiles and amphibians in the forest management and wetlands areas. In addition, a freshwater fishery is managed in two ponds on the NAS.

An active bald eagle (an endangered species) nest is located on the NAS at Dewey Park. Also, both sites are located adjacent to the St. Johns River which is classified as critical habitat for the Florida manatee (seen at NAS) and a known habitat for the shortnosed sturgeon, both endangered species. The American alligator, a threatened species, has been observed on the NAS and can be expected on the NFD.

2.2.4 Population and Land Use

The population of the City of Jacksonville in 1980 was listed as 584,100. This population and 766 square miles within the incorporated area of the city identifies it as the largest city in the state, and the 20th largest city in the nation. The consolidation of the Duval County governments in 1968 resulted in Jacksonville becoming the largest city in the nation in terms of land area.

The Jacksonville Standard Metropolitan Statistical Area (SMSA) includes Nassau, Duval, Clay and St. Johns counties. The population of the Jacksonville SMSA as reported in 1980 was 739,100 and the total area is 3,199 square miles.

The land use in the vicinity of NAS is predominantly residential while the land use in the vicinity of NFD is predominantly industrial.

2.3 SITE OPERATIONS

2.3.1 Naval Air Station

The principal mission of NAS Jacksonville is to maintain and operate facilities and provide services and material to support operations of aviation activities and units designated by the Chief of Naval Operations. This mission has remained unchanged, for the most part, since the construction of the NAS in 1940. Past and present site operations are the source of materials now recognized as hazardous. This initial assessment study considered past site operations falling into the following three categories: (1) ordnance operations; (2) non-ordnance operations; and (3) low level radiological operations.

One of NAS Jacksonville's tenant activities, the Naval Air Rework Facility (NARF), is the station's primary industrial operation, and consequently a major user of hazardous materials and generator of hazardous wastes.

Of the 43 sites identified as potential sources of contamination, 10 NAS Jacksonville sites and 1 NFD Jacksonville site satisfy the criteria listed in Section 1.3 and are therefore recommended for a Confirmation Study. These sites are listed in Table 3.3.1.

The NACIP Team found that sites recommended for Confirmation Studies were, in general, characterized by natural conditions conducive to migration of contaminants via groundwater and surface water, evidence indicating the potential for contamination and presence of a potential receptor population. Specifically, the permeable nature of the sandy soils found at NAS Jacksonville may permit contaminants to migrate to the groundwater. The groundwater is found at a depth of less than 10 feet at NAS Jacksonville. Many sites are within 1,000 feet of the St. Johns River or of storm drains that discharge into the river, which may provide a conduit for migration. Two endangered species are native to the area: the Florida manatee and the bald eagle.

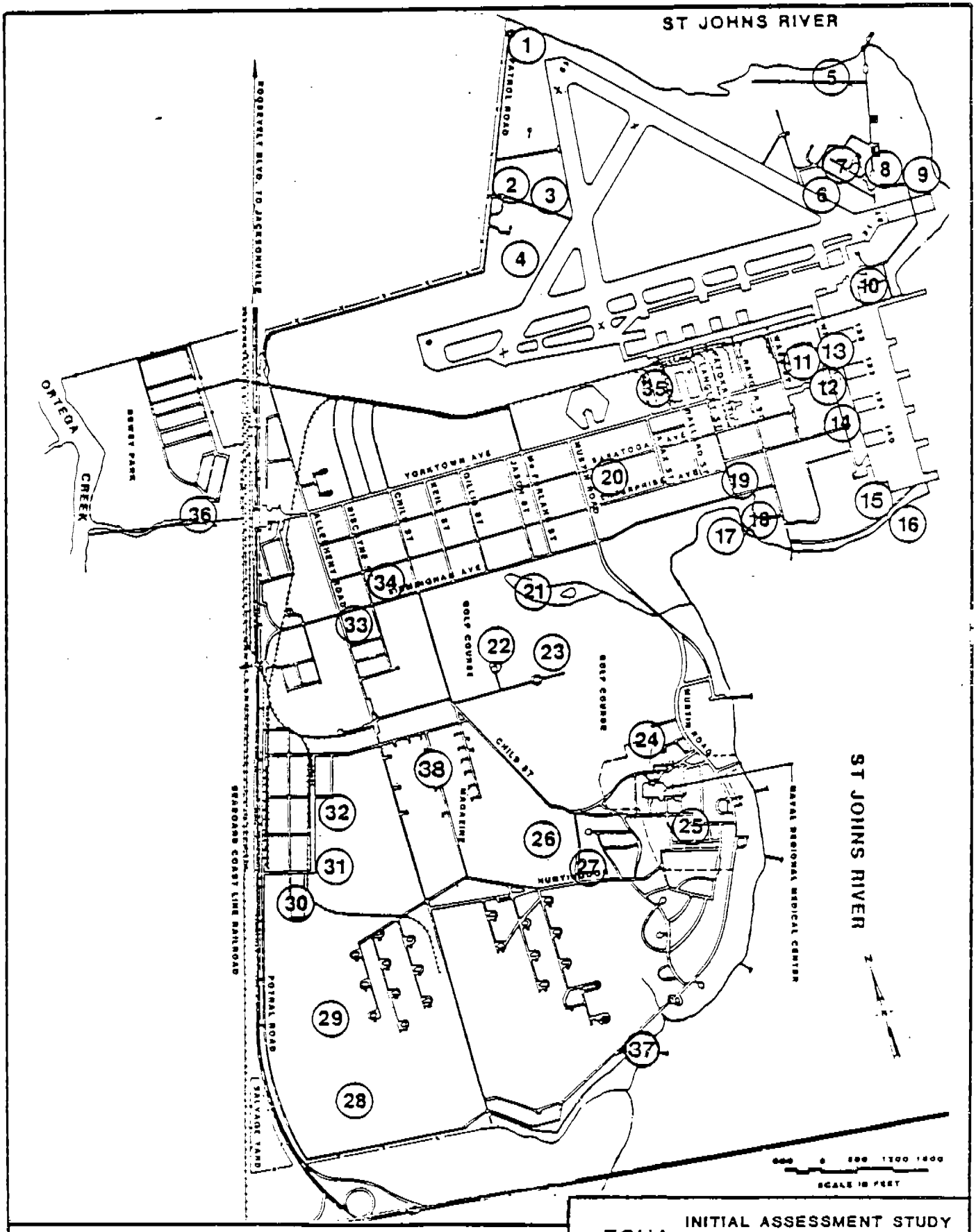

Figure 3.1-1 SPILL/DISPOSAL SITES IDENTIFIED BY IAS TEAM AT NAS JACKSONVILLE

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TABLE 3.2-1

Sites for which a Confirmation Study is Recommended

Site No.	Description	Ranking Score
	NAS	
4	Pine Tree Area	16
9	Old Disposal Area (East of Fuel Farm)	14
11	Hangar Building 101	53
12	Old Test Cell Building	21
14	Battery Shop	21
15	Solvent and Paint Sludge Disposal Area (NARF)	48
16	Storm Sewer Discharge (Black Point)	*
17	Glass Bead Disposal Area	52
19	Old Gas Station	*
30	Old Drum Lot	8
	NFD	
5	Old Oil Pond and Land Spreading Area	10

* Recommended for confirmation by IAS Team (see Sec. 3 & 4)

approximately 1968 until 1975 this area was used for disposal of paint shavings and sewage sludge containing heavy metals, asbestos, oil and other petroleum products. Paint shavings were identified throughout the approximately 1 acre area. Sewage sludge was identified in an area approximately 100 feet long by 100 feet wide.

This site is characterized by hydrogeologic conditions that are conducive to migration towards the residential area to the northeast of the site. Leachate from this site may possibly contaminate potable water supplies.

3.3.1.2 Site No. 9, Old Disposal Area (East of Fuel Farm)

This site is located east of Catapult Road along the shoreline of the St. Johns River. This site contains garbage, construction debris and five 55-gallon drums. This material was disposed of for approximately one year during 1977 and 1978. Soil tests that were conducted by NAS personnel in this area have shown a high chromium level, indicating that industrial wastes (i.e., chromium sludge) may have been disposed of.

The concern at this site is the possible migration of metals into the St. Johns River.

3.3.1.3 Site No. 11, Hangar Building 101

Reportedly, waste solvents, oils and fuels have leaked beneath the floor boards of Hangar Building 101 for many years. Infiltration of waste solvents and other flammable liquids to the soils has also occurred. The potential for an explosion or fire and migration of solvents to the St. Johns River via storm sewers are the concerns at this site.

3.3.1.4 Site No. 12, Old Test Cell Building

Reportedly some interconnection of the storm, sanitary and industrial sewer system in the old test cell area, Building 101 k, has occured. In addition, numerous spills (one 55-gallon drum per week) of chemicals (waste oil, fuel and solvents) from ruptured or rusted drums were reported at this site. The concern at this site is the potential contamination of the St. Johns River due to migration of these hazardous materials into the storm sewer via infiltration/inflow or faulty connections. Specifically, wastes containing heavy metals may possibly contaminate the St. Johns River.

3.3.1.5 Site No. 14, Battery Shop

The battery shop is located in Building 125. The shop contains a seepage pit where waste acids from lead-acid batteries were disposed. Approximately 100 gallons of waste were disposed here for 23 years.

The concern at this site is the potential migration of wastes off-site resulting from the direct discharge of waste acid to the ground. Lead and sulfate in the waste may migrate to and impact the St. Johns River.

3.3.1.6 Site No. 15, Solvent and Paint Sludge Disposal Area (NARF)

This area, approximately 100 feet x 100 feet, is located northeast of Building 970. This area was used for the disposal of waste solvents and paints until 1978. Based on current operations, it is estimated that up to 2,000 gallons of these wastes were disposed of at this site annually for 10 years, bringing the total quantity disposed at this site to approximately 20,000 gallons.

The major concern at this site is the contamination of the soils with wastes, such as electroplating wastes and paint sludges, that contain toxic metals, and solvent wastes, which due to their mobility, may contaminate groundwater. Migration of these wastes to the St. Johns River poses a threat to fish, waterfowl and manatees (see 3.3.1.5).

3.3.1.7 Site No. 16, Storm Sewer Discharge -- Black Point

The storm sewer runs along Buildings 101, 50 and 795 discharges at Black Point. There is a recurring discharge of JP-5 fuel and oil that is believed to have come from the past disposal practices of a variety of sources in the NARF area. Waste oils and fuels that were spilled or discarded may be migrating via groundwater and infiltrating the storm sewer. An oil boom was installed at the outfall to contain the oil. Reportedly, over the years many chemical wastes from the NARF were disposed of by discharge into the storm sewer system. It is difficult to estimate the volume of material disposed of in this way, but it is likely that a variety of chemicals were discarded into the storm sewer at some time in the past. Given the type of operations conducted at the NARF, these chemicals were corrosive, and probably ate through the sewer line. From there, the chemicals were able to migrate into the groundwater. Now that chemicals are no longer in the sewer line, the chemicals in the groundwater may be migrating back into the storm sewer. This storm sewer would then act as a conduit for off-site migration of these hazardous materials in the groundwater. Migration of chemical wastes to the St. Johns River poses a threat to fish, waterfowl and manatees.

3.3.1.8 Site No. 17, Glass Bead Disposal Area

This area is located across from the marina and approximately 10-15 feet from the shoreline. The area was used for the disposal of spent glass beads used in the abrasive blasting operations conducted at the NARF. Disposal of the spent glass beads in this off-shore area occurred for a period of 16 years. There is visible evidence of a "glass bead bar" that has been created as a result of off-shore disposal.

NARF personnel report that approximately 400,000 lbs of the glass beads are used per year, and it can be expected that 80% (approximately 300,000 lbs) per year may have been disposed at this site. The glass beads contain cadmium, chromium, nickel and lead (Table 6.6-2). This site is characterized by the presence of abrasive blast grit that contains toxic metals.

3.3.1.9 Old Gas Station, Site No. 19

This site is currently the base garden center. The site contains abandoned underground gasoline tanks. The abandoned gasoline tanks are possibly leaking gasoline into the ground where conditions are conducive to migration. This possibility may pose a threat to human health and the environment from explosion potential and the potential effect on aquatic life in the St. Johns River (i.e. Florida manatee).

3.3.1.10 Site No. 30, Old Drum Lot

This site was used for the outdoor, unprotected storage of drums containing unused products. The drums were stored on Marsden Matting. Approximately 10,000 drums were stored at this site for 12 years. Although there is no visible evidence of environmental contamination at this site, reportedly, from time to time drums containing hazardous materials (i.e. PCB's, solvents, acids, paints, mineral spirits, pesticides) corroded or were damaged during handling and leaked their contents onto the ground.

This site is characterized by hydrogeological conditions conducive to migration. Therefore, the possibility of migration of spilled hazardous materials exists.

3.3.2 NFD Jacksonville

3.3.2.1 Site No. 5, Old Oil Pond and Land Spreading Area

This site is located due east of Fifth Street in the general vicinity of facilities 3 and 4. The old pond area was excavated and diked in the 1950's. Through 1967 approximately 8,000 bbls of fuel oil contaminated with water were disposed of in this area along with garbage, wood, etc. In 1965 the pond was filled with soil. In 1967 approximately 5,000 gallons of JP-5 fuel mixed with tetra ethyl lead sludge from cleaning tanks was disposed of in the old oil pond area. In 1971 the area was regraded and the oil/sludge contaminated soils were spread over a larger area.

This site located approximately 500 feet from the St. Johns River is characterized by hydrogeological conditions conducive to migration of oil and metals into the St. Johns River. Although uncontaminated waste oil is not considered hazardous by the state of Florida or USEPA the potential exists for the migration of oil and lead contaminants into the river.

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SECTION 4

RECOMMENDATIONS

4.1 GENERAL

Based on the discussions in Sections 2 and 3, 14 individual sites at the NAS Jacksonville and 1 site at the NFD Jacksonville have been identified as potentially contaminated and pose a possible threat to human health or the environment, on or off the activity. The recommendations presented in this section are intended to be used as a guide in the development and implementation of the Confirmation Study. The recommendations outline the number of groundwater monitoring wells, types of samples to be taken, (i.e., soil, water, sediment) and suspected contaminants for which testing should be conducted. Generally the recommendations have been developed on a site by site basis. However, due to their close proximity, sites 11, 12, 14, 15 and 16 have been combined and considered as one area for Confirmation Studies. The recommendations are specific to the site conditions and types of waste disposed. It is also recommended that the groundwater monitoring program, including monitoring well installation, be conducted in accordance with the guidance provided in the Groundwater Monitoring Guide, NEESA 20.2-031 of March 1981. The number of groundwater monitoring wells recommended reflects the number of wells that are considered to be required to determine both the groundwater level and direction of flow and will provide groundwater samples for initial screening for contaminants. The location of each of these sites at NAS Jacksonville and NFD Jacksonville are shown on Figures 4.1-1 and 4.1-2, respectively.

In addition to these site specific recommendations the following are general recommendations with respect to the activity:

1. It is recommended that NAS complete the identification and inventory of the wells on the activity. Ideally, this well search should be completed prior to the start of any Confirmation Studies proposed in this report.

2. All the wells that are not in use at this time should be inspected and identified as suitable for future service or unusable. The wells that are unusable should be cemented and abandoned properly, and the wells that are deemed suitable for future service should be capped securely during the interim period that they are not in use. It is also recommended that the NAS contact the Jacksonville Department of Health, Welfare and Bio-Environmental Services (DHWBES) for proper abandonment techniques and to ensure compliance with all applicable laws and regulations.

3. During the confirmation level phase of the NACIP program the USGS should be consulted regarding the impacts to Drummond Creek from the City of Jacksonville landfill (Section 5.3.6.5).

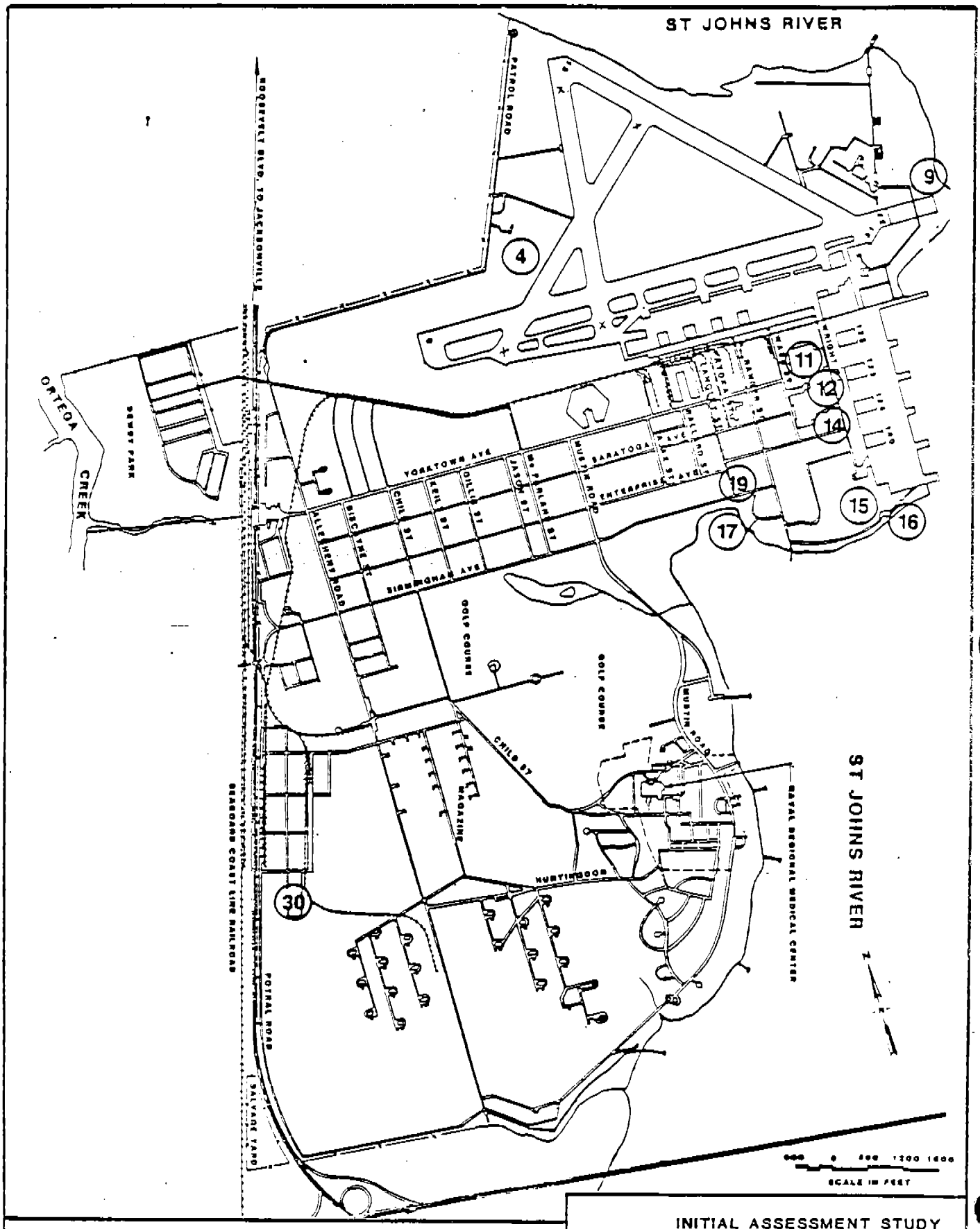

Figure 4.1-1 SPILL/DISPOSAL SITES RECOMMENDED FOR CONFIRMATION STUDY AT NAS JACKSONVILLE.

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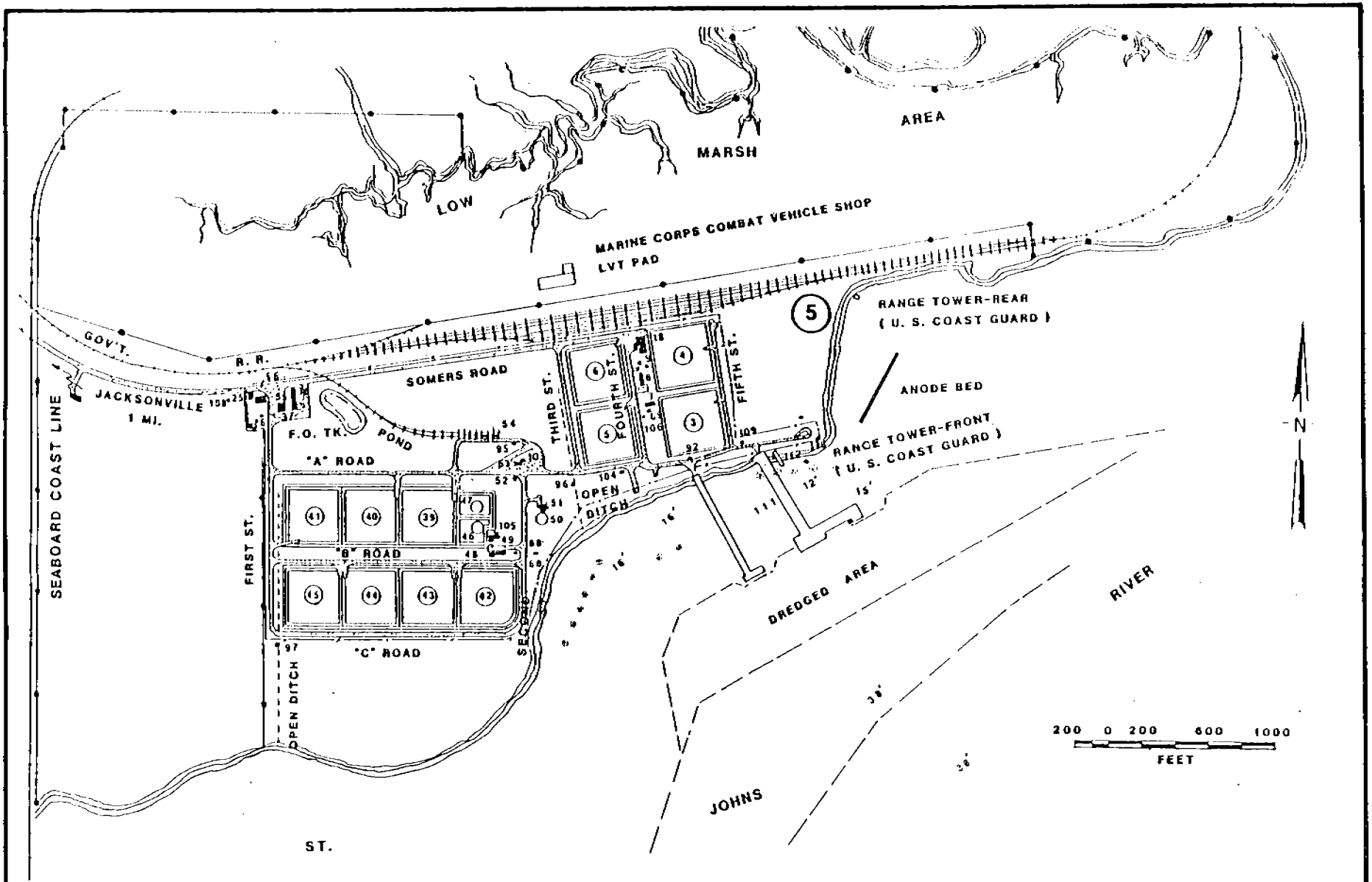

Figure 4.1-2 SPILL/DISPOSAL SITES RECOMMENDED FOR CONFIRMATION STUDY AT NFD JACKSONVILLE.

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4.2 CONFIRMATION STUDY

A Confirmation Study should be conducted at the following sites:

NAS JACKSONVILLE

Site No. 4 - Pine Tree Area
Site No. 9 - Old Disposal Area (East of Fuel Farm)
Site No. 11 - Hangar Building 101
Site No. 12 - Old Test Cell Building
Site No. 14 - Battery Shop
Site No. 15 - Solvent and Paint Sludge Disposal Area (NARF)
Site No. 16 - Storm Sewer Discharge (Black Point)
Site No. 17 - Glass Bead Disposal Area
Site No. 19 - Old Gas Station
Site No. 30 - Old Drum Lot

NFD JACKSONVILLE

Site No. 5 - Old Oil Pond and Land Spreading Area

4.2.1 NAS Jacksonville

4.2.1.1 Confirmation Site No. 4, Pine Tree Area

Groundwater monitoring wells: Four shallow wells, 4" Polyvinyl Chloride (PVC), screened to a depth of 20 feet below the water level.

Type of samples: Groundwater

Number of samples: Four

Testing parameters: Chromium (Cr), Cadmium (Cd), Lead (Pb), Cyanide (CN), Nickel (Ni), water level measurement, Total Organic Carbon (TOC), Total Organic Halogens (TOX), pH, specific conductance (SC), temperature.

Frequency: Quarterly for 1 year

Remarks: If contamination is detected in the sample, additional monitoring wells may be required to determine the contaminant concentrations and the extent and rate of migration of the plume.

4.2.1.2 Confirmation Site No. 9, Old Disposal Area (East of Fuel Farm)

Groundwater monitoring wells: Three shallow wells, 4" PVC, screened to a depth of 20 feet below the water level.

Types of samples: Groundwater

Number of samples: Three

Frequency: One time sampling

Testing parameters: pH, Total Organic Carbon (TOC), Total Dissolved Solids (TDS), Cr, Cd, Pb, CN^-, oils and grease, water level measurement, SC, temperature, TOX.

4.2.1.3 Confirmation Study Area "A" (Includes Site Nos. 11, 12, 14, 15, and 16)

- Site No. 11, Hangar Building 101
- Site No. 12, Old Test Cell Building
- Site No. 14, Battery Shop
- Site No. 15, Solvent and Paint Sludge Disposal Area (NARF)
- Site No. 16, Storm Sewer Discharge (Black Point)

Sites 11, 12, 14, 15, and 16 are located within the boundaries of the NARF. The close proximity of the sites, similarity in types of hazardous materials used in the operations, past disposal practices, potential pathways of migration between these sites (i.e., sewer system, surface runoff and air) and similar hydrogeological conditions in the area make it practical from an environmental, engineering and economic standpoint to consider the NARF area as a single site for the purpose of conducting a Confirmation Study. The quantity of hazardous materials used there, the conditions of the buildings and sewer systems and past disposal practices all contribute to the potential human health threat (i.e., explosion, direct contact and inhalation of toxic vapors). Furthermore, the hydrogeological conditions are conducive to migration, posing a threat to potable water supplies and aquatic life in the St. Johns River.

The Confirmation Study in Area A should be conducted as a three phase program with each phase contingent upon the results of the proceeding phase.

Phase I:	Type of Samples:	Air quality
	Number of Samples:	Sampling to be conducted in basements of NARF buildings, (Hangar 101) adjacent to foundations, and in parking area
	Test Parameters:	Organic vapors
	Frequency:	One time sampling using portable survey equipment (organic vapor analyzer, photoionization detector)
	Remarks:	If organic vapors are detected during Phase I of the program additional air samples should be taken to identify specific contaminants. The results of this survey will be used in the design and implementation of Phase II.

Phase II:	Type of Samples:	Storm water, sample storm sewer from outfall, back through NARF to determine area where contaminants are entering. Samples should be taken during periods of low flow in order to get an indication of contamination in base flow (i.e., groundwater contribution).
	Number of Samples:	One at each selected manhole
	Testing Parameters:	Cr, Ni, Cd, Pb, oils and grease, pH, TOC, TOX, SC
	Frequency:	One time sampling
	Remarks:	If contaminants are detected in the storm sewer, Phase III should be implemented.
Phase III:	Groundwater Monitoring Wells:	Four shallow wells, 4" PVC, screened to a depth of 20 feet below the water level.
	Type of Samples:	Groundwater
	Number of Samples:	Four
	Testing Parameters:	Cr, Cd, Ni, Pb, CN^-, pH, water level measurement, TOX, TOC, SC, temperature
	Frequency:	Quarterly for 1 year
	Remarks:	If contamination is detected in the wells during the initial screening, additional monitoring wells should be installed to determine the contaminant concentrations in the plume and the extent and rate of migration.

4.2.1.4 Confirmation Site No. 17, Glass Bead Disposal Area

Type of Samples:	Sediment
Number of Samples:	Five samples spaced approximately 50 feet apart extending from the shoreline into the St. Johns River
Frequency:	One time sampling
Testing Parameters:	Total metals, EP toxicity
Remarks:	If contamination is detected during the initial screening, additional samples may be taken (over a wider area and at greater depths) to determine the boundaries of the contaminated area.

4.2.1.5 Confirmation Site No.19, Old Gas Station

The old gas station area should be surveyed using metal detectors to determine if the underground storage tanks have been removed. If the tanks have not been removed they should be tested for contents, (e.g. diesel fuel, gasoline).

Phase I:	Types of samples:	Liquid
	Number of samples:	One per tank
	Frequency:	One time sampling
	Testing Parameters:	Tetraethyl lead, oils and grease
	Remarks:	If the tanks have been abandoned full of gasoline, leaks may have occurred. Phase II should be implemented.
Phase II:	Groundwater monitoring wells:	Three shallow wells, 4" PVC, screened to a depth of 20 feet below the water level.
	Type of Samples:	Groundwater
	Number of samples:	Three
	Testing Parameters:	Oils and grease, tetraethyl lead
	Frequency:	One time sampling
	Remarks:	If contamination is detected in the wells during the initial screening additional monitoring wells should be installed to determine the contaminant concentrations in the plume and the extent and rate of migration.

4.2.1.6 Confirmation Site No. 30, Old Drum Lot

	Groundwater monitoring wells:	Three shallow wells, 4" PVC, screened to a depth of 20 feet below the water level
	Type of samples:	Groundwater
	Number of samples:	Three
	Testing Parameters:	TOX, SC, pH, TOC, water level measurement, temperature
	Frequency:	Quarterly for 1 year

Remarks: If contamination is detected in the wells during the initial screening additional monitoring wells should be installed to determine the contaminant concentrations in the plume and the extent and rate of migration.

4.2.2 NFD Jacksonville

4.2.2.1 Confirmation Site No. 5, Old Oil Pond and Land Disposal Area

Groundwater monitoring wells: Three shallow wells, 4" PVC, screened to a depth of 20 feet below the water level.

Type of samples: Soil and groundwater

Number of samples: Three

Testing Parameters: Oil and grease, tetraethyl lead, water level measurement, pH, SC, temperature

Frequency: Quarterly for 1 year

Remarks: If contamination is detected in the wells during the initial screening, additional monitoring wells should be installed to determine the extent and rate of migration.

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SECTION 5

BACKGROUND

5.1 GENERAL

5.1.1 Location and Organization

Several major naval activities comprise the Jacksonville Florida Naval Complex. The two areas that are the subject of this IAS are the Naval Air Station (NAS) Jacksonville, which includes the Naval Regional Medical Center (NRMC) and the Naval Air Rework Facility (NARF), and the Naval Fuel Depot (NFD) Jacksonville. The Naval Activities located at the Naval Station Mayport and the NAS Cecil Field are not discussed in this IAS.

Both the NAS and the NFD are located in Duval County and are within the limits of the city of Jacksonville, Florida. Jacksonville is located in northeastern Florida, approximately 15 miles from the Atlantic Ocean and along the St. Johns River (Figure 5.1-1).

The NAS Jacksonville is located in southern Duval County approximately 10 miles south of the central business district of the city of Jacksonville. The station occupies approximately 3,800 acres of land on the west bank of the St. Johns River upstream from Jacksonville. The operating portion of the NAS lies between Highway 17 and the St. Johns River; however, the station also occupies 515 acres west of Highway 17. Within the physical boundaries of the station are several separate naval tenant commands.

The NFD Jacksonville is also located in Duval County and is approximately 7 miles north of the Jacksonville Central Business District and about 1 mile east of the intersection of Interstate 95 and State Highway 105. This activity encompasses 181 acres on the west bank of the St. Johns River downstream from Jacksonville. The NFD is located on the northern (western) bank of the St. Johns River at river mile 16. A 38-foot channel provides access to the Atlantic Ocean, and to the Atlantic Intracoastal Waterway. The depot consists of 149.88 acres of government owned land and 30.88 acres on permanent easement. There are 13 fuel storage tanks within the depot ranging form 20,000 to 85,000 barrels with a total capacity of 880,000 barrels. Additionally, the depot includes a fueling wharf, tank car loading rack and other support buildings, both permanent and temporary. The NFD became a department of the Naval Supply Center (NSC), an activity located at the NAS, when the NSC was established in October 1982.

5.1.2 Command and Tenant Command Relationships and Missions

The NAS Jacksonville has the primary mission function of "maintaining and operating facilities and providing services and material to support operations of aviation activities and units designated by the Chief of Naval Operations." As the hub of several major naval activities within the Jacksonville, Florida Naval Complex, the NAS has a multitude of assigned missions and several tenants. Two of these tenants, the NRMC and the NARF, are believed to have engaged in activities that involved the storage, transfer, processing or disposal of hazardous materials and have therefore been

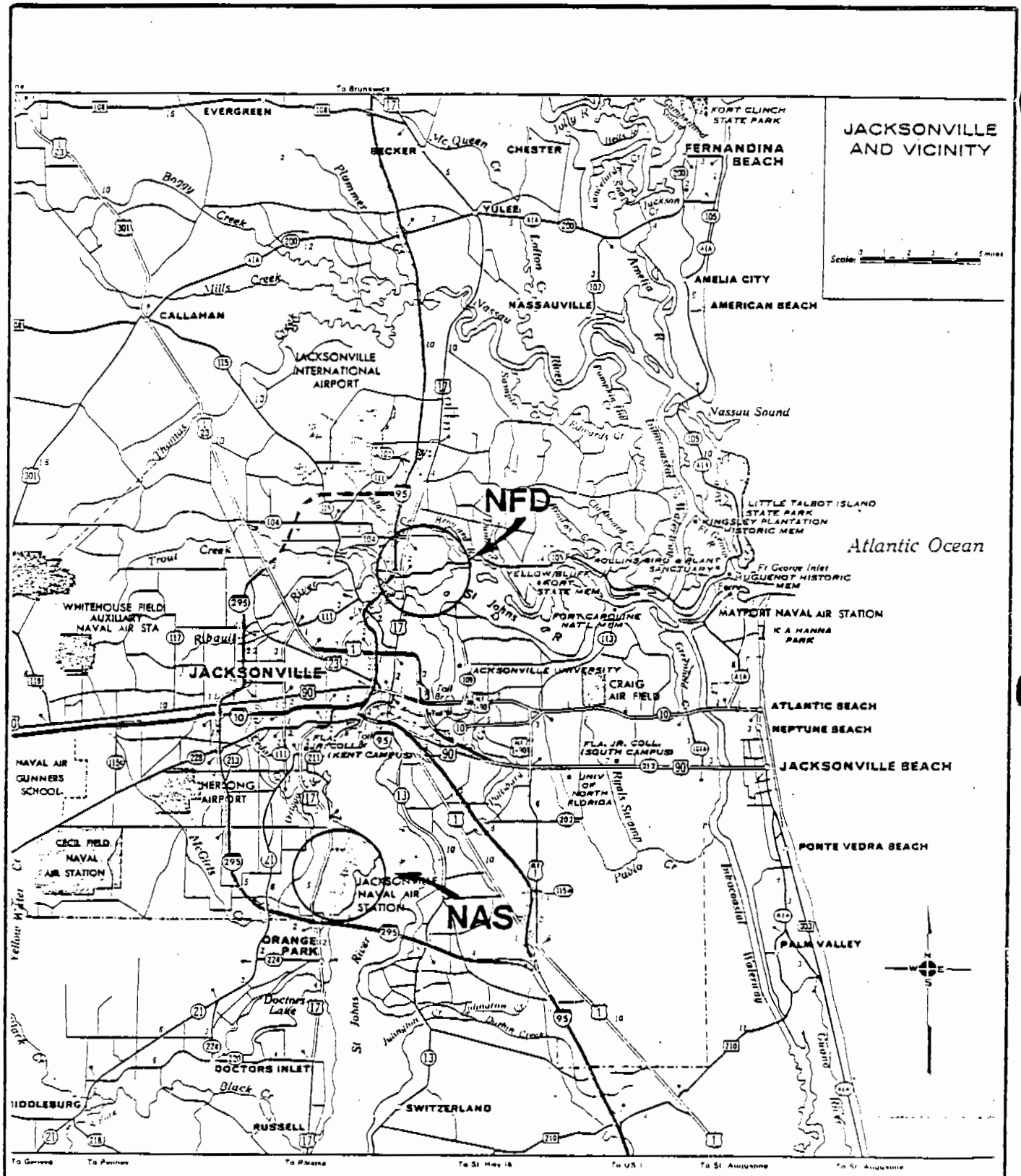

Figure 5.1-1 FACILITIES LOCATION.

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included as part of this IAS. The remaining tenants, such as the Armed Forces Reserve Center and the Naval Air Reserve Training Unit, are training divisions that would not be expected to handle hazardous materials and thus have not been included in this IAS.

The primary mission of the NFD is to receive, store and distribute petroleum products required for the support of assigned fleet units and shore activities, and to furnish necessary administrative services and maintenance functions incidental to these operations. There are no tenants within the physical boundaries of the NFD property.

Naval Regional Medical Center

Although almost completely surrounded by the NAS, the NRMC exists as an entirely separate command. The mission assigned to the NRMC is to provide general clinical and hospitalization services for active duty military personnel and their dependents; to cooperate with military and civil authorities in matters pertaining to health, sanitation, local disaster and other emergencies; and to fulfill a number of other specific functions. The mission is achieved through services provided at a 400-bed hospital and support buildings on 73.6 acres.

Naval Air Rework Facility

The NARF is a major command within NAS Jacksonville. The mission assigned to NARF is to maintain and operate facilities; perform a complete range of depot-level rework operations on designated naval aircraft, engines, their components and accessories, and equipment; provide engineering services in the development of changes in hardware design; and furnish technical services on aircraft maintenance and logistic problems. The NARF consists of a total of 45 buildings.

5.2 HISTORY

The idea for a NAS Jacksonville was originally conceived by the Hepburn Board in 1938. It was primarily planned for seaplane support. This operational requirement largely determined its final location; adjoining a two- to three-mile wide stretch of the St. Johns River at Black Point, just south of Jacksonville. Officials of Duval County offered to donate the land required for the station and, upon acceptance by the Navy Department, county bonds were marketed and the land was acquired. Additional usable land was acquired by the hydraulic fill of marshes along the St. Johns River in the northeastern part of the area.

When conceived, the concept for the station included facilities for pilot training and a Navy Aviation Trades School (NAT) for ground crewmen. The NAS was commissioned on 15 October 1940. With the advent of World War II, the physical size of the facility was more than doubled, and military functions were geared to supporting the war effort. During 1942, the primary training of pilots was phased out and the station became the headquarters for the Chief of Naval Operational Training (CNAOPTRA), the final training phase before fleet assignment. The NAT School became the Naval Air Technical Training Center (NATTC) under the Chief of Naval Air Technical Training, NAS Memphis. The operational areas of the station still main-

tained coastal protection with seaplanes (PBY's). The facility reached a peak of 42,000 naval personnel and 11,000 civilians by 1946.

At the end of World War II NAS Jacksonville was devoted entirely to aviation training. In 1945 CNAOPTRA was redesignated Chief Naval Air Advanced Training (CNAVANTRA) but this mission, and that of the station, remained basically the same. In July 1946 the Seventh Naval District was transferred from Miami, Florida to NAS Jacksonville, as a joint command with CNAVANTRA. On 5 April 1948 the transfer of CNAVANTRA, and all training facilities, to NAS Corpus Christi, Texas was announced and the move was completed on 15 November 1948. The NATTC Jacksonville was transferred and consolidated with the NATTC at NAS Memphis.

Due to this relocation there was some doubt as to the continued requirement for NAS Jacksonville. The Office of the Chief of Naval Operations (CNO) however, made the decision to return to the originally planned concept as a Fleet Air Operational Support Base at that time. Therefore, as CNAVANTRA activities moved to NAS Corpus Christi, operational squadrons replaced them. By January 1949, the station was devoted to support of operational carrier squadrons with fleet squadrons assigned to Commander, Naval Air Bases, Sixth District (Now COMSEABAS EDASWWINGSLANT) and patrol squadrons assigned to Combat Patrol Wing (COMPATWING) Eleven. On 1 January 1951, the NATTC and Marine Air Division (MAD) activities were reactivated in support of the Korean build-up of facilities. This joint operational and training status continues to this time.

The NARF, a tenant of NAS Jacksonville, has been a major part of the activity since 1940. It was originally the NAS Assembly and Repair Department. Its mission has been the maintenance, repair and inspection of aircraft and aircraft components. Peak workload at the NARF occurred in 1945 when 7,300 employees, including 3,500 military personnel were on board. In 1965 the NARF became the East Coast designated overhaul port for 3 attack-type aircraft, the A-4 Skyhawk, the A-5 Vigilante and the A-7 Corsair. As of 1 April 1967 the Assembly and Repair Department (NAS Jacksonville) became a separate command, the NARF. The facility includes 45 buildings occupying approximately 33 acres.

The NFD was originally constructed on approximately 142 acres by the Army during World War II as the terminus of a pipeline from the Gulf of Mexico. It was to be used to barge fuel north along the intracoastal waterway. The purpose of the plan was to avoid shipping by tanker along the Atlantic Coast due to the presence of enemy submarines. The war ended before the pipeline was completed and, in 1947, the NFD was transferred to the Reconstruction Finance Corporation for disposal. The Navy Department acquired it in 1949 to provide AVGAS storage for the NAS Jacksonville and as a Fleet Refueling Unit. The pipeline, meanwhile, was dismantled and sold as surplus material.

From 1949 to 1951, the NFD operated as part of the NAS Jacksonville, and consisted of four tanks with a capacity of 280,000 barrels. On 26 April 1951, the NFD was established as an independent activity under the management control of Naval Supply Systems Command (NAVSUP) and the military command of Commanding Officer, NAS Jacksonville. An additional 300 acres of land was acquired, and in 1951 the first increment of an expansion program

was completed. This expansion added seven 80,000 barrel floating roof tanks and two 20,000 barrel tanks to the NFD's storage, bringing the capacity to its current total of 880,000 barrels. The four original tanks were converted to NSFO to support fleet units at Naval Station, Mayport, and the new tanks were used for aviation fuels in support of NAS Jacksonville. The second increment of the plan, providing for 690,000 barrels of additional storage, was subsequently cancelled when it became apparent that the storage facilities were adequate to meet the existing requirements in the area.

In 1967, 181 acres were declared in excess of the requirements of the Navy, and were transferred to the U.S. Marine Corps Reserve. An additional 90 acres were sold to commercial interests in 1973.

Effective 1 April 1967, the military control was redelegated to Naval Supply Systems Command. On 1 March 1976, the NFD was designated as a DFSC Terminal and included the accountability of fuel stored at Naval Station, Mayport. A highlight in the history of the NFD occurred in September 1978 when it was awarded the 1977 Secretary of the Navy Environmental Protection Award for a small shore activity. This achievement was culminated with NFD being chosen to represent the entire Navy for the prestigious Secretary of Defense Environmental Protection Award. On 1 July 1980, NFD acquired the Mayport Fuel Division as a functional transfer from the Naval Station, Mayport. On 1 October 1982 NFD became a department of the newly established NSC Jacksonville.

5.3 PHYSICAL FEATURES

5.3.1 General

The entire state of Florida is located within the Coastal Plain physiographic province. The ground surface relief is very moderate with topographic highs rarely exceeding 200 feet above sea level. The Coastal Plain groundwater region, coinciding with the Coastal Plain physiographic province, contains abundant supplies of both surface and groundwater. Areally extensive deposits of sands, gravels and permeable limestones of considerable thickness are found in the region. Large amounts of groundwater can be obtained from individual wells throughout the entire region.

5.3.2 Climatology

The climate of the Jacksonville area is humid subtropical. Typically the summers are long, hot and humid and the winters are short and mild, with occasional frost from November through February. The Atlantic Ocean and the Gulf Stream have a moderating influence on both the minimum and maximum temperatures. The average annual temperature is approximately 70 degrees ranging from the mid 50's in January to the low 80's in July. The area has an average annual rainfall of approximately 53 inches with half the annual precipition falling between June and September (see Table 5.3-1). Most of the summer rain comes from short duration thunderstorms that occur almost every other day. These showers are often extremely heavy and can cause localized flooding and runoff problems. The area is also subjected to tornadoes each year.

TABLE 5.3-1

Climatic Data
Jacksonville, Florida

Month	Air Temperatures Normal Max	Min	Avg. Monthly	Precipitation Normal Total	24 Hr Max	Humidity 7 am	1 am	Wind Speed (Knots) Mean Speed	Prevail Dir.	Max Speed/ Dir.	Mean Number Days Clear	Ptly Cldy	Cldy	Fog
January	67	45	56	2.45	3.02	87	56	7.5	NW	34S	9	9	13	5
February	69	47	57	2.91	3.84	86	52	8.6	WSW	45NE	9	7	12	4
March	73	51	62	3.49	3.21	85	49	8.5	NW	38W	9	10	12	3
April	80	58	69	3.55	4.88	84	47	8.3	SE	42SW	10	10	10	2
May	86	65	76	3.47	5.09	83	48	7.8	WSW	44E	10	12	9	2
June	91	71	81	6.33	5.93	85	55	7.6	SW	66NE	6	12	12	1
July	92	73	83	7.68	10.09	87	57	7.0	SW	43SW	4	15	12	1
August	91	73	82	6.85	7.93	90	59	6.7	SW	39NE	5	16	10	1
September	88	71	79	7.56	10.17	90	62	7.8	NE	71N	5	11	14	1
October	80	62	71	5.16	6.66	90	57	7.8	NE	63E	11	8	12	3
November	72	51	62	1.69	4.21	88	55	7.5	NW	52S	12	8	10	5
December	67	45	56	2.22	2.51	88	57	7.2	NW	54N	9	9	13	5

The entire Gulf and East Coast of the United States are subject to tropical hurricanes, but major hurricanes are relatively rare events at any location. Most occur in August, September and October, but the six-month period after 1 June to 30 November is considered the Atlantic hurricane season. On the average, six Atlantic hurricanes occur each year, but there have been significant deviations from the average.

In August 1964 hurricane Dora entered the Florida coast between St. Augustine and Jacksonville. St. Augustine recorded winds of 125 miles per hour and total damage exceeded $50 million. Dora was the first hurricane on record to move inland from the east over northeastern Florida.

In September 1979 hurricane David claimed 1,200 lives in the Caribbean and property and crops damage in excess of $1.5 billion. When it arrived in the U.S. it had lost much of its power, but swept the Atlantic coast from Florida to Maine, claiming 19 lives and causing more than $500 million in damages. This storm passed over the Jacksonville area from the south.

Passing hurricanes and tropical storms have their greatest impact through prolonged rains and high tides causing flooding problems that are usually considered equivalent to 100-year storm events (see Figures 5.3-1 and 5.3-2). The immediate river shoreline is most affected by such storms due to the exposure to the maximum effect of winds from the northeast and southeast. Under-flooding conditions, hazardous materials stored or disposed in low areas (approximately below elevation 6 feet above mean sea level [msl]), adjacent to shoreline of the St. Johns River, would be subject to migration by floating or washing away to other areas off property and spreading of contaminants on property due to damaged or leaking container systems. As is indicated on Figure 5.3-3, the 1-year 24-hour rainfall for the Jacksonville area would be 4 inches.

5.3.3 Topography

The topography in northeast Florida is mostly low, gentle to flat, and composed of a series of ancient marine terraces. These terraces were formed in the Pleistocene (glacial period) when the sea was relatively stationary at various higher levels than the present sea level. When the sea dropped to a lower level, the sea floor emerged as a level plain or terrace and the landward edge of each terrace became an abandoned shoreline, which is generally marked by low scarp.

The highest altitude in Duval County is about 190 feet above msl in the extreme southwest corner of the county, along the eastern slope of a prominent topographic feature known as "Trail Ridge." Trail Ridge is a remnant of the highest ancient marine terrace (Cohaire) in Duval County. The terraces parallel the present Atlantic shoreline and become progressively lower from west to east (Fairchild, R.W., 1972).

Surface drainage in the area is primarily controlled by the terrace. Each terrace is bounded along its east seaward edge by remnants of a beach ridge parallel to the ancient shore line. These ridges direct runoff so that the streams flow parallel to the ancient shorelines, e.g., St. Johns River at the NAS (Figure 5.3-4). A feature of this topography in the flat

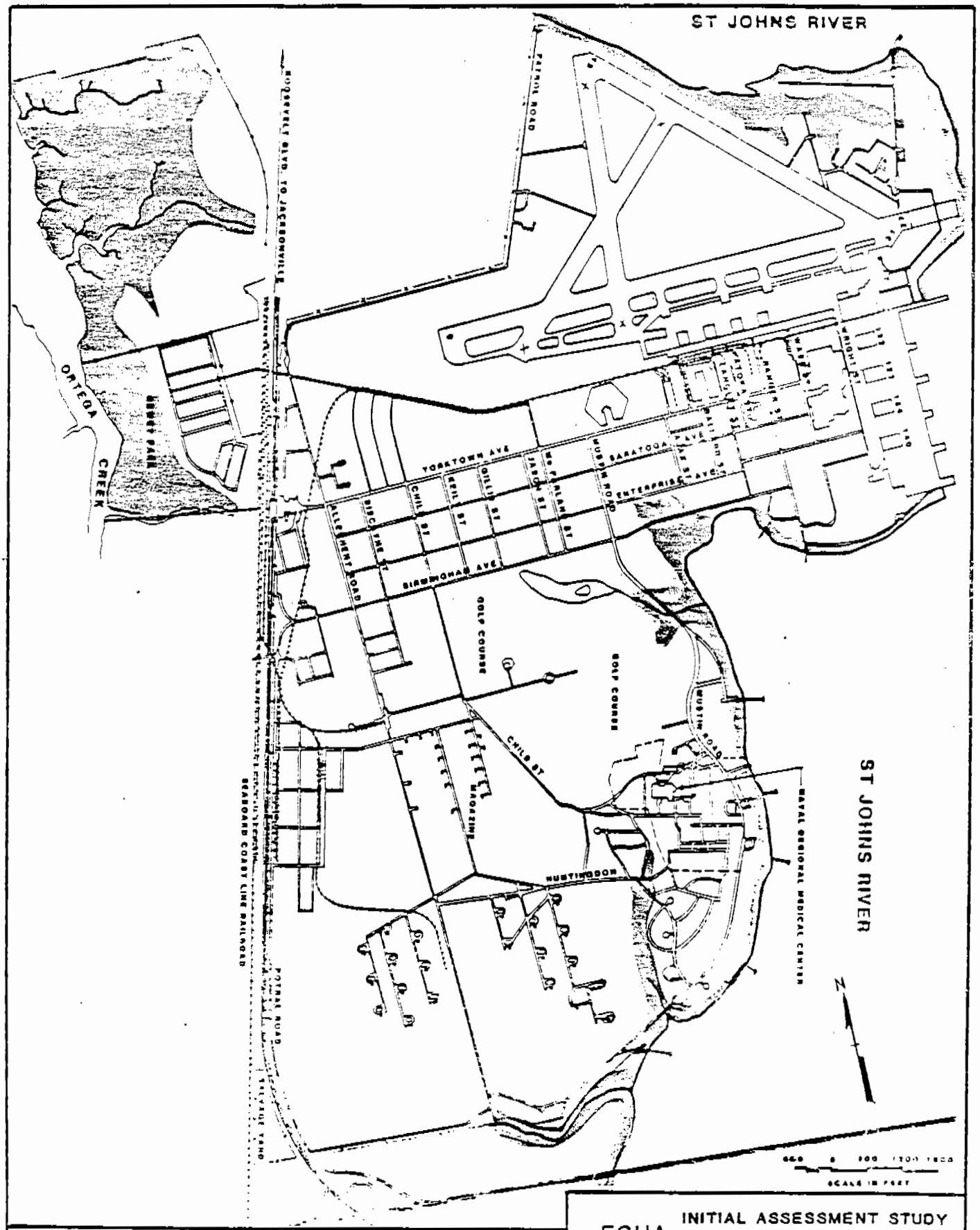

Figure 5.3-1 FLOOD ZONES NAS JACKSONVILLE.

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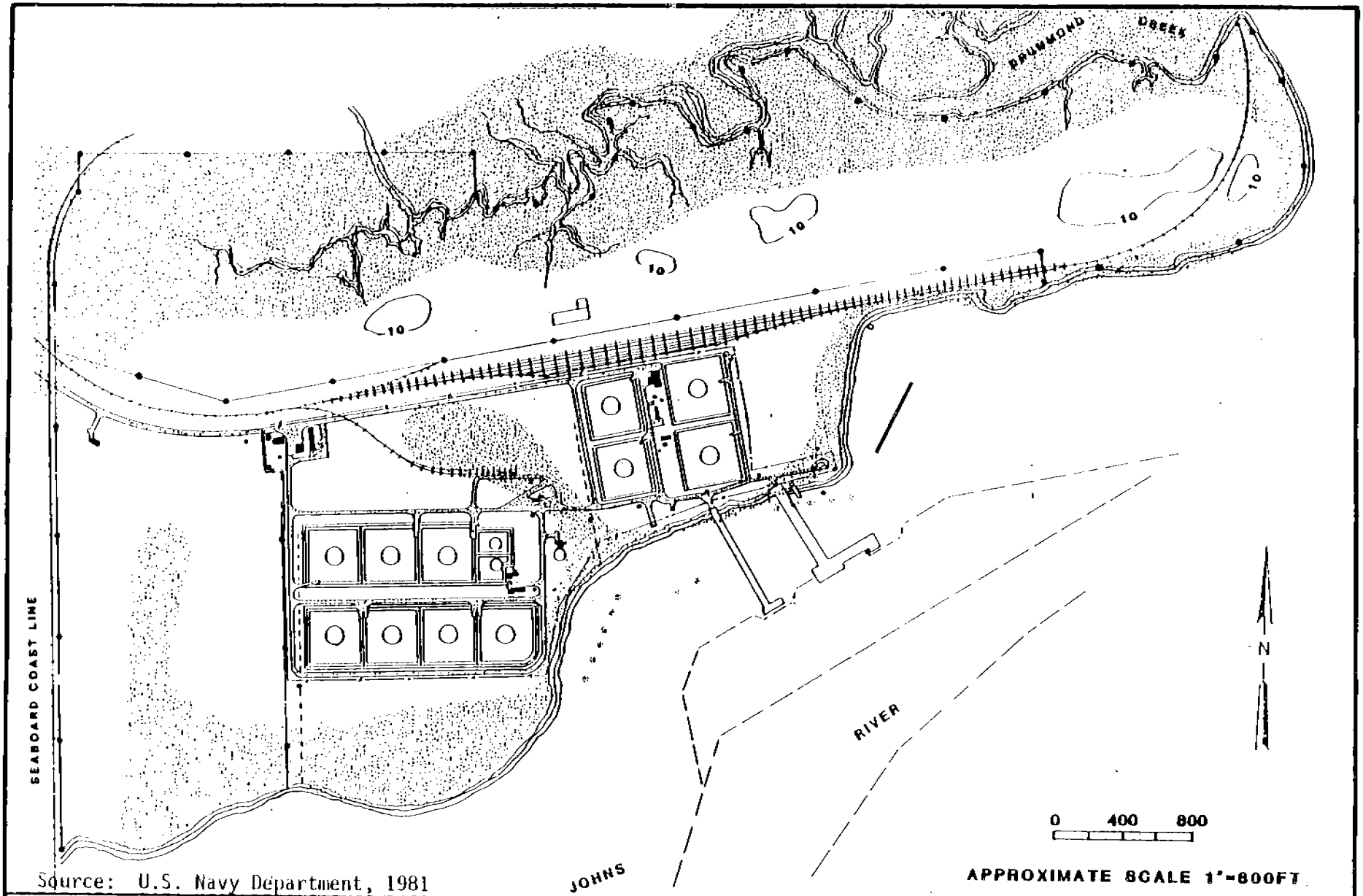

Source: U.S. Navy Department, 1981

Figure 5.3-2 FLOOD ZONES NFD JACKSONVILLE

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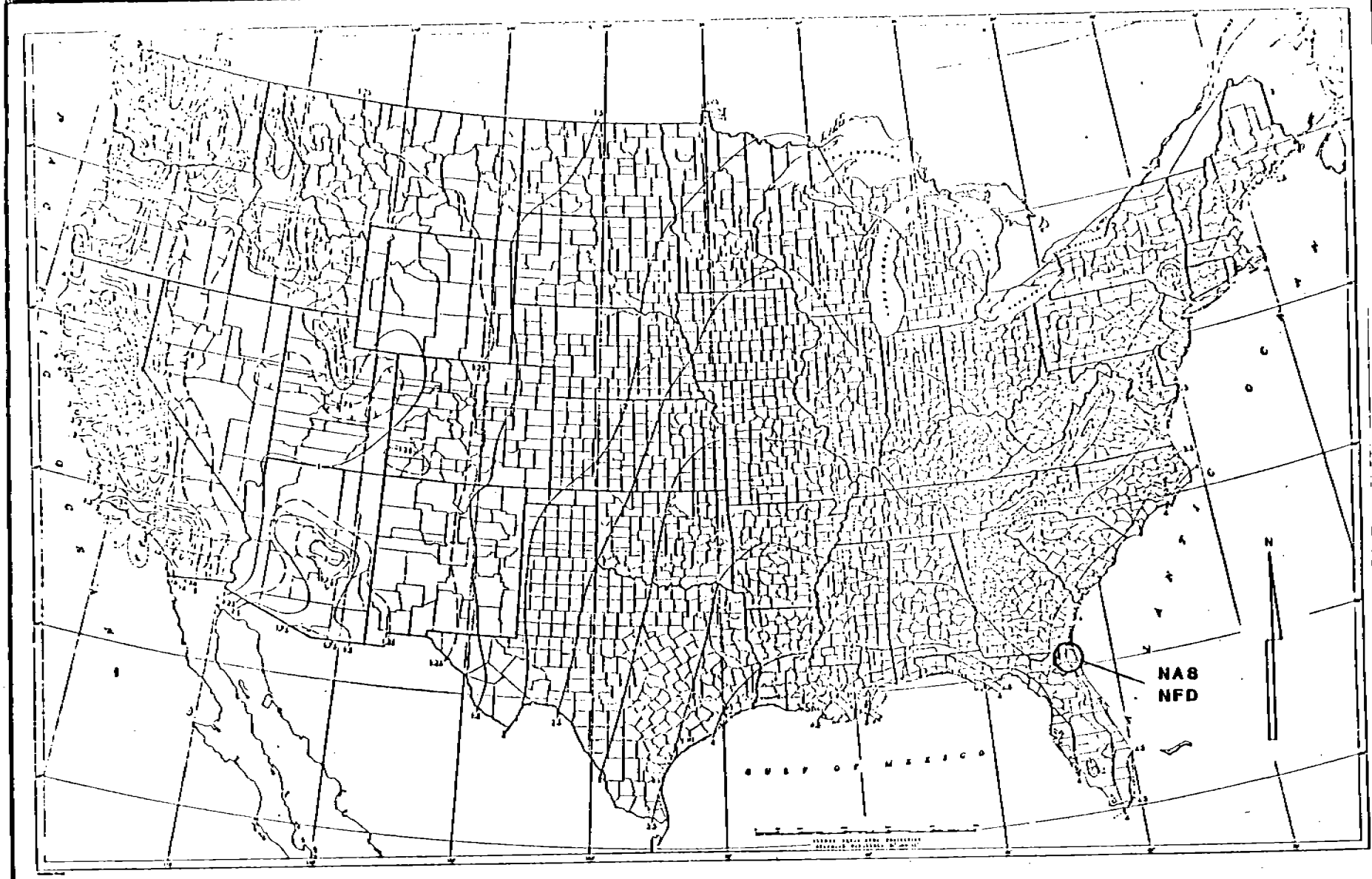

Source: U.S. Department of Commerce, 1963

Figure 5.3-3 1-YEAR 24-HOUR RAINFALL (INCHES)

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JACKSONVILLE, FLORIDA

Old Drum Lot (Site No. 30)

Findings and Recommendations

Resampling of soils at the Old Drum Lot, as recommended in the verification study, indicates that 2 of the six soil samples contained cadmium slightly exceeding the EP toxicity limit of 1.0 ppm Cd. Sample Nos. 3 and 4 contained 1.04 and 1.18 ppm Cd, respectively (Figure 9 and Appendix C, Section 3). Lead content of all samples was relatively low and within acceptable limits. Although contaminated soils had been removed from the site prior to sampling, it appears that some contaminated soil remains.

Water-level elevations determined on September 19, 1985, are also given in this illustration. As indicated, the highest water-table elevation (20.8 ft) was determined at 30-5. Lithologic logs for 30-4 and 30-5 are given in Table 3; chemical analyses in Appendix C, Section 3.

Monitor well NAS 30-1 was resampled, as recommended, and found to be free of VOCs and heavy metals. Samples from the newly installed monitor well 30-4 were also free of VOCs and heavy metals. Well 30-5, however, contained a total of 29 ug/l VOCs, chiefly toluene (11 ug/l) and TCE (7 ug/l). The metal content of the sample was low and below drinking water standards.

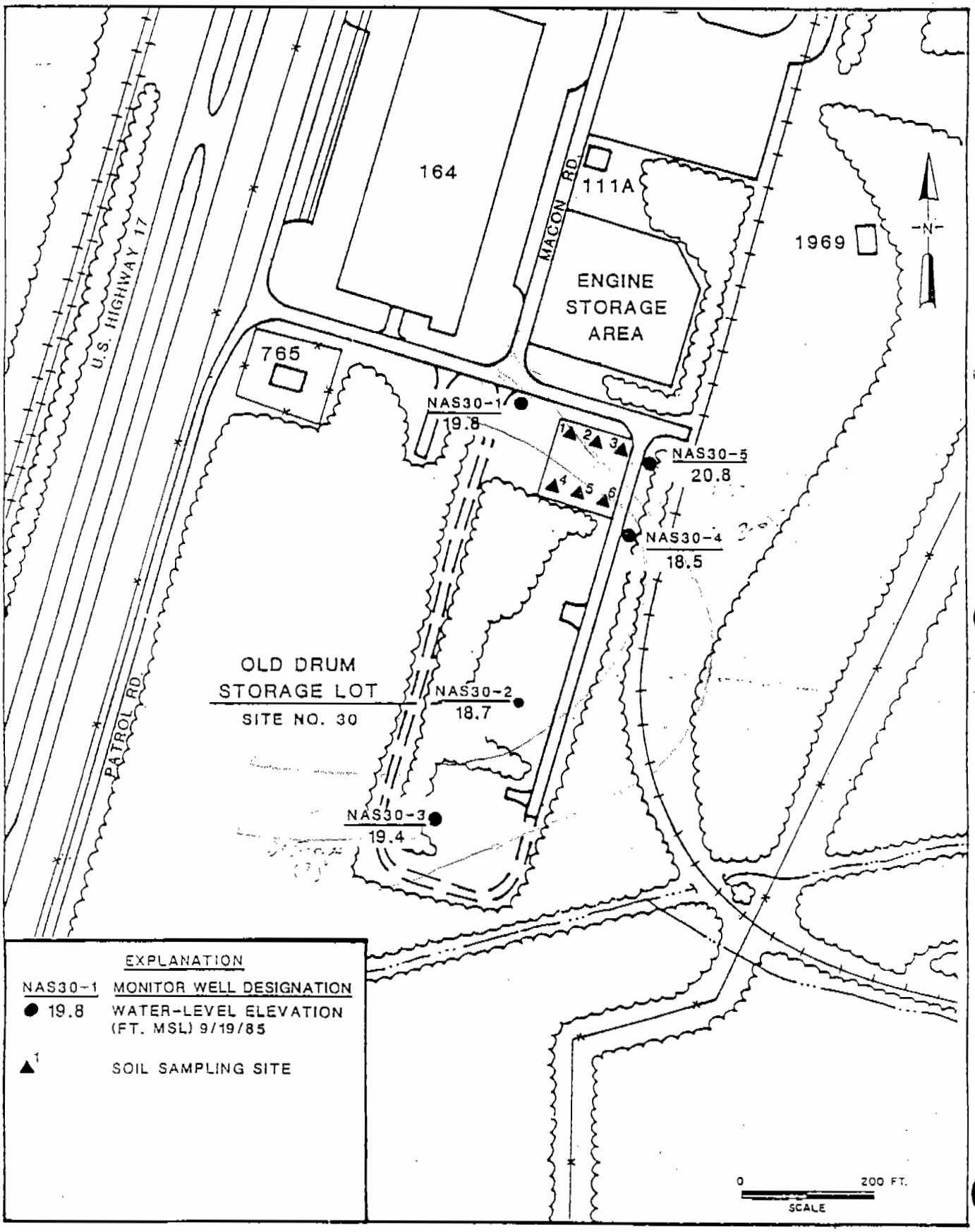

Figure 9. Location of Wells and Sampling Sites, NAS Site No. 30

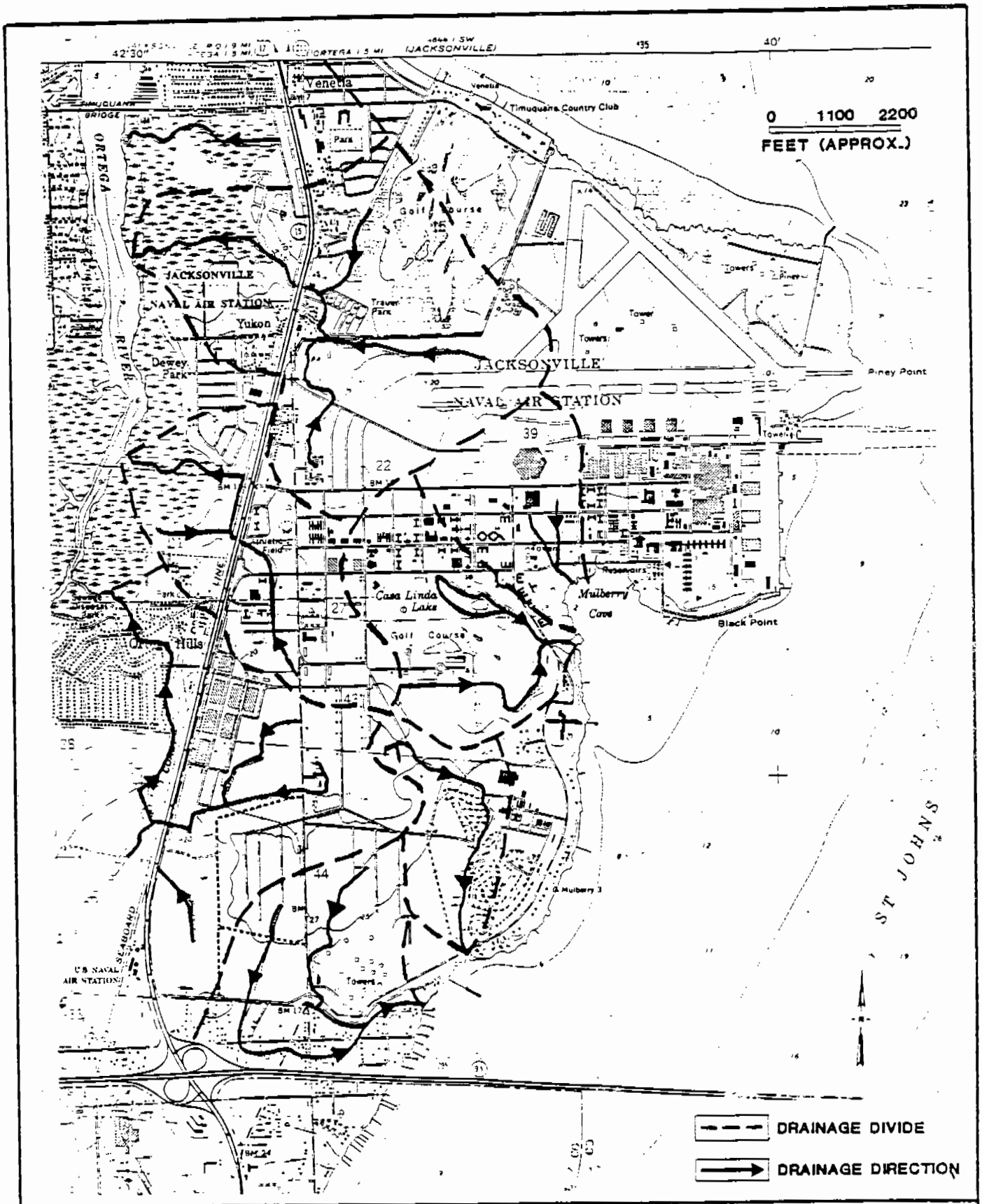

Figure 5.3-4 TOPOGRAPHY AND DRAINAGE MAP NAS JACKSONVILLE.

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NAVAL AIR STATION
JACKSONVILLE, FLORIDA

marshy areas northeast of Jacksonville, and in the vicinity of the NFD, is that drainage is more sluggish and the streams often form a dentritic pattern (Figure 5.3-5). Because of the low relief over much of the area, drainage divides are often difficult or impossible to define. The terraces also play a significant role in determining the configuration of the potentiometric surface of the shallow aquifer system. The potentiometric surface, based on water levels in wells that penetrate the shallow aquifer system, roughly follows the contour of the land surface. As a result, the potentiometric surface is highest where the terraces are highest and lowest where they are lowest. This topic is discussed in greater detail in Section 5.3.7.1.

The elevation of the land surface at the NAS varies from a high of about 35 feet msl near the center of the southern portion of the base (at the former registered disposal site), to a low of 0 feet msl at the St. Johns River. This topographic high forms an elongated ridge oriented in a northeast-southwest direction (see Figure 5.3-4). The land slopes gradually away from the topographic high in all directions with the greatest relief occurring to the east-southeast.

5.3.4 Geology

In the Jacksonville area, supplies of fresh water are obtained entirely from wells drilled into the soil and rock formations that comprise the aquifer systems. In order to assess the potential for contamination of these groundwater supplies it is first necessary to differentiate the various geologic formations and to determine their water bearing properties.

The geologic formations are fairly well defined throughout the Jacksonville area due to the many deep wells and the diligence of the state and oil company geologists who provided detailed geologic logs and stratigraphic interpretations. Examples of geologic logs of wells (W-27, W-514 and W-661) at and near the NAS, obtained from the Florida Bureau of Geology, Tallahassee, Florida, are provided in Appendix A. Geologic logs such as these allow the construction of detailed geologic cross sections and thus provide the basis for evaluating subsurface conditions at the NAS and NFD.

The majority of the Florida Peninsula is made up of Eocene and Oligocene aged limestones and dolomites. These carbonate rocks, which form the Floridan Aquifer, were deposited in an environment similar to today's Bahama Boulas. Except for the more central and western portions of Florida, these older carbonate rocks were covered by Miocene and more recent aged phosphate sandy clays, coarse to fine sand, shell and friable limestone beds. As indicated on Table 5.3-2, these more recent unconsolidated deposits form the aquicludes and shallow aquifer systems in Duval County, including the NAS and NFD. The areal distribution of the various aged formations throughout the Florida Peninusla is shown on the Generalized Geologic Map (Figure 5.3-6).

In most areas of northeastern Florida the top of the Ocala Group generally corresponds to the top of the Floridan Aquifer. Thus the structure contours for the top of the Ocala Group, shown in Figure 5.3-7, also approximately represent the top of the Floridan Aquifer. As shown in Figure 5.3-7, the Ocala Group is exposed at the surface (approximately 100 feet

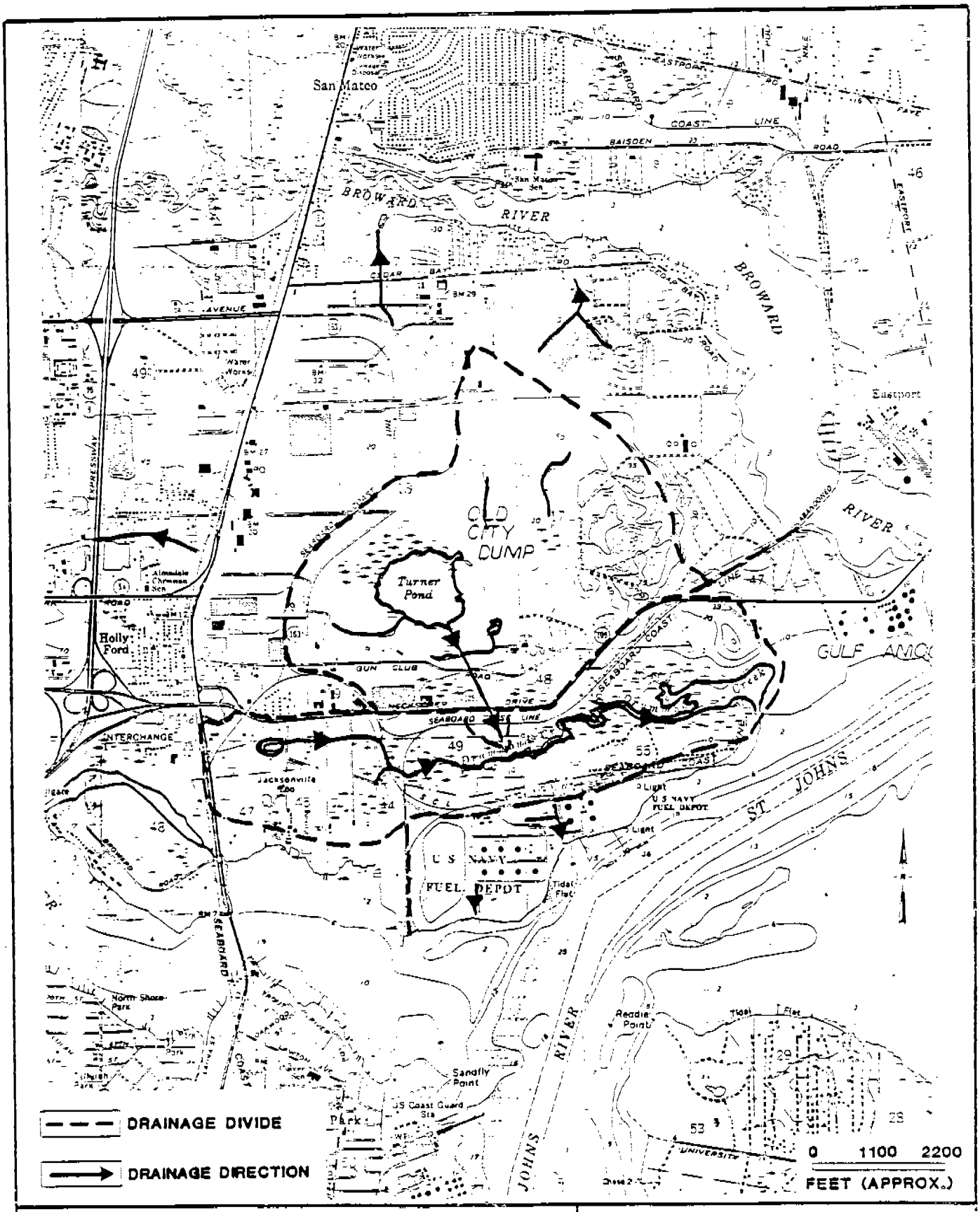

Figure 5.3-5 TOPOGRAPHY AND DRAINAGE MAP NFD JACKSONVILLE.

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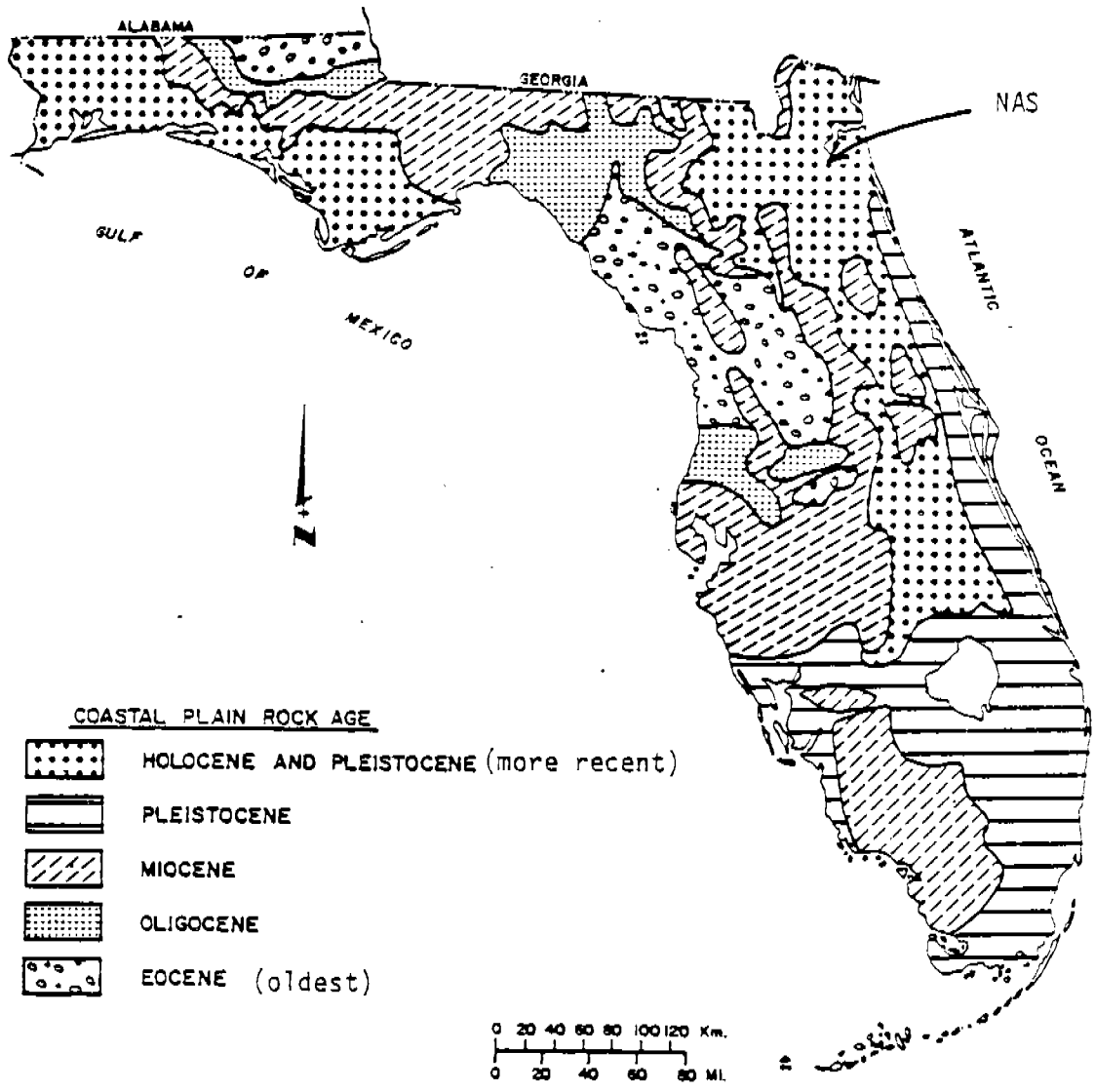
TABLE 5.3-2

Stratigraphic Units and Aquifer Systems in Duval, Nassau, and Baker Counties

Geologic age	Stratigraphic unit		Approximate thickness (feet)	Lithologic character	Aquifer systems		Water-bearing properties
Recent and Pleistocene	Recent and Pleistocene deposits		0-150	Soil, muck, coarse to fine sand, shell, and some clayey sand	Shallow aquifer system		Surficial sand yields small amounts of water. Sand and shell bed along coast yields moderate quantities.
Pliocene?	Pliocene or Upper Miocene deposits		20-110	Gray-green calcareous, silty clay and clayey sand; contains shell beds and white soft, friable limestone beds			Limestone, sand, and shell bed near base of deposits yield moderate to (locally) large amounts.
Miocene	Hawthorn Formation		260-490	Gray to blue-green calcareous phosphatic, sandy clays and clayey sands; contains fine to medium phosphatic sand lenses and limestone and dolomite beds, particularly near the base of the formation.	Aquiclude		Relatively impermeable clays and marls in both the late Miocene or Pliocene deposits and the Hawthorn Formation confines the artesian water in the Eocene limestone and in the limestone and shell beds above the Eocene limestone. Yields small to moderate supplies.
Eocene	Ocala Group	Crystal River Formation	50-300	White to cream chalk, massive fossiliferous marine limestone.	Floridan aquifer system		Marine limestone formations utilized as the primary source of water in the area.
		Williston Formation	20-100	Tan to buff granular, marine limestone			
		Inglis Formation	40-120	Tan to buff granular, calcitic, marine limestone; contains thin dolomite lenses and zones of Miliolidae foraminiferal coquina			
	Avon Park Limestone		50-250	Alternating beds of brown to tan hard, massive dolomite, brown finely crystalline dolomite, and granular calcitic limestone		Aquiclude	Massive dolomite beds restrict vertical movement of water.
	Lake City Limestone		425-500+	White to brown, purple-tinted lignitic, granular limestone and gray hard, massive dolomite; contains lignite beds and zones of Valvulinidae foraminiferal coquina			Limestone and porous dolomite beds yield large to very large quantities of water. Hard dolomite and limestone beds restrict vertical movement of water within certain zones. Potentially the greatest source of water in the area.
	Oldsmar Limestone		846	Cream to brown massive to chalky, granular limestone and tan to brown massive to finely crystalline dolomite			

Source: Leve, 1966



Source: Miller, 1977

Figure 5.3-6 GENERALIZED GEOLOGIC MAP OF FLORIDA.

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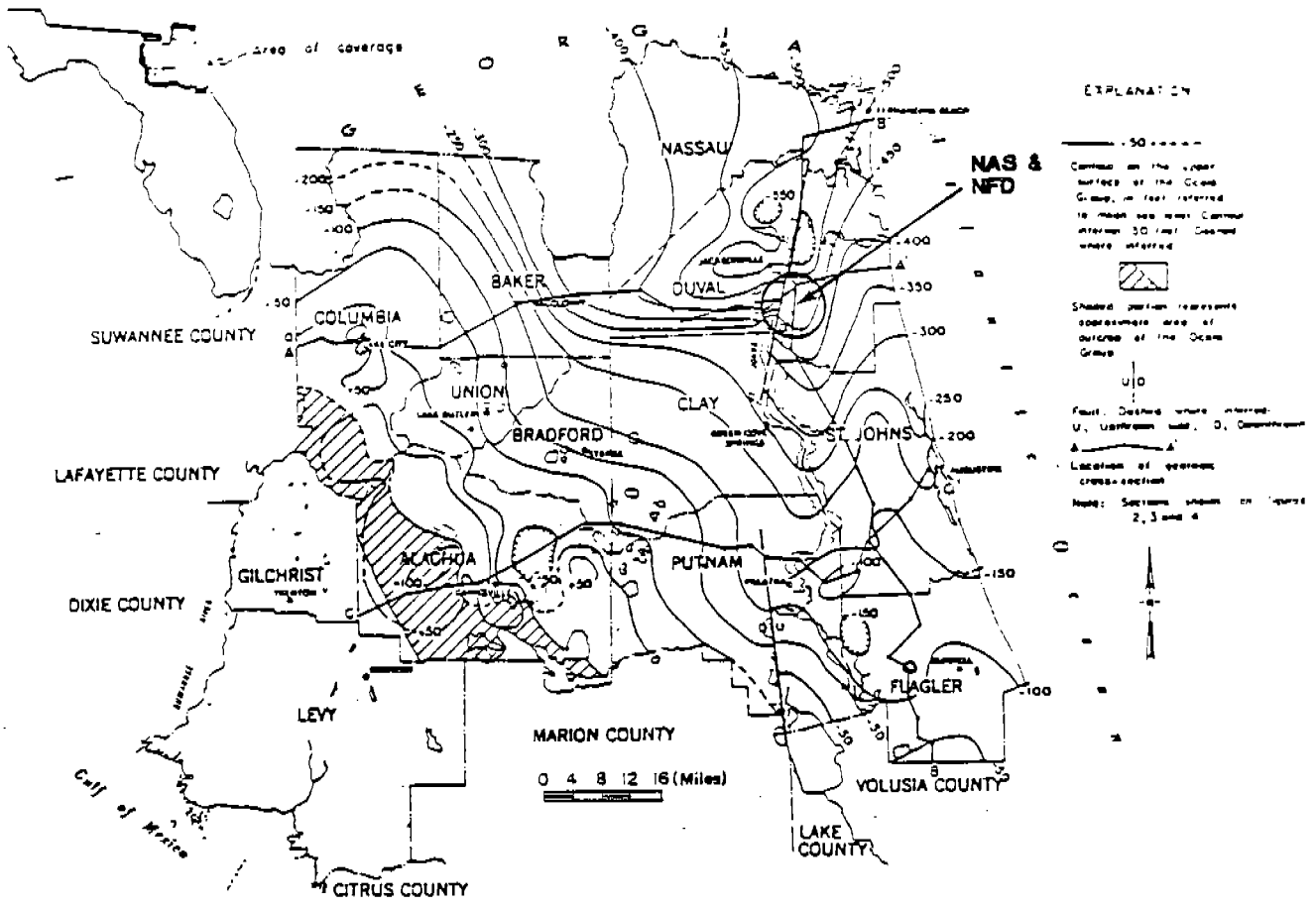

Source: Leve, 1968.

Figure 5.3-7 MAP OF NORTHEAST FLORIDA SHOWING THE ALTITUDE AND CONFIGURATION OF THE TOP OF THE OCALA GROUP.

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above msl) in western Alochua County (approximately 30 miles southwest of Jacksonville). In the vicinity of the NAS the top of the Ocala Group is at a depth of approximately 300 feet (elevation of 300 below msl). The top of the Ocala Group generally dips to the northeast forming a wide basin in Duval County.

The many irregularities in the surface of this aquifer were formed by erosion before the younger Miocene sediments were deposited and some irregularities were formed by collapse as a result of solution of rock material by circulating groundwater (Leve, 1968). Although sinkholes are fairly common to the central and western part of northeastern Florida none have been reported near the NAS or NFD.

As shown in Figure 5.3-7, a fault occurs in the vicinity of the NAS, beneath the St. Johns River. As shown in Figure 5.3-8 the top of the Ocala Group is displaced about 100 feet along this fault plane. As indicated in the geologic cross section A-A' (Figure 5-3.8) this fault could not be traced through the Hawthorn Formation or into the Pleistocene deposits and therefore would be considered inactive, at least prior to the Pleistocene (greater than 20,000 years ago). This fault would not be expected to have any significance to potential contaminant migration, as it apparently is discontinuous through the Hawthorn Formation which is considered an aquiclude in this area (see section 5.3.7.1).

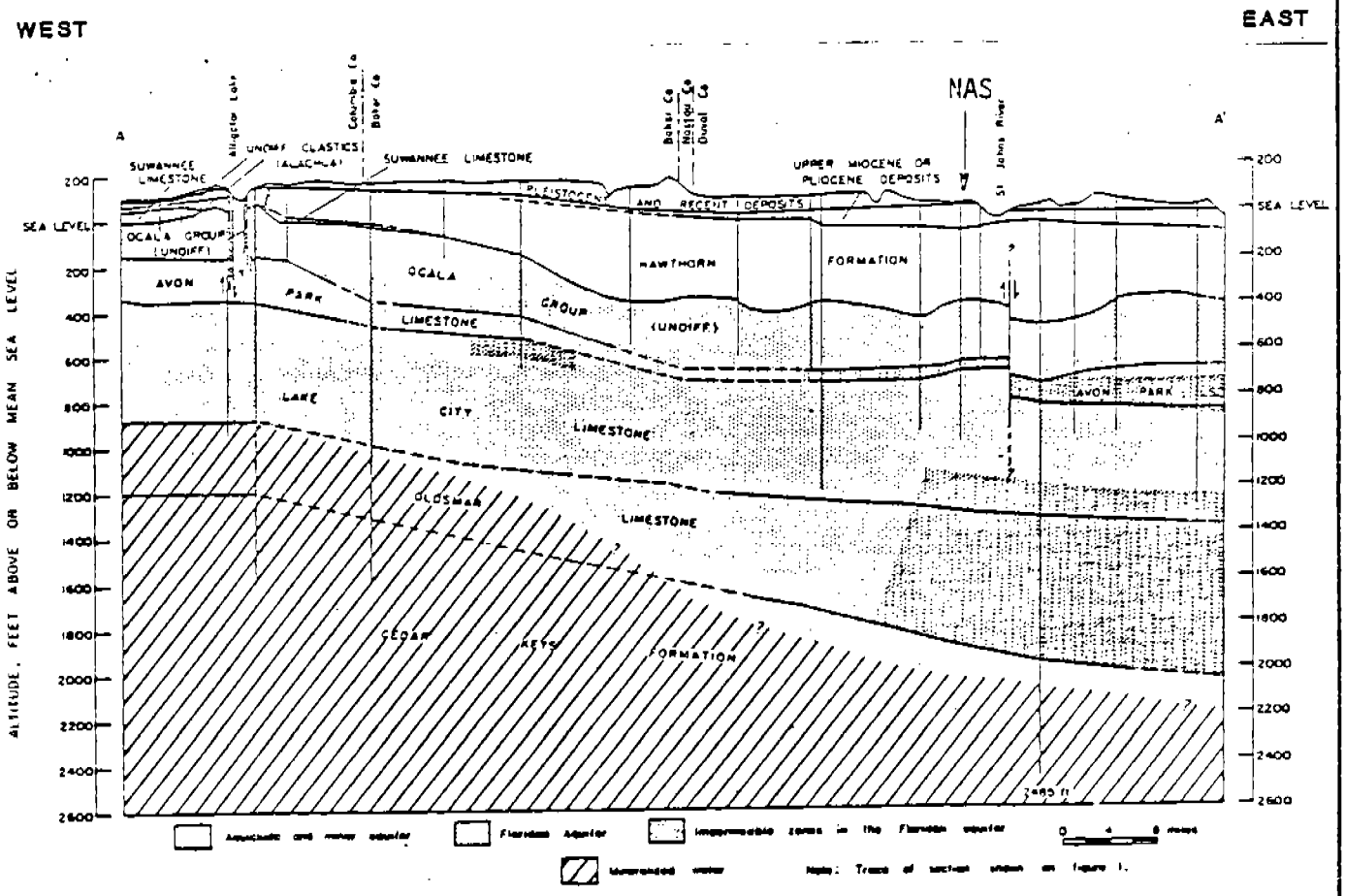
5.3.5 Soils

According to the 2005 Comprehensive Plan, there are 38 different soils found in Duval County and they can generally be characterized as being either sand, organic or man-made (Jacksonville Area Planning Board [JAPB], 1979). The sandy soils are the most common. In terms of total acreage a major portion of this county is composed of soils that are broad, sandy, very strongly acid, very poorly drained and have an organic stained pan within 42 inches of the surface. These soils are considered poor for septic tank use and fair for developments such as building foundations, highways and airports.

Fresh water swamps are located mainly along the tributaries of the St. Johns River. These areas are poorly suited for development due to excessive wetness and flooding potential. The salt marshes located in the northeastern part of the county, along the St. Johns River, have very low development potential, due to excessive wetness, flooding, high shrink-swell potential, low soil strength and high corrosivity (JAPB, 1979).

Test borings were drilled in several areas at the NAS and NFD to provide information on the bearing capacity, contaminant migration potential, etc. of the shallow soils.

At Site No. 26 (at the NAS), borings indicated that the site is underlain by approximately 20 to 30 feet of unconsolidated very fine to medium grained quartz sand that contains lenses of clayed fine sand (Geraghty and Miller, May 1980). This unconsolidated sequence contains the water table aquifer. A north-south and east-west geologic cross-section of the surficial sediment underlying the site is shown in Figures 5.3-9 and 5.3-10 (see Figure 5.3-11, for cross-section location). At borings DPW-1,



NOTE: FOR LOCATION OF SUBSURFACE SECTION A-A' SEE FIGURE 5.3-7

Source: Leve, 1968

Figure 5.3-8 GEOLOGIC CROSS SECTION A-A' FROM WEST OF LAKE CITY TO THE ATLANTIC OCEAN, SHOWING FORMATIONS PENETRATED BY WATER WELLS.

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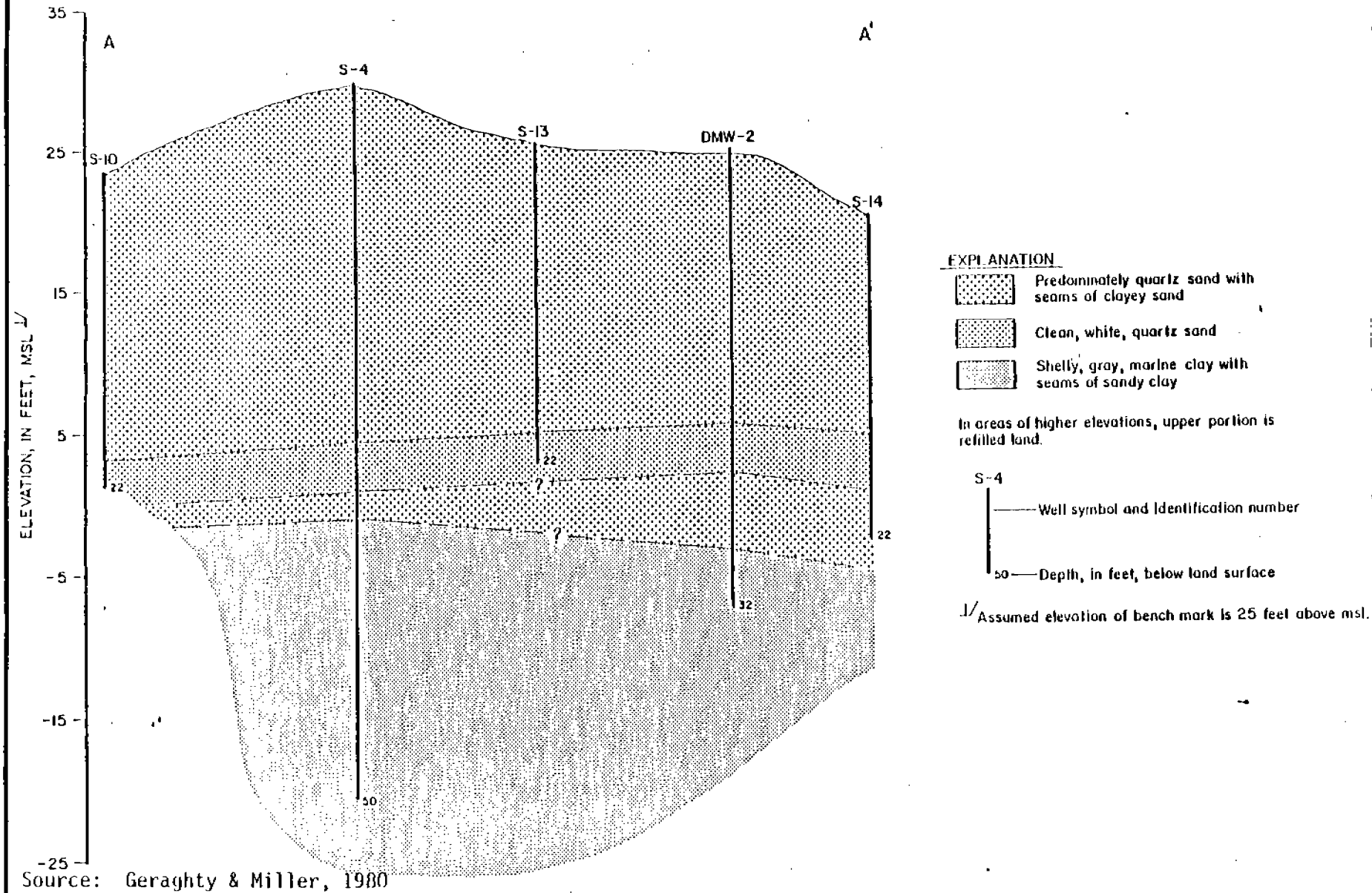

Source: Geraghty & Miller, 1980

Figure 5.3-9 GEOLOGIC CROSS SECTION A-A'.

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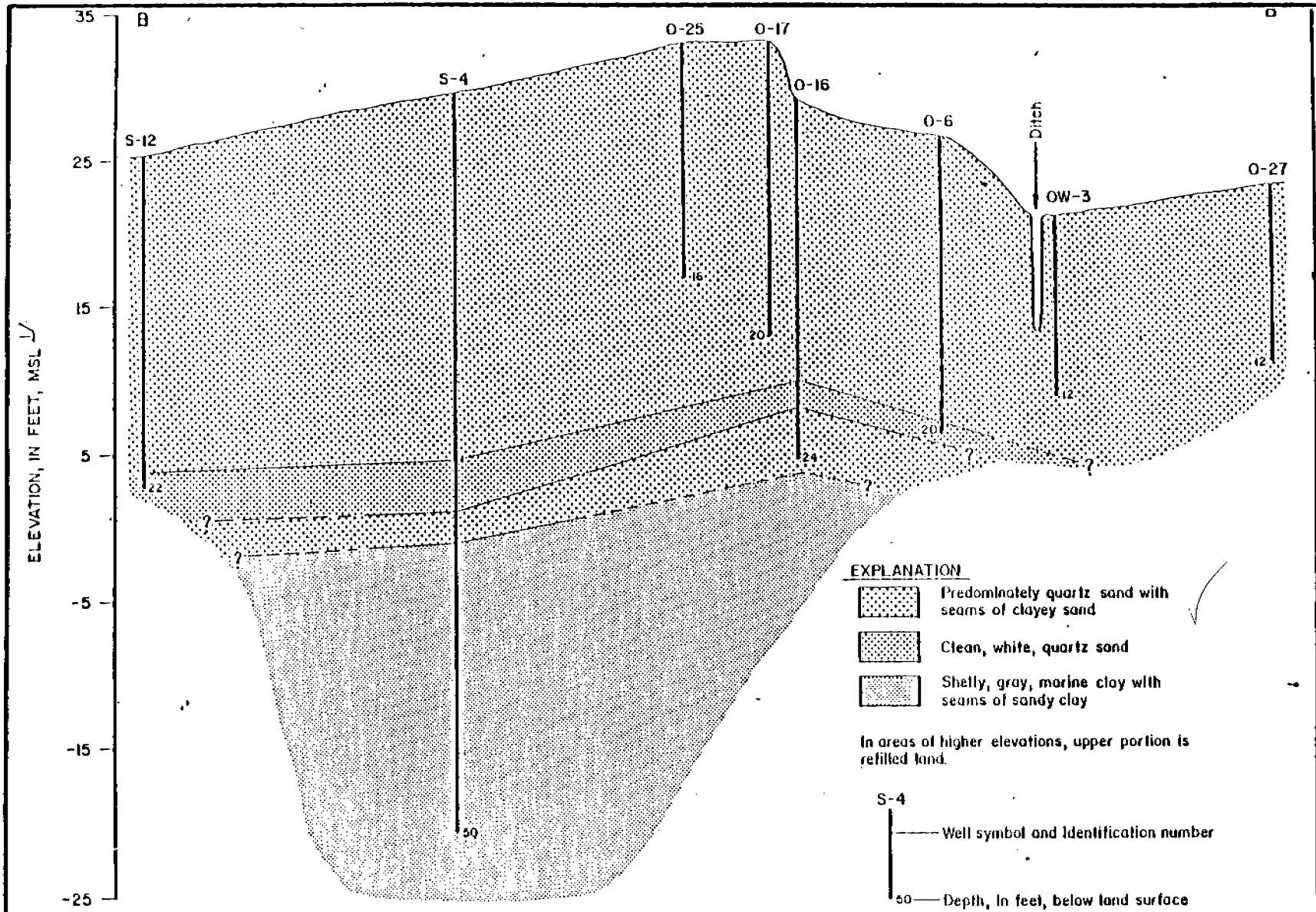

Source: Geraghty & Miller, 1980

1/ Assumed elevation of bench mark is 25 feet above msl.

Figure 5.3-10 GEOLOGIC CROSS SECTION B-B'

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Source: Geraghty & Miller, 1980

Figure 5.3-11 MAP SHOWING THE LOCATION OF GEOLOGIC CROSS SECTIONS A-A' and B-B'.

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DPW-2, and S-4, the base of the water table aquifer was approximately located at depths of 22, 28 and 30 feet, respectively. The confining material underlying the aquifer was found to vary from a gray, sandy clay to a white marl and green clay (Geraghty and Miller, Inc., May 1980).

At the northern end of the NAS, borings drilled for the Plating and Cleaning Facility indicated that there was considerally more sand (i.e. at greater depths). The report by Burns and McDonnell, July 1981 (Appendix B) indicated that the soils at this location (NARF) consist primarily of loose to very dense sand with some silt and clay. Generally these soils are classified as SP to SM materials according to the Unified Soils Classification System. However, some silty clays and clayey sands, classified as SC and CL materials, were encountered. Bedrock was not encountered in any of the borings observed by the Burns and McDonnell engineer, including B-7 which penetrated to a depth of 70 feet. Water level measurements at the completion of drilling were taken in each of the eight borings. The groundwater in these borings varied from 5.8 to 17.4 feet (Burns and McDonnell, July 1981).

Shallow test borings drilled at the NFD, by Brevard Engineering, dated 20 May 1975 (Appendix A) indicate the primary soil type to consist of a light brown fine to coarse sand (SW to SP). This material is to be expected as much of the NFD is hydraulic fill or material dredged from the St. Johns River. Figure 5.3-12 is a photograph of one stage of the hydraulic fill operation in 1951.

5.3.6 Surface Water Resources

5.3.6.1 General

At the NAS Jacksonville two principal waterways are located in the immediate vicinity: the St. Johns River and its tributary, the Ortega River. The St. Johns River forms the eastern boundary of the station, while the Ortega River is located approximately ½ mile west of the station. At the NFD three principal waterways are of interest: the St. Johns River, the Trout River, and Drummond Creek. The NFD is located on the northwest bank of the confluence of the St. Johns River and the Trout River, while Drummond Creek is located several hundred feet north of the NFD. Figure 5.3-4 and 5.3-5 depict the locations of these principal waterways in relation to the NAS and the NFD sites. The physical characteristics of the four principal waterways are discussed below.

5.3.6.2 St. Johns River

The St. Johns River is the largest of the waterways of interest to this study. The Trout River, Ortega River and Drummond Creek are all tributaries of the St. Johns. The river originates in a marsh near Fort Pierce, Florida, 312 miles to the south from its mouth near Mayport, Florida. At Mayport, the river discharges to the Atlantic Ocean. The St. Johns River drains an area of 9,430 square miles, nearly one sixth of the land area of Florida (Anderson and Goolsby, 1973). The portion of the St. Johns from Lake George (106 miles upstream from the ocean) to the Atlantic Ocean is under the influence of tides and salt water flow from the ocean, and is therefore considered an estuary. Occasionally, tidal effects are noted as far as 161 miles upstream (Anderson and Goolsby, 1973).

Jacksonville is situated on the St. Johns River approximately 21 miles upstream from the ocean. At the Main Street Bridge in Jacksonville the river is about 1,250 feet in width, between Jacksonville and the ocean the river becomes as wide as 2 miles. At low water, open water areas of the river total more than 300 square miles.

Flow records for the St. Johns River in the Jacksonville area are obtained at stage monitoring stations at Main Street Bridge in Jacksonville, at the NAS 8.2 miles upstream from the Main Street Bridge, and at the U.S. Army Corps of Engineers Dredge Depot 4.8 miles downstream from the Main Street Bridge. The channel of the St. Johns estuary above Jacksonville is capable of storing huge amounts of water, and rising tides force large amounts of water upstream past Jacksonville. As the tide falls, much of the water flows back past Jacksonville as tidal flows, averaging 87,000 cfs with peak flows commonly exceeding 150,000 cfs. The average tidal flow is more than seven times the average freshwater flow (Anderson and Goolby, 1973). Wide variations in the volume of flow at Jacksonville are therefore experienced. Table 5.3-3 shows selected flow statistics for the St. Johns River at Jacksonville. The period of record covers 4,597 days, during which 8,883 tidal cycles occurred. As can be seen from this table, flow conditions are extremely variable. The average net downstream discharge of the St. Johns River is 5,883 cfs with daily net flow in the downstream direction occurring on about 70 percent of the days of record, and net daily upstream flow occurring on about 30 percent of the days of record. The greatest number of consecutive days during the period of record that the net flow upstream was zero was 14 days. Although tides exert the greatest influence on the flow regime of the St. Johns River at Jacksonville, a number of other nontidal factors, such as wind, runoff, channel storage, rainfall, and evapotranspiration can affect flow volumes in the St. Johns (Anderson and Goolsby, 1973). Typically, these factors can superimpose their combined effect on the tidal flow regime, moderating and augmenting the net tidal effect.

5.3.6.3 Water Quality of the St. Johns River

The quality of water in the St. Johns River (and its tributaries) depends to a large extent on the flow characteristics of the watercourse (as described in the previous section). According to Fairchild and Leve (1973), the ability of the St. Johns River system to transport and discharge polluted water is hampered significantly by daily tidal fluctuations. Wastewater that enters the river may remain in the vicinity of the outfall for prolonged periods of time due to the changing direction and velocity of the current. The situation is compounded further by the effects of northeastern winds. At times, strong northeastern winds, accompanied by high tides, may push wastewater upstream a considerable distance from its point of outfall.

The St. Johns River is rated by the Florida Department of Regulation as a Class III waterbody, designated for fish and wildlife propagation, and body contact recreational uses. According to a recent Draft Environmental Impact Statement prepared by the Florida Department of Transportation (1982), the water quality of the St. Johns River in the Jacksonville area has shown significant improvement over the past decade. The U. S. Geological Survey (USGS) maintains a continuous monitor station at the Main Street Bridge in Jacksonville. Water quality in the St. Johns River is electronically monitored at 30 minute intervals for temperature, dissolved oxygen,

TABLE 5.3-3

Selected Flow Statistics for the
St. Johns River at Jacksonville

Statistic	Direction of Flow	
	Downstream	Upstream
Average discharge, cfs	46,419	40,536
Average net discharge, cfs	5,883	
Maximum daily net flow, cfs	87,000	-
Minimum daily net flow, cfs	-	51,500
Average volume per tidal cycle, mcf	2,075.5	1,812.4
Average net volume per tidal cycle, mcf	263.1	
Maximum volume per tidal cycle, mcf	5,280	4,410
Minimum volume per tidal cycle, mcf	0	0

Source: Anderson and Goolsby, 1973.

pH, and specific conductance. According to the Florida Department of Transportation EIS (1982), the river generally meets State of Florida Class III Standards, with the exception of occasional dissolved oxygen and total coliform violations. The river appears to have naturally occurring iron levels exceeding state standards.

The tidal effects on the St. Johns River allow a high degree of mixing between fresh water and salt water in the river. The salinity of the river at Jacksonville can range from relatively fresh water to a mixture of fresh and marine water consisting of more than 60 percent sea water. The USGS has developed a relationship which relates the specific conductance of the river to the concentration of several major chemical constituents comprising the dissolved solids load. Figure 5.3-13 graphically delineates this relationship, as prepared by Anderson & Gollsby (1973). Table 5.3-4 denotes the results of chemical analyses of St. Johns River water samples (at Main Street Bridge) conducted over a one year period during the development of the conductance relationship (Anderson & Goolsby, 1973). As can be seen from this table, there is an extreme variability in the concentration levels of the major constituents and changes in specific conductance of as much as 12,000 micromhos during a single tidal cycle are common (Anderson & Goolsby, 1973).

Additional data exemplary of the water quality in the St. Johns River have been compiled by Fairchild and Leve (1973). These data are shown in Table 5.3-5. Again, as with the data assembled by Anderson and Goolsby (1973), it is readily apparent that the quality of the river is highly influenced by sea water interactions.

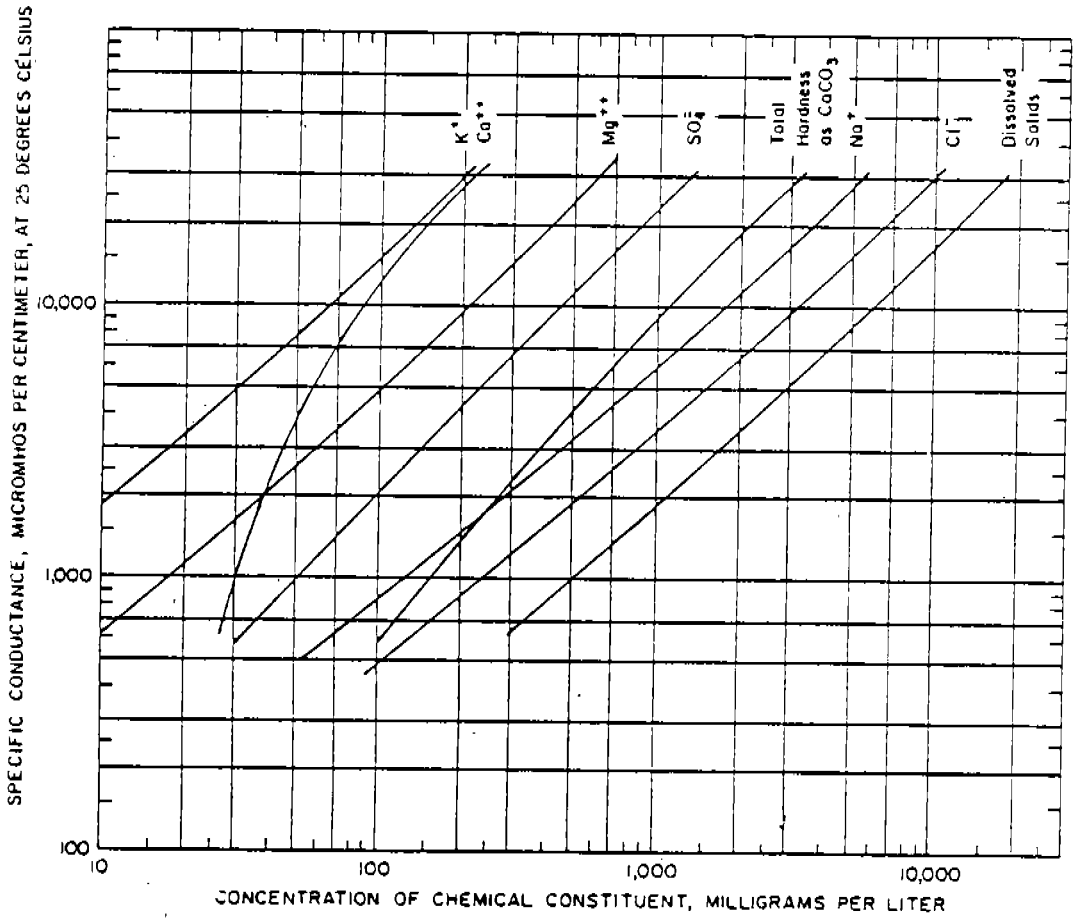
5.3.6.4 Floodplains

The Florida Department of Transportation EIS (1982) outlines the 100-year flood information for the Jacksonville area, based on a Flood Insurance Study for the City of Jacksonville by the Federal Insurance Administration. The 100-year flood elevation in the area is 6 feet above msl and would be the result of hurricane surge flooding. Figures 5.3-2 and 5.3-3 delineate 100-year storm events for the NAS and NFD, respectively.

The Master Plan for the NAS Jacksonville reports that the 100-year flood level for the NAS is 5 feet above msl. Therefore, on the basis of the above information, the NAS would experience a 100-year flood elevation of 5 feet above msl, and the NFD would experience a 100-year flood elevation of 6 feet above msl.

5.3.6.5 Ortega River, Trout River, Drummond Creek

These three tributary drainages to the St. Johns River are of interest because they occur in the immediate proximity of the NAS and the NFD. The Ortega River is located to the west of the NAS, and the Trout River and Drummond Creek are in close proximity to the NFD. Both the Ortega River and the Trout River are gauged by the USGS, while Drummond Creek is not. The available information on the physical characteristics of the three tributaries is discussed in the following paragraphs.



Source: Anderson and Goolsby, 1973

Figure 5.3-13 RELATIONS OF SPECIFIC CONDUCTANCE TO CONCENTRATION OF MAJOR CHEMICAL CONSTITUENTS IN THE ST. JOHNS RIVER AT JACKSONVILLE.

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TABLE 5.3-4

Chemical Analyses of the St. Johns River at Jacksonville

Date of Collection	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids		Hardness as $CaCO_3$		Specific conductance (micromhos at 25° C	pH	Color	Strontium (Sr)
													Sum	Residue on evaporation at 180° C	Calcium, Magnesium	Non-carbonate				
1966																				
b Apr. 26	0.7	0.01	41	26	201	7.3	66	88	359	0.3	0.1	0.00	765	820	210	156	1470	7.3	70	
t Oct. 5	4.7	.05	1.04	274	2320	84	80	571	4090	.5	2.1	.16	7490	7830	1390	1320	1300	7.0	100	1.8
b Oct. 5	2.4	.00	138	377	3240	119	84	750	5690	.6	3.3	.20	10400	10500	1900	1830	17500	7.1	80	2.4
t Oct. 10	3.6	.05	29	14	95	3.6	64	42	176	.3	.1	.15	396	459	130	78	790	7.0	100	.54
b Oct. 10	3.9	.05	28	14	96	3.6	60	43	174	.3	.2	.26	394	462	128	79	790	6.8	100	.54
t Nov. 3	4.6	.04	27	10	71	2.6	40	34	136	.3	.2	.11	306	360	109	76	618	6.9	120	.55
b Nov. 3	2.6	.13	27	10	72	2.6	78	28	128	.3	.3	.10	310	363	109	45	770	6.8	110	.52
t Nov. 16	5.2	.08	211	608	5340	196	85	1240	9470	.9	1.5	.26	17100	18200	3030	2960	28000	7.0	40	3.5
b Nov. 16	2.5	.05	225	633	5520	200	109	1320	9720	.9	11	.24	17700	18700	3170	3080	30000	7.1	60	3.7
t Nov. 21	4.6	.11	104	263	2310	82	84	563	4090	.6	1.2	.30	7460	7560	1340	1270	12500	7.1	120	1.8
b Nov. 21	3.4	.10	131	351	3110	122	112	756	5540	.6	6.3	.22	10100	10600	1770	1680	16000	7.0	100	2.4
t Dec. 22	3.4	.12	72	141	1180	46	78	304	2100	.3	1.1	.18	3890	4150	760	696	6700	7.1	100	1.2
1967																				
t May 10	3.6	.05	215	448	3690	143	95	933	6800	.7	5.7	.32	12300	—	2330	2310	20800	6.9	45	4.8

Notes:

t = top sample
b = bottom sample
units in mg/l

Source: Anderson and Goolsby, 1973.

TABLE 5.3-5

Additional Chemical Analyses of the St. Johns River at Jacksonville

DATE	ORGANIC NITROGEN (N) (MG/L)	NITRATE (NO3) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	HARDNESS (CA,MG) (MG/L)	NON-CARBONATE HARDNESS (MG/L)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION
02246500 - 09E ST JOHNS RIVER AT JACKSONVILLE FLA (LAT 30 19 26 LONG 081 39 12)												
DEC., 1967												
06...	--	.7	.57	11000	--	2080	2000	18500	6.9	50	6.8	--
MAY , 1968												
02...	--	.4	--	15300	--	2890	2800	24100	7.2	40	5.8	66
SEP.												
05...	--	.0	--	245	313	85	52	465	6.9	120	--	--
OCT., 1968												
07...	--	--	--	--	--	--	--	1700	--	--	5.6	69
14...	.68	1.6	.29	--	--	--	--	--	--	--	--	--
14...	.83	1.2	.30	6720	--	1320	1260	11700	7.4	130	4.4	54
14...	.73	1.0	.30	--	--	--	--	--	--	--	4.6	--
14...	.68	.8	.24	9280	--	1720	1650	15500	7.4	140	4.4	--
NOV.												
14...	--	--	--	--	--	--	--	--	--	--	--	54
DEC.												
19...	--	--	--	--	--	--	--	9650	--	--	--	--
FEB., 1969												
05...	--	--	--	--	--	--	--	4100	--	--	--	--
MAR., 1969												
28...	--	.1	.03	--	--	--	--	640	--	70	--	--
APR.												
30...	--	.6	--	4670	--	966	899	8400	7.0	70	6.3	74
JUNE												
19...	--	.4	--	3520	--	747	690	6100	7.7	50	--	--
AUG.												
08...	--	.9	--	3380	--	697	641	6100	7.4	50	6.1	80
14...	--	1.3	--	5400	--	995	936	9100	7.7	400	--	--
OCT., 1969												
08...	--	--	--	--	--	--	--	600	--	--	--	--
22...	--	2.2	.44	257	315	101	60	485	6.9	140	--	--
DEC.												
29...	--	2.2	.30	--	--	--	--	550	7.5	--	9.1	86
JAN., 1970												
06...	--	.1	.17	--	--	--	--	5800	--	--	--	--
27...	--	.0	.12	236	294	93	56	455	6.6	120	9.8	91
MAR.												
03...	--	1.6	.37	--	--	--	--	385	--	--	--	--
30...	--	1.3	--	179	278	70	41	350	6.7	100	--	--
MAY												
11...	--	--	--	--	--	--	--	4320	7.6	--	6.9	83
15...	.79	1.1	.41	822	939	212	158	1590	7.7	12	5.8	71
JUNE												
24...	--	1.3	.36	--	--	--	--	10500	--	--	--	--
AUG.												
25...	--	1.4	--	587	618	180	127	1130	7.6	40	6.8	--

Source: Fairchild and Leve, 1973.

TABLE 5.3-5 (cont'd)

DATE	DIS-CHARGE (CFS)	TEMP-ERATURE (DEG C)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)
02246500 - ST JOHNS RIVER AT JACKSONVILLE FLA (LAT 30 19 26 LONG 081 39 12)												
DEC., 1967												
06...	--	17	3.0	.08	161	409	3400	127	103	870	6000	.7
MAY , 1968												
02...	--	22	2.7	.03	240	555	4580	168	114	1160	8500	.9
SEP.												
05...	--	0	3.1	.14	19	9.1	58	2.8	40	30	103	.3
OCT., 1968												
07...	--	27	--	--	--	--	--	--	--	--	485	--
14...	--	--	--	--	--	--	--	--	--	--	--	--
14...	--	27	6.8	290	101	260	2080	79	78	502	3650	.4
14...	--	--	--	--	--	--	--	--	--	--	--	--
14...	--	27	6.4	270	122	344	2820	106	86	690	5150	.6
NOV.												
14...	--	--	--	--	--	--	--	--	--	--	--	--
DEC.												
19...	--	12	--	--	--	--	--	--	--	--	--	--
FEB., 1969												
05...	--	15	--	--	--	--	--	--	--	--	--	--
MAR., 1969												
28...	--	17	2.5	--	--	--	--	--	--	--	156	--
APR.												
30...	--	24	2.3	0	90	180	1440	12	82	388	2520	.5
JUNE												
19...	--	31	2.7	0	75	136	1080	37	70	200	1950	.3
AUG.												
08...	--	30	2.2	40	68	128	996	35	68	220	1800	.3
14...	--	30	1.4	30	92	186	1640	58	72	400	2950	.4
OCT., 1969												
08...	--	26.0	--	--	--	--	--	--	--	--	--	--
22...	--	27.0	4.6	--	25	9.2	53	3.0	49	37	98	.3
DEC.												
29...	--	13.0	6.2	--	--	--	--	--	--	--	113	--
JAN., 1970												
06...	--	13.0	6.4	--	--	--	--	--	--	--	1700	--
27...	--	12.0	5.0	--	23	9.6	51	2.5	46	30	92	.3
MAR.												
03...	--	16.5	3.0	--	--	--	--	--	--	--	71	--
30...	--	20.5	1.3	--	18	6.1	38	2.1	36	25	69	.2
MAY												
11...	--	26.0	--	--	--	--	--	--	--	--	--	--
MAY , 1970												
15...	--	27.5	3.0	250	32	32	227	9.8	66	77	405	.6
JUNE												
24...	--	30.5	2.3	--	--	--	--	--	--	--	3260	--
AUG.												
25...	--	--	2.0	--	34	23	150	5.9	64	66	272	.3

Source: Fairchild and Leve, 1973.

The Ortega River is approximately 30 miles long. It is of concern as it receives runoff from the western portion of the NAS. It is also likely that the river could receive shallow groundwater discharge (i.e., base flow) from the NAS as well. Stream gauge data is collected on the Ortega midway between the headwaters and the mouth of the river. The gauge station is above the influence of tidal action, which extends approximately 10 miles up the river from the confluence with the St. Johns. As reported by Anderson (1972) the drainage area for the Ortega River gauge station is 28 square miles, the average discharge is 42 cfs, with a minimum discharge of 0.20 cfs, and a maximum discharge of 2,950 cfs. Limited water quality data has also been reported for the Ortega River gauge station by Fairchild and Leve (1973). The results indicate that the Ortega River (above the tidal portion) is characterized by low dissolved solids content (70-80 ppm range), low specific conductance (less than 160 micro mhos/cm), and low iron. Below the zone of tidal influence, the Ortega would be expected to respond similarly to the St. Johns River, and exhibit extremely variable dissolved solids content.

The Trout River, located immediately adjacent to the western boundary of the NFD, is approximately 20 miles long. Tidal conditions extend up the river approximately 15 miles. Crest stage data (i.e., maximum flow), is collected on the river just upstream from the tidal boundary. As reported by Anderson (1972), the drainage area above the gauge station is 20 square miles, and the maximum discharge for the 11 year period of record is 1,140 cfs. No water quality data is available on the Trout River.

Drummond Creek is a minor tributary to the St. Johns River, located to the immediate north of the NFD Area. The creek is approximately 3 miles long. The creek is not gauged by the USGS, and therefore flow records are not available. According to available records a water quality monitoring station does not exist on Drummond Creek. The creek is of concern as it passes in close proximity to the NFD, and may therefore receive runoff from the site (or at least tidal backwash from NFD runoff via the St. Johns River). Drummond Creek is also of concern as the Jacksonville Municipal Landfill is located ½ mile north of the creek, and runoff from the landfill area flows directly to the creek. Future investigations regarding the potential for contaminants to enter Drummond Creek from operations at the NFD should therefore be designed to distinguish between the potential Navy contributions and those arising as a result of the Jacksonville Municipal Landfill.

The USGS has performed an initial appraisal of the water quality impacts associated with the Jacksonville Minicipal Landfill (Fairchild and Leve, 1973). Appendix A contains the landfill study information excerpted from the Fairchild and Leve report. The findings of the USGS indicate that solid waste deposited at the landfill is situated on the edge of a large pond hydraulically connected to the regional surficial aquifer. Waste is depositied below the water table and leachate is strongly suspected of entering both the pond and the aquifer. Initial samples showed elevated bacteriological and mineral levels indicating leachate contamination. The landfill had been in operation since 1970, 3 years prior to the USGS investigation and the authors concluded that further long term studies would be necessary to determine the extent and nature of potential problems.

5.3.7 Groundwater Resources

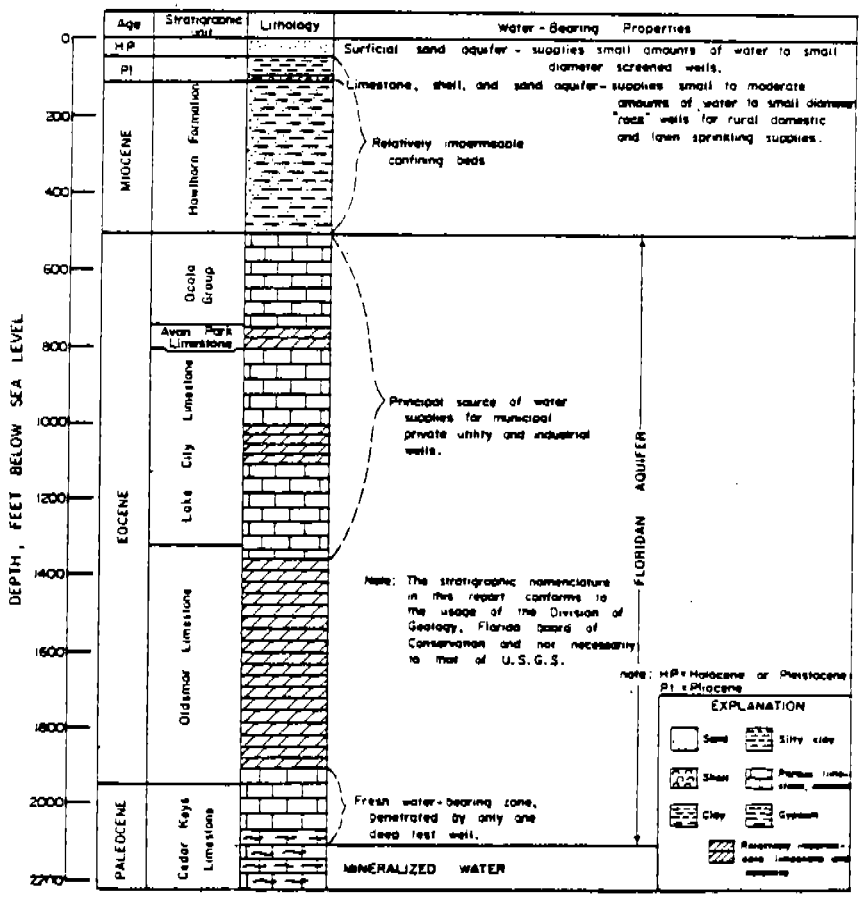
5.3.7.1 Aquifer Description

Two aquifer systems have been defined in the northeast Florida area. In ascending order they are the deep Floridan Aquifer and the shallow aquifer. These aquifers are separated by a complex aquiclude defined by the Hawthorn Formation. (Figure 5.3-14).

The deep Floridan Aquifer is known to produce water under artesian pressure. This aquifer is composed of a thick carbonate sequence with local evaporate from thin, soft, porous limestones and dolomite sequences interbedded with hard indurated limestone and dolomite beds. The water producing zones are thickest in the Ocala Group and thinnest in the deeper limestone. Evaporate mineralization along with hard impermeable dolomite beds in the Avon Park limestone, Lower Lake City limestone, and the Oldsmar limestone yield very little water to wells, and subdivide the aquifer into separate water producing zones under varying artesian pressure (Table 5.3-6). Aquifer tests have shown the coefficient of transmissibility to vary from 50,000 gpd/ft to 1,000,000 gpd/ft and averages 275,000 gpd/ft. The coefficient of storage ranges from 1.6×10^{-2} to 1.5×10^{-4} and averages 9.4×10^{-4} (Leve, 1968). Wells drilled through the entire sequence of the aquifer can expect to produce potable water from a zone 1,000 to 1,800 feet in thickness. Below this zone the water becomes mineralized. The Floridan Aquifer is recharged naturally by direct rainfall along the Ocala uplift where the limestone of the aquifer is exposed at the surface (approximately 30 miles west of the NAS and NFD, Figure 5.3-15). Some recharge also occurrs where sinkholes in this limestone penetrate to the Floridan Aquifer limestones.

The shallow aquifer is composed of surficial sand, silts and clays and a porous, cavernous limestone unit above the Hawthorn Formation. The limestone is the major source of water for shallow wells in the Jacksonville area. Where the limestone is missing, smaller amounts of water are obtained from the less permeable sand, silts, clays and shell beds. Recharge to the shallow aquifer is by direct rainfall. In same areas in the vicinity of Jacksonville this aquifer will produce water under artesian pressure, this is especially true for wells that tap the shallow limestone. It is not uncommon for some wells to stop flowing during dry periods. Figure 5.3-16 depicts the static water level of the shallow aquifer and potentiometric water level of the Floridan Aquifer. Because of overlapping character of the potentiometric surface of the Floridan Aquifer with the shallow aquifer it has been suggested that some recharge to the shallow aquifer may be caused by the upward movement of water from the Floridan Aquifer. It has been estimated by Leve and Goolsby (1969) that approximately 45,000 to 50,000 domestic wells produce 10 to 25 mgd) from this aquifer.

The Hawthorn Formation is a complex aquiclude that acts as a confining bed to the Floridan Aquifer and prevents the downward percolation of water from the shallow aquifer system. A dynamic equilibrium exists within the Hawthorn Formation that further defines this unit as an aquiclude. First it is a complex lithologic formation. Work by Miller, et al (1978) in the Oscala National Forest in Baker and Columbia Counties have helped to elucidate the internal stratigraphy and hydrologic character of the individual lithologic units. Additionally, the artesian character of



Source: Leve and Goolsby, 1969

Figure 5.3-14 GENERALIZED GEOLOGIC SECTION AND THE AQUIFERS IN THE JACKSONVILLE AREA.

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TABLE 5.3-6

Geologic Formations that Comprise the Floridan Aquifer in Northeast Florida and their Water-Bearing Characteristics

Geologic Age		Stratigraphic Unit	Approximate Thickness (feet)		Water-Bearing Characteristics
			Western Part (Alachua, Columbia, Bradford, Union, Baker, western Putnam and western Clay Counties)	Eastern Part (Flagler, St. Johns, Duval, Nassau, eastern Putnam and eastern Clay Counties)	
Miocene		Basal sand and limestone in the Hawthorn Formation	0- 80	0- 10	Sand and limestone beds are locally important sources of water in western part of the area where they are thickest. Yield moderate to large amounts of water under both artesian and nonartesian conditions.
Oligocene		Suwannee Limestone	0- 50	Absent	
Eocene	Jackson	Ocala Group	Undifferentiated 80-320	Crystal River Fm. 0-280 Williston Fm. 0-120 Inglis Fm. 50-120	Utilized as primary source of ground water throughout northeast Florida. Soft, permeable limestones generally yield large amounts of water to wells.
	Claiborne	Avon Park Limestone	60-220	40-260	Soft, permeable limestones locally yield large quantities of water to wells. Hard, impermeable dolomitic limestone and dolomite beds separate permeable water bearing zones and restrict movement of water in the aquifer in northeastern part of area.
		Lake City Limestone		550-650±	Large quantities of water are obtained from wells tapping relatively thin, permeable limestone and porous dolomite. Hard, indurated, zones restrict vertical movement of water within aquifer and divide it into separate water-bearing zones in northeastern part of area. The Oldsmar Limestone is tapped by a few wells in the vicinity of Fernandina and Jacksonville.
	Wilcox	Oldsmar Limestone		692	
Paleocene	Midway	Cedar Keys Formation		410+	Only one well at Jacksonville taps the Cedar Keys Formation.

Source: Leve, 1968.

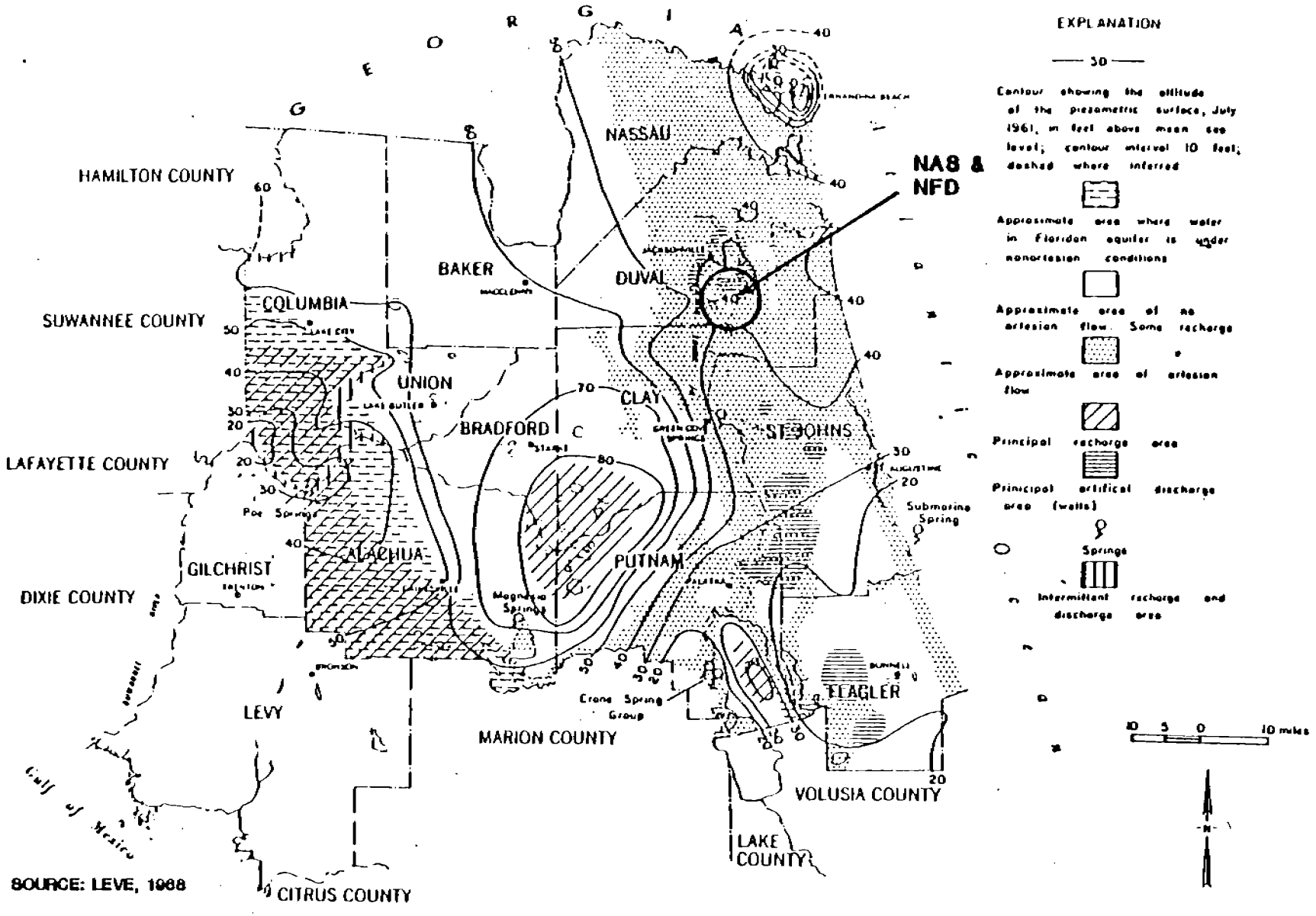

Figure 5.3-15 MAP OF NORTHEAST FLORIDA SHOWING THE OPERATION OF THE FLORIDIAN AQUIFER

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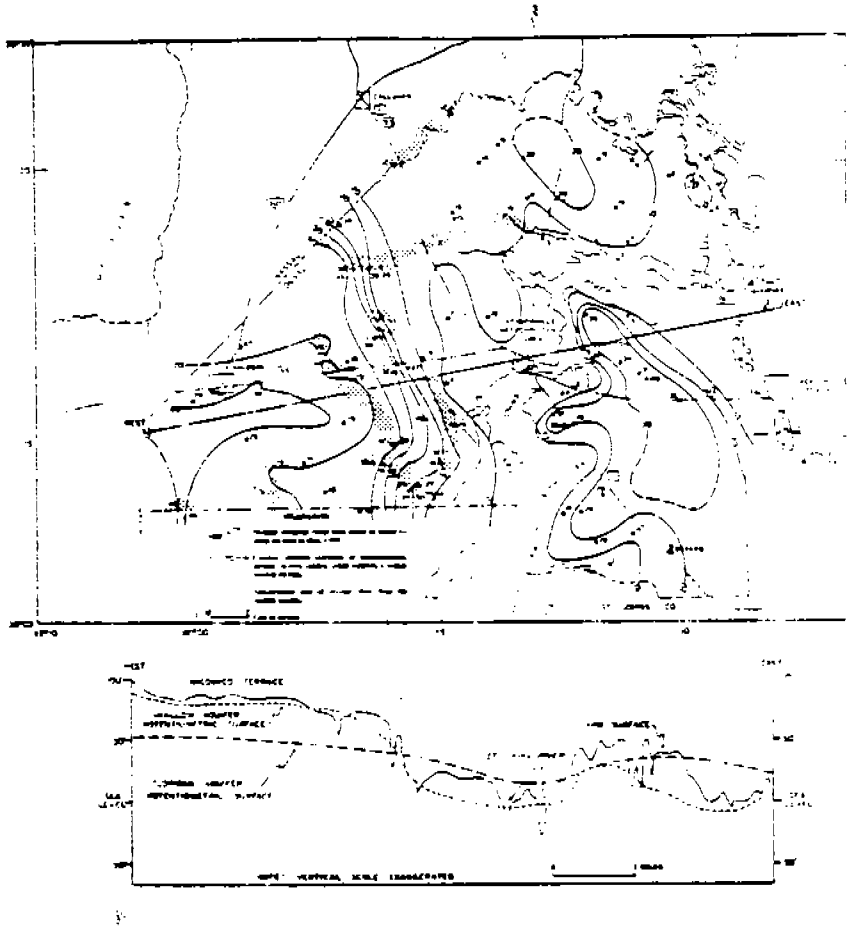

Source: Fairchild, 1972

Figure 5.3-16 MAP OF DUVAL COUNTY SHOWING THE POTENTIOMETRIC SURFACE OF THE SHALLOW AQUIFER SYSTEM AND THE AREA OF FLOW IN MAY 1969.

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the Floridan Aquifer does permits some upward migration of groundwater in the Floridan Aquifer into the lower sections of the Hawthorn Formations and the shallow aquifer.

Miller in his study of the Hawthorn Formation subdivided the Formation into five (5) separate units designated A, B, C, D and E (Table 5.3-7). Unit A is a brown sandy phospatic limestones which grades eastward into a limestone. Unit B is a greenish gray massive clay containing prominant organic material. Unit C is greenish-gray fine to medium sand which contains clay and limestone in the eastern part of the forest. Unit D is defined by an interbedded network of clay, clayey sand and fine grained sandstone. Unit E is a brown calcareous fossiliferous sandstone. During the above referenced study Miller also looked at the hydrologic parameters of each of the five (5) units (Table 5.3-8). The only unit that would conduct significant amounts of water was unit C. Production ratios were in the range of 2 to 3 gpm.

In summary the Hawthorn Formation is composed of five distinct lithologic units. It is reasonable, based on the artesian conditions that exist in the Floridan Aquifer, that some groundwater is able to leak upward into the E, D and C hydrologic units. However the upward movement of the groundwater probably does not penetrate past the clay unit defined by Unit B. In terms of the shallow aquifer, groundwater does migrate into the phosphate limestone but the downward leakage is slowed by the B clay unit. The natural percolation of groundwater into the Hawthorn Formation is presently more than offset by the artesian head in the Floridan Aquifer. If, on the other hand, the potentiometric potential of the Floridan Aquifer continues to decline then the overall potential for groundwater in the shallow aquifer to migrate through the clay and into the Floridan Aquifer will increase.

Thus, it is unlikely that in the near future contaminated groundwater in the shallow aquifer could affect the deeper Floridan Aquifer. The primary aquifer of concern is the shallow aquifer. The NAS, however obtains its water from the Floridan Aquifer. Since the majority of the local domestic supplies (off-base) tap the shallow limestone every effort should be made to keep the Aquifer clean.

5.3.7.2 Water Quality

The background water quality of the aquifers in the Jacksonville area has been studied by the USGS. Table 5.3-9 portrays chemical analysis data assembled by Leve and Goolsby (1969) in a study of groundwater supplies in the metropolitan area of Jacksonville. Shown on this table are water quality results for two wells completed in the surficial sand portion of the shallow aquifer, four wells in the limestone, shell and sand portion of the shallow aquifer, and five wells in the Floridan Aquifer. These results show that the surficial sand portion of the shallow aquifer is characterized by a low dissolved solids content and low hardness (less than 60 ppm). In some areas, water from the surficial sand portion of the shallow aquifer contains water with more than 1.5 ppm iron, exceeding drinking water standards (Leve and Goolsby, 1969). The surficial sand portion of the shallow aquifer is also subject to contamination from septic tanks, polluted surface drainage and potential surface contamination at the NAS. Except for iron, water from unpolluted wells in this aquifer is potable (Leve and Goolsby, 1969).

TABLE 5.3-7

Generalized Description of Hydrogeologic Units of the Hawthorn Formation in tho Osceola National Forest

Hydrogeologic Unit	Water Bearing Properties	Geologic Unit		Age	Thickness (feet)	Lithology
Surficial aquifer	Water unconfined. Readily absorbs and stores precipitation until water table rises to land surface. Principal source of baseflow to streams draining forest. Uppermost member of Hawthorn Formation is hydraulically continuous with surficial deposits and forms lower part of surficial aquifer.	Unnamed		Post-Miocene	6-54	Medium-grained sand and blue-gray sandy clay. Local peat layers.
		A	Hawthorn Formation	Miocene	15-102	Brown phosphatic sand, yellow-brown to blue-gray clay, gray phosphatic shell limestone. Limestone more prominent in western part of forest.
Hawthorn confining unit	Because of comparatively low permeability, most of unit acts to retard the downward movement of water from the surficial aquifer to the Floridan aquifer. Member C yields small quantities of water under confined conditions. Basal limestone beds are not considered part of the Floridan aquifer in the Forest.	B			13-70	Green to greenish-gray massive clay. Often fractured. Black clay prominent.
		C			13-58	Green to greenish-gray fine- to medium grained sand. Contains clay and limestone to east of forest.
		D			5-43	Complexly interbedded shell limestone, clay, clayey sand, and fine-grained sandstone.
		E			14-73	Brown sandstone, tan to dark-brown limestone, dolomite, and argillaceous limestone. Fossiliferous, well indurated.
Floridan aquifer	Yields large quantities of water under confined conditions everywhere under Osceola National Forest.	Ocala Limestone*		Eocene	102+	White calcarenite at top, containing some green clay. Gray hard fractured limestone below. Penetrated 102 feet.

*The Suwannee Limestone of Oligocene age, which is part of the Floridan aquifer in places, was not found in the Osceola National Forest.

TABLE 5.3-8

Results of Laboratory Tests of the Hawthorn Formation, West of Jacksonville

Hydrogeologic Unit	Geologic Unit			Laboratory				Extensometer		
				Depth To Core Sample (feet)	Vertical Hydraulic Conductivity (feet/d)	Horizontal Hydraulic Conductivity (feet/d)	Specific Storage ($feet^{-1}$)	Storage Coefficient	Vertical Hydraulic Conductivity (feet/d)	Leakance (day^{-1})
Surficial aquifer	Unnamed post-Miocene deposits									
Hawthorn confining unit	Hawthorn Formation	A		55	5.6×10^{-3}			7.9×10^{-4}		
		B	Upper	77	1/16	5.5×10^{-2}				
			?	?	?	?	?	?	?	?
			Lower	95	1.3×10^{-3}		1.8×10^{-5}	2×10^{-4}	2/ 2×10^{-4}	1.4×10^{-3}
		C		110		3.3×10^{-2}				
		D		127 135 3/136 137	1.9×10^{-2} 7.8×10^{-7} 4.9×10^{-6}	3.2×10^{-2} 1.2×10^{-1}	2.2×10^{-6}	1.6×10^{-5}		
		E	Upper	149		4.9×10^{-2}				
			?	3/150 ?	1.5×10^{-2} ?	?	?	?	?	?
			Lower							
Floridan aquifer	Ocala Limestone									

1/ High value apparently due to vertical fractures in sample.
2/ Based on an assumed thickness of 14 feet for the lower part of B member.
3/ Dense limestone.

Source: Miller, et al, 1978

TABLE 5.3-9

Chemical Analyses of Groundwater in the Jacksonville Area

USGS Well or Station Number	Owner or Location	Date Sampled	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Hardness as $CaCO_3$	Noncarbonate Hardness as $CaCO_3$	Specific Conductance (Micromhos at 25°)	pH	Color	Free Carbon Dioxide (CO_2)	Temperature (°F)	Well Depth (Ft.)
Surficial Sand Aquifer																								
301922N0812634.1	Private	09-21-66	2.3	1.6	1.9	2.0	.16	12	.3	8	0	.0	25	.1	.1	48	12	6	105	5.2	5	80	73	40
303535N0820034.1	Private	06-07-66	4.9	.24	7.6	3.6	.20	6.1	3.6	12	0	.0	12	.2	33	71	34	24	118	5.8	5	31	73	15
Limestone Sand and Shell Aquifer																								
300857N0813444.2	Private	05-20-65	29	2.0	83	15	–	14	1.3	328	0	.0	21	.2	.0	326	268	0	533	7.3	0	26	74	92
302136N0814255.2	Private	05-27-65	18	2.8	73	12	–	13	1.1	236	0	38	18	.3	0.0	289	232	38	472	7.9	10	5	72	80
301340N0814754.1	Private	11-03-66	19	–	43	16	.19	6.6	1.2	213	0	.8	12	.5	.1	205	174	0	349	7.8	0	5	71	60
301817N0813749.2	Private	03-19-65	43	.31	39	16	–	15	6.1	204	0	4.0	18	1.4	.0	243	162	0	353	7.8	0	5	73	–
Floridan Aquifer																								
302033N0813945.1	City of Jacksonville C-10	08-05-65	21	.17	76	29	3.6	11	2.1	164	0	176	15	.8	.0	416	313	178	642	7.9	10	3	80	1270
301838N0813935.1	City of Jacksonville C-35	08-06-65	22	.09	65	27	3.6	11	2.0	166	–	137	15	.6	.0	362	273	137	566	8.0	5	3	85	1280
301335N0813526.1	Private	09-26-66	20	.19	65	33	4.2	12	2.7	152	0	180	13	.9	.0	402	302	178	642	7.6	10	6	77	625
301617N0814217.1	City of Jacksonville	09-27-66	19	.19	41	22	2.7	11	2.4	148	0	81	12	.9	.1	262	196	74	440	7.7	10	5	78	729
301529N0813803.1	Lake Wood Utilities	09-27-66	21	.07	70	31	4.5	12	2.5	156	0	176	16	.8	.1	406	307	179	675	7.5	5	8	85	1187

(Results in parts per million except for color, pH and specific conductance)

Source: Leve and Goolsby, 1969.

Water from the limestone, shell and sand portion of the shallow aquifer is classified as hard to very hard (values above 150 ppm) and contains moderate dissolved solids levels (150-400ppm). The iron content is also variable and in some areas the aquifer contains hydrogen sulfide. Except for the high iron and hydrogen sulfide content occurring in localized areas water from this aquifer is considered potable (Leve and Goolsby, 1969).

Water quality in the Floridan Aquifer is variable with wells west of the St. Johns River and south of the Ortega River yielding the highest quality (Leve and Goolsby, 1969). Hardness levels range from 200 to 400 ppm over most of the area and dissolved solids are generally 500 ppm or less. Hydrogen sulfide is found in most all wells in the area and treatment is generally necessary. Although the water is generally considered potable, treatment is usually necessary for many industrial uses including boiler feed water (Leve and Goolsby, 1969).

The Floridan Aquifer is also subject to salt-water intrusion in several counties southeast of the Jacksonville area. In the Jacksonville area chloride content (used as an index of seawater contamination) is less than 50 ppm. However, in central St. Johns and Putnam Counties the chloride content of the aquifer is in the 50 to 250 ppm range. In southern St. Johns County and the majority of Flagler County chloride levels are in the 250 to 1,000 ppm range.

Along the Atlantic coast of St. Johns and Flagler counties chloride levels exceed 1,000 ppm. The increase in sea.water contamination of the aquifer in the coastal areas is generally the result of lowered artesian pressures in the aquifer. These lowered artesian pressures stem from an increased rate of water withdrawal from the aquifer, particularly in the Jacksonville and Fernandina Beach areas of Florida (Leve, 1968). Typically, salt water underlies the fresh water in the Floridan Aquifer in the discharge areas of northeastern Florida. As the artesian pressures in the fresh water zones of the Floridan Aquifer are reduced by dishcarge or water withdrawal salt water from the lower part of the aquifer tends to move into the zones of reduced pressure and mix with the fresh water. Leve (1968) concluded that salt water contamination will continue to increase as more water is withdrawn from the Floridan Aquifer in northwestern Florida. Careful planning is necessary in the future to ensure that wells are properly spaced in the area and that water wells in the farming areas of northeastern Florida selectively utilize water from the upper part of the aquifer without disturbing the deeper saline water.

5.3.7.3 Naval Air Station Wells

The water supply system at the NAS Jacksonville utilizes groundwater as the source of supply. Currently, the water supply distribution network is fed from 5 deep wells, which are completed in the Floridan Aquifer beneath the site. Many more wells, however, have been drilled at the NAS over the stations' history and NAS personnel are in the process of locating and inventorying all wells located on base. To date 27 wells have been identified by NAS personnel, inclusive of the 5 major water supply wells that furnish water to the distribution network (Figure 5.3-17).

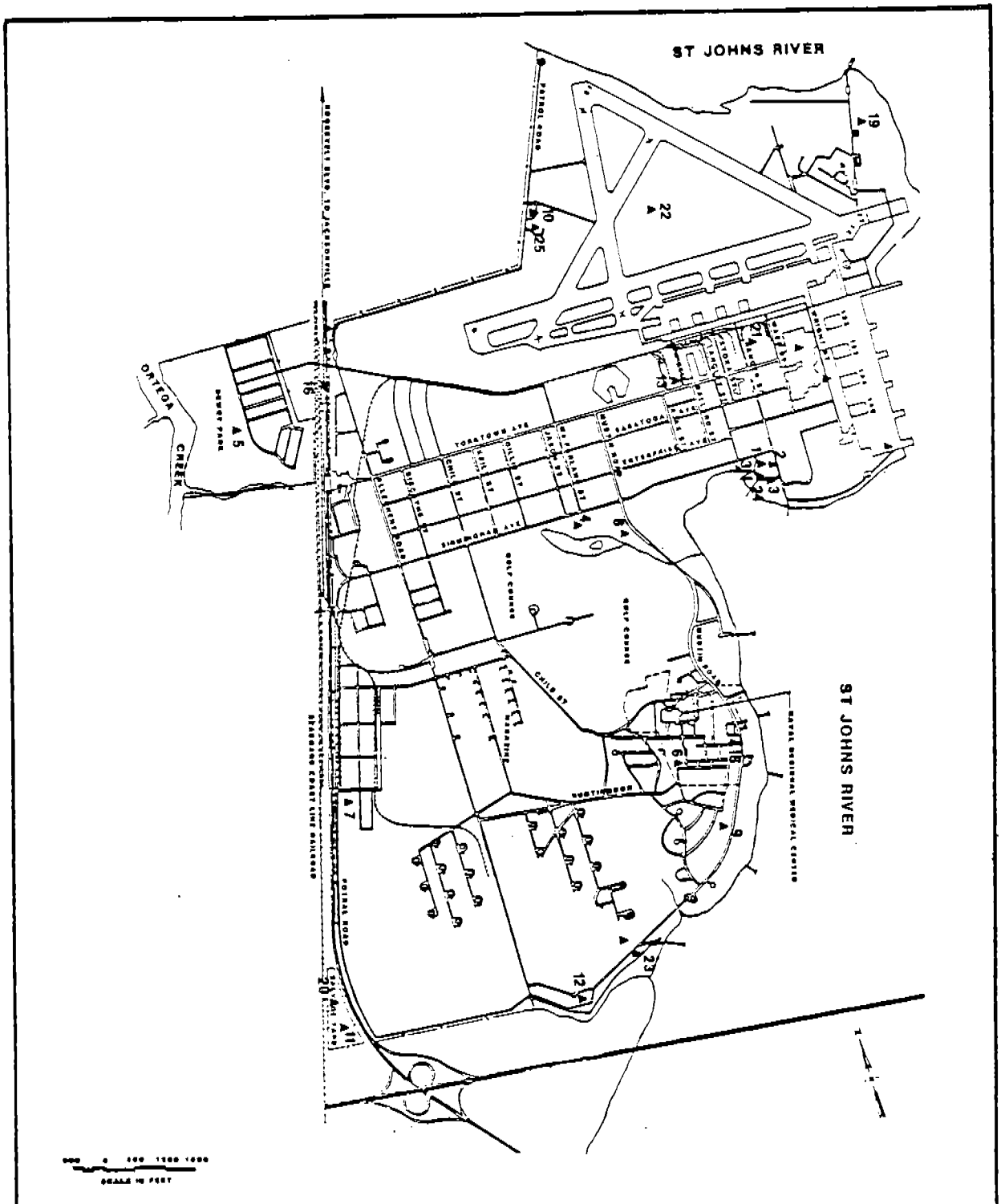

Figure 5.3-17 WELL LOCATIONS NAS JACKSONVILLE

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Table 5.3-10 summarizes the available information that could be obtained on the 27 wells. It can be seen from this table that many of the wells are used for non-potable purposes, such as irrigation, fire protection, or cooling water. A number of the wells are no longer utilized where this has been demonstrated, it is indicated on Table 5.3-10.

There has also been some confusion regarding the numbering system used over the years to identify the wells. Consequently a number of the wells bear the same number, depending on which system is utilized. In Table 5.3-10 two numbering systems are shown. The well number shown first in Table 5.3-10 is derived from the numbering system shown on NAS Public Works Drawing Number 1-25-99, entitled, Wells-Location and Information. The alternate well numbers shown parenthetically in Table 5.3-10 are derived from the numbers utilized in various engineering reports and water supply file information, such as: Smith and Gillespie (1970); SOUTHDIV (1974); Chas. T. Main, Inc. (November, 1954); and NAS Public Works water quality file data (Appendix A).

It can be seen from Table 5.3-10 that the majority of the NAS wells are deep wells, most likely completed in the Floridan Aquifer. Typically, the wells are cased from the land surface to the point where the Floridan Aquifer Zone is encountered. Below that depth, the wells are completed as open boreholes to the total depth of the well. In Table 5.3-10, the cased interval and the total depth of the wells are identified where this information is available.

. Four of the wells (10(9), 13(12), 19 and 21) may be completed in the limestone, shell and sand portion of the shallow aquifer which is situated several hundred feet above the Floridan Aquifer. Typically, the limestone, shell and sand portion of the shallow aquifer is found at depths between 50 and 100 feet below the land surface in the Jacksonville area (Leve and Goolsby, 1969). Judging by the depths of these four wells (160 feet or less) it appears likely that they are completed in the limestone, shell and sand portion of the shallow aquifer.

None of the NAS wells identified by base personnel are completed in the surficial sand portion of the shallow aquifer. However, the depths of wells 20, 22, and 26 were not available from base personnel and therefore it cannot be concluded if all the wells on the base are completed in the shallow water-bearing zones found in the surficial sand deposits at the site.

Generally, the data base on the existing wells present at the site is extremely limited, with the exception of the five main water supply wells. For those wells at the site that are not currently in use, it is unknown if they have been sealed or otherwise properly abandoned. It is also unknown if any of these wells can or will be brought back into service in the future. Improperly sealed or open wells or bore holes are a common conduit to groundwater contamination, as potential contaminants have a direct and easy access to deeper waterbearing zones. This condition is not a current problem for the wells at the NAS, which tap the Floridan Aquifer. However, increased water usage and trends toward drawing down water levels may cause problems in the future (5 to 10 years).

TABLE 5.3-10

Inventory of Wells at the Jacksonville NAS

Well No. (Alt Nos)	Location	Map Grid	Diameter	Depth	Ft. of Casing	Status (current)	Free Flow (GPM) in 1971	Piezometric elv. (msl)	Well logs avail.?	H_2O quality?	Notes
1(01)	Water Plant #1	12J	8"	708	463	NIU	150-613	40' Nov 1969		limited	
2(1)	Water Plant #1	12J	12"	1005	380	In use	600-3500	40' Nov 1969		Yes	Main water supply well
3(2)	Water Plant #1	12J	12"	998	464	NIU	3300	39' Nov 1969		Yes	Main water supply well
3(2) new	Water Plant #1	12J	12"/18"/ 26"	1210	410	In use	-	-		Yes	Replaces well 3(2)
4(3)	Water Plant #2	9J	10"	1015	312	In use	400-3800	41' Nov 1969		Yes	Main water supply well
5(4)	Water Plant #3	3G	12"	988	400	In use	1250	43' Nov 1969		Yes	Main water supply well
6(5)	Hospital Water Plant	9D	12"	646	271	In use	1200	37' Nov 1969		Yes	Main water supply well
7(6)	S. of Bldg. #164	3N	10"	1096	316	In use	1700				Fire Protection only
8(7)	S. end of Casa Linda Lake	9K	6"	500	?	In use	500				Golf course irrigation

TABLE 5.3-10 (continued)

Inventory of Wells at the Jacksonville NAS

Well No. (All Nos)	Location	Map Grid	Diameter	Depth	Ft. of Casing	Status (current)	Free flow (GPM) in 1971	Piezometric elv. (msl)	Well logs avail.?	H_2O quality?	Notes
9(8)	NW of GG Qtrs.	10P	6"	498	?	In use	1000				Supply Hospital sprinklers
10(9)	West Side Sewage Plant	9D	6"	120	120	In use	50				Supplies wastewater treatment plant
11(10)	Salvage Yd.	2R	8"	400	288	In use	800				Supplies salvage yard
12(11)	Radio Tower Area	6S	4"	407	251	In use	300			limited USGS data	Used in Radio Tower Area
13(12)	Bldg.#135	11H	6"	144	95	In use	45				Cooling water
14(13)	S. Boundary	Not Located	6"	400	?	NIU	300				Capped
15(14)	CPO Club	Not Located	4"	400	?	NIU	300				Capped
16(15)	YOKON	4F	4"	400	?	NIU	300				Capped
17(16)	Highway	Not Located	3"	400	?	NIU	300				Capped
18(17)	Hospital	10D	6"	400	?	NIU	300				Capped
19	Bldg#201	16D	2"	101	?	?	515-600				
20	Salvage Yd	1R	3"	?	?	?					
21	Bldg#104	13G	?	160	115	?					
22	CRASH SIA	12E	?	?	?	?					

TABLE 5.3-10 (continued)

Inventory of Wells at the Jacksonville NAS

Well No. (Alt Nos)	Location	Map Grid	Diameter	Depth	Ft. of Casing	Status (current)	Free flow (GPM) in 1971	Piezometric elv. (msl)	Well Logs avail.?	H_2o quality?	Notes
23	Inductance Pier	8R	8"	522	297	Avail. for Use					
24	Water Plant #1	12J	18"	1200	350	?					
25	Sewage Plant	9D	4"	650	120	?					
26	Black Point Test cell	?	12"	?	?	?					

Notes:
NIU = Not in use

Well numbering system according to Public Works Drawing #1-25-99 entitled, Wells-Location and Information. Alternate numbers shown in parenthesies and appear in reports as Smith and Gillespie (1970) and SOUTHDIV (1974).

Map grid according to Public Works Drawing #1-25-99 Wells - location and information.

During the site visit at the NAS facility, base personnel described a problem that had developed with well 3(2) at Water Plant No. 1. A large quantity (several truckloads) of fine to medium grained sand had been pumped from this well in the recent past. Subsequent surface erosion and slumping of the pumphouse foundation occurred, indicating that the integrity of the well bore was suspect. The well was inspected by NAS contractors in March of 1979 using downhole TV equipment and recommendations were made to drill a new well or line the existing 12-inch casing with a deeper 8-inch casing string. In the summer of 1979 a new well was drilled at the No. 1 Water Plant to replace the damaged well. This well is identified in Table 5.3-10 as well 3(2) New and the well permit for this well is included in Appendix A. Interviews revealed that the old well has not been plugged and abandoned to date. The damage to the well bore of the old well indicates that this well could serve as a conduit for potential vertical migration of contaminants since the well casing is no longer functional. The old well is close to 1,000 feet in depth and contaminants would have access to the deep zones of the Floridan Aquifer. As with the other non-useable wells at the NAS, it is recommended that the old well 3(2) at Water Plant No. 1 be plugged and properly abandoned as quickly as possible.

The NAS is in the process of completing the identification and inventory of all existing wells on the Naval property. It is therefore possible that more than the 27 wells listed in Table 5.3-10 will be identified. As an understanding of well location, status, depth, and aquifer zone(s) utilized, the elements of well construction or abandonment are crucial to the assessment of any potential risk of contamination to groundwater supply.

5.3.7.4 Groundwater Quality at the Naval Air Station

Water quality information is available for the 5 principal water supply wells that serve the NAS water supply network. The system consists of four main treatment plants connected to a central distribution network. Table 5.3-11 shows the results of water quality analyses conducted at the four water supply plants in August of 1981. Wells 1(01) through 3(2) supply Water Plant No.1, well 4(3) supplies Water Plant No. 2, well 5(4) supplies Water Plant No.3, and well 6(5) supplies the Hospital Water Plant. Generally, the quality of the NAS water supply is good, meeting applicable drinking water standards. The base water system is tested every three years, with the next sampling due in September 1984.

5.3.7.5 Naval Fuel Depot Wells

Three wells are located at the NFD area, although only one well is utilized. Minimal information on the wells was obtained through interviews with NFD area personnel. The information that was obtained is summarized below.

Well 1, located at Building 19, is not being used at present and is capped off (see Figure 5.3-18). This well is artesian. The well was used in the past for potable water supply. Depth of the well and other completion characteristics are unknown.

TABLE 5.3-11
August 1981 Water Quality Data for the Four Water Supply Plants at the NAS[1]

Parameter	Water Plant 1	Water Plant 2	Water Plant 3	Hospital Water Plant
Arsenic	ND	ND	0.009	0.008
Barium	ND	ND	ND	ND
Cadmium	ND	ND	ND	ND
Chromium	ND	ND	ND	ND
Lead	0.037	ND	ND	ND
Mercury	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Nitrate	0.020	0.010	0.021	0.010
Fluoride	0.58	0.58	0.45	0.50
Turbidity (NTU)	0.33	2.4	0.88	1.20
Lindane	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND
2,4-D	ND	ND	ND	ND
2,4,5-TP	ND	ND	ND	ND
Endrin	ND	ND	ND	ND
Chloride	13.8	13.8	10.6	12.9
Color	1	0.5	0.5	0.5
Copper	ND	0.14	0.004	0.020
Foaming Agents	0.001	0.004	0.003	ND
Iron	ND	0.46	ND	0.19
Manganese	ND	ND	ND	ND
Odor	ND	Slight	Slight	ND
pH	7.29	7.25	7.50	7.59
Sulfate	95	61	68.6	68.9
TDS	354	243	246	249
Zinc	0.036	0.015	0.16	0.59
H_2S	ND	ND	ND	ND
Total Hardness	278	216	190	209
Total Alkalinity	105	105	108	108
Non-Carbonate Hardness	173	111	82	101
Bicarbonate	105	105	108	108
Calcium	61.8	51.5	43.8	47.5
Magnesium	29.9	21.2	19.4	21.9
CO_2	14	14	10	10
Carbonate	ND	ND	ND	ND
Sodium	9.3	8.7	8.0	8.7
Stability Index	7.99	8.17	8.04	7.89
Saturation Index	-0.35	-0.46	-0.27	-0.15

Notes: 1. Values are reported in mg/liter.
ND = Not detected

Source: August 1981 Water Quality Analyses performed by Technical Services, Inc. of Jacksonville, FL for NAS-Public Works.

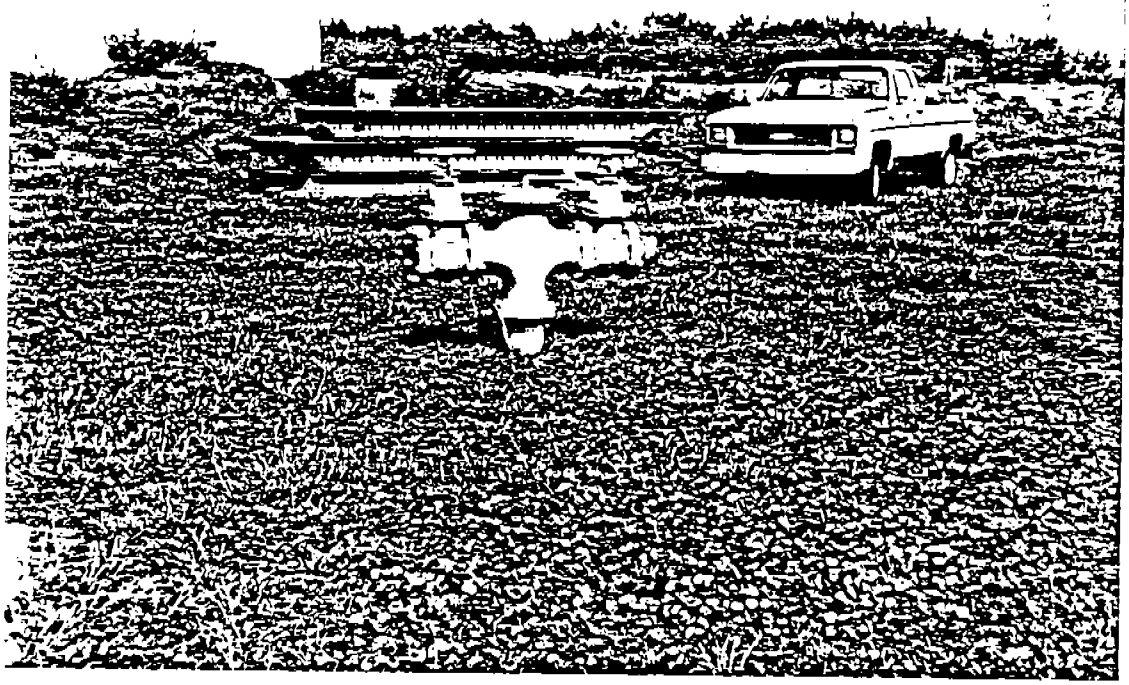

Figure 5.3-18 WELL 1 AT BUILDING 19, NFD JACKSONVILLE

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JACKSONVILLE, FLORIDA

Well 2 is located south of Building 18. This well has been sheared off below the land surface, permanently capped (cap has been welded to the casing) and buried. The well is 150 feet deep.

Well 3, located at Building 51 (see Figure 5.3-19), is currently used for potable water supply purposes. The well is 1,015 feet deep, and is cased to 150 feet with well casing. Below 150 feet, the well is completed as an 8-inch open borehole. The well is artesian and yields 1,000 gpm. The locations of the three wells at the NFD are shown on Figure 5.3-20.

5.3.7.6 Off-Site Wells

All potable water supplies in the Jacksonville metropolitan area and the eastern part of Duval County are obtained from wells (Appendix A). Jacksonville is reportedly the largest city in the Nation obtaining its public supply from flowing wells (McGuiness, 1963). These groundwater supplies are obtained from two types of aquifers in the area: surficial sand beds, hydraulically connected with relatively thin limestone, shell and sand beds between 50 and 100 feet below the surface, which comprise the shallow aquifer (surficial aquifer); and the thick limestone and dolomite beds below 300 to 600 feet in depth, which comprise the Floridan Aquifer (Leve and Goolsby, 1969). While the Floridan Aquifer is the principal source of potable water supplies in the area, the surficial sand beds and the thin limestone, shell and sand beds are commonly utilized for private domestic supplies, some air conditioning, and for lawn sprinkling. The limestone, shell, and sand aquifer is hydraulically connected to the upper surficial sand aquifer, and is recharged locally by the upper aquifer. Generally, wells located in the surficial sand aquifer are used for watering purposes, while those in the limestone, shell, and sand aquifer are used for domestic supply, watering, and for some industrial purposes such as cooling condensers and for boiler make-up water (Leve and Goolsby, 1969).

At least 50,000 homes in the Jacksonville area obtain all of their water from privately owned wells, while an additional 5,000 to 10,000 homes which are serviced by municipal utilities also have wells to supplement the utility supplies (Leve and Goolsby, 1969). Therefore, it is obvious that groundwater is an important resource in the Jacksonville area.

The Jacksonville Department of Health, Welfare, Bio-Environmental Services (DHWBES) was contacted during this study in an effort to identify groundwater users in the immediate vicinity of the NAS. Twenty private wells were identified by the DHWBES immediately adjacent to the NAS boundary. These wells are shown on Figure 5.3-21. Well permits for three off-site wells and a drinking water analysis for the Ortega Hills housing development water supply were also provided by the DHWBES. These documents are included in Appendix A.

Although the information base on the wells in the immediate off site area is extremely limited, the three DHWBES well permits indicate that at least three of the wells in the area are deep wells completed in the Floridan Aquifer. The completion and construction information on the remaining wells, however, is unknown at this time and it must be conservatively concluded that a significant number of the wells are completed in the upper aquifers present in the area. Off-site use of groundwater (both shallow and deep) occurs at distances less than 3,000 feet from the NAS.

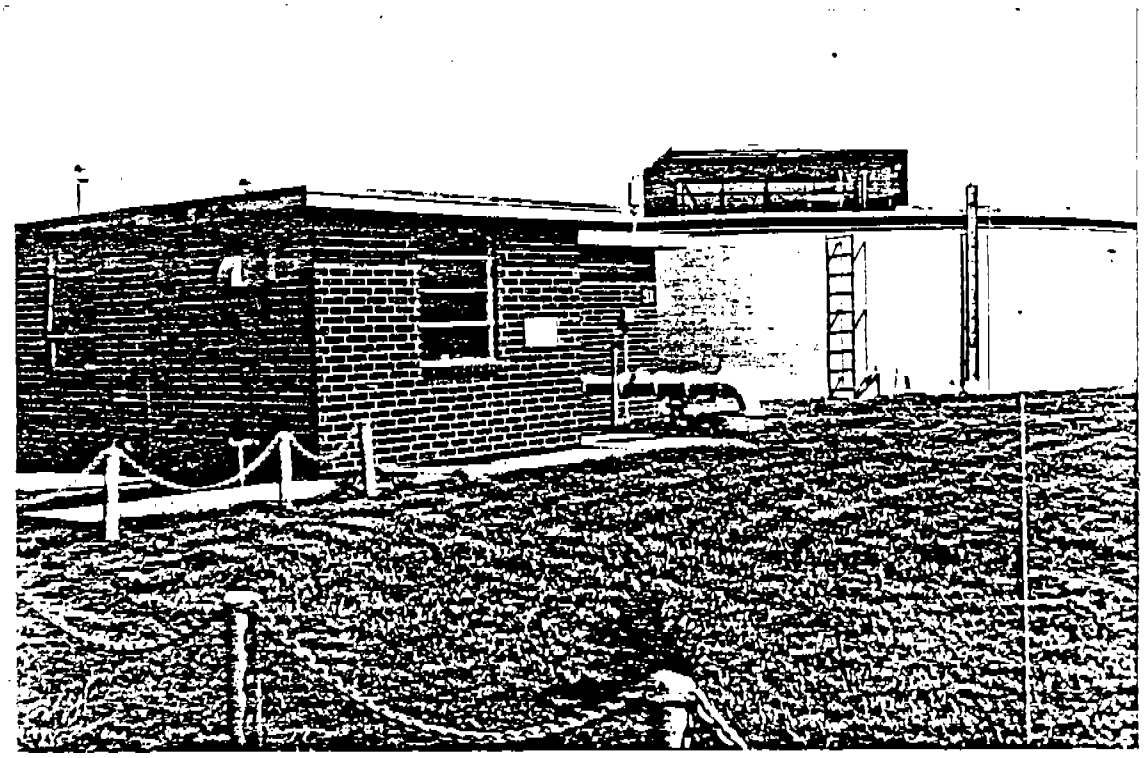

Figure 5.3-19 WELL 3 AT BUILDING 51
NFD JACKSONVILLE

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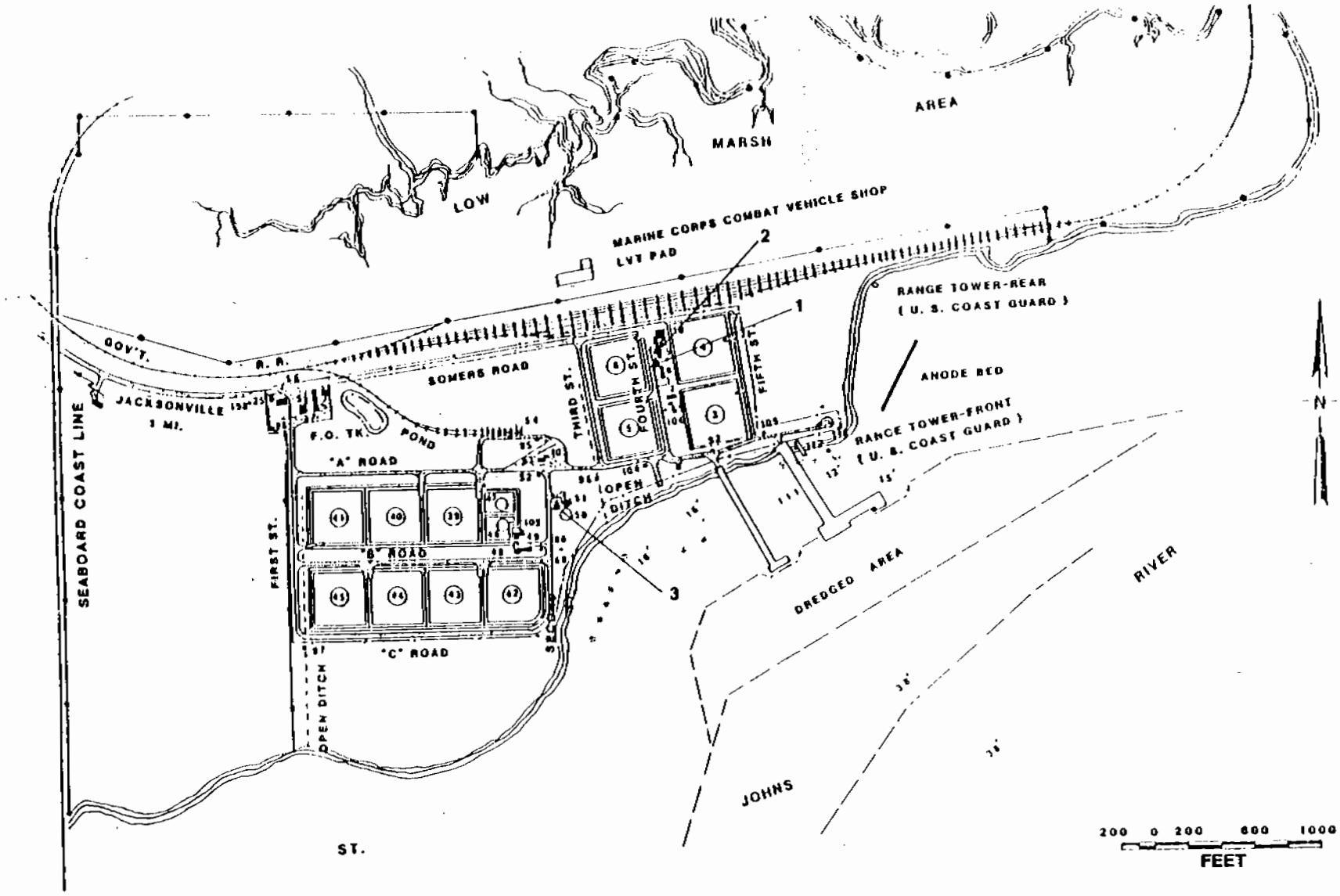

Figure 5.3-20 WELL LOCATIONS NFD JACKSONVILLE

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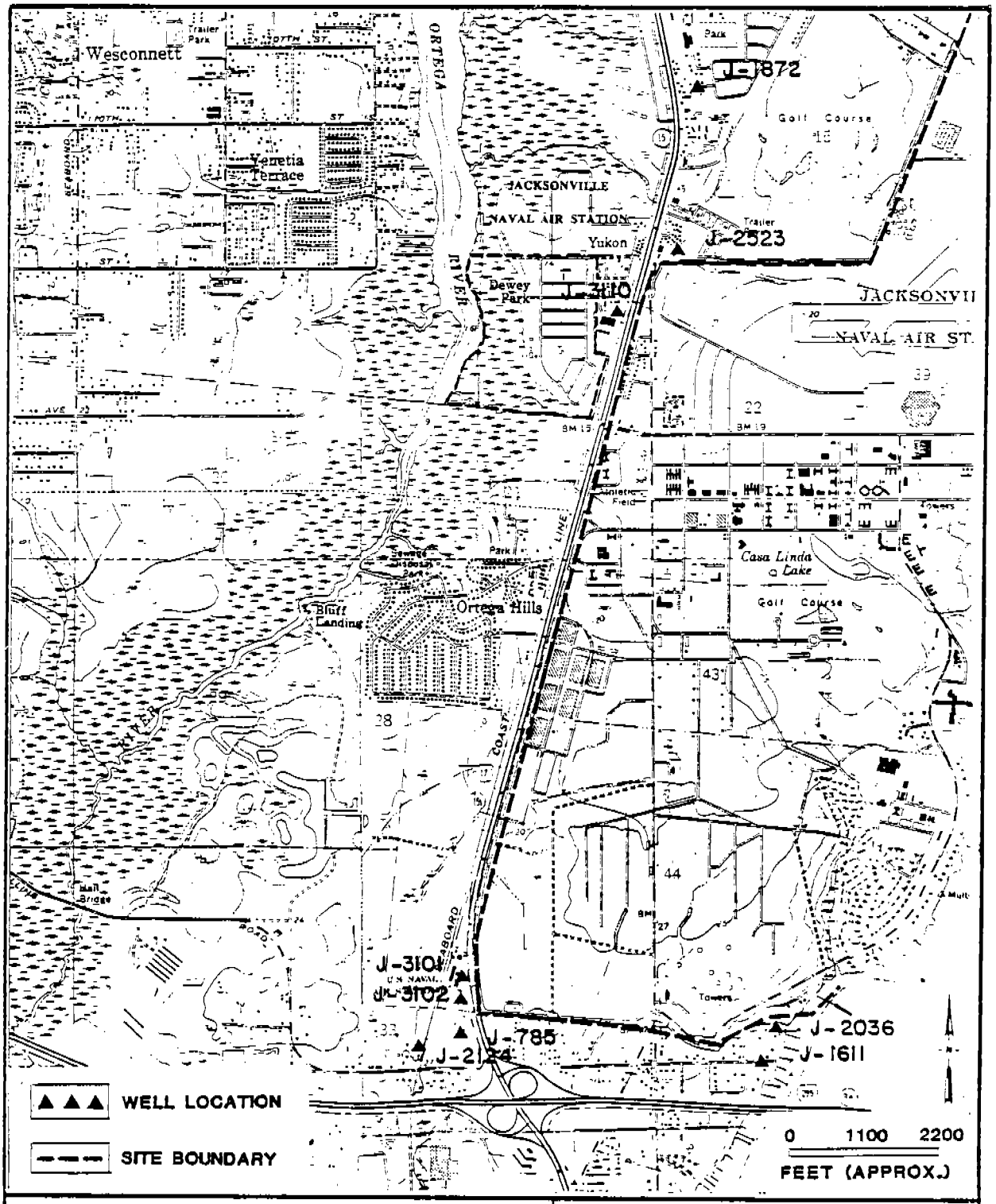

Figure 5.3-21 LOCATION OF WATER SUPPLY WELLS IDENTIFIED BY THE STATE DHWBES IN THE IMMEDIATE VICINITY OF THE NAS SITE BOUNDARY.

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JACKSONVILLE, FLORIDA

5.3.8 Migration Potential

5.3.8.1 Surface Water

In general, the relatively light infiltration capacity of the sandy soils along with the relatively flat topography, that exists over most of the NAS, tend to reduce the amounts and rates of direct surface water runoff. This reduced amount and rate of surface runoff would likewise mean a decreased potential for pollution migration via natural surface water drainage systems.

In contrast, at the NARF and other more developed areas of the facility, the amounts and rates of direct surface water runoff are controlled and augmented by the storm drain system that collects water from impermeable surfaces and transports it nearly directly to the receiving body of water. Pollutants on these impermeable surfaces (e.g., runways, aprons, roads, parking areas and storage areas) would be more readily moved to the adjoining rivers and streams as shown on the Topography and Drainage Map (Figure 5.3-4). Most of the drainage for the eastern half of the NAS, including the NARF, discharges directly into the St. Johns River. Drainage for the western half of the NAS is to the Ortega River via three unnamed streams that are culverted beneath U.S. Route 17. The southern most stream, on the west side, passes through an off-base housing development known as Ortega Hills. The other two streams, on the west side, pass through undeveloped land including forest and wetland areas prior to discharging into the Ortega River. An unnamed stream drains the southern end of the facility, and passes through a small off-base housing area (just north of I-295) before entering the St. Johns River.

The potential for pollutant migration at the NFD, via direct surface water runoff, is not considered to be appreciable for the following reasons:

- Much of the surface runoff is contained within the fuel tank containment dikes and is released under a controlled discharge.
- Relatively little direct surface runoff is generated due to the infiltration capacity of the sandy soils, flat topography and small watershed area.

There is a limited potential for off-base sources of pollutants to migrate on-base or at least to collect along the shore line and impact tidal flats and wetland areas. The following are offered as examples of possible off-base sources:

- Past incidences of oil spills originating from the Eastport area, that were initially attributed to NFD operations.
- Possible implications and or impacts due to contaminants migrating from the old city dump, near Turner Pond, entering Drummond Creek, and possibly flowing

upstream in the St. Johns River (during flood tide) to the NFB.

5.3.8.2 Groundwater

Due to the sandy surface soils at the NAS, much of the 53 inches of average annual precipitation that falls on the surface infiltrates into the ground to recharge the shallow (water table) aquifer. Likewise pollutants spilled or disposed of at or near the surface can readily percolate downward to the water table and then migrate laterally under the prevailing groundwater flow rate and direction.

An actual case of shallow aquifer contamination, the Old Main Disposal Area at the NAS (Site No. 26) is described in the Geraghty & Miller, Inc. report to the Navy (Southern Division, Naval Facilities Engineering Command) dated May 27, 1980. To the extent that some of the information in this report may be useful in assessing the potential for pollution migration at other areas of the NAS, several of the key findings are listed here:

- The disposal area, which is presently covered and no longer used, was receiving a variety of liquid and solid waste residues (including waste oil and solvents) for a period of several decades.

- A water table high occurs near the center of the disposal area and groundwater within the shallow aquifer moves radially away at rates varying up to 0.4 feet per day (146 feet per year).

- Two distinct oil plumes estimated to contain about 70,000 to 125,000 gallons of oil were identified in the northeast portion of the disposal area and adjacent area. The oil in this plume is moving toward the deep ditch at a rate of about 0.01 to 0.03 feet per day.

- Groundwater contaminated with volatile organic compounds has moved 2,000 to 3,000 feet from the southwest position of the disposal area into the restricted area (magazine area) and will eventually discharge into the St. Johns River.

- The disappearance of volatile organics from water in the deep ditch as it flows to the St. Johns River (based on a one-time sampling) is attributed to several factors including evaporation, biodegradation, dilution, adsorption by organic matter, and absorption by plants.

- If heavy metals are seeping from the groundwater and into the deep ditch, as the data seems to indicate, they are reduced either by dilution or by adsorption on sediments before discharging into the St. Johns River.

- Although the presence of volatile organic compounds were detected in the shallow groundwater system, it is believed that, as long as this shallow groundwater system is not used as a potable water supply it poses no major problems.

As discussed previously, the aquifer of primary concern is the shallow (water table) aquifer. This shallow aquifer is the one of primary concern for the following reasons:

- The relative ease of contamination from surface sources.
- There is limited on-base use of water from this aquifer (i.e., wells used for lawn sprinkling, etc.)
- The NAS is bounded on three sides (north, west and south) by off-base housing developments that utilize the shallow aquifer as a water supply for various domestic purposes (i.e., indoor and outdoor).

The deep Floridan Aquifer, which is the principal aquifer in terms of water supply for the City of Jacksonville and the NAS, is not considered an aquifer of concern (for the purpose of this assessment), for the following reasons:

- The Floridan Aquifer is protected from surface sources of contamination by an approximately 200 feet thick confining layer (low permeability zone) known as the Hawthorn Formation.
- The Floridan Aquifer is artesian. The water within the formations that make up this aquifer occur under pressure. If a conduit existed (i.e., an improperly installed or abandoned well) through the Hawthorn Formation, the water would tend to flow upward from the Floridan Aquifer to the shallow (water table) aquifer. This upward component of flow would preclude the potential for downward migration of pollutants to the Floridan Aquifer from the surface of the NAS and the NFD.

At the NFD, neither the shallow aquifer or the Floridan Aquifer are of concern, from the standpoint of potential for pollutant migration or well contamination, for the following reasons:

- Most of the ground surface at the NFD and much surrounding areas was "made land" (i.e., dredge fill). This material consists of sediment dredged from the bottom of Jacksonville Harbor and St. Johns River Channel. The dredge fill material was placed over low areas that were once floodplains and tidewater

areas for the St. Johns River. Due to the origin of the "made land" that is now the NFD, the quality of groundwater within the surficial sand portion of the shallow aquifer is most likely poor.

- Due to the hydraulic interconnection of the shallow aquifer with the tidal St. Johns River it is likely that the groundwater is salty or at least brackish.

- The one NFD well (No. 2) that was screened within the shallow aquifer has been permanently capped and burried.

- There are only two existing water wells at the NFD (No. 1 and No. 3). These wells are both artesian wells and receive their water from the deep Floridan Aquifer.

- The area surrounding the NFD consists of primarily heavy industry and there are no known potable water supply wells in the vicinity that tap the shallow aquifer.

5.4 BIOLOGICAL FEATURES

5.4.1 General

Both the NAS and NFD at Jacksonville are located in the "flatwoods" section of Duval County. This is a relatively level area composed of intricate patterns of low ridges interspersed with ponds, swamps and occasional knolls. The central feature of this portion of the county is the St. Johns River, which supports diverse assemblages of aquatic and wetland habitats.

5.4.2 Terrestrial Ecosystems

The predominant vegetative association of the "flatwoods" in northeast Florida is the pine flatwoods community, dominated by either long leaf, slash or black pine. This community exists in flat, poorly drained areas where standing water occurs during the wetter months of the season. The pine flatwoods is often a transition zone between higher, drier associations and wetlands. Typical plant species found in pine flatwoods are listed in Table B-1. The relatively higher, drier areas in the flatwoods tend to support less water tolerant, hardwood species such as live oak (Quercus virginiana) and turkey oak (Quercus laevis) along with the pines. The lower, wetter areas within the flatwoods, between ridges and adjacent to water bodies, support dense growths of hydrophytic hardwoods. This hydric hardwood or swamp community is one of the most impressive forest groups in the state, encompassing a great variety of tree species including oak, pine, palm and bay. Typical plant species encountered in this community are listed in Table B-2.

5.4.2.1 Naval Air Station Vegetation

The pine flatwoods vegetative community has been altered extensively on the base by past and present land use practices. It appears most of the natural vegetation was removed during the development of the base. Large areas adjacent to the runway on the northern section of the base were cleared to remove obstructions to aircraft. These areas are vegetated by grasses that are periodically mowed to prevent the growth of trees and shrubs. Land cover on the central portion of the base and the areas around the NRMC and base housing complex to the south has been converted to lawns, ornamental trees and shrubs and remnant hardwoods (particularly oaks).

Aerial photographs taken in 1943 show the undeveloped upland (primarily the southern portion) area of the base sparsely covered by pine trees, exhibiting an open savannah-like appearance. Later photographs indicate these areas were permitted to succeed toward natural pine flatwoods habitat until 1973 when a forest management program was initiated. Under this program, 925 acres (Figure 5.4-1) have been subjected to forest management practices. This includes previously undeveloped areas as well as previously mowed areas. The goals of the Navy's long-term Forest Management Plan are to maximize commercial timber production, reduce ground maintenance costs while increasing wildlife habitat. The primary tree species planted has been slash pine. Hardwood standards within the management areas are also managed to produce salable hardwood while enhancing wildlife habitat values.

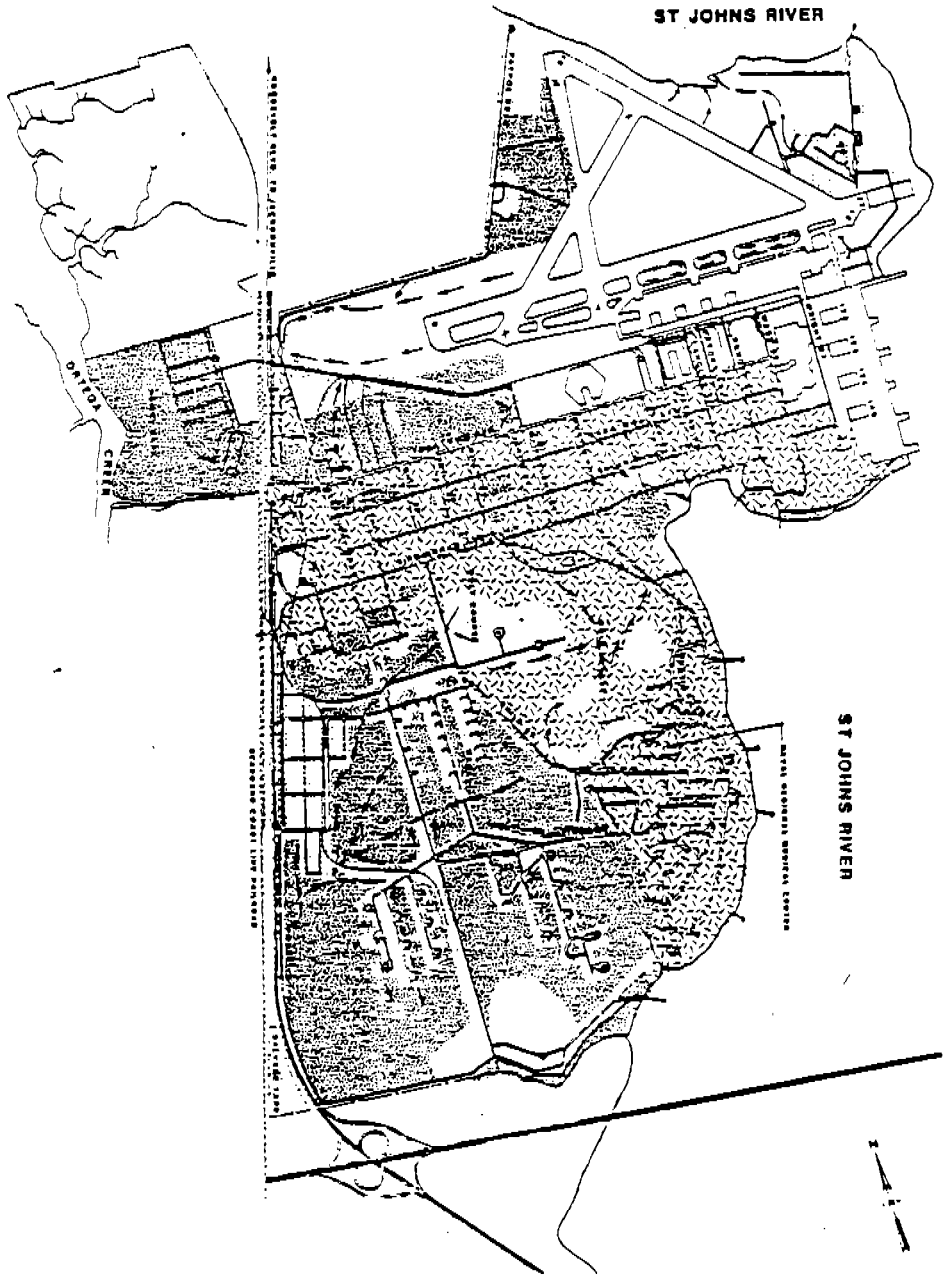
5.4.2.2 Navy Fuel Depot Vegetation

The upland areas of the NFD are primarily manmade land constructed from dredged material. Forty-eight acres of the approximately 150-acre site is under forest management (Figure 5.4-2). These areas have been reforested with slash pine. Hydric hardwoods are found on lower wetter elevations, particularly bordering the Drummond Creek tidal marsh. The same species of plants listed in Tables B-1 and B-2 can be expected on the NFD.

5.4.2.3 Wildlife

Each of the several different vegetative communities found on the NAS and NFD can support a characteristic, although not necessarily unique, wildlife association due to differences in such basic habitat parameters as canopy cover, ground cover, and water and food availability. The relative scarcity of undeveloped areas and the proximity to urban development limits its value to the larger wildlife species, particularly carnivores such as the bobcat. Tables B-3 and B-4 list animal species that can be expected in typical pine flatwoods and hardwoods communities.

The NAS has also implemented a long-range Fish and Wildlife Management Plan, which is primarily directed toward managing the fish communities of Casa Linda Lake and Scotlis Pond. Terrestrial wildlife habitat management is a unit of the Forest and Land Management programs. The goals of these programs are to improve wildlife habitat through such practices as converting undeveloped areas to forest, providing food plots and preserving productive hardwood areas. No hunting is permitted on NAS or NFD.



IMPROVED AREA
SEMI-IMPROVED AREA
FOREST MANAGEMENT AREA
UNIMPROVED AREA

Figure 5.4-1 VEGETATION AND WILDLIFE AREAS NAS JACKSONVILLE

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JACKSONVILLE, FLORIDA

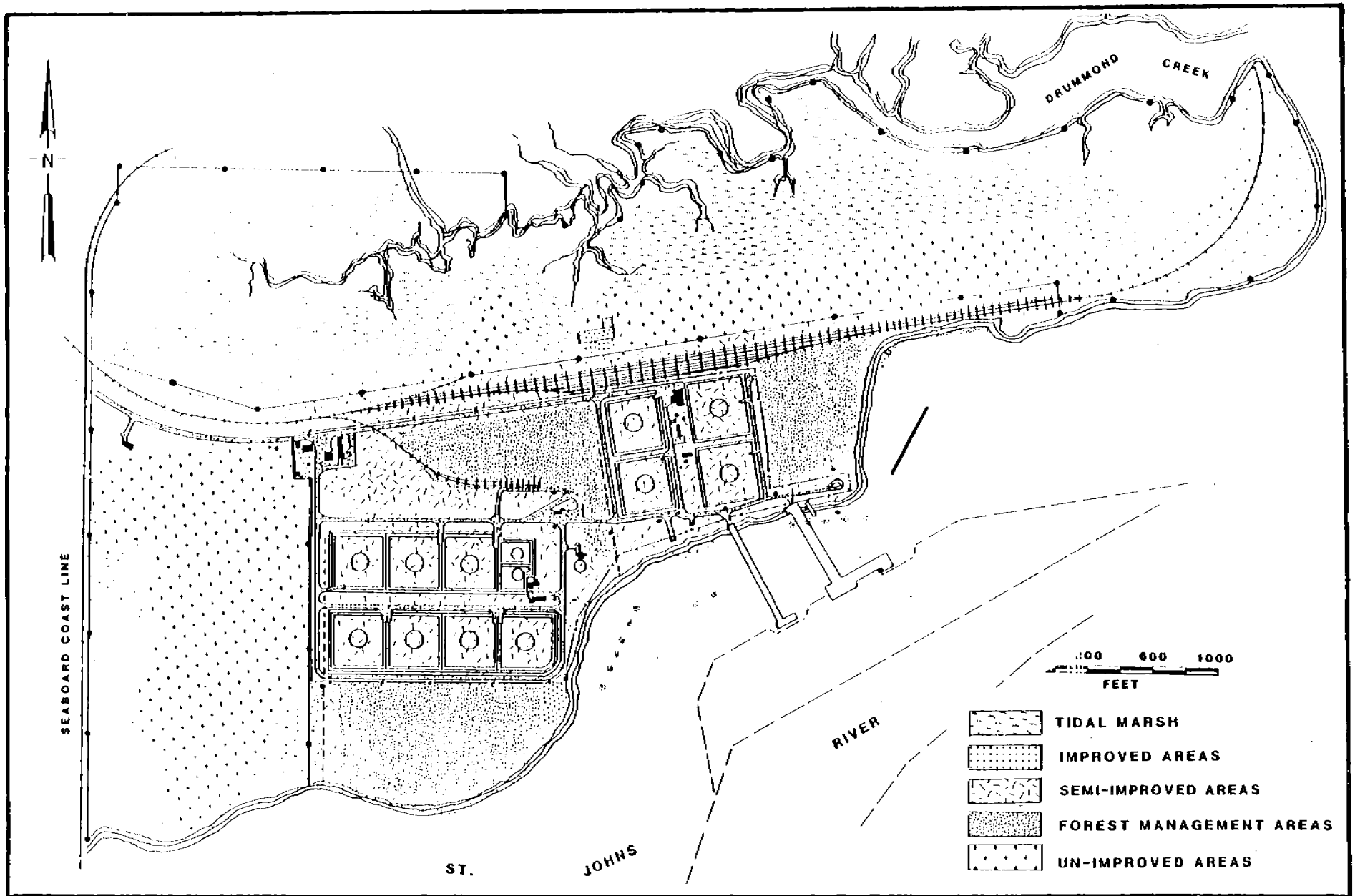

Figure 5.4-2 VEGETATION AND WILDLIFE AREAS NFD JACKSONVILLE

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NAVAL AIR STATION
JACKSONVILLE, FLORIDA

5.4.3 Wetlands Ecosystems

The flatwoods region of northeast Florida supports a diverse assemblage of wetlands in depressed areas between the low ridges and along natural drainage ways and in the floodplains of streams and lakes. Freshwater and salt or brackish water wetlands within Jacksonville have been mapped by the Jacksonville Area Planning Board (Figures 5.4-3 and 5.4-4). In addition, maps depicting wetlands on both NAS and NFD have been prepared by the Navy for their Jacksonville Complex Master Plan (Figures 5.4-5 and 5.4-6). These maps coincide to a great extent, except for smaller wetland areas delineated on the NAS and NFD maps.

5.4.3.1 Naval Air Station

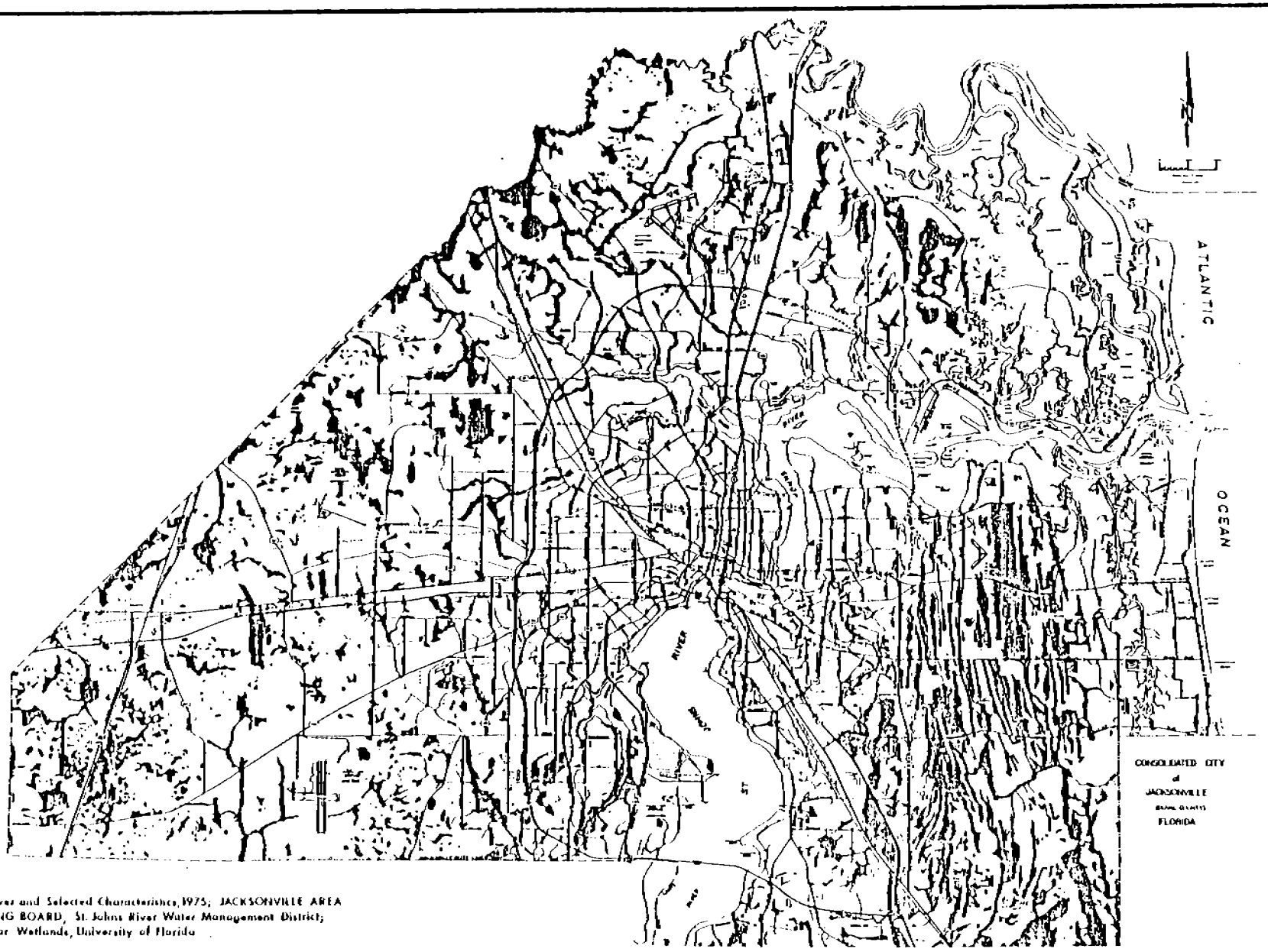
The primary wetland type on the NAS is the hardwood swamp. This wetland forest is located along major drainage ways in the southern portion of the base and along Ortega Creek in Dewey Park. This riverine swamp is subject to periodic overflow caused primarily by tidal fluctuations. No one tree species dominates. The most common species are red maple (Acer rubrum), water tupelo (Nyssa sylvatica var. biflora), sweet gum (Liquidamber styraciflua), bald cypress (Taxodiun distichum), pop ash (Fraxinus carolinana), Florida elm (Ulmus floridana), and cabbage palm (Sabal palmetto). Additional species were listed previously in Table B-2.

A small area of freshwater (slightly brackish) tidal marsh is located at the northern end of the NAS (Figure 5.4-3). This area has been disturbed in the past by expansion activities on the base. The marsh area supports herbaceous (grasses, rushes, and reeds) and shrub vegetation. In addition, narrow bands of marsh vegetation particularly common threesquare (Scirpus americanus) occur along several areas of base-river shoreline.

5.4.3.2 Navy Fuel Depot

The NFD is located much closer to the mouth of the St. Johns River which results in a greater salt water influence on wetland vegetation. Only species of plants tolerant of high salt concentrations can survive under this condition. In northeast Florida, these plants are limited to a relatively small number of herbaceous species, primarily smooth cordgrass (Spartina alterniflora) and black needle rush (Juncus roemerianus) which largely comprise the salt marsh vegetative association. Additional species are listed in Table B-5.

The NFD salt marsh occurs along Drummond Creek at the northern end of the property (Figures 5.4-4 and 5.4-6). Smaller patches of salt marsh are located on the southern portion of the property where tidal exchange with the St. Johns River occurs (Figure 5.4-4). The importance of salt marshes has been well documented. The marsh directly provides habitat to shrimp, oysters, crabs and the early life stages of many commercially important fish such as mullet, menhaden and drum. Many birds such as herons, egrets, ospreys, hawks and rails breed and/or feed in the marshes. A variety of amphibians, reptiles and mammals are partially dependent upon salt marshes, frequently entering in search of food. One reptile, the American alligator, is not uncommon in the marsh and marsh fringe areas. Typical salt marsh species are listed in Table B-6.



Source: Land Cover and Selected Characteristics, 1975; JACKSONVILLE AREA PLANNING BOARD, St. Johns River Water Management District; Center for Wetlands, University of Florida

Figure 5.4-3 SELECTED FRESHWATER MARSHES & SWAMPS

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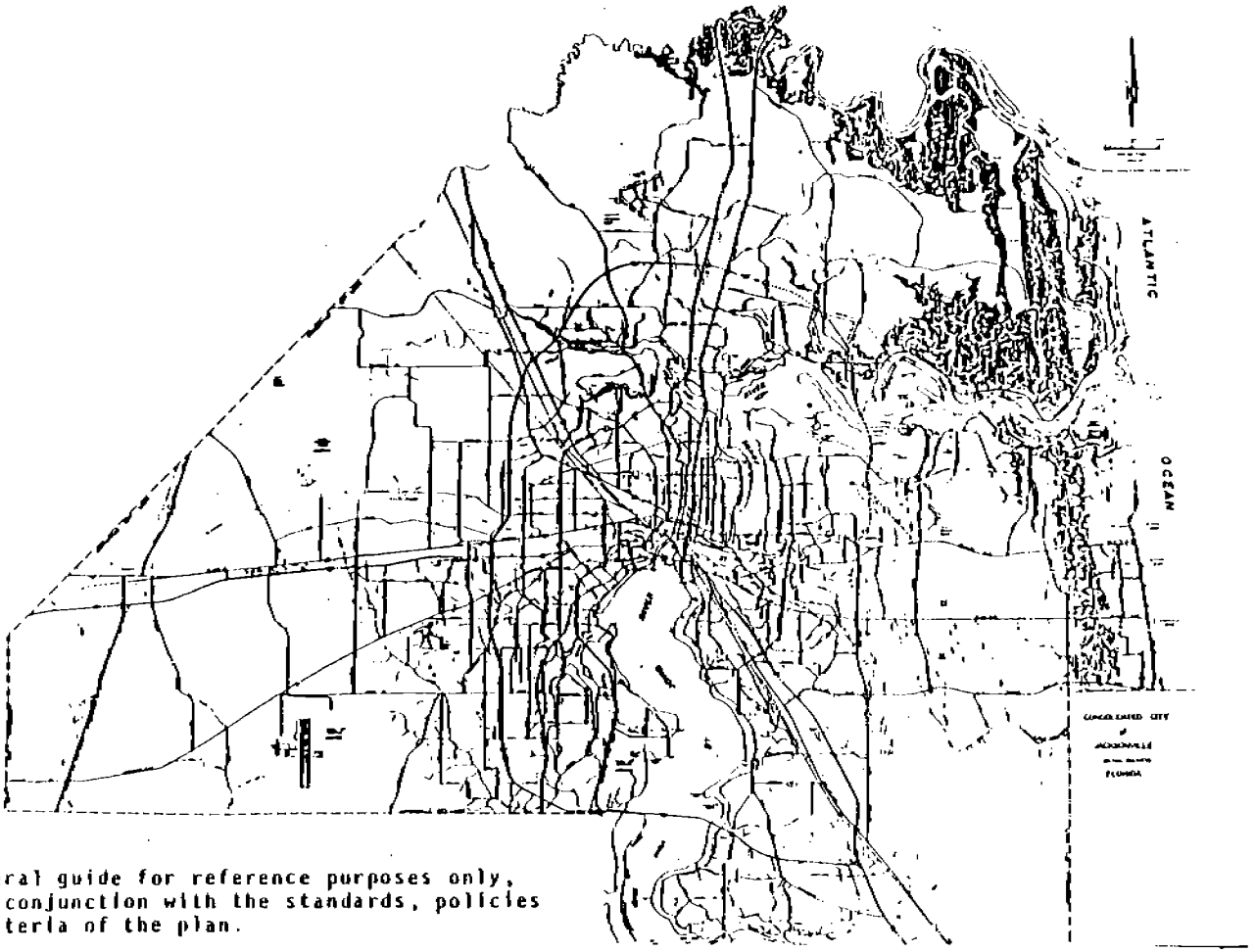
JACKSONVILLE, FLORIDA



This map is a general guide for reference purposes only, to be utilized in conjunction with the standards, policies and locational criteria of the plan.

Source: Land Cover and Selected Characteristics, 1975; JACKSONVILLE AREA PLANNING BOARD; St. Johns River Water Management District; Center for Wetlands, University of Florida

Figure 5.4-4 SELECTED COASTAL (TIDAL) MARSHES

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NAVAL AIR STATION
JACKSONVILLE, FLORIDA

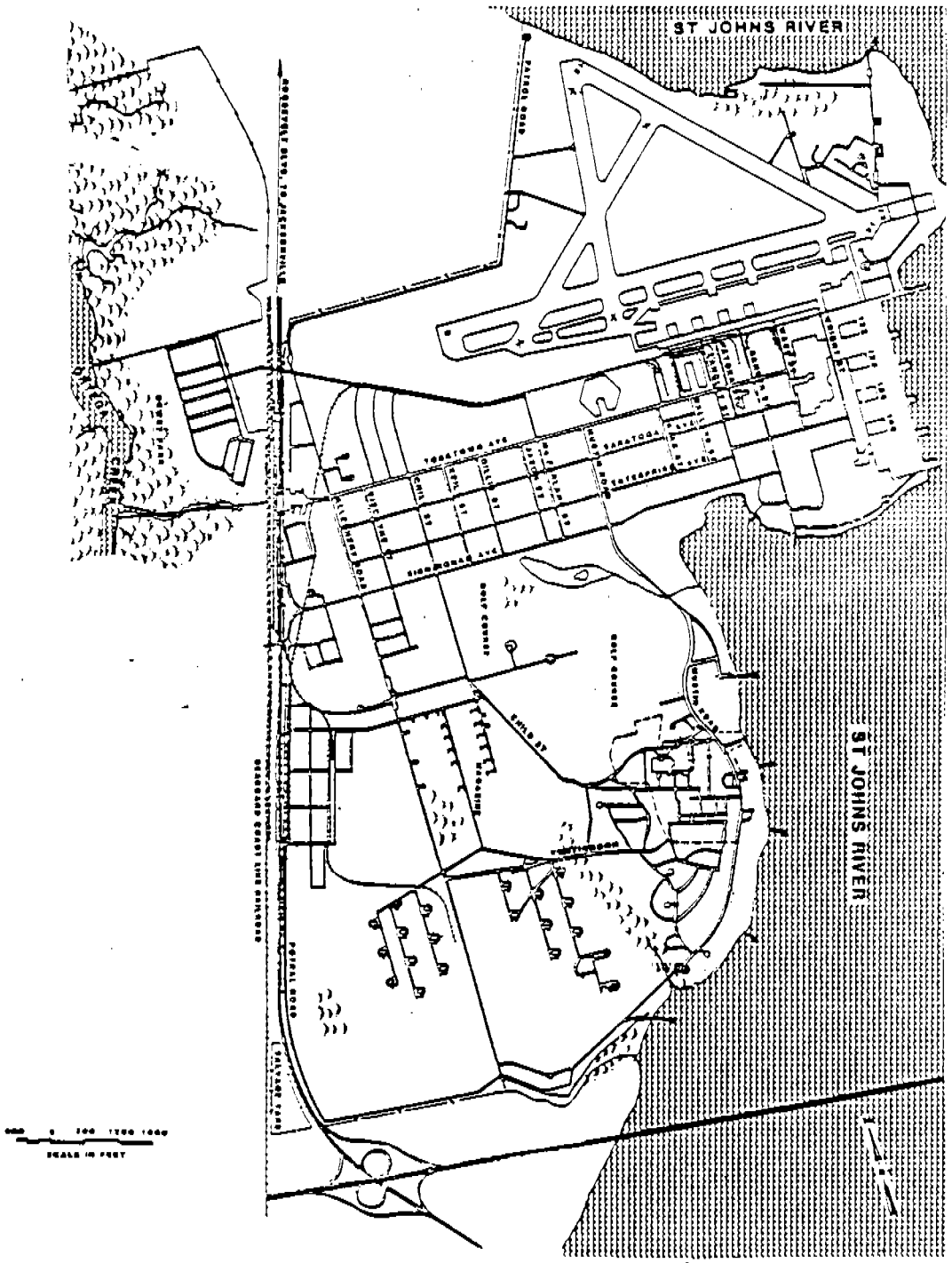

Figure 5.4-5 WETLANDS NAS JACKSONVILLE

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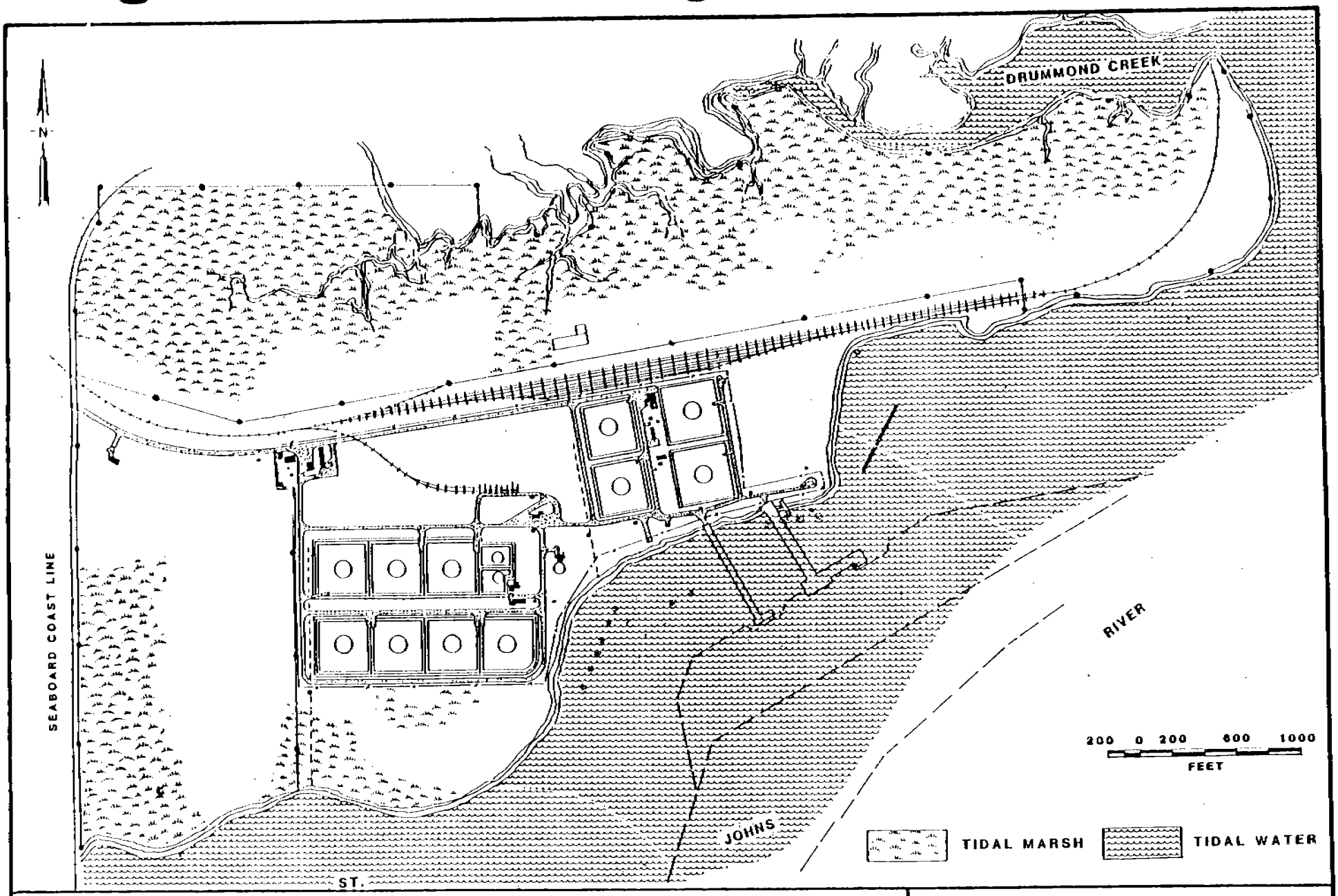

Figure 5.4-6 WETLANDS NFD JACKSONVILLE

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JACKSONVILLE, FLORIDA

Narrow bands of hydric hardwoods also occur between the Drummond Creek salt marsh and upland areas. This system was discussed in Section 5.4.2.2.

5.4.4 Aquatic Ecosystems

The St. Johns River estuary continues to be a very productive aquatic system in spite of intense development along its banks in the Jacksonville area. Over 150 species of fish have been identified in this system, many of them early life stages of commercially important marine species. In addition, studies by the Florida Department of Natural Resources indicate the St. Johns River to be the most important nursery ground to the shrimp fishery along the northeast Florida coast. Some fish species of commercial and/or recreational importance are listed in Table B-7. A detailed listing can be found in Melane's 1955 study.

Through the efforts of the various environmental agencies and the city of Jacksonville, the water quality of the river has significantly improved over the last decade.

5.4.4.1 Naval Air Station

Two small lakes, Casa Linda Lake and Scotlis Pond are located on the NAS. Casa Linda Lake is approximately 10 acres in area and supports populations of largemouth bass, bluegill, golden shiners and yellow bullhead catfish. Under the NAS Long-Range Fish and Wildlife Managment Plan, Casa Linda Lake is managed for largemouth bass and bluegill to provide a fishery for base personnel. Scotlis Pond is approximately 3 acres in area. It was constructed in the early 1970s and stocked with largemouth bass, bluegill and redear sunfish in 1974-1975. This pond is presently not open to fishing. Both water bodies have a recurring problem of overgrowth by the aquatic "weed" southern naiad.

A fish kill occurred in Casa Linda Lake in 1979. The cause was the pesticide Dazonon which had been applied to the golf course to control nematodes. Several days of rain followed the application, apparently washing a toxic concentration of the pesticide into the lake.

5.4.5 Rare, Threatened or Endangered Species

Table 5.4-1 lists rare, threatened and endangered species that may occur in the Jacksonville area. Only those species designated by the U.S. Fish and Wildlife Service are protected by the Endangered Species Act of 1973.

5.4.5.1 Naval Air Station

There is an active bald eagle nest on the NAS within the Dewey Park area. This nest has been observed by wildlife biologists from the Florida Game and Freshwater Fish Commission since 1979. Successful hatchings have occurred in 1979, 1980 and 1982. Although active in 1981, no offspring were observed. Reportedly there was another bald eagle nest located on the southern portion of the NAS in the vicinity of the magazine area. However, the NACIP team could not locate this nest at the time of the site inspection.

TABLE 5.4-1

Rare, Threatened or Endangered Species that
May Occur in the Jacksonville Area

Species	Legal Status(1)	
	GFWFC(2)	USFWS(3)
Eastern Indigo Snake	T	T
Bobcat		UR
Brown Pelican	T	E
Snowy Egret	SSC	
Louisiana Heron	SSC	
Little Blue Heron	SSC	
American Oyster Catcher	SSC	
Least Tern	T	
American Alligator	SSC	T
Wood Stork	E	
Florida Otter		UR
Gopher Turle	SSC	
Atlantic Loggerhead Turtle	T	T
Florida Manatee	E	E
Fox Squirrel	T	
Southern Bald Eagle	T	E
Florida Sandhill Crane	T	
Shortnose Sturgeon		E

Notes:

(1) E = Endangered; T = Threatened; SSC = Species of Special Concern; UR Under Review (for possible listing).

(2) Florida Game and Fresh Water Fish Commission.

(3) U.S. Fish and Wildlife Service.

Another endangered species, the Florida manatee, has been observed by the NACIP team on several occasions in the St. Johns River just off shore from the NAS. The St. Johns River has been classified by the U.S. Fish and Wildlife Service as a critical habitat for the manatee.

The American alligator, a threatened species, has been observed in water bodies adjacent to the NAS as well as on the base.

5.4.5.2 Navy Fuel Depot

No Federally listed species have been observed on the NFD property.

The manatee, the shortnose sturgeon and the American alligator can be expected in the offshore waters. The Drummond Creek salt marsh may be utilized by bald eagles and other protected birds of prey.

5.5 ADJACENT LAND USE

The area adjacent to the NAS is zoned for land uses from Commercial Intensive (CI) and Industrial Light Warehouse (ILW) to Residential (R) and Open Rural (OR). There is no heavy industry adjacent to NAS Jacksonville. To the west, across Route 17, is a sand and gravel operation. Also to the west is a cement mixing company.

The area adjacent to the NFD is generally zoned for industrial use. On the north side, from the St. Johns River west to the Seaboard Coast Line, land use varies from Industrial Waterfront (IW) to Industrial Heavy (IH) at the Seaboard Coast Line. The west side along the Seaboard Coast Line Railroad to the St. Johns River is Industrial Waterfront (IW). Due north of the NFD is Drummond Creek. This creek passes through the Jacksonville municipal landfill. Fuel tanks containing bulk storage for various oil companies are located on the St. Johns River both up and downstream from the NFD.

SECTION 6

ACTIVITY FINDINGS

6.1 GENERAL

A description of the operations at NAS Jacksonville that utilize(d) hazardous materials is provided in this section. The descriptions are focused on the following types of operations: ordnance, non-ordnance, low level radiological, hazardous materials storage, and waste disposal. The information included in this section provides the background and documentation upon which sections 2, 3, and 4 are based.

In addition to describing the various operations, the wastes generated by each operation and method of disposal are identified. The periods of operation and quantities of materials disposed are described in as great a detail as was possible to obtain. For example, the changing missions of NAS Jacksonville over the years and the varying intensity of operations (i.e., WWII, Korea, Vietnam) allows for only an estimate of waste quantities where historical data was not available.

6.2 ORDNANCE OPERATIONS

Operations at NAS and NFD Jacksonville are primarily focused on providing services and materials to support operation of aviation activities and store and supply fuels. Ordnance operations play a minor role at the NAS. There is a restricted magazine area at the NAS and the Torpedo Rework Facility (site 38) is located within this boundary. Activities at this facility include the repair and cleaning of propulsion systems, addition of Otto fuel to and inspection of torpedos. Personnel with the Ordnance Environmental Support Office (OESO) reported that approximately one 55 gallon drum of solid waste material (i.e., rags and gloves containing Otto fuel) was generated per day. It was also reported that these drums have always been disposed of off-site.

6.3 NON-ORDNANCE OPERATIONS

6.3.1 Vehicle Maintenance Shop

The vehicle maintenance shop is located in Building 105. The shops primary mission is to rebuild, repair, and maintain automobiles, trucks, and jeeps. Waste oils and solvents are stored in 55 gallon drums and hauled off-site by a private contractor. Until 1976 these waste materials were disposed in the waste oil and solvent pits in the registered base dump, Site No. 26.

6.3.2 Pest Control Shop

The Disease Vector Ecology and Control Center, which currently occupies Building 937 (since 1978), has been established as a tenant of the NAS since 1949. This facility is used for the storage and mixing of pesticides and herbicides used at the activity. Characteristic materials stored in this facility include: malathion, chlordane, aldrin, dieldrin, lindane, and diazinon.

6.3.3 Fleet Photo Shop and Audio Visual Center

This photographic shop provides photographic services to all Naval Air Station departments and tenant commands. The services provided by the photography shop include still and high speed photography.

The liquid wastes generated by the photography shop include bleach and developer/fixers. In the past these waste streams were disposed of in shop drains. Currently, they are disposed of in the sewer and routed to the domestic sewage treatment plant. A silver recovery process was installed at the shop in 1972 thereby reducing the quantity discharged. Silver levels in treated wastewater are in compliance with the facility's discharge permit. A description of these wastes is contained in Table 6.3-1.

6.3.4 Boiler Plants, Power Plants

The energy system at NAS Jacksonville is dependent on electricity purchased from the Jacksonville Electric Authority (JEA) and natural gas purchased from the Florida Gas Company. This gas is used as the primary fuel in the boiler plants. Backup fuel storage is 14 days or approximately 420,000 gallons. A project is underway to increase the capacity of reserve fuel supply to thirty days requirement. The storage capacity at that time will be approximately 900,000 gallons.

The gas distribution system at the activity consists of one main. The main feeds power plants #1, #2, and #3. Gas distribution on the base is maintained by the Florida Gas Company to the five-foot building line.

Natural gas is the primary fuel in the main boiler plants, Buildings 104, 650, and H-2032. Each building has four boilers, and each boiler has dual fuel capability of natural gas and No. 6 fuel oil. The incinerator plant has three boilers that burn solid waste and fuel oil. The total installed capacity of the main distribution system is 438,000,000 BTU/hr. In addition, there are ten boilers that have various capacities within the limits of 400,000 to 3,500,000 BTU/hr, and these units serve individual buildings. The small units total capacity is 13,552,000 BTU/hr, and the small units operate on No. 2 fuel oil.

Boiler plant #1 (Building 104) has an installed capacity of 200,000,000 BTU/hr. The four boilers were installed in 1941 and operate at 125 psi. Boiler plant #2 (Building 650) has an installed capacity of 180,000,000 BTU/hr. Boilers 7, 8, and 9 were installed in 1940, and boiler 10 was installed in 1941; they operate at 125 psi. Boiler plants #1 and #2 are interconnected. They each have condensate return systems, and approximately 20% of the original flow is returned.

Boiler plant #3 (Building H-2032) has an installed capacity of 58,000,000 BTU/hr. Boilers 26 and 27 were installed in 1940. The boilers operate at 125 psi, and have an output of 9,000,000 BTU/hr each. Boiler 28 was installed in 1941, and Boiler 29 was installed in 1942. The output capacity of each boiler is 20,000,000 BTU/hr at 125 psi. Condensate return is 85% of the original flow.

TABLE 6.3-1

Hazardous Waste Inventory Photo Shop/Audio Visual Center

RESPONSIBLE TENANT/DEPARTMENT	DESCRIPTION OF HAZARDOUS WASTE[1]	HAZARD[2]	QUANTITY GENERATED ANNUALLY (express units)	STORAGE SITE[3]				CURRENT TREATMENT, DISPOSAL, RECLAMATION	COMMENT
				LOCATION OF SITE	KIND OF[4] STORAGE	QUANTITY STORED (express units)	AVERAGE STORAGE TIME		
AUDIO VISUAL CEN	Hunt Color-Print - 30-Bleach Fix Replenisher	Toxic Corrosive	12 24-Gal	Lg. #921	Containers inside A/C Building	6 25-Gal	6 Mos	Sewage Plant	All Chemicals Listed are Toxic and Corrosive
	Bleach Starter	" "	8 1-Gal	Containers inside A/C Bldg. #921	" "	4 1-Gal	6 Mos	" "	" "
	C-41 Bleach Replenisher		20 5-Gal			10 5-Gal	6 Mos	" "	" "
	C-41 Fixer - Replenisher	" "	18 5-Gal	" "	" "	9 5-Gal	6 Mos	" "	" "
Sulfuric Acid	C-41 Developer Replenisher	" "	40 5-Gal	" "	" "	10 5-Gal	3 Mos	" "	" "
	C-41 Stabilizer & Replenisher	" "	12 5-Gal	" "	" "	6 5-Gal	6 Mos	" "	" "
	Royal print Activator/ Stop Bath	" "	120 1/2 Gal	" "	" "	30 1/2 Gal	3 Mos	" "	" "
	Royal print Fixer	" "	96 5-Qt	" "	" "	24 5-Qt	3 Mos	" "	" "
Acetic) Acid)	Starmat type B Dev. Starter	" "	12 Qt	" "	" "	6 Qt	6 Mos	" "	" "
Aluminum	Hunt Starfix Fixer	" "	24 20-Gal	" "	" "	12 20-Gal	6 Mos	" "	" "

[1]Description should include common/chemical name and other appropriate details (e.g., concentration, military specification, stock number, pesticide registration). Do not include radioactive wastes.

[2]Possible hazards.
- Toxic
- Corrosive
- Reacti.e
- Ignitable

[3]Any area with an accumulation of hazardous wastes constitutes a storage site.

[4]Examples of kinds of storage:
- 55-gal drums on pallets over soil
- Small containers on concrete
- Containers inside sub-standard building
- Drums inside adequate shelter
- Storage tank under pavement

(Continued)

RESPONSIBLE TENANT/DEPARTMENT	DESCRIPTION OF HAZARDOUS WASTE[1]	HAZARD[2]	QUANTITY GENERATED ANNUALLY (express units)	STORAGE SITE[3]				CURRENT TREATMENT, DISPOSAL, RECLAMATION	COMMEN
				LOCATION OF SITE	KIND OF[4] STORAGE	QUANTITY STORED (express units)	AVERAGE STORAGE TIME		
AUDIO VISUAL CEN	Hunt Type B Developer/ Replenisher	Toxic Corro-sive	22 20-Gal	Containers inside A/C building Bldg. #921	Containers Inside A/C Bldg.	11 20-Gal	6 Mos	Sewage Plant	All Chemicals listed are Toxic and Corrosive
Potassium) Hydroxide)	E-6 Color Dev. Replen.	" "	44 5-Gal	" "	" "	11 5-Gal	3 Mos	" "	" "

[1]Description should include common/chemical name and other appropriate details (e.g., concentration, military specification, stock number, pesticide registration). Do not include radioactive wastes.

[2]Possible hazards.
- Toxic
- Corrosive
- Reactive
- Ignitable

[3]Any area with an accumulation of hazardous waste constitutes a storage site.

[4]Examples of kinds of storages
- 55-gal drums on pallets over soil
- Small containers on concrete
- Containers inside sub-standard building
- Drums inside adequate shelter
- Storage tank under pavement

(Continued)

RESPONSIBLE TENANT/DEPARTMENT	DESCRIPTION OF HAZARDOUS WASTE[1]	HAZARD[2]	QUANTITY GENERATED ANNUALLY (express units)	STORAGE SITE[3]				CURRENT TREATMENT, DISPOSAL, RECLAMATION	COMMENTS
				LOCATION OF SITE	KIND OF[4] STORAGE	QUANTITY STORED (express units)	AVERAGE STORAGE TIME		
AUDIO VISUAL CEN.	E-6 First Dev. Replen.	Toxic Corrosive	44 5-Gal	LG. #921	Container inside A/C Bldg.	11 5-Gal	3 Mos	Sewage Plant	All Chemicals listed are toxic & corrosive
	E-6 Reversal Bath & Replen.	" "	12 5-Gal	" "	" "	6 5-Gal	6 Mos	" "	"
Formaldehyde	E-6 Stabilizer Replenisher	" "	20 5-Gal	" "	" "	10 5-Gal	6 Mos	" "	"
	E-6 Conditioner & Replenisher	" "	16 5-Gal	" "	" "	4 5-Gal	3 Mos	" "	"
	E-6 Fixer and Replenisher	" "	16 5-Gal	" "	" "	8 5-Gal	6 Mos	" "	"
Acetic Acid	E-6AR Bleach Replenisher	" "	12 5-Gal	" "	" "	6 5-Gal	6 Mos		
	Color Developer Starter	" "	4 25-Gal	" "	" "	2 25-Gal	6 Mos		
	Hunt Color-Print - 30 Dev. Starter	" "	12 Qt	" "	" "	12 Qt	6 Mos	" "	"
Potassium Hydroxide	Hunt Color-Print - 30 Dev	" "	12 25-Gal	" "	" "	6 25-Gal	6 Mos	" "	"
	Hunt Color-Print - 30 Bleach Type "A" Fix (Replenisher	" "	12 25-Gal	" "	" "	6 25-Gal	6 Mos	" "	"

[1] Description should include common/chemical name and other appropriate details (e.g., concentration, military specification, stock number, pesticide registration). Do not include radioactive wastes.

[2] Possible hazards.
- Toxic
- Corrosive
- Reactive
- Ignitable

[3] Any area with an accumulation of hazardous waste constitutes a storage site.

[4] Examples of kinds of storage:
- 55-gal drums on pallets over soil
- Steel containers on concrete
- Containers inside sub-standard building
- Drums inside adequate shelter
- Storage tank under pavement

6.3.5 Wastewater Collection and Treatment

Until 1961, there were no industrial wastewater treatment facilities at NAS Jacksonville. In 1940, two trickling filter plants were constructed for treatment of domestic wastes (combined domestic and industrial). The west side plant is located north of the center of the main east-west runway. The east side plant (no longer in existence) was located south of the east end of the main runway. In 1972, the east side plant was taken out of service and the flow directed to the west side plant. The west side plant was expanded to 2.25 mgd capacity and upgraded (to activated sludge with aerobic sludge digestion) in 1972.

Prior to 1972, industrial wastes reaching the east side plant were treated initially by settling (for paint chip removal) and skimming for removal of oils and solvent. These industrial wastes were then transported to the previously identified solvent waste disposal site. Effluent from settling/skimming was treated in the trickling filter plant for discharge to the St. Johns River. Trickling filter sludges were disposed near the PCB storage area (Site 27).

After construction in 1974, the upgraded west side activated sludge plant was supplemented with a chromium reduction/precipitation and cyanide reduction/ oxidation facility for pretreatment of chromium and cyanide bearing plating wastes, and was fully operational in 1981. While designed for automated operation, this facility is currently being operated manually with (apparently) good results. The batch-type process design used typically responds well to manual operation.

Of note, paint chips and solvents from aircraft and component paint removal operations are treated initially at the source. A combined pump station and paint chip removal system (currently inoperative) behind the component stripping ramp area is used to screen out paint chips which are then conveyed to a dumpster for contractor removal. Solvents used in aircraft and component stripping are typically lost to the atmosphere in the process of stripping, flowing through the screens, pump station wet well, and the west side treatment plant. The total solvent discharge from aircraft stripping (93112) and component stripping (93111) is approximately 1,200 gallons per week of methylene chloride/cresylic acid blend, 225 gallons per week of butyrate stripper, 55 gallons per week of trichloroethane and 25 gallons per week of naphtha. With a 2.1 mgd average flow and five-day work week, concentrations reaching the activated sludge unit (assuming no volatilization loss) would be: methylene chloride, 152 mg/l; trichloroethane, 7 mg/l; and naphtha, 1.6 mg/l. The butyrate stripper is insufficiently defined to predict specific gravity and behavior. Based on 250 horsepower aeration capacity, 2 lb oxygen per horsepower hour and 20 percent oxygen in air, the effluent concentration of methylene chloride and trichloroethane would be 73 percent and 66 percent respectively of influent concentrations. If there were no losses of methylene chloride and trichloroethane before the treatment plant, the effluent concentrations could be as much as 110 mg/l and 4.6 mg/l, respectively. Because of the patterns of use and losses attendant on that use, the influent and effluent concentrations are one to two orders of magnitude below these levels. This is based on results of analysis of effluent in accordance with NPDES permit for the west side plant.

Sludges from the west side plant were formerly disposed on base, either to the PCB storage area (Site 27) or broadcast near the west side plant. One area of stressed vegetation within the new pine plantation southeast of the plant, Site No. 4, showed evidence of sludge dumping (tomato plants). Sludges are currently disposed in the pine woods surrounding the waste treatment plant with approval from the EFD based on results of an EP toxicity test.

Also at this location, the out of service trickling filter plant filters (two) contain an unknown quality of oil used as bottom bearing seals to prevent intrusion of sand or salt into the bearing.

6.3.6 Firefighting Training

The firefighting companies at the NAS provides fire protection for the general NAS activities and aircraft operations. The NAS Fire Department conducts firefighting training exercises at a site south of the effluent polishing pond No. 834 identified as Site No. 2. Junk vehicles are sprayed with JP-5 or waste oil and ignited to simulate aircraft crashes. Prior to use of the current area, a firefighting pit, Site No. 28, was used for firefighting training. When the old firefighting training area was in operation, a mixture of flammable materials were used as fuel. Reportedly waste oils and lubricants were dumped in the pit and burned.

6.3.7 Incinerators

An incinerator plant on the station has three boilers that burn solid waste and fuel oil. These boilers were installed in 1980 and each has an output capacity of 6,000,000 BTU/hr. The output from the incinerator is connected into the system between boiler plants #1 and #2. The maximum allowable firing rate is two boilers at 4,000 lbs/hr total.

6.3.8 Fuel Farms/Gas Stations

The old gas station Building 48, Site No. 19 has been taken out of service. The site currently houses the base garden center. The underground gasoline storage tanks with a total capacity of 16,000 gallons are believed to remain. Although there were no reported problems from leaks at this facility, the potential exists for tanks, fittings, hoses to corrode causing contents to leak.

The existing base service station, Building 429, Site No. 33 has had a recent fuel leak. Approximately 2,000 gallons of gasoline leaked from an underground pipe fitting and infiltrated the sewer system allowing gasoline vapors to migrate in the sewer line to lavatory receptacles within a 9 block area of the service station.

All petroleum facilities are entirely on shore and consist of storage and transfer of aviation, automotive, heating and waste fuels. The handling of waste oil and fuels are the joint responsibility of the Naval Supply Center and Public Works Department. The Naval Air Station's petroleum product storage facilities requiring SPCC consideration consist of twenty-five (25) underground tanks and seven (7) above-ground tanks varying in size from 1,500 to 567,000 gallons. A recent report, Hazardous Waste Management Plan for Jacksonville, Florida Naval Complex Including Kings Bay,

describes the Fuel Farms/Gas Station area in great detail (Cassidy, 1981). Discussions relating to past disposal practices that are contained in this report are summarized below.

Facility 159-a bulk fuel storage facility is located at the northeast end of the station adjacent to Catapult Road. The bulk fuel storage facility consists of eleven (11) underground storage tanks. The tanks are constructed at ground level with earth covering to form a large mound. This facility has an annual throughput of approximately 60 million gallons. All fuel deliverables are via barge.

The Fuel/Lube Oil Storage Facility (Facility 119) consists of seven underground storage tanks used to store Aviation Lube Oil, No. 2 Fuel Oil, MOGAS, AVGAS, and Waste Oil. Four (4) tanks are abandoned, filled with sand and are flanged off. The remaining four (4) tanks are filled with water. A listing of those tanks is shown in Table 6.3-2. Where known, average annual flow rates are noted as a comment.

A disposal area, south of the station's golf course, was used to dispose of waste solvents, cresols, oil, grease and other liquid industrial wastes. The disposal area is now closed and projects C9-81, C10-81 and C11-81 will remove pollutants and restore the area.

Fuel/Storage/Transfer areas also exist at Facilities 120, 120A, 650A, 650B, H-2032, 1987, 1988 and 1963. A detailed discussion of these facilities is also included in Cassidy (1981).

6.3.9 Sanitation, Refuse and Garbage

The main sources of solid waste generation include the Naval Air Station Operations and Administrative Activities, the NARF and the family housing units.

Until 1977 the majority of solid waste generated on the base was collected by Standard Refuse, Inc., a refuse collection contractor. Items that were not acceptable in the contractor collection system were collected by the Public Works Department or were hauled to the on station disposal area by the generating organizations. Approximately 330 cubic yards of waste per week was disposed of at a disposal area operated by the Public Works Department on board station at this time. The disposal area was located south of the Golf Course and immediately west of the New Family Housing Area. The Public Works Department maintained a disposal area supervisor at the site, to insure that only burnable material was deposited at the disposal area and to see that refuse was placed in piles to facilitate burning, consolidation and covering (Cassidy, 1981).. Generally the disposal area was burned every Friday. The burned and semiburned material was then pushed over an embankment formed by previously covered refuse and ash. The new material was then covered with fill material.

Liquid waste, including sludge from grease traps and oil sumps as well waste chemicals from NARF shops was collected in 400 to 750 gallon tank trailers pulled by tractors. Liquid waste products including cleaning solvents, paint thinners, heavy petroleum products sludge, and galley grease trap sludge were disposed of at a holding tank at the sewage treatment plant

TABLE 6.3-2 Facility 119 - Fuel/Lube Oil Storage

Structure Number	Material Construction	Fuel	Comment[1]
119-A	Steel	No. 2	90,000 g/yr
119-B	Steel	Lube Oil	15,000 g/yr
119-C	Steel	AVGAS	
119-D	Steel	AVGAS	45,000 g/yr
119-I	Steel	AVGAS	
119-J	Steel	MOGAS	480,000 g/yr
119-L	Steel	MOGAS (Leaded)	
119-K	Steel	Paint Waste	
119-Q	Steel	Abandoned	Filled with water
119-R	Steel	Abandoned	Filled with water
119-S	Steel	Abandoned	Filled with water
119-T	Steel	Abandoned	Filled with water
119-Y	Steel	Abandoned	Filled with sand/ Flanged off
119-Z	Steel	Abandoned	Filled with sand/ Flanged off
119-AA	Steel	Abandoned	Filled with sand/ Flanged off
119-AB	Steel	Abandoned	Filled with sand/ Flanged off

Note: 1. Capacity of all tanks is 27,200 gallons

Source: Cassidy, 1981.

or at a slurry pit located next to the disposal site. Part of the liquid waste generated at the NARF activities was hauled to the sewage treatment plant holding area but the majority of the NARF waste and all of the sludge generated at other activities was hauled to the slurry pit located at the station disposal area (Cassidy, 1981).

The majority of the solid waste collected on board station was disposed of by the refuse collection contractor off-site.

The majority of the waste petroleum products generated on board station were recycled as a part of the station refueling contract. Waste oil and contaminated aircraft fuel was placed in holding tanks throughout the station for collection by the station refueling contractor. The Defense Property Disposal Office collected $12,600 in FY 75 for waste petroleum products (Cassidy, 1981).

6.3.11 Defense Property Disposal

The Defense Property Disposal Office (DPDO) is located off-site. However, the DPDO facility, located across from the NAS, arranges for sale or disposal of "used" or surplus items from NAS and NFD Jacksonville.

6.3.12 Naval Air Rework Facility

The NARF, one of the major tenant activities at Jacksonville, employs approximately 3,000 workers in stripping, testing, and refitting P-3 (long-range anti-submarine) and A-7 (ground support) aircraft. The general flow of work begins with removal of engines and other components (propellors, control surfaces, etc.). After these components have been removed, the airframe is stripped of paint and sprayed with corrosion inhibitors before inspection and repainting. Components are also stripped of paint, sprayed (or given other treatment), and inspected before being repainted and installed on the airframe. Engines are disassembled, inspected, and moving parts are "magnafluxed" (inspected for cracks) and, if necessary, replated before assembly and installation in the airframe.

In addition to direct aircraft-related operations, the NARF operations include support functions, such as battery repair (for fork lifts), joiners (crating and carpentry), and riggers shops. Chemical usage at NARF is predominantly located in six shops, with only minor amounts consumed in other areas.

The following paragraphs describe in more detail the hazardous chemicals and the nature of operations conducted in each major shop and support function which may result in these three categories of discharges.

The following paragraphs describe in more detail the hazardous chemicals and the nature of operations conducted in each major shop and support function which may result in these three categories of discharges.

6.3.12.1 Component Stripping and Cleaning Shop (93111)

This shop performs paint stripping operations and degreases and steamcleans aircraft components. These operations require the use of paint

strippers and organic solvents. Paint strippers, including methylene chloride and cresylic acid, trichloroethane, butyl acetate and naphtha are used in an open paint stripping shed. The spent stripper and paint is washed off the metal parts, and discharged into floor drains. Approximately 430 gallons per week of solvents are disposed. The waste is pumped through an inoperative paint chip remover and the enters the industrial waste water system. This shop also contains a "hot strip" tank containing dichlorobenzene. Approximately 12-13 drums (660-715 gallons) of the material is disposed off-site. Cold carbon remover (methylene chloride, Phenol 48, and emulsifiers) is also used in a tank, but is not disposed. Losses from evaporation dragout, and reactors are replenished.

The solvents used in the shop's operation include: trichloroethane (55 gallons/week discharged into ramp drains); naphtha (25 gallons/week discharged into ramp drains); trichloroethylene (165 gallons/month lost to evaporation and 55 gallons/month now shipped to off-site disposal; butyrate (100-125 gallons/week discharged into ramp drains and lost to evaporation). The stripper and solvent wastes were discharged to the storm sewer system for approximately 32 years ending in 1972.

6.3.12.2 Aircraft Stripping Shop (93112)

This shop performs airframe stripping and paint and corrosion treatment. The operation generates waste methylene chloride - Mil. spec. 81294 (less than 17 drums per week), paint stripper wastes, containing cresylic acid, cellulose acetate, and butyrate thinner (less than 2 drums per week), and waste alodine (less than 140 ounces per week of dry powder). These wastes are discharged into the industrial waste water treatment plant via the floor drains in the shop. A NARF report (O'Brian, 1979) provides data on the amount of chromium, phenol and cyanide which enter the drains from paint stripping and conversion coating operations for each aircraft processed. This data is presented in Table 6.3-3. Using the data for the number of aircraft processed from January to June, 1978, the shop would discharge 2866 lb. of chromium, 52,972 lb. of phenol, and 71 lb. of cyanide to the industrial treatment facility in a 6 month period.

Approximately 400,000 lb/yr of glass beads are used as abrasive blast on aircraft. The waste beads are currently drummed and disposed of offsite by a contractor. Before 1981, the glass beads were disposed into the St. Johns River.

6.3.12.3 Metal Treating Shop (93113)

This shop performs miscellaneous metal finishing and treating operations. The shop has 42 tanks containing various metal treating solutions and rinse waters. Many of the metal treating formulations are replenished by adding chemicals as specified by the Materials Engineering Laboratory. The tanks are therefore emptied only at long intervals. For example the alodine tank has been emptied only twice in 14 years according to the shop's records. Table 6.3-4 summarizes the major waste types, quantities, and disposal practices of this shop.

TABLE 6.3-3
Chemical Wastes From Paint Stripping And Conversion Coating Operations

Chemicals	Aircraft Model (No. Processed Jan-Jun 78) A-7E(54)	A-7(116)	P-3(28)	Misc.(12)
Chromium(Cr) fm stripper(lbs.)	14.9	8.7	23.2	9.9
Phenol fm stripper (lbs.)	304	179	477	203
Chromium(Cr) fm alodine (lbs.)	1.13	1.13	2.8	1.1
Cyanide (CN) fm alodine (lbs.)	0.28	0.28	0.7	0.3

NOTES:

(1) Excessive stripper was used on the A-7E because of a special coating.

(2) Only one P-3 can be stripped at a time, but two A-7 aircraft can be stripped at once.

(3) The workload for the period investigated is 2-3 times normal due to a special program requirement.

(4) Stripping shed used approximately 1,000 gallons of stripper and 20 pounds of alodine per week in 1978. These enter the drain in a fairly constant volume.

(5) Calculations for amounts of various chemicals are based on composition of manufacturer's material presently in use. TURCO 6037 is 12.3 percent by weight phenol, 1.75 percent by weight sodium chromate. ALODINE 1200 is 20-30 percent chromium (Cr) and 5-10 percent cyanide (Cn).

Source: O'Brien, 1979

TABLE 6.3-4
Metal Treating Shop Wastes

Waste Type	Waste Quantity	Present Disposal Practice	Past Disposal Practice
Chromic acid (1 lb/100 gal)	6.7 lb/yr.	(not used) since 1973	until 1973
Excelgold 1200	1050 gal (total)	*	all in 1980
Alodine	80 oz./yr	*	(disposed twice in 14 yrs.)
Chromate	1140 gal/yr. (3 tanks, total capacity 3450 gal)	IWWTP	IWWTP
Sodium Dichromate	730 gal capacity	IWWTP	IWWTP
Parcolube	360 gal/yr.	*	*
Parcolube sealer	760 gal/yr.	*	*
Sulfuric Acid	av. 80 gal/yr.	*	*
Hydrochloric Acid	av. 50 gal/yr. (300 gal capacity)	*	*
Metralux	(315 gal capacity)	(not used since 1977)	*
Phosphoric Acid	315 gal every 4 yrs.	*	*
Trichloroethylene	100 gal total	(Not used)	until 1977
1,1,1,-Trichloroethane		(100 gal on hand)	*
Sodium hydroxide	460 gal every 1.5 yr.	IWWTP	Drain
Nickel Acetate sealer	av. 20 gal/yr (100 gal every 5 yrs.)	*	*
Black Dye	av. 20 gal/yr. (100 gal every 5 yrs.)	*	*
Potassium Bifluoride	av. 76 gal/yr. (380 gal capacity)	IWWTP	IWWTP
Black Oxide for stainless	220 gal/yr.	*	*

Note: *A disposal practice could not be determined by the NACIP team.

6.3.12.4 Component Finish Shop (93115)

This shop paints small aircraft components (propellers, control surfaces, etc.). The operation generates approximately five 55 gallon drums of paint shop and solvent wastes per week. Paint shop wastes (600 gpw), cold carbon remover (200 gpw), and vapor degreasing solvents (300 gpw) are stored together in an underground tank (Tank 11 9K). Two or three times per month NY-TREX, Inc. disposes of the waste under contract No. N62467-82-B-2468. The waste has been manifested as F017 which is a RCRA listing for paint wastes. It has been determined that the underground storage tank held a mixture containing listed waste F001 (spent halogenated solvents used in degreasing: tetrachloroethylene, trichloroethylene, etc.). In the past, these wastes were disposed in the solvent pit at the registered base disposal site, Site No. 26. Clean-up of this site is underway.

6.3.12.5 Aircraft Finish Shop (93116)

The function of this shop is painting airframes before assembly of components. The operation generates approximately three 55 gallon drums of paint shops and solvent wastes per week. Currently, these wastes are disposed of through contract No. N62467-82-B-2460. Until 1978, Plant Maintenance practice was to dispose the wastes in the solvent pit at the registered base disposal site, Site No. 26. This site is currently undergoing clean-up.

6.3.12.6 Plating Shop (96225)

The plating shop, which has been in operation since 1962, performs metal plating with nickel, copper, silver, chromium, tin, and lead. Table 6.3-5 summarizes the major hazardous materials discharged in rinse waters to the industrial waste water treatment plant, according to a NARF report. In addition, spent sodium hydroxide (100 gal/ year) and sulfuric acid and other acids (150 gal/year) are collected in drums for treatment at the industrial wastewater treatment plant. Prior to construction of the central industrial waste treatment facility, a small plating waste treatment facility (for cyanide reduction and chromium reduction) adjacent to the shop, was used. Tricholoroethylene waste (ten 55 gallon drums per year) is currently being disposed of off-site by a contractor. In the past, it was disposed of in the solvent pit at the registered base disposal site, Site No. 26. This site is currently undergoing clean-up.

6.3.12.7 Cleaning Shop (96223)

The cleaning shop cleans engines and engine parts. Chemicals and materials used by the shop include: silicate stripper, sodium hydroxide, chromic acid, potassium permanaganate, sodium chromate, sodium dichromate, 1,1,1-trichloroethane, dichloromethane, phosphoric acid, corrosion remover, steam cleaning compound, cold carbon remover, and alodine. It is estimated that 92 oz. of sodium dichromate and 62 oz. of chromic acid per week are discharged to the industrial wastewater treatment plant. Approximately 220 gallons of trichloroethane per week from this operation is disposed of off-site by contract.

TABLE 6.3-5

Hazardous Materials Routinely Discharged in
Rinse Waters in Plating Shop (96225) Operations

Chemical	Events/Day	Amount/Event (Oz.)
Chromic acid	1-1/3	160
Nickel sulfamate	2	66
Cadmium oxide	2 days/wk, every 30 minutes	1.5
Silver cyanide	14	1.6
Potassium cyanide	14	0.2
Sodium cyanide (with copper or cadmium plating bath)	20	5.1
Copper cyanide	14	0.5
Nickel chloride/sulfate	4	2
Lead/tin fluoborate	14	6.3

Source: O'Brien, 1979

The cleaning shop used trichloroethylene until 1978, and generated approximately the same amount (approximately 220 gallons per week) of waste solvent. Prior to 1979 these solvent wastes were disposed in the solvent pit at the registered base disposal site, Site No. 26, by Plant Maintenance. Site 26 is currently undergoing clean-up.

6.3.12.8 Paint Shop (96226)

This shop is responsible for painting engine parts. The shop uses the following chemicals and materials: acetone, xylene, cellosove, methyl ethyl ketone, toluene, 1,1,1-trichloroethane, enamels, lacquers, zinc chromate primer, thinners, sermetal. Approximately two to three gallons of waste per day is generated from this shop's operation. This material is stored in waste cans for off-site disposal by contract. Until 1978 these wastes were disposed of in the solvent and paint waste pit at the registered base disposal site, Site No. 26, which is currently undergoing clean-up.

6.3.12.9 Plant Services Division, Battery Shop (65210)

This shop, repairs nickel/cadmium and lead acid batteries. The shop has been in Building 125 since approximately 1959. In 1973 H-2 and H-3 helicopters arrived on base necessitating the splitting of the shop into acid and alkaline areas. Currently, unusable nickel/cadmuim cells (approximately 120 cubic feet) are being stored in an outside area behind the shop (Building 125). Spent electrolyte (Nos. 1275 and 1250) from lead/acid batteries has been routinely disposed into a lead - lined sink which discharges to ground behind the building, Site No. 14.

6.3.12.10 Avionics Division, Instrument Branch (94100)

The shops in the instrument branch are responsible for maintenance and repair of aviation instruments. Operations in this branch which generate wastes include painting of instrument parts, photographic processes, and electroplating. Less than 5 gallons of paint and paint thinner waste are generated per week. These wastes are collected by Plant Maintenance and disposed off-site via contractors. For approximately 36 years these wastes were disposed in the solvent pit at the registered base disposal area, Site No. 26. Developer wastes are dumped down the sink into the industrial wastewater treatment system, as is the very small volume of electroplating wastes.

6.3.12.11 Avionics Division, Calibration Laboratory Branch (94400)

Employees interviewed in other NARF shops reported that waste mercury from broken manometers and other instruments was sent to Avionics for disposal. The Calibration Laboratory also had instruments containing mercury and as such was also a source of waste mercury. For approximately 36 years as much as two to three quarts per year of mercury was disposed.

6.3.13 Water Treatment Plant

The treatment plant consist of the raw water supply wells, aerators for hydrogen sulfide aeration, ground storage, service pumps and chlorination for disinfection. Chlorine is applied to disinfect the delivered

water and to aid in chemical oxidation of hydrogen sulfide. The chlorine is stored inside the water plant structures in separate rooms. No significant problem has been reported with the storage method.

6.3.14 Naval Regional Medical Center

Medical and dental laboratories in the NRMC use small quantities of chemicals (e.g., mercury) which are routinely disposed of into the sanitary sewer system. The Nuclear Medicine Department keeps on hand various radiochemicals. The department has a licensed "hot sink" for disposal of low levels of radioactive wastes. Approximately 2 millicuries per month of ^{125}I (iodine-125) from radioimmunoassays and 3 picocuries of ^{57}Co (cobalt-57) per month are disposed to the sanitary sewer, in accordance with NRC (Nuclear Regulatory Commission) regulations.

The NRMC is conducting a drug screening program which results in the generation of water contaminated with radioactive isotopes (^{125}I). This material is currently being drummed and disposed of off-site.

6.4 RADIOLOGICAL OPERATIONS

6.4.1 General

A history of the uses and disposition of sources of low level ionizing radiation at NAS Jacksonville was obtained from available records and interviews with station personnel. Sources of low level ionizing radiation have been present at NAS Jacksonville, primarily in the from of luminoius instrument dials, since the origin of the station. Use of radioisotopes in other aircraft parts constitutes another source of low level ionizing radiation. Low level radioisotopes and ionizing radiation sources are also present at the Naval Regional Medical Center.

6.4.2 Aircraft Operations

With the development of aircraft came the need to produce gauge and dial faces that the pilot would be able to read during night-time operations. Luminous paints utilized in the watch and clock industry were ideal for this application and thus found direct and immediate application into the aircraft gauge and dial industry. Luminous paints consist of a compound capable of emitting light when energy is imparted to it (a phosphor) coupled with the required source of energy. This needed source of energy can be provided in a number of ways, however, one that was readily identified, was very effective and found widespread use was radioactive material, usually radium-226. The use of radium-226 by the luminous dial industries was uncontrolled and each gauge or dial contains a relatively small quantity of radioactive material. However, in aircraft maintenance operations where a large number of these gauges and dials are used, maintained, repaired, stored, and calibrated, the quantity of radioactive material can become significant, with any personnel involvement resulting in low-level radiation exposure. If as a result of these maintenance operations the radioactive material is disturbed or dislodged from the gauge or dial face, that work area can then become radioactively contaminated and this presents a personnel contamination hazard.

The Naval Air Rework Facility (NARF) at NAS Jacksonville overhauls and maintains naval aircraft. Several of the shops in NARF have handled aircraft instruments with radium dials. Aircraft instrument dial stripping operations took place during and after World War II. A review of records and interviews with station personnel indicated that these gauges and dials were used, maintained, repaired, stored, and calibrated in various shops in NARF. In the period during and after World War II paint wastes were disposed in several locations on the station, as described in Section 6.6. Instrument dials were also disposed on-site. In more recent years disposal was handled by the Naval Supply Systems Command in Norfolk. These materials were then packaged and shipped to a disposal site. Other sources of ionizing radiation from aircraft include vacuum tubes which are part of aircraft exciter systems, as well as uranium counterweight used in naval aircraft.

6.4.3 Naval Regional Medical Center NRMC

The Nuclear Medicine Department of the NRMC uses various radioisotopes and posseses equipment which are sources of ionizing radiation. These sources and disposal practices were described in Section 6.3.14.

6.5 HAZARDOUS MATERIALS STORAGE OPERATIONS

The NAS currently has never had a centralized hazardous materials storage area. Hazardous materials are stored in a number of areas on the station. Shops in NARF limit storage of all chemicals to several days supply. Drummed chemicals are stored outdoors in various locations on wooden pallets. These storage areas are fenced or cordoned off and labelled with hazard warning signs.

Drummed chemical wastes are also stored in outdoor storage areas. An area near the industrial pretreatment lift station is used for this purpose. Paint waste drums are located outside hangars and buildings where aircraft and aircraft parts are painted. The paint wastes are then collected for disposal off-site by a contractor.

Waste solvents generated by NARF are placed in a 27,200 gallon buried storage tank. A waste collection contractor, NY-TREX, Inc, collects approximately 50,000 gallons annually in 5,000 gallon increments. The waste solvent contains methylene chloride, methylethylketone, ethylacetate, trichloroethalene, methyl isobutyl ketone, n-butylacetate, and xylene.

6.6 WASTE DISPOSAL OPERATIONS

NAS JACKSONVILLE

The FCHA staff has identified 38 potential contamination sites during the investigation at the NAS Jacksonville during the week of 28 June 1982 (Figure 6.6-1 Table 6.6-1). Sites 26 and 27 were identified under Naval Facilities Engineering Command Contract No. N6246-78-C-0717, 1980. They have been identified for the purpose of avoiding duplication of effort. The NAS Jacksonville oil and solvent disposal areas in the registered base disposal area, Site No. 26, and the polychlorinated biphenyl (PCB) storage area (Site No. 27) were registered with the United States Environmental Protection Agency on 11 June 1980. Both of these sites are currently under-

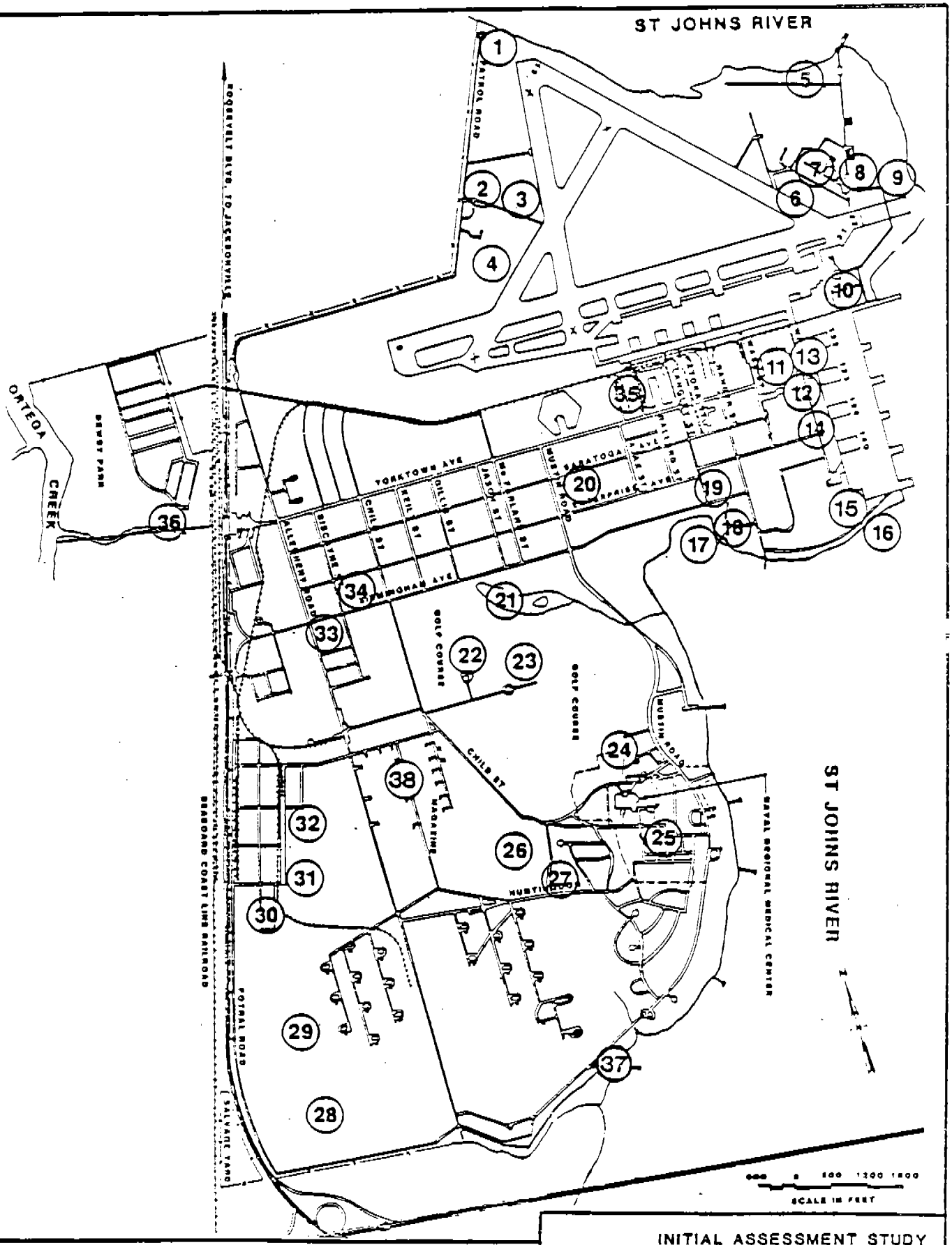

Figure 6.6-1 SPILL/DISPOSAL SITES IDENTIFIED BY IAS TEAM AT NAS JACKSONVILLE

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NAVAL AIR STATION
JACKSONVILLE, FLORIDA

TABLE 6.6-1

Potential Contamination Sites at NAS Jacksonville

Site No	Discription
1	Patrol Road Turn-around Site
2	Present Firefighting Training Area
3	Sludge Disposal Area /Sewage Treatment Plant Area
4	Pine Tree Planting Area
5	Shoreline Fill West of Fuel Barge Dock Site
6	Fuel Farm
7	JP-4 Explosion and Roof Collapse, Fuel Farm Area, Underground Tanks
8	Vacant Lot, Fuels Farm Area
9	Old Disposal Area (East of Fuel Farm)
10	Building 119, A-T
11	Hangar Building 101
12	Old Test Cell Building
13	Radium Paint Waste Disposal Pit
14	Battery Shop
15	Solvent and Paint Sludge Disposal Area (NARF)
16	Storm Sewer Discharge - Black Point
17	Glass Bead Disposal Area
18	Radioactive Waste Fill Area
19	Old Gas Station
20	Solid Waste Incinerator
21	Golf Course
22	"Ft. Dix"

TABLE 6.6-1(Con't)

Potential Contamination Sites at NAS Jacksonville

Site No	Discription
23	Old Skeet Range
24	Scrap Metal Disposal Area
25	Building No. 2038
26	Old Main Registered Disposal Area
27	PCB Storage Area
28	Fire Pit
29	Organic Disposal Area
30	Old Drum Lot
31	Asphalt Mix Area
32	Base Landfill
33	Base Service Station
34	Old Transformer Storage Building
35	Temporary PCB Storage Area
36	Dewey Park
37	Power Barge
38	Torpedo Rework Facility

going clean-up. These sites were also reported to the State of Florida Department of Environmental Regulation and the City of Jacksonville Bio-Environmental Service Division on 10 June 1980.

The PCB, solvent and waste oil contaminents have been clearly defined and are located in the immediate area of the disposal and spill sites. The PCB spill site and the solvent waste oil disposal area are completely fenced and the gates are securely locked. There are adequate warning signs posted at the sites and children do not play at these sites. The contaminent constituents are not a threat to the Station's drinking water supply. The Geraghty-Miller site investigation report states that since the surficial aquifer is not utilized for drinking purposes, there is no health hazard associated with the presence of the contaminent constituents in the surficial aquifer. NAS Jacksonville's drinking water source is the Floridan Aquifer which is very deep and more than adequately protected from infiltration by three overlays and a constant positive upward gradient pressure. Test Well No. S-14 is one of several groundwater monitoring wells under surveillance at the disposal site. The drinking water supply is monitored and no PCBs or other adverse constituents have been found.

Jacksonville has officially notified all of the required public agencies and has protected the St. Johns River from contaminents. Special projects for pollution abatement and restoration of the disposal sites have been prepared and are currently under design. The corrective projects have been funded. These projects are being accomplished and the matter of NAS Jacksonville disposal sites closed.

6.6.1 Patrol Road Turn-Around Site No. 1

This site is located north of the patrol road turn-around along the shoreline of the St. Johns River, at grid coordinates A-11, B-11, and B-12. This area has been used periodically for the disposal of construction debris in order to reclaim land and provide shoreline protection. The site contains rubble, consisting mostly of concrete and asphalt (see Photograph 6.6-1). The site is approximately 50 feet wide by 300 feet long. The specific date(s) of disposal and quantities disposed were not available. The site is now covered with vegetation with no visible environmental impacts. Only inert materials, which pose no threat to the environment or human health, were identified at this site. Therefore, a Confirmation Study is not recommended.

6.6.2 Present Firefighting Training Area, Site No. 2

This site is located in the immediate vicinity north of the sewage treatment plant at grid coordinates D-10. The site occupies an area approximately 100 feet wide by 100 feet long and contains junk vehicles which are used for firefighting training. These vehicles are ignited using JP-5 or waste oil as fuel. This area has been used for training from 1966 to the present. It has been estimated that approximately 6,000 gallons of fuel have been burned at this site annually. The area immediately surrounding the junk vehicles shows visible evidence of fire damage. Although there is a potential for liquids discharged to the ground to migrate offsite, the quantities are small and the associated risk minimal. Therefore a Confirmation Study is not recommended.

Photo 6.6-1

Site 1 Patrol Road Turn-Around

6.6.3 Sludge Disposal Area/Sewage Treatment Plant Area, Site No. 3

This site is located just north of the sewage treatment plant at grid coordinates D-10 (Figure 6.6-2). The dimensions of the sludge dump area are approximately 15 acres. Approximately 20,000 tons of sewage sludge containing toxic metals were dumped here from 1962 to 1980. However, the sludge is not hazardous under RCRA regulations, (see EP toxicity test data Appendix C). This site does not pose a potential threat to human health and the environment and therefore is not recommended for a Confirmation Study.

6.6.4 Pine Tree Planting Area, Site No. 4

This site is located approximately 200 feet southeast of the sewage treatment plant chemistry laboratory, Building No. 261L at coordinates E-10 (see detailed Figure 6.6-2). Until 1975 this area was reportedly used for the disposal of paint shavings, sewage sludge, asbestos, oil and other petroleum products. Inspection of the area yielded visual confirmation of paint shavings. Paint shavings were identified throughout the area, approximately 1 acre. Sewage sludge was identified in an area approximately 100 feet long by 100 feet wide. Heavy metals from this site may possibly migrate into the potable water supply. Therefore, this site is recommended for a Confirmation Study.

6.6.5 Shoreline Fill, West of Fuel Barge Dock Site No. 5

This area, used in the 1940s, is approximately 200 feet wide by 600 feet long and is located at grid coordinates C15 and 16. Visual inspection revealed that the materials disposed in this area were largely concrete runway debris. Because there is no evidence that the hazardous materials were disposed of at this site a Confirmation Study is not recommended.

6.6.6 Fuel Farm, Site No. 6

A fuel leak (No. 6 fuel oil) occurred in a pipeline at a connection to a buried tank. An unknown quantity of fuel leaked into the underground concrete lined "steampit" which is located at the watertable. Therefore the pit contains a quantity of water at the invert level for its entire length. The oil was reported to have floated on the surface of the water in the pit, and to have been contained within the concrete pit. After this was discovered, all the oil was pumped out. Because the oil was contained in the "steampit" and subsequently removed, a Confirmation Study is not recommended.

6.6.7 JP-4 Explosion and Roof Collapse, Fuel Farm Area, Underground Tanks, Site No. 7

This area is located west of Catapult Road at coordinates E-15. Reportedly explosions involving underground tanks occured in this area in 1978 and 1979. The explosion and fire in an underground tank in 1978 resulted in pumping of the residual fuel, not consumed by fire, into tank trucks and hauling it off-site for disposal as waste oil. Because the fuel was contained in the tank and subsequently removed, a Confirmation Study is not recommended.

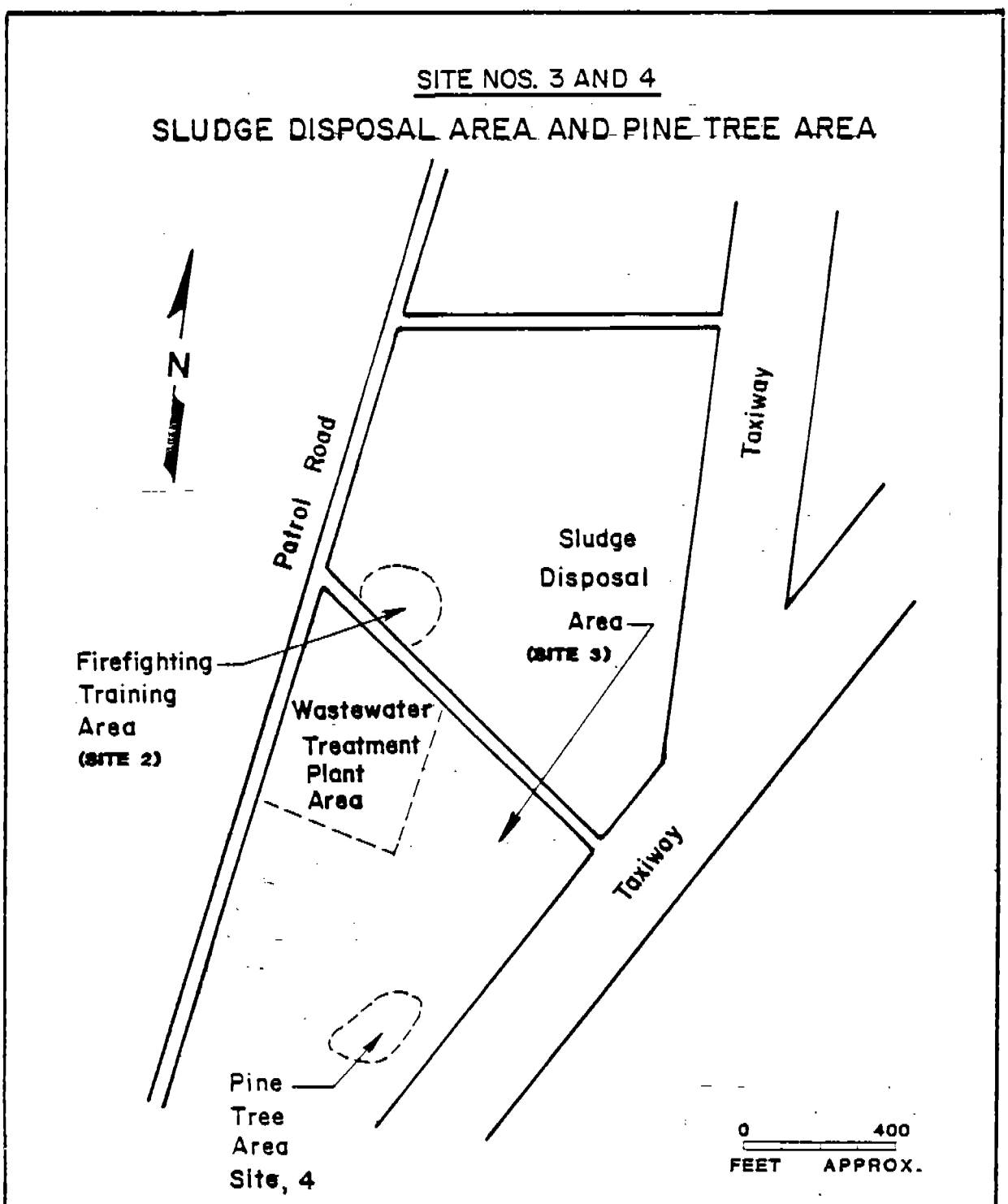

Figure 6.6-2 SITES 3 AND 4 - SLUDGE DISPOSAL AND PINE TREE AREAS

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6.6.8 Vacant Lot, Fuels Farm Area, Site No. 8

This area (200 feet X 100 feet) is located adjacent to the east side of Catapult Road at coordinates E-16 (see detailed Figure 6.6-3). As indicated by an aerial photo dated September 1976, the area was used for parking aircraft (approximately 5 fighter planes). Inspection of the site revealed four piles (possibly abrasive blast grit) and two disintegrated plastic bags of fine granular materials. Due to the minimal quantites at this site, this site has not been recommended for a Confirmation Study.

6.6.9 Old Disposal Area (East of Fuel Farm), Site No. 9

This site is approximately 200 feet wide by 400 feet long and located east of Catapult Road along the shoreline of the St. John's River at grid coordinates E-16 (See Photograph 6.6-2 and detailed Figure 6.6-3). This site contains garbage, construction debris, and a few 55-gallon drums. This material was disposed for approximately one year during the years 1977-1978. Soil tests conducted in this area have shown high chromium levels, indicating that industrial wastes (i.e., chromium sludge) may have been disposed in this area. Due to the level of toxic chromium and hydrological conditions conducive to migration, this site is recommended for a Confirmation Study.

6.6.10 Building 119 (A-T), Site No. 10

Approximately 600 gallons of hot stripper, MIL-R-81835 or Turco 3823 are currently stored in an underground steel tank (capacity 25,000 gal.) in the vicinity of Building 119, at coordinates G-15. The contents of the tank are intended to be disposed of offsite by contract. This tank is used for the temporary storage of hazardous waste and while there is a potential for leakage there is no evidence to support that this has occured. As such, the tank does not currently classify as a disposal site, consequently a Confirmation Study is not recommended.

6.6.11 Hangar Building 101, Site No. 11

The floor of the main hanger section of Building 101, coordinates H-13,14, is constructed of steel plates over steel beams (Figure 6.6-4). Reportedly unauthorized disposal of waste solvents and other materials below the old floor boards occurred for many years. Approximately 2,000 gal. of solvents may have been disposed, (assume 1 gal per wk over 40 yr. period). In 1975 a fire broke out below the steel plates (Figure 6.6-5). Infiltration of waste solvents and other flammable liquids from deteriorated industrial sewer lines or disposal may also be responsible for the presence of flammable materials under the hanger floor. Information about specific waste materials was not available. However, any chemical used in Building 101, such as TCE and oils, might potentially reach this area. The quantity of materials spilled may be significant and therefore, this site is recommended for a Confirmation Study.

In addition, a spill of more than 150 lb of mercury also occurred in the "old pump shop" in Building 101 (coordinates H-14). Although most of the spilled mercury was removed and sent for reclaiming, reportedly some was not removed and remained at the site.

SITE NOS. 8 AND 9

VACANT LOT – FUEL FARM AREA
OLD DISPOSAL AREA EAST OF FUEL FARM

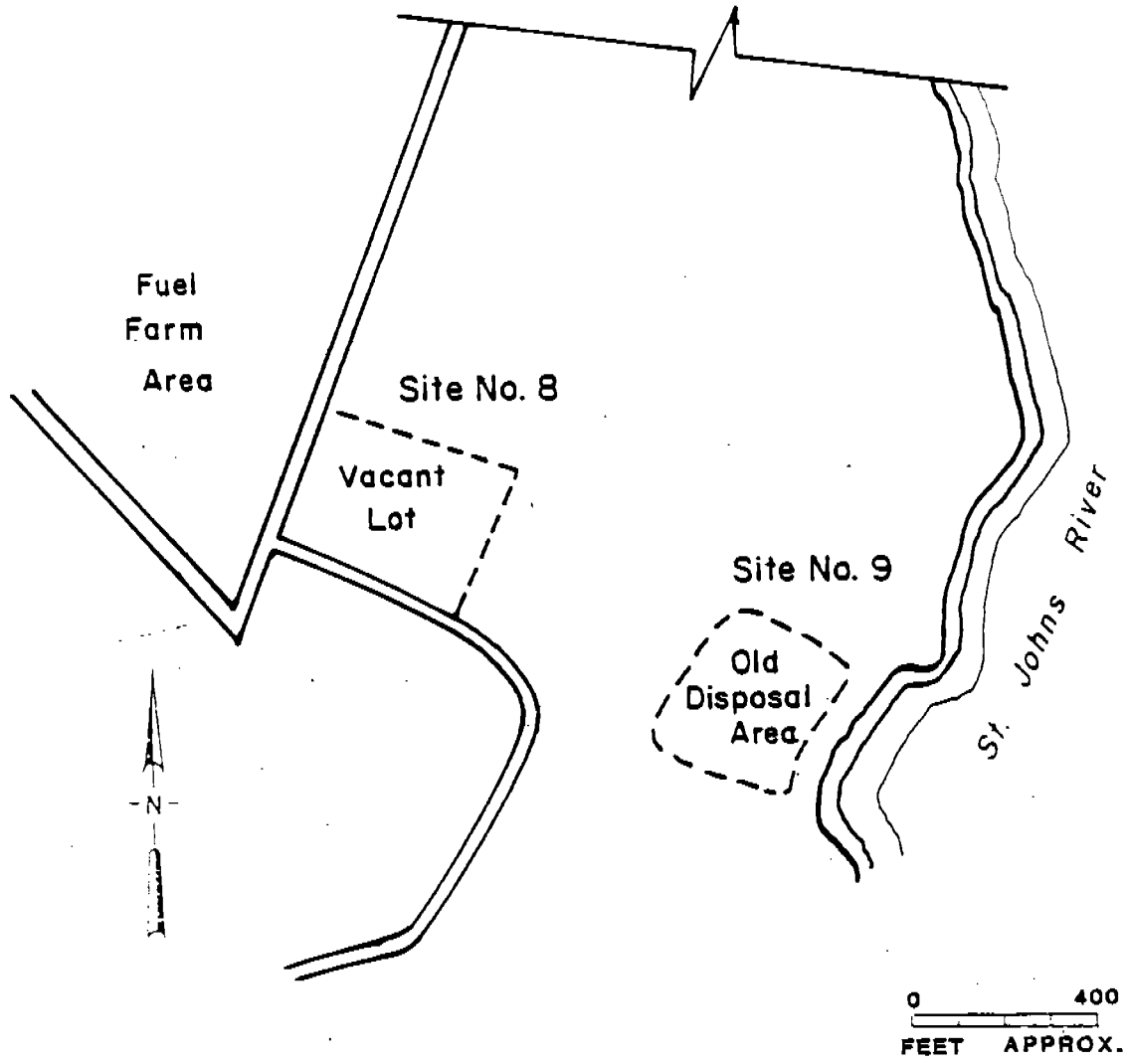

Figure 6.6-3 SITES 8 & 9 VACANT LOT, AND OLD DISPOSAL AREA

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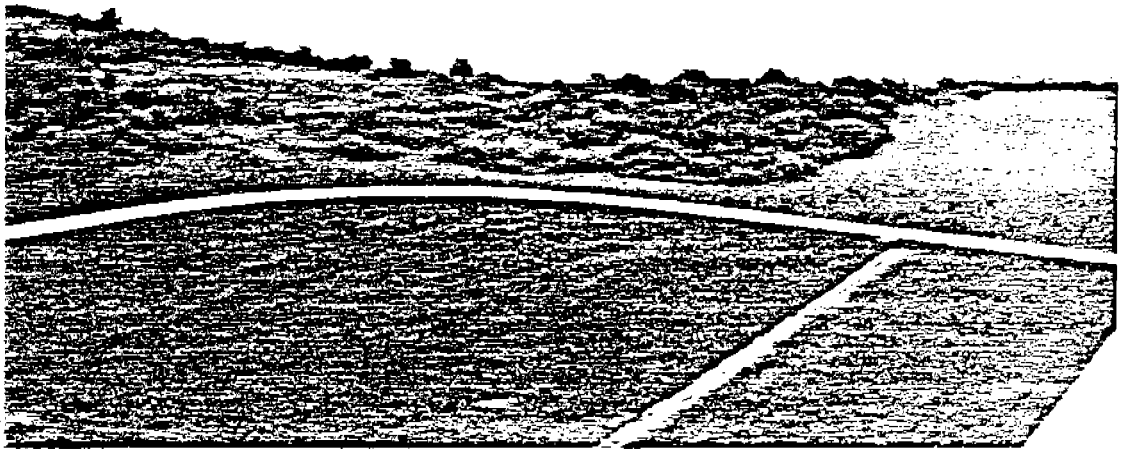
Photo 6.6-2

Site 9 - Old Disposal (East Fuel Farm) Area



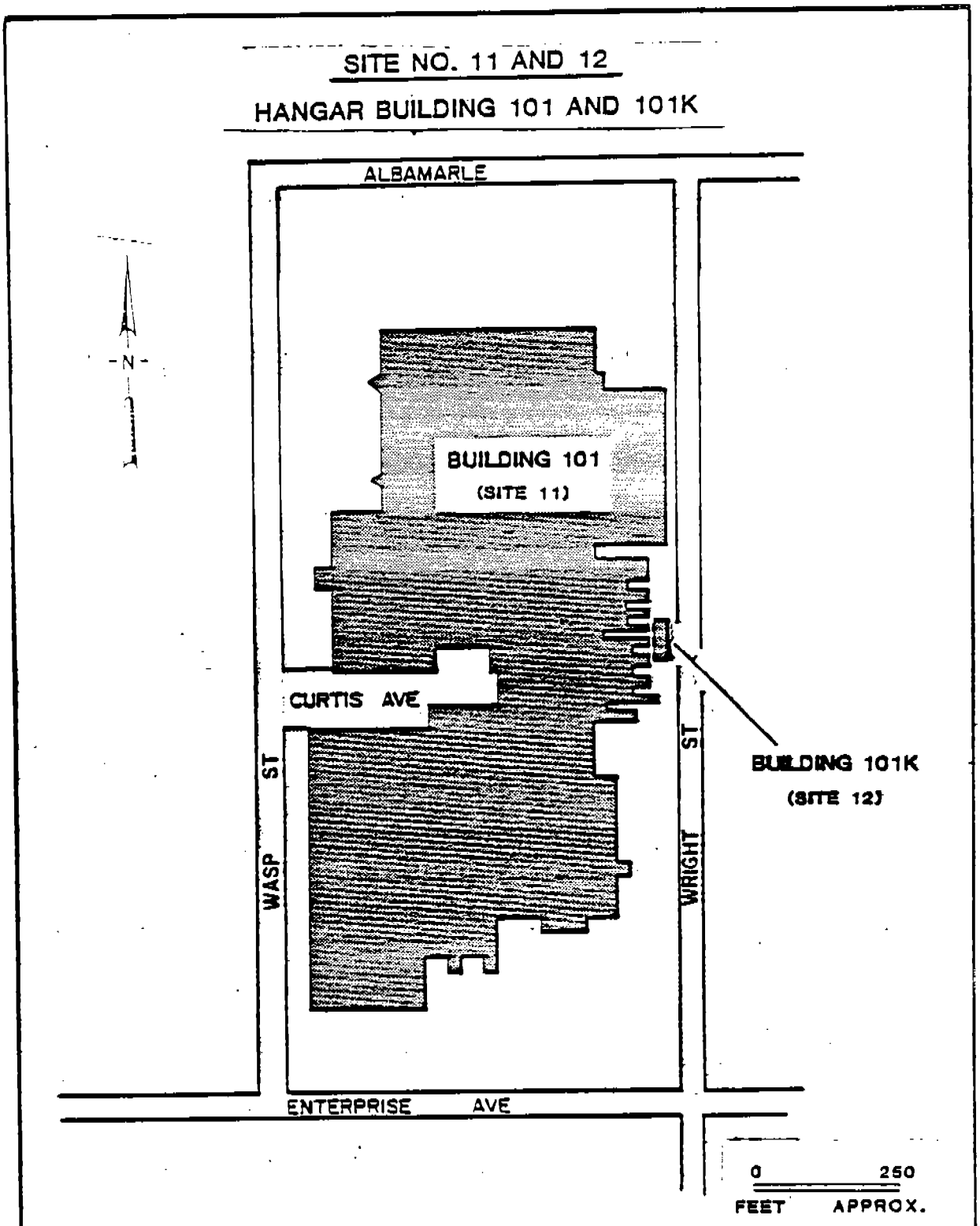


Figure 6.6-4 SITES 11 and 12 - HANGAR BUILDING 101 AND BUILDING 101K

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Figure 6.6-5 Fire Caused by Flammable Wastes Under Hangar 101 floor

6.6.12 Old Test Cell Building, Site No. 12

Reportedly there are interconnections of the storm and sanitary sewers with the building roof drains and the industrial sewer system in the old test cell area, Building 101 k (coordinates H-14) (see detailed Figure 6.6-4). In addition, it was reported that numerous spills of chemicals from ruptured or rusted drums occurred at this site. Due to the quantity and toxic and reactive nature of the materials used at the site, this site is recommended for a Confirmation Study.

6.6.13 Radium Paint Waste Disposal Pit, Site No. 13

The area north of Building 167 coordinates H-14 was used for the disposal of radioactive radium paint waste from aircraft instrument dial painting operations which took place at NARF during World War II and continued until the late 1950's. These wastes were disposed into a burial pit approximately 40 ft by 50 ft by 0.75 ft deep and contained the paint wastes mixed with soil. This site was excavated in the late 50's. At the time of excavation, radioactivity readings at the surface taken with a radiation survey meter were in the range of 3 to 5 mR/hr above background. The contaminated soil was moved to another site (see Radioactive Waste Fill Area, Site No. 18) described later in this section.

It is unlikely that this site was used for disposal of other radioactive wastes. At the time this site was used, the only other radioactive materials which were disposed of at NARF were electron tubes from aircraft exciter systems and drogue lights, used for night-time aircraft refueling. It was common practice to pack these items in 5 gallon cans, fill the cans with cement, and dispose them at sea from aircraft. Because the hazardous materials were removed and no residual contamination has been detected, this site is not recommended for a Confirmation Study.

6.6.14 Battery Shop, Site No. 14

The battery shop is located in Building 125 at coordinates I-14 (see detailed Figure 6.6-6). The shop contains a seepage pit where waste acids from lead-acid batteries were disposed. Approximately 100 gallons of waste were dumped annually from 1959 to 1982. Due to the quantity of wastes disposed, disposal method, and hydrogeological conditions in the area this site is recommended for a Confirmation Study.

6.6.15 Solvent and Paint Sludge Disposal Area (NARF), Site No. 15

This area approximately 100 feet by 100 feet is located along the eastern side of Building 970 (see detailed Figure 6.6-7). The area was used for disposal of solvents and paint sludges as recently as 1978. A 1978 photograph (Figure 6.6-8) shows the lack of vegetation in large patches where the soil is caked and cracked. Another photograph showed a white residue on the soil. The soil was tested by the Materials Engineering Laboratory and reportedly showed presence of "solvents of all types".

This area was used for the disposal of waste solvents and paints. Based on current operations, it is estimated that up to 2,000 gallons of these wastes were disposed of at this site annually for approximately 36

SITE NO. 14

BATTERY SHOP

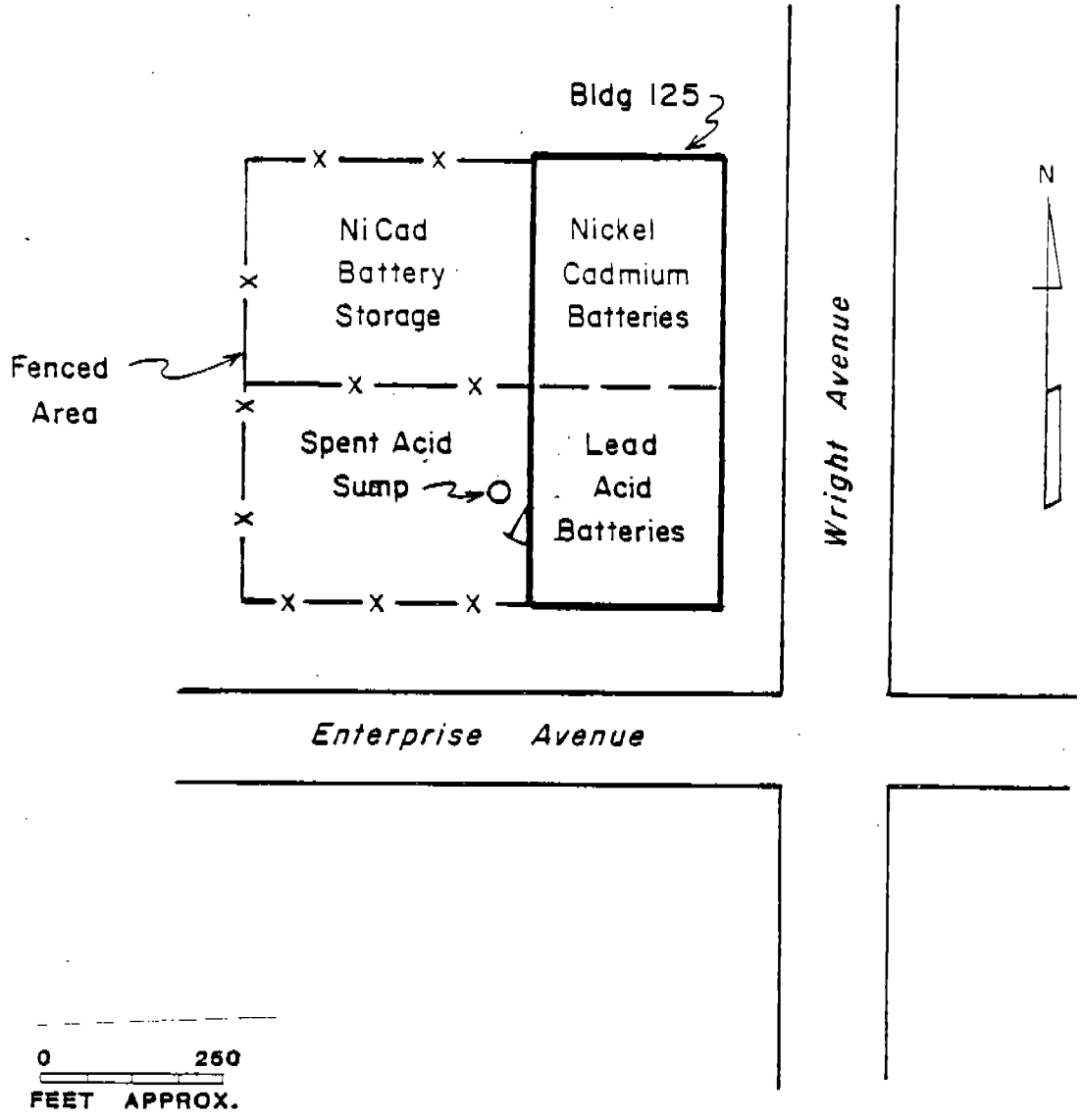

Figure 6.6-6 SITE 14 BATTERY SHOP.

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SITE NO. 15

SOLVENT AND PAINT SLUDGE DISPOSAL AREA

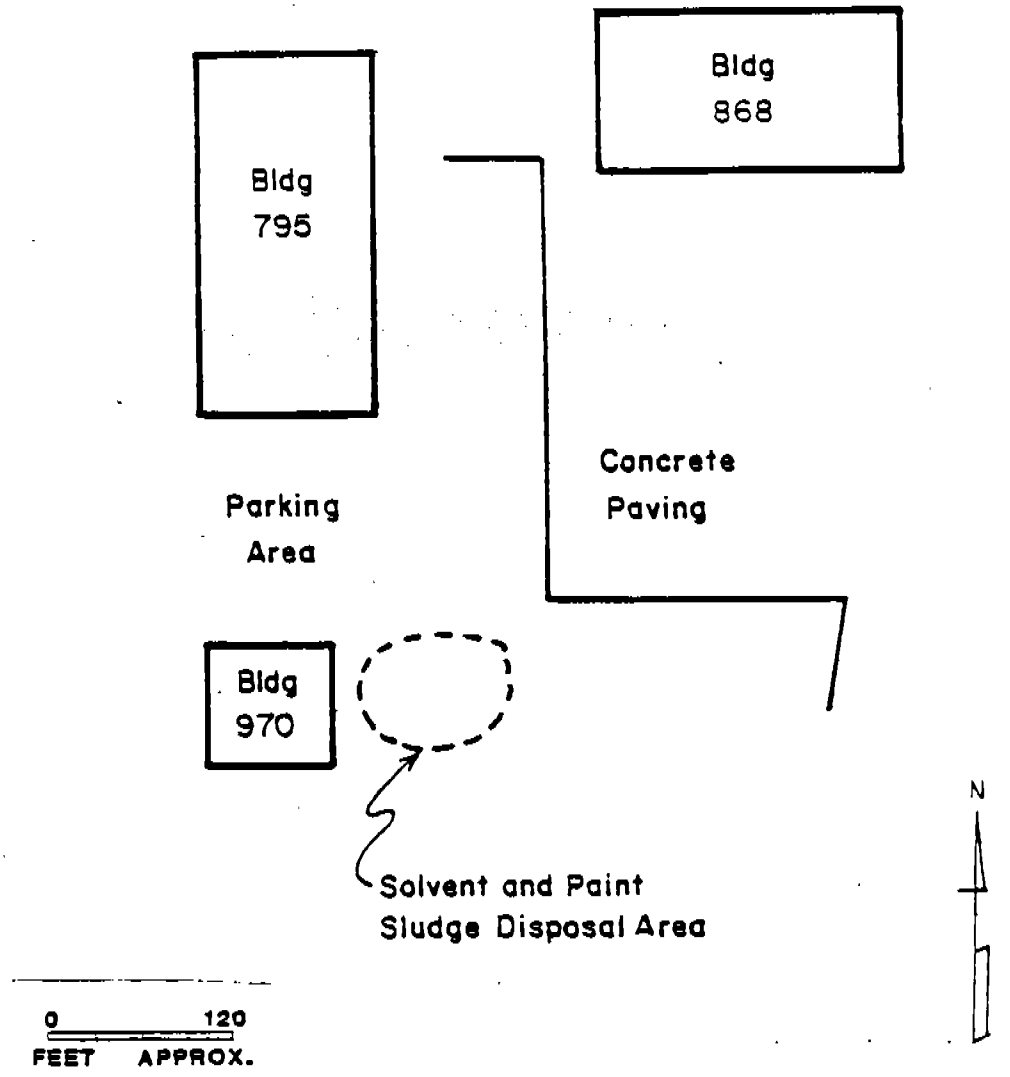

Figure 6.6-7 SITE 15 SOLVENT AND PAINT SLUDGE DISPOSAL AREA (NARF)

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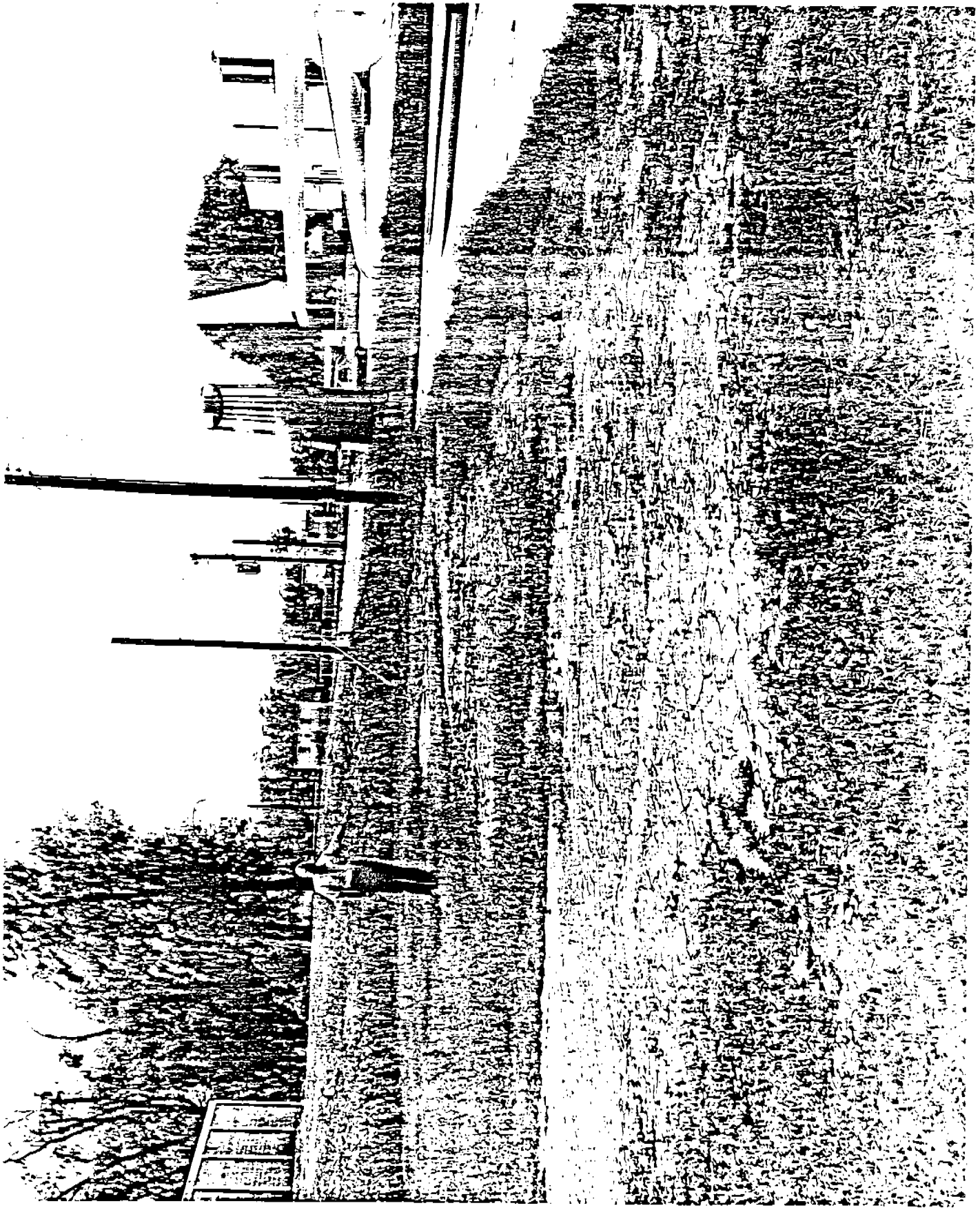
Figure 6.6-8 Area near Building 970 where solvents and paint sludge were dispos



years. This site is characterized by large quantities of hazardous materials and hydrogeologic conditions conducive to migration off-site. Therefore, this site is recommended for a Confirmation Study.

6.6.16 Storm Sewer Discharge - Black Point, Site No. 16

The storm sewer runs along buildings 101, 50, 795, coordinates J, K-15 and discharges at Black Point (see detailed Figure 6.6-9). There has been a re-occurring discharge of JP-5 fuel and oil which are believed to come from a fuel tank overflow in the vicinity of test cell 12, and possibly a variety of other sources in the NARF area. An oil boom was installed at the outfall to contain the oil (see Photograph 6.6-3). Over the years various chemical wastes from NARF were reportedly disposed of by discharge into the storm sewer system, eroded the sewer and leached into the ground. It is difficult to estimate the volume of material disposed of in this way, but it is likely that a variety of chemical wastes may have been disposed/spilled on the ground and since have migrated back into the storm sewer. The storm sewer acts as a conduit to the St. Johns River. The possible discharge of toxic materials through the storm sewer to the St. Johns River poses a potential threat to human health and aquatic life in the river. Therefore, this site is recommended for a Confirmation Study.

6.6.17 Glass Bead Disposal Area, Site No. 17

This area is located approximately 10-15 feet from the shoreline at grid coordinates J-12 (see detailed Figure 6.6-10). The area was used for the disposal of spent glass beads used in the abrasive blasting operations conducted at NARF (Code 93112). Disposal of the spent glass beads in this off-shore area was started 1965 stopped in January, 1981. There is visible evidence of a "glass bead bar" that has been created as a result of off-shore dumping, (see Photograph 6.6-4).

NARF personnel report that approximately 400,000 lb. of the glass beads is used per year, and it can be expected that 80% (approx 300,000 lb.) per year may have been disposed at this site. The glass beads contain cadmium, chromium, nickel and lead. Table 6.6-2 presents the metal analysis of a sample of "wet process" bead blasting material. The blasting beads are considered a hazardous waste according to RCRA regulations, by virtue of the EP Toxicity test results (Table 6.6-3). Because of these results and because a large quantity was disposed of here a Confirmation Study is recommended.

Currently the glass beads used for blasting are stored in bags inside an aircraft maintenance building. The spent beads that are contaminated with cadmium are stored in drums and removed by a private contractor for disposal off-site.

6.6.18 Radioactive Waste Fill Area, Site No. 18

Radioactive radium paint wastes from aircraft instrument dial stripping operations at NARF during and after World War II were placed in a burial site (Site No. 21) in the NARF until the late 50's. When this operation ceased, the site was excavated, as described in Section 6.6.17. The contaminated soil, approximately 1500 cubic feet, was disposed of at a site

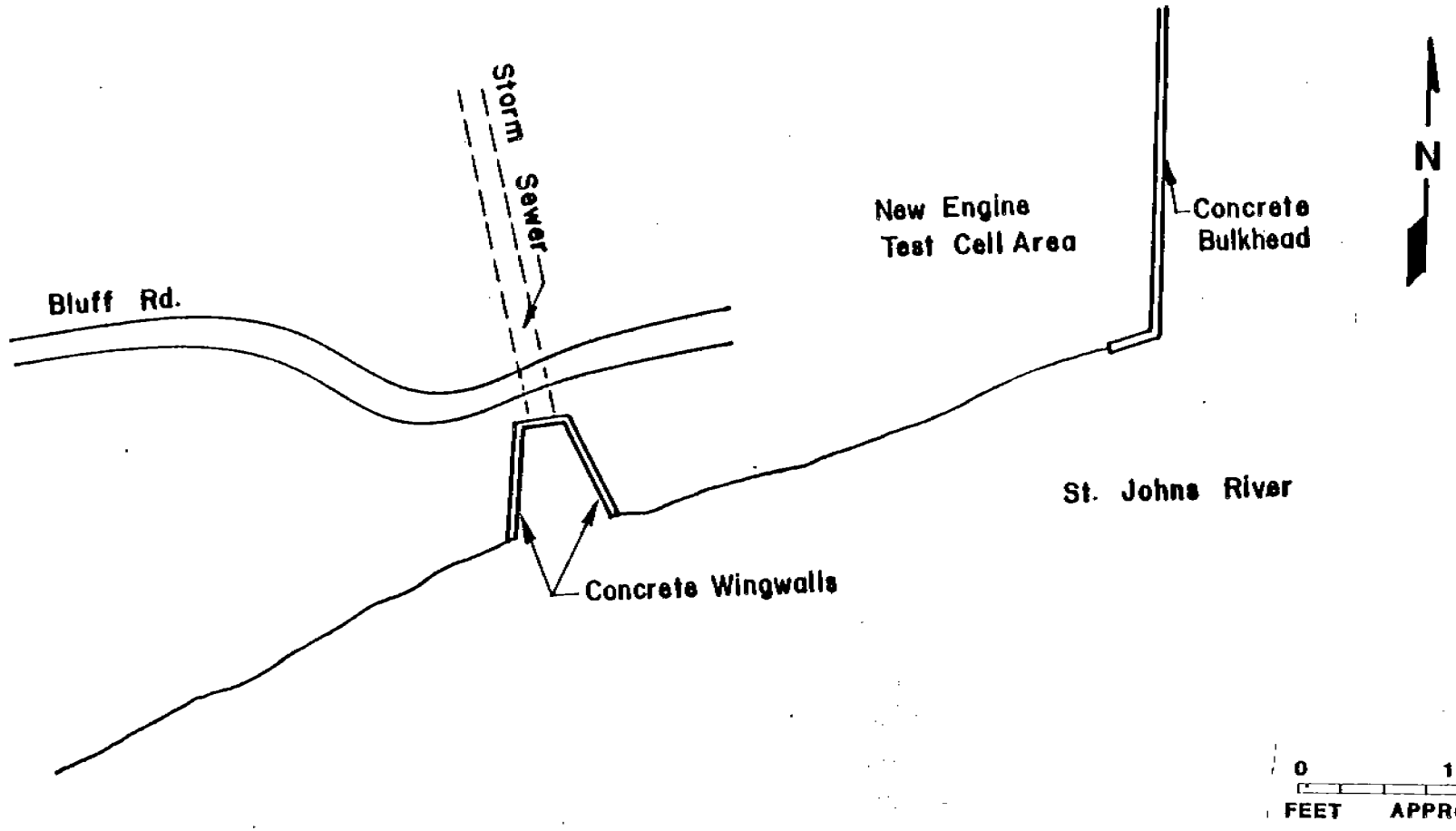


Figure 6.6-9 SITE 16 STORM SEWER DISCHARGE (BLACK POINT)

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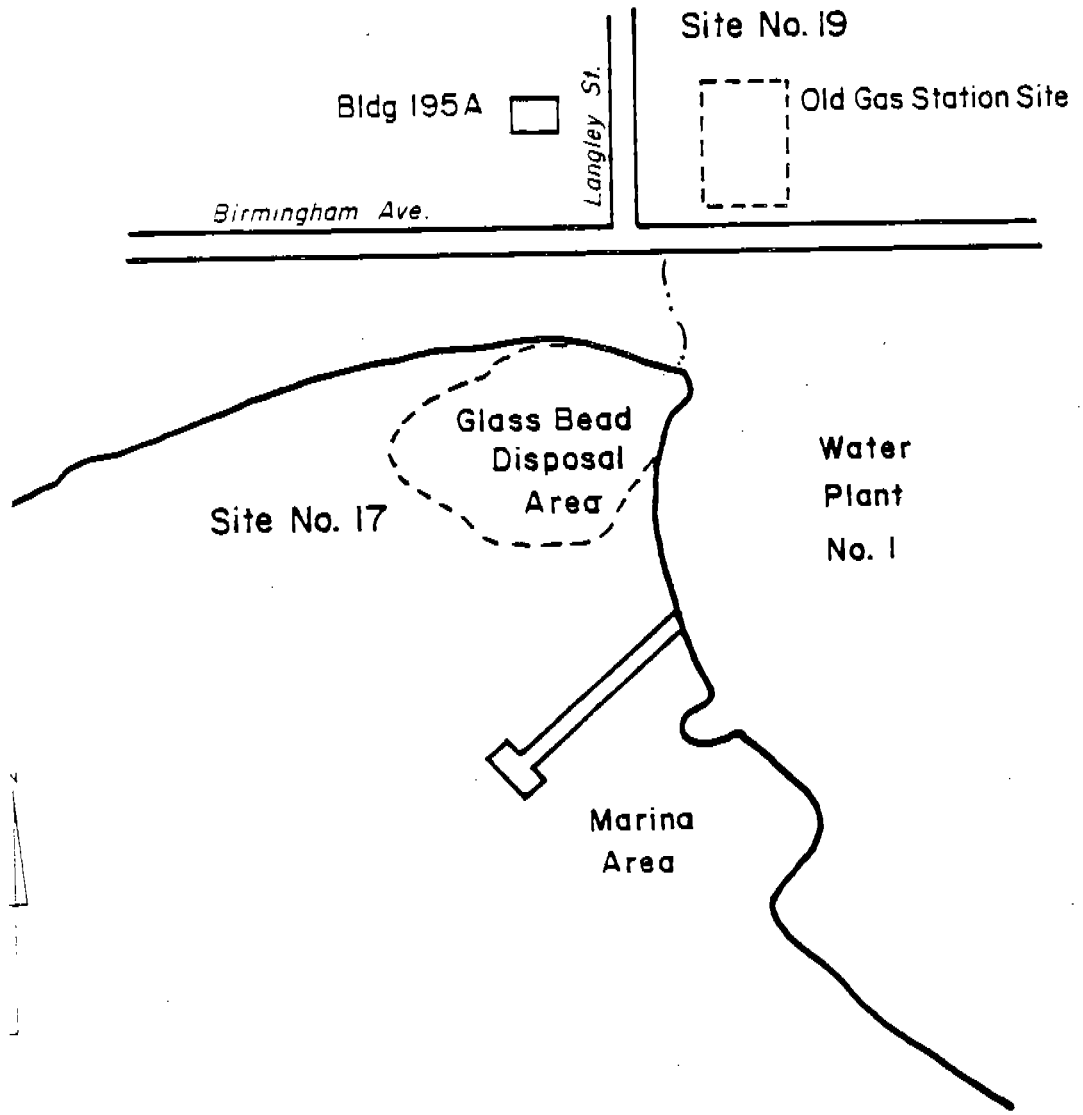
Photo 6.6-3

Site 16 - Storm Sewer Discharge Black Point

SITE NOS. 17 AND 19

GLASS BEAD DISPOSAL AREA AND OLD GAS STATION SITE



SITE 17 GLASS BEAD DISPOSAL AREA

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INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
JACKSONVILLE, FLORIDA

Photo 6.6-4

Site 17 - Glass Bead Disposal Area

TABLE 6.6-2

Chemical Analysis* of NARF Glass Bead Blasting Material (Wet Process Waste)

Parameter	Dried Solid Phase (mg/g)	Liquid Phase Only (mg/l)
Cadmium	120	0.61
Chromium	220	0.01
Copper	10	0.01
Nickel	670	0.55
Lead	460	0.05

*Analysis performed by Materials Engineering Division Laboratory, NARF, March 25, 1981.

TABLE 6.6-3

EP Toxicity Test Results* For Glass Bead Blasting Material

Parameter	EP Extract Concentration (mg/g)	Maximum Concentration*
Chromium	0	5.0
Cadmium	11	1.0
Nickel	2.4	--

*Source: Federal Register 45, No. 98 May 19, 1981, pp. 33122 - 33133.

*Analysis performed by Materials Engineering Division Laboratory, NARF, May 15, 1981.

near the shoreline in the vicinity of the present Marina No. 1 (coordinates J-12), This area was originally at water level, but was built up 3 to 5 ft. by the fill material. When excavated, radiation measurements of the soil (using a radiation survey meter) were reportedly 3 to 5 mR/hr. At the time of the site visit, surface measurements of radiation using a survey meter (NUCOR CRM 595 with CP 595 probe) were not significantly above background readings (0.15 mR/hr). The site has already been cleaned up and so poses no threat to human health or the environment, and therefore a Confirmation Study is not recommended.

6.6.19 Old Gas Station, Site No. 19

The old gas station Building 48 located at coordinates J-12 is currently the base garden center (see detailed Figure 6.6-10). The site contains two abandoned buried gasoline storage tanks and is in close proximity to the potable water well which was abandoned. There is a possibility that the abandoned gasoline tanks may be leaking gasoline into the ground where conditions are conducive to migration. Therefore, a Confirmation Study is recommended.

6.6.20 Solid Waste Incinerator, Site No. 20

The solid waste incinerator, Building 952, is located at coordinates I-10. The ash and solids are taken to the Clay County Landfill. There is no evidence of hazardous wastes either spilled or disposed of at this site. Therefore, a Confirmation Study is not recommended.

6.6.21 Golf Course, Site No. 21

The pesticides Dazonon and "Roundup" are occasionally applied to the golf course greens to control moles and crickets. On 30 April 1979 these pesticides were applied to the greens. On 6 May 1979 a fish kill resulted following several days of rain. The fish kill in Casa Linda Lake later was attributed to runoff of pesticides, specifically Dazonon, into the lake. This was an isolated incident. No further environmental damage was detected, therefore a Confirmation Study is not recommended.

6.6.22 "Ft. Dix", Site No. 22

The area known as Ft. Dix was reported to be used as a small arms ammo disposal area for target or skeet range. This area's dimensions are approximately 100 feet by 100 feet, and is located at grid coordinates K-7. There was no visible evidence of disposal during the site inspection. Because there is no substantiated evidence of disposal of hazardous materials, a Confirmation Study is not recommended.

6.6.23 Old Skeet Range, Site No. 23

In an area adjacent to the golf course, coordinates L-8, cinder piles and disturbed ground (indicating a possible disposal area) were identified. This area, which appeared to be an old sand pit, is approximately 500 feet long by 100 feet wide. Also observed were a few empty drums and engine containers that were pushed over an embankment and two (2) 2-inch white PVC standpipes. This site has not been recommended for a Confirmation

Study because only inert wastes were identified, and there is no evidence of hazardous materials disposal.

6.6.24 Scrap Metal Disposal Area, Site No. 24

The scrap metal disposal area is located adjacent to Building No. 497 at coordinates M-10. A new training center for housing management is being constructed at this site. There is scrap metal piled in the area along with assorted junk truck parts and empty drums, (see Photograph 6.6-5). There is no evidence of waste burial at the site, and excavation of soils for foundations yielded no evidence of contamination. Due to the types of materials disposed at this site and lack of evidence of soil contamination, a Confirmation Study is not required at this site.

6.6.25 Building No. 2038, Site No. 25

This area, adjacent to Building 2038 located at coordinates O-10 was used for the storage of hospital wastes containing radioactive iodine (^{125}I) and other radioisotopes. The site was cleaned up by a contractor, surveyed, and determined to be free of radiation.

Since 1979, as many as 25 barrels per month of these wastes, each containing approximately 500 to 700 microcuries of ^{125}I when fresh, were being generated. A total of approximately 300 barrels required offsite disposal. This disposal took place in June 1982, under the direction of Radiological Affairs Support Office (RASO). The empty barrels were left at the site. A Confirmation Study is not recommended for this site.

6.6.26 Old Main Registered Disposal Area Site No. 26

This area, located at coordinates N&J-8 and O-7&8 was used for the disposal of a variety of wastes including waste solvents and waste oils. Before 1940, the site was a vehicle graveyard. From 1940 to 1968, the site was operated as the NAS disposal area for trash, garbage, demolition and construction debris and waste oil. These wastes were burned at the edge of trenches and pits with the remains bulldozed into the trench and pits and covered. Air pollution control requirements halted burning and the wastes were then hauled off-site by contract. However, waste oil continued to be dumped in pits, and the NARF disposed of paint waste and solvents in a adjacent slurry pit. The site was officially closed January 15, 1979.

A portion of the disposal area was also used for the disposal of low level radioactive wastes during World War II and until approximately 1955. A report from the Commanding Officer of the Naval Civil Engineering Laboratory (Port Huememe, CA) dated February 1, 1973, described the radioactive waste as "radium-contaminated paint stripper, in vials." Instruments with radium dials and other low-level radioactive wastes were probably disposed there, according to other reports. Although the radiation levels measured at the time were not considered "high enough to cause ambient problems" (see report), there was concern that "if one of the vials should be picked up and carried, or if some of the contents of the vials should be accidently (sic) ingested, an unfortunate incident could occur." Therefore it was decided to decontaminate the area. The following description taken from a memo from the station safety manager to the commanding officer dated 31, July, 1973, provides an account of the cleanup.

Photo 6.6-5

Site 24 - Scrap Metal Disposal Area

Radioactive radium paint waste accumulated from aircraft instrument dial stripping operations in the Overhaul and Repair Department (now NARF) during and after World War II. The waste was bured in a remote area of the station dump (until approximately 1955) and the burial site was enclosed with a fence and posted with "Radioactive Materials" warning signs. After 1955, radioactive waste disposal was accomplished in accordance with Atomic Energy Commission Regulations under the technical direction of Mr. R. E. Byrd, Industrial Hygienist.

Plans for an enlisted personnel housing development, to be located hear the station dump, were completed in FY73; consequently, a decision was made to excavate and dispose of the accumulation of buried radioactive waste. A request for funds to implement the disposal project was submitted to the Pollution Abatement Control Agency and $30,000 was allocated for this purpose. A request was then submitted to the Radiological Affairs Support Office (RASO), Ft. Balvoir, Virginia, for assistance in the waste disposal project. Mr. Gene Hendrix, SW2 R. H. Quest and HM1 G. M. Jones were assigned to supervise excavation and packaging the waste. Also assigned to work in the project were the following NAS JAX Public Works employees: Mr. R. J. Wilson, Supervisor, Mr. J. J. Arnold, Heavy Equipment Operator and Mr. H. H. Cohens, Mr. S. Canady, Mr. D. M. McNair and Mr. N. Moxon, all Laborers.

The RASO Team arrived at NAS JAX on 11 May 1974 and the project was begun. The station furnished coveralls, rubber boots/gloves and dust respirators for the workforce; however, the dump area was very wet and RASO technicians did not require the use of respirators. Mr. Byrd obtained air flasks and collected breath samples of RASO personnel, six Public Works employees and himself, prior to excavation of the waste. Dirt within the burial site was excavated to the depth required to remove the radioactive contamination and the waste was packaged in 55 gallon steel drums. The drums were sealed with lids secured with bolted lock rings. Five hundred and one drums were filled, sealed and loaded on wood pallets, labeled with "Radioactive Materials, Low, Specific Activity: decals required by the Interstate Commerce Commission, and left inside the fenced dump area to await award of the disposal contract. Several drums were weighed and the total weight of 501 drums was estimated at 353,205 pounds.

A contract to dispose of the waste/dirt at Barnwell, South Caroline was awarded. The first load of waste was shipped on 8 July 1974 and the last load left the station on 22 July 1974. Total cost of the contract was $15,400., according to P. W. Maintenance Control Director.

Mr. Oakley called the Safety Manager on 23 July 1974 to inquire about contents of the drums in that water spilled out when the drums were removed from the R.R. cars. Mr. Hendrix return call on 24 July 1974 indicated that water which spilled out the

drums contained radioactive particles, which according to radiac instrument reading taken by Mr. Oakley, were insignificant for harmful radioactive exposure.

The Safety Manager and N.R.M.C. Industrial Hygienist jointly monitored the disposal project to insure incorporation of safety practices and expeditions removal of the waste from this activity. In essence, a confirmation study has already been completed for this site.

6.6.27 PCB Storage Area, Site No. 27

This area, approximately 100 feet by 100 feet is located at coordinates O-7&8, and was used for the outdoor storage of transformers containing PCB's. The transformers were vandalized in 1978 resulting in the spillage of transformer fluids on the ground. The transformers were removed and the PCB contaminated soil removed and disposed. The site was secured by an 8 foot chain link fence which has subsequently been taken down. A Confirmation Study has already been completed for this site.

6.6.28 Fire Pit, Site No. 28

This site was a former firefighting training area. The fire pit is located in the vicinity of Building 842 at coordinates R-3. Approximately 5-10 gallons/day of waste oil was placed in the pit and burned from 1946 to 1952. There was no visible evidence of the pit during the site survey and no conclusive evidence of disposal without burning. Therefore, a Confirmation Study is not recommended for this site.

6.6.29 Organic Disposal Area Site No. 29

The organic disposal area located at coordinates O&P-3 has been used for the disposal of organic debris (wood, grass clippings, etc.) However, inspection of the site yielded evidence of crushed drums (approximately 1 dozen), construction debris, discolored soil piles, scrap metals, and PVC cases. Reportedly materials other than organic debris have been disposed in this area in the past. However, quantities, types of wastes and dates were not obtainable (see Photograph 6.6-6. There is also an area approximately 50 feet wide and 5 feet high containing creosoted wood blocks.

In addition, the disposal area may have previously been used as a borrow pit. The disposal area is approximately 200 feet wide by 1,000 feet long. This side does not pose a threat to human health and the environment. As a consequence, a Confirmation Study is not recommended.

6.6.30 Old Drum Lot, Site No. 30

This site, located at coordinates O-3, was used for the outdoor, unprotected storage of drums containing raw products (see detailed Figure 6.6-11). The drums were stored on Marsden Matting. Approximately 10,000 drums were stored at this site from 1955 to 1967. Although there is no visible evidence of environmental impairment at this site, it was reported that from time to time drums containing hazardous materials corroded and leaked their contents onto the ground. Surface soils in the area were re-

Photo 6.6-6

Site 29 - Organic Disposal Area

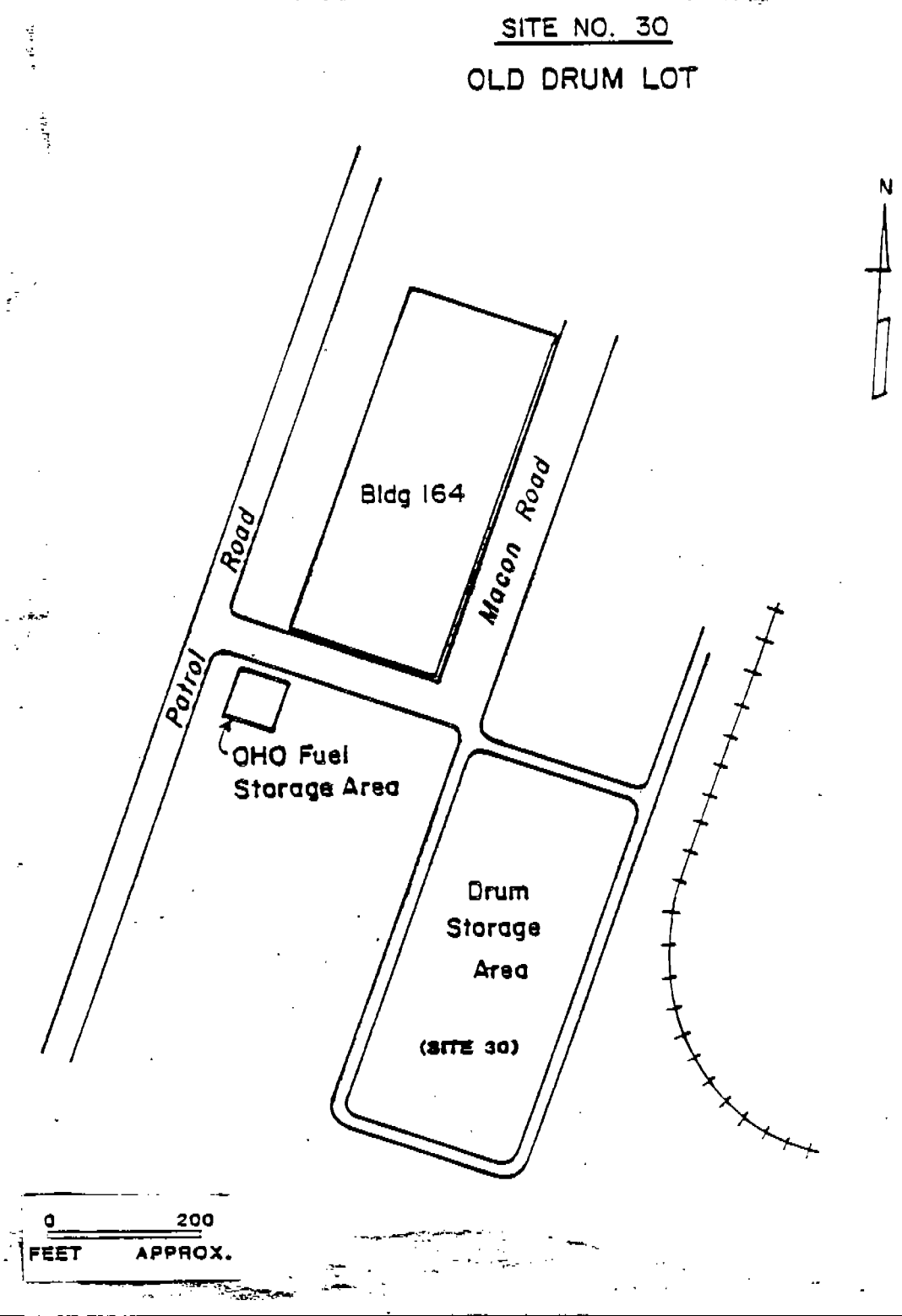

Figure 6.6-11 SITE 30 OLD DRUM LOT

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cently tested for PCB contamination. Test results were negative. This site is characterized by hydrogeological conditions conducive to migration, a residential area with water supply wells within 1/2 mile, and the possibility that drums containing hazardous materials leaked their contents onto the ground (approximately 10 drums per year for 12 years). Therefore, this site is recommended for a Confirmation Study.

6.6.31 Asphalt Mix Area, Site No. 31

This site is located at coordinates N-4 adjacent to the contract garbage hauler truck maintenance area. The area is presently used by the public works department for storage of equipment, materials, and junk vehicles. Leaking drums containing asphalt mix materials were reported to have been stored in this area. There is no visible evidence of contamination. Because of the small quantities and characteristics of asphalt mix materials stored here, this site is not recommended for a Confirmation Study.

6.6.32 Base Landfill Site No. 32

The old base landfill is located at coordinates M-4. This area was used during the 1960's for disposing of soil, refuse and construction debris and junk vehicles. This site covers approximately 2 acres. A portion of this area is presently used for the collection (in dumpsters) of large household refuse (i.e., appliances). This site has not been recommended for a Confirmation Study. The wastes identified are not hazardous and pose no significant impact to human health or the environment.

6.6.33 Base Service Station, Site No. 33

The base service station, Building 429, is located at coordinates J-5. There has been a problem with gasoline leakage from this station as recently as June, 1982. Gasoline vapors were detected in sewer lines within a 9 block area of the station at an explosion index of 100%. The total loss of fuel was approximately 2,000 gallons. The problem was greater at this area because this area is at the end of a small sewer line. Therefore, low wastewater depths in the line permitted increased movement of fuel into the line. A nearby groundwater monitoring well 27 ft deep yielded no odors upon inspection, (see Photograph 6.6-7). The source of the problem has been identified and work was underway to correct this problem at the time of the site visit, therefore, a Confirmation Study is not recommended.

6.6.34 Old Transformer Storage Building, Site No. 34

Building 525 (coordinates J-6) was formerly used to store transformers. This building and the adjacent building (No. 951) today serve as the base commissary. Building 525 was originally a warehouse. According to interviews with base personnel, the building was completely remodeled when it was converted to a commissary in 1978. There is no evidence of hazardous materials remaining at this site, therefore a Confirmation Study is not recommended.

Photo 6.6-7

Site 33 - Base Service Station Ongoing Remedial Action

6.6.35 Temporary PCB Storage Area, Site No. 35

The temporary PCB storage area, Building 480, is located at coordinates H-11. This building was inspected in July, 1981 by the EPA and approved for temporary storage of PCB's. In 1980, a contractor removed asbestos pipe insulation from a building in NARF, and deposited the asbestos in Building 480. The contractor was later required to remove the bulk material and decontaminate the building after dust samples indicated that the area was contaminated. Since the building was cleaned up, it is not expected to pose a current health or environmental problem. Therefore, a Confirmation Study is not recommended for this site.

6.6.36 Dewey Park, Site No. 36

This area is located west of gate 3 south of the Dewey Park Water Plant at coordinates H-3&4. The site contains construction debris and materials from fire damaged buildings. The site occupies an area approximately 2 acres in size in a clearing in a wooded area. Access to this area is through Dewey Park; however, the site spans the border of Navy Property. The site contains inert materials and therefore has not been recommended for a Confirmation Study.

6.6.37 Power Barge, Site No. 37

This site is located at coordinates R-8. Reportedly, an explosion of a transformer had occurred on the shore in the vicinity of the power barge dock when the barge was in operation. Investigation of this issue revealed that all transformers were located on the barge and that no explosions were reported. Therefore this site is not recommended for a Confirmation Study.

6.6.38 Torpedo Rework Facility, Site No. 38

This site is located within the restricted magazine area boundary of the base. Interviews with base and Ordnance Environmental Support Office (OESO) personnel revealed that approximately 1, 55 gallon drum per day of solid waste materials (i.e. rags, gloves containing Otto Fuel) was generated per day. They indicated that drums containing waste have always been disposed of off-site. Therefore, this site is not recommended for a Confirmation Study.

Naval Fuel Depot

Five potential contamination sites were identified during the investigation at the Naval Fuel Depot, Jacksonville, Florida during the on-site visit of the IAS. (Figure 6.6-12, Table 6.6-4)

6.6.37 Sludge Weathering Area and Slurry Pit, Site No. 1

This site is located adjacent to "C" Road due south of facility 42, Bottom sludge and rust removed from fuel tanks during cleaning were spread over the weathering area and tilled into the soil in accordance with API Publication 2015A (see photograph 6.6-8). Washwater generated during tank cleaning was pumped into the slurry pit. This practice was conducted

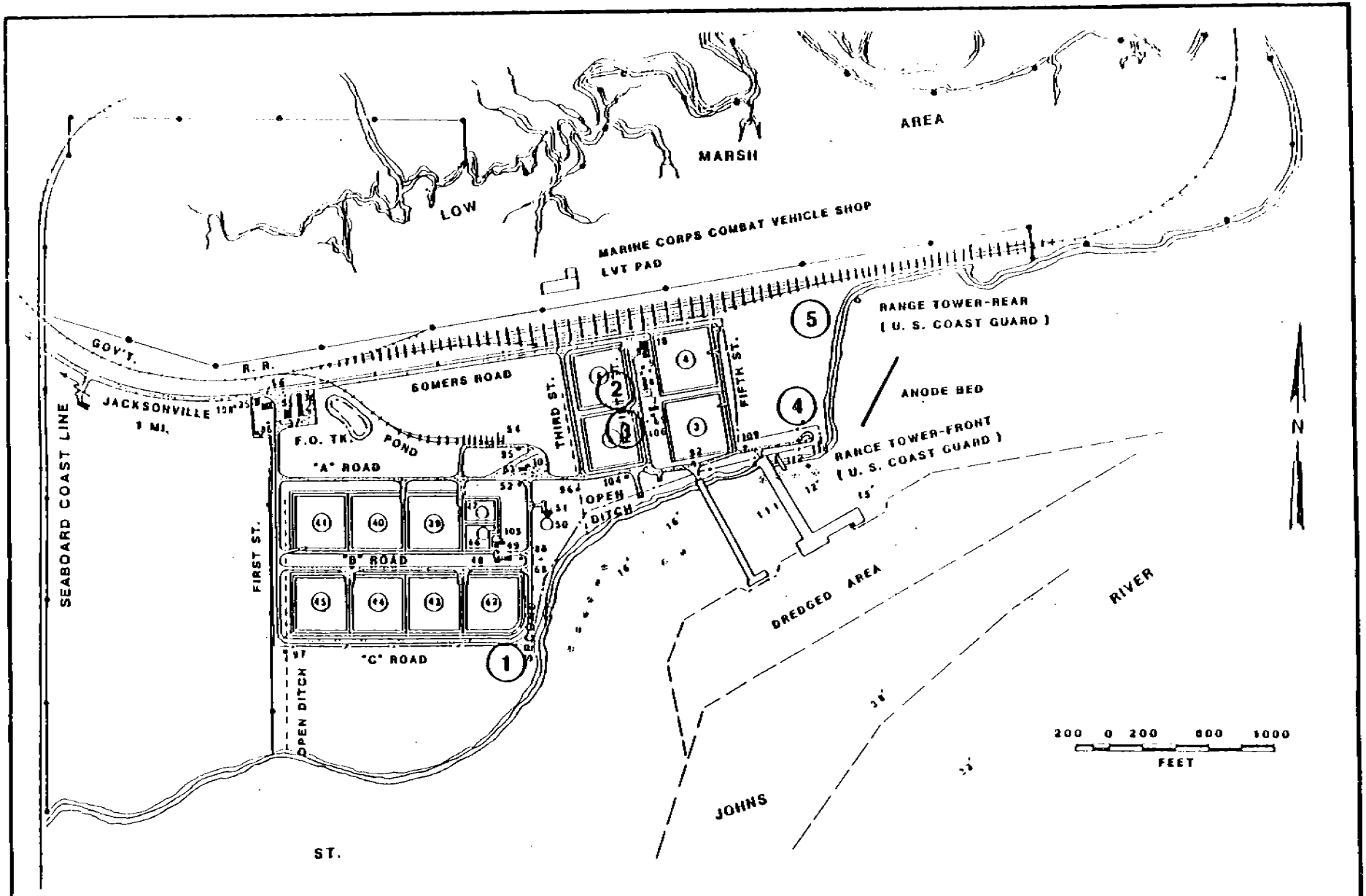

Figure 6.6-12 SPILL/DISPOSAL SITES IDENTIFIED BY IAS TEAM AT NFD JACKSONVILLE.

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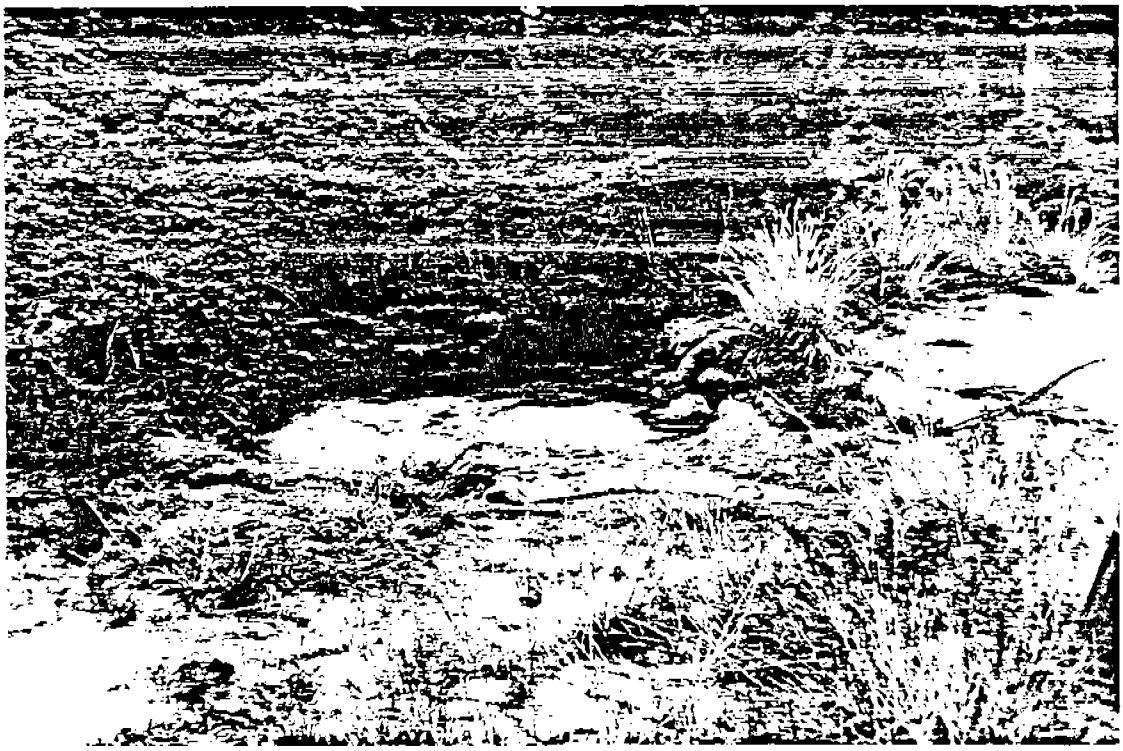
TABLE 6.6-4
Potential Contamination Sites at NFD Jacksonville

Site No.	Description
1	Sludge Weathering Area and Slurry Pit
2	Slurry Pit/Sludge Trench Tank #21
3	Slurry Pit Tank #20
4	Slurry and Burn Pit
5	Old Oil Pond and Land Disposal Area

Photo 6.6-8

Site 1 - Sludge Weathering Area and Slurry Pit



from 1976 to 1979 with approximately 10 bbls of TEL (tetraethyl lead) contaminated sludge from the aviation gasoline storage tanks disposed of in this area. The types of fuels that were stored in these tanks included, AVGAS, JP 4,5, and 8 and Navy Special. This is approximately 40 feet wide by 80 feet long and approximately 3 to 5 feet deep. The sludge weathering area is completely covered with vegetation. The slurry pit area is nearly void of vegetation. Due to the small quantities of waste involved, this site is not recommended for a Confirmation Study.

6.6.38 Slurry Pit/Sludge Trench Tank #21, Site No. 2

This site is located southeast of facility 6 inside the dike area surrounding Tank #21 (see photograph 6.6-9). A slurry pit and sludge trench, were excavated and all bottom sludge, rust and washwater generated by tank cleaning was pumped into them. This practice was conducted from September 1954 to October 1954. Approximately 6 bbls of TEL contaminated rust and sludge from an aviation gasoline storage tank was disposed of in these areas. The slurry pit was approximately 10 feet wide by 10 feet long. The sludge trench is approximately 3 feet wide by 20 feet long. Due to the small quantities of waste involved, a Confirmation Study is not recommended.

6.6.39 Slurry Pit Tank #20, Site No. 3

This site is located northeast of facility 5 inside the dike area surrounding tank #20 (see photograph 6.6-10). The slurry pit was excavated and all bottom sludge, rust and washwater generated by tank cleaning was pumped into the pit. This practice was conducted from September 1954 to October 1954. Approximately 8 bbls of TEL contaminated rust and sludge from an aviation gasoline storage tank was disposed of. The slurry pit was approximately 10 feet wide by 10 feet long. Due to the small quantities of waste involved, Confirmation Study is not recommended.

6.6.40 Slurry and Burn Pit, Site No. 4

This site is located due east of Fifth Street in the general vicinity of facility 3 (see photograph 6.6-11). The slurry pit was excavated and all bottom sludge, rust and washwater generated by tank cleaning was pumped into the pit. Occasionally, off-grade petroleum products were disposed of and burned in the pit. Station generated trash was also disposed of at this site and routinely burned in the burn kettle. This practice was conducted from 1965 to 1967. Approximately 8,000 bbls of Navy special fuel and water, from off-spec NSFO, 20 bbls of TEL contaminated sludge and rust from aviation gasoline storage tanks, and an unknown quantity of trash, cans, paper, etc., from the Naval Fuel Depot were disposed of at this site. The slurry and burn pit was approximately 30 feet wide by 50 feet long. Visual inspection revealed disturbed ground and the burn kettle. No visible evidence of waste oil, sludge, trash or hazardous materials was found therefore, a Confirmation Study is not recommended.

6.6.41 Old Oil Pond and Land Spreading Area, Site No. 5

This site is located due east of Fifth Street in the general vicinity of facilities 3 and 4, (see Photograph 6.6-12, Figure 6.6-13). The old pond area was excavated and diked in the 1950's. In 1964 a hurricane

Photo 6.6-9

Site 2 - Slurry Pit/Sludge Trench Tank #21

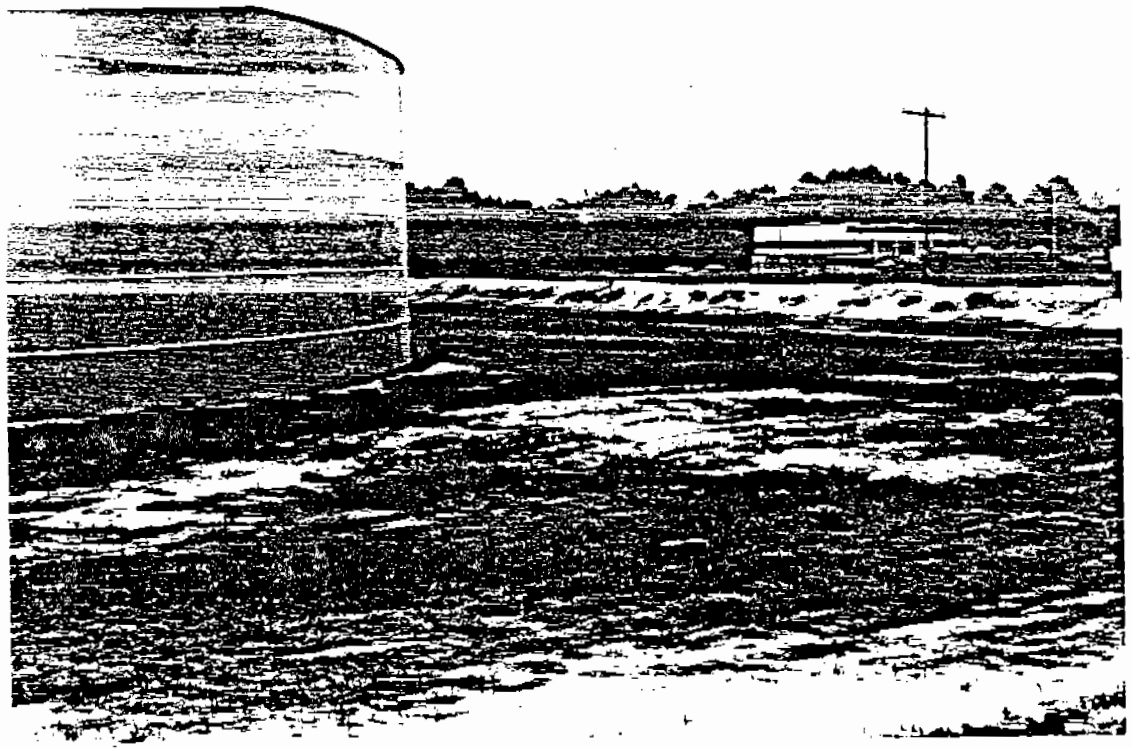


Photo 6.6-10

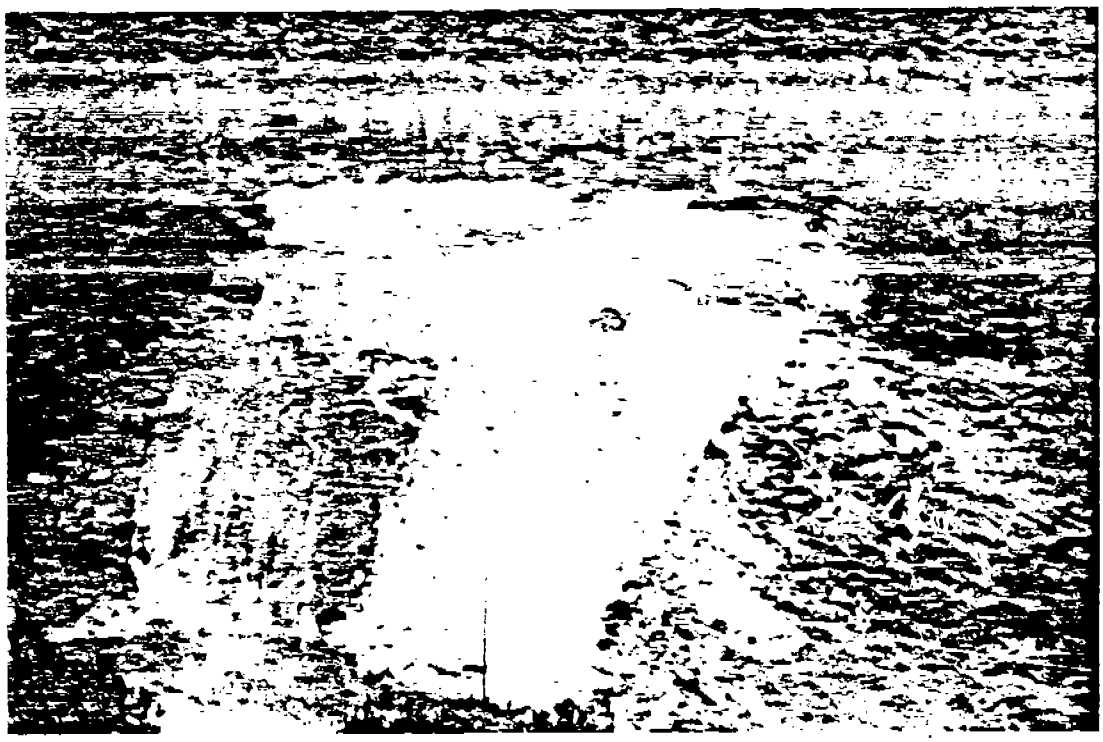
Site 3 - Slurry Pit Tank #20

Photo 6.6-11

Site 4 - Slurry and Burn Pit

Photo 6.6-12

Site 5 - Old Oil Pond and Land Spreading Area



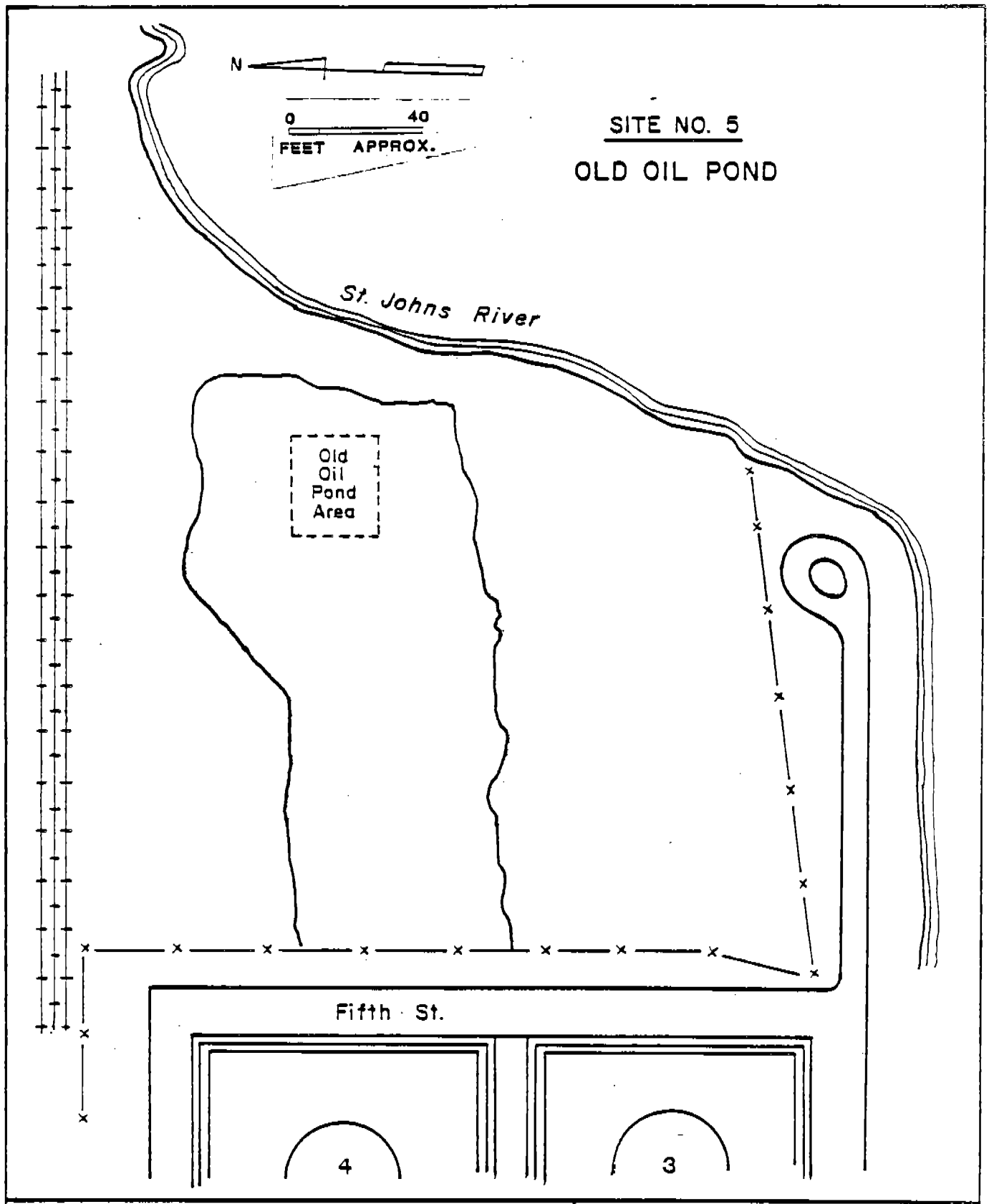


Figure 6.6-13 SITE 5 - OLD OIL POND.

damaged the dike and resulted in oil leaking out. Through 1967 approximately 8,000 bbls of contaminated fuel oil from an aircraft carrier were disposed of in this area along with garbage, wood, etc. In 1965 the pond was filled with soil using a bulldozer. Subsequent to 1967 approximately 5,000 gallons of JP-5 fuel mixed with TEL sludge from cleaning tanks was disposed of in this area. In 1971 the area was regraded with oil/sludge contaminated soils spread over a larger area. The dimensions of the site are approximately 100 feet wide by 500 feet long by 1 foot deep. Aerial photographs dated Nov. 3, 1960 show the oil pond. The pond was approximately 200 feet long by 100 feet wide. Due to the sandy dredge spoil materials located in this area fuels and oils may migrate to the St. John's River via groundwater. Therefore this site is recommended for Confirmation Study.

APPENDIX A

DOCUMENTATION IN SUPPORT OF GEOLOGY, SOILS AND HYDROGEOLOGY SECTIONS

APPENDIX 1.1

Preliminary Assessment

(The Initial Assessment Study serves as the Preliminary Assessment for the Site)

Appendix A-1

NAS Jacksonville
Air, Water Pollution Sampling Locations

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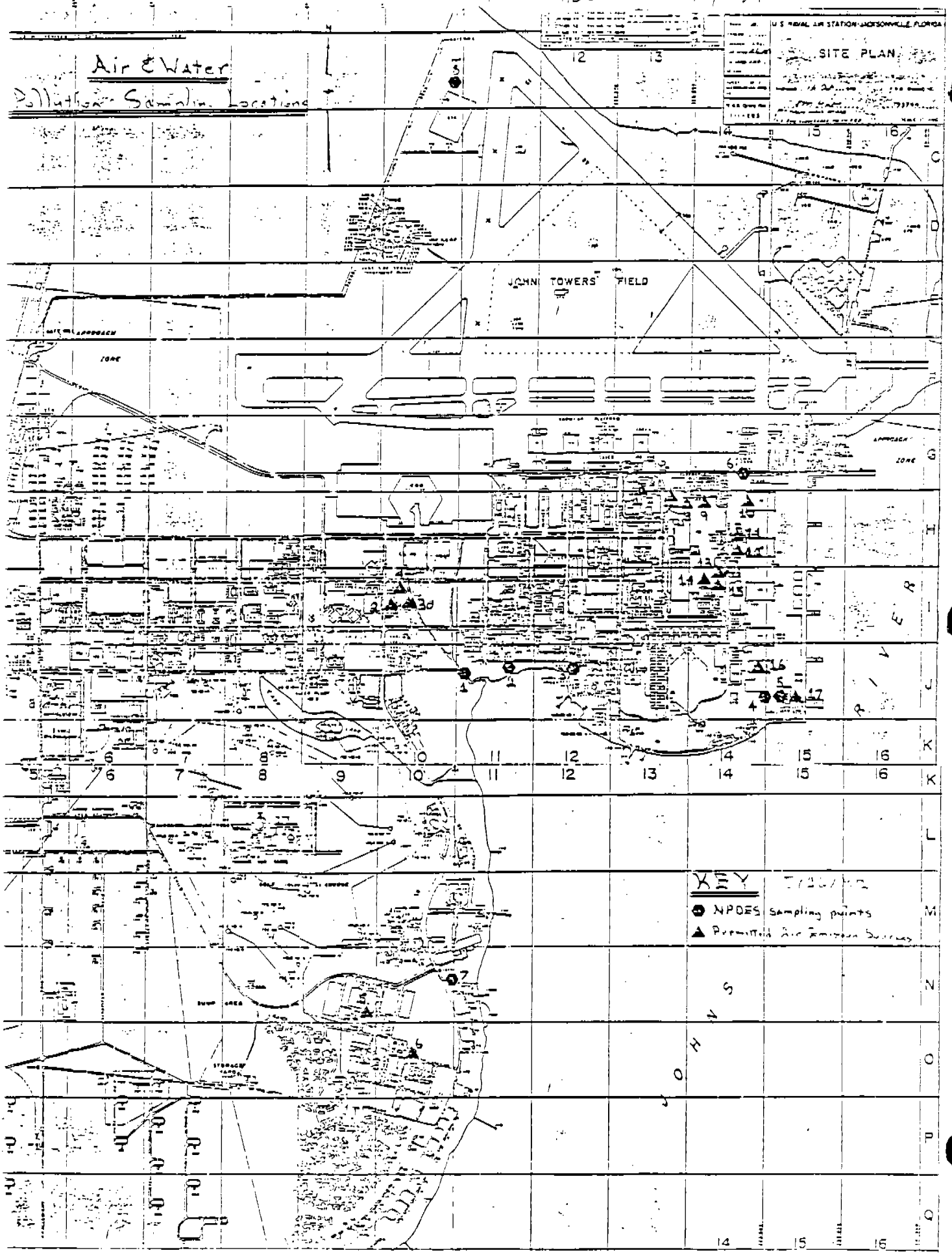

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) SAMPLING POINTS

1. Sampling point ITO1 is located at the outfall where Birmingham Avenue crosses the creek southwest of Building 964.

2. Sampling point ITO2 is located at the outfall where Birmingham Avenue crosses the creek southeast of Building 964.

3. Sampling point ITO3 is located at the outfall where Birmingham Avenue crosses the storm sewer west of Building 127.

4. Sampling point ITO4 is located in the west line of the storm sewers at Black Point Outfall.

5. Sampling point ITO5 is located in the east line of the storm sewers at Black Point Outfall.

6. Sampling point ITO6 is located in the boathouse outfall west of Building 121.

7. Sampling point ITO7 is located at the outfall where Mustin Road crosses the creek south of Building 845.

8. Source sampling point ISO1 is located in the discharge line coming from the oxidation pond.

Appendix A-2

Burns and McDonald Soils Report
Naval Air Rework Facility

#B135b

Subsurface Information

Plating & Cleaning Facility

at

Naval Air Rework Facility, NAS

Jacksonville, Florida

FY 1982 MCON P-419

A-E Contract N62467-80-C-0246

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July, 1981

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Burns & McDonnell

ENGINEERS - ARCHITECTS - CONSULTANTS

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APPENDIX

A. "Subsurface Investigation, Plating and Cleaning Facility, NARF, Jacksonville, Florida," (First Phase)
B. "Subsurface Investigation, NARF P419, Jacksonville, Florida," (Second Phase)
C. Boring Logs (as prepared by Burns & McDonnell Personnel for the Second Phase of Drilling)

LIST OF FIGURES AND DRAWINGS

Figure No. 1: Boring Location Plan

Drawing No. 5021827: "Test Boring Logs" prepared by Smith and Gillespie - Getter Assoc., Joint Venture, April 20, 1973.

INTRODUCTION

A subsurface investigation was performed for the proposed Plating and Cleaning Facility for the Naval Air Rework Facility, located on the Naval Air Station in Jacksonville, Florida as shown on the Boring Location Plan, Figure 1, (see back pocket).

The subsurface investigation was conducted in two phases. The first phase consisted of drilling five borings on August 8, 1980. In this initial phase the borings were located, drilled and logged by Pittsburgh Testing Laboratory personnel. The second phase, which consisted of three borings, began on March 13, 1981 and was completed on March 14, 1981. The borings for the second phase were located and logged by a Burns & McDonnell engineer. A duplicate set of logs for the three latter borings also was prepared by Pittsburgh Testing Laboratory personnel. A laboratory testing program was assigned by Burns & McDonnell for the soil samples obtained from the second phase borings. The laboratory tests were performed by Pittsburgh Testing Laboratory, between March 14 and April 14, 1981.

* * * * *

PART I

PURPOSE AND SCOPE

The purpose of the investigation was to obtain information about the composition, classification, and engineering characteristics of the subsurface materials at the site of the proposed facility. The investigation was conducted solely to provide data necessary for design purposes. Note, it should be recognized by the reader that the information contained herein may not be directly applicable to all types of construction activities. Therefore, it is recommended that a Geotechnical Engineer be consulted for advice in applying this data.

* * * * *

PART II

SITE CONDITIONS

A. FIELD INVESTIGATION

Eight soil borings were drilled at the approximate locations shown on the Boring Location Plan, Figure 1. In each boring, continuous sampling was performed from the ground surface to a depth of ten feet. Below a depth of ten feet, samples were taken at five foot intervals to the completed depth of the boring. These samples were taken using a Standard Penetration Test split-spoon sampler driven according to ASTM D1586.

The first phase of the subsurface investigation was conducted solely by Pittsburgh Testing Laboratory personnel. During this phase Borings B-1 through B-5 were drilled to depths ranging from 28 to 30 feet. Below a depth of ten feet, the borings were advanced between samples using a hollow stem auger with an outside diameter of six inches. The complete subsurface report for the first phase as prepared by Pittsburgh Testing Laboratory personnel is contained in Appendix A of this report.

The second phase of the subsurface investigation was drilled also by Pittsburgh Testing Laboratory, but an engineer of Burns & McDonnell observed the drilling and logged the borings. During this phase, borings B-6, B-7, and B-8 were drilled to depths ranging from 45 to 70 feet. Fifty-pound bag samples were taken from the auger cuttings from the ground surface to a depth of five feet. Below a depth of ten feet, the borings were advanced between samples using a 3-inch-diameter tricone roller bit

and rotary wash methods. The complete subsurface report for the second phase as prepared by Pittsburgh Testing Laboratory personnel is contained in Appendix B of this report. The boring logs for the second phase of drilling as prepared by the Burns & McDonnell engineer are contained in Appendix C of this report.

The borings were located in the field by taping from existing structures. Elevations were estimated to the nearest 1/2-foot from a contour map prepared by Bennett R. Wattles and Associates, Inc. of Jacksonville, Florida. The location and elevation of the borings should be considered accurate only to the degree implied by the method used.

B. LABORATORY TESTING

The purpose of the laboratory testing program was to obtain engineering parameters and general soil classifications for design of the proposed Plating and Cleaning Facility.

Samples from the second exploration phase were selected by a Burns & McDonnell engineer for testing by Pittsburgh Testing Laboratory at their laboratory in Jacksonville, Florida between March 14, 1981 and April 14, 1981. The testing consisted of nine sieve analyses (perecent passing No. 200 sieve only), two California Bearing Ratio Tests, and one set of Atterberg limits (Plastic and Liquid Limits).

C. SOILS ENCOUNTERED

The site for the proposed facility lies in the coastal plain of northeastern Florida. Little topographic relief exists in the vicinity surrounding the site.

The soil materials encountered in the borings drilled for this investigation consist primarily of loose to very dense sand with some silt and clay. Generally, these soils are classified as SP to SM materials according to the Unified Soil Classification System. However, some silty clays and clayey sands, classified as SC and CL materials, were encountered. In Boring B-3 auger refusal was encountered by Pittsburgh Testing Laboratory personnel at a depth of 28.0 feet. Bedrock was not encountered in any of the borings observed by the Burns & McDonnell engineer, including Boring B-7 which penetrated to a depth of 70 feet.

Water level measurements at the completion of drilling were taken in each of the eight borings. Pittsburgh Testing Laboratory personnel found the water level to vary from 10.1 to 17.4 feet below the existing ground surface on August 8, 1980 (corresponding to a mean sea level elevation ranging from 0.1 to 3.9 feet). The Burns & McDonnell engineer measured the water level in Borings B-6, B-7, and B-8. The groundwater in these borings varied from 5.8 to 11.6 feet below the existing ground

surface on March 13 and 14, 1981 (corresponding to a mean sea level elevation ranging from 6.4 to 11.7 feet).

* * * * *

PART III

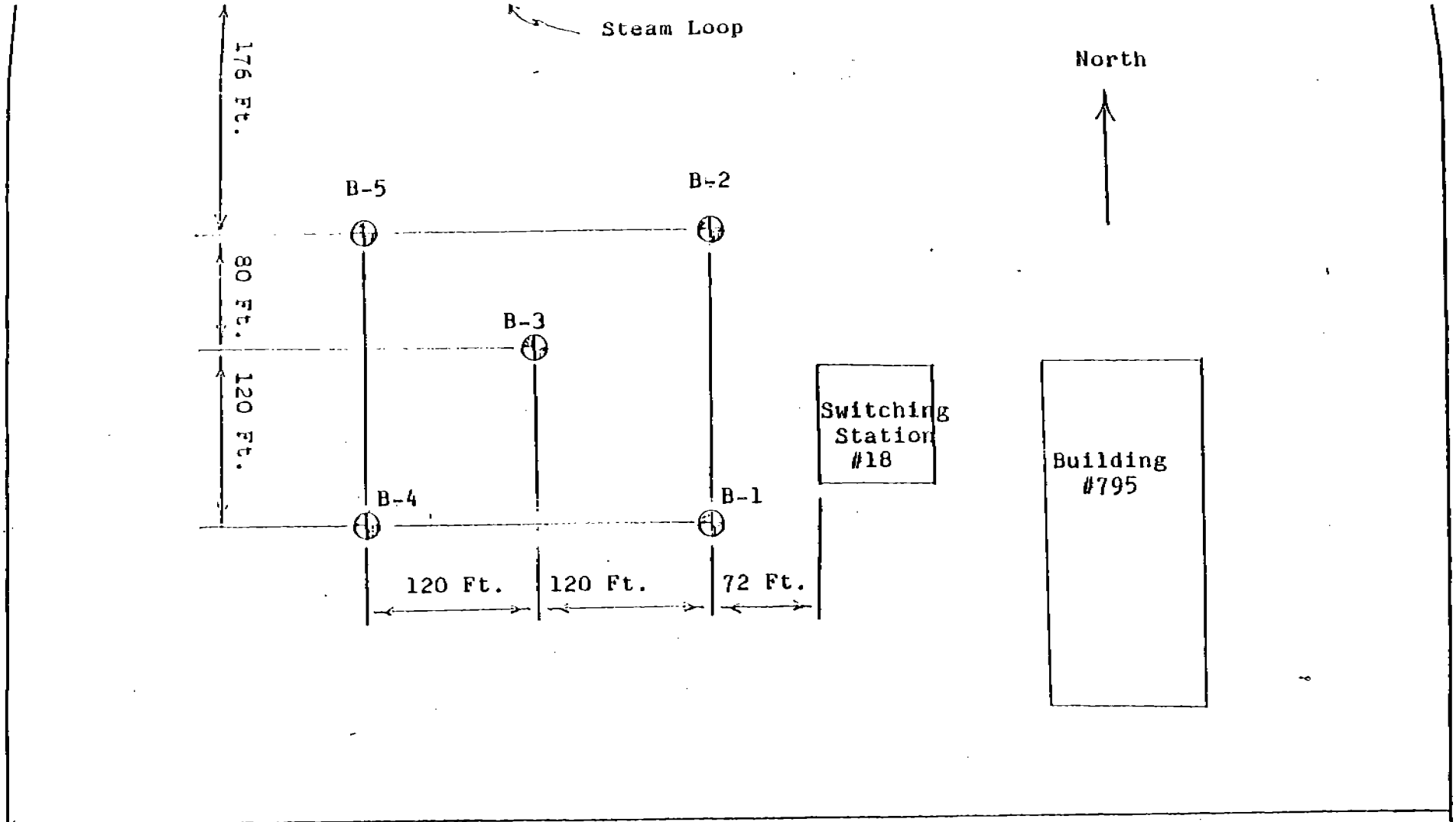
ADDITIONAL SUBSURFACE INFORMATION

A request was made to the Naval Air Rework Facility for existing subsurface information at or near the proposed Plating and Cleaning Facility. In response to this request the Naval Air Rework Facility then provided Burns & McDonnell with copies of nine soil boring logs which were made for the Jet Engine Test Cells. These borings were drilled in an area located approximately 1,200 feet southeast of the proposed Plating and Cleaning Facility. Copies of these logs are presented on Drawing No. 5021827, entitled "Test Boring Logs" prepared by Smith & Gillespie-Getter Associates, Joint Venture, and dated April 20, 1973 (see back pocket).

The design studies performed in conjunction with this report for the Plating and Cleaning Facility are available for review at Burns & McDonnell's office upon written request.

Burns & McDonnell is not aware of any other subsurface information in the near vicinity to the proposed facility. We recommend that requests for additional subsurface information pertaining to the proposed site be directed to the Naval Air Rework Facility.

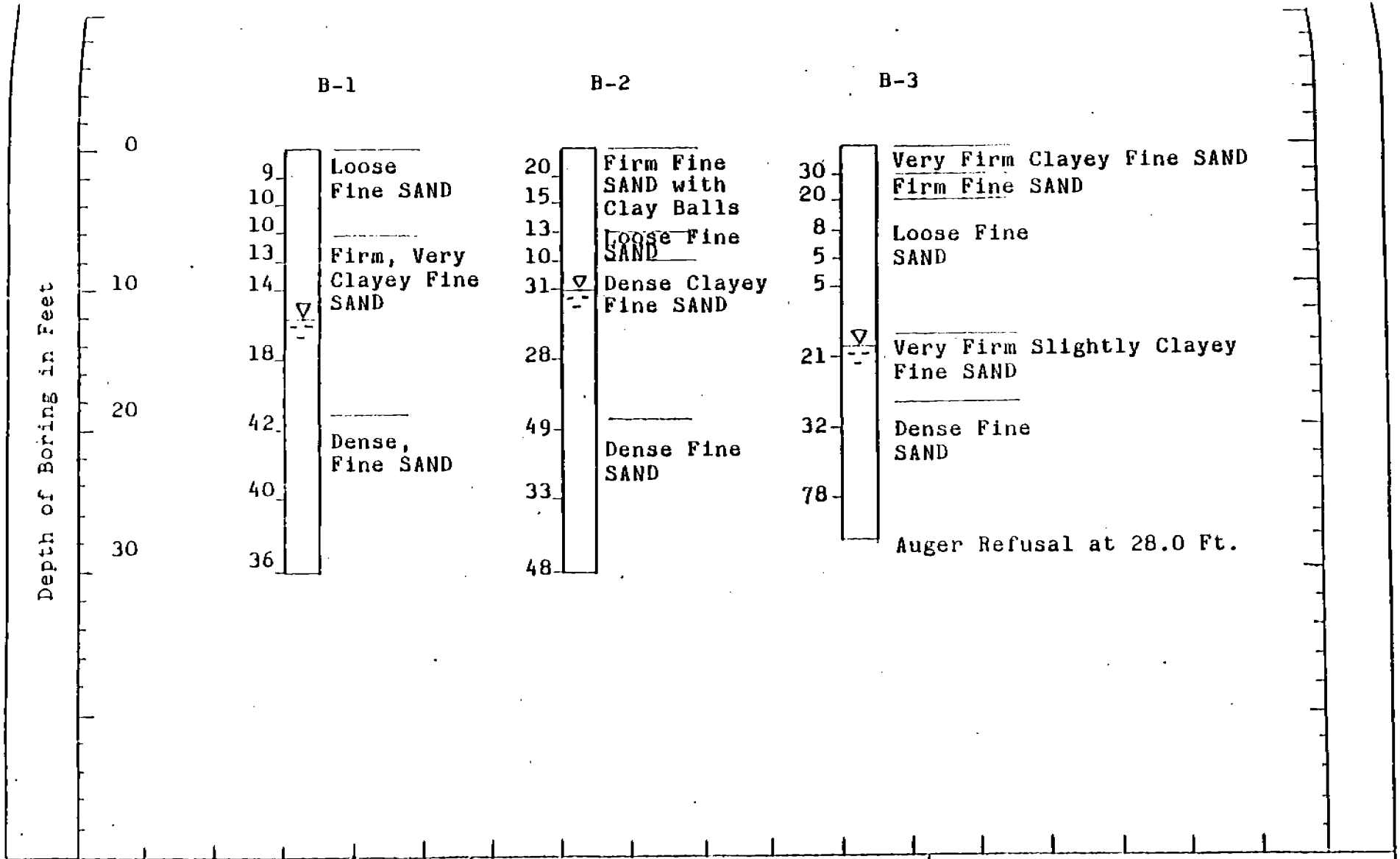
* * * * *



8-15-80

JA-2771

Boring Location Sketch
Plating & Cleaning Facility
NARF, Jacksonville, Fla.

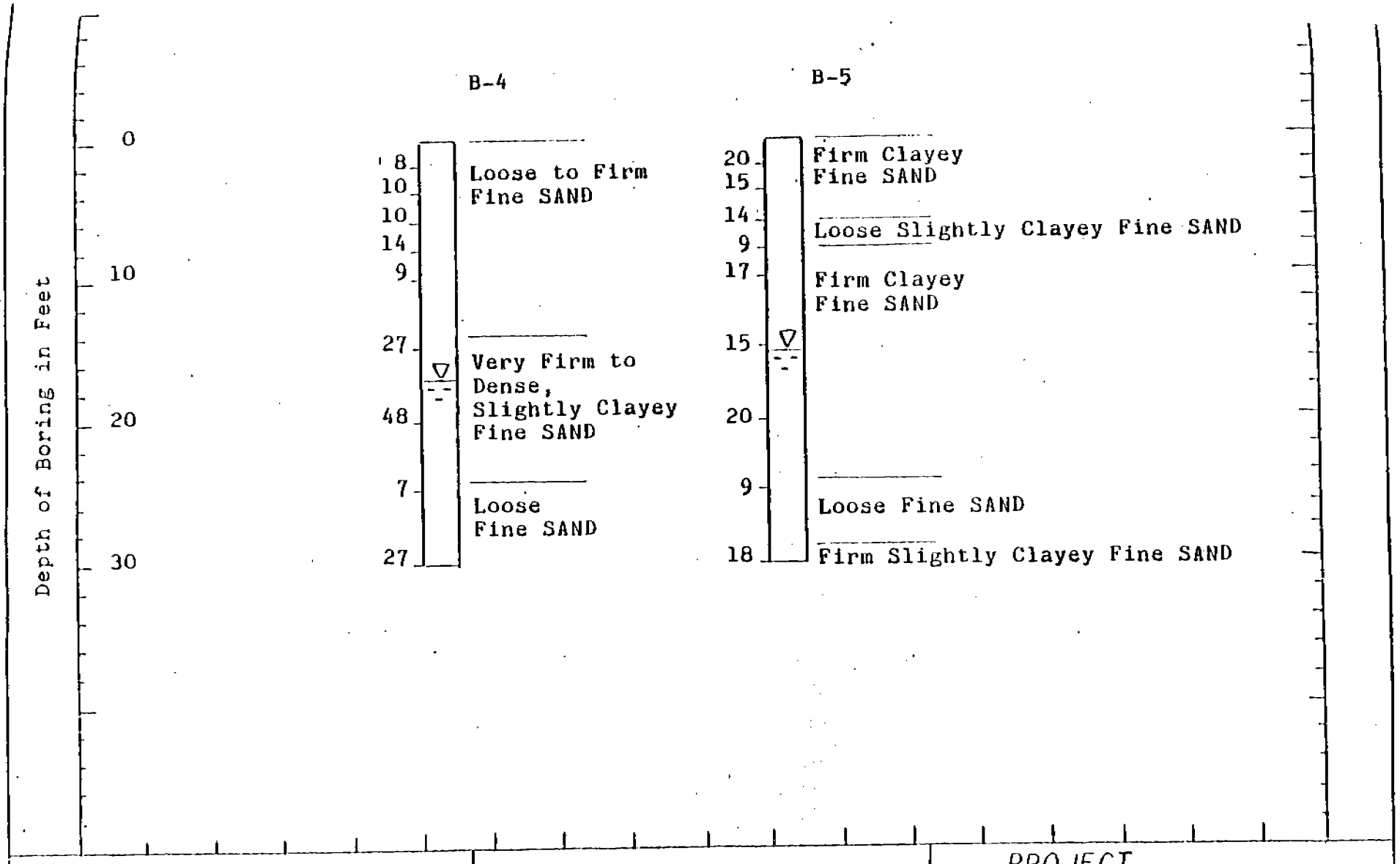


SOIL PROFILE

SCALE: 1 Inch = 10 Ft.

PROJECT
Plating & Cleaning Facility
NARF, Jacksonville, Fla.

JOB NO. JA-2758

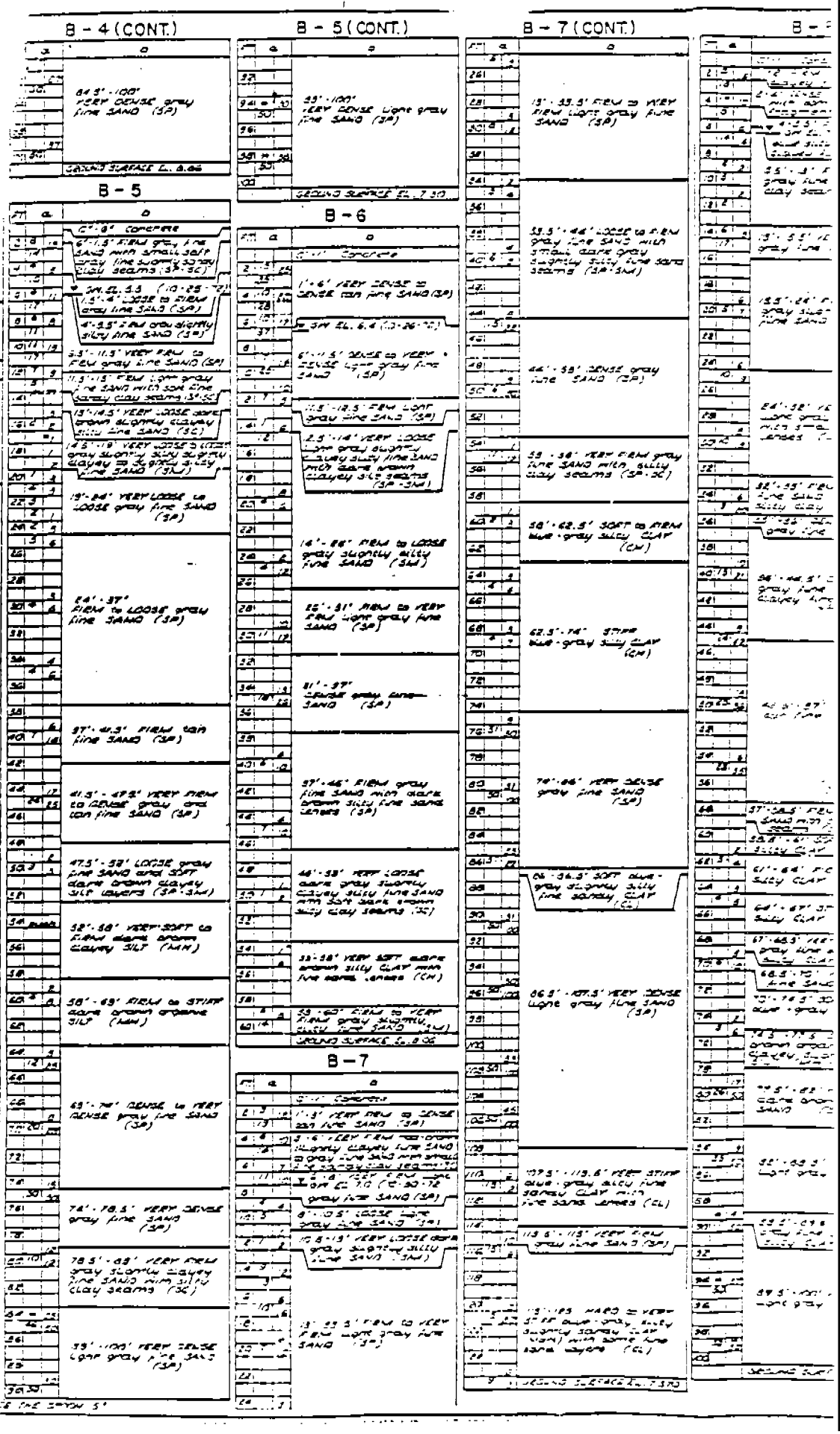


SOIL PROFILE

PROJECT
Plating & Cleaning Facility
NARF, Jacksonville, Fla.

SCALE: 1 Inch = 10 Ft

JOB NO. JA-2758



B - 4 (CONT.)

Depth	Description
84.5' - 100'	VERY DENSE gray fine SAND (SP)
	GROUND SURFACE EL. 8.06

B - 5

Depth	Description
0' - 6'	Concrete
6' - 1.5'	FIRM gray fine SAND with small soft gray fine slightly sandy clay seams (SP-SC)
	GW. EL. 5.5 (10-25-72)
1.5' - 4'	LOOSE to FIRM gray fine SAND (SP)
4' - 5.5'	FIRM gray slightly silty fine SAND (SP)
5.5' - 11.5'	VERY FIRM to FIRM gray fine SAND (SP)
11.5' - 15'	FIRM light gray fine SAND with soft fine sandy clay seams (SP-SC)
15' - 14.5'	VERY LOOSE dark brown slightly clayey silty fine SAND (SC)
14.5' - 19'	VERY LOOSE to LOOSE gray slightly silty slightly clayey to slightly silty fine SAND (SM)
19' - 24'	VERY LOOSE to LOOSE gray fine SAND (SP)
24' - 37'	FIRM to LOOSE gray fine SAND (SP)
37' - 41.5'	FIRM tan fine SAND (SP)
41.5' - 47.5'	VERY FIRM to DENSE gray and tan fine SAND (SP)
47.5' - 52'	LOOSE gray fine SAND and SOFT dark brown clayey silt layers (SP-SM)
52' - 58'	VERY SOFT to FIRM dark brown clayey SILT (MH)
58' - 63'	FIRM to STIFF dark brown organic SILT (MH)
63' - 74'	DENSE to VERY DENSE gray fine SAND (SP)
74' - 78.5'	VERY DENSE gray fine SAND (SP)
78.5' - 83'	VERY FIRM gray slightly clayey fine SAND with silty clay seams (SC)
83' - 100'	VERY DENSE light gray fine SAND (SP)

B - 5 (CONT.)

Depth	Description
83' - 100'	VERY DENSE light gray fine SAND (SP)
	GROUND SURFACE EL. 7.30

B - 6

Depth	Description
0' - 1'	Concrete
1' - 6'	VERY DENSE to DENSE tan fine SAND (SP)
	GW EL. 6.4 (10-26-72)
6' - 11.5'	DENSE to VERY DENSE light gray fine SAND (SP)
11.5' - 12.5'	FIRM light gray fine SAND (SP)
12.5' - 14'	VERY LOOSE light gray slightly clayey silty fine SAND with dark brown clayey silt seams (SP-SM)
14' - 26'	FIRM to LOOSE gray slightly silty fine SAND (SM)
26' - 31'	FIRM to VERY FIRM light gray fine SAND (SP)
31' - 37'	DENSE gray fine SAND (SP)
37' - 46'	FIRM gray fine SAND with dark brown silty fine sand lenses (SP)
46' - 53'	VERY LOOSE dark gray slightly clayey silty fine SAND with soft dark brown silty clay seams (SC)
53' - 58'	VERY SOFT dark brown silty CLAY with fine sand lenses (CH)
58' - 60'	FIRM to VERY FIRM gray slightly silty fine SAND (SM)
	GROUND SURFACE EL. 8.06

B - 7

Depth	Description
0' - 1'	Concrete
1' - 3'	VERY FIRM to DENSE tan fine SAND (SP)
3' - 6'	VERY FIRM red-brown slightly clayey fine SAND to gray fine SAND with small fine sandy clay seams (SP)
6' - 8'	VERY FIRM light gray fine SAND (SP)
8' - 10.5'	LOOSE light gray fine SAND (SP)
10.5' - 13'	VERY LOOSE dark gray slightly silty fine SAND (SM)
13' - 33.5'	FIRM to VERY FIRM light gray fine SAND (SP)

B - 7 (CONT.)

Depth	Description
13' - 33.5'	FIRM to VERY FIRM light gray fine SAND (SP)
33.5' - 44'	LOOSE to FIRM gray fine SAND with small dark gray slightly silty fine sand seams (SP-SM)
44' - 53'	DENSE gray fine SAND (SP)
53' - 58'	VERY FIRM gray fine SAND with silty clay seams (SP-SC)
58' - 62.5'	SOFT to FIRM blue-gray silty CLAY (CH)
62.5' - 74'	STIFF blue-gray silty CLAY (CH)
74' - 86'	VERY DENSE gray fine SAND (SP)
86' - 86.5'	SOFT blue-gray slightly silty fine sandy CLAY (CL)
86.5' - 107.5'	VERY DENSE light gray fine SAND (SP)
107.5' - 113.5'	VERY STIFF blue-gray silty fine sandy CLAY with fine sand lenses (CL)
113.5' - 115'	VERY FIRM gray fine SAND (SP)
115' - 125'	HARD to VERY STIFF blue-gray silty slightly sandy CLAY (CH) with some fine sand layers (CL)
	GROUND SURFACE EL. 7.370

B - 8

Depth	Description
0' - 1'	Concrete
1' - 2'	FIRM [illegible]
2' - 4'	DENSE [illegible]
4' - 5.5'	[illegible]
5.5' - 8'	[illegible] gray fine clay seams
8' - 13.5'	[illegible] gray fine [illegible]
13.5' - 24'	[illegible] gray slightly fine SAND
24' - 32'	[illegible] light gray with small lenses [illegible]
32' - 35'	FIRM fine SAND silty clay
35' - 36'	[illegible] gray fine
36' - 44.5'	[illegible] gray fine clayey fine [illegible]
44.5' - 57'	[illegible] tan fine
57' - 58.5'	FIRM SAND with [illegible] seams
58.5' - 61'	[illegible] silty CLAY
61' - 64'	FIRM silty CLAY
64' - 67'	STIFF silty CLAY
67' - 68.5'	VERY [illegible] gray fine [illegible]
68.5' - 70'	[illegible] fine SAND
70' - 74.5'	[illegible] blue-gray
74.5' - 77.5'	[illegible] brown organic clayey [illegible]
77.5' - 82'	[illegible] dark brown SAND [illegible]
82' - 83.5'	[illegible] light gray
83.5' - 89.5'	[illegible] gray fine [illegible] silty CLAY
89.5' - 100'	[illegible] light gray
	GROUND SURFACE [illegible]

REVISIONS				
LET	DESCRIPTION	PREP'D BY	DATE	APPROVED

B - 8

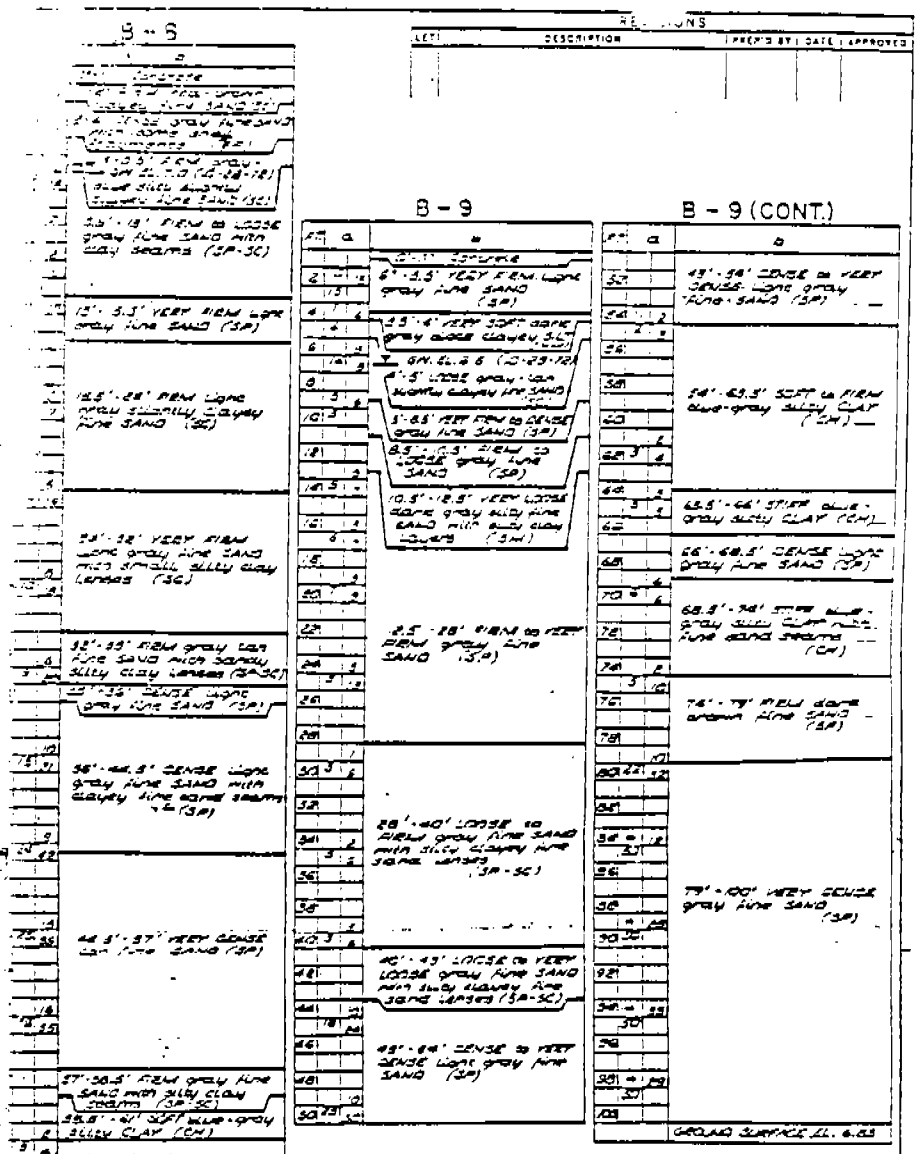
Depth	Description
	Concrete
	6" - 3.5' Fine - brown clayey fine SAND (SC)
	3.5' - 4' Dense gray fine SAND with some shell fragments (SP)
	4' - 5.5' Firm gray - GW. EL. 5.0 (10-28-72) blue silty slightly clayey fine SAND (SC)
	5.5' - 15' Firm to loose gray fine SAND with clay seams (SP-SC)
	15' - 5.5' Very firm light gray fine SAND (SP)
	15.5' - 28' Firm light gray slightly clayey fine SAND (SC)
	28' - 32' Very firm light gray fine SAND with small silty clay lenses (SC)
	32' - 35' Firm gray tan fine SAND with sandy silty clay lenses (SP-SC)
	35' - 36' Dense light gray fine SAND (SP)
	36' - 44.5' Dense light gray fine SAND with clayey fine sand seams (SP)
	44.5' - 57' Very dense tan fine SAND (SP)
	57' - 58.5' Firm gray fine SAND with silty clay seams (SP-SC)
	58.5' - 61' Soft blue-gray silty CLAY (CH)
	61' - 64' Firm blue-gray silty CLAY (CH)
	64' - 67' Stiff blue-gray silty CLAY (CH)
	67' - 68.5' Very stiff blue-gray fine sandy silty CLAY (CH)
	68.5' - 70' Firm gray fine SAND (SP)
	70' - 74.5' Soft to firm blue-gray silty CLAY (CH)
	74.5' - 77.5' Stiff dark brown organic slightly clayey slightly sandy silt (MH-CH)
	77.5' - 82' Very dense dark brown fine SAND (SP)
	82' - 88.5' Very dense light gray fine SAND (SP)
	88.5' - 89.5' Firm blue-gray fine sandy silty CLAY (CH)
	89.5' - 100' Very dense light gray fine SAND (SP)
	GROUND SURFACE EL. 8.24

B - 9

Depth	Description
	Concrete
	6" - 3.5' Very firm light gray fine SAND (SP)
	3.5' - 4' Very soft dark gray black clayey silt (CL)
	GW. EL. 6.6 (10-23-72)
	4' - 5' Loose gray - tan slightly clayey fine SAND (SP)
	5' - 8.5' Very firm to dense gray fine SAND (SP)
	8.5' - 10.5' Firm to loose gray fine SAND (SP)
	10.5' - 12.5' Very loose dark gray silty fine SAND with silty clay layers (SM)
	12.5' - 28' Firm to very firm gray fine SAND (SP)
	28' - 40' Loose to firm gray fine SAND with silty clayey fine sand lenses (SP-SC)
	40' - 43' Loose to very loose gray fine SAND with silty clayey fine sand lenses (SP-SC)
	43' - 64' Dense to very dense light gray fine SAND (SP)

B - 9 (CONT.)

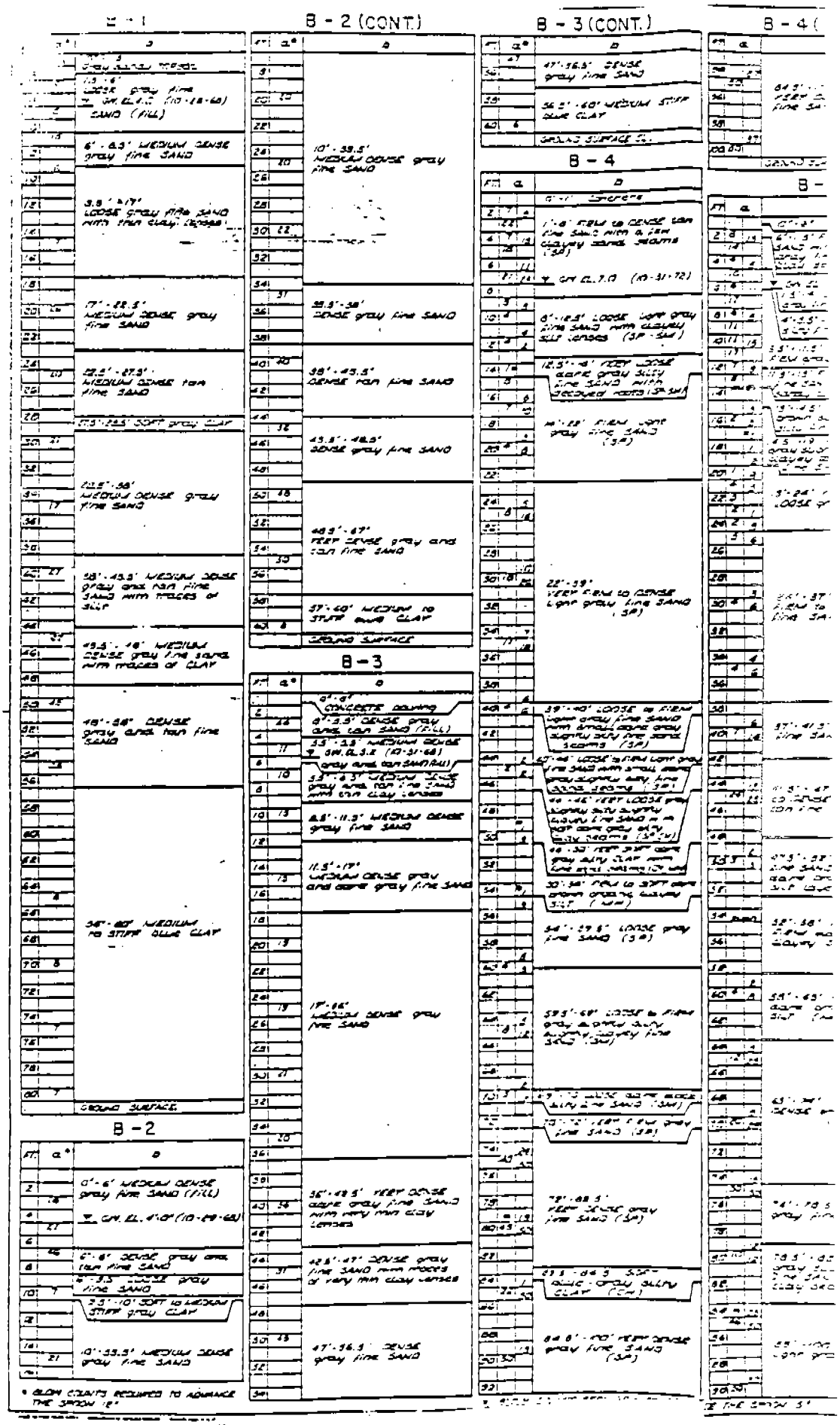
Depth	Description
	43' - 54' Dense to very dense light gray fine SAND (SP)
	54' - 63.5' Soft to firm blue-gray silty CLAY (CH)
	63.5' - 66' Stiff blue-gray silty CLAY (CH)
	66' - 68.5' Dense light gray fine SAND (SP)
	68.5' - 74' Stiff blue-gray silty CLAY with fine sand seams (CH)
	74' - 79' Firm dark brown fine SAND (SP)
	79' - 100' Very dense gray fine SAND (SP)
	GROUND SURFACE EL. 6.83



SUBSURFACE EXPLORATION NOTES

1. EXPLORATION WAS PERFORMED DURING OCTOBER 1972.
2. BORING HOLES (3) WHERE ACCOMPLISHED BY STANDARD PENETRATION TEST PROCEDURES USING A 1 3/8" I.D. SPLIT SPOON SAMPLER. SAMPLE SPOON WAS ADVANCED BY A 140# HAMMER FALLING 30".
3. THE BLOW COUNT IN A GIVEN LENGTH OF DRIVE IS FOR 0.5' UNLESS OTHERWISE NOTED.
4. BLOW COUNTS REQUIRED TO ADVANCE THE SPOON 6" ARE SHOWN IN "b" (SEE NOTE 3)
5. DEPTH BELOW GROUND AND SOIL DESCRIPTION ARE SHOWN IN "b"
6. SOIL DESCRIPTIONS ARE BASED ON VISUAL IDENTIFICATION AND BY LABORATORY TESTS ON SELECTIVE SAMPLES. DESCRIPTIONS GIVEN ARE ON THE UNIFIED SOIL CLASSIFICATION SYSTEM (NAVAL STD - 619)
7. GROUND WATER NOTATION ARE INDICATED ON THE LOGS AS ▽ GW. WITH THE DEPTH BELOW THE GROUND SURFACE GIVEN. DATES WHERE SHOWN ON THE LOGS ARE THE DATES WHEN GROUND WATER WAS ENCOUNTERED.
8. ELEVATIONS SHOWN ON THE BORING LOGS ARE GROUND SURFACE ELEVATIONS AT THE TIME OF EXPLORATION.
9. BORINGS WHERE TAKEN IN THE FIELD BY LAW ENGINEERING TESTING COMPANY
10. FOR LOCATION OF BORINGS SEE NAVFAC DWG. NO. 80317SC

SMITH AND GILLESPIE / HAYTER ASSOC. JOINT VENTURE LOCATION MANAGER	DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND SOUTHERN DIVISION CHARLESTON, S.C.
	NAVAL AIR REWORK FACILITY JACKSONVILLE, FLA JET ENGINE TEST CELLS TEST BORING LOGS CIVIL
SIZE F	CODE IDENT NO. 80091 — NAVFAC DRAWING NO. 3021827
	CONTR CONTR NO. N62467-72 C-0141
	SCALE 1/4" = 1'-0" — SPEC 08-72-0141 — SHEET 42 OF 129


B - 1
B - 2
B - 2 (CONT.)
B - 3
B - 3 (CONT.)
B - 4
GROUND SURFACE
* BLOW COUNTS REQUIRED TO ADVANCE THE SPOON 1'

Appendix A-3

Test Boring Logs
NFD Jacksonville

2, 43, 46, 47

BORING LOG — DATE 5-20-75

DEPTH		MATERIAL DESCRIPTION
	HA 8 (SIDE OF DIKE)	
0-0.5	HAND AUGER	5" OF SOIL CEMENT
0.5-3.5		FINE CLAYEY SAND, TRACE SILT, LIGHT GRAYISH BROWN, MOIST TO WET, (SP)
	WATER LEVEL - 3.00	
	END OF BORING	
	HA 7 (TOP OF DIKE)	
0-0.5	HAND AUGER	3" OF CRUSHED STONE, APPROXIMATELY 3/4" TO 1 1/2", WHITE, (GW)
0.5-6.0		FINE SAND, TRACE SILT, GRAYISH BROWN, MOIST, (SP)
	WATER LEVEL NOT ENCOUNTERED	
	END OF BORING	
	HA 8 (FLOOR OF DIKE)	
0-2.5	HAND AUGER	FINE TO MEDIUM SAND, TRACE SILT, BROWN TO WHITE, MOIST TO WET, (SP)
	WATER LEVEL - 2.00	
	END OF BORING	
	HA 9 (SIDE OF DIKE)	
0-0.5	HAND AUGER	CRUSHED STONE (SW)
0.5-6.0		FINE SAND, TRACE SILT, LIGHT GRAYISH BROWN, MOIST, (SP)
	PERFORMED BY EXPOSING SOIL ON OUTSIDE OF BERM	
	END OF BORING	
	HA 10 (TOP OF DIKE)	
0-0.5	HAND AUGER	3" OF CRUSHED STONE, (SW)
0.5-7.0		FINE SAND, TRACE SILT, LIGHT GRAY, MOIST, (SP)
	WATER LEVEL NOT ENCOUNTERED	
	END OF BORING	
	HA 11 (FLOOR OF DIKE)	
0-0.5	HAND AUGER	8" OF SOIL CEMENT
0.5-4.5		FINE SAND, TRACE SILT, LIGHT GRAY, MOIST TO WET, (SP)
	END OF BORING.	
	HA 12 (TOP OF DIKE)	
0-6.0	HAND AUGER	FINE SAND, TRACE SILT, LIGHT BROWN TO LIGHT GRAY, MOIST, (SP)
	WATER LEVEL NOT ENCOUNTERED	
	END OF BORING	
	HA 13 (TOP OF DIKE)	
0-6.0	HAND AUGER	FINE TO COARSE SAND, TRACE SILT, SOME CLAYEY SAND NOTED FROM 4.5' TO 5.0', LIGHT BROWN TO LIGHT GRAY, MOIST, (SW)
	WATER LEVEL NOT ENCOUNTERED	
	END OF BORING	

SOIL BORINGS PROVIDED BY SOIL & MATERIALS ENGINEERS OF FLORIDA, INC., ALTAMONTE SPRINGS, FLORIDA.

0' 40' 80' 160'

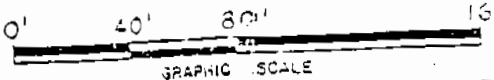
NO'S 141 44 & 45

BORING LOG — DATE 5-20-75

DEPTH	TYPE	MATERIAL DESCRIPTION
	HA 1 (TOP OF DIKE)	
0-0.5	HAND AUGER	6" OF SOIL CEMENT
0.5-5.0		FINE TO FINE TO MEDIUM SAND, LIGHT GRAY TO WHITE, MOIST.
		MOIST TO WET FROM 3' TO 8', (SP)
	WATER LEVEL - 8.00	
	END OF BORING	
	HA 2 (TOP OF DIKE)	
0-0.5	HAND AUGER	6" OF SOIL CEMENT
0.5-5.5		FINE SAND, LIGHT GRAYISH BROWN, MOIST, SP
	END OF BORING	
	HA 3 (TOP OF DIKE)	
0-1.0	HAND AUGER	12" OF SOIL CEMENT
1.0-4.0		COARSE TO FINE SAND, LIGHT GRAYISH BROWN, MOIST TO WET, (SW)
	WATER LEVEL - 3.50	
	END OF BORING	
	HA 4 (FLOOR OF DIKE)	
0-1.0	HAND AUGER	10" OF SOIL CEMENT
1.0-3.0		FINE TO COARSE SAND, LIGHT GRAYISH BROWN, MOIST TO WET, (SW)
	WATER LEVEL - 2.50	
	END OF BORING	
	HA 5 (TOP OF DIKE)	
0-6.0	HAND AUGER	COARSE TO FINE SAND, TRACE SHELL FRAGMENTS, LIGHT GRAYISH BROWN, MOIST, (SW)
	WATER LEVEL NOT ENCOUNTERED	
	END OF BORING	
	HA 14 (FLOOR OF DIKE)	
0-1.0	HAND AUGER	8" OF SOIL CEMENT
1.0-3.5		FINE TO MEDIUM SAND, LIGHT TAN, MOIST TO WET, (SP)
	WATER LEVEL - 3.08	
	END OF BORING	
	HA 15 (FLOOR OF DIKE)	
0-0.5	HAND AUGER	6" OF SOIL CEMENT
0.5-3.5		FINE TO MEDIUM SAND, TRACE SILT, LIGHT BROWN, MOIST TO WET, (SP)
	WATER LEVEL - 3.17	
	END OF BORING	
	HA 16 (TOP OF DIKE)	
0-0.5	HAND AUGER	FINE SAND, TRACE SILT, LIGHT BROWN, MOIST, (SP)
0.5-6.0		COARSE TO FINE SAND, TRACE SILT, LIGHT BROWNISH GRAY, MOIST, (SW)
	WATER LEVEL NOT ENCOUNTERED	
	END OF BORING	

SOIL BORINGS PROVIDED BY SOIL & MATERIALS ENGINEERS OF FLORIDA, INC., ALTAMONTE SPRINGS, FLORIDA.

SCALE: 1"=40'



BREVARD ENGINEERING
CAPE CANAVERAL

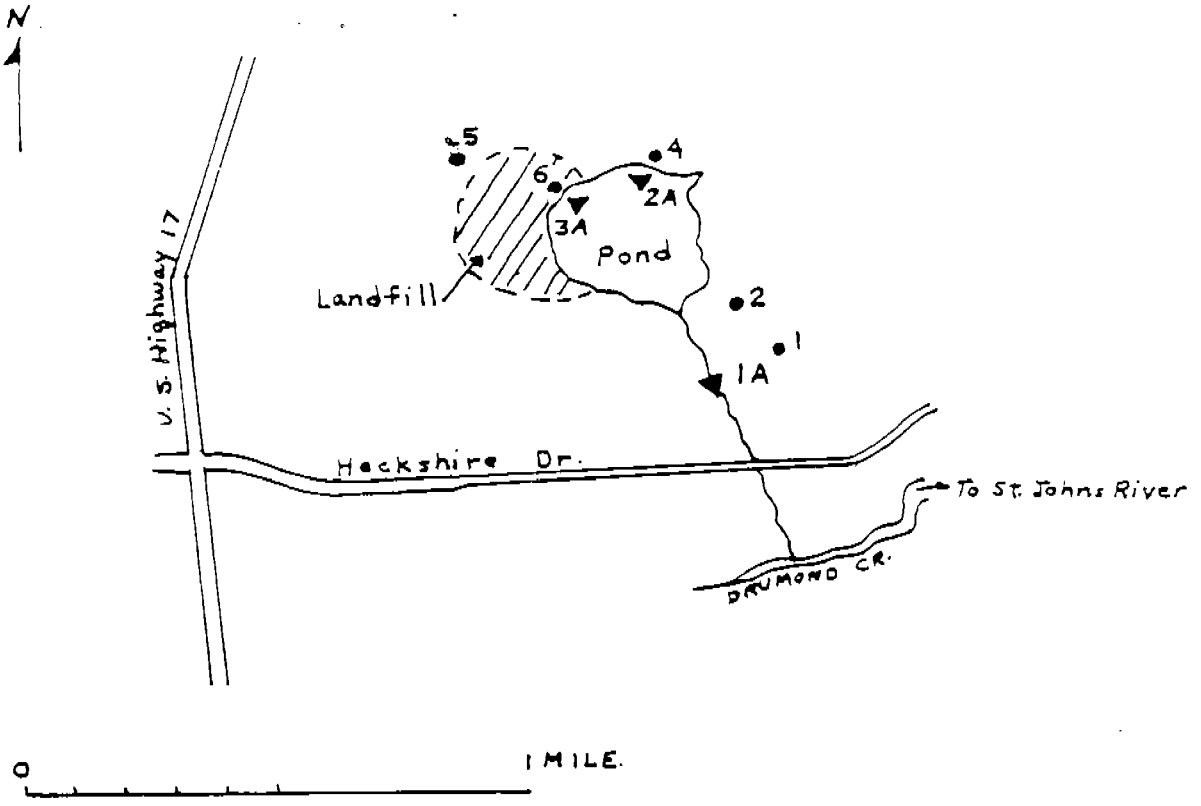
SOUTHERN DIVISION

Appendix A-4

Report on Landfill Leachate in
Drummond Creek Area

Discussion Of Landfill Leachate In The Drummond Creek Area,
Excerpted From Fairchild and Leve, (1973).

In addition to investigation of hydrologic and geologic conditions at landfill sites, the Geological Survey is monitoring the quality of water near the active municipal landfill at Imeson Airport (fig. 11). The municipal landfill is at the edge of a large pond which is hydraulically connected to the regional surficial aquifer. Some of the solid waste is deposited below the water table and leachate from the landfill directly enters the surficial aquifer, the pond, or through the pond into the surficial aquifer. Water samples were collected both from shallow wells that penetrate the surficial aquifer in the vicinity of the landfill and from the pond. The samples were analyzed for bacteriological content, common chemical constituents and various trace metals to determine the type of leachate from the landfill and the distribution of the leachate in the receiving waters.



EXPLANATION

●² Ground-water sampling point and number.

2A ▼ Surface-water sampling point and number.

Figure 11. Map showing location of quality of water sampling points at the municipal sanitary landfill at Jacksonville.

Table 4. Analyses of Samples from the Municipal Sanitary Landfill, January 11, 1972
(Quantities in milligrams per liter (mg/l) except where noted)

	Sample Location							
	1A	2A	3A	Well #1	Well #2	Well #4	Well #5	Well #6
Temperature, degrees Celsius	19	22	21	13	22	21	21	20
pH units	7.2	6.6	7.1	5.8	7.2	5.4	6.5	5.8
COD	98	157	108	225	372	265	88	49
BOD	7.7	< 7.5	< 8.4	4.1	< 5.8	< 5.4	3.2	12
Coliform, most probable number	3300	3300	35000	240000	3100	240000	160000	92000
Coliform-Fecal, most probable number	790	790	7900	4900	1300	2300	13000	3300
Ortho-phosphate	0	.6	0	.6	.6	1.2	1.2	0.6
Total phosphate	1.8	3.0	1.8	5.9	2.4	1.8	1.8	2.4
Ammonia nitrogen (NH_3-N)	5.8	18.6	7.3	0	0	4.3	0	0
Organic nitrogen	0	1.2	1.5	1.8	.7	2.2	0	2.6
Nitrate nitrogen (NO_3-N)	.18	.13	.26	.33	.56	.18	2.20	.19
Total Solids	531	810	627	7094	4362	3312	31656	11701
Suspended Solids	44	98	102	2980	4020	2952	9918	10606
Dissolved Solids	487	712	525	4114	342	360	21738	1095
Hardness ($CaCO_3$)	250	370	270	125	55	293	135	550
Specific Conductivity-micromhos	231	131	610	234	1040	730	1080	798
Alkalinity	269	495	350	380	60	354	145	2270
Acidity	14	68	19	87	64	150	60	528
Calcium (Ca)	66.1	106.2	78.2	38.1	20.0	88.2	42.1	126.3
Sodium (Na)	60.0	76.0	60.0	10.0	5.0	20.8	2.3	15.5
Potassium (K)	44.5	74.0	48.5	6.0	3.6	22.0	2.0	8.0
Magnesium (Mg)	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*
Chloride (Cl)	135	140	125	50	45	75	45	60
Color-APHA units	100	200	100	100	200	200	200	250
Turbidity - J.T.U.	18	68	26	25	237	130	180	284
Cadmium (Cd)				< .02	< .02	< .02	< .02	< .02
Chromium (Cr)				< .02	.02	.03	< .02	< .02
Copper (Cu)				< .0005	< .0005	.0006	.0005	< .0005
Zinc (Zn)				.001	.04	.004	.026	.001
Lead (Pb)				< .02	< .02	.9	.02	< .02

*BDL = Below Detectable Limits

< = Less than

Analyses of water from both the shallow aquifer and the pond collected on January 11, 1972 (table 4) showed a higher bacteriological and mineral content than normally would be found in these waters in this area. This indicates that both the ground water and surface water in the vicinity of the landfill are being affected by leachate. However, some of the analyses are anomalous. For example, the coliform count and mineral constituents were lower in water from some of the wells close to the landfills than in water from some wells farther away. In addition, most of the constituents whose presence commonly indicate the existence of leachate were low in all samples. The landfill has been in operation for only 3 years, not long enough for the leachate to completely saturate the subsurface material and it is possible that none of the constituents of diagnostic value will be detected for years.

Collecting additional samples of water from these wells, particularly the ones farthest away from the landfill, over a period of many years may help in determining the extent and nature of the leachate and also in determining the average long-term chemical composition of natural ground water.

Appendix A-5

Technical Report No. 10
Annual Water Use Survey

Technical Report No. 10

ANNUAL WATER USE SURVEY: 1979

by

Richard Marella

Agricultural Data Compiled by: Phil Leary

Water Resources Department

St. Johns River Water Management District

Palatka, Florida

July 1981

Project Number
2002303
1502303

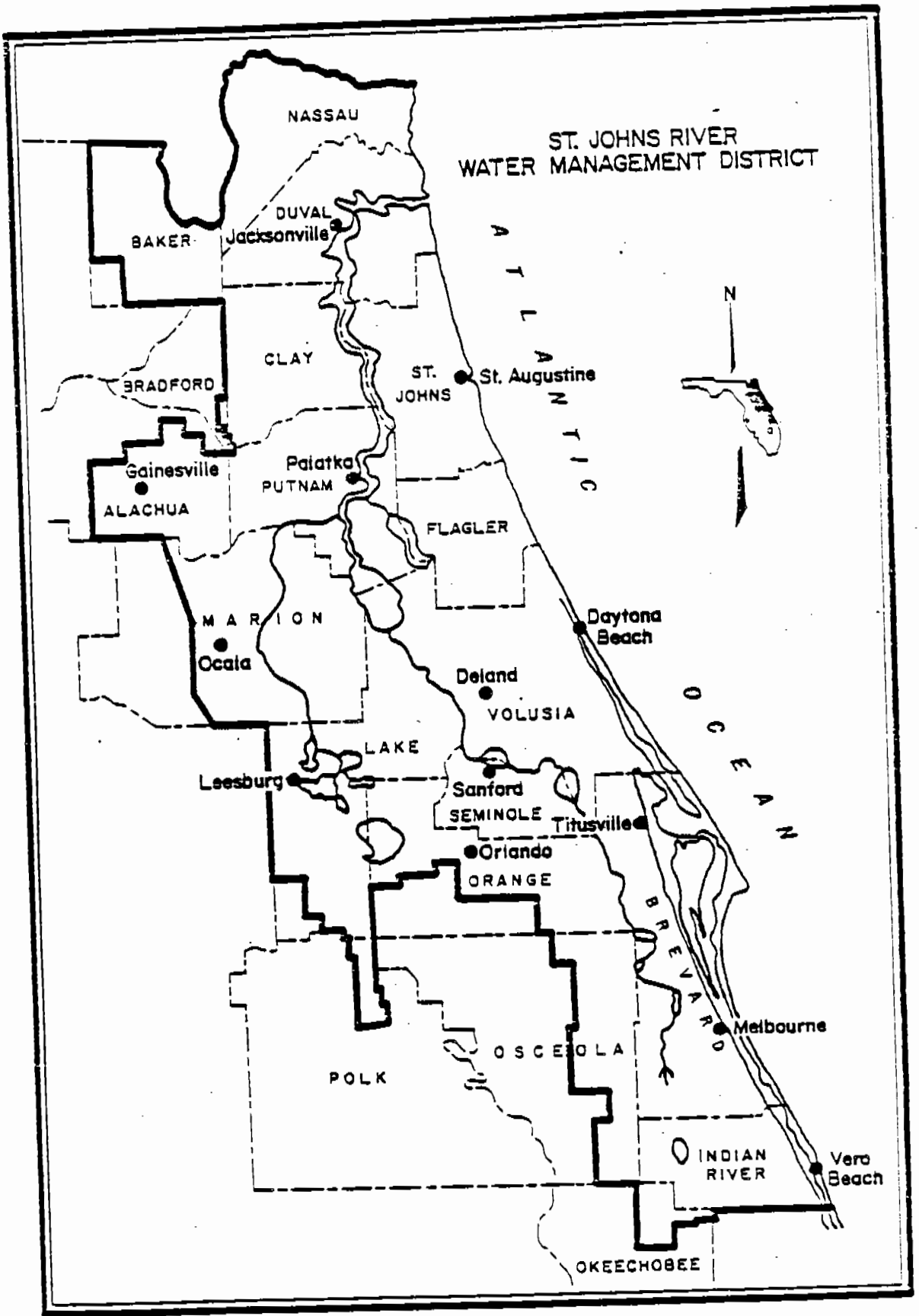


Figure 1.--St. Johns River Water Management District

TABLE 1 PUBLIC WATER USE BY COUNTY 1979

COUNTY	WATER WITHDRAWN (MGD) FRESH WATER GROUND	FRESH WATER SURFACE	FRESH WATER TOTAL	FRESH WATER PERCENT	SALINE WATER GROUND	SALINE WATER SURFACE	SALINE WATER TOTAL	1979 TOTALS (MGD)	1979 TOTALS PERCENT
ALACHUA (1)	15.04	0.0	15.04	6	0.0	0.0	0.0	15.04	6
BAKER	0.61	0.0	0.61	0 (2)	0.0	0.0	0.0	0.61	0 (2)
BREVARD	6.54	11.88	18.42	7	0.0	0.0	0.0	18.42	7
CLAY	5.24	0.0	5.24	2	0.0	0.0	0.0	5.24	2
DUVAL	63.67	0.0	63.67	25	0.0	0.0	0.0	63.67	25
FLAGLER	1.37	0.0	1.37	0 (2)	0.0	0.0	0.0	1.37	0 (2)
INDIAN RIVER	6.23	0.0	6.23	2	0.0	0.0	0.0	6.23	2
LAKE (1)	10.59	0.0	10.59	4	0.0	0.0	0.0	10.59	4
MARION (1)	5.07	0.0	5.07	2	0.0	0.0	0.0	5.07	2
NASSAU	2.32	0.0	2.32	0 (2)	0.0	0.0	0.0	2.32	0 (2)
OKEECHOBEE (1)	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0
ORANGE (1)	76.29	0.0	76.29	30	0.0	0.0	0.0	76.29	30
OSCEOLA (1)	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0
POLK (1)	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0
PUTNAM	2.55	0.0	2.55	1	0.0	0.0	0.0	2.55	1
SEMINOLE	18.78	0.0	18.78	7	0.0	0.0	0.0	18.78	7
ST.JOHNS	2.83	0.0	2.83	1	0.0	0.0	0.0	2.83	1
VOLUSIA	28.26	0.0	28.26	11	0.08	0.0	0.08	28.34	11
DISTRICT TOTAL	245.39	11.88	257.27		0.08	0.0	0.08	257.35	

1 THESE COUNTIES ARE PARTIALLY WITHIN THE SJRWMD. THE DATA GIVEN IS FOR THAT PART OF THE COUNTY WITHIN THE SJRWMD.
2 HAS A VALUE OF LESS THAN 1.0 PERCENT

TABLE 2 DOMESTIC SELF-SUPPLIED WATER USE BY COUNTY 1979

COUNTY	WATER WITHDRAWN (MGD) FRESH WATER GROUND	FRESH WATER SURFACE	FRESH WATER TOTAL	FRESH WATER PERCENT	SALINE WATER GROUND	SALINE WATER SURFACE	SALINE WATER TOTAL	1979 TOTALS (MGD)	1979 TOTALS PERCENT
ALACHUA (1)	0.82	0.0	0.82	0 (2)	0.0	0.0	0.0	0.82	0 (2)
BAKER	1.33	0.0	1.33	1	0.0	0.0	0.0	1.33	1
BREVARD	3.3	0.0	3.3	3	0.0	0.0	0.0	3.3	3
CLAY	2.49	0.0	2.49	2	0.0	0.0	0.0	2.49	2
DUVAL	46.17	0.0	46.17	42	0.0	0.0	0.0	46.17	42
FLAGLER	0.33	0.0	0.33	0 (2)	0.0	0.0	0.0	0.33	0 (2)
INDIAN RIVER	7.96	0.0	7.96	7	0.0	0.0	0.0	7.96	7
LAKE (1)	5.64	0.0	5.64	5	0.0	0.0	0.0	5.64	5
MARION (1)	7.89	0.0	7.89	7	0.0	0.0	0.0	7.89	7
NASSAU	4.09	0.0	4.09	4	0.0	0.0	0.0	4.09	4
OKEECHOBEE (1)	0.04	0.0	0.04	0 (2)	0.0	0.0	0.0	0.04	0 (2)
ORANGE (1)	5.47	0.0	5.47	5	0.0	0.0	0.0	5.47	5
OSCEOLA (1)	0.03	0.0	0.03	0 (2)	0.0	0.0	0.0	0.03	0 (2)
POLK (1)	0.71	0.0	0.71	0 (2)	0.0	0.0	0.0	0.71	0 (2)
PUTNAM	7.16	0.0	7.16	7	0.0	0.0	0.0	7.16	7
SEMINOLE	7.57	0.0	7.57	7	0.0	0.0	0.0	7.57	7
ST.JOHNS	2.73	0.0	2.73	2	0.0	0.0	0.0	2.73	2
VOLUSIA	5.94	0.0	5.94	5	0.0	0.0	0.0	5.94	5
DISTRICT TOTAL	109.67	0.0	109.67		0.0	0.0	0.0	109.67	

1 THESE COUNTIES ARE PARTIALLY WITHIN THE SJRWMD. THE DATA GIVEN IS FOR THAT PART OF THE COUNTY WITHIN THE SJRWMD.
2 HAS A VALUE OF LESS THAN 1.0 PERCENT

Appendix A-6

NAS Jacksonville
Water Well Permit Information

Joe & Jim

CONSOLIDATED CITY OF JACKSONVILLE
STATE OF FLORIDA
BIO-ENVIRONMENTAL SERVICES DIVISION
AIR, WATER, NOISE POLLUTION CONTROL AND
WATER CONSERVATION ACTIVITY
515 W. 6th STREET TEL: 633-3318

NOTICE TO CORRECT SOURCE OF POLLUTION/VIOLATION

TO: U. S. Navy
N. A. S.
Jacksonville Fla.

This Notice Is to Inform You That On Or About The 6 of June, 1979
An Inspection Was Made By This Department And A Violation of Section(s)
625.302

OF CITY ORDINANCE(S) AND/OR STATE RULES 74-867-523 Sec 1;
76-186-153, Sec. 6
Was Found to be in Existence On or From Your Premises For the Following Reason(s)
Construction of well without
a permit

You Are Hereby Notified To Correct This Violation No Later Than The 20th day of June, 1979. Legal Action May Be Instituted Against You For Failure To Comply.

Correction of This Source Of Pollution/Violation And Compliance With the Terms of This Notice Does Not Relieve You Of Any Liability To Civil Or Criminal Actions That May Accrue Or Have Accrued Against You For The Alleged Acts Sought To Be Corrected By This Notice.

FOR THE CITY OF JACKSONVILLE, FLORIDA
BIO-ENVIRONMENTAL SERVICES DIVISION
AIR, WATER, NOISE POLLUTION CONTROL AND
WATER CONSERVATION ACTIVITY

Samuel L. Alberti, Engr Tech
Name and Title

Received by William P. Rock Date: 6 June 1979

B135 b
RCD

WATER SUPPLY SOURCE, NAS Jacksonville, Fla. March 1971

Well #	Location	Dia."	Depth-ft.	Freeflow, GPM	Remarks
1.	Wtr.Plt.#1,Bldg.#127	8	708	613 - 150	Original Well(Not in Use)
2.	Wtr.Plt.#1,Bldg.#127	12	1005	3500 - 600	Flow with Booster Pump 2000 GPM
3.	Wtr.Plt.#1,Bldg.#127	12	998	3300	Flow with Booster Pump 1950 GPM
4.	Wtr.Plt.#2,Bldg.#640	12	1015	3800 - 400	Flow with Booster Pump 2000 GPM
5.	Wtr.Plt.#3,Bldg.#3900	12	988	1250	-
6.	Hosp.Wtr.Plt.Bldg.#H-2050	12	646	1200	-
7.	Strhse #164(Ck.to Sys)Pump Hse.1913	10	1096	1700	-
8.	CasaLindaLake(Aux)	6	500	500	-
9.	Hosp.Mustin Rd.(Sprinklers)	6	498	1000	-
10.	W.S.Sew.Plt,Bldg.#150	6	120	50	Pump
11.	Salvage Yd.(Area)	8	400	800	Height Approx. 10'
12.	Radio Tower (Area)	4	407	300	-
13.	Cold Strg.,Bldg.#135	6	144	45	Pump
14.	S.Boundary(Not Used)(Not Located)	6	400	300	-
15.	C.P.O.Club (Not Used)	4	400	300	-
16.	Yukon (Not in Sys.)	4	400	300	-
17.	Highway (Not Used)	3	400	300	-
18.	Hosp.(Capped)	6	400	300	-
19.	Rawin Bldg.#201	2	101	575 - 600 GPH	With Pump

WATER CONSERVATION PROGRAM
WATER WELL FIELD INSPECTION REPORT

10957 Complaint No. | TWUP No. | 78-157 Construction/Plugging Permit No. | 1-1872 Well Inventory No.

Is Well Free Flowing? Yes ___ No ✓

Owner Robert Hancock Phone ___

Owner's Address 4316 Lucerne Rd

Well Location Address 4316 Lucerne Rd.

Well Drilling Contractor Partridge Well Drilling Co License/Bond No. 1005

Site Identification: 30 14.36 081 44 01 Lat/Long (if different) 30 ___ 081 ___ 01

NW 1/4 | SW 1/4 | NW 1/4 | 15 Section | 35 TWP | 26E Range | ORANGE PARK Quad Map Name

Depth of Hole Drilled 504 Depth of Well 504 How Measured BW2

Diameter/Cross Section 3"x 2" Depth of Casing 405

Depth and Diameter of Well Segments: 5 " from LSD to 137

3 " Dia. from 137 ' to 405 ' 2 " Dia. from 405 ' to 504 '

Depth and Diameter of Casing Segments: 3 " Dia. from 0 ' Above / Below LSD

To: 137 ' 2 " Dia. from 132 ' to 425 .

Type and Quantity of Grouting Used Cement 6 bags Well Centered in Grout? ___

Use of Well Irrigation No. of People Served ___

Water Level ___ Above / Below LSD Measuring Pt. ___ ' Above / Below LSD

How Measured ___ Measured by ___ Date ___

Method of Construction Hydraulic Rotary Date of Construction 6/12/78

Condition of Casing/Liner Pipes (wall thickness 0.125" min. new, used, etc.)

New

Casing Material Used Galv. Steel

Altitude 5 Interval 5

Topo Setting FLAT

Distance to Closest Well of 3" Diameter or Over and/or Depth of 250' or Deeper if Closer than 300' _____

Distance to nearest Contaminant - Septic Tank, etc., if Less than 100' _____

Maximum Well Yield _____ GPM Average Well Yield _____ GPM

Free Flowing Well Yield _____ GPM How Yield Determined _____

Frequency of Well Use 24 Hrs/Day 365 Days/Year

Pump Data - Type and Make _____ HP _____

Pump Capacity _____ GPM No. Bowls or Stages _____

Type of Power _____ Static Water Level _____

Production Water Level _____ Pump Intake Setting _____
= Depth of Section Line

Water Sampled for: Dissolved Solids _____ Conductivity _____

Hardness _____ Chlorides _____ PH= _____ Temperature _____

General Rating: Poor _____ Average _____ Good _____ Excellent _____

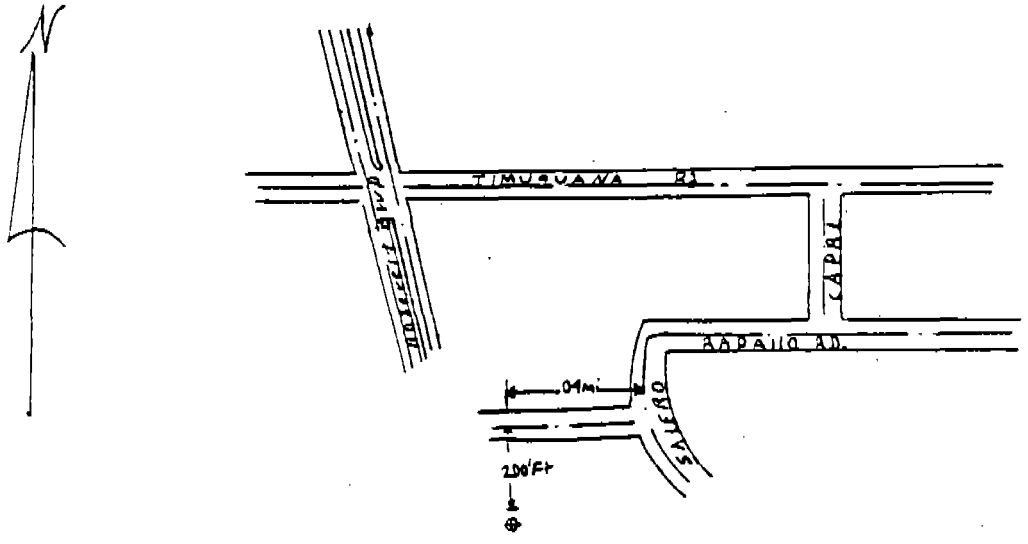
Action Taken/Comments _____

_____

_____

Follow Up Needed _____

Inspector's Name L. L. Alaniz Field Inspection Date 7/27/78



[illegible]

DE[illegible] [illegible] REGULATION

WELL COMPLETION REPORT

OWNER: Last Name First Name Initial

Number Street

City State

Area Code Phone Number Zip Code

WELL LOCATION: [illegible] of Section

(N-S) (E-W)

Township Range

Latitude Deg. Min Sec. N

Longitude Deg. Min Sec. W

Locate in Section

Number Street/Road

Lot No. Subdivision

City County

OWNER WELL NUMBER OR NAME:

DRILL METHOD: [ ] Rotary [ ] Cable Tool [ ] Jet [ ] Auger [ ] Other:

SURFACE CASING, CASING, AND LINER MATERIAL:

Steel Dia. (In.)*			Steel Wt. (lb/ft.)	Dia. (In.)		From (Ft.)	To (Ft.)	Schedule No.	Joints*
Black	Galv.	S. Steel		PVC	Other†				

† Describe Material:

* TC = Threaded and Coupled, TCW = Threaded, Coupled, and Welded, W = Welded, B = Bonded (PVC), O = Other:

GROUT: [ ] None [ ] Neat Cement [ ] Other:

Type and Percent of Additives and Grout Volume or Number of 94 lb. Sacks

	From (Ft.)	To (Ft.)

FINISH: [ ] Open Hole [ ] Perforated or Slotted Casing [ ] Gravel Pack [ ] Sandpoint or Screen Attached to Well Casing [ ] Sandpoint or Screen Telescoped with Packer Inside Casing (Packer Material:)

Sandpoint/Screen Material	Dia. (In.)	Slot Size (In.)	From (Ft.)	To (Ft.)

[ ] Other Finish:

QUALITY TEST: [ ] None [ ] Bacteria Date [ ] Chemical Date

By: [ ] Health Dept. [ ] USGS [ ] Other

[ ] Clear [ ] Colored [ ] Sulphur [ ] Salty [ ] Iron [ ] Other

Conductance (Micromhos) Chloride ppm

Hardness ppm as calcium carbonate pH Temp °F

Well Disinfected: [ ] No [ ] Yes (Date)

WELL TEST, by: [ ] Natural Flow G.P.M. [ ] Airlift [ ] Bailer [ ] Permanent Pump [ ] Test Pump [ ] None

Discharge Measured By: [ ] Bailer [ ] Estimated [ ] Current Meter [ ] Orifice [ ] Trajectory [ ] Venturi [ ] Volumetric [ ] Other

Measured Static Water Level + – Ft.

Measured Pumping Water Level + – Ft.

After Hours At G.P.M.

Specific Capacity G.P.M./Ft. of Drawdown

Measuring Pt. (Described):

Which is Ft. [ ] Above [ ] Below Land Surface

Elevation of Measuring Pt. = Ft. [ ] Above [illegible]

WELL EQUIPMENT: [ ] Open [ ] Capped [ ] Valved [ ] Permanent Pump [ ] Temporary Pump

Type Pump: [ ] Centrifugal [ ] Cylinder [ ] Jet [ ] Submersible [ ] Turbine [ ] Other:

Power: [ ] Diesel [ ] Electric [ ] Gasoline [ ] Other

Horsepower Capacity G.P.M.

Intake/Injection Depth Ft.

DER Form PERM 13-10 (Oct 77)

[illegible] OF WORK: [ ] Construction [ ] Repair [ ] Deepening [ ] Plugging [ ] Other

[illegible] NUMBER:

WELL NUMBER

TYPE OF WELL: [ ] Water Well [ ] Test Well [ ] Recharge Drainage [ ] Waste Disposal [ ] Observation [ ] Other

USE: [ ] Domestic [ ] Irrigation [ ] Industrial [ ] Livestock [ ] Public Supply [ ] Other:

SKETCH LOCATION OF WELL in relation to local landmarks, giving distance and direction from nearest town, road, or other reference point.

North

GEOPHYSICAL LOGS: Type: By

WELL LOG				
Bore Hole (In.)	Casing Size (In.)	Depth (Ft.) From	Depth (Ft.) To	Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note any cavities. Indicate producing zones. Attach additional sheets if necessary.
				6.3 lbs psi

Total Depth Ft. Producing Zone Material: [ ] Sand [ ] Shell [ ] Broken Shell [ ] Limestone [ ] Other:

Top of Producing Zone Ft. Bottom of Producing Zone Ft.

[ ] Drill Cuttings Sent to Bureau of Geology

License No. Contractor Signature Position

Completion Date Driller Signature

JUL 17 1978

WATER WELL FIELD INSPECTION REPORT

11200 Complaint No. | TWUP No. | 79-11 Construction/Plugging Permit No. | J-2036 Well Inventory No.

Is Well Free Flowing? Yes ✓ No

Owner John Everett Phone 264-7921

Owner's Address 8335 Malaga Ave

Well Location Address 8335 Malaga Ave

Well Drilling Contractor Partridge Well Co License/Bond No. 1065

Site Identification: 30 11 43 081 41 24 01 Lat/Long (if different) 30 11 43 081 41 24 01

LND GRT 1/4 1/4 1/4 Section 3S TWP 26E Range Orange Park Fl Quad Map Name

Depth of Hole Drilled 378 Depth of Well 378 How Measured BW2

Diameter/Cross Section 3x2 Depth of Casing 273

Depth and Diameter of Well Segments: 5 " from LSD to 26

3 " Dia. from 26 ' to 273 ' 2 " Dia. from 273 ' to 378 '

Depth and Diameter of Casing Segments: 3 " Dia. from .50 ' Above/Below LSD

To: 42 ' 2 " Dia. from 35 ' to 273.

Type and Quantity of Grouting Used Cement Well Centered in Grout?

Use of Well Domestic No. of People Served

Water Level 24.95 Above/Below LSD Measuring Pt. .50 ' Above/Below LSD

How Measured Pressure Gage Measured by Albertie Date 2/30/79

Method of Construction Hydraulic Rotary Date of Construction ~~0[illegible]~~ 1/23/79

Condition of Casing/Liner Pipes (wall thickness 0.125" min. new, used, etc.)

New

Casing Material Used Galv Steel

Altitude 40' Interval 5 [illegible]

Topo Setting Hillside

Distance to Closest Well of 3" Diameter or Over and/or Depth of 250' or Deeper if Clos than 300' _____

Distance to nearest Contaminant - Septic Tank, etc., if Less than 100' _____

Maximum Well Yield _____ GPM Average Well Yield _____ G

Free Flowing Well Yield 71.5 GPM How Yield Determined Trg'

Frequency of Well Use 24 Hrs/Day 365 Days/Year

Pump Data - Type and Make Jacuzzi HP .5

Pump Capacity _____ GPM No. Bowls or Stages _____

Type of Power Electric Static Water Level _____

Production Water Level _____ Pump Intake Setting _____ = Depth of Section Line

Water Sampled for: Dissolved Solids _____ Conductivity _____

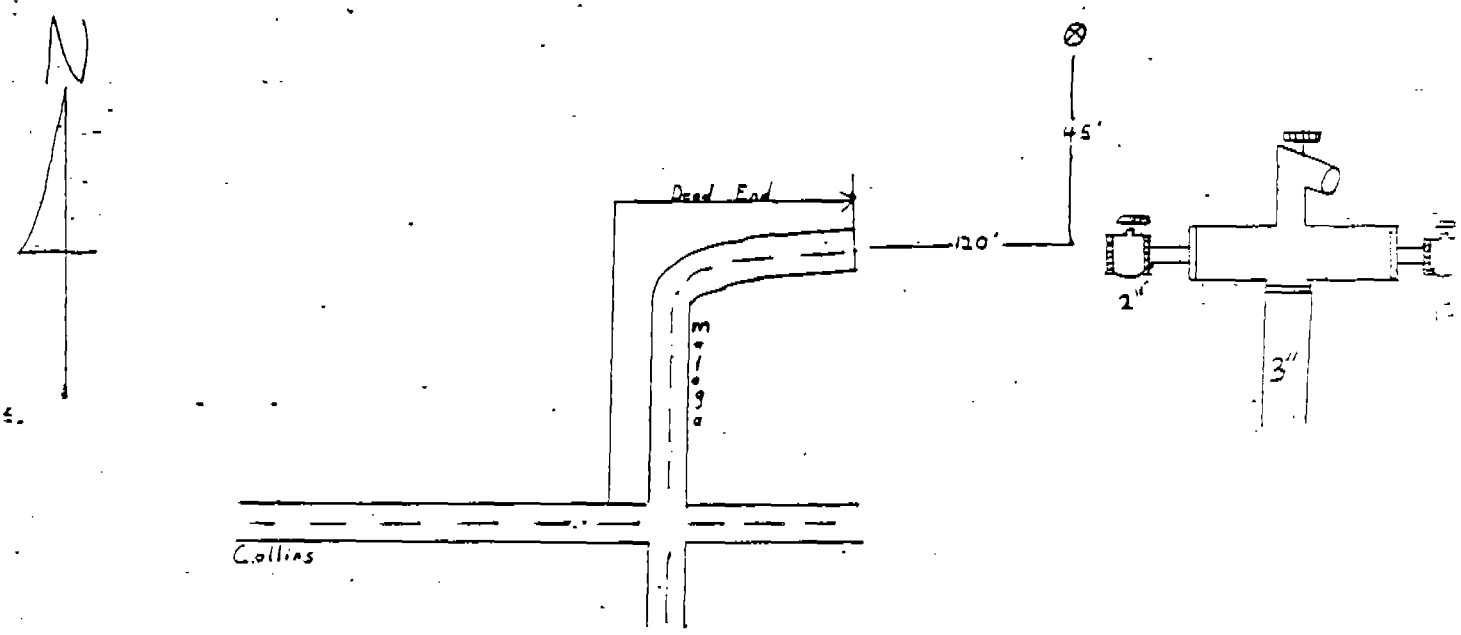
Hardness _____ Chlorides _____ PH= _____ Temperature _____

General Rating: Poor _____ Average _____ Good _____ Excellent _____

Action Taken/Comments _____

Follow Up Needed _____

Inspector's Name S/ Alberti Field Inspection Date 1/30/79



79-11

J-2636

WELL NUMBER

OWNER

Last Name | First Name | Initial

Number | Street

City | State

Area Code | Phone Number | Zip Code

WELL LOCATION:

Locate in Section

Township | Range

Latitude Deg. Min. Sec. N

Longitude Deg. Min. Sec. W

Number | Street/Road

Lot No. | Subdivision

City | County

OWNER WELL NUMBER OR NAME:

DRILL METHOD: [ ] Rotary [ ] Cable Tool [ ] Jet [ ] Auger [ ] Other:

SURFACE CASING, CASING, AND LINER MATERIAL:

Steel Dia. (In.) Black	Galv.	S. Steel	Steel Wt. (lb./ft.)	Dia. (In.) PVC	Other†	From (Ft.)	To (Ft.)	Schedule No.	Joints*
	3"					0	42		
	6"					39	273		

† Describe Material:

* TC = Threaded and Coupled, TCW = Threaded, Coupled, and Welded, W = Welded, B = Bonded (PVC), O = Other:

GROUT: [ ] None [ ] Neat Cement [ ] Other:

Type and Percent of Additives and Grout Volume or Number of 94 lb. Sacks

	From (Ft.)	To (Ft.)
2 bags		

FINISH: [ ] Open Hole [ ] Perforated or Slotted Casing [ ] Gravel Pack [ ] Sandpoint or Screen Attached to Well Casing [ ] Sandpoint or Screen Telescoped with Packer Inside Casing (Packer Material:

Sandpoint/Screen Material	Dia. (In.)	Slot Size (In.)	From (Ft.)	To (Ft.)

[ ] Other Finish:

QUALITY TEST: [ ] None [ ] Bacteria Date [ ] Chemical Date

By [ ] Health Dept. [ ] USGS [ ] Other

[ ] Clear [ ] Colored [ ] Sulphur [ ] Salty [ ] Iron [ ] Other

Conductance (Micromhos) Chloride ppm

Hardness: ppm as calcium carbonate pH Temp °F

Well Disinfected: [ ] No [ ] Yes (Date)

WELL TEST, by: [ ] Natural Flow G.P.M. [ ] Airlift [ ] Bailer [ ] Permanent Pump [ ] Test Pump [ ] None

Discharge Measured By: [ ] Bailer [ ] Estimated [ ] Current Meter [ ] Orifice [ ] Trajectory [ ] Venturi [ ] Volumetric [ ] Other

Measured Static Water Level + - Ft.

Measured Pumping Water Level + - Ft.

After Hours At G.P.M.

Specific Capacity G.P.M./Ft. of Drawdown

Measuring Pt. (Described)

Which is Ft. [ ] Above [ ] Below Land Surface

Elevation of Measuring Pt. = Ft. [ ] Above [ ] Below MSL

WELL EQUIPMENT: [ ] Open [ ] Capped [ ] Valved [ ] Permanent Pump [ ] Temporary Pump

Type Pump: [ ] Centrifugal [ ] Cylinder [ ] Jet [ ] Submersible [ ] Turbine [ ] Other

Power [ ] Diesel [ ] Electric [ ] Gasoline [ ] Other

Horsepower Capacity G.P.M.

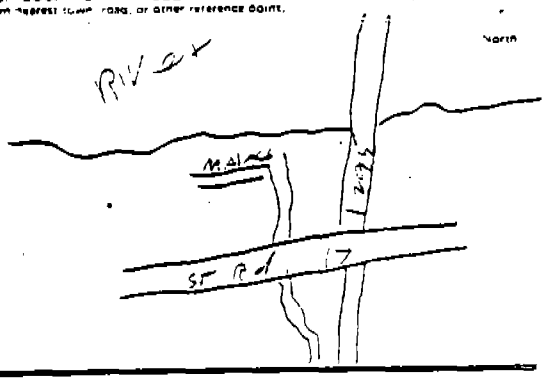
Intake/Injection Depth Ft.

DER Form PERM 13.10 (Oct 77)

TYPE OF WELL: Water Well [ ] Test Well [ ] Recharge [ ] Drainage [ ] Other

[ ] Domestic [ ] Irrigation [ ] Industrial [ ] Livestock [ ] Public Supply [ ] Other

SKETCH LOCATION OF WELL in relation to local landmarks, giving distance and direction from nearest town, road, or other reference point.



GEOPHYSICAL LOGS: Type: By:

WELL LOG

Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note any cavities. Indicate producing zones. Attach additional sheets if necessary.

Bore Hole (In.)	Casing Size (In.)	Depth (Ft.) From	To	
5"	3"	0	17	Sand
		17	26	Rock
5"/3"	3"/2"	26	87	White Marl
		87	90	Green Rock
		90	178	Green Clay
		178	243	Greenish Sand
		243	270	Sticky Green Clay
		270	273	Tan Rock
		273		Limestone
1 7/8				
			378	Bottom

Total Depth 378 Ft. Producing Zone Material [ ] Sand [ ] Shell [ ] Broken Shell [ ] Limestone [ ] Other

Top of Producing Zone 273 Ft., Bottom of Producing Zone 378 Ft.

[ ] Drill Cuttings Sent to Bureau of Geology

License No. 1005 Contractor Signature Position

Completion Date 11 23 79 Driller Signature

WATER WELL FIELD INSPECTION REPORT

Complaint No. _____ TWUP No. _____ Construction/Plugging Permit No. _____ Well Inventory J-2523

Is Well Free Flowing? ____ Yes V No

Owner Mobile Living of Jacksonville (Azalea Terrace) Phone 772-6900

Owner's Address _____

Well Location Address 6301 Roosevelt Blvd

Well Drilling Contractor _____ License/Bond No. _____

Site Identification: 30 1405 081 4128 01 Lat./Long (if different) 30 _____ 081 _____ 01

SW 1/4 SW 1/4 SW 1/4 15 Section 3S TWP 26E Range Orange Park Quad Map Name

Depth of Hole Drilled _____ Depth of Well _____ How measured _____

Diameter/Cross Section _____ Depth of Casing _____

Depth and Diameter of Well Segments: _____" from LSD to _____'

_____" Dia. from _____' to _____' _____" Dia. from _____' to _____'

Depth and Diameter of Casing Segments: _____" Dia. from _____' Above Below LSD

To: _____' _____" Dia. from _____' to _____'

Type and Quantity of Grouting Used _____ Well centered in Grout? _____

Use of Well Public Supply Number of People Served _____

Water Level _____ Above Below LSD Measuring Pt. _____ Above Below LSD

How Measured _____ Measured by _____ Date _____

Method of Construction _____ Date of Construction _____

Condition of Casing/Liner Pipes (wall thickness 0.125" min. new, used; etc.)

_____

Casing Material Used _____

Altitude 10 Interval 5

Topo Setting Flat

Distance to Closest Well of 3" Diameter or Over and/or Depth of 250' or Deeper if closer than 300' _____

Distance to nearest Contaminant - Septic Tank; etc., if less than 100' _____

Maximum Well Yield _____ GPM Average Well Yield _____ GPM

Well Yield _____ GPM How Yield Determined _____

Frequency of Well Use _____ Hrs/Day _____ Days/Yea

Pump Data - Type and Make _____ HP _____

Pump Capacity _____ GPM No. Bowls or Stages _____

Type of Power _____ Static Water Level _____

Production Water Level _____ Pump Intake Setting _____
= Depth of Section Lin

Water Sampled for: Dissolved Solids _____ Conductivity _____

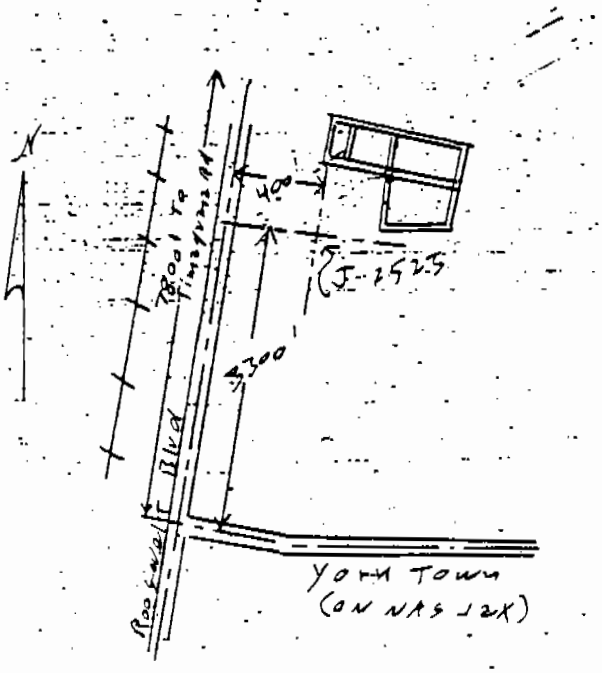
Hardness _____ Chlorides _____ PH= _____ Temperature _____

General Rating: Poor _____ Average _____ Good _____ Excellent _____

Action Taken/Comments _____

Follow Up Needed _____

Inspector's Name _____ Field Inspection Date _____



	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
BACT. SAMP.												
CHEM. ANAL.												
MON. REP.												
TOTAL Q		.422	.529		.804	.802	.787	.798	.744	.757	.708	.678
DAILY Q MAX		.019	.021		.029	.030	.027	.028	.028	.029	.025	.026
DAILY Q MIN		.010	.012		.022	.024	.025	.024	.022	.022	.021	.019
DAILY Q AVG		.015	.017		.026	.027	.025	.026	.025	.025	.024	.023
AVG pH		7.2	7.1		7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
LBS Cl_2		253	305		49.8	41.5	45.7	50	45.7	41.5	37.4	41.5
Cl_2 PPM		72	84		7.5	6.2	7	7.5	7.4	6.6	6.4	7.4
Cl_2 MAX		1.2	1.0		1.8	2.4	2.5	1.8	1.2	3.0	1.6	1.6
Cl_2 MIN.		0.6	0.6		0.0[1]	0.6	0.0[2]	.02	0.2	0.0[3]	0.0[2]	0.6
COMM SECT'D		[illegible]	[illegible]		40	40	40 (ERO)	ERO 40	ERO 40	ERO 40	ERO 40	ERO 40

Aziza MHP

DATE 1981

EPA I.D. No. 2/6/839

State of Florida
Department of Environmental Regulation
SANITARY SURVEY REPORT
for
Drinking Water Systems

Inspection date: 5/19/82

I. GENERAL

Plant name Azalea MHP County Duval

Plant owner Joel S. Heffron Person contacted

Plant address 6301 Roosevelt Blvd Operator certification no. Enviro Services

City Jacksonville Zip 32244 Phone no. 772-6900 Basin code 30

Population Served 240 No. of service connections 90

Type of Service community Type of meter at plant & capacity in-line

Percent or no. of meters -0- Plant designed by

Plant capacity (design) .084MGD Plant output, average (MGD)

Storage capacity (design) 4200 Maximum hour (1000's gals.)

Approval no. and date Emergency water source none

Daily maximum (MGD) Standby equipment none

Emergency power source N/A Capacity N/A

TYPE OF SERVICE [X] Community [ ] Non-community

[ ] Municipal	[ ] Subdivision	[ ] Common carrier
[ ] Recreation area	[ ] Institution	[ ] Motel or hotel
[X] Trailer park	[ ] College or school	[ ] Other
[ ] Restaurant	[ ] Industrial plant	

II. SOURCE(S) OF RAW WATER SUPPLY [XX] Ground; Number of wells [1]
[ ] Surface; Purchased [ ]

A. Ground supplies; (Attach sketch of well(s) in relation to plant location on separate sheet.)

Well no. (if more than 5, attach extra sheets)	1	2	3	4	5
Year drilled					
Depth drilled	600+				
Length, outside casing					
Diameter, outside casing	6"				
Material, outside casing	steel				
Depth to static water level					
Normal suction lift (working level)					
Normal yield in GPM					
Test yield in GPM	Free Flowing				
Type of strainer used					
Depth to top of strainer					
Is well subject to inundation?	no				
Is well protected against surface water?	yes				
Salt water infiltration problems in past?	no				
Latitude					
Longitude					
Check valve					
Grouted					
Has well ever been contaminated?	no				
Pump manufacturer's name	centr f.				
Date manufactured					
Model number					
Capacity	60gpm				
Last serviced (date)					
Comment	HP 3				
Maint. schedule (day, week, month, etc.)					

RADIOCHEMICAL ANALYSIS OF DRINKING WATER

PWS ID: 161329

Public Water System: Name and Address
Azalea Mobile Home Park
6301 Roosevelt Blvd.
Jax. Fla

Send Results to: Name and Address
Public Health Division
Sanitary Engineering Branch
515 W. 6th St.
Jax Fla.

Contaminant ID	CONTAMINANT NAME	ANALYSIS METHOD	ANALYSIS RESULTS	ANALYSIS ERROR	ANALYSIS DATE MO.	DAY	YR.	SAMPLE ANALYZED BY
4000	Gross Alpha	401	<10*		09	04	80	K. Taylor

SAMPLE PRESERVATION	
HNO_3	X ← NONE
HCl	
Other Specify	
Lab Specify	

*ACID ADDED IN LAB

LAB #: 612

One year composite

LOCATION CODE	NAME	SAMPLE DATE MO.	DAY	YR.	SAMPLE TYPE	TIME	LAB ID	LAB NAME	SAMPLE COLLECTED BY:
							13186	DRHS	

Prepared By _____ Date ___/___/___

Approved By _____ Date ___/___/___

SAMPLE TYPE KEY
- C. Check Sample
- D. Regular Distribution Sample
- F. Plant Tap Sample
- R. Raw Water Sample
- S. Special Sample

HRS Form 1124 May 1979

(1)

Department of Health and Rehabilitative Services
Office of Laboratory Services
P. O. Box 210
Jacksonville, Florida 32231

Submitting Age: SOUTHERN GULF UTILITIES INC
Address: 5503 WESCONNETT BLVD.
P. O. BOX 7267
JACKSONVILLE, FLA. 32210

DRINKING WATER CHEMICAL ANALYSIS

System Name: OCTEGA HILLS
County: DUVAL
Collector: [illegible]
Address: GREENWAY DR.
System I.D. No.: 2160352
DER District:
Sample Site: 5150 OAKSIDE DR
Raw or Treated: TREATED
Temperature:
Date and Time Collected: 4-20-82 - 9:00 AM
Field Chlorine, mg/l: 0.8
Field pH: 7.4

Circle one: 40. Community public water system 41. Non-community public water system 42. Other public water system 43. Private water system

Circle one: 1. Compliance 2. Recheck 3. Other (indicate below parameters to be tested for items 2 or 3).

PRIMARY STANDARDS			SECONDARY STANDARDS			GENERAL	
PARAMETER	METHOD†	RESULT**	PARAMETER	METHOD†	RESULT**	PARAMETER	RESULT**
Arsenic as As		BDL	Chloride as Cl		18	Total Hardness as $CaCO_3$ (c)	173
Barium as Ba		BDL	Color*		5 *	Total Alkalinity as $CaCO_3$	97 *
Cadmium as Cd		BDL	Copper as Cu		BDL	N.C.H. as $CaCO_3$ (c)	76
Chromium as Cr		BDL	Corrosivity*			Bicarbonate as HCO_3 (c)	118
Lead as Pb		BDL	Foaming Agents		BDL *	Calcium as Ca	38
Mercury as Hg		BDL	H_2S			Magnesium as Mg	19
Selenium as Se		BDL	Iron as Fe		.31	Carbon Dioxide as CO_2 (c)	3
Silver as Ag		BDL	Manganese as Mn		BDL	Bicarbonate as $CaCO_3$ (c)	97
Nitrate as N		.03	Odor*		BDL *	Carbonate as $CaCO_3$ (c)	0
Fluoride as F		.41	pH*		7.84*	Hydroxide as $CaCO_3$ (c)	0
Turbidity,* NTU		2.4	Sulfate as SO_4		54	Sodium as Na	BDL
			TDS		219		
Endrin			Zinc as Zn		BDL	pHs* (c)	7.95
Lindane						Stability Index* 2pHs-pH (c)	8.05
Methoxychlor						Saturation Index* pH-pHs (c)	-.10
Toxaphene						INTERPRETATION: Stable	
2, 4-D						Corrosive	
2, 4-5 TP Silvex						Scale Forming	
Trihalomethanes			DER reviewer:				
			Action required:				

Note: *All results in mg/liter except those denoted
†List of methods available on request

(c) = Calculated value
** BDL = Below detection limit, see reverse side

Date and Time Received: 4/20/82 3:55 PM
Laboratory I.D. No.: 12001
Date Reported: 6/1/82
Analysts: Robert L. Sullivan

Remarks: * These Parameters exceeded the 24 hour holding

Received JUN 10 1982 Sanitary Engineering Branch

HRS Form 1125, May 79 (Obsoletes HRS(TEST) Form 32)

RADIOCHEMICAL ANALYSIS OF DRINKING WATER

PWS ID

Public Water System: Name and Address: Ortega Hills WTP

Send Results to: Name and Address

Contaminant ID	CONTAMINANT NAME	ANALYSIS METHOD	ANALYSIS RESULTS	ANALYSIS ERROR	ANALYSIS DATE MO.	DAY	YR.	SAMPLE ANALYZED BY
4000	gross Alpha	401	4.2					

SAMPLE PRESERVATION: HNO_3 | HCl | Other Specify | Lab. Specify

LAB #

LOCATION CODE	LOCATION NAME	SAMPLE DATE MO.	DAY	YR.	SAMPLE TYPE	SAMPLE TIME	LAB ID	LAB NAME	SAMPLE COLLECTED BY:

Prepared By _____ Date / /

Approved By _____ Date / /

SAMPLE TYPE KEY

C. Check Sample
D. Regular Distribution Sample
P. Plant Tap Sample
R. Raw Water Sample
S. Special Sample

HRS For 1124 May 1979

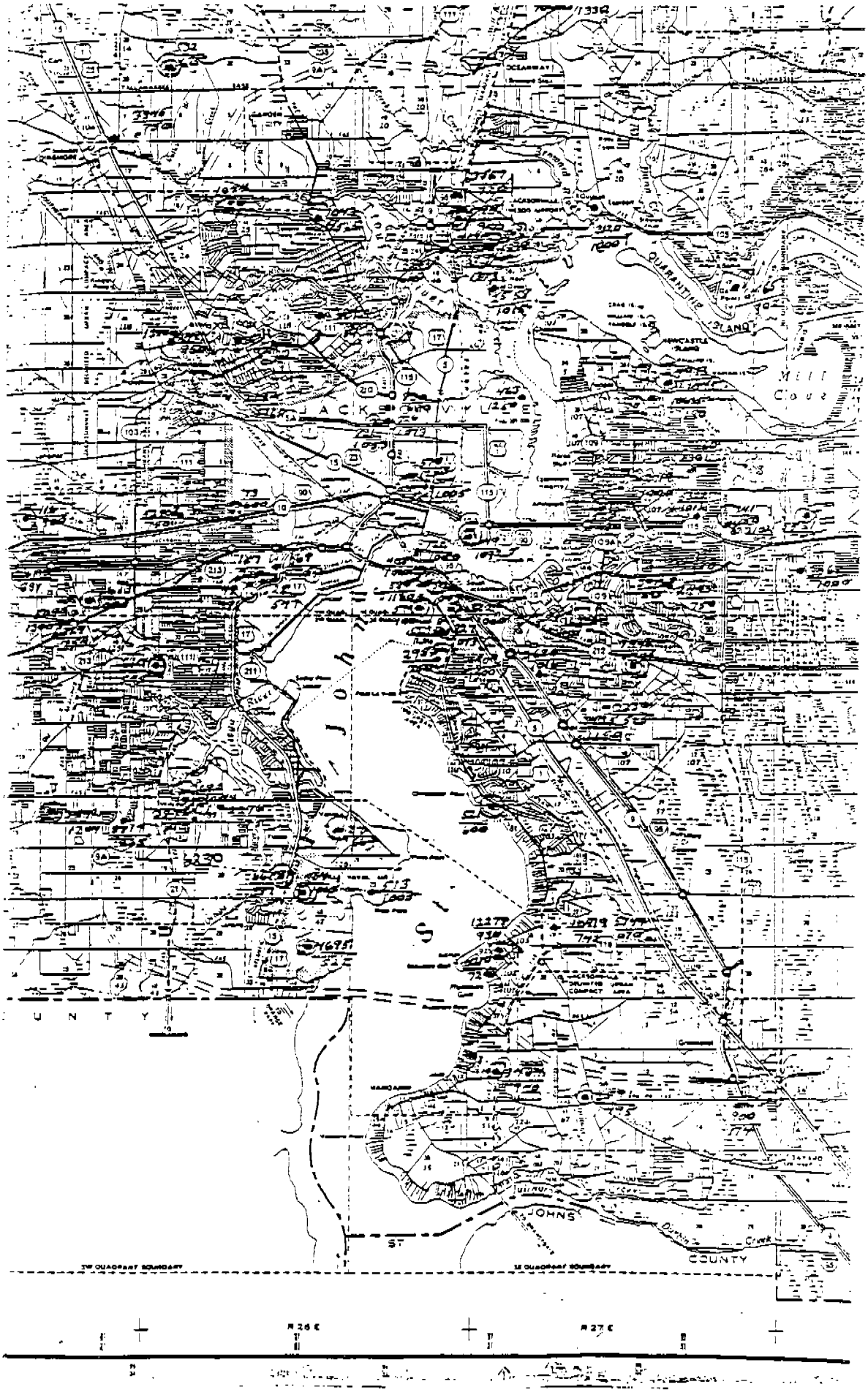
ORTEGA HILLS

DATE 1981

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
BACT. SAMP												
CHEM. ANAL												
MICR. REP.												
TOTAL Q	3.341	3.903	2.888	2.671	4.327	5.852	3.798	3.839	5.768	3.760	2.880	2.654
DAILY Q MAX	.211	.145	.098	.099	.146	.201	.129	.129	.198	.126	.101	.091
DAILY Q MIN	.095	.139	.068	.085	.135	.181	.117	.119	.186	.116	.091	.081
DAILY Q AVG	.107	.140	.093	.089	.140	.195	.123	.124	.192	.121	.096	.086
AVG pH	7.4	7.4	7.4	7.5	7.5	7.4	7.5	7.5	7.4	7.5	7.5	7.5
LBS Cl2	297	244	270	303	354	376	341	293	326	296	267	252
Cl2 PPM	10	8	11	14	10	8	10.8	9.2	6.8	9.5	11.2	11.4
Cl2 MAX	2.1	1.8	1.7	1.8	1.9	1.8	1.8	1.7	1.7	1.8	1.7	1.6
Cl2 MIN	0.5	1.0	1.4	1.4	1.2	1.3	1.3	1.3	1.3	1.3	1.4	1.2
COMP SAMP'D		447	444	449	447		453	454	452	457	445	446

Appendix A-7

Florida Bureau of Geology Geologic Logs from Deep Wells in the Vicinity of NAS Jacksonville



QUARANTINE ISLAND
Mill Cove
JACKSONVILLE
JOHNS
COUNTY
ST
R 26 E
R 27 E

INTER-OFFICE CORRESPONDENCE SHEET
SUN OIL COMPANY

W-27
(Monsour)

Subject:

Date: May 6, 1940

Office: Florida

From: Emil Monsour

To: Dr. F. H. Lahee
Box 2880 Sun Oil Company
Dallas, Texas

Dear Sir:

Samples from W-27 Timuquana Country Club, south of Ortega, Elev. 10', Duval County, Florida, have been examined. Determinations are as follows:

400	Cutting	Top Ocala
630-640		No sample (635' is being used as top Coskinolina Zone.)
640	"	Light to medium honey brown, fossiliferous, fine grained, crystalline dolomite. Coskinolina cookei, Dictyoconus codon, Lituonella.

The surveys files have been checked for wells in Pasco, Hernando, and Citrus counties. The only available well is 274, U. S. Dept. of Agriculture Chinsegut Hill Experiment Station, Elev. 256', Sec. 36, T21S, R19E, 5 miles north of Brooksville in Hernando County, Florida. Samples have been examined. Determinations are as follows:

197-200	Cutting	Top Ocala. Contains typical Ocala forams and Coskinolina cookei.
360-375	"	Top Coskinolina Zone. Light honey brown, fossiliferous very fine grained to compact, crystalline dolomite. Coskinolina Cookei, Lituonella, Dictyoconus codon.

Additional samples from W-3, Dundee Petroleum Co., Elev. 75', Sec. 36, T20S, R22E, 4 miles NE of Bushnell in Sumter County, Florida, have been examined. Determinations are as follows:

1027	Cutting	First Eponides of cf. yeguaensis noted.
1052	"	First Dictyoconus gunteri noted.
1787-1845		No samples
1845	"	Yellowish white to pale yellow, hard, non-fossiliferous, very fine grained dolomite. First appearance of small capsule-shaped, very fine grained concretions.
1865	"	Yellowish white to dark gray, hard, porous, non-fossiliferous very fine grained dolomite. Dark brown capsule-shaped concretions (Differs from above only in color).
2250	"	First Borelis noted. Grayish white to dark gray, hard fossiliferous dolomite.

OWNER: Timuquana Country Club
LOCATION: South of Ortega, Jacksonville Sec. 15, T3S, R26E, 2300' from E line, 2380' from S line
ELEVATION: 16.33 Gr.
COUNTY: Duval
STARTED: April, 1922
COMPLETED: June, 1922
CASING: 286' 2" of 8"
DEPTH: 669'
DRILLER: Ohio Well Drilling Company. H. H. Bailey
REMARKS: Pressure 18 pounds, 1500 gallons per minute. Driller's log and a lithologic log (Stubbs) 36 samples, from the surface to 669'. Interv sheet made August 3, 1948.

0-70	Fine gray surface sand with broken shell. (Driller noted clay at 40 and 70, enough to color water.)
70-121	Gray sand, broken shell, phosphate pebbles. Probably Miocene.
121-198	Same as above.
198-233	Coarse, gray, siliceous sand, phosphate pebbles.
233-259	Same as above, with fragments shell.
259-270	Dark gray siliceous sand, some clay - phosphate pebbles.
270-291	Dark gray coarse siliceous sand - phosphate pebbles.
291-298	Gray sandy marl - small phosphate pebbles.
298-305	Same as above.
305-315	Gray, sandy, calcareous clay - phosphate pebbles.
315-320	Gray sandy, calcareous clay with fragments of dark crystalline quartz, phosphate pebbles.
320-330	Gray, sandy, calcareous clay - phosphate pebbles.
330-332	Same as above.
332-338	A coarse siliceous sand with minute phosphate pebbles - a layer of dark crystalline flint, (6 in. thick according to drillers log) also some calcareous phosphatic sand.
340-350	A greenish-gray calcareous sandy clay with phosphate pebbles.
350-375	Slightly more siliceous than the above.
375-382	A coarse siliceous sand with siliceous pebbles the size of a pea and phosphate pebbles. Also fragments of hard white calcareous matter - flow of water - 40 ga per minute.
382-393	A light colored sandy calcareous marl - minute phosphate pebbles.
383-400	Same as above.
400	Shell marl - large phosphate pebbles - strong flow.
420	White shell marl - increase flow.
440	White limestone - increase flow.
460	White limestone - probably Ocala - increase flow.
480	White limestone - many foraminifera - Ocala - no increase flow.
500	White porous limestone, foraminifera abundant.
500-520	White porous limestone, foraminifera abundant.
520-540	Light colored, porous, fossiliferous limestone.
540-560	Light colored, porous, fossiliferous limestone. Foraminifera abundant.
560-580	Light colored, porous, fossiliferous limestone. Foraminifera abundant.
580-600	Light colored, porous, fossiliferous limestone. Foraminifera abundant.
600-610	Light colored, porous, fossiliferous limestone. Foraminifera abundant. Hard from 604-608.
620	Light colored, porous, fossiliferous limestone. Foraminifera abundant.
630	Same as above. Conical foraminifera noted.
640	Same as above.
650	Light colored, porous, limestone.
660	Light colored, porous limestone. Foraminifera abundant.
669	Brownish limestone, few fossils noted.

OWNER: Timuquana Country Club
LOCATION: South of Ortega, Jacksonville, 2300' from
COUNTY: Duval line, 2380' from S line, Sec. 1
STARTED: April 1922. T3S, R26
COMPLETED: June 1922
CASING: 286' 2" of 8"
DRILLER: Ohio Well Drilling Co., H. H. Bailey
TOTAL DEPTH: 669'
REMARKS: Pressure 18 lbs. 1500 GPM, 36 samples, fr
the surface to 669'.
ELEVATION: 16.33 Grd.

393-400 Coarse clean quartz sand, phosphate pebbles and some tan colored calcareous, phosphatic sandstone.

Miocene - Hawthorn
Eocene - Ocala

400 Large fragments of very porous, fossiliferous white limestone Lepidocyclina, many large phosphate pebbles.
420 Friable white limestone largely composed of Lepidocyclina.
440-460, 480, 500, 520, 540 Same.

FLORIDA BUREAU OF GEOLOGY - LITHO LOG PRINTOUT

W- 27

DUVAL CO. T03S R26E SEC 15 30 14 50 N 81 41 00 W
TOTAL DEPTH- 669 FT. ELEV.- 16 FT. 36 SAMPLES- 0- 669
COMPLETED- 22.06. DEPTH WORKED 669 FT.

WELL NAME-
TIMUCUANA COUNTRY CLUB (OHIO WELL DRILLING CO.)
REMARKS-
WORKED BY H. SCHNEIDER DEC. 26, 1979

STRATIGRAPHIC FORMATIONS -

0.0-	70.0	UNDIFFERENTIATED SAND AND CLAY
70.0-	400.0	HAWTHORN FORMATION
400.0-	480.0	CRYSTAL RIVER FORMATION
480.0-	620.0	WILLISTON FORMATION
620.0-	660.0	AVON PARK LIMESTONE
660.0-	690.0	LAKE CITY LIMESTONE

LITHOLOGIC LOG
W- 27 . DUVAL CO. T03S, R26E, SEC 15

70.0 SAND , YL GY, 35 PERCENT POROSITY-INTERGRAN,SIZE- MED,
RANGE- FINE- V C, SUB-ANG, ROUNDED, MED SPH, NON-INC,
01 PCT. PHOS GRAV, 01 PCT. MICA, 02 PCT. LIMESTONE,
04 PCT. DOLOMITE,MOLLUSKS ,FOSS FRAG,
121.0 SAND , LT GY, 35 PERCENT POROSITY-INTERGRAN,SIZE- MED,
RANGE- FINE- V C, SUB-ANG, ROUNDED, MED SPH, NON-INC,
03 PCT. PHOS SAND, 12 PCT. DOLOMITE, 04 PCT. PHOS GRAV,
01 PCT. FE STAIN,MOLLUSKS ,FOSS FRAG,
198.0 SAND , LT GY, 35 PERCENT POROSITY-INTERGRAN,SIZE- MED,
RANGE- FINE- V C, SUB-ANG, ROUNDED, MED SPH, NON-INC,
02 PCT. PHOS SAND, 01 PCT. PHOS GRAV, 05 PCT. DOLOMITE,
01 PCT. FE STAIN,MOLLUSKS ,FOSS FRAG,
233.0 SAND ,MD LT GY, 35 PERCENT POROSITY-INTERGRAN,SIZE- MED,
RANGE- MED- V C, SUB-ANG, ROUNDED, MED SPH, NON-INC,
03 PCT. PHOS SAND, 07 PCT. PHOS GRAV, 01 PCT. DOLOMITE,
259.0 SAND ,MD LT GY, 30 PERCENT POROSITY-INTERGRAN,SIZE- MED,
RANGE- MED- V C, SUB-ANG, ROUNDED, MED SPH, POOR INC,
DOLOM CMT, 02 PCT. PHOS SAND, 24 PCT. DOLOMITE,MOLLUSKS ,
FOSS FRAG,
270.0 SAND ,MD LT GY, 25 PERCENT POROSITY-INTERGRAN,SIZE- MED,
RANGE- FINE- V C, SUB-ANG, ROUNDED, MED SPH, POOR INC,
DOLOM CMT, 40 PCT. DOLOMITE, 06 PCT. PHOS SAND, 04 PCT.
LIMESTONE,
291.0 SAND , LT GY, 35 PERCENT POROSITY-INTERGRAN,SIZE-CRSE,
RANGE- MED- V C, SUB-ANG, ROUNDED, MED SPH, NON-INC,
08 PCT. PHOS GRAV, 02 PCT. PHOS SAND, 08 PCT. DOLOMITE,
SHARK TTH,
298.0 DOLOMITE , V LT GY, 04 PERCENT POROSITY-INTERGRAN, MICRO,
0-10 PCT. ALTERED ,SUBHEDRAL,SIZE-MICR, RANGE- CRYP- V F,
GOOD IND,DOLOM CMT, 22 PCT. SAND(QTZ), 06 PCT. PHOS SAND,
02 PCT. PHOS GRAV,
305.0 DOLOMITE , LT GY, 09 PERCENT POROSITY-INTERGRAN, 0-10 PCT.
ALTERED ,SUBHEDRAL,SIZE-MICR, RANGE- CRYP- V F, MOD IND,
DOLOM CMT, 39 PCT. SAND(QTZ), 04 PCT. PHOS SAND, 05 PCT.
PHOS GRAV, 01 PCT. FE STAIN,MOLLUSKS ,FOSS FRAG,
315.0 SAND ,MD LT GY, 25 PERCENT POROSITY-INTERGRAN,SIZE-FINE,
RANGE- FINE- V C, SUB-ANG, ROUNDED, MED SPH, NON-INC,
46 PCT. DOLOMITE, 03 PCT. PHOS SAND, 01 PCT. PHOS GRAV,
320.0 SAND , PK GY, 02 PERCENT POROSITY-INTERGRAN,SIZE-CRSE,
RANGE- MED-CRSE, SUB-ANG, ROUNDED, MED SPH, GOOD INC,
DOLOM CMT, 21 PCT. DOLOMITE, 02 PCT. PHOS SAND, 05 PCT.
CHERT,
330.0 SAND , V LT GY, 35 PERCENT POROSITY-INTERGRAN,SIZE- MED,
RANGE- MED-CRSE, SUB-ANG, ROUNDED, MED SPH, NON-INC,
12 PCT. PHOS GRAV, 24 PCT. DOLOMITE, 04 PCT. PHOS SAND,
332.0 SAND , V LT GY, 30 PERCENT POROSITY-INTERGRAN, NON-INC,
09 PCT. PHOS SAND, 24 PCT. DOLOMITE,
338.0 SAND ,GY BU GN, 33 PERCENT POROSITY-INTERGRAN,SIZE-CRSE,
RANGE- MED- V C, SUB-ANG, ROUNDED, MED SPH, NON-INC,
04 PCT. PHOS SAND, 19 PCT. DOLOMITE, 03 PCT. PHOS GRAV,

LITHOLOGIC LOG
W- 27 . DUVAL CO. T03S, R26E, SEC 15

340.0 NO SAMPLE,
350.0 SAND , LT GY, 30 PERCENT POROSITY-INTERGRAN,SIZE- MED,
RANGE- MED- V C, SUB-ANG, ROUNDED, MED SPH, NON-INT,
02 PCT. PHOS SAND, 06 PCT. PHOS GRAV, 42 PCT. DOLOMITE,
SHARK TTH,
375.0 SAND , V LT GY, 35 PERCENT POROSITY-INTERGRAN,SIZE-CRSE,
RANGE- CRSE- V C, SUB-ANG, ROUNDED, MED SPH, NON-INT,
02 PCT. PHOS SAND, 12 PCT. DOLOMITE,SHARK TTH,
382.0 SAND , V LT GY, 35 PERCENT POROSITY-INTERGRAN,SIZE-CRSE,
RANGE- CRSE- V C, SUB-ANG, ROUNDED, MED SPH, NON-INT,
03 PCT. PHOS SAND, 01 PCT. PHOS GRAV, 14 PCT. DOLOMITE,
SHARK TTH,
393.0 DOLOMITE , YL GY, 11 PERCENT POROSITY-INTERGRAN, MODIC,
0-10 PCT. ALTERED ,SUBHEDRAL,SIZE-MICR, RANGE- CRYP-MICR,
MOD IND,DOLOM CMT, 29 PCT. SAND(QTZ), 04 PCT. PHOS SAND,
03 PCT. PHOS GRAV,
400.0 SAND , LT GY, 30 PERCENT POROSITY-INTERGRAN,SIZE-CRSE,
RANGE- MED- V C, SUB-ANG, ROUNDED, MED SPH, NON-INT,
43 PCT. DOLOMITE, 04 PCT. PHOS GRAV, 01 PCT. PHOS SAND,
05 PCT. FE STAIN,
420.0 LIMESTONE, WHITE, 12 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 72 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP-MICR, MOD IND,MICRT CMT,FORAMINIF,
MOLLUSKS ,FOSS MOLD,
440.0 LIMESTONE, WHITE, 14 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 84 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP-MICR, POOR IND,MICRT CMT,FORAMINIF,
BRYOZOA,FOSS FRAG,
460.0 LIMESTONE, WHITE, 15 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 72 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP-CRSE, POOR IND,MICRT CMT,FORAMINIF,
FOSS MOLD, BRYOZOA,
480.0 AS ABOVE ,
500.0 LIMESTONE, WHITE, 18 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 91 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP- MED, MOD IND,MICRT CMT, 01 PCT.
SAND(QTZ), BRYOZOA,FORAMINIF,MOLLUSKS ,FOSS FRAG,
OPERCULINOIDES ABUNDANT
520.0 LIMESTONE, WHITE, 03 PERCENT POROSITY-INTERGRAN, MODIC,
GRAINTYPE- BIOGENIC, MICRITE, 60 PCT. ALLOCHEMS,SIZE-MICR,
RANGE- CRYP-CRSE, GOOD IND,MICRT CMT,FORAMINIF, BRYOZOA,
FOSS FRAG,
540.0 LIMESTONE, WHITE, 17 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 84 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP-FINE, MOD IND,MICRT CMT, 02 PCT.
SAND(QTZ),FORAMINIF,MOLLUSKS , BRYOZOA,
560.0 LIMESTONE, WHITE, 10 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 72 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP-CRSE, GOOD IND,MICRT CMT,FORAMINIF,
MOLLUSKS ,ECHINOID ,
580.0 LIMESTONE, WHITE, 14 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 75 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP- MED, MOD IND,MICRT CMT,FORAMINIF,
BRYOZOA,ECHINOID ,
600.0 LIMESTONE, WHITE, 16 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 81 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP-CRSE, MOD IND,MICRT CMT,MOLLUSKS ,
610.0 LIMESTONE, WHITE, 15 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 74 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP-CRSE, GOOD IND,MICRT CMT,FORAMINIF,
620.0 LIMESTONE, WHITE, 13 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 76 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP-CRSE, MOD IND,MICRT CMT, 02 PCT.
FE STAIN,FORAMINIF,MOLLUSKS , BRYOZOA,
640.0 LIMESTONE, WHITE, 16 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 75 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP-MICR, POOR IND,MICRT CMT, 22 PCT.
DOLOMITE,FORAMINIF, BRYOZOA,MOLLUSKS ,
650.0 LIMESTONE, WHITE, 16 PERCENT POROSITY-INTERGRAN, MODIC,
VUGULAR,GRAINTYPE- BIOGENIC, MICRITE, 75 PCT. ALLOCHEMS,
SIZE-MICR, RANGE- CRYP-MICR, MOD IND,MICRT CMT, 18 PCT.
DOLOMITE,FORAMINIF, BRYOZOA, CONES,MOLLUSKS ,

LITHOLOGIC LOG
W- 27 . DUVAL CO. T03S, R26E, SEC 15

660.0 LIMESTONE, WHITE, 12 PERCENT POROSITY-INTERGRAN, MOLDIC, GRAINTYPE- BIOGENIC, MICRITE, 60 PCT. ALLOCHEMS, SIZE-MICR, RANGE- CRYP-MICR, MOD IND, MICRT CMT, 10 PCT. DOLOMITE, 01 PCT. FE STAIN, BRYOZOA, FORAMINIF, CONES,

669.0 DOLOMITE, YL GY, 02 PERCENT POROSITY-INTERGRAN, 0-10 PCT. ALTERED, SUBHEDRAL, SIZE-MICR, RANGE- CRYP- V F, MOD IND, DOLOM CMT, 23 PCT. LIMESTONE, 01 PCT. FE STAIN, CONES, FORAMINIF, BRYOZOA,
TD.

*** END OF DATA ***

W-514
(E. R. Applin)
(Sun Oil Company)

August 24, 1943
Paleontology
Duval County, Florida
U. S. Navy, Naval Air Base No. 2

3520'FWL, 350'FSL
Sec 22 (Sec 39, Wm. Traverse GRAN
T3S, R22E (Coordinates Taken From
NORMAL section)

Mr. J. A. Waters
Office

Dear Sir:

Cutting samples from 20-1015' from U. S. Navy, Naval Air Base No. 2, Duval County, Florida, have been examined.

Location: SW¼ SE¼ Sec. 22, T3S, R26E. 1 mile SE of Yukon P. O.
Elevation: 21' Surface: 12 cross-24, 26 above MSL.
Determinations are as follows:

SUMMARY

20	Pliocene. Fine clear quartz sand.
50-307	Miocene. Sandy clays and argillaceous sand with many phosphate nodules and some limestone lenses showing fragmentary fossil molds and impressions.
312-560	Ocala. Jackson-Upper Eocene. White highly fossiliferous limestone carrying a typical Ocala fauna.
	500-560 Lower Ocala. Cream-colored limestone with some dolomite at the base of the section. Amphistegina cf. cubensis and other fossils typical of this zone of the Ocala present.
580	Lituonella zone of the Claiborne Middle Eocene. White and gray limestone carrying a sparse fauna characteristic of this zone of the Claiborne.
600-1015	Dictyoconus americanus zone of the Claiborne Eocene. Hard and soft, light brown to light cream-colored limestones irregularly somewhat dolomitic, carrying a fauna typical of this zone of the Claiborne. Two faunal units noted.
	I - Top 600' Dictyoconus Fabularia (?) unit.
	IV- Top 920' Lepidocyclina sp. unit, Large thick form.

20	Pliocene. Fine even grained clear quartz sand.
50	Miocene. Light cream-colored porous highly sandy limestone showing many fragmental molds and casts of macro-fossils.
60	Light gray, granular textured sandy and calcareous clay. Sand, quartz and phosphate nodules.
100	Light tan-gray, sandy clay as above.
120	No change.
140	Clay as above, sand of quartz and phosphate nodules, fine

140 (Cont'd)	to coarse in size of grain. Numerous calcareous and sandy clay nodules. A few shell fragments. (Ostrea? sp.)
160	Like the above.
180	Gray highly sandy clay. Sand averaging moderately fine, composed of clear quartz and many phosphate nodules.
200	Fine to coarse sand of quartz and phosphate nodules, and many sandy calcareous nodules in light tan-colored, finely granular textured calcareous soft clay matrix.
220	Like the above.
240	Argillaceous sand like the above, few calcareous nodules.
260	Like the above. A few chalky shell fragments in the sand.
280	Greenish-tan colored argillaceous sand, fine to coarse clear quartz sand and phosphate nodules, some sandy lime nodules.
290	Sand as above, also many fragments of a light brown, crystalline dolomitic sandy and phosphatic limestone showing some fragmental fossil molds and impressions.
298	Like the above.
307	Large calcareous nodular fragments of light cream-colored, sandy and phosphatic clay.
312	Upper Ocala. Cuttings of white moderately hard chalky limestone carrying many bryozoan fragments, fragments of a fossil bivalve (Ostrea? sp.) and a few fragments of Lepidocyclina ocalana.
340	Fragments of a water-worn, highly fossiliferous limestone. Fragments of Operculina ocalana, Lepidocyclina ocalana and Pseudophragmina floridana common.
360	Similar to preceding. Fauna better preserved, many bryozoan fragments also present.
400	Similar to above, more finely cut and water-worn.
420	No change.
440	Material more chalky, fauna better preserved, about 25% of sample fine clear quartz sand.
460	Finely cut fragments of the same.
480	Like the above.
500	Lower Ocala. Cuttings of a cream-colored limestone composed of water-worn micro-fossil molds and molds fragments, and showing calcite inclusions. Many specimens of Amphistegina cf. cubensis, some of Camerina cf. vanderstoki and Gypsina globula present.
520	Like the above.
540	Fragments of dense deep cream-colored somewhat dolomitic limestone. Some specimens of Amphistegina cf. cubensis as above.

560 Fragments of light brown finely granular dolomite and of white chalky finely nodular limestone. No change in fauna.

580 Lituonella zone. Chalky white and gray limestone. Many specimens of Coskinolina floridana. Lituonella floridana, and a few of Dictyoconus cookei and a few other foraminifera common to the Lituonella zone of the Claiborne Eocene.

600 Zone I. Dictyoconus americanus. Fabularia? zone. Cuttings of a hard nodular white and gray limestone and of a light brown chalky and dolomitic hard limestone showing many traces of fossils and carrying specimens of D. americanus and Fabularia (?) sp.

620 Fragments of a hard light brown chalky and dolomitic limestone. Major portion of fauna very poorly preserved. Some diagnostic fossils as in the preceding.

640 Similar to preceding. Small miliolids abundant in the limestone which is somewhat gray spotted.

660 Like the above.

680 No change.

700 Similar to the preceding but softer and more chalky. Fauna same.

720 Fragments of cream-colored hard chalky and dolomitic limestone. Molds of D. americanus common.

740 Fragments of a hard, coarsely nodular light cream-colored, somewhat dolomitic limestone. Many molds of Dictyoconus as above, some of Pseudorbitolina sp.

760 Like the above.

780 Sample composed mainly of small rolled molds and rolled mold fragments of fossils. Some poor specimens of smaller foraminifera common to the Dictyoconus zone.

800 Material as above and abundant specimens of Dictyoconus americanus.

820 Sample of small rolled molds and rolled mold fragments. Some smaller foraminifera common to the Dictyoconus americanus zone.

840 As above and many specimens of Dictyoconus americanus.

860 Chalky white and light cream-colored limestone, fauna as above.

880 Like the above, many large irregular shaped white limestone, concretions also present.

900 Small fragments of white limestone as above and about 75% fragments of a light brown hard dolomitic and irregularly porous limestone. Many sections and poor molds of fossils in this limestone. One fragment of Lepidocyclina sp.

920 Zone IV. Lepidocyclina sp. Fragments of a hard white and light gray limestone carrying many smoothly worn molds of a large and moderately thick Lepidocyclina sp. probably related to one found at 1190' below in well W-579 Duval County. (See slide).

940	Similar to above, more chalky.
960	Sample of hard cream-colored worn fossil molds and mold fragments. Molds of Dictyoconus americanus abundant.
980	Like the above.
1000	Material softer, otherwise as above.
1015	Fragments of a chalky and dolomitic limestone. Many bryozoan fragments, some fragments of macro-fossils and many specimens of Amphistegina lopeztrigoi. A few fragments of an Operculina sp., some poor specimens of the large Lepidocyclina first noted at 920'.

Yours truly,

/s/ E. R. Applin

ERA:vh

W-661
(E. R. Applin)
(Sun Oil Company)

August 27, 1943
Paleontology
Duval County, Florida
U. S. Naval Air Station
Jacksonville, Florida
Depth 987.5'

Mr. J. A. Waters
Office

Dear Sir:

Cutting samples from 0-987' from U. S. Naval Air Station, Jacksonville, Florida, have been examined.

Location: Dewey Park ½ mile S. E. of Yukon P. O. Sec. 21? T3S, R26E.
Elevation:
Determinations are as follows:

SUMMARY

0-40	Pliocene. Fine grained clear quartz sand.
40-400	Miocene. Argillaceous sand and sandy clays with many phosphatic nodules. Some limestone lenses showing fragments of fossil molds and casts, a few shell fragments in some sandy clay lenses.
400-660?	Ocala. Jackson Upper Eocene. Highly fossiliferous limestone showing a typical micro-fauna. 560-660 (?) Lower Ocala, cream-colored somewhat calcitic limestone carrying Amphistegina cf. cubensis and other characteristic foraminifera.
660-700(?)	Lituonella Zone. Claiborne Middle Eocene. Note: Samples in this part of section probably incorrectly labeled. 660-680 Sample shows fossils and lithology common to the lower Ocala zone.
700-987	Dictyoconus americanus Zone of the Claiborne Middle Eocene. Cream-colored, in part dolomitic limestone carrying Dictyoconus americanus and other foraminifera characteristic of this zone of the Claiborne. Two fauna units noted. I. 700' Top of Dictyoconus, Fabularia? unit. II. (?) 800' Top of Lepidocyclina cedarkeyensis unit (only a few specimens present.)

0-20	Fine clear quartz sand and a few particles of magnetite.
20-40	Like the above.
40-60	Fine to coarse quartz sand with many phosphatic nodules in grayish-tan calcareous granular textured clay matrix. Some calcareous sandy nodules also present.
60-80	Like the above, also some fragments of gray and brown porous limestone showing many casts and some mold of fragments of macro-fossils.
80-100	Fragments of gray limestone as above, and many fragments of a hard porous cream-colored limestone showing many fragments of molds and casts of macro-fossils. A mold of Archaias sp. also noted. Some sand and phosphatic nodules in sample.
100-120	Fine even grained clear quartz sand like that found (0-40'). Sample not correctly numbered (?).
120-140	Sample of small black phosphatic pebbles and fragments of white sandy and phosphatic calcareous granular textured clay.
140-160	Cuttings of a light cream-colored, sandy and phosphatic calcareous and in part chalky clay.
160-180	Moderately large cream-brown and gray, nodules limestone fragments somewhat sandy and phosphatic and showing many fragments of molds and cast of macro-fossils and some chalky shell fragments.
180-200	Like the above, some highly sandy and phosphatic moderately soft and calcareous nodules also present.
200-220	Like the above.
220-240	No change.
240-260	Fine to coarse quartz and phosphatic sand in light tan calcareous granular textured clay matrix, some inclusions of chalky cream-colored nodules and some chalky fragments of fossil bivalves.
260-280	Like the above. Sand averaging coarser grained.
280-300	Like the above.
300-320	Fragments of a hard finely granular textured gray and brownish gray finely sand and finely phosphatic limestone.
300-340	Like the above, some of the nodules cream-colored.
340-360	Like the above, some loose sand of quartz and phosphatic nodules.
360-380	Sample mainly fragments of nodular limestone as above. Some of the fragments showing fragments of fossil molds and casts, and some inclusions of chalky shell fragments.
380-400	No change.
400-420	Fragments of a hard white highly fossiliferous limestone carrying Operculina ocalana, Pseudophragmina floridana, many Bryozoan fragments, a few poor specimens of Lepidocyclina sp., many fragments of a bivalve resembling Ostrea sp.

420-440 Limestone similar to above, but more indurated Lepidocyclina ocalana also fairly common.

440-460 Fragments of a gray and white limestone similar to above. No change in fauna.

460-480 Like the above, some specimens of Heterostegina ocalana also present.

480-500 Like the above.

500-520, 520-540, 540-560, 560-580 No change.

580-600 Finely cut fragments of a finely fossiliferous light cream-colored limestone.

600-620 Like the above, some smaller foraminifera usually characteristic of the Lower Ocala present.

620-640 More coarsely cut fragments of a hard water-worn calcitic limestone. Many poor specimens of Amphistegina cf. cubensis and Gypsina globula present. A few fragments of finely granular light brown dolomite.

640-660 Softer limestone similar to the above in lithology and fauna content.

660-680 Cuttings of a deep cream-colored dolomitic and chalky limestone carrying specimens of Lituonella floridana, worn fragments of Operculina sp. Coskinolina floridana. Most of the fossil material fragmentary and very poorly preserved.

680-700 Fragments of a hard cream-colored limestone carrying many poor specimens of Amphistegina cf. cubensis Camerina sp. Gypsina sp. and other forms common to the Lower Ocala.

700-720 Fragments of a soft deep cream-colored to light brown chalky and highly dolomitic limestone. Many dolomitized fragments of a large echinoid and some fossil bivalves present, also many specimens of Fabularia (?) sp. and some poor specimen of Dictyoconus sp.

720-740 Similar to above but harder and more dolomitized.

740-760 Like the above with many cavings of chalky limestone and fossils from higher depths.

760-780 Fragments of limestone as above and soft carbonaceous chalk.

780-800 Fragments of a deep cream-colored limestone composed mainly of water-worn molds of micro-fossils and fossil fragments. Many specimens of Dictyoconus americanus and some other foraminifera characteristic of the Dictyoconus americanus zone present.

800-820 Like the above. A few specimens of Lepidocyclina cedarkeyensis also present.

820-840 Like the preceding, but no specimens of Lepidocyclina noted.

840-860, 860-880, 880-890, 900-920 No change.

920-940 Like the above and some irregular shaped moderately large lime concretions.

940-960 Like the above. Many fragments of dark brown granular crystalline dense dolomite also present.

960-980 Like the above.
987 Large fragments of very hard dark brown dolomite.

Yours truly,

/s/ E. R. Applin

ERA:vh

Appendix A-8

Chas. T. Main Report on
Jacksonville Well Water Supply System

U. S. NAVAL AIR STATION
JACKSONVILLE, FLORIDA

STATION UTILITIES
BETTERMENT STUDY

DEPARTMENT OF THE NAVY

BUREAU OF YARDS AND DOCKS

CHAS. T. MAIN, INC.

BOSTON, MASSACHUSETTS CHARLOTTE, NORTH CAROLINA

1417-18.1

NOVEMBER 1954

THE WATER SYSTEM - DESCRIPTION

There are four main water treating plants on the Air Station. These are tied together by a pipe distribution system supplying domestic and process water. The total connected capacity available at the plants is 7300± gpm supplied as indicated below.

Water Plant No.	Location	Capacity
1	South side of Industrial Area	3000 gpm
2	South side of Training Area	2000
3	West side of Dewey Park Housing	1500
4	Southwest in Hospital Area	800
		7300 gpm

All of the fresh water used on the Station is obtained from artesian wells or driven wells; there are twenty of these wells on the station, of which six are capped or not in use.

On the Station area it has been found that most of the wells should be driven to about 1000 feet in order to get a sufficient quantity of water. The wells of this approximate depth are listed below with their general location.

Location	Well No.	Dia.	Depth	Free Flow gpm	Pumped Flow gpm	Status
Water Plant #1	1	8	708	150- 613	-	Not used
#1	2	12	1005	600-3500	2000	Used
#1	3	12	998	3300	1950	Used
#2	4	10	1015	400-3800	2000	Used
#3	5	12	998	2000-4900	2300	Used
Hospital Water Plant	6	12	646	2000-6000		Used
Building #164	7	10	1096	1700		Used

The temperature of this well water is about 70 degrees all year around. The water is corrosive. The piping recently installed has been coated inside for protection. The water going through the main water plants is at present aerated and chlorinated but the existing water softening equipment is not being used. It was designed to produce 5 grain water.

The Naval Air Station water system supplies all of the make-up water for the steam generating plants. This raw water is first passed through the make-up water treating plants in each of the power plants except the BOQ.

Power Plants No. 1, No. 2, and the Hospital Power Plant now use approximately 120 gpm maximum for make-up water during the coldest winter days and 27 gpm minimum during the summer.

WATER ANALYSES

	Typical Well Water Jan. 14, 1954	Typical Distribution Water
	ppm	ppm
Silica (SiO_2)	17.	
Iron (Fe) - dissolved	0.02	
- total	0.18	0.6 (over 3.0 at end of line)
Manganese (Mn) - dissolved	-	
- total	-	
Calcium (Ca)	43.	
Magnesium (Mg)	8.2	
Sodium (Na))		
Potassium (k))	35.	
Bicarbonate (HCO_3)	137.	
Carbonate (CO_3)	-	
Sulfate (SO_4)	87.	
Chloride (Cl)	9.5	
Fluoride (F)	0.5	
Nitrate (NO_3)	0.1	
Dissolved solids - total	267.	
Residue on evaporation (180°C)	294.	
Hardness - as Ca CO_3	141.	226.
- as non carbonate	29.	
Specific conductance (micromhos at 25°C)	413.	
pH -	7.6	
- unsaturated		7.5
- saturated		7.7
Saturation index		-0.2
Color	7.	
Total Alkalinity as $CaCO_3$	112.	
Residual Chlorine		0.25 (Range 0.0 to 0.5)
Dissolved Oxygen (at end of line)		7.2

WATER USE

Total for Water Plants No. 1, 2, and 3

1953

January	97 million gallons
February	90
March	101
April	107
May	126
June	125
July	111
August	88
September	79
October	69
November	65
December	62
Total	1120 million gallons

Average gallons per day (24 hours): 3.1 million gallons

APPENDIX B

DOCUMENTATION IN SUPPORT OF BIOLOGY SECTIONS

TABLE B-1

Pine Flatwoods Community Vegetation

Common Name	Scientific Name
Saw palmetto	*Seranoa repens*
Shining sumac	*Rhus copallina* var. *leucar*
Greenbriar	*Smilax* spp.
Cat-claw vine	*Bignonia unguis-cati*
Muscadine vine	*Vitis rotundifolia*
Wire grass	*Aristida stricta*
Pignut hickory	*Carya glabra*
Mockernut hickory	*Carya tomentosa*
Sweet gum	*Liquidambar styraciflua*
Magnolia	*Magnolia grandiflora*
Blackberry	*Rubus* spp.
Slash pine	*Pinus elliotti*
Wild persimmon	*Diospyros virginiana*
Poison ivy	*Rhus radicans*
Virginia creeper	*Parthenocissus quinquefolia*
Stagger bush	*Lyonia mariana*
Fetter bush	*Lyonia lucida*

TABLE B-2

Hydrophytic Hardwood Community Vegetation

Common Name	Scientific Name
Shining sumac	Rhus copallina var. leucar
Greenbriar	Smilax spp.
Boston fern	Nephrolepis exaltat
Cinnamon fern	Osmunda cinnamonea
Wood fern	Thelypteris normalis
Chain fern	Woodwardia virginica
Cat-claw vine	Bignonia unguis-cati
Japanese honeysuckle	Lonicera japonica
Muscadine vine	Vitis rotundifolia
Jack-in-the Pulpit	Arisaema triphyllum
White-top sedge	Dichromena spp.
Box elder	Acer negundo
Red buckeye	Aesculus pavia
Pignut hickory	Carya glabra
Ash	Fraxious spp.
Virginia willow	Itea virginica
Sweet gum	Liquidambar styraciflua
Black tupelo	Nyssa sylvatica
Laurel oak	Quercus laurifolia
Slash pine	Pinus elliotti
Red maple	Acer rubrum
Buttonbush	Cephalanthus occidentalis
Arrow arum	Peltandra virginica
Poison ivy	Rhus radicans
Bladder wort	Utricularia spp.
Resurrection fern	Polypodium polypoides
Loblolly bay	Gordonia lasianthus
Spanish moss	Dendropogon usnedides
Lizard's tail	Saururus cernuus
Royal fern	Osmunda regalis
Red bay	Persea burbonia

TABLE B-3

Animals of the Pine Flatwoods Community

Common Name	Scientific Name
Florida Crowned Snake	Tantilla coronata
Florida Red-Bellied Snake	Storeria occipitomaculatus
Narrow-Mouthed Toad	Gastrophayne carolinensis
Pine Warbler	Dendroica pinus
Ruby-Crowned Kinglet	Regulus calendula
Golden-Crowned Kinglet	Regulus satrapa
Least Shrew	Cryptotis parva
Florida Chorus Frog	Pseudacris nigrita verrucosa
Frosted Flatwoods Salamander or "spring lizard"	Ambystoma c. cingulatum
Mole Salamander or "spring lizard"	Ambystoma talpoideum
Southern Cricket Frog	Bufo quercicus
Spring Peeter	Hyla crucifer
Piney Wood Treefrog	Hyla femoralis
Least Trefrog	Hyla ocularis
Gray Treefrog	Hyla versicolor
Barking Treefrog	Hyla gratiosa
Box Turtle	Terrapene carolina
Ground Skink	Lygosoma laterale
Eastern Garter Snake	Thamnophis sirtalis
Rough Earth Snake	Haldea striatula
White-tailed Deer	Odocoileus virginianus
Cottontail Rabbit	Sulvilagus floridanua
Ground Dove	Columbigallina passerina
Rufous-sided Towhee (Joree)	Pipilo erythropthalmus
Six-line Racerunner	Cnimidophorus sexlineatus
Black Racer	Coluber constrictor
Red-tailed Skink	Eumeces egregius
Eastern Fence Lizard	Sceloporus undulatus
Broad-headed Skink	Eumeces laticeps
Corn Snake	Elaphe guttata guttata
Eastern Kingsnake	Lampropeltis getulus
Mole Snake	Cemophora coccinea
Coral Snake	Micrurus fulvius
Black Vulture	Coragyps atratus
Cooper's Hawk	Accipiter cooperii
Red-tailed Hawk	Buteo jamaicensis
Red-shouldered Hawk	Buteo lineatus
Sparrow Hawk	Falco sparverius
Bobwhite	Colinus virginianus
Turkey Vulture	Cathartes aura
Mourning Dove	Xenaidura macrourn
Yellow-billed Cuckoo	Coccyzus americanus

Table B-3 (Continued)

Common Name	Scientific Name
Great Horned Owl	Bubo virginianus
Chuck-Will's-Widow	Caprimulgus carolinensis
Whip-Poor-Will	Caprimulgus vociferus
Common Nighthawk	Chordeiles minor
Yellow-shafted Flicker	Colaptes auratus
Red-bellied Woodpecker	Centurus carolinus
Yellow-bellied Sapsucker	Sphyrapicus varius
Downy Woodpecker	Dendrocopos pubescens
Eastern Kingbird	Tyrannus tyrannus
Western Kingbird	Tyrannus verticalis
Cedar Waxwing	Bobcilla cedrorum
Starling	Sturnus vulgaris
Worm-eating Warbler	Helmitheros vermivorus
Great Crested Flycatcher	Myianrchus crinitus
Eastern Phoebe	Sayornis phoebe
Eastern Wood Pewee	Contopus virens
Barn Swallow	Hirundo rustica
Purple Martin	Progne subis
Field Sparrow	Spizella pusilia
Green Tree or Bell Frog	Hyla cinerea
Florida Brown or Dekay's Snake	Storeria dekayi
Eastern Glass Lizard, Glass "Snake" or Joint "Snake"	Ophisaurus ventralis
Chipping Sparrow	Spizella passerina
Island Glass Lizard, Glass "Snake" or Joint "Snake"	Ophisaurus compressus
Hispid Cotton Rat	Sigmodon hispidus
Eastern Mole or "Ground Mole"	Scalopus aquaticus
Sharp-shinned Hawk or Little Blue Darter	Accipiter striatus
American Goldfinch	Spinus tristis
Southern Hognosed Snake, Puff Adder, or Spreading Adder	Heterodon simus
Oak Toad	Bufo quericus
Black Widow Spider	Latrodectus mactans
Southeastern Shrew	Sorex longirostris
Short Tail Shrew	Blarina brevicauda
Blue Jay	Cyanocitta cristata
Common Crow	Corvus brachyrhynchos
Fish Crow	Corvus ossifragus
House Wren	Troglodytes aedon
Cape May Warbler	Dendroica tigrina
Myrtle Warbler	Dendroica coronata
Slender Glass Lizard, Glass "Snake" or Joint "Snake"	Ophisaurus attenautus
Song Sparrow	Melospiza melodia
Black-throated Blue Warbler	Dendroica caerulescens

Table B-3 (Continued)

Common Name	Scientific Name
Blackpoll Warbler	Dendroica striata
Prairie Warbler	Denroica discolor
Mockingbird	Mimos polyglottos
Brown Thrasher	Toxostoma rufum
House Sparrow	Passer demosticus
Bobolink	Dolichonyx oryzivorus
Eastern Meadowlark	Sturnella magna
Boat-tailed Grackle	Cassidix mexicanus
Robin	Turdus migratorius
Indigo Bunting	Passerina cyanea
Painted Bunting	Passerina ciris
Pine Siskin	Spinus pinus
Savannah Sparrow	Passerculus sandwichensis
Vesper Sparrow	Pooecetes
Slate-colored Junco	Junco hyemalis
Nine-banded Armadillo	Dasypus novemcinctus
Spotted Skunk	Spilogale putorius
Marsh Rabbit	Sylvilagus palustris
Loggerhead Shrike (Butcher bird)	Lanius ludovicianus
Fox Squirrel	Sciurus niger
Screech Owl	Otus asio
Flying Squirrel	Glaucomys volans
Striped Skunk	Mephitis mephitis
Scarlet King Snake	Lampropeltis doliata
Gray Fox	Urcyon cinereoargenteus
Indigo Snake	Drymarchon corias couperi
Opossum	Didelphis virginiana
Eastern Harvest Mouse	Reithrodontomys humulis
Eastern Woodrat	Neotoma floridana
Norway Rat	Rattus norvegicus
Rusty Mud Salamander	Pseudotrition montanus
Barred Owl	Strix varia
Hoary Bat	Lasiurus cinereus
Eastern Pipistrel Bat	Pipistrellus subflavus
Oven Bird	Seiurus aurocapillus
Striped Newt	Diemictylus perstriatus
Carr's Dusky Salamander	Desmognathus fuscus
Southern Slimy Salamander	Plethodon glutinosus
Yellow Throat	Geothlypis trichas
Squirrel Tree Frog or Rain Frog	Thamnophis sauritus
Narrow-Striped Dwarf Siren	Pseudobranchus striatus
Two-toed Amphium or "Congo Eel"	Amphiuma means
Cardinal or Redbird	Richmondena cardinalis
Raccoon	Procyon lotor
Yellow Rat Snake or Four-Lined Chicken Snake	Elaphe obsoleta
Gray or Cat Squirrel	Sciurus carolinensis

Table B-3 (Continued)

Common Name	Scientific Name
Bobcat, Wildcat or Bay Lynx	*Lynx rufus*
Yellow-Throated Warbler	*Dendroica dominica*
Carolina Chickadee	*Parus carolinensis*
Razor Back, Wild Board, Wild Hog, or Pinewoods Rooter	*Sus scrofa*
Greater Five-Lined Skink	*Eumeces inexpectatus*
Southern Common or Gray Tree Frog	*Hyla versicolor*
Hermit Thrush	*Hylocichla guttata*
Cat Bird	*Dumetella carolinesis*
Carolina Anole or "Chameleon"	*Anois carolinesis*
Carolina Wren	*Thryothorus ludovicianus*
Florida Sandhill Crane	*Grus canadensis practensis*

TABLE B-4

Animals of the Hydrophytic Hardwood Community

Common Name	Scientific Name
Florida Crowned Snake	Tantilla coronata
Narrow-Mouthed Toad	Gastrophayne carolinensis
Southern Ring-Necked Snake	Diadophis punctatus
Pine Warbler	Dendroica pinus
Florida Chorus Frong	Pseudacris nigrita verrucosa
Little Grass Frog	Hyla occularis
Southern Leopard Frog	Ranapipiens sphenocephala
Frosted Flatwoods Salamander or "spring lizard"	Ambystoma cingulatum
Mole Salamander or "spring lizard"	Ambystoma talpoideum
Swamp Sparrow	Melospiza georgiana
Lesser Siren	Siren intermedia
Tiger Salamander	Ambystoma tigrinum
Central Newt	Notophthalmus viridescens
Southern Cricket Frog	Bufo quercicus
Spring Peeper	Hyla crucifer
Barking Tree Frog	Hyla gratiosa
Yellow-bellied Turtle	Pseudemys scripta
American Chaemeleon	Anolis carolinensis
Ground Skink	Lygosoma laterale
Red-Tailed Skink	Eumeces egregius
Red-Bellied Water Snake	Natrix erythroquster
White-tailed Deer	Odocoileus virginianus
Cottontail Rabbit	Sulvilagus floridanua
Eastern Garter Snake	Thamnophis sirtalis
Rough Earth Snake	Haldea striatula
Smooth Earth Snake	Haldea valeriae
Mud Snake	Farancia abacura
Corn Snake	Elaphe guttata guttata
Eastern King Snake	Lampropeltis getulus
Mole Snake	Cemophora coccinea
Coral Snake	Micrurus fulvius
Common Egret	Bubulcus ibis
Great Blue Heron	Ardea herodias
Louisiana Heron	Hydranassa tricolor
Little Blue Heron	Florida caerulea
Yellow-Billed Cuckoo	Coccyzus
Yellow-Shafted Flicker	Colaptes auratus
Red-Bellied Woodpecker	Centurus carolinus
Yellow-Bellied Sapsucker	Sphyrapicus varius
Downy Woodpecker	Dendrocopos pubescens
Diamond-Backed Rattlesnake	Crotalus adamanteus
Cedar Waxwing	Bobcilla cedrorum

TABLE B-4 (Continued)

Common Name	Scientific Name
Orange-Crowned Warbler	Vermivora celata
Prairie Warbler	Dendroica discolor
Palm Warbler	Dendroica palmarum
Red-eyed Vireo	Vireo olivaceus
Great Crested Flycatcher	Myianrchus crinitus
Eastern Wood Pewee	Contopus virens
Tree Swallow	Iridoprocne bicolor
Blue Jay	Cyanocitta cristata
Mockingbird	Minus polyglottos
Brown Thrasher	Toxostoma rufum
Northern Water Thrush	Seiurus noveboracensis
Yellowthroat	Geothlypis trichas
Boat-Tailed Grackle	Cassidix mexicanus
Nine-Banded Armadillo	Dasypus novemcinctus
Longtail Weasel	Mustela frenata
Spotted Skunk	Spilogale putorius
Marsh Rabbit	Sylvilagus palustris
Eastern Harvest Mouse	Reithrodontomys humulis
Rice Rat	Oryzomys palustris
Norway Rat	Rattus norvegicus
Green Tree or Bell Frog	Hyla cinerea
Florida Brown or Dekay's Snake	Storeria dekayi
Eastern Glass Lizard, Glass "Snake" or Joint "Snake"	Ophisaurus ventralis
Hispid Cotton Rat	Sigmodon hispidus
Southern Hognosed Snake, Puff Adder, or Spreading Adder	Heterodon simus
Oak Toad	Bufo quericus
Southeastern Shrew	Sorex longirostris
Flying Squirrel	Glaucomys volans
Striped Skunk	Mephitis mephitis
Scarlet King Snake	Lampropeltis triangulum elapsoides
Gray Fox	Urcyon cinereoargenteus
Indigo Snake	Drymarchon corias couperi
Opossum	Didelphis virginiana
Rusty Mud Salamander	Psuedotrition montanus
Barred Owl	Strix varia
Hoary Bat	Lasiurus cinereus
Eastern Pipistrel Bat	Pipistrellus subflavus
White Ibis or Spanish Curlew	Eudocimus albus
Florida Otter	Lutra canadensis
American Alligator	Alligator mississippiensis
Peninsular Turtle or Florida Cooter	Pseudemys floridana
Green Heron	Butorides virescens
Florida or Southern Softshell Turtle	Trionyx ferox
River-Swamp Frog	Rana heckscheri
Louisiana Water Thrush	Seiurus motacilla
Striped Newt	Diemictylus perstriatus

TABLE B-4 (Continued)

Common Name	Scientific Name
Carr's Dusky Salamander	Desmognathus fuscus
Dwarf Salamander	Sanculus quadridigitatus
Southern Slimy Salamander	Plethodon glutinosus
Squirrel Tree Frog or Rain Frog	Hyla squirella
Southern Ribbon Snake	Thamnophis sauritus
Black Swamp Snake	Seminatrix pygaea
Striped or Allens' Swamp Snake	Liodytes alleni
Narrow-Striped Dwarf Siren	Pseudobranchus striatus
Two-toed Amphium or "Congo Eel"	Amphiuma means
Greater Sirven	Sirven lacertina
Glossy Water or Striped Water Snake	Natrix rigida
Chicken Turtle	Dierochelys reticularia
Wood Ibis, Wood Stork, or Iron Head	Mycteria americana
Water Turkey, anhinga or Snake Bird	Anhinga anhinga
Wood Duck	Aix sponsa
Florida Banded Water Snake	Natrix sipedon
Green Water Snake	Natrix cyclopion
Cardinal or Redbird	Richmondena cardinalis
Keeled or Rough Green Snake	Opheodrys aestivus
Cottonmouth or Water Moccasin	Agkistrodon piscivorus
Brown Water Snake	Natrix taxispilota
Raccoon	Procyon lotor
Redstart	Setophaga ruticilla
Black and White Warbler	Mniotilta varia
Tufted Titmouse	Parus bicolor
Yellow Rat Snake or Four-Lined Chicken Snake	Elaphe obsoleta
Gray or Cat Squirrel	Sciurus carolinensis
Bobcat, Wildcat or Bay Lynx	Lynx rufus
Yellow-Throated Warbler	Dendroica dominica
Razor Back, Wild Board, Wild Hog, or Pinewoods Rooter	Sus scrofa
Southern Common or Gray Tree Frog	Hyla versicolor
Hermit Thrush	Hylocichla guttata
Cat Bird	Dumetella carolinesis
Yellow-Crowned Night Heron	Lyctanassa violacea
Black-Crowned Night Heron	Nycticorax nycticorax
Carolina Wren	Thryothorus ludovicianus
White-eyed Vireo	Vireo griseus
Gopher Turle	Gopherus polyphemus

TABLE B-5

Salt Marsh Vegetation

Common Name	Scientific Name
Salt bush	*Baccharis halimifolia*
Smooth cordgrass	*Spartina alterniflora*
Salt grass	*Distichlis spicata*
Salt meadow cordgrass	*Spartina patens*
Black needlerush	*Juncus roemerianus*
Hightidal bush	*Iva frutescens*

TABLE B-6

Animals of the Salt Marsh Community

Common Name	Scientific Name
Turkey Vulture	Cathartes aura
Diamondback Terrapin	Mala clemmys terrapin
Common Loon	Gavia immer
Red-Throated Loon	Gavia stellata
Horned Grebe	Podiceps auritus
Brown Pelican	Pelecanus occidentalis
Gannet	Morus bassanus
Double-Crested Cormorant	Phalacrocorax auritus
Mallard	Anas platyrhynchos
Pintail	Anas acuta
Gadwall	Anas strepera
Shoveller	Spatula clypeata
Blue-Winged Teal	Anas discors
Green-Winged Teal	Anas carolinensis
Marsh Hawk	Circus cyaneus
Redhead	Aythya americana
Canvasback	Aythya valisineria
Ring-Necked Duck	Aythya collaris
Greater Scaup	Aythya marila
Lesser Scaup	Aythya affinis
Common Golden Eye	Bucephala clangula
Least Shrew	Cryptotis parva
Buffle Head	Bucephala albeola
Red-Breasted Merganser	Mergus serrator
Black Vulture	Coragyps atratus
Common Egret	Casmerodius albus
Snowy Egret	Egretta thula
Cattle Egret	Bubulcus ibis
Great Blue Heron	Ardea herodias
Louisiana Heron	Hydranassa tricolor
Little Blue Heron	Florida caerulea
Virginia Rail	Rallus limicola
Pora	Porzana carolina
Clapper Rail	Rallus longitrostris
King Rail	Rallus elegans
American Coot	Fulica americana
American Oyster Catcher	Haematopus palliatus
American Avocet	Recurvirostra americana
Black-Necked Stilt	Himantopus mexicanus
Piping Plover	Charadrius melodus
Wilson's Plover	Charadrius wilsonia
Hispid Cotton Rat	Sigmodon hispidus
Whimbrel	Numenius phaeopus
Spotted Sandpiper	Actitis macularia

TABLE B-6 (Continued)

Common Name	Scientific Name
Greater Yellowlegs	Totanus melanoleucus
Lesser Yellowlegs	Totanus flavipes
Stilt Sandpiper	Micropalama himantopus
Short-Billed Dowitcher	Limnodromus griseus
Ruddy Turnstone	Arenaria interpres
Pectoral Sandpiper	Erolia melanotos
Knot	Calidris canutus
White-Rumped Sandpiper	Erolia fuscicollis
Common Snipe	Capella gallinago
Great Black-Backed Gull	Larus marinus
Herring Gull	Larus argentatus
Ring-Billed Gull	Larus argentatus
Laughing Gull	Larus atricilla
Bonaparte's Gull	Larus philadelphia
Least Tern	Sterna albifrons
Common Tern	Sterna hirundo
Forster's Tern	Sterna foresteri
Sandwich Tern	Thalasseus sandvicensis
Killdeer	Charadrius vociferus
Gull-Billed Tern	Gelochelidon nilotica
Caspian Tern	Hydroprogne caspia
Black Tern	Chlidonias niger
Black Skimmer	Rynchops nigra
Water Pipit	Anthus spinoletta
Tree Swallow	Tridoprocne bicolor
Common Crow	Corvus brachyrhynchos
Fish Crow	Corvus ossifragus
Short-Billed Marsh Wren	Cistothorus platensis
Red-Winged Blackbird	Agelaius phoeniceus
Boat-Tailed Grackle	Cassidix maxicanus
House Sparrow	Passer domesticus
Bobolink	Dolichonyx oryzivorus
Sharp-Tailed Sparrow	Ammospiza caudacuta
Rice Rat	Oryzomys palustris
Norway Rat	Rattus norvegicus
Hoary Rat	Lasiurus cinereus
Eastern Pipistrel Bat	Pipistrellus subflavus
White Ibis or Spanish Curlew	Eudocimus albus
Florida Otter	Lutra canadensis
Hooded Merganser or Fish Duck	Lophodytes cucullatus
American Alligator	Alligator mississippiensis
Green Heron	Butorides virescens
American Bittern	Botaurus lentiginosus
Wood Ibis, Wood Stork, or Iron Head	Mycteria americana
Water Turkey, Anhinga or Snake Bird	Anhinga anhinga
Wood Duck	Aix sponsa
Common Gallinule	Gallinula chloropus
Bald Pate or American Widgeon	Marceca americana

TABLE B-6 (Continued)

Common Name	Scientific Name
Ruddy Duck	Oxyura janaicensis
Pied-Billed Grebe or Didapper	Podilymbus podiceps
Least Bittern	Ixobrychus exilis
Cottonmouth or Water Moccasin	Agkistrodon piscivorus
Raccoon	Procyon lotor
Blue Gray Gratcatcher	Polioptila caerulea
Yellow-Crowned Night Heron	Lyctanassa violacea
Black-Crowned Night Heron	Nycticorax nycticorax
Atlantic Loggerhead Turtle	Caretta caretta caretta
Florida Manatee	Trichechus manatus latirostris

TABLE B-7

Selected Fish and Shellfish Species
of St. Johns River System

Common Name	Scientific Name
Short-nosed Sturgeon	Acipenser brevirostrum
Common Sturgeon	Acipenser oxyrhyachus
Tarpon	Tarpon atlantious
Bonefish	Albula vulpes
Hickory Shad	Pomolobus mediocris
Shad	Alosa sapidissima
Menhaden	Brevoortia tyrannus
Sea Catfish	Galeichthys felis
American Eel	Anguilla restrata
Striped Mullet	Mugil cephalus
Bluefish	Pomatomus saltatrix
Striped Bass	Roccus saxatilis
Common Sea Bass	Centropristes striatus
Black Drum	Pogonius cromis
Channel Bass	Sciaenops ocellatus
Southern Flounder	Paralichthys lethostigma
Pink Shrimp	Penaeus duorarum
Blue Crab	Callinectes sapidus
Oyster	Crassostrea virginica
Florida Gar	Lepisosteus platyrhincus
Redfin Pickerel	Esox americanus
Mud Pickerel	Esox vermiculatus
Carp	Cyprinus carpio
Yellow Bullhead	Ictalurus natalia
Green Bullhead	Ictalurus brunneus
Brown Bullhead	Ictalurus nebulosus
Largemouth Bass	Microperus salmoides
Black Crappie	Pomoxis nigromaculatus
Mud Sunfish	Acantharchus pomotia
Blackbanded Sunfish	Enneacanthus chactodon
Banded Sunfish	Enneacanthus obesus
Redbreast Sunfish	Lepomis auritus
Bluegill	Lepomis macrochirus
Redear Sunfish	Lepomis mircrolophus
Tilapia	Tilapia mossambica

CONSERVATION/COASTAL ZONE PROTECTION ELEMENT

2005 COMPREHENSIVE PLAN

JACKSONVILLE, FLORIDA

JUNE, 1979

REVISED JANUARY, 1980

Section Adopted by City Council

AIR QUALITY

Goals and Objectives

Goal I

To protect the health and welfare of the residents of Jacksonville from any actual or potential adverse effects resulting from exposure to air pollutants.

Objective A. Encourage the reduction and prevention of air quality deterioration.

Objective B. Comply with federal standards for total suspended particulates (TSP's).

Objective C. Comply with federal standards for oxidants.

Objective D. Reduce undesirable odors in Jacksonville.

Objective E. Upgrade the Air Monitoring network to meet the standing Air Monitoring Work Group (SAMWG) guidelines.

Objective F. Insure that the Air Activity Quality Assurance (Control) Program meets federal EPA requirements for sampling techniques as well as laboratory analysis techniques.

Objective G. Initiate a hazardous and toxic substance inventory leading to development of an air ambient monitoring program to assume responsibilities under the Federal Toxic Substances Control Act.

Objective H. Promote and support efforts to obtain the federal, state and local commitments of resources necessary to operate an effective air quality planning and control program.

Goal II

To plan land use patterns and transportation systems in a manner which is compatible with desired air quality standards.

Objective A. Assist new industry in locating a site for development that will not lead to exceeding of air quality standards or to significant deterioration of the environment.

Objective B. Develop a computer model for Jacksonville to study the relationship between the location of emission points and ambient pollution levels.

Objective C. Encourage increased utilization of the mass transit system.

Air Quality Standards

The United States Environmental Protection Agency, as required by the Clean Air Act, established two standards for air quality; the primary standard designed to protect human health and the secondary standard designed to protect human welfare. Florida adopted the more stringent secondary standards (Florida Administrative Code - Chapter 17-2).

Ozone

Primary and Secondary (Florida) Standards:	120 parts per billion, maximum 1-hour concentration not to be exceeded more than once per year.

Total Suspended Particulates

Primary Standard:	260 micrograms per cubic meter; maximum 24-hour concentration not to be exceeded more than once per year.

Secondary (Florida) Standard:	60 micrograms per cubic meter; annual geometric mean.
	150 micrograms per cubic meter; maximum 24-hours concentration not to be exceeded more than once per year.

Sulfur Dioxide

Primary Standard:	365 micrograms per cubic meter; maximum 24-hour concentration not to be exceeded more than once per year.
Secondary (Florida) Standard:	60 micrograms per cubic meter (0.02 ppm) - annual arithmetic mean.
	260 micrograms per cubic meter; maximum 24-hour concentration not to be exceeded more than once per year.
	1,300 micrograms per cubic meter (0.5 ppm) maximum 3-hour concentration, not be be exceeded more than once per year.

Carbon Monoxide

Primary and Secondary (Florida) Standards:	10 milligrams per cubic meter (9 ppm), maximum 8-hour concentration not to be exceeded more than once per year.
	40 milligrams per cubic meter (35 ppm), maximum 1-hour concentration not to be exceeded more than once per year.

Nitrogen Dioxide

Primary and Secondary (Florida) Standards: 100 micrograms per cubic meter (0.05 ppm) annual arithmetic mean.

Air Quality Policies

A. The effective and efficient use of resources for the control of point sources of air pollution should be supported. If necessary, increased manpower and equipment for monitoring and enforcement should be available. Legislation requiring vehicle inspection and more stringent standards for both ambient conditions and source emissions may also be needed.

B. Atmospheric and topographic diffusion characteristics should be a factor in determing the location of major air pollution sources such as industrial sources, power plants, incinerators and airports, in that wind and air currents are used to minimize air pollution buildup.

C. Wherever possible, urban land uses should be buffered from stationary and line (thoroughfare) sources of emissions. The size of effective buffers around stationary sources can be determined on the basis of emission volume and meteorological conditions.

D. Facilitites which house or provide activities for sensitive individuals; i.e., the young, elderly and sick, should be kept as remote as possible from emission sources. Facilitites of concern include schools, hospitals, parks, elderly housing projects or activity centers, nursing homes, orphanages, etc.

E. Support should be given to actions which would divert trips from automobiles to public transit, thereby reducing traffic generated air emissions. Population and employment centers should be located on designated transit/development corridors.

F. Planned unit developments, multi-use centers and other innovative development forms should be promoted and

encouraged as ways to reduce the need to travel and the average trip length.

G. Attention should be given to improvements to existing thoroughfares which would smooth the flow of traffic and reduce automotive pollution caused by bottlenecks, capacity overloads, on-street parking, poorly synchronized signals, rough pavement surfaces and pedestrian-vehicular conflicts.

H. Consideration should be given to reducing the concentration of auto traffic in activity centers, particularly at peak traffic hours, through the use of parking pricing policies and traffic-free zones, where adequate transit and traffic facilities are available.

I. The city should assist industries desiring to locate in Jacksonville in selecting a site where ambient air standards would not be violated.

Air Quality Proposals

- Adopt Air Quality Control Plan.

- Develop a computer model for Jacksonville to study the relationship between emission points and ambient pollution levels. Utilize this model to assist new industry in determining locations for development in Jacksonville that will not lead to exceeding of air quality standards or to a significant deterioration of the environment.

- Institute a more comprehensive air quality monitoring system to accurately measure air pollution.

NOISE CONTROL

Goals and Objectives

Goal I

To reduce noise levels to the minimum practical level.

Objective A. Promote the reduction of noise which is physically injurious to hearing or psychological health.

Objective B. Promote the elimination of unnecessary nuisance noises.

Objective C. Review new housing developments by reference to the noise guidelines set forth by the U.S. Department of Housing and Urban Development.

Objective D. Provide noise buffers between highways, commercial uses and noise generating developments and residential developments.

Standards for Noise Control

The U. S. Department of Housing and Urban Development has developed standards to encourage the reduction of noise levels. It is the purpose of departmental policy to call attention to the noise pollution threat, to encourage the control of noise at its source in cooperation with other federal departments and agencies, to encourage land utilization patterns for housing and other municipal needs that will separate uncontrollable noise sources from residential and other noise sensitive areas, and to prohibit HUD support to new construction on sites having unacceptable noise exposure.

The following standards were adopted by HUD to guide program decisions.

External Noise Exposure

Unacceptable. Exceeds 80 dB (A) 60 minutes per 24 hours. Exceeds 75 dB (A) 8 hours per 24 hours.

Exceptions are strongly discouraged and require a 102(2)C environmental statement and the approval of the Secretary of Housing and Urban Development.

Discretionary. Normally Unacceptable: exceeds 65 dB(A) 8 hours per 24 hours. Loud repetitive sounds on site.

Approvals require noise attenuation measures, the Regional Administration concurrence and a 102(2) environmental Statement.

Discretionary. Normally Acceptable: does not exceed 65 dB(A) more than 8 hours per 24 hours.

Acceptable. Does not exceed 45 dB(A) more than 30 minutes per 24 hours.

Interior Noise Exposures. (for new and rehabilitated residen- construction)

The following standards are performance standards. The means for achieving them will depend on the external noise levels, the equipment and layout used in the building and the noise attentuation characteristics of the buildings floors and walls. These standards assume open windows unless other provision is made for adequate venilation.

Acceptable. Noise exposures for sleeping quarters are considered "acceptable" if interior noise levels resulting from exterior noise sources and interior building sources such as heating, plumbing and air conditioning:

- Do not exceed 55 dB(A) for more than an accumulation of 60 minutes in any 24 hour period, and

- Do not exceed 45 dB(A) for more than 30 minutes during night time sleeping hours from 11 p.m. to 7 a.m., and

- Do not exceed 45 dB(A) for more than an accumulation of eight hours in any 24 hour day.

Insulation Between Dwelling Units

Unacceptable: For multi-family structures, including attached single family units, floor and dividing walls between dwelling units having Sound Transmission Class (STC) of less than 45 are always unacceptable.

Policies

A. Potential noise generated by proposed developments and the existing noise levels at these sites should be a consideration in review and planning.

B. All planning and review should take cognizance of existing performance standards set by city ordinance and the noise guidelines set forth by the U.S. Department of Housing and Urban Development.

C. The use of buffer zones to curtail noise should be encouraged.

D. The planting and preservation of trees and vegetation and the construction of berms along highways and railroad rights-of-way should be encouraged as a method of noise abatement.

E. Strict land use controls and buffers and/or protective zones in and around airports should be encouraged.

Proposals

- Conduct a citywide study of existing noise levels in order to have a base line against which future increases in noise levels may be measured.

- Encourage new residential development to locate where noise levels from major highways, industrial sources or airports will be minimized.

WATER QUALITY

Goals and Objectives

Goal I

To protect the health and welfare of the residents of Jacksonville from actual or potential adverse effects resulting from surface water pollution.

Objective A. Meet and maintain the Class II and III water quality standards which have been adopted by the state and the city. (Chapter 17-3, Florida Administrative Code.)

Objective B. Upgrade and maintain the quality of streams, waterways, and the coastal zone so that the water may serve recreational, agricultural, industrial and other beneficial uses.

Objective C. Plan land use patterns and transportation systems in a manner which is compatible with desired water quality standards.

Objective D. Improve the quality of stormwater runoff to the receiving waters of Jacksonville.

Objective E. Support the legal, organizational, financial and technological changes necessary to achieve the desired water quality standards.

Objective F. Promote and support efforts to obtain the federal, state and local commitments of resources necessary to operate an effective water quality planning and control program.

Objective G. Retain the ecological, drainage and water storage role of the wetlands as much as possible.

Objective H. Monitor proposed modifications of the National Pollutant Discharge Elimination System permits issued by EPA.

Goal II

To maintain and replenish the quality and quantity of groundwater supplies within the county and region.

Objective A. Encourage the recycling of water, whenever possible.

Objective B. Encourage the use of non-potable water sources by business and industry wherever possible to conserve groundwater supplies.

Objective C. Establish effective water management programs to ensure that satisfactory levels of quantity and quality are maintained.

Objective D. Encourage provisions for induced groundwater recharge where necessary to the maintenance of groundwater supplies.

Objective E. Seek the establishment of additional deep monitoring wells, rules and standards for local well construction and water use criteria.

Standards

The State of Florida Department of Environmental Regulation (DER) has promulgated rules by which the quality of the water is determined and the implementation of state and national water quality goals is achieved. Chapter 17-3 of the Florida Administrative Code establishes minimum criteria for all waters.

Within the territorial limits of the state, all waters shall be free from settleable, floating, deleterious and toxic substances. Specific water quality standards have also been established for various constituents classified

as deleterious regardless of the use to which the surface water is put. These standards are set forth in Chapter 17-3, Florida Administrative Code.

In addition to the foregoing requirments, DER has established water quality criteria on the basis of surface water use. All waters in Duval County are Class III waters except for Pumpkin Hill Creek, the Fort George River, Sawpit, Simpson, Garden and Myrtle Creeks which are Class II waters.

Class II Waters - Shellfish Harvesting

The following selected criteria are for classification of waters in areas which either actually or potentially have the capability of supporting recreational or commercial shellfish propagation and harvesting. Harvesting may only occur in areas approved by the Division of Health, Florida Department of Health and Rehabilitative Services.

A. Bacteriological Quality -Coliform Group - areas classified for shellfish harvesting, the median coliform MPN (Most Probable Number) of water shall not exceed 70 per 100 ml., and not more than 10 percent of the samples shall exceed an MPN of 230 per 100 ml. The fecal coliform bacterial level shall not exceed a median value of 14 MPN per 100 ml. with not more than 10 percent of the samples exceeding 43 MPN per 100 ml.

B. pH - pH shall not be caused to vary more than one (1.0) unit above or below normal pH of coastal waters as defined in Section 17-3.021 and not more than two-tenths (0.2) unit above or below normal pH of open waters as defined in Section 17-3.021 and the lower value shall not be less than six and one-half (6.5) and the upper value not more than eight and one-half (8.5).

C. Dissolved Oxygen - the concentration in all waters shall not average less than 5 mg/l in a 24-hour period and shall never be less than 4 mg/l. Normal daily and seasonal fluctuations above these levels shall be maintained.

D. Odor - threshold odor number not to exceed 24 at 60 degrees C as a daily average.

Class III Waters - Recreation, Propagation and Management of Fish and Wildlife

The following selected criteria are for classification of waters to be used for recreational purposes, including such body contact activities as swimming and water skiing, and for the maintenance of a well-balanced fish and wildlife population. All surface waters within and coastal waters contiguous to these basins, including offshore waters, not otherwise classified shall be classified as Class III; however, waters of the open ocean shall be maintained at a dissolved oxygen level of not less than five (5.0) milligrams per litre (mg/l).

A. pH - ph of receiving waters shall not be caused to vary more than one (1.0) unit above or below normal pH of predominantly freshwaters and coastal waters as defined in Section 17-3.021; and not more than two-tenths (0.2) units above or below normal pH of open waters as defined in Section 17-3.021; the lower value shall not be less than six (6.0) in predominantly freshwaters or less than six and one-half (6.5) in predominantly marine waters; and the upper value not more than eight and one-half (8.5).

B. Dissolved oxygen - in predominantly freshwaters, the concentration shall not be less than 5 milligrams (mg)/l. In predominantly marine waters, the concentration shall not average less than 5 milligrams (mg)/l in a 24-hour period and never less than 4 milligrams (mg)/l. Normal daily and seasonal fluctuations above these levels shall be maintained in both predominantly freshwaters and predominantly marine waters.

C. Bacteriological Quality - fecal coliform bacteria shall not exceed a monthly average of 200 per 100 ml of sample, nor exceed 400 per 100 ml of sample in 10 percent of the samples, not exceed 800 per 100 ml on any one day, nor exceed a total coliform bacteria count of 1,000 per 100 ml as a monthly average, nor exceed 1,000 per 100 ml in more than 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml at any time. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30 day period. Either MPN or MF counts may be utilized.

Policies

Class II and Class III Waters

A. Any reduction, impedance or other hydrologic modification of stream flows should be considered from the standpoint of the effect upon the assimilative capacity of waterbodies.

B. Soil conservation practices such as runoff and erosion control measures to prevent pollution of the St. Johns River and/or its tributaries from upland construction activitites should be encouraged.

C. Conservation of natural vegetation and limitation on the amount of paved areas is encouraged to minimize stormwater runoff. The use of semi-pervious paving is encouraged.

Point Source Control

A. Local government should become the dominant provider of sewage collection and treatment services and should continue its program of developing a regional sewage system.

B. Private wastewater package treatment plants should be permitted only where public systems are inadequate or unavailable and private plants should be connected to the public system where the latter is adequate and available.

C. Permits should not be issued for any treatment facilities, the discharges from which may exceed the assimilative capacity of the receiving waters as determined by DER modeling programs.

D. All existing sewage treatment systems should be upgraded to the point that discharges are compatible with the assimilative capacity of receiving waters or lands, as determined on the basis of applicable standards and allowable waste loads.

E. Efforts should be made to reduce water quality damage caused in the St. Johns estuary by port activitites by prohibition of discharge of untreated waste from ships and smaller craft, and continued efforts to prevent oil spills.

F. Where economically feasible and necessary, storm drainage outfalls should be located where receiving waters are most capable of assimilating wastes.

G. Dredging except for approved maintenance dredging of existing public navigation channels should be discouraged adjacent to Class II waters. Dredge spoil areas should be properly designed to prevent their becoming mosquito breeding areas.

H. Discharge of effluent which will cause health hazards for the population engaging in water contact sports and propagation of fish and wildlife should be prohibited.

Non-Point Source Control

A. Efforts should be accelerated to reduce pollution caused by agricultural runoff and to identify and reduce other non-point pollution sources.

B. Impervious surfaces should be limited to the minimum possible. When impervious paving is used, natural drainage systems should be protected and stormwater runoff incorporated back into the natural system.

C. Storm drainage projects should simulate the natural drainage pattern as nearly as possible.

D. Where feasible stormwater runoff should be delayed with detention systems for dispersal and release at a rate of flow simulating the pre-development state.

Groundwater Supply

A. Groundwater resources should be managed on a long-term "self sustained yield" basis through management of withdrawal rates, well spacing, sources of contamination and leakage.

B. In order to protect the regional water supply, the drilling of all wells should be by permit for drilling and operation. The capping, filling and plugging of abandoned wells should be required. Valves on free flowing wells and the closing of such valves except when water is in use should be required.

C. Use of groundwater for industrial cooling purposes should be discouraged where suitable and adequate surface waters are available for that purpose.

Conservation and re-use of cooling water should be encouraged in all cases, as well as re-use of treated wastewater where economically feasible.

D. Groundwater recharge should be enhanced where feasible and desirable through artificial means; i.e., detention dams, retention ponds, pumping during high flow, and swales.

E. Deep well water quality tests should be conducted to determine the extent of saltwater intrusion.

F. Use of low volume water fixtures should be required for new construction by the City Building Code.

Proposals

- The St. Johns River is a valuable environmental resource; however, it is also a valuable economic resource due to the dependence of the city on port related activities. In order to recognize the dual uses of the river, the Department of Environmental Regulation should be encouraged to expand the definition of Class III waters in port areas so that the water quality standards do not unduly discourage or restrict economic activity.

- Review recommendations of the state regarding control of non-point sources of water pollution (208).

- Encourage and assist in the development of a plan which will consider the St. Johns River estuarine ecosystem and its reaction to an increase or decrease of freshwater introduction.

- Encourage the development by USGS and other concerned agencies of a computer model to predict changes in water quality and quantity for groundwater, surface water and estuarine systems.

- Encourage studies by USGS and other concerned agencies to determine source and rate of movement of saline water in the aquifer.

- Encourage studies by USGS and other concerned agencies on the effect of urbanization on surface and groundwater supplies.

- Encourage the St. Johns River Water Management District to help fund water management studies.

- Encourage greater cooperation between the St. Johns River Water Management District, the Corps of Engineers, USGS, DER and local agencies in development of water plans.

SENSITIVE AREAS

Areas of Jacksonville where measures should be taken to encourage conservation of important natural resources and the function that they provide should be designated sensitive areas. Sensitive areas may include:

1. Areas of unique, scarce, fragile or vulnerable natural habitat, physical feature, historical significance, cultural value and scenic importance.

2. Areas of high natural productivity or essential habitat for living resources, including fish, wildlife and the various tropic levels in the food web critical to their well-being.

3. Areas of substantial recreational value and/or opportunity.

4. Areas where developments and facilitites are dependent upon the utilization of or access to coastal waters. The impacts of port activitites are discussed in the Economic Element and Land Use Element of the 2005 Comprehensive Plan.

5. Areas of urban concentration where shoreline utilization and other water uses are highly competitive.

6. Areas of significant hazard if developed, due to such factors as storms, floods and erosion.

7. Areas needed to protect, maintain or replenish lands or resources, including flood hazard areas and sand dunes and beaches.

Goals and Objectives

Goal I

To enhance and conserve natural areas, wildlife habitats, fisheries resources, air and water quality and other renewable and non-renewable resources.

Objective A. Study the ecological character of Jacksonville and delineate Sensitive Areas in detail.

Objective B. Protect the valuable functions of wetlands, estuaries and submerged lands including the territorial sea, by maintaining the integrity of vegetation and hydrologic systems.

Objective C. Protect the valuable functions of beaches and dunes by maintaining the integrity of those systems.

Objective D. Reduce declines in and increase the productivity potential of environmental resources.

Goal II.

To encourage greater compatibility between the land development process and the natural environment.

Objective A. Enhance and conserve areas of environmental sensitivity, while permitting development that will hold ecological alterations to acceptable levels.

Objective B. Enhance the quality of development by controlling the encroachment of urbanization on lands poorly suited for development.

Objective C. Promote and support the establishment and maintenance of pleasant, healthful surroundings in which the man-made environment is compatible with natural resources and amenities.

Objective D. Utilize natural resources to define and shape urban development patterns at both the county and community neighborhood scales.

Objective E. Plan for and provide adequate opportunity for economic development consistent with resource limitations.

Objective F. Integrate environmental and economic consideration into Jacksonville's decision-making process in order to maximize the benefits derived from new development.

Objective G. Control erosion and sedimentation in development areas.

Objective H. Reduce or prevent loss of property and lives which may result from natural disaster.

Objective I. Encourage multiple uses of environmental resources wherever possible.

Objective J. Review all development proposals to insure that development occurs according to established criteria, such as the existing Floodplain Ordinance.

Objective K. Monitor public notices on application to the Corps of Engineers for permits.

Goal III

To increase citizen participation in decisions affecting environmental resources.

Objective A. Acquire and disseminate basic knowledge and information concerning the environment and the ways in which it may be used to benefit the citizens of Jacksonville.

Objective B. Provide measures for resolving conflicts and preventing potential conflicts which arise out of competition between uses and users of environmental resources.

General Policies

A. The environmental implications of a proposed development should be considered as part of the review process of the city.

B. New techniques should be developed to provide legal protection for the area's natural resources as designated within the Comprehensive Plan.

C. All costs for restoring environmentally damaged areas should be imposed, insofar as possible, upon those persons declared responsible.

The following are land and water areas included in the Sensitive Areas Category. See Maps 1, 2, 3 and 4 for general location of these areas.

Selected Coastal (Tidal) Marshes

Tidal marshes are low coastal wetland areas covered by grassy salt tolerant vegetation subject to tidal actions. These marshes occur generally in the northeastern one-fifth of the county. They also occur along the Nassau River, the Intracoastal Waterway (south of the St. Johns River) and at Mill Cove. Map 1 shows the location of these areas.

The state defines tidal marshes as those areas capable of supporting salt tolerant vegetation. Salt marshes may also be identified as the soil series Tisonia.

Suitable Activity/Use

Propagation of marine life; wildlife refuges; hurricane buffer and shoreline stabilization; runoff retention areas; scenic resources.

The coastal marshes should be maintained in their natural state except for critical uses from which the general public will receive benefit.

APPENDIX C

EP TOXICITY DATA

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
105 STOCKTON STREET — P.O. BOX 52329
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 37662 November 17, 1980

Sample of Sludge

Date Received October 8, 1980

For Commanding Officer, Southern Division, Naval Facilities Engineering Command, P.O. Box 10068, Charleston, South Carolina 29411

Marks:

Contract #N62467-80-C-0464

CERTIFICATE OF ANALYSIS OR TESTS

Dry sludge, Naval Air Station
Jacksonville, Florida

	EPA Extraction Procedure Toxicity Tests
Endrin, µg/l	<1
Lindane, µg/l	<1
Methoxychlor, µg/l	<5
Toxaphene, µg/l	<3
2,4-D, µg/l	<1
2.4-5-TP Silvex, µg/l	<0.5
Arsenic, mg/l	0.018
Barium, mg/l	0.24
Cadmium, mg/l	0.078
Chromium, mg/l	0.51
Lead, mg/l	0.051
Mercury, mg/l	<.0002
Selenium, mg/l	<0.01
Silver, mg/l	0.022

Respectfully submitted.

TECHNICAL SERVICES, INC.

BY [signature]

Enclosure (2)

Table 1- Total composition of NAS dry sewage sludge, 8/80

Factor	Tank Number				Mean
	835	836	837	838	
Water, %	21.4	21.8	14.1	92.1	
pH	5.8	6.8	7.2	7.3	7.0
Nitrogen, %	4.22	4.69	4.46	4.75	4.53
Cadmium, ppm	241	270	311	261	271
Chromium, ppm	18,900	21,300	17,000	18,000	18,800
Copper, ppm	585	555	628	510	570
Barium, ppm	1,100.	890	1,120	850	990
Mercury, ppm	2.8	3.1	2.4	2.2	2.6
Manganese, ppm	365	390	380	480	404
Nickel, ppm	105	112	100	117	109
Lead, ppm	975	1,030	1,030	1,240	1,070
Potassium, ppm	2,200	2,450	2,180	2,590	2,360
Selenium, ppm	0.43	0.72	0.31	0.17	0.41
Silver, ppm	72	73	82	83	79
Sodium, ppm	500	1,280	845	1,330	989
Zinc, ppm	939	780	938	804	865
Arsenic, ppm	3.4	4.0	4.0	2.9	4.6
Ignition loss, %	60.8	68.2	65.7	72.1	66.7

Analysis by J. G. A. Fiskell and Analytic Research Laboratory, Soil Science Department, University of Florida, Gainesville, 32611.

APPENDIX 1.2

Site Inspection

(The Verification Study serves as the Site Inspection for the Site)

VERIFICATION STUDY

Assessment of Potential Ground-Water Pollution at Naval Air Station-Jacksonville, Florida

Prepared for

NAVAL FACILITIES
ENGINEERING COMMAND

Southern Division
Charleston, South Carolina

DECEMBER, 1985

GERAGHTY & MILLER, INC.
GROUND-WATER CONSULTANTS

LANDMARK OFFICE CENTER
14310 N. Dale Mabry Hwy., Ste. 200, Tampa, Florida 33618 (813) 961-1921

GERAGHTY & MILLER, INC.

VERIFICATION STUDY

ASSESSMENT OF POTENTIAL GROUND-WATER POLLUTION AT NAVAL AIR STATION-JACKSONVILLE, JACKSONVILLE, FLORIDA

Prepared for

NAVAL FACILITIES ENGINEERING COMMAND
SOUTHERN DIVISION
Charleston, South Carolina

December 1985

Prepared by

GERAGHTY & MILLER, INC.
Ground-Water Consultants
14310 North Dale Mabry Highway, Suite 200
Tampa, Florida 33618

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INTRODUCTION

In August 1983, Geraghty & Miller, Inc., (G&M) was retained by the Naval Facilities Engineering Command, Southern Division (Navy) to provide hydrogeologic consulting services at the Naval Air Station (NAS) and Naval Fuel Depot (NFD), Jacksonville, Florida (see Figure 1). Specifically, G&M was to assist the Navy in performing Phase II (Confirmation Study) of the Navy Assessment and Control of Installation Pollutants (NACIP) program. This program is designed to identify contamination of Navy lands resulting from the past operations and to institute corrective measures as needed.

The NACIP program is divided into three phases. The first phase is the Initial Assessment Study (IAS) in which record searches and personal interviews are performed to collect and evaluate all evidence supporting the existence of a contamination problem at an installation. The second phase, the Confirmation Study, involves on-site investigations to confirm or refute the existence of contamination, and to quantify the extent of the problem if contamination is present. The third and final phase is the implementation of corrective actions and remedial measures to control or mitigate the contamination.

The Confirmation Study is further divided into two parts, verification and characterization. Initially, a verfication study is conducted to determine the presence or

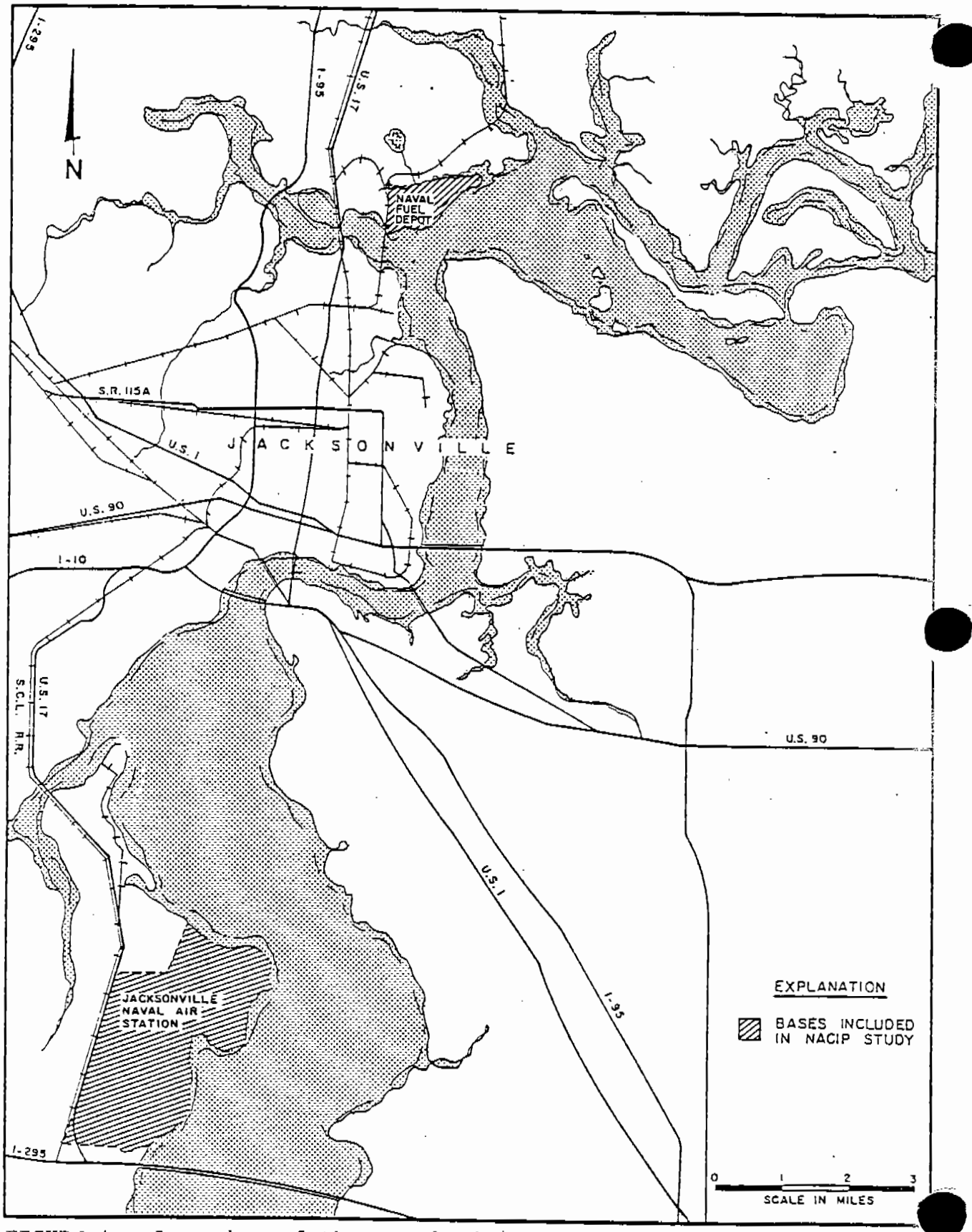

FIGURE 1. Location of the Naval Air Station (NAS) and Naval Fuel Depot (NFD), Jacksonville, Florida.

absence of contamination in the soil, surface water or ground water at each site. Based on these findings, the characterization study is then implemented at those sites requiring additional study to identify the nature and extent of the contamination.

A verification study was initiated in August 1983, in order to assess the potential environmental impacts of 13 sites previously identified in a report dated March 1983 entitled: "Initial Assessment Study of the Naval Air Station and Naval Fuel Depot, Jacksonville, Florida" (IAS). In October 1983, the FDER (Florida Department of Environmental Regulation) reviewed the IAS and a Plan-of-Action prepared for the verification study (August 15, 1983) and requested five (5) sites for additional investigation (four new sites and expanded scope of work for Site No. 29). Additionally, as a result of newly acquired information in March 1985, four new sites were added for consideration under the verification Study.

The results of the entire verification study (21 sites) and recommendations for further characterization at selected sites is presented in this report. The locations of the sites studied are shown in Figures 2 and 3 for the NAS and NFD, respectively. The site identification numbering system used in the IAS report has been retained for this report. Table 1 lists all the potential sites identified at the NAS and NFD including how they were identified, when recommended

verification, characterization, or remedial actions, and the current status.

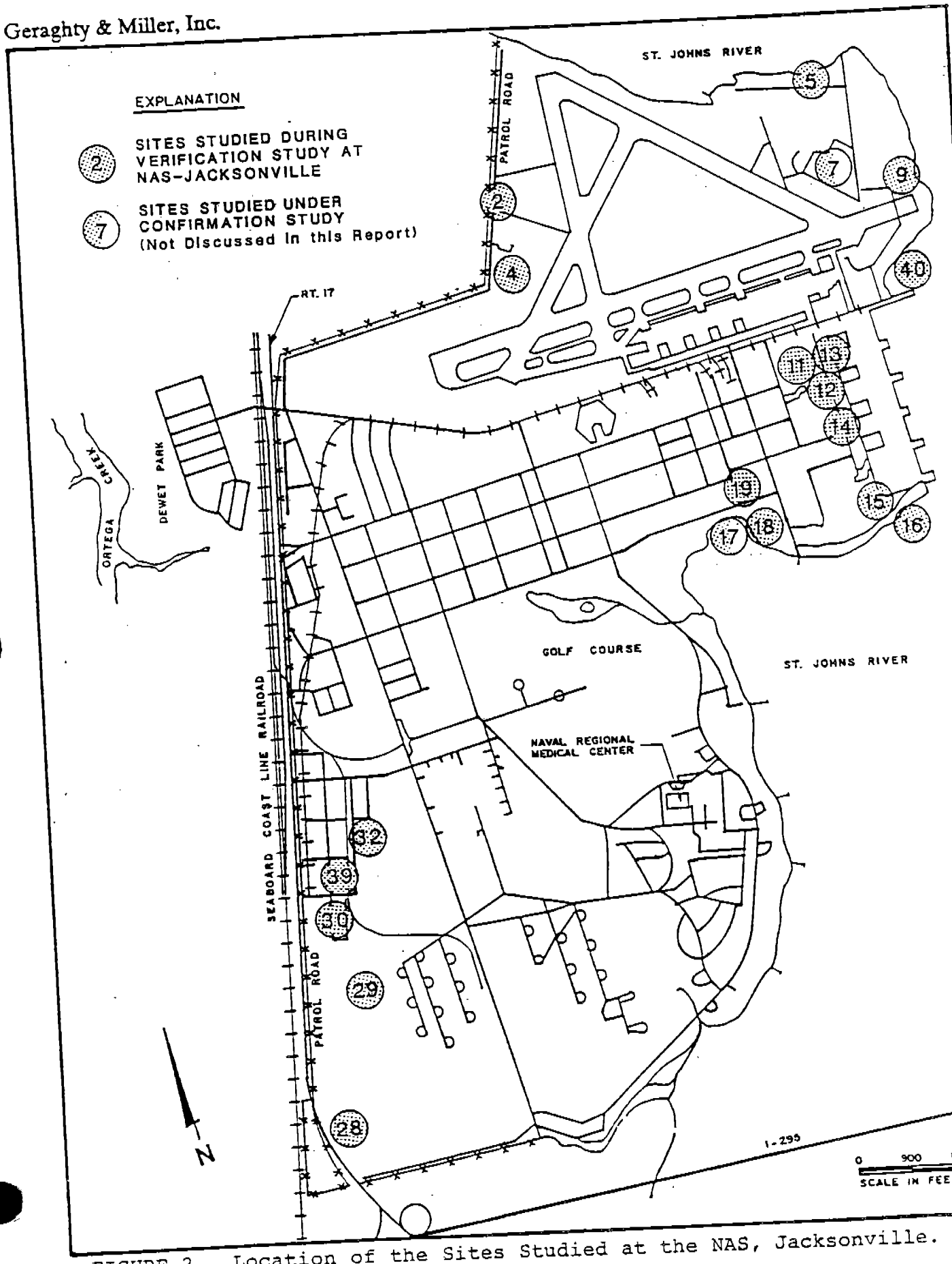

FIGURE 2. Location of the Sites Studied at the NAS, Jacksonville.

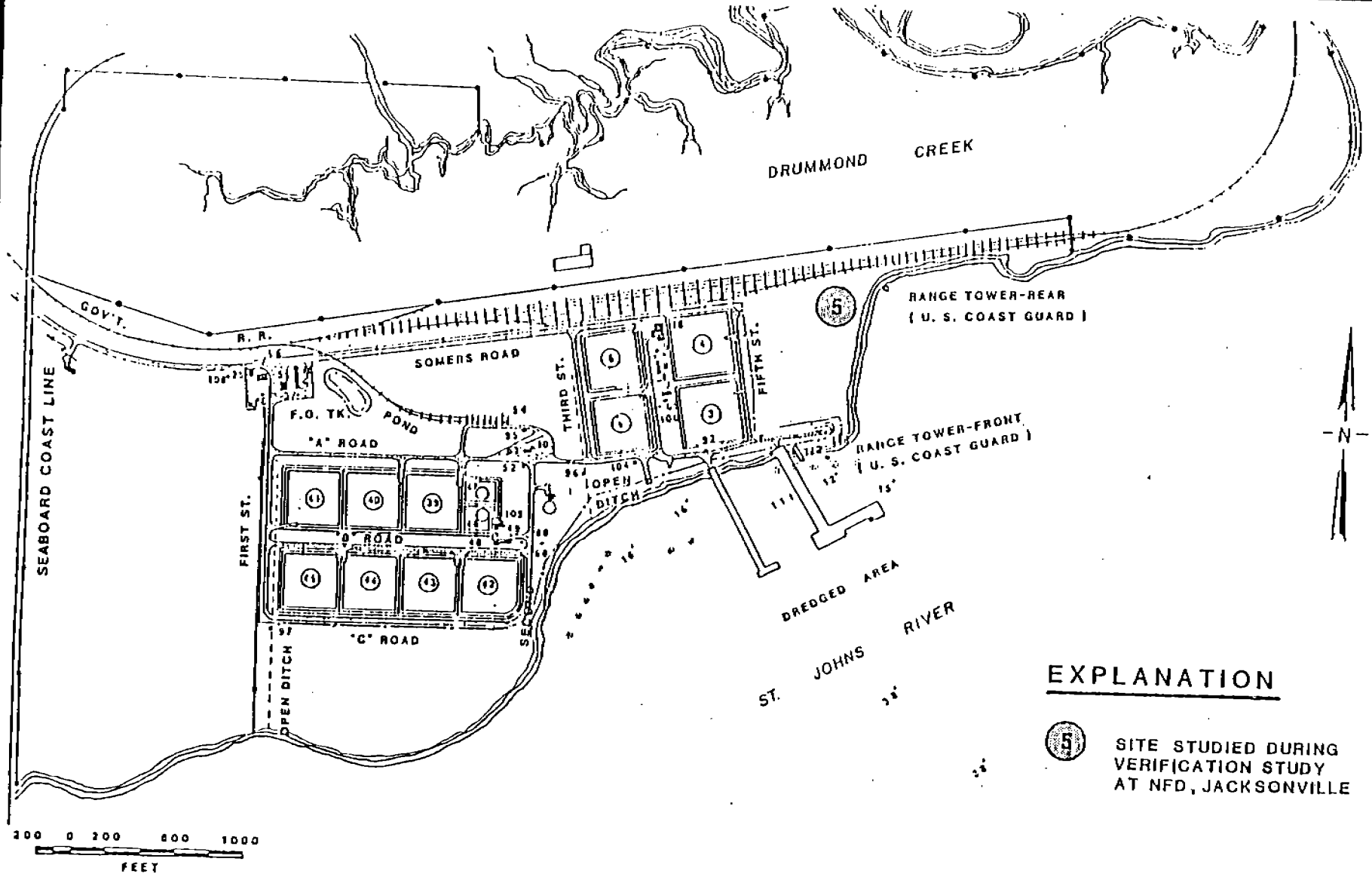

FIGURE 3. Location of the Site Studied at the NFD, Jacksonville.

TABLE 1. CURRENT STATUS OF ALL SITES IDENTIFIED AT THE NAS AND NFD

SITE NO.	IDENTIFIED BY	VERIFICATION RECOMMENDED BY	CHARACTERIZATION RECOMMENDED BY	REMEDIAL ACTION RECOMMENDED BY	CURRENT STAT
NAS					
1	IAS[1/]	NR[2/]	-	-	Complete
2	IAS	FDER[3/]	NR	-	Complete
3	IAS	NR	-	-	Complete
4	IAS	IAS	NR	-	Complete
5	IAS	NAS-JAX	NR	-	Complete
6	IAS	NR	-	Characterization	Characteriza
7	IAS	NAS-JAX	NAS-JAX	-	Complete
8	IAS	NR	-	-	Complete
9	IAS	IAS	NR	- [4/]	Complete
10	IAS	NR	-	NA	Characteriza
11	IAS	IAS	Verification	NA	Characteriza
12	IAS	IAS	Verification	-	Complete
13	IAS	FDER	NR	NA	Characteriza
14	IAS	IAS	Verification	NA	Characteriza
15	IAS	IAS	Verification	NA	Characteriza
16	IAS	IAS	Verification	-	Closure Pla
17	IAS	IAS	NR	-	Complete
18	IAS	FDER	NR	-	Tanks to be
19	IAS	IAS	NR	-	abandoned by
20	IAS	NR	-	-	Complete
21	IAS	NR	-	-	Complete
22	IAS	NR	-	-	Complete
23	IAS	NR	-	-	Complete
24	IAS	NR	-	-	Complete
25	IAS	NR	-	-	Complete
26	NAS-JAX	Prior to NACIP	-	NAS-JAX	Remedial act
27	IAS	NR	-	-	Complete
28	IAS	NAS-JAX	Verification	NA	Characteriza
29	IAS	IAS	Verification	NA	Characteriza
30	IAS	IAS	Verification	NA	Characteriza
31	IAS	NR	-	-	Complete
32	IAS	FDER	Verification	NA	Characteriza
33	IAS	NR	-	-	Complete
34	IAS	NR	-	-	Complete
35	IAS	NR	-	-	Complete
36	IAS	NR	-	-	Complete
37	IAS	NR	-	-	Complete
38	IAS	NR	-	-	Complete
39	NAS-JAX	NAS-JAX	NR	-	Complete
40	NAS-JAX	NAS-JAX	NR	-	
NFD					
1	IAS	NR	-	-	Complete
2	IAS	NR	-	-	Complete
3	IAS	NR	-	-	Complete
4	IAS	NR	-	-	Complete
5	IAS	IAS	Verification	NA	Characteriza

1/ IAS = Initial Assessment Study
2/ NR = Not recommended
3/ FDER = Florida Department of Environmental Regulation
4/ NA = Not applicable; site still under investigation

APPROACH

In evaluating the sites studied during the verification study, the overriding consideration was the risk to human health and the environment. The factors which were taken into account in preparing recommendations for further study at specific sites as outlined in Chapter 17-4.245(7)b, FAC (Florida Administrative Code) includes: (1) size of the contaminant plume, (2) toxicity of the contaminants and their concentrations, (3) rate and direction of plume movement in relation to sources of water supply, (4) rate of attentuation or dilution of the plume, (5) current and projected future use of adjacent ground and surface waters affected by the plume, and (6) costs of further study or clean-up in comparison to the benefits to the public of such actions.

For sites where characterization studies are recommended, the proposed programs of monitor-well installation and sampling are designed to provide sufficient data for determining the need for long-term monitoring or corrective action, and for the preliminary design of corrective measures, if necessary. For other sites, no further actions were recommended because of the limited benefits to the public in view of the costs for additional study or clean-up.

BACKGROUND

An IAS study was conducted at the NAS and NFD in 1982 and 1983. The IAS report, submitted to the Navy in March, 1983, described in detail the general naval activities that comprise the NAS and NFD complexes, the history of each facility and the general physical setting including the topography, climate, geology, soil and surface waters, and the waste types and disposal practices at the individual sites. Accordingly, this verification study report discusses these types of information only where it is enhanced by recently collected site-specific information or is necessary to clarify a particular action or recommendation at a site.

Study Sites

As previously discussed, ten sites at the NAS and one site at the NFD were concluded to pose a potential threat to human health and the environment upon completion of the IAS. After reviewing the IAS report, the FDER (Florida Department of Environmental Regulation) recommended four new sites for study, and additional work at a previously studied site. The Navy then added four sites for consideration based on information supplied by a former employee.

At the NAS, two sites recommended for a confirmation study in the IAS (Site Numbers 7 and 17) were previously studied and the findings presented in separate reports. A report discussing the findings and recommendations for

remedial actions at Gas Hill (Site No. 7) was submitted to the Navy in December, 1983. The other site, the glass bed waste pile (Site No. 17), initially was studied in conjunction with the verification study in August, 1983. Three sediment samples were collected at that time and analyzed for EP Toxicity for nine metals. A subsequent report was prepared entitled, "Closure Plan for the Spent Glass Bead Waste Pile, NAS-Jacksonville, Jacksonville, Florida." This report, submitted in April 1984, discussed the findings of the three sediment samples and outlined a program for final closure of the waste pile. Final closure of the waste pile included additional sediment sampling; the results of the additional sampling were included in a final closure report, "Closure Certification of the Spent Glass Bead Waste Pile."

Two active sites at NAS, the industrial waste sludge drying beds and the sewage treatment plant polishing ponds are currently under investigation as part of both Federal and State ground-water monitoring requirements. A ground-water monitoring system has been installed at the industrial waste sludge drying beds in compliance with the Resource Conservation and Recovery Act for interim status facilities; Section 265.91, Subpart F of the Code of Federal Regulations. In addition, a ground-water monitoring system has been installed at the polishing ponds for the sewage treatment plant in compliance with the ground-water monitoring requirements as stated in Chapter 17-4.245, FAC. Both of

these facilities have completed the first year of quarterly water-quality sampling from installed monitor wells; the laboratory results from the first year of sampling have been submitted to the FDER for each facility.

PROJECT SETTING

NAS Jacksonville

The NAS, shown in Figure 1, is located along the St. Johns River at Orange Park, approximately 9 miles south of the City of Jacksonville. . In addition to housing and training facilities, the NAS primarily is responsible for monitoring and operating facilities to provide services and materials in support of aviation operations. There are several major tenants within its confines, the largest being the NARF (Naval Air Rework Facility). The NARF is a large industrial complex of 45 buildings and is responsible for maintenance, repair, and rework operations of various aircraft engines and frames.

The NAS has evolved since its inception in 1938 from a naval aviation training facility to its present command. During the course of its history there have been many activities in which hazardous materials have been handled, transferred and stored as part of the NAS operations. Basically, these hazardous materials are a result of NARF operations, fuel farms and gasoline service stations, fire-fighting training, and radiological operations (luminous aircraft dials and parts). Many of these activities are now inactive and are largely without records of past operations.

Until 1972, the NAS operated two domestic wastewater-treatment plants; the east side plant located south of the

east end of the main runway, and the west side plant located north of the west end of the main runway. In 1972, the east side plant was abandoned and the west side plant was expanded to handle 2.25 mgd (million gallons per day) and upgraded with an activated sludge digestion system. This plant receives both domestic and industrial wastes from the base. The industrial wastes are pretreated in an industrial wastewater-treatment plant, located near the west side plant, which became operational in 1981. Presently, the two west side plants treat all of the liquid wastes generated at the NAS not manifested for off-site disposal.

Solid wastes at the NAS are removed from the base by an independent refuse-collection contractor. At present, three inactive landfills (Site Nos. 9, 26, and 32) and one active organic (construction materials, wood and grass clippings) disposal area (Site No. 29) have been identified at the NAS. Two of the three inactive landfills (Site Nos. 9 and 32) were investigated during this study; Site No. 26 had been previously studied as reported by the IAS. The findings and recommendations of the study of the two inactive landfills (Site Numbers 9 and 32) and the active landfill (Site No. 29) are presented in the individual site evaluations in this report.

The IAS report identified 27 water wells at NAS. A recent water-well survey completed by NAS personnel, determined that 29 wells are present on the base (Figure 4).

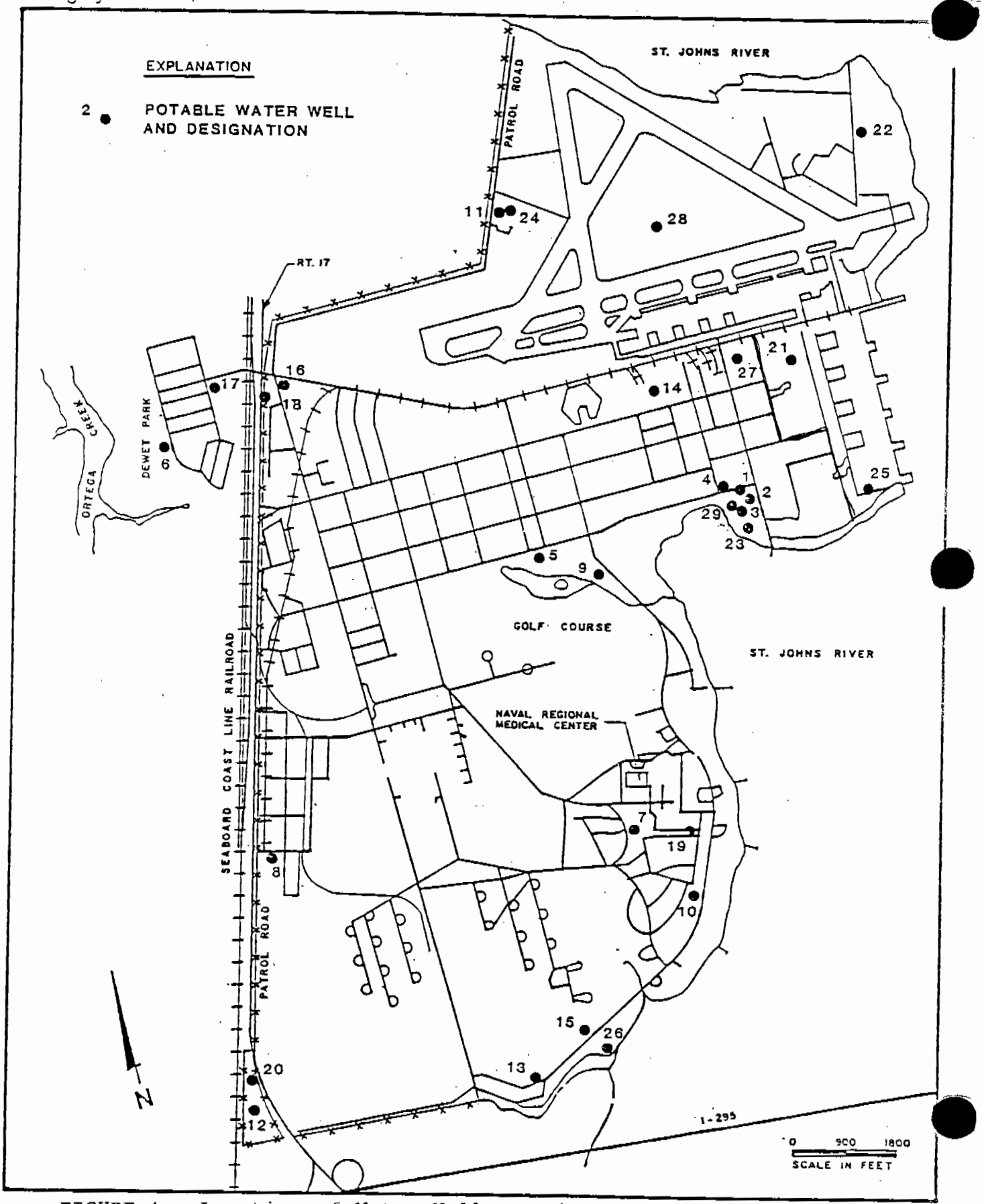

FIGURE 4. Location of Water Wells at the NAS, Jacksonville.

Information concerning the construction details and use of these wells is presented in Table 2. A new well (No. 29), installed in early 1984 at the NAS, is also included in this table.

Water-quality samples were collected on April 14, 1984, from two drinking-water wells, Number 4 and 7 located at water plants Number 1 and 4, respectively. The samples were analyzed by a independent laboratory for selected EPA (Environmental Protection Agency) priority pollutants including volatile organic compounds, acid and base neutral extractable compounds, EDB (1,2 dibromoethane) and Temik (brand name for Union Carbide's pesticide, aldicarb). The laboratory results, in addition to other water-quality results from samples collected by the Navy, are contained in Appendix A. The results show that all of these constituents are either below the detection limits or less than the drinking-water standards set forth in Chapter 17-22.104 FAC.

NFD

The NFD, located at the confluence of the St. Johns and Trout River, has always been used as a tank farm supplying various types of fuels to naval operations in the Jacksonville area. Initially, the storage capacity was approximately 280,000 barrels until 1951 when the Navy expanded the facility by 300 acres (271 acres were later transferred or sold by the Navy) and 600,000 barrels. Presently, the NFD supplies fuel oil to the Naval Station at

TABLE 2. CONSTRUCTION DETAILS AND USE OF WATER WELLS AT THE NAS

WELL DESIGNATION (PREVIOUS DESIGNATION)	DIAMETER (inches)	TOTAL DEPTH (feet)	CASING DEPTH (feet)	MAP GRID	WELL USE
1 (01)	8	708	463	12J	NIU[1/]
2 (1)	12	1215	380	12J	In use at Water Plant No. 1
3 (2)	12	1215	464	12J	NIU, area around well collapsed
4 (3, 2A)	26x18x12	1210	410	12J	In use at Water Plant No. 1
5 (4, 3)	12	1015	318	9J	In use at Water Plant No. 2
6 (5, 4)	12	988	400	3G	In use at Water Plant No. 3
7 (6, 5)	12	646	271	9)	In use at Water Plant No. 4 Hospital Supply Well
8 (7, 6)	10	1096	316	3N	Fire Protection
9 (8, 7)	6	500	250	9K	Golf Course Irrigation
10 (9, 8)	6	498	248	10P	NIU, previously used for hospital sprinklers
11 (10, 9)	6	500	120	9D	NIU, previously used for westside WWTP
12 (11, 10)	8	400	288	2R	Fire protection for salvage yard
13 (12, 11)	4	407	251	6J	Used in Radio Tower area
14 (13, 12)	6	?	95	11H	NIU, previously used for cooling water

TABLE 2. Continued

WELL DESIGNATION (PREVIOUS DESIGNATION)	DIAMETER (inches)	TOTAL DEPTH (feet)	CASING DEPTH (feet)	MAP GRID	WELL USE
15 (14, 13)	6	400	-	7R	NIU, capped prior to 1946
16 (15, 14)	4	400	-	5F	NIU, capped prior to 1946
17 (16, 15)	4	400	-	3F	NIU, capped
18 (17, 16)	3	400	-	5F	NIU, capped
19 (18, 17)	6	400	-	10O	NIU, capped
20	3	400	-	2R	NIU
21 (22)	2	-	-	14I	NIU
22 (19, 23)	2	101	-	16D	NIU
23 (24)	18	1200	350	12J	NIU-Water Plant No. 1
24 (25)	4	770	120	9D	Grey water at WWTP
25 (26)	12	-	-	15J	Make-up water for test cells
26 (23)	8	522	297	8R	NIU, operable USGS sampling point
27 (21)	8	160	115	13G	NIU, previously used for cooling water
28 (22)	-	-	-	12E	Crash Station
29	18x12	1223	441	12J	In use at Water Plant No. 1

1/ Not in use

Mayport, Florida, and aviation fuels to the NAS - Jacksonville via buried pipelines.

The NFD does not maintain housing, training, or support activities, as operation of this facility is not dependent on a large amount of manpower. Basically, only small amounts of solid wastes are generated at this base, and it is reported that past burning of this waste material at Site Number 5 ceased in 1967. An independent waste-collection contractor is responsible for removing all solid wastes from the facility.

With the exception of contaminated fuels, bottom sludges, and wash-water generated by infrequent tank cleaning, the NFD does not transport, store or dispose of any other hazardous wastes. The IAS report identified five sites which received past disposal of liquid wastes (sludge and wash water contaminated with tetra ethyl lead (TEL), off-specification fuel oil, and contaminated fuel oil). Domestic wastewater generated on-base is discharged to the Jacksonville sanitary sewer system.

Three deep wells are located at the NFD; two wells have been capped and one is currently used for the potable water supply. The location of these wells are provided in Figure 5.

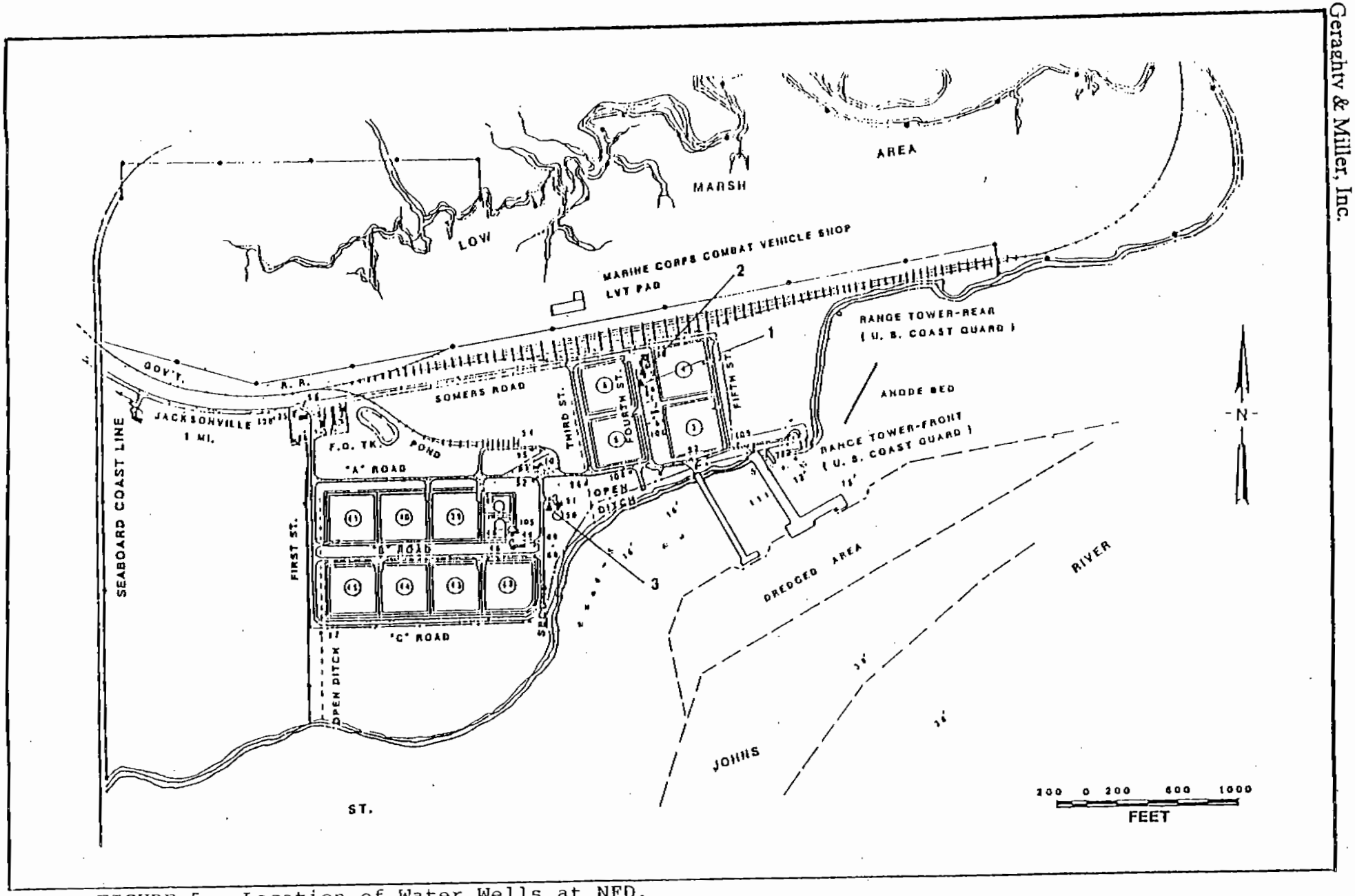

FIGURE 5. Location of Water Wells at NFD.

WORK PERFORMED

The work performed at the NAS and NFD proceeded according to three plan-of-action reports prepared in August and December, 1983 and November, 1984. Prior to beginning the field programs at each base, existing data and literature concerning the study areas were collected and reviewed. The field program at each base consisted of a drilling and testing program performed during three phases. The first phase, which studied the original 13 sites identified in the IAS, was conducted during August and September 1983, the second phase (including the four additional sites and expanded work at Site No. 29 recommended by FDER), was performed in March and April 1984 and the third phase (including sites recommended by a former Navy employee) was conducted in March, 1985. Each phase consisted of essentially the same activities; soil boring/monitor-well installation, water-level measurements, and sediment and water-quality sampling. The second phase also included water-quality sampling at two water-supply wells at the NAS. A hydrogeologist from Geraghty & Miller, Inc., was present at all times to supervise the drilling program, collect the sediment and water-quality samples, and gather water-level information. For the purposes of this report, the field programs will be discussed as one.

Soil Boring/Monitor-Well Installation

During drilling activities, 81 soil borings were drilled, 47 at NAS and 34 at NFD. The 34 soil borings at NFD, located within the boundary of Site No. 5, were installed to determine the horizontal and vertical extent of soil contamination by contaminated fuel oil reportedly disposed of in this area. Two of these borings were converted to monitor wells. The location map of these soil borings is contained in the site evaluation of NFD Site No. 5. The description of the lithologic logs for all of the soil borings are presented in Appendix B, Section 1.

Twenty-two shallow monitor wells were installed at 15 study sites at the NAS and 2 monitor wells were installed at one site at the NFD. The monitor-well locations at each particular site are shown in the individual site evaluations presented later in this report. Generally, the wells were similarly constructed; the construction details of a typical well are shown in Figure 6 and Table 3 lists the specific construction elements of each well.

Soil borings were initially drilled at each well location to determine the surficial geology. Continuous sediment samples were collected from land surface to the total depth of the borehole. The total depth and screen setting of each well was established by site-specific geologic characteristics. Upon completion of sampling to the desired depth, well casing, consisting of 2-inch-diameter PVC

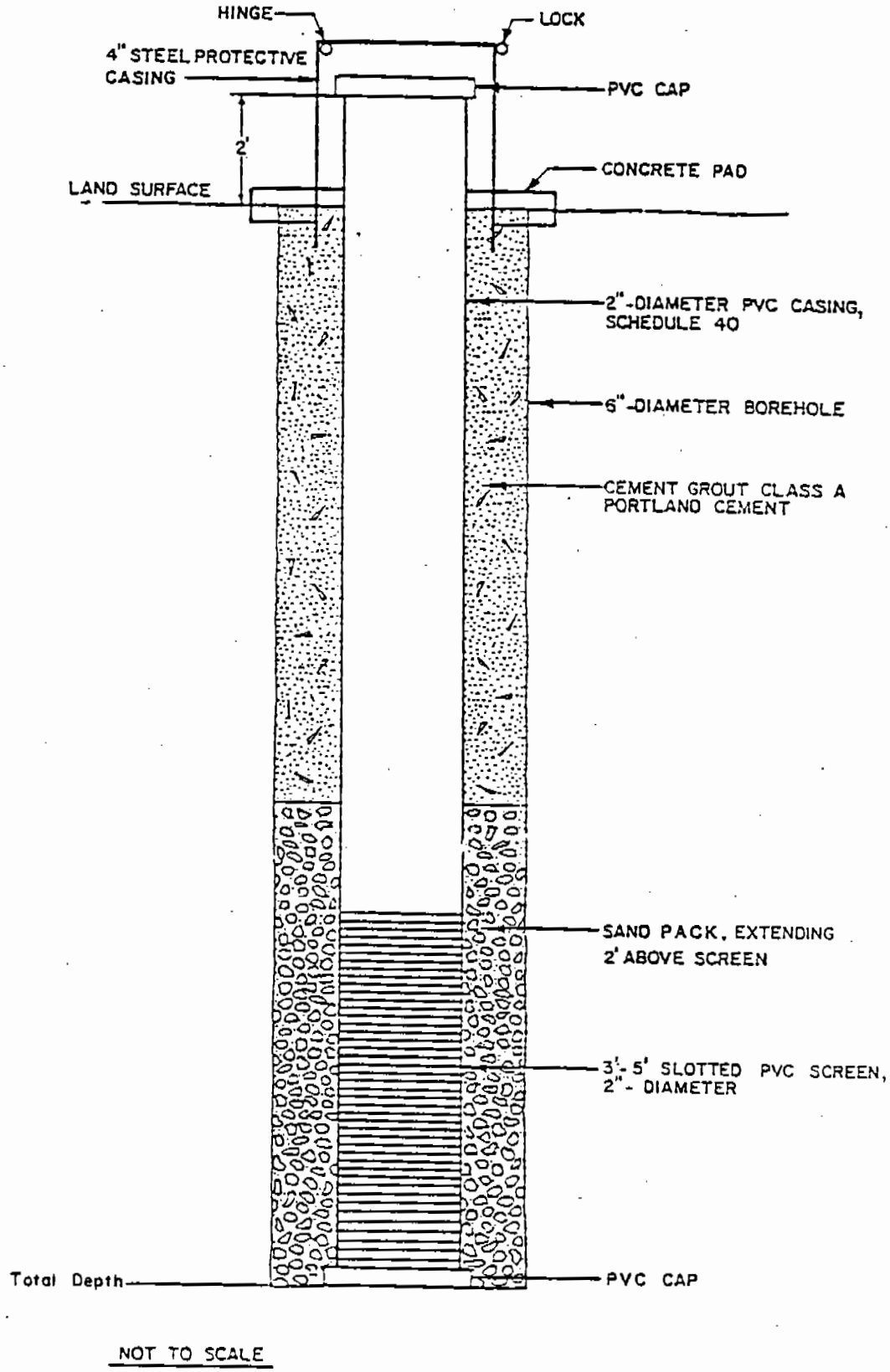

FIGURE 6. Schematic Diagram Showing the Construction Details of a Typical Monitor Well.

TABLE 3. CONSTRUCTION DETAILS OF INSTALLED MONITOR WELLS

MONITOR WELL NUMBER	TOTAL DEPTH (ft below land surface)	SCREEN SETTING (ft below land surface)	MEASURING POINT ELEVATION (ft msl)
NARF-1	10.0	7.0 - 10.0	11.99
NARF-2	16.0	13.0 - 16.0	14.78
NARF-3	10.5	7.5 - 10.5	12.26
NARF-4	11.5	8.5 - 11.5	8.84
NARF-5	10.5	7.5 - 10.5	7.17
NARF-6	9.0	6.0 - 9.0	10.72
NARFB-1	16.0	13.0 - 16.0	11.62
NAS2-1	11.5	6.5 - 11.5	-[1/]
NAS4-1	11.5	8.5 - 11.5	21.44
NAS4-2	11.5	8.5 - 11.5	18.83
NAS4-3	11.5	8.5 - 11.5	19.55
NAS5-1	15.0	15.0 - 10.0	-
NAS9-1	13.0	10.0 - 13.0	-
NAS13-1	12.5	7.5 - 12.5	8.35
NAS18-1	12.5	7.7 - 12.5	-
NAS28-1	15.0	15.0 - 10.0	-
NAS29-1	12.5	7.5 - 12.5	-
NAS29-2	12.5	7.5 - 12.5	-
NAS30-1	11.0	8.0 - 11.0	22.02
NAS30-2	10.0	7.0 - 10.0	21.08
NAS30-3	9.0	6.0 - 9.0	21.12
NAS32-1	12.0	6.0 - 12.0	
NFD-1	6.5	3.5 - 6.5	-
NFD-2	7.0	4.0 - 7.0	-

1/ Blank space means measuring point elevation was not determined.

pipe with attached 3- to 5-ft (feet) of well screen, was inserted into the borehole. Fresh water was then circulated through the well casing and screen, and up through the annulus of the borehole, to clear the drilling fluid from the hole. After the return water was sufficiently clean, a graded silica sand was installed by the tremie method from the bottom of the well screen to 2 ft above the top of the well screen. The remaining annular space between the borehole and well casing was filled with a neat cement grout to land surface to prevent any surface-water infiltration. Following a minimum of 12 hours after the grout was emplaced, each well was developed by alternately swabbing and pumping the well for approximately one to two hours to ensure a clear discharge.

Surveying

Upon completion of the monitor-well installation, a site survey was conducted to reference the water-level measuring points of each well (top of PVC well casing) to a common datum, mean sea level (msl). The survey, performed by a certified land surveyor (L.D. Bradley, Florida Certification No. 1380), was conducted at those sites having three or more monitor wells. The elevation of the top of the PVC well casing and ground-water elevations at each well are contained in Table 4.

TABLE 4. GROUND-WATER ELEVATIONS IN THE STUDY AREA
(All measurements in feet above mean sea level)

MONITOR WELL NUMBER	MEASURING PT ELEVATION (ft above msl)	DATE OF MEASUREMENT									
		9/8/83	9/9/83	9/10/83	9/11/83	3/8/84	3/12/84	4/17/84	7/10/85	10/18/84	5/10/85
NARF-1	11.99	2.6	–	2.84	2.73	3.01	3.09	–	–	–	–
NARF-2	14.78	3.53	–	–	3.53	3.56	3.62	–	3.48	4.10	2.78
NARF-3	12.26	3.22	–	–	3.22	3.15	3.20	–	2.86	3.84	2.59
NARF-4	8.84	1.22	–	–	1.24	0.95	0.85	–	1.08	1.97	1.14
NARF-5	7.17	1.94	–	–	1.93	2.03	2.03	–	2.01	2.91	1.51
NARF-6	10.72	–	–	3.87	3.87	4.32	4.31	–	4.25	3.89	3.56
NARFB-1	11.62	–	–	–	–	–	–		–	2.92	1.95
NAS13-1	9.04	–	–	–	–	–	–	–	–	4.37	4.20
NAS4-1	21.44	15.39	–	–	15.28	17.56	16.89	–	15.28	16.33	–
NAS4-2	18.83	13.91	–	–	14.43	16.51	15.87	16.22	–	–	–
NAS4-3	19.55	14.41	–	–	14.16	17.21	16.04	16.33	14.00	15.05	–
NAS4-6	19.26	–	–	–	–	–	13.10	13.84	11.96	12.53	–
NAS4-7	16.01	–	–	–	–	–	11.94	12.42	9.94	11.18	–
NAS4-8	15.17	–	–	–	–	–	9.98	11.18	9.40	9.29	–
NAS30-1	22.02	18.04	17.95	–	17.64	19.15	18.27	18.03	17.20	17.13	15.60
NAS30-2	21.08	–	16.03	–	16.17	18.05	17.34	–	16.31	16.30	14.66
NAS30-3	21.12	16.99	16.94	–	16.63	18.76	17.81	–	16.04	16.85	15.05

Sampling and Analysis

During the verification study, 24 ground water and 25 soil samples were collected by G&M personnel and analyzed by private laboratories for site-specific chemical compounds. To collect the ground-water samples, approximately three well volumes were initially removed from the well with either a peristaltic or centrifugal pump followed by well sampling with the peristaltic pump or a teflon bailer. Field measurements of temperature, pH, and specific conductance were made on the ground water at the time of sampling and are summarized in Table 1 of Appendix C. The sample containers were supplied (except for the volatile organic analyses) by an FDER approved laboratory; all containers requiring preservatives were prepared by the laboratory according to EPA Report Number 600/4-79-020. Additionally, the sample containers were stored on ice prior to delivery via air freight to the laboratory. The laboratory water-quality results are presented in Appendix C.

The 25 soil samples were obtained with either a split-spoon sampler, trowel or clam-shell dredge sampler (sediments in St. John's River at Site No. 39). The approximate location of the soil samples are shown in the site evaluations. These samples also were delivered via air freight to the laboratory within 48 hours from the time of sampling. The laboratory results for the soil analyses are presented with the water-quality data in Appendix C.

HYDROGEOLOGIC SYSTEM

Topography and Drainage

NAS Jacksonville

The NAS is located in southern Duval County on remnants of the Silver Bluff and Pamlico marine terraces, modified by stream erosion and by excavation and fill activities associated with construction of the NAS. Surface drainage is divided between eastward flow directly into the St. Johns River and westward flow toward the Ortega River. Surface drainage features and watershed divides are illustrated in Figure 7. Many surface-water features were constructed or modified to assist the natural drainage from the base. Also, much of the NAS is serviced by storm sewers that convey storm-water runoff to the St. Johns River.

The land surface elevations range from approximately 35 ft msl in an area just east of Site No. 29 to near 0 ft msl along the St. Johns River bordering the east and north sides of the base.

NFD

The NFD is located in north-central Duval County along the St. Johns River. The NFD is situated on a bar of sediments deposited by the fluvial processes of the river. Land-surface elevations are generally less than 10 ft msl and

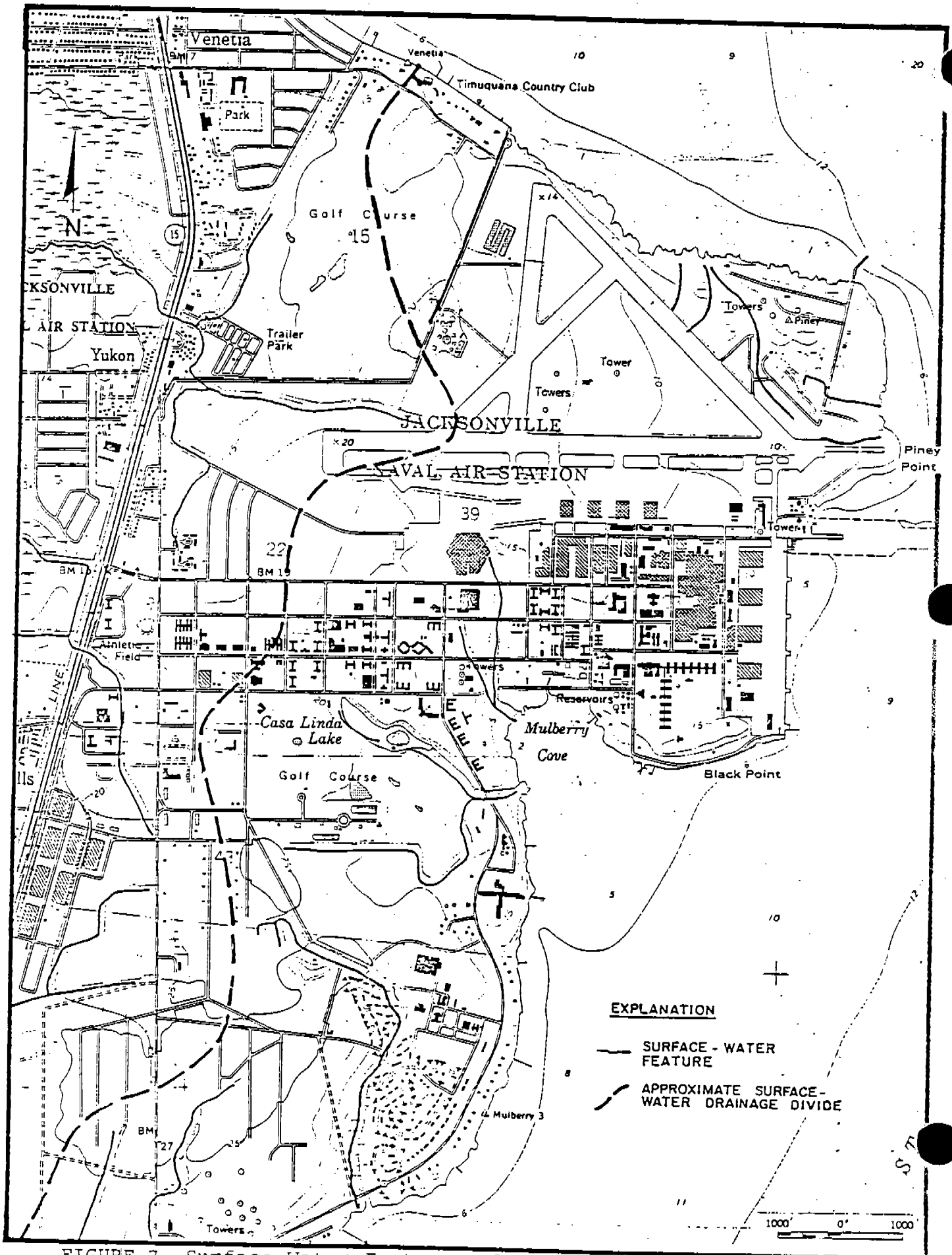

FIGURE 7. Surface-Water Features of the NAS, Jacksonville.

some of the outlying areas exist as tidal flats; alternately flooded and dry depending on the tidal cycles in the river.

The land holdings at the NFD are relatively small. Other than a few man-made ditches, most of the precipitation infiltrates directly into the veneer of medium to coarse-grained sand and shell deposits left by the river or moves to the St. Johns River via overland runoff. Drummond Creek, a small tributary to the St. Johns River sluggishly drains the northern side of the NFD. The surface-water drainage features and watershed divides are shown in Figure 8.

Geologic Framework

The geologic sequence of sediments underlying the NAS and NFD generally consists of unconsolidated deposits of sands, clays, and shell overlying a thick sequence of marine carbonate rocks. A composite geologic column, shown in Figure 9, was constructed from well logs from the area as well as published data. Basically, the water table or surficial aquifer is contained in the uppermost unconsolidated sediments which are generally a few tens of feet thick in the study area. The surficial sediments are underlain by silty clays, clays, and clayey sands of Pliocene and upper Miocene age. Beneath these is the Hawthorn Formation, which consists primarily of calcareous, phosphatic, sandy clays with occasional, thin lenses of sand, limestone, and dolostone. The Hawthorn Formation serves as a

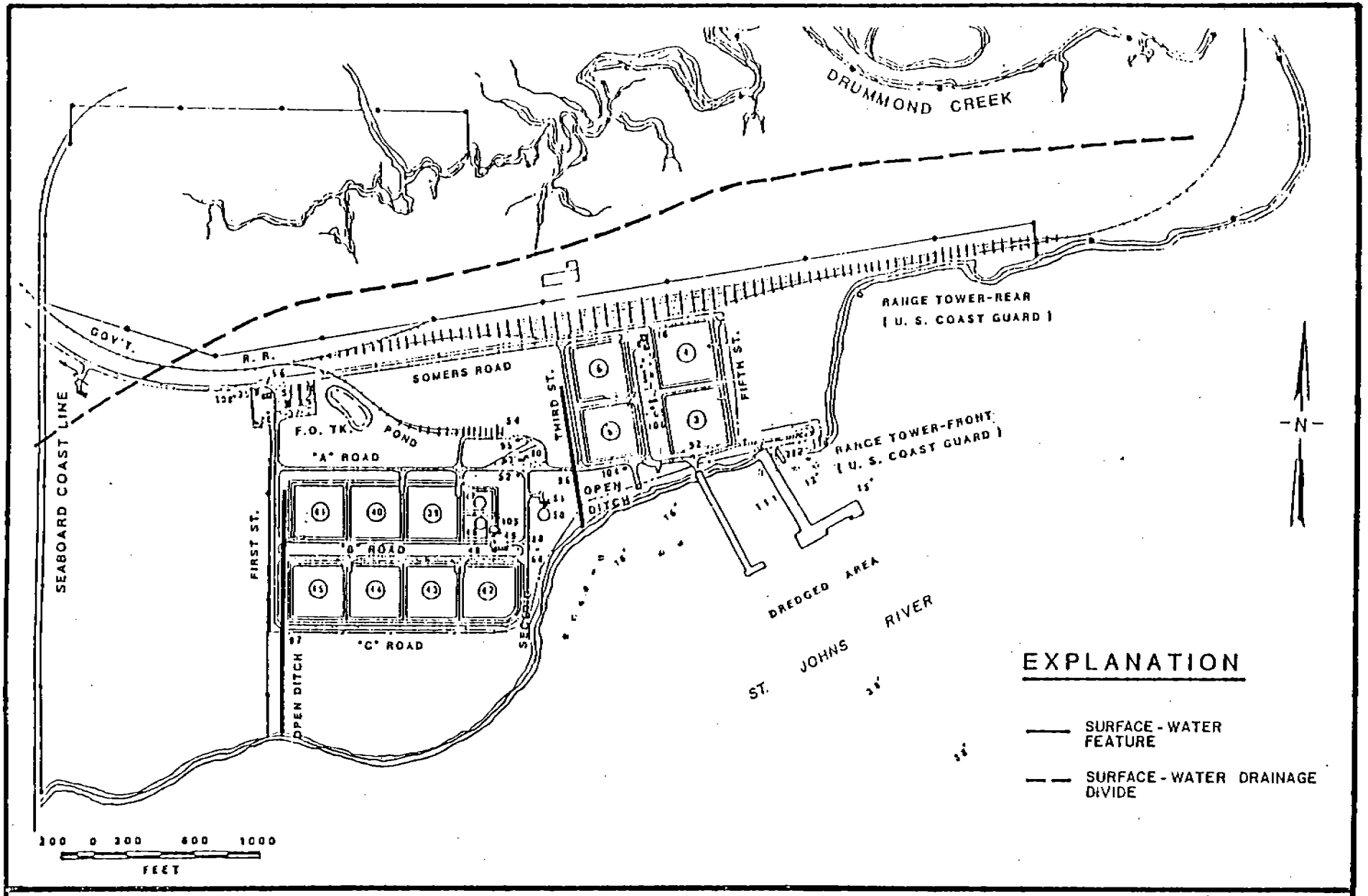

FIGURE 8. Surface-Water Features at the NFD, Jacksonville.

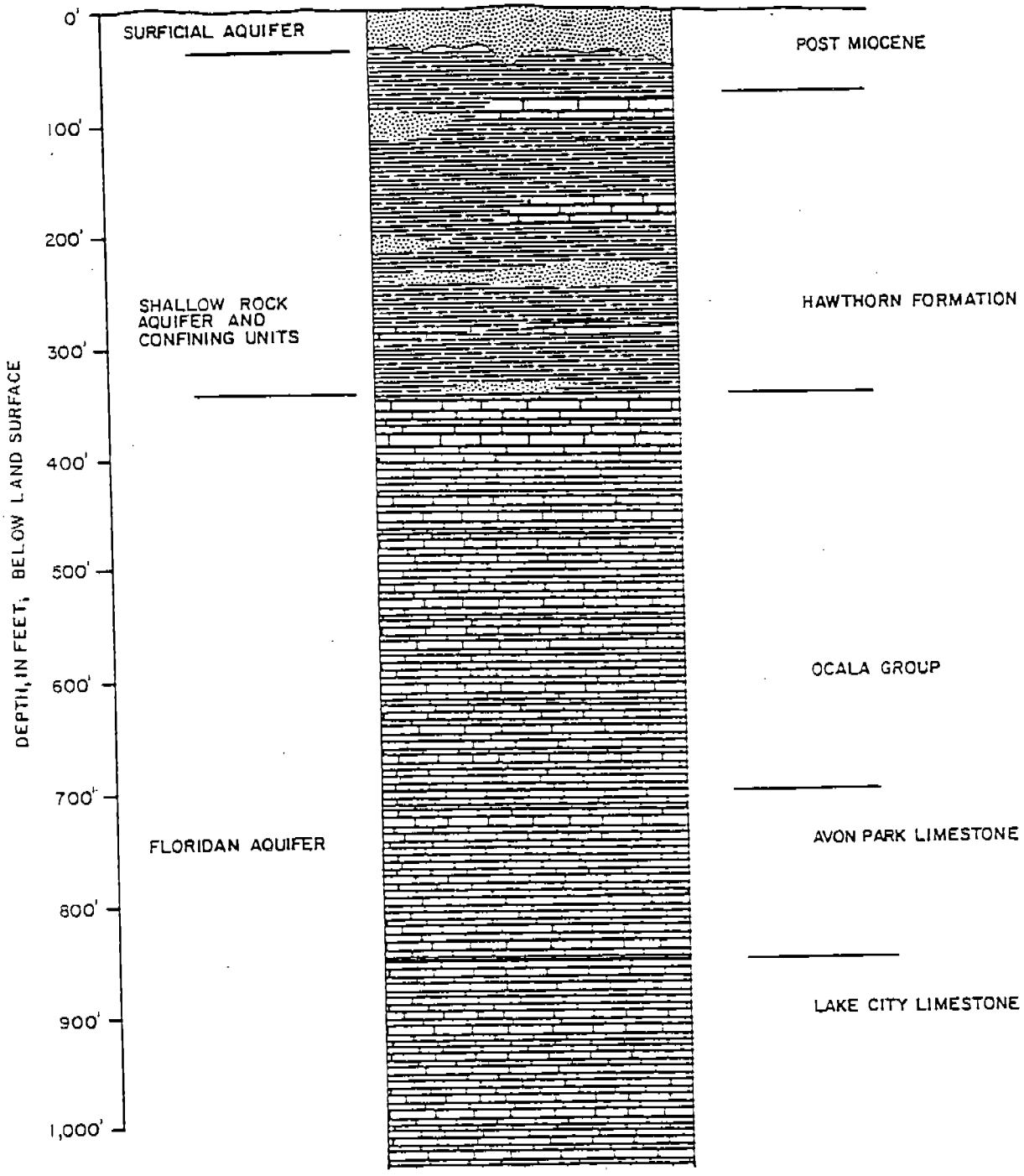

FIGURE 9. Generalized Geologic Column at the NAS, Jacksonville.

confining layer which separates the surficial aquifer from the underlying Floridan, although permeable sand and limestone layers within the confining clays form what is referred to as the secondary artesian aquifer or shallow rock aquifer.

The basal portion of the Hawthorn Formation generally coincides with the top of the Floridan aquifer which occurs at a depth of about 350 ft at the NAS, Jacksonville. The Floridan aquifer, a thick sequence of limestone and dolostone, consists in order of increasing depth, of the Ocala Group, Avon Park Limestone, and the Lake City Limestone. The Floridan aquifer is the principal source of water supply for public and commercial uses in the area.

Ground-Water System

NAS Jacksonville

Surficial Aquifer

The surficial aquifer generally ranges from 10 to 30 ft in thickness and is comprised of unconsolidated sands, with varying amounts of silt and clay. These sediments are generally saturated with ground water from 3 to 8 ft below land surface and the ground water exists under water-table conditions. The surficial aquifer primarily is recharged by precipitation percolating into the permeable veneer of sand. Due to the presence of lower permeability, clayey sands and clays below the aquifer, ground-water movement in surficial

sediments primarily is horizontal. Basically, the shallow ground water moves from topographic highs to areas of discharge such as ditches, streams, rivers or surface-water bodies. Figure 10 shows the inferred direction of shallow ground-water flow at the NAS. In areas having three or more monitor wells, ground-water flow patterns have been established and are included in the individual site evaluations.

Figures 11, 12, and 13 are geologic cross-sections showing the uppermost sediments at the NAS. Most of the lithologic logs used to construct the cross-sections are from wells installed during the verification study and are presented in Appendix B, Section 1; other logs used are presented in Appendix B, Section 2. In some areas of the base, notably the NARF area, the surficial sand consists of hydraulically-filled dredge spoil from the St. Johns River. The vertical and horizontal hydraulic properties of the surficial sediments were determined at two locations at the NAS.

The horizontal hydraulic conductivity of the surficial aquifer was determined for the area north of Gannet Road in an investigation by Geraghty & Miller, Inc., (1980). In this study, transmissivities of 780 and 3600 gpd/ft (gallons per day per foot) were determined from pumping tests at two different well sites. Also, the vertical hydraulic conductivity was determined by laboratory permeability tests

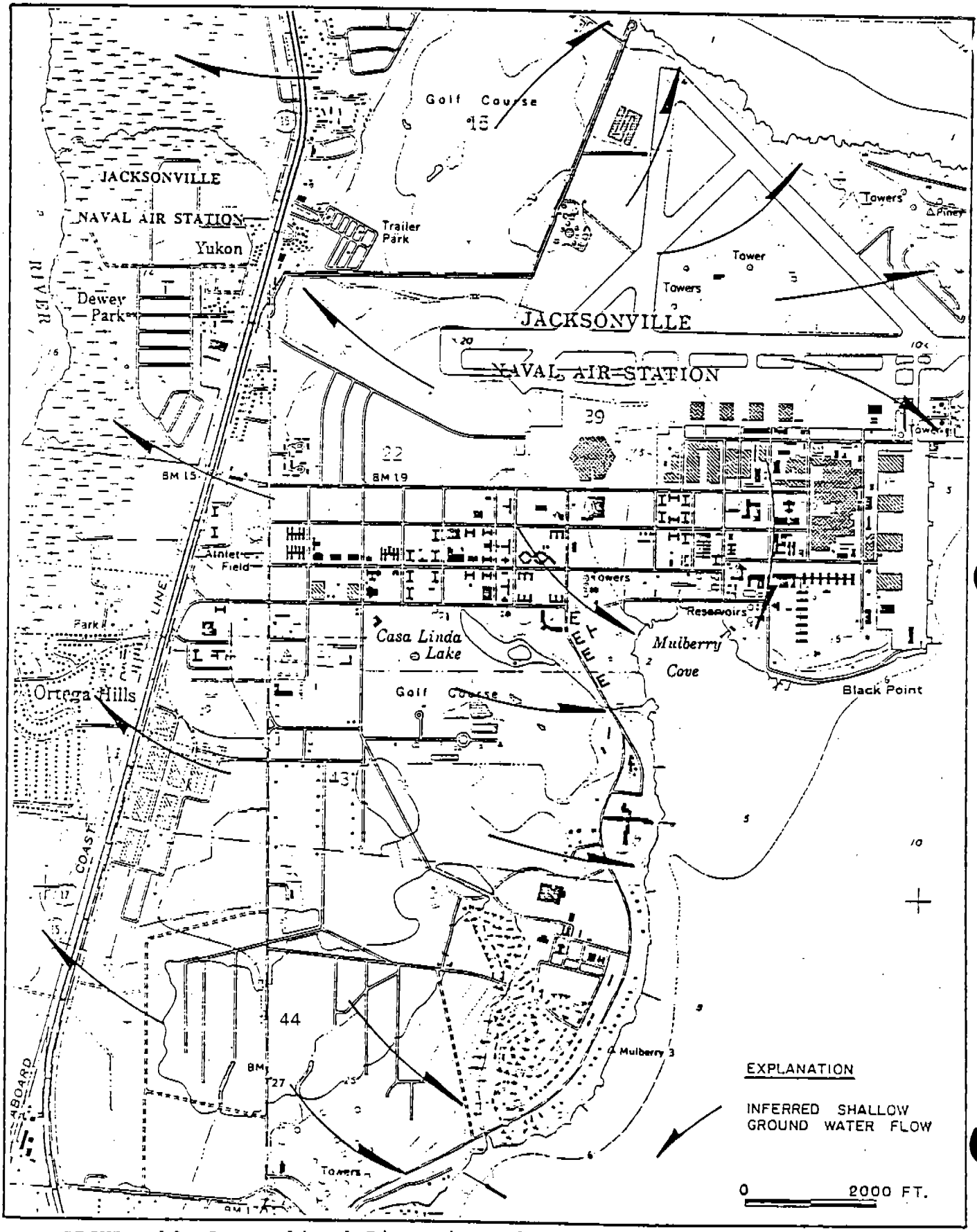

FIGURE 10. Generalized Direction of Shallow Ground-Water Flow at the NAS, Jacksonville.

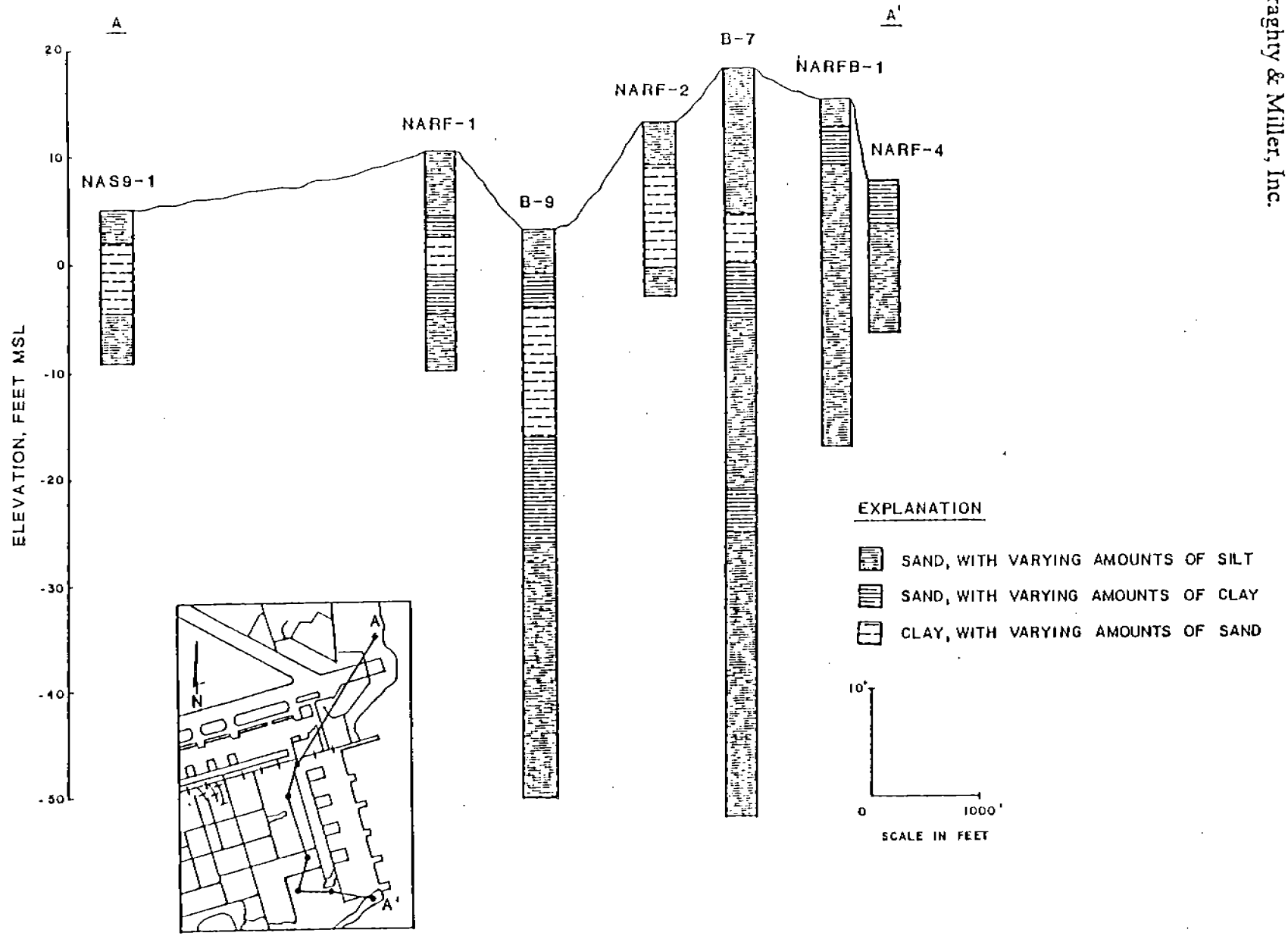

FIGURE 11. Geologic Cross-Section A-A' at the NAS, Jacksonville.

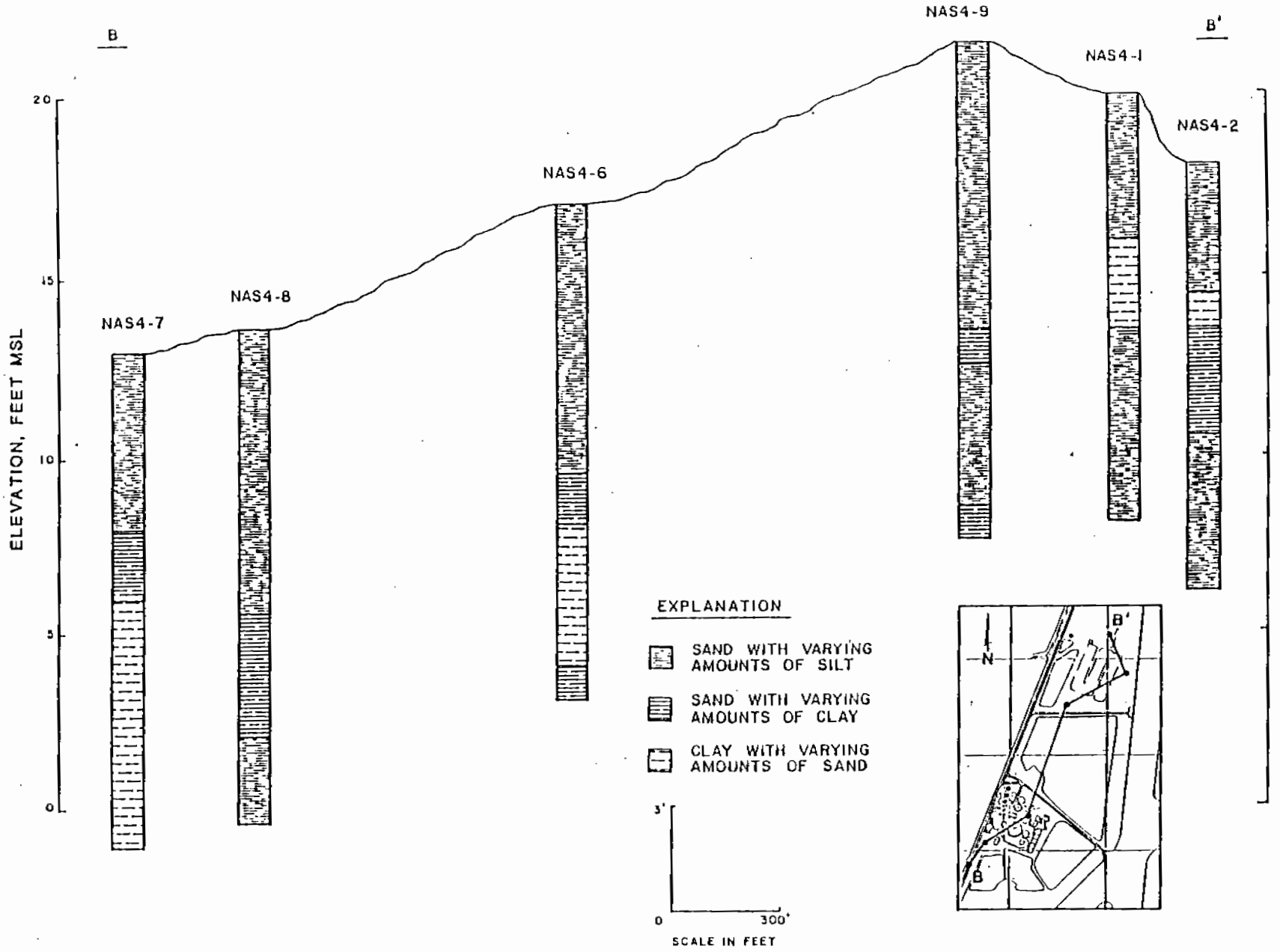

FIGURE 12. Geologic Cross-Section B-B' at the NAS, Jacksonville.

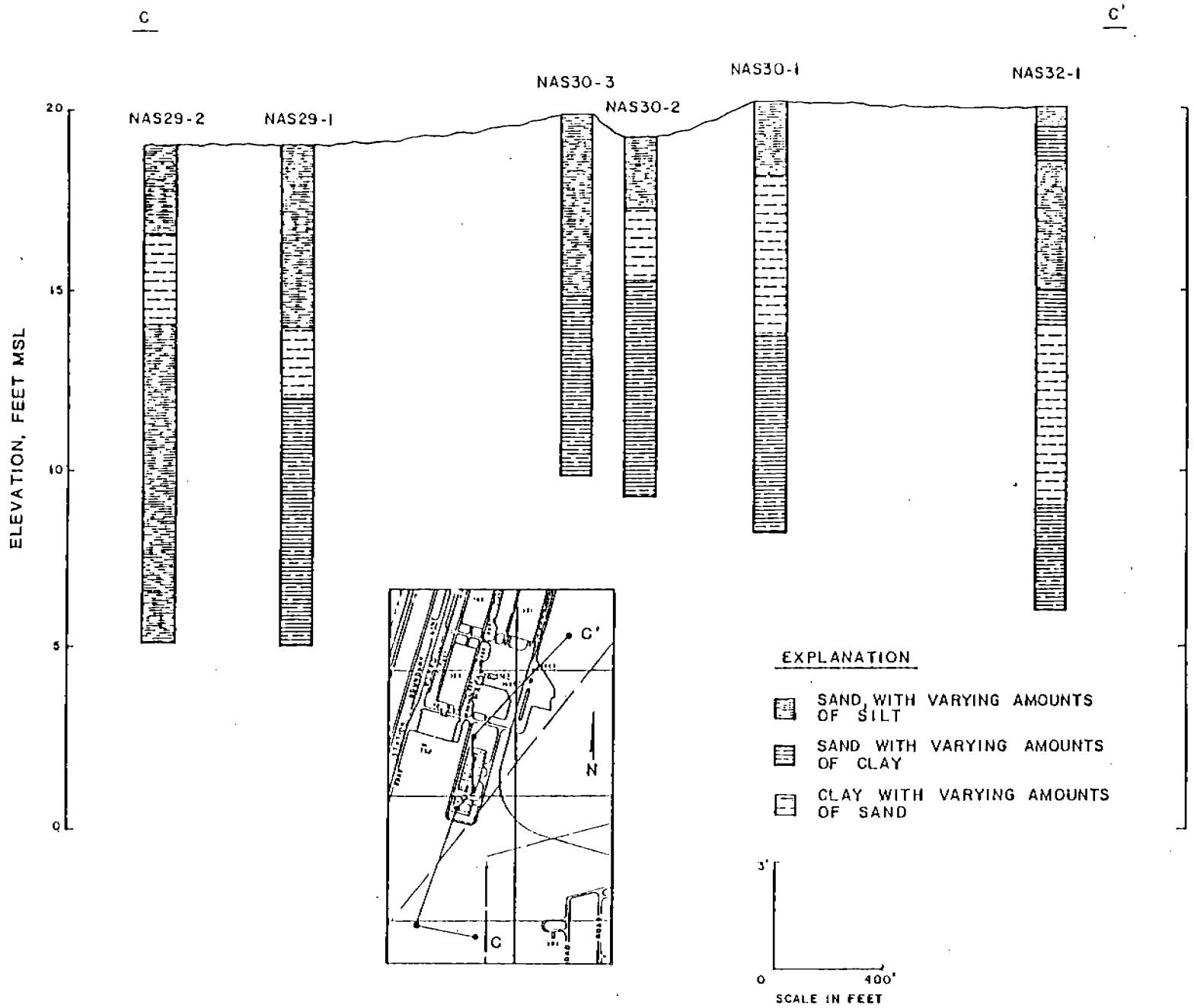

FIGURE 13. Geologic Cross-Section C-C' at the NAS, Jacksonville.

of undisturbed sediment samples collected at the wastewater treatment plant polishing pond and industrial sludge-drying beds. Table 5 lists the estimated hydraulic conductivities determined from these tests; the hydraulic conductivities ranged from 1.6×10^{-3} to 2.7×10^{-6} cm/sec (centimeters per second).

Shallow Rock Aquifer

The intermediate rock aquifer or secondary artesian aquifer consists of permeable beds of sand, shell, and limestone within the upper part of the Hawthorn Formation and basal portion of the undifferentiated sediments overlying the Hawthorn Formation. Figure 14 shows the generalized configurations of the top of the limestone unit of the shallow rock aquifer (Fairchild, 1972). Where present at the NAS, the limestone unit appears to be approximately 40 to 60 ft below land surface. However, two borings drilled at the NAS suggest that, if present, this aquifer may be deeper than regional data indicate. Soil boring B-7, which is shown is Figure 11, and boring S-4 (Appendix B, Section 2) were drilled to 70 ft and 50 ft, respectively, without encountering a shallow limestone layer.

The ground-water flow direction in this aquifer at the NAS is toward the east or the St. Johns River, as seen in the potentiometric map contained in the IAS report. The water-level elevations in the shallow rock aquifer appear to coincide with the water-level elevations in the water-table

TABLE 5. ESTIMATES OF VERTICAL PERMEABILITY AND TRANSMISSIVITY OF THE SHALLOW SEDIMENTS AT THE NAS

WELL NUMBER	LOCATION	WELL DEPTH	PERMEABILITY k (cm/sec)[1/]	TRANSMISSIVITY T (gpd/ft)[2/]	DESCRIPTION
NAS4-5	Industrial WWTP Sludge drying beds	13.5	3.93×10^{-4}		Sand, fine, clayey, gray
NAS4-6	Domestic WWTP polishing pond	11.5	2.70×10^{-6}		Sand, fine, clayey, gray
NAS4-8	Domestic WWTP	12.5	2.87×10^{-5}		Sand, fine, silty, brown
DPW-1	Site No. 26	25		706.0	Interbedded clayey sands and clays
DPW-2	Site No. 26	30		3600.0	Sand, fine, very clayey gray

1/ cm/sec = centimeters per second

2/ gpd/ft = gallons per day per foot

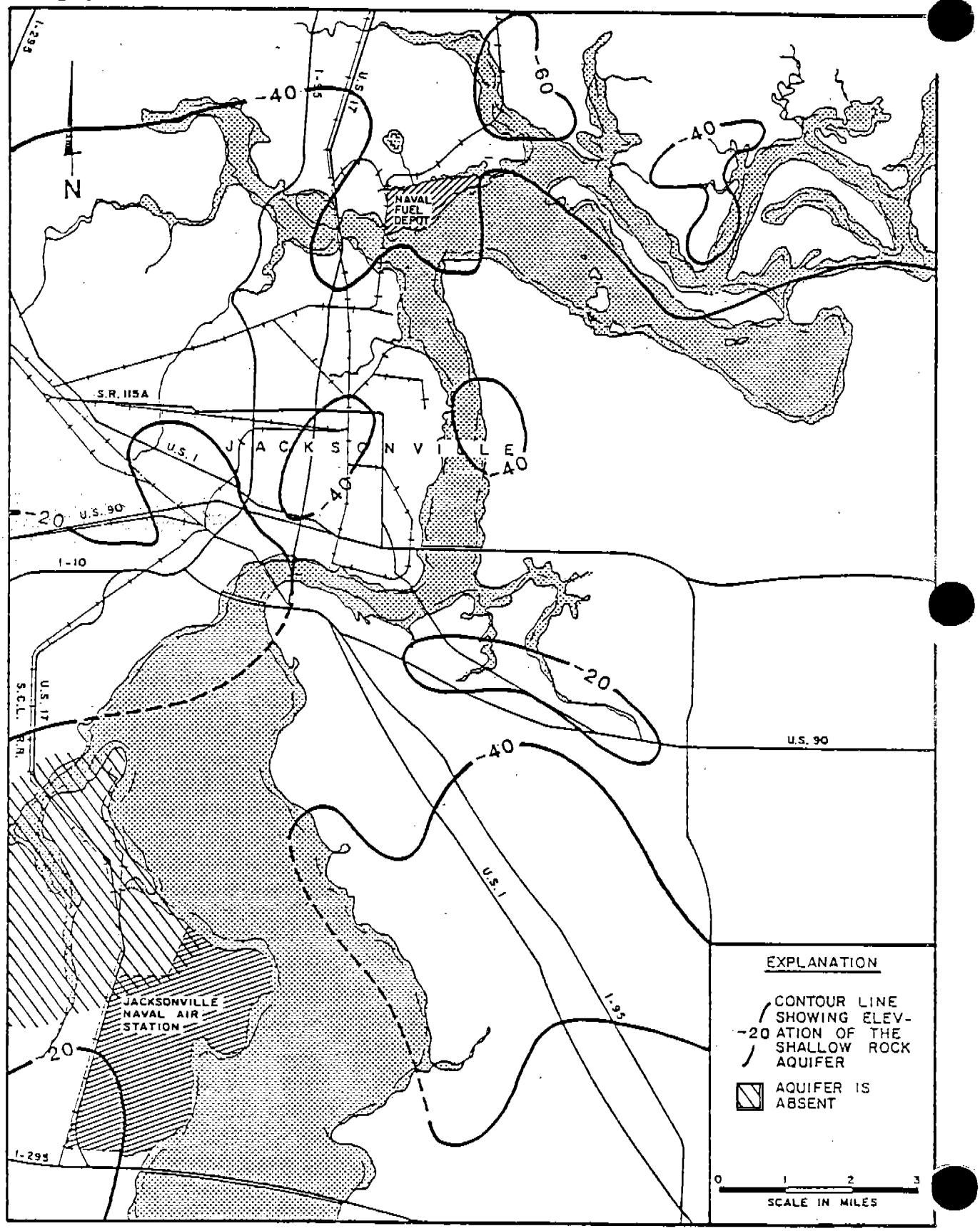

FIGURE 14. Configuration of the Top of the Shallow Rock Aquifer.

aquifer. During the year, however, the net hydraulic gradient may be either up or down depending on the season.

In general, the transmissivity of the shallow-rock aquifer is several hundred gallons per day per foot. Field studies performed by Causy and Phelps (1978) indicate that yields from the shallow-rock zone vary from place to place due to variations in the lithology.

Floridan Aquifer

The Floridan aquifer consists of over 1,000 ft of limestone and dolostone formations in descending order of age: Ocala Group, Avon Park Limestone, and the Lake City Limestone. The top of the Floridan aquifer occurs at about 350 ft below land surface at the NAS. As seen in Figure 15, the NAS is located near the center of low area in the potentiometric surface of the Floridan aquifer and because of this, it is difficult to predict the actual direction of ground-water movement. The potentiometric surface elevation in the vicinity at the NAS is about 30 ft above mean sea level, which explains why many of the wells tapping the Floridan aquifer at the NAS flow freely at land surface. Testing of the hydraulic characteristics of the Floridan aquifer have revealed coefficients of transmissivity ranging from 50,000 to over 1,000,000 gpd/ft. One well very near the NAS penetrated 703 ft of the Floridan aquifer and had a transmissivity of 1,100,000 gpd/ft (Leve, 1968).

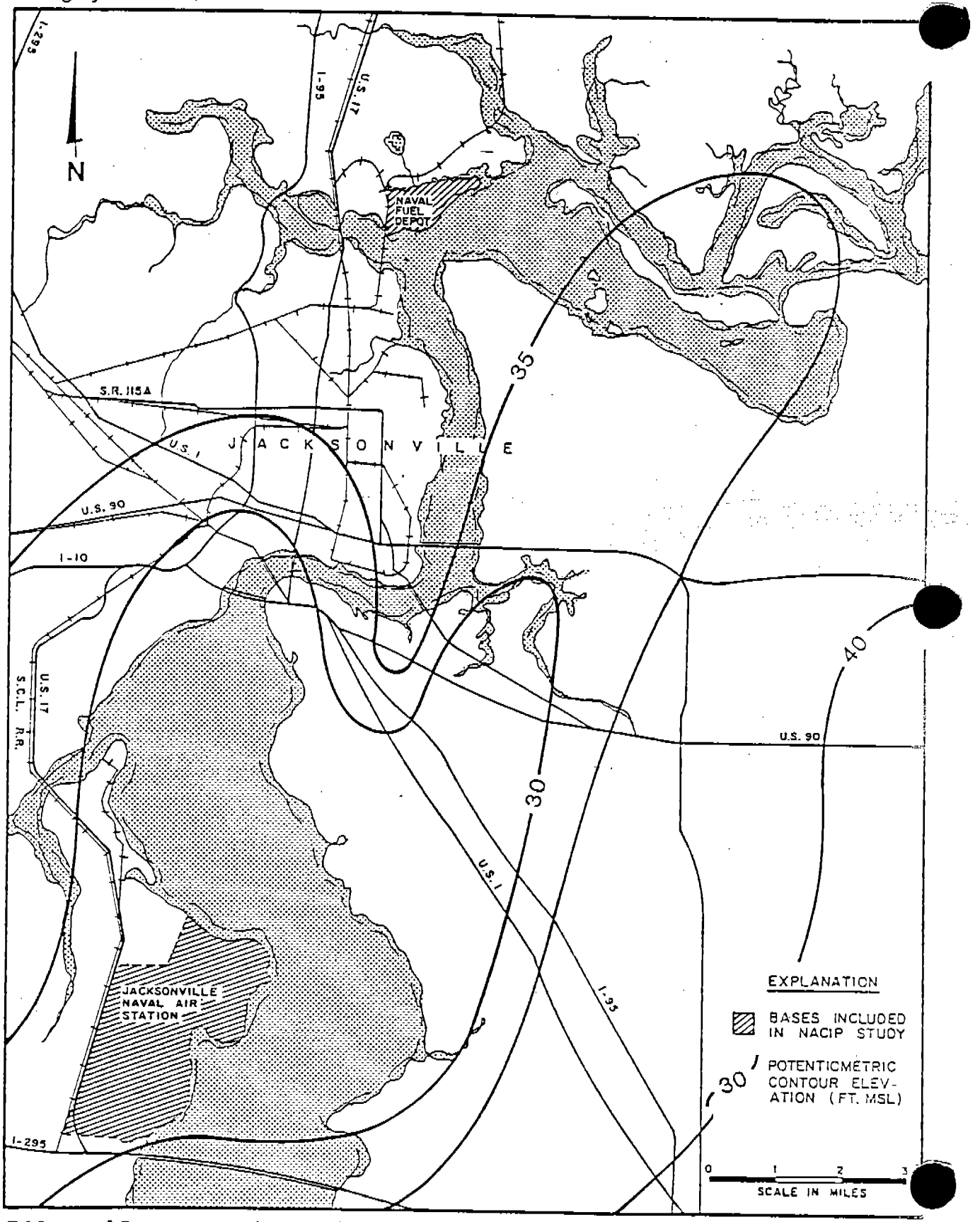

FIGURE 15. Potentiometric Surface of the Floridan Aquifer, September 1983.

All of the potable water wells at the NAS tap the Floridan aquifer. Each of these wells is free flowing indicating that the net upward hydraulic head between the Floridan aquifer and the shallower aquifers (shallow rock and surficial aquifers) may be as much as 20 ft. The upward hydraulic gradient combined with the thick confining bed precludes any significant downward migration of contaminants from the study sites.

NFD

Surficial Aquifer

The surficial aquifer at the NFD consists of approximately 30 to 40 ft of unconsolidated fine to medium-grained sands with varying amounts of silt and clay. The water table generally occurs within a few feet of land surface and may fluctuate with the tidal cycles in the St. Johns River near the shoreline. Much of the surficial sediments have been replaced by dredge and hydraulic fill operations.

The surficial aquifer is recharged by infiltrating precipitation. The shallow ground-water flows from topographic high areas to lower lying areas along Drummond Creek and the St. Johns River. Although the actual slope of the water table was not determined, based on the topography, the general ground-water flow direction is toward the south. The surficial aquifer is thin and generally not of

drinking-water quality; therefore it is seldom used in this area as a potable water supply.

Shallow Rock Aquifer

The shallow rock aquifer lies below the undifferentiated sediments at a depth ranging between 40 to 50 ft as seen in Figure 14. This is confirmed by on-site soil borings some of which were used to construct the geologic cross-section in Figure 16. Based on these soil borings, the shallow sands generally become coarser with depth. Once the limestone has been penetrated, alternating layers of soft marl and hard fractured limestone were encountered. The general direction of ground-water flow in the shallow rock aquifer in the vicinity of the NFD is south and southeast or toward the St. Johns River. As discussed earlier, the shallow rock aquifer is part of the upper Hawthorn Formation. The Hawthorn Formation within which the low permeability confining beds exist, is about 400 ft in thickness in the vicinity of the NFD.

Floridan Aquifer

The top of the Floridan aquifer at the NFD occurs at approximately 550 ft below land surface. Again, most large supply wells in the area withdraw water from this aquifer, including the potable water-supply well at the NFD. It is reported in the IAS that this well is free flowing at land

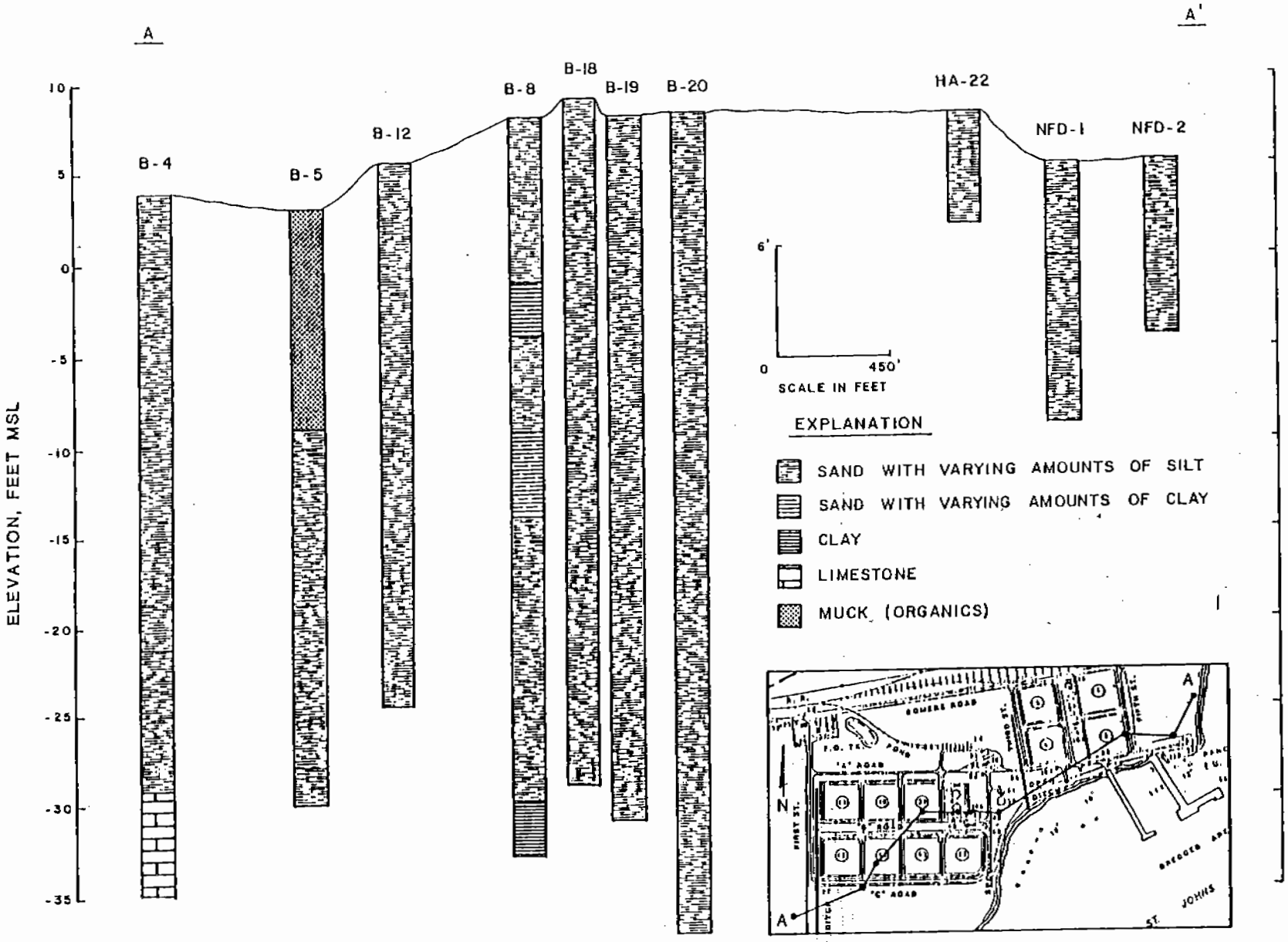

FIGURE 16. Geologic Cross-Section A-A' at the NFD, Jacksonville.

surface. The ground-water flow direction in the Floridan aquifer (Figure 15) is to the south.

FIRE FIGHTING AREA (SITE NO. 2)

Background

This site is located in the immediate vicinity north of the wastewater treatment plant as shown in Figure 17. It occupies an area approximately 100 by 100 ft and contains junk vehicles which are used for fire-fighting training. These vehicles are ignited with small quantities of jet fuel, JP-5, or waste oil.

Findings and Recommendations

A monitor well (NAS2-1) was installed at the fire-fighting training area at the approximate location shown in Figure 17. A water-quality sample was collected from this well and analyzed for pH in the field, and for pesticides, PCBs (polychlorinated biphenyls), and VOCs (volatile organic compounds) in two private water-quality laboratories. The results of these analyses, presented in Appendix C, Section 1, indicate that the ground water does not contain detectable concentrations of VOCs, pesticides, or PCBs. Based on these analyses, there is no imminent hazard to the environment or to public health, therefore no further study is recommended at this site.

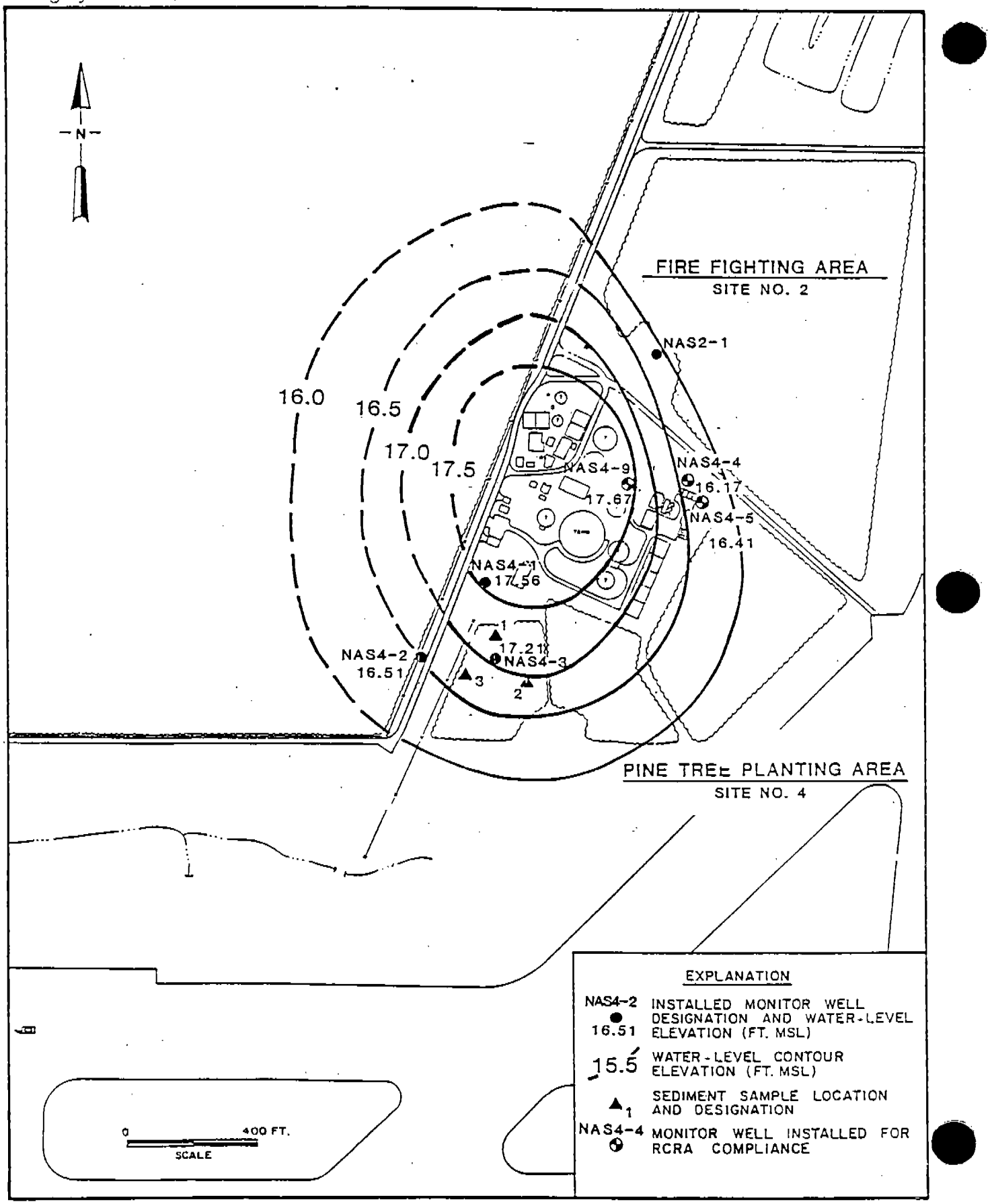

FIGURE 17. Locations of Installed Monitor Wells, Soil Samples, and Water-Table Contours (March 9, 1984) Collected at the Fire-Fighting Area (Site No. 2) and the Pine Tree Planting Area (Site No. 4).

PINE TREE PLANTING AREA (SITE NO. 4)

Background

This site is located approximately 200 ft southeast of the sewage treatment plant chemistry laboratory, Building No. 261L (Figure 17). The sewage treatment plant is located on a topographically high area along the northwestern boundary of the NAS. A small drainage ditch exists approximately 500 ft south of the site. This ditch generally contains water throughout the year suggesting that it receives discharges from the shallow ground-water system.

Until 1975, this area was reportedly used for the disposal of paint shavings, sewage sludge, asbestos, oil and other petroleum products. Inspection of the area during the IAS study yielded visual confirmation of paint shavings from the treatment plant settling basins, which were identified throughout a 1-acre area. Based on favorable EP Toxicity (Extraction Procedure) results, the sewage sludges generated at the sewage treatment plant are presently disposed of in the pine woods surrounding the site.

Findings and Recommendations

Three monitor wells (NAS4-1, NAS4-2, and NAS4-3) were installed at the locations shown in Figure 17. Water samples were collected from the wells and analyzed in the field for pH and specific conductance, and in a water-quality laboratory for VOCs, TOC (total organic carbon), cyanide, and

selected metals including cadmium, chromium, lead, and nickel. The results of these analyses are presented in Appendix C, Section 2. Three soil samples were collected at locations within the pine tree area and analyzed by EP Toxicity for eight primary drinking metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver) and nickel. The data shows that the levels of cyanide and dissolved metals in the ground water were below the detection limits. The TOC content was relatively low and ranged from 1.0 to 3.7 ppm (parts per million). Low concentrations of VOCs were detected in each of the wells including 9.1 ppb (parts per billion) of trans-1,2-dichloroethene, 1.1 ppb of tetrachloroethene, and 45 ppb of TCE (Trichloroethene) in well NAS4-2, and 15, and 0.7 ppb of TCE in wells NAS4-1, and NAS4-3, respectively.

The soil samples were collected from land surface to a depth of about 0.5 ft; the results, presented in Appendix C, Section 2, indicate that the concentrations of these constituents are well below the levels at which the soil would be considered a hazardous waste.

Water-level measurements, collected from the monitor wells prior to sampling, were combined with measurements collected in previously installed wells (NAS4-4, NAS4-5, NAS4-9), and used to compile the water-table contour map shown in Figure 17. A radial pattern of ground-water flow is evident with the center occuring approximately 500 ft north

of the site. The general shallow ground-water flow direction is toward the southwest in the immediate vicinity of the site. In addition, the nearest potable well, as identified by the IAS, is approximately six-tenths of a mile to the west.

Based on the data collected during the verfication study, this site does not appear to be an imminent hazard to the environment or to public health. Accordingly, it is recommended that no further investigation be conducted at this site.

SHORELINE FILL WEST OF PIER 142 (SITE NO. 5)

Background

This area, used in the 1940's, is approximately 200 ft wide by 600 ft long and located at the northern end of Catapult Road, as shown in Figure 18. Reportedly, paint shavings mixed with paint remover and solvents and radioactive paint, were deposited here during 1945 and 1946 and later covered with concrete rubble. The concrete rubble is presently visible at land surface throughout this site.

Findings and Recommendations

One monitor well (NAS5-1) was installed at the site and a water sample was collected and analyzed in the field for pH and specific conductance and in a water-quality laboratory for gross alpha, radium 226 and 228, VOCs, and selected metals including arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. As shown in Appendix C, Section 3, the laboratory results for the eight selected metals were all below laboratory detection limits (except for barium, 0.28 milligrams per liter). Also, the VOCs were all below laboratory detection limits, and the radiological data show that gross alpha and radium 228 were below laboratory detection limits; radium 226 was 0.7 $\pm$ 0.1 pCi/l (picocuries per liter); and gross beta was 14 $\pm$ 3.1 pCi/l. Based on

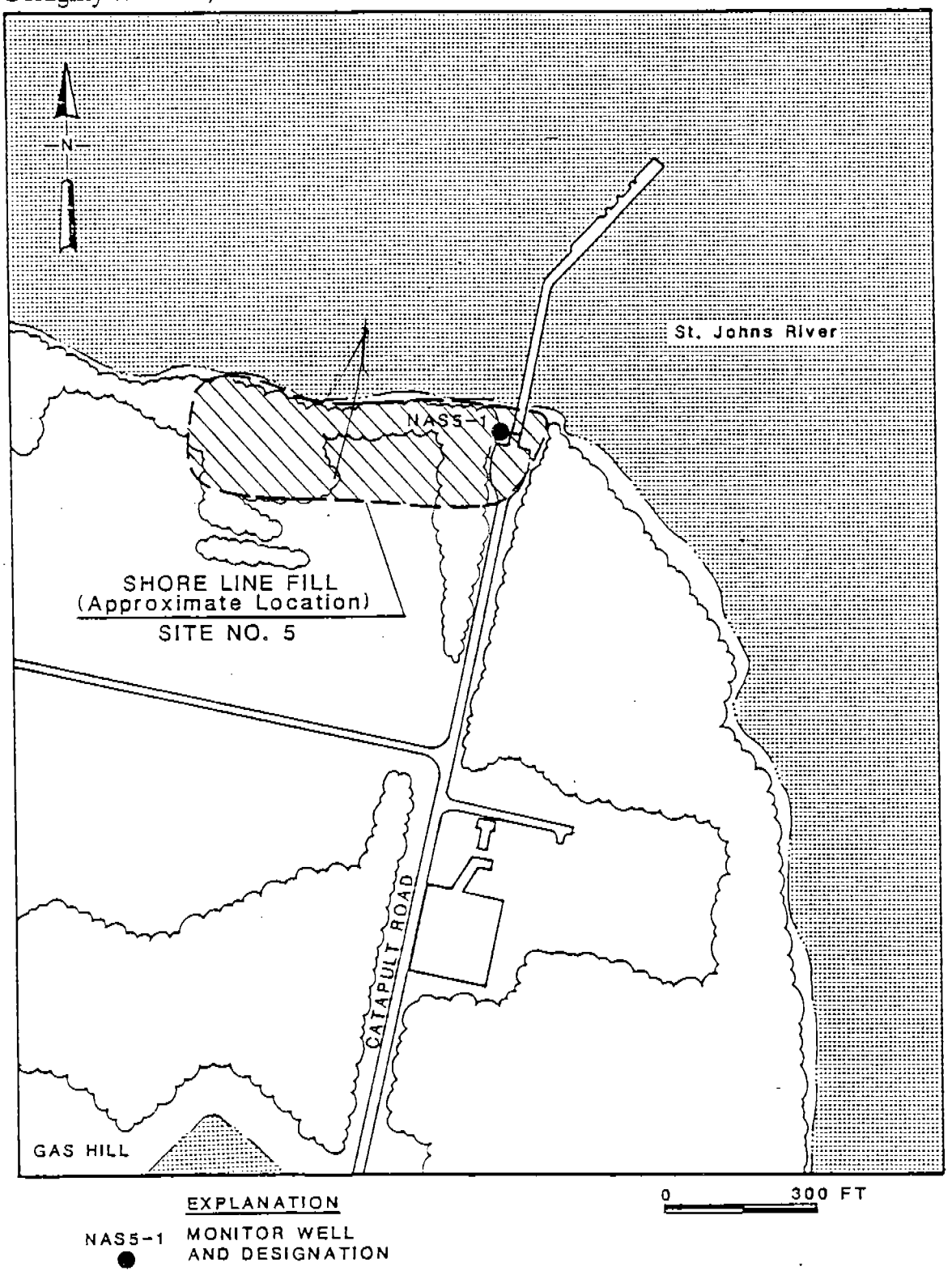

FIGURE 18. Location of Installed Monitor Well at the Shoreline Fill, West of Pier 142 (Site No. 5).

these results, there is no imminent hazard to human health or the environment; therefore, no further actions are proposed for this site.

OLD DISPOSAL AREA (SITE NO. 9)

Background

The old disposal area is located along the shoreline of the St. Johns River just north of the east side of the main east-west runway. The site (Figure 19), approximately 200 ft by 400 ft, was used as a disposal area for garbage, construction debris, and a few 55-gallon drums. This material was reportedly disposed of during the years of 1977 and 1978. Soils tests (destructive analysis) previously conducted in this area have shown high chromium levels, indicating that industrial wastes, such as chromium sludge, may have been disposed in this area.

Findings and Recommendations

One monitor well (NAS 9-1) was installed at the old disposal area, and a water sample was collected and analyzed in the field for pH and conductivity, and in a water-quality laboratory for cyanide, TOC, VOCs, and selected metals including cadmium, chromium, lead, and nickel. The laboratory results presented in Appendix C, Section 4, show that the ground water is of relatively good quality and that the levels of dissolved metals and cyanide were below the detection limit. Low concentrations of several VOCs were detected, including 1.2 ppb each of methylene chloride and trichloroethene, and 21 ppb of trans-1,2-dichloroethene.

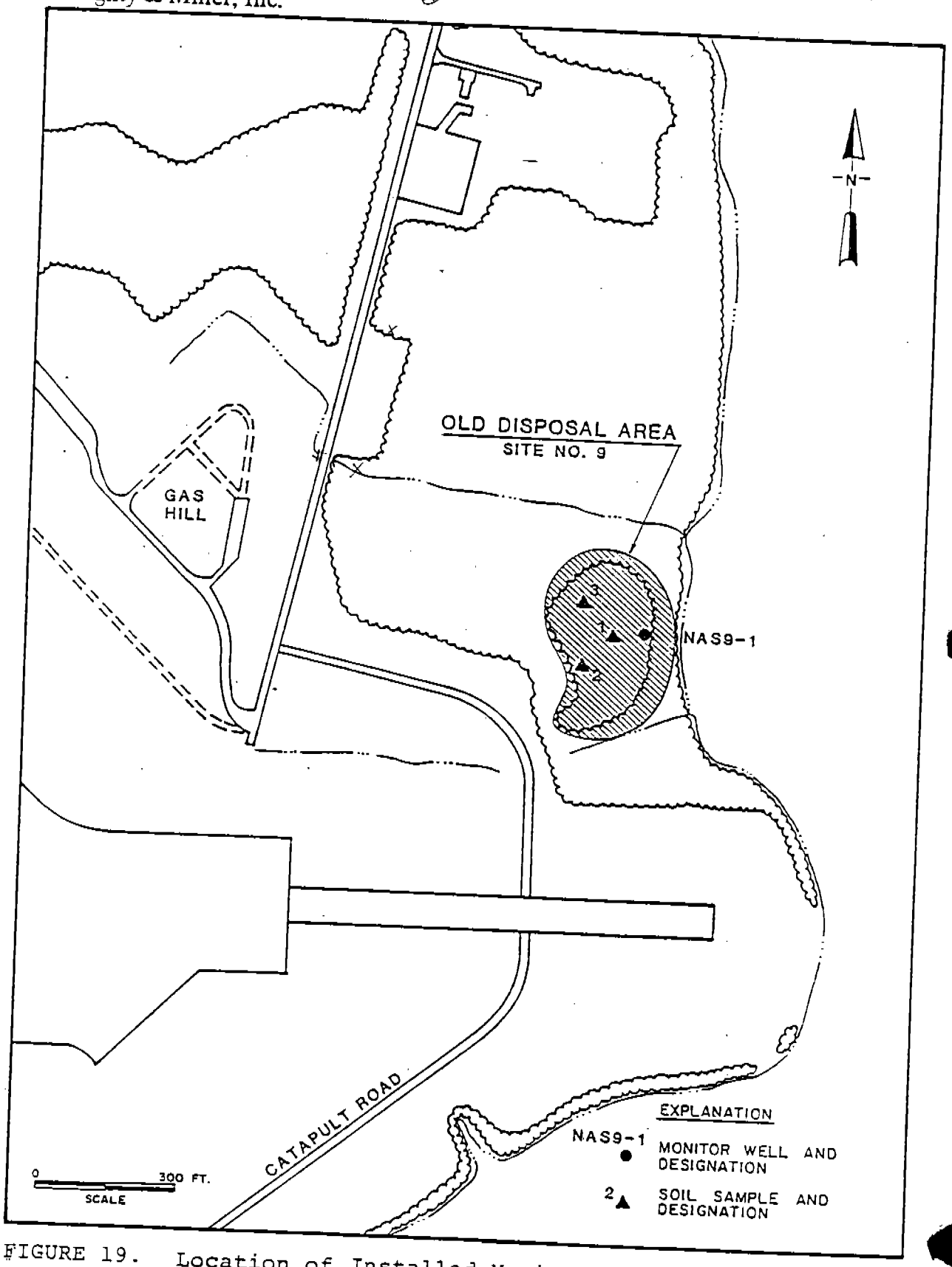

FIGURE 19. Location of Installed Monitor Well and Soil Samples Collected at the Old Disposal Area (Site No. 9).

The pH (6.9 units) is typical of the shallow ground water at the NAS, but the specific conductance at 1400 umhos/cm (micromhos/centimeter) appears to be influenced by the brackish water in the St. Johns River. The general direction of ground-water flow is toward the St. Johns River, which serves as a discharge point.

Three soil samples were also collected at selected locations in order to determine the leachable concentrations of metals discovered in the earlier test. The soil samples were analyzed by EP Toxicity for nine metals; the results (Appendix D, Section 3) show that the concentrations of these metals are well below the standards indicative of a hazardous waste.

Based on the data collected, this site does not pose an imminent hazard to human health or the environment; therefore, no further study is recommended for this site.

RADIUM PAINT WASTE DISPOSAL PIT (SITE NO. 13)

Background

The radium paint waste disposal area is located north of Building 167. A pit (Figure 20), approximately 40 x 50 x 0.75 ft, was used for the disposal of radioactive radium paint waste from aircraft instrument dial painting operations. Radium-226 was found to be a very effective material for imparting luminescence to the dials. The paint wastes, disposed of during World War II and continued into the 1950's, were mixed with the soil in the pit. The site was excavated in the late 1950's at which time surface radiation surveys showed this area was 3 to 5 mr/hr (millirems per hour) above background conditions. The excavated material was deposited at the radioactive waste fill area (Site No. 18).

Findings and Recommendations

One monitor well, NAS 13-1, was installed approximately in the center of the radium paint waste disposal area at the location shown in Figure 20. A water-quality sample was collected from this well and analyzed in the field for pH and in an approved laboratory for gross alpha. The laboratory analyses (Appendix C, Section 5) revealed a gross alpha concentration of 54 $\pm$ 7 pCi/l. A second sample was then collected and analyzed for VOCs, gross alpha and radium-226 and radium-228. These results show that the second sample

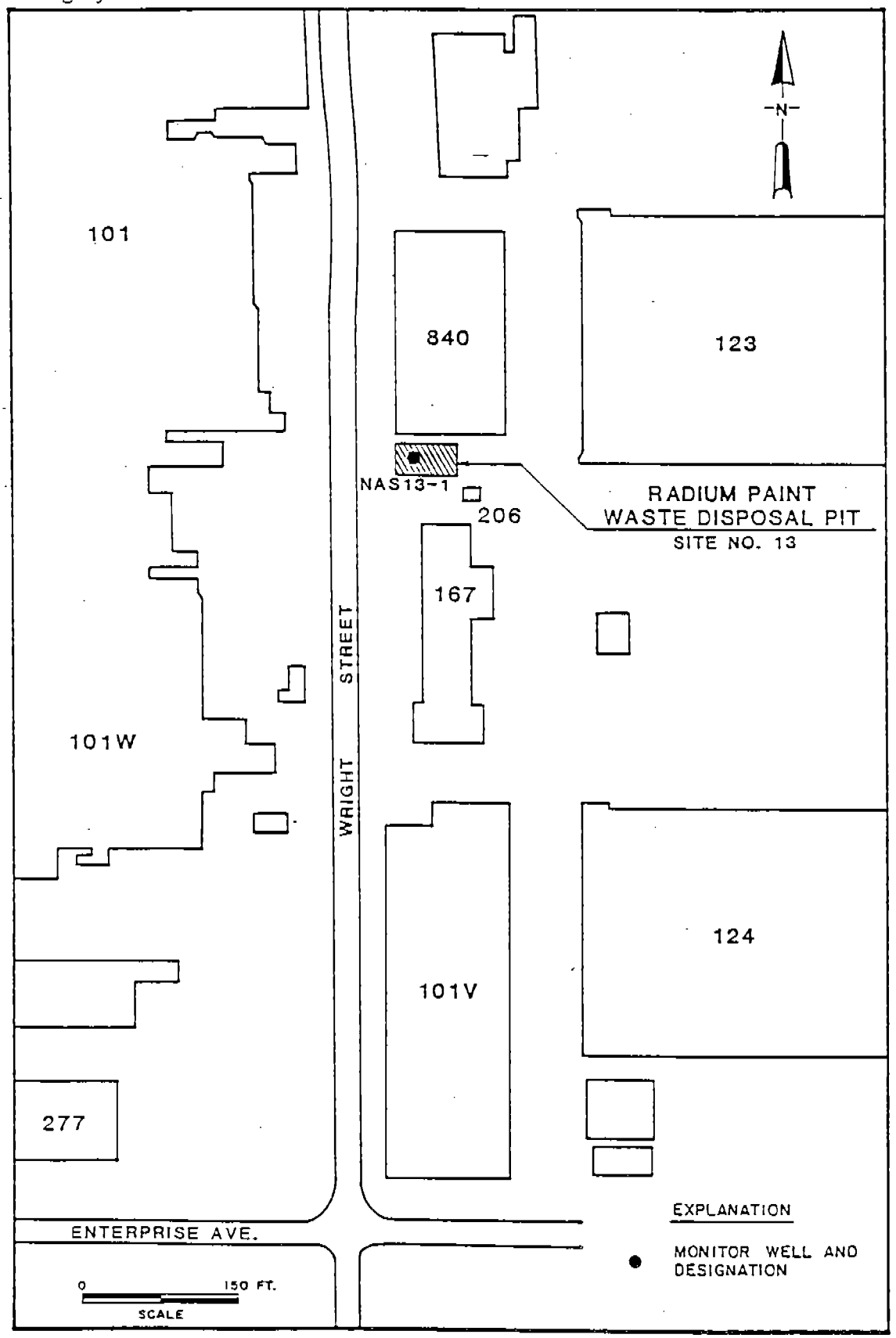

FIGURE 20. Location of the Monitor Well Installed at the Radium Paint Waste Disposal Pit (Site No. 13)

contained gross-alpha and gross-beta levels of 6+3 and 4+2 pCi/l, respectively. Further analyses of these samples indicated that the levels of radium 226 and radium 228 were 6+2 pCi/l and <1 pCi/l, respectively. The levels of VOCs in the well were less than the detection limits. The findings of the second sampling round show that only radium 226 in the shallow ground water slightly exceeds the FDER drinking-water standards (5 pCi/l), however, because this site does not pose an imminent hazard to human health or the evironment, no additional study is recommended for this site.

NARF AREA (SITES NOS. 11, 12, 14, 15, 16)

Background

The NARF (Naval Air Rework Facility) area is an industrialized area at the NAS located adjacent to the St. Johns River (Figure 21). The NARF is a major tenent command within the NAS assigned to maintain and operate facilities; perform a complete range of depot-level rework operations on designated naval aircraft, engines, their components, accessories, and equipment; provide engineering services in the development of changes in hardware design; and furnish technical services on aircraft maintenance and logistic problems. The NARF consists of a total of 45 buildings.

The site numbers above refer to specific buildings or areas inside the NARF that were determined to present a potential threat to the environment. For the purpose of this study, the 5 study areas in the NARF were treated as one due to their close proximity to one another.

Reportedly unauthorized disposal of waste solvents and other materials from the main hangar section of Building 101 (Site No. 11) occurred for many years. Approximately 2,000 gallons of solvents may have been disposed of over a 40-year period. Following a fire in 1975, it was thought that either disposal or exfiltration of waste solvents and other flammable liquids from deteriorated industrial sewer lines

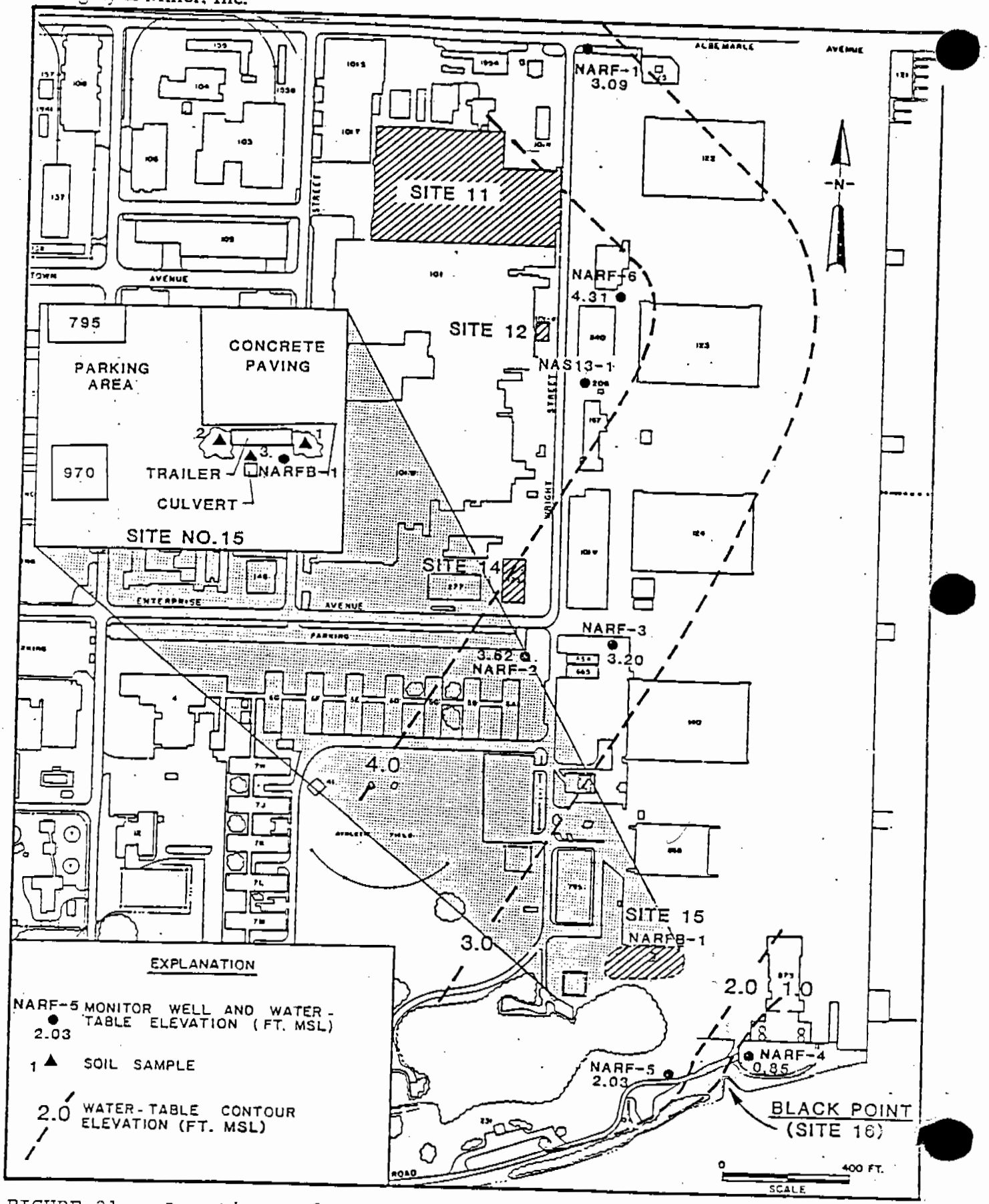

FIGURE 21. Locations of Installed Monitor Wells, Soil Samples and Water-Table Contours (March 12, 1984) in the NARF Area (Site Nos. 11, 12, 14, 15, and 16.

were responsible for the presence of these compounds in the ground.

The old test cell building (Site No. 12) is located at Building 101K, also shown in Figure 21. Reportedly, there are connections of the storm and sanitary sewers with the building roof drains and the industrial wastewater system. Basically, this area is used for the storage of various chemicals in 55-gallon drums. It has been reported that numerous leaks of chemicals from ruptured or rusty drums has occurred in this area.

The battery shop (Site No. 14) located in Building 125, contains a seepage pit where waste acids from lead-acid batteries were disposed. Approximately 100 gallons of waste were dumped annually from 1959 to 1982.

The solvent and paint disposal area (Site No. 15) is located along the eastern side of Building 970. The area is approximately 100 ft by 100 ft and was used for disposal of solvents and paint sludges as recently as 1978. Based on current operations, it is estimated that up to 2,000 gallons of these wastes were disposed of at this site annually for approximately 36 years. 72,000 gallons

The storm sewer (Black Point) runs along Buildings 101, 50, 795, and discharges at Black Point (Site No. 16). There has been a recurring discharge of JP-5 fuel and oil which were believed to come from a fuel tank overflow in the

vicinity of test cell 12, and possibly a variety of other sources in the NARF area. An oil boom was installed at the outfall to contain the oil. Over the years various chemical wastes from NARF were reportedly disposed of by discharge into the storm sewer system, which may have eroded the sewer pipe and leached into the ground.

Findings and Recommendations

Seven monitor wells were installed to investigate the presence or absence of chemical constituents in the ground water beneath the NARF area. The locations of these wells, which are designated as NARF-B1 and NARF-1 through NARF-6, are shown in Figure 21. Water samples were collected from each and analyzed in the field for pH and conductivity and in a laboratory for TOC, VOCs, cyanide, and selected metals, including cadmium, chromium, lead, and nickel. The results, (Appendix C, Section 6) show that: the concentrations of dissolved metals were below the detection level; cyanide ranged from below laboratory detection limits to 0.071 ppm (NARF-3); and TOC concentrations ranged from below detection limits (NARF-2) to 9.5 ppm (NARF-6). The pH and specific conductance measurements generally ranged from 5.5 to 6.8 and from 70 to 610 umhos/cm, respectively, except for NARF-1 (pH of 11.88 units and specific conductance of 2,010 umhos/cm), which is believed to be influenced by the grout used to plug the bottom of the borehole prior to setting the well casing.

The VOCs analyses show that some of these compounds are present in varying concentrations in each well. The concentrations of total VOCs in wells NARF-1, 2, 3, 5 were relatively low varying from 3.9 ppb (NARF-2) to 25.0 ppb (NARF-1). Relatively high levels of total VOCs were found, in the other three wells including 239.5 ppb in NARF-6, 1,930 ppb in NARF-4, and 242,780 ppb in NARF-B1. Analysis of a water sample from NAS13-1, which is also located in the NARF area showed that no VOCs were detected.

A total of eight VOCs were detected in the NARF wells of which 4 compounds comprised nearly 80% (percent) of all the VOC detections. These compounds are listed in decreasing frequency of detection; TCE, trans-1,2-dichloroethene, 1,1-dichlorethene, and 1,1,1-trichloroethane; TCE was detected in 7 of the 8 wells. Two other compounds, trans-1,2-dichloroethene and 1,1-dichloroethene are thought to be daughter compounds resulting from anaerobic biodegradation of TCE in the ground water. Therefore, at a particular location the concentrations of TCE relative to any of the daughter compounds may indicate the nearness to the original source of contamination. Two monitor wells, NARF-1 and NARF B-1, show concentrations of TCE significantly above the other detected compounds, these wells are either located at the suspected source (Site No. 11-NARF-1 and Site No. 15-NARF B-1), or very near and hydraulically downgradient from it.

The water-table contours as determined on March 12, 1984, illustrate the general ground-water flow directions. The water-level data collected from the wells shows that the water table is relatively flat and based on the existence of the sea wall along the eastern portion of the NARF, it is inferred that ground-water flow in the southern portion is primarily toward the south and in the northern portion toward the north.

Three soil samples were collected in the NARF area at the paint and sludge disposal area (Site 15). The samples were analyzed for EP Toxicity for the eight primary drinking-water metals and nickel. The results, presented in Appendix C, Section 6, show that the levels of these metals were generally low and each was below the levels at which it would be considered a hazardous waste.

Relatively high levels of VOCs were found primarily in two areas: (1) in the vicinity of the paint and sludge disposal area in the southeast portion of the NARF (Site 15), and (2) east of the central portion of hangar Building 101 (Site 11 and 12). It is recommended that five additional shallow monitor wells and one deeper monitor well (installed to the base of the surficial aquifer) be installed in the southeastern portion of the NARF, at the locations shown in Figure 22. These wells, in addition to existing wells NARF-4, NARF-5, and NARF-B1 would be sampled and analyzed for pH, specific conductance, and VOCs. Also, five shallow

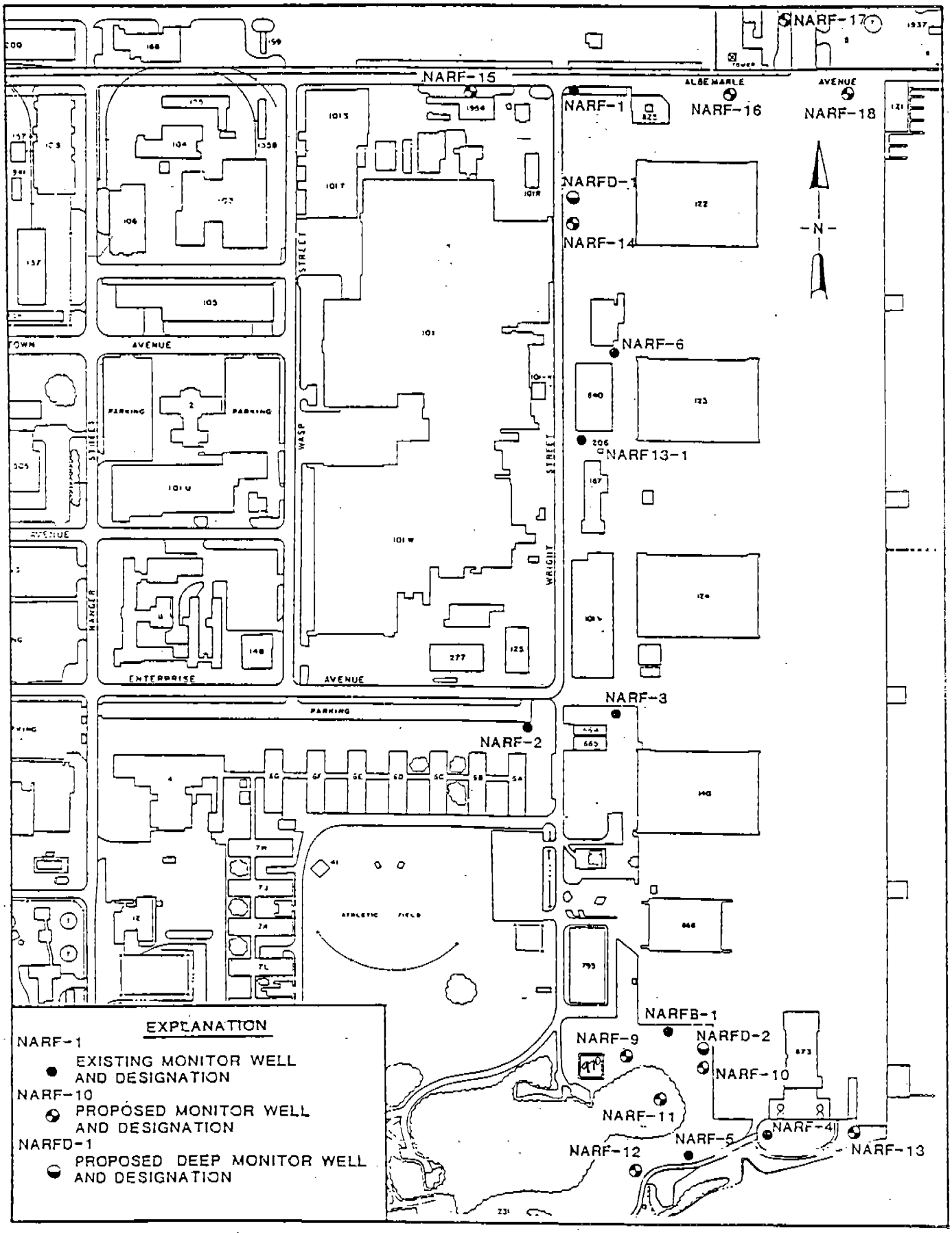

FIGURE 22. Locations of Proposed Monitor Wells in the NARF Area.

monitor wells and one deeper well should be installed in the northeast portion of the NARF at the approximate location shown in Figure 22 and these wells, along with wells NARF-1 and NARF-6 and an existing adjacent monitor well, NAS 13-1, be sampled and analyzed for pH, specific conductance, and VOCs. Additionally, four of the NARF wells (NARFB-1, NARF-10, NARF-6, and NARF-14) will be sampled for the remaining EPA priority pollutants including acid and base neutral extractable compounds, pesticides, PCBs (poly-chlorinated biphenyls), and metals.

Short-term pumping tests will be conducted on selected wells to determine the hydraulic characteristics of the surficial sediments. The new monitor wells and existing wells NARFB-1 and NAS13-1 will be surveyed by a professional land surveyor so that water-level elevations may be referenced to mean sea level and used to update the water-table contour map.

RADIOACTIVE WASTE FILL AREA (SITE NO. 18)

SS

Background

The radioactive radium paint wastes, initially deposited at Site No. 13, were excavated along with the contaminated soil in the late 1950's and deposited near the shoreline in the vicinity of the present Marina No. 1. This area was originally at water level, but was built up 3 to 5 ft by the deposition of approximately 1,500 cubic feet of this fill material. The approximate boundaries of the fill area are shown in Figure 23.

Findings and Recommendations

One monitor well (NAS18-1) was installed in the radioactive waste fill area at the location shown in Figure 23. A water sample was collected and analyzed in the field for pH and in a private water-quality laboratory for gross alpha. The laboratory results (Appendix C, Section 7) show that the ground water has a gross alpha activity of 0 $\pm$ 3 pCi/l. Based on these data, the site does not appear to be an imminent hazard to human health or the environment; therefore, no further study is recommended for this site.

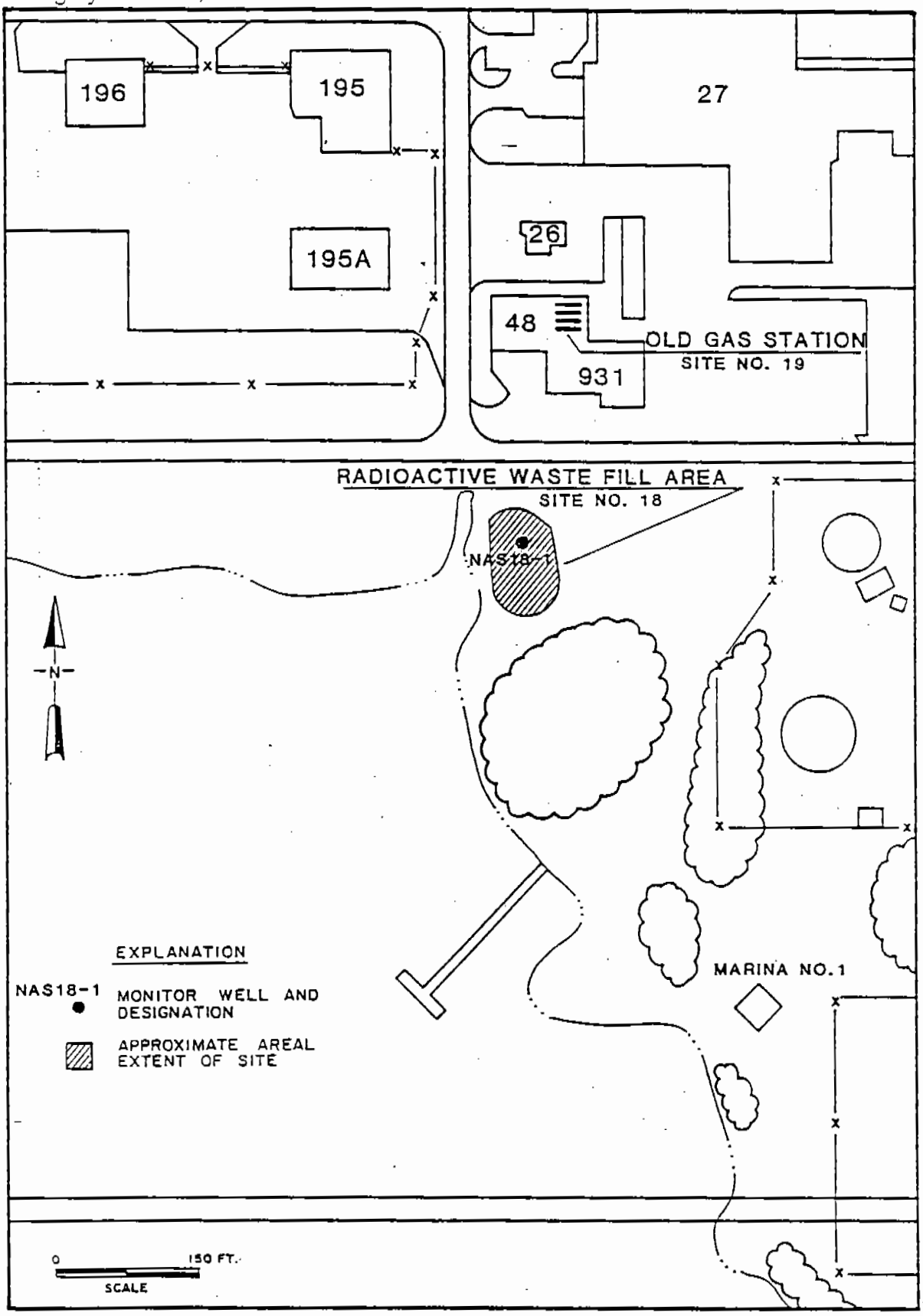

FIGURE 23. Location of the Monitor Well Installed at the Radioactive Waste Fill Area (Site No. 18) and Buried Storage Tanks at the Old Gas Station (Site No. 19)

SS-POL

OLD GAS STATION (SITE NO. 19)

Background

The old gasoline service station (Building 48) presently is used as the base garden center. When in operation, the old service station maintained four buried storage tanks each having a capacity of 10,000 gallons. The tanks are buried below the screened nursery at the garden center (Figure 23). The tanks were abandoned in early 1980 when the fire department completely filled each tank with water. At that time, no gasoline was observed discharging from the tanks. The buried fill pipes, cross-connecting lines and venting system were removed and capped. A visit to the garden center in September 1983 did not reveal the exact location of the buried tanks.

Recommendations

Although early discussions with Navy personnel indicated that the buried tanks were to be kept for emergency storage, it seems that they are now considered abandoned tanks. The FDER has promulgated new regulations as of September 1, 1984, concerning storage tanks (Chapter 17-61, FAC). According to this rule an abandoned tank means: (1) not intended to be returned to service, (2) has been out of service for three years, and (3) cannot be tested in accordance with the requirements of the rule. Additionally, a buried storage tank can only be abandoned by pumping the system free of

liquid and filling the tank with sand, concrete, or other inert material in lieu of removal of the tank. Therefore, it is recommended that the tanks be abandoned according to the FDER regulations. The water presently contained in the tanks should be discharged to the domestic wastewater treatment plant.

FIRE PIT (SITE NO. 28) SS

Background

This site was a former fire-fighting training area in which waste oil was placed in a pit and incinerated. The IAS Report did not recommend this site for a verification study, however, it was later added by the Navy as it reportedly was used as an oil disposal site during 1943 through 1946. Due to the presence of PCBs found in oil at the oil and solvent disposal pit site (Site No. 26), this site was also thought to receive oil that contained PCBs. Prior to beginning the verification work, the exact area thought to be Site No. 28 was field located by a retired Public Works Department employee (see Figure 24).

Findings and Recommendations

One monitor well (NAS28-1) was installed at the fire-fighting training area and a water sample was collected and analyzed in the field for pH and specific conductance and in a water-quality laboratory for PCBs and VOCs. A composite soil sample was also collected and analyzed in a laboratory for PCBs. The laboratory results presented in Appendix C, Section 8, show that the ground-water sample was free of all compounds with the exception of 4 ppb of TCE. The soil sample, which consisted of a composite sample from three locations (Figure 24), contained 103 ppm of PCBs.

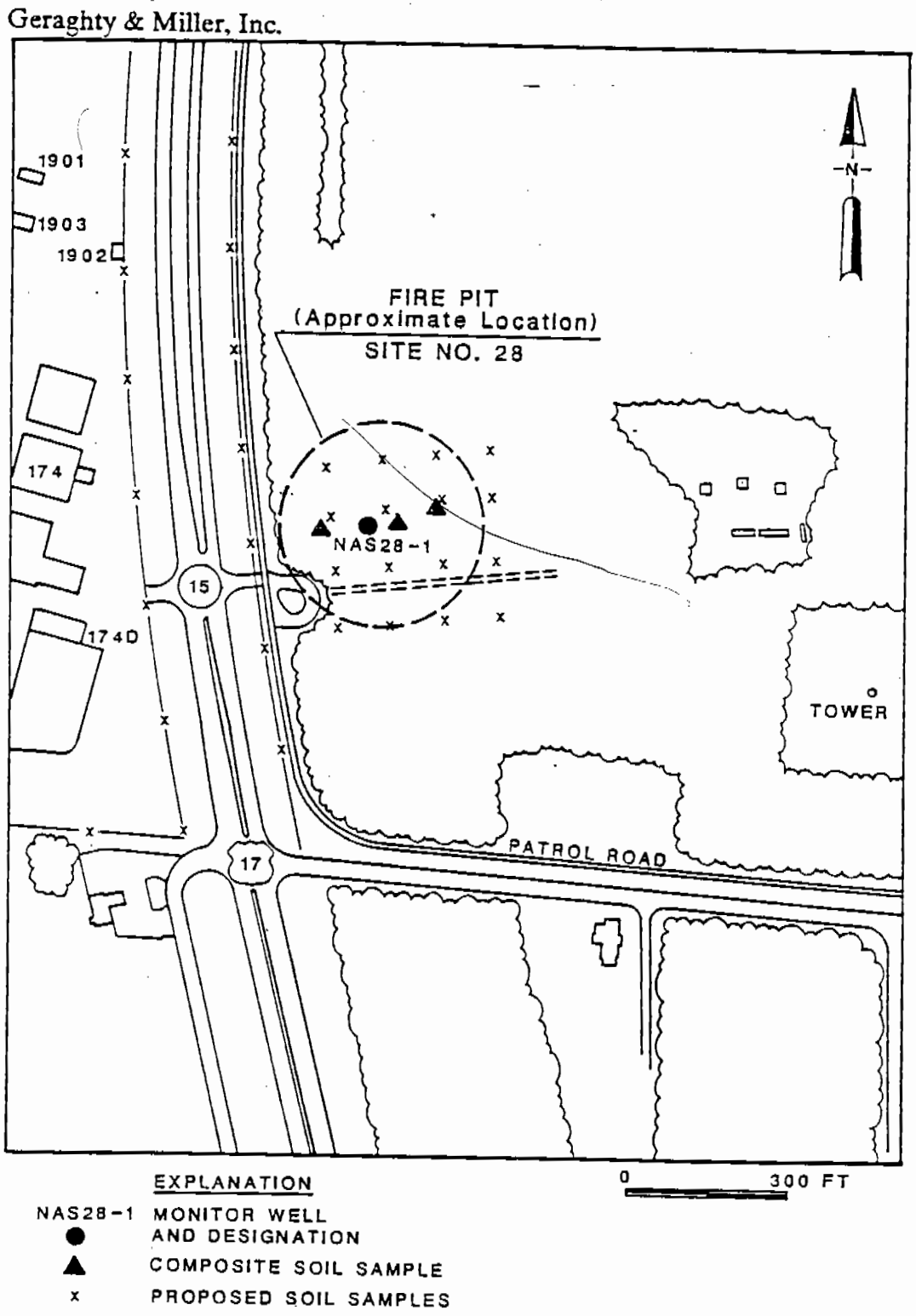

FIGURE 24. Locations of Installed Monitor Well and Soil Samples at the Fire Pit Area (Site No. 28).

In accordance with Section 17-34.02(k), FAC PCBs are defined as a chemical substance or substances (including soils and materials contaminated as a result of a spill) that contain 50 ppm (on a dry weight basis) or greater of PCBs. Above this level, the soil is considered to be a hazardous waste; therefore, it is recommended that additional soil samples be collected to define both the vertical and horizontal extent of the PCBs in the soils in this area. Initially, 16 sampling locations, shown in Figure 24, should be identified from which two soil samples would be collected at distinct depths, 0-2 ft and 3-5 ft below land surface. These soils will be analyzed for PCBs and the laboratory results will be used to determine the area where the soils are considered to be a hazardous waste.

ORGANIC DISPOSAL AREA (SITE NO. 29)

Background

The organic disposal area is located along the patrol road near the southwest corner of the NAS (Figure 25). This area has been used for the disposal of organic debris such as wood and grass clippings; however, during the IAS inspection of the site, crushed drums (approximately one dozen), construction debris, discolored soil piles, scrap metals, and PVC cases were present. The deposited material is graded on occasion in order to maintain truck access. Based on a topographic map, the organic disposal area appears to have been used as a borrow pit at one time.

Findings and Recommendations

Two monitor wells, NAS29-1 and NAS29-2, were installed at the organic disposal area at the locations shown in Figure 25. Water samples were collected and analyzed in the field for pH and in a water-quality laboratory for TOC, VOCs, cyanide, and selected metals, including antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, zinc, and thallium. The laboratory results, presented in Appendix C, Section 9 show that the dissolved metal and cyanide levels were low; only copper (0.022 ppm) and zinc (0.066 ppm) were detected in NAS29-1, and zinc (0.016 ppm) in NAS29-2. Very low levels of VOCs were detected in both NAS29-1 (0.6 ppb of trans-1,2-

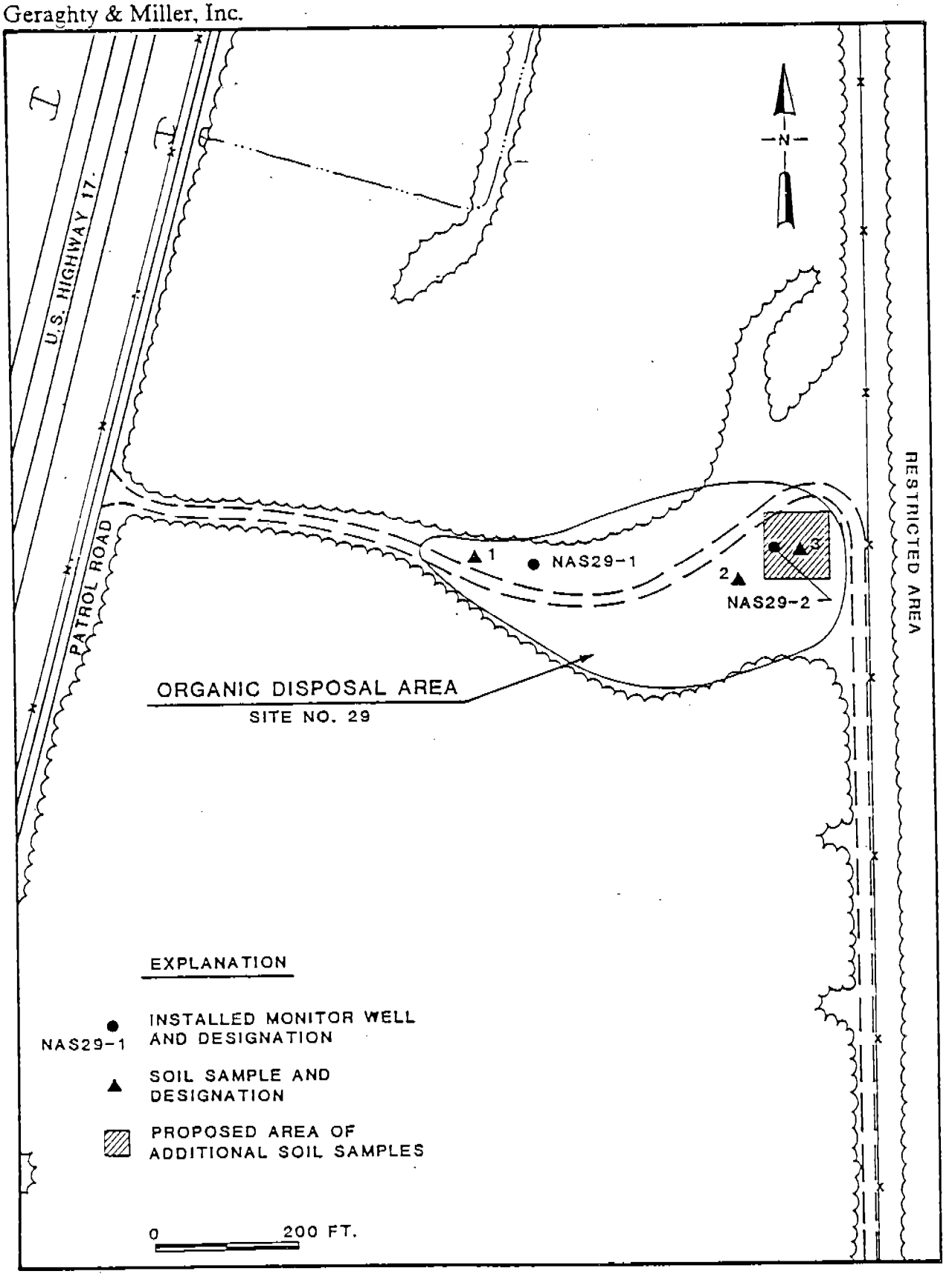

FIGURE 25. Locations of Installed Monitor Wells and Soil Samples at the Organic Disposal Area (Site No. 29).

dichloroethene and 0.4 ppb of 1,1,1-trichloroethane) and NAS29-2 (3.4 ppb of chloromethane). The TOC ranged from 2.8 mg/l (NAS29-2) to 20.5 mg/l (NAS29-1).

Three soil samples were collected from three small piles of what appeared to be blasting material, at the location shown in Figure 25. The soils were analyzed for EP Toxicity for metals, including arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and nickel. The results, also presented in Appendix C, Section 9, show that the levels for samples collected from two of the piles were well below the levels which would designate them as a hazardous waste. However, the cadmium content in the third sample, at 2.62 ppm, exceeds the EPA's standard; thus, this pile would constitute a hazardous waste.

A recent site visit was made to locate the pile that failed the EP Toxicity test. The site had been graded and the tainted soil could not be identified. As shown in Figure 25, monitor well NAS29-1 is located very near the original pile location. Apparently, the cadmium contained in that soil has not leached into the shallow ground water. It is recommended, however, that nine additional soil samples be collected in the vicinity of NAS29-1 and analyzed for EP Toxicity for cadmium.

OLD DRUM LOT (SITE NO. 30)

Background

The old drum lot, shown in Figure 26, was used for outdoor storage of unprotected drums containing raw products. Approximately 10,000 drums were stored on Marsden Matting (aircraft landing matting) from 1955 to 1967. Although there is no visible evidence of environmental impairment, it was reported that on occasion drums containing hazardous materials corroded and leaked their contents onto the ground. Surface soils in the area were tested previously for PCB contamination; the test results did not show PCB contamination.

Findings and Recommendations

Three monitor wells, NAS30-1, NAS30-2, and NAS30-3, were installed at the old drum lot at the locations shown in Figure 26. Water samples were collected and analyzed in the field for pH and specific conductance and in a water-quality laboratory for EPA's list of priority pollutants which includes 32 VOCs, 11 acid compounds, 45 base-neutral compounds, 18 pesticides, 7 PCBs, 13 metals, and cyanide. The laboratory results, (Appendix C, Section 10) show that two VOCs, trans-1,2-dichloroethene and trichloroethene, were detected in trace concentrations and only one base-neutral extractable compound was detected; well NAS30-2 showed a concentration bis (2-chloroethyl) ether at 54 ppb.

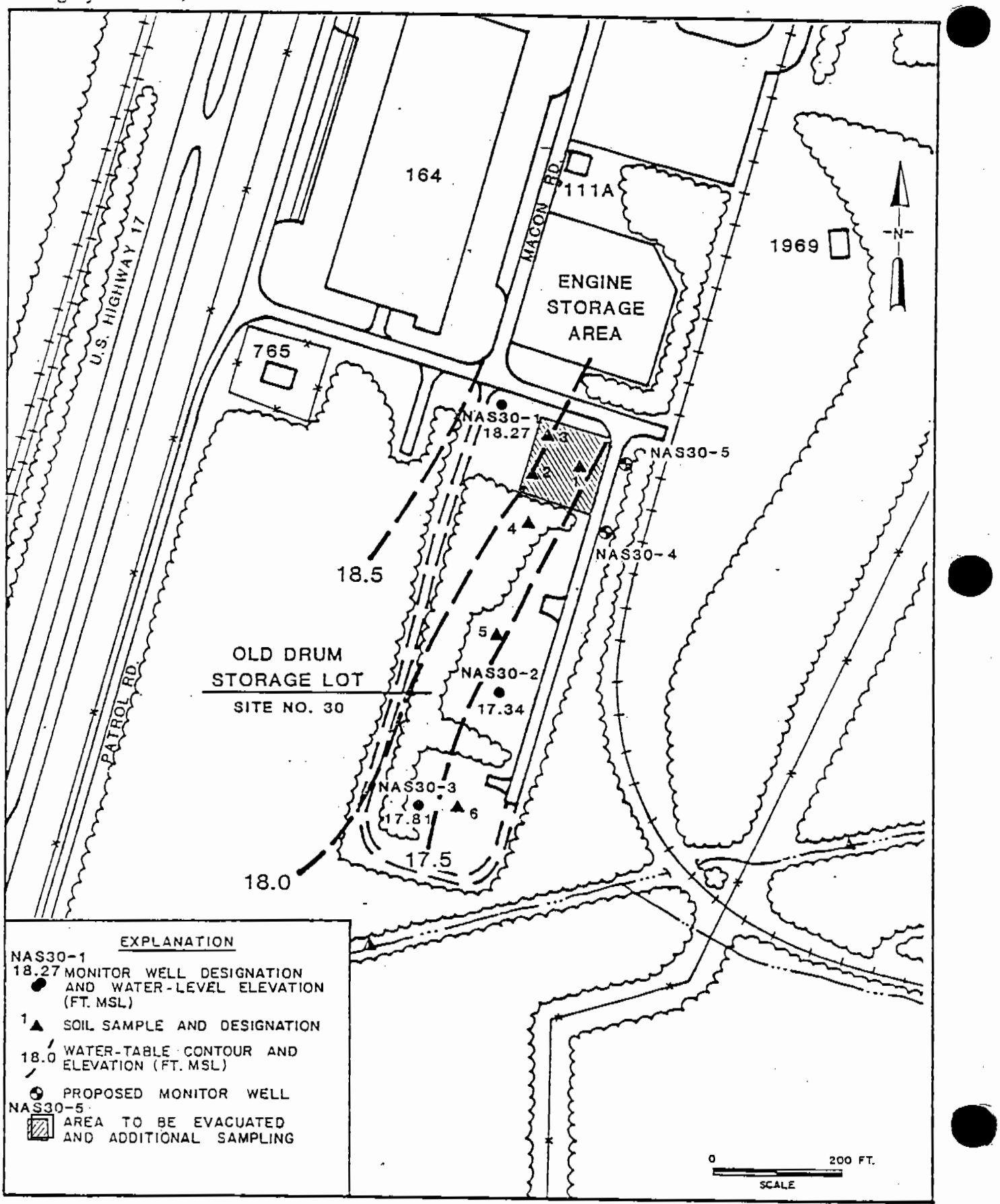

FIGURE 26. Locations of Installed Monitor Wells, Soil Samples, and Water-Table Contours (March 12, 1984) in the Old Drum Storage Lot (Site No. 30)

Most of the cyanide and dissolved metal levels were non-detectable, and all were well below FDER's primary drinking-water standards. Water-level measurements (Table 4) collected from the installed monitor wells on March 12, 1984, show that the general direction of shallow ground-water flow is to the southeast or toward a small drainage ditch.

Six soil samples were also collected at the locations shown in Figure 26 and analyzed for EP Toxicity for metals, including arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and nickel. The sampling procedures consisted of compositing four to six subsamples at given locations to produce a broader coverage of the area. The three soil samples (4, 5, 6) collected between the Marsden Matting show metal concentrations well below EPA criteria for identifying hazardous wastes. The other samples (1, 2, 3) collected immediately north of the drum storage area revealed levels of cadmium in the soil above the established levels for a hazardous waste.

As a result of the sampling, the Navy has contracted a hazardous-waste disposal contractor to remove the contaminated soil and dispose of it in a secure landfill.

It is recommended that a follow-up study be conducted in the excavated area to confirm the success of the clean-up operation and to ensure that the ground water has not been adversely affected by the disposal and removal operations. Six soil samples will be collected at this site and analyzed

for EP Toxicity for cadmium and lead. In addition, two additional monitor wells will be installed at the locations shown in Figure 26. Water samples will be collected from these and from existing monitor well NAS30-1 and analyzed for pH, specific conductance, VOCs, and FDER's primary drinking-water metals. Water levels will be measured and the elevations of the top of casings will be determined in order to delineate the direction of ground-water flow.

BASE LANDFILL (SITE NO. 32) NFA

Background

The old base landfill, located northeast of Site No. 30 covers an area approximately two acres in size, as shown in Figure 27. This area was used during the 1960's for disposing of soil, refuse and construction debris and junk vehicles. A portion of this area is presently used for the collection (in dumpsters) of large household refuse, such as appliances. Also, a new building has been constructed (Building 144) north of the landfill for storage of hazardous wastes prior to disposal off-site.

Findings and Recommendations

One monitor well (NAS32-1) was installed at the base landfill at the location shown in Figure 27. A water sample was collected and analyzed in the field for pH and in a water-quality laboratory for TOC and VOCs. The results, which are presented in Appendix C, Section 11, show that the water had a TOC concentration of 60 ppm and only one VOC was detected, methylene chloride, at a concentration of 2.6 ppb.

Based on the TOC results, it is recommended that the monitor well NAS32-1 be analyzed for EPA's list of acid and base-neutral extractable compounds as well as field measurements for pH and specific conductance. If these

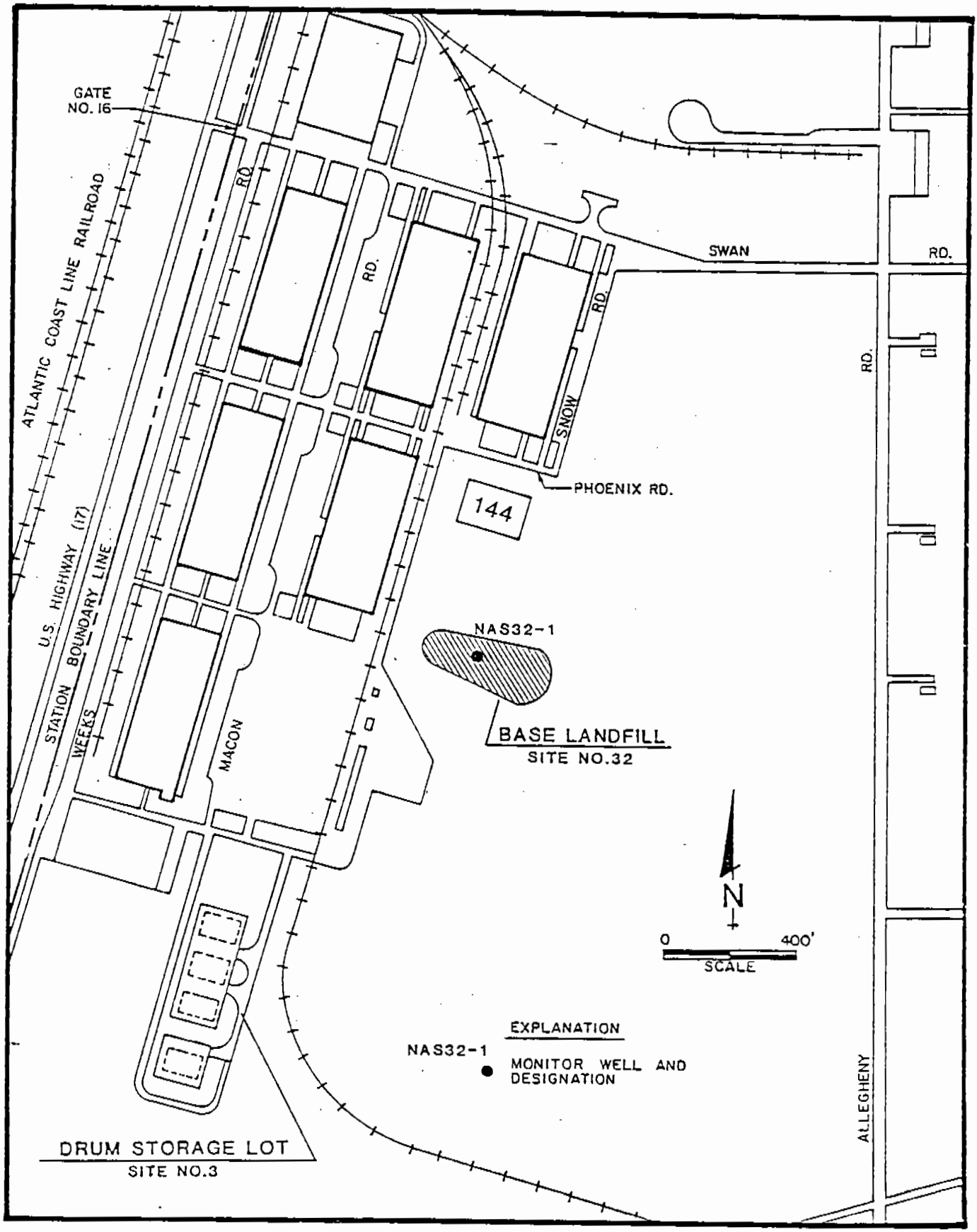

FIGURE 27. Location of the Monitor Well Installed at the Base Landfill (Site No. 32).

compounds are not detected or are detected in low concentrations, then it is suspected that the high TOC was due to organic matter naturally occuring in the soil.

TRANSFORMER BURIAL AREA (SITE NO. 39) NFA

Background

A retired Public Works Department employee reported that hundreds of items of electrical gear consisting of old and new transformers (which may have contained PCB oils), were buried east of warehouse building No. 164 (shown in Figure 28) during the years 1943 through 1945. A 10-ft wide by 5-ft deep ditch, between the warehouse building and the railroad tracks to the east, was believed to have been the burial spot for the transformers.

Findings and Recommendations

Twenty-seven soil borings were installed to a depth of 10 ft in the area previously located by former Naval employees as being the burial area. The lithologic logs from these borings are presented in Appendix B, pages B-1.9 to B-1.17. Continuous split-spoon samples were collected and visually inspected in the field for electrical parts. In all of the borings, no evidence was found to indicate that anything may have been buried there. Based on the data collected, no further study is recommended for this site.

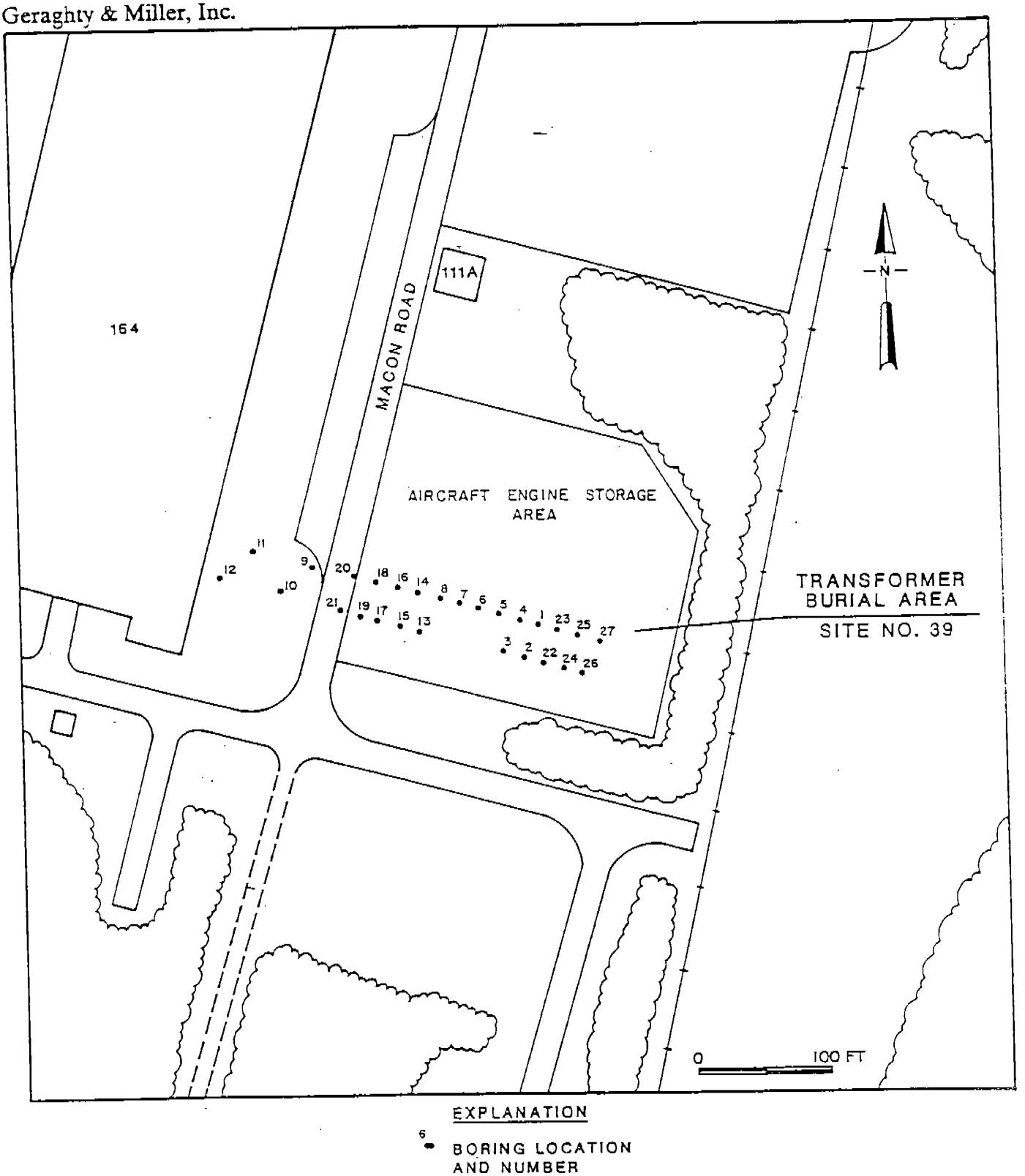

FIGURE 28. Locations of Soil Borings at the Suspected Transformer Burial Area (Site No. 39).

NFA

INDUSTRIAL WASTEWATER DISCHARGE AREA (SITE NO. 40)

Background

Prior to 1972, a wastewater treatment plant (east side plant) was located south of the east end of the main runway. Wastes reaching this plant were treated initially by settling (for paint chip removal) and skimming for removal of oils and solvents (disposed of at Site No. 26). Effluent from the settling/skimming operations were then treated in a trickling filter plant for discharge to the St. Johns River. Reportedly, the discharge to the river resulted in a build-up of sediments in the cove east of runway 27, as shown in Figure 29. The east side plant was removed from service in 1972 and the waste stream was diverted to the west side plant.

Findings and Recommendations

Four composite sediment samples were collected in the cove east of runway 27. Each composite sample was composed of sediments collected at the surface of the cove bottom and sediments down to a depth of 2 ft below the cove bottom. The surface sediments were collected with a clamshell-type dredge sampler and the deeper sediments were collected with a PVC pipe driven to the desired depth.

The results of the EP Toxicity analyses, presented in Appendix C, Section 12, show that the composite samples at

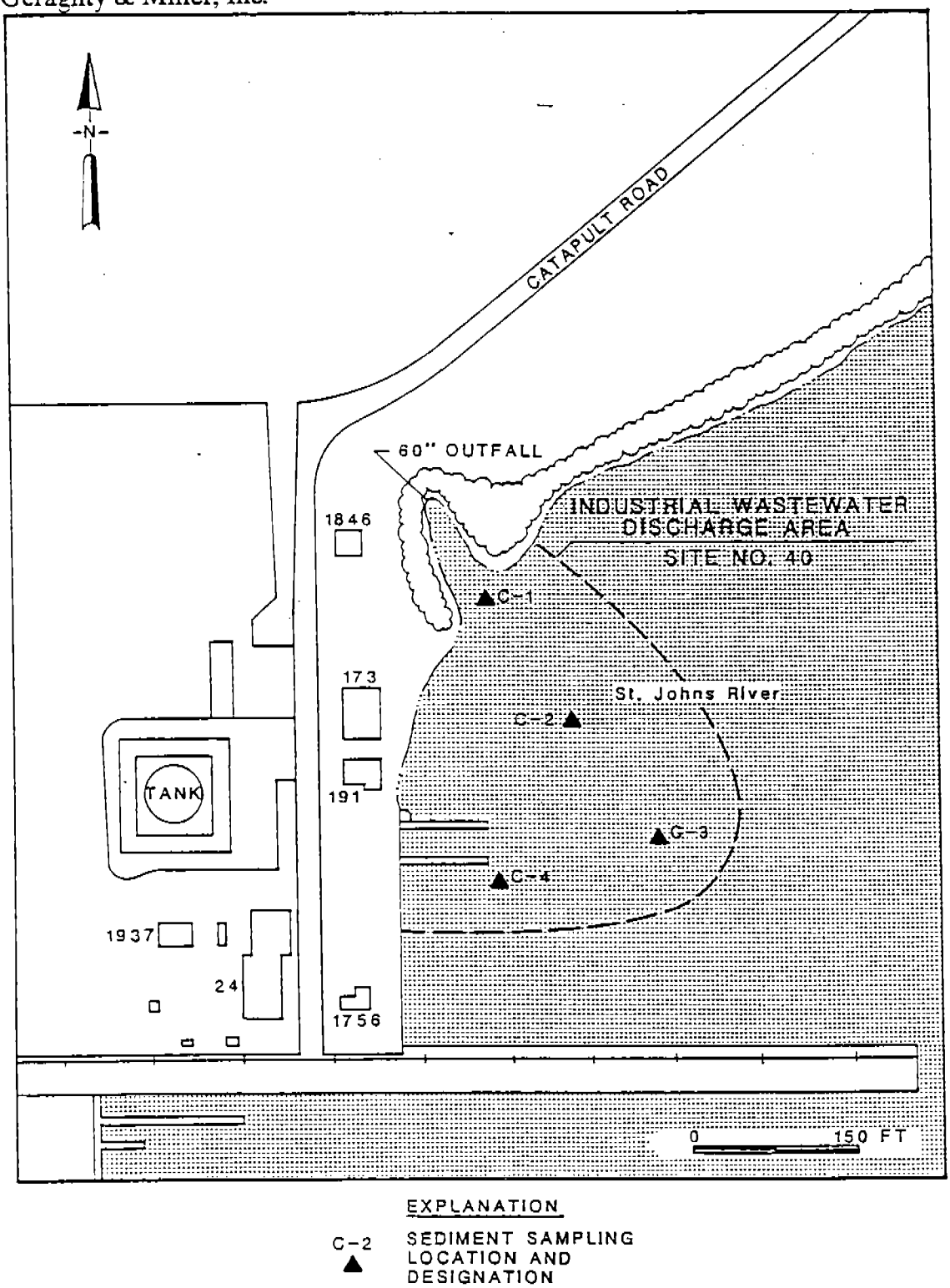

FIGURE 29. Locations of Sediment Samples at the Industrial Wastewater Discharge Area (Site No. 40).

each site were all below the laboratory detection limit; therefore, the sediments in this area are not classiified as a hazardous waste. Based on the data collected, this site does not pose an imminent threat to human health or the environment; therefore, no further action is proposed at this site.

NFD: OIL POND AND LAND SPREADING AREA (SITE NO. 5)

Background

The oil pond and land spreading area (Figure 30) is located along the St. Johns River at the east side of the NFD. The pond, originally 200 ft by 100 ft, is clearly identified due to the lack of vegetation in this area. The oil pond was excavated and diked in the 1950's, but a hurricane in 1964 damaged the dike which resulted in oil leaking out. Also, 5,000 gallons of JP-5 mixed with bottom sludge from tank cleaning operations were disposed of in this area prior to 1967. Through 1967, approximately 8,000 barrels of contaminated fuel oil from an aircraft carrier were disposed in this area along with trash and wood. The pond was filled with soil in 1965 and was graded at that time with heavy equipment. In 1971, the site was regraded causing the contaminated soils to be spread over on the present area approximately 100 ft by 500 ft.

Findings and Recommendations

Thirty-two soil borings were drilled in the oil pond area to determine the extent of contamination of both the soil and ground water. The borings were drilled to depths ranging between 4 and 14 feet below grade. The lithologic logs presented in Appendix B, Section 1 show the vertical extent of oil in the soil column at a particular site. Generally, most of the oil is tightly held by molecular

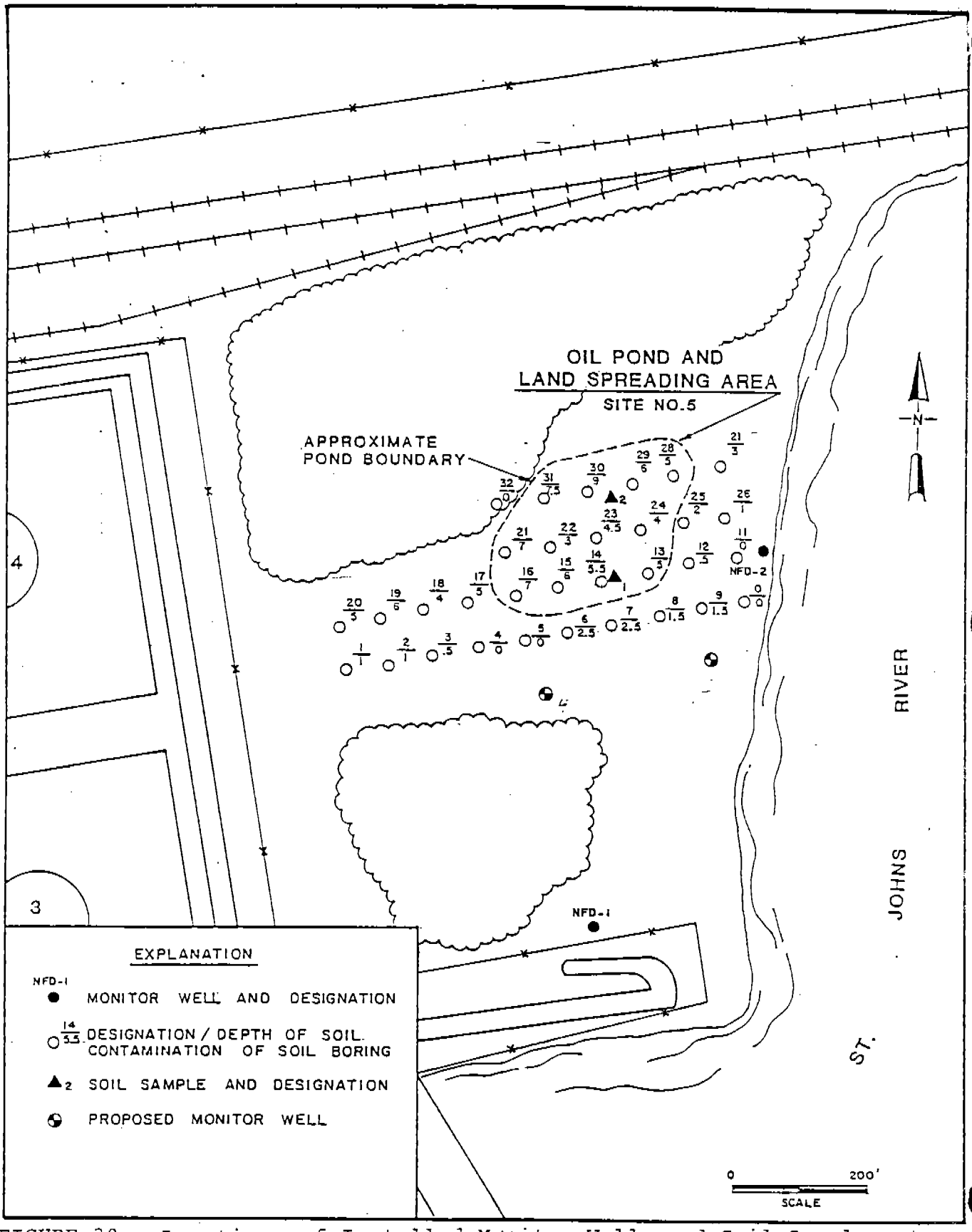

FIGURE 30. Locations of Installed Monitor Wells and Soil Samples at the Oil Pond and Land Spreading Area (Site No. 5-NFD)

attraction with the soil particles. The oil-covered soil extends below the water-table in many places; the water table occurs at a depth of approximately 4 ft below land surface.

The oil is very viscous, and is not likely to flow through the fine-grained sands at the NFD. There does not appear to be a floating plume of oil, rather the oil is held by the soil. The oil-saturated soil is, however, relatively widespread due to grading operations in this area.

Two soil samples were collected at locations shown in Figure 26 and analyzed in a laboratory for EP Toxicity for the nine metals discussed earlier. With the exception of barium (0.2 mg/l (milligrams per liter), in sample number 1, the leachable metals levels were below detection limits; therefore, all the values were well below the EPA's criteria for identifying a hazardous waste.

Two monitor wells were also installed at locations east and south of the oil pond area (Figure 25). Water-quality samples were collected from the wells and analyzed in the field for pH and specific conductance and in a private laboratory for metals (cadmium, chromium, lead, mickel), and VOCs. The laboratory results are presented in Appendix C, Section 13. The dissolved metal concentrations were all below laboratory detection limits and the total VOCs concentrations in NFD-1 were 1 ppb (1,1,1-trichloroethane at 0.7 ppb, and trichloroethene at .3 ppb); no VOCs were detected in NFD-2.

Based on the results of this study, it is proposed that two additional monitor wells be installed at the locations shown in Figure 30. The new wells will be installed near the outer edge of the spreading operations. The new and existing wells will be referenced to mean sea level by a professional land surveyor to determine the direction of ground-water flow in this area. Water-quality samples will be collected from the two new wells and NFD-2 and analzyed using a hydrocarbon scan (EPA Method 602) to determine the concentrations of relatively soluble aromatic hydrocarbons and a petroleum hydrocarbon scan to determine the presence or absence of dissolved fuels found in the ground water.

SUMMARY

During the verification study, 14 sites (5 sites in the NARF area were considered as 1) were studied due to their potential for adversely affecting the environment or human health. Appendix D contains a general location map of each study site and the individual site maps showing the location of installed monitor wells and soil and sediment sampling sites. Twelve of these sites are past disposal areas that have not received wastes in many years; at these locations much of the potential ground-water contaminants have been attenuated by the processes of biodegradation, evaporation, adsorption, dilution or dispersion. Six of the 14 study sites are recommended for further investigation in the characterization study. A summary of the recommended work plan for the characterization study at these sites is presented in Table 6.

Respectfully submitted,

GERAGHTY & MILLER, INC.

Fred A. Seguiti
Staff Scientist

Peter L. Palmer, P.E.
Associate

December 1985
T9290GW2

TABLE 6. SUMMARY OF WORK PROPOSED FOR THE CHARACTERIZATION FOR THE NAS AND NFD

SITE & NUMBER	PROPOSED MONITOR WELLS	CHEMICAL ANALYSIS[1] Ground-Water Samples	CHEMICAL ANALYSIS[1] Soil Samples	COMMENTS
NAS				
NARF Area (11, 12, 14, 15, 16)	12	(18) VOCs AND (4) EPA priority pollutants in four wells		Define and delineate contaminant plume(s). Six existing wells will be resampled.
Organic Disposal Area (29)			(9) Cd.[3]	Attempt to delineate location of hazardous material.
Old Drum Lot (30)	2	(3) VOCs[2] (3) PDWM[4]	(6) Cd, Pb[5]	Evaluate effectiveness of soil removal. One existing well will be resampled.
Base Landfill (32)	resample existing well	(1) A & B/N extractables		Identify elevated TOC value.
Fire Pit (28)			(32) PCBs	Delineate horizontal and vertical extent of PCB in soil.
NFD				
Oil Pond and Land Spreading Area (5)	2	(3) BTX Scan[6] petroleum hydrocarbons		Identify presence or absence and type of hydrocarbon in ground water. Two existing well will be resampled.

1/ Water-quality samples will be analyzed in the field for pH and specific conductance.

2/ VOCs = Volatile organic compounds.

3/ Cd = Cadmium, analyzed by extraction procedure (E.P. Toxicity).

4/ PDWM = Primary drinking-water metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver).

5/ Pb = Lead, analyzed by extraction procedure (E.P. Toxicity).

6/ BTX Scan = Benzene, toluene, xylene, (aromatic hydrocarbons)

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APPENDIX A

Laboratory Water-Quality Analyses of Potable Drinking-Water Wells (Nos. 4 and 7) at the NAS

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty and Miller - Tampa 3/ Report No.: 84-439

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] No. 4 8401959	No. 7 8401960
chloromethane			
dichlorodifluoromethane			
vinyl chloride			
chloroethane			
methylene chloride			
trichlorofluoromethane			
1,1-dichloroethene			
1,1-dichloroethane			
trans-1,2-dichloroethene			
chloroform			
1,2-dichloroethane			
1,1,1-trichloroethane			
carbon tetrachloride			
bromodichloromethane			
1,2-dichloropropane			
trans-1,3-dichloropropane			
trichloroethene			
dibromochloromethane			
1,1,2-trichloroethane			
cis-1,3 dichloropropene			
2-chloroethylvinyl ether			
bromoform			
1,1,2,2-tetrachloroethane			
tetrachloroethene			
chlorobenzene			
1,2 dibromoethane (EDB)			
Detection Limit		0.1	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

N/A - Not analyzed

3/Results from G&M samples collected on April 13, 1984.

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Acid/Base/Neutral Extractables (Method 625[1])

Client: Geraghty and Miller - Tampa Report No.: 84-439

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] No. 4 8401959	No. 7 8401960
ACID COMPOUNDS			
(21A) 2,4,6-trichlorophenol			
(22A) p-chloro-m-cresol			
(24A) 2-chlorophenol			
(31A) 2,4-dichlorophenol			
(34A) 2,4-dimethylphenol			
(57A) 2-nitrophenol			
(58A) 4-nitrophenol			
(59A) 2,4-dinitrophenol			
(60A) 4,6-dinitro-2-methylphenol			
(64A) pentachlorophenol			
(65A) phenol			
Detection Limit		2	2
BASE/NEUTRAL COMPOUNDS			
(1B) acenaphthene			
(5B) benzidine			
(8B) 1,2,4-trichlorobenzene			
(9B) hexachlorobenzene			
(12B) hexachloroethane			
(18B) bis (2-chloroethyl) ether			
(20B) 2-chloronaphthalene			
(25B) 1,2-dichlorobenzene			
(26B) 1,3-dichlorobenzene			
(27B) 1,4-dichlorobenzene			
(28B) 3,3'-dichlorobenzidine			
(35B) 2,4-dinitrotoluene			
(36B) 2,6-dinitrotoluene			
(37B) 1,2-diphenylhydrazine			
(39B) fluoranthene			
(40B) 4-chlorophenyl phenyl ether			
(41B) 4-bromophenyl phenyl ether			

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Acid/Base/Neutral Extractables (Method 625[1])

Client: Geraghty and Miller

Report No.: 84-439

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] No. 4 8401959	No. 7 8401960
BASE NEUTRAL COMPOUNDS (cont'd)			
(42B) bis (2-chloroisopropyl) ether			
(43B) bis (2-chloroethoxy) methane			
(52B) hexachlorobutadiene			
(53B) hexachlorocyclopentadiene			
(54B) isophorone			
(55B) naphthalene			
(56B) nitrobenzene			
(62B) N-nitrosodiphenylamine			
(63B) N-nitrosodipropylamine			
(66B) bis (2-ethylhexyl) phthalate			
(67B) benzyl butyl phthalate			
(68B) di-n-butyl phthalate			
(69B) di-n-octyl phthalate			
(70B) diethyl phthalate			
(71B) dimethyl phthalate			
(72B) benzo(a)anthracene			
(73B) benzo(a)pyrene			
(74B) benzo(b)fluoroanthene			
(75B) benzo(k)fluoroanthene			
(76B) chrysene			
(77B) acenaphthylene			
(78B) anthracene			
(79B) benzo(ghi)perylene			
(80B) fluorene			
(81B) phenanthrene			
(82B) dibenzo(a,h)anthracene			
(83B) ideno(1,2,3-cd)pyrene			
(84B) pyrene			
Detection Limit		2	2

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times the limit of detection are listed as trace levels (TR).

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Results of Pesticide Analysis[1]

Client: Geraghty and Miller - Tampa

Report No.: 84-439

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] No. 4 8401959	No. 7 8401960
temik (aldicarb)			
aldicarb sulfoxide[3]			
aldicarb sulfone[3]			
Detection Limit		0.1	0.1

[1]U.S. EPA. 1980. Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samles. EPA-600/8-80-038. EPA/HERL, Research Triangle Park, NC.

[2]Concentrations less than the detection limit are left blank.

[3]Principal breakdown products of Temik.

TECHNICAL SERVICES, INC.

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OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 58705

July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B — Hospital Water Plant. Well #7. → Well Closest to Old Disposal Area

CERTIFICATE OF ANALYSIS OR TESTS

BASE NEUTRAL EXTRACTABLES

All Units ppb	CONCENTRATION	DETECTION LIMIT
Acenaphthene	BDL	10
Acenaphthylene	BDL	10
Anthracene	BDL	10
Benzo(a)anthracene	BDL	10
Benzo(b)fluoranthene	BDL	10
Benzo(k)fluoranthene	BDL	10
Benzo(a)pyrene	BDL	10
Benzo(g,h,i)perylene	BDL	25
Benzidine	BDL	10
Bis(2-chloroethyl)ether	BDL	10
Bis(2-chloroethoxy)methane	BDL	10
Bis(2-ethylhexyl)phthalate	BDL	10
Bis(2-chloroisopropyl)ether	BDL	10
4-Bromophenyl phenyl ether	BDL	10
Butyl benzyl phthalate	BDL	10
2-Chloronaphthalene	BDL	10
4-Chlorophenyl phenyl ether	BDL	10
Chrysene	BDL	10
Dibenzo(a,h)anthracene	BDL	25
Di-n-butylphthalate	BDL	10
1,3-Dichlorobenzene	BDL	10
1,4-Dichlorobenzene	BDL	10
1,2-Dichlorobenzene	BDL	10
3,3-Dichlorobenzidine	BDL	10

Respectfully submitted,

TECHNICAL SERVICES, INC.

By: [signature]

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
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LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 58705 July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B — WC487

CERTIFICATE OF ANALYSIS OR TESTS

BASE NEUTRAL EXTRACTABLES

All Units ppb	CONCENTRATION	DETECTION LIMIT
Diethylphthalate	BDL	10
Dimethylphthalate	BDL	10
2,4-Dinitrotoluene	BDL	10
2,6-Dinitrotoluene	BDL	10
Dioctylphthalate	BDL	10
1,2-Diphenylhydrazine	BDL	10
Fluoranthene	BDL	10
Fluorene	BDL	10
Hexachlorobenzene	BDL	10
Hexachlorobutadiene	BDL	10
Hexachloroethane	BDL	10
Hexachlorocyclopentadiene	BDL	10
Indeno(1,2,3-cd)pyrene	BDL	25
Isophorone	BDL	10
Naphthalene	BDL	10
Nitrobenzene	BDL	10
N-Nitrosodimethylamine	BDL	10
N-Nitrosodi-n-propylamine	BDL	10
N-Nitrosodiphenylamine	BDL	10
Phenanthrene	BDL	10
Pyrene	BDL	10
2,3,7,8-Tetrachlorodibenzo-p-dioxin (Dioxin)	BDL	10
1,2,4-Trichlorobenzene	BDL	10

Respectfully submitted,

TECHNICAL SERVICES, INC.

By Harvey C. Gray, Jr.

LABORATORY I.D. NO. 82145

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(904) 353-5761

Laboratory No. 58705

July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B Well #7

CERTIFICATE OF ANALYSIS OR TESTS

ACID EXTRACTABLES All Units ppb	CONCENTRATION	DETECTION LIMIT
2-Chlorophenol	BDL	10
2,4-Dichlorophenol	BDL	10
2,4-Dimethylphenol	BDL	10
2,4-Dinitrophenol	BDL	100
2-Methyl-4,6-Dinitrophenol	BDL	25
2-Nitrophenol	BDL	10
4-Nitrophenol	BDL	100
Pentachlorophenol	BDL	10
Phenol	BDL	10
2,4,6-Trichlorophenol	BDL	10

Respectfully submitted,

TECHNICAL SERVICES, INC.

By Harvey C. Gras, Jr.

LABORATORY I.D. NO. 82145

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 58705 July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B Well #7

CERTIFICATE OF ANALYSIS OR TESTS

PURGEABLES

All Units ppb	CONCENTRATION	DETECTION LIMIT
Acrolein	BDL	50
Acrylonitrile	BDL	50
Benzene	BDL	0.5
Bromodichloromethane	BDL	1
Bromoform	BDL	1
Bromomethane	BDL	1
Carbon tetrachloride	BDL	1
Chlorobenzene	BDL	1
Chloroethane	BDL	1
2-Chloroethylvinyl ether	BDL	1
Chloroform	BDL	1
Chloromethane	BDL	1
Dibromochloromethane	BDL	1
Dichlorodifluoromethane	BDL	1
1,1-Dichloroethane	BDL	1
1,2-Dichloroethane	BDL	1
1,1-Dichloroethene	BDL	1
1,2-Dichloroethene	BDL	1
1,2-Dichloropropane	BDL	1
cis-1,3-Dichloropropene	BDL	1
trans-1,3-Dichloropropene	BDL	1
Ethylbenzene	BDL	1
Methylene chloride	BDL	1
Tetrachloroethene	BDL	1
1,1,1-Trichloroethane	BDL	1
1,1,2-Trichloroethane	BDL	1
Trichloroethene	BDL	1
Trichlorofluoromethane	BDL	1
Toluene	BDL	1
Vinyl chloride	BDL	1
Xylene	BDL	1
Styrene	BDL	1

Respectfully submitted,

TECHNICAL SERVICES, INC.,

By [signature]

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 587105

July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B - Well #7

CERTIFICATE OF ANALYSIS OR TESTS

PURGEABLES All Units ppb	CONCENTRATION	DETECTION LIMIT
Dichlorobenzene	BDL	1
1,2-Dibromoethane (EDB)	BDL	0.02
1,2-Dibromo-3-Chloropropane	BDL	1

PESTICIDES All units ppb		
Aldrin	BDL	0.001
a-BHC	BDL	0.001
b-BHC	BDL	0.001
g-BHC	BDL	0.001
d-BHC	BDL	0.001
Chlordane	BDL	0.005
4,4'-DDD	BDL	0.005
4,4'-DDE	BDL	0.005
4,4'-DDT	BDL	0.005
Dieldrin	BDL	0.005
Endosulfan I	BDL	0.002
Endosulfan II	BDL	0.002
Endosulfan Sulfate	BDL	0.010
Ethion	BDL	0.010
Trithion	BDL	0.010
o,p-DDT, DDE and DDD	BDL	0.005
Tedion	BDL	0.010
Endrin Aldehyde	BDL	0.005
Heptachlor	BDL	0.001
Heptachlor Epoxide	BDL	0.002
Toxaphene	BDL	0.010
PCB-1016	BDL	0.050
PCB-1221	BDL	0.050

Respectfully submitted,

TECHNICAL SERVICES, INC.

By Harvey A. Gray, Jr.

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 58705 July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B — Well #7

CERTIFICATE OF ANALYSIS OR TESTS

PESTICIDES All Units ppb	CONCENTRATION	DETECTION LIMIT
PCB-1232	BDL	0.050
PCB-1242	BDL	0.050
PCB-1248	BDL	0.050
PCB-1254	BDL	0.050
PCB-1260	BDL	0.050
Aldicarb	BDL	0.08
Diazinon	BDL	0.050
Malathion	BDL	0.050
Parathion	BDL	0.020
Guthion	BDL	0.1
Kelthane (Dicofal)	BDL	0.050

Supplemental Report

Respectfully submitted,

TECHNICAL SERVICES, INC.

George C. Gray, Jr.

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 58705 July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B — Ucu 67

CERTIFICATE OF ANALYSIS OR TESTS

Gross Alpha: <2 pCi/liter

Respectfully submitted,

TECHNICAL SERVICES, INC.

BY _____

LABORATORY I.D. NO 82145

TECHNICAL SERVICES, INC.
ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
STOCKTON STREET — P.O. BOX 52329
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Received
OCT 1
Sanitary Engineering
Branch

Laboratory No. 42289

September 15, 1981

Sample of POTABLE WATER

Date Received August 20, 1981

For Director of Utilities, Public Works Department, Box 5, Code 187, Naval Air Station, Jacksonville, Florida 32212

Marks: No. 1 Plant, Call No. P-014, 8/20/81
Wells #2 + #4

CERTIFICATE OF ANALYSIS OR TESTS

Primary Standards	
Arsenic, as As, mg/l	<0.004
Barium, as Ba, mg/l	<0.2
Cadmium, as Cd, mg/l	<0.002
Chromium, as Cr, mg/l	<0.01
Lead, as Pb, mg/l	0.037
Mercury, as Hg, mg/l	<0.0002
Selenium, as Se, mg/l	<0.01
Silver, as Ag, mg/l	<0.005
Nitrate, as N, mg/l	0.020
Fluoride, as F, mg/l	0.58
Turbidity, NTU	0.33
Lindane, mg/l	<0.00001
Methoxychlor, mg/l	<0.0001
Toxaphene, mg/l	<0.0002
2,4-D, mg/l	<0.0010
2,4-5 TP Silvex, mg/l	<0.0005
Endrin, mg/l	<0.00002
Secondary Standards	
Chloride, as Cl, mg/l	13.8
Color	1
Copper, as Cu, mg/l	<0.004
Corrosivity	Slightly corrosive
Foaming Agents, mg/l	0.001
Iron, as Fe, mg/l	<0.1
Manganese, as Mn, mg/l	<0.001
Odor	None
pH	7.29
Sulfate, as SO_4, mg/l	95
Total Dissolved Solids, mg/l	354
Zinc, as Zn, mg/l	0.036
Hydrogen Sulfide, mg/l	<0.1

Respectfully submitted,

(Continued)

TECHNICAL SERVICES, INC.

By Harvey C. Hays, Jr.

TECHNICAL SERVICES, INC.
ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
105 STOCKTON STREET — P.O. BOX 52329
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

OCT 1 1981
Sanitary Engineering Branch

Laboratory No. 42208

September 15, 1

Sample of POTABLE WATER

Date Received August 20, 1981

For Director of Utilities, Public Works Department, Box 5, Cod
Naval Air Station, Jacksonville, Florida 32212

Marks: No. 1 Plant, Call No. P-014, August 20, 1981

Wells #2 & #4 Combination

CERTIFICATE OF ANALYSIS OR TESTS

General

Total Hardness, as $CaCO_3$, mg/l	278
Total Alkalinity, as $CaCO_3$, mg/l	105
Non-Carbonate Hardness, as $CaCO_3$, mg/l	173
Bicarbonate, as HCO_3, mg/l	128
Calcium, as Ca, mg/l	61.8
Magnesium, as Mg, mg/l	29.9
Carbon Dioxide, as CO_2, mg/l	14
Bicarbonate, as $CaCO_3$, mg/l	105
Carbonate, as $CaCO_3$, mg/l	0
Hydroxide, as $CaCO_3$, mg/l	0
Sodium, as Na, mg/l	9.3
pHs	7.64
Stability Index	7.99
Saturation Index	-0.35
Interpretation	Slightly Corrosive

Respectfully submitted,

TECHNICAL SERVICES, INC.

By Harvey C. Gross, C

By

APPENDIX B

SECTION 1

Lithologic Logs of Monitor Wells and Soil Borings Installed During Verification Study

LITHOLOGIC LOG OF MONITOR WELL NAS2-1

Description	Depth (ft)	Thickness (ft)
Sand, fine, gray to tan, oil stained from 1 - 1.5'	0 - 2	2.0
Sand, silty, fine, tan	2 - 6	4.0
Sand, clayey, fine, gray	6 - 10	4.0
Clay, sandy, gray	10 - 12.5	2.5
Sand, silty, fine, gray	12.5 - 14	1.5

LITHOLOGIC LOG OF MONITOR WELL NAS4-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, gray to tan, mixed with organics, iron stained	0 - 2	2
Sand, fine, tan	2 - 4	2
Clay, sandy, tan to gray, iron stained	4 - 6.5	2.5
Sand, slightly silty, fine, tan	6.5 - 12.0	5.5

LITHOLOGIC LOG OF MONITOR WELL NAS4-2

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan to gray to brown, mixed with organics	0 - 3.5	3.5
Clay, sandy, gray to tan, iron stained	3.5 - 4.5	1.0
Sand, clayey, fine, brown to gray	4.5 - 7.5	3
Sand, fine, tan	7.5 - 12.0	4.5

LITHOLOGIC LOG OF MONITOR WELL NAS4-3

Description	Depth (ft)	Thickness (ft)
Sand, fine, white, mixed with organics....	0 - 3.5	3.5
Sand, clayey, fine, tan to gray, iron stained.....	3.5 - 5.5	2
Sand, slightly silty, fine, gray, some iron staining.....	5.5 - 12.0	6.5

LITHOLOGIC LOG FOR MONITOR WELL NAS5-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, brown, mixed with organics.....	0 - 2	2
Clay, sandy, gray, stiff, iron stained....	2 - 6	4
Sand, silty, fine-grained, gray.....	6 - 7	1
Clay, sandy, gray-green, stiff.....	7 - 8	1
Sand, silty, fine-grained, gray, mixed with shell fragments.....	8 - 16	8

LITHOLOGIC LOG OF MONITOR WELL NAS9-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown with pieces of concrete; fill material.....	0 - 2.5	2.5
Silt, black, organic.....	2.5 - 3.0	0.5
Clay, slightly sandy, gray, mixed with organics.....	3.0 - 9.5	6.5
Sand, silty, fine, tan to dark brown, mixed with organics.....	9.5 - 14.0	4.5

LITHOLOGIC LOG OF WELL NAS13-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown to white.....	0 - 2	2.0
Clay, sandy, brown, mixed with fine shells	2 - 3	1.0
Sand, silty, fine, white.....	3 - 6.5	3.5
Sand, clayey, fine, dark brown.....	6.5 - 8	1.5
Sand, silty, fine, brown to tan.....	8 - 10.5	2.5
Clay, sandy, green, layer of fine shell at 13' about 2" thick.....	10.5 - 14	3.5

LITHOLOGIC LOG OF MONITOR WELL NARF-1

Description	Depth (ft)	Thickness (ft)
Sand, fine, white, with road base at surface.....	0 - 6	6
Sand, slightly clayey, fine, gray, mixed with stringers of black, organic sand.....	6 - 8	2
Clay, slightly sandy, greenish-gray, soft, iron stained.....	8 - 11.5	3.5
Sand, fine, white.....	11.5 - 12.5	1
Sand, clayey, fine, dark brown, mixed with organics; peat.....	12.5 - 15.0	2.5
Sand, silty, fine, dark brown.....	15 - 20	5

LITHOLOGIC LOG OF MONITOR WELL NARF-2

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan to gray, iron stained, mixed with gray to red clayey sand.....	0 - 4	4
Sand, very clayey, fine, tan to gray to red, iron stained, interbedded with gray to red, sandy clay.....	4 - 13.5	9.5
Sand, slightly clayey, fine, tan to red, iron stained with stringers of tan, sandy clay.....	13.5 - 16.0	2.5

LITHOLOGIC LOG OF MONITOR WELL NARF-3

Description	Depth (ft)	Thickness (ft)
Sand, very clayey, fine, tan to gray to red; interbedded with tan, sandy clay.....	0 - 6	6
Sand, clayey, fine, tan to red, iron stained.....	6 - 7.5	1.5
Sand, fine, white.....	7.5 - 8.0	0.5
Sand, clayey, fine, tan to brown, iron stained.....	8 - 9	1
Clay, sandy, tan to red, firm.....	9 - 14	5

LITHOLOGIC LOG OF MONITOR WELL NARF-4

Description	Depth (ft)	Thickness (ft)
Sand, clayey, fine, tan to red.....	0 - 4	4
Sand, silty, fine, black to dark gray.....	4 - 5.5	1.5
Sand, slightly silty, fine, tan.....	5.5 - 10	4.5
Sand, silty, fine, gray, interbedded with stringers of green, sandy clay.....	10 - 12	2
Sand, fine, gray, mixed with organics.....	12 - 14	2

LITHOLOGIC LOG OF MONITOR WELL NARF-5

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown, mixed with organics.....	0 - 3	3
Sand, slightly clayey, fine, gray.....	3 - 4.5	1.5
Sand, fine, white to gray.....	4.5 - 6.0	1.5
Sand, slightly clayey, fine, gray.....	6 - 10	4

LITHOLOGIC LOG OF MONITOR WELL NARF-6

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone road base.....	0 - 0.5	0.5
Sand, silty, fine, brown, mixed with organics.....	0.5 - 8.5	7.0
Clay, sandy, gray, iron stained, mixed with organics.....	8.5 - 11.0	2.5

LITHOLOGIC LOG OF TEMPORARY WELL NARFB-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan, mixed with organics.....	0 - 2.5	2.5
Sand, clayey, fine, orange, iron stained..	2.5 - 6.0	3.5
Sand, silty, fine, tan to orange, iron stained; odor of chemicals.....	6 - 32	26

LITHOLOGIC LOG FOR WELL NAS18-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown to gray, traces of clay.....	0 - 2	2.0
Sand, silty, fine, brown, zone of cemented sand at 4 ft, (shells at 6.5').....	2 - 11	7.0
Sand, clayey, fine, gray, mixed with organics (wood).....	11 - 12	1.0
Clay, sandy, gray.....	12 - 13	1.0
Sand, clayey, gray, mixed with organics...	13 - 14	1.0

LITHOLOGIC LOG FOR MONITOR WELL NAS28-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, black to cream.	0 - 3	3
Clay, slightly sandy, orange, stiff.....	3 - 7.5	4.5
Sand, slightly clayey, fine-grained, gray to green.....	7.5 - 10	2.5
Sand, silty, fine-grained, tan to white, with stringers of green clay.....	10 - 14	4
Clay, slightly sandy, orange, stiff.....	14 - 15	1
Sand, slightly clayey, fine-grained, gray.	15 - 16	1

LITHOLOGIC LOG FOR WELL NAS29-1

Description	Depth (ft)	Thickness (ft)
Sand, fine, dark brown mixed with wood fragments.....	0 - 1	1.0
Sand, silty, fine, gray, with landfill material.....	1 - 5	4.0
Clay, sandy, tan to gray.....	5 - 7	2.0
Sand, clayey, fine, gray, layer of black organic matter at 10'.....	7 - 14	7.0

LITHOLOGIC LOG FOR WELL NAS29-2

Description	Depth (ft)	Thickness (ft)
Sand, medium, brown to gray.....	0 - 2.5	2.5
Clay, sandy, tan to orange.....	2.5 - 5	2.5
Sand, silty, fine, gray.....	5 - 14	9.0

LITHOLOGIC LOG OF MONITOR WELL NAS30-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black and gray, mixed with organics.....	0 - 2	2
Clay, sandy, gray to orange, iron stained, with stringers of fine, white sand.....	2 - 6.5	4.5
Sand, clayey fine, gray, interbedded with stringers of fine, white sand.....	6.5 - 8.0	1.5
Sand, clayey, fine, gray.....	8 - 12	4

LITHOLOGIC LOG OF MONITOR WELL NAS30-2

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black, mixed with organics and limestone; fill material.....	0 - 1.5	1.5
Sand, fine, white.....	1.5 - 2.0	0.5
Clay, slightly sandy, gray, mixed with organics, iron stained.....	2 - 4	2
Sand, clayey, fine, gray.....	4 - 10	6

LITHOLOGIC LOG OF MONITOR WELL NAS30-3

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black, mixed with organics and limestone.....	0 - 0.5	0.5
Sand, silty, fine, tan to dark brown.....	0.5 - 5.0	4.5
Sand, slightly clayey, fine, gray.....	5 - 10	5

LITHOLOGIC LOG FOR NAS32-1

Description	Depth (ft)	Thickness (ft)
Sand, fine, dark brown, mixed with organics.....	0 - .5	0.5
Sand, clayey, fine, gray.....	.5 - 1.5	1.0
Sand, fine, dark brown, some evidence of decaying matter at 2 - 3', trace of gray clay.....	1.5 - 5	3.5
Sand, clayey, dark brown.....	5 - 6	1.0
Clay, sandy, gray to green.....	6 - 11	5.0
Sand, clayey, gray.....	11 - 14	3.0

LITHOLOGIC LOG FOR SOIL BORING B-1 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to tan...	0.5 - 2.5	2.0
Clay, sandy, dark gray to gray, stiff, iron stained.....	2.5 - 6.0	3.5
Sand, silty, fine-grained, tan.....	6.0 - 7.0	1.0
Sand, clayey, fine-grained, gray-green....	7.0 - 12.0	5.0
Sand, silty, fine-grained, gray-green.....	12.0 - 16.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-2 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to gray...	0.5 - 2.5	2.0
Clay, sandy, gray-green, stiff, iron stained.....	2.5 - 6.0	3.5
Sand, silty, fine-grained, gray, iron stained.....	6.0 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-3 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to tan...	0.5 - 2.5	2.0
Clay, sandy, gray to gray-green, stiff....	2.5 - 6.0	3.5
Sand, clayey, fine-grained, gray-green, stiff.....	6.0 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-4 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to tan...	0.5 - 2.5	2.0
Clay, sandy, gray-green, stiff.....	2.5 - 6.0	3.5
Sand, clayey, fine-grained, gray-green....	6.0 - 8.0	2.0
Sand, silty, fine-grained, gray-green.....	8.0 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-5 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to tan...	0.5 - 2.5	2.0
Clay, sandy, gray-green, stiff.....	2.5 - 6.0	3.5
Sand, silty, fine-grained, gray.....	6.0 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-6 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to tan...	0.5 - 2.5	2.0
Clay, sandy, gray-green, stiff, iron stained.....	2.5 - 6.0	3.5
Sand, silty, fine-grained, gray, with stringers of gray clay lenses.....	6.0 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-7 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to gray..	0.5 - 5.0	4.5
Clay, sandy, gray-green, stiff, iron stained.....	5.0 - 6.0	1.0
Sand, silty, fine-grained, gray, iron stained.....	6.0 - 8.0	2.0
Sand, clayey, fine-grained, gray-green....	8.0 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-8 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, gray to tan....	0.5 - 5.0	4.5
Clay, sandy, gray to green-gray, stiff, iron stained.....	5.0 - 8.0	3.0
Sand, silty, fine-grained, tan, iron stained.....	8.0 - 9.0	1.0
Clay, sandy, orange, soft, iron stained...	9.0 - 9.5	0.5
Sand, clayey, fine-grained, gray, iron stained.....	9.5 - 10.0	0.5

LITHOLOGIC LOG FOR SOIL BORING B-9 (SITE B)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, gray to tan.....	0 - 6.0	6.0
Sand, clayey, fine-grained, gray.....	6.0 - 8.0	2.0
Sand, silty, fine-grained, gray.....	8.0 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-10 (SITE B)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, tan to gray....	0 - 5.0	5.0
Clay, very sandy, gray, stiff, iron stained.....	5.0 - 6.0	1.0
Sand, silty, fine-grained, gray to brown..	6.0 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-11 (SITE B)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, gray to brown..	0 - 6.0	6.0
Clay, sandy, gray, stiff, iron stained....	6 - 7.0	1.0
Sand, silty, fine-grained, gray.....	7 - 10.0	3.0

LITHOLOGIC LOG FOR SOIL BORING B-12 (SITE B)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, tan to gray, mixed with organics.....	0 - 7.0	7.0
Sand, clayey, fine-grained, gray.....	7 - 8.0	1.0
Sand, silty, fine-grained, cream.....	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-13 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to cream.	1 - 3.5	2.5
Clay, sandy, gray, soft, iron stained.....	3.5 - 8.0	4.5
Sand, slightly clayey, fine-grained, tan..	8.0 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-14 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to cream.	1 - 3.0	2.0
Clay, sandy, gray, firm.....	3 - 6.0	3.0
Sand, clayey, fine-grained, gray-green....	6 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-15 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to cream.	1 - 3.0	2.0
Clay, sandy, gray-green, firm.....	3 - 7.5	4.5
Sand, silty, fine-grained, gray.....	7.5 - 10.0	2.5

LITHOLOGIC LOG FOR SOIL BORING B-16 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to cream.	1 - 4.0	3.0
Clay, sandy, gray, stiff, iron stained....	4 - 7.0	3.0
Sand, silty, fine-grained, gray.....	7 - 10.0	3.0

LITHOLOGIC LOG FOR SOIL BORING B-17 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to cream.	1 - 5.0	4.0
Clay, sandy, gray, soft, iron stained.....	5 - 8.0	3.0
Sand, very silty, fine-grained, gray-green	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-18 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to gray..	1 - 5.5	4.5
Clay, sandy, gray-green, soft.....	5.5 - 8.0	2.5
Sand, silty, fine-grained, gray.....	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-19 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to tan...	1 - 3.0	2.0
Clay, sandy, gray, soft, iron stained.....	3 - 6.0	3.0
Sand, clayey, fine-grained, gray-green, iron stained.....	6 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-20 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to tan...	1 - 4.0	3.0
Clay, sandy, gray, firm, iron stained.....	4 - 9.0	5.0
Sand, silty, fine-grained, gray.....	9 - 10.0	1.0

LITHOLOGIC LOG FOR SOIL BORING B-21 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, gray to tan....	0.5 - 4.0	3.5
Clay, sandy, gray-green, firm, mixed with organics.....	4 - 8.0	4.0
Sand, silty, fine-grained, gray.....	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-22 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to tan...	1 - 3.0	2.0
Clay, sandy, gray-green, firm, iron stained.....	3 - 6.0	3.0
Sand, clayey, fine-grained, gray.....	6 - 8.0	2.0
Sand, very silty, fine-grained, gray.....	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-23 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to tan...	1 - 3.0	2.0
Clay, sandy, gray, firm, iron stained, mixed with organics.....	3 - 5.5	2.5
Sand, silty, fine-grained, cream to gray..	5.5 - 10.0	4.5

LITHOLOGIC LOG FOR SOIL BORING B-24 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to tan...	1 - 3.0	2.0
Clay, sandy, gray, firm, iron stained.....	3 - 6.0	3.0
Sand, very silty, fine-grained, tan to gray.....	6 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-25 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to gray..	0.5 - 3.5	3.0
Clay, sandy, gray, firm, iron stained.....	3.5 - 6.0	2.5
Sand, very silty, fine-grained, tan to gray-green.....	6 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-26 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to gray..	1 - 3.0	2.0
Clay, sandy, gray, firm, iron stained.....	3 - 8.0	5.0
Sand, clayey, fine-grained, gray.....	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-27 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to gray..	0.5 - 3.5	3.0
Clay, sandy, gray-green, iron stained.....	3.5 - 8.0	4.5
Sand, clayey, fine-grained, gray.....	8 - 10.0	2.0

LITHOLOGIC LOG OF MONITOR WELL NFD-1

Description	Depth (ft)	Thickness (ft)
Sand, fine to coarse, tan, with cemented sand below 2 feet.....	0 - 5.0	5.0
Sand, fine to medium, gray.....	5.0 - 6.5	1.5
Sand, silty, fine, dark brown to gray.....	6.5 - 11.0	4.5
Sand, fine, dark gray, with some organics.	11.0 - 14.0	3.0

LITHOLOGIC LOG OF MONITOR WELL NFD-2

Description	Depth (ft)	Thickness (ft)
Sand, fine, tan to brown.....	0 - 2.0	2.0
Sand, silty, fine, gray to black, mixed with organics; pieces of wood.....	2.0 - 2.5	0.5
Sand, fine, gray.....	2.5 - 9.5	7.0

LITHOLOGIC LOG OF BORING B-1 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black, mixed with oil..	0 - 1	1
Sand, fine, tan.....	1 - 4	3

LITHOLOGIC LOG OF BORING B-2 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black, mixed with oil..	0 - 1	1.0
Sand, fine, tan.....	1 - 4.0	3.0

LITHOLOGIC LOG OF BORING B-3 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black, mixed with oil..	0 - 0.5	0.5
Sand, fine, tan.....	0.5 - 4.0	3.5

LITHOLOGIC LOG OF BORING B-4 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black to brown.....	0 - 3	3
Sand, fine, light brown.....	3 - 6	3
Sand, silty, fine, dark brown.....	6 - 9	3

LITHOLOGIC LOG OF BORING B-5 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, gray to brown.....	0 - 3.5	3.5
Peat.....	3.5 - 4.0	0.5
Sand, silty, fine, reddish-brown.....	4 - 8	4
Sand, clayey, fine, gray.....	8 - 14	6

LITHOLOGIC LOG OF BORING B-6 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, brown, mixed with oil.....	0 - 2.5	2.5
Sand, fine, brown.....	2.5 - 4.5	2
Peat.....	4.5 - 5.0	0.5
Sand, silty, fine, reddish-brown.....	5 - 6	1
Sand, clayey, fine, gray.....	6 - 14	8

LITHOLOGIC LOG OF BORING B-7 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, brown, mixed with oil.....	0 - 2.5	2.5
Sand, fine, tan.....	2.5 - 5.0	2.5
Sand, silty, fine, brown, mixed with organics; pieces of wood.....	5 - 6	1
Sand, clayey, fine, gray, with stringers of gray, sandy clay.....	6 - 14	8

LITHOLOGIC LOG OF BORING B-8 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, brown, mixed with oil.....	0 - 1.5	1.5
Sand, fine, brown.....	1.5 - 3.5	2
Sand, clayey, fine, gray.....	3.5 - 6.0	2.5
Sand, silty, fine, gray.....	6 - 14	8

LITHOLOGIC LOG OF BORING B-9 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, brown, mixed with oil.....	0 - 1.5	1.5
Sand, fine, tan.....	1.5 - 6.0	4.5
Sand, silty, fine, gray.....	6 - 14	8

LITHOLOGIC LOG OF BORING B-10 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, tan to brown, no oil.....	0 - 2.5	2.5
Sand, fine, tan.....	2.5 - 5.5	3
Sand, silty, fine, reddish-brown.....	5.5 - 7.5	2
Sand, silty, fine, gray.....	7.5 - 14.0	6.5

LITHOLOGIC LOG OF BORING B-11 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, dark brown.....	0 - 1.5	1.5
Sand, fine to coarse, tan to brown.....	1.5 - 6.0	4.5
Sand, clayey, fine, gray.....	6 - 7	1
Sand, silty, fine, gray.....	7 - 14	7

LITHOLOGIC LOG OF BORING B-12 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, mixed with oil.....	0 - 1.5	1.5
Sand, silty, fine, tan to brown.....	1.5 - 5.0	3.5
Sand, fine, tan.....	5 - 6	1
Sand, silty, fine, gray.....	6 - 14	8

LITHOLOGIC LOG OF BORING B-13 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown, mixed with oil and roots.....	0 - 5.5	5.5
Sand, silty, fine, reddish-brown.....	5.5 - 6.5	1
Sand, clayey, fine, gray.....	6.5 - 7.5	1
Sand, silty, fine, gray.....	7.5 - 14.0	6.5

LITHOLOGIC LOG OF BORING B-14 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 5.5	5.5
Sand, silty, fine, dark brown.....	5.5 - 7.0	1.5
Sand, clayey, fine, gray; strong odor of petroleum.....	7.0 - 8.5	1.5
Sand, silty, fine, gray.....	8.5 - 14.0	5.5

LITHOLOGIC LOG OF BORING B-15 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 6	6
Sand, silty, fine, tan to brown; strong odor of petroleum.....	6 - 9	3
Sand, silty, fine, gray.....	9 - 14	5

LITHOLOGIC LOG OF BORING B-16 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, tan.....	0 - 1.5	1.5
Sand, silty, fine, dark brown to gray, mixed with oil.....	1.5 - 7.0	5.5
Sand, silty, fine, reddish-brown.....	7 - 9	2
Sand, clayey, fine, gray.....	9 - 11	2
Sand, silty, fine, gray.....	11 - 14	3

LITHOLOGIC LOG OF BORING B-17 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, tan to dark brown.....	0 - 1.5	1.5
Sand, silty, fine, dark brown to black, mixed with oil.....	1.5 - 5.0	3.5
Sand, silty, fine, gray to reddish-brown..	5 - 7	2
Sand, silty, fine, gray.....	7 - 14	7

LITHOLOGIC LOG OF BORING B-18 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan to dark brown, mixed with oil.....	0 - 4	4
Sand, silty, fine, dark brown, mixed with organics, roots, and peat.....	4 - 5.5	1.5
Sand, fine, brown.....	5.5 - 7.0	1.5
Sand, silty, fine, reddish-brown.....	7 - 14	7

LITHOLOGIC LOG OF BORING B-19 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan to black, mixed with oil.....	0 - 6	6
Sand, silty, fine, gray to brown; strong odor of petroleum.....	6 - 7.5	1.5
Sand, silty, fine, reddish-brown.....	7.5 - 14.0	6.5

LITHOLOGIC LOG OF BORING B-20 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan to black, mixed with oil.....	0 - 5	5
Sand, silty, fine, reddish-brown.....	5 - 7	2
Sand, silty, fine, gray.....	7 - 10	3

LITHOLOGIC LOG OF BORING B-21 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 7	7
Sand, silty, fine, tan to reddish-brown...	7 - 14	7

LITHOLOGIC LOG OF BORING B-22 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 3	3
Sand, fine, tan.....	3 - 4	1
Sand, silty, fine, dark brown to brown....	4 - 14	10

LITHOLOGIC LOG OF BORING B-23 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 4.5	4.5
Sand, silty, fine, reddish-brown to gray..	4.5 - 9.0	4.5
Sand, clayey, fine, gray.....	9 - 10	1
Sand, silty, fine, gray.....	10 - 14	4

LITHOLOGIC LOG OF BORING B-24 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 4	4
Sand, silty, fine, brown.....	4 - 6.5	2.5
Sand, clayey, fine, gray.....	6.5 - 8.5	2
Sand, silty, fine, gray.....	8.5 - 13.5	5

LITHOLOGIC LOG OF BORING B-25 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 2	2
Sand, silty, fine, reddish-brown.....	2 - 4.5	2.5
Sand, clayey, fine, gray.....	4.5 - 7.0	2.5
Sand, silty, fine, gray.....	7 - 14	7

LITHOLOGIC LOG OF BORING B-26 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown, mixed with oil..	0 - 1	1
Sand, fine to coarse, tan; fill material..	1 - 4.5	3.5
Sand, silty, fine, reddish-brown.....	4.5 - 6.0	1.5
Sand, clayey, fine, gray.....	6 - 7	1
Sand, silty, fine, gray.....	7 - 8.5	1.5

LITHOLOGIC LOG OF BORING B-27 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 3	3
Sand, silty, fine, brown.....	3 - 5	2
Sand, clayey, fine, gray.....	5 - 6.5	1.5
Sand, silty, fine, gray.....	6.5 - 10.0	3.5

LITHOLOGIC LOG OF BORING B-28 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 5	5
Sand, silty, fine, brown.....	5 - 8.5	3.5
Sand, clayey, fine, gray.....	8.5 - 11.0	2.5
Sand, silty, fine, gray.....	11 - 13	2

LITHOLOGIC LOG OF BORING B-29 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 6	6
Sand, silty, fine, reddish-brown.....	6 - 8.5	2.5
Sand, clayey, fine, gray.....	8.5 - 13.0	4.5

LITHOLOGIC LOG OF BORING B-30 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown to black, mixed with oil.....	0 - 9	9
Sand, silty, fine, reddish-brown.....	9 - 11	2
Sand, clayey, fine, gray.....	11 - 14	3

LITHOLOGIC LOG OF BORING B-31 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 7.5	7.5
Sand, silty, fine, reddish-brown.....	7.5 - 11.0	3.5
Sand, clayey, fine, gray.....	11 - 14	3

LITHOLOGIC LOG OF BORING B-32 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, tan.....	0 - 7	7
Sand, silty, fine, reddish-brown.....	7 - 11	4
Sand, clayey, fine, gray.....	11 - 14	3

SECTION 2

Lithologic Logs of Wells and Soil Borings at the NAS and NFD Used for the Geologic Cross-Sections

Lithologic Log of Well S-4

Description	Depth (ft)	Thickness (ft)
No recovery	0 - 5	5
Sand, slightly clayey, very fine to fine-grained, white, red, orange, black and gray; assorted fill material	5 - 7	2
No recovery	7 - 10	3
Sand, slightly clayey, very fine to fine-grained, gray, dark-gray and brown	10 - 12	2
No recovery	12 - 15	3
Sand, very fine to fine-grained, light-tan to white and brown	15 - 17	2
No recovery	17 - 20	3
Sand, very fine to fine-grained, clean and pure, white and some orange	20 - 22	2
Sand, very fine-grained, tan	22 - 30	8
Sandy clay, gray, with some shell fragments, sand, very fine-grained, silty	30 - 50	20

LITHOLOGIC LOG FOR WELL NAS4-6

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown to gray.....	0 - 7.5	7.5
Sand, clayey, gray.....	7.5 - 9	1.5
Clay, sandy, gray.....	9 - 13	4.0
Sand, clayey, gray.....	13 - 14	1.0

LITHOLOGIC LOG FOR WELL NAS4-7

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, gray to gray.....	0 - 5	5.0
Sand, clayey, fine, gray.....	5 - 7	2.0
Clay, sandy, gray.....	7 - 14	7.0

LITHOLOGIC LOG FOR WELL NAS4-8

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown to gray, some clay from fill material.....	0 - 8.0	8.0
Sand, clayey, fine, green.....	8 - 11.5	3.5
Sand, silty, fine, green.....	11.5 - 14	2.5

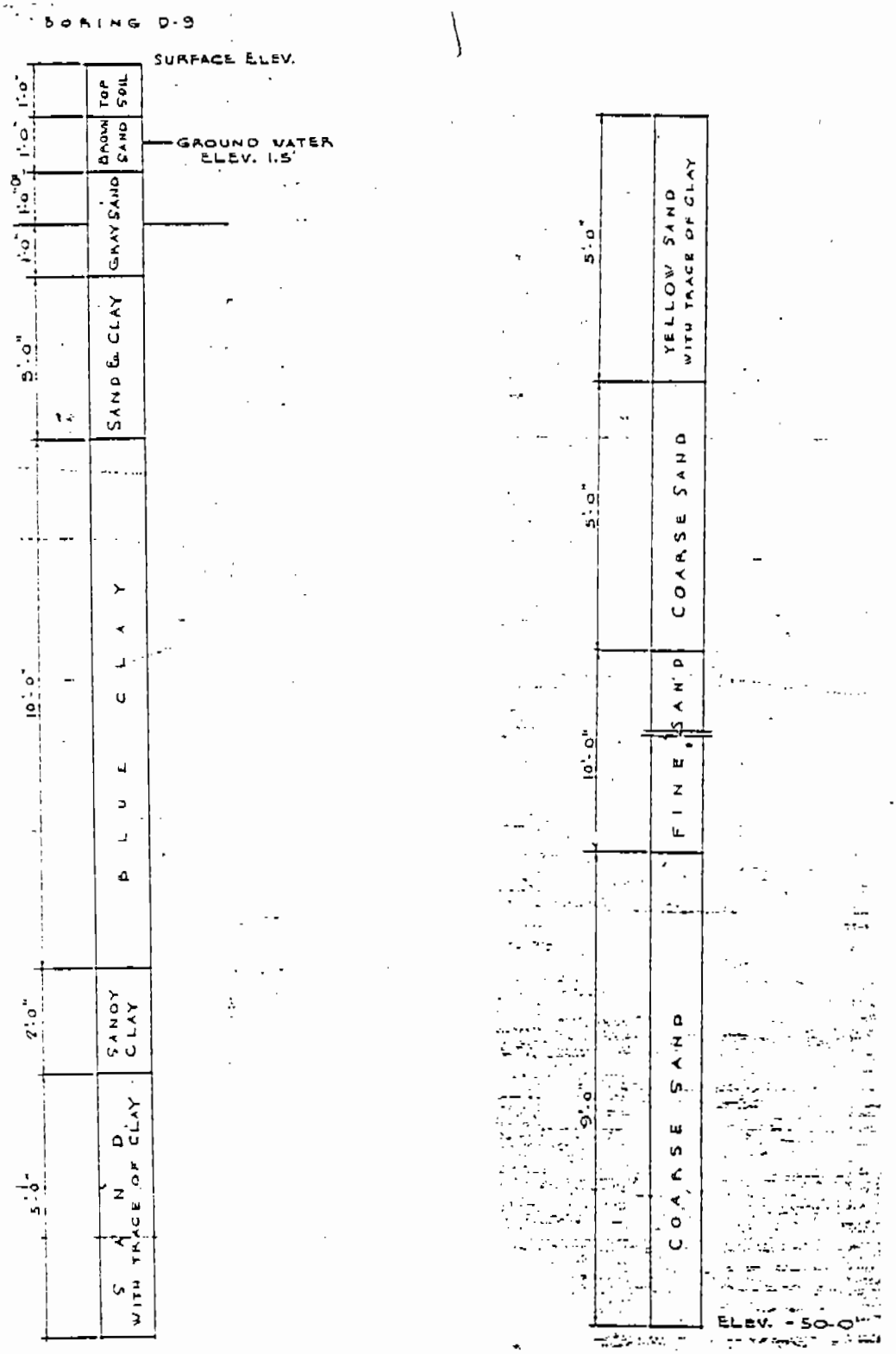
Table Lithologic Log of Well B -7[1]

DEPTH IN FEET	N	MATERIAL DESCRIPTION
0		BROWN TOPSOIL - GRASS
2	9	REDDISH YELLOW SANDY CLAY, W/TRACE OF ORGANICS, STIFF, MOIST
4	19	BROWN FINE SAND, POORLY GRADED, FIRM, MOIST
6	9	BROWN TO WHITE FINE SAND, POORLY GRADED, LOOSE, MOIST
8	7	
10	6	
12		W.L. 11.6' 3-18-81
14	15	YELLOWISH RED TO GRAY, SLIGHTLY SANDY CLAY, STIFF, WET
16		
18		
20	16	BROWN CLAYEY, FINE SAND, POORLY GRADED, FIRM, MOIST
22		
24	53	WHITE TO YELLOW, FINE SAND, POORLY GRADED, DENSE, TO VERY DENSE, WET
26		
28		
30	35	
32		
34	24	VERY PALE BROWN FINE SAND, POORLY GRADED, VERY FIRM, WET
36		
38		
40	13	WHITE FINE SAND, W/ TRACE OF CLAY, POORLY GRADED, FIRM, WET
42		
44	26	GRAY FINE SAND, POORLY GRADED, VERY FIRM, WET
46		
46		
50	39	GRAY FINE SAND, POORLY GRADED, DENSE, WET
52		
54	72	VERY PALE BROWN FINE SAND, POORLY GRADED, VERY DENSE, WET
56		
58		
60	72	
62		
64	68	VERY PALE BROWN FINE SAND, POORLY GRADED, VERY DENSE, WET
66		
68		
70	87	BORING TERMINATED @ 70.0'

BORING B-7
N 2,140,680
E 288,095
TOP EL. 18.0
DATE: 3-18-81

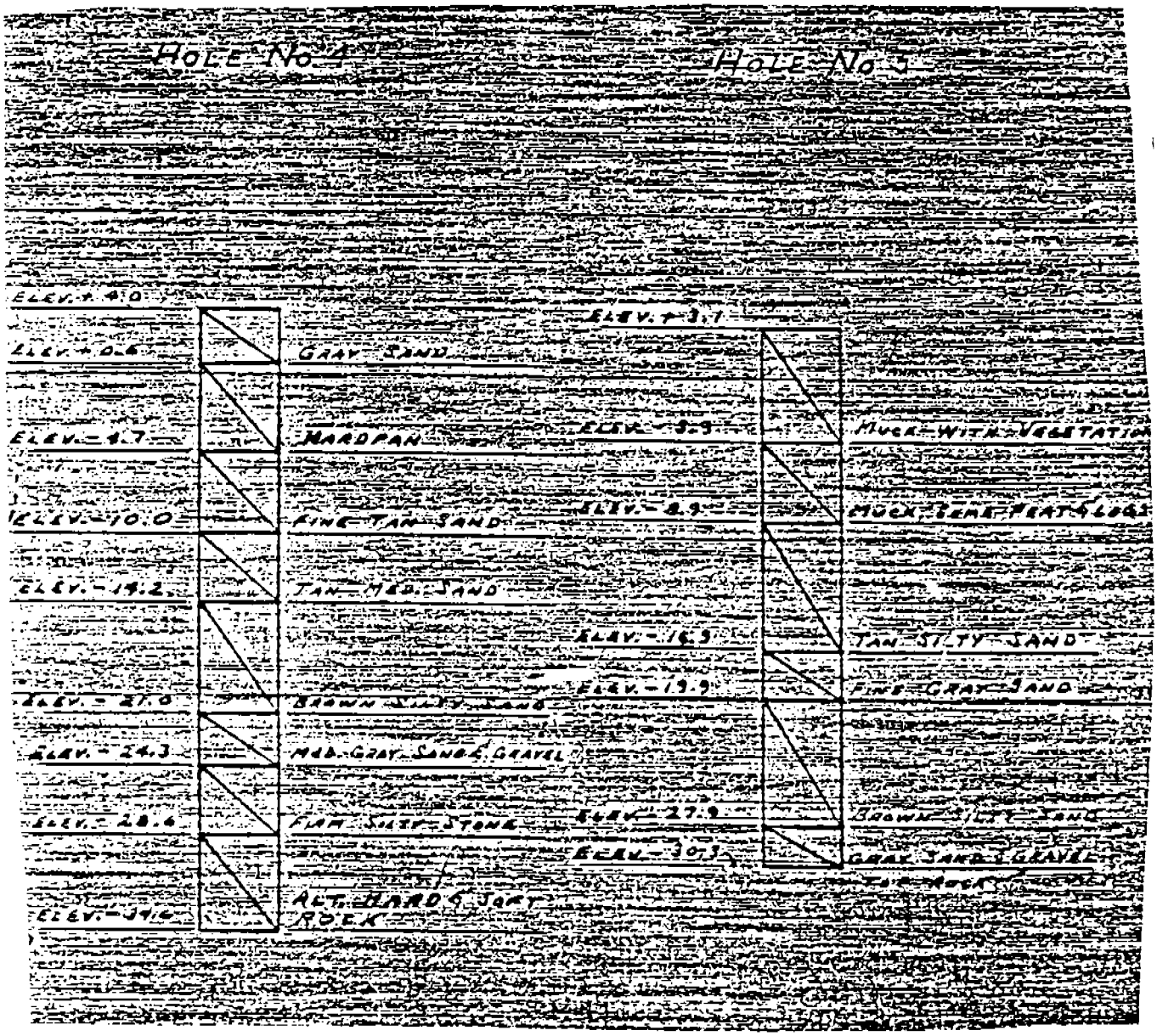
[1]Source: Burns & McDonnell, Kansas City, 1982

Lithologic Log of Soil Boring D-7[1/]



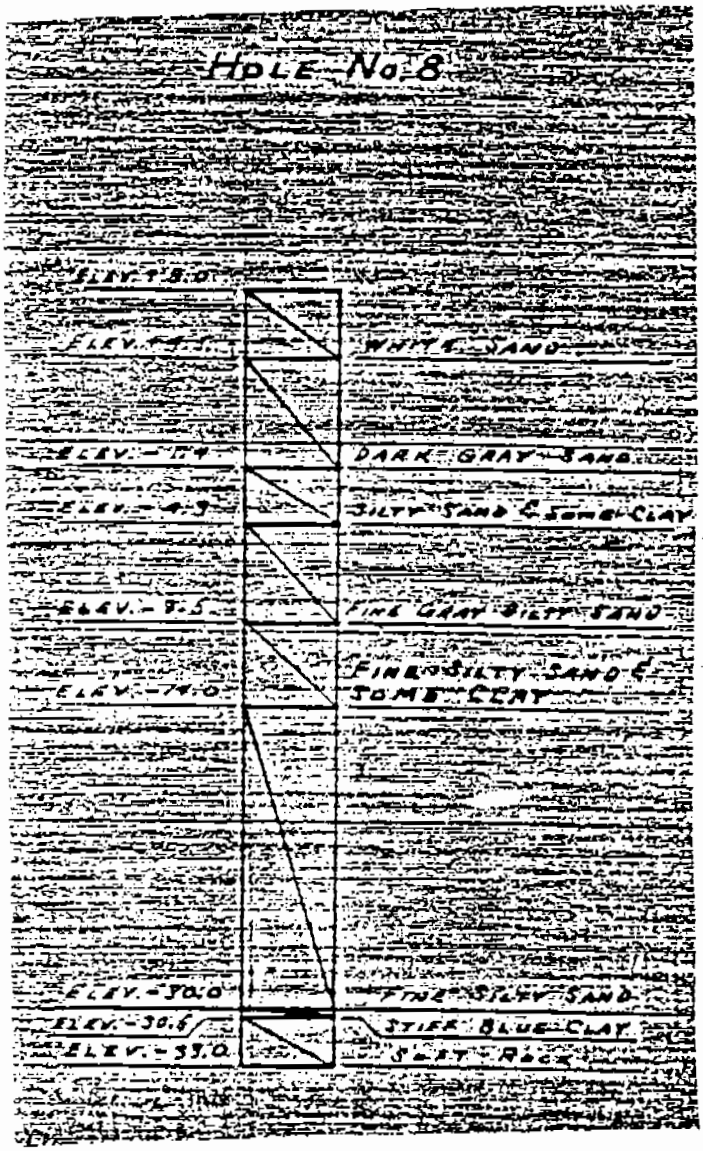
[1/]Source: Robert and Company, Inc., Architects and Engineers, Atlanta, GA, 1940.

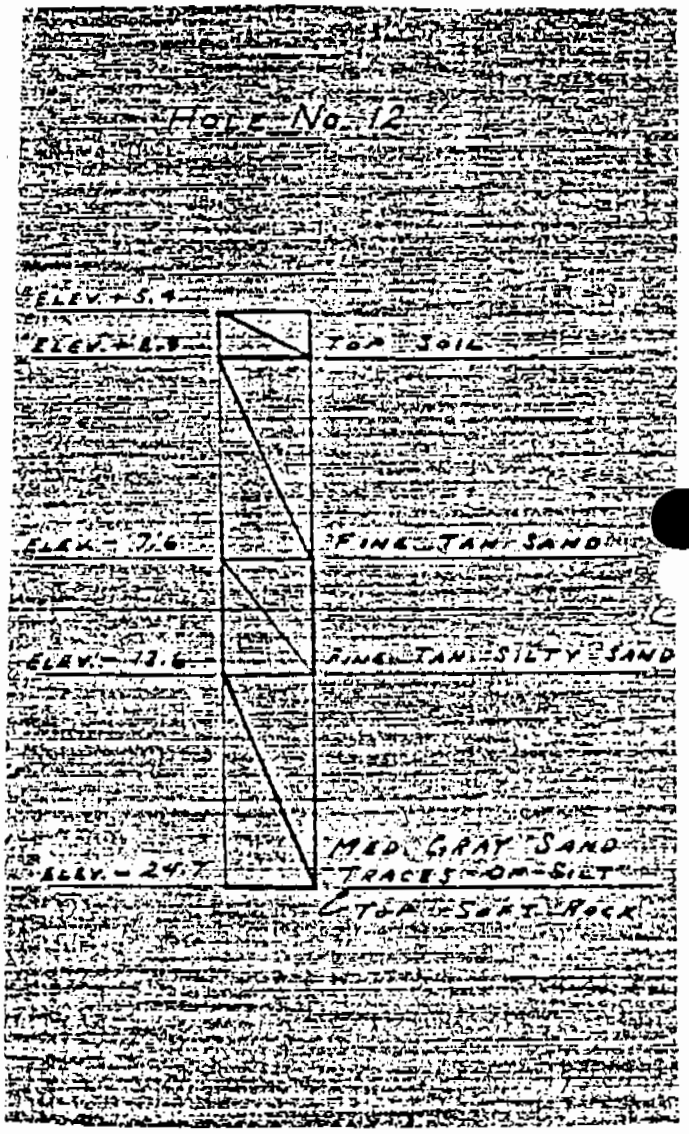
Lithologic Log of Soil Boring No. 4 and No. 5[1/]



[1/]Source: District Public Works Office DPW Drawing No. NAJX-136.

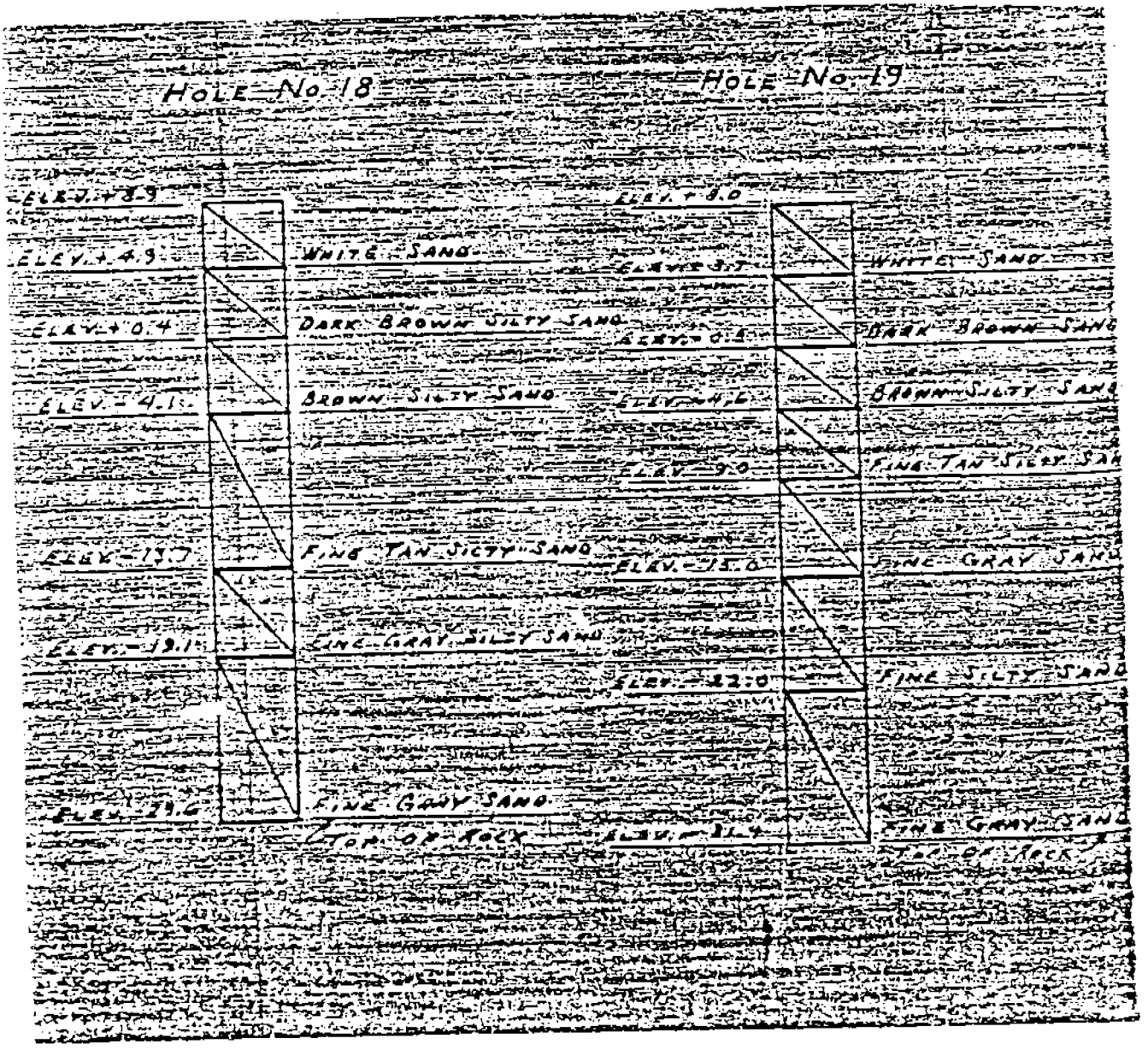
Lithologic Log of Soil Boring Nos. 8 and 12[1/]





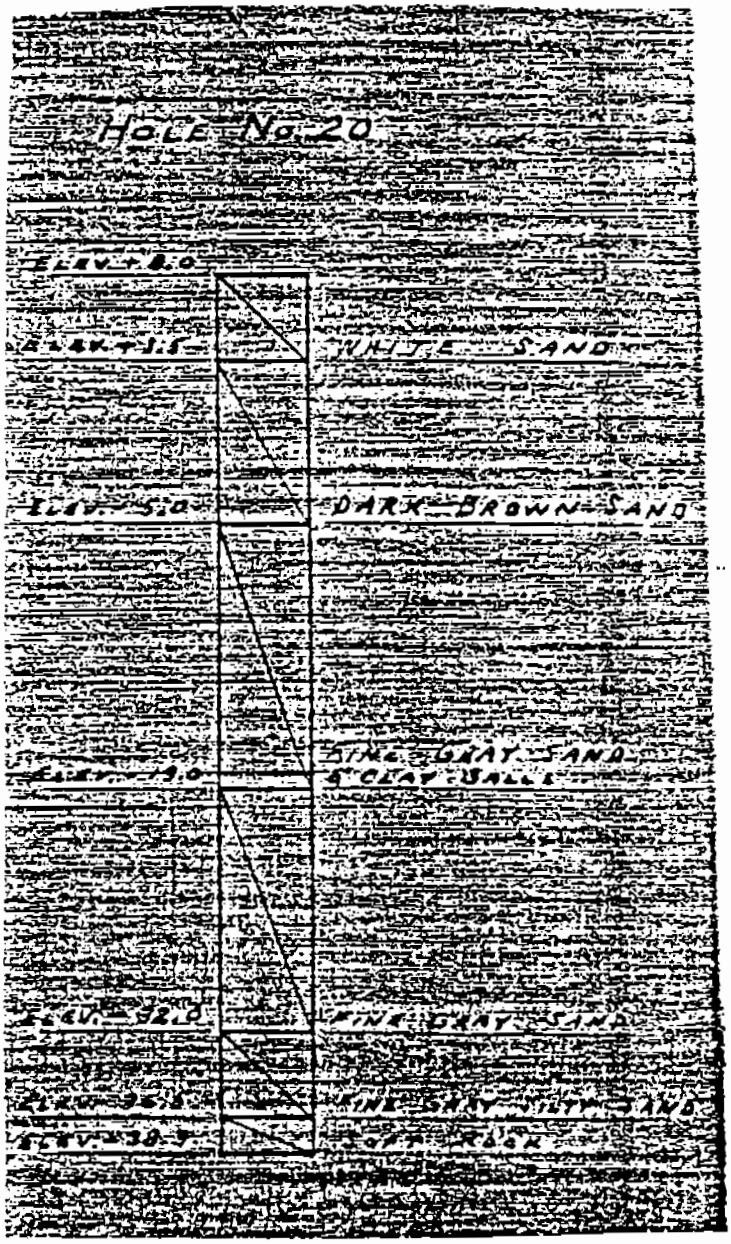
[1/]Source: District Public Works Office, DPW Drawing No. NAJX-136

Lithologic Log of Soil Boring Nos. 18 and 19[1/]



[1/]Source: District Public Works Office, DPW Drawing No. 136

Lithologic Log of Soil Boring No. 20[1/]



[1/]Source: District Public Works Office, DPW Drawing No. 136.

LITHOLOGIC LOG OF SOIL BORING HA-22[1/]

Description	Depth (ft)	Thickness (ft)
Fine sand, trace silt, dark gray, moist (SP).....	0 - 6	6

1/ Source: Brevard Engineering, Cape Canaveral, FL, 1975, NAVFAC Drawing No. 5039448

APPENDIX C

Laboratory Water-Qualaity and Sediment Analysis Results For Individual Sites

TABLE 1. Water-Quality Parameters Measured in the Field

SECTION 1. Fire-Fighting Area (Site No. 2)
SECTION 2. Pine Tree Planting Area (Site No. 4)
SECTION 3. Shoreline Fill (Site No. 5)
SECTION 4. Old Disposal Area (Site No. 9)
SECTION 5. Radium Paint Waste Disposal Pit (Site No. 13)
SECTION 6. NARF Area (Site Nos. 11, 12, 14, 15, 16)
SECTION 7. Radioactive Waste Fill Area (Site No. 18)
SECTION 8. Fire Pit Area (Site No. 28)
SECTION 9. Organic Disposal Area (Site No. 29)
SECTION 10. Old Drum Storage Lot (Site No. 30)
SECTION 11. Base Landfill (Site No. 32)
SECTION 12. Industrial Wastewater Discharge Area (Site No. 40)
SECTION 13. Oil Pond and Land Spreading Area (NFD: Site No. 5)

TABLE 1. WATER-QUALITY PARAMETERS MEASURED IN THE FIELD

WELL NUMBER	TEMPERATURE (C)	pH (Units)	SPECIFIC CONDUCTANCE (umhos/cm)	DATE SAMPLED MO.-DAY-YR
NAS2-1	18	5.93	-	4-16-84
NAS4-1	26	5.23	75	9-11-83
NAS4-2	26	6.07	310	9-11-83
NAS4-3	24	5.52	110	9-11-83
NAS5-1	22	7.49	600	5-16-85
NAS9-1	24	6.90	1400	9-10-83
NAS13-1	25	6.18	-	4-15-84
NARF-1	29	11.88	2010	9-11-83
NARF-2	28	5.51	70	9-10-83
NARF-3	31	6.07	360	9-10-83
NARF-4	26	6.81	610	9-10-83
NARF-5	27	6.17	550	9-10-83
NARF-6	30	6.35	400	9-10-83
NARFB-1	28	6.73	610	9-10-83
NAS18-1	19	6.75	-	4-15-84
NAS28-1	20	6.68	260	4-3-85
NAS29-1	26	6.38	-	4-17-84
NAS29-2	19	6.28	-	4-17-84
NAS30-1	25	5.37	145	9-11-83
NAS30-2	27	6.13	420	9-11-83
NAS30-3	27	6.10	290	9-11-83
NAS32-1	16.5	6.71	-	4-17-84
NFD-1	28	7.61	430	9-9-83
NFD-2	28	5.60	110	9-9-83

SECTION 1

Fire-Fighting Area
Site No. 2

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty and Miller - Tampa

Report No.: 84-448

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] NAS-2-1 / 8402010
chloromethane		
dichlorodifluoromethane		
vinyl chloride		
chloroethane		
methylene chloride		
trichlorofluoromethane		
1,1-dichloroethene		
1,1-dichloroethane		
trans-1,2-dichloroethene		
chloroform		
1,2-dichloroethane		
1,1,1-trichloroethane		
carbon tetrachloride		
bromodichloromethane		
1,2-dichloropropane		
trans-1,3-dichloropropane		
trichloroethene		
dibromochloromethane		
1,1,2-trichloroethane		
cis-1,3 dichloropropene		
2-chloroethylvinyl ether		
bromoform		
1,1,2,2-tetrachloroethane		
tetrachloroethene		
chlorobenzene		
Detection Limit		0.1

[1] U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2] Concentrations less than the detection limit are left blank.

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Pesticides and PCBs (Method 608[1])

Client: Geraghty and Miller - Tampa Report No.: 84-448

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] NAS-2-1 8402010
PESTICIDES AND PCBs		
(89P) aldrin		
(90P) dieldrin		
(91P) chlordane		
(92P) 4,4'-DDT		
(93P) 4,4'-DDE		
(94P) 4,4'-DDD		
(95P) endosulfan-alpha		
(96P) endosulfan-beta		
(97P) endosulfan sulfate		
(98P) endrin		
(99P) endrin aldehyde		
(100P) heptachlor		
(101P) heptachlor epoxide		
(102P) BHC-alpha		
(103P) BHC-beta		
(104P) BHC-delta		
(105P) BHC-gamma (lindane)		
(106P) PCB - 1242		
(107P) PCB - 1254		
(108P) PCB - 1221		
(109P) PCB - 1232		
(110P) PCB - 1248		
(111P) PCB - 1260		
(112P) PCB - 1016		
(113P) toxaphene		
Detection Limit		0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

SECTION 2

Pine Tree Planting Area
Site No. 4

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geragnty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by:

Date Analysis Completed: October 2, 1983 Checked by:

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] NAS-4-1 8308120	NAS-4-2 8308121	NAS-4-3 8308122
chloromethane				
dichlorodifluoromethane				
vinyl chloride				
chloroethane				
methylene chloride				
trichlorofluoromethane				
1,1-dichloroethene				
1,1-dichloroethane				
trans-1,2-dichloroethene			9.1	
chloroform				
1,2-dichloroethane				
1,1,1-trichloroethane				
carbon tetrachloride				
bromodichloromethane				
1,2-dichloropropane				
trans-1,3-dichloropropane				
trichloroethene		15	45	0.7
dibromochloromethane				
1,1,2-trichloroethane				
cis-1,3 dichloropropene				
2-chloroethylvinyl ether				
bromoform				
1,1,2,2-tetrachloroethane				
tetrachloroethene			1.1	
chlorobenzene				
Detection Limit		0.1	0.1	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 60074-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

CONCENTRATION OF METALS & CYANIDES

Concentration (ppm)

Client ID	CAA ID	Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Sl	Ag	Tl	Zn	Cyanide	Total Organic Carbon
NAS4-1	8308120	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	1.0
NAS4-2	8308121	-----	-----	-----	<0.010	<0.25	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	3.7
NAS4-3	8308122	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	1.0

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275

412-788-1080

RECEIVED
SEP 21 1993
GERAGHTY & MILLER, INC.

LAB ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700360
NUS CLIENT NO: 891604

REPORT DATE: 09/14/93

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/93

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
NAS 4-1 PINE TREE AREA	08/26	13082056		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M049 Barium, leachable (Ba)			0.1	mg/l
M098 Cadmium, leachable (Cd)			< 0.005	mg/l
M149 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M259 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 4-2 PINE TREE AREA	08/26	13082057		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M049 Barium, leachable (Ba)			0.1	mg/l
M098 Cadmium, leachable (Cd)			0.009	mg/l
M149 Chromium, leachable (Cr)			0.02	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M259 Mercury, leachable (Hg)			0.0016	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 4-3 PINE TREE AREA 1425	08/26	13082058		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M049 Barium, leachable (Ba)			0.3	mg/l
M098 Cadmium, leachable (Cd)			0.036	mg/l
M149 Chromium, leachable (Cr)			0.02	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M259 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l

SECTION 3

Shoreline Fill West of Pier 142
Site No. 5

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 5-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 5-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 5-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
ARSENIC	< 0.005	mg/l
BARIUM	0.28	mg/l
CADMIUM	< 0.01	mg/l
CHROMIUM, TOTAL	< 0.01	mg/l
LEAD	< 0.01	mg/l
MERCURY	< 0.1	µg/l
SELENIUM	< 0.005	mg/l
SILVER	< 0.01	mg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully submitted,

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 5-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : RADIOACTIVE ANALYSIS		UNITS
GROSS ALPHA	< 2.3	pCi/l
GROSS BETA	14±3.1	pCi/l
RADIUM 226	0.7±0.1	pCi/l
RADIUM 228	< 0.8	pCi/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

SECTION 4

Old Disposal Area
Site No. 9

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geragnty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by:

Date Analysis Completed: October 2, 1983 Checked by:

Compound	Sample ID: NAS-9-1 CAA ID: 8308123
	Concentration ug/l (ppb)[2]
chloromethane	
dichlorodifluoromethane	
vinyl chloride	
chloroethane	
methylene chloride	1.2
trichlorofluoromethane	
1,1-dichloroethene	
1,1-dichloroethane	
trans-1,2-dichloroethene	21
chloroform	
1,2-dichloroethane	
1,1,1-trichloroethane	
carbon tetrachloride	
bromodichloromethane	
1,2-dichloropropane	
trans-1,3-dichloropropane	
trichloroethene	1.2
dibromochloromethane	
1,1,2-trichloroethane	
cis-1,3 dichloropropene	
2-chloroethylvinyl ether	
bromoform	
1,1,2,2-tetrachloroethane	
tetrachloroethene	
chlorobenzene	
Detection Limit	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL. Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

CONCENTRATION OF METALS & CYANIDES

Concentration (ppm)

Client ID	CAA ID	Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Si	Ag	Tl	Zn	Cyanide	Total Organic Carbon
HAS9-1	8308123	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	17.

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700360
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
NAS 9-1 OLD DISPOSAL AREA 1240	08/26	13082061		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.2	mg/l
M098 Cadmium, leachable (Cd)			0.028	mg/l
M148 Chromium, leachable (Cr)			0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 9-2 OLD DISPOSAL AREA 1247	08/26	13082062		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.2	mg/l
M098 Cadmium, leachable (Cd)			0.17	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 9-3 OLD DISPOSAL AREA 1255	08/26	13082063		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			0.002	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			0.071	mg/l
M148 Chromium, leachable (Cr)			0.02	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l

SECTION 5

Radium Paint Waste Disposal Pit
Site No. 13

Results of Radiological Analyses (Method 900.0)[1]

Constituent	Concentration pCi/l Client ID: NAS 13-1 CAA ID: 8402014
Gross alpha activity	54±7

[1]U.S. EPA. 1980. Procedures for Measurement of Radioactivity in Drinking Waters. EPA 600/4-80-032. EPA/EMSL, Cincinnati, Ohio. August, 1980.

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 61244 September 21, 1984

Sample of WATER

Date Received August 31, 1984

For GERAGHTY & MILLER, P.O. Box 271173, Tampa, FL 33688
Attn: Mr. Fred Sequiti

Marks: NAS-13-1

CERTIFICATE OF ANALYSIS OR TESTS

METHOD 601 - All Units ppb	CONCENTRATION	DETECTION LIMIT
Bromodichloromethane	BDL	1.0
Bromoform	BDL	1.0
Bromomethane	BDL	1.0
Carbon Tetrachloride	BDL	1.0
Chlorobenzene	BDL	1.0
Chloroethane	BDL	1.0
2-Chloroethylvinyl Ether	BDL	1.0
Chloroform	BDL	1.0
Chloromethane	BDL	1.0
Dibromochloromethane	BDL	1.0
1,2-Dichlorobenzene	BDL	1.0
1,3-Dichlorobenzene	BDL	1.0
1,4-Dichlorobenzene	BDL	1.0
Dichlorodifluoromethane	BDL	1.0
1,1-Dichloroethane	BDL	1.0
1,2-Dichloroethane	BDL	1.0
1,1-Dichloroethene	BDL	1.0
Trans-1,2-Dichloroethene	BDL	1.0
1,2-Dichloropropane	BDL	1.0
Cis-1,3-Dichloropropene	BDL	1.0
Trans-1,3-Dichloropropene	BDL	1.0
Methylene Chloride	BDL	1.0
1,1,2,2-Tetrachloroethane	BDL	1.0
Tetrachloroethene	BDL	1.0
1,1,1-Trichloroethane	BDL	1.0
1,1,2-Trichloroethane	BDL	1.0
Trichloroethene	BDL	1.0
Trichlorofluoromethane	BDL	1.0
Vinyl Chloride	BDL	1.0

BDL = Below Detection Limit

Respectfully submitted,

TECHNICAL SERVICES, INC.

BY Harvey C. Gray, Jr.

LABORATORY I.D. NO. 82145

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 61244

September 21, 1984

Sample of WATER

Date Received September 4, 1984

For GERAGHTY & MILLER, P.O. Box 271173, Tampa, FL 33688
Attn: Mr. Fred Sequiti

Marks: NAS-13-1

CERTIFICATE OF ANALYSIS OR TESTS

Radium 226, pCi/liter:	6 ± 2
Radium 228, pCi/liter:	<1
Gross Alpha, pCi/liter:	6 ± 3
Gross Beta, pCi/liter:	4 ± 2

Respectfully submitted,

TECHNICAL SERVICES, INC.

By Harvey C. Grace, Jr.

LABORATORY I.D. NO. 82145

SECTION 6

NARF Area
Site Nos. 11, 12, 14, 15, 16

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geragnty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by:

Date Analysis Completed: October 2, 1983 Checked by:

Compound	Sample ID: NARF-6 CAA ID: 8308119	Concentration ug/l (ppb)[2] NARF-81 8308113
chloromethane		
dichlorodifluoromethane		
vinyl chloride		
chloroethane		
methylene chloride		
trichlorofluoromethane		
1,1-dichloroethene	16	53,500
1,1-dichloroethane		
trans-1,2-dichloroethene	190	8000
chloroform	5.5	
1,2-dichloroethane		
1,1,1-trichloroethane	22	25,500
carbon tetrachloride		
bromodichloromethane		
1,2-dichloropropane		
trans-1,3-dichloropropane		
trichloroethene	6.0	155,300
dibromochloromethane		
1,1,2-trichloroethane		
cis-1,3 dichloropropene		
2-chloroethylvinyl ether		
bromoform		
1,1,2,2-tetrachloroethane		
tetrachloroethene		480
chlorobenzene		
Detection Limit	0.1	100

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geragnty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by:

Date Analysis Completed: October 2, 1983 Checked by:

Site 16

Compound	Sample ID: NARF-1 CAA ID: 8308114	NARF-2 8308 115	NARF-3 8308 116	NAEF-4 8308117	NARF-5 8308118
	Concentration ug/l (ppb)[2]				
chloromethane					
dichlorodifluoromethane					
vinyl chloride				270	
chloroetnane					
methylene chloride	0.6		1.8		
trichlorofluoromethane					
1,1-dichloroethene	0.3		0.2	12	
1,1-dichloroetnane					
trans-1,2-dichloroethene	0.4		2.2	1470	7.6
chloroform					
1,2-dichloroethane					
1,1,1-trichloroethane	0.7		0.5	6.2	
carbon tetrachloride					
bromodichloromethane					
1,2-dichloropropane					
trans-1,3-dichloropropane					
[illegible]chloroethene	23	3.9	6.1	170	4.9
dibromochloromethane					
1,1,2-trichloroetnane					
cis-1,3 dichloropropene					
2-chloroethylvinyl ether					
bromoform					
1,1,2,2-tetrachloroethane					
tetrachloroethene				1.8	
chlorobenzene					
Detection Limit	0.1	0.1	0.1	0.1	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

CONCENTRATION OF METALS & CYANIDES

Concentration (ppm)

Client ID	CAA ID	Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Sl	Ag	Tl	Zn	Cyanide	Total Organic Carbon
NARFB-1	8308113	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	
NARF-1	8308114	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	0.007	3.9
NARF-2	8308115	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	0.010	<1.0
NARF-3	8308116	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	0.071	3.3
NARF-4	8308117	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	6.6
NARF-5	8308118	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	3.2
NARF-6	8308119	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	9.5

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700300
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
NAS 15-1 PAINT & SLUDGE DISPOSAL AREA	08/26	13082064		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M049 Barium, leachable (Ba)			0.1	mg/l
M098 Cadmium, leachable (Cd)			0.15	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			1.66	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 15-2 PAINT & SLUDGE DISPOSAL AREA	08/26	13082065		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M049 Barium, leachable (Ba)			0.3	mg/l
M098 Cadmium, leachable (Cd)			0.041	mg/l
M148 Chromium, leachable (Cr)			0.02	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 15-3 PAINT & SLUDGE DISPOSAL AREA	08/26	13082066		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M049 Barium, leachable (Ba)			0.3	mg/l
M098 Cadmium, leachable (Cd)			< 0.005	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l

SECTION 7

Radioactive Waste Fill Area
Site No. 18

Results of Radiological Analyses (Method 900.0)[1]

Constituent	Concentration pCi/l Client ID: CAA ID:	 NAS18-1 8402015
Gross alpha activity		0±3

[1]U.S. EPA. 1980. Procedures for Measurement of Radioactivity in Drinking Waters. EPA 600/4-80-032. EPA/EMSL, Cincinnati, Ohio. August, 1980.

SECTION 8

Fire Pit
Site No. 28

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

June 4,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS 28-1		UNITS
ACRYLONITRILE	< 50	µg/l
POLYCHLORINATED BIPHENYLS	< 1.0	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	4	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

June 4,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS 28-1		UNITS
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

Envirapact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 28-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : PCB ANALYSIS		UNITS
POLYCHLORINATED BIPHENYLS	< 1.0	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

4790 N.W. 157th Street
Hialeah, Florida 33014
Telephone: (305) 620-1700
Fla. Wats: (800) 432-9706

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS 28-1 SOIL		UNITS
POLYCHLORINATED BIPHENYLS	103	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

SECTION 9

Organic Disposal Area
Site No. 29

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty and Miller - Tampa

Report No.: 84-448

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] NAS-29-1 8402016	NAS-29-2 8402017
chloromethane			3.4
dichlorodifluoromethane			
vinyl chloride			
chloroethane			
methylene chloride			
trichlorofluoromethane			
1,1-dichloroethene			
1,1-dichloroethane			
trans-1,2-dichloroethene		0.6	
chloroform			
1,2-dichloroethane			
1,1,1-trichloroethane		0.4	
carbon tetrachloride			
bromodichloromethane			
1,2-dichloropropane			
trans-1,3-dichloropropane			
trichloroethene			
dibromochloromethane			
1,1,2-trichloroethane			
cis-1,3 dichloropropene			
2-chloroethylvinyl ether			
bromoform			
1,1,2,2-tetrachloroethane			
tetrachloroethene			
chlorobenzene			
Detection Limit		0.1	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

Results of Trace Element Analyses

Constituent	Client ID: NAS 29-1 CAA ID: 8402016	NAS 29-2 8402017
Sb (mg/l)	<0.005	<0.005
As (mg/l)	<0.005	<0.005
Be (mg/l)	<0.010	<0.010
Cd (mg/l)	<0.001	<0.001
Cr (mg/l)	<0.005	<0.005
Cu (mg/l)	0.022	<0.005
Pb (mg/l)	<0.005	<0.005
Hg (mg/l)	<0.0002	<0.0002
Ni (mg/l)	<0.005	<0.005
Se (mg/l)	<0.005	<0.005
Ag (mg/l)	<0.001	<0.001
Tl (mg/l)	<0.005	<0.005
Zn (mg/l)	0.066	0.016
Cyanide (mg/l)	<0.010	<0.010

Results of Total Organic Carbon Analyses

Client ID	CAA ID	TOC mg/l (ppm)
NAS 29-1	8402016	20.5
NAS 29-2	8402017	2.8

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 152..

412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700390
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
WAS 29-1 LARGE PILE OF WOOD & SANDY MATL	08/26	13082070		
M275 EP TOXICITY PACKAGE				
M032 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			0.084	mg/l
M148 Chromium, leachable (Cr)			0.04	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			0.02	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			0.10	mg/l
WAS 29-2 PILE OF WOOD & SANDY MATERIAL	08/26	13082071		
M275 EP TOXICITY PACKAGE				
M032 Arsenic, leachable (As)			0.009	mg/l
M048 Barium, leachable (Ba)			0.2	mg/l
M098 Cadmium, leachable (Cd)			0.016	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
WAS 29-3 PILE OF WOOD & SANDY MATERIAL	08/26	13082072		
M275 EP TOXICITY PACKAGE				
M032 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.1	mg/l
M098 Cadmium, leachable (Cd)			2.62	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l

SECTION 10

Old Drum Storage Lot
Site No. 30

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 624[1])

Client: Geraghty & Miller, Inc. Project No.: 83-792

Date Samples Received: September 14, 1983 Reported by: EC

Date Analysis Completed: September 16, 1983 Checked by: DF

Compound	Sample ID: / CAA ID:	Concentration (ug/l)[2] NAS-30-1 8308125	NAS-30-2 8308126	NAS-30-3 8308127
(2v) acrolein				
(3v) acrylonitrile				
(4v) benzene				
(6v) carbon tetrachloride				
(7v) chlorobenzene				
(10v) 1,2-dichloroethane				
(11v) 1,1,1,-trichloroethane				
(13v) 1,1-dichloroethane				
(14v) 1,1,2-trichloroethane				
(15v) 1,1,2,2-tetrachloroethane				
(16v) chloroethane				
(19v) 2-chloroethylvinyl ether				
(23v) chloroform				
(29v) 1,1-dichloroethylene				
(30v) trans-1,2-dichloroethylene			TR	
(32v) 1,2-dichloropropane				
(33v) trans-1,3-dichloropropene				
cis-1,3-dichloropropane				
(38v) ethylbenzene				
(44v) methylene chloride				
(45v) chloromethane				
(46v) bromomethane				
(47v) bromoform				
(48v) bromodichloromethane				
(49v) fluorotrichloromethane				
(50v) dichlorodifluoromethane				
(51v) chlorodibromomethane				
(85v) tetrachloroethylene				
(86v) toluene				
(87v) trichloroethylene			TR	
(88v) vinyl chloride				

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than 1 ug/l are not detected and are left blank. Concentrations between 1 and 9 ug/l are listed as trace levels (TR).

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Acid/Base/Neutral Extractables (Method 625[1])

Client: Geraghty & Miller (Jacksonville Project) Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by: EC

Date Analysis Completed: September 28, 1983 Checked by: DF

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] NAS 30-1 8308125	NAS 30-2 8308126	NAS 30-3 8308127
ACID COMPOUNDS				
(21A) 2,4,6-trichlorophenol				
(22A) p-chloro-m-cresol				
(24A) 2-chlorophenol				
(31A) 2,4-dichlorophenol				
(34A) 2,4-dimethylphenol				
(57A) 2-nitrophenol				
(58A) 4-nitrophenol				
(59A) 2,4-dinitrophenol				
(60A) 4,6-dinitro-2-methylphenol				
(64A) pentachlorophenol				
(65A) phenol				
Detection Limit		2	2	2
BASE/NEUTRAL COMPOUNDS				
(1B) acenaphthene				
(5B) benzidine				
(8B) 1,2,4-trichlorobenzene				
(9B) hexachlorobenzene				
(12B) hexachloroethane				
(18B) bis (2-chloroethyl) ether			54	
(20B) 2-chloronaphthalene				
(25B) 1,2-dichlorobenzene				
(26B) 1,3-dichlorobenzene				
(27B) 1,4-dichlorobenzene				
(28B) 3,3'-dichlorobenzidine				
(35B) 2,4-dinitrotoluene				
(36B) 2,6-dinitrotoluene				
(37B) 1,2-diphenylhydrazine				
(39B) fluoranthene				
(40B) 4-chlorophenyl phenyl ether				
(41B) 4-bromophenyl phenyl ether				

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Acid/Base/Neutral Extractables (Method 625[1])

Client: Geraghty & Miller (Jacksonville Project) Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by: EC

Date Analysis Completed: September 28, 1983 Checked by: EAF

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] NAS 30-1 8308125	NAS 30-2 8308126	NAS 30-3 8308127
BASE NEUTRAL COMPOUNDS (cont'd)				
(42B) bis (2-chloroisopropyl) ether				
(43B) bis (2-chloroethoxy) methane				
(52B) hexachlorobutadiene				
(53B) hexachlorocyclopentadiene				
(54B) isophorone				
(55B) naphthalene				
(56B) nitrobenzene				
(62B) N-nitrosodiphenylamine				
(63B) N-nitrosodipropylamine				
(66B) bis (2-ethylhexyl) phthalate				
(67B) benzyl butyl phthalate				
(68B) di-n-butyl phthalate				
(69B) di-n-octyl phthalate				
(70B) diethyl phthalate				
(71B) dimethyl phthalate				
(72B) benzo(a)anthracene				
(73B) benzo(a)pyrene				
(74B) benzo(b)fluoroanthene				
(75B) benzo(k)fluoroanthene				
(76B) chrysene				
(77B) acenaphthylene				
(78B) anthracene				
(79B) benzo(ghi)perylene				
(80B) fluorene				
(81B) phenanthrene				
(82B) dibenzo(a,h)anthracene				
(83B) ideno(1,2,3-cd)pyrene				
(84B) pyrene				
Detection Limit		2	2	2

[1]U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times the limit of detection are listed as trace levels (TR).

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Pesticides and PCB's (Method 608[1])

Client: Geragnty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by: SRD

Date Analysis Completed: September 29, 1983 Checked by: [illegible]

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] NAS 30-1 8308125	NAS 30-2 8308126	NAS 30-3 8308127
PESTICIDES AND PCB's				
(89P) aldrin				
(90P) dieldrin				
(91P) chlordane				
(92P) 4,4'-DDT				
(93P) 4,4'-DDE				
(94P) 4,4'-DDD				
(95P) endosulfan-alpha				
(96P) endosulfan-beta				
(97P) endosulfan sulfate				
(98P) endrin				
(99P) endrin aldehyde				
(100P) heptachlor				
(101P) heptachlor epoxide				
(102P) BHC-alpha				
(103P) BHC-beta				
(104P) BHC-delta				
(105P) BHC-gamma (lindane)				
(106P) PCB - 1242				
(107P) PCB - 1254				
(108P) PCB - 1221				
(109P) PCB - 1232				
(110P) PCB - 1248				
(111P) PCB - 1260				
(112P) PCB - 1016				
(113P) toxaphene				
Detection Limit		1	1	1

[1]U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times detection limit are listed as trace levels (TR).

CONCENTRATION OF METALS & CYANIDES

Concentration (ppm)

Client ID	CAA ID	Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Si	Ag	Tl	Zn	Cyanide	Total Organic Carbon
NAS30-1	8308125	<0.005	<0.005	<0.01	<0.010	<0.025	<0.010	<0.05	<0.0002	<0.025	<0.005	<0.010	<0.005	0.030	<0.005	
NAS30-2	8308126	<0.005	<0.005	<0.01	<0.010	<0.025	<0.010	<0.05	<0.0002	<0.025	<0.005	<0.010	<0.005	<0.010	<0.005	
NAS30-3	8308127	<0.005	<0.005	<0.01	<0.010	<0.025	0.023	<0.05	<0.0002	<0.025	<0.005	<0.010	<0.005	<0.010	<0.005	

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: BERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700330
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
MAS 30-1 SANDPILE 0725	08/26	13083073		
M275 EP TOXICITY PACKAGE				
M033 Arsenic, Leachable (As)			< 0.001	mg/l
M048 Barium, Leachable (Ba)			0.2	mg/l
M098 Cadmium, Leachable (Cd)			3.53	mg/l
M148 Chromium, Leachable (Cr)			0.23	mg/l
M208 Lead, Leachable (Pb)			< 0.03	mg/l
M258 Mercury, Leachable (Hg)			0.0005	mg/l
M298 Selenium, Leachable (Se)			< 0.002	mg/l
M308 Silver, Leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, Leachable (Ni)			< 0.03	mg/l
MAS 30-2 SANDPILE 0935	08/26	13083074		
M275 EP TOXICITY PACKAGE				
M033 Arsenic, Leachable (As)			< 0.001	mg/l
M048 Barium, Leachable (Ba)			< 0.1	mg/l
M098 Cadmium, Leachable (Cd)			2.67	mg/l
M148 Chromium, Leachable (Cr)			0.01	mg/l
M208 Lead, Leachable (Pb)			2.55	mg/l
M258 Mercury, Leachable (Hg)			< 0.0002	mg/l
M298 Selenium, Leachable (Se)			< 0.002	mg/l
M308 Silver, Leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, Leachable (Ni)			1.22	mg/l
MAS 30-3 SANDPILE 0840	08/26	13083075		
M275 EP TOXICITY PACKAGE				
M033 Arsenic, Leachable (As)			< 0.001	mg/l
M048 Barium, Leachable (Ba)			< 0.1	mg/l
M098 Cadmium, Leachable (Cd)			3.59	mg/l
M148 Chromium, Leachable (Cr)			< 0.01	mg/l
M208 Lead, Leachable (Pb)			< 0.03	mg/l
M258 Mercury, Leachable (Hg)			< 0.0002	mg/l
M298 Selenium, Leachable (Se)			< 0.002	mg/l
M308 Silver, Leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, Leachable (Ni)			0.55	mg/l

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700380
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
NAS 30-4 DRUM STORAGE AREA 0905	08/26	13082076		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			0.089	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			0.087	mg/l
M143 Chromium, leachable (Cr)			0.06	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			0.02	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			0.14	mg/l
NAS 30-5 DRUM STORAGE AREA 0915	08/26	13082077		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			0.037	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			0.015	mg/l
M143 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			0.02	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			0.09	mg/l
NAS 30-6 DRUM STORAGE AREA 0925	08/26	13082078		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			0.008	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			0.040	mg/l
M143 Chromium, leachable (Cr)			0.03	mg/l
M208 Lead, leachable (Pb)			0.11	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			0.02	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			0.14	mg/l

SECTION 11

Base Landfill
Site No. 32

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty and Miller - Tampa

Report No.: 84-448

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] NAS-32-1 8402018
chloromethane		
dichlorodifluoromethane		
vinyl chloride		
chloroethane		
methylene chloride		2.6
trichlorofluoromethane		
1,1-dichloroethene		
1,1-dichloroethane		
trans-1,2-dichloroethene		
chloroform		
1,2-dichloroetnane		
1,1,1-trichloroethane		
carbon tetrachloride		
bromodichloromethane		
1,2-dichloropropane		
trans-1,3-dichloropropane		
trichloroethene		
dibromochloromethane		
1,1,2-trichloroethane		
cis-1,3 dichloropropene		
2-chloroethylvinyl ether		
bromoform		
1,1,2,2-tetrachloroethane		
tetrachloroethene		
chlorobenzene		
Detection Limit		0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

Results of Total Organic Carbon Analyses

Client ID	CAA ID	TOC mg/l (ppm)
NAS 32-1	8402018	60

SECTION 12

Industrial Wastewater Discharge Area
Site No. 40

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS C-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
CHROMIUM-E.P.TOXIC	< 0.1	ppm
ARSENIC-E.P.TOXIC	< 0.015	ppm
BARIUM-E.P.TOXIC	< 0.1	ppm
MERCURY-E.P.TOXIC	< 0.015	ppm
CADMIUM-E.P.TOXIC	< 0.1	ppm
SELENIUM-E.P.TOXIC	< 0.1	ppm
SILVER-E.P.TOXIC	< 0.1	ppm
LEAD-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437 Page 4 of 6

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS C-2

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
CHROMIUM-E.P.TOXIC	< 0.1	ppm
ARSENIC-E.P.TOXIC	< 0.015	ppm
BARIUM-E.P.TOXIC	< 0.1	ppm
MERCURY-E.P.TOXIC	< 0.015	ppm
CADMIUM-E.P.TOXIC	< 0.1	ppm
SELENIUM-E.P.TOXIC	< 0.1	ppm
SILVER-E.P.TOXIC	< 0.1	ppm
LEAD-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS C-3

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
CHROMIUM-E.P.TOXIC	< 0.1	ppm
ARSENIC-E.P.TOXIC	< 0.015	ppm
BARIUM-E.P.TOXIC	< 0.1	ppm
MERCURY-E.P.TOXIC	< 0.015	ppm
CADMIUM-E.P.TOXIC	< 0.1	ppm
SELENIUM-E.P.TOXIC	< 0.1	ppm
SILVER-E.P.TOXIC	< 0.1	ppm
LEAD-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS C-4

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
CHROMIUM-E.P.TOXIC	< 0.1	ppm
ARSENIC-E.P.TOXIC	< 0.015	ppm
BARIUM-E.P.TOXIC	< 0.1	ppm
MERCURY-E.P.TOXIC	< 0.015	ppm
CADMIUM-E.P.TOXIC	< 0.1	ppm
SELENIUM-E.P.TOXIC	< 0.1	ppm
SILVER-E.P.TOXIC	< 0.1	ppm
LEAD-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

SECTION 13

Oil Pond and Land Spreading Area
NFD: Site No. 5

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geragnty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by:

Date Analysis Completed: October 2, 1983 Checked by:

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] NFD-1 8309124	NFD-2 8308129
chloromethane			
dichlorodifluoromethane			
vinyl chloride			
chloroethane			
methylene chloride			
trichlorofluoromethane			
1,1-dichloroethene			
1,1-dichloroethane			
trans-1,2-dichloroethene			
chloroform			
1,2-dichloroethane			
1,1,1-trichloroethane		0.7	
carbon tetrachloride			
bromodichloromethane			
1,2-dichloropropane			
trans-1,3-dichloropropane			
trichloroethene		0.3	
dibromochloromethane			
1,1,2-trichloroethane			
cis-1,3 dichloropropene			
2-chloroethylvinyl ether			
bromoform			
1,1,2,2-tetrachloroethane			
tetrachloroethene			
chlorobenzene			
Detection Limit		0.1	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

CONCENTRATION OF METALS & CYANIDES

Concentration (ppm)

Client ID	CAA ID	Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Si	Ag	Ti	Zn	Cyanide	Total Organic Carbon
MFD-1	8308124	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	
MFD-2	8308129	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	-----	

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: DERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 70038C
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
WFD 5-1 OIL POND & LAND SPREADING 1630	08/26	13082059		
M275 EP TOXICITY PACKAGE				
M033 Arsenic, leachable (As)			< 0.001	mg/l
M049 Barium, leachable (Ba)			0.2	mg/l
M099 Cadmium, leachable (Cd)			< 0.005	mg/l
M149 Chromium, leachable (Cr)			< 0.01	mg/l
M209 Lead, leachable (Pb)			< 0.03	mg/l
M253 Mercury, leachable (Hg)			< 0.0002	mg/l
M299 Selenium, leachable (Se)			< 0.002	mg/l
M309 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
WFD 5-2 OIL POND & LAND SPREADING 1645	08/26	13082060		
M275 EP TOXICITY PACKAGE				
M033 Arsenic, leachable (As)			< 0.001	mg/l
M049 Barium, leachable (Ba)			< 0.1	mg/l
M099 Cadmium, leachable (Cd)			< 0.005	mg/l
M149 Chromium, leachable (Cr)			< 0.01	mg/l
M209 Lead, leachable (Pb)			< 0.03	mg/l
M253 Mercury, leachable (Hg)			< 0.0002	mg/l
M299 Selenium, leachable (Se)			< 0.002	mg/l
M309 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l

APPENDIX D

General Location Map and Individual Site Plan for Each Site Studied During Verification Phase

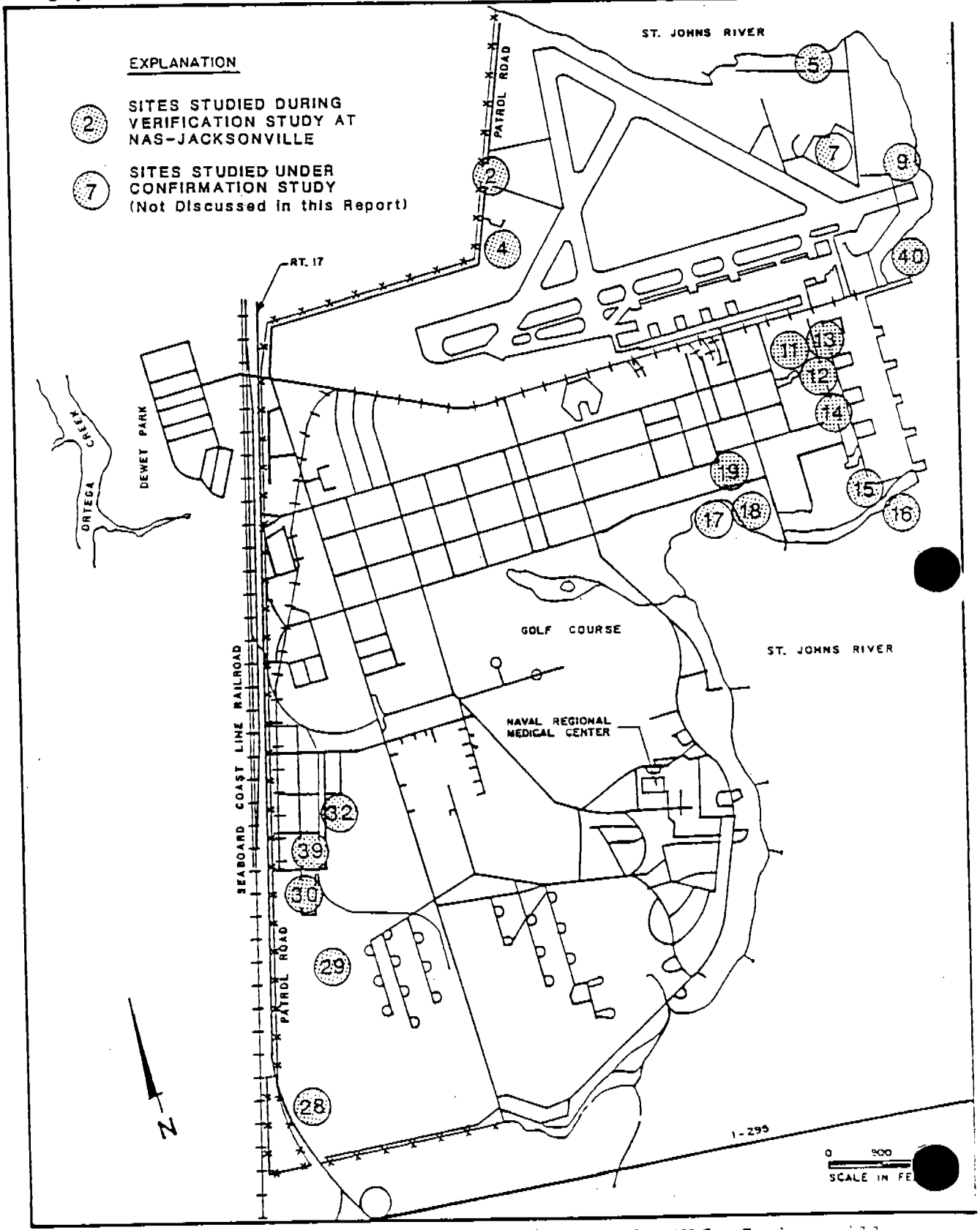


FIGURE 2. Location of the Sites Studied at the NAS, Jacksonville.

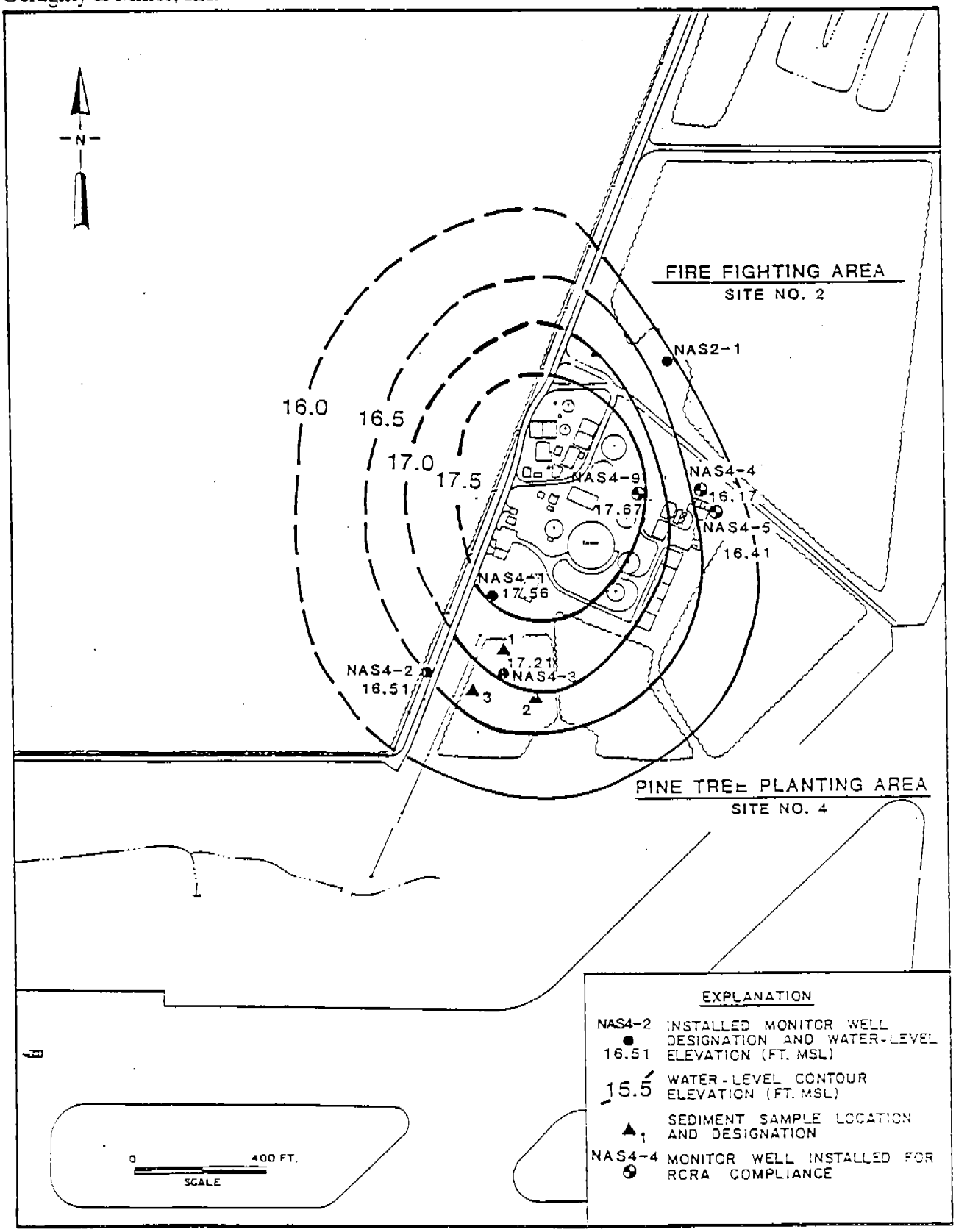


FIGURE 17. Locations of Installed Monitor Wells, Soil Samples, and Water-Table Contours (March 9, 1984) Collected at the Fire-Fighting Area (Site No. 2) and the Pine Tree Plantin

Geraghty & Miller, Inc.

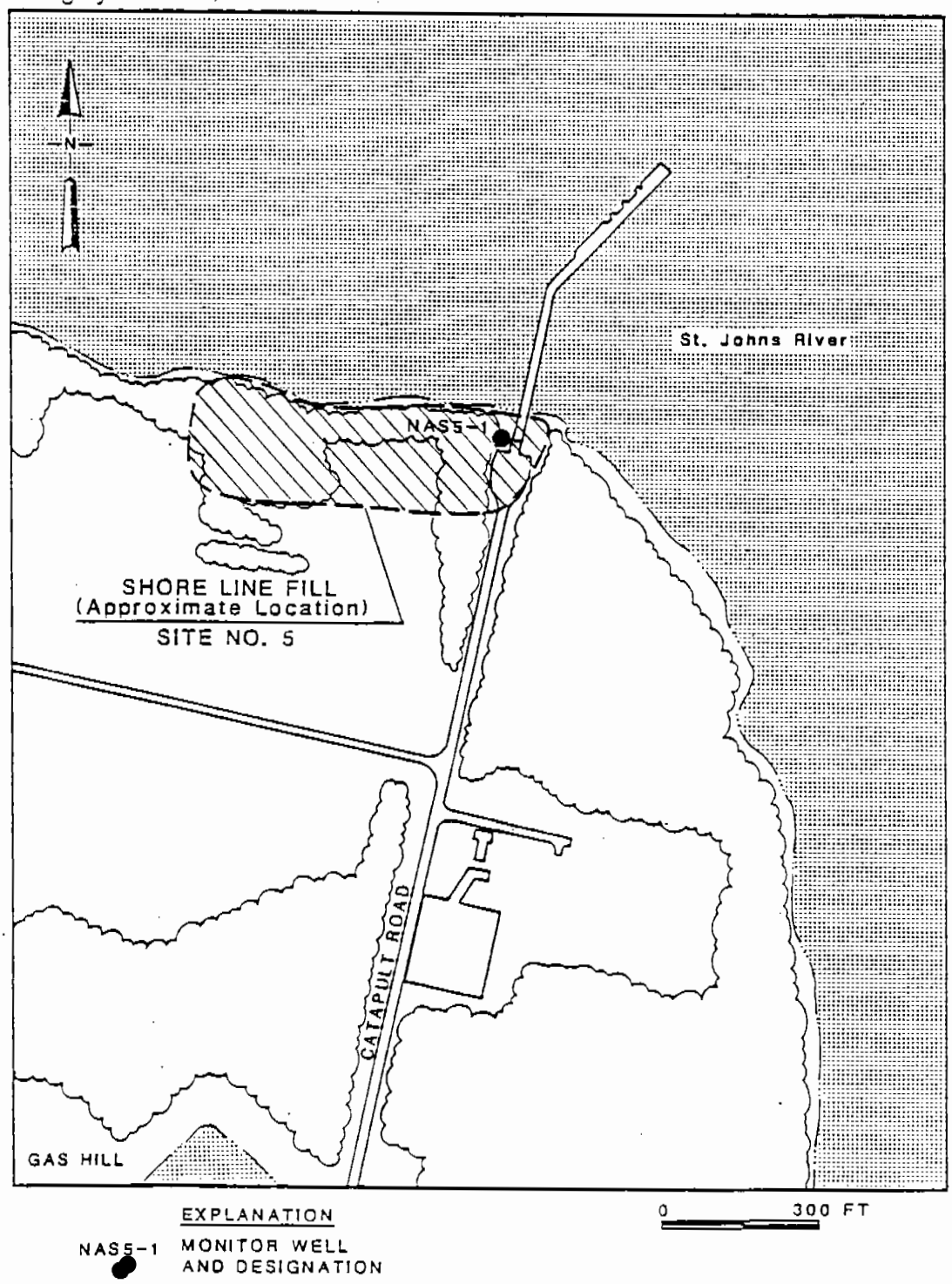


FIGURE 18. Location of Installed Monitor Well at the Shoreline Fill, West of Pier 142 (Site No. 5).

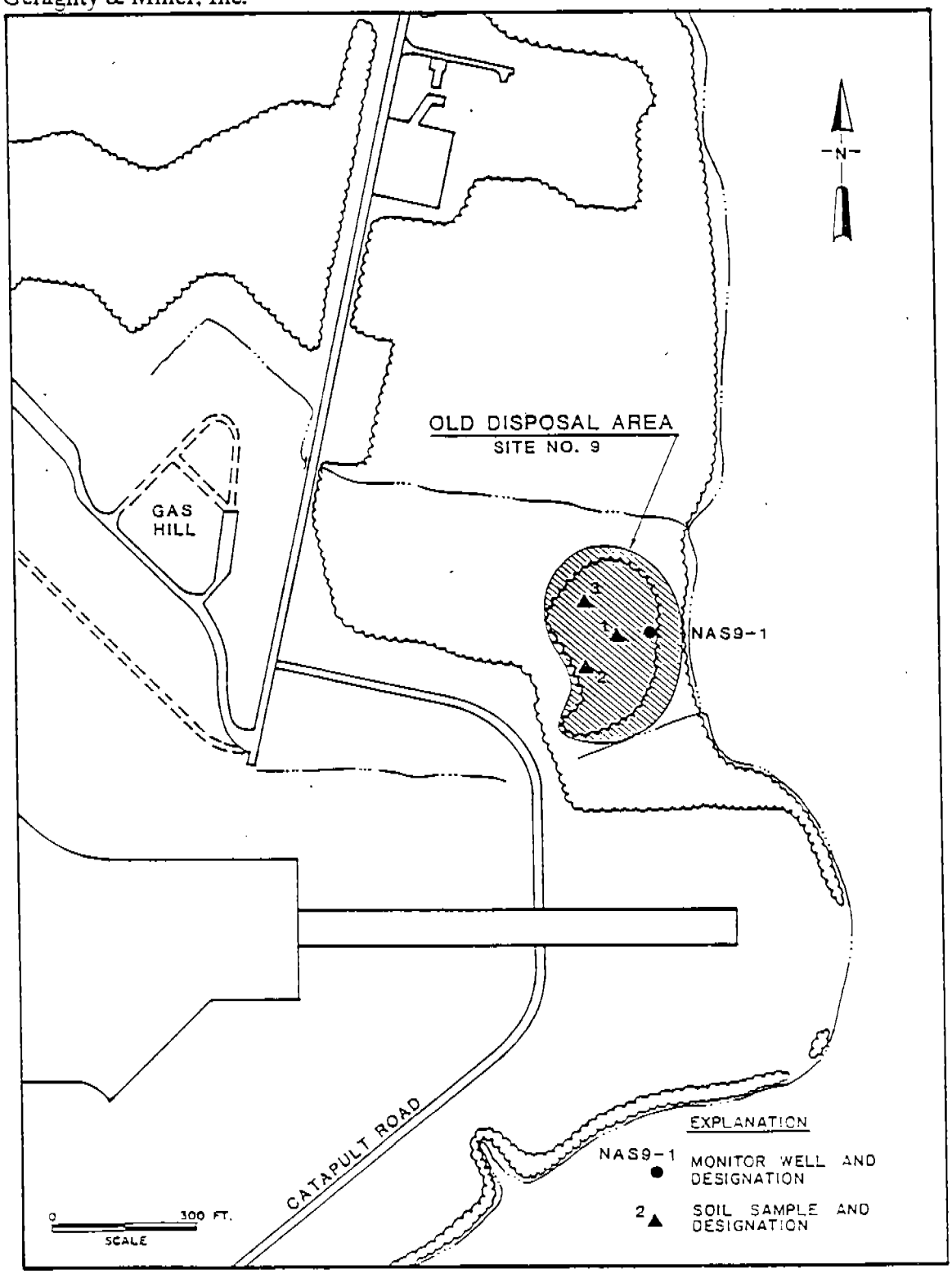


FIGURE 19. Location of Installed Monitor Well and Soil Samples Collected at the Old Disposal Area (Site No. 9).

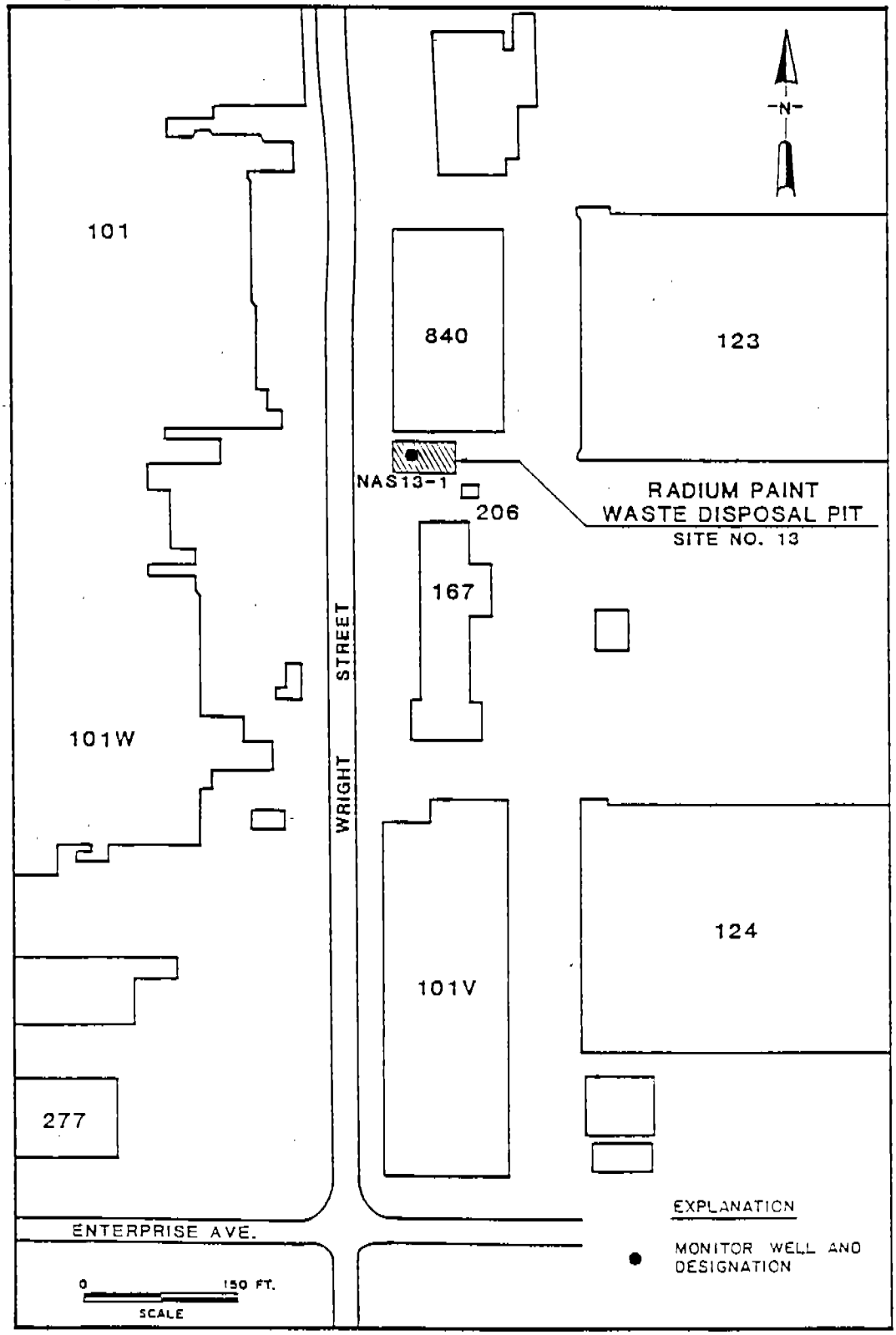


FIGURE 20. Location of the Monitor Well Installed at the Radium Paint Waste Disposal Pit (Site No. 13)

Geraghty & Miller, Inc.

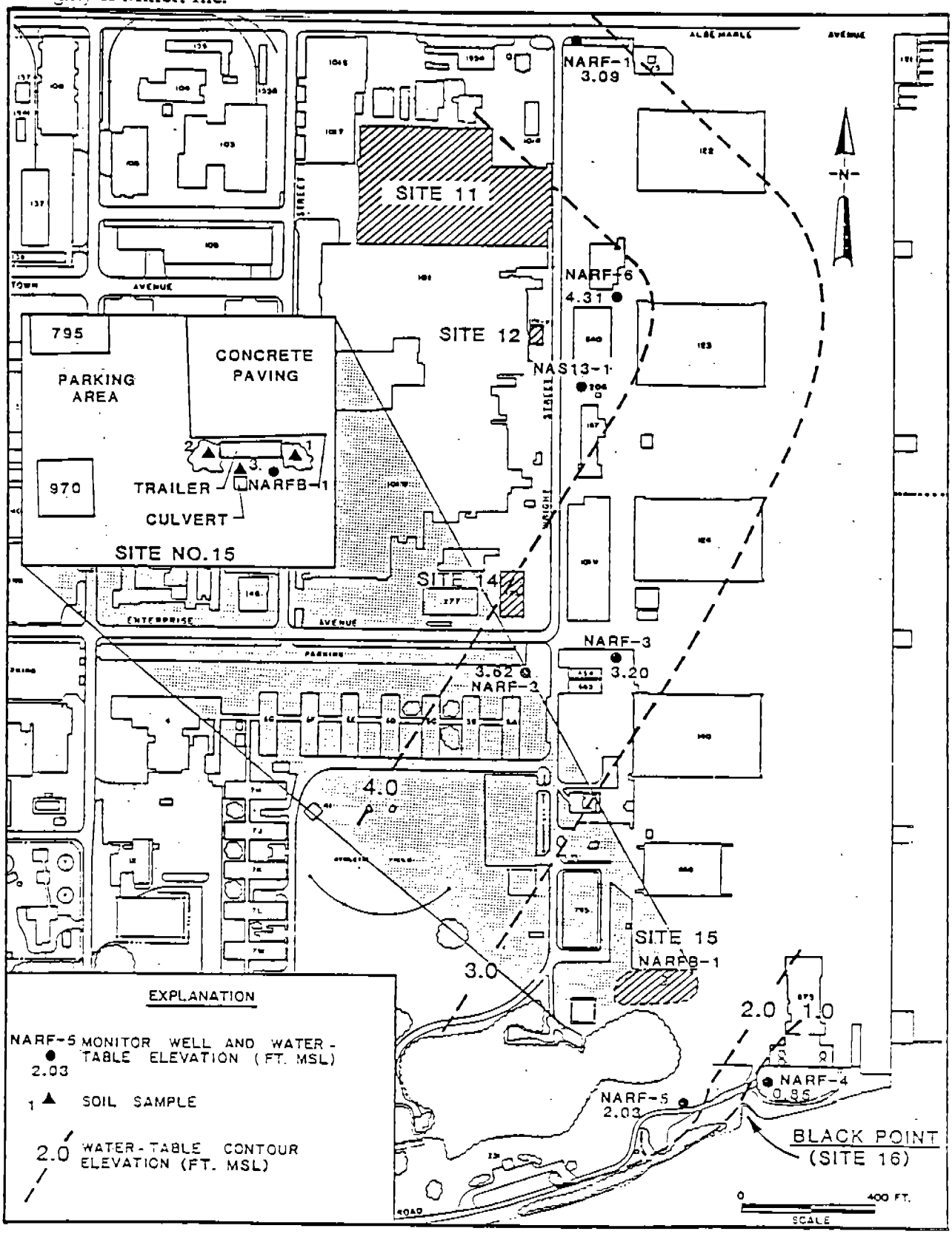


FIGURE 21. Locations of Installed Monitor Wells, Soil Samples and Water-Table Contours (March 12, 1984) in the NARF Area (Site Nos. 11, 12, 14, 15, and 16.

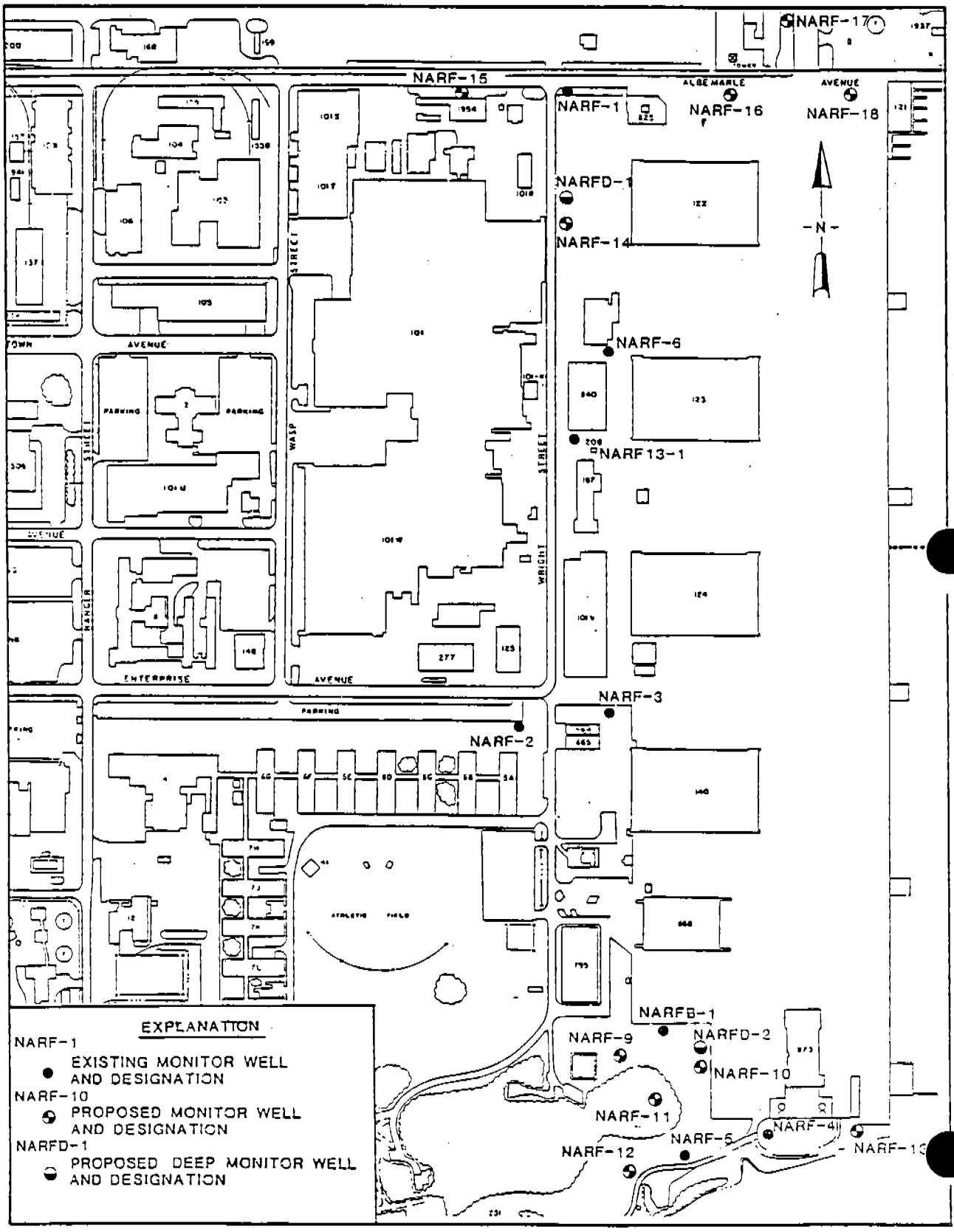


FIGURE 22. Locations of Proposed Monitor Wells in the NARF Area.

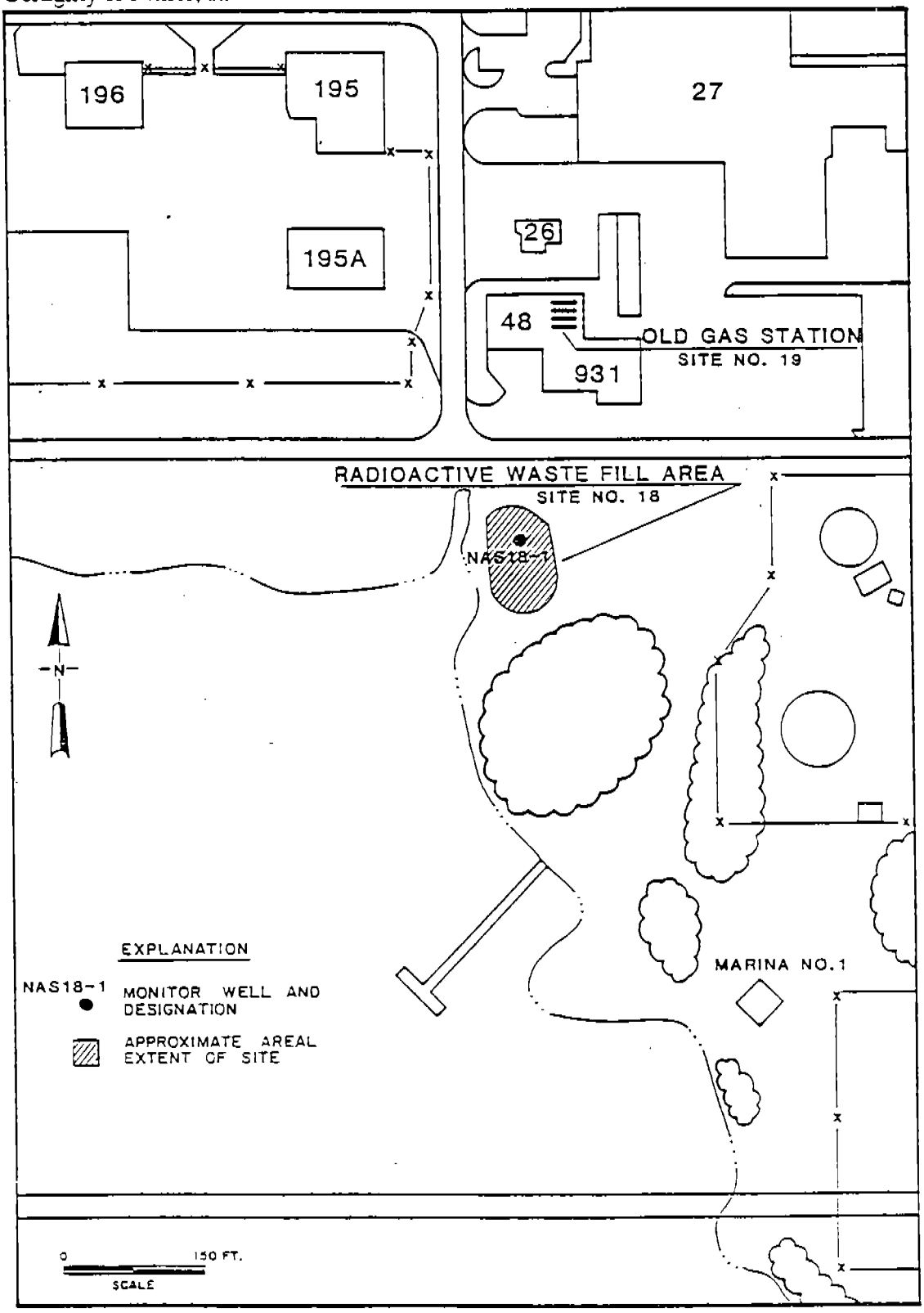


FIGURE 23. Location of the Monitor Well Installed at the Radioactive Waste Fill Area (Site No. 18) and Buried Storage Tanks at the Old Gas Station (Site No. 19)

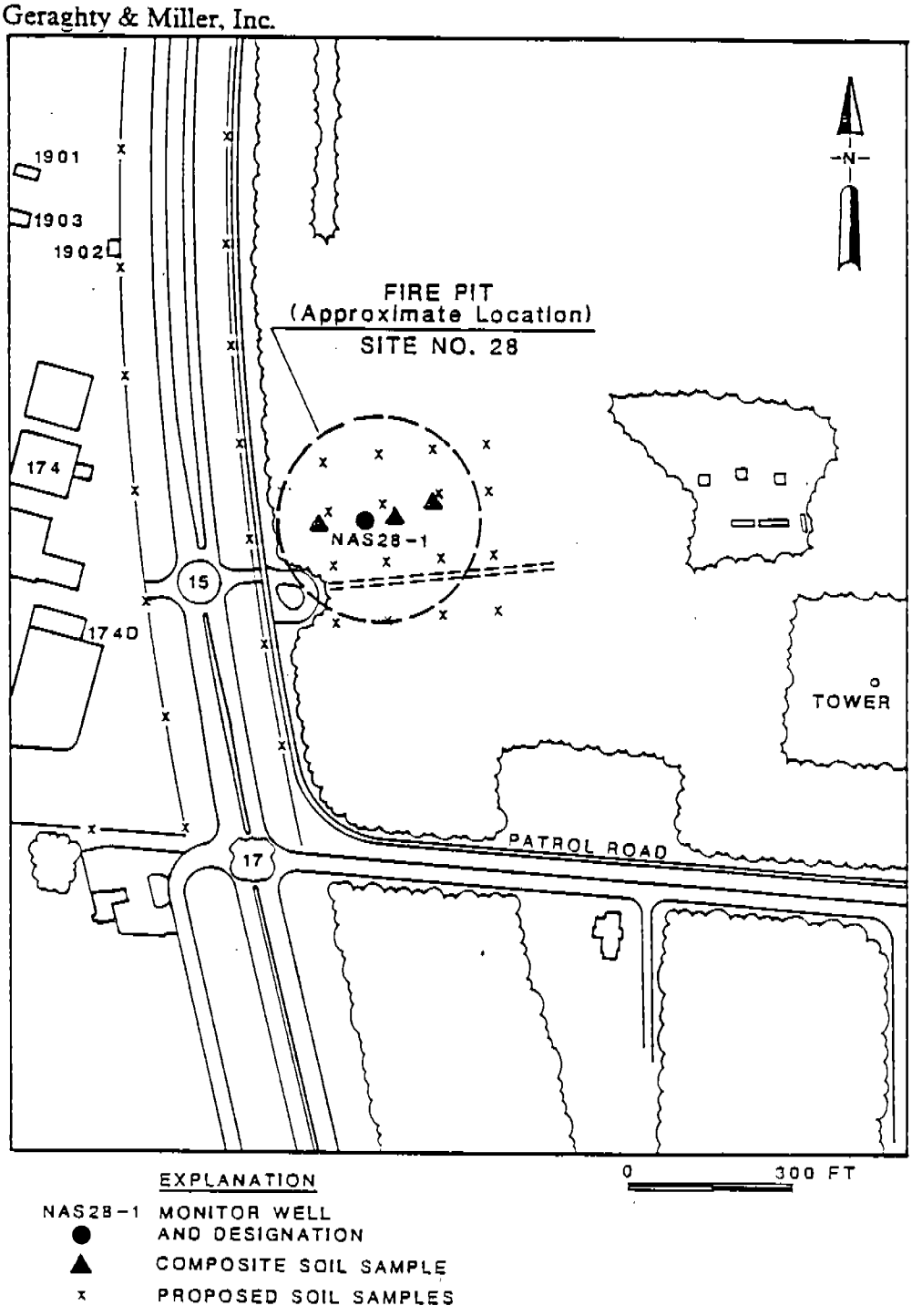


FIGURE 24. Locations of Installed Monitor Well and Soil Samples at the Fire Pit Area (Site No. 28).

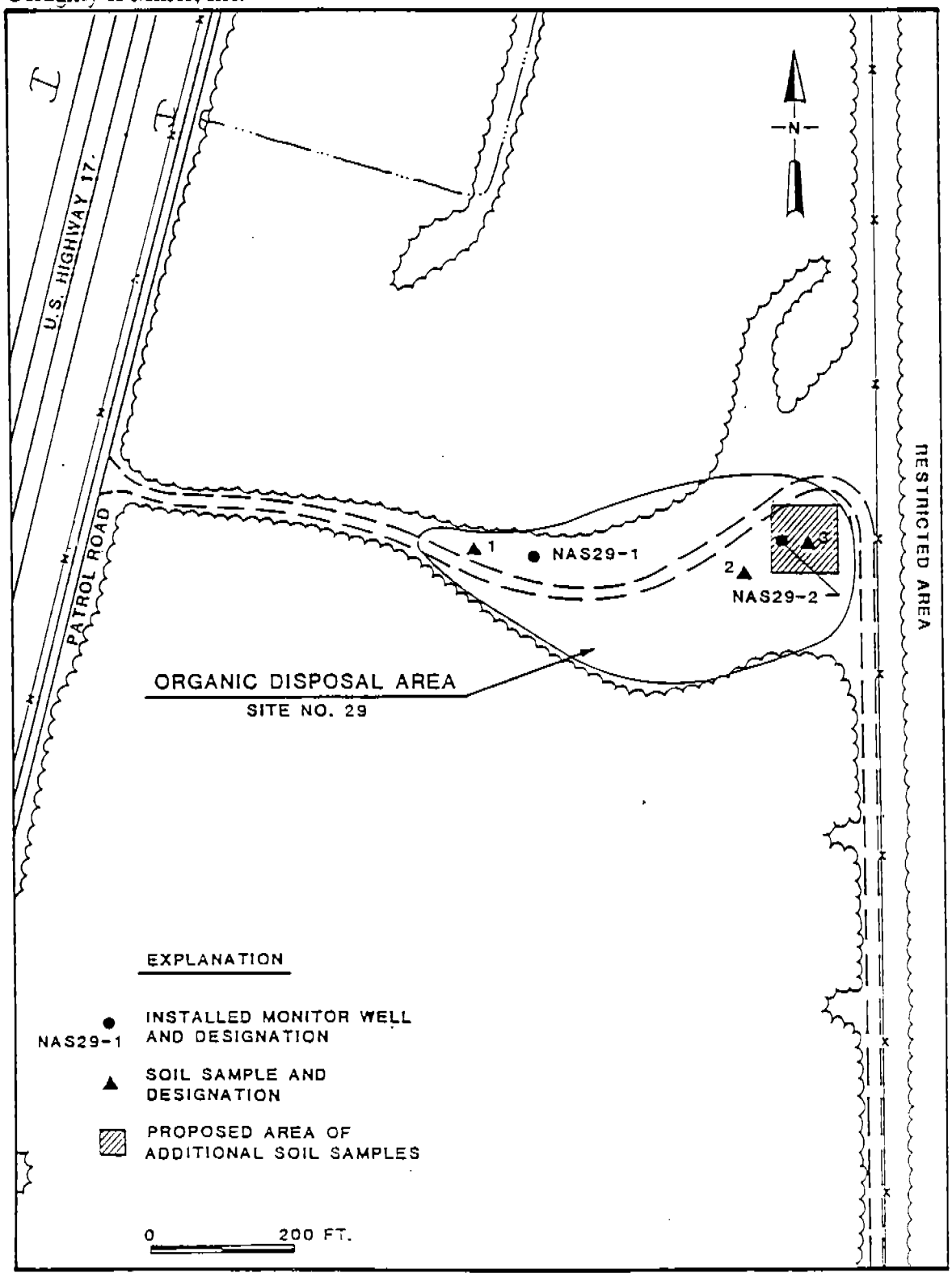


FIGURE 25. Locations of Installed Monitor Wells and Soil Samples at the Organic Disposal Area (Site No. 29).

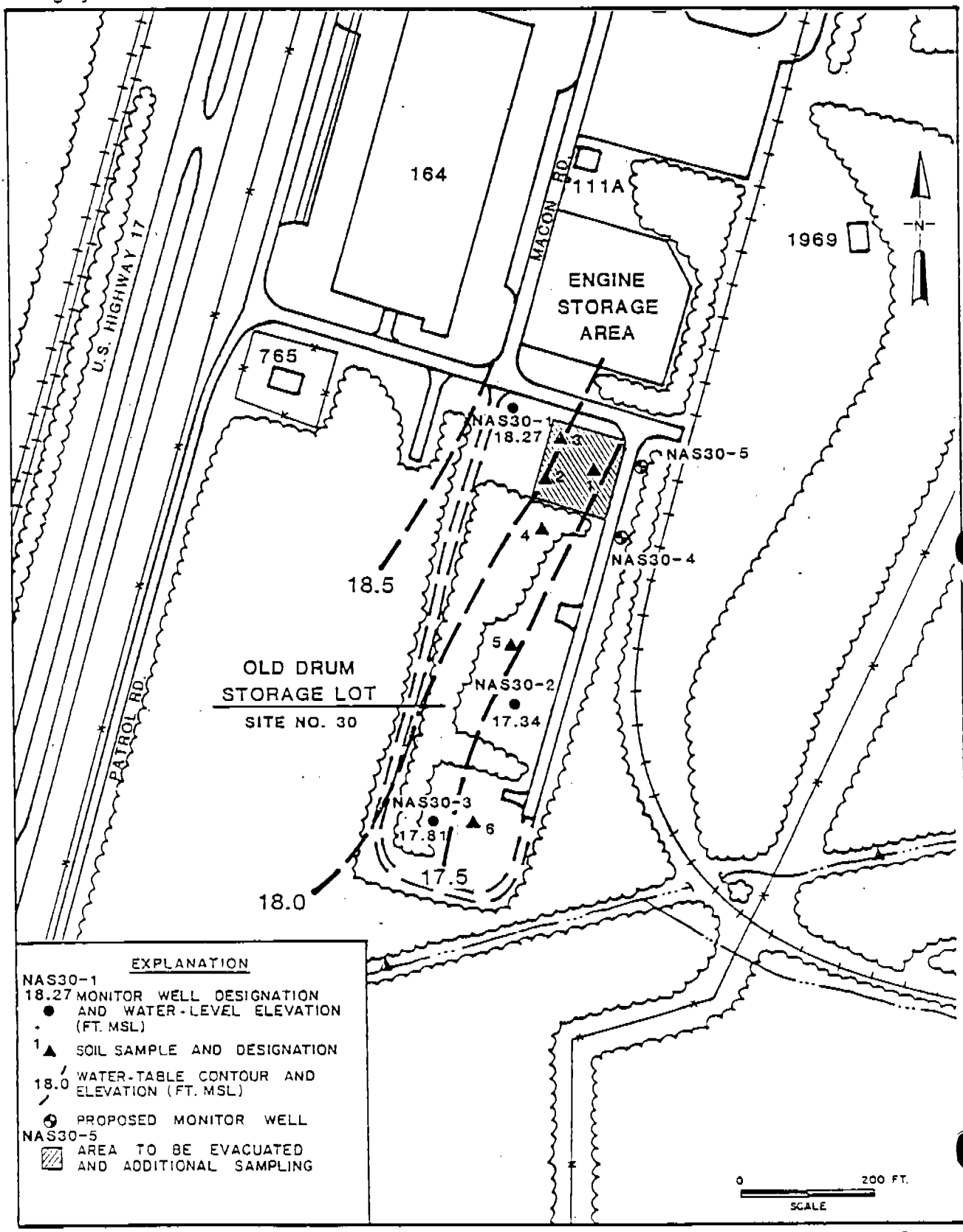


FIGURE 26. Locations of Installed Monitor Wells, Soil Samples, and Water-Table Contours (March 12, 1984) in the Old Drum Storage Lot (Site No. 30)

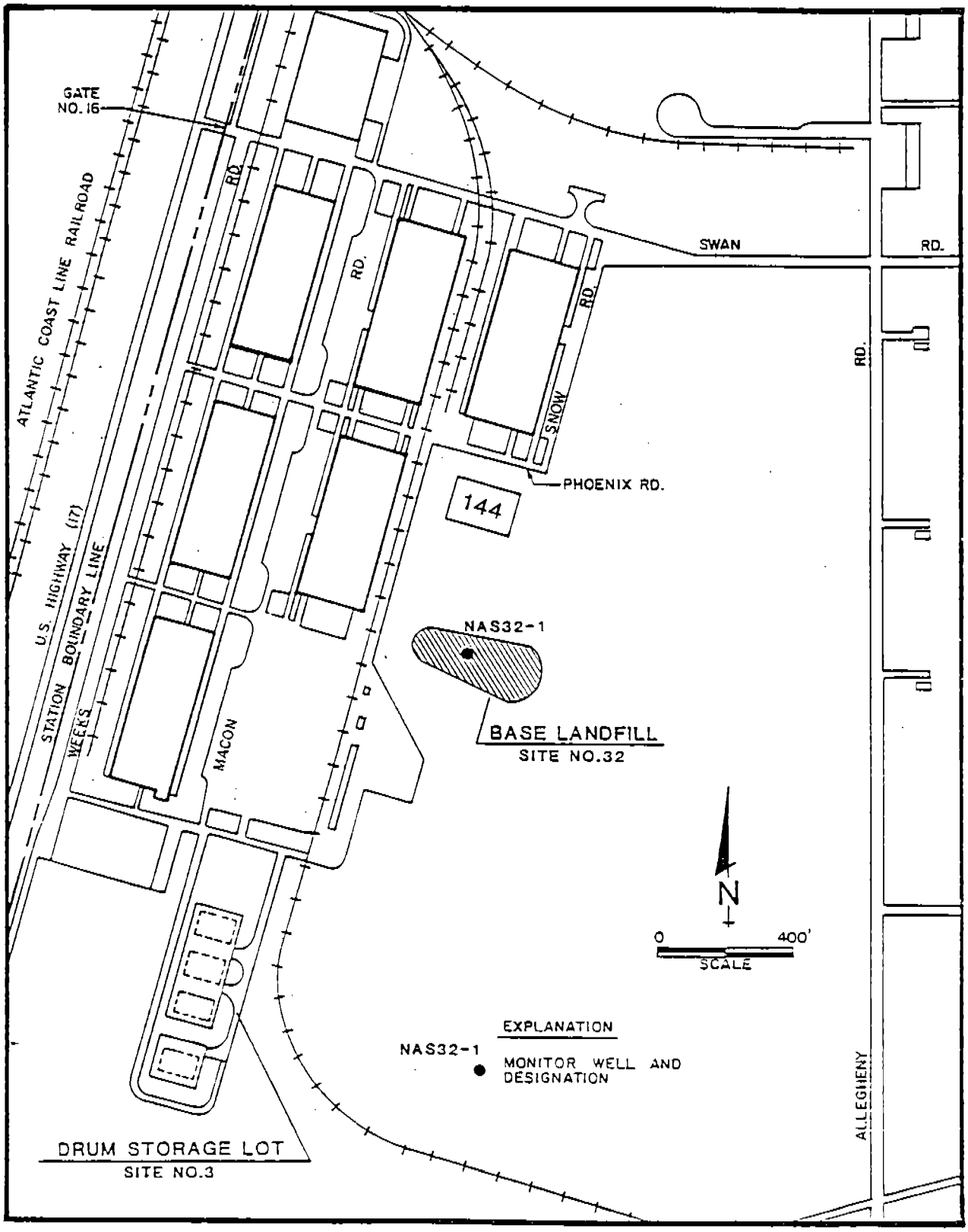


FIGURE 27. Location of the Monitor Well Installed at the Base Landfill (Site No. 32).

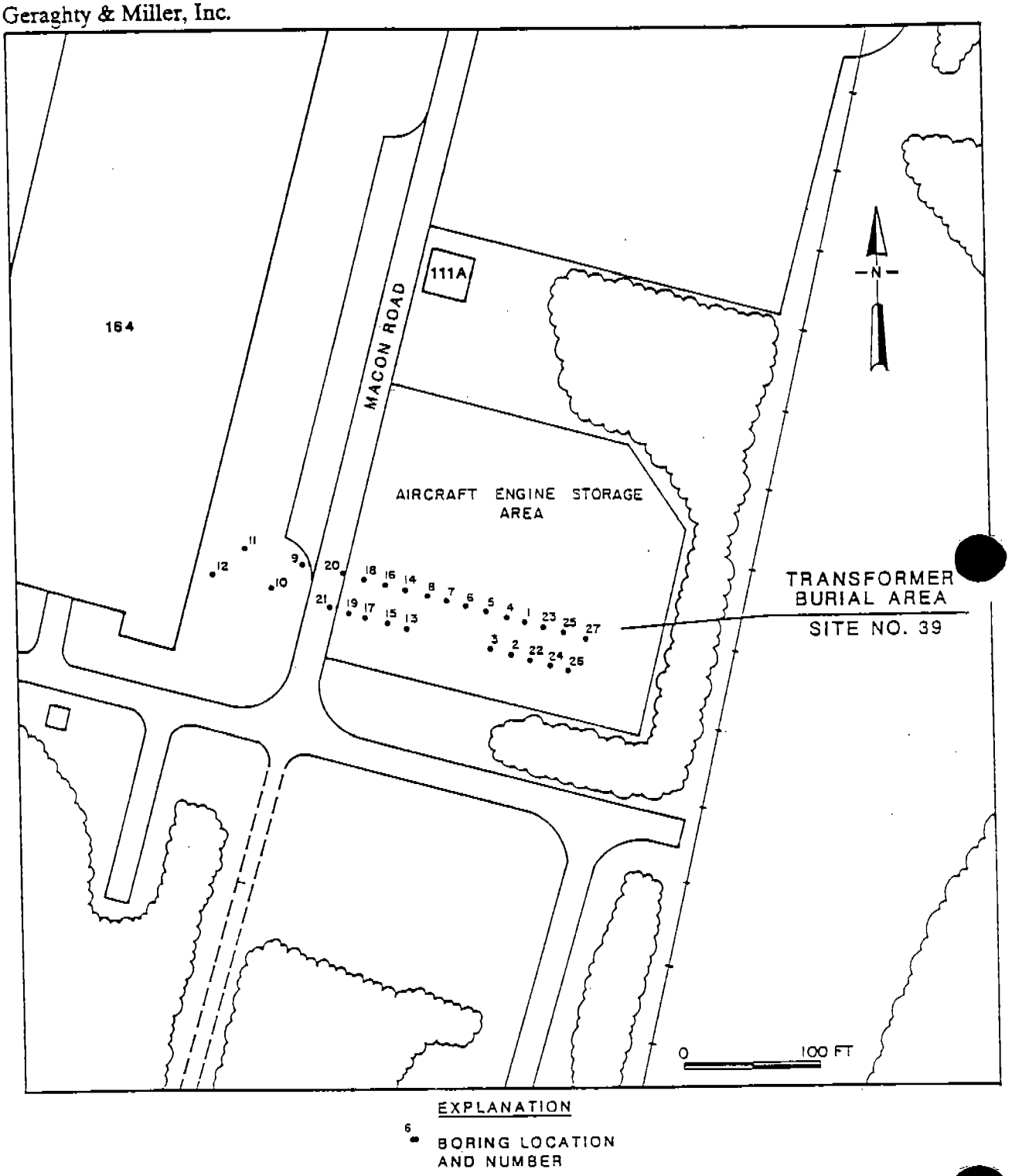
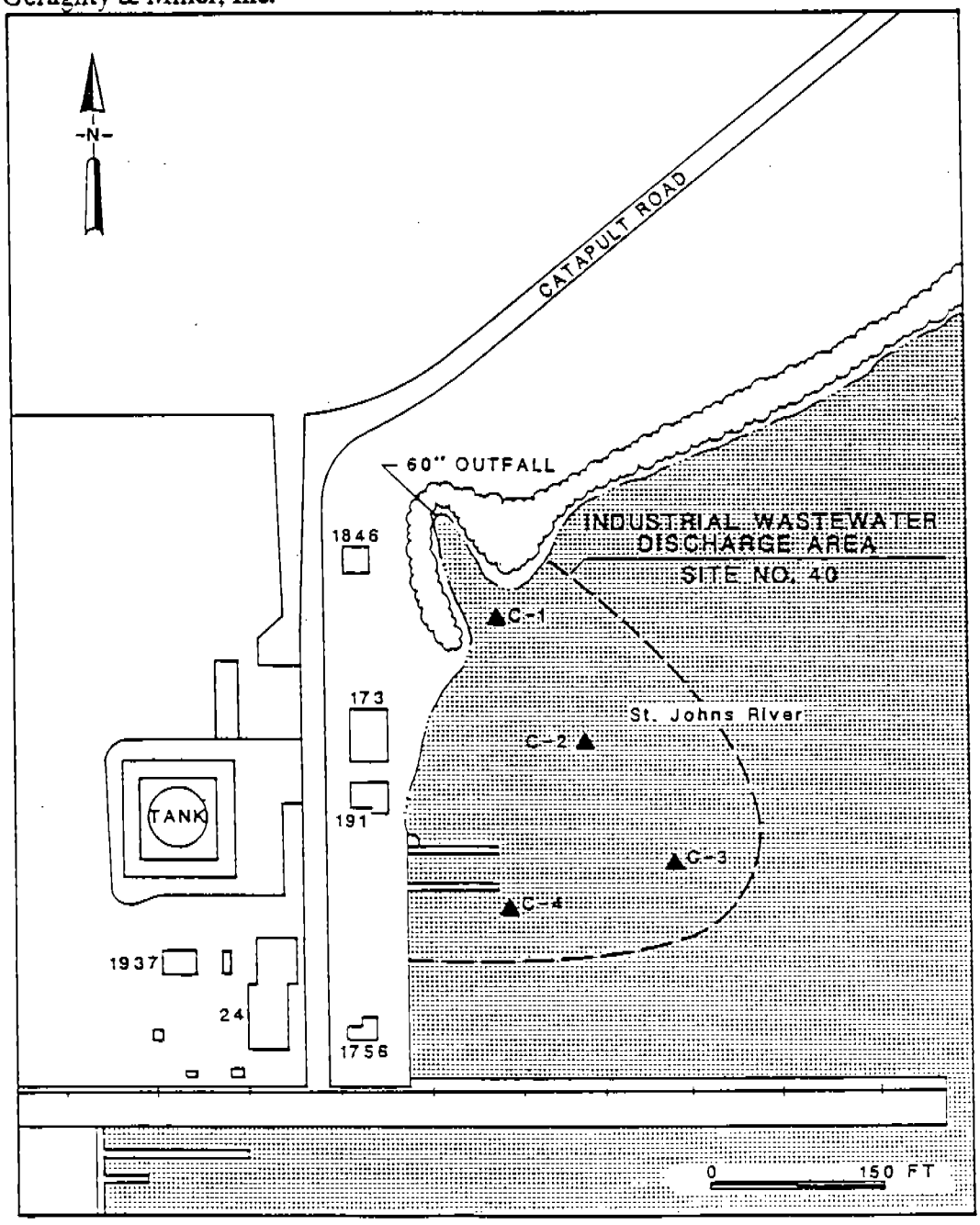


FIGURE 28. Locations of Soil Borings at the Suspected Transformer Burial Area (Site No. 39).



EXPLANATION

C-2 ▲ SEDIMENT SAMPLING LOCATION AND DESIGNATION

FIGURE 29. Locations of Sediment Samples at the Industrial Wastewater Discharge Area (Site No. 40).

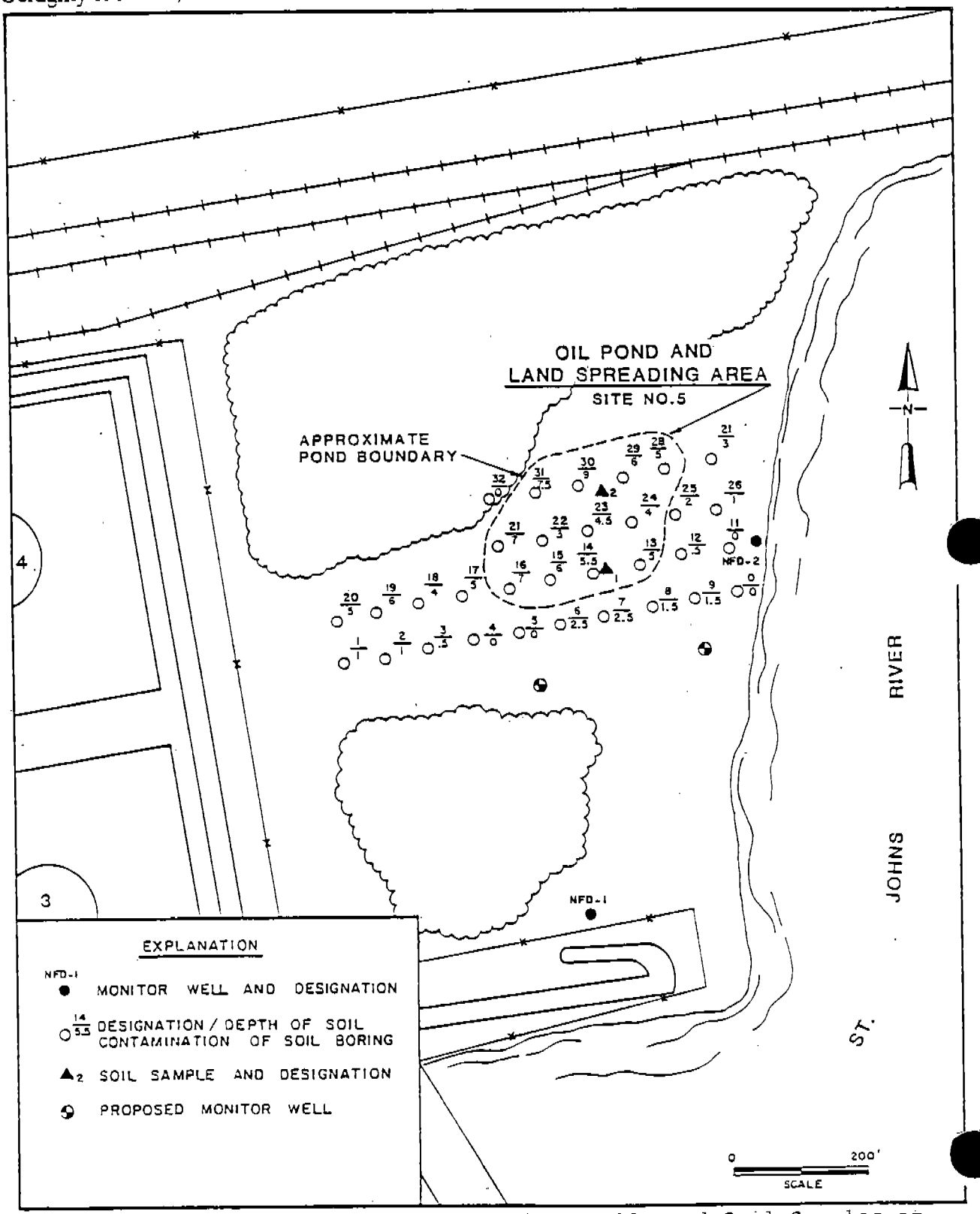


FIGURE 30. Locations of Installed Monitor Wells and Soil Samples at the Oil Pond and Land Spreading Area (Site No. 5-NFD)

APPENDIX 1.3

Extended Site Inspection

(The Characterization Phase serves as the Extended Site Inspection for the Site)

CHARACTERIZATION PHASE

Assessment of Ground-Water Contamination at Naval Air Station Jacksonville, Florida

Prepared for

NAVAL FACILITIES
ENGINEERING COMMAND
SOUTHERN DIVISION
Charleston, South Carolina

MARCH 1986

GERAGHTY & MILLER, INC.
GROUND-WATER CONSULTANTS

LANDMARK OFFICE CENTER
14310 N. Dale Mabry Hwy., Ste. 200, Tampa, Florida 33618 (813) 961-192.

Geraghty & Miller, Inc.

CHARACTERIZATION PHASE

ASSESSMENT OF GROUND-WATER CONTAMINATION AT NAVAL AIR STATION - JACKSONVILLE, FLORIDA

Prepared for

NAVAL FACILITIES ENGINEERING COMMAND
SOUTHERN DIVISION
Charleston, South Carolina

February 1986

Prepared by

GERAGHTY & MILLER, INC.
Ground-Water Consultants
14310 North Dale Mabry Highway, Suite 200
Tampa, Florida 33618

GERAGHTY & MILLER, INC.
Ground-Water Consultants

March 21, 1986

Mr. James Malone
Southern Division
Naval Facilities Engineering Command
Corporate Square One
2420 Mall Drive
North Charleston, SC 29406

Dear Mr. Malone:

Enclosed please find eight copies of the final Characterization Report for the Naval Air Station (NAS) and Naval Fuel Depot (NFD), Jacksonville, Florida. This report represents the completion of the Confirmation Study at the NAS and NFD.

Based on the findings of the Confirmation Study (verification and characterization phase), only one area, NARF, which consists of five sites (Site Nos. 11, 12, 14, 15, and 16) is recommended for further investigation prior to evaluating remedial alternatives for this area. The additional laboratory results for soil sampling at Site No. 28, which was recommended in the verification report, are expected to be available by the end of March.

Geraghty & Miller, Inc. greatly appreciates the opportunity to perform this investigation for the Navy.

Please call should there be any questions concerning the finding and recommendations contained herein.

Respectfully submitted,

GERGHTY & MILLER, INC.

Fred A. Seguiti
Staff Scientist

Peter L. Palmer, P.E.
Associate

Enclosures
T0290GW3
401/1.3

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INTRODUCTION

As recommended in Geraghty & Miller, Inc. (G&M)'s report dated December 1985 (Verification Study Report), additional hydrogeologic information was obtained for better definition of ground-water contamination at specific sites within the Naval Air Station (NAS) and Naval Fuel Depot (NFD), Jacksonville, Florida. This previous report also provides a description of the NAS-Jacksonville history, site-specific background data, and local and regional hydrogeologic information. This type of information is contained herein only where it bears on the work performed during the characterization phase, the results of which are contained herein. During 1985, a total of 16 monitor wells were installed and 15 shallow soil samples were obtained. Water samples were analyzed for the presence of volatile and other organic priority pollutants, PCBs, selected metals, and radioactivity. Soil samples were tested for PCBs and selected metals.

WORK PERFORMED

During the characterization phase of the Confirmation Study, twelve additional monitor wells were installed in the NARF (Navy Air Rework Facility) area, two wells at Site 30 and two wells were installed at the Naval Fuel Depot (NFD) Site 5. The wells are constructed of 2-inch diameter PVC, with 5 ft (feet) of slotted screen. Most of the wells are less than 20 ft deep; however, two deep wells

D-1 and D-2 having 10-ft screens were installed at NARF to depths of 68 and 61 ft, respectively. The well screens are gravel-packed; cement grout extends from two feet above the screen to land surface. A construction diagram of a typical monitor well at the site is shown in Figure 1. Well construction details for the monitor wells installed in 1985 are given in Table 1. A summary table of all monitor wells installed during the Confirmation Study (verification and characterization) is given in Appendix A.

The location of monitor wells, as well as pertinent analytical data, lithologic logs, and water-level information are included in the individual site descriptions presented in subsequent sections of this report. Water-level measurements collected at various times during the project have been summarized in Appendix B.

All field work for the characterization study was carried out according to the procedures developed in the previous investigation, as detailed in G&M's report of December, 1985. Well installation, surveying, lithologic description and water sampling were supervised or performed by G&M hydrogeologists. Chemical analyses of water and soil samples were performed by a private laboratory. Analytical methods, sample-collection methods, chain-of-custody and quality-assurance procedures were in accordance with U.S. EPA

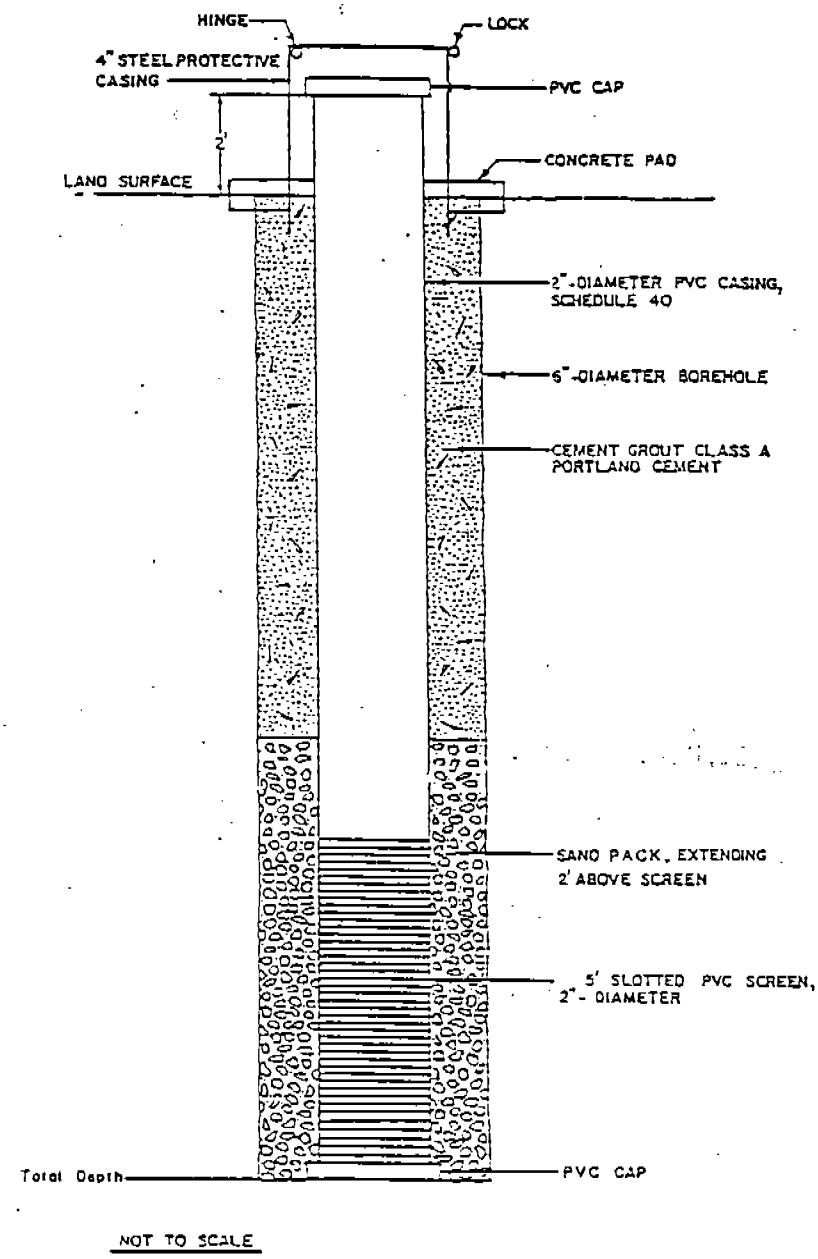

Figure 1. Construction Diagram for a Typical Shallow Monitor Well

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TABLE 1. WELL-CONSTRUCTION DATA, 1985 [1/]

WELL NO.	DATE INSTALLED	DEPTH OF SCREEN SETTING (FT BELOW LAND SURFACE)	LAND-SURFACE ELEVATION (FT, MSL) 2/	MEASURING POINT ELEVATION (FT, MSL) 2/
NARF-9	3-85	19-24	15.2	17.33
NARF-10	3-85	11-16	9.7	10.62
NARF-11	3-85	19-24	16.3	18.33
NARF-12	3-85	10-15	3.9	6.07
NARF-13	3-85	11-16	6.6	8.47
NARF-14	3-85	9-14	9.3	9.04
NARF-15	3-85	10-15	8.6	10.85
NARF-16	3-85	9-14	8.9	9.15
NARF-17	3-85	10-15	10.4	12.22
NARF-18	3-85	10-15	8.4	7.93
NARF D-1	3-85	58-68	9.3	8.85
NARF D-2	3-85	51-61	9.8	10.50
NAS 30-4	3-85	10-15	-	24.82
NAS 30-5	3-85	7-12	-	24.86
NFD-3	3-85	3-8	-	-
NFD-4	3-85	3-8	-	-

1/ All wells have 2-inch diameter threaded PVC casing, Schedule 40, and screens.

2/ ft, msl means feet above mean sea level.

(Environmental Protection Agency) and FDER (Florida Department of Environmental Regulation) requirements or guidelines.

SITE ASSESSMENT AND RECOMMENDATIONS

NARF Area (Site Nos. 11, 12, 14, 15, 16)

Findings

In each of two areas within NARF where ground-water contamination had been noted in the previous investigation, one deep and five shallow monitor wells have been installed. In the northeast, the new wells are D-1, and 14 through 18; in the southeast, wells D-2 and 9 through 13 have been installed. Their location is shown in Figure 2. Lithologic logs (Table 2) indicate that the dominant material penetrated by the shallow wells (16 to 24 ft below land surface) is silty sand, of moderate permeability. Reported clay zones are generally less than six ft thick and have large admixtures of sand; they may contain thin lenses of compact clay. An extensive clayey zone was logged at D-1 from 11 to 32 ft (Table 2), but apparently is absent in D-2. Predominantly sandy material extends to 68 ft at D-1, and to 61 ft at D-2. Both borings bottom in gray-green clay of the Hawthorn Formation.

Water-table elevations in the NARF area on September 18, 1985, are shown in Figure 3. The contours indicate a generally easterly flow of ground water in the surficial aquifer, at gradients of about 0.003 to 0.004 (3 to 4 ft per 1000 ft). Southerly ground-water flow toward Black Point is at gradients that are about twice as steep. The water levels

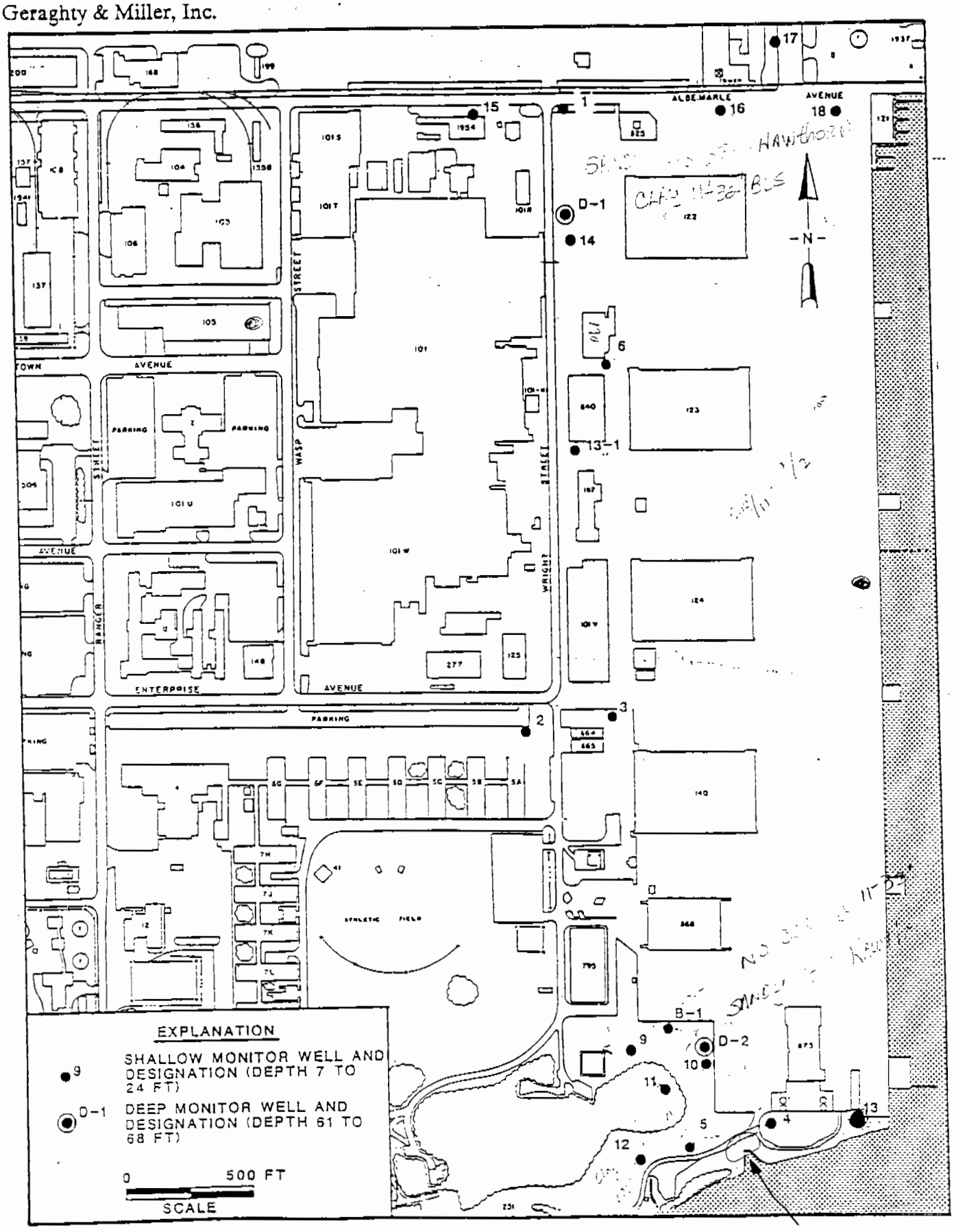

Figure 2. Well Locations, NARF

TABLE 2. LITHOLOGIC LOGS, NARF

LITHOLOGIC LOG FOR MONITOR WELL NARF-9

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, fine-grained, silty, tan.....	0.5 - 7.5	7.0
Clay, very sandy, dry, orange and gray....	7.5 - 14.0	6.5
Sand, fine-grained, silty, gray.....	14.0 - 24.0	10.0

LITHOLOGIC LOG FOR MONITOR WELL NARF-11

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, silty, brown to tan...	0 - 9.0	9.0
Sand, fine-grained, clayey, orange.....	9.0 - 10.0	1.0
Clay, very sandy, orange.....	10.0 - 14.0	4.0
Sand, fine-grained, silty, gray to tan....	14.0 - 24.0	10.0

LITHOLOGIC LOG FOR MONITOR WELL NARF-12

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, silty, tan; with organics and clay lenses.....	0 - 2.0	2.0
Sand, fine-grained, silty, tan to light gray.....	2.0 - 16.0	14.0

TABLE 2. Continued

LITHOLOGIC LOG FOR MONITOR WELL NARF-17

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, silty, brown to light gray.....	0 - 13.5	13.5
Clay, very sandy, gray, plastic.....	13.5 - 14.0	0.5
Sand, fine-grained, silty, brown to tan...	14.0 - 15.5	1.5
Clay, very sandy, gray, plastic.....	15.5 - 16.0	0.5

LITHOLOGIC LOG FOR MONITOR WELL NARF-18

Description	Depth (ft)	Thickness (ft)
Asphalt and limerock base.....	0 - 0.5	0.5
Sand, fine-grained, silty, white to tan...	0.5 - 15.0	14.5
Clay, very sandy, gray, plastic.....	15.0 - 16.0	1.0

TABLE 2. Continued

LITHOLOGIC LOG FOR MONITOR WELL NARF D-1

Description	Depth (ft)	Thickness (ft)
Concrete.....	0 - 1.0	1.0
Sand, fine-grained, silty, tan, clay lens at 4.5'.....	1.0 - 6.0	5.0
Sand, fine-grained, silty, brown to gray; with limestone fragments.....	6.0 - 11.0	5.0
Clay, slightly sandy, gray-green, stiff...	11.0 - 16.0	5.0
Clay, very sandy, gray-green, soft.....	16.0 - 23.0	7.0
Clay, plastic, gray, stiff, with sand seams.....	23.0 - 32.0	9.0
Sand, fine-grained, slightly clayey, gray.	32.0 - 35.0	3.0
Sand, fine-grained, silty, white to tan to gray.....	35.0 - 68.0	33.0
Clay, gray-green, stiff, plastic.....	68.0 - 70.0	2.0

TABLE 2. Continued

LITHOLOGIC LOG FOR MONITOR WELL NARF-13

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, silty, tan to gray....	0 - 4.0	4.0
Sand, fine-grained, slightly clayey, gray.	4.0 - 5.0	1.0
Clay, sandy, stiff, green.....	5.0 - 10.0	5.0
Sand, fine-grained, silty, light gray to cream.....	10.0 - 16.0	6.0

LITHOLOGIC LOG FOR MONITOR WELL NARF-14

Description	Depth (ft)	Thickness (ft)
Concrete.....	0 - 1.0	1.0
Sand, fine-grained, silty, tan to cream...	1.0 - 6.0	5.0
Clay, green, plastic.....	6.0 - 6.5	0.5
Sand, fine-grained, silty, brown with limestone fragments.....	6.5 - 10.0	3.5
Sand, fine-grained, silty, brown with clay lenses.....	10.0 - 12.0	2.0
Sand, fine-grained, silty, brown.....	12.0 - 13.5	1.5
Clay, sandy, green, plastic.....	13.5 - 16.0	2.5

TABLE 2. Continued

LITHOLOGIC LOG FOR MONITOR WELL NARF-15

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, silty, brown to light gray.....	0 - 8.5	8.5
Clay, gray-green, soft.....	8.5 - 9.0	0.5
Sand, fine-grained, silty, tan to light tan.....	9.0 - 15.0	6.0
Clay, sandy, gray-green, stiff.....	15.0 - 16.0	1.0

LITHOLOGIC LOG FOR MONITOR WELL NARF-16

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, silty, tan to cream...	0 - 4.0	4.0
Sand, fine-grained, silty, cream to brown, with clay lenses.....	4.0 - 9.5	5.5
Clay, gray, soft, with fine sand lenses...	9.5 - 10.0	0.5
Sand, fine-grained, silty, tan, with clay lenses.....	10.0 - 13.5	3.5
Clay, gray-green, soft, with fine sand lenses.....	13.5 - 16.0	2.5

TABLE 2. Continued

LITHOLOGIC LOG FOR MONITOR WELL NARF D-2

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, silty, tan.....	0 - 3.0	3.0
Sand, fine-grained, clayey, orange	3.0 - 8.0	5.0
Sand, fine-grained, silty, light brown to gray.....	8.0 - 32.0	24.0
Sand, fine-grained, silty, gray to tan; with clay lenses.....	32.0 - 40.0	8.0
Sand, fine-grained, silty, light gray to tan.....	40.0 - 60.0	20.0
Sand, medium-grained, orange.....	60.0 - 61.0	1.0
Clay, gray-green, soft.....	61.0 - 66.0	5.0

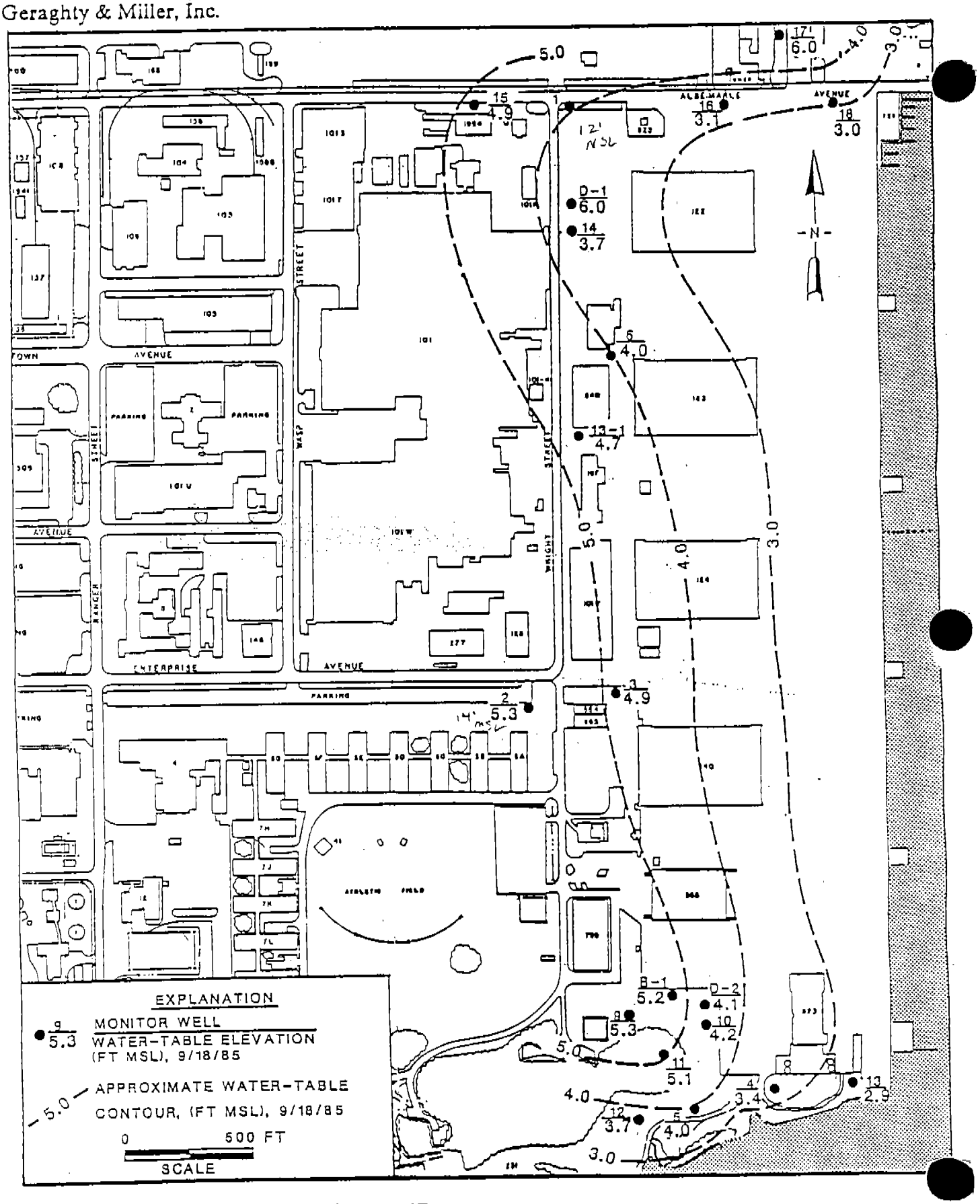

Figure 3. Water-Table Elevation, NARF

determined on September 18, 1985 were uncommonly high and average gradients probably are considerably lower.

Approximate ground-water flow velocities may be calculated by estimating the hydraulic conductivity and the effective porosity of the aquifer material. As shown on Table 5 of the verification report, vertical permeabilities ranged from a low of 2.70×10^{-6} to a high of 5.6×10^{-3} cm/sec (centimeters per second) or 3600 gpd/ft. For the silty sands encountered in the NARF area, containing small amounts of clay, a horizontal hydraulic conductivity of 1×10^{-3} cm/sec, and an effective porosity of 0.20 (20 percent) may be estimated. This information combined with a gradient of 0.004, average velocities might be of the order of 20 ft/year. Furthermore, the presence of a sea wall along the eastern boundry of the NARF impedes the movement of ground water to the adjacent St. Johns River.

In April 1985, water samples were obtained from 12 new monitor wells and from six wells installed previously. Analytical results are given in Appendix C, Section 1. Nearly all samples were found to contain VOCs (volatile organic compounds) in concentrations ranging from trace amounts to several tens of ug/l (micrograms per liter) of total VOCs. Very large concentrations (>13,400 ug/l) were found only in one sample, B-1.

Four wells (B-1, D-1, D-2, and 6) were tested for the presence of other priority pollutants, including base/neutral

and acid-extractable fractions, 11 metals, and PCBs. Water samples from these wells were found to be free of any priority pollutants other than VOCs.

In the northeastern part of NARF, total VOC concentrations were as high as 62 ug/l at well 17 and 68 ug/l in the sample from the deep well D-1. Only traces (1.1 ug/l) were determined in the sample from the nearby shallow well 14. VOCs ranged from 15 to 47 ug/l in other wells; none were detected in two samples (15 and 18). In the northeastern area, toluene is the principal contaminant, in concentrations as high as 57 ug/l. Other contaminants, commonly reported in trace amounts, are carbon tetrachloride, bromodichloro-methane, and 1,1,1 - trichloroethane. TCE (trichloroethene) has not been detected in recent samples from the northeastern part of NARF, however, traces of that solvent were determined in two wells in 1983. Total VOC and toluene concentrations in ground-water samples are shown in Figure 4. The content of TCE and 1,1,1 - trichloroethane in water samples is shown in Figure 5.

In the southeastern part of the NARF area, ground-water contamination by VOCs is generally of the same magnitude and by the same compounds identified in the northeastern section. Thus total VOCs generally range from 4 to 88 ug/l; toluene being the principal contaminant. At B-1, however, samples obtained in April 1985 contained more than 13,400 ug/l total VOCs, principally TCE and 1,1,1- trichloroethane. The

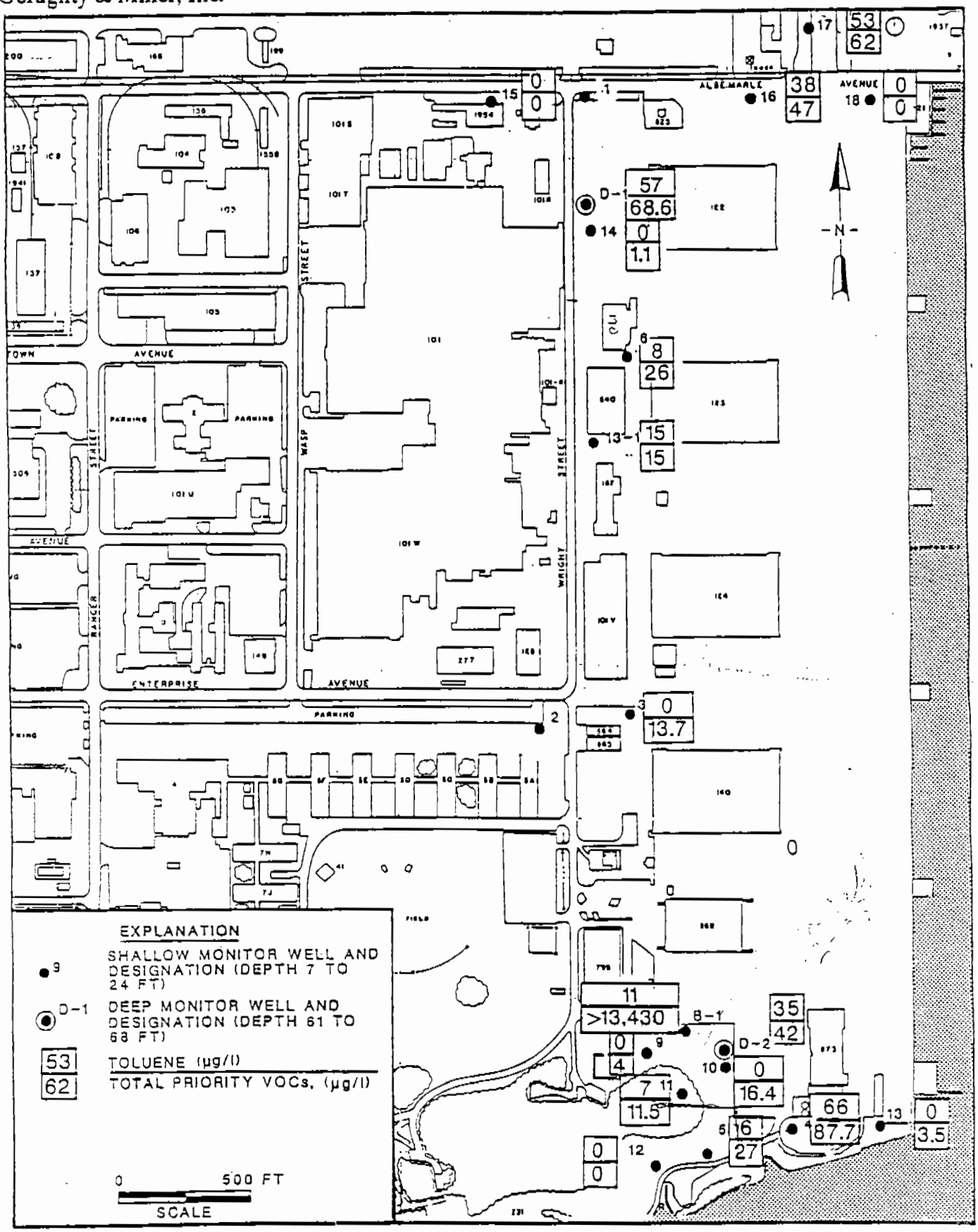

Figure 4. Total VOC and Toluene Concentrations, NARF

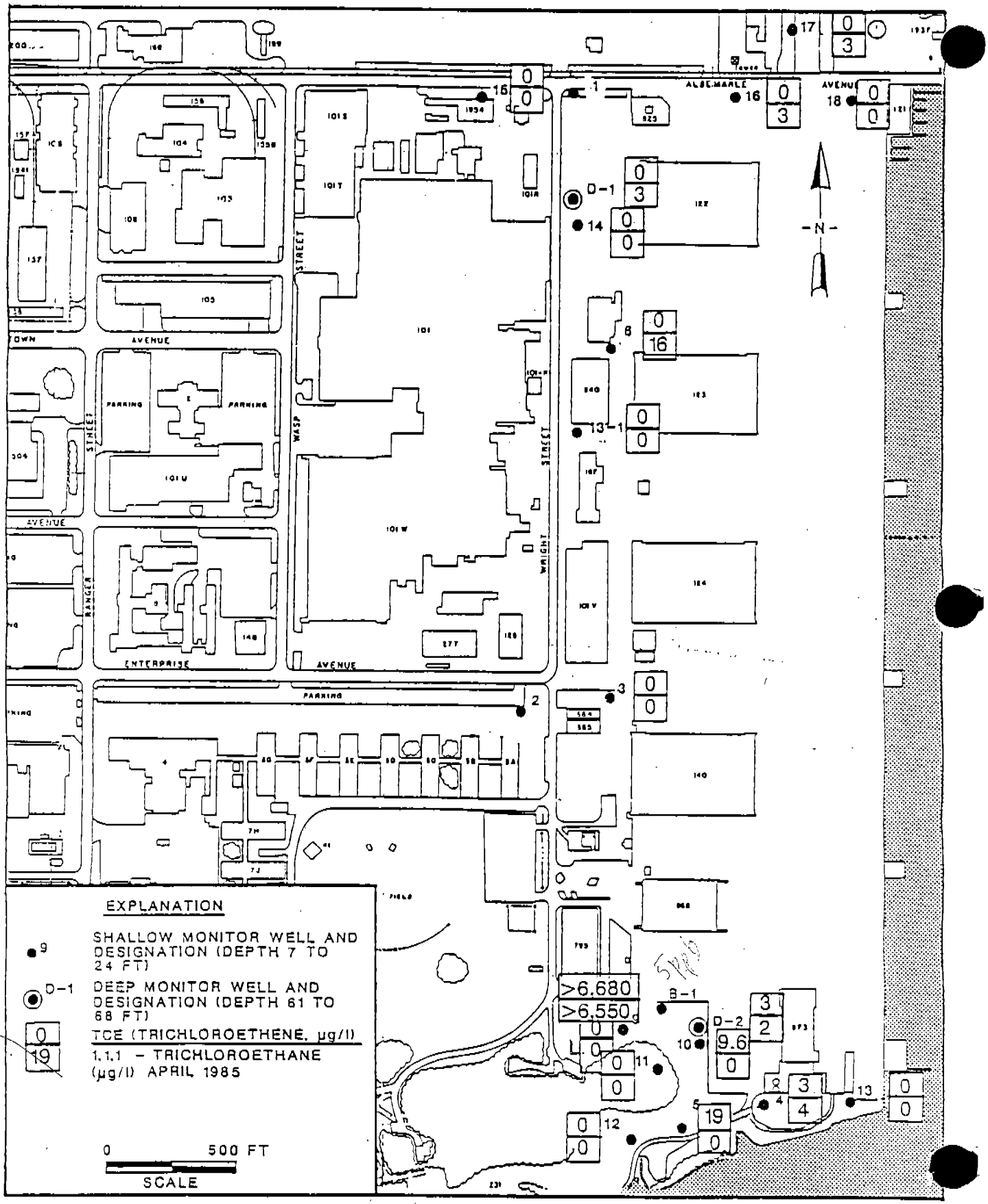

Figure 5. TCE and 1,1,1,-Trichloroethane Concentrations, NARF

concentrations of these compounds were not quantified in the most recent analysis; for September 1983, however, concentrations of 155,300 and 25,500 ug/l, respectively, have been reported. In addition to the compounds named, the sample from B-1 contained 170 ug/l of 1,1,2 - trichloroethane and traces of other solvents (Appendix C, Section 1).

Monitor well B-1 is screened in silty sands from 13 to 16 ft. In other nearby shallow wells, TCE and 1,1,1-trichloroethane were not detected (wells 9 and 11) or were present in relatively low concentrations. The sample from the deep well, D-2, contained 3 ug/l TCE, as shown in Figure 5. The relative position of monitoring well B-1 and nearby wells, their screen settings, and general lithology are indicated in a fence diagram, Figure 6.

As indicated by the contours shown in Figure 3, shallow ground-water flow in the water-table aquifer is toward the St. Johns River. Water-level measurements (Appendix B) from the paired deep and shallow monitor wells (D-1 and 14, D-2 and 10) reveal that there is a net upward hydraulic gradient in the northeast portion of NARF and either no vertical gradient or a slight downward hydraulic gradient in the southeast section. As discussed earlier, there is an approximately 21 ft thick clayey zone in the subsurface at D-1. Neither deep well penetrated the shallow rock aquifer which is thought to be absent in this area.

The water-table is not used as drinking-water source in

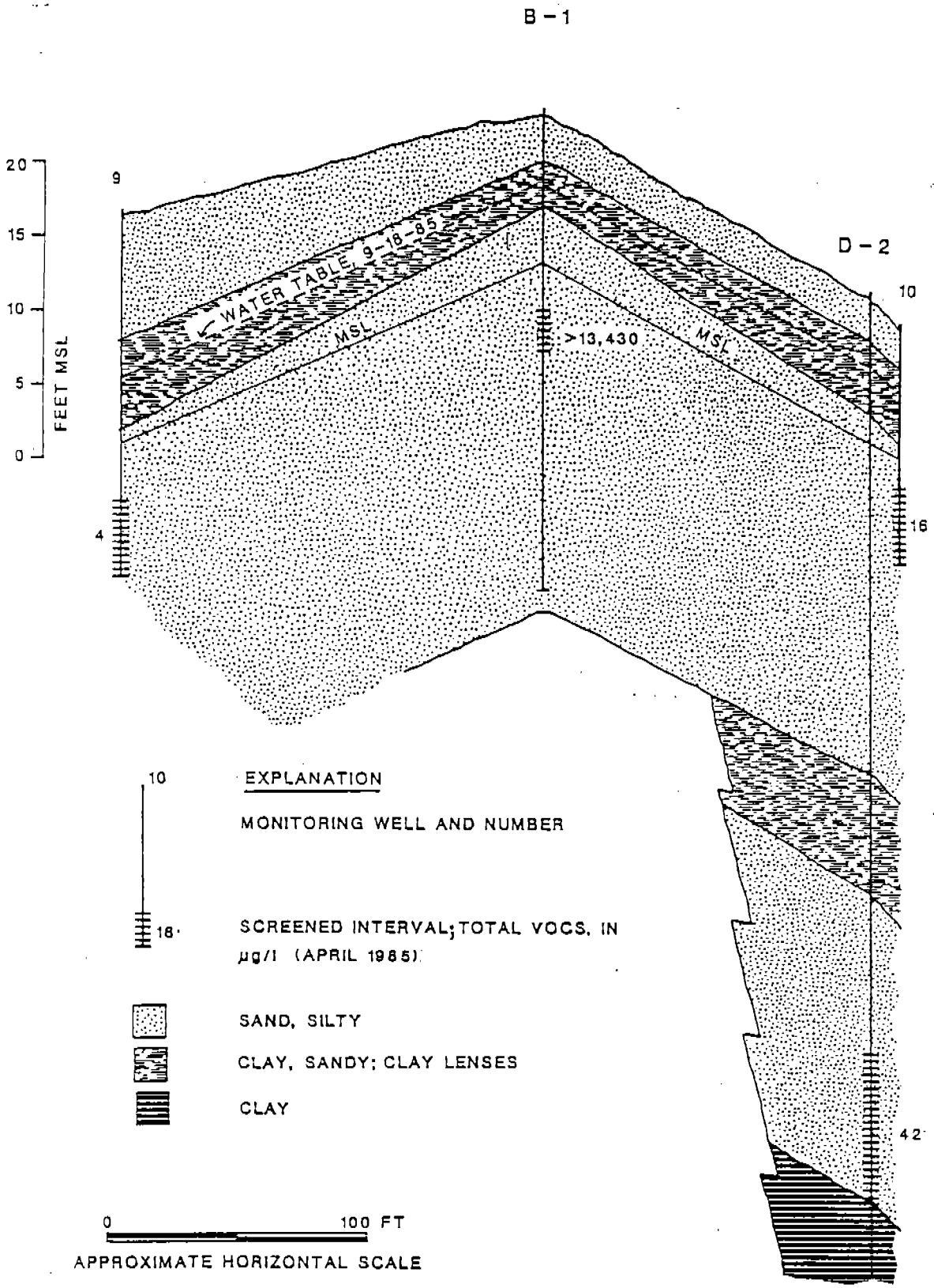

Figure 6. Fence Diagram, NARF

the NARF area. All water supplies are obtained from wells tapping the Floridan aquifer, at depths of 400 to 1,200 ft which has water-levels that are considerable higher than the water table. Most supply wells reportedly flow at land surface. Therefore, the potential of contamination of the Floridan from shallow sources in the NARF area is generally negligible.

Recommendations

In view of the large concentrations of priority VOCs determined at monitor well B-1, and the potential of contaminant migration, an interceptor well should be installed at this site. This interceptor well should be 6-inches or greater in diameter and an 8-hr pumping test should be performed on this well in order to determine aquifer characteristics. These data will be used to select the appropriate size of the pump. Water-quality samples will be collected and analyzed for VOCs (EPA Method 624) during the pumping test to determine the possibility of discharging the recovered ground water to the domestic sewage treatment plant, or used to design an air-stripping tower to treat the recovered water should pretreatment be required.

Inasmuch as there are discrepancies in concentrations and compounds reported in 1985, compared to earlier analyses, it is recommended that all NARF wells in which contaminants have been detected, be resampled; analysis will consist of a determination of priority VOCs (EPA Method 624). Wells to be

resampled are:

NARF B-1, D-1, D-2

NARF 4, 5, 6, 9, 10, 11

NARF 13, 13-1, 14, 16, 17

Using the laboratory results of the resampling program, as well as the previous results, a risk assessment will be conducted to determine the risks associated with the no-action alternative. Based on these results, the need for additional recovery wells will be evaluated. Moreover, well NARF 2, for which no samples were obtained in April, 1985, should be resampled. Monitor well NARF-1 has been damaged due to vehicular traffic; accordingly, this well should be either repaired or properly abandoned.

As a precuation, water-supply wells in the vicinity of the NARF area tapping the Floridan aquifer should be sampled and analyzed for the presence of VOCs (EPA Method 624).

Fire Pit (Site No. 28)

Findings and Recommendations

The composite soil sample collected during the verification study contained relatively large concentrations of PCBs and it was recommended at the time to resample the soils of the fire pit area. Soil samples from 16 locations (Figure 7) have not been collected as of the report date; therefore recommendations for this site cannot be made. An addendum to this report detailing the laboratory results of this sampling will be provided when available.

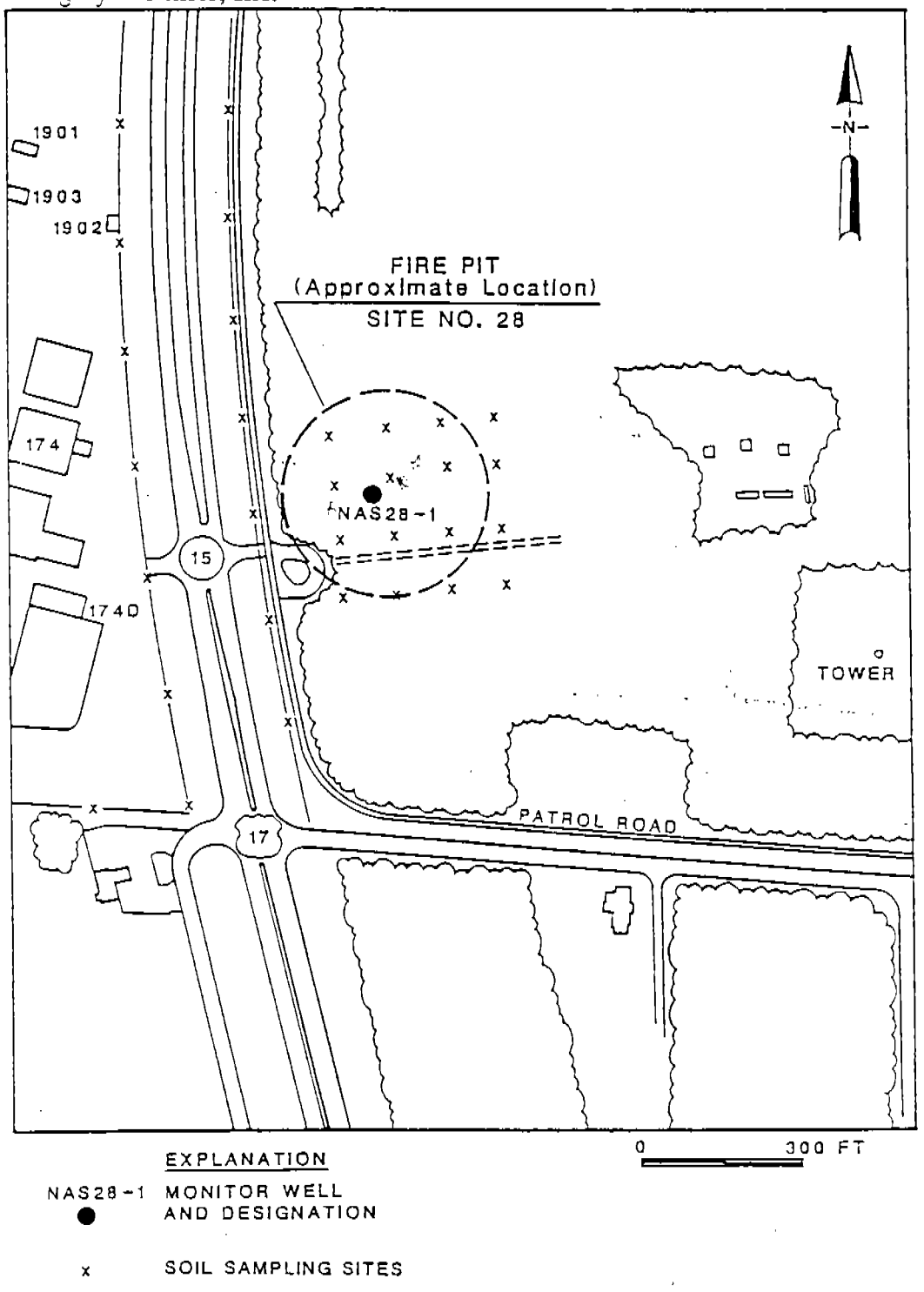

Figure 7. Location of Wells and Sampling Sites, NAS Site No. 28

Organic Disposal Area (Site No. 29)

Findings and Recommendations

As recommended in the verification study, nine soil samples were tested for the presence of cadmium (Cd) by the EP (Extraction Procedure) toxicity method. For eight samples, concentrations of <0.1 ppm Cd were determined; one sample, No. 4, had a concentration of 0.19 ppm Cd (Figure 8 and Appendix C, Section 2). None of these samples exceeded the EP toxicity of 1.0 ppm for Cd; therefore these soils are not considered to be a hazardous waste.

Water-quality samples collected in April 1984, from two monitor wells, NAS 29-1 and 29-2 contained only traces of VOCs. Based on these data, the site does not pose a risk to public health or the environment and no further action is recommended for this site.

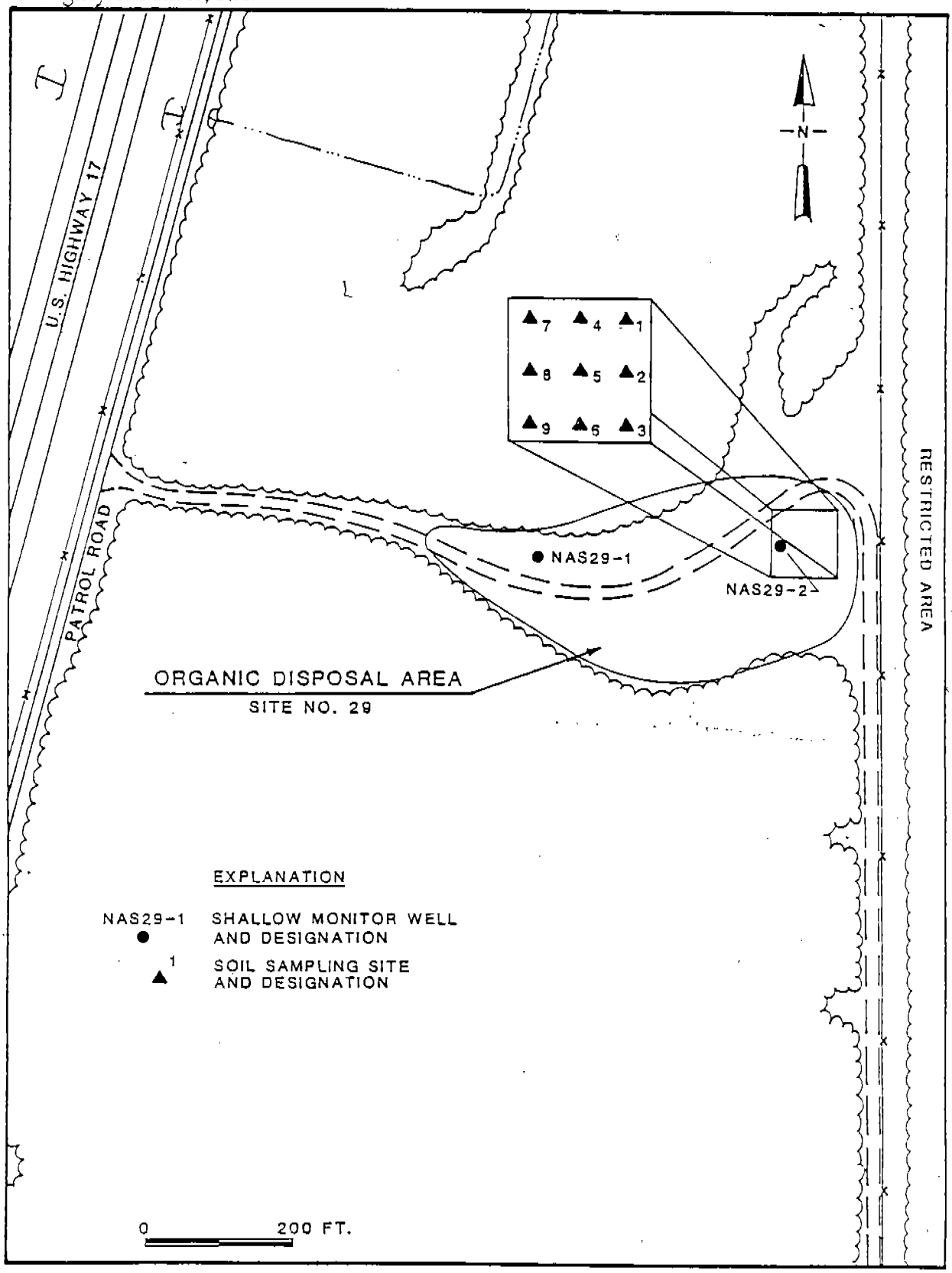

Figure 8. Location of Wells and Sampling Sites, NAS Site No. 29

TABLE 3. LITHOLOGIC LOGS, NAS SITE 30

LITHOLOGIC LOG FOR MONITOR WELL NAS30-4

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, silty, brown to white, with clay lenses	0 - 4.0	4.0
Clay, sandy, gray to orange, stiff	4.0 - 8.0	4.0
Sand, fine-grained, silty, slightly clayey, gray	8.0 - 15.5	7.5
Clay, sandy, gray, soft	15.5 - 16.0	0.5

LITHOLOGIC LOG FOR MONITOR WELL NAS30-5

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, silty, brown; mixed with organics	0 - 4.5	4.5
Clay, sandy, dark gray to brown; stiff	4.5 - 7.0	2.5
Sand, medium-grained, clayey, gray	7.0 - 8.0	1.0
Sand, fine-grained, silty, gray	8.0 - 9.0	1.0
Clay, very sandy, green to gray with sand lenses	9.0 - 16.0	7.0

The soils in the area around sample Nos. 3 and 4 should be removed and disposed of in an approved hazardous waste landfill. During removal, samples should be taken in the immediate vicinity and analyzed for EP toxicity (Cd) to assure that all of the soils exhibiting the characteristic for EP toxicity (EP) are removed.

Base Landfill (Site No. 32)

Findings and Recommendations

A water-quality sample from monitor well NAS 32-1 at the base landfill site (Figure 10) was analyzed for the presence of acid extractable and base/neutral organic priority pollutants, including chlorobenzenes and PCBs. As indicated by the analytical data (Appendix C, Section 4), the sample was free of any of these priority pollutants.

Based on the results of these analyses and the samples collected during the verification study the site does not pose a threat to public health or the environment. Therefore, no further action is recommended.

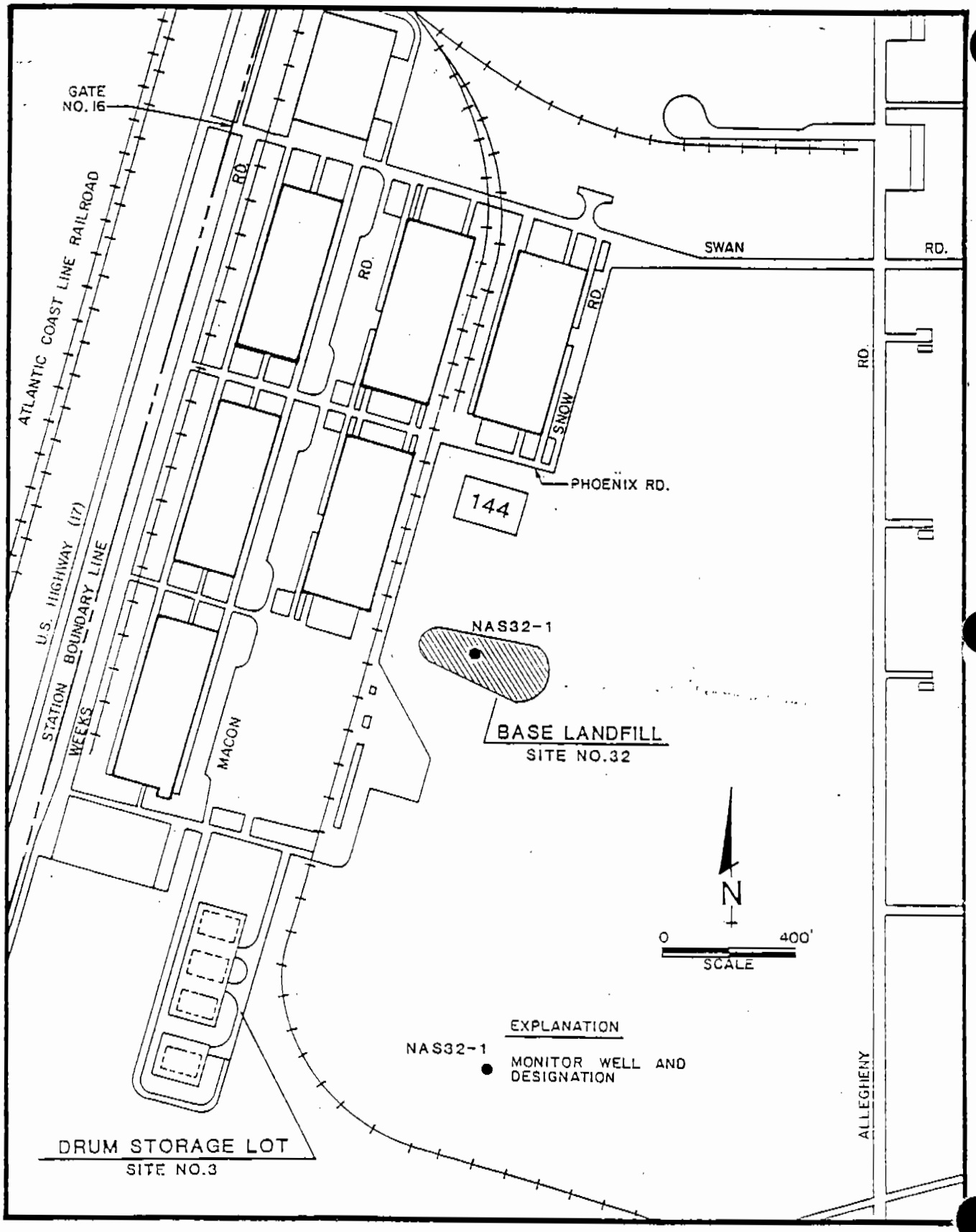

Figure 10. Well Location, Base Landfill Area, Site No. 32

NFD: Oil Pond and Land Spreading Area (Site No. 5)

Findings and Recommendations

Two additional monitor wells were installed south of the oil pond and the land spreading area of the NFD, as shown in Figure 11. The wells, NFD-3 and 4, penetrated predominately fine, silty sands to depths of 16 ft (lithologic logs, Table 4) and were screened from 3 to 8 ft. Water samples from wells NFD 2, 3, and 4, obtained in April 1985, were tested for eight aromatic hydrocarbons (EPA Method 602) and were found to be free of these compounds (Appendix C, Section 5). A scan of petroleum hydrocarbons indicated <1 mg/l for NFD-4 and only 1 mg/l in samples from wells 2 and 3.

The elevations of the monitor wells at Site No. 5 have not been surveyed, however, due to the site's proximity to the St. Johns River, it is presumed to be to the south and east. Based on the findings of the verification study and characterization study, the site does not appear to pose a threat to public health or the environment. Therefore, no future actions are recommended for this site.

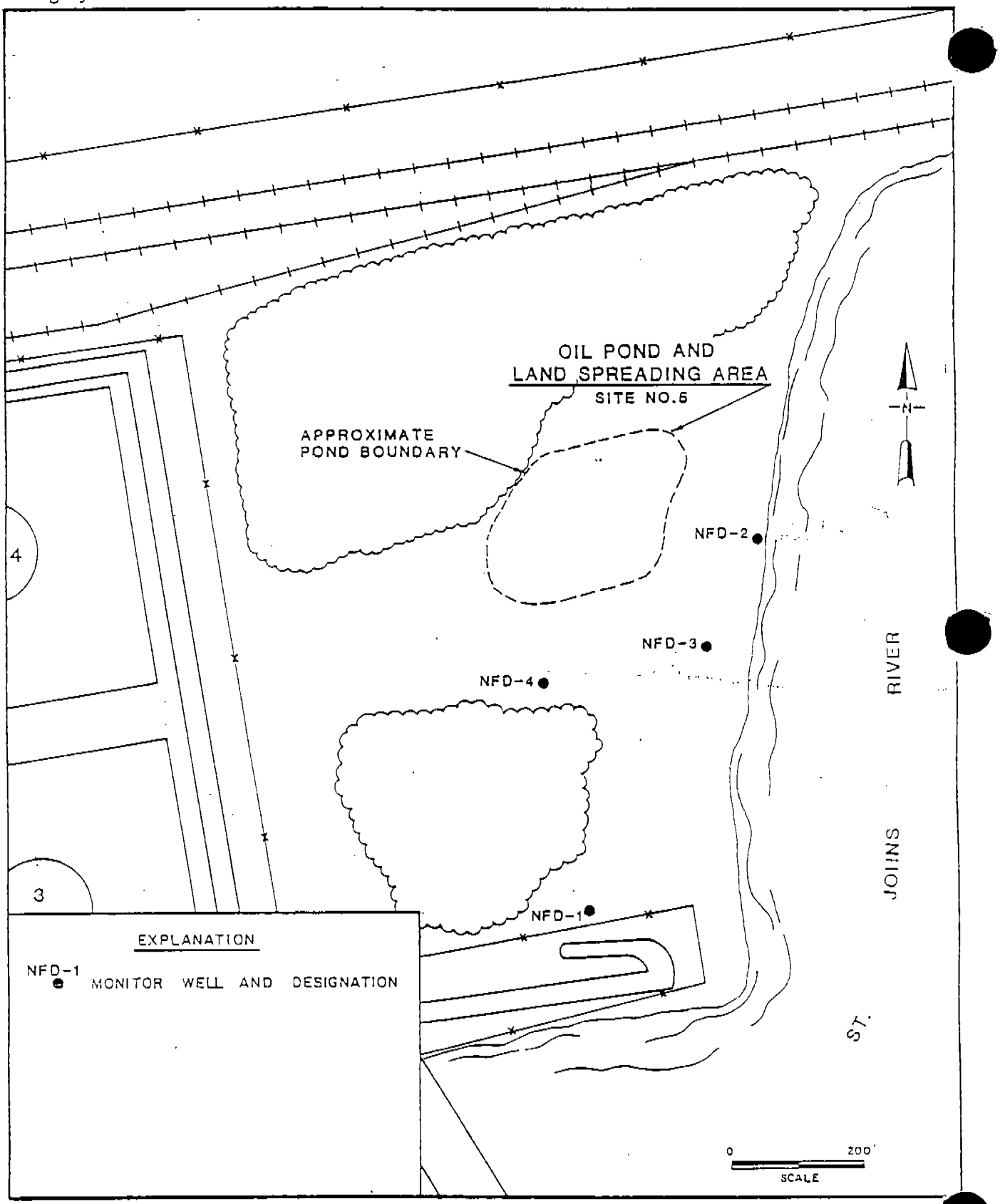

Figure 11. Well Locations, NFD Site No. 5

TABLE 4. LITHOLOGIC LOGS, NFD SITE NO. 5

LITHOLOGIC LOG FOR MONITOR WELL NFD-3

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, silty, tan to gray....	0 - 7.5	7.5
Sand, fine-grained, silty, slightly clayey, brown to gray.....	7.5 - 8.5	1.0
Sand, fine-grained, silty, gray.....	8.5 - 10.0	1.5

LITHOLOGIC LOG FOR MONITOR WELL NFD-4

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, silty, cream to gray..	0 - 2.0	2.0
Sand, fine to medium-grained, silty, dark gray to light gray.....	2.0 - 6.0	4.0
Sand, fine-grained, silty, brown to gray..	6.0 - 7.5	1.5
Sand, fine-grained, silty, slightly clayey, gray.....	7.5 - 8.5	1.0
Sand, fine-grained, silty, brown to gray..	8.5 - 16.0	7.5

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SUMMARY

During the confirmation study, 14 past waste disposal areas were considered for investigation (5 sites in NARF were considered as one). Upon completion of the verification phase, 8 sites were not recommended for future study under the characterization phase. Therefore, the characterization phase study consisted of additional field work to better define potential contamination of the soil matrix and shallow ground water at six sites (NARF, NAS Site Nos. 28, 29, 30, and 32; and NFD Site No. 5). The results of the characterization study suggest that only one site, NARF, warrants remedial action considerations. Also, the soil of NAS Site No. 28 should be resampled for PCBs. Based on the data collected during the Confirmation Study (both verification and characterization), the remaining sites (NAS Site Nos. 29, 30, 32 and NFD Site No. 5) should be disregarded for future investigation. The current status of each site identified at the NAS and NFD is presented in Table 5.

TABLE 5. CURRENT STATUS OF ALL SITES IDENTIFIED AT THE NAS AND NFD

SITE NO.	IDENTIFIED BY	VERIFICATION RECOMMENDED BY	CHARACTERIZATION RECOMMENDED BY	REMEDIAL ACTION RECOMMENDED BY	CURRENT STATUS
NAS					
1	IAS[1/]	NR[2/]	-	-	Complete
2	IAS	FDER[3/]	NR	-	Complete
3	IAS	NR	-	-	Complete
4	IAS	IAS	NR	-	Complete
5	IAS	NAS-JAX	NR	-	Complete
6	IAS	NR	-	-	Complete[5/]
7	IAS	NAS-JAX	NAS-JAX	Characterization	Design
8	IAS	NR	-	-	Complete
9	IAS	IAS	NR	-	Complete
10	IAS	NR	-	-	Complete
11	IAS	IAS	Verification	Characterization	RA Design
12	IAS	IAS	Verification	Characterization	RA Design
13	IAS	FDER	NR	-	Complete
14	IAS	IAS	Verification	Characterization	RA Design
15	IAS	IAS	Verification	Characterization	RA Design
16	IAS	IAS	Verification	Characterization	RA Design
17	IAS	IAS	NR	-	Closure Plan submitted
18	IAS	FDER	NR	-	Complete
19	IAS	IAS	NR	-	Tanks to be properly abandoned by the Navy
20	IAS	NR	-	-	Complete
21	IAS	NR	-	-	Complete
22	IAS	NR	-	-	Complete
23	IAS	NR	-	-	Complete
24	IAS	NR	-	-	Complete
25	IAS	NR	-	-	Complete
26	NAS-JAX	Prior to NACIP	-	NAS-JAX	Remedial action underway
27	IAS	NR	-	-	Complete
28	IAS	NAS-JAX	Verification	Characterization	Resampling
29	IAS	IAS	Verification	NR	Complete
30	IAS	IAS	Verification	Characterization	Sediment removal
31	IAS	NR	-	-	Complete
32	IAS	FDER	Verification	NR	Complete
33	IAS	NR	-	-	Complete
34	IAS	NR	-	-	Complete
35	IAS	NR	-	-	Complete
36	IAS	NR	-	-	Complete
37	IAS	NR	-	-	Complete
38	IAS	NR	-	-	Complete
39	NAS-JAX	NAS-JAX	NR	-	Complete
40	NAS-JAX	NAS-JAX	NR		
NFD					
1	IAS	NR	-	-	Complete
2	IAS	NR	-	-	Complete
3	IAS	NR	-	-	Complete
4	IAS	NR	-	-	Complete
5	IAS	IAS	Verification	NR	Complete

1/ IAS = Initial Assessment Study
2/ NR = Not recommended
3/ FDER = Florida Department of Environmental Regulation
4/ RA = Not applicable; site still under investigation
5/ RA Design = Remedial Action Design

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APPENDIX A

Well-Construction Data

APPENDIX A - WELL-CONSTRUCTION DATA
(Continued)

Well No.	Date Installed	Depth of Screen Setting (ft below land surface)	Land-Surface Elevation (ft, msl)	Measuring Point Elevation (ft, msl)
NAS 29-1	3-84	7 - 12.5	-	-
NAS 29-2	3-84	7 - 12.5	-	-
NAS 30-1	9-83	8-11	-	22.02
NAS 30-2	9-83	7-10	-	21.08
NAS 30-3	9-83	6-9	-	21.12
NAS 30-4	3-85	10-15	-	24.82
NAS 30-5	3-85	7-12	-	24.86
NAS 32-1	2-84	6.5 - 12	-	-
NFD 1	8-83	3.5 - 6.5	-	-
NFD 2	8-83	4-7	-	-
NFD 3	3-85	3-8	-	-
NFD 4	3-85	3-8	-	-

1/ All wells have 2-inch-diameter threaded PVC casing, Schedule 40, and screens, slot size 0.010 inch.
2/ Ft msl means feet above mean sea level.
3/ Data not available.

APPENDIX A - WELL-CONSTRUCTION DATA 1/

Well No.	Date Installed	Depth of Screen Setting (ft below land surface)	Land-Surface Elevation (ft, msl) 2/	Measuring Point Elevation (ft, msl)
NARF 1	9-83	6.5 - 9.5 atop & in clay	-3/	11.99
NARF 2	9-83	13.0 - 16.0 no clay	13.0	14.75
NARF 3	9-83	7.5 - 10.5 atop & in clay	10.0	12.24
NARF 4	9-83	8.5 - 11.5 no clay	7.4	8.80
NARF 5	9-83	7.5 - 10.5 no clay	5.11	7.10
NARF 6	9-83	6.5 - 9.5 atop & in clay	9.0	10.21
NARF 9	3-85	19.0 - 24.0 — between upper clay	15.2	17.33
NARF 10	3-85	11-16 no clay	9.7	10.62
NARF 11	3-85	19-24 below upper clay	16.3	18.33
NARF 12	3-85	10-15 no clay to 16'	3.9	6.07
NARF 13	3-85	11-16 below upper clay	6.6	8.47
NARF 13-1	9-83	7 - 12.5	-	9.04
NARF 14	3-85	9-14 above clay	9.3	9.04
NARF 15	3-85	10-15	8.6	10.85
NARF 16	3-85	9-14	8.9	9.15
NARF 17	3-85	10-15 atop clay	10.4	12.22
NARF 18	3-85	10-15 atop clay	8.4	7.93
NARF D-1	3-85	58-68 atop clay / no upper clay	9.3	8.85
NARF D-2	3-85	51-61 not atop clay or bracketing water table	9.8	10.50
NARF B-1	8-83	13-16	9.4	11.60
NAS 2-1	2-84	6 - 11.5	-	-
NAS 4-1	9-83	8.5 - 11.5	-	21.44
NAS 4-2	9-83	8.5 - 11.5	-	18.83
NAS 4-3	9-83	8.5 - 11.5	-	19.55
NAS 4-4	2-84	7 - 12.5	19.3	21.26
NAS 4-5	2-84	7 - 12.5	18.8	20.59
NAS 4-6	3-84	6 - 11.5	17.1	19.27
NAS 4-7	3-84	4 - 9.5	11.9	16.02
NAS 4-8	3-84	7 - 12.5	12.9	15.18
NAS 4-9	3-84	7 - 12.5	21.6	23.51
NAS 4-10	1-85	8 - 13	18.9	20.58
NAS 5-1	3-85	10-15	-	-
NAS 9-1	8-83	10-13	-	-
NAS 13-1	3-84	7 - 12.5	-	-
NAS 18-1	3-84	7 - 12.5	-	-
NAS 28-1	3-85	10 - 15.0	-	-

APPENDIX B

Ground-Water Elevation in the Study Area (1985)

APPENDIX B: GROUND-WATER ELEVATIONS IN THE STUDY AREA (1985)
(All measurements in feet above mean sea level)

MONITOR WELL NUMBER	MEASURING PT ELEVATION (ft above msl)	DATE OF MEASUREMENT 4/5/85	5/10/85	9/18,19/85
NARF-1	11.99	-	-	-
NARF-2	14.75	2.52	1.75	5.34
NARF-3	12.24	2.29	2.57	4.90
NARF-4	8.80	0.57	1.10	3.35
NARF-5	7.10	1.07	1.44	4.00
NARF-6	10.21	3.10	3.05	4.02
NARF-9	17.33	1.73	1.98	5.33
NARF-10	10.62	1.28	1.62	4.22
NARF-11	18.33	1.58	1.75	5.09
NARF-12	6.07	0.83	1.20	3.72
NARF-13	8.47	0.31	1.07	2.85
NARF-13-1	9.04	0.88	4.20	4.73
NARF-14	9.04	2.97	3.04	3.67
NARF-15	10.85	3.66	3.70	4.86
NARF-16	9.15	1.76	1.89	3.06
NARF-17	12.22	3.12	3.28	5.99
NARF-18	7.93	1.79	1.60	3.00
NARF B-1	11.60	1.65	1.93	5.15
NARF D-1	8.85	4.65	4.72	6.03
NARF D-2	10.50	1.23	1.61	4.12
NAS 4-1	21.44	-	-	18.72
NAS 4-2	18.83	-	-	17.01
NAS 4-3	19.55	-	-	17.97
NAS 4-4 1/	21.26	-	-	16.59
NAS 4-5 1/	20.59	-	-	16.77
NAS 4-6 2/	19.27	-	-	15.17
NAS 4-7 2/	16.02	-	-	13.02
NAS 4-8 2/	15.18	-	-	11.44
NAS 4-9 1/	23.51	-	-	20.03
NAS 4-10 1/	20.58	-	-	17.16
NAS 30-1	22.02	16.36	15.60	19.84
NAS 30-2	21.08	15.22	14.66	18.69
NAS 30-3	21.12	15.42	15.05	19.43
NAS 30-4	24.82	16.50	16.12	18.52
NAS 30-5	24.86	16.93	16.39	20.78

1/ RCRA compliance wells around the industrial waste-water treatment plant sludge drying beds.

2/ Wells installed for compliance with Chapters 17-3 and 17-4, FAC.

APPENDIX C

Laboratory Water-Quality and Sediment Analyses Results for Individual Sites

Section 1. NARF Area (Site Nos. 11, 12, 14, 15, 16)

Section 2. Organic Disposal Area (Site No. 29)

Section 3. Old Drum Lot (Site No. 30)

Section 4. Base Landfill (Site No. 32)

Section 5. NFD: Oil Pond (Site No. 5)

SECTION 1

NARF Area

Site Nos. 11, 12, 14, 15, 16

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P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF D-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	57	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	3	µg/l
CARBON TETRACHLORIDE	2	µg/l
BROMODICHLOROMETHANE	6.6	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

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REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

C-1-2

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TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF D-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
BIS (2-CHLOROISOPROPYL) ETHER	< 10	µg/l
4-BROMOPHENYL PHENYL ETHER	< 10	µg/l
BUTYL BENZYL PHTHALATE	< 5	µg/l
2-CHLORONAPHTHALENE	< 5	µg/l
4-CHLOROPHENYL PHENYL ETHER	< 5	µg/l
CHRYSENE	< 5	µg/l
DIBENZO (A,H) ANTHRACENE	< 5	µg/l
DI-N-BUTYLPHTHALATE	< 5	µg/l
DIETHYLPHTHALATE	< 25	µg/l
DIMETHYLPHTHALATE	< 5	µg/l
2,4-DINITROTOLUENE	< 10	µg/l
2,6-DINITROTOLUENE	< 10	µg/l
DIOCTYLPHTHALATE	< 5	µg/l
FLUORANTHENE	< 5	µg/l
FLUORENE	< 5	µg/l
HEXACHLOROBENZENE	< 5	µg/l
HEXACHLOROBUTADIENE	< 5	µg/l
HEXACHLOROETHANE	< 5	µg/l
INDENO-(1,2,3-CD) PYRENE	< 5	µg/l
ISOPHORONE	< 5	µg/l
NITROBENZENE	< 5	µg/l
N-NITROSODI-N-PROPYLAMINE	< 5	µg/l
PHENANTHRENE	< 5	µg/l
PYRENE	< 5	µg/l

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Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF D-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
3,3 DICHLOROBENZIDINE	< 50	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
NAPHTHALENE	< 5	µg/l
ALDRIN	< 1	µg/l
DIELDRIN	< 1	µg/l
ENDRIN ALDEHYDE	< 1	µg/l
HEPTACHLOR	< 1	µg/l
HEPTACHLOR-EPOXIDE	< 1	µg/l
BETA BHC	< 1	µg/l
DELTA BHC	< 1	µg/l
ACENAPHTHENE	< 5	µg/l
ACENAPHTHYLENE	< 5	µg/l
ANTHRACENE	< 5	µg/l
BENZO (A) ANTHRACENE	< 10	µg/l
BENZO (B) FLUORANTHENE	< 5	µg/l
BENZO (K) FLUORANTHENE	< 5	µg/l
BENZO (A) PYRENE	< 5	µg/l
BENZO (G,H,I) PERYLENE	< 5	µg/l
BIS (2-CHLOROETHYL) ETHER	< 10	µg/l
BIS (2-CHLOROETHOXY) METHANE	< 5	µg/l
BIS (2-ETHYLHEXYL) PHTHALATE	< 5	µg/l

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September 12,1985
Report 13670
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Sample Received: 4/05/85
Sample Designation:NARF D-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : ACID EXTRACTABLES		UNITS
PHENOL	< 5	µg/l
2 -NITRO PHENOL	< 5	µg/l
2,4 - DIMETHYL PHENOL	< 5	µg/l
2,4 - DICHLOROPHENOL	< 5	µg/l
2,4,6 - TRICHLOROPHENOL	< 5	µg/l
4 - CHLORO - 3 METHYLPHENOL	< 5	µg/l
2,4, - DINITROPHENOL	< 50	µg/l
PENTACHLOROPHENOL	< 5	µg/l
2-CHLOROPHENOL	< 5	µg/l
2-METHYL-4,6-DINITROPHENOL	< 25	µg/l
4-NITROPHENOL	< 5	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully submitted,

Lawrence J. Korn
Laboratory Supervisor

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Environmental Consulting and Analysis

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September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF D-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
1,2,4-TRICHLOROBENZENE	< 5	µg/l
4,4'-DDD	< 1	µg/l
4,4'-DDE	< 1	µg/l
4,4'-DDT	< 1	µg/l
PCB 1016	< 1	µg/l
PCB 1221	< 1	µg/l
PCB 1232	< 1	µg/l
PCB 1242	< 1	µg/l
PCB 1248	< 1	µg/l
PCB 1254	< 1	µg/l
PCB 1260	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

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September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF D-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
ARSENIC	< 0.005	mg/l
BARIUM	0.10	mg/l
CADMIUM	< 0.01	mg/l
CHROMIUM, TOTAL	< 0.01	mg/l
COPPER	< 0.01	mg/l
LEAD	< 0.01	mg/l
MERCURY	< 0.1	µg/l
NICKEL	< 0.01	mg/l
SELENIUM	< 0.005	mg/l
SILVER	< 0.01	mg/l
ZINC	0.04	mg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

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Laboratory Supervisor

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P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF D-2

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	35	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	2	µg/l
CARBON TETRACHLORIDE	2	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	3	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

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Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

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September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF D-2

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
BIS (2-CHLOROISOPROPYL) ETHER	< 10	µg/l
4-BROMOPHENYL PHENYL ETHER	< 10	µg/l
BUTYL BENZYL PHTHALATE	< 5	µg/l
2-CHLORONAPHTHALENE	< 5	µg/l
4-CHLOROPHENYL PHENYL ETHER	< 5	µg/l
CHRYSENE	< 5	µg/l
DIBENZO (A,H) ANTHRACENE	< 5	µg/l
DI-N-BUTYLPHTHALATE	< 5	µg/l
DIETHYLPHTHALATE	< 25	µg/l
DIMETHYLPHTHALATE	< 5	µg/l
2,4-DINITROTOLUENE	< 10	µg/l
2,6-DINITROTOLUENE	< 10	µg/l
DIOCTYLPHTHALATE	< 5	µg/l
FLUORANTHENE	< 5	µg/l
FLUORENE	< 5	µg/l
HEXACHLOROBENZENE	< 5	µg/l
HEXACHLOROBUTADIENE	< 5	µg/l
HEXACHLOROETHANE	< 5	µg/l
INDENO-(1,2,3-CD) PYRENE	< 5	µg/l
ISOPHORONE	< 5	µg/l
NITROBENZENE	< 5	µg/l
N-NITROSODI-N-PROPYLAMINE	< 5	µg/l
PHENANTHRENE	< 5	µg/l
PYRENE	< 5	µg/l

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF D-2

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
3,3 DICHLOROBENZIDINE	< 50	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
NAPHTHALENE	< 5	µg/l
ALDRIN	< 1	µg/l
DIELDRIN	< 1	µg/l
ENDRIN ALDEHYDE	< 1	µg/l
HEPTACHLOR	< 1	µg/l
HEPTACHLOR-EPOXIDE	< 1	µg/l
BETA BHC	< 1	µg/l
DELTA BHC	< 1	µg/l
ACENAPHTHENE	< 5	µg/l
ACENAPHTHYLENE	< 5	µg/l
ANTHRACENE	< 5	µg/l
BENZO (A) ANTHRACENE	< 10	µg/l
BENZO (B) FLUORANTHENE	< 5	µg/l
BENZO (K) FLUORANTHENE	< 5	µg/l
BENZO (A) PYRENE	< 5	µg/l
BENZO (G,H,I) PERYLENE	< 5	µg/l
BIS (2-CHLOROETHYL) ETHER	< 10	µg/l
BIS (2-CHLOROETHOXY) METHANE	< 5	µg/l
BIS (2-ETHYLHEXYL) PHTHALATE	< 5	µg/l

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GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF D-2

Collected By: YOUR REP.

REPORT OF ANALYSIS : ACID EXTRACTABLES		UNITS
PHENOL	< 5	µg/l
2 -NITRO PHENOL	< 5	µg/l
2,4 - DIMETHYL PHENOL	< 5	µg/l
2,4 - DICHLOROPHENOL	< 5	µg/l
2,4,6 - TRICHLOROPHENOL	< 5	µg/l
4 - CHLORO - 3 METHYLPHENOL	< 5	µg/l
2,4, - DINITROPHENOL	< 50	µg/l
PENTACHLOROPHENOL	< 5	µg/l
2-CHLOROPHENOL	< 5	µg/l
2-METHYL-4,6-DINITROPHENOL	< 25	µg/l
4-NITROPHENOL	< 5	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

C-1-12

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF D-2

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
1,2,4-TRICHLOROBENZENE	< 5	µg/l
4,4'-DDD	< 1	µg/l
4,4'-DDE	< 1	µg/l
4,4'-DDT	< 1	µg/l
PCB 1016	< 1	µg/l
PCB 1221	< 1	µg/l
PCB 1232	< 1	µg/l
PCB 1242	< 1	µg/l
PCB 1248	< 1	µg/l
PCB 1254	< 1	µg/l
PCB 1260	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF D-2

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
ARSENIC	< 0.005	mg/l
BARIUM	0.07	mg/l
CADMIUM	< 0.01	mg/l
CHROMIUM, TOTAL	< 0.01	mg/l
COPPER	< 0.01	mg/l
LEAD	< 0.01	mg/l
MERCURY	< 0.1	µg/l
NICKEL	< 0.01	mg/l
SELENIUM	< 0.005	mg/l
SILVER	< 0.01	mg/l
ZINC	0.02	mg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

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GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF B-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	11	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	> 6,550	µg/l
CARBON TETRACHLORIDE	2	µg/l
BROMODICHLOROMETHANE	4	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	> 6,680	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	170	µg/l

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September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF B-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	6	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	4	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

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GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF B-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
BIS (2-CHLOROISOPROPYL) ETHER	< 10	µg/l
4-BROMOPHENYL PHENYL ETHER	< 10	µg/l
BUTYL BENZYL PHTHALATE	< 5	µg/l
2-CHLORONAPHTHALENE	< 5	µg/l
4-CHLOROPHENYL PHENYL ETHER	< 5	µg/l
CHRYSENE	< 5	µg/l
DIBENZO (A,H) ANTHRACENE	< 5	µg/l
DI-N-BUTYLPHTHALATE	< 5	µg/l
DIETHYLPHTHALATE	< 25	µg/l
DIMETHYLPHTHALATE	< 5	µg/l
2,4-DINITROTOLUENE	< 10	µg/l
2,6-DINITROTOLUENE	< 10	µg/l
DIOCTYLPHTHALATE	< 5	µg/l
FLUORANTHENE	< 5	µg/l
FLUORENE	< 5	µg/l
HEXACHLOROBENZENE	< 5	µg/l
HEXACHLOROBUTADIENE	< 5	µg/l
HEXACHLOROETHANE	< 5	µg/l
INDENO-(1,2,3-CD) PYRENE	< 5	µg/l
ISOPHORONE	< 5	µg/l
NITROBENZENE	< 5	µg/l
N-NITROSODI-N-PROPYLAMINE	< 5	µg/l
PHENANTHRENE	< 5	µg/l
PYRENE	< 5	µg/l

Enviropact. Inc.
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GERAGHTY & MILLER, INC."TAMPA"
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TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF B-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
3,3 DICHLOROBENZIDINE	< 50	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
NAPHTHALENE	< 5	µg/l
ALDRIN	< 1	µg/l
DIELDRIN	< 1	µg/l
ENDRIN ALDEHYDE	< 1	µg/l
HEPTACHLOR	< 1	µg/l
HEPTACHLOR-EPOXIDE	< 1	µg/l
BETA BHC	< 1	µg/l
DELTA BHC	< 1	µg/l
ACENAPHTHENE	< 5	µg/l
ACENAPHTHYLENE	< 5	µg/l
ANTHRACENE	< 5	µg/l
BENZO (A) ANTHRACENE	< 10	µg/l
BENZO (B) FLUORANTHENE	< 5	µg/l
BENZO (K) FLUORANTHENE	< 5	µg/l
BENZO (A) PYRENE	< 5	µg/l
BENZO (G,H,I) PERYLENE	< 5	µg/l
BIS (2-CHLOROETHYL) ETHER	< 10	µg/l
BIS (2-CHLOROETHOXY) METHANE	< 5	µg/l
BIS (2-ETHYLHEXYL) PHTHALATE	< 5	µg/l

Enviropact. Inc.
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TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF B-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : ACID EXTRACTABLES		UNITS
PHENOL	< 5	µg/l
2 -NITRO PHENOL	< 5	µg/l
2,4 - DIMETHYL PHENOL	5.1	µg/l
2,4 - DICHLOROPHENOL	< 5	µg/l
2,4,6 - TRICHLOROPHENOL	< 5	µg/l
4 - CHLORO - 3 METHYLPHENOL	< 5	µg/l
2,4, - DINITROPHENOL	< 50	µg/l
PENTACHLOROPHENOL	< 5	µg/l
2-CHLOROPHENOL	< 5	µg/l
2-METHYL-4,6-DINITROPHENOL	< 25	µg/l
4-NITROPHENOL	< 5	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor
C-1-19

Enviropact, Inc.
Environmental Consulting and Analysis

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GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF B-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
1,2,4-TRICHLOROBENZENE	< 5	µg/l
4,4'-DDD	< 1	µg/l
4,4'-DDE	< 1	µg/l
4,4'-DDT	< 1	µg/l
PCB 1016	< 1	µg/l
PCB 1221	< 1	µg/l
PCB 1232	< 1	µg/l
PCB 1242	< 1	µg/l
PCB 1248	< 1	µg/l
PCB 1254	< 1	µg/l
PCB 1260	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

C-1-20

Enviropact. Inc.
Environmental Consulting and Analysis

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GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF B-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
ARSENIC	< 0.005	mg/l
BARIUM	0.18	mg/l
CADMIUM	< 0.01	mg/l
CHROMIUM, TOTAL	< 0.01	mg/l
COPPER	< 0.01	mg/l
LEAD	< 0.01	mg/l
MERCURY	< 0.1	µg/l
NICKEL	< 0.01	mg/l
SELENIUM	< 0.005	mg/l
SILVER	< 0.01	mg/l
ZINC	0.03	mg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA, FL 33688

October 18, 1985
Report 14978
LAB I.D. 86119

Sample Received: 9/24/85
Collected By: YOUR REP.
Sample Designation:VOC'S BY EPA METHOD 624

REPORT OF ANALYSIS : NARF-3		UNITS
ACROLEIN	< 1	µg/l
ACRYLONITRILE	< 1	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	13.7	µg/l

Enviropact Inc.
Environmental Consulting and Analysis

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GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA, FL 33688

October 18, 1985
Report 14978
LAB I.D. 86119

Sample Received: 9/24/85
Sample Designation:VOC'S BY EPA METHOD 624

Collected By: YOUR REP.

REPORT OF ANALYSIS : NARF-3		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 4

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	66	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	5.7	µg/l
1,1,1-TRICHLOROETHANE	4	µg/l
CARBON TETRACHLORIDE	2	µg/l
BROMODICHLOROMETHANE	7	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	3	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact Inc.
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GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 4

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Environpact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 5

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	6	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	2	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	19	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

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Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 5

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

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September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 6

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	8	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	16	µg/l
CARBON TETRACHLORIDE	2	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 6

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 6

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
BIS (2-CHLOROISOPROPYL) ETHER	< 10	µg/l
4-BROMOPHENYL PHENYL ETHER	< 10	µg/l
BUTYL BENZYL PHTHALATE	< 5	µg/l
2-CHLORONAPHTHALENE	< 5	µg/l
4-CHLOROPHENYL PHENYL ETHER	< 5	µg/l
CHRYSENE	< 5	µg/l
DIBENZO (A,H) ANTHRACENE	< 5	µg/l
DI-N-BUTYLPHTHALATE	< 5	µg/l
DIETHYLPHTHALATE	< 25	µg/l
DIMETHYLPHTHALATE	< 5	µg/l
2,4-DINITROTOLUENE	< 10	µg/l
2,6-DINITROTOLUENE	< 10	µg/l
DIOCTYLPHTHALATE	< 5	µg/l
FLUORANTHENE	< 5	µg/l
FLUORENE	< 5	µg/l
HEXACHLOROBENZENE	< 5	µg/l
HEXACHLOROBUTADIENE	< 5	µg/l
HEXACHLOROETHANE	< 5	µg/l
INDENO-(1,2,3-CD) PYRENE	< 5	µg/l
ISOPHORONE	< 5	µg/l
NITROBENZENE	< 5	µg/l
N-NITROSODI-N-PROPYLAMINE	< 5	µg/l
PHENANTHRENE	< 5	µg/l
PYRENE	< 5	µg/l

Enviropact. Inc.
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September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 6

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
3,3 DICHLOROBENZIDINE	< 50	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
NAPHTHALENE	< 5	µg/l
ALDRIN	< 1	µg/l
DIELDRIN	< 1	µg/l
ENDRIN ALDEHYDE	< 1	µg/l
HEPTACHLOR	< 1	µg/l
HEPTACHLOR-EPOXIDE	< 1	µg/l
BETA BHC	< 1	µg/l
DELTA BHC	< 1	µg/l
ACENAPHTHENE	< 5	µg/l
ACENAPHTHYLENE	< 5	µg/l
ANTHRACENE	< 5	µg/l
BENZO (A) ANTHRACENE	< 10	µg/l
BENZO (B) FLUORANTHENE	< 5	µg/l
BENZO (K) FLUORANTHENE	< 5	µg/l
BENZO (A) PYRENE	< 5	µg/l
BENZO (G,H,I) PERYLENE	< 5	µg/l
BIS (2-CHLOROETHYL) ETHER	< 10	µg/l
BIS (2-CHLOROETHOXY) METHANE	< 5	µg/l
BIS (2-ETHYLHEXYL) PHTHALATE	< 5	µg/l

Enviropact, Inc.
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TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF-6

Collected By: YOUR REP.

REPORT OF ANALYSIS : ACID EXTRACTABLES		UNITS
PHENOL	< 5	µg/l
2 -NITRO PHENOL	< 5	µg/l
2,4 - DIMETHYL PHENOL	< 5	µg/l
2,4 - DICHLOROPHENOL	< 5	µg/l
2,4,6 - TRICHLOROPHENOL	< 5	µg/l
4 - CHLORO - 3 METHYLPHENOL	< 5	µg/l
2,4, - DINITROPHENOL	< 50	µg/l
PENTACHLOROPHENOL	< 5	µg/l
2-CHLOROPHENOL	< 5	µg/l
2-METHYL-4,6-DINITROPHENOL	< 25	µg/l
4-NITROPHENOL	< 5	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

Envirapact, Inc.
Environmental Consulting and Analysis

1437 Page 4 of 96

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF-6

Collected By: YOUR REP.

REPORT OF ANALYSIS : ACID EXTRACTABLES		UNITS
PHENOL	< 5	µg/l
2 -NITRO PHENOL	< 5	µg/l
2,4 - DIMETHYL PHENOL	< 5	µg/l
2,4 - DICHLOROPHENOL	< 5	µg/l
2,4,6 - TRICHLOROPHENOL	< 5	µg/l
4 - CHLORO - 3 METHYLPHENOL	< 5	µg/l
2,4, - DINITROPHENOL	< 50	µg/l
PENTACHLOROPHENOL	< 5	µg/l
2-CHLOROPHENOL	< 5	µg/l
2-METHYL-4,6-DINITROPHENOL	< 25	µg/l
4-NITROPHENOL	< 5	ug/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

Enviropact Inc.
Environmental Consulting and Analysis

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P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 6

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
1,2,4-TRICHLOROBENZENE	< 5	µg/l
4,4'-DDD	< 1	µg/l
4,4'-DDE	< 1	µg/l
4,4'-DDT	< 1	µg/l
PCB 1016	< 1	µg/l
PCB 1221	< 1	µg/l
PCB 1232	< 1	µg/l
PCB 1242	< 1	µg/l
PCB 1248	< 1	µg/l
PCB 1254	< 1	µg/l
PCB 1260	< 1	µg/l

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Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

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GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF-6

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
ARSENIC	< 0.005	mg/l
BARIUM	0.10	mg/l
CADMIUM	< 0.01	mg/l
CHROMIUM, TOTAL	< 0.01	mg/l
COPPER	< 0.01	mg/l
LEAD	< 0.01	mg/l
MERCURY	< 0.1	µg/l
NICKEL	< 0.01	mg/l
SELENIUM	< 0.005	mg/l
SILVER	< 0.01	mg/l
ZINC	0.02	mg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 9

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	2	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	2	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact Inc.
Environmental Consulting and Analysis

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GERAGHTY & MILLER, INC."TAMPA"
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September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 9

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

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P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 10

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	1.3	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	5.5	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	9.6	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 10

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 11

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	7	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	2	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	2.5	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact Inc.
Environmental Consulting and Analysis

1437

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September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 11

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 12

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Envirospect Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF - 12

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA, FL 33688

October 18, 1985
Report 14978
LAB I.D. 86119

Sample Received: 9/24/85
Sample Designation:VOC'S BY EPA METHOD 624

Collected By: YOUR REP.

REPORT OF ANALYSIS : NARF-13		UNITS
ACROLEIN	< 1	µg/l
ACRYLONITRILE	< 1	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	3.5	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA, FL 33688

October 18, 1985
Report 14978
LAB I.D. 86119

Sample Received: 9/24/85
Sample Designation:VOC'S BY EPA METHOD 624

Collected By: YOUR REP.

REPORT OF ANALYSIS : NARF-13		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 13-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	15	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 13-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 14

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	1.1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 14

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 15

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact. Inc.
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GERAGHTY & MILLER, INC."TAMPA"
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TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 15

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 16

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	38	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	3	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	6	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact Inc.
Environmental Consulting and Analysis

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GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 16

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 17

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	53	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	3	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	6	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 17

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 18

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NARF 18

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

SECTION 2

Organic Disposal Area

Site No. 29

Envirapact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 29 SOIL # 1		UNITS
CADMIUM-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 29 SOIL # 2		UNITS
CADMIUM-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 29 SOIL # 3		UNITS
CADMIUM-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 29 SOIL # 4		UNITS
CADMIUM-E.P.TOXIC	0.19	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 29 SOIL # 5		UNITS
CADMIUM-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 29 SOIL # 6		UNITS
CADMIUM-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 29 SOIL # 7		UNITS
CADMIUM-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 29 SOIL # 8		UNITS
CADMIUM-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 29 SOIL # 9		UNITS
CADMIUM-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

SECTION 3

Old Drum Lot

Site No. 30

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 30-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 30-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 30-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
ARSENIC	< 0.005	mg/l
BARIUM	0.14	mg/l
CADMIUM	< 0.01	mg/l
CHROMIUM, TOTAL	< 0.01	mg/l
COPPER	< 0.01	mg/l
LEAD	< 0.01	mg/l
MERCURY	< 0.1	µg/l
SELENIUM	< 0.005	mg/l
SILVER	< 0.01	mg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

4790 N.W. 157th Street
Hialeah, Florida 33014
Telephone: (305) 620-1700
Fla. Watts: (800) 433-9705

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA, FL 33688

October 18, 1985
Report 14978
LAB I.D. 86119

Sample Received: 9/24/85
Sample Designation:VOC'S BY EPA METHOD 624

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS-30-4		UNITS
ACROLEIN	< 1	µg/l
ACRYLONITRILE	< 1	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA, FL 33688

October 18, 1985
Report 14978
LAB I.D. 86119

Sample Received: 9/24/85
Sample Designation:VOC'S BY EPA METHOD 624

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS-30-4		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 30-4

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
ARSENIC	< 0.005	mg/l
BARIUM	0.15	mg/l
CADMIUM	< 0.01	mg/l
CHROMIUM, TOTAL	< 0.01	mg/l
COPPER	< 0.01	mg/l
LEAD	< 0.01	mg/l
MERCURY	< 0.1	µg/l
SELENIUM	< 0.005	mg/l
SILVER	< 0.01	mg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 30-5

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	11	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	2.5	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	2.5	µg/l
CARBON TETRACHLORIDE	2	µg/l
BROMODICHLOROMETHANE	4	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	7	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l

Enviropact Inc.
Environmental Consulting and Analysis

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GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 30-5

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
1,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 30-5

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
ARSENIC	< 0.005	mg/l
BARIUM	0.25	mg/l
CADMIUM	< 0.01	mg/l
CHROMIUM, TOTAL	< 0.01	mg/l
COPPER	< 0.01	mg/l
LEAD	< 0.01	mg/l
MERCURY	< 0.1	µg/l
SELENIUM	< 0.005	mg/l
SILVER	< 0.01	mg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 30 SOIL # 1		UNITS
CADMIUM-E.P.TOXIC	0.58	ppm
LEAD-E.P.TOXIC	0.20	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Kohn

Enviropact Inc.
Environmental Consulting and Analysis

1437 Page 43 of 96

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 30 SOIL # 2		UNITS
CADMIUM-E.P.TOXIC	0.39	ppm
LEAD-E.P.TOXIC	0.19	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 30 SOIL # 3		UNITS
CADMIUM-E.P.TOXIC	1.04	ppm
LEAD-E.P.TOXIC	1.51	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 30 SOIL # 4		UNITS
CADMIUM-E.P.TOXIC	1.18	ppm
LEAD-E.P.TOXIC	0.20	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn

Enviropact, Inc.
Environmental Consulting and Analysis

1437 Page 46 of 96

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 30 SOIL # 5		UNITS
CADMIUM-E.P.TOXIC	0.53	ppm
LEAD-E.P.TOXIC	0.13	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
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TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS - 30 SOIL # 6		UNITS
CADMIUM-E.P.TOXIC	< 0.1	ppm
LEAD-E.P.TOXIC	0.11	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

SECTION 4

Base Landfill

Site No. 32

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 32-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
BIS (2-CHLOROISOPROPYL) ETHER	< 10	µg/l
4-BROMOPHENYL PHENYL ETHER	< 10	µg/l
BUTYL BENZYL PHTHALATE	< 5	µg/l
2-CHLORONAPHTHALENE	< 5	µg/l
4-CHLOROPHENYL PHENYL ETHER	< 5	µg/l
CHRYSENE	< 5	µg/l
DIBENZO (A,H) ANTHRACENE	< 5	µg/l
DI-N-BUTYLPHTHALATE	< 5	µg/l
DIETHYLPHTHALATE	< 25	µg/l
DIMETHYLPHTHALATE	< 5	µg/l
2,4-DINITROTOLUENE	< 10	µg/l
2,6-DINITROTOLUENE	< 10	µg/l
DIOCTYLPHTHALATE	< 5	µg/l
FLUORANTHENE	< 5	µg/l
FLUORENE	< 5	µg/l
HEXACHLOROBENZENE	< 5	µg/l
HEXACHLOROBUTADIENE	< 5	µg/l
HEXACHLOROETHANE	< 5	µg/l
INDENO-(1,2,3-CD) PYRENE	< 5	µg/l
ISOPHORONE	< 5	µg/l
NITROBENZENE	< 5	µg/l
N-NITROSODI-N-PROPYLAMINE	< 5	µg/l
PHENANTHRENE	< 5	µg/l
PYRENE	< 5	µg/l

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 32-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
3,3 DICHLOROBENZIDINE	< 50	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
NAPHTHALENE	< 5	µg/l
ALDRIN	< 1	µg/l
DIELDRIN	< 1	µg/l
ENDRIN ALDEHYDE	< 1	µg/l
HEPTACHLOR	< 1	µg/l
HEPTACHLOR-EPOXIDE	< 1	µg/l
BETA BHC	< 1	µg/l
DELTA BHC	< 1	µg/l
ACENAPHTHENE	< 5	µg/l
ACENAPHTHYLENE	< 5	µg/l
ANTHRACENE	< 5	µg/l
BENZO (A) ANTHRACENE	< 10	µg/l
BENZO (B) FLUORANTHENE	< 5	µg/l
BENZO (K) FLUORANTHENE	< 5	µg/l
BENZO (A) PYRENE	< 5	µg/l
BENZO (G,H,I) PERYLENE	< 5	µg/l
BIS (2-CHLOROETHYL) ETHER	< 10	µg/l
BIS (2-CHLOROETHOXY) METHANE	< 5	µg/l
BIS (2-ETHYLHEXYL) PHTHALATE	< 5	µg/l

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 32-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : BASE NEUTRALS		UNITS
1,2,4-TRICHLOROBENZENE	< 5	µg/l
4,4'-DDD	< 1	µg/l
4,4'-DDE	< 1	µg/l
4,4'-DDT	< 1	µg/l
PCB 1016	< 1	µg/l
PCB 1221	< 1	µg/l
PCB 1232	< 1	µg/l
PCB 1242	< 1	µg/l
PCB 1248	< 1	µg/l
PCB 1254	< 1	µg/l
PCB 1260	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 32-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : ACID EXTRACTABLES		UNITS
PHENOL	< 5	µg/l
2 -NITRO PHENOL	< 5	µg/l
2,4 - DIMETHYL PHENOL	< 5	µg/l
2,4 - DICHLOROPHENOL	< 5	µg/l
2,4,6 - TRICHLOROPHENOL	< 5	µg/l
4 - CHLORO - 3 METHYLPHENOL	< 5	µg/l
2,4, - DINITROPHENOL	< 50	µg/l
PENTACHLOROPHENOL	< 5	µg/l
2-CHLOROPHENOL	< 5	µg/l
2-METHYL-4,6-DINITROPHENOL	< 25	µg/l
4-NITROPHENOL	< 5	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

SECTION 5

NFD: Oil Pond

Site No. 5

Enviropact Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NFD - 2

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 602		UNITS
TOLUENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NFD - 2

Collected By: YOUR REP.

REPORT OF ANALYSIS : PETROLEUM HYDROCARBONS		UNITS
HYDROCARBONS	1	mg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC."TAMPA"
P.O. BOX 271173
TAMPA ,FL 33688

September 12,1985
Report 13670
LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NFD - 3

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 602		UNITS
TOLUENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
1,3-DICHLOROBENZENE	< 1	µg/l
1,2-DICHLOROBENZENE	< 1	µg/l
1,4-DICHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

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Sample Designation:NFD - 3

Collected By: YOUR REP.

REPORT OF ANALYSIS : PETROLEUM HYDROCARBONS		UNITS
HYDROCARBONS	1	mg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

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APPENDIX 1.4

Community Relations Plan

NAVY INSTALLATION RESTORATION PROGRAM

NAVAL AIR STATION
JACKSONVILLE, FLORIDA

UIC : N00207

VOLUME I

Appendix 1.4

June 1991

13 - 0019 - IRPP CRP

Contract M62467-89-C-0860

Prepared by :

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Chapter 1. Overview

This Community Relations Plan describes a program of community relations activities to be conducted during implementation of the Installation Restoration (IR) Program at Naval Air Station, Jacksonville (NAS Jacksonville or the naval air station). The plan also identifies community concerns regarding NAS Jacksonville as determined by community interviews. The purpose of this community relations program is to inform local public officials, commercial interests, the community, and other interested or affected groups of the activities associated with, and information obtained from, the IR Program. Another purpose of the plan is to solicit questions and comments from, and provide responses to, the community regarding IR Program activities. Public participation in the IR Program is an integral objective of the community relations activities described in this plan.

The communications program described in this plan is based upon interviews with local elected officials, regulatory and public health agencies, NAS Jacksonville housing residents, naval air station employees and management officials, residents within a three-mile radius of NAS Jacksonville, and special interest and environmental groups. The questions posed during the interviews were designed to obtain the information included in Chapter 3, paragraph 3.2 of this plan entitled "Key Community Concerns." Interviews indicated a general low level of community awareness about the IR program and its purpose and goals. This community relations program will describe activities designed to address this finding.

Detailed information about all potential sources of contamination (PSCs) at NAS Jacksonville is provided and the status of work at each PSC is discussed. This plan summarizes community concerns derived from interviews as described above. It also outlines how NAS Jacksonville will address these concerns by opening up two-way communications between the public and the naval air station.

Interactions between the naval air station and community members will focus on their involvement in this project. Public involvement begins during remedial investigation and continues through final decisions and remedial action. A citizen's involvement may include attending public meetings, reviewing available information, and submitting proposals or ideas to NAS Jacksonville. Citizens may comment at any time and are especially encouraged to do so during formal comment periods. Fact sheets will provide up-to-date information on site activities. These fact sheets will be mailed to all persons on the Community Relations Plan Mailing List of Interested Parties (see Attachment C). Information on the IR Program is also available at the public information repository maintained at:

Webb Wesconnett Branch Library
Jacksonville Public Libraries
6887 103rd Street
Jacksonville, FL 32210-6897

Technical Assistance Grants (TAGs) are available through the U.S. Environmental Protection Agency (USEPA). This USEPA program consists of grants designed to facilitate qualified community groups in hiring their own technical experts to better understand environmental program documents and other activities. For further information on TAGs, contact the USEPA at their toll free telephone number, (800) 424-9346.

For more information about the NAS Jacksonville IR Program and/or this Community Relations Plan, please call or write:

Mr. Nick Young
IR Program Community Relations
Public Affairs Office
Building 1
Naval Air Station
Jacksonville, Florida 32212-5000
(904) 772-2413

This Community Relations Plan is organized into the following sections.

Chapter 1.	Overview
Chapter 2.	Site Background
Chapter 3.	Community Background
Chapter 4.	Objectives of the Community Relations Program
Chapter 5.	Community Relations Activities and Schedule
Attachment A	Summary of PSCs, Types of Wastes, Affected Media, and Response Actions
Attachment B	Guidelines and Questions for Community Interviews
Attachment C	Mailing List of Interested Parties
Attachment D	Locations for Information Repository and Public Meetings
Attachment E	Superfund Glossary and Acronyms

NAS Jacksonville is responsible for coordinating, implementing, and updating the Community Relations Plan.

Chapter 2. Site Background

2.1 LOCATION AND ORGANIZATION

The naval air station is located in southern Duval County, about nine miles south of downtown Jacksonville, and occupies approximately 3,800 acres of land on the west bank of the St. Johns River upstream from the downtown area. The operating portion of NAS Jacksonville lies between U.S. Highway 17 and the St. Johns River. The naval air station also occupies 515 acres (included in the 3,800 acres) west of U.S. Highway 17, adjacent to the Ortega River (Figure 2-1). NAS Jacksonville is one of three naval air stations located in the city of Jacksonville.

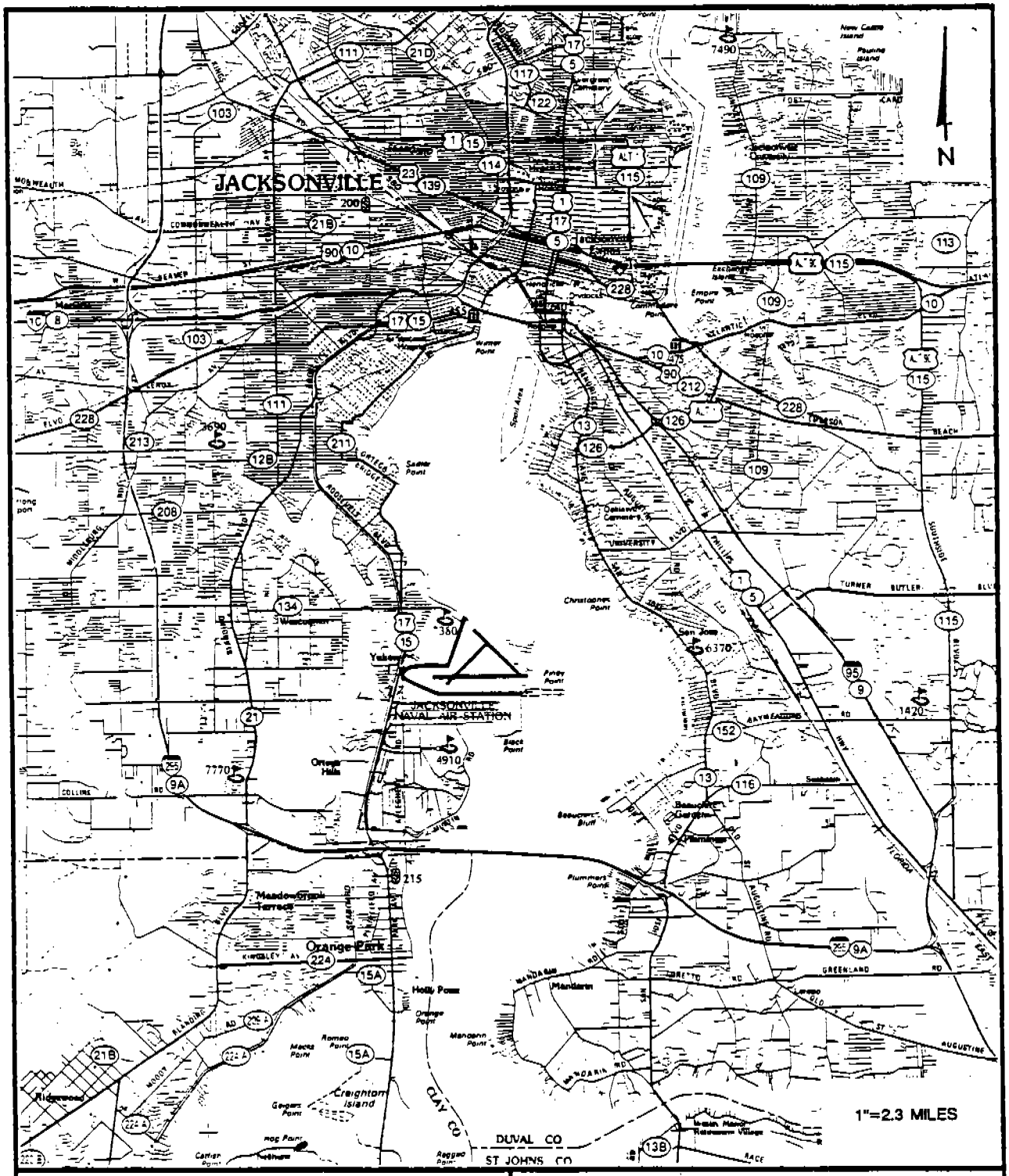
Two principal waterways are located in the immediate vicinity of NAS Jacksonville: the St. Johns River and its tributary; and the Ortega River. While the St. Johns River forms the eastern boundary of the naval air station, the Ortega River is located approximately one-half mile west of NAS Jacksonville. Both rivers experience heavy recreational use. The naval air station is surrounded on three sides by moderately-populated communities.

NAS Jacksonville is located in the flatwoods section of Duval County. This area is composed of an intricate pattern of low ridges interspersed with ponds, swamps, and occasional knolls. The central feature of this portion of the county is the St. Johns River. Various habitats at the naval air station include terrestrial, wetland, and aquatic ecosystems. These ecosystems support a great variety of trees, vegetation, and wildlife.

Three aquifer systems have been defined in the northeast Florida, Duval County area. In descending order, they are: the surficial aquifer; the intermediate aquifer; and the Floridan aquifer systems. The Floridan aquifer system is the principal source of potable water in northeast Florida and Duval County. NAS Jacksonville drinking water is supplied by the Floridan aquifer system.

The primary mission of the naval air station is to provide a workplace, service, and managerial support for the operation and maintenance of naval weapons and aircraft to activities and units of the operating forces as designated by the Chief of Naval Operations. NAS Jacksonville has five major tenants: the Naval Aviation Depot (NADEP, formerly the Naval Air Rework Facility or NARF); the Naval Hospital; the Naval Supply Center, Jacksonville; Patrol Wing Eleven; and Helicopter Antisubmarine Wing One.

The NADEP is the largest tenant command of the naval air station. The mission is to provide a full range of the highest quality maintenance, engineering, logistic, and support services to the fleet at a competitive price. NADEP is one of six modern industrial facilities commissioned by the Navy to perform in-depth rework, repair, and modification of aircraft,



LOCATION OF
NAVAL AIR STATION, JACKSONVILLE

FIGURE 2-1

COMMUNITY RELATIONS
PLAN

NAS JACKSONVILLE
JUNE 1991

engines, and aeronautical components. The Depot consists of approximately 50 buildings which occupy about 102 acres aboard the naval air station.

The Hospital is a separate major tenant command on NAS Jacksonville. The mission of the Hospital is to provide general, clinical, and hospitalization services for active duty and retired military personnel and their dependents; to cooperate with military and civil authorities in matters pertaining to health, sanitation, local disaster, and other emergencies; and to fulfill a number of other specific functions. The Hospital achieves this mission through services provided at a 400-bed hospital and support buildings.

Naval Supply Center, Jacksonville, is the principal Navy supply point for the Southeastern United States, the Caribbean, the Gulf of Mexico, the Panama Canal Zone, Guantanamo Bay, and Puerto Rico. The Supply Center operates as the principal commercial interface within this large geographic region for most categories of supplies and services required by the Navy.

Patrol Wing Eleven with approximately 2,500 men and women provides long range antisubmarine reconnaissance utilizing the P-3C Orion aircraft. Helicopter Antisubmarine Wing One provides antisubmarine protection for aircraft carriers and other high value logistic support units. The Wing also performs search and rescue missions for both military and civilian operations.

Besides medical and housing facilities, a variety of other facilities and services are located on the naval air station. These include a Navy Exchange and Commissary complex, restaurants, and food services, child care, banking facilities, libraries, and chapels. There also are a variety of recreational facilities such as a gymnasium, bowling alleys, golf course, tennis courts, swimming pools, a marina, and picnic grounds.

NAS Jacksonville housing is available to approximately 400 families of military personnel stationed there. Bachelors quarters accommodate approximately 2,500 officers and enlisted men and women. The majority of civil and military personnel live in Duval and Clay Counties with the remainder residing in other surrounding counties. Most military personnel remain at the naval air station for two years, or one tour of duty.

2.2 HISTORY

In 1938, the Hepburn Board originated the concept for a naval air station located in Jacksonville. The naval air station primarily was planned as a training facility that included seaplane support. This operational requirement largely determined its final location because NAS Jacksonville adjoins a two- to three-mile wide stretch of the St. Johns River at Black Point, just south of downtown Jacksonville. Officials of Duval County offered to donate the land required for the naval air station and, upon acceptance by the Navy Department, county bonds were marketed and the land was acquired. Additional usable land was

developed by the hydraulic fill of marshes along the St. Johns River in the northeastern part of the area.

When conceived, the naval air station included facilities for pilot training and a Navy Aviation Trades School (NAT) for ground crewmen. NAS Jacksonville was commissioned on October 15, 1940. With the advent of World War II, the physical size of the naval air station more than doubled and military functions supported the war effort. During 1942, the Navy phased out initial pilot training and NAS Jacksonville became the headquarters for the Chief of Naval Operational Training, the final training phase before fleet assignment. The school became the Naval Air Technical Training Center under the Chief of Naval Air Technical Training, headquartered on NAS Memphis. The operational areas of the naval air station still maintained coastal protection with seaplanes. NAS Jacksonville reached a peak of 42,000 naval personnel and 11,000 civilians by 1946.

At the end of World War II, NAS Jacksonville was devoted entirely to aviation training. In 1945, Chief of Naval Operational Training was redesignated Chief Naval Air Advanced Training but this mission, and that of NAS Jacksonville, remained basically the same. In July 1946, the Seventh Naval District was transferred from Miami, Florida to NAS Jacksonville as a joint command with Chief Naval Air Advanced Training. On April 5, 1948, the Navy announced the transfer of Chief Naval Air Advanced Training and all training facilities to NAS Corpus Christi, Texas. The move was completed on November 15, 1948. The Naval Air Technical Training Center was transferred and consolidated with the Naval Air Technical Training Center at NAS Memphis.

Due to this relocation, some doubt arose concerning the continued need for NAS Jacksonville. The Office of the Chief of Naval Operations, however, made the decision to return to the originally planned concept as a Fleet Air Operational Support Base. Therefore, as Chief of Naval Operational Training activities moved to NAS Corpus Christi, operational squadrons replaced them. By January 1949, NAS Jacksonville's mission was to support the operational aircraft carrier squadrons with fleet squadrons assigned to Commander, Naval Air Bases, Sixth District, and patrol squadrons assigned to Combat Patrol Wing Eleven. On January 1, 1951, the Navy reactivated the Naval Air Technical Training Center and Marine Air Division activities in support of the Korean build-up of facilities. This joint operational and training status continues to this time.

The NADEP, a tenant of the naval air station, has been a major part of the activity since 1940. Currently, with approximately 3,200 personnel, NADEP reworks the A-7 Corsair, P-3 Orion, T-2 Buckeye, S-3 Viking, and F/A-18 Hornet aircraft; a variety of aircraft engines including the J-52, TF-41, TF-34, and F-404; as well as some 38,000 aircraft, engine, and weapon system components.

2.3 ENVIRONMENTAL PROTECTION PROGRAMS

The purpose of the Navy's IR Program is to identify, study, and remediate or control contamination resulting from past waste handling and disposal practices at its facilities. Because of the nature of its operations and heavy industrial use of its installations, the Navy has generated, stored, and disposed of large amounts of industrial wastes at its facilities. Recognition that these waste products may be harmful to people and the environment resulted in new laws and regulations governing their handling and disposal. With changes in waste handling and disposal methods, steps already have been taken by the Department of Defense (DOD) to avoid future contamination from existing operations. Many new environmental protection programs are currently in place at NAS Jacksonville.

NAS Jacksonville currently implements a variety of programs designed to protect the environment and minimize the generation of wastes. These programs are described in greater detail below.

2.3.1 Environmental Compliance Board

In June 1988, NAS Jacksonville established the Environmental Compliance Board. The board is made up of the Commanding Officers of the naval air station and Naval Aviation Depot (NADEP), and the Navy Public Works Office (PWO). The board has been endorsed by the Chief of Naval Operations and its purpose is to coordinate environmental compliance at the naval air station.

2.3.2 Technical Review Committee

In May 1989, NAS Jacksonville established a Technical Review Committee (TRC). Representatives of the Navy, the USEPA, the Florida Department of Environmental Regulation (FDER), the St. Johns River Water Management District, the city of Jacksonville, and the local community make up this committee. The committee was established to review recommendations for and monitor progress of the NAS Jacksonville IR effort.

2.3.3 Hazardous Waste Minimization Program

Since 1987, NAS Jacksonville has implemented a hazardous waste minimization program to reduce the amount of hazardous waste generated at the naval air station. A $14.7 million construction project is currently being advertised to construct three facilities which will close-loop aircraft final finishing, metal electroplating, cleaning and finishing, and chemical paint stripping waste systems. This will eliminate industrial hazardous waste discharges to the naval air station's waste water treatment plant. A continuous naval air station training program on the proper handling and disposal of hazardous waste also has greatly reduced the amount of hazardous material generated at NAS Jacksonville.

2.3.4 Natural Resources Management Plan

NAS Jacksonville has a long-range natural resources management plan. At the naval air station's two lakes, largemouth bass and bluegill are managed as a fishery for NAS Jacksonville personnel. In addition, manatee signs were placed along the St. Johns River to protect the species. Wildlife is managed as part of the forest and land management program. Habitats are improved through converting undeveloped areas to forest, providing food plots, and preserving productive hardwood areas.

2.3.5 Recycling Program

In 1990, NAS Jacksonville established an intense recycling program. Over 900 tons of solid waste were recycled in the program's first year. Recyclables include glass, newspapers, aluminum cans, cardboard, paper, plastic containers, tires, and car batteries. The program has many benefits. It has greatly reduced the solid waste normally disposed at Jacksonville landfills. Second, the revenue generated from selling recyclable materials has been returned directly to the naval air station for environmental and recreation projects. Dollars from the recycling program have been used to construct a fitness center, Manatee Point Park, a recycling center building, and a variety of landscape projects. In August 1990, the naval air station received the 1990 Recycling Award from the National Recycling Coalition.

2.3.6 Hazardous Waste Management Program

NAS Jacksonville operates 75 accumulation points and a new permitted storage facility for hazardous waste. The accommodation points and storage facility are inspected weekly to ensure compliance with all regulations. In 1990, a computerized hazardous waste tracking system was developed to track quantities, disposal cost, and locations of wastes.

2.3.7 Storage Tank Program

There are 26 underground and six above ground tank systems at NAS Jacksonville which are regulated by the State of Florida. In the last two years, the naval air station removed nine underground storage tank systems. In 1991, NAS Jacksonville will remove or abandon an additional 25 tanks and associated piping. Ground-water monitoring wells were installed as underground tank leak detection devices. The naval air station's tank storage system management plan identified additional upgrades and removals. Upgrades include high-level alarms and overflow protection. In October 1990, NAS Jacksonville signed an agreement with the State of Florida to remediate past petroleum contamination on the naval air station.

2.3.8 Waste Water Treatment Facilities

NAS Jacksonville improved waste water treatment facilities in 1990 with the completion of new sludge drying beds and secondary containment around the industrial waste treatment plant. The use of magnesium hydroxide in the chemical treatment of industrial wastewater has reduced sludge weight and volume thereby reducing hazardous waste disposal costs.

2.3.9 Waste Oil Management

NAS Jacksonville generates over 25,000 gallons of waste oil per year. The waste oil is collected from sources throughout the naval air station including the aviation squadrons and maintenance shops. The oil is tested and then disposed of through the Defense Reutilization and Marketing Office (DRMO).

2.3.10 Potable Water System

The naval air station's potable water system is served from artesian wells entering the Floridan aquifer system. NAS Jacksonville tests the water for constituents required by the Safe Drinking Water Act and Florida's Administrative Code. The naval air station cooperates with the St. Johns River Water Management District in all matters pertaining to the use of potable water through the ground-water Consumptive Use Permit (CUP) Program. Because of low water levels in the Florida aquifer system, NAS Jacksonville implemented a water conservation program through restrictions on activities such as watering lawns and washing automobiles. In addition, the naval air station has a water system cross-connection control and backflow prevention program to inventory primary structures for potential cross-connection, necessary backflow prevention equipment, and corrective measures.

2.3.11 Polychlorinated Biphenyl (PCB) Management

The naval air station removed the majority of the PCB transformers and capacitors through a project to upgrade the NAS Jacksonville electrical distribution system. The remainder of the PCB items will be removed or retrofitted when a contract for the work is awarded.

2.3.12 Air Pollution Control Program

In 1989, the naval air station renewed all previous state air permits after completion of all visible emission and compliance testing. In 1990, NAS Jacksonville submitted permit applications to the State on all air pollution sources not previously permitted.

2.3.13 Staffing

Since 1988, the Environmental Division in the naval air station's Public Works Department increased from four to nine personnel. NAS Jacksonville hired engineers to coordinate the hazardous waste, air pollution, and IR programs.

2.3.14 Awards

In June 1990, the Secretary of the Navy selected NAS Jacksonville as the winner of the Non-Industrial Environmental Quality Installation Award for outstanding environmental protection accomplishments.

2.4 THE IR PROGRAM

The Navy has been actively engaged in installation restoration since 1980 and has taken an aggressive approach to the problem of hazardous waste contamination resulting from past practices at its installations. Identification of waste areas has taken place at all Naval installations, including NAS Jacksonville. The Navy also has performed Preliminary Assessments for all its installations listed in the Federal Hazardous Waste Compliance Docket which consists of installations that generate hazardous waste or those that have reported pollutant spills. Actions are either being taken or planned to respond to any potential contamination problems. The Navy is committed to compliance with both its legal and community obligations to protect public health and the environment.

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) was passed by Congress in 1980. Under the Act, commonly referred to as "Superfund," monies were set aside to fund the investigation and remediation of hazardous waste sites. At this time, CERCLA did not apply to federal facilities. Therefore, the DOD established its own environmental program in 1980 which was adopted by each branch of the services. The Navy adopted this DOD program by creating the Navy Assessment and Control of Installation Pollutants (NACIP) Program. The NACIP Program consisted of five phases: Initial Assessment Study (IAS); Verification Study (VS); Characterization Study (CS); Remedial Design (RD); and Remedial Action (RA). Once CERCLA was re-enacted in 1986 under the Superfund Amendments and Reauthorization Act (SARA), Superfund stipulated that the DOD and other federal facilities meet all CERCLA requirements. The NACIP Program was subsequently discontinued in 1986 and replaced by the IR Program. The IR Program consists of six phases: Preliminary Assessment (PA); Site Inspection (SI); Remedial Investigation (RI); Feasibility Study (FS); Remedial Design (RD); and Remedial Action (RA). A Federal Facilities Agreement (FFA) was signed in November 1990 between the USEPA, the FDER, and the Navy to coordinate IR Program efforts. The Navy, as part of the DOD, is responsible for the investigation and remediation of NAS Jacksonville.

SARA also requires that the DOD set aside its own funds for the investigation and cleanup of its facilities. Therefore, the Defense Environmental Restoration Account (DERA) was established.

In December 1989, NAS Jacksonville was placed on the USEPA's National Priorities List (NPL). The NPL is a vehicle used by the USEPA to prioritize those facilities requiring further action under CERCLA. The NPL therefore serves as an information and management tool which allows the USEPA to decide which facilities need remediation.

The IR Program is not an all-encompassing environmental program. It focuses on the remediation of contamination from past hazardous waste operations. Specific eligibility criteria are:

- The IR Program is intended to address the cleanup of contamination and damage resulting from past, not current, disposal operations. The cut-off date distinguishing past and current operations is January 1, 1981, the first day of the first month after the enactment of CERCLA.

- The IR Program is primarily intended to remediate hazardous substance contamination or pollution. It may, though, address any pollutants and contaminants which have the potential of endangering public health, welfare or the environment, including petroleum, oil and lubricant (POL) products and research associated with unexploded ordnance detection and range clearance.

- The IR Program addresses installations both on and off the NPL.

- The IR Program includes areas on properties which are currently owned or leased by the Navy and which are in the United States, its territories, or possessions.

The IR Program consists of six basic phases. The first two phases involve the identification and confirmation of areas that are potential sources of contamination (PSCs); the second two consist of defining the nature and extent of contamination and developing remedial alternatives; and the final phases involve designing and implementing selected remedial actions. Long-term maintenance and testing of remedial actions continue after they are implemented. Following is a more detailed explanation of the IR Program's six phases.

- <u>Preliminary Assessment/Site Inspection (PA/SI)</u>

  The PA involves a record review, both at the facility itself and elsewhere, and interviews with former and active long-term employees. The SI involves water and soil sampling and analysis for suspected contaminants. Additional investigation may be performed in an Expanded Site Inspection (ESI).

- Remedial Investigation/Feasibility Study (RI/FS)

  The RI concentrates on determining the extent and nature of contamination through extensive sampling and analysis. The purpose of the FS is to develop, evaluate, and select remedial alternatives. These alternatives are subject to nine criteria including their ability to protect human health and the environment, community acceptance, regulatory compliance, and their cost and effectiveness. Finally, a decision on how best to rectify the problem is made by the Navy and presiding State and/or Federal regulatory agencies. At NAS Jacksonville, the Navy, the FDER, and the USEPA must agree on a chosen remedial action. The USEPA has final authority in the decision-making process.

- Remedial Design/Remedial Action (RD/RA)

  During these phases, the remedial action decided upon during the RI/FS phases is designed and constructed at the PSC. Long-term maintenance and testing may be conducted after the system is in place.

If, at any stage of the process, it is determined that contamination poses an immediate threat to human health and the environment, Interim Remedial Measures or a removal action will begin. These activities are temporary cleanup methods that are conducted until more permanent solutions are chosen.

2.4.1 IR Program Activities

At NAS Jacksonville, the Navy has completed a PA and an SI at pertinent areas (PSCs). A more detailed description of this study follows. Southern Division, Naval Facilities Engineering Command contracted with a consulting firm in 1989 to develop work plans, conduct field work, and recommend remedial alternatives for the next phase. Work plans are currently underway. Once they are reviewed and approved by the NAS Jacksonville TRC, the RI/FS will begin.

In 1982, a Preliminary Assessment (PA) was performed at NAS Jacksonville. The purpose of the PA was to collect and evaluate evidence that potential contamination at selected areas (PSCs) existed and whether or not the contamination posed a health risk to people located on or off naval air station property. The Navy investigated and performed remedial action at two PSCs (Nos. 26 and 27) prior to the PA.

The principal conclusion drawn from the review of records, interviews, and inspections of PSCs during the PA was that the range of environmental problems at NAS Jacksonville is limited. A total of 38 PSCs were identified. The study concluded that ten of the 38 PSCs pose a potential threat to human health or the environment.

The Navy evaluated all known or suspected hazardous waste disposal areas identified during the PA using a Confirmation Study Ranking System (CSRS) developed for the NACIP Program. The CSRS is a two-step procedure for systematically evaluating a PSC's potential hazard to human health and the environment based on evidence collected during the PA. The CSRS is similar to the Hazard Ranking System (HRS) used by the USEPA.

CSRS scores and engineering judgment were then used by the Navy to evaluate the need for a Site Inspection (SI). It was recommended that SIs be conducted at ten PSCs. In August 1983, Southern Division, Naval Facilities Engineering Command retained Geraghty & Miller, Inc. to assist the Navy in performing the SI.

The SI was conducted to determine the presence or absence of contamination in the soil, surface water or ground water at each PSC. Based on these findings, an Expanded Site Inspection (ESI) was then implemented at those PSCs requiring additional study to identify the nature and extent of contamination.

The SI was initiated in August 1983 to assess the potential environmental impacts of the PSCs previously identified in the PA. In October 1983, the FDER reviewed the PA and a plan-of-action was prepared for the SI. Five sites were suggested for additional investigation (four new PSCs and an expanded scope of work for another PSC). As a result of information acquired in March 1985, four more PSCs were added for consideration under the study. The Navy also added two PSCs (No. 39 and No. 40). Subsequently, the SI was conducted at 18 PSCs.

The SI concluded that twelve of the fourteen PSCs had not received wastes in many years and the potential ground-water contaminants had been attenuated by the processes of biodegradation, evaporation, adsorption, dilution, or dispersion. Nine of the 18 PSCs studied were recommended for further investigation under an ESI.

The ESI was conducted at nine selected PSCs to gather additional data and assess the extent of contamination. The results of the study suggested that only areas located within the NADEP (PSC Nos. 11, 12, 14, 15, and 16) warranted remedial action considerations. Also, the study suggested that the soil at PSC No. 28 be resampled for PCBs. Based on the data collected during the SI, the remaining PSCs (PSC Nos. 29, 30, and 32) were not recommended for future investigation.

Attachment A presents existing information on the nature and extent of the environmental problems for each PSC identified in the NAS Jacksonville PA. The information contained in this attachment is derived from the Remedial Investigation Work Plan.

Chapter 3. Community Background

3.1 COMMUNITY PROFILE

NAS Jacksonville is surrounded on three sides by moderately populated, diverse communities. To the north is a well-established, country club area comprised of a steady, middle-to-late aged population. A small group of retired military personnel reside in this area. The Timuquana Country Club, immediately adjacent to the north side of the naval air station, acts as a social center for the majority of residents to the north. To the west of the naval air station is Ortega Hills, a well-established development mostly comprised of retired military and civilian personnel. Housing is less dense along the southern perimeter of NAS Jacksonville. This southern area contains many rental properties that house a transient population.

3.2 KEY COMMUNITY CONCERNS

The communications program described in this plan is based upon interviews with local elected officials, regulatory and public health agencies, NAS Jacksonville housing residents, naval air station employees, management officials, residents within a three-mile radius of NAS Jacksonville, and special interest and environmental groups. The questions posed during the interviews were designed to determine the community's level of knowledge and concern about environmental issues in general, the NAS Jacksonville IR Program in particular, and the relative importance of those IR Program issues when compared to other types of concerns. Efforts also were made to identify the level of participation in the IR Program sought by the community and the most effective means of providing that participation.

As a whole, interviews found that the community has moderate concern over environmental issues. This concern, however, is more city-wide and national in scope than directly related to NAS Jacksonville activities. An assessment of responses obtained from interviewees suggests that the community has a very low-level of awareness, and subsequent low-level of concern, about the IR Program and its goals. Local and national environmental issues and their relationship to NAS Jacksonville are described in more detail below. Following this description is a discussion of the three community segments showing the most interest in IR Program activities during the interviews.

Interviews suggested that local solid waste disposal practices are perhaps of utmost concern to the community. Landfill siting and closures, incineration, and recycling are issues that have received much attention, debate, and media coverage. The public is aware of the progressive naval air station recycling program which has received praise throughout the media and community. However, interviews also suggested that the publicity over new waste

management procedures at NAS Jacksonville has led to some confusion over past versus present waste disposal practices.

Air quality is another issue consistently referred to during the interviews. This local concern is specifically over smog and odor attributed to pulp and paper mills located in Jacksonville. Interviewees did not perceive NAS Jacksonville as a contributor to air pollution problems.

Special interest and environmental groups, property owners with land along waterways and wetlands, and recreational and commercial users of coastal areas expressed a high level of concern over the preservation and protection of the St. Johns and Ortega Rivers. Interviews also suggested that during the past decade, there has been significant community concern about ulcerated fish found in the St. Johns River. Although a state-funded study conducted by the University of Florida was inconclusive in determining the cause of the fish disease, an independent study by a local college professor alleged that industrial activities at the naval air station had contaminated the river. The study received considerable publicity. Although other industries located along the river also are seen as contributors to pollution, interviews suggested that the preservation and protection of the St. Johns River will remain a high-level concern of this group.

Ground-water supply and quality were identified as issues of concern throughout northeast Florida and subsequently throughout the city of Jacksonville. High iron and sulphur content in ground water, as well as water rationing and the threat of salt water intrusion, contribute to this concern over water quality and supply. Interviewees did not perceive the naval air station as contributing to ground-water contamination or shortages. However, neighbors and users of naval air station drinking water supplies expressed a desire to obtain information on the affect of the naval air station's past waste disposal practices on ground-water quality.

NAS Jacksonville has recently received negative media coverage over being identified as a potentially responsible party for a nearby Superfund site. Overall, however, the interviews found that the naval air station has a very good relationship with its neighbors, military and civilian personnel, commercial interests, and local officials. NAS Jacksonville management is highly regarded. However, several interviewees attributed events at NAS Jacksonville to other naval facilities in the city.

Interviews found that the highest level of interest in gaining information about IR Program activities was expressed by three particular segments of the community: neighbors within a three-mile radius of the base; naval air station residents; and NAS Jacksonville employees. A description of current concerns of these groups follows. Because of the different populations of the group of neighbors residing within three miles of NAS Jacksonville, this community segment is broken down further into: (1) residents to the north or Timuquana area; (2) residents to the west or Ortega Hills area; and (3) residents along the southern perimeter of the naval air station.

Residents within a three-mile radius of the base expressed concern during the interviews over the possibility of fuel dumping or objects falling off aircraft. The possibility of plane crashes also was a concern. Residents in the Timuquana area expressed concern over aircraft noise and the naval air station's effect on the water quality of the St. John's River. Even though their drinking water is supplied by the city, interviewees of the Timuquana area expressed concern over ground-water quality due to the use of private irrigation wells. These residents expressed a benign relationship with the naval air station.

During the interviews, residents of Ortega Hills expressed concern over their drinking water supply in terms of the prices charged by a local supplier. Other area issues include interference with the access to and from the community by a nearby railroad track which is not associated with NAS Jacksonville. When asked about any possible concerns arising from IR program activities, residents in this area expressed confidence that the Navy would take care of any and all problems it may encounter, including environmental ones. Even though loyalty to the Navy was expressed, Ortega Hills residents were interested in receiving information about the IR Program because of their proximity to the naval air station and their general interest in the Navy.

Residents along the southern perimeter of NAS Jacksonville spoke of water quality in terms of the high sulphur content and the bad odor and taste of drinking water during the interviews. Interviewees did not attribute these water quality problems to the naval air station. Issues expressed by this group specifically related to NAS Jacksonville include noise and dust problems, as well as concern over the use of herbicides on the naval air station property lines.

Occupants of NAS Jacksonville housing expressed several of the same overall concerns as the neighbors: appearance and taste of drinking water; fuel dumping; and equipment falling from aircraft. This group's knowledge of environmental issues includes current waste minimization and recycling practices employed at the naval air station.

Interviews suggested that NADEP employees are currently more concerned with the effect of diminishing government budgets on their job security than on environmental issues. New health and safety measures and training, however, have led to an increased awareness of the impact of hazardous waste management practices on the environment. This group expressed an interest in acquiring more information about the IR Program, especially if a work area is affected by remedial activities, because of the proximity of their workplace to several PSCs.

Chapter 4. Objectives of the Community Relations Program

The objectives of this community relations program are described below. Communications activities designed to achieve each objective follow the descriptions of program goals. Communications activities will address the difference between past and current waste handling practices and fully explain the purpose and goals of the IR Program. The community relations program also will take into account the different community segments and target specific audiences when activities are conducted to educate the public. Special emphasis will be made to keep new residents of naval air station housing, a constantly changing population, up-to-date on IR Program and remedial activities. In order to ensure the most effective means of scheduling communications activities, the program provides for close coordination of Community Relations Plan activities with technical milestones. Chapter 5 provides details of community relations activities and scheduling.

4.1 OBJECTIVE 1: Give citizens the opportunity to comment on, and be involved with, decisions that relate to naval air station remedial actions. Encourage local citizens to contribute to NAS Jacksonville decisions that will have a long-term effect on their community. Assist citizens in providing their input.

METHOD OF ACCOMPLISHMENT:

- Emphasize two-way communication between the community and decision makers through methods such as the TRC.

- Provide opportunities for formal and informal comments on documents and plans. Hold meetings with individual citizens, groups, and naval air station housing residents when requested or needed. Include the name and telephone number of the program contact person in each correspondence concerning the project.

- Hold public meeting(s) to discuss Feasibility Study results and remedial alternatives. Keep the community informed and involved.

- Provide information through updates to this Community Relations Plan, periodic fact sheets and releases to local media.

- Place information, including studies and reports, in an information repository for public access and use.

4.2 OBJECTIVE 2: Inform the public of planned actions.

METHOD OF ACCOMPLISHMENT:

- NAS Jacksonville will periodically produce fact sheets which will discuss IR program activities and technical information in non-technical language.

- Fact sheets will be sent to all persons who request them, those identified as being an interested or affected party, and naval air station housing residents.

- Fact sheets and news releases will be sent to local newspapers, radio, and television stations for wide distribution of information. The weekly naval air station paper, Jax Air News, also will provide information as well as existing publications for other targeted groups such as the monthly NADEP or naval air station housing newsletters.

- Speakers will be available to present NAS Jacksonville environmental issues through the Public Affairs Office upon request.

- NAS Jacksonville will maintain and utilize a mailing list of local, State and Federal officials, and other interested and affected individuals and groups. Anyone interested in program information may request that their name be placed on this list.

- Public meetings will be announced through paid notices in one or more of the following: a daily newspaper; media release; fact sheets; and flyers. A published notice will be printed a minimum of two weeks in advance of meeting.

4.3 OBJECTIVE 3: Focus and resolve conflicts that may arise.

METHOD OF ACCOMPLISHMENT:

- NAS Jacksonville will identify conflict and develop a forum for resolution if doing so appears to serve a useful purpose for both the naval air station and the community.

- NAS Jacksonville will maintain a list of environmental experts to address questions about remedial actions and alternatives. These experts will be comprised of representatives from the USEPA; the FDER; Southern Division, Naval Facilities Engineering Command; and NAS Jacksonville. These experts will be available to speak at public meetings and other forums by requests submitted through the Public Affairs Office and as practicable.

Chapter 5. Community Relations Activities and Schedule

Community relations activities and their relationship to technical milestones are described below. All communications activities are designed to provide the public with current information and the opportunity for input during each phase of the IR Program. NAS Jacksonville is responsible for implementing all activities described in this chapter.

5.1 PRE-REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS).

- Create and update an information repository as necessary. Publicize the availability and location of the information repository.

- Publicize the name, address, and phone number of the primary contact person who will respond to all inquiries about the IR Program.

- Develop a mailing list of concerned citizens, residents near the naval air station, local elected officials, appropriate agencies, and the local media for distribution of IR Program materials.

- Distribute a brochure that introduces and explains the IR Program. If appropriate, distribute fact sheets to update the community on pre-RI activities. Articles in NAS Jacksonville publications may be placed to reach a wider audience. The brochure and fact sheets will be placed in naval air station orientation packages and/or distributed through the housing office, as well as sent to all persons listed in the Community Relations Plan mailing list.

- Distribute news releases to local news media about the IR Program, the Community Relations Plan, and the availability of the information repository.

- Maintain contact with local officials and community leaders to provide information about the IR Program and to monitor community concerns.

- Hold informal community meetings to discuss studies, analyses, results, and plans for IR Program activities. Presentations and speakers will be made available to as many interested and affected groups upon request and as practicable. Interested parties should contact the primary contact person.

5.2 DURING REMEDIAL INVESTIGATION (RI)

- Update the information repository as necessary. Publicize the availability and location of the information repository.

- Publicize the name, address, and phone number of the primary contact person who will respond to all inquiries about the IR Program.

- Develop a mailing list of concerned citizens, residents near the naval air station, local elected officials, appropriate agencies, and the local media for distribution of IR Program materials.

- If appropriate, distribute fact sheets to update the community on RI findings. Articles in NAS Jacksonville publications may be placed to reach a wider audience. Fact sheets will be placed in naval air station orientation packages and/or distributed through the housing office, as well as sent to all persons listed in the Community Relations Plan mailing list.

- Distribute news releases to local news media about the IR program, the Community Relations Plan, and the availability of the information repository.

- Maintain contact with local officials and community leaders to provide information about the IR Program and to monitor community concerns.

- Hold informal community meetings to discuss studies, analyses, results, and plans for IR Program activities. Presentations and speakers will be made available to interested and affected groups upon request and whenever practicable. Interested parties should contact the primary contact person.

5.3 UPON COMPLETION OF REMEDIAL INVESTIGATION (RI)

- Update and publicize information repository.

- Continue to publicize IR contact person.

- Update mailing list.

- Distribute fact sheet and/or place articles in NAS Jacksonville publications to explain RI findings and discuss plans for the next phase of the project. Update orientation packages and/or naval air station housing materials.

- Inform community leaders of the completion and results of the RI.

- Update presentation for informal community groups to include RI results and continue to respond to speaking opportunities whenever practicable.

5.4 DURING FEASIBILITY STUDY (FS)

- Distribute fact sheet and/or place articles in naval air station publications to report on the status of the FS.
- Update mailing list.
- Continue to respond to requests for speaking engagements whenever practicable.

5.5 UPON COMPLETION OF FEASIBILITY STUDY (FS)

- Update and publicize information repository.
- Publicize IR contact person.
- Update mailing list.
- Prepare fact sheet and/or articles for naval air station publications and local news media announcing the completion of the FS, explaining the criteria used for evaluating alternatives, describing the alternatives, and reporting the recommendation.
- Update NAS Jacksonville orientation and/or housing packages.

5.6 PROPOSED PLAN (PP) ACTIVITIES

- Prepare news release and public notice for placement in a newspaper of general circulation to announce the availability of the PP in the information repository for review and comment. Send comments to the primary contact person.
- Prepare news release and public notice for placement in a newspaper of general circulation to announce a public meeting and the start of a 45-day public comment period.
- Hold public meeting to discuss FS report and PP and to explain public comment period.
- Place a transcript of the PP public meeting in the information repository.
- Prepare a written summary of significant comments, criticisms, new relevant information submitted during the public comment period, and a response to each issue. This responsiveness summary shall be made available with the Record of Decision.

- Hold informal community meetings as warranted by the level of public interest.

- Maintain contact with local officials and community leaders.

- Prepare a fact sheet, if necessary, on public comments received on the PP.

5.7 RECORD OF DECISION (ROD) ACTIVITIES

- Publish public notice upon signing of the ROD and place a copy of the signed ROD in the information repository.

- After adoption of the ROD, if the remedial action taken differs significantly from the remedy selected in the ROD with respect to scope, performance, or cost, community relations requirements, as specified in the National Contingency Plan (40 CFR Part 300.435), will be implemented.

5.8 DURING AND UPON COMPLETION OF REMEDIAL DESIGN (RD)

- Update information repository, as necessary.

- Review and, if necessary, revise the Community Relations Plan to reflect any changes in public concern over the IR Program.

- Update local officials and community leaders to discuss remedial action plans.

- Prepare news releases, fact sheets and publish articles on the remedial design once it is proposed and finalized.

- Hold informal community meetings, if necessary, to discuss proposed and/or final remedial design.

5.9 DURING REMEDIAL ACTION (RA)

- Continue to publicize IR contact person and information repository.

- Update mailing list, as necessary.

- Continue to update the community through fact sheets to those on the mailing list, media releases, and naval air station publication articles, when necessary.

- Conduct informal community meetings to discuss status of remedial action, when needed or requested.

- Continue to update local officials and community leaders, as necessary.

- Review and, if necessary, revise the Community Relations Plan to reflect any changes in public concern over the IR Program.

5.10 UPON COMPLETION OF REMEDIAL ACTION (RA)

- Update information repository, as necessary.
- Update local officials and community leaders, as necessary.
- Publicize completion of RA through a news release to local media, and/or a fact sheet and naval air station publication articles.
- Hold informal community meetings, if necessary, to discuss the completion of RA and the delisting process.

5.11 INTERIM REMEDIAL MEASURE/REMOVAL ACTION ACTIVITIES

- Continue to publicize IR contact person.
- Update information repository, as necessary.
- Publish public notice announcing the availability of the Engineering Evaluation/Cost Analysis (EE/CA) in the information repository and a 30-day public comment period, when appropriate.
- Prepare written responses to significant comments.

ATTACHMENT A

SUMMARY OF PSCs, TYPES OF WASTES, AFFECTED MEDIA, AND RESPONSE ACTIONS

ATTACHMENT A

SUMMARY OF PSCs, TYPES OF WASTES, AFFECTED MEDIA, AND RESPONSE ACTIONS

Existing information on the nature and extent of the environmental problems for each PSC identified in the NAS Jacksonville PA is presented below. Figure A-1 is a location map for the PSCs described in this attachment. Table A-1 is a summary of the types of wastes, affected media, and response actions at each PSC. This information is derived from the Remedial Investigation Work Plan.

The PA identified and assessed areas (PSCs) posing a potential threat to human health or to the environment due to contamination from past waste disposal operations at NAS Jacksonville. The PA identified a total of 38 PSCs on the naval air station through an extensive records search, interviews with NAS Jacksonville personnel, retirees, and previous reports. Two PSCs were added by the naval air station and another two were added due to FFA activities. According to the study, a majority of the PSCs do not pose a significant threat to public health or the environment.

PSC No. 1-Patrol Road Turn-Around.

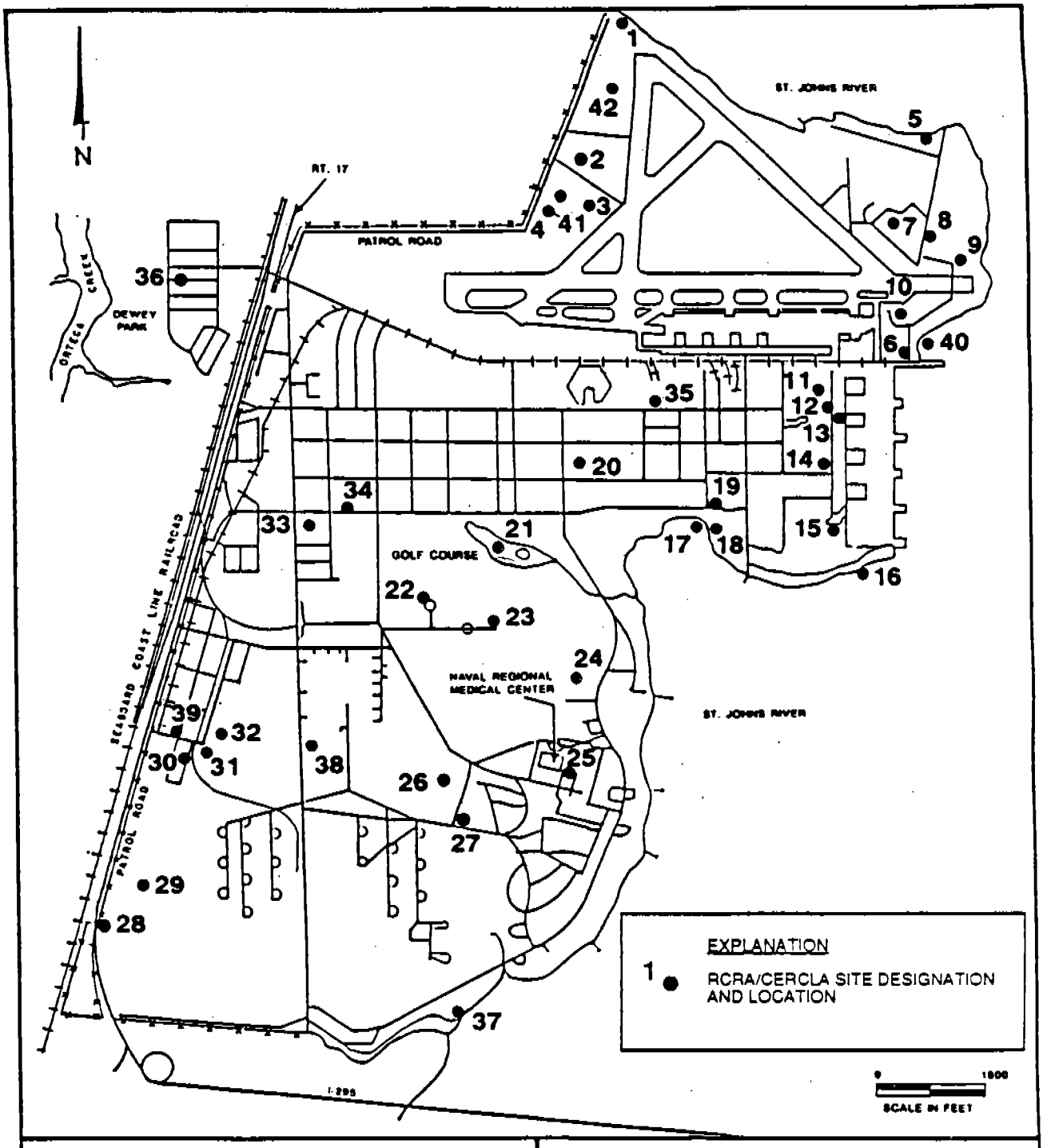
This PSC is located north of the patrol road turn-around along the shoreline of the St. Johns River. The Navy used this area periodically for the disposal of construction debris in order to reclaim land and provide shoreline protection. The PSC contains rubble consisting mostly of concrete and asphalt. The PSC is approximately 50 feet (ft) wide by 300 ft long. The specific date(s) of disposal and quantities disposed were not available.

PSC No. 2-Present Fire Fighting Training Area.

This PSC is located in the immediate vicinity north of the sewage treatment plant. The PSC occupies an area approximately 100 ft wide by 100 ft long and is used for fire fighting training. Over the years, training personnel have ignited mock airplane forms using JP-4, JP-5, Av-Gas, or spent oil as fuel. This area has been used for training from 1966 to the present. The Navy estimates that approximately 6,000 gallons of fuel have been burned at this PSC annually. The area immediately surrounding the PSC shows visible evidence of fire damage.

PSC No. 3-West Waste Water Treatment Plant Ex-Sludge Disposal Area.

This PSC is located just east of the sewage treatment plant. The area of the sludge disposal PSC is about 15 acres. The Navy dumped approximately 20,000 tons of sewage sludge containing toxic metals here from 1962 to 1980.



LOCATIONS OF PSCs AT
NAVAL AIR STATION, JACKSONVILLE

FIGURE A-1

COMMUNITY RELATIONS PLAN

NAS JACKSONVILLE
JUNE 1991

PSC No. 4-Pine Tree Planting Area.

This PSC is located approximately 200 ft south of the sewage treatment plant. Until 1975, the Navy reportedly used this area for the disposal of paint shavings, sewage sludge, asbestos, oil and other petroleum products.

PSC No. 5-Shoreline Fill, West of Fuel Barge Dock.

This area, used in the 1940s for waste disposal, is approximately 200 ft wide by 600 ft long. The materials disposed in this area were largely concrete runway debris.

PSC No. 6-Fuel Farm.

A fuel oil leak (No. 6 fuel oil) occurred in a pipeline at a connection to a buried tank. An unknown quantity of fuel oil leaked into the underground concrete lined "steampit" which contained some water. Reportedly, the fuel oil floated on the surface of the water and was contained within the concrete pit. Subsequently, the Navy pumped the fuel oil out of the pit.

PSC No. 7-Gas Hill.

This PSC is located west of Catapult Road. Reportedly, explosions involving underground tanks occurred in this PSC in 1978 and 1979. In 1978, lightning caused an explosion and fire in an underground tank. The residual fuel, not consumed by fire, was pumped into tank trucks and hauled off naval air station property for disposal as spent oil. It is known that leaks from some existing tanks and their associated piping exist.

PSC No. 8-Vacant Lot, Fuels Farm Area.

This PSC, approximately 200 ft by 100 ft, is located adjacent to the east side of Catapult Road. As indicated by an aerial photo dated September 1976, the Navy used the area for parking approximately five fighter planes. Inspection of the PSC revealed four piles of material, possibly abrasive blast grit, and two disintegrated plastic bags of fine granular materials.

PSC No. 9-Old Disposal Area (East of Fuel Farm).

This PSC is approximately 200 ft wide by 400 ft long and located east of Catapult Road along the shoreline of the St. Johns River. This PSC contains construction debris, and a few 55-gallon drums. The Navy disposed of this material for approximately one year from 1977 to 1978.

PSC No. 10-Tank 119 K.

The Navy stored hot stripper, MIL-R-81835 or Turco 3823, in an underground steel tank (capacity 25,000 gallons) at tank No. 119 k located near Building 119. In accordance with presiding regulations, a Navy contractor disposed of the tank contents off NAS Jacksonville property and the tank was removed in 1983.

PSC No. 11-Hangar Building 101.

The floor of the main hangar section of Building 101 is constructed of 10-inch thick reinforced concrete. Reportedly, unauthorized disposal of spent solvents (approximately 2,000 gallons) and other materials into abandoned hydraulic lift shafts occurred for many years. These shafts were concrete pits constructed in the floor of the hanger and covered with steel grates. Infiltration of spent solvents and other flammable liquids from deteriorated industrial sewer lines or disposal may also be responsible for the presence of flammable materials into these shafts. Information about specific waste materials is not available, however, chemicals used in Building 101, such as trichloroethylene (TCE) and oils, might potentially reach this area.

In addition, a spill of more than 150 pounds of mercury also occurred in the "old pump shop" in Building 101. Although the Navy removed most of the spilled mercury and sent it to reclaiming, reportedly some mercury was not removed and remained at the PSC.

PSC No. 12-Old Test Cell Building.

There were cross-interconnections of the storm and sanitary sewers with the building roof drains in the vicinity of the old test cell area and Building 101 k. In addition, it was reported that numerous spills of chemicals occurred at this PSC. In 1989, all of the cross-connections were removed.

PSC No. 13-Radium Paint Disposal Pit.

The Navy used the area north of former Building 167 for the disposal of radioactive radium paint waste from aircraft instrument dial painting operations which took place at NADEP during World War II and continued through the late 1950s. The Navy disposed of these wastes into a burial pit approximately 40 ft by 50 ft and less than a foot deep. The burial pit contained the paint wastes mixed with soil. The Navy excavated this PSC in the late 1950s. At the time of excavation, radioactivity readings at the surface taken with a radiation survey meter were in the range of 3 to 5 mR/hr above background. The Navy reportedly moved the contaminated soil to the Radioactive Waste Fill Area, PSC No. 18.

PSC No. 14-Battery Shop.

The battery shop is located in Building 125. The shop contains a seepage pit where, from 1959 to 1982, the Navy disposed of approximately 100 gallons of waste acids from lead-acid batteries.

PSC No. 15-Solvent and Paint Sludge Disposal Area NADEP.

This area is approximately 100 ft by 100 ft and is located south of the paint shop (Building 868). The Navy used the PSC for disposal of solvents and paint sludges as recently as 1978. Materials Engineering Laboratory tested soil at the PSC and findings reported the presence of "solvents of all types."

PSC No. 16-Storm Sewer Discharge - Black Point.

A storm sewer, located along Buildings 101, 50, and 795, discharges at Black Point. Over the years, various chemical wastes in the NADEP unintentionally made their way into the storm sewer system. Accurate estimates of the volume of material disposed in this way are not available. The PSC is considered the outfall or discharge point.

PSC No. 17-Glass Bead Disposal Area.

This area is located approximately 10 ft to 15 ft from the shoreline in Mulberry Cove. The Navy used the PSC for the disposal of spent glass beads used in the abrasive blasting operations conducted at NADEP. Disposal of the spent glass beads in this off-shore area began in 1965 and ended in January 1981. There is visible evidence of a "glass bead bar" that has been created as a result of off-shore dumping.

PSC No. 18-Radioactive Waste Disposal Area.

The Navy placed radioactive radium paint wastes from aircraft instrument dial stripping operations at NADEP during and after World War II in a burial area (PSC No. 13) until the late 1950s. Reportedly, when this operation ceased, the Navy excavated the PSC. The Navy disposed of this excavated contaminated soil, approximately 1500 cubic feet, at PSC No. 18 located near the shoreline in the vicinity of Building 48. This area was originally at water level but was built up 3 ft to 5 ft by the fill material. When excavated, radiation measurements of the soil (using a radiation survey meter) were reportedly 3 to 5 mR/hr. At the time of the PA, surface measurements of radiation using a survey meter (NUCOR CRM 595 with CP 595 probe) were not significantly above background readings (0.15 mR/hr).

PSC No. 19-Old Gas Station.

The old gas station was located at Building 48. Formerly, the PSC contained two buried gasoline storage tanks that were in close proximity to a potable water well. The tanks leaked gasoline, filled with ground water, and were later abandoned. The potable water well was also abandoned.

PSC No. 20-Solid Waste Incinerator.

The solid waste incinerator was located in Building 952. The ash and solid residues resulting from incineration were taken to the Clay County Landfill. There is no evidence of hazardous wastes either spilled or disposed at this PSC.

PSC No. 21-Golf Course.

The pesticide Dasinit was occasionally applied to the golf course greens to control mole crickets. On April 30, 1979, the Navy applied this pesticide to the greens. On May 6, 1979, a fish kill resulted following several days of heavy rain. The fish kill in Casa Linda Lake later was attributed to runoff of pesticides into the lake. This was an isolated incident.

PSC No. 22-"Fort Dix".

Reportedly, the Navy used the area known as Fort Dix as a small arms ammo disposal area for the target or skeet ranges. During a PSC inspection, there was no visible evidence of disposal.

PSC No. 23-Old Skeet Range.

This area is approximately 500 ft long by 100 ft wide and is adjacent to the golf course. The PSC contains cinder piles, a few empty drums, and engine containers. Because of the disturbed ground present in the area, the PSC may be an old sand pit.

PSC No. 24-Scrap Metal Disposal Area.

The scrap metal disposal area was located beneath the Housing Institute which the Navy constructed as a training center for housing management at this PSC. Scrap metal was piled in the area along with assorted junk truck parts and empty drums. It is assumed that scrap metal was disposed off NAS Jacksonville property in accordance with presiding regulations.

PSC No. 25-Building No. 2038 (NRMC Ex-Radioactive Waste Storage Area).

The Navy used this area, adjacent to Building 2038, for the storage of hospital wastes containing radioactive iodine (I_{25}) and other radioisotopes. The PSC was cleaned by a contractor, surveyed, and determined to be free of radiation. Building 2038 was demolished in 1989 when the NRMC was expanded.

PSC No. 26-Old Main Registered Disposal Area.

The Navy used this area for the disposal of a variety of wastes including spent solvents and spent oils. Before 1940, the U.S. Army controlled and utilized the PSC for disposal of debris. From 1940 to 1968, the Navy operated the PSC as a disposal area for solid waste, demolition and construction debris, and spent solvents and oil. The Navy burned these wastes at the edge of trenches and pits with the remains bulldozed into the trenches and pits and covered. Air pollution control requirements halted burning, and the solid wastes were then hauled off NAS Jacksonville property by a contractor. However, the Navy continued to dump spent solvents and oil in the pits. The Navy officially closed the PSC on January 15, 1979.

The Navy also used a portion of the area for the disposal of low-level radioactive wastes during World War II and until 1955. Instruments with radium dials and other low-level radioactive wastes were probably disposed at PSC No. 26. Although the Navy did not consider the radiation levels measured at the time of disposal significant, the area was decontaminated. A contractor for the Navy excavated and placed dirt in approximately 500 steel drums for disposal at an approved facility in Barnwell, South Carolina.

PSC No. 27-Ex-PCB Storage Area.

The Navy used this area, approximately 100 ft by 100 ft, for the outdoor storage of transformers containing PCBs. The transformers were vandalized in 1978 resulting in the spillage of transformer fluids on the ground. The Navy removed the transformers and the PCB contaminated soil was removed and disposed off NAS Jacksonville property in accordance with presiding regulations.

PSC No. 28-Ex-Fire Fighting Training Area.

The Navy used this PSC as a former fire fighting training area. The fire pit was located in the vicinity of the patrol road turnaround. Approximately 5 to 10 gallons/day of spent oil was placed in the pit and burned from 1946 to 1952. During a survey conducted during the week of January 21, 1990, there was no visible evidence of the pit.

PSC No. 29-Organic Disposal Area.

The Navy used the area for the disposal of organic debris (wood, grass clippings, etc.). Reportedly, the Navy disposed of materials other than organic debris in this PSC. There is evidence of approximately one dozen crushed drums, construction debris, discolored soil, and scrap metal in the PSC. Historically, the disposal area may have been used as a borrow pit. Quantities, types of wastes, and dates of disposal are not known.

PSC No. 30-Old Drum Lot.

The Navy used this PSC for the storage of drums containing raw products, which were placed on Marsden Matting. The Navy stored approximately 10,000 drums at this PSC from 1955 to 1967. Although there is no visible evidence of environmental impairment at this PSC, it was reported that from time to time drums containing hazardous materials corroded and leaked their contents onto the ground.

PSC No. 31-Asphalt Mix Area.

This PSC is located at the Public Works Materials Lay Down Area. The Navy was reported to have stored leaking drums containing asphalt mix materials in this area. There is no visible evidence of contamination. The area is presently used by the public works department for storage of equipment, materials, and old vehicles.

PSC No. 32-Base Landfill.

The Navy used the old base landfill during the 1960s for disposing of soil, refuse, construction debris, old vehicles, and household refuse (in dumpsters). This PSC covers approximately five acres.

PSC No. 33-Base Service Station.

The NAS Jacksonville service station is located at Building 429. There was an occurrence of gasoline leakage from this service station as recently as June 1982. The total loss of fuel was approximately 2,000 gallons. The Navy identified the source of the problem, and remedial action pursuant to Chapter 17-770 FAC is currently underway.

PSC No. 34-Old Transformer Storage Building.

Formerly, the Navy used Building 525 to store transformers. This and the adjacent building (No. 951) today serve as the naval air station Commissary. Building 525 was originally a warehouse. According to interviews with naval air station personnel, the building was demolished and a new commissary was built on this PSC in 1978. Reportedly, hazardous materials originally stored in the building were moved to PSC No. 27.

PSC No. 35-Temporary PCB Storage Area.

The Navy used Building 480 for the temporary storage of PCB oil. In July 1981, the USEPA inspected and approved temporary storage of PCBs. In 1980, a Navy contractor removed asbestos pipe insulation from a building and deposited the asbestos in Building 480. A Navy contractor removed the bulk material and decontaminated the building after dust samples indicated that the area was contaminated.

PSC No. 36-Dewey Park.

This area is located west of Gate 3 south of the Dewey Park Water Plant. The PSC contains construction debris and materials from fire damaged buildings. The PSC occupies an area approximately two acres in size in a clearing in a wooded area. Access to this area is through Dewey Park, however, the PSC spans the border of the naval air station property.

PSC No. 37-Ex-Power Barge Dock Area.

Reportedly, an explosion of a transformer had occurred on the shore in the vicinity of the power barge dock when the barge was in operation. Investigation of this issue revealed that all transformers were located on the barge and that no explosions occurred.

PSC No. 38-Torpedo Rework Facility.

PSC No. 38 is located within the restricted magazine area of the naval air station. Interviews with NAS Jacksonville and Ordnance Environmental Support Office (OESO) personnel revealed that the Navy generates approximately one 55-gallon drum of solid waste materials (i.e., rags and gloves containing Otto Fuel) each day which is disposed off NAS Jacksonville property in accordance with presiding regulatory requirements.

PSC No. 39-Possible Transformer Burial Area.

A retired Public Works Department employee reported that the Navy buried hundreds of old and new transformers (which may have contained PCB oils) east of warehouse Building No. 164 during 1943 through 1945. The retired employee believed that a 10 ft wide by 5 ft deep ditch, between the warehouse building and railroad tracks to the east, is the probable burial spot of the transformers.

PSC No. 40-Ex-East IWTP Discharge Area.

Prior to 1972, a waste water treatment plant was located near the main runway. Primary waste water treatment included settling for removal of solids and skimming for removal of oils and solvents. Secondary treatment was provided by trickling filter units. Effluent from the plant was discharged to the St. Johns River. Reportedly, the discharge to the river resulted in a build-up of sediments in the cove east of runway 27. The Navy

removed the east side plant from service in 1972 and the waste stream was diverted to the west side plant.

PSC No. 41-Domestic Waste Sludge Drying Beds.

The USEPA classified the domestic sludge drying beds as surface impoundments operated to treat Resource Conservation and Recovery Act (RCRA) hazardous wastes F006 and F019. An average of 90 gallons per day of sludge was dewatered in domestic sludge drying beds during the operation. These sludges may potentially contain heavy metals.

PSC No. 42 - Polishing Pond for the Waste Water Treatment Plant (WWTP) Effluent.

The USEPA classified the Polishing Pond as a surface impoundment operated to treat RCRA hazardous wastes F006 and F019. The Polishing Pond received 2.3 million gallons per day of treated effluent from the WWTP for final clarification before chlorination and discharge to the St. Johns River.

Table A-1. Summary of PSCs, Types of Wastes, Affected Media, and Response Actions

PSC Name and Number	Type of Waste	Description of Activities	Public Health/ Environmental Status
1. Patrol Road Turnaround Area	Rubble, concrete & asphalt	Waste was disposed on land surface along shoreline.	PA indicates no threat exists.
2. Present Fire Fighting Training Area	JP-5, waste oil & aviation gas	Fuel is sprayed in a bermed area and burned during training exercises.	During PA-SI, hazardous substances were identified, RI/FS required.
3. Sludge Disposal Area/Sewage Treatment Plant Area	Sludge containing toxic metals	Dumped from 1962-1980 over 15 acres east of IWTP.	During PA-SI, hazardous substances were identified, RI/FS required.
4. Pine Tree Planting Area	Paint shavings, sewage sludge, asbestos, oil, other petroleum products	Dumped over a 1-acre site. Paint shavings noticeable, sewage sludge present.	During PA-SI, hazardous substances were identified, RI/FS required.
5. Shoreline Fill Area (West of Fuel Barge Dock, Pier 142)	Concrete runway debris, paint shavings, paint remover, solvents, and radioactive paint	The paint and solvents disposed in 1945-1946 below grade, covered with concrete and runway debris.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
6. Fuel Farm	Fuel oil	Fuel leak at connection pipeline was contained in concrete steam pit.	PA indicates no threat exists.
7. Gas Hill	JP-4	Explosion involving underground tanks.	To be managed in accordance with FAC 17-770.
8. Vacant Lot Near Fuel Farm Area	Abrasive blast grit	Material disposed of on ground.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
9. Old Disposal Area (East of Fuel Farm)	Garbage, construction debris, 55-gal drums, sludges	Waste was disposed of on ground.	During PA-SI, hazardous substances were identified, potential threat, need site screening.

Table A-1. Summary of PSCs, Types of Wastes, Affected Media, and Response Actions

PSC Name and Number	Type of Waste	Description of Activities	Public Health/ Environmental Status
10. Building 119 (A-T)	Hot stripper MIL-R-81835 or turco 3823	27,000-gal underground tank: No release reported, temporary storage.	PA indicates no threat exists.
11. Hanger Building 101	Waste solvents, mercury	Solvents released to soil and ground water from leaky piping located below hanger floor.	During PA-SI, hazardous substances were identified, RI/FS required.
12. Old Test Cell Building	Solvents, hazardous waste	Spills and leaks from old drums discharged to storm sewer system.	During PA-SI, hazardous substances were identified, RI/FS required.
13. Radium Paint Waste Disposal Pit	Radioactive paint waste	Waste was mixed with soil in a pit 40'x50'x1'.	During PA-SI, hazardous substances were identified, RI/FS required.
14. Battery Shop	Lead acids, waste, battery acids	Acids were dumped in seepage pit which is connected to storm/ industrial sewer system.	During PA-SI, hazardous substances were identified, RI/FS required.
15. Solvent and Paint Sludge Disposal Area	Waste solvents and paint sludges	Paint and sludge was disposed of on the ground and mixed with soil. Visible at land surface.	During PA-SI, hazardous substances were identified, RI/FS required.
16. Storm Sewer Discharge Black Point Black Point	Discharge point for storm drain sewers located along Wright St (NADEP)	Waste was discharged through the sewer system to St. Johns River and to ground water via cracked pipes.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
17. Glass Bead Disposal Area	Spent glass beads containing metals	Disposal of beads offshore in the river. Stored in drums, removed by a private contractor. A glass bead bar has developed in St. Johns River.	During PA-SI, hazardous substances were identified, potential threat, need site screening.

Table A-1. Summary of PSCs, Types of Wastes, Affected Media, and Response Actions

PSC Name and Number	Type of Waste	Description of Activities	Public Health/ Environmental Status
18. Radioactive Waste Fill Area	Radioactive radium paint wastes	Waste mixed with soil.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
19. Old Gas Station (Building 48)	Gasoline and diesel fuels	Underground storage tanks 4-10,000 gallons, no release documented.	To be managed in accordance with FAC 17-770.
20. Solid Waste Incinerator	Ash and solids	Waste is burned; no release documented.	PA indicates no threat exists.
21. Golf Course	Pesticides, dazonon herbicides, roundup	Pesticides were applied on gold course near lake.	PA indicates no threat exists.
22. Fort Dix	Small arms and ammo disposal area	No release documented.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
23. Old Skeet Range	Miscellaneous	No release documented.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
24. Scrap Metal Disposal Area	Scrap metal, assorted junk	Waste pile on ground; no release documented.	PA indicates no threat exists.
25. Building No. 2038	Hospital waste containing radioactive iodine	Stored in drums; no release documented.	PA indicates no threat exists.
26. Old Main Registered Disposal Area (Pits Site)	Trash, garbage, waste, oil, solvents, radium contaminated paint stripper	Waste materials buried/ disposed of in trenches and pits. Leaching to ground water and surface waters.	During PA-SI, hazardous substances were identified, RI/FS required.

PSC Name and Number	Type of Waste	Description of Activities	Public Health/ Environmental Status
27. PCB Storage Area (Pits Site)	Transformers containing PCB oils	Outdoor storage of transformers. Transformers were vandalized; PCB leaked on the ground.	During PA-SI, hazardous substances were identified, RI/FS required.
28. Fire Pit Area	Waste oil, PCB oils	Waste oil placed in pit and presumably burned.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
29. Organic Disposal Area	Organic debris (wood, cuttings), PVC casing, construction debris, scrap metal, drums, trash and garbage, creosote wood blocks	Waste was disposed of on ground and graded for access. No release documented.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
30. Old Drum Lot	Solvents, metal containing sludges	Stored in approximately 10,000 drums.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
31. Asphalt Mix Area	Asphalt mixing material	Piles of asphalt and drums reported to be present.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
32. Base Landfill	Soil, refuse, junk vehicles	Landfill; no release documented.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
33. Base Service Station (Building No. 429)	Gasoline, diesel fuels	Underground storage tanks.	To be managed in accordance with FAC 17-770.
34. Old Transformer Storage Building No. 525	Transformers (PCB oil)	Warehouse; no release documented.	PA indicates no threat exists.

Table A-1. Summary of PSCs, Types of Wastes, Affected Media, and Response Actions

PSC Name and Number	Type of Waste	Description of Activities	Public Health/ Environmental Status
35. Temporary PCB Storage Area (Building No. 480)	PCB oil, asbestos	Asbestos debris stored in building along with transformers containing PCBs.	PA indicates no threat exists.
36. Dewey Park	Construction and demolition debris, materials from fire damaged buildings	Disposed on ground over two acres.	PA indicates no threat exists.
37. Power Barge	Transformers, PCBs	Barge Area; no release documented.	PA indicates no threat exists.
38. Torpedo Rework Facility	Rags and gloves containing otto fuel-dibutyl civa-cate, nitryl diamene	Drums used for storing waste; no release documented.	During PA-SI, hazardous substances were identified, potential threat, need site screening.
39. Transformer Burial Area (east of Building No. 164)	Transformers possibly containing PCB oils	Buried transformers; no release documented.	PA indicates no threat exists.
40. Ex-East Industrial Wastewater Treatment Plant Discharge Area	Wastewater recovered from skimming, paint chips and waste oil	Wastewater was discharged to St. Johns River.	PA indicates no threat exists.
41. Domestic Waste Sludge Drying Beds	Domestic sludge	Sludge stored in concrete drying beds.	During PA-SI, hazardous substances were identified, RI/FS required.
42. Polishing Pond for WWTP Effluent	Effluent water contains VOCs and heavy metals	Effluent stored in pond might leach to ground water, soil, or discharge to ground water.	During PA-SI, hazardous substances were identified, RI/FS required.

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ATTACHMENT B

GUIDELINES AND QUESTIONS FOR COMMUNITY INTERVIEWS

ATTACHMENT B

GUIDELINES AND QUESTIONS FOR COMMUNITY INTERVIEWS

INTRODUCTORY COMMENTS

- Description of Superfund, NPL, and Installation Restoration (IR) Programs
- Description of Community Relations Plan
- Purpose and Objectives of Interviews

QUESTIONS

1. How long have you lived near/worked/lived at NAS Jacksonville?

   - Describe occupation (if employee)
   - Describe affiliation with the naval air station

2. What do you know about NAS Jacksonville?

   - history
   - types of operations (flying, maintenance)
   - number of employees
   - size

3. What is your source of information on the naval air station?

   - DOD/US Navy
   - media (if so, which ones)
   - friends/neighbors
   - employees
   - community/civic groups
   - other
   - libraries

4. What do you know about the environmental work (Superfund, NPL, and IR Program) being conducted at the naval air station?

5. What is your source of information?

   - DOD/US Navy
   - employees
   - friends
   - media (if so, which ones)
   - community/civic groups

- information repository
- libraries
- PA open house and air shows
- participation in environmental activities
- other

6. What issues or activities related to environmental work at NAS Jacksonville are of interest or concern to you?

   - health and safety
   - air pollution
   - ground-water contamination
   - property value
   - proximity to sites
   - other problems associated with the naval air station

NOTE: With this question, we will probe for specific issues which may include subjects such as those listed above. This question is the crux of each interview and will be referred to throughout the time available but must be discussed in relation to each person's situation. For example, an elected official may have his/her own personal or professional issues which may or may not be the same as his/her constituents' concerns. During the introductory questions, we will be able to identify areas in which we can focus during this part of the interview as well as determine the importance of environmental issues in relation to other types of concerns associated with the naval air station.

7. Have you had any contact with NAS Jacksonville officials or personnel about your concerns? If so, who were they and what was their response?

8. Do you have any suggestions or ideas about ways in which we can keep the community informed of the Superfund/IR Programs? How does the community generally gain its information?

   - media
   - newsletter
   - meetings
   - libraries
   - community leaders
   - other

9. What are the primary community groups or organizations in the area? Do you belong to any of these groups?

   - unions
   - Lion's Club, etc.
   - church groups
   - other

10. Do these groups or organizations have regular meetings, newsletters, or special events?

    - are speakers needed?
    - are articles needed?
    - can we use your mailing list?

11. Can you suggest other individuals or groups that would be helpful in our community relations planning?

12. Demographic information.

    - age group
    - family make-up
    - educational level
    - occupation (if not employed at the naval air station)
    - length of time in office (if elected official)

13. Would you like to be included on our mailing list to receive further information on the NAS Jacksonville IR Program? If yes, verify address.

ATTACHMENT C

MAILING LIST OF INTERESTED PARTIES

ATTACHMENT C

MAILING LIST OF INTERESTED PARTIES
(As of June 1991)

CITIZENS AND OTHER INTERESTED PARTIES

Mr. John Austin
Citizens Reaction Against Pollution
(Military Toxics Network)
6365 Sundown Drive
Jacksonville, FL 32244

Mrs. James L. Crowell

Ms. Jackie Eldridge
Keep Jacksonville Beautiful
City Hall, Room 1207
220 East Bay Street
Jacksonville, FL 32202

Mr. Russell Foland
Duval County Chamber of Commerce
133 East Bay Street
Jacksonville, FL 32202

Mr. Joseph Hines

Mr. Greg Larson
General Manager
Timuquana Country Club
9028 Timuquana Road
Jacksonville, FL 32210

Mr. Bud Luman
Jacksonville Chamber of Commerce
1758 Cassett Avenue
Jacksonville, FL 32205

Ms. Mary de Martini
Sierra Club
Toxics Committee
3311 Pine Street, #4
Jacksonville, FL 32205

Mr. Scott Maslin

Ms. Melissa Proebstle
Tree Hill Nature Center
7152 Lone Star Road
Jacksonville, FL 32211

Mr. Clark Vargas, P.E.[1]
8596 Arlington Expressway
Jacksonville, FL 32211

Mr. and Mrs. Louis Zust

[1]Technical Review Committee member.

NAVAL AIR STATION HOUSING RESIDENTS

List will be obtained from and updated by the NAS Jacksonville Housing Office.

MEDIA

Newspapers

Environmental Writer
Florida Times-Union
One Riverside Avenue
Jacksonville, FL 32202

Editor
Clay Today
P.O. Box 1209
Orange Park, FL 32073

Editor
Tribune Publishing Company
P.O. Box 917
Orange Park, FL 32067

Editor
Jax Air News
Public Affairs Office
Naval Air Station
Jacksonville, FL 32212-5002

Radio

WKTZ-FM/WJAX-FM
5353 Arlington Expressway
Jacksonville, FL 32211

WCRJ-FM
8636 Baymeadows Road, Suite 107
Jacksonville, FL 32205

WIVY-FM
3100 South University Boulevard
Jacksonville, FL 32216

WAPE-FM
8655 Regency Square Boulevard
Jacksonville, FL

WEJZ-FM
9487 Baypine Road
Jacksonville, FL

WRFY-FM
9090 Hogan Road
Jacksonville, FL 32216

WQIK-AM/FM
5555 Radio Lane
Jacksonville, FL 32205

WJCT-FM
100 Festival Park Avenue
Jacksonville, FL 32202

WJXR-FM
P.O. Box 1
Jacksonville, FL 32234

WAIV-WOKV
6869 Lennox Avenue
Jacksonville, FL 32205

Television

WJXT-TV
1851 Southhampton Road
Jacksonville, FL 32207

WTLV-TV
1070 East Adams Street
Jacksonville, FL 32202

WJKS-TV
9117 Hogan Road
Jacksonville, FL 32216

WAWS-TV
8675 Hogan Road
Jacksonville, FL 32216

WJCT-TV
100 Festival Park Avenue
Jacksonville, FL 32202

WNFT-TV
2117 South University Boulevard
Jacksonville, FL 32216

CITY OF JACKSONVILLE OFFICIALS AND AGENCIES

Honorable Tommy L. Hazouri
Mayor
City of Jacksonville
421 West Church Street
Jacksonville, FL 32202

Mr. Walter W. Honour
Environmental Advisor to the Mayor
City of Jacksonville
421 West Church Street, Suite 709
Jacksonville, FL 32202

Councilwoman Tillie Fowler
Office of City Council
City Hall, 10th Floor
220 East Bay Street
Jacksonville, FL 32202

Ms. Christi Veleta
Program manager
Environmental Protection Board
City of Jacksonville
421 West Church Street, Suite 412
Jacksonville, FL 32202

Mr. E.B. Johnson
Executive Director
Community Relations Commission
Office of the Mayor
City of Jacksonville
421 West Church Street
Jacksonville, FL 32202

Mr. John Griffith
Office of the Mayor
City of Jacksonville
421 West Church Street
Jacksonville, FL 32202

Mr. Jim Sewell
Bio-Environmental Engineer
Hazardous Material Activity
Water Resources Division
City of Jacksonville
421 West Church Street, Suite 412
Jacksonville, FL 32202

Mr. Gerald Young[1]
Jacksonville Bio-Environmental Services Division
City of Jacksonville
421 West Church Street, Suite 412
Jacksonville, FL 32202-4111

[1]Technical Review Committee member.

OTHER GOVERNMENTAL AND REGULATORY AGENCIES

Janis Nepshinsky[1]
Water Quality Engineer
St. Johns River Water Management District
P.O. Box 1429
Palatka, FL 31278-1429

STATE OF FLORIDA OFFICIALS AND AGENCIES

State Senator
Ander Crenshaw
4250 Lakeside Drive, Suite 205
Jacksonville, FL 32210-3306

State Representative
Frances L. Chance Irvine
2105 Park Avenue
Orange Park, FL 32073

Governor Lawton Chiles
The Capital Building
Tallahassee, FL 32301

Eric S. Nuzie[1]
Federal Facilities Coordinator
Florida Department of Environmental Regulations
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Mike Fitzsimmons
Florida Department of Environmental Regulations
Northeast District
7825 Baymeadows Way, Suite B200
Jacksonville, FL 32256-7577

State Senator
Arnett Girardeau
26 East Sixth Street
Jacksonville, FL 32206

State Representative
Stephen R. Wise
5655 Timuquana Road, Suite 4B
Jacksonville, FL 32210

Mr. Tim Bahr
Bureau of Waste Cleanup
Florida Department of Environmental Regulations
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Jacksonville, FL 32202

Lynn Griffin
Natural Resource Trustee
Florida Department of Environmental Regulations
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Ashwin Patel
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Ernie Barnett
Natural Resource Trustee
Florida Department of Natural Resources
3900 Commonwealth Boulevard
Tallahassee, FL 32399

Connie Garrett HRS (HSET)
Environmental Specialist
Toxicology and Hazard Assessment Section
State of Florida
Department of Health and Rehabilitative Services
1317 Winewood Boulevard
Tallahassee, FL 32399-0700

FEDERAL OFFICIALS AND AGENCIES

U.S. Senator Bob Graham
United States Senate
SD - 241 Dirken State Office Building
Washington, DC 20510-0903

U.S. Senator Connie Mack
United States Senate
Hart Senate Office Building, Room 902
Washington, DC 20510-0903

U.S. Representative Charles Bennett
Third District
314 Palmetto Street
Jacksonville, FL 32202

U.S. Representative Craig James
Fourth District
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Daytona Beach, FL 32018

Hagan Thompson
Office of Public Affairs
USEPA, Region IV
345 Courtland Street, NE
Atlanta, GA 30365

Carl Froede[1]
RCRA and Federal Facilities Branch
USEPA, Region IV
345 Courtland Street, NE
Atlanta, GA 30365

Shirley Jones
Community Relations Coordinator
USEPA, Region IV
345 Courtland Street, NE
Atlanta, GA 30365

U.S. NAVY PERSONNEL

Captain Kevin Delaney, USN[1]
Commanding Officer
Naval Air Station
Jacksonville, FL 32212-5000

Captain William R. Albertolli, USN[1]
Commanding Officer
Naval Air Station
Naval Aviation Depot
Jacksonville, FL 32212-0016

[1]Technical Review Committee member.

Captain James Cheney, USN[1]
Commanding Officer
Naval Supply Center
Naval Air Station
Jacksonville, FL 32212-0077

Captain A.W. Johnson, USN[1]
Public Works Officer
Naval Air Station
Jacksonville, FL 32212-5000

Command Master Chief Brown
Naval Air Station
Jacksonville, FL 32212

Mr. Joseph Sarver
Public Affairs Office
Naval Aviation Depot
Naval Air Station
Jacksonville, FL 32212-0016

Ms. Imogene Mitchell
Housing Director
Naval Air Station
Jacksonville, FL 32212

Mr. Ezra McDaniel
Naval Aviation Depot
Naval Air Station
Jacksonville, FL 32212-0016

Mr. Ronald Williamson
Safety Division
Naval Air Station
Jacksonville, FL 32212

Mr. Dave Culbert
Safety Division
Naval Air Station
Jacksonville, FL 32212

Mr. Robert MacLeay
Recreation Director
Naval Air Station
Jacksonville, FL 32212

Lieutenant Audwin Jackson[1]
Legal Officer
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Jacksonville, FL 32212

Mr. Kevin Gartland[1]
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Public Works Department
Environmental Division
Box 5, Code 184IR
Naval Air Station
Jacksonville, FL 32212-5000

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Route 4, Box 115B
Montecello, FL 32344

Ms. Marie Ferdman[1]
Environmental Division Director
Naval Aviation Depot
Naval Air Station
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Mr. Joel Murphy[1]
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Southern Division
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Mr. Joseph Wallmeyer[1]
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Environmental Division
Naval Air Station
Jacksonville, FL 32212-5000

Mr. Veronica Cazier[1]
Public Affairs Office
Community Relations Coordinator
Naval Air Station
Jacksonville, FL 32212-5000

Mr. Nick Young[1]
Public Affairs Officer
Naval Air Station
Jacksonville, FL 32212-5000

[1]Technical Review Committee member.

ATTACHMENT D

LOCATIONS FOR INFORMATION REPOSITORY AND PUBLIC MEETINGS

ATTACHMENT D

LOCATIONS FOR INFORMATION REPOSITORY AND PUBLIC MEETINGS

INFORMATION REPOSITORY

Webb Wesconnett Branch
Jacksonville Public Library
6887 103rd Street
Jacksonville, FL 32210

Telephone: (904) 778-7305

Hours:

Mon - Wed	10 a.m. to 9 p.m.
Thurs - Sat	10 a.m. to 6 p.m.
Sunday	Closed

PUBLIC MEETINGS

- Community meetings for naval air station personnel will be held on NAS Jacksonville.
- Public meetings for the community will be held in (a) location(s) easily accessible to affected citizens.

ATTACHMENT E

SUPERFUND GLOSSARY AND ACRONYMS

ATTACHMENT E

SUPERFUND GLOSSARY AND ACRONYMS

This glossary defines terms used by NAS Jacksonville representatives and the USEPA when describing activities under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended in 1986. The definitions apply specifically to the Superfund program and may have other meanings when used in different circumstances.

ADMINISTRATIVE ORDER ON CONSENT (AOC): A legal agreement between the USEPA and Potentially Responsible Parties (PRPs) whereby PRPs agree to perform or pay the cost of a site cleanup. The agreement describes actions to be taken at a site and may be subject to a public comment period. Unlike a consent decree, an administrative order on consent does not have to be approved by a judge.

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

AIR STRIPPING: A treatment system that removes, or "strips" volatile organic compounds from contaminated ground water or surface water by causing the compounds to evaporate.

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

CARCINOGEN: A substance that can cause cancer.

CARBON ADSORPTION: A treatment system where contaminants are removed from ground or surface water when the water is forced through tanks containing activated carbon, a specially treated material that attracts contaminants.

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

COMMENT PERIOD: A time period during which the public can review and comment on various documents and actions taken, either by the DOD installation or the USEPA. For

example, a comment period is provided when the USEPA proposes to add sites to the National Priorities List. Also, a minimum 30-day comment period is provided to allow community members to review and comment on a draft feasibility study.

COMMUNITY RELATIONS (CR): The USEPA, and subsequently NAS Jacksonville, program to inform and involve the public in the Superfund process and respond to community concerns.

COMMUNITY RELATIONS PLAN (CRP): A formal plan for community relations activities at a Superfund site, in this case NAS Jacksonville.

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act created a special tax that goes into a Trust Fund, commonly known as "Superfund," to investigate and clean up abandoned or uncontrolled hazardous waste sites. Under the program, the USEPA can either: (a) pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work; or (b) take legal action to force parties responsible for site contamination to clean up the site or pay back the federal government for the cost of the cleanup.

CONSENT DECREE: A legal document, approved and issued by a judge, that formalizes an agreement reached between the USEPA and potentially responsible parties (PRPs) where PRPs will perform all or part of a Superfund site clean up. The consent decree describes actions that PRPs are required to perform and is subject to a public comment period.

CONTRACT LAB PROGRAM: Laboratories under contract to the Navy or the USEPA which analyze soil, water and waste samples taken from areas at or near the Superfund site.

CONTROLLED AREA: An area that contains a security interest which, if lost, stolen, compromised, or sabotaged, would cause identifiable damage to the command mission or national security. It may also be an exclusion area providing administrative control, safety and protection against sabotage, disruption or potentially threatening acts.

COST-EFFECTIVE ALTERNATIVE: The cleanup alternative selected for a site on the National Priorities List based on technical feasibility, permanence, reliability and cost. The selected alternative does not require the USEPA to choose the least expensive alternative. If there are several clean up alternatives available to deal effectively with the problems at the site, the USEPA is required to choose the remedy on the basis of permanence, reliability and cost.

COST RECOVERY: A legal process where Potentially Responsible Parties (PRPs) can be required to pay back the Federal government for money it spends on any clean up action.

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

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

EMERGENCY: Those releases or threats of releases requiring initiation of on-site activity within hours of the lead agency's determination that a removal action is appropriate.

ENFORCEMENT: The USEPA's efforts, through legal action if necessary, to force potentially responsible parties to perform or pay for a Superfund site cleanup.

ENGINEERING EVALUATION/COST ANALYSIS (EE/CA): An analysis of removal alternatives for a site, similar to a remedial program feasibility study. The EE/CA must be made available for a 30-day public comment period prior to the signing of an Action Memorandum.

ENVIRONMENTAL RESPONSE TEAM (ERT): The USEPA hazardous waste experts who provide a 24-hour technical assistance to the USEPA regional offices and states during all types of emergencies involving releases at hazardous waste sites and spills of hazardous substances.

EXPLANATION OF DIFFERENCES: After adoption of a final remedial action plan, if any remedial action is taken, or any enforcement action under Section 106 is taken, or if any settlement or consent decree under Section 106 or 122 is entered into, and if such action, settlement or decree differs in any significant respect from the final plan, the lead agency is required to publish an explanation of the significant differences and the reasons the changes were made.

FEASIBILITY STUDY (FS): See Remedial Investigation/Feasibility Study.

FEDERAL FACILITIES AGREEMENT (FFA): An agreement between presiding regulatory agencies and the Department of Defense designed to coordinate Installation Restoration (IR) Program efforts. An FFA was signed in November 1990 between the Navy, the USEPA, and the Florida Department of Environmental Regulation to coordinate NAS Jacksonville IR Program activities.

GROUND WATER: Water found beneath the earth's surface that fills pores between material such as sand, soil, or gravel. In aquifers, ground water occurs in sufficient quantities so that it may be used for drinking water, irrigation and other purposes.

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

HYDROLOGY: The science of dealing with the properties, movement and effects of water on the earth's surface, in the soil and rocks below, and in the atmosphere.

INFORMATION REPOSITORY: A file containing current information, technical reports, and reference documents regarding a Superfund site.

LEACHATE: A contaminated liquid resulting when water percolates, or trickles, through waste materials and collects components of those wastes. Leaching may occur at landfills and may result in hazardous substances entering soil, surface water, or ground water.

MONITORING WELLS: Wells drilled at specific locations on or off a hazardous waste site where ground water can be sampled at selected depths and studied to determine such things as the direction in which ground water flows and the types and amounts of contaminants present.

NATIONAL OIL AND HAZARDOUS SUBSTANCES CONTINGENCY PLAN (NCP): The Federal regulation that guides the Superfund program.

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

NATIONAL RESPONSE CENTER (NRC): The center operated by the U.S. Coast Guard that receives and evaluates reports of oil and hazardous substance releases into the environment and notifies the appropriate agencies. The NRC can be contacted 24-hours a day, toll free at (800) 424-8802.

NATIONAL RESPONSE TEAM (NRT): Representatives of twelve Federal agencies that coordinate Federal responses to nationally significant pollution incidents and provide advice and technical assistance to the responding agencies.

NON-TIME-CRITICAL REMOVALS: Those releases or threats of releases not requiring initiation of on-site activity within six months after the lead agency's determination, based on site evaluation, that a removal action is appropriate.

ON-SCENE COORDINATOR: The Federal official who coordinates and directs Superfund removal actions.

OPERABLE UNIT: An action taken as one part of an overall site cleanup. For example, a carbon adsorption system could be installed to halt rapidly spreading ground-water contamination while a more comprehensive and long-term remedial investigation/feasibility study is underway. A number of operable units can be used in the course of a site cleanup.

OPERATION AND MAINTENANCE (O&M): Activities conducted at a site after a response action occurs to ensure that the cleanup or containment system is functioning properly.

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

POTENTIAL SOURCE OF CONTAMINATION (PSC): An area that has been identified as having the potential to contaminate the environment.

POTENTIALLY RESPONSIBLE PARTY (PRP): An individual(s) or company(ies) (such as owners, operators, transporters or generators) potentially responsible for, or contributing to, the contamination problems at a Superfund site. Whenever possible, the USEPA requires PRPs, through administrative and legal actions, to clean up hazardous waste sites they have contaminated.

PRELIMINARY ASSESSMENT: The process of collecting and reviewing available information about a known or suspected hazardous waste site or release. The USEPA or states use this information to determine if the site requires further study. If further study is needed, a site inspection is undertaken.

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

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC): A system of procedures, checks, audits and corrective actions used to ensure that field work and laboratory analysis during the investigation and cleanup of Superfund sites meet established standards.

RECORD OF COMMUNICATION: A register of all verbal communication between the USEPA and citizens regarding site concerns.

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

REGIONAL RESPONSE TEAM (RRT): Representatives of Federal, State and local agencies who may assist in coordination of activities at the request of the on-scene coordinator or remedial project manager before and during response actions.

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

REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS): Investigation and analytical studies usually performed at the same time in an interactive, iterative process, and together referred to as the "RI/FS." They are intended to gather the data necessary to determine the type and extent of contamination at a Superfund site; establish criteria for cleaning up the site; identify and screen cleanup alternatives for remedial action; and analyze in detail the technology and costs of the alternatives.

REMEDIAL PROJECT MANAGER (RPM): The USEPA or state official responsible for overseeing remedial response activities.

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

REMOVAL ACTION: An immediate action taken over the short-term to address a release or threatened release of hazardous substances.

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

RESPONSE ACTION: A CERCLA authorized action at a Superfund site involving either a short-term removal action or a long-term remedial response that may include, but is not limited to, the following activities: (a) removing hazardous materials from a site to a USEPA approved, licensed hazardous waste facility for treatment, containment, or destruction, (b) containing the waste safely on-site using incineration or other technologies; (c) destroying or treating the waste on-site using incineration or other technologies; and (d)

identifying and removing the source of ground-water contamination and halting further movement of the contaminants.

RESPONSIVENESS SUMMARY: A summary of oral and/or written public comments received by the USEPA during a comment period on key USEPA documents, and the USEPA's responses to those comments. The responsiveness summary is a key part of the ROD, highlighting community concerns for USEPA decision-makers.

SITE INSPECTION (SI): A technical phase that follows a preliminary assessment which is designed to collect more extensive information on a hazardous waste site. The information is used to score the site with the Hazard Ranking System and determine whether a response action is needed.

SUPERFUND: The common name used for the Comprehensive Environmental Response, Compensation and Liability Act, also referred to as the Trust Fund.

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA): Modifications to CERCLA enacted on October 17, 1986. SARA required Federal facilities such as NAS Jacksonville to comply with the provisions of CERCLA.

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

TECHNICAL REVIEW COMMITTEE (TRC): A committee established to review recommendations for and monitor progress of IR Program efforts. NAS Jacksonville established a TRC in 1989 which is comprised of representatives of the Navy, the USEPA, the Florida Department of Environmental Regulation, the St. Johns Water Management District, the city of Jacksonville, and the local community.

TIME-CRITICAL REMOVALS: Including emergencies lasting longer than 30 calendar days, those releases requiring initiation of on-site activities within six months of the lead agency's determination, based on the site evaluation, that a removal action is appropriate.

TREATMENT, STORAGE AND DISPOSAL (TSD) FACILITY: Any building, structure, or installation where a hazardous substance has been treated, stored, or disposed. TSD facilities are regulated by the USEPA and states under the RCRA.

TRUST FUND: A fund set up under the CERCLA to help pay for cleanup of hazardous waste sites and to take legal action to force those responsible for the sites to clean them up.

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

WATER PURVEYOR: A public utility mutual water company, county water district or municipality that delivers drinking water to customers.

SUPERFUND ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CRP	Community Relations Plan
EE/CA	Engineering Evaluation/Cost Analysis
ERT	Environmental Response Team
FS	Feasibility Study
HRS	Hazard Ranking System
NCP	National Oil and Hazardous Substances Contingency Plan
NPL	National Priorities List
NRC	National Response Center
NRT	National Response Team
OSC	On-scene Coordinator
O&M	Operation and Maintenance
PA	Preliminary Assessment
PPM/PPB	Parts Per Million/Parts Per Billion
QA/QC	Quality Assurance/Quality Control
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act of 1976
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision

RPM	Remedial Project Manager
RRT	Regional Response Team
SARA	Superfund Amendments and Reauthorization Act of 1986
SI	Site Inspection
TSD	Treatment, Storage and Disposal Facility
VOC	Volatile Organic Compound

APPENDIX 1.5

Site Health and Safety Plan

APPENDIX 1.5

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ATTACHMENT

Attachment A: Additional Health & Safety Information.
Internal Safety & Health Plan Audit Checklist.
Resumes.
Physical Examination Parameters.
Respiratory Protection Plan.

1.0 HEALTH & SAFETY PLAN OBJECTIVE

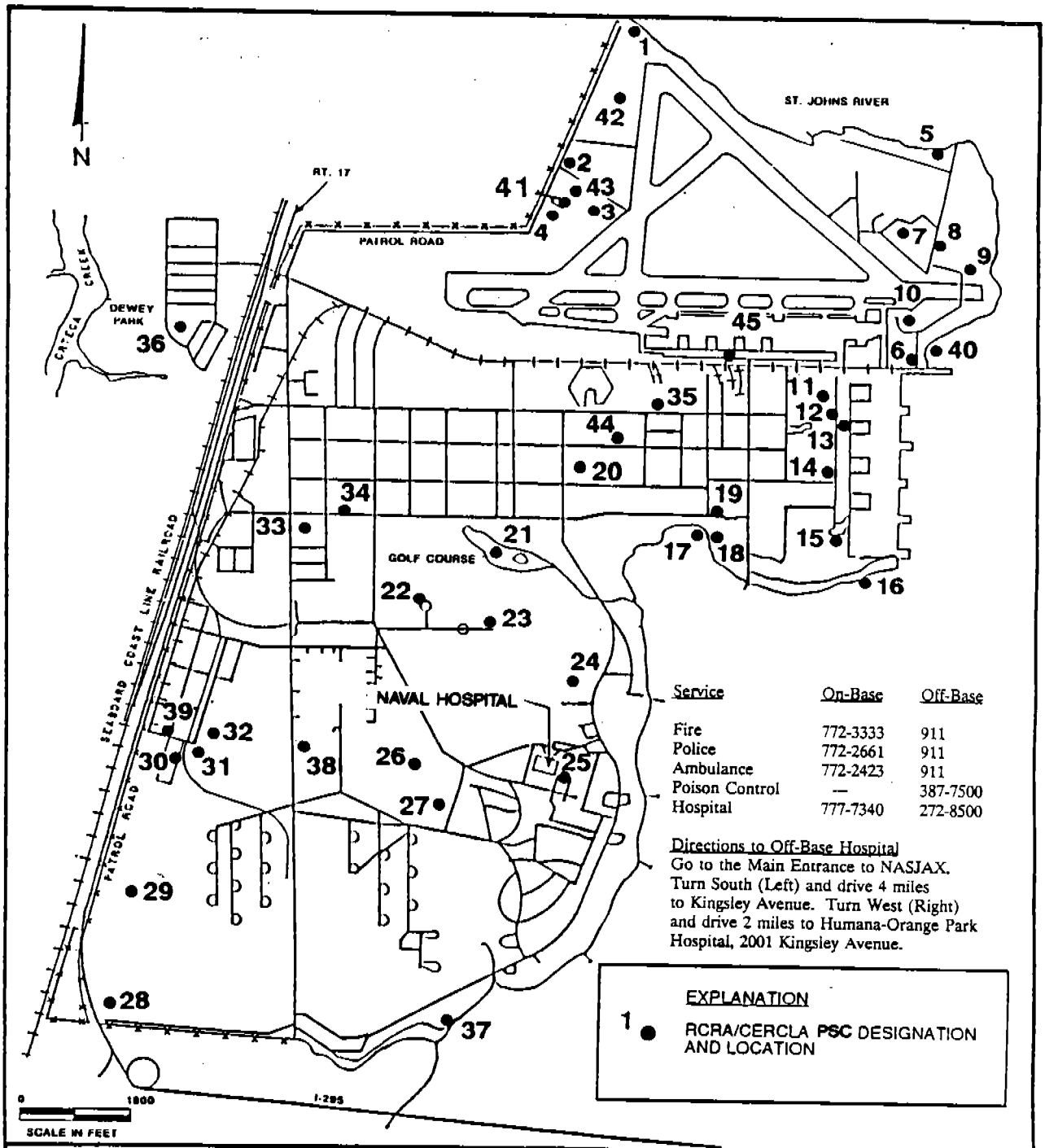
This Site Health and Safety Plan (HASP) has been prepared for the Navy Installation Restoration Program at the Naval Air Station in Jacksonville, Florida (Figure 1-1). The elements of the HASP are based on requirements described in the following references:

- o U.S. Environmental Protection Agency (EPA) Standard Operating Safety Guides, November 1984,
- o The Department of Labor, Occupational Safety and Health Administration (OSHA) Standards 29 CFR Part 1910.120,
- o The U.S. Army Corps of Engineers Safety and Health Requirements Manual, revised October 1987,
- o Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. NIOSH 85-115 NIOSH/OSHA/USCG/EPA, 1985.

The method to be used to monitor and protect personnel during the investigation of the potential sources of contamination (PSCs) are described in this report. Applicable safety and health standards are specified and the procedures to implement the plan are described. Health and safety program requirements, hazard control, and personnel monitoring also are included.

1.1 Organization and Responsibilities

The Contractor shall comply with all the requirements described in the HASP and shall take all reasonable precautions to ensure the safety and health of workers and the general public.



Service	On-Base	Off-Base
Fire	772-3333	911
Police	772-2661	911
Ambulance	772-2423	911
Poison Control	—	387-7500
Hospital	777-7340	272-8500

Directions to Off-Base Hospital
Go to the Main Entrance to NASJAX. Turn South (Left) and drive 4 miles to Kingsley Avenue. Turn West (Right) and drive 2 miles to Humana-Orange Park Hospital, 2001 Kingsley Avenue.

EXPLANATION

1 ● RCRA/CERCLA PSC DESIGNATION AND LOCATION

NAVAL AIR STATION
JACKSONVILLE
FIGURE 1-1

HEALTH & SAFETY PLAN

NAS JACKSONVILLE
SEPTEMBER 1991

Compliance with the HASP will be documented in the daily logs that are maintained during the field investigation.

The specific responsibilities for each individual of the investigative team are shown in the project Safety and Health Organization Chart (Figure 1-2) and are outlined below. Resumes of the Geraghty & Miller personnel are provided in Attachment A.

Department of the Navy, Project Manager:

The Navy Project Manager is responsible for coordinating the review of the HASP.

On-Station Project Coordinator:

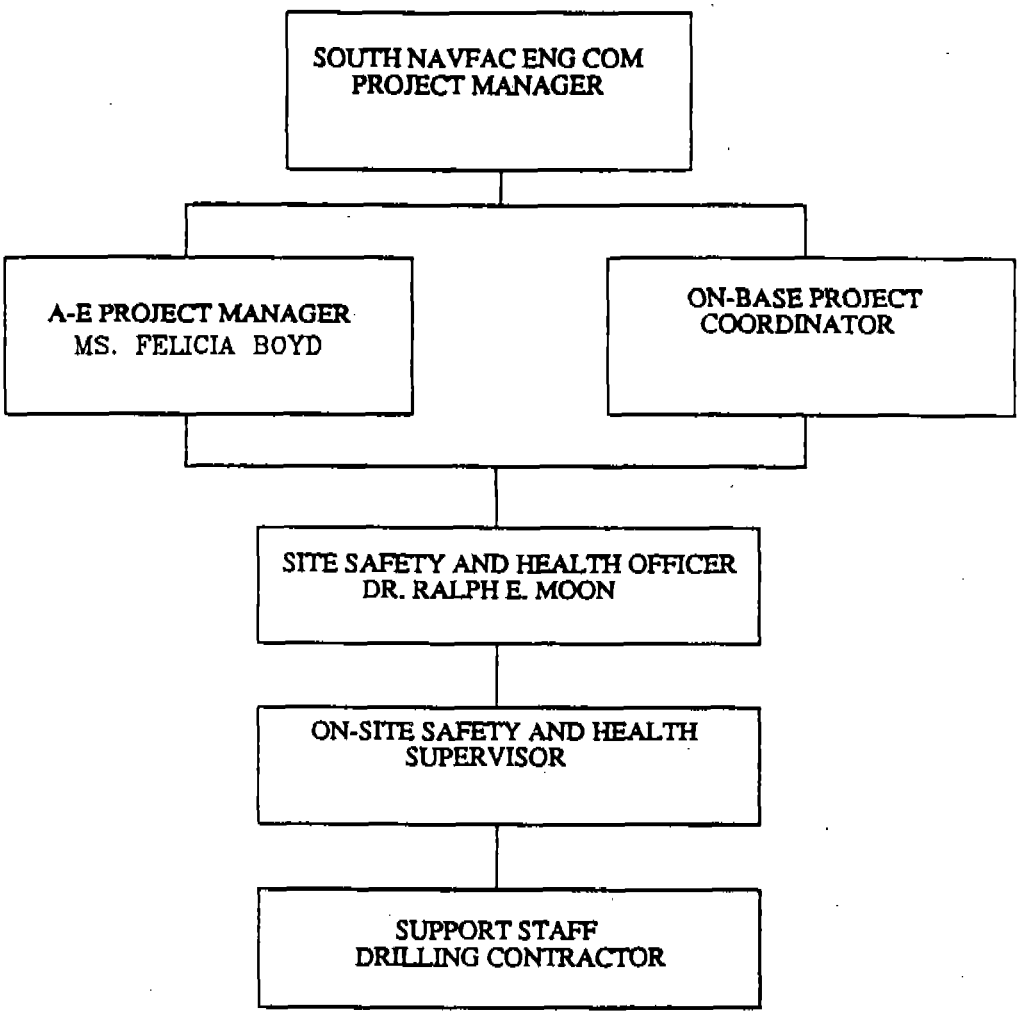
The On-Station Project Coordinator is responsible for participating in the orientation of the investigative staff and for assisting in the gathering of data necessary for preparing the HASP.

A-E Project Manager: Ms. Felicia Boyd

The A-E Project Manager is responsible for overseeing the preparation of the HASP and the enforcement of the provisions specified in the plan.

A-E Site Safety and Health Officer (SSHO): Dr. Ralph E. Moon

The SSHO reports to the A-E Project Manager and is responsible for preparing the HASP. In addition, the SSHO is responsible for conducting the orientation meeting as described in the HASP.



HEALTH & SAFETY
ORGANIZATIONAL CHART
FIGURE 1-2

HEALTH & SAFETY PLAN
NAS JACKSONVILLE
SEPTEMBER 1991

A-E Site Safety and Health Supervisor (SSHS): (will be PSC- or OU-specific)

The SSHS assures compliance with all provisions of the HASP. The SSHS controls the entry and exit of all personnel at each soil boring and monitor well location. The SSHS evaluates air quality in the breathing zone and supervises and participates in the decontamination procedures described in the HASP.

The SSHS assures that all safety equipment is accessible and in working order. The SSHS also notifies the SSHO and the On-Station Coordinator of any hazardous working conditions not described in the HASP and of any changes that may require an upgrade or downgrade of the personnel protection level.

1.2 Description of Site and Waste Characteristics

The provisions of the HASP will be used to determine the level of personal protection at the PSCs and/or Operable Units (OUs) located throughout the Naval Air Station. Because it is not practical to describe the physical and chemical characteristics of each PSC or OU in the HASP, a PSC- or OU-specific Health and Safety Checklist will be prepared with the OU-specific Work Plans provided as separate volumes to these Navy Installation Restoration documents.

The OU-specific Health and Safety Checklist will describe briefly the disposal practices and chemicals detected and will recommend an appropriate level of personal protection. The level of personal protection will represent the "minimum" requirements for personal protection equipment. Air monitoring results may require an upgrade in protection during the course of the investigation.

During the course of the field investigations, the Contractor will conduct site reconnaissance, sampling (soil, air, ground water, soil-gas, and surface water), drilling, surveying, geophysical evaluations, and/or radiological surveys.

2.0 SAFETY AND HEALTH PROGRAM REQUIREMENTS

2.1 PSC Site Preparation

The support area and decontamination corridors will be prepared for foot and vehicular traffic by removing obstructions from the PSC. These areas will be clearly defined as figures and discussed during orientation meetings prior to initiating activities. In addition, the SSHS will review visually the immediate support area to avoid sharp objects, wildlife (bees, wasps, snakes, etc.), and holes caused by either erosion or previous PSC activities.

2.2 Worker Training

A detailed summary of required levels of OSHA training corresponding to various investigative activities is presented in Table 2-1. The Navy requires all personnel conducting the field investigation to satisfy the requirements in 29 CFR 1910.120 for training. Personnel working with RCRA hazardous waste will also be trained in accordance with 40 CFR 264.16. This provision requires 40 hours of training and completion of an 8-hour annual refresher training course for all field personnel. Field personnel will also be provided with respiratory protection services satisfying the requirements in 29 CFR.134. In addition, an 8-hour project managers' training course is required for supervisory personnel.

Table 2-1

OSHA 1910.120 TRAINING SUMMARY

Type	Clean-up Sites*			Emergency Response					TSD Sites	
Level	General Site Worker	Occas. Worker	Low Hazard Worker	Level 1 Responder Awareness	Level 2 Responder Operations	Level 3 HAZMAT Technician	Level 4 HAZMAT Specialist	Level 5 Incident Commander	General Site Workers	Emergency Response Personnel
Reference 29 CFR 1910.120	(e) (3)(i)	(e) (3)(ii)	(e) (3)(iii)	(q) (6)(i)	(q) (6)(ii)	(q) (6)(iii)	(q) (6)(v)	(q) (6)(v)	(p) (7)(i)	(p) (8)(iii)
Time (Hours): Classroom	40	24	24	Training or Experience	8 or Experience	24 of Level 2 + Items**	24 of Level 3+ Items**	24 of Level 2+ Items**	24 or Experience	Training or Experience
Field	24	8	8							
Annual	8	8	8	Yes	Yes	Yes	Yes	Yes	8	Yes
SUBJECT										
Site Safety & Health Organization	x	x	x						x	
Overview of Reg. Requirements	#	#	#			#	#	#	#	#
Hazard Communication	x	x	x	x	x	x	x ***	x ***	x	x
Personal Protective Equipment (PPE)	x	x	x		x	x	x	x	x	x
Medical Surveillance & Overexposures	x	x	x		#	#	#	#	x	x
Respiratory Protection	#	#	#		#	x	x	#	#	#
Site Security & Control	#	#	#	x	x	x	x	x	#	
Decontamination Procedures	x	x	x		x	x	x	x	x	x
Containment & Cleanup of Hazardous Subs.	x	x	x		#	x	x	#	x	#
Drum & Container Handling	x	x	x						x	
Engineering Controls & Equipment	x	x	x						x	
Emergency Response Plan & Equipment	x	x	x	x	x	x	x	x	x	x
Confined space Entry Procedures	x	x	x	#	#	#	#	#	#	#
Information Sources				x	x	x	x	x		x
Electrical Lockout/ Tagout Procedures	#	#	#		#	#	#	#	#	#
Monitoring Equip. & Methods						x	x			
First Aid & Rescue Equipment	#	#	#	#	#	#	#	#	x	x
Demo. Competency/ Written Certification	x	x	x		x	x	x	x	x	x
Incident Command System						x	x	x		
Std. Op. Procedures & Safe Work Practices	x	x	x		x	x	x	x	x	x
Federal/State/Local Emergency Plans							x	x		
Site Risk Assessment & Characterization						x	x			

* Supervisors and Managers of employees at clean-up sites shall have training equivalent to the employee being supervised plus eight hours of Hazardous Waste Management.

** Individuals must be competent in the specific items listed in the referenced paragraph.

*** These individuals need more extensive training in this subject. See the appropriate paragraph of the standard.

x = Required

= Recommended if applicable

The Contractor will provide an orientation meeting for all subcontractors, service personnel, and personnel having a field investigation-related function. These personnel will be required to complete a 40-hour health and safety training course for hazardous waste activities according to 29 CFR 1910.120, the interim final rule. The orientation meeting will cover the items listed below:

1) HASP

2) Emergency instruction

3) Physical health hazards of the waste constituents identified at the PSC

4) Personal hygiene

5) Safety equipment and procedures required for personal protection

6) Proper use and fitting of respirators

7) Work zones established at the PSC

8) Prohibitions in the exclusion zone or contamination reduction zone:
   a) Beards and long sideburns (when using respirators)
   b) Eating, drinking, smoking, chewing
   c) Personal articles, e.g., watches and rings
   d) Working when ill
   e) Wearing contact lenses

9) Buddy system

10) Medical surveillance

11) Heat stress monitoring

12) Route to nearest hospital

The SSHS will not allow personnel who have not attended the orientation meeting to enter the designated work areas. Following the orientation meeting, a written examination and discussion of the correct answers will be used to evaluate comprehension of the HASP.

2.3 Recordkeeping

The Contractor shall establish and maintain records of all monitoring required as described below:

1) The dates, number, duration, and results of air-sample analysis during the investigation. These data shall be written on a daily instrument log sheet (Table 2-2) that shall be available for inspection at all times.

2) A description of the sampling and analytical methods used.

3) Type of respiratory protection devices worn.

4) Name and job classification of each worker.

2.4 Complaints

Personnel are encouraged to report to the SSHS any conditions which they consider detrimental to their health or safety.

Table 2-2

DAILY INSTRUMENT LOG SHEET

Date: _____	Action Levels: _____
Analyst: _____	Threshold Levels: _____
Site: _____	Level of Personal Protection: _____

Time	Photovac Tip					WEATHER CONDITIONS		
	Ambient	Reading	Net Concentration	Draeger Tube	Explosion Meter	Temperature	Wind Direct.	Wind Speed

TF531\[illegible]1\TABLE2-1.W51

Complaints may be made orally and then written in a form used to report violations (Table 2-3).

In the event of inadequate corrective action, the employee and/or authorized representative also may contact the SSHO, or the On-Station Project Coordinator by telephone and arrange an appointment for an inspection.

2.5 Restrictions

Only authorized personnel meeting the requirements of the HASP shall be allowed in the controlled areas.

2.6 Internal Audits

The Contractor shall conduct an internal safety and health audit to ensure compliance with the requirements of the HASP and OU SHSP. An initial audit will be conducted by the SSHO within three weeks of commencing characterization sampling. Attachment A contains a checklist of items to complete the internal safety and health audit. Follow-up actions will be determined and implemented should there be any violations of safety and health standards. Additional audits will be conducted more frequently, if necessary.

2.7 Controlled Areas

Activities at a PSC must be controlled to reduce the possibility of (1) exposure to any contaminants present, and (2) their transport by personnel or equipment from the site. The possibility of exposure will be reduced or eliminated in the following ways:

Table 2-3

SAFETY AND HEALTH COMPLAINT FORM

DATE: _____

SITE:

_____

COMPLAINTANT: _____

COMPANY AFFILIATION: _____

SITE SAFETY AND HEALTH OFFICER: _____

PLEASE CHECK APPROPRIATE AREAS OF CONCERN

O NATURE OF COMPLAINT: _____

_____

_____

_____

_____

_____

WORK AREAS	_____	SANITATION	_____
"RIGHT-TO-KNOW"	_____	PERSONAL HYGIENE	_____
PERSONAL PROTECTION LEVEL	_____	EMERGENCY PROCEDURES	_____
SAFETY EQUIPMENT	_____	WASTE DISPOSAL	_____
EXPOSURE MONITORING	_____	RECORDKEEPING	_____
HEAT STRESS	_____	RESPIRATOR PROTECTION	_____
HOUSEKEEPING	_____	WORKER TRAINING	_____
NOISE	_____	PROTECTIVE CLOTHING	_____
SAFETY PRECAUTIONS	_____	OTHER _____	
DECONTAMINATION	_____		

_____

SIGNATURE _____

DATE _____

1) Setting up physical barriers to exclude personnel from the general working area.

2) Minimizing the number of personnel and equipment at the sites.

3) Establishing work zones with the sites.

4) Establishing control points to regulate access to work zones.

5) Implementing decontamination procedures.

6) Where appropriate, a pressurized cab may be required for workers operating trenching equipment.

2.8 Posting

Controlled areas must be marked conspicuously at points of potential access with appropriate sign or signs according to applicable posting and labeling requirements set forth in 29 CFR 1910.144, 1910.145, and 1910.147.

2.9 Regulations

The Contractor will follow the most conservative regulations and recommendations described in the regulations and publications during the course of the investigation. These documents are listed in Section 1.0 of this HASP.

3.0 OCCUPATIONAL MONITORING AND PERSONAL PROTECTION

3.1 Medical Surveillance

The Contractor will provide medical examinations to personnel according to 29 CFR 1910.120. Upon request, field personnel will provide representatives of the Navy with medical evidence that each employee is in good health and is capable of wearing the appropriate dermal and respiratory protective clothing/equipment necessary during the field investigations. All individuals associated with the investigations shall have undergone a physical examination within 12 months before the start date. In addition, personnel will be required to have a physical examination at the termination of employment. A list of medical parameters to be included in the physical examination is provided in Attachment A.

An occupational health physician shall be available for verbal contact with the SSHO and On-Station Project Coordinator. The physician can provide professional health recommendations during the course of the work and at any other time when either adverse exposure to toxic chemical substances or physical agents are suspected. In the event of chemical exposure, the physician will be provided project-specific information to enable medical surveillance of PSC-specific chemicals.

After the project is completed, the Contractor will, upon request, provide the Navy Project Manager and On-Station Project Coordinator with the results of the surveillance program. Any person(s) contracting any irregular health conditions or symptoms of irregular health conditions will be required to undergo examination(s) by an occupational physician before returning to the PSC.

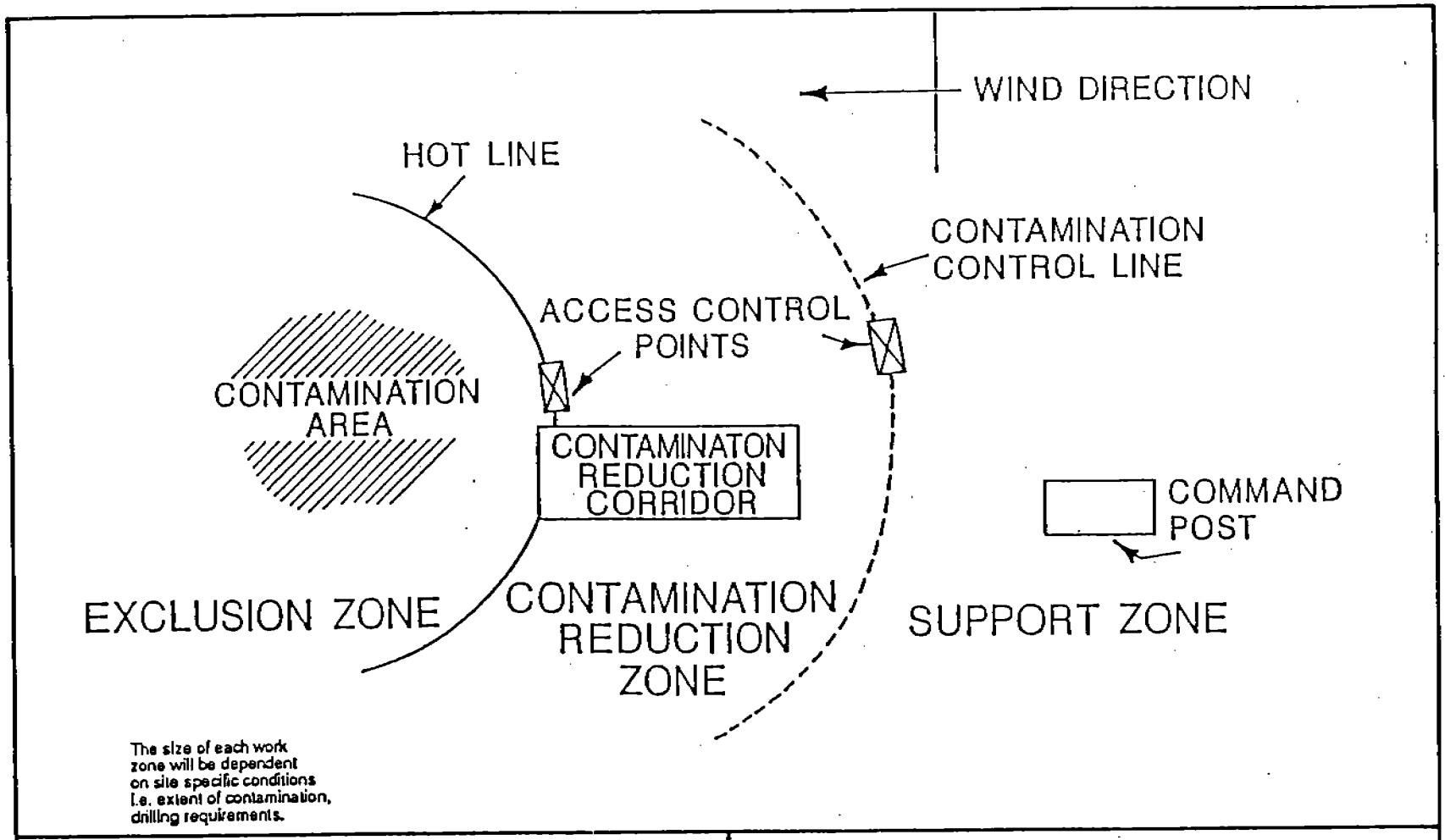
3.2 Determination of Work Areas

The SSHS will identify the work areas, as defined below, at the PSCs (Figure 3-1). The distance between work areas will be determined by the SSHS. Prevailing PSC conditions and access restrictions will influence the specific size of the zone.

Zone 1: Exclusion Zone -- The exclusion zone is the zone where contamination exists or could exist. Individuals entering the exclusion zone will wear the prescribed level of protection (see Personnel Protection Zone Requirements). An entry and exit check point will be visually identified at the periphery of the exclusion zone to regulate the flow of personnel and equipment into and out of the zone.

Zone 2: Contamination Reduction Zone -- The area between the exclusion zone and the support zone is the contamination reduction zone. This zone is a transition between the contaminated area and the support zone. It provides additional assurance that the physical transfer of contaminating substances on either people, equipment, or in the air is limited through a combination of decontamination, distance between exclusion and support zones, air dilution, zone restrictions, and work functions. The SSHS will establish a decontamination corridor at the entrance to the exclusion zone (see Personal Protection Program). In addition, the SSHS will identify the locations of showers nearest the investigation sites.

Zone 3: Support Zone -- This area is the area outside Zones 1 and 2. The support zone shall be marked and shall be protected against contamination from Zone 1 (work/sampling site). The area consists of the following:



WORK AREAS

FIGURE 3-1

HEALTH & SAFETY PLAN

NAS JACKSONVILLE

SEPTEMBER 1991

a. an entry area for personnel, material, and equipment,

b. an exit area for decontaminated personnel, materials and equipment,

c. a storage area for clean safety and work equipment, and

d. an area for rest breaks, the consumption of food and beverages, and all other activities.

3.3 Personnel Protection Program

The Contractor has established, and will maintain as part of the HASP, a Personnel Protection Program for all personnel working at the Site. The levels of personal protection are anticipated to be broad. Throughout the course of the field investigation, personal protection equipment for Level D, Level C, and Level B may be required. Based upon the chemical and physical characteristics of the hazards which may be encountered, conditions warranting Level A protection are not anticipated.

The level of personal protection required at the PSCs may vary according to individual PSC characteristics and air measurements obtained during the field investigation. In addition, the hazards associated with each PSC will vary slightly as a function of the specific sample locations. These hazards primarily concern the nature of the disposed waste. These include: waste oils, industrial solvents, aviation and motor fuels, acids, and construction debris.

3.4 Personnel Protection Zone Requirements

PSC conditions may change and therefore the on-going level of personnel protection will be evaluated by criteria described in the "Permissible Exposure Limit Provisions" in Section 3.12.

3.5 Level D Equipment

The protective items to be worn under Level D conditions are the following:

a. hard hat;
b. safety glasses, goggles, or face shield;
c. chemically resistant steel toe and shank shoes;
d. outer gloves (chemical resistant); and
e. options as required:
    1) hearing protection,
    2) inner gloves, and
    3) one piece white Tyvek suit.

Level D personal protection will be worn under the following conditions:

1) no known or suspected substances are present in the air at concentrations that exceed the threshold limit values (TLVs);

2) there is sufficient oxygen (19.5% or greater) in the ambient air;

3) particulates are not present in the air; and

4) there is no potential for higher concentrations to be present in the ambient air under the specific PSC operations.

3.6 Level D Decontamination Procedures

The stages of Level D decontamination are included in Figure 3-2 and described below:

Station 1: Segregated Equipment

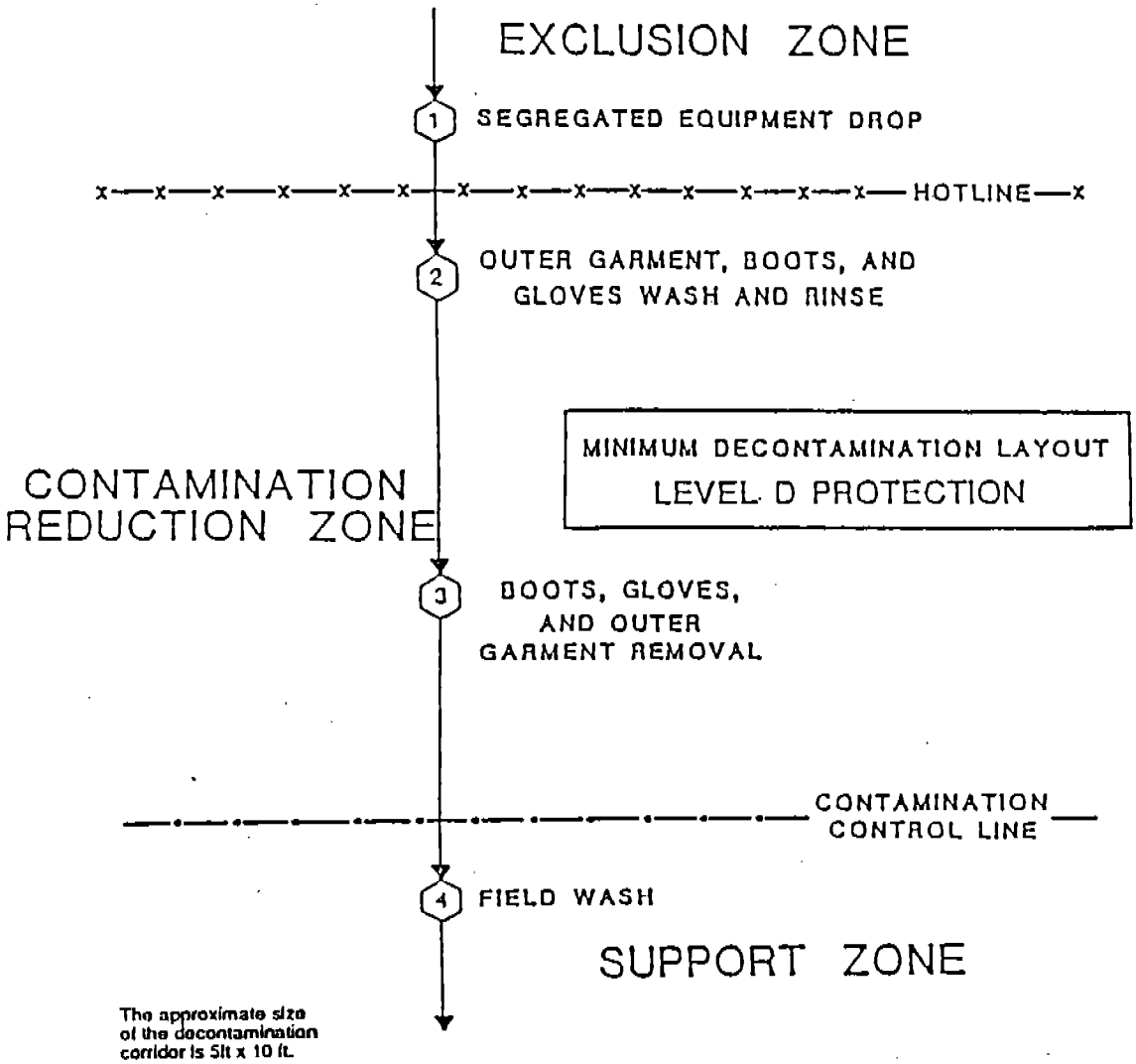
Equipment used at the PSCs (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) will be placed on plastic drop cloths or in different containers with plastic liners.

Equipment: Various size containers
Plastic liners
Plastic drop cloths

Station 2: Outer Garments, Boots and Gloves, Wash and Rinse

Scrub outer boots and gloves with decontamination solution or detergent/water. Rinse gloves, boots, and garments with hand pump spray device. Collect the rinsate in a plastic bucket to be disposed. Proper disposal of the rinsate will be discussed in the PSC-specific orientation meetings.

Equipment: 2 containers (30-50 gallon)
Hand pump spray device (garden sprayer)
Water
Detergent
Scrub brushes
Plastic Bucket



LEVEL D
DECONTAMINATION PROCEDURE
FIGURE 3-2

HEALTH & SAFETY PLAN

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Station 3: Outer Boot and Glove Removal

Remove outer boots (if worn) and gloves.
Equipment: 1 container (30-50 gallon)
Plastic liners

Station 4: Field Wash

Wash hands and face.

Equipment: Water
Soap
Wash basins/buckets

3.7 Level C Equipment

The protective items to be worn under Level C conditions are the following:

a. hard hat (face shield optional);

b. half-face or full-face piece, air-purifying, cartridge equipped respirator;

c. Tyvek chemical-resistant clothing, long sleeves, one or two pieces;

d. gloves (chemical resistant);

e. steel toe and shank boots/shoes (safety or chemical-protective);

f. inner gloves; and

g. options as required:
   1) hearing protection.

Level C personal protection will be worn under the following conditions:

1) known substances have been identified and measured in the air;

2) the concentration of airborne substances may exceed the threshold limit values;

3) particulates may be present in the air;

4) there is sufficient oxygen (19.5% or greater) in the ambient air;

5) the airborne substances can be recognized by smell at low concentrations;

6) the airborne substances initiate toxicological responses (tearing, eye and nose irritation) at low concentrations;

7) the airborne substances can be adsorbed to selected media within an air-purifying respirator equipped with the appropriate cartridge or canister;

8) some airborne substances may not elicit a response on the air monitoring instruments; and

9) there is the potential for higher concentrations of airborne substances to be present in the air following specific-site operations.

3.8 Level C Decontamination Procedures

The stages of Level C decontamination are included in Figure 3-3 and are described below:

Station 1: Segregated Equipment Drop

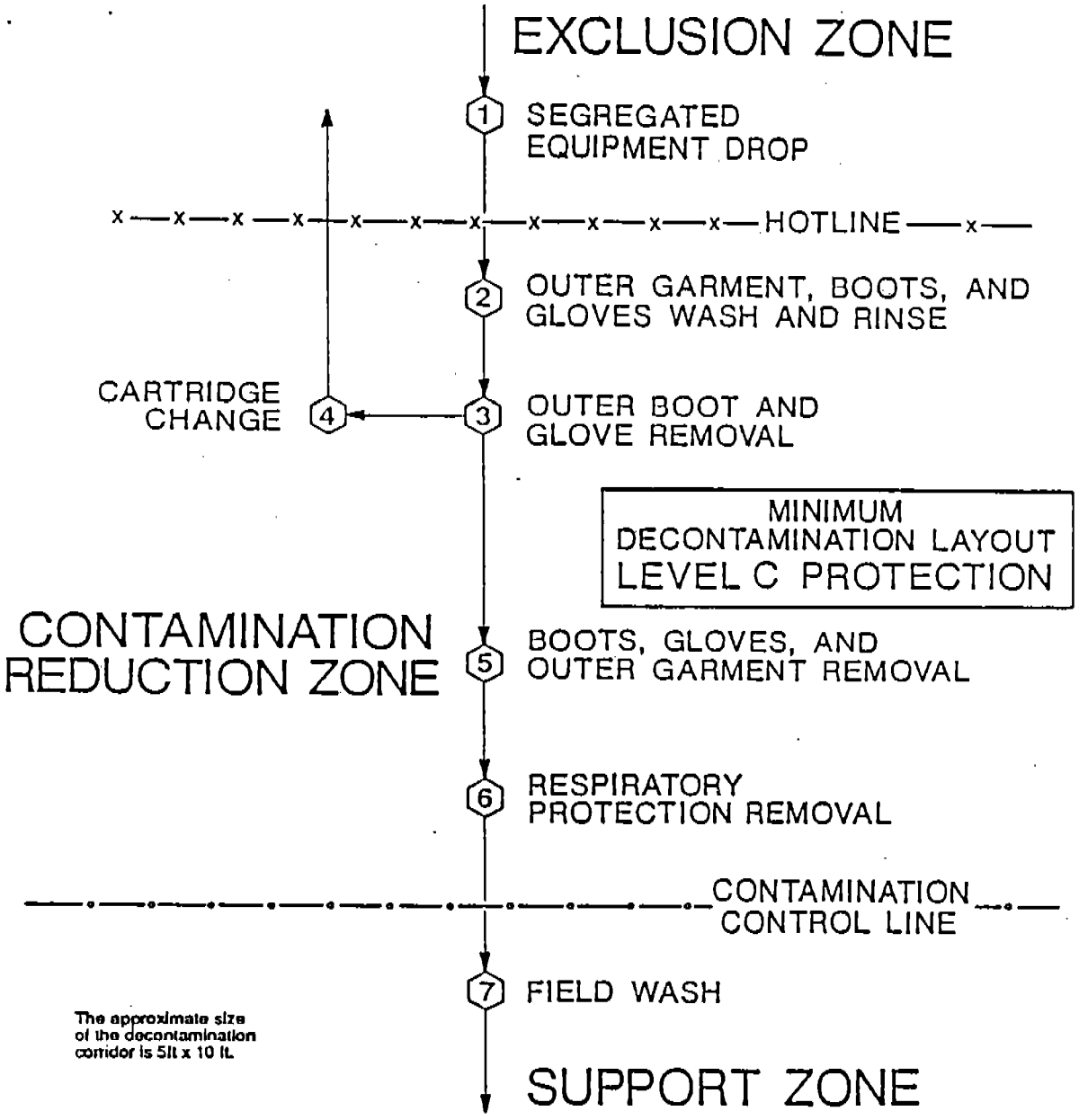
Equipment used at the PSCs (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) will be placed on a plastic drop cloth or in different containers with plastic liners.

Equipment: Various size containers
Plastic liners
Plastic drop cloths

Station 2: Outer Garment, Boots and Gloves, Wash and Rinse

Scrub outer boots and gloves with detergent/water. Rinse gloves, boots, and garments with hand pump spray device and collect the rinsate in a plastic bucket to be disposed of appropriately.

Equipment: 2 containers (30-50 gallon)
Hand pump spray device
Water
Detergent
Scrub brushes
Plastic Bucket



LEVEL C

DECONTAMINATION PROCEDURE

FIGURE 3-3

HEALTH & SAFETY PLAN

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Station 3: Outer Garments, Boots and Gloves Removal

Remove outer boots and gloves and place them outside the contamination reduction zone. Tyvek suits are to be deposited in separate containers lined with plastic.

Equipment: Containers (30-50 gallon)
Plastic liners

Station 4: Cartridge Change

If a worker leaves the exclusion zone to change a cartridge on his/her respirator, then this is the last step in the decontamination procedure. The employee will deposit the used cartridge in a plastic-lined container and insert a fresh cartridge. Once the employee's cartridges are exchanged, the outer gloves are retaped if necessary and the worker may then return to the exclusion zone.

Equipment: Container (30-50 gallon)
Plastic liners
Respirator cartridges
Tape
Extra Gloves
Boot covers (if worn)

Station 5: Boots, Gloves and Outer Garment Removal

Remove boots, gloves (inner), and outer garment. The outer chemically resistant garment should be deposited in a plastic lined container.

Equipment: Container (30-50 gallon)
Plastic liners

Station 6: Respiratory Protection Removal

Remove the face piece respirator, deposit used cartridges in a plastic lined container, and wipe the face piece with clean water and paper towels.

Equipment: Container (30-50 gallon)
Plastic liners
Paper towels
Detergent solution
Water

Station 7: Field Wash

Procedure:

Wash hands and face.

Equipment: Water
Soap
Wash basins/buckets

3.9 Level B Equipment

The protective items to be worn under Level B conditions are the following:

a. hard hat;

b. pressure-demand, full-face piece SCBA or pressure-demand supplied air respirator with escape SCBA,

c. chemical-resistant clothing, disposable chemical-resistant one-piece suit;

d. inner and outer chemical-resistant gloves;

e. chemical resistant safety shoes; and

f. options as required:
   1) coveralls,
   2) disposable boot covers,
   3) face shield.

Note that workers will use an air-line supply system in connection with the SCBA described in Item b above. This arrangement eliminates the need for workers to carry air supply tanks and for a decontamination station for changing air tanks.

Level B personal protection will be worn under the following conditions:

1) the concentration of airborne substances exceed the threshold limit values;

2) the airborne substances have poor adsorptive qualities to media used in air-purifying respirators equipped with either cartridges or canisters;

3) the airborne substances do not irritate skin;

4) there is insufficient oxygen (19.4% or less) in the ambient air; and

5) PSC activities will be limited to PSC reconnaissance and will not require the manipulation of drums or heavy equipment.

3.10 Level B Decontamination Procedures

The decontamination procedures for Level B are listed in Figure 3-4 and summarized as follows:

Station 1: Segregated Equipment Drop

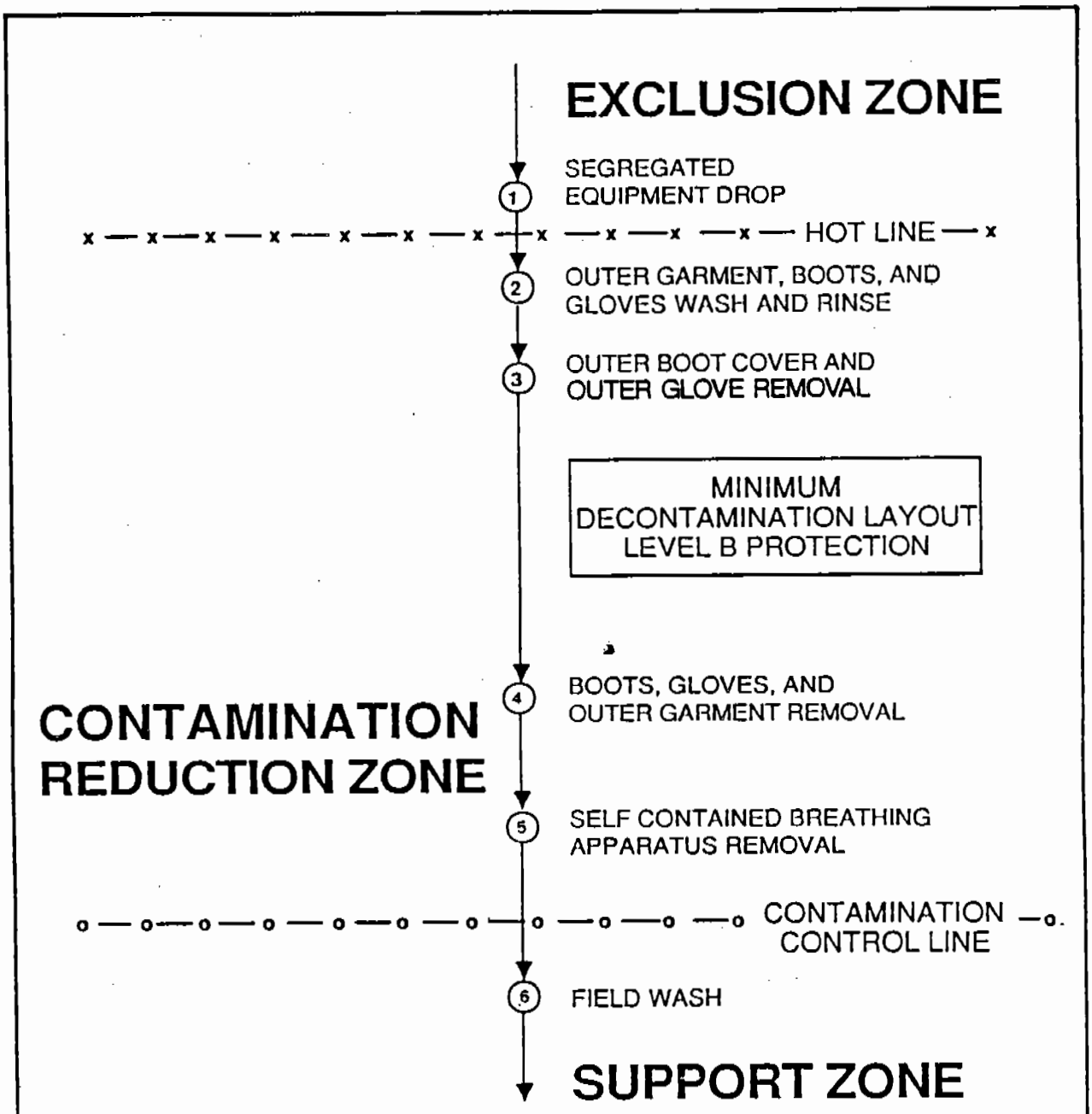
Equipment used at the PSCs (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) will be placed either on a plastic drop cloth or in different containers with plastic liners.

Equipment: Various size containers
Plastic liners
Plastic drop cloths

Station 2: Outer Garment, Boots, and Gloves, Wash and Rinse

Scrub outer boots and gloves with detergent/water. Rinse gloves, boots, and garments with hand pump spray device and collect the rinsate in a plastic bucket to be disposed of appropriately.

Equipment: 2 containers (30-50 gallon)
Hand pump spray device
Water
Detergent
Scrub brushes
Plastic Bucket



LEVEL B
DECONTAMINATION PROCEDURE
FIGURE 3-4

HEALTH & SAFETY PLAN

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Station 3: Boot Covers and Outer Glove Removal

Remove outer boot covers and outer gloves and place them outside the contamination reduction zone. Dispose chemical resistant material in separate plastic-lined containers.

Equipment: Containers (30-50 gallon)
Plastic liners

Station 4: Boots, Inner Gloves, and Outer Garment Removal

Remove boots, gloves (inner), and outer garment. The outer chemical resistant garment should be deposited in a plastic-lined container.

Equipment: Container (30-50 gallon)
Plastic liners

Station 5: Self-Contained Breathing Apparatus

Remove the face piece and attached air line. Avoid touching the face with fingers and wipe the face piece with clean water and paper towels. Deposit face piece and air line on plastic sheets.

Equipment: Container (30-50 gallon)
Plastic liners
Paper towels
Detergent solution
Water
Plastic sheets

Station 6: Field Wash

Wash hands and face.

Equipment: Water
Soap
Wash basins/buckets

3.11 Exposure Monitoring

The SSHS will measure selected parameters (total ionizable pollutants or organic vapors and explosive potential) during the field investigation. These measurements will provide the basis for determining (1) the appropriateness of a designated level of personal protection, (2) the need to elevate the level of protection, and (3) the need to halt all work and temporarily evacuate the site.

Personnel within the exclusion zone will receive monitoring of the breathing zone (chest height to several inches above the head) during sampling and drilling conducted at either Level D or Level C. Personnel associated with field activities that require Level B personal protection will use supplied air and, therefore, be monitored for explosive potential only. Visitors and employees that remain in the support zone will neither receive breathing zone air monitoring nor will they be required to wear personal protection clothing.

3.12 Permissible Exposure Limits Provisions

(a) PSC Reconnaissance, PSC Visits

The Contractor, through the SSHS, will evaluate all PSCs for airborne contaminants before PSC visits are conducted by its employees and subcontractors. During the initial PSC evaluation, either the SSHO or SSHS will obtain and record measurements in the breathing zone to determine the degree of health hazard.

Before the start of a field investigation, numerous visitors may traverse the area to acquaint themselves with the Site. At PSCs where the ambient air measurements (of ionizables present or organic vapors) are 5 ppm or less, protective clothing and air monitoring will not be required.

At PSCs where the ambient air measurements are greater than 5 ppm, the permissible exposure limit provisions described in the specific work plans for managing each PSC will apply. These action levels will be based on previous ambient air quality data obtained at selected PSCs and measurements obtained near the flight lines at the specific PSC.

(b) Soil, Soil-Gas, Surface-Water, Ground-Water, and Air Sampling, Radiological Surveys, Geophysical Surveys, and Drilling

The Contractor shall limit employee exposure to an airborne concentration of total ionizable pollutants no greater than 10 parts per million (ppm) for 5 minutes under conditions designated Level D protection. This action level may be lowered to 5 ppm depending on the concentrations of chemicals detected at each site.

The inhalation exposure limit of 10 ppm will be measured using an organic vapor analyzer (OVA). Periodic measurements of the breathing zone (in the exclusion zone) will be conducted while the field investigation is being conducted. Frequent measurements of the breathing zone (every 2 to 5 minutes) will be obtained while the soil boring is being conducted through the vadose zone, since VOCs occupying soil pore space in the vadose zone may be released when the subsurface is disturbed. Less frequent measurements (every 30 minutes) will be obtained after the drill stem reaches the water table.

Level C personal protection will be worn where airborne concentrations exceed 10 ppm for 5 minutes or more. Respiratory protection information is obtained in Attachment A. Airborne concentrations in excess of 50 ppm will require a temporary interruption of work until the airborne concentrations are measured at 10 ppm or less for 5 minutes. Should airborne concentrations remain above 50 ppm (although this is unlikely), Level B personal protection may be required.

Level B will be designated for the initial level of personal protection under one or more of the following conditions:

1) potential carcinogenic chemicals identified at the PSC are not adsorbed easily to activated carbon filters (organic carbon partition coefficient less than 50 milligrams per gram);

2) potential carcinogenic chemicals identified at the PSC cannot be detected by an organic vapor analyzer; or

3) chemical vapor concentrations in the breathing zone exceed 50 ppm and they do not diminish during the investigation of the PSC.

A PSC investigation initially conducted using Level B personal protection may be downgraded to Level C or Level D under all the following conditions:

1) chemical vapor concentrations in the breathing zone decrease to below 10 ppm;

2) the chemicals detected at the PSC are easily adsorbed to activated carbon (organic carbon); and

3) the chemicals detected at the PSC can be measured at concentrations below the Permissible Exposure Limit using an organic vapor analyzer.

3.13 Heat Stress Monitoring and Prevention

The use of chemical protective clothing will require the SSHS to conduct heat stress monitoring. Monitoring will begin when the ambient temperature is above 70°F. Worker monitoring will be conducted as follows:

1) Heart Rate: Count the radial pulse during a 30-second period as early as possible in the rest period.

If the heart rate exceeds 110 beats per minute at the beginning of the rest period, then shorten the next work cycle by one-third and keep the rest period the same.

If the heart rate exceeds 110 beats per minute at the beginning of the next period, then shorten the following work cycle by one-third.

2) Oral Temperature: Use a clinical thermometer or similar device to measure the oral temperature at the end of the work period (before drinking).

If oral temperature exceeds 99.6°F, then shorten the next work cycle by one-third without changing the rest period.

If oral temperature still exceeds 99.6°F at the beginning of the next rest period, then shorten the following work cycle by one-third.

Do not permit a worker to wear either a semipermeable or impermeable garment when his/her temperature exceeds 100.6°F.

Proper training of personnel and use of preventive measures will minimize health effects and loss of productivity due to heat stress. The Contractor will employ the following preventive measures to heat stress occurrences:

1) Adjustment of work schedules when indicated by results of heart rate and/or oral temperature monitoring;

2) Provision of shaded areas or air conditioned shelters, if possible, to protect personnel during rest period;

3) Provision of water or dilute drinks and disposable cups and encouragement of personnel to increase fluid intake to compensate for water lost by sweating; and

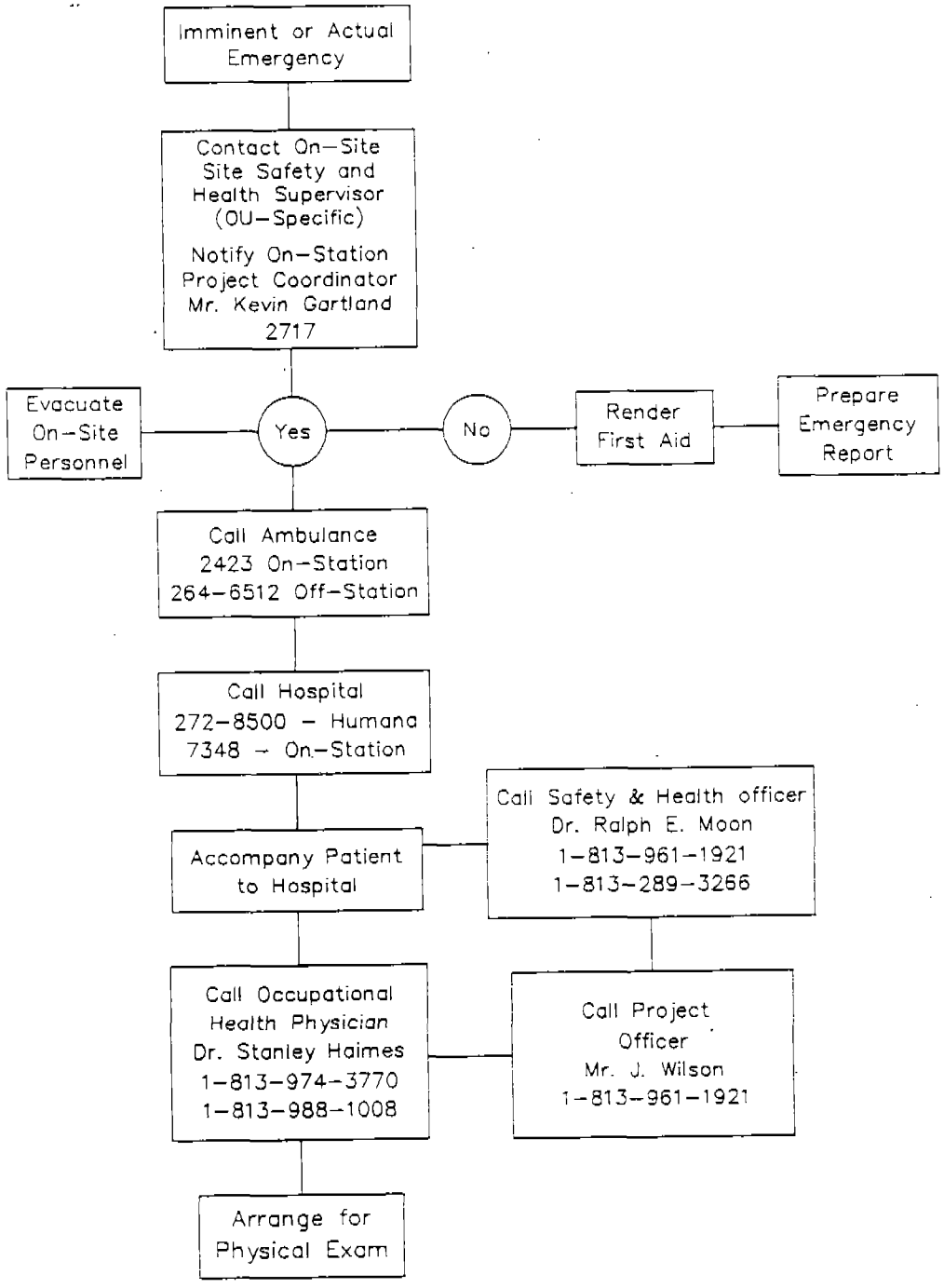
4) Provision of cooling devices to aid natural body heat exchange during prolonged work or severe heat exposure. Cooling devices may include field showers or hose-down areas, where protective clothing may be cooled by contact with water, and cooling garments (jackets, vests, or suits), which are designed to circulate cool air or chilled water throughout the garment.

3.14 Emergency Situations

A written plan for emergency situations has been developed to protect workers as outlined in 29 CFR 1910.120(1) i, ii. All employees will be informed about the emergency response plan during the PSC orientation meeting. The plan includes: (1) recognition of emergencies, (2) methods or procedures for alerting employees on site, (3) evacuation procedures and routes to places of refuge or safe distances away from the danger area, (4) means and methods for emergency medical treatment and first aid, (5) line of authority for employees, and (6) on-site decontamination procedures.

3.15 Emergency Response Plan

The nature of work at these types of sites provides a continual possibility for emergencies. A plan for emergency situations has been developed to protect workers as outlined in 29 CFR 1926.23, concerning first aid and medical attention, and 1926.24, concerning fire protection and prevention (Figure 3-5). All employees will be informed about the emergency response plan during the PSC orientation meeting.



EMERGENCY RESPONSE PLAN
FIGURE 3-5

HEALTH AND SAFETY PLAN

NAS JACKSONVILLE
SEPTEMBER 1991

FILE: NASOC13

(a) Recognition of Emergencies

An emergency situation will be recognized as: a chemical release, the release of biological agents, the loss of radioactive material, physical injury, explosions, fires, spills, toxic atmospheres or other dangerous and harmful situations (Table 3-1).

(b) Alerting Employees

The SSHS is responsible for calling to the employee's attention an emergency situation by voice command.

(c) Personnel Evacuation

Personnel not engaged in correcting the emergency will be restricted from the area until the emergency is over. Evacuation procedures and routes to places of refuge will be identified during the site orientation meeting.

(d) Emergency Medical Treatment

The Contractor, as necessary, will prearrange for emergency medical care services at a nearby medical facility to establish emergency routes. The SSHS will cease all work in the event of an emergency and take action to remove or minimize the cause of the emergency. The Contractor will institute appropriate measures to prevent any repetition of the conditions that lead to the emergency.

Table 3-1

SUMMARY OF POSSIBLE EMERGENCIES

Worker-Related

- Minor accidents (slips, trips, falls)
- Chemical exposure
- Medical problems (heat stress, heat stroke, aggravation of pre-existing conditions)
- Failure of personal protective equipment (air source, tearing of protective clothing)
- Physical injury (injuries from hot or flying objects, loose clothing entangled in machinery, serious falls, vehicle accidents)
- Electrical (burns, shock, electrocution)

Waste-Related

- Fire
- Explosion
- Leak
- Release of toxic vapors
- Reaction of incompatible chemicals
- Discovery of radioactive materials

(e) Emergency Situation Line of Authority

The SSHS will distribute laminated copies of the emergency telephone numbers and show the location of the nearest telephones during the orientation meeting. Each field team will be equipped with a mobile telephone. The emergency telephone numbers are:

	On Base	Off Base
Fire	3333	264-3737
Police	2662	264-6512
Ambulance	2423	630-0527
Poison Control	---	387-7500
Hospital	7348	272-8500

The SSHS is responsible for the initial telephone calls to contact emergency personnel and for preparing an accident report (Table 3-2) of all incidents that require a break in work.

(f) Medical Emergency Response

The Contractor will prearrange for emergency medical care services. The local emergency services and hospitals will be informed of field operations and the potential hazards for each PSC/OU before work begins. In the event of a life threatening emergency, personnel will be transported to the Base Hospital. The location of the Naval Hospital is shown on Figure 1-1. All other emergencies will be transported to Humana-Orange Park Hospital. Emergency routes to Humana-Orange Park Hospital from NAS-Jacksonville are shown in Figure 3-6. Following transport of the injured employee, the Contractor will (1) cease drilling and sampling, (2) take diligent action to remove or otherwise minimize the cause of the emergency, and (3) institute measures to prevent repetition of the emergency.

OCCUPATIONAL EXPOSURE GUIDE

OSHA No. 101
Case or File No. _____

Form approved
OMB No. 44R 1453

Supplementary Record of Occupational Injuries and Illnesses

EMPLOYER

1. Name _____
2. Mail address _____ (No. and street) (City or town) (State)
3. Location, if different from mail address _____

INJURED OR ILL EMPLOYEE

4. Name _____ (First name) (Middle name) (Last name) Social Security No. _____
5. Home address _____ (No. and street) (City or town) (State)
6. Age _____ 7. Sex: Male_____ Female_____ (Check one)
8. Occupation _____ (Enter regular job title, *not* the specific activity he was performing at time of injury.)
9. Department _____ (Enter name of department or division in which the injured person is regularly employed, even though he may have been temporarily working in another department at the time of injury.)

THE ACCIDENT OR EXPOSURE TO OCCUPATIONAL ILLNESS

10. Place of accident or exposure _____ (No. and street) (City or town) (State)

If accident or exposure occurred on employer's premises, give address of plant or establishment in which it occurred. Do not indicate department or division within the plant or establishment. If accident occurred outside employer's premises at an identifiable address, give that address. If it occurred on a public highway or at any other place which cannot be identified by number and street, please provide place references locating the place of injury as accurately as possible.

11. Was place of accident or exposure on employer's premises? _____ (Yes or No)
12. What was the employee doing when injured? _____ (Be specific. If he was using tools or equipment or handling material, name them and tell what he was doing with them.)
13. How did the accident occur? _____ (Describe fully the events which resulted in the injury or occupational illness. Tell what happened and how it happened. Name any objects or substances involved and tell how they were involved. Give full details on all factors which led or contributed to the accident. Use separate sheet for additional space.)

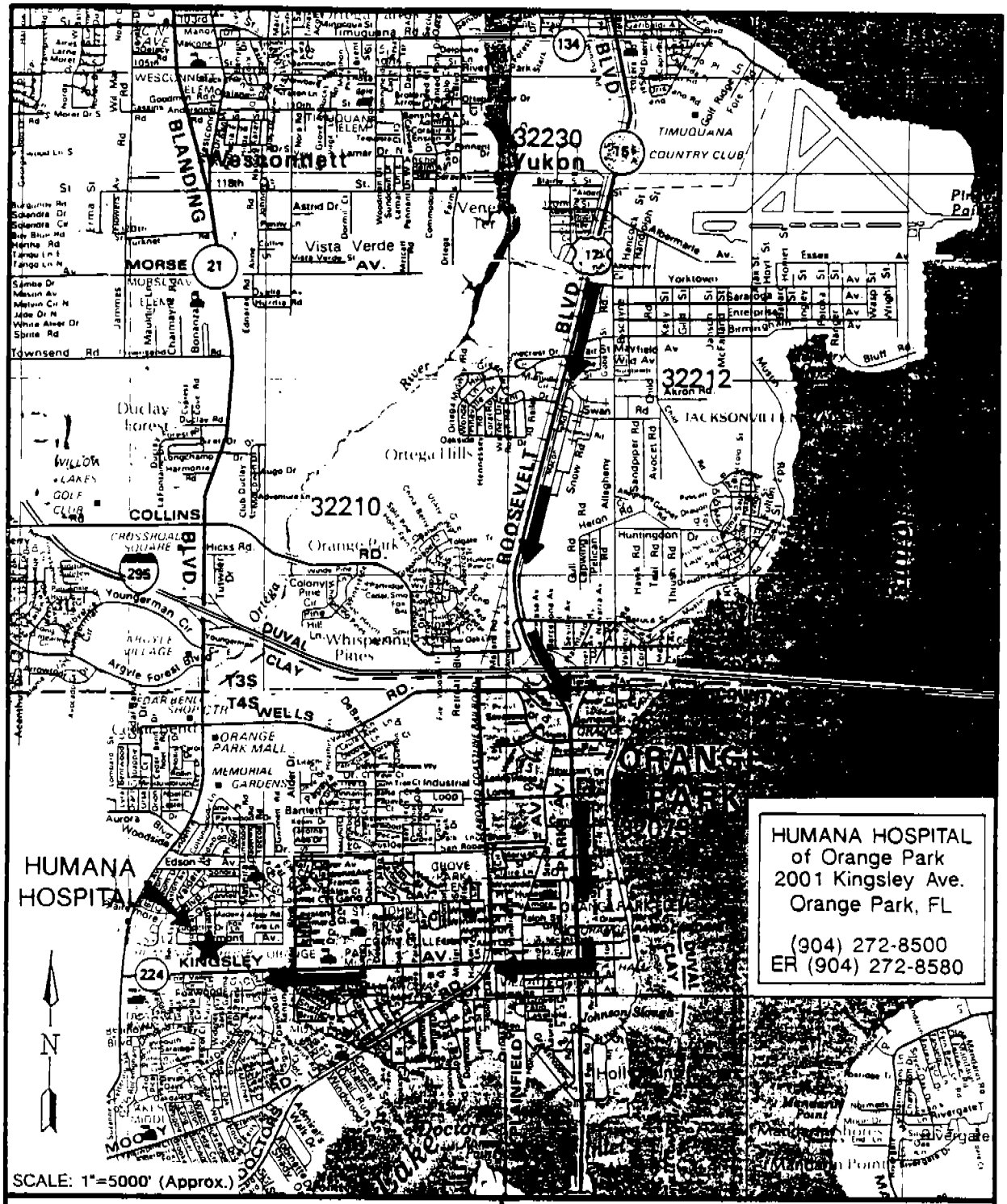
OCCUPATIONAL INJURY OR OCCUPATIONAL ILLNESS

14. Describe the injury or illness in detail and indicate the part of body affected. _____ (e.g.: amputation of right index finger at second joint; fracture of ribs; lead poisoning; dermatitis of left hand, etc.)
15. Name the object or substance which directly injured the employee. (For example, the machine or thing he struck against or which struck him; the vapor or poison he inhaled or swallowed; the chemical or radiation which irritated his skin; or in cases of strains, hernias, etc., the thing he was lifting, pulling, etc.)
16. Date of injury or initial diagnosis of occupational illness _____ (Date)
17. Did employee die? _____ (Yes or No)

OTHER

18. Name and address of physician _____
19. If hospitalized, name and address of hospital _____

Date of report _____ Prepared by _____
Official position _____



EMERGENCY ROUTE TO OFF-SITE HOSPITAL

FIGURE 3-6

HEALTH & SAFETY PLAN
NAS JACKSONVILLE
SEPTEMBER 1991

3.16 Visitor Protection

All visitors to the PSC shall be instructed to stay outside the work zone and remain within the support zone during the extent of their stay, unless they have been granted access to the work zone by the Contractor. Visitors shall sign a Visitor's Log Book (Table 3-3) and record all information as noted in the log book.

Visitors shall be cautioned to avoid skin contact with contaminated or suspected contaminated surfaces and hand-to-mouth transfers (eating, drinking, smoking, chewing gum, and tobacco) in either the exclusion zone or contamination reduction zone.

The use of either alcohol, drugs, or medicine by visitors, workers, or Base personnel that impair visual acuity and motor skills are prohibited. Visitors requesting to observe the work must wear all appropriate personnel protective wear before entering the support zone. Should respiratory protective devices be necessary (Level C), visitors who wish to enter the support zone must produce evidence that they have had a complete physical examination and respiratory protection training within the past twelve months. Visitor admittance to the work zone will be left to the discretion of the SSHS.

3.17 Housekeeping

The Contractor shall implement a housekeeping program to minimize the spread of contaminants beyond the work zone. The program shall include the following:

- periodic scheduling to clean the work area of debris including paper products, cans, and other materials brought on site;

Table 3-3

VISITOR'S LOG BOOK

NAME AND AFFILIATION	DATE	SOCIAL SECURITY NUMBER	TIME IN	TIME OUT	REASON FOR SITE VISIT

O SPECIAL INSTRUCTIONS O

PLEASE AVOID CONTAMINATED SURFACES AND HAND TO MOUTH TRANSFERS (SMOKING, EATING, CHEWING) WHILE VISITING THE SITE.

- periodic changing of wash water and rinse water for hand, face, and equipment; and

- periodic removal (daily minimum) of all garbage bags and containers used for disposal of food products, plastic inner gloves, and contaminated disposable clothing (Tyvek).

3.18 Waste Disposal

The Contractor will not remove material from the PSC that may potentially endanger the safety and health of on-site employees or the general public. Such material will be collected and disposed appropriately.

Reusable Protective Wear: All gloves, boots, hats, and protective outerwear that can be cleaned and reused shall be scrubbed and cleaned in containers within the decontamination zone before reuse. The protective items will be removed from the site at the end of each working day. Disposable equipment will be placed in garbage bags and stored in dumpsters near each site. The contents of the dumpsters will be disposed in an appropriate manner.

Waste Food Containers: During and following meal periods and break periods, all waste materials shall be collected (by all individuals) and disposed of in waste containers provided by the Contractor.

3.19 Safety Equipment

Equipment to be provided by the Contractor includes:

- Organic Vapor Analyzer
- Drinking cups
- Water
- Explosion meter or explosimeter
- Garbage bags
- Paper towels
- Brushes
- Spray container

Equipment to be provided by drilling subcontractor:

- Emergency eye wash (15 minute capacity)
- First aid kit
- Fire extinguisher or equivalent (Class ABC)
- Garbage cans
- Drop cloth
- Safety cones

Equipment locations will be identified in each PSC-Specific Health and Safety Plan.

3.20 Noise

Noise-suppression devices shall be used where appropriate and the use of hearing protective devices shall be encouraged.

4.0 HAZARD CONTROL

4.1 General Precautions

Personnel working at sites where chemical and radiological substances are present may encounter conditions that are unsafe or potentially unsafe. In addition to physical, chemical, and toxicological dangers, other types of hazards (electricity, water, heavy equipment, falling objects, loss of balance, or tripping) might have an adverse effect on the safety and health of personnel. The following sections describe the requirements to be implemented to minimize adverse effects from these conditions.

4.2 Buddy System

For all PSC activities, the buddy system will be implemented to ensure personnel safety. Workers will be required to perform all characterization activities with another individual.

4.3 Fire and Explosion Prevention

The Contractor shall maintain a fire and explosion prevention and control effort appropriate for the needs at the site. An explosimeter will be used during drilling and at regularly scheduled times during field activities at the discretion of the SSHS and the On-Station Project Coordinator. The location of fire extinguishing equipment will be pointed out during the orientation session.

4.4 Safety Precautions Near Utility Lines

While in use, a crane or drilling rig shall be no less than:

- 10 feet from a 50 KV line
- 20 feet from a 345 KV line
- 34 feet from a 750 KV line

In transit, with the boom lowered on a derrick, a crane or drilling rig shall be no less than:

- 4 feet from a 50 KV line
- 10 feet from a 50-345 KV line
- 16 feet from a 345-750 KV line

The Site Coordinator from NAS will be contacted to locate any underground utilities. Permission will be obtained before drilling to avoid the interruption of subsurface conduits.

4.5 Safety Precautions When Drilling

All drillers shall wear safety glasses, hard hats, steel-toed shoes, and respiratory protection as determined by the SSHO.

4.6 Sanitation

Toilet facilities and showers shall be provided in accordance with 29 CFR 1926.51. The location of these facilities will be identified during the orientation meeting.

Potable water for drinking and washing shall be provided for all personnel.

ATTACHMENT A

ADDITIONAL HEALTH AND SAFETY INFORMATION
including
Internal Safety & Health Plan Audit Checklist
Resumes
Physical Examination Parameters
Respiratory Protection Plan

Internal Safety & Health Plan Audit Checklist

___ Organizational structure chapter
- ___ general supervisor (resp/auth to dir site operations)
- ___ site S&H supervisor (res/auth dev/imp plan & comp)
- ___ all pers for site oper & ER (their functions & resp)
- ___ lines of auth, responsibility & communications
- ___ provide for periodic review & update
- ___ provision that plan/updates made avail all aff. empl.

___ Comprehensive workplan chapter
- ___ cleanup activities &
- ___ normal operating procedures
- ___ work tasks & objectives & methods for accomplishing
- ___ personnel requirements
- ___ provide for implementation of required training
  - ___ 40/hr off-site
  - ___ any special hazards
  - ___ three days field experience
  - ___ mgrs/supervisors 8/hrs
  - ___ site-specific training
    - ___ site S&H personnel & alternatives
    - ___ hazards present onsite
    - ___ use of PPE
    - ___ work practices to minimize risks
    - ___ safe use of engineering controls
    - ___ med surv rqmts + signs & symptoms overexp
  - ___ provide for implementation required inf programs
    - ___ inform emp/contr/subs-nature/level/degree expos
  - ___ provide for implementation med surv program
    - ___ those exp above PELs 30+ days/yr
    - ___ those wearing res prot 30+ days/yr
    - ___ those injured/overexp from emergency incident
    - ___ HAZMAT team members

  - ___ Site-specific safety & heath plan chpt (ea op phse)
    - ___ key pers/alts for site S&H & site S&H supervisor
    - ___ S&H risk or haz analysis for ea task/oper workplan
    - ___ employee training assignments
    - ___ PPE for each task & operation
      - ___ PPE program
        - ___ site hazards
        - ___ PPE selection (based on hazards)
        - ___ PPE use
        - ___ work mission duration
        - ___ PPE maint & storage
        - ___ PPE decon
        - ___ PPE training & proper fitting
        - ___ PPE donning doffing procedures

___ PPE inspection
___ PPE in-use monitoring
___ PPE program effectiveness evaluation
___ temp extreme limits/other med consider
___ written resp prot SOPs (29 CFR 1910.134)

___ medical surveillance

___ monitoring
___ types (air, personnel, environmental)
___ frequency
___ techniques/instrumentation
___ maintenance
___ calibration
___ site control measures
___ site map
___ site work zones
___ use of "buddy system"
___ site communications
___ SOPs or safe work practices
___ ident. nearest medical assist.
___ decontamination procedures
___ dev/comm pre entry to potent exp areas
___ SOPs to minimize employee contact
___ decon location
___ all leaving area to be deconned
___ all cont cloth/equip deconned or disposed
___ S&H super monitors decon proc/effectiveness
___ decon equip/solvents deconned or disposed
___ pro clo/equip-decon/etc replace
___ imperm clothing wet/remove/shower decon/disp
___ unauth not remove pro clo/equip change rooms
___ inform commerical laundries if used
___ if need showers/change rooms-meet 1910.141
___ emergency resp plan (exempt if evac-then 1910.38)

1910.120(1) plan	1910.38 plan
___ topo/layout/weather	___ emerg escape proc
___ incident reporting	___ emerg escape rte assig
___ ER plan integ/govt	___ proc emp remain operat crit plant oper/evac
___ rehearse/training	___ evac acctng proc
___ ER plan review	___ resc/med duty assign
___ alarm system	___ report means fire & other emergencies
___ incident-eval,imp plan	___ names/titles-persons/ depts info/duty explai
___ PPE/other equipment	

___ confined space entry procedures
___ employees instructed (1926.21)
___ nature of hazards

___ precautions to be taken
___ use of PPE
___ any specific regs re dangerous areas work
___ standby personnel (1910.134)
___ harnesses/lines (")
___ communications (")
___ spill containment program (if major spills anticipated)
___ pre-emergency planning
___ pers roles/auth lines/trng/communication
___ emergency recognition/prevention (fire plan?)
___ safe distances/places of refuge
___ site security & control
___ evac routes/procedures
___ decon
___ emer med treatment/first aid
___ emer alerting & response procedures
___ response critique & follow-up
___ PPE & emergency equipment
___ pre-entry briefings
___ inspections by site S&H officer or other
___ excavations shored sloped (1910, Subpart P)
___ S&H program made available contractors/subs

Other standards that do, or may, need to be incorporated in site safety and health plans:

___ first aider onsite if no close med facility 1910.23
___ fire prev/prot 1926, subF - 1910.38
___ handling drums/containers - 1910.120(j)
___ illumination - 1910.120(m)
___ sanitation - 1910.120(n)

Note: This outline of elements for possible, or mandatory, inclusions in site safety and health plans is not necessarily exhaustive. There are probably yet other regulations that apply. The purpose of this outline is to provide a guide for evaluating, or preparing, site safety and health plans as required by 29 CFR 1910.120.

Resumes

FELICIA M. BOYD
Senior Scientist II

CREDENTIALS/REGISTRATION

M.A. Geology, University of Texas at Austin, 1982
B.S. Geology, College of William and Mary, 1979
Certified as a Professional Hydrogeologist by the American Institute of Hydrology, 1988

PROFESSIONAL AFFILIATIONS

National Water Well Association
American Institute of Hydrology

FIELDS OF SPECIALIZATION

- RCRA/CERCLA investigations
- Investigation of ground-water contamination and environmental assessment
- Ground-water resources development

EXPERIENCE SUMMARY

Ms. Boyd has over 10 years of experience as a hydrogeologist specializing in ground-water management and environmental impact assessment. Ms. Boyd's experience with environmental and hazardous waste management has included investigations at several RCRA and CERCLA sites. Ms. Boyd is currently project manager for a RCRA Facility Investigation (RFI) being conducted at Redstone Arsenal, Alabama. Work for the RFI has included development of work plans and project scope for investigations conducted at solid waste management units (SWMUs) including a variety of sanitary and industrial landfills on Redstone Arsenal. Field investigations for the RFI include collection of over 250 soil gas samples; 100,000 linear feet of geophysical investigations; drilling and construction of over 100 monitor wells in karst terrain and overlying sediments to depths ranging from 20 to 250 feet; test pit excavation and associated air monitoring at over 40 locations; and collection of over 400 soil, sediment and surface water, and ground-water samples. Ms. Boyd has conducted numerous contamination assessments of potential leakage from sewage disposal ponds, landfills, irrigation areas, and underground storage tanks, including monitor well installation, testing, and sampling for evaluation of associated plume development and management techniques. Ms. Boyd has been manager on projects involving environmental impact assessments for industrial and mining activities, with work including site investigations, ground-water monitoring, preparation of environmental impact statements and permitting submittals, and expert witness testimony at regulatory proceedings.

Ms. Boyd has been a principal investigator on numerous water-supply development projects for municipal and industrial purposes involving evaluation of ground-water availability; planning and design of present and future well locations for well-field development; preparation of well specifications; and supervision of test drilling, well construction, and aquifer testing. Ground-water resources development projects have involved deep well drilling in major sand and limestone aquifers; modeling of future water-level drawdown caused by well-field development; determination of effects of pumping on existing wells; and design and implementation of monitoring and mitigation programs for affected wells.

KEY PROJECTS

Project manager for RCRA Facility Investigations currently being conducted at Redstone Arsenal in northern Alabama. The field investigations involving overburden and bedrock drilling and sampling of over 100 wells ranging in depths from 20 to 250 feet in karst terrain.

Project manager for mitigation/monitoring program for a major mining company. The project involved projections of future water-level drawdowns caused by a 10 million gallon per day depressurization well field. Site investigations included production and drilling, construction, testing, and sampling of numerous shallow (50 feet) and deep (200 feet) production and monitor wells; computer modeling of potential drawdowns; thorough, door-to-door water well inventory of over 300 private wells; and determination of effects of well field pumping on individual wells, assessment of mitigation for affected wells, and design and implementation of a monitoring and protection program.

Project manager for design and development of a 4-million gallon per day industrial water supply well field involving design and supervision of field programs, ground-water availability evaluation, and well field planning and design.

Principal investigator on numerous test drilling programs for private developers involving ground-water resources development in the Edwards Limestone in Central Texas.

Technical assistance to the Guadalupe-Blanco River Authority on a water management and rights issue regarding spring discharge and ground-water flow through the karst terrain of the Edwards Limestone.

Project manager for hydrologic investigation of underground storage tank leakage in southwestern Florida involving delineation of three hydrocarbon and chlorinated hydrocarbon plumes.

Project manager on a contamination assessment involving leakage from a 640-acre municipal sewage disposal pond. The project involved test and monitor well drilling and installation, private water well inventory, computer modeling of contamination plume, supervision and assessment of mitigation, and implementation of a continuous monitoring program.

March/91

CHRISTOPHER P. AMSTUTZ
Project Scientist

CREDENTIALS/REGISTRATION

B.S. Chemistry, Florida State University, 1977
M.S. Industrial Chemistry, University of Central Florida, in progress
Florida Certified Radon Measurement Specialist

PROFESSIONAL AFFILIATIONS

Florida Chapter Health Physics Society

FIELDS OF SPECIALIZATION

- Analysis of pesticides and herbicides in water and sediments
- Radiochemical analysis of naturally occurring radioisotopes
- Laboratory Quality Assurance/Quality Control procedures and analytical methodologies (EPA)
- Radon measurement techniques
- Field applications of gas chromatography

EXPERIENCE SUMMARY

Mr. Amstutz participates in Geraghty & Miller's Laboratory Quality Assurance Program. His responsibilities include writing Quality Assurance Project Plans, evaluating laboratory data, and auditing contract laboratories. He also provides project managers with guidance in evaluating and selecting appropriate analytical methods for various types of environmental testing programs. He has been involved with a remedial investigation of hazardous waste sites by field gas chromatography and he recently completed work on a multi-site contamination investigation using field gas chromatography for the analysis of petroleum products.

Mr. Amstutz was formerly with Post, Buckley, Schuh and Jernigan (PBS&J), Environmental Laboratories, Orlando, where he functioned as Wet Chemistry, Radiochemistry, and/or Organic Section Leaders. His responsibilities included daily section management, employee performance/salary evaluations, data quality assurance, data reporting and quantitation, section related certifications, methods implementation and instrument troubleshooting/repair. Additional responsibilities included Laboratory Safety Officer, Project Quality Assurance Officer, and Project Manager.

Mr. Amstutz was instrumental in gaining PBS&J State of Florida certification for pesticides and herbicides, and interim measurement proficiency of radon by charcoal canister.

KEY PROJECTS

Remedial investigation of hazardous waste sites, Moody AFB.

Environmental screening of eight sites for petroleum based products, by field gas chromatography.

Chief chemist of 3-year project analyzing a variety of foods for long-lived naturally-occurring radioisotopes for the Florida Institute of Phosphate Research (PBS&J).

RCRA Facility Investigation, Redstone Arsenal, Alabama. Responsible for field gas chromatography.

Remedial Investigation, Tyndall AFB, QA/QC Manager.

South Florida Water Management District. Analysis of water and sediments for organic contaminants by GC and HPLC (PBS&J).

Tennessee Valley Authority. Analysis of foods and soils for RA-226 content by wet digestion/deemanation.

8/91

RALPH E. MOON, Ph.D.
Associate

CREDENTIALS/REGISTRATION

B.S., Biology, Western Michigan University, 1972
M.S., Botany, University of South Florida, 1975
Ph.D., Biology, University of South Florida, 1980
Post Doctoral Fellowship, University of South Florida, Department of Chemistry, 1981
Certified Hazardous Materials Manager, Master Level, 1985

PROFESSIONAL AFFILIATIONS

Sigma Xi
Institute of Environmental Studies (IES), Board of Directors, University of South Florida
American Chemical Society
Institute of Hazardous Materials Management
National Water Well Association
Society for Risk Analysis
Water Pollution Control Federation
Florida Scientist, Quarterly Journal of the Florida Academy of Sciences, Editorial Board Member

FIELDS OF SPECIALIZATION

- Investigation and evaluation of ground-water contamination incidents
- Health and safety assessments at hazardous-waste sites
- Public health evaluations and risk assessments
- Property transfer site assessments
- Geraghty & Miller Seminar Speaker
- Expert witness- Ground-water monitoring

EXPERIENCE SUMMARY

Dr. Moon joined Geraghty & Miller, Inc. in 1984 from employment with the Florida Department of Environmental Regulation where he served as the Southwest District Hydrologist. Since his employment at Geraghty & Miller, Dr. Moon has had the opportunity to participate in a variety of ground-water contamination projects where he has served as either the Project Manager, Health and Safety Officer, or prepared the Endangerment/Risk Assessment Report. Prior to joining Geraghty & Miller, Dr. Moon was a course instructor at the University of South Florida's (USF) School of Public Health, a Clinical Assistant Professor in the Department of Comprehensive Medicine, and served as an Industrial Hygiene Consultant to the Jim Walter Research Corporation in St. Petersburg, Florida. Dr. Moon has served on the Board of Directors of the Chemical and Environmental Management Center in the Department of Chemistry at USF since 1983.

SELECTED PROJECTS

Project Manager: Ground-Water Contamination

Aromatic Solvent Loss: The accidental loss of several thousand gallons of aromatic solvents prompted the installation of ground-water recovery wells, a spray irrigation system, and the use of selected strains of microbes to treat contaminated soils.

MORE SELECTED PROJECTS

Mercury: The fracture of a valve on a drum containing a mercury paint additive required a hydrogeological investigation to determine the extent of contamination and violations of ground-water standards.

Arsenic: The long-term use of coal at a power plant resulted in the accumulation of arsenic in settling ponds and discharge to ground water. A hydrogeological investigation determined the source of arsenic and prompted the selection of the remedial action alternative.

Missile Fuel: The accidental discharge of tetra-hydrocyclomethylpentadiene required the recovery of free product, removal of contaminated soils, and the installation of a ground-water recovery system.

Reduced Sulfur Compounds: The unforeseen loss of pharmaceutical intermediates during manufacturing resulted in ground-water contamination and the emission of reduced sulfur compound vapors to the atmosphere. Ground-water, soil, and air samples were collected to determine the extent of contamination, occupational health risks, and appropriate remedial actions.

Aviation Fuels: A hydrogeological investigation of a fuel depot and two landfills in Alaska prompted a health and safety site assessment to determine the appropriate level of personal protection.

Health and Safety Officer: Superfund and RCRA Sites

Oregon: The production of cyanide containing wastes as a byproduct of an aluminum production facility prompted special health and safety provisions.

Tennessee: The historical production of enhanced uranium products resulted in the disposal of a variety of substances including radioactive compounds, solvents, and metal-containing substances.

Florida: A hazardous waste landfill experienced enhanced biodegradation of wastes that resulted in the generation of methane gas and posed health risks to site workers.

Tennessee: An unreclaimed strip mine area was used to dispose of drummed waste and liquids. The large quantities of volatile organic compounds and organic sludges posed unusual personal protection circumstances.

Caribbean: The production of hydrogen sulfide and associated compounds from the degradation of contaminants in the ground water posed special requirements for personal protection.

Public Health Evaluation Reporting:

Florida: The disposal of construction debris, solvents, aviation fuels, medical wastes, and domestic waste adjacent to the Gulf of Mexico required an evaluation of potential public health and environmental risks.

MORE SELECTED PROJECTS

California: Trichloroethene was detected in ground-water samples at microgram per Liter concentrations beneath the parking lot. A silicon chip manufacturer was required to prepare a public health evaluation to describe the public health and environmental risks.

California: The accidental loss of solvents to the soil and ground water from a silicon chip manufacturer required an evaluation of current and future health risks via the ingestion of ground-water.

Massachusetts: PCB and halogenated solvent discharge to the soil and ground water, and the emission of organic vapors to the atmosphere required the evaluation of numerous routes of exposure to the public environment.

Missouri: The long-term disposal of halogenated solvents from an electronic manufacturing facility prompted the evaluation of public health risks via multiple exposure pathways within and outside the immediate area.

SELECTED PUBLICATIONS

D.F. Martin, T.N. Krumrei, R.E. Moon. Comparison of Steroidal Agents DCytolytic Toward Florida Red Tide Organism (Gymnodinium breve, Ptychodiscus brevis). J. of Environmental Science and Health A15 (1), 37-44, 1980.

R.E. Moon and D.F. Martin. The Polyene Antibiotic Filipin and a Red Tide Cytolytic Agent "Aponin", A Comparative Study. Microbios Letters 10, 115-119, 1980.

R.E. Moon and D.F. Martin. The Cytolytic Substrate Aponin on Prymnesium parvum and Ptychodiscus brevis, A Comparative Study. Botanica Marina, Vol. XXIV, 1981.

R.E. Moon and D.F. Martin. Effects of 2- and 4-Hydroxybiphenyl On Cultures of the Red Tide Organism Ptychodiscus brevis. J. of Environmental Science and Health. A16(4), 381-386, 1981.

R.E. Moon and D.F. Martin. Assay of Diverse Biological Activities of Material Elaborated by a Marine Blue-Green Alga, Gomphosphaeria aponina. Microbios Letters 18, 103-110, 1981.

R.E. Moon and D.F. Martin. Studies on Utilization of Stack Gas. I. Preliminary Experiments. J. of Environmental Science and Health, A18(1), 19-28, 1983.

R.E. Moon. Domestic Sewage and Tampa Bay. The Overflow, May-June Issue, 22-23, 1983.

R.E. Moon. Bid Requirements Are Needed For Used Oil Dealers. The Florida Specifier, Vol. 5, No. 11, October 1984.

R.E. Moon and D.F. Martin. Study of Allelopathic Substances from a Marine Alga. American Chemical Society (ACS) Symposium Series Vol. 268, pp. 371-380, 1984.

R.E. Moon. Ground Water Monitoring in Florida--Living with Hydrologic and Regulative Peculiarities. National Water Well Association. Fifth Symposium and Exposition on Aquifer Restoration and Ground-Water Monitoring, 1985.

JOSEPH E. MIZERANY
Staff Scientist

CREDENTIALS / REGISTRATION

B.A., Geology, University of Oklahoma, 1986
Registered in the State of Arkansas, 1990, number pending
Certified Health and Safety Training, 29 CFR 1910.120, Hazardous Waste Site Activities, 1990

PROFESSIONAL AFFILIATIONS

Florida Water Well Association
American Association of Petroleum Geologists
Oklahoma City Geological Society
National Water Well Association

FIELDS OF SPECIALIZATION

- Aquifer characteristic investigations (pump tests, slug tests, etc.)
- RCRA permitting, closure and post closure projects
- Hydrocarbon contamination assessment investigation and remediation
- Surface water, groundwater and soil quality investigations
- Extensive experience in deep and shallow drilling and development techniques
- Experienced with most geophysical well logging techniques
- Knowledge of federal and state agency regulations

EXPERIENCE SUMMARY

Mr. Mizerany currently is working in the Groundwater Services Division of Geraghty & Miller, involved with hazardous waste contamination investigations. His responsibilities include groundwater monitoring and remediation, monitor well design and construction, and aquifer characterization.

Prior to his employment with Geraghty & Miller, Mr. Mizerany was employed with a groundwater consulting firm where he was involved with hazardous waste permitting and developing groundwater monitoring programs for hazardous waste contamination related projects. His responsibilities also included underground storage tank management, hydrocarbon contamination investigations and remedial activities to comply with state and federal regulations.

Mr. Mizerany worked three years as an oil and gas exploration geologist based in Oklahoma City, Oklahoma where he generated and evaluated oil and gas prospects in the mid-continent region. His experience included well site geology on deep (15,000 ft-30,000 ft) gas exploration wells in the Arkoma and Anadarko basins, and the interpretation down-hole geophysical logs for prospect development.

KEY PROJECTS

Hazardous waste permitting and the development and implementation of groundwater detection monitoring programs in the central Florida region.

Contamination assessment investigations for abandoned and active landfills in the state of Florida.

Project manager of various RCRA facilities in Tampa and St. Petersburg, Florida area.

Project manager of contamination assessments for underground storage tank projects throughout southern central and south Florida.

Designed a large scale (150 acre) drilling program for a CERCLA project in central Florida in order to determine groundwater quality and aquifer characteristics of the surficial and Floridan aquifers.

January/91

Physical Examination Parameters

The following physical requirements have been evaluated by a qualified occupational health physician on all Geraghty & Miller, Inc., personnel associated with the field investigations to assure that they are certified to perform work at NAS JAX.

1. Compilation of a complete occupational health history.

2. Compilation of a complete family health history.

3. Blood analysis (SMAC-25).

4. Urine analysis.

5. PCB level in the blood.

6. Chest X-ray (front only).

7. Hearing examination.

8. Sight examination.

9. Pulmonary function examination.

10. Complete physical examination.

Respiratory Protection Plan

Prepared by

GERAGHTY & MILLER, INC.
Environmental Services
14497 North Dale Mabry Highway
Suite 115
Tampa, Florida 33618

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RESPIRATORY PROTECTION PLAN

Introduction

A respiratory protection plan has been written in compliance with the Occupation Safety and Health Administration requirements as described in 29 CFR Section 1910.134.

Respiratory Protection Practices

It is the policy of Geraghty & Miller, Inc., (Geraghty & Miller) to provide respiratory protection to all employees to avoid breathing air contaminated with dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors. This will be accomplished through the use of respiratory protection, where appropriate, at all monitor-well drilling and soil and ground-water sampling sites.

Respirators, described in the Safety and Health Plan, will be supplied to all employees of Geraghty & Miller. Subcontractors of Geraghty & Miller will supply their own employees with the appropriate respiratory protection as described in the site Safety and Health Plan. During the site Safety and Health Training Program, all staff and personnel associated with the subsurface investigation will be informed about the specific conditions and practices of the site investigation. The training course will include a respirator fit test in accordance with the Occupational Exposure Guide, using the qualitative Fit Test protocol with isoamyl acetate ampules. In addition, course attendees will be informed as to:

- Respirator limitations
- Leak detection

- Canister/cartridge removal frequencies
- Appropriate respirator removal areas
- Proper cleaning procedures
- Uses of various types of respirators: half-face, full-face

Respirator Selection

Respirators selected for Level C protection will be selected following an evaluation of the site with air-monitoring equipment and review of the site contamination history and climatic conditions. The selection of cartridges and canisters accompanying the respirator will be based on the presence of gases or airborne materials that may be detected or potentially released from the site during all aspects of the investigation (Table 1).

Respirator Cleaning and Storage

When in use, all respirators will be cleaned prior to each working day and visually inspected by each worker after break periods. During canister/cartridge changes, the rubber facepiece should be visually inspected to detect and remove dirt and dust that may have accumulated when in contact the face or hands. Wash/rinse stations used during decontamination may provide a source for cleaning materials for this purpose. It is recommended that respirators be assigned to individuals rather than arbitrarily passed among employees during the course of a project or between assignments. All respirators will be returned to a clean storage

Table 1

Atmospheric contaminants to be protected against	Colors assigned*
Acid gases	White.
Hydrocyanic acid gas	White with 1/2-inch green stripe completely around the canister near the bottom.
Chlorine gas	White with 1/2-inch yellow stripe completely around the canister near the bottom.
Organic vapors	Black.
Ammonia gas	Green.
Acid gases and ammonia gas	Green with 1/2-inch white stripe completely around the canister near the bottom.
Carbon monoxide	Blue.
Acid gases and organic vapors	Yellow.
Hydrocyanic acid gas and chloropicrin vapor.	Yellow with 1/2-inch blue stripe completely around the canister near the bottom.
Acid gases, organic vapors, and ammonia gases.	Brown.
Radioactive materials, excepting tritium and noble gases.	Purpose (Magenta).
Particulates (dusts, fumes, mists, fogs, or smokes) in combination with any of the above gases or vapors.	Canister color for contaminant, as designated above, with 1/2-inch gray stripe completely around the canister near the top.
All of the above atmospheric contaminants	Red with 1/2-inch gray stripe completely around the canister near the top.

* Gray shall not be assigned as the main color for a canister designed to remove acids or vapors.

NOTE: Orange shall be used as a complete body, or stripe color to represent gases not included in this table. The user will need to refer to the canister label to determine the degree of protection the canister will afford.

Adapted from the Occupational Exposure Guide by J. J. Keller Company.

area at the end of each work day and stored in a cool storage room during prolonged storage.

After inspection, cleaning, and necessary repair, respirators will be stored to protect agains dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators placed at stations and work areas for emergency use should be quickly accessible at all times and should be stored in canvas bags provided for this purpose. Respirators should not be stored in lockers or tool boxes unless they are in carrying cases or cartons.

Respirators should be packed or stored so that the facepiece and exhalation valve will rest in a normal position and function will not be impaired by the elastomer setting in an abnormal position.

Qualifications for Respirator Use

The anticipated use of respirators by an employee will require certification by a physician that the employee is suited to work under stressful circumstances. This decision should be based upon evaluations made during the annual with physical examination. Annual physical examinations are required prior to work at all investigative sites regardless of the anticipated use of a respiratory protection device.

Selection of Respirators

The proper selection of respirators will be made in accordance with the guidance provided by The American National Standard Practices for Respiratory Protection.

Respirator Training and Fit Testing

Each employee will be instructed in the proper use and maintenance of the device to assure the safe use of the respirator. The training will allow on-site workers the opportunity to individually handle and properly fit each device. During the test procedure (see Occupational Fit Test protocol), the facepiece-to-face seal will be tested in both normal and test atmospheres. Instruction also will include a demonstration on how to adjust and determine proper fit. Respirators will not be worn when conditions prevent a good face seal, such as the growth of a beard, long sideburns, or a hat that intercepts under the facepiece. For employees wearing glasses, a spectacle kit must be used to fit glasses inside the facepiece. Contact lenses are prohibited.

August 30, 1991

Revision 0.0

SITE MANAGEMENT PLAN
NAS JACKSONVILLE, FL.
CALENDAR YEAR 1992

PREPARED BY

Joel G. Murphy

Southern Division

Naval Facilities Engineering Command

2155 Eagle Drive

P.O. Box 10068

Code 18213

Charleston, South Carolina

29411-0068

1. THE BASIS FOR A SITE MANAGEMENT PLAN

The requirement for this Site Management Plan (SMP) is identified in the Federal Facilities Agreement (FFA) signed by the Environmental Protection Agency, the State of Florida, Department of Environmental Regulation and the US Navy. The FFA was entered into based on the requirement for an interagency agreement identified in the Superfund Amendments and Reauthorization Act (SARA), section 120(e)(1). The intent of the plan is to provide: (1) an action deemed necessary to mitigate any immediate threat to human health of the environment, (2) a list of operable units subject to the tenets of the FFA, (3) a prioritization and rationale for the operable units at the Site, (4) activities and schedules for work planned for the current year, including the submittal schedule for primary and secondary documents, and (5) work projections for subsequent calendar years. The FFA was signed on 16 October, 1990 and has an effective date of 1 November, 1990.

2. OVERALL SITE MANAGEMENT APPROACH

Three major investigation activities have been conducted at NAS Jacksonville, the Site, under the Navy Installation Restoration (IR) Program (NIRP) or Superfund Program: Preliminary Assessment (PA) or Initial Assessment Study, Site Inspection (SI) or Verification Study, and Extended Site Inspection (ESI) or Confirmation Study. The PA (1983) identified and assessed 38 potential sources of contamination (PSC) on the Site that could pose a potential threat to human health or the environment as a result of contamination derived from past naval operations. Two additional PSCs were identified for a total of 40 post-PA PSCs. The SI (1985) and ESI (1986) were conducted to confirm or refute the presence of hazardous substances at the PSCs identified in the PA; and, if contamination was detected, evaluate its magnitude and extent to a degree that would allow for the recommendation of future remedial

response actions. As a result of further IR activities, five additional sites were identified for a total of 45 post-ESI PSCs.

In addition to the NIRP/CERCLA program, the station has other active regulatory programs. A Florida RCRA permit was issued to NAS Jacksonville by the Florida Department of Environmental Regulation (FDER). Concurrently, a RCRA/HSWA permit was issued to the installation by the U.S. EPA in June, 1987. A RCRA Facility Assessment (RFA) was included in the EPA issued permit. An Underground Storage Tank Program is currently investigating over 50 tanks as provided for in Florida Administrative Code Section 17-770.

Of the 45 identified IR PSCs, thirteen are currently being addressed as Remedial Investigation/Feasibility Study PSCs with the remaining requiring FFA site screening efforts due to present data quality objective inadequacies and data gaps, or due to a preliminary determination that no further action is required. Due to the proximity of 23 PSCs, the US Navy shall assess the state of the St. Johns River in the immediate area about those PSCs.

The SMP provides a PSC-IR Program event management plan. Included is a description of the Site's PSC program arrangement into Remedial Activity groupings or Operable Units (OU). The Plan ONLY discusses the management of PSCs that are identified as needing to undergo Phase II: Remedial Investigation, Feasibility Study, and Record of Decision, and possibly Phase III: Remedial Design and Remedial Action, of the IR/CERCLA Program. A list of projected schedule tasks through the deletion of the Site from the National Priority List is furnished. Detailed are program events to take place in the upcoming year and the delivery dates for draft primary documents and target dates for secondary program documents. The Navy shall update the SMP yearly. A SMP addenda is scheduled when significant changes in scheduling time frames occur. Updates may reflect changes in project priorities,

refining each OU's project schedule, and PSC additions or deletions due to program accomplishments or field conditions.

3. RATIONALE FOR OPERABLE UNIT PSC GROUPINGS

In order to facilitate implementation of NAS Jacksonville's IR Program, the 45 PSCs are organized into five groups: 3 RI/FS Operable Units (OUs), a PSC Screening group, and Petroleum PSC group. The screening group consisting of 29 PSCs and the petroleum group consisting of 3 PSCs will not be further considered in this SMP. The criteria used to generate the RI/FS OU arrays are as follows:

1) geographic proximity of sites;
2) similar contaminant types;
3) similar aquifer contamination zones;
4) similar potential investigation methods;
5) potential scope and complexity of the investigation;
6) mission impact of remedial activities;
7) regulatory concerns; and
8) similarity of potential remedial actions.

The PSCs in each OU are:

OU#1 : Oil and Solvent Disposal Pits Area
- PSC 26, The Old Main Registered Disposal Area
- PSC 27, Ex Transformer Storage Area

OU#2 : Wastewater Treatment Area
- PSC 2, Aircraft Fire Fighting Training Area
- PSC 3, Ex Sludge Disposal Area
- PSC 4, Pine Tree Planting Area
- PSC 41, Domestic Sludge Drying Beds

PSC 42, Polishing Pond

PSC 43, IWTP Sludge Drying Beds

OU#3 : Industrial Area

PSC 11, Hanger 101

PSC 12, Old Test Cell Building 101K

PSC 13, Radium Paint Waste Disposal Pit

PSC 14, Battery Shop

PSC 15, Solvent and Paint Sludge Disposal Area

Operable Unit remedial activities are being phased based on investigation and hazard priorities, schedule effectiveness and task management. Due to the large number of PSCs on the Site overall, the number of PSCs in each RI/FS OU, and the aggregate complexity of the contamination problem at each OU, the commencement of work at all OUs concurrently is not feasible; therefore, a phased approach has been implemented. Present management plans, based on hazardous assessment, are to proceed with RI/FS OU#1 first, then activate RI/FS OU#2, and then commence RI/FS OU#3. The scheduled staggering provides for a coherent effort by the investigative and engineering team enabling a higher quality assessment of the problem and more accurate identification of a suitable remedial response action. The aggregation of the PSCs and the assignment of phasing priorities was based on the seven criteria stated above. The specific aggregation issues are discussed in the accompanying OU Narratives. The assignment of priorities was driven by the actual or potential threat posed by the PSC's known or suspected contamination.

The Oil and Solvent Disposal, OU#1, is situated on a topographical high and contains halogenated hydrocarbons and petroleum hydrocarbons. The area drains into a St. Johns River estuary and adjoining wetlands and abuts a military housing area. The potential environmental and human health threat is sufficient to commence

IR program RI/FS work at this OU first.

The Wastewater Treatment Area, OU#2, has a known, large areal, heavy metal and potential halogenated hydrocarbon contamination problem. Due to the proximity of the OU to the St. Johns River, there is a sufficient potential environmental threat that makes this OU a number two priority.

Although the Industrial Area, OU#3, has known halogenated hydrocarbon contamination, the extent of the problem is unknown. Because the OU abuts the St. Johns River, there is concern about an environmental threat. The areal industrial development effects a complex investigation. Due to the anticipated time and mission sensitivity of this area, IR efforts at this OU are scheduled to commence last.

NAS Jacksonville's Navy IR Program (NIRP) Plan, the Plan, details the overall and specific management of addressing IR remedial activities at 45 PSCs in seven volumes. Due to the large number of PSCs at the Site, economies of scale dictate the singular establishment of plan methodologies and protocols. Volume 1, Organization and Planning, addresses the organization of the Plan, data and project management functions, specific IR Program sub-plans: Health and Safety Plan, and Community Relations Plan, Site and PSC background information, OU PSC aggregation process, and activity/ OU priority formulation. Volumes 2 and 3, not yet developed, shall contain, respectfully, No Further Action and Site Screening activities. Volume 4 contains the basic methodologies and protocols for conducting field investigations, doing field sampling work - Basic Field Sampling Plan (BFSP), and performing field and laboratory analytical activities - Quality Assurance Program Plan (QAPP); the BFSP and the QAPP are combined into one document called the Basic Sampling and Analysis Plan (BSAP). The specific RI/FS Work Plans for each OU are contained in Volume 5-OU#1, Volume 6-OU#2, and Volume 7-OU#3; Volumes 6 and 7 are not yet developed. Once this basic set of IR/CERCLA work protocols and methodologies containing the OU#1

specific work plan are approved, the development of additional work plans shall commence. The Navy's Installation Restoration Program Plan for NAS Jacksonville is available for viewing in the information repository at the Webb Wesconnett Branch Library of the City of Jacksonville Public Libraries located at 6887 103rd Street, Jacksonville, Fl. 32212-6897.

4. SITE PSCs SMP EXCLUSIONS

The 29 PSCs identified in Attachment A to the FFA are not included nor otherwise addressed herein, except in this section. After screening the 29 PSCs, the Navy will determine future response activities. See NIRP Plan Volume I for additional information. If RI/FS activities are recommended, the US Navy shall create additional OUs to address PSC(s) problems. When established, the future additional OUs shall be incorporated into the SMP. The Petroleum PSC Group, consisting of three PSCs: 7, 19, and 33, have been transferred to the Underground Storage Tank Program for response activities detailed in Florida Administrative Code 17-770 and are not included in the SMP or the Navy's IR Program.

5. OPERATIONAL UNIT SCHEDULING

The schedules of operable units #2 and #3 are based on the issuance of the draft RI/FS Work Plan for the previous operable unit. The start of the next OU's work plan is commenced during the review process of previous OU's Draft Final Work Plan. Presently, the time projected for this staggered scheduling is the result of the extensive review comments being received on the initial NIRP Plan, and for inclusion of Federal Facilities Agreement review and comment periods. Upon obtaining an agreement on the level of information required in a specific work plan and if the FFA review and comment durations are shortened by the parties by their ability to perform the required

review in less than the provided time frames, the Navy shall be able to exepidite and execute plans earlier.

6. 1992 - 1993 GENERAL SCHEDULE

The following is a list of the general deliverables that are associated with the overall management of the site and their target transmittal date.

1992 GENERAL DELIVERABLES	TARGET DATES
1st Qtr. Quarterly Progress Report	30 April, 1992
2nd Qtr. Quarterly Progress Report	30 July, 1992
1993 Site Management Plan	1 September, 1992
3rd Qtr. Quarterly Progress Report	30 October, 1992
4th Qtr. Quarterly Progress Report	30 January, 1993

1993 GENERAL DELIVERABLES	TARGET DATE
1st Qtr. Quarterly Progress Report	30 April, 1993
2nd Qtr. Quarterly Progress Report	30 July, 1993
1992 Site Management Plan	1 September, 1993
3rd Qtr. Quarterly Progress Report	30 October, 1993
4th Qtr. Quarterly Progress Report	30 January, 1994

7. OPERATIONAL UNIT NARRATIVES

The following are narratives describing the contents of each OU. A description of the physical location and terrain is furnished. What is known about the contamination and an assessment of its present threat is included. The events for the upcoming year are listed and the due dates of primary documents and the target dates of secondary

documents are provided. A schedule of the projected submittal dates for primary documents only is included for the first outlying year. The upcoming and outlying year are on one time line Gantt Chart schedule. For the long term view, a list of projected schedule program tasks thru the finalization of the Record of Decision is included.

A. RI/FS Operable Unit #1 : The Oil and Solvent Disposal Area PSCs

Description :

An area of approximately 20 acres located in the south central part of the Site. The topology is open and relatively flat. The unit is located within a drainage ditch network. In an included area approximately 150 feet square, PCB transformers were stored. This unit is comprised of PSC 26 - The Old Main Registered Disposal Area and PSC 27 - Ex-Transformer Storage Area. Previous studies have identified ground water and subsurface soils contaminated with industrial solvents, heavy metals, PCBs and petroleum hydrocarbons. The unit has experienced interim remedial measures that have removed the direct exposure threat to the public's health or the environment.

1992 Primary Deliverables:	Due Date :
-- NONE --	-- NONE --
1992 Secondary Deliverables :	Target Dates :
Preliminary Site Characterization Report	5 December, 1992
Projected 1993 Primary Deliverables :	Target Dates :
Draft Baseline Risk Assessment	19 January, 1993
[Agency Review Comments]	90 days after receipt of document
Draft Final Baseline RA	120 days after reciept of review comments
Draft Remedial Investigation Report	20 March, 1993
[Agency Review Comments]	90 days after receipt of document
Draft Final RI Report	120 days after reciept of review

	comments
Draft Feasibility Study	27 March, 1993
[Agency Review Comments]	90 days after receipt of document
Draft Final FS	120 days after reciept of review comments

** : Action occurs unless Dispute Resolution evoked by one of the three FFA Parties.

Schedule Name : SMP Work Schedule for OU# 1
Responsible : US NAVY
As-of Date : 27-Aug-91 Schedule File : OU19293B

The proposed schedule for performing CERCLA response actions at OU#1 - Oil and Solvent Disposal Pits Area.

Task Name	Start Date	Duration	End Date
NAVY MAILS DFINAL	13-Sep-91	7.0 days	20-Sep-91
RI/FS WP GOES FINAL	20-Sep-91	30.0 days	20-Oct-91
RI/FS WP FINALIZED	20-Oct-91	0.0	20-Oct-91
RI Field Work	5-Oct-91	427.0 day	5-Dec-92
AWARD WORK	5-Oct-91	75.0 days	19-Dec-91
FW Mobilization	19-Dec-91	30.0 days	18-Jan-92
Do Field Work	18-Jan-92	187.0 day	23-Jul-92
Data Validation	23-Jul-92	45.0 days	6-Sep-92
Data Analysis	6-Sep-92	45.0 days	21-Oct-92
Gen D-PCSR	21-Oct-92	45.0 days	5-Dec-92
Review & Gen F-PCSR	5-Dec-92	89.0 days	4-Mar-93
Transmit D-PCSR	5-Dec-92	7.0 days	12-Dec-92
AGENCY REVIEW	12-Dec-92	30.0 days	11-Jan-93
Agency Transmits RCs	11-Jan-93	7.0 days	18-Jan-93
Navy Rvs RCs, Gen F-Rpt	18-Jan-93	45.0 days	4-Mar-93
Additional RI Field Wk.	4-Mar-93	1.0 day	5-Mar-93
NUMERICAL MODELING	5-Oct-91	472.0 day	19-Jan-93
AWARD WORK	5-Oct-91	75.0 days	19-Dec-91
Phase I NM Tasks	19-Dec-91	150.0 day	17-May-92
Phase II NM Tasks	21-Oct-92	60.0 days	20-Dec-92
Gen DNM Rpt.	20-Dec-92	30.0 days	19-Jan-93
Review & Gen F-NMRpt.	19-Jan-93	89.0 days	18-Apr-93

Task Name	Start Date	Duration	End Date
Transmit D-PCSR	19-Jan-93	7.0 days	26-Jan-93
AGENCY REVIEW	26-Jan-93	30.0 days	25-Feb-93
Agency Transmits RCs	25-Feb-93	7.0 days	4-Mar-93
Navy Rvs RCs, Gen F-Rpt	4-Mar-93	45.0 days	18-Apr-93
BASELINE RISK ASSESSMENT	5-Oct-91	479.0 day	26-Jan-93
AWARD WORK	5-Oct-91	75.0 days	19-Dec-91
Phase I BLRA Tasks	19-Dec-91	150.0 day	17-May-92
Phase II BLRA Tasks	21-Oct-92	60.0 days	20-Dec-92
PREPARE DRFT BASELINE	20-Dec-92	30.0 days	19-Jan-93
SUBMIT DRAFT BASELINE	19-Jan-93	7.0 days	26-Jan-93
Transmit D-BLRA	19-Jan-93	0.0	19-Jan-93
Gen Final BRA	26-Jan-93	254.0 day	7-Oct-93
AGENCY REVIEW	26-Jan-93	90.0 days	26-Apr-93
NAVY RECVS COMMENTS	26-Apr-93	7.0 days	3-May-93
NAVY R ON RCs	3-May-93	60.0 days	2-Jul-93
NAVY MAIL R ON RCs	2-Jul-93	7.0 days	9-Jul-93
PREPARE DRAFT/FINAL	2-Jul-93	60.0 days	31-Aug-93
SUBMIT DRAFT/FINAL	31-Aug-93	7.0 days	7-Sep-93
BASELINE FINALIZED	7-Sep-93	30.0 days	7-Oct-93
DF-BLRA RPT Transmit.	31-Aug-93	0.0	31-Aug-93
RI REPORT GENERATION	5-Oct-91	539.0 day	27-Mar-93
AWARD WORK	5-Oct-91	75.0 days	19-Dec-91
WORK RI TASKS	19-Dec-91	232.0 day	7-Aug-92
Develop Draft RI Rpt.	19-Jan-93	60.0 days	20-Mar-93
SUBMIT DRAFT RI RPT	20-Mar-93	7.0 days	27-Mar-93
DRAFT RI RPT DLVD	27-Mar-93	0.0	27-Mar-93
GEN FINAL RI RPT	27-Mar-93	254.0 day	6-Dec-93
AGENCY REVIEW	27-Mar-93	90.0 days	25-Jun-93

Task Name	Start Date	Duration	End Date
NAVY RECVS COMMENTS	25-Jun-93	7.0 days	2-Jul-93
NAVY R on RCs	2-Jul-93	60.0 days	31-Aug-93
NAVY MAILS COMENTS	31-Aug-93	7.0 days	7-Sep-93
PREPARE DRAFT/FINAL	31-Aug-93	60.0 days	30-Oct-93
SUBMIT DRAFT/FINAL	30-Oct-93	7.0 days	6-Nov-93
RI REPORT FINALIZED	6-Nov-93	30.0 days	6-Dec-93
RI Finalized	6-Dec-93	0.0	6-Dec-93
TREATABILITY STUDY	5-Oct-91	478.0 day	25-Jan-93
AWARD WORK Plan Gen	5-Oct-91	75.0 days	19-Dec-91
Gen Work Plans	19-Dec-91	45.0 days	2-Feb-92
Award T/T WP	2-Feb-92	75.0 days	17-Apr-92
PERFORM TREATABILITY	17-Apr-92	150.0 day	14-Sep-92
Gen. D-T/T Rpt.	14-Sep-92	45.0 days	29-Oct-92
SUBMIT DRFT TREAT	29-Oct-92	7.0 days	5-Nov-92
AGENCY REVIEW	5-Nov-92	30.0 days	5-Dec-92
AGENCY MAILS RCs	5-Dec-92	7.0 days	12-Dec-92
NAVY Assess RCs	5-Dec-92	14.0 days	19-Dec-92
NAVY SENDS R OF RCs	19-Dec-92	7.0 days	26-Dec-92
TREAT STDY FINALIZED	26-Dec-92	30.0 days	25-Jan-93
FEASIBILITY STUDY	5-Oct-91	539.0 day	27-Mar-93
AWARD WORK	5-Oct-91	75.0 days	19-Dec-91
DO FS WORK TASKS	19-Dec-91	360.0 day	13-Dec-92
GEN. DRAFT FS RPT	19-Jan-93	60.0 days	20-Mar-93
SUBMIT DRAFT FS	20-Mar-93	7.0 days	27-Mar-93
DRAFT FS RPT DLVD	27-Mar-93	0.0	27-Mar-93
GEN FINAL FS RPT	27-Mar-93	254.0 day	6-Dec-93
AGENCY REVIEW	27-Mar-93	90.0 days	25-Jun-93
NAVY RECVS COMMENTS	25-Jun-93	7.0 days	2-Jul-93

Task Name	Start Date	Duration	End Date
NAVY R of RCs	2-Jul-93	60.0 days	31-Aug-93
NAVY Mail R of RCs	31-Aug-93	7.0 days	7-Sep-93
PREPARE DRFT/FINAL	31-Aug-93	60.0 days	30-Oct-93
SUBMIT DRAFT/FINAL	30-Oct-93	7.0 days	6-Nov-93
FS RPT goes final	6-Nov-93	30.0 days	6-Dec-93
FS Finalized	6-Dec-93	0.0	6-Dec-93
PROPOSED PLAN	6-Dec-93	142.0 day	27-Apr-94
AWARD PP & ROD WORK	6-Dec-93	75.0 days	19-Feb-94
PREPARE PP	19-Feb-94	60.0 days	20-Apr-94
SUBMIT DRAFT PP	20-Apr-94	7.0 days	27-Apr-94
DPP ISSUED	27-Apr-94	0.0	27-Apr-94
GEN FINAL PP	27-Apr-94	254.0 day	6-Jan-95
AGENCY REVIEW	27-Apr-94	90.0 days	26-Jul-94
AGENCY MAILS COMMENTS	26-Jul-94	7.0 days	2-Aug-94
NAVY R of RCs	2-Aug-94	60.0 days	1-Oct-94
NAVY MAILS COMENTSS	1-Oct-94	7.0 days	8-Oct-94
PREPARE DRAFT/FINAL	1-Oct-94	60.0 days	30-Nov-94
SUBMIT DRAFT/FINAL	30-Nov-94	7.0 days	7-Dec-94
PP goes final	7-Dec-94	30.0 days	6-Jan-95
PP FINAL ISSUED	6-Jan-95	0.0	6-Jan-95
PP PUB. MTG.	6-Jan-95	90.0 days	6-Apr-95
PREP PUB. MTG NOTICE	6-Jan-95	15.0 days	21-Jan-95
PUBLISH MTG NOTICE	21-Jan-95	30.0 days	20-Feb-95
COMMENTS FROM PUBLIC	20-Feb-95	45.0 days	6-Apr-95
PP Finalized	6-Apr-95	0.0	6-Apr-95
GEN DRAFT ROD	6-Apr-95	112.0 day	27-Jul-95
GEN RESPON. SUM	6-Apr-95	45.0 days	21-May-95
Review Pub Comments	6-Apr-95	15.0 days	21-Apr-95

Task Name	Start Date	Duration	End Date
Gen Summary	21-Apr-95	30.0 days	21-May-95
PREPARE DRAFT ROD	21-May-95	60.0 days	20-Jul-95
NAVY MAILS DROD	20-Jul-95	7.0 days	27-Jul-95
DRAFT ROD SUBMITTED	27-Jul-95	0.0	27-Jul-95
GEN FINAL ROD	27-Jul-95	254.0 day	6-Apr-96
AGENCY REVIEW	27-Jul-95	90.0 days	25-Oct-95
AGENCY MAILS COMMENTS	25-Oct-95	7.0 days	1-Nov-95
NAVY R of RCs	1-Nov-95	60.0 days	31-Dec-95
NAVY COMENTS mailed	31-Dec-95	7.0 days	7-Jan-96
NAVY GEN DFinal	31-Dec-95	60.0 days	29-Feb-96
NAVY mails DFinal	29-Feb-96	7.0 days	7-Mar-96
ROD GOES FINAL	7-Mar-96	30.0 days	6-Apr-96
ROD FINALIZED	6-Apr-96	0.0	6-Apr-96
ROD OFFICIAL	6-Apr-96	46.0 days	22-May-96
ROD SIGNATURE	6-Apr-96	1.0 day	7-Apr-96
PREP PUB. NOTICE	7-Apr-96	15.0 days	22-Apr-96
PUBLISH NOTICE	22-Apr-96	30.0 days	22-May-96
ROD FINAL & OFFICIAL	22-May-96	0.0	22-May-96

B. RI/FS Operable Unit #2 : The Wastewater Treatment Area PSCs

Description :

An area on the Northwest end of the air station comprising six PSCs: 2 - Fire Fighting Training Area, 3 - Ex-Sludge Disposal Area, 4 - Pine Tree Planting Area, 41 - Ex-Domestic Sludge Drying Beds, 42 - Ex-Polishing Pond, and 43 - Ex-IWTP Sludge Drying Beds. The area is the location of the stations domestic and industrial wastewater plants, is bounded on the north by the St. Johns River and, even though relatively flat, is a hydrologic high. The area's groundwater has known contamination consisting of industrial solvents and heavy metals. No direct exposure threat presently exists to public health or the environment.

1992 Primary Deliverables :	Due Dates :
Draft RI/FS Work Plan	19 April, 1992
[Agency Review Comments]	90 Days after receipt of document
Final RI/FS Work Plan	120 Days after reciept of review comments

1992 Secondary Deliverables :	Target Dates
OU#2 RI/FS Sampling & Analysis Plan	19 April, 1992
OU#2 RI/FS Health and Safety Plan	19 April, 1992
[Agency Review Comments]	30 Days after reciept of document

Projected 1993 Primary Deliverables :	Projected Due Dates
-- NONE --	-- NONE --

** : Action occurs unless Dispute Resolution evoked by one of the three FAA Parties

Schedule Name : SMP Work Schedule for OU# 2
Responsible : US NAVY
As-of Date : 1-Oct-91 Schedule File : OU29293A

The proposed FFA CERCLA schedule for response actions at OU#2, Wastewater Treatment Area.

Task Name	Start Date	Duration	End Date
GEN Draft RI/FS WP	1-Oct-91	187.0 day	26-Apr-92
AWARD WORK	1-Oct-91	75.0 days	20-Dec-91
Develop Rough WP	20-Dec-91	30.0 days	3-Feb-92
NAVY Review Rough	3-Feb-92	30.0 days	5-Mar-92
Gen Draft WP	5-Mar-92	45.0 days	19-Apr-92
NAVY Mail Draft RI/FSWP	19-Apr-92	7.0 days	26-Apr-92
Draft RI/FS WP Issued	19-Apr-92	0.0	19-Apr-92
Gen Final RI/FS WP	26-Apr-92	254.0 day	26-Jan-93
Agency R&C Draft WP	26-Apr-92	90.0 days	27-Jul-92
AGENCY MAIL RCs	27-Jul-92	7.0 days	3-Aug-92
NAV ASSESS R&C	3-Aug-92	60.0 days	3-Oct-92
NAVY MAIL R OF RCs	3-Oct-92	7.0 days	10-Oct-92
NAVY GEN FINAL RI/FS WP	3-Oct-92	60.0 days	7-Dec-92
NAVY MAILS DFINAL	7-Dec-92	7.0 days	14-Dec-92
RI/FS WP GOES FINAL	14-Dec-92	30.0 days	26-Jan-93
RI/FS WP FINALIZED	26-Jan-93	0.0	26-Jan-93
RI Field Work	10-Jan-93	427.0 day	8-Apr-94
AWARD WORK	10-Jan-93	75.0 days	28-Mar-93
FW Mobilization	28-Mar-93	30.0 days	27-Apr-93
Do Field Work	27-Apr-93	187.0 day	4-Nov-93
Data Analysis	4-Nov-93	45.0 days	6-Jan-94

Task Name	Start Date	Duration	End Date
Data Validation	6-Jan-94	45.0 days	22-Feb-94
Gen D-PCSR	22-Feb-94	45.0 days	8-Apr-94
Review & Gen F-PCSR	8-Apr-94	89.0 days	8-Jul-94
Transmit D-PCSR	8-Apr-94	7.0 days	15-Apr-94
AGENCY REVIEW	15-Apr-94	30.0 days	15-May-94
Agency Transmits RCs	15-May-94	7.0 days	22-May-94
Navy Rvs RCs, Gen F-Rpt	22-May-94	45.0 days	8-Jul-94
Additional RI Field Wk.	8-Jul-94	1.0 day	9-Jul-94
NUMERICAL MODELING	10-Jan-93	472.0 day	23-May-94
AWARD WORK	10-Jan-93	75.0 days	28-Mar-93
Phase I NM Tasks	28-Mar-93	150.0 day	27-Aug-93
Phase II NM Tasks	22-Feb-94	60.0 days	23-Apr-94
Gen DNM Rpt.	23-Apr-94	30.0 days	23-May-94
Review & Gen F-NMRpt.	23-May-94	89.0 days	22-Aug-94
Transmit D-PCSR	23-May-94	7.0 days	31-May-94
AGENCY REVIEW	31-May-94	30.0 days	30-Jun-94
Agency Transmits RCs	30-Jun-94	7.0 days	8-Jul-94
Navy Rvs RCs, Gen F-Rpt	8-Jul-94	45.0 days	22-Aug-94
BASELINE RISK ASSESSMENT	10-Jan-93	479.0 day	31-May-94
AWARD WORK	10-Jan-93	75.0 days	28-Mar-93
Phase I BLRA Tasks	28-Mar-93	150.0 day	27-Aug-93
Phase II BLRA Tasks	22-Feb-94	60.0 days	23-Apr-94
PREPARE DRFT BASELINE	23-Apr-94	30.0 days	23-May-94
SUBMIT DRAFT BASELINE	23-May-94	7.0 days	31-May-94
Transmit D-BLRA	23-May-94	0.0	23-May-94
Gen Final BRA	31-May-94	254.0 day	2-Mar-95
AGENCY REVIEW	31-May-94	90.0 days	30-Aug-94
NAVY RECVS COMMENTS	30-Aug-94	7.0 days	7-Sep-94

Task Name	Start Date	Duration	End Date
NAVY R ON RCs	7-Sep-94	60.0 days	7-Nov-94
NAVY MAIL R ON RCs	7-Nov-94	7.0 days	15-Nov-94
PREPARE DRAFT/FINAL	7-Nov-94	60.0 days	23-Jan-95
SUBMIT DRAFT/FINAL	23-Jan-95	7.0 days	30-Jan-95
BASELINE FINALIZED	30-Jan-95	30.0 days	2-Mar-95
D-BLRA RPT Transmit.	23-Jan-95	0.0	23-Jan-95
DRAFT RI RPT DLVD	31-Jul-94	0.0	31-Jul-94
RI REPORT GENERATION	10-Jan-93	539.0 day	31-Jul-94
AWARD WORK	10-Jan-93	75.0 days	28-Mar-93
WORK RI TASKS	28-Mar-93	232.0 day	20-Nov-93
Develop Draft RI Rpt.	23-May-94	60.0 days	24-Jul-94
SUBMIT DRAFT RI RPT	24-Jul-94	7.0 days	31-Jul-94
GEN FINAL RI RPT	31-Jul-94	254.0 day	25-May-95
AGENCY REVIEW	31-Jul-94	90.0 days	31-Oct-94
NAVY RECVS COMMENTS	31-Oct-94	7.0 days	7-Nov-94
NAVY R on RCs	7-Nov-94	60.0 days	23-Jan-95
NAVY MAILS COMENTS	23-Jan-95	7.0 days	30-Jan-95
PREPARE DRAFT/FINAL	23-Jan-95	60.0 days	4-Apr-95
SUBMIT DRAFT/FINAL	4-Apr-95	7.0 days	13-Apr-95
RI REPORT FINALIZED	13-Apr-95	30.0 days	25-May-95
RI Finalized	25-May-95	0.0	25-May-95
TREATABILITY STUDY	10-Jan-93	478.0 day	29-May-94
AWARD WORK Plan Gen	10-Jan-93	75.0 days	28-Mar-93
Gen Work Plans	28-Mar-93	45.0 days	12-May-93
Award T/T WP	12-May-93	75.0 days	28-Jul-93
PERFORM TREATABILITY	28-Jul-93	150.0 day	14-Jan-94
Gen. D-T/T Rpt.	14-Jan-94	45.0 days	2-Mar-94
SUBMIT DRFT TREAT	2-Mar-94	7.0 days	9-Mar-94

Task Name	Start Date	Duration	End Date
AGENCY REVIEW	9-Mar-94	30.0 days	8-Apr-94
AGENCY MAILS RCs	8-Apr-94	7.0 days	15-Apr-94
NAVY Assess RCs	15-Apr-94	14.0 days	29-Apr-94
NAVY SENDS R OF RCs	29-Apr-94	7.0 days	6-May-94
TREAT STDY FINALIZED	29-Apr-94	30.0 days	29-May-94
FEASIBILITY STUDY	10-Jan-93	539.0 day	31-Jul-94
AWARD WORK	10-Jan-93	75.0 days	28-Mar-93
DO FS WORK TASKS	28-Mar-93	360.0 day	16-Apr-94
GEN. DRAFT FS RPT	23-May-94	60.0 days	24-Jul-94
SUBMIT DRAFT FS	24-Jul-94	7.0 days	31-Jul-94
DRAFT FS RPT DLVD	31-Jul-94	0.0	31-Jul-94
GEN FINAL FS RPT	31-Jul-94	254.0 day	25-May-95
AGENCY REVIEW	31-Jul-94	90.0 days	31-Oct-94
NAVY RECVS COMMENTS	31-Oct-94	7.0 days	7-Nov-94
NAVY R of RCs	7-Nov-94	60.0 days	23-Jan-95
NAVY Mail R of RCs	23-Jan-95	7.0 days	30-Jan-95
PREPARE DRFT/FINAL	23-Jan-95	60.0 days	4-Apr-95
SUBMIT DRAFT/FINAL	4-Apr-95	7.0 days	13-Apr-95
FS RPT goes final	13-Apr-95	30.0 days	25-May-95
FS Finalized	25-May-95	0.0	25-May-95
PROPOSED PLAN	25-May-95	142.0 day	19-Dec-95
AWARD PP & ROD WORK	25-May-95	75.0 days	12-Sep-95
PREPARE PP	12-Sep-95	60.0 days	8-Dec-95
SUBMIT DRAFT PP	8-Dec-95	7.0 days	19-Dec-95
DPP ISSUED	19-Dec-95	0.0	19-Dec-95
GEN FINAL PP	19-Dec-95	254.0 day	23-Dec-96
AGENCY REVIEW	19-Dec-95	90.0 days	29-Apr-96
AGENCY MAILS COMMENTS	29-Apr-96	7.0 days	8-May-96

Task Name	Start Date	Duration	End Date
NAVY R of RCs	8-May-96	60.0 days	2-Aug-96
NAVY MAILS COMENTSS	2-Aug-96	7.0 days	13-Aug-96
PREPARE DRAFT/FINAL	2-Aug-96	60.0 days	29-Oct-96
SUBMIT DRAFT/FINAL	29-Oct-96	7.0 days	7-Nov-96
PP goes final	7-Nov-96	30.0 days	23-Dec-96
PP FINAL ISSUED	23-Dec-96	0.0	23-Dec-96
PP PUB. MTG.	23-Dec-96	90.0 days	2-May-97
PREP PUB. MTG NOTICE	23-Dec-96	15.0 days	15-Jan-97
PUBLISH MTG NOTICE	15-Jan-97	30.0 days	28-Feb-97
COMMENTS FROM PUBLIC	28-Feb-97	45.0 days	2-May-97
PP Finalized	2-May-97	0.0	2-May-97
GEN DRAFT ROD	2-May-97	112.0 day	10-Oct-97
GEN RESPON. SUM	2-May-97	45.0 days	8-Jul-97
Review Pub Comments	2-May-97	15.0 days	23-May-97
Gen Summary	23-May-97	30.0 days	8-Jul-97
PREPARE DRAFT ROD	8-Jul-97	60.0 days	1-Oct-97
NAVY MAILS DROD	1-Oct-97	7.0 days	10-Oct-97
DRAFT ROD SUBMITTED	10-Oct-97	0.0	10-Oct-97
GEN FINAL ROD	10-Oct-97	254.0 day	16-Oct-98
AGENCY REVIEW	10-Oct-97	90.0 days	24-Feb-98
AGENCY MAILS COMMENTS	24-Feb-98	7.0 days	5-Mar-98
NAVY R of RCs	5-Mar-98	60.0 days	29-May-98
NAVY COMENTS mailed	29-May-98	7.0 days	9-Jun-98
NAVY GEN DFinal	29-May-98	60.0 days	24-Aug-98
NAVY mails DFinal	24-Aug-98	7.0 days	2-Sep-98
ROD GOES FINAL	2-Sep-98	30.0 days	16-Oct-98
ROD FINALIZED	16-Oct-98	0.0	16-Oct-98
ROD OFFICIAL	16-Oct-98	46.0 days	23-Dec-98

Task Name	Start Date	Duration	End Date
ROD SIGNATURE	16-Oct-98	1.0 day	19-Oct-98
PREP PUB. NOTICE	19-Oct-98	15.0 days	9-Nov-98
PUBLISH NOTICE	9-Nov-98	30.0 days	23-Dec-98
ROD FINAL & OFFICIAL	23-Dec-98	0.0	23-Dec-98

C. RI/FS Operable Unit #3 : The Industrial Area PSCs

Description :

An area on the east side of the air station comprising five PSCs: 11 - Hanger 101, 12 - Old Test Cell Building 101k, 13 - Radium Paint Waste Disposal Pit, 14 - Battery Shop, 15 - Ex-Solvent and Paint Sludge Disposal Area. The area is flat and adjacent to the St. Johns River. Located within this industrial complex is the Naval Aviation Depot and several helicopter squadrons. Previous studies have identified groundwater and subsurface soils contaminated with industrial solvents and heavy metals. No direct exposure threat presently exists to public health or the environment.

1992 Primary Documents :	Due Dates :
-- NONE --	-- NONE --
1992 Secondary Documents :	Target Dates :
-- NONE --	-- NONE --
Projected 1993 Primary Deliverables :	Projected Due Dates :
Draft RI/FS Work Plan	3 July, 1993
[Agency Review Comments]	90 Days after receipt of document
Final RI/FS Work Plan	120 Days after reciept of review comments

** : Action occurs unless Dispute Resolution evoked by one of the three FAA Parties

Schedule Name : SMP Work Schedule for OU# 3
Responsible : US NAVY
As-of Date : 27-Aug-91 Schedule File : OU39293C

The proposed FFA CERCLA schedule for response actions at OU#2, Wastewater Treatment Area.

Task Name	Start Date	Duration	End Date
GEN Draft RI/FS WP	4-Jan-93	187.0 day	10-Jul-93
AWARD WORK	4-Jan-93	75.0 days	20-Mar-93
Develop Rough WP	20-Mar-93	30.0 days	19-Apr-93
NAVY Review Rough	19-Apr-93	30.0 days	19-May-93
Gen Draft WP	19-May-93	45.0 days	3-Jul-93
NAVY Mail Draft RI/FSWP	3-Jul-93	7.0 days	10-Jul-93
Draft RI/FS WP Issued	3-Jul-93	0.0	3-Jul-93
Gen Final RI/FS WP	10-Jul-93	254.0 day	21-Mar-94
Agency R&C Draft WP	10-Jul-93	90.0 days	8-Oct-93
AGENCY MAIL RCs	8-Oct-93	7.0 days	15-Oct-93
NAV ASSESS R&C	15-Oct-93	60.0 days	14-Dec-93
NAVY MAIL R OF RCs	14-Dec-93	7.0 days	21-Dec-93
NAVY GEN FINAL RI/FS WP	14-Dec-93	60.0 days	12-Feb-94
NAVY MAILS DFINAL	12-Feb-94	7.0 days	19-Feb-94
RI/FS WP GOES FINAL	19-Feb-94	30.0 days	21-Mar-94
RI/FS WP FINALIZED	21-Mar-94	0.0	21-Mar-94
RI Field Work	6-Mar-94	427.0 day	7-May-95
AWARD WORK	6-Mar-94	75.0 days	20-May-94
FW Mobilization	20-May-94	30.0 days	19-Jun-94
Do Field Work	19-Jun-94	187.0 day	23-Dec-94
Data Analysis	23-Dec-94	45.0 days	6-Feb-95
Data Validation	6-Feb-95	45.0 days	23-Mar-95

Task Name	Start Date	Duration	End Date
Gen D-PCSR	23-Mar-95	45.0 days	7-May-95
Review & Gen F-PCSR	7-May-95	89.0 days	4-Aug-95
Transmit D-PCSR	7-May-95	7.0 days	14-May-95
AGENCY REVIEW	14-May-95	30.0 days	13-Jun-95
Agency Transmits RCs	13-Jun-95	7.0 days	20-Jun-95
Navy Rvs RCs, Gen F-Rpt	20-Jun-95	45.0 days	4-Aug-95
Additional RI Field Wk.	4-Aug-95	1.0 day	5-Aug-95
NUMERICAL MODELING	6-Mar-94	472.0 day	21-Jun-95
AWARD WORK	6-Mar-94	75.0 days	20-May-94
Phase I NM Tasks	20-May-94	150.0 day	17-Oct-94
Phase II NM Tasks	23-Mar-95	60.0 days	22-May-95
Gen DNM Rpt.	22-May-95	30.0 days	21-Jun-95
Review & Gen F-NMRpt.	21-Jun-95	89.0 days	18-Sep-95
Transmit D-PCSR	21-Jun-95	7.0 days	28-Jun-95
AGENCY REVIEW	28-Jun-95	30.0 days	28-Jul-95
Agency Transmits RCs	28-Jul-95	7.0 days	4-Aug-95
Navy Rvs RCs, Gen F-Rpt	4-Aug-95	45.0 days	18-Sep-95
BASELINE RISK ASSESSMENT	6-Mar-94	479.0 day	28-Jun-95
AWARD WORK	6-Mar-94	75.0 days	20-May-94
Phase I BLRA Tasks	20-May-94	150.0 day	17-Oct-94
Phase II BLRA Tasks	23-Mar-95	60.0 days	22-May-95
PREPARE DRFT BASELINE	22-May-95	30.0 days	21-Jun-95
SUBMIT DRAFT BASELINE	21-Jun-95	7.0 days	28-Jun-95
Transmit D-BLRA	21-Jun-95	0.0	21-Jun-95
Gen Final BRA	28-Jun-95	254.0 day	12-Mar-96
AGENCY REVIEW	28-Jun-95	90.0 days	26-Sep-95
NAVY RECVS COMMENTS	26-Sep-95	7.0 days	3-Oct-95
NAVY R ON RCs	3-Oct-95	60.0 days	2-Dec-95

Task Name	Start Date	Duration	End Date
NAVY MAIL R ON RCs	2-Dec-95	7.0 days	9-Dec-95
PREPARE DRAFT/FINAL	2-Dec-95	60.0 days	31-Jan-96
SUBMIT DRAFT/FINAL	31-Jan-96	7.0 days	7-Feb-96
BASELINE FINALIZED	7-Feb-96	30.0 days	12-Mar-96
D-BLRA RPT Transmit.	31-Jan-96	0.0	31-Jan-96
DRAFT RI RPT DLVD	27-Aug-95	0.0	27-Aug-95
RI REPORT GENERATION	6-Mar-94	539.0 day	27-Aug-95
AWARD WORK	6-Mar-94	75.0 days	20-May-94
WORK RI TASKS	20-May-94	232.0 day	7-Jan-95
Develop Draft RI Rpt.	21-Jun-95	60.0 days	20-Aug-95
SUBMIT DRAFT RI RPT	20-Aug-95	7.0 days	27-Aug-95
GEN FINAL RI RPT	27-Aug-95	254.0 day	5-Jun-96
AGENCY REVIEW	27-Aug-95	90.0 days	25-Nov-95
NAVY RECVS COMMENTS	25-Nov-95	7.0 days	2-Dec-95
NAVY R on RCs	2-Dec-95	60.0 days	31-Jan-96
NAVY MAILS COMENTS	31-Jan-96	7.0 days	7-Feb-96
PREPARE DRAFT/FINAL	31-Jan-96	60.0 days	12-Apr-96
SUBMIT DRAFT/FINAL	12-Apr-96	7.0 days	23-Apr-96
RI REPORT FINALIZED	23-Apr-96	30.0 days	5-Jun-96
RI Finalized	5-Jun-96	0.0	5-Jun-96
TREATABILITY STUDY	6-Mar-94	478.0 day	27-Jun-95
AWARD WORK Plan Gen	6-Mar-94	75.0 days	20-May-94
Gen Work Plans	20-May-94	45.0 days	4-Jul-94
Award T/T WP	4-Jul-94	75.0 days	17-Sep-94
PERFORM TREATABILITY	17-Sep-94	150.0 day	14-Feb-95
Gen. D-T/T Rpt.	14-Feb-95	45.0 days	31-Mar-95
SUBMIT DRFT TREAT	31-Mar-95	7.0 days	7-Apr-95
AGENCY REVIEW	7-Apr-95	30.0 days	7-May-95

Task Name	Start Date	Duration	End Date
AGENCY MAILS RCs	7-May-95	7.0 days	14-May-95
NAVY Assess RCs	14-May-95	14.0 days	28-May-95
NAVY SENDS R OF RCs	28-May-95	7.0 days	4-Jun-95
TREAT STDY FINALIZED	28-May-95	30.0 days	27-Jun-95
FEASIBILITY STUDY	6-Mar-94	539.0 day	27-Aug-95
AWARD WORK	6-Mar-94	75.0 days	20-May-94
DO FS WORK TASKS	20-May-94	360.0 day	15-May-95
GEN. DRAFT FS RPT	21-Jun-95	60.0 days	20-Aug-95
SUBMIT DRAFT FS	20-Aug-95	7.0 days	27-Aug-95
DRAFT FS RPT DLVD	27-Aug-95	0.0	27-Aug-95
GEN FINAL FS RPT	27-Aug-95	254.0 day	5-Jun-96
AGENCY REVIEW	27-Aug-95	90.0 days	25-Nov-95
NAVY RECVS COMMENTS	25-Nov-95	7.0 days	2-Dec-95
NAVY R of RCs	2-Dec-95	60.0 days	31-Jan-96
NAVY Mail R of RCs	31-Jan-96	7.0 days	7-Feb-96
PREPARE DRFT/FINAL	31-Jan-96	60.0 days	12-Apr-96
SUBMIT DRAFT/FINAL	12-Apr-96	7.0 days	23-Apr-96
FS RPT goes final	23-Apr-96	30.0 days	5-Jun-96
FS Finalized	5-Jun-96	0.0	5-Jun-96
PROPOSED PLAN	5-Jun-96	142.0 day	30-Dec-96
AWARD PP & ROD WORK	5-Jun-96	75.0 days	20-Sep-96
PREPARE PP	20-Sep-96	60.0 days	18-Dec-96
SUBMIT DRAFT PP	18-Dec-96	7.0 days	30-Dec-96
DPP ISSUED	30-Dec-96	0.0	30-Dec-96
GEN FINAL PP	30-Dec-96	254.0 day	5-Jan-98
AGENCY REVIEW	30-Dec-96	90.0 days	8-May-97
AGENCY MAILS COMMENTS	8-May-97	7.0 days	19-May-97
NAVY R of RCs	19-May-97	60.0 days	13-Aug-97

Task Name	Start Date	Duration	End Date
NAVY MAILS COMENTSS	13-Aug-97	7.0 days	22-Aug-97
PREPARE DRAFT/FINAL	13-Aug-97	60.0 days	7-Nov-97
SUBMIT DRAFT/FINAL	7-Nov-97	7.0 days	19-Nov-97
PP goes final	19-Nov-97	30.0 days	5-Jan-98
PP FINAL ISSUED	5-Jan-98	0.0	5-Jan-98
PP PUB. MTG.	5-Jan-98	90.0 days	13-May-98
PREP PUB. MTG NOTICE	5-Jan-98	15.0 days	27-Jan-98
PUBLISH MTG NOTICE	27-Jan-98	30.0 days	11-Mar-98
COMMENTS FROM PUBLIC	11-Mar-98	45.0 days	13-May-98
PP Finalized	13-May-98	0.0	13-May-98
GEN DRAFT ROD	13-May-98	112.0 day	22-Oct-98
GEN RESPON. SUM	13-May-98	45.0 days	17-Jul-98
Review Pub Comments	13-May-98	15.0 days	4-Jun-98
Gen Summary	4-Jun-98	30.0 days	17-Jul-98
PREPARE DRAFT ROD	17-Jul-98	60.0 days	13-Oct-98
NAVY MAILS DROD	13-Oct-98	7.0 days	22-Oct-98
DRAFT ROD SUBMITTED	22-Oct-98	0.0	22-Oct-98
GEN FINAL ROD	22-Oct-98	254.0 day	27-Oct-99
AGENCY REVIEW	22-Oct-98	90.0 days	5-Mar-99
AGENCY MAILS COMMENTS	5-Mar-99	7.0 days	16-Mar-99
NAVY R of RCs	16-Mar-99	60.0 days	9-Jun-99
NAVY COMENTS mailed	9-Jun-99	7.0 days	18-Jun-99
NAVY GEN DFinal	9-Jun-99	60.0 days	2-Sep-99
NAVY mails DFinal	2-Sep-99	7.0 days	14-Sep-99
ROD GOES FINAL	14-Sep-99	30.0 days	27-Oct-99
ROD FINALIZED	27-Oct-99	0.0	27-Oct-99
ROD OFFICIAL	27-Oct-99	46.0 days	5-Jan-00
ROD SIGNATURE	27-Oct-99	1.0 day	28-Oct-99

Task Name	Start Date	Duration	End Date
PREP PUB. NOTICE	28-Oct-99	15.0 days	19-Nov-99
PUBLISH NOTICE	19-Nov-99	30.0 days	5-Jan-00
ROD FINAL & OFFICIAL	5-Jan-00	0.0	5-Jan-00