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FINAL REMEDIAL INVESTIGATION FEASIBILITY STUDY WORK AND PROJECT MANAGEMENT PLAN FOR OPERABLE UNIT 3 (OU 3) VOLUME 7 OF 7 NAS JACKSONVILLE FL

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ABB ENVIRONMENTAL

NAVY INSTALLATION RESTORATION PROGRAM PLAN
NAVAL AIR STATION
JACKSONVILLE, FLORIDA

VOLUME 7

Remedial Investigation and Feasibility Study
Work and Project Management Plan for OU 3

Contract Task Order No. 076
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March 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

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The geological interpretations, engineering evaluations and professional opinions rendered in this Remedial Investigation and Feasibility Study Work and Project management Plan for Operable Unit 3, Naval Air Station Jacksonville, Florida, were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

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2/29/96

CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/076 is complete, accurate, and complies with all requirements of this contract.

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REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
WORK AND PROJECT MANAGEMENT PLAN
OPERABLE UNIT 3

NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Unit Identification Code: N00207

Contract No. N62467-89-D-0317

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FOREWORD

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

One of these programs is the Installation Restoration (IR) program. This program complies with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA), the Resource Conservation and Recovery Act (RCRA), and the Hazardous and Solid Waste Amendments (HSWA) of 1984. These acts establish the means to assess and clean up hazardous waste sites for both private-sector and Federal facilities. The CERCLA and SARA acts form the basis for what is commonly known as the Superfund program.

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

The IR program is conducted in several stages as follows:

- Preliminary Assessment (PA),
- Site Inspection (SI) (formerly the PA and SI steps were called the Initial Assessment Study (IAS) under the NACIP program),
- Remedial Investigation and Feasibility Study (RI/FS), and
- remedial design and remedial action (RD/RA).

The Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) manages and the U.S. Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP; formerly Florida Department of Environmental Regulation [FDER]) oversee the Navy environmental program at Naval Air Station (NAS) Jacksonville. All aspects of the program are conducted in compliance with State and Federal regulations, as ensured by the participation of these regulatory agencies.

Questions regarding the CERCLA program at NAS Jacksonville should be addressed to Dana Gaskins, Code 1857, at (803) 743-0628.

EXECUTIVE SUMMARY

The Naval Air Station (NAS) at Jacksonville, Florida, was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priority List (NPL) in December 1989. On October 23, 1990, NAS Jacksonville entered into a Federal Facility Agreement with the U.S. Environmental Protection Agency (USEPA) and the Florida Department of Environmental Regulation (FDER; now known as Florida Department of Environmental Protection ([FDEP]). Based on available information, several operable units (OUs) were formed to facilitate remedial response. This document augments the *Navy Installation Restoration Program Plan, Naval Air Station, Jacksonville, Florida; Volume I, Organization and Planning* (September 1991) and *Volume 4, The Basic Site Workplan* (September 1991), and presents the Remedial Investigation and Feasibility Study (RI/FS) workplan for OU 3 at NAS Jacksonville.

OU 3 is located in the eastern part of NAS Jacksonville, adjacent to the St. Johns River. The OU 3 area, consisting primarily of the Naval Aviation Depot (NADEP), includes six Potential Sources of Contamination (PSCs). Five of these PSCs (Sites 11, 12, 13, 14, and 15) were identified during the Initial Assessment Study (IAS) and are associated with past operations for the maintenance and rework of military aircraft. The sixth PSC (Site 48), associated with the facility's laundry and dry cleaning operations, was identified during the Scoping Study Field Program (SSFP) conducted in 1993.

Waste materials previously spilled or disposed at OU 3 reportedly include paint sludges, solvents, battery acids, and aviation fuels. Previous investigations have focused on individual locations either to assess the potential for a health threat during construction activities or as potential sources of soil or groundwater contamination. These investigations detected the presence of chlorinated volatile organic compounds and metals.

The objective of the RI/FS is to focus initially on these individual sites through the implementation of non-time-critical removal actions (following the administrative format of Engineering Evaluation and Cost Analysis [EE/CA]) to enable timely reductions of source areas, thus reducing risks, in addition to evaluating and remediating OU 3 as a whole.

This workplan describes an innovative and aggressive approach to collect site information in accordance with the USEPA's Superfund Accelerated Clean-up Model (SACM). To meet these objectives and increase the usage of non-time-critical removal actions to achieve prompt risk reduction at Superfund sites, a series of focused studies and interim remedial actions (IRAs) conducted under the administrative format of an EE/CA will be implemented with the resulting information integrated into the OU 3 overall RI/FS. This approach has been deemed appropriate by the OU 3 partnering team (consisting of the Navy, USEPA Region IV, FDEP, and ABB Environmental Services, Inc. [ABB-ES]) and includes the following key components:

- the establishment of characterization logic and decision rules to enable the collection of "sufficient" data to support risk and alternative evaluations for IRAs and the final remedies,

- the identification of appropriate presumptive remedies to enable streamlining of the alternative selection process, and

- the application of the observational approach that will identify and manage uncertainties through monitoring and the development of contingent actions to allow more flexibility in the program and ensure that remedial objectives are met.

Appendices to this document include an OU 3-specific, *Sampling and Analysis Plan* (Appendix M), which includes the *Quality Assurance Project Plan* and *Field Sampling Plan*, a *Health and Safety Plan* (Appendix N), and detailed information developed through the SSFP and previous studies.

ACKNOWLEDGMENTS

In preparing this report, ABB Environmental Services, Inc. (ABB-ES), acknowledges the support, assistance, and cooperation provided by the personnel at Naval Air Station (NAS) Jacksonville, Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), and Florida Department of Environmental Protection. In particular, we acknowledge the assistance provided by the following people in the preparation of this report.

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
AFCEE	Air Force Center for Environmental Excellence
AOC	area of contamination
APEG	alkali polyethylene glycol
ARAR	applicable or relevant and appropriate requirements
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AVGAS	aviation gasoline
AWQC	Ambient Water Quality Criteria
BHC	benzene hexachloride
bls	below land surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
cm	centimeter
cm/sec	centimeters per second
CPC	chemical of potential concern
CPT	cone penetrometer test
CRQL	contract required quantitation limit
CSF	cancer slope factor
°C	degrees Celsius
DCA	dichloroethane
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DNAPLs	dense nonaqueous phase liquids
DOD	Department of Defense
DOE	Department of Energy
DPT	direct push technology
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
°F	degrees Fahrenheit
ECPC	ecological contaminants of potential concern
EDWTP	East Domestic Waste Treatment Plant
EE/CA	engineering evaluation and cost analysis
eV	electron-volt
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FDER	Florida Department of Environmental Regulation
FFA	Federal Facility Agreement
FID	flame ionization detector
FIRM	Facility Installation Restoration Manager
FOL	Field Operations Leader

GLOSSARY (Continued)

FOTW	Federally Owned Treatment Works
FS	Feasibility Study
FSP	Field Sampling Plan
ft/s	feet per second
GAC	granular activated carbon
GC	gas chromatograph
G&M	Geraghty & Miller
gpm	gallons per minute
GPS	Global Positioning System
HASP	Health and Safety Plan
HI	Hazard Index
HQ	Hazard Quotient
HSO	Health and Safety Officer
IAS	Initial Assessment Study
IR	Installation Restoration
IRA	Interim Removal Action
IRIS	Integrated Risk Information System
KPEG	potassium polyethylene glycol
kg/day	kilogram per day
lb/ft^3	pounds per cubic feet
ℓ/day	liters per day
MCLs	maximum contaminant levels
MCLGs	maximum contaminant level goals
mg/kg	milligrams per kilogram
mg/kgBW	milligrams per kilogram of body weight
mg/kg/day	milligrams per kilogram per day
mg/ℓ	milligrams per liter
mm Hg	millimeters of mercury
mR/hr	millirems per hour
MS	mass spectroscopy
msl	mean sea level
μmhos/cm	micromhos per centimeter
μg/g	micrograms per gram
μg/kg	micrograms per kilogram
NACIP	Naval Assessment and Control of Installation Pollutants
NADEP	Naval Aviation Depot
NARF	Naval Air Rework Facility
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NIRP	Navy Installation Restoration Program
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List

O&M	operation and maintenance
OU	operable unit
OVA	organic vapor analyzer
PA	Preliminary Assessment
PAH	polynuclear aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
pCi/ℓ	picocuries per liter
PDE	potential dietary exposure
PID	photoionization detector
PP	Proposed Plan
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
PRGs	preliminary remediation goals
PRP	potential responsible party
PSC	potential source of contamination
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
RA	Risk Assessment
RCRA	Resource Conservation and Recovery Act
RGOs	remedial goal options
RI/FS	Remedial Investigation and Feasibility Study
RfD	reference dose
ROD	Record of Decision
RPM	Remedial Project Manager
RTV	Reference toxicity values
SACM	Superfund Accelerated Cleanup Model
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SAV	submerged aquatic vegetation
SI	Site Inspection
SOUTHNAV-FACENGCOM	Southern Division, Naval Facilities Engineering Command
SSFP	Scoping Study Field Program
SVOC	semivolatile organic compound
TAL	target analyte list
TBC	to be considered
TCA	trichloroethane
TCE	trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TCL	target compound list

GLOSSARY (Continued)

TKN	total kjeldahl nitrogen
TOC	total organic compound
TOM	Task Order Manager
TPH	total petroleum hydrocarbon
TSF	tons per square feet
UCL	upper confidence limit
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank
UV	ultraviolet
VOC	volatile organic compound

1.0 INTRODUCTION

The Naval Air Station (NAS) at Jacksonville, Florida (see Figure 1-1), was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priority List (NPL) in December 1989. As an NPL site, remedial response at NAS Jacksonville must be consistent with the guidelines that are specified in Section 120 (42 United States Code [USC] 9620) of the Superfund Amendments and Reauthorization Act (SARA) of 1986, which addresses the applicability of CERCLA to the Federal government. On October 23, 1990, NAS Jacksonville entered into a Federal Facility Agreement (FFA) with the U.S. Environmental Protection Agency (USEPA) and the Florida Department of Environmental Regulation (FDER; known as the Florida Department of Environmental Protection [FDEP] since July 1993). Based on available information, several operable units (OUs) were formed to facilitate remedial response.

This document presents the Remedial Investigation and Feasibility Study (RI/FS) workplan for OU 3 at NAS Jacksonville. The document is the seventh volume of the Navy Installation Restoration (IR) program plan, a compendium of management plans that are designed to support all of the components of the remedial response process at NAS Jacksonville. The RI/FS workplan documents the activities to be conducted under a CERCLA and naval IR program at OU 3. This workplan presents the current setting and nature of contamination, risk and technology screening information to focus response actions, and a comprehensive "blueprint" for future response at OU 3. Appendicized documents to the project workplan include: the Quality Assurance Project Plan (QAPP), Appendix M-1; the Field Sampling Plan (FSP), Appendix M-2; and the Health and Safety Plan (HASP), Appendix N.

1.1 RESPONSE RATIONALE AND APPROACH. This section introduces key material that is associated with the development and implementation of remedial response plans for OU 3. Introductory material is presented about established Superfund policy and program information that is pertinent to establishing the rationale and framework of the response approach for OU 3. Following this, the specific methodology for response activities at OU 3 is introduced.

1.1.1 Emerging Response Initiatives In September 1992, the USEPA (1992b) introduced the Superfund Accelerated Cleanup Model (SACM). SACM is designed to streamline site cleanups and to quickly reduce site risks. The SACM framework (USEPA, 1992a), depicted on Figure 1-2, for streamlining assessment and remedial activities includes:

- **initial screening assessment** that combines, as appropriate, the traditional elements of site characterization and risk, remediation, and removal assessments;

- **early removal and remedial actions** focus on risk reduction primarily through source control by non-time critical removal actions using the administrative format of engineering evaluation and cost analysis (EE/CA);

- **long-term remedial actions** for media (e.g., groundwater) expected to require more than 5 years for restoration; and

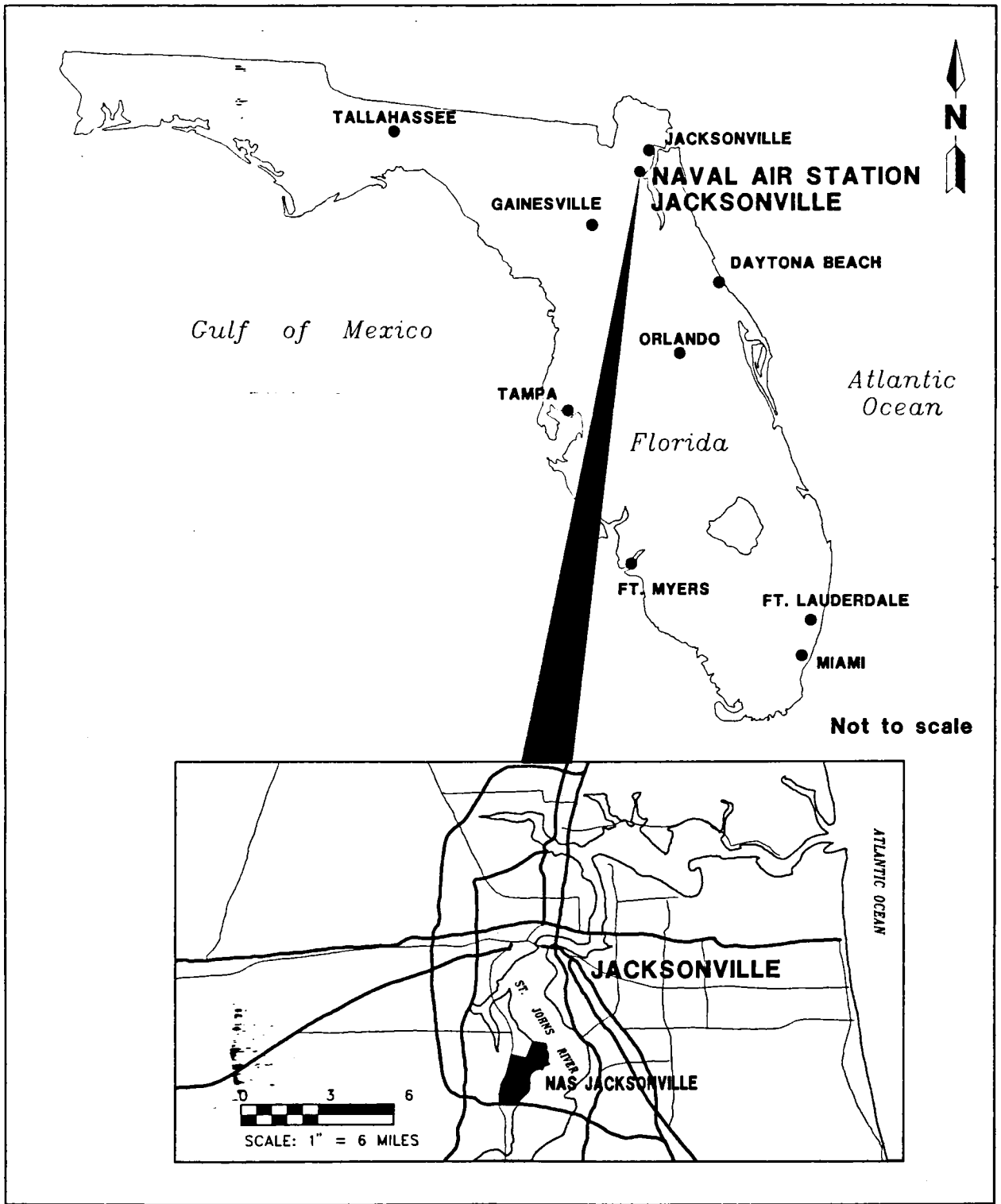


FIGURE 1-1
FACILITY LOCATION MAP

JAX/JAXSITE/DRM-WDW-NP/03-27-95

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

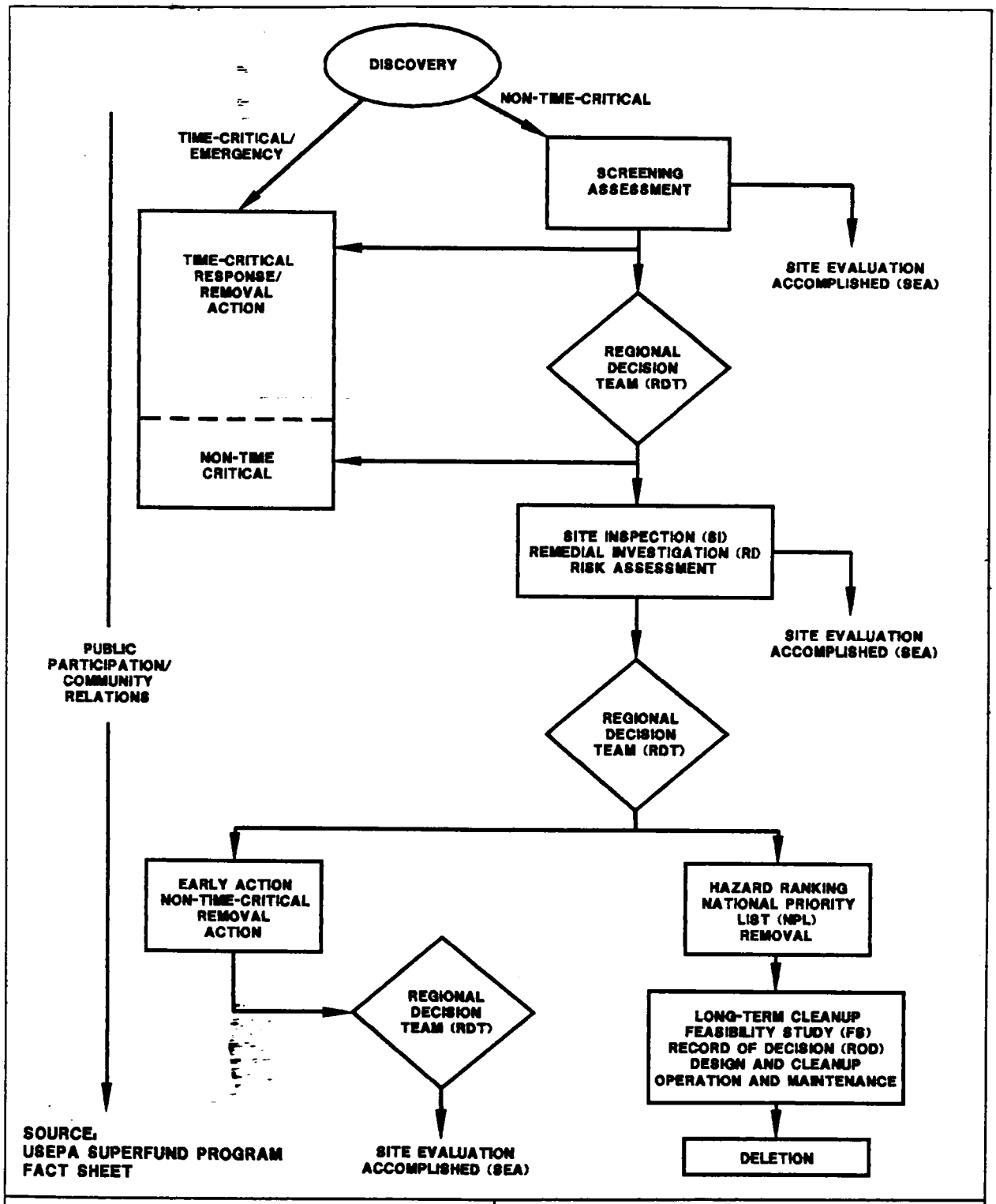


FIGURE 1-2
THE SUPERFUND ACCELERATED CLEANUP MODEL ASSESSMENT APPROACH

SACM/DRM/12-9-93

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

- **presumptive remedies** to streamline and focus removal actions, site studies, and cleanup actions, using preferred technologies for particular site conditions as identified by USEPA from past experience on NPL sites, thereby improving consistency, reducing costs, and increasing the speed with which sites are remediated.

The process integrates the traditional site assessment functions into a single continuous activity that proceeds until all of the necessary data are collected to support action at the site. Under SACM, response activities can begin as soon as evidence indicates that a response action is appropriate. In this manner, sites that pose the greatest threat can be quickly addressed.

To achieve the goals of SACM, uncertainties inherent in the RI/FS process must be recognized in the work planning phase. A common misconception is that uncertainties can be reduced early in the life of the project. It is reasoned that time and resources invested during the investigation and study phase can yield a high degree of certainty in the expected results, thus preventing large expenses later. However, it has been demonstrated in previous Superfund projects that major technical uncertainties exist in all key components of hazardous waste site characterization and remediation. There remains uncertainty in characterizing the affected media, predicting contaminant fate and transport, assessing risk, and predicting technology performance.

Uncertainty need not handicap a project as long as it is recognized as a factor from the beginning and as long as it is possible to observe and contiguously test the working model of the site as implementation proceeds. The observational approach relies on robust and flexible designs that can be modified during implementation to meet conditions as they are encountered. It is far safer to recognize uncertainty and plan for it than to assume that state-of-the-art technology will make highly accurate predictions and provide the necessary answers. It is this premise that has spawned programs such as SACM and related concepts including presumptive remedies.

The observational approach recognizes that complete characterization is not possible or necessary and, therefore, it will be necessary to manage remaining uncertainties. This approach emphasizes the collection of data to support decisions.

Anticipated benefits from this approach include:

- maximizing the effectiveness of resources allocated to the project,
- reducing the amount of time to complete site assessment and remedial action, and
- improving decision making by collecting data only as required to support risk-based management determinations.

<u>1.1.2 Operable Unit (OU) 3 Response Approach</u> The objective of this workplan is to define the process, procedures, and schedule for determining appropriate response actions to address conditions within OU 3. The approach that will be used incorporates current Superfund strategies (Start Initiative, SACM, etc.) to streamline the site evaluation and risk reduction process along with the observational approach. It will focus resources to achieve reduced risk at

specific high-risk areas or zones within OU 3 that warrant accelerated threat reduction actions or Interim Removal Action (IRA). The response approach at OU 3 is illustrated on Figure 1-3.

The response approach uses the existing chemical database that was developed based on data supplied from past investigations at NAS Jacksonville. In addition, significant site characterization work has been completed as part of the RI/FS planning process. The Scoping Study Field Program (SSFP) significantly advanced the understanding of the environmental setting and contaminant profile at OU 3. The data derived during the scoping field work, along with the existing chemical database, were used to develop this workplan.

All sampling conducted as part of the SSFP was completed using an OU 3-wide sampling grid (Figure 1-4) to initiate quantitation of environmental setting and quality using a symmetrical statistical distribution. In addition, the grid system pictured on Figure 1-4 is used to correlate both historical and SSFP data and identify the location of previous sampling points in later sections of this workplan.

Key components of the workplan development process include the following.

- Initial activities include a situational analysis and problem definition, risk screening, and remediation screening. The results of these initial activities have been presented to the OU 3 partnering team (which consists of Navy [Southern Division, Facilities Engineering Command, SOUTHNAVFACENGCOM and NAS Jacksonville], USEPA Region IV, FDEP, and ABB Environmental Services, Inc. [ABB-ES], personnel) via multiple meetings.

- Based on the results of these meetings and the consensus of the team a response approach has been developed.

The key features of this response approach include:

- development of characterization logic and decision rules to evaluate if a removal action(s) is warranted within OU 3 (see Figures 1-5 and 1-6);

- an onsite decision-based approach to collecting sufficient data to define the nature, extent, and fate of contaminants;

- identification of presumptive remedies to ensure the collection of appropriate data for streamlining IRAs and the FS, and allowing for the integration of the two consistent with SACM and the observational approach; and

- identification of IRAs (accelerated threat reduction actions) through non-time critical removal actions that could be expedited prior to overall site remediation to shorten response time.

1.1.2.1 **Overview of Preliminary Risk Screening** Chapter 3.0 describes in detail how risk screening was conducted. Based on the OU 3 site model, zones of contamination were identified that were each evaluated for risk, the magnitude of which was used in making an initial determination of the kind of response that will be undertaken. Risk screening was performed by identifying the principle exposure pathways and then comparing contaminant concentrations to chemical-

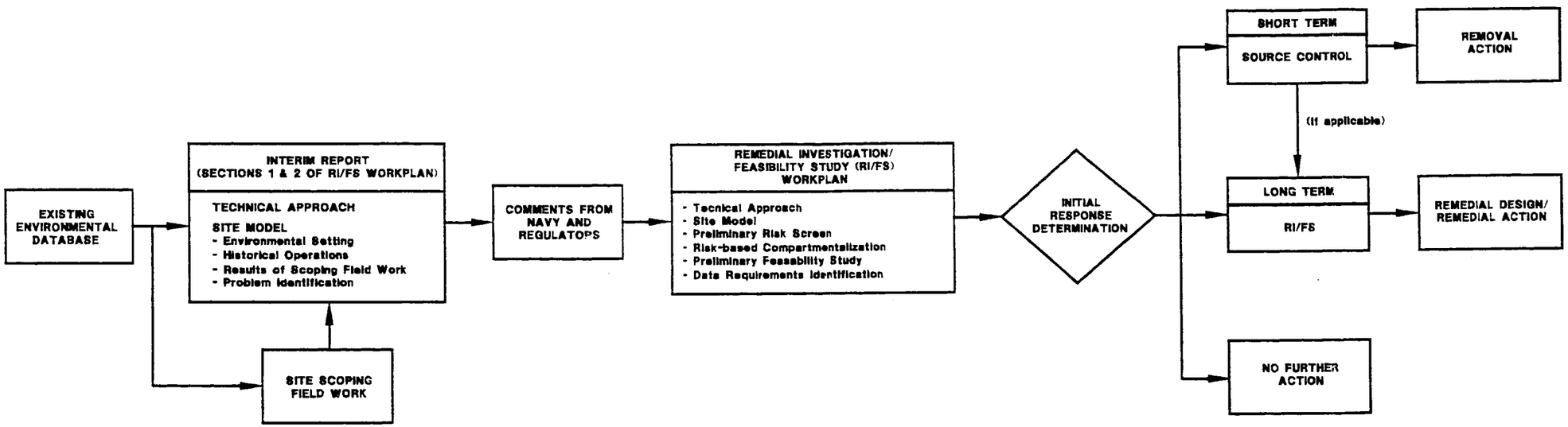


FIGURE 1-3
RESPONSE APPROACH DIAGRAM

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

RESPONSE2/DRM/08-23-94

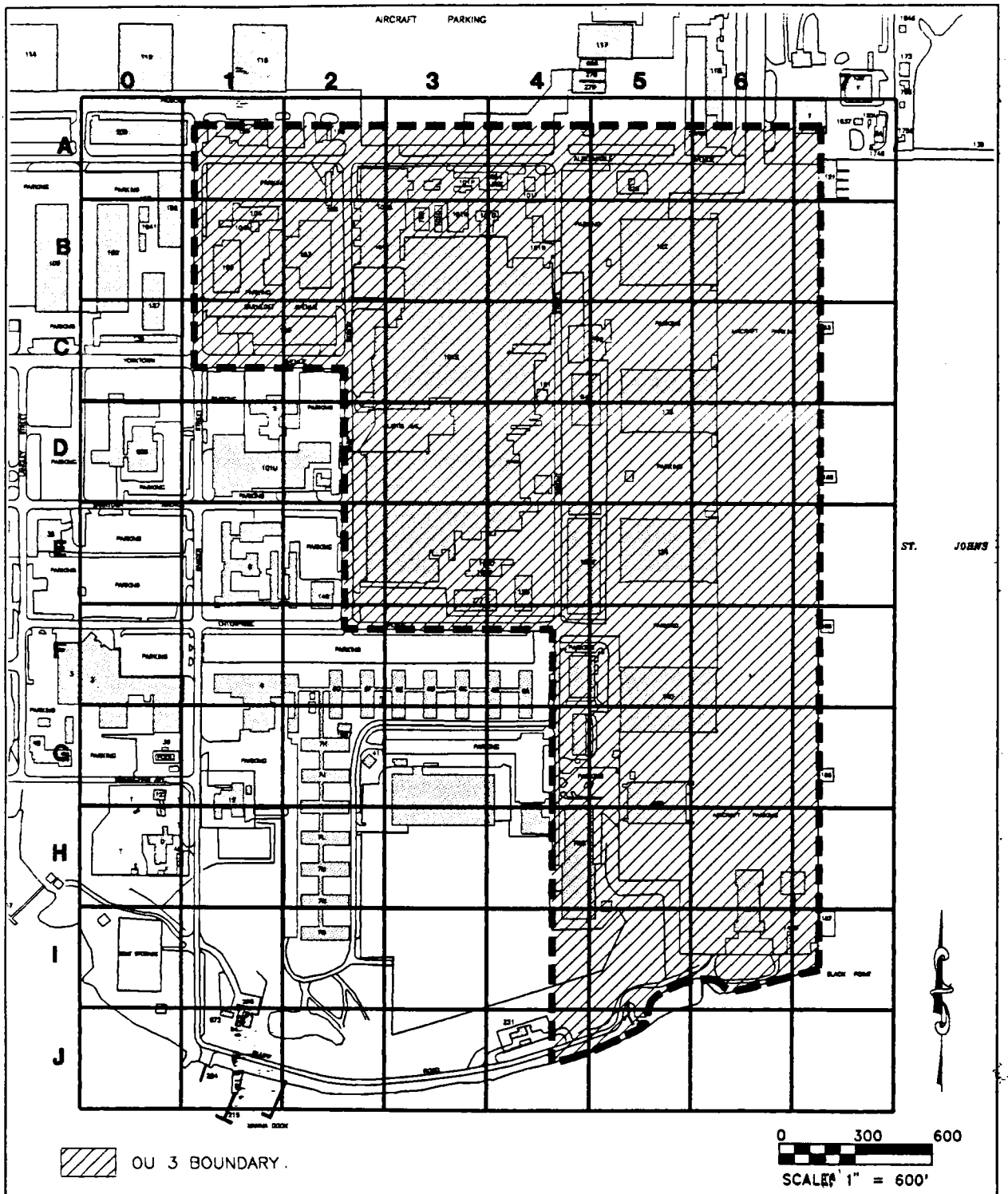


FIGURE 1-4
OPERABLE UNIT 3
GRID PATTERN

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

2013/DRM/08-17-94

Assumption: Geographical extent of contamination (overall) has been determined by use of Geostatistics. Additional verification sampling will be added during Data Collection Phase. Additionally, have knowledge of probable remedies.

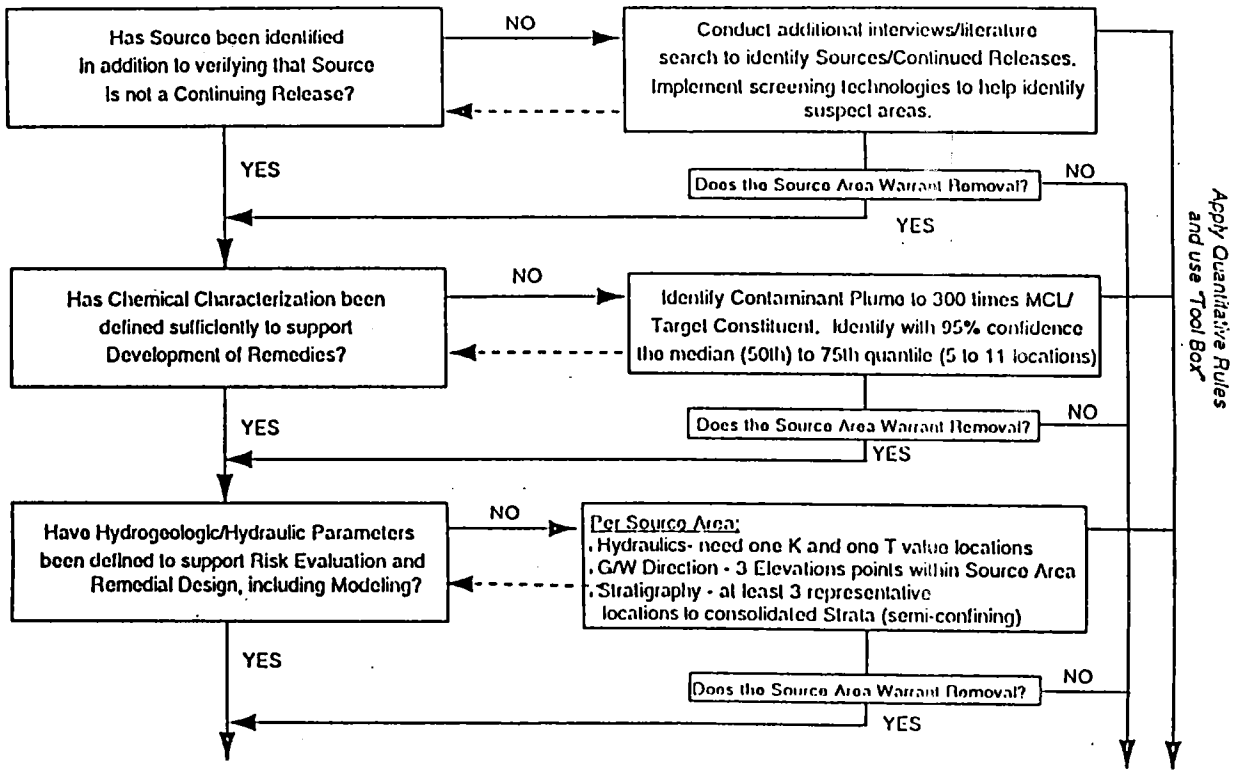
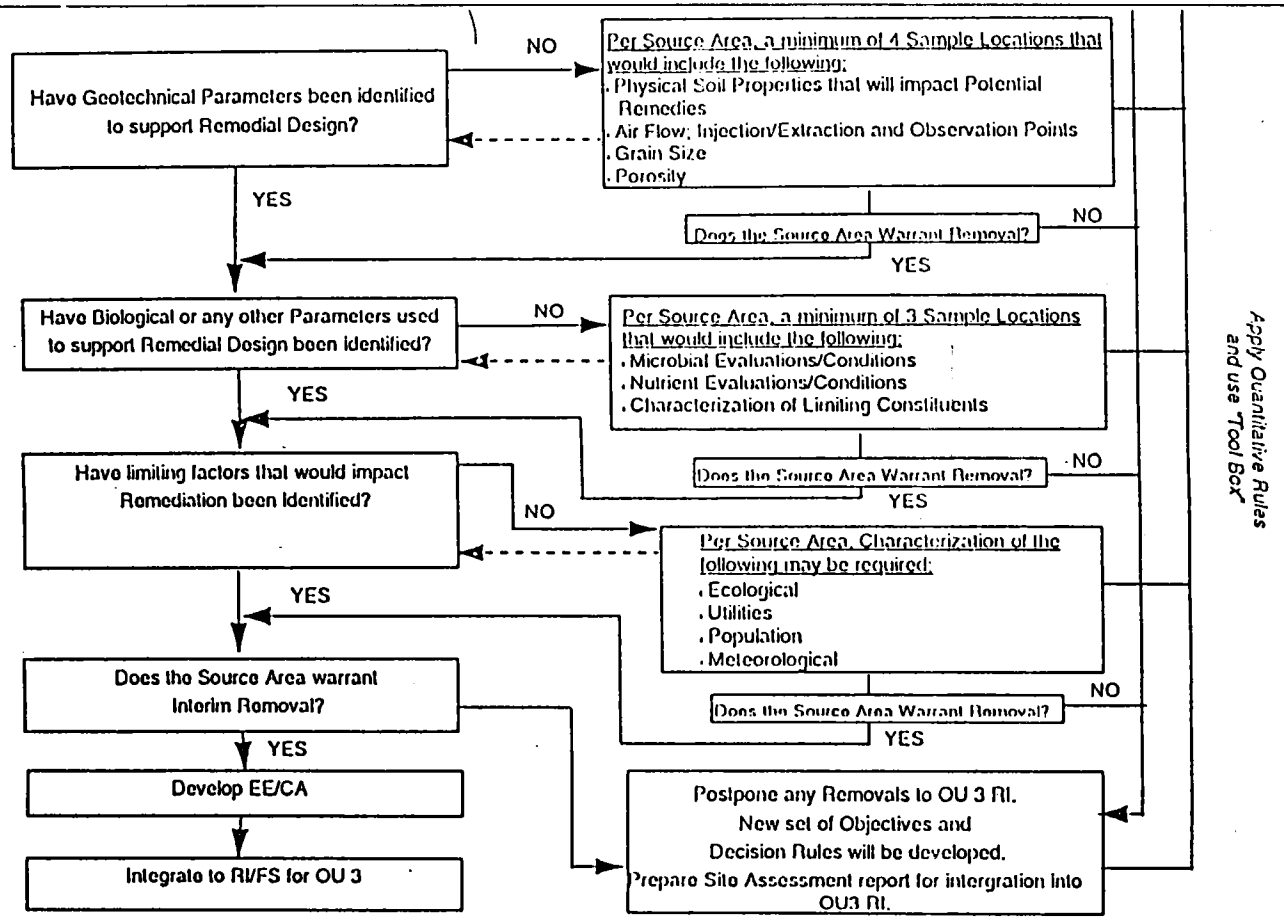


FIGURE 1-5
CHARACTERIZATION LOGIC AT OPERABLE UNIT 3

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA



Note: Sample specific quantities may be reduced by combination of aquisition methods during implementation. Decision Rules apply to all media being investigated.

FIGURE 1-6
CHARACTERIZATION LOGIC AT OPERABLE UNIT 3

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

specific risk-screening values. The risk screening was then used to provide a preliminary list of chemicals of potential concern (CPCs), to help identify possible sources, and to geographically limit the investigation to those areas that presented an unacceptable risk.

1.1.2.2 **Overview of Remedial Screening** Remedial screening was performed to identify the data requirements necessary to perform a comprehensive FS along with possible IRAs. Technology screening was performed in accordance with USEPA guidance for the contaminants identified in the risk screening in the OU 3 environmental setting. For this RI/FS workplan, a distinction was made between technologies that would have site-wide final remedial applicability and those that would lend themselves to accelerated threat reduction or IRAs.

1.2 DOCUMENT ORGANIZATION. The project workplan establishes the framework for response and presents detailed information defining the proposed response process. The document is organized as follows.

Chapter 1.0 **Introduction** provides the overview and format followed in developing this workplan and introduces approaches for streamlining implementation of remedial response at OU 3.

Chapter 2.0 **Situation Analysis and Problem Definition** presents the current understanding of the environmental setting at OU 3 and the locations of contamination and identifies current data deficiencies.

Chapter 3.0 **Risk Screening** screens and compartmentalizes the risks within OU 3 to identify zones where interim response and removal, RI/FS, or no additional response actions are warranted. Risk screening also identifies the data deficiencies that need to be addressed during the RI.

Chapter 4.0 **Remediation Screening** identifies the technologies appropriate to long- and short-term remedial response at OU 3 and indicates the data requirements for detailed evaluation of those technologies.

Chapter 5.0 **Data Requirements** defines the data quality objectives (DQOs) and data requirements to support risk and remedial assessments that will be conducted as part of removal actions, RI/FSs, and confirmatory sampling for candidate no further action zones.

Chapter 6.0 **Remedial Investigation Scope of Work** presents specific objectives and approaches that will be used to provide data to address risk and remedial assessment data deficiencies for zones within OU 3 that require additional information.

Chapter 7.0 **Feasibility Study Scope of Work** contains the objectives and approach for the development of remedial alternatives for addressing the contamination at OU 3, where presumptive remedies are not appropriate.

Chapter 8.0 **Accelerated Threat Reduction Action** provides an accelerated OU 3 remedial response strategy and implementation plan.

Chapter 9.0 **Project Management** provides project organization and schedule information.

Appendices to this document include an OU 3-specific, Sampling and Analysis Plan (which includes the QAPP and Field Sampling Plan), a HASP, and detailed information developed through the SSFP and prior studies.

2.0 SITUATIONAL ANALYSIS AND PROBLEM DEFINITION

This chapter presents an analysis of the environmental situation at OU 3 from which subsequent sections of this report were developed. The analysis is a compilation and evaluation of information and analytical results pertaining to the regional environmental setting, historical operations, historical investigations, and the SSFP. The chapter concludes with a preliminary analysis of the nature and extent of contamination at OU 3.

Chapter 4.0, Volume 1, of the Navy IR program plan (Geraghty & Miller, 1991a) contains extensive background information about NAS Jacksonville, including site description, and site background information concerning the various potential sources of contamination (PSC) and OUs to be investigated. To expedite the presentation of the OU 3 historical data, appropriate NIRP sections are cited for those readers requiring more historical detail.

2.1 ENVIRONMENTAL SETTING. The following sections discuss the environmental setting for OU 3 and factors that may influence contaminant transport. These factors include location and land use, topography, geology, hydrogeology, hydrology, and climatology. Only regional geology and hydrogeology discussions are presented in this section; OU 3-specific geologic and hydrogeologic information was collected during the SSFP and is presented in Section 2.3.

2.1.1 Location and Land Use OU 3 is a 134-acre area located in the southeast corner of NAS Jacksonville (Figure 2-1), and is bounded on the south and east by the St. Johns River. The OU is approximately 5,000 feet east of State Highway 17, which serves as the western boundary to the facility. The Timuquana Country Club golf course, located in the northwest corner of the facility, lies approximately 2,000 feet northeast of OU 3. Land use in the vicinity of OU 3 is multipurpose: industrial, commercial, and residential. Building 101, the largest building in OU 3, houses diverse operations such as a machine shop, maintenance hangars, and administrative offices. Adjacent to the southern part of OU 3 are the Bachelor Enlisted Quarters (Figure 2-2), which are two barracks housing enlisted personnel.

The major command tenant of NAS Jacksonville, the Naval Aviation Depot (NADEP), is located in OU 3. NADEP currently employs approximately 2,800 civilians and 150 military personnel (Geraghty & Miller, 1991). To enter NADEP, persons must possess and present the required identification pass. Therefore, access to this part of OU 3 is limited, for the most part, to NADEP employees and authorized vehicles. However, no special identification or pass is required for facility personnel to enter the northwestern section of the OU.

2.1.2 Topography The following physiographic observations specific to OU 3 were made based on the Navy IR program information; the Orange Park, Florida, quadrant U.S. Geological Survey (USGS) map; the OU 3 topographic sheet (which shows the topography in 1939 as compared to the current topography); and field observations made by ABB-ES personnel. Full-size copies of the maps are included in Appendix L.

Information obtained from the USGS topographic map shows that the elevation at OU 3 ranges from 0 feet above mean sea level (msl) at the St. Johns River to 15 feet above msl at both the northwestern and southeastern areas of OU 3. The OU

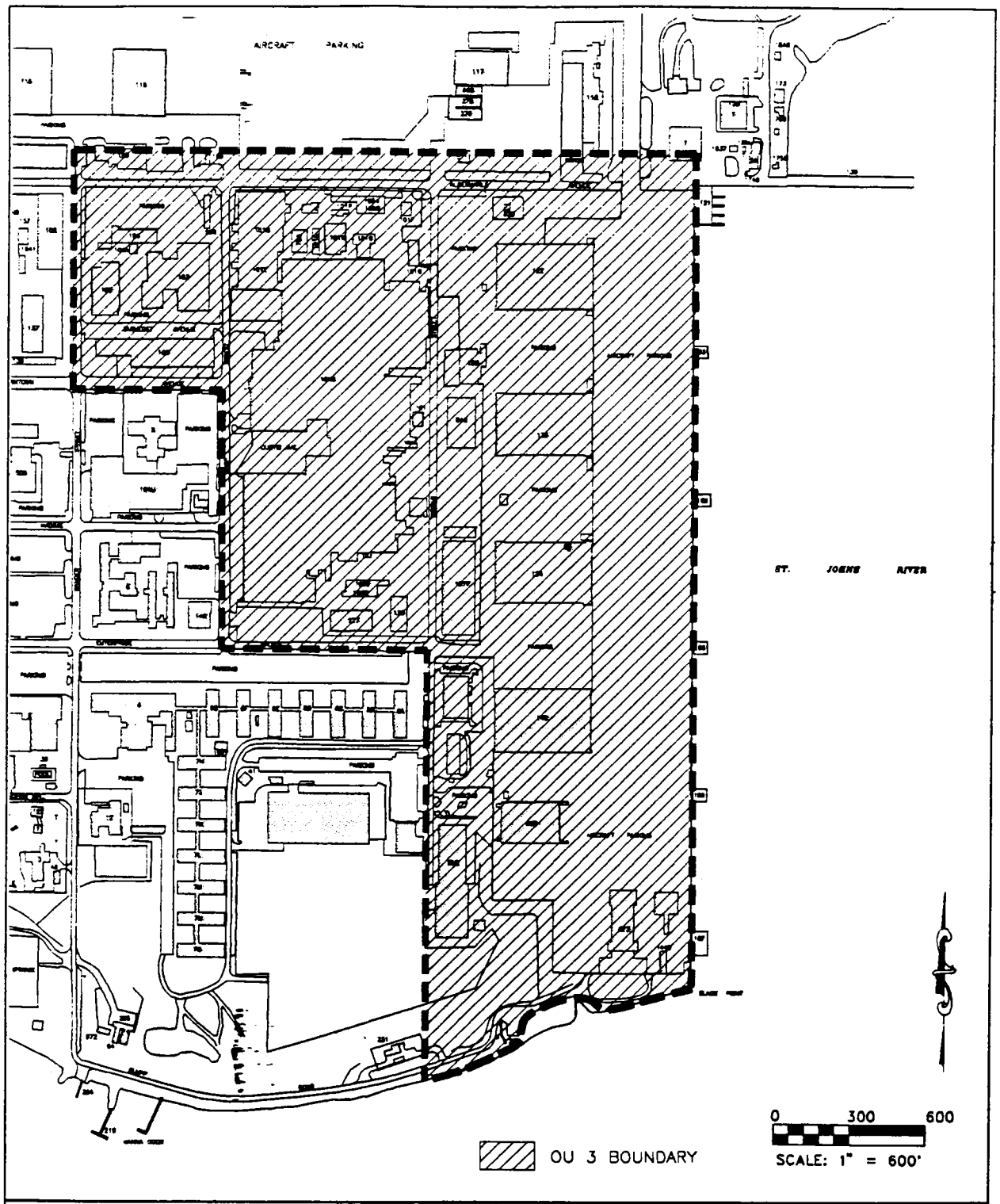


FIGURE 2-2
OPERABLE UNIT 3
BOUNDARIES

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

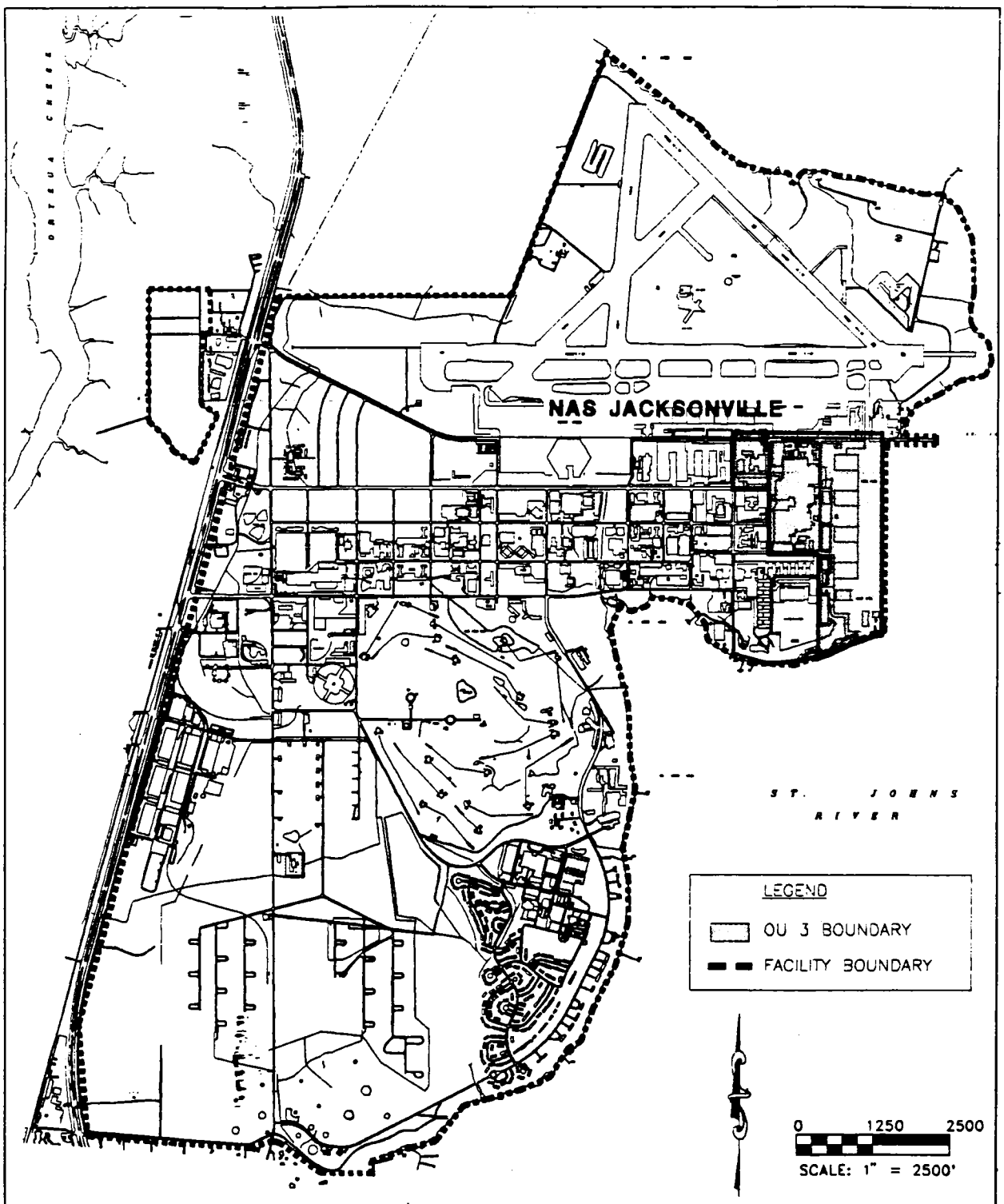


FIGURE 2-1
FACILITY MAP AND LOCATION OF OPERABLE UNIT 3

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

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JACKSONVILLE, FLORIDA

3 topographic sheet (Appendix L) further indicates that parts of OU 3 were filled (around 1942) to accommodate the current land use. According to Geraghty & Miller (1991), low-lying areas were hydraulically filled to an elevation of approximately 10 feet above msl with dredge spoil from the St. Johns River. Thus, filled areas were determined by delineating the areas of OU 3 that were below 10 feet msl in 1939, to the current 10-foot contour. As shown on Figure 2-3, areas previously filled underlie much of the northern part of OU 3 (bounded by Wasp Street and Enterprise Avenue). However, the current OU 3 topographic highs are basically unchanged from the 1939 contours.

2.1.3 Geology This section describes the regional geology developed using information from available published regional data and from historical studies conducted at NAS Jacksonville. A generalized cross section of NAS Jacksonville is shown in the Navy IR program plan and regional geology is discussed in depth in Section 4.2 of that plan. Details on the OU 3 geology from the recent SSFP are presented in Subsection 2.3.2 of this RI/FS workplan.

The geologic profile at NAS Jacksonville is comprised of unconsolidated deposits of coarse- to fine-grained sands, phosphatic sandy clays, and friable coquina limestone, overlying thick deposits of limestones and dolomites (Leve, 1966). Two major formations in the area are the Hawthorn Formation and the units comprising the Floridan aquifer system.

Karst features, called sinkholes, are common in Florida. Sinkholes occur when underlying limestone units are dissolved by acidic groundwater and the overlying stratigraphy collapses into the void created by the dissolution. Sinkholes allow virtually direct contact of surficially released contaminants to groundwater. However, based on a survey of the aforementioned maps and the Navy IR program reports, no sinkholes appear to be present at NAS Jacksonville. Based on the 1939 contours on the OU 3 topographic sheet (Appendix L), the area underlying the northeast section of Building 101 appears to be a potential subsidence area with man-made ditches draining into a depression prior to construction of Building 101. To determine whether the area was a developing sinkhole, two direct push technology cone penetrometer tests (CPTs) were conducted in the area during the SSFP. No subsurface void was encountered in either probe, nor was there any indication that one had previously existed.

A non-active fault is reported to be present near NAS Jacksonville beneath the St. Johns River (Figure 2-4). Displacement of the Ocala Group along the fault has been shown to be 100 feet at the fault plane; however, as established in the Navy IR program, the fault has not been traced through the Hawthorn Formation or deposits overlying the Hawthorn. Therefore, the fault is not believed to affect groundwater flow within the uppermost geologic formations underlying the facility. However, the fault displacement could affect the depth at which the Hawthorn Formation occurs beneath NAS, as well as the thickness of the Hawthorn.

The Hawthorn Formation is significant at NAS Jacksonville due to its lithology. The Hawthorn contains as much as 200 feet of low permeability, silty, sandy-clay layers (Scott, 1988). This low permeability deposit acts as an aquiclude for the underlying Floridan aquifer system. The Floridan aquifer system is the major source of potable water in Florida.

The depth and thickness of the Hawthorn aquiclude at NAS Jacksonville was influenced by paleoerosion and by depositional rates. Erosion occurring during

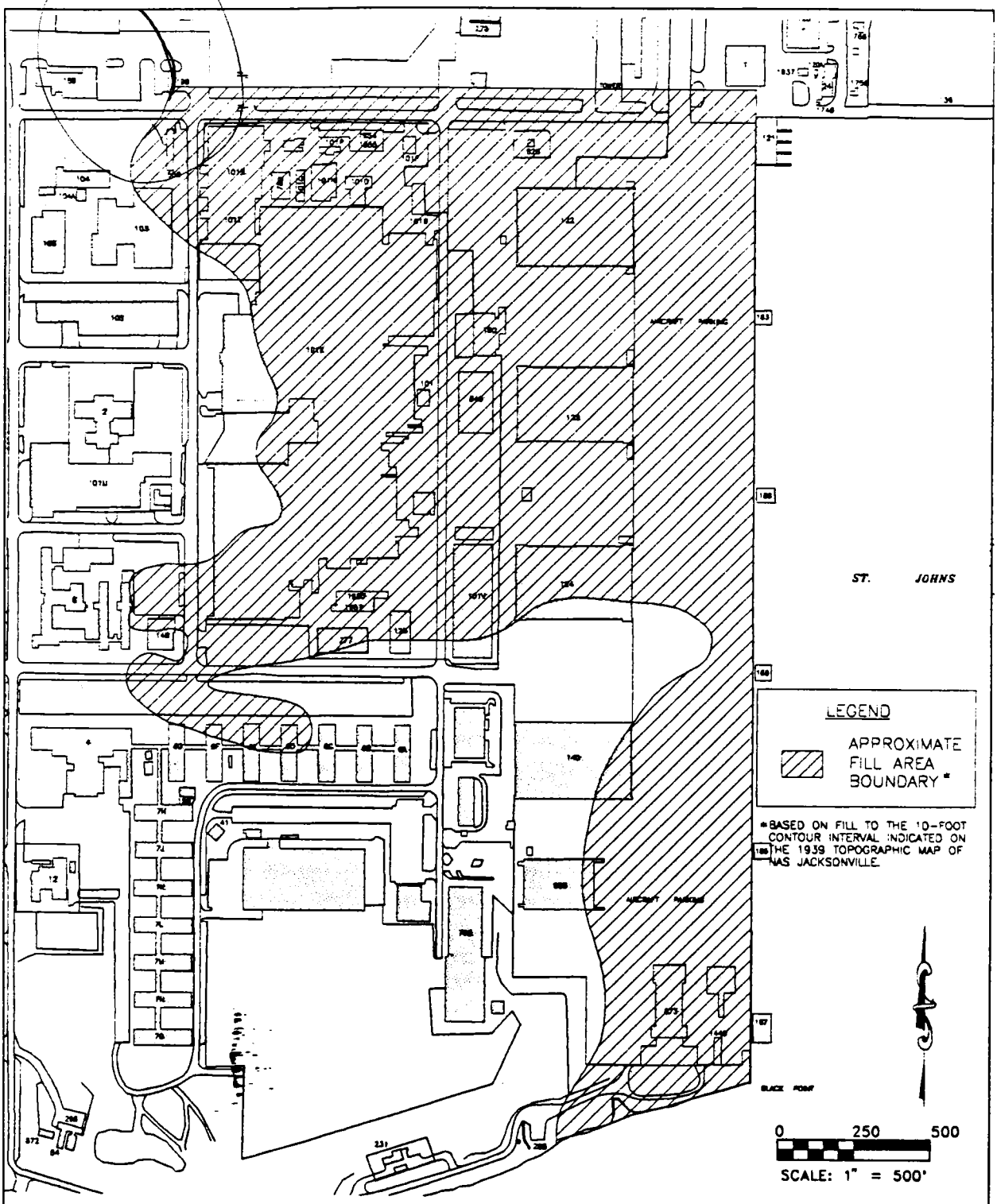
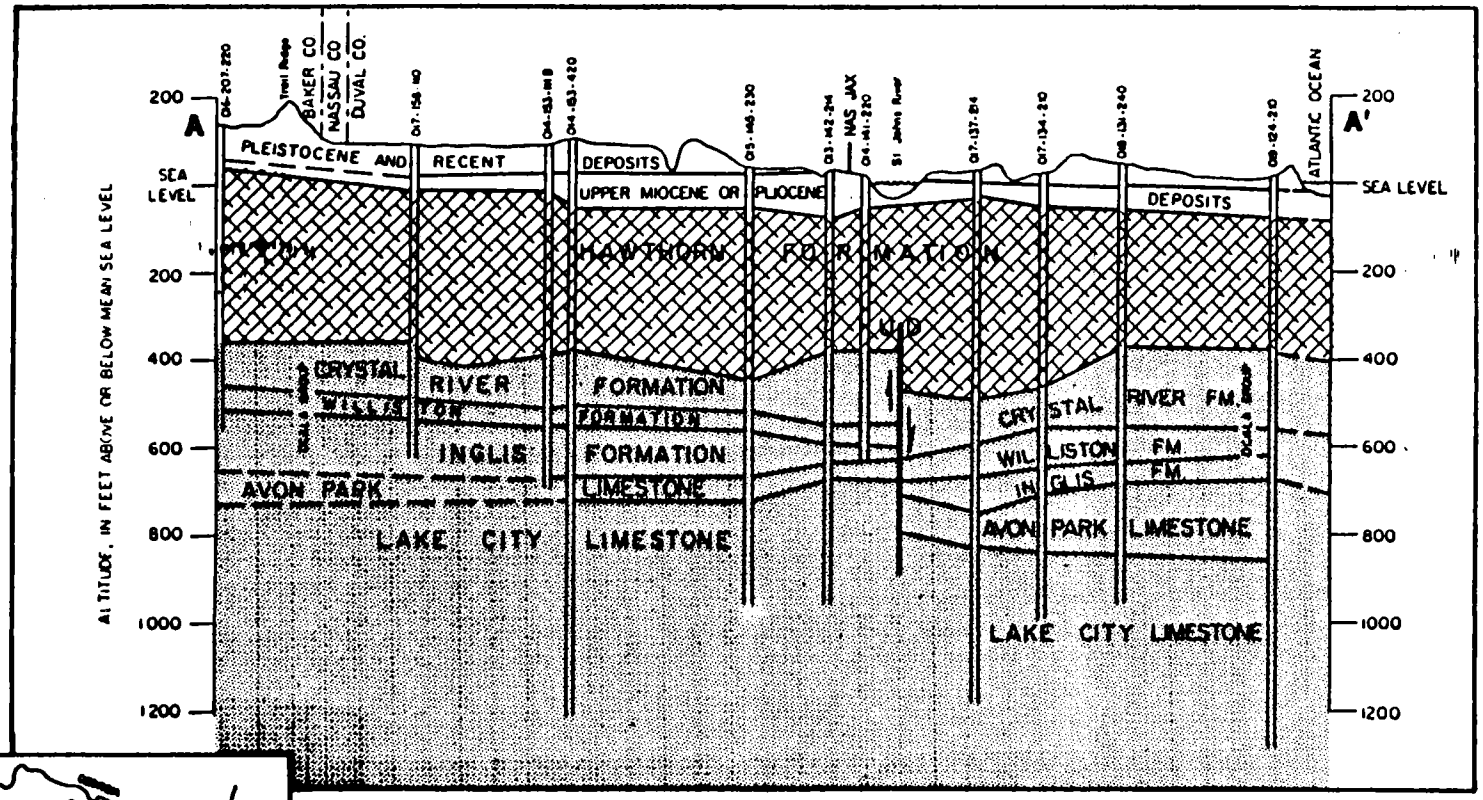
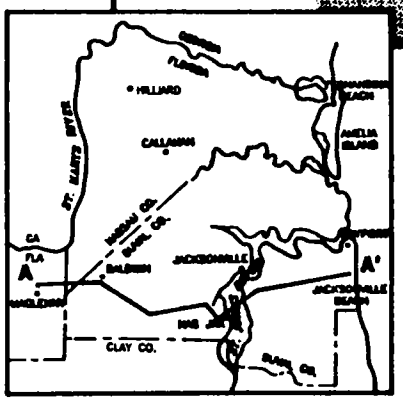


FIGURE 2-3
FILL AREA WITHIN OPERABLE UNIT 3

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA





LEGEND

HAWTHORN FORMATION

FLORIDAN AQUIFER SYSTEM

UNDIFFERENTIATED DEPOSITS

SOURCE: LEVE, 1966

FIGURE 2-4
REGIONAL GEOLOGIC CROSS SECTION

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

GLOCROSS/DRM/11-13-93

previous geologic periods abraded the surfaces of the Ocala Limestone and the Hawthorn Formation limestones and dolomites. Also, paleokarstic features (i.e., caves), present in the Ocala Limestone, collapse. These collapses result in localized subsidence in the Ocala Limestone and in the overlying units (Geraghty & Miller, 1991).

Sediment was not deposited in a uniform thickness during depositional periods as a result of uneven surfaces developed in the paleoerosional and paleokarstic terrain and because of the fluvial and estuarine depositional environments in which the sediment was deposited. The irregular surfaces of the Ocala Limestone and the Hawthorn Formation cause a variation in the depth at which the overlying Hawthorn clay aquiclude is found at OU 3.

2.1.4 Hydrogeology Three aquifer systems have been identified in the Jacksonville area: (1) the surficial aquifer, (2) the intermediate aquifer of the permeable units within the Hawthorn Formation, and (3) the Floridan aquifer system (Figure 2-4). Information concerning the surficial aquifer at OU 3 was further developed during the SSFP and is presented in Section 2.3.

It was observed in previous studies conducted at OU 3 (Geraghty & Miller, 1985b; 1986) that the water table generally mirrored topography, and surficial groundwater flow direction was, in general, toward the St. Johns River. However, areas of changing flow directions in OU 3 were noted in both historical studies and during the SSFP. Some factors that could affect groundwater movement at NAS Jacksonville are seasonal changes in recharge and discharge and tidal fluctuations of the St. Johns River.

Groundwater withdrawal in the Jacksonville area has resulted in documented (Toth, 1990) potentiometric surface depressions (e.g., near San Jose; see USGS topographic quadrangle in Appendix L). Such depressions generally indicate areas of groundwater withdrawal from the Floridan aquifer system; however, urbanization may affect the more shallow aquifers as well. Water use estimates in Jacksonville, for the shallow groundwater aquifer, are estimated by the Jacksonville Planning Department to be in the 10 to 25 million gallons per day range (Toth, 1990). This groundwater is primarily used for lawn irrigation, domestic purposes, and heat exchange units in air conditioning and heating units.

As indicated on Figure 2-5, four water supply wells exist at OU 3. Well No. 1 is located in the southernmost part of OU 3 and, according to NADEP employees, the well is 900 feet deep and is used for make-up water for cooling towers located near the well. The Verification Study (Geraghty & Miller, 1985b) states the well is 12 inches in diameter and is used for make-up water for test cells. Well No. 2, located in the center of OU 3 as shown on Figure 2-5, was listed as a production well for test cells in the Initial Assessment Study (IAS) (Fred C. Hart and Associates, 1983). However, this well was not shown on the Verification Study production well map, nor listed in the Verification Study production well survey. Current employees at NADEP could find no record for this well. Also, there are currently no records available for production well No. 3, which appears to be located underneath Building 101. The Verification Study listed Well No. 3 as being a 2-inch well that was no longer in use. Production Well No. 4, located in the northwestern part of OU 3 near Building 104, was listed on the well inventory list of the IAS as being 160 feet deep with a 115-foot casing. The Verification Study listed Well No. 4 as a former cooling water well that was no longer in use.

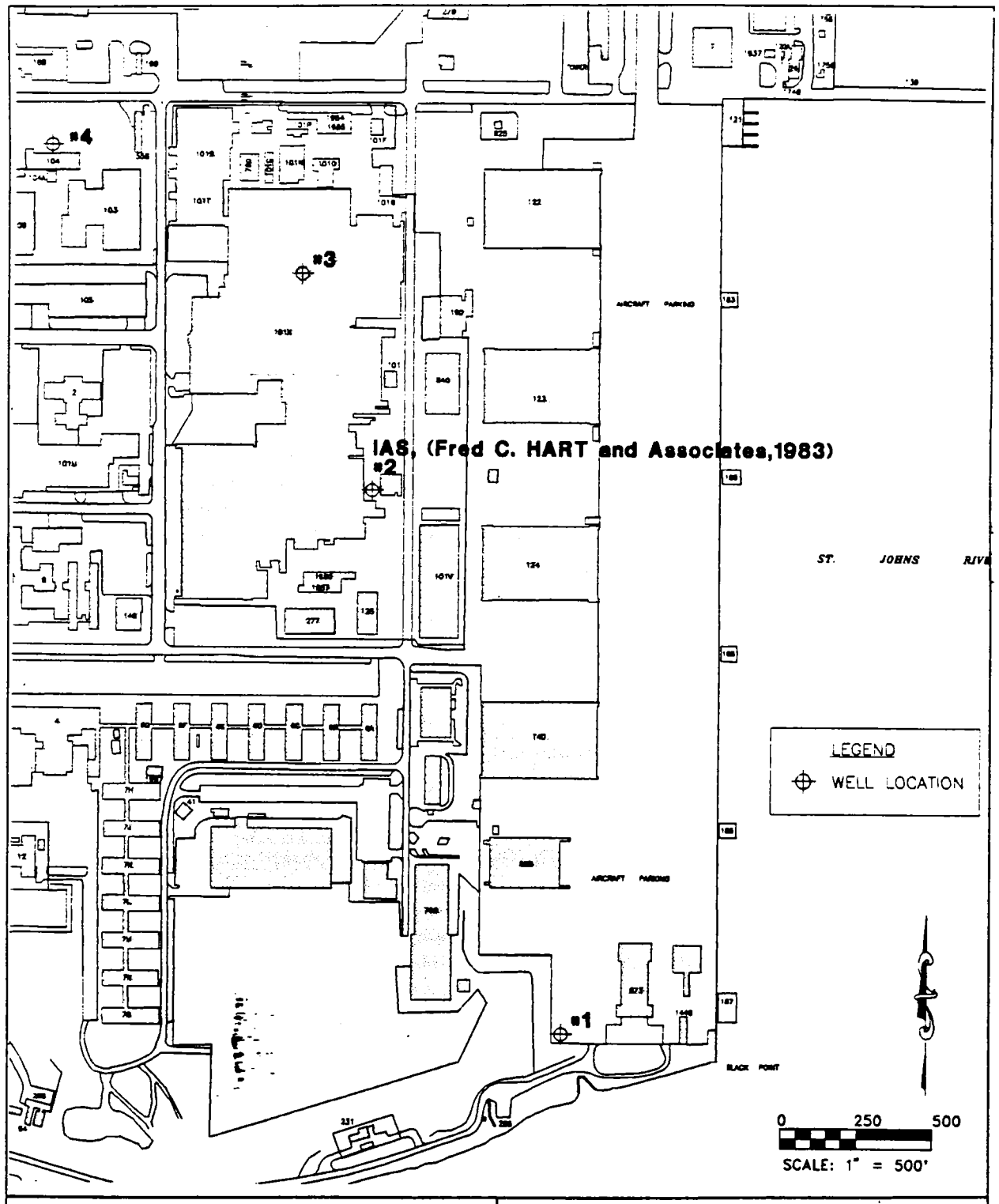


FIGURE 2-5
PRODUCTION WELL LOCATIONS FROM INITIAL ASSESSMENT STUDY AND VERIFICATION STUDIES

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

2.1.5 Hydrology Two principal waterways are located near the facility: the St. Johns River and the Ortega River (see USGS map in Appendix L). The St. Johns River forms the eastern boundary of NAS Jacksonville and of OU 3. The river at this point is strongly influenced by tidal action and can be considered part of the St. Johns River estuary (Jacksonville Planning Department, 1990). Based on salinity measurements taken during the SSFP (which ranged from 7.0 to 8.8 parts per thousand) the water would be classified as marine. (Salinity values greater than 2 parts per thousand will support marine vegetation and marine aquatic life.)

Surface water run-off from OU 3 flows toward the river, which discharges to the Atlantic Ocean approximately 21 miles north and east of the facility. In general, the water quality of the St. Johns River is good; however, the St. Johns River Water Management District has rated the water quality of the river as poor in the urban reaches of Jacksonville (the area along OU 3 is rated as fair). The terms good, fair, or poor are subjective because they are based on a combination of national water quality criteria, State standards, literature values, and professional judgment. The areas rated poor have low dissolved oxygen, high nutrients and bacteria, and some toxics problems (especially metals) (Jacksonville Planning Department, 1990).

The Ortega River, a tributary of the St. Johns River, is located 0.5 mile west of the facility. The surface water drainage is controlled by the topographic watershed divide and by surface water features constructed or modified to assist the natural drainage of the base. OU 3 is located about 2,800 feet east of the watershed divide as delineated in the Verification Study (Geraghty & Miller, 1985b); therefore, no surface water from OU 3 is expected to affect the Ortega River.

2.1.6 Climatology The climate of the Jacksonville area is classified as humid subtropical. Average temperatures range from the mid-50 degrees Fahrenheit (°F) in January to the low 80 °F in July. The area has an average annual rainfall of approximately 53 inches, with the rainy season occurring between June and September. Hurricanes and tropical storms can produce prolonged rains and high tides that are equivalent to 100-year flood events (Geraghty & Miller, 1991). OU 3 is potentially affected by such storms and, according to records supplied by the Southeast Regional Climate Center (1993), two hurricanes affected Jacksonville in the last decade: on August 25, 1988, resulting in a 3-day recorded rainfall of 3.01 inches; and on March 13, 1993, resulting in a 1-day recorded rainfall of 1.89 inches. The maximum 24-hour rainfall event recorded in Jacksonville, Florida, during the period from 1982 through September 1993 is 7.83 inches recorded on October 3, 1992.

Based on rainfall amounts recorded in Jacksonville, Florida, by the Southeast Regional Climate Center (1993), the average annual rainfall for the period from 1982 through 1993 is 54.06 inches. However, rainfall amounts can differ dramatically from year to year as shown in Table 2-1. The driest year during the period shown was 1990, with 31.2 inches of precipitation recorded, as contrasted with the wettest year during this period (1991), with 79.63 inches of precipitation recorded.

2.2 HISTORICAL OPERATIONS AND INVESTIGATIONS REVIEW. The following sections discuss information garnered from historical sources, as referenced, as well as from the March 1993 site visit by NADEP, Navy, USEPA, FDEP, USGS, and ABB-ES personnel.

Table 2-1
Annual Rainfall Amounts,
January 1982 through September 1993

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Year	Annual Average (inches)	Maximum Precipitation Amount per Month (inches)	Maximum Precipitation Within a 24-Hour Period (inches)
1982	51.52	9.32, September	3.08, September 8
1983	62.19	8.46, March	2.32, June 7
1984	48.96	12.28, September	4.80, September 28
1985	58.39	16.82, September	6.40, September 1
1986	44.1	9.60, August	2.60, August 2
1987	43.39	7.13, September	1.92, March 6
1988	60.68	16.36, September	3.47, September 6
1989	51.45	14.37, September	4.01, September 28
1990	31.2	6.53, July	2.30, July 2
1991	79.63	15.90, July	3.97, July 12
1992	63.18	10.76, August	7.83, October 3
1993[1]	NA	7.60, September	2.77, September 8

[1] Recording period was January through September, 1993.

Source: Southeast Regional Climate Center, 1993.

Note: NA = not available.

2.2.1 Historical Operations The concept for a NAS in Jacksonville originated in 1938 (Geraghty & Miller, 1991). The facility was originally designed for seaplane support. The 2- to 3-mile expanse of the St. Johns River at Black Point made the current location ideally suited for the proposed NAS mission. As the facility expanded, additional land was reportedly made available by hydraulically filling areas along the St. Johns River.

OU 3 is located south of the flightline within the NADEP at NAS Jacksonville. As stated earlier, NADEP, previously known as the Naval Air Rework Facility (NARF), is the largest tenant command within NAS Jacksonville. It has been a major tenant of the facility since 1940 when it operated as the NAS Assembly and Repair Department of NAS Jacksonville. Peak workload occurred at the NADEP in 1945 when approximately 7,300 employees worked around the clock to return aircraft to allied lines. Over the subsequent years, NADEP has produced or repaired almost every type of Navy aircraft (Geraghty & Miller, 1991).

During fiscal year 1990, NADEP reworked 130 aircraft, 500 engines, and 38,000 components and avionics. According to Geraghty & Miller (1991), NADEP workers strip, test, and retrofit P-3 long-range, anti-submarine aircraft and A-7 ground-support aircraft. The general flow of work begins with removal of the engines and other components (e.g., propellers). 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, inspected, and repainted before reinstallation on the airframe. Engines are disassembled, inspected, and moving parts are inspected for cracks and potentially replated before their reassembly and installation on the airframe.

In addition to direct aircraft-related operations, NADEP operations include support functions such as battery repair for fork lifts. NADEP currently occupies 120 acres on the St. Johns River and is the largest industrial employer in northeast Florida and Southeast Georgia. It is estimated that NADEP contributes a $110 million payroll to the Jacksonville economic community annually (Geraghty & Miller, 1991). Chapter 3.0 of the Navy IR program plan (Volume 1) discusses the history of NADEP in more detail.

OU 3 PSCs. OU 3 originally consisted of five formally defined PSCs, PSCs 11 through 15 (Figure 2-6). The PSCs are close in proximity and share similar fate and transport mechanisms for contaminants. In addition, a variety of present and former underground storage tank locations, transfer lines, and sewers exist at OU 3 that may be acting as sources of contamination or migration pathways.

The following paragraphs present a brief description of reported disposal activities or releases to the environment that have occurred at each of the five PSCs in OU 3.

PSC 11, Building 101. PSC 11 is located at Building 101. Building 101 is one of the largest buildings at NAS, covering an area approximately 1,800 feet by 750 feet. Building 101 houses diverse operations such as administrative office space, aircraft parts repair, a machine shop, and airplane hangars. Various locations in Building 101 have used or stored hazardous materials necessary for the industrial processes conducted by NADEP. Previous investigations have suggested that hazardous materials may have potentially been released at this PSC through

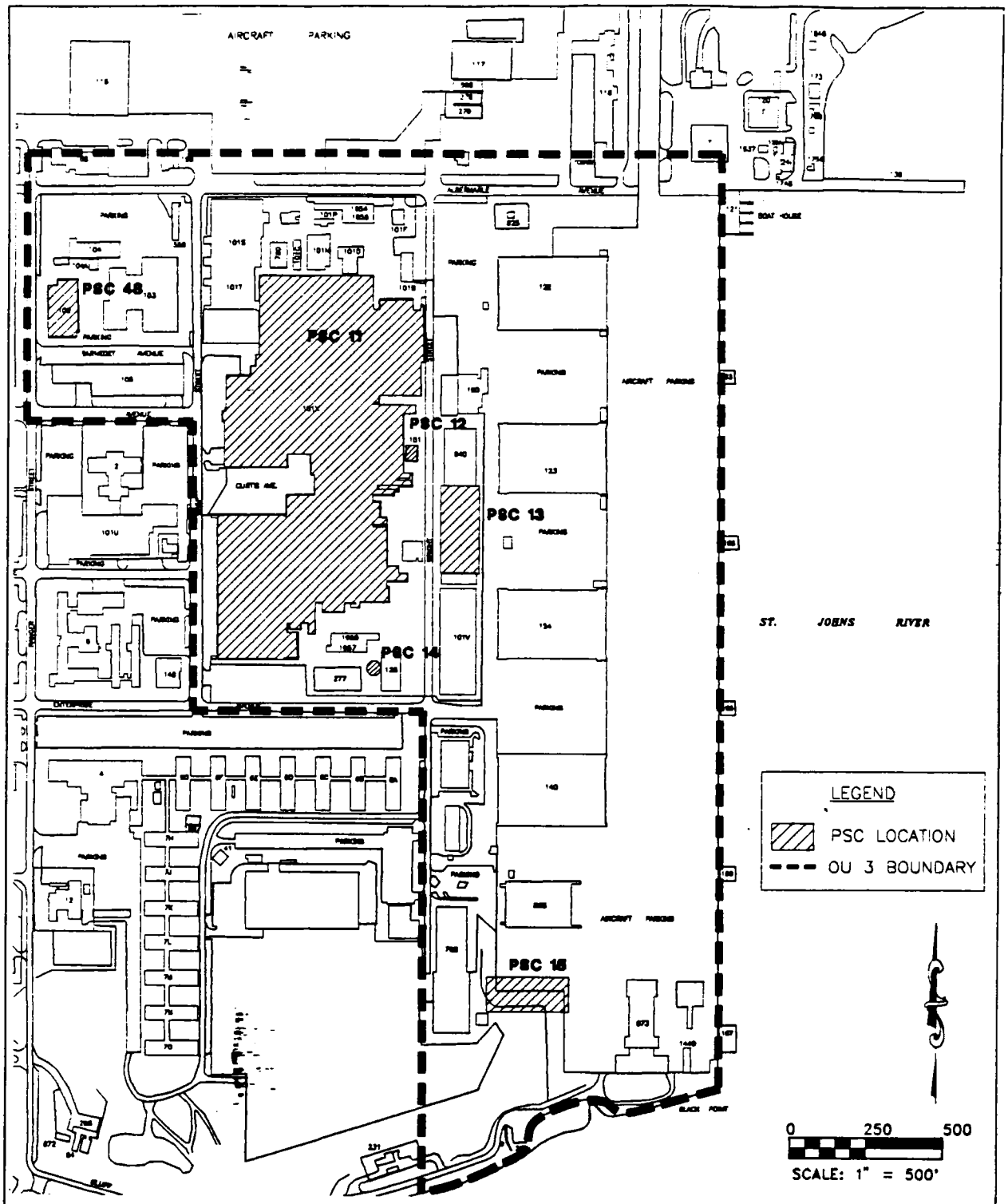


FIGURE 2-6
POTENTIAL SOURCES OF CONTAMINATION (PSCs) AT OPERABLE UNIT 3

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

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spills, unauthorized disposals by employees, and leaking underground stormwater and industrial drain systems (Geraghty & Miller, 1985b).

Initially, two areas where releases had potentially occurred in Building 101 were identified during the IAS: Location 1, comprising areas of the Building 101 flooring that are constructed from steel plating over steel beams, including the hydraulic-lift shaft area; and Location 2, the "old Pump Shop" (see Figure A-1 in Appendix A). Since its initial designation, the boundaries of PSC 11 were enlarged to include the old Painting Shop (Location 3); PSC 11 is now considered to encompass all of Building 101.

A site inspection of OU 3 was completed by NAS, NADEP, SOUTHNAVFACENGCOM representatives, USEPA and FDEP regulatory personnel, USGS personnel, and ABB-ES personnel on March 16 and 17, 1993. Several production activities that were formerly conducted at or near Building 101 were discussed by facility personnel and regulatory agents during the inspection. The additional locations, numbered 3 through 20, are presented in Appendix A, Figure A-1. (The locations of former work sites as depicted on Figure A-1 were approximated by NADEP personnel.) A brief description of locations 1 through 20 is also contained in Appendix A. It should be noted that there is little or no formal documentation of production levels, materials used, or disposal practices at several of these locations. Therefore, in some descriptions of the potential historical production areas, the compounds listed are chemicals generally used in the type of work potentially conducted there.

PSC 12, Old Test Cell Building. Numerous spills of toxic and reactive chemicals from ruptured or rusted drums are reported to have occurred at this location. Also, solvents and other wastes were potentially discharged via ruptures and breaks of storm, sanitary, and industrial sewer interconnections at the building (Geraghty & Miller, 1991).

PSC 13, Radium Paint Waste Disposal Site. An area located north of Building 167 and south of Building 840 was formerly used for the disposal of radioactive radium paint waste from aircraft instrument dial painting operations. These operations took place at NADEP during World War II and continued into the late 1950's. Radioactive waste was mixed with soil in a burial pit, which was approximately 40 feet by 50 feet and 0.75 foot deep.

According to the Navy IR program plan, this site was excavated in late 1950 and the radiation measured with a survey meter (type unknown) ranged from 3 to 5 millirems per hour (mR/hr) above background. Approximately 1,500 cubic feet of radioactive waste were excavated and moved to PSC 18, which is outside OU 3. However, Radium 226 and gross alpha levels exceeded FDER Drinking Water Standards in groundwater at the site; thus, additional investigation of the site was requested by FDER (now referred to as FDEP). PSC 13 will not be addressed during the RI/FS; it will be investigated, however, as part of a facility-wide radiological survey to be conducted in 1994.

PSC 14, Battery Shop. The Battery Shop located at Building 125 contains a seepage pit where waste acid from lead-acid batteries was formerly disposed. The seepage pit was reportedly connected to the storm and industrial sewer system at the facility. The volume disposed has been estimated in the Navy IR program plan at 100 gallons annually for 23 years (1959 to 1982). Additional investigation was requested at this site by FDEP.

PSC 15, Solvent and Paint Sludge Disposal Area, NADEP. This disposal area is located east of Building 795 and south of Building 868 and was approximately 100 feet by 100 feet. The disposal area was used as recently as 1978. The estimated volume of spent solvent and paint sludge disposed at the site is 2,000 gallons per year with the period of years being reported in the IAS as both 10 and 36 years in duration. Paint and sludge were disposed on the ground at this location and mixed with soil.

2.2.2 Investigative History To comply with regulatory changes promulgated during the 1980's and 1990's, NAS command contracted for various environmental studies to be conducted at NAS Jacksonville. The date, objective, scope, and conclusion summary of each study are tabulated in Table 2-2 and discussed in more detail in Appendix B. The conclusions indicate that several of the studies identified contaminants in the groundwater and/or soil at locations within OU 3.

Operational and/or waste disposal practices described in Appendix B were obtained from the referenced documents and are not intended to either describe or characterize current operational or waste disposal practices.

2.3 RESULTS OF THE OU 3 SCOPING STUDY. This section summarizes the activities associated with the SSFP undertaken at OU 3. It identifies the purpose or objectives of each activity and presents a discussion of the findings. Contaminants detected in soil and groundwater during this program are discussed in Section 2.4. In addition, the findings from previous investigations have been tabulated and are included as part of the preliminary nature and extent of contamination discussion (Section 2.4).

2.3.1 Summary of Scoping Study Field Program (SSFP) Activities SSFP activities were conducted at OU 3 from July 13 to October 1, 1993. The overall objective of the SSFP was to obtain site-specific information on OU 3 that could be used to direct and scope later RI/FS activities. Specific goals were to:

- evaluate the groundwater flow regime at OU 3;
- assess stratigraphy and groundwater quality, identify contaminants on a preliminary basis, and delineate contaminant boundaries, as appropriate; and
- characterize the near-shore aquatic habitat of the St. Johns River.

SSFP field work activities included an OU 3-wide well inventory, piezometer installation, soil sampling and chemical analyses, soil borings, cone penetrometer testing, direct push technology (DPT) groundwater sampling and analyses, long-term groundwater level measurements, surveying, and aquatic habitat characterization. Table 2-3 provides the objectives specific to each activity and a summary of the work completed. Details of the scoping field work activities follow below.

Well Inventory. An inventory of existing monitoring wells was conducted at OU 3 to identify wells that could be used during the scoping study and subsequent RI to provide water level measurements and/or groundwater samples for water quality analysis. A review of site documentation suggested that 66 wells existed at OU 3. Of these, 46 were located during the well inventory and 39 were found

Table 2-2
Investigative History Summary

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
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Year	Document Name	Objective	Number of Study Component Samples		Contaminants Present[1]		Conclusions
			Soil	Groundwater	Soil	Groundwater	
1982	Hazardous Waste Management Plan (Water and Air Research, 1982)	Inventory of generation, storage, and disposal of hazardous waste at NAS Jacksonville.	0	0	0	0	Recommended OU 3 PSCs for Confirmation Study.
1983	Initial Assessment Study (Fred C. Hart Associates, 1983)	Scored evaluation of potential risk to human health and environment.	0	0	0	0	Recommended PSCs 11, 12, 14, and 15 for Verification Study (NACIP Phase II).
1985	Results of sediment sampling at Plating and Cleaning Shop Building 101 (G&M, 1985a).	Assessed potential soil contamination beneath Building 101.	5	0	CN at 0.46 μg/g	NA	No potential risk posed by area soil.
1985	Verification Study and assessment of potential groundwater pollutants (G&M, 1985b)	Verify absence or presence of contaminants at OU 3.		8 MW total 1 at PSC 13 and 7 at PSCs 11, 12, 14, and 15		PSC-13: gross alpha at 54 pCi/ℓ and radium 226 at 6 pCi/ℓ PSCs 11, 12, 14, and 15: VOCs $\leq$ 243 ppm CN $\leq$ .071 ppm TOC $\leq$ 9.5 ppm	PSC 13 NFA recommended. PSCs 11, 12, 14, and 15 recommended for Characterization Study. PSCs 11 and 15 suspected source of VOCs.
1986	Characterization phase assessment of groundwater contamination (G&M, 1986)	Define groundwater contamination.		18		VOCs at $\leq$ 13,000 ppb	Conduct monitoring well resampling program for risk assessment.

See notes at end of table.

Table 2-2 (Continued)
Investigative History Summary

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Year	Document Name	Objective	Number of Study Component Samples		Contaminants Present		Conclusions
			Soil	Groundwater	Soil	Groundwater	
1988	Utility technical study, evaluation of stormwater drainage system cross connections in NADEP area (Robert Bates and Associates, 1988)	Identify potential sources of industrial and wastewater leaks.	0	0	0	0	Identified leaks in OU 3 sewer and industrial lines.
1988	Findings from the subsurface investigation at Wright Street (G&M, 1988)	Assess potential soil and groundwater contamination.	24	14		ppb VOCs at 2,300 Ni ≤ 90 As ≤ 20 Pb ≤ 10 Se ≤ 5 (pCi/ℓ) Gross alpha at 23 Gross beta at 35	Recommended Level C personal protection equipment (PPE) for persons excavating at site.
1989	Contamination assessment of Building 795 (G&M, 1989)	Determine potential health and safety risks at site.	6	2	(ppb) Hg ≤ 350 Cr ≤ 8,000 Cu ≤ 7,000 Pb ≤ 13,000 Zn ≤ 4,000 Dieldrin ≤ 6.8. 4,4 DDT ≤ 2.9.	(ppb) Zn ≤ 90	No constraints beyond standard safety practices.
1990	Technical Memorandum No. 1, Building 780 Area: Subsoil and Groundwater (G&M, 1990)	Develop soil and groundwater handling plans and develop health and safety standards.	5	2			
1992	Sampling Event Report No. 6, MILICON P615 (ABB-ES, 1992a)	Assess potential soil and groundwater contamination at proposed construction site.	12	6	(ppb) Pesticides endrin ketone ≤ 27.0 Chlordane ≤ 15.0	(ppb) TCE ≤ 1,400	

See notes at end of table.

Table 2-2 (Continued)
Investigative History Summary

Operable Unit 3
NAS Jacksonville
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Year	Document Name	Objective	Number of Study Component Samples		Contaminants Present		Conclusions
			Soil	Groundwater	Soil	Groundwater	
1992	Health Threat Evaluation, Draft Final (ABB-ES, 1992b)	Health threat evaluation for proposed construction at Building 780. Air and tank sampling also conducted.	3 from sub-floor area.	0	mg/kg TCE ≤ 1,000 mg/kg		Level C PPE suggested for workers in this area.
1993	Sampling Event Report No. 16, Building 101 USTs (ABB-ES, 1993b)	Assess potential contamination prior to UST abandonment and removal.	15	4		(ppb) Pb ≤ 30.5 Benzene Vinyl chloride TCE bis(2-chloroethyl) ether ≤ 17.0 2-methyl phenol at 27.0 4,4-DDD ≤ 0.32 4,4-DDT ≤ 0.14	Recommended for further characterization.
1993	Environmental Health Sampling at Albermarle and Wasp Street Utility Construction Site (ERS, 1993)	Assess potential ambient air, soil, and groundwater contamination at excavation site.	4		(ppb) 1,3-dichloro-benzene ≤ 145. 1,4-dichloro-benzene ≤ 439.		

See notes at end of table.

Table 2-2 (Continued)
Investigative History Summary

Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Year	Document Name	Objective	Number of Study Component Samples		Contaminants Present		Conclusions
			Soil	Groundwater	Soil	Groundwater	
1993	Sampling Event Report No. 15, P159 (ABB-ES, 1993a)	Assess potential health risks at proposed construction area.	12	7	No VOCs, SVOCs, or metals detected above health-based screening levels for soil exposure.	Concentrations of vinyl chloride, 1,1-DCE, TCE, benzene, and PCE exceed MCLs. Calculated cancer risks are well below the acceptable cancer risk of 1×10^{-5}	Recommended further characterization.

[1]Maximum contaminant level detected.

Notes:
NAS = Naval Air Station.
OU = operable unit.
PSC = potential source of contamination.
NACIP = Naval Assessment and Control of Installation Pollutants.
MW = monitoring well.
pCi/ℓ = picocuries per liter.
VOCs = volatile organic compounds.
CN = cyanide.
TOC = total organic carbon.
ppm = parts per million.
NFA = no further action.
NADEP = Naval Aviation Depot.
ppb = parts per billion.
Ni = nickel.
As = arsenic.
Pb = lead.
Se = selenium.
PPE = personal protection equipment.
Hg = mercury.
Cr = chromium.
Cu = copper.
Zn = zinc.
DDT = dichlorodiphenyltrichloroethane
ABB-ES = ABB Environmental Services, Inc.
TCE = trichloroethene.
mg/kg = milligrams per kilogram.
USTs = underground storage tanks.
DDD = dichlorodiphenyldichloroethane.
DDT = dichlorodiphenyltrichloroethane.
ERS = Environmental Remediation Services.
DCE = dichloroethene.
PCE = tetrachloroethene.
MCL = maximum contaminant level.

Table 2-3
Summary of Scoping Field Program Activities

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Activity	Objectives	Summary
Well inventory	Assess the condition of existing wells at OU 3 to determine whether they can be used in evaluating the groundwater flow regime.	Located 42 useable existing wells.
Piezometer installation	Measure groundwater elevations to produce potentiometric surface maps of the shallow and deep surficial aquifer system.	Installed 12 shallow and 15 deep piezometers.
Soil sampling	Assess the presence of soil contamination and potential impact to groundwater quality.	Collected 50 soil samples, from above the water table, at the 15 deep piezometers for chemical analyses.
	Describe local lithology and stratigraphy	Logged soil samples at 5-foot intervals throughout the boring.
Long-term groundwater level measurements	Assess seasonal variations in groundwater flow patterns that can affect potential contaminant migration.	Measured groundwater levels in the 42 existing wells and 27 newly installed piezometers. Additional gauging planned on a monthly basis over a 10-month period.
Soil borings	Log detailed descriptions of the surficial aquifer and Hawthorn Group.	Advanced two soil borings to a depth of 150 feet.
Cone penetrometer test (CPT) soundings	Assess site stratigraphy and hydrogeology by identifying zones of high and low permeability	Conducted piezocone soundings at 63 grid locations. (Each sounding was paired with a DPT groundwater sampling location.)
	Calculate hydraulic conductivity of low permeability clay layers by conducting dissipation tests.	
	Select depths at which to collect groundwater samples.	
DPT (groundwater sampling)	Assess areas and boundaries of groundwater contamination.	Collected 180 groundwater samples from the 63 paired DPT sounding locations.
Survey	Establish horizontal and vertical control to evaluate the horizontal and vertical extent of contamination and to generate geologic cross sections and groundwater contour maps.	Surveyed the horizontal locations and elevations of all piezometers and DPT soundings relative to the Transverse Mercator Projection for Florida, East Zone; North American Datum of 1983; and the National Geodetic Vertical Datum of 1929.
Aquatic habitat characterization	Characterize the aquatic habitat of the St. Johns River adjacent to OU 3 that may be exposed to potential OU 3 contaminants.	Collected 37 surface water samples for temperature, salinity, and conductivity measurements. Recorded secchi measurements, sediment type, and vegetation and living matter assessment at each location.

Notes: OU = operable unit.
DPT = direct push technology.

to be potentially useable for water level measurements and future sampling (pending well construction quality assurance and quality control verification). During the course of the field program, after the well inventory, three additional wells were brought to the attention of ABB-ES by NAS Jacksonville personnel. Wells OTC-10-1, OTC-10-2, and OTC-10-3, located at Building 101 west of Wright Street, are compliance monitoring wells surrounding the location of a former UST and an oil and water separator. Well OTC-10-3 was found to have free product in it and is thus being monitored quarterly by NADEP personnel to note any changes in product quantity in this well.

A summary of well construction details is contained in Appendix C and locations of the wells are indicated on Figure 2-7. The inventory revealed that existing monitoring wells are primarily clustered around Building 873 in the southeast corner of OU 3, around construction site P159 in the northeast corner, and around the northern part of Building 101. These wells are designated JAX-873-X, P159MW-X, and B101MW-X, respectively, where X is the sequential number assigned to each well. The wells designated NARF-X, installed in 1985 and 1986 by G&M, are widely scattered across OU 3.

All inventoried wells are shallow (less than 25 feet below land surface [bls]) and screened at or near the water table, with the exception of NARFD-1 and NARFD-2. NARFD-2 is not useable, however, due to a damaged surface casing and a 2-inch free product layer on the surface of the water. Because it is unlikely that floating product would be present at depth in the surficial aquifer, oil was probably discharged to the well by surface water runoff or direct disposal through the damaged protective casing. The product is currently being purged from NARFD-2 by NADEP personnel and the well will subsequently be abandoned by backfilling with grout. In addition, shallow wells NARF-10 and NARF-13 will be abandoned due to damaged riser pipes.

Of the 20 wells not located, 14 were installed in 1988 by Geraghty & Miller (Table 2-2) to screen for contamination prior to continuation of construction work on a sewer line along Wright Street (Appendix B). The wells were described in their documentation as "temporary;" thus, it is presumed that they were abandoned or removed during construction activities. In addition to the Wright Street wells, six NARF wells (NARF-1, NARF-2, NARF-3, NARF-5, NARF-6, and NARF-13-1) were not located.

Piezometer Installation. The well inventory revealed that existing well locations provided inadequate coverage to reliably map groundwater flow directions at OU 3. Also, only one useable existing well (NARFD-1) was screened at depth within the surficial aquifer. As a result, ABB-ES identified locations for 12 new shallow (water table) and 15 new deep (greater than 50 feet bls) piezometers to provide a more detailed understanding of groundwater flow in the surficial aquifer. (No intermediate depth piezometers [between 25 to 50 feet bls] were installed during the SSFP.) Locations were selected throughout OU 3 to provide site-wide water-level data. Figure 2-8 illustrates the locations of the piezometers.

The piezometers were installed in August and September 1993. Twenty-four piezometers were installed as 12 couplets of shallow and deep piezometers to provide data on the vertical hydraulic gradient. Three deep piezometers (PZ015, PZ022, and PZ027) were installed adjacent to existing shallow wells. All piezometers were constructed of 2-inch inside diameter, flush-threaded, gasketed polyvinyl chloride (PVC) riser pipe with 0.010-inch slotted PVC well screens.

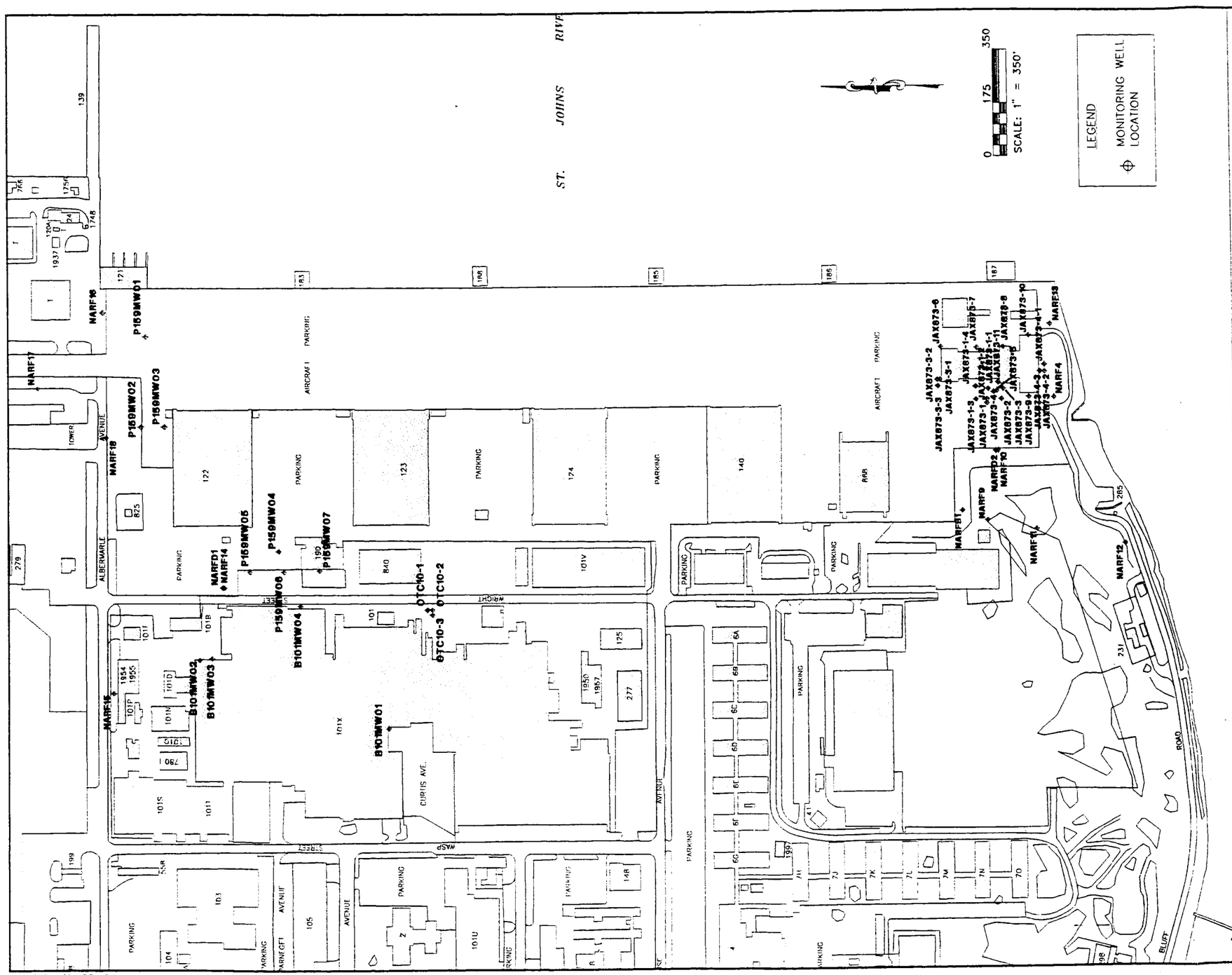

FIGURE 2-7
LOCATIONS OF EXISTING MONITORING WELLS

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

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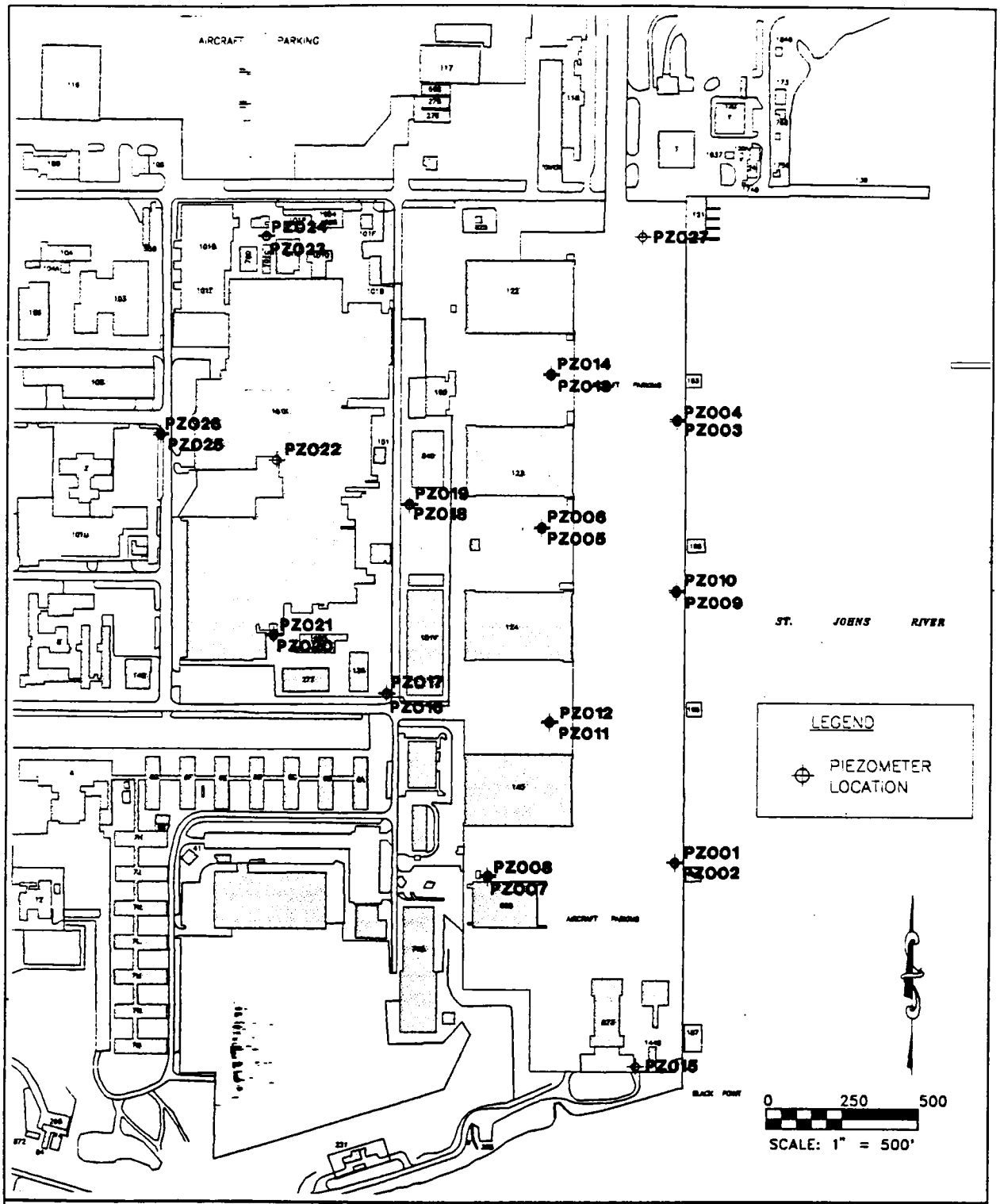

FIGURE 2-8
LOCATIONS OF PIEZOMETERS

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

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JACKSONVILLE, FLORIDA

Screens for shallow piezometers were 10 feet long and placed to span the water table to account for fluctuations in water levels. Screens for deep piezometers were 5 feet long with the exception of PZ005 and PZ027, which have 10-foot screens. Even though the piezometers were only used for obtaining water level data during the SSFP, they were constructed and developed in conformance with NEESA and USEPA Region 4 standards for monitoring well installation, so that water samples could be collected for laboratory analyses, if needed, during the RI.

Geologic logging of split-spoon samples was conducted during drilling of all deep piezometers. Samples were collected continuously from the land surface to the water table, and at 5-foot intervals below the water table. Borings were terminated at the first stiff, cohesive, greenish-gray clay layer at least 4 feet thick and 50 feet or more bls. Depths to the clay layer ranged from 54 feet to 99 feet bls. Deep piezometers were installed in each boring and the screened intervals were placed immediately above the clay layer.

Table 2-4 summarizes the construction details of each piezometer. Further details can be obtained from the drilling logs and piezometer installation logs in Appendices D and E, respectively. Piezometer development records are also included as part of Appendix E.

Soil Sampling. Soil samples collected from above the water table during deep piezometer installation were submitted to the onsite field laboratory for chemical analyses. A total of 50 soil samples was analyzed during the SSFP. Results of the analyses are discussed in Section 2.4.

Soil Borings. Two deep soil borings, SB001 and SB002, were drilled to a depth of 150 feet at the western and eastern edges of OU 3 (Figure 2-9) to supplement deep stratigraphic data obtained from logs of existing deep wells NARFD-1 and NARFD-2 drilled at the northern and southern edges of OU 3. Continuous split-spoon soil samples were collected and logged (using the Unified Soil Classification System) for geologic interpretation and reference during the advancement of the deep soil borings. Appendix D contains the drilling logs for the two deep soil borings.

Cone Penetrometer Testing. To provide a systematic, site-wide stratigraphic database, and to locate and characterize low permeability clay units that could influence contaminant migration, CPT was performed on a regular grid pattern (adjusted for the locations of structures and utilities) within OU 3, and at regular intervals surrounding OU 3. A total of 63 locations was tested. Approximate spacing between CPT locations was 300 feet. Total depths of the CPTs ranged from 46 to 150 feet. Penetration depth was frequently limited to less than 90 feet due to formation resistance of dense sand or clay. CPT locations are indicated on Figure 2-10. A brief summary of the methodology and logs of the CPT output are contained in Appendix F.

Whenever a clay unit of sufficient thickness and dynamic pore pressure was encountered, the CPT sounding was temporarily halted to perform a pore-pressure dissipation test. The dissipation tests were used to compute estimates of the horizontal hydraulic conductivity of the clay unit. A total of 48 dissipation tests at 40 CPT locations were performed. The results of these tests are summarized in Subsection 2.3.3.

Table 2-4
Piezometer Completion Data

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
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Piezometer Number	Total Depth (feet)[1]	Surface Casing Depth (feet)[1]	Screened Interval (feet)[1]	Top of 20/30 Sand (feet)[1]	Top of 30/65 Sand (feet)[1]	Top of Bentonite Seal (feet)[1]	Bentonite Seal Type	Top of Grout: (feet)[1]
PZ001	13	NA	2.5 to 12.5	1.5	NA	1	Chips	0
PZ002	87.5	55	82 to 87	80	78	75	Slurry	1.5
PZ003	63.7	29.5	58.2 to 63.2	56.2	55.2	53	Slurry	1
PZ004	14.0	NA	3.5 to 13.5	2.5	NA	2	Chips	1
PZ005	99	25.5	88.5 to 98.5	86.4	85.0	84	Slurry	1
PZ006	14.5	NA	4 to 14	3	NA	2.5	Chips	0.5
PZ007	61	NA	55.5 to 60.5	54	52	50	Slurry	0
PZ008	16	NA	5.5 to 15.5	4	NA	3	Chips	0
PZ009	94	75	88.5 to 93.5	86.5	85.5	83.5	Slurry	1
PZ010	14	NA	3.5 to 13.5	2.5	NA	2	Chips	1
PZ011	93	NA	87.5 to 92.5	85.5	84.5	82.5	Slurry	0.5
PZ012	15	NA	4.5 to 14.5	2.5	NA	2	Chips	0.5
PZ013	67.5	24	62 to 67	60	59	57	Slurry	0.5
PZ014	14	NA	3.5 to 13.5	1.5	NA	1	Chips	0.5
PZ015	56.5	NA	51 to 56	49	48	42	Slurry	0.5
PZ016	54	11	48.5 to 53.5	46.5	45.5	43.5	Slurry	4
PZ017	14	NA	3.5 to 13.5	2	NA	1.7	Chips	1
PZ018	73.5	23	68 to 73	66	65	63	Slurry	2
PZ019	14	NA	3.5 to 13.5	1.5	NA	1.2	Chips	1
PZ020	89.5	21	84 to 89	81.7	80.5	78.5	Slurry	1.5
PZ021	13.0	NA	3 to 13	2.0	NA	1.5	Chips	0
PZ022	82.5	20	77 to 82	75	74	72	Slurry	1.5
PZ023	80.5	37	75 to 80	73	72	69	Slurry	1.5
PZ024	14	NA	3.5 to 13.5	2	NA	1.5	Chips	0.4
PZ025	85.5	20	80 to 85	78	77	75	Slurry	1.5
PZ026	13.5	NA	3 to 13	2	NA	1.5	Chips	1.5
PZ027	88.5	28	78.5 to 88.5	76	74	72	Slurry	1

[1] Measured in feet below land surface.

Note: NA = not applicable, no 30/65 sand used.

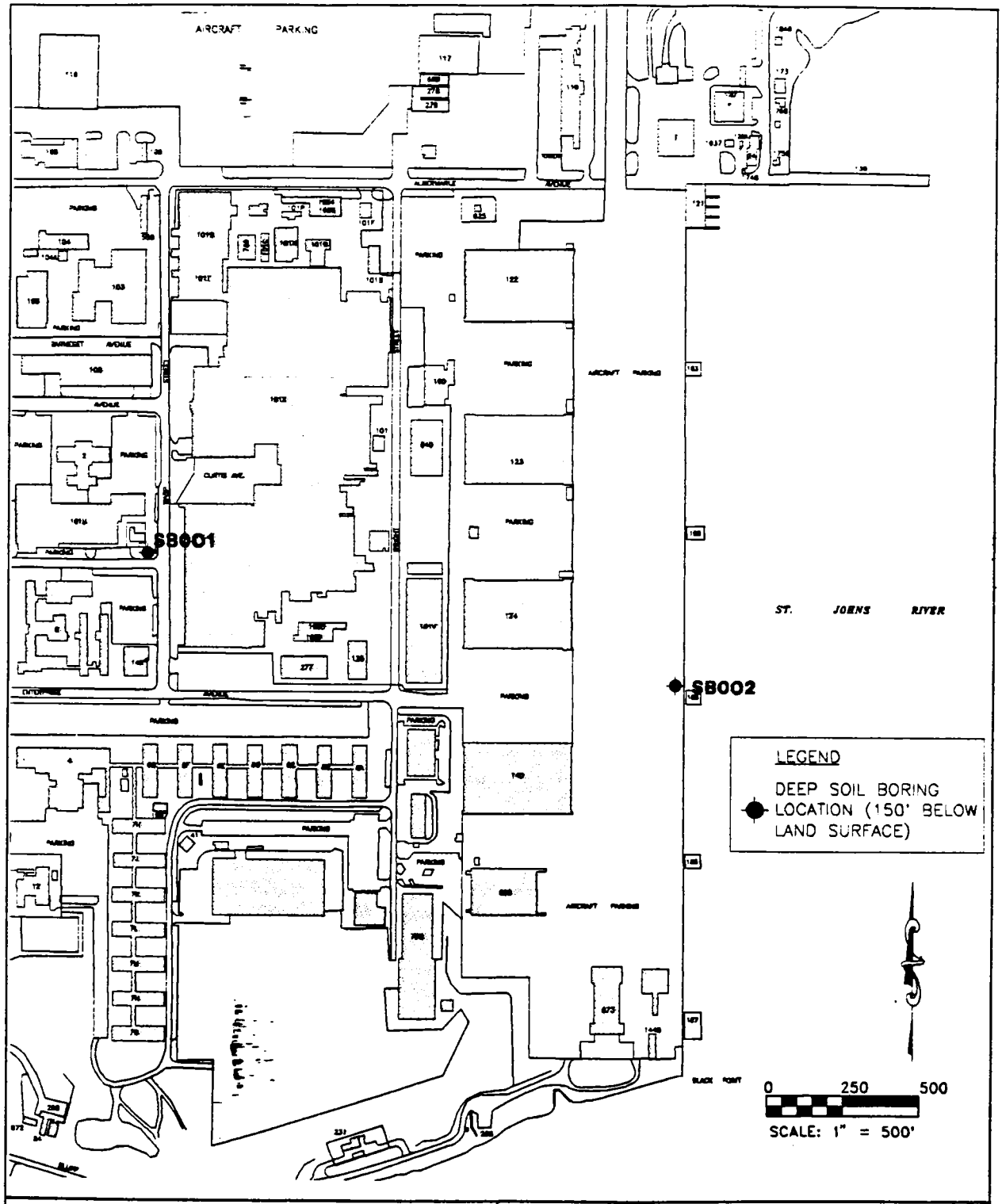

FIGURE 2-9
MONITORING WELL PAIRS, LOCATIONS UPGRADIENT OF OPERABLE UNIT 3 AND ADJACENT TO THE ST. JOHNS RIVER

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

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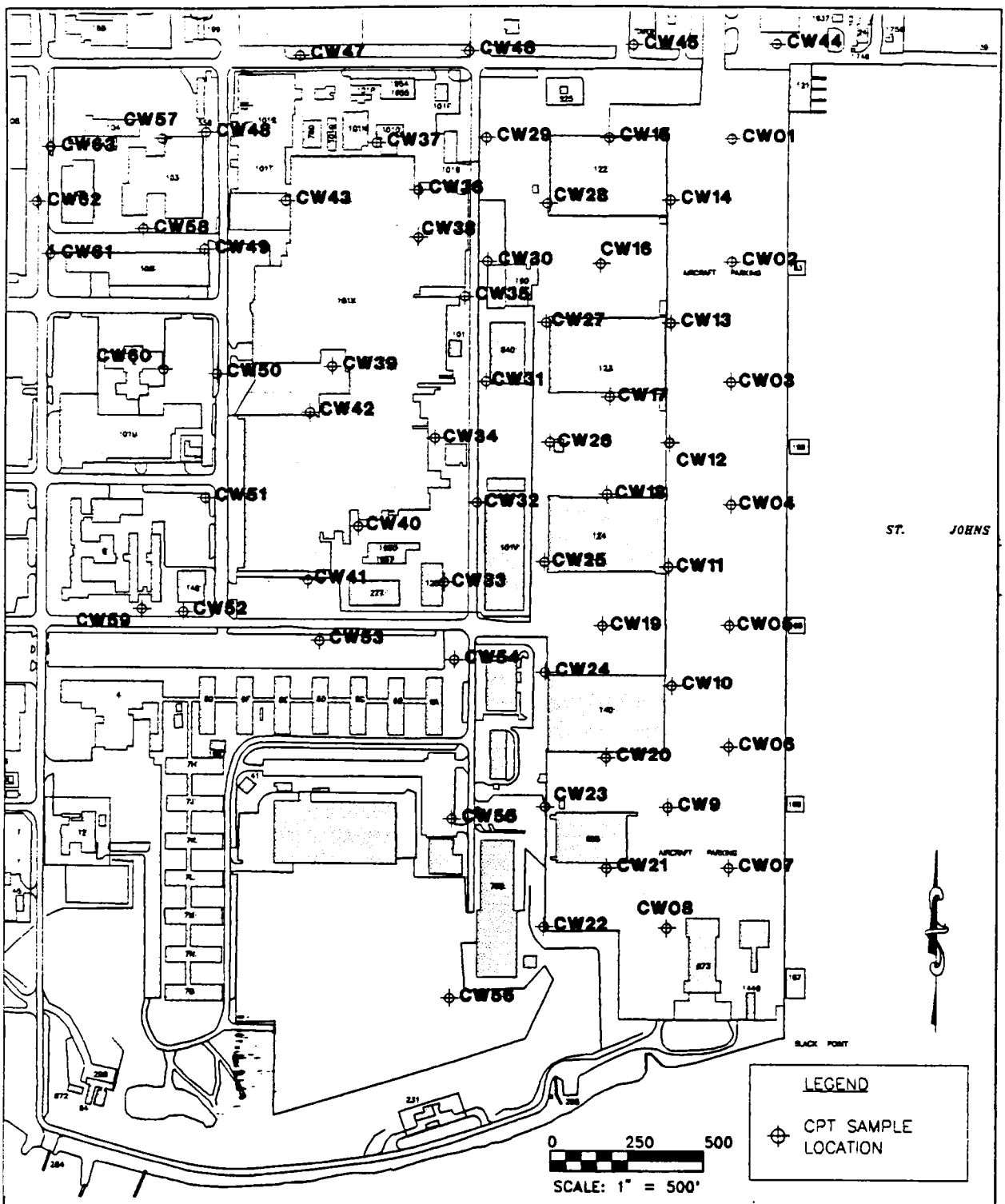

FIGURE 2-10
LOCATIONS OF CONE PENETROMETER TESTS (CPT) AND GROUNDWATER SAMPLING POINTS

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

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DPT Groundwater Sampling. DPT groundwater sampling was performed adjacent to each CPT location. The objective of groundwater sampling was to provide a systematic, three-dimensional chemical database for OU 3 to (1) identify contaminants of concern and (2) locate regions and boundaries of groundwater contamination that may require focused investigation during the RI. Based on the CPT data for each location, sampling intervals were selected from sufficiently granular strata that could be expected to yield water. A specialized groundwater sampling cone was pushed to the selected depth and opened to allow groundwater to enter through a discrete screened interval. Samples were collected using a modified BAT™ Enviro Probe™ sampler with a sealed stainless-steel chamber or with a stainless-steel bailer for volatile samples and a stainless-steel bailer or peristaltic pump for other analyses.

Groundwater sampling soundings were typically performed to the deepest clay units identified by the CPTs, or to cone refusal. With only a few exceptions due to geologic conditions, samples were collected within sufficiently granular strata from three depths at each location: (1) near the water table, (2) near the middle of the surficial aquifer, and (3) immediately above the deepest clay encountered. Three samples could not be collected from depths that were predominantly fine grained and would not yield water. Sample depths varied between locations due to geologic variation; they averaged 12, 37, and 65 feet bls for shallow, intermediate, and deep samples, respectively. A total of 180 samples from 63 locations were collected for chemical analyses. Table 2-5 lists the depths of the CPT soundings and DPT groundwater samples.

Analytical Program. Both soil and groundwater sampling for chemical analysis was conducted during the scoping study. Soil samples were collected during the drilling of deep piezometers and groundwater samples were collected from each DPT sounding for onsite chemical analyses.

Analyses of soil and groundwater were performed at an onsite field laboratory operating under USEPA DQO level 2. Chemical analyses were for selected volatile organic compounds (VOCs), halogenated hydrocarbons, pesticides and PCBs, metals, and total petroleum hydrocarbons (TPH) as listed in Table 2-6. A gas chromatograph with flame ionization and electrolytic conductivity detectors was used for organic compound analysis, atomic absorption was used for metals analysis, and infrared absorbance was used for TPH analysis. Duplicate samples were collected approximately every 10th sample for onsite analysis. An equipment blank was collected on each day a soil and/or groundwater sample was collected.

Ten percent of the soil and groundwater samples collected from each media were duplicated for confirmatory analyses at an offsite, Naval Energy and Environmental Support Activity (NEESA)-approved laboratory. A matrix spike and matrix spike duplicate sample was collected for offsite analysis for 5 percent of the samples. DQOs for offsite analyses were NEESA level D (USEPA level 4), but only results were reported. Offsite analyses were for target compound list (TCL) VOCs, semivolatile organics compounds (SVOCs), pesticides, and PCBs and target analyte list (TAL) metals plus cyanide. Contract required quantitation limits (CRQL) were 10 parts per billion (ppb) for organic compounds. CRQLs vary for inorganic compounds but are higher than the onsite laboratory detection limit of 20 parts per billion (ppb). Analytical methods and sample collection, preservation, documentation, and shipping were conducted in compliance with Appendix 4.4.1, Quality Assurance Program Plan of Volume 4, Basic Site Workplan, of the NAS Jacksonville Navy IR program plan (Geraghty & Miller, 1991a).

Table 2-5
Summary of Cone Penetrometer Testing
and Direct Push Technology (DPT) Groundwater Sampling

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Location No.	Total Depth[1] (feet)	Level 1 Sample Depth[1] (feet)	Level 2 Sample Depth[1] (feet)	Level 3 Sample Depth[1] (feet)
CW01	100	11	37.5	62
CW02	100	12.5	37	60
CW03	90	10	24	74
CW04	100	14	43	70
CW05	100	10.5	40	82
CW06	100	10	24	40
CW07	100	13	31	91.5
CW08	71	12	36	60
CW09	150	14	35	54
CW10	112	10	35	60
CW11	121	22	45	80
CW12	46	12	28	60
CW13	80	13	20	NS
CW14	69	12	19	63
CW15	90	11.5	39	64
CW16	90	9	35	57
CW17	90	9	48.5	75
CW18	87	8	20.5	NS
CW19	90	17.5	32	58.5
CW20	100	15	33	57
CW21	112	10	33	57
CW22	71	10	33	64
CW23	69	11	36	62
CW24	90	14	33	52
CW25	90	13	45	NS
CW26	90	15	23	67
CW27	56	NS	17	44
CW28	90	10	40	56
CW29	90	11.5	37	65
CW30	90	15	41	NS
CW31	64	10	38	60
CW32	81	14.5	72	NS

See notes at end of table.

Table 2-5 (Continued)
Summary of Cone Penetrometer Testing
and Direct Push Technology (DPT) Groundwater Sampling

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Location No.	Total Depth[1] (feet)	Level 1 Sample Depth[1] (feet)	Level 2 Sample Depth[1] (feet)	Level 3 Sample Depth[1] (feet)
CW33	87	NS	60	84
CW34	100	13	23	61
CW35	105	13	39	69
CW36	90	17	33	67
CW37	60	9	27	48
CW38	105	17	30	70
CW39	75	10	27	49
CW40	90	13	83	NS
CW41	90	12.5	47	62.5
CW42	92	10	30	80
CW43	90	16	35	77
CW44	90	17	39	85
CW45	104	13	35	67
CW46	90	11	40	65
CW47	58	11	30	42
CW48	101	13	39	77
CW49	63	12	30	53
CW50	121	12.5	24	85
CW51	82	13	68	NS
CW52	89	10	32	56.5
CW53	90	11.5	53	73
CW54	108	14	35	57
CW55	90	12	40	64
CW56	142	16	40	72
CW57	69	9	31	58
CW58	90	11	35	62
CW59	90	10.5	55	75
CW60	90	11.5	38	60
CW61	90	15	43	83
CW62	90	13	40	82
CW63	83	14	33.5	73

[1] All depths based on feet below land surface.

Note: NS = no sample collected.

Table 2-6
Onsite Laboratory Analytes

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

VOCs	Pesticides	PCBs	Metals	TPH
Benzene	alpha-BHC	Aroclor-1016	Arsenic	Other
Toluene	beta-BHC	Aroclor-1221	Lead	
Ethylbenzene	delta-BHC	Aroclor-1232	Nickel	
m/p-Xylene	gamma-BHC (lindane)	Aroclor-1242	Chromium	
o-Xylene	Heptachlor	Aroclor-1248	Cadmium	
Chloroform	Aldrin	Aroclor-1254		
Trichloroethene	Heptachlor epoxide	Aroclor-1260		
t-1,2-Dichloroethene	Endosulfan I			
c-1,2-Dichloroethene	Dieldrin			
1,1-Dichloroethene	4,4'-DDE			
1,1,1-Trichloroethane	Endrin			
Tetrachloroethene	Endosulfan II			
1,1-Dichloroethane	4,4'-DDT			
1,2-Dichloroethane	Endrin aldehyde			
1,1,2-Trichloroethane	Endosulfan sulfate			
Bromodichloromethane	4,4'-DDD			
Carbon tetrachloride	Chlordane			
1,2-Dichlorobenzene	Toxaphene			
1,3-Dichlorobenzene				
1,4-Dichlorobenzene				

Notes: Detection limits for organic compounds: soil = 1 part per billion (ppb) and water = 1 ppb.
Detection limits for inorganic compounds: soil = 20 ppb and water = 1 part per million (ppm).

VOCs = volatile organic compounds.
PCBs = polychlorinated biphenyls.
TPH = total petroleum hydrocarbon.
BHC = benzene hexachloride.
DDE = dichlorodiphenyldichloroethene.
DDT = dichlorodiphenyltrichloroethene.
DDD = dichlorodiphenyldichloroethane.

Elevation and Location Survey. In July 1993, the horizontal locations and vertical elevations (top of casing and ground surface) of all wells located in the well inventory were surveyed. All new piezometers and DPT soundings were surveyed in September 1993. The surveys were conducted relative to the Transverse Mercator Projection for Florida, East Zone; North American Datum of 1983; and the National Geodetic Vertical Datum of 1929. The results of the surveys are contained in Appendix G.

Long-term Groundwater Level Measurements. Water levels were measured at the existing OU 3 wells following the well inventory. Complete sets of water level measurements were taken at all existing wells and newly installed piezometers on September 22, November 18, and December 16-17, 1993, and on January 27-28, 1994 (Appendix H). The hydrogeologic assessment discussed in Subsection 2.3.3 is based on these measurements. Water levels will continue to be measured on a monthly basis until June 1994. The purpose of the long-term monitoring is to assess potential seasonal fluctuations in groundwater levels or flow directions.

The USGS in Tallahassee, Florida, is currently conducting a study assessing tidal influence on the St. Johns River near NAS Jacksonville and the resulting impact on groundwater flow at OU 3. Gauging stations are currently set up in monitoring wells NARF-12 and NARF-15. Preliminary data indicate that groundwater flow is not influenced by tidal fluctuations.

Aquatic Habitat Characterization. Ten transects perpendicular to the shore line were established in the St. Johns River between the active fuel dock to the north and Black Point at the south end of OU 3 (see Subsection 2.3.4). Because the water is deep along the seawall, only three transects were established east of OU 3 and additional data were obtained by cruising along the seawall. Depending on water depth, between two and five sampling intervals were established along each transect. All sampling was conducted from a boat to minimize disturbance to the sediment. A sediment corer was used to collect sediment samples. Sediment composition (i.e., grain size, relative amounts of organic matter, sands, and silts) was qualitatively evaluated. In addition, a petite Ponar dredge sampler was used to determine the presence, coverage, and composition of submerged aquatic vegetation (SAV). A secchi disk was used to calculate the depth of light penetration and measurements of temperature, salinity, and conductivity were taken at each sampling location.

2.3.2 Local Stratigraphy OU 3 soil stratigraphy was investigated for two reasons: (1) to map permeable pathways and low permeability flow barriers that could affect contaminant migration and (2) to investigate two localized potential anomalies (the reported sinkhole under Building 101 and the former tidal lagoon). Information regarding the stratigraphy at OU 3 was obtained from geologic logs of 2 150-foot soil borings, 15 deep piezometers, and 63 CPT soundings (Appendices D and F).

Prior to the construction of geologic cross sections, the logs of the CPT soundings were compared to the logs of nearby piezometers and borings to evaluate the correlation between logs generated by strain and pressure gauge measurements and logs based on visual classification (Figures 2-11 and 2-12). The points used in the correlations were up to 100 feet apart; therefore, the potential for lateral variation was considered in the comparison. The comparison indicated consistent estimates for the depths at which clays and sands were encountered.

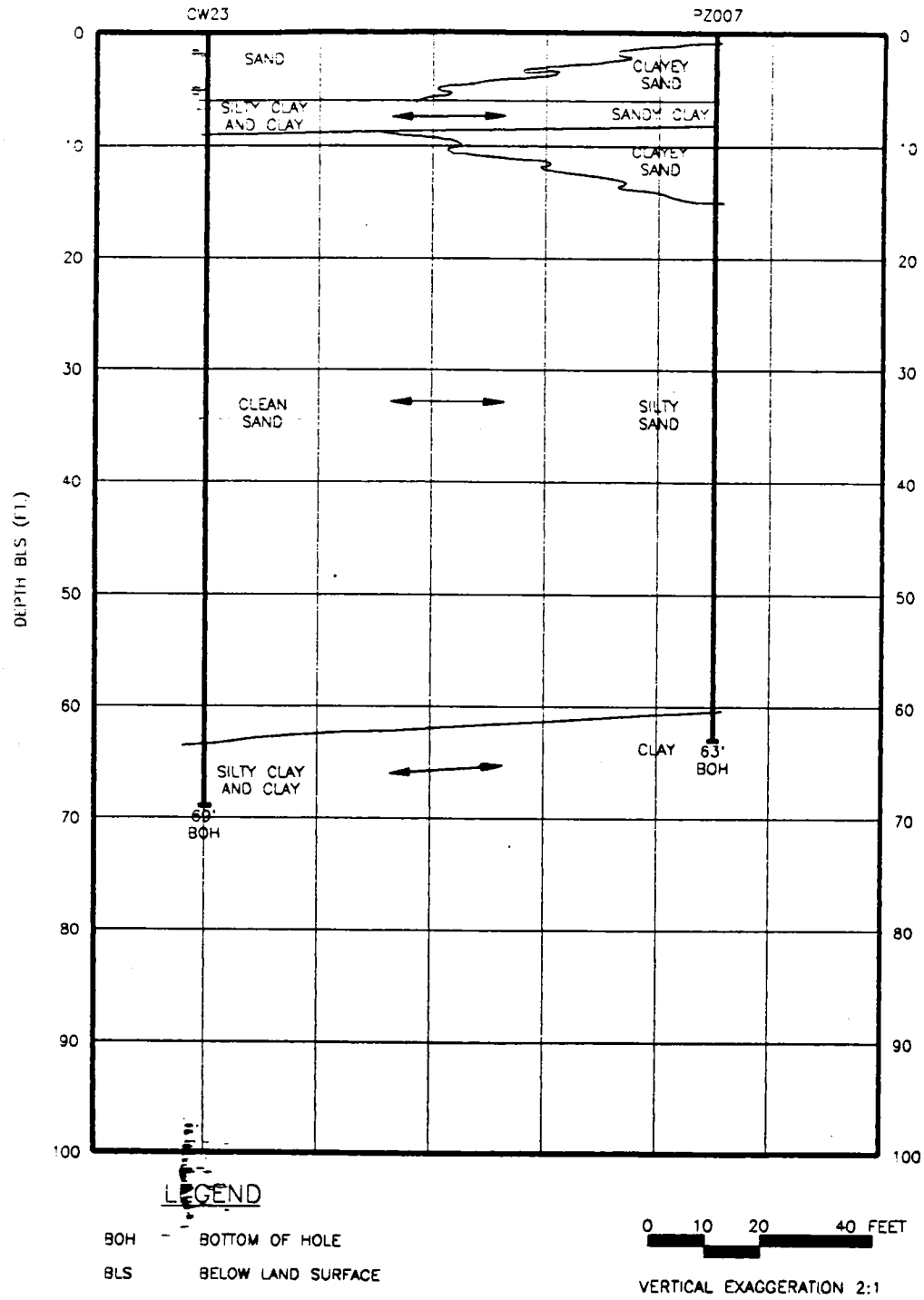

FIGURE 2-11
COMPARISON OF CONE PENETROMETER TESTING AND BORING LITHOLOGIC LOGS, SOUTHEAST OPERABLE UNIT 1

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

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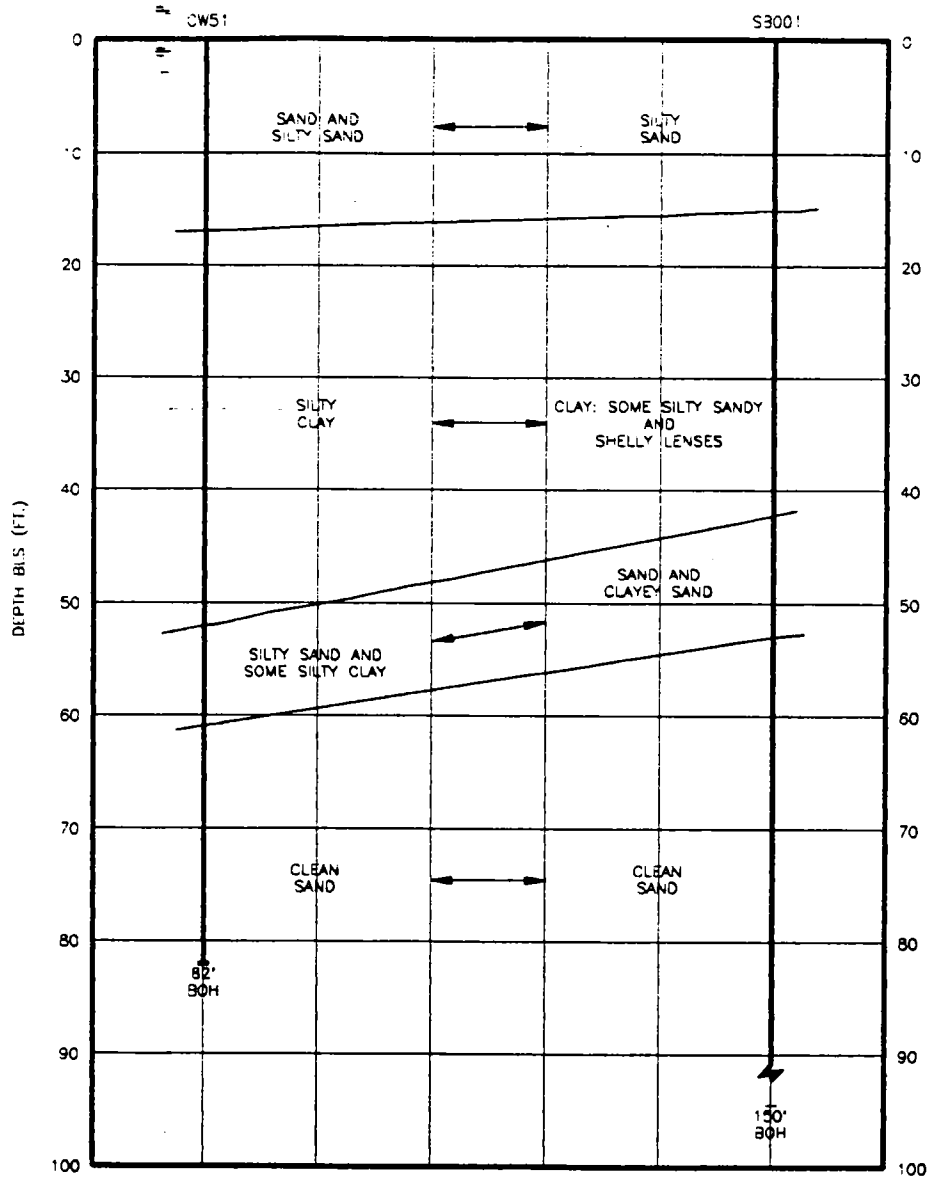

LEGEND

BOH BOTTOM OF HOLE

BLS BELOW LAND SURFACE

0 10 20 40 FEET

VERTICAL EXAGGERATION 2:1

FIGURE 2-12
COMPARISON OF CONE PENETROMETER TESTING AND BORING LITHOLOGIC LOGS, WEST OPERABLE UNIT 3

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

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However, CPT and boring logs commonly differed in their designation of pure versus silty clay and clean versus silty sand. In addition, sandy clays or clayey sands were not labeled in the CPT logs. Based on this comparison, lithologies were re-interpreted from the CPT data and indicated on the CPT logs (Appendix F). The cross sections and fence diagrams were constructed from the modified logs. The general classifications of sand, clay, clayey sand, and sandy clay were assigned to the various lithologies of the CPT, boring, and piezometer logs. These classifications encompassed the following lithologies:

> sand, clean to silty sand and gravel;
> clay, pure to silty clay, shelly clay, and clayey silt;
> clayey sand, clayey sand and very silty sand; and
> sandy clay, sandy to very silty clay.

Visual classification of sediment indicates that OU 3 is underlain to a depth of at least 150 feet by interbedded layers of sand, clayey sand, and clay. Sand layers generally consist of unstratified, light gray to very pale brown, poorly graded, sub-angular to subrounded, fine- to very fine-grained, clean quartz sand. Silty sand was encountered at only a few locations. Density of the sands ranged from loose at shallow depths to very dense at depths greater than 50 feet.

Clayey sands consist of sand, as above, with greenish-gray clay present as nodules or as thin seams. At depths generally greater than 50 feet, the clayey sands also contain a carbonate fraction of calcite or dolomite mud with occasional shell fragments. The clayey sands generally occur as transitional zones between sand and clay layers.

The clay layers consist of homogeneous, stiff, dry to moist, low- to high-plasticity clay and silty clay. Some sandy clay intervals were also present, generally as clay with fine-grained quartz sand lenses or seams. The color of the clay encountered at depths less that 30 feet was typically very pale brown, light gray, or light greenish-gray. At PZ002, PZ016, and PZ023, a black, plastic, organic clay was found at depths of 20 to 60 feet. Clay layers at depths greater than 20 feet typically ranged from grayish-green to dark greenish-gray. The darker color and locally shelly intervals are indicative of the Hawthorn Formation. The Hawthorn Formation at OU 3 consists of clay interbedded with sand and clayey sand. Dolomite and limestone layers were also encountered within the Hawthorn Formation at depths greater than 120 feet in the two deep soil borings and at 95 feet at PZ027 in the northeast corner of OU 3. The clay layers of the Hawthorn Formation and the overlying surficial deposits were not distinguished in the cross sections and fence diagrams. Instead, they were considered as one hydrostratigraphic unit; an aquitard inhibiting the downward migration of groundwater and contaminants from overlying sand and clayey sand layers.

The clay layers encountered at OU 3 ranged from 2 to 65 feet thick. The thickest clay layer trends southwest to northeast and corresponds to the location of the former "lagoon" noted on the 1939 topographic map of the base (Appendix L). The clay is lenticular in cross section and crescent shaped in plan view. Figure 2-13 shows the location of seven cross sections that have been constructed from the CPT, piezometer, and boring logs. Cross-sections C-C', E-E', and G-G' are contained in Appendix I for reference but are not discussed here. Cross-section F-F' (Figure 2-14) shows a cut through the length of the clay lens; cross-sections A-A', B-B', and D-D' (Figures 2-15, 2-16, and 2-17) are cuts approximately perpendicular to F-F'.

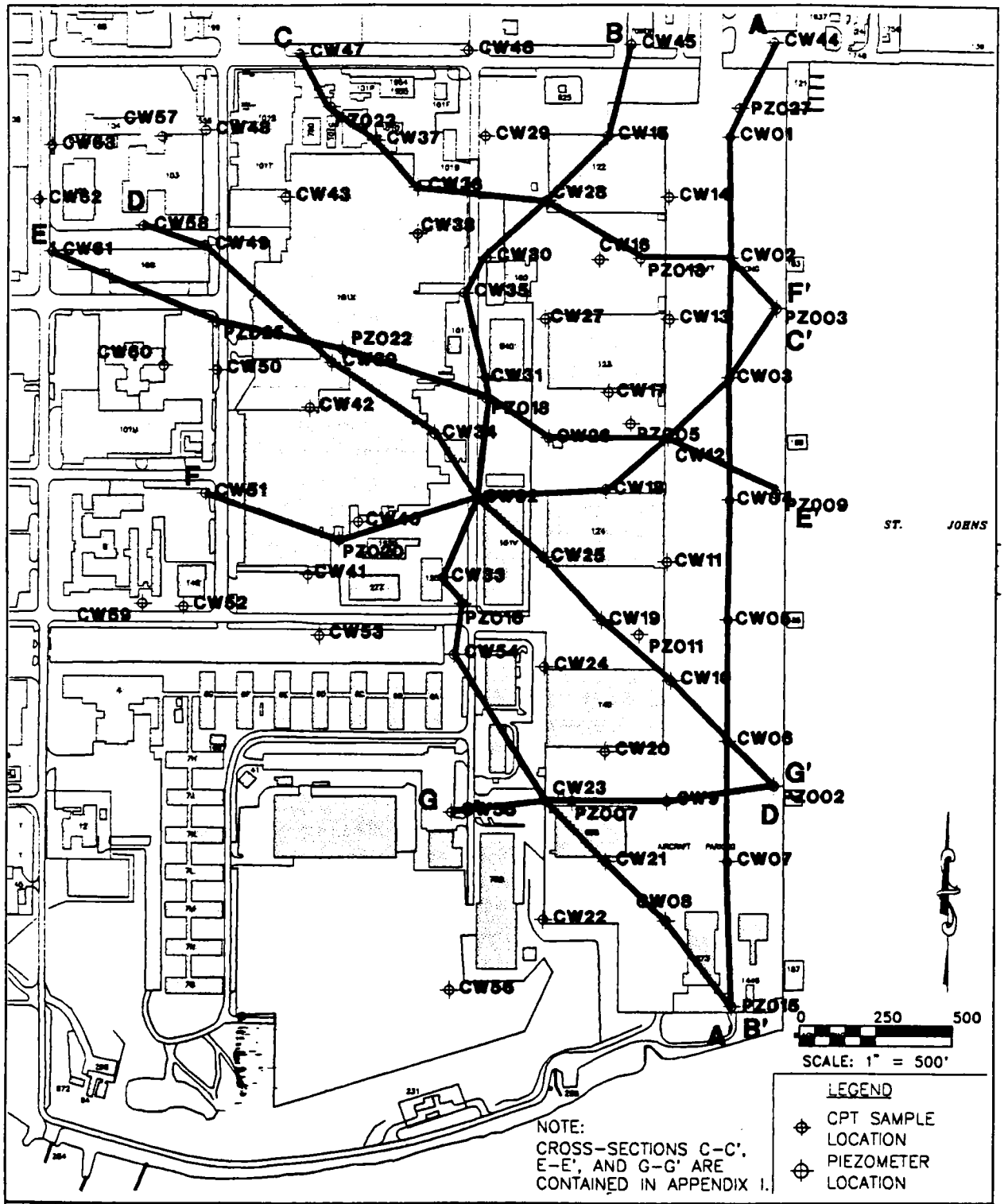

FIGURE 2-13
LOCATIONS OF CROSS-SECTION LINES

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

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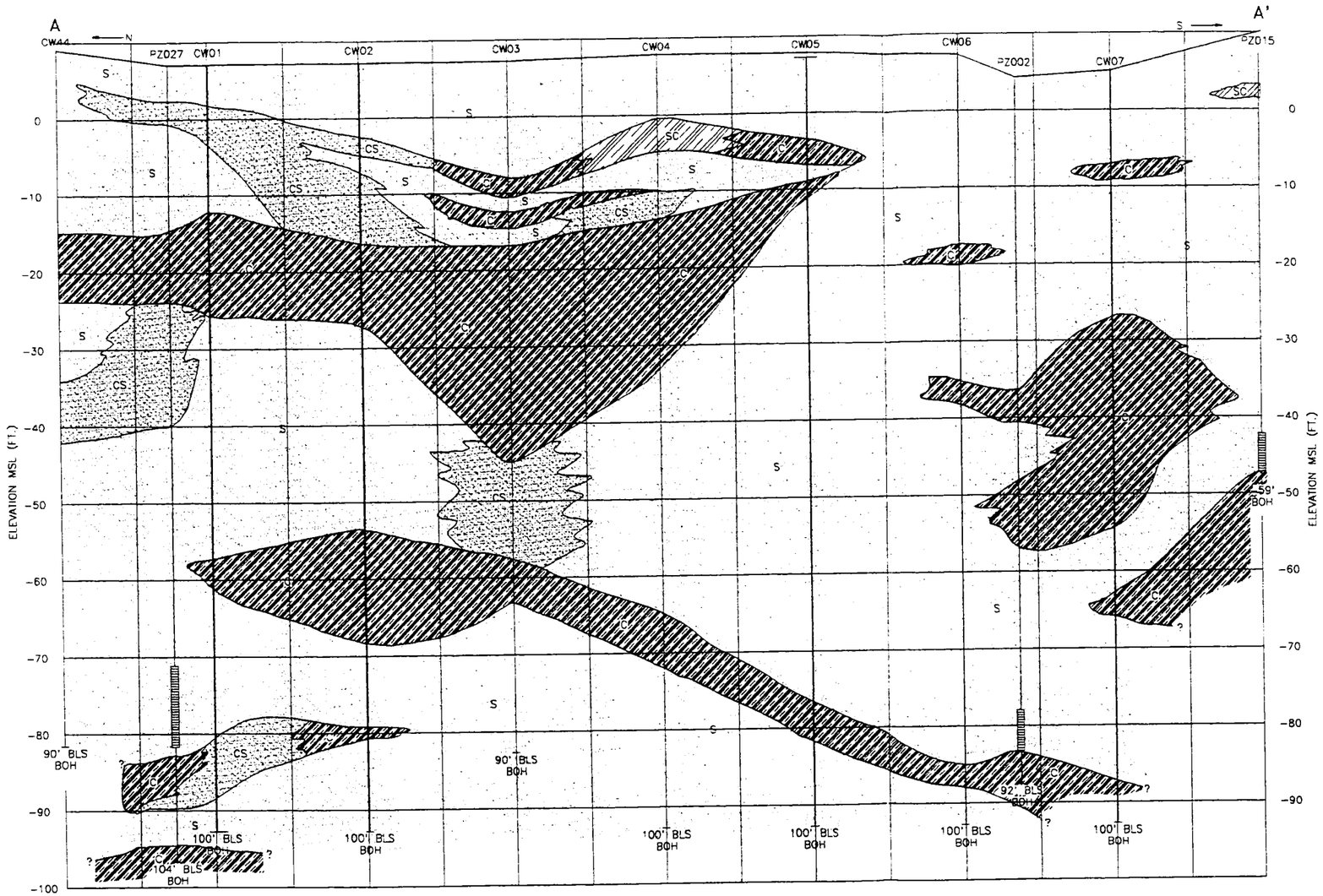

LEGEND

- S: SAND
- CS: CLAYEY SAND
- SC: SANDY CLAY
- C: CLAY
- UNKNOWN CONTACT
- INFERRED CONTACT
- SCREENED INTERVAL
- BOH BOTTOM OF HOLE
- BLS BELOW LAND SURFACE

0 100 200 400 FEET

VERTICAL EXAGGERATION 20:1

FIGURE 2-15
GEOLOGIC CROSS-SECTION
A - A'

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

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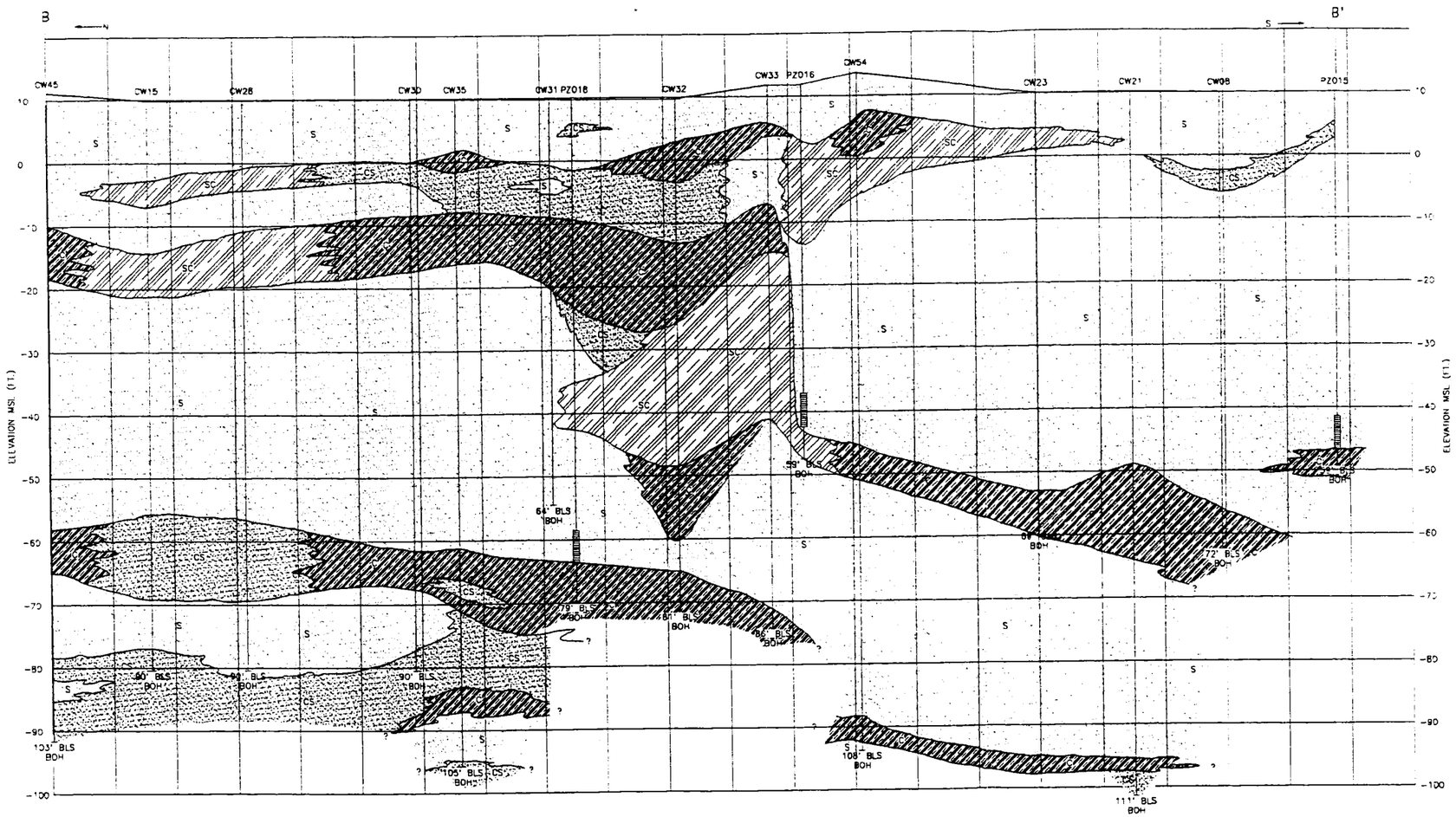

LEGEND

- S: SAND
- CS: CLAYEY SAND
- SC: SANDY CLAY
- C: CLAY
- UNKNOWN CONTACT
- INFERRED CONTACT
- SCREENED INTERVAL
- BOH BOTTOM OF HOLE
- BLS BELOW LAND SURFACE

0 100 200 400 FEET

VERTICAL EXAGGERATION 20:1

FIGURE 2-16
GEOLOGIC CROSS-SECTION
B - B'

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

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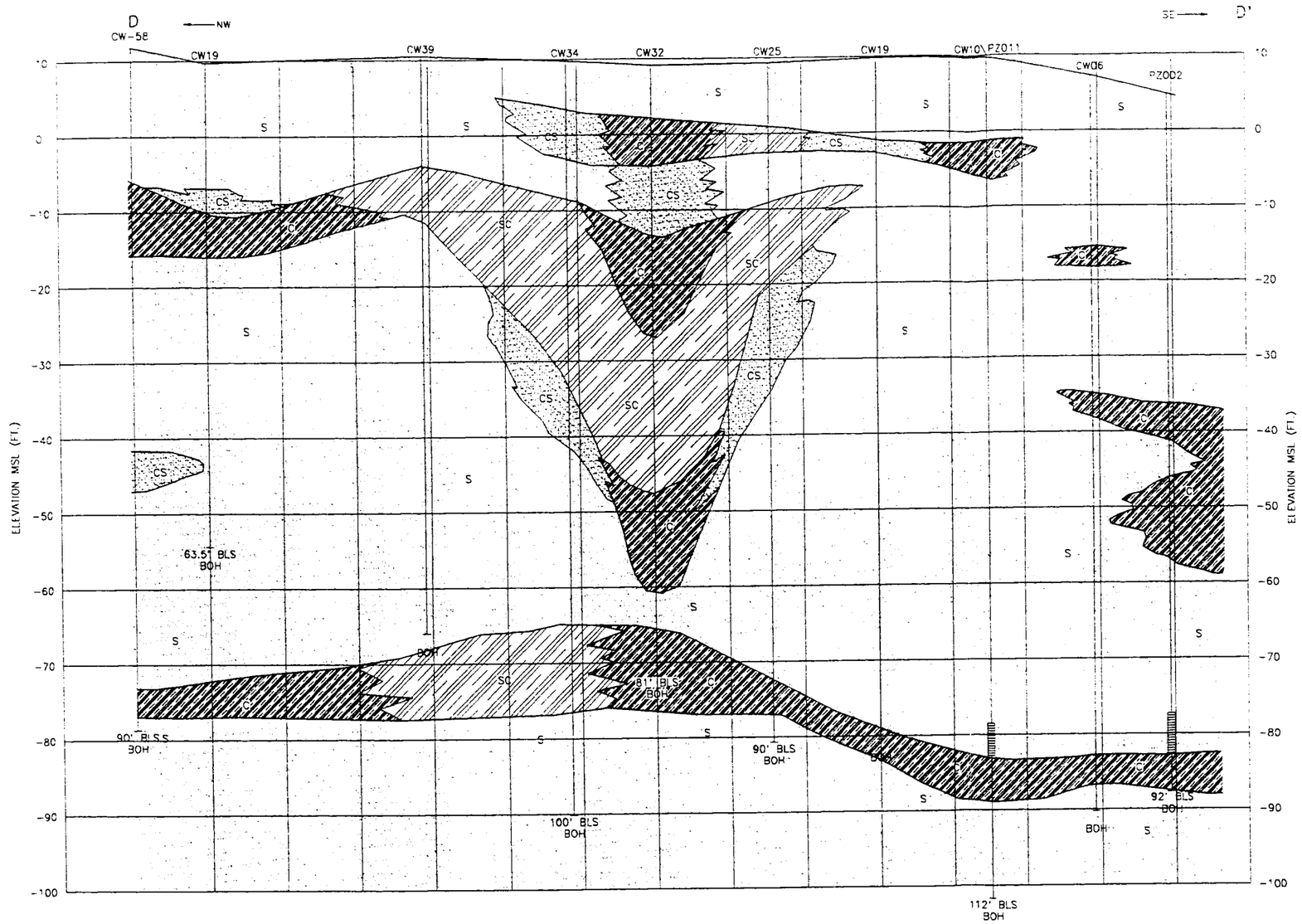
7586SB-B/DRM/3-7-94



LEGEND

- S: SAND
- CS: CLAYEY SAND
- SC: SANDY CLAY
- C: CLAY
- ? UNKNOWN CONTACT
- INFERRED CONTACT
- SCREENED INTERVAL
- BOH BOTTOM OF HOLE
- BLS BELOW LAND SURFACE

0 100 200 400 FEET

VERTICAL EXAGGERATION 20:1

FIGURE 2-17
GEOLOGIC CROSS-SECTION
D - D'

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

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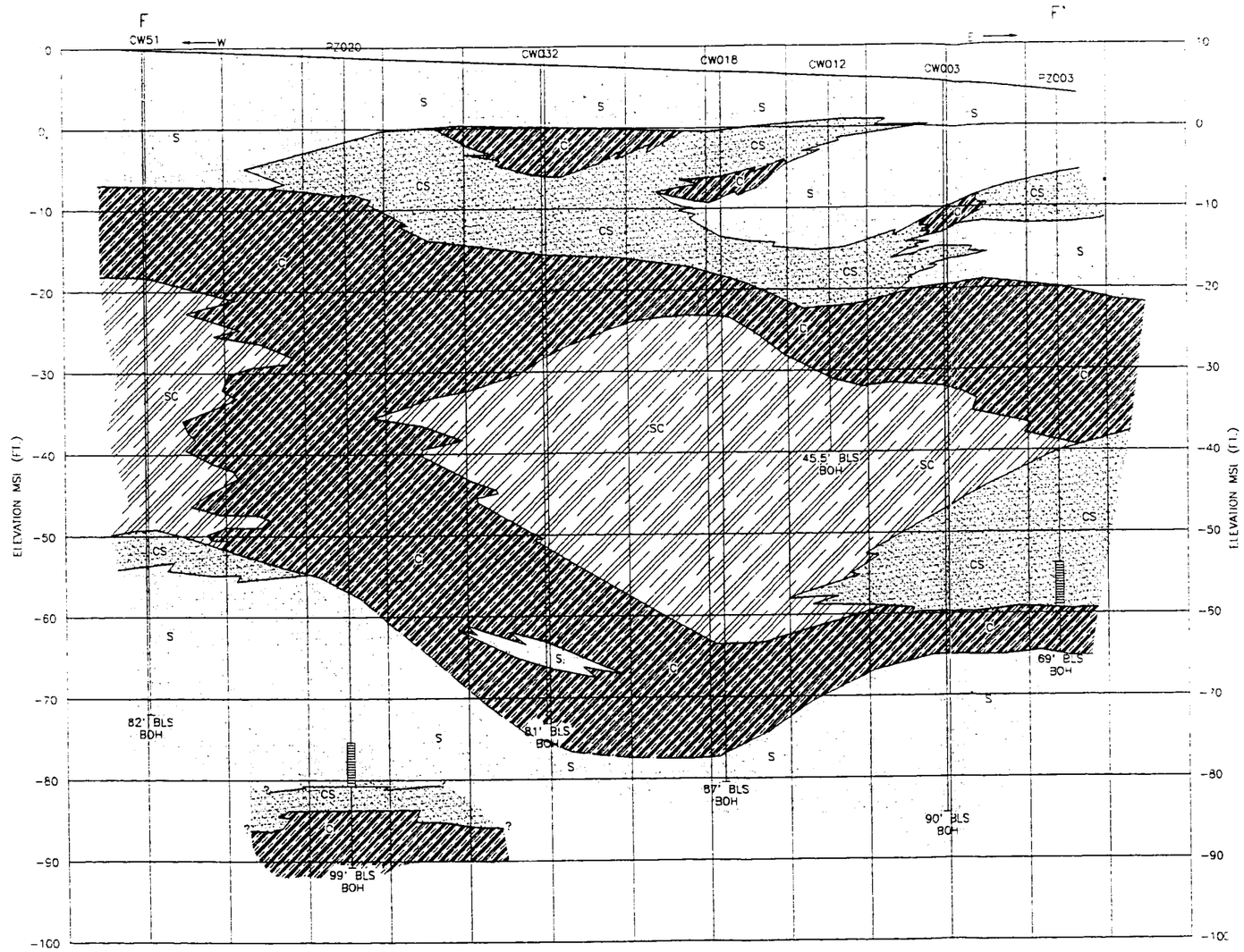
7586S_DD/DRM/3-7-94



LEGEND

- S: SAND
- CS: CLAYEY SAND
- SC: SANDY CLAY
- C: CLAY
- UNKNOWN CONTACT
- INFERRED CONTACT
- SCREENED INTERVAL
- BOH BOTTOM OF HOLE
- BLS BELOW LAND SURFACE

0 100 200 400 FEET

VERTICAL EXAGGERATION 20:1

FIGURE 2-14
GEOLOGIC CROSS-SECTION
F - F'

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

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7586_FF/DRW/3-8-94

The cross sections and the fence diagram (Figure 2-18) show the clay lens extending beyond the boundaries of OU 3 to the west and thinning to the east beneath the helicopter flightline. The clay is 65 feet thick between CW32 and CW18 (Figure 2-14) north of Hangar 124, and approximately 700 feet wide between PZ016 and PZ018, just east of Wright Street (Figure 2-16). Much of the clay lens contains sandy clay indicating a higher permeability and potential for groundwater flow through the lens. The clay lens thins to the north and northwest into an upper and a lower unit, both of which are continuous and extend offsite. The lower unit, at approximately 85 feet bls, is consistently 4 to 6 feet thick. The upper unit, at approximately 15 to 25 feet bls, varies from 2 to 10 feet in thickness. To the southeast, the lens thins to a 4- to 10-foot thick layer of clay at 90 to 100 feet bls. Only discontinuous clay and clayey sand lenses exist between the surface and the deep clay between Hanger 124 to PZ002 (Figures 2-15 and 2-17). To the south and southwest, the clay lens appears to pinch into upper and lower units at depths of 10 to 30 feet and 55 to 65 feet, respectively. The upper unit thins and grades to a clayey sand to the south. The lower unit appears to be continuous to the southeast through CW08 (Figure 2-16) and thickens to 25 feet to the southwest at CW56 (Figure 2-18).

The presence of clay within the shallow aquifer appears to be laterally extensive across OU 3 although several localized, discontinuous clay layers were encountered. The reported sinkhole beneath Hangar 101 was investigated by conducting a CPT sounding (CW32) in that area. The CPT log indicated that the underlying sediment consist mostly of clay. No anomalous results, such as a subsurface void, were encountered and the CPT log was consistent with those from surrounding locations.

2.3.3 Characterization of Groundwater Regime The objectives of the groundwater regime characterization were as follows: (1) to assess general groundwater flow direction(s) at OU 3, (2) to define potential seasonal changes in groundwater flow, and (3) to evaluate the influence on local groundwater flow of the filled former lagoon or swale located between the present locations of Buildings 123 and 124.

Water level elevations measured on September 22 and November 18, 1993, at the shallow piezometers and useable shallow wells were used to generate contour maps of the water table (Figures 2-19 and 2-20). A similar contour map of the potentiometric surface of the lower shallow aquifer was not generated from the deep piezometer data due to significant differences in the depth of the screened interval and thickness of the overlying clay layers. Additional water level data have been collected on a monthly basis and are contained in Appendix H. Although contour maps for the later data are not presented here, the data were considered in the groundwater regime characterization.

The water table contour maps on Figures 2-19 and 2-20 indicate that the general groundwater flow direction follows topography toward the St. Johns River to the east. However, the concrete seawall, which extends to a depth of 17 feet along the river, appears to serve as a barrier boundary to the upper reaches of shallow aquifer flow, redirecting it to the north and south along the seawall.

Groundwater flow at greater depths within the shallow aquifer is toward the St. Johns River and is not influenced by the seawall. The impact on groundwater flow of the northeast to southwest clay lens near the center of OU 3 has not been determined.

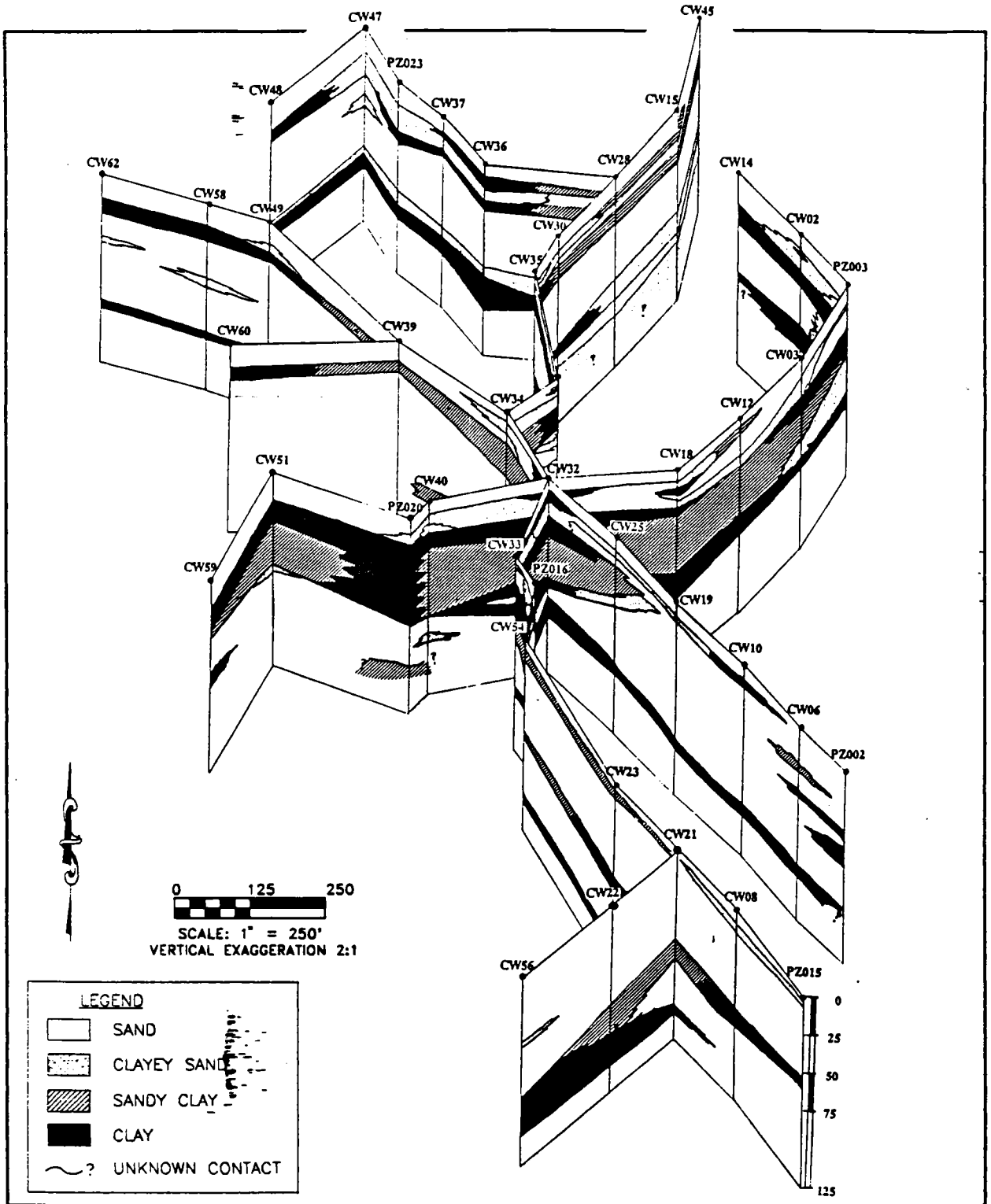

FIGURE 2-18
FENCE DIAGRAM

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

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JACKSONVILLE, FLORIDA

003/DRM/08-29-94

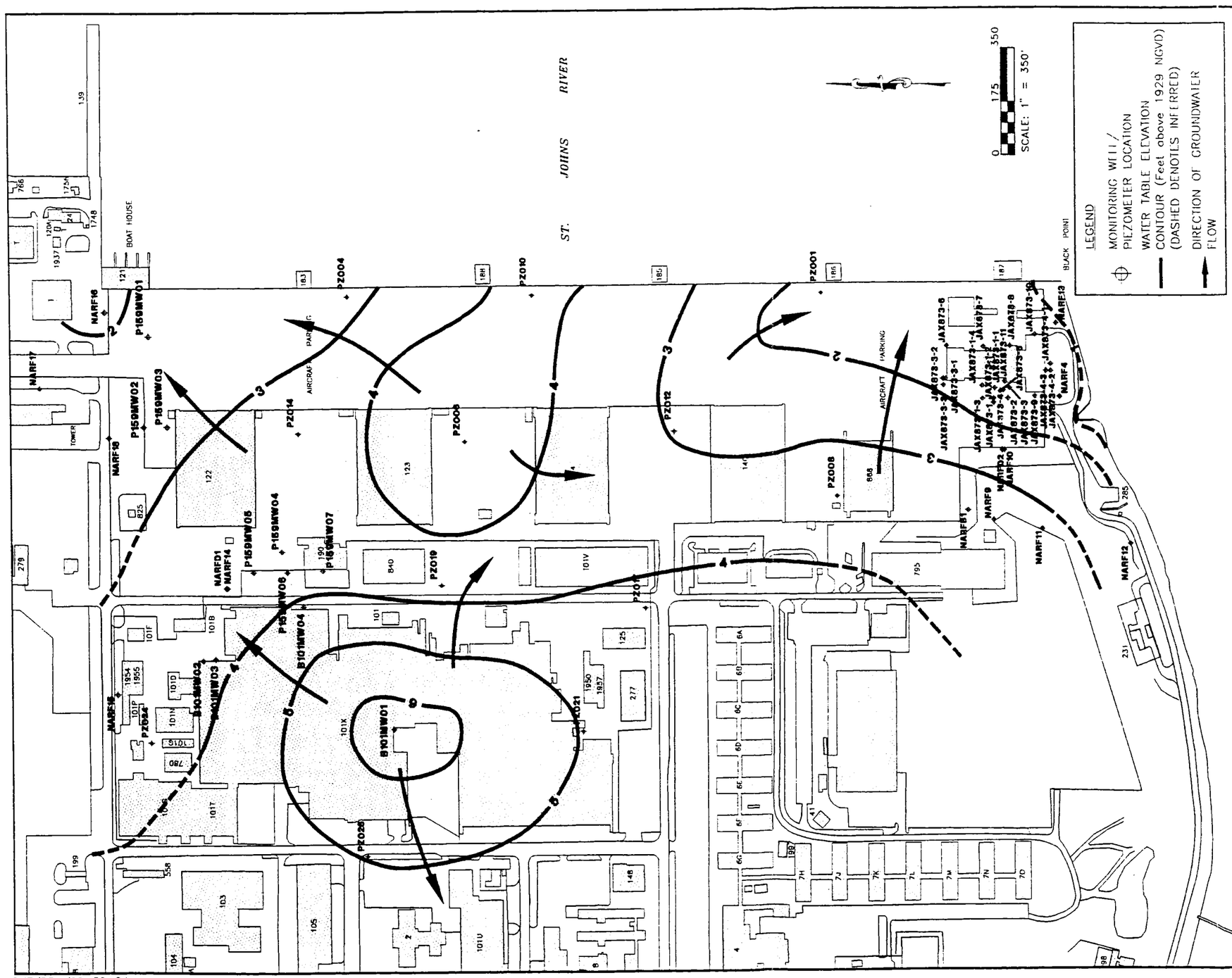

FIGURE 2-20
WATER TABLE CONTOUR MAP, DATA FROM SHALLOW WELLS AND PIEZOMETERS, NOVEMBER 18, 1993

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

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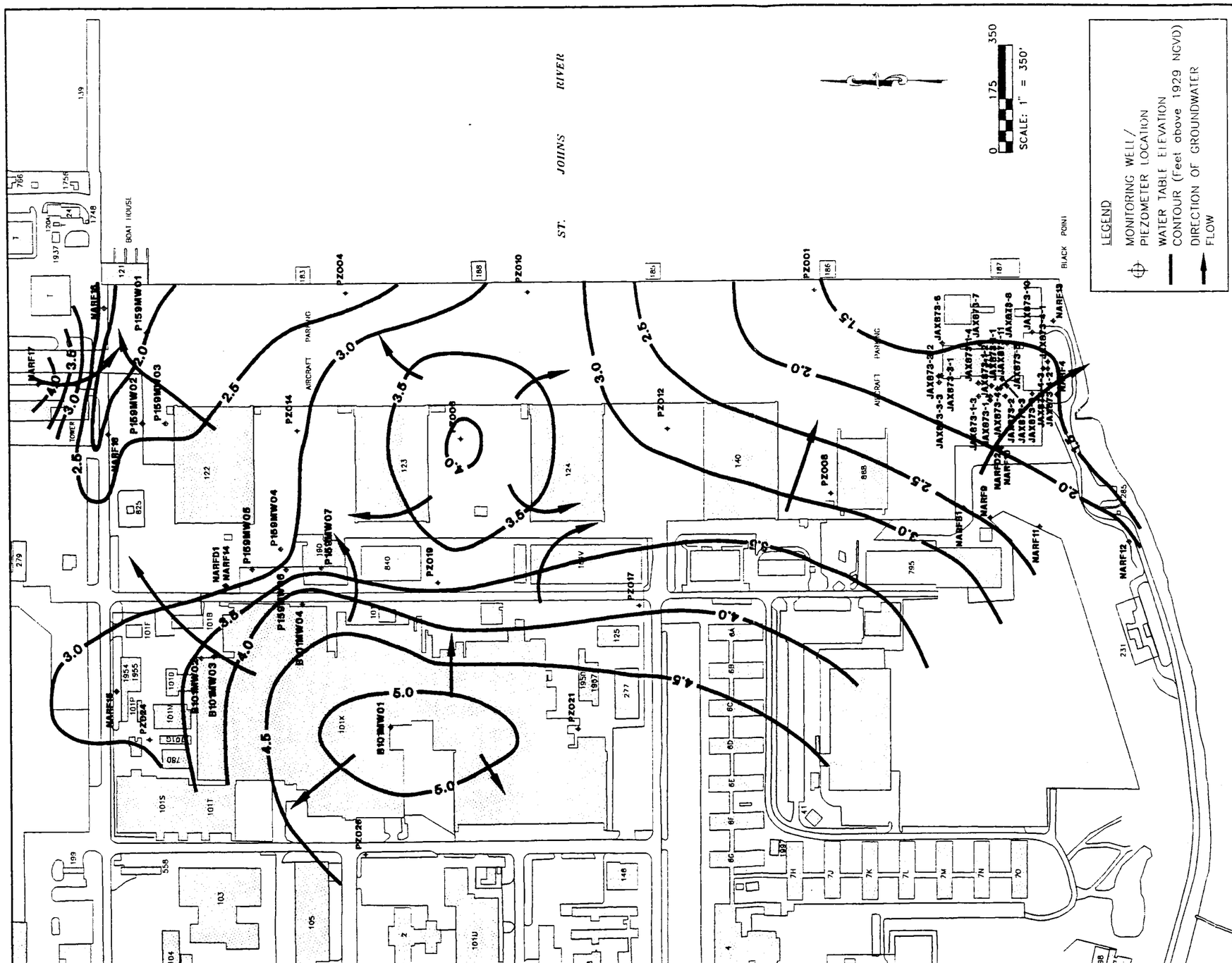

FIGURE 2-19
WATER TABLE CONTOUR MAP, DATA FROM SHALLOW WELLS AND PIEZOMETERS, SEPTEMBER 22, 1993

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

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OU3/DRM/08-29-94

Flow from the shallow surficial aquifer likely discharges to the St. Johns River along the south end of the site; the point of discharge to the north is uncertain but may be in the area of the boathouse (located at the northeastern corner of OU 3). Based on the contours of the September 22, 1993, measurements, shallow groundwater flow appears to converge from the north and southwest and curve to the east toward the river. A channel-like zone of highly permeable sand or gravel could result in such a flow pattern; however, the lithology of the surficial aquifer in this location does not significantly differ from the rest of the seawalled area. The unusual flow pattern may also be due to a break in the seawall near the boathouse causing flow through the barrier. The November 1993 (Figure 2-20) and December 1993 contour data do not suggest flow through the seawall; instead, flow is to the northeast around the seawall, as expected. However, the subsequent contour data collected in January 1994 does have a similar flow pattern to that measured in September. Additional water-level measuring points are needed to better assess groundwater flow direction in this area.

In addition to the seawall, two possible groundwater mounds locally redirect flow away from the St. Johns River. These mounds, located under Building 101 and between Hangars 123 and 124, induce radial groundwater flow in these areas. The mound indicated between Hangers 123 and 124 on September 22, 1993, was less pronounced on November 18, 1993, and appears to be a groundwater divide for flow north and south along the seawall. The effect of mounding is significant because groundwater flow (and contaminant transport) in these areas is not to the east-southeast as previously expected on the basis of topography and the location of the St. Johns River.

The possible mounding at OU 3 may be a result of a low rate of groundwater infiltration caused by underlying low permeability clay layers. The groundwater mound between Hangars 123 and 124 corresponds to the thickest sequence of clay at OU 3 (65 feet); however, no significant clay layer is present beneath Building 101 suggesting another explanation for low infiltration rates. Because the majority of the ground surface at OU 3 is paved, which limits infiltration by rainfall, the source of infiltration may be a leaking subsurface storm sewer or water line.

Both groundwater mounds were defined based on anomalously high water levels recorded at one piezometer or well in each location (PZ006 and B101MW01). Additional piezometers are needed in the areas of these mounds to verify their existence and to better define the resulting radial flow patterns.

Comparison of water levels in the shallow and deep piezometer pair indicates an upward vertical hydraulic gradient of 0.22 to 3.68 feet across most of OU 3. Differences in the magnitude of the vertical gradient are likely due to differences in the depth of the screened interval, the lithology of the screened interval, and the thickness of the overlying clay. An upward vertical gradient can be explained by either the confining effect of the clay layers and/or the upwelling of groundwater recharging the St. Johns River.

A downward hydraulic gradient was indicated at three locations (PZ005/6, PZ009/10, and PZ016/17) in September 1993 and five locations (PZ005/6, PZ009/10, PZ016/17, PZ020/21, and PZ022/B101MW-1) in October 1993. Downward gradients were also measured at the five piezometer pairs from December through February. The downward gradient at these locations cannot be explained based on the local

geology and more information is needed to verify the presence of the downward gradient.

The hydraulic conductivities (K_h) of clay layers underlying OU 3 were calculated from the dissipation test data collected during the CPT soundings (Table 2-7). The calculations yielded K_h estimates of $6x10^{-8}$ to $1x10^{-10}$ feet per second (ft/s). These values fall within the typical range for clay and represent a very low permeability layer. Slug tests conducted at seven shallow piezometers, selected based on their spatial distribution an variable lithologies, yielded K_h estimates generally ranging from 2×10^{-6} to $8x10^{-6}$ ft/s for the upper sand unit. This range is typical for a silty sand. A larger K_h value of $4x10^{-5}$ ft/s was measured at NARF-9, however, which is screened at an interval approximately 15 feet deeper than the other six wells.

The hydraulic conductivity data indicate that the clay and sandy clay units within the surficial aquifer are significantly less permeable than the sand and silty sand units. This is reflected in the relative change in water levels of the shallow versus deep piezometers measured in September and November (Appendix H). Water table elevations increased in shallow piezometers from September to November, but water level elevations increased correspondingly in only half of the deep piezometers. This difference in response is likely due to the varying thickness of the overlying clay confining layer, which has a much lower hydraulic conductivity and, thus, impedes recharge to lower parts of the surficial aquifer.

The slug test data were supplied to the USGS to support their numerical model for OU 3 and to calculate an estimated pumping rate that a shallow well could sustain during a multi-day pumping test. The USGS calculated a sustainable pumping rate of less than 0.5 gallon per minute (gpm) based on the slug test results. However, subsequent pumping tests, conducted as part of an Interim Removal Action at Buildings 106 and 780, indicated significantly higher sustainable yields; 1.0 gpm at Building 780 and 5.0 gpm at Building 106.

2.3.4 Aquatic Habitat Evaluation A characterization of the St. Johns River adjacent to and north of OU 3 (Figure 2-21) was completed to evaluate the St. Johns River aquatic habitat that may be exposed to contaminants potentially originating from OU 3. The characterization was also conducted to assist in determining whether a quantitative biomonitoring investigation should be undertaken during the RI. Specifically, a survey of the sea grass beds on the shoreline of the St. Johns River adjacent to OU 3 was completed.

Table 2-8 provides information on depth, temperature, salinity, conductivity, secchi measurements, sediment type, and presence of vegetation and living matter at each of the sampling locations. The presence of sea grass beds was noted at transects 4A, 5A, and 8A. At transect 8A, vegetation was located just south of the NAS Jacksonville boat dock, extending approximately 1,000 feet to the south. At the northern edge of the seawall (transect 8A), sea grasses were observed to extend approximately 10 to 20 feet from the wall. To determine the extent of vegetation adjacent to the seawall, the boat cruised parallel to the entire length of the seawall. The majority of submerged sea grasses are located at the northern end of the seawall just south of the NAS Jacksonville fuel dock. Brody (1990) suggests that light penetration probably restricts plant growth to the shallow part of the river (maximum 5 to 6.5 feet depth) in the SAV zone.

Table 2-7
Hydraulic Conductivity Values of Clay and Sandy Clay Layers as Calculated from Dissipation Tests

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

CPT ID Numbers	Depth (feet)	t_{50} from graph (s)	$C_h = \frac{T_{50}\, r^2}{t_{50}}$	q_c at given depth (TSF)	$M = q_c x \alpha_m$ (TSF)	$k_h = C_h x \gamma_w$ (ft/s)
CW01	27.55	3,000	$3.97x10^{-8}$	11.45	57.25	$2x10^{-9}$
CW04	74.52	13,000	$9.15x10^{-7}$	17.95	89.75	$3x10^{-10}$
CW07	34.37	1,500	$7.93x10^{-8}$	5.20	26.0	$1x10^{-8}$
CW07	95.38	16,000	$7.00x10^{-7}$	21.86	109.3	$2x10^{-10}$
CW09	104.11	2,000	$6.00x10^{-8}$	326.82	1,634.1	$1x10^{-10}$
CW10	96.10	800	$1.49x10^{-10}$	46.08	230.4	$2x10^{-9}$
CW27	25.52	650	$1.83x10^{-5}$	13.31	66.55	$9x10^{-9}$
CW32	27.03	850	$1.4x10^{-5}$	11.26	56.3	$7x10^{-9}$
CW32	67.04	2,300	$5.2x10^{-6}$	12.80	64.0	$3x10^{-9}$
CW40	25.06	600	$1.98x10^{-5}$	9.37	46.85	$1x10^{-8}$
CW46	72.36	340	$3.5x10^{-5}$	4.55	222.75	$5x10^{-9}$
CW56	90.53	32,000	$4.00x10^{-7}$	18.68	93.4	$1x10^{-10}$
CW59	22.37	230	$5.17x10^{-5}$	10.93	54.65	$3x10^{-8}$
CW59	63.83	41,000	$3.00x10^{-7}$	13.53	67.65	$1x10^{-10}$
CW62	22.70	950	$1.25x10^{-5}$	7.29	36.45	$1x10^{-8}$
CW63	77.47	26	$4.58x10^{-4}$	47.88	239.40	$6x10^{-8}$

Notes: CPT = cone penetroscopy test.
ID = identification.
t_{50} = elapsed time from start of dissipation test to 50 percent dissipation of excess pore pressure.
T_{50} = dimensionless time factor corresponding to 50 percent dissipation of excess pore pressure (3.5).
C_h = coefficient of consolidation in the horizontal direction.
r = radius of piezocone probe (0.70 inch).
q_c = measured cone tip resistance.
TSF = tons per square feet.
M = constrained modulus.
α_m = constrained modulus coefficient (assumed to be 5 for low plastic clays and high plastic soil and clays).
k_h = hydraulic conductivity in the horizontal direction.
γ_w = unit weight of water (62.46 pounds per cubic feet [lb/ft^3]).

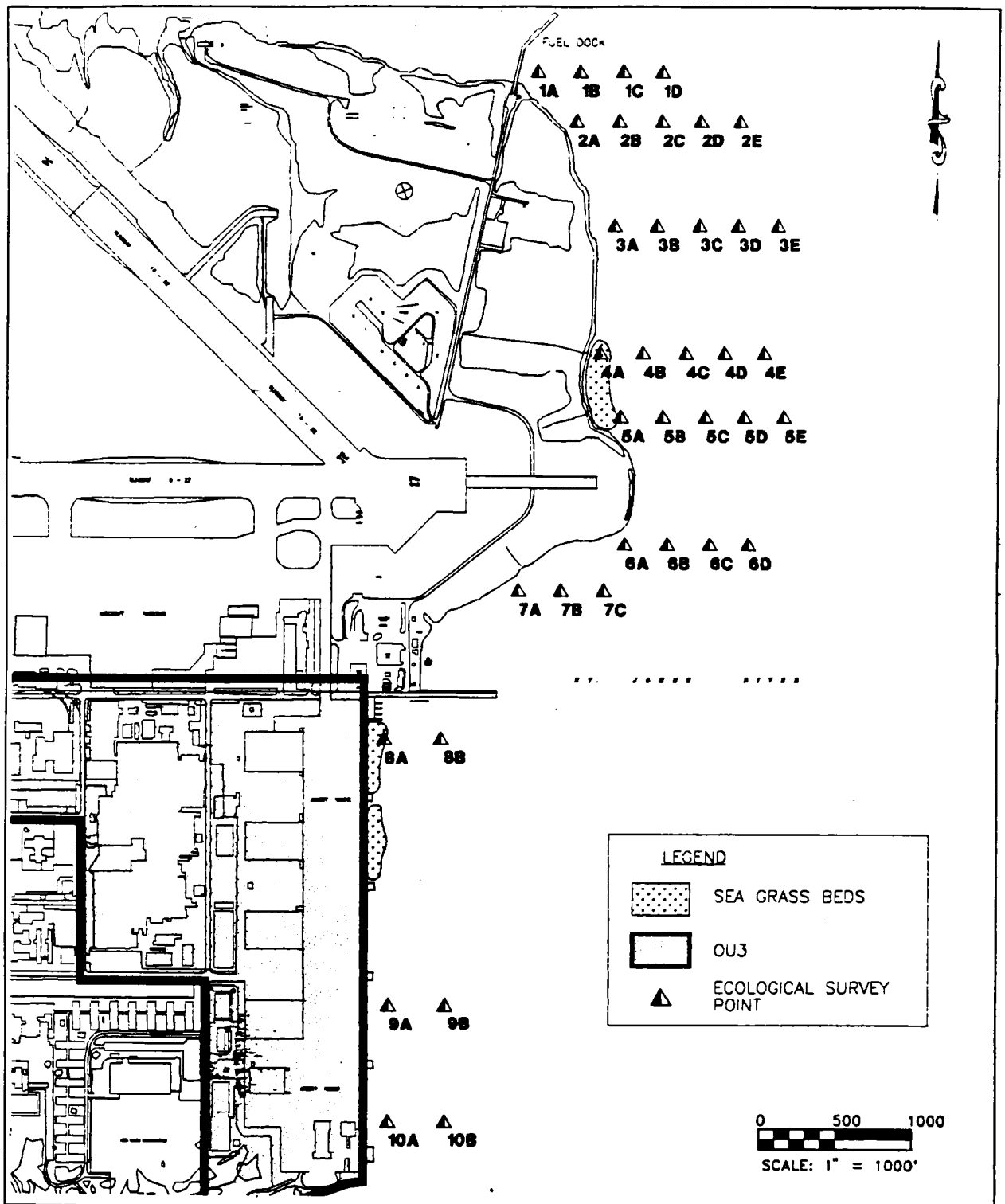

FIGURE 2-21
ECOLOGICAL SURVEY POINT LOCATIONS

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Table 2-8
Results of Aquatic Habitat Characterization

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Sampling Location	Depth (feet)	Temperature (degrees Celsius)	Salinity (ppt)	Conductivity (μohms/cm)	Secchi (feet)	Sediment Type	Presence of SAV/Living Matter
1A	2.6	28.5	8.0	1,400	2.6	Green clay	No/Dead bivalves; one small mud crab.
1B	2.6	29.0	7.0	1,450	2.6	Mostly sands with some black silt; sulphur odor.	No/Worms and bivalves.
1C	3.6	30.0	7.0	1,500	3.0	Black fines (muck) with organic sheen; no odor.	No/No
1D	10.2	29.0	7.0	1,500	3.0	Black fines (muck) with petroleum odor and sheen.	No/No
2A	2.0	30.0	8.0	1,400	2.0	Mostly sands with some black fines.	No/No
2B	2.6	30.0	8.0	1,400	2.6	All sands	No/No
2C	5.6	30.0	8.0	1,450	3.9	Black fines	No/No
2D	6.9	30.0	8.0	1,400	3.9	Black fines (ooze); evidence of petroleum.	No/No
2E	9.8	30.0	7.5	1,400	3.9	Black fines with some sands	No/No
3A	1.0	30.5	7.5	1,380	1.0	Sands with some black silts	No/No
3B	2.0	30.5	7.5	1,350	2.0	Sands with some black fines	No/Live bivalves and one seed.
3C	3.9	30.0	7.5	1,400	3.9	Black mud with some sands	No/Live bivalves
3D	3.9	30.5	8.0	1,400	3.9	Black shiny mud with some sand; organic sheen.	No/No
3E	7.2	30.0	7.5	1,400	3.9	Black fines with some sand	No/No
4A	2.0	28.0	7.5	1,380	2.0	All sands	Yes/No animals
4B	3.6	28.0	8.0	1,400	3.6	Black fines with some sand; sulphur odor.	No/No
4C	4.6	28.5	8.5	1,500	3.6	Black shiny mud with some sand.	No/No
4D	5.9	29.0	8.5	1,500	2.6	Black shiny mud	No/No

See notes at end of table.

Table 2-8 (Continued)
Results of Aquatic Habitat Characterization

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Sampling Location	Depth (feet)	Temperature (degrees Celsius)	Salinity (ppt)	Conductivity (μmhos/cm)	Secchi (feet)	Sediment Type	Presence of SAV/Living Matter
4E	9.5	29.0	8.8	1,520	2.0	Black shiny mud	No/No
5A	2.6	29.0	8.5	1,500	2.6	All sands	Sparse vegetation/Seeds and bivalves
5B	3.0	29.0	8.5	1,480	3.0	Mostly sands with some black silt; sulphur odor.	No/Bivalves
5C	3.6	29.0	8.5	1,500	3.0	Mostly sands with some black silt.	No/Snail
5D	5.9	29.0	8.5	1,500	3.3	Mostly sands	No/No
5E	7.9	29.5	8.5	1,500	2.6	Sands with some fines	No/No
6A	3.9	31.0	8.0	1,400	3.3	All sands	No/No
6B	5.9	31.0	8.0	1,400	3.6	Sands with shell fragments and some silt.	No/Bivalves
6C	6.9	31.0	8.0	1,450	3.6	Sands with some silts	No/Bivalves
6D	7.9	31.0	8.0	1,450	3.9	Mostly sands with some black silts.	No/Bivalves
7A	3.9	30.5	7.8	1,400	3.6	All fines; black mud	No/No
7B	4.9	31.0	8.0	1,400	3.6	All fines; black mud	No/No
7C	5.9	31.0	8.0	1,400	3.0	All fines; black mud	No/No
8A	2.3	30.0	7.5	1,350	2.3	All sands	Yes/No
8B	3.9	30.0	8.0	1,400	3.9	Sands with a clay layer	No/No
9A	3.9	30.0	7.7	1,390	3.9	Sands with some silt	No/No
9B	5.9	30.0	8.0	1,450	3.3	Black mud	No/No
10A	3.9	30.0	7.7	1,390	3.6	Sands with some silt	No/Bivalves
10B	6.6	30.0	7.9	1,400	3.6	Sands with some silt	No/No

Notes: ppt = parts per thousand.
μmhos/cm = micromhos per centimeter.
SAV = submerged aquatic vegetation.

All vegetation on the St. Johns River adjacent to OU 3 occurred at depths of less than 3.3 feet. Light penetration, as measured by a secchi disk, ranged from 2.6 to 4 feet.

Visual and olfactory evidence of petroleum contamination was observed approximately 500 feet south of the fuel dock at sample location 1D, the deepest station at transect 1. Further evidence of petroleum contamination was also observed at the deepest station within the second transect (2D) and one of the deeper stations in the third transect (3D). A sheen was present on all three of the aforementioned sediment samples. More information must be obtained during the RI to assess whether OU 3 is the source of this petroleum contamination and whether future biomonitoring is warranted. Also, substrate mapping and sampling must be conducted in the St. Johns River to the south of OU 3 for which there are currently no data.

2.4 PRELIMINARY NATURE AND EXTENT OF CONTAMINATION. The preliminary nature and extent of contamination presented in this section is based on all of the available sampling data collected during historical environmental investigations and the SSFP. A computerized data management system, JAXFAX, was used to store the data to facilitate data management and evaluation. A preliminary nature of contamination was developed by identifying preliminary CPCs. CPCs were identified by comparing the sample database to sitewide background concentrations of metals and then including all organic compounds present above detection limits (Chapter 3.0). A preliminary extent of contamination was developed by identifying those parts of the site containing CPCs. As a result, the area of OU 3 requiring further investigation during the proposed RI/FS was reduced.

2.4.1 Chemical Database To manage and evaluate the vast database generated during historical environmental studies and the recent SSFP, a computerized database was developed. In this section, the composite chemical database is presented in summary and sorted formats to identify preliminary CPCs. The data management system JAXFAX was used to store all analytical and related data. By querying this database, reports that concisely present information relevant to specific data end uses were generated.

The chemical data are provided in Appendix K with the following objectives: (1) to familiarize the reader with the chemicals analyzed and detected in site soil and groundwater, (2) to orient the reader with the current distribution of contamination throughout OU 3 by presenting chemical-specific contaminant profiles in the subsurface by horizontal (grid designation) and vertical locations (depth horizon), (3) to allow comparison of historical and SSFP data, and (4) to support the evaluation of temporal changes in the contaminant profile by presenting grid-specific historical and SSFP studies contaminant(s) and concentrations in ascending chronological order. SSFP groundwater and soil samples were designated as specified in the document *CLEAN Data Management Guidelines and JAXFAX User's Guide for NAS Jacksonville* (Messer, 1993).

The NAS Jacksonville sample designation system is intended to provide a unique and informative identification for every sample and sampling point at NAS Jacksonville. The system also satisfies database management system requirements. The system incorporates identifiers for each site, sample matrix, sample location and sequence, and quality assurance and quality control (QA/QC), if applicable. The following is an example of a sample identification code: U3CW10A01RP (Format: U3 CW 10A 01 RP)

The five sets of identifiers from left to right are as follows: site ID (U3 indicates OU 3), sample matrix, sample location number, sample sequence, and QA/QC code. If a sample identification code does not have a fifth set of identifiers, the sample was not collected for QA/QC purposes. Specific codes used for sample and media designation for this study are found in the document *CLEAN Data Management Guidelines and JAXFAX User's Guide for NAS Jacksonville* (ABB-ES, June 1993).

The data are presented tabularly in Appendix K as follows.

- Appendix K-1, Chemical Table, provides a summary of all elements, chemicals, and chemical groups analyzed during the SSFP and detected in environmental media (SSFP and historical data) along with associated regulatory standards (applicable or relevant and appropriate requirements [ARARs] and other Federal and State criteria advisories to be considered [TBC]) and pertinent chemical properties (i.e., solubility in water).

- Appendix K-2, Detected Chemicals in Environmental Media, presents a summary of elements and chemicals detected (by location) in subsurface soil and groundwater for all studies completed within OU 3 with data sorted by media (soil or groundwater) and depth interval (0 feet to 20 feet bls, 20 feet to 60 feet bls, and greater than 60 feet bls).

- Appendix K-3, OU 3 Database Sample Summary, provides a complete listing of all samples taken and analyzed under all environmental studies within the operable unit.

2.4.2 Preliminary Nature of Contamination A preliminary list of CPCs was developed for soil and groundwater to focus the RI on those chemicals posing the greatest risk to public health at OU 3. The list is considered to be preliminary because a complete TCL and TAL suite of analyses has not yet been performed in all areas of identified contamination (Section 5.2). In addition, the lists of CPCs will be is further modified during the risk assessment process (Chapter 3.0). A final list of CPCs will be developed during the RI.

Table 2-9 lists the preliminary CPCs at OU 3 and the maximum concentrations detected in groundwater or soil. All organic compounds were considered to be CPCs for the purposes of determining the nature of contamination at OU 3. Preliminary metal CPCs were identified first by comparing the sample site-wide database to background concentrations for metals. Metals with maximum detected concentrations, in a particular study area, less than 2 times the average sitewide background concentration were not considered to be CPCs for that study area. If there had been a reason to assume that a specific metal was a site contaminant, it would have been considered a CPC even though it was present at less than 2 times the average background concentration. This was not the case at OU 3.

A review of the CPC list reveals that VOCs, particularly aliphatic chlorinated VOCs, are the primary preliminary CPCs. The chlorinated VOCs include perchloroethylene (PCE), and its breakdown products trichloroethene (TCE), trichloroethane (TCA), dichloroethene (DCE), dichloroethane (DCA), and vinyl chloride. Potential sources of the various chlorinated VOCs are solvents or degradation products of solvents.

Table 2-9
Preliminary Chemicals of Potential Concern

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Class	Maximum Result	ARAR Flags[1]	Grid
Metals (ppm)			
Antimony	0.04	ABC**	F6
Arsenic	13.6	**C**	G4
Barium	438	ABC**	G5
Beryllium	5.0	ABC**	G4
Cadmium	1.1	ABC**	I4
Chromium	255	ABC**	G4
Copper	37	ABC**	G4
Lead	22	ABC**	G4
Manganese	165	ABC**	G4
Mercury	0.44	ABC**	G4
Nickel	65	ABC**	G4
Thallium	0.001	aBc**	F6
Zinc	193	A*C**	G4
Pesticides and PCBs (ppb)			
4,4'-dichlorophenyldichloroethane	25	Soil	C5
4,4'-dichlorophenyldichloroethene	30	Soil	B4
Heptachlorepoxide	0.018	aBcde	G5
alpha-Chlorate	0.022	aBc**	G5
gamma-Chlordane	0.012	aBc**	G5
Semivolatile Organic Compounds (ppb)			
bis(2-Ethylhexyl)phthalate	10	ABC**	G5
Chrysene	2.0	AB*DE	G5
Di-n-butylphthalate	2,000	Soil	B3
Naphthalene	310	**C**	C5

See notes at end of table.

Table 2-9 (Continued)
Preliminary Chemicals of Potential Concern at Operable Unit 3

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Class	Maximum Result	ARAR Flags[1]	Grid
Total Petroleum Hydrocarbons (ppm)	1,218.000	**C**	D4
Volatile Organic Compounds (ppb)			
1,1,1-Trichloroethane	106,000	ABCDe	B3
1,1,2-Trichloroethane	170	ABCde	H5
1,1-Dichloroethane	2,260	Soil	B3
1,1-Dichloroethene	53,500	ABCDe	H5
1,2-Dichloroethane	5.7	ABCde	I6
Benzene	150	ABCde	G5
Bromodichloromethane	7.0	aBc**	I6
Carbon tetrachloride	2.0	ABcde	H5
Chloroform	5.5	ABcde	C5
Ethylbenzene	4,300	Soil	G7
Methylene chloride	94,000	ABC**	B3
Tetrachloroethene	9,600	ABCDe	B1
Toluene	3,000	ABCde	B3
Trichloroethene	155,300	ACBDE	H5
Vinyl chloride	2,000	ABCde	B3
cis-1,2-Dichloroethene	4,900	ABCde	D4
trans-1,2-Dichloroethene	8,000	ABCde	H5
Xylenes	4,500	Soil	B3

[1] Specific flag explanations are as follows:

A or a, Federal maximum contaminant level (MCL) comparison completed;
B or b, Federal maximum contaminant level goal (MCLG) completed;
C or c, State MCL comparison completed;
D or d, 1 percent of maximum chemical solubility in water comparison;
E or e, 10 percent of maximum chemical solubility in water comparison; and
Soil, detected in soil at concentrations or frequencies that warrant additional investigation.

An upper case letter indicates an exceedance of the specified numerical value whereas a lower case letter signifies that the contaminant concentration is below the specified numerical value (individual standard numerical values located in Appendix K-1).

Notes: ARAR = applicable or relevant and appropriate requirements.
ppm = parts per million.
PCB = polychlorinated biphenyl.
ppb = parts per billion.

Another group of VOCs on the preliminary CPC list is the compounds benzene, toluene, ethylbenzene, and xylenes (BTEX). The presence of BTEX compounds in groundwater and soil at OU 3 may be associated with past fuel spills in the flightline area. This possible association is supported by the detections of BTEX compounds near the flightline, hangars, and aircraft refueling stations (Subsection 2.4.3). BTEX compounds were also commonly detected in the areas where high levels of TPH were detected. TPH can be an indicator of fuel spills and is also a preliminary CPC at OU 3.

Several metals are also included on the CPC list. Because metals occur naturally in soil and bedrock, they are commonly present in measurable concentrations in groundwater. Although concentrations of some metals (i.e. arsenic, chromium, and lead) exceeded background as defined above, it is still uncertain whether these metals represent site-derived contaminants. Because numerous groundwater samples were collected from DPT points or temporary wells, and not from developed monitoring wells with gravel packs, they contained significantly more suspended sediment than other groundwater samples. The higher sediment content likely contributed to the higher metals concentrations. In addition, no background samples have yet been obtained from an area that contains hydraulic fill, which would more accurately represent conditions at OU 3. Thus, the contribution, if any, of the hydraulic fill to the concentrations of metals in groundwater has not been determined.

2.4.3 Preliminary Extent of Contamination The current chemical database, preliminary CPC list, and understanding of historical operations were used to assess the extent of contamination at OU 3 on a preliminary basis. This assessment was subsequently used to identify data deficiencies requiring further investigation during the RI/FS. It was also used to focus the RI/FS on the parts of OU 3 most affected by OU activities.

To help illustrate the extent of contamination at OU 3, a contaminant distribution map was generated using both historical and SSFP sampling data (Figure 2-22). Only total aliphatic chlorinated VOCs only are depicted on the map because they appear to be the primary CPCs at OU 3. The highest concentrations of total chlorinated VOCs (disregarding sample depth) detected at each sampling point are shown. Chlorinated VOCs were detected throughout much of OU 3, but primarily at shallow depths above the upper clay unit. Some chlorinated VOCs were detected below the upper clay, however. Most of the highest concentrations detected are clustered around Building 101. Several of these were detected at the northwest corner of Building 101. Two of the locations were sampled during the Building 780 investigation, at the current location of the closed-loop solvent recycling center. Total chlorinated VOCs in groundwater samples were as high as 300,000 ppb in this area. It has not yet been determined whether the source of the chlorinated VOCs was Building 780 or a possible upgradient location such as Buildings 101S or 101T.

Concentrations of chlorinated VOCs detected farther west along Barneget Avenue may be due to the dry cleaning operation at Building 106. The operation currently maintains a closed-loop system for solvent usage and is not thought to be an ongoing source of contamination. However, past disposal methods (prior to 1989-90) are being investigated by NAS Jacksonville personnel. Leaky sewer lines or direct discharge of solvents to the environment are possible sources of chlorinated VOCs in this area. Additional investigation of the area around Buildings 780 and 106 is needed to identify contaminant sources and to delineate the extent of contaminant plumes.

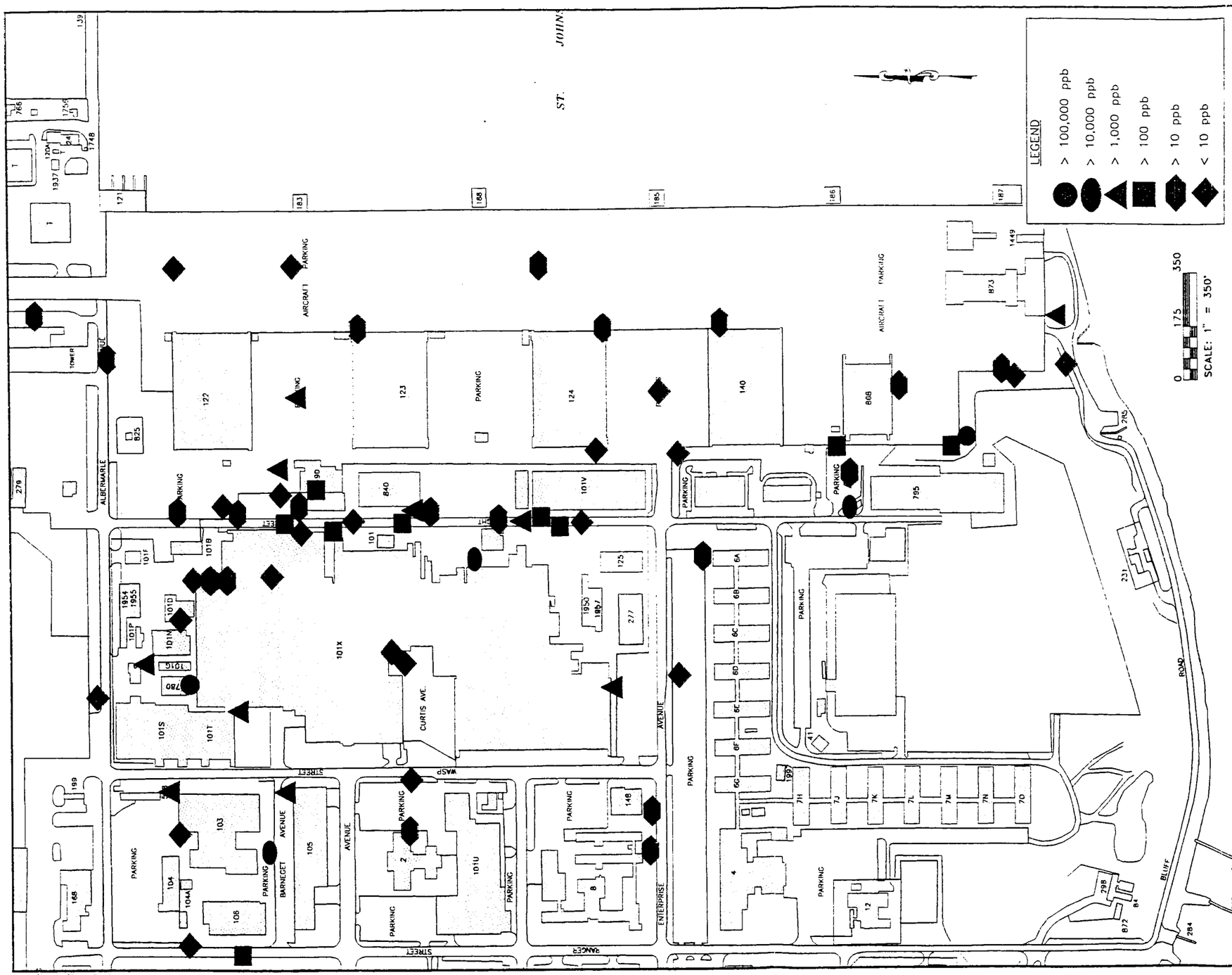

FIGURE 2-22
HIGHEST DETECTIONS OF TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS AT ALL HISTORICAL AND SSFP SAMPLING LOCATIONS

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRM/3-16-94

Numerous sampling points exist due east (downgradient) of Building 101 and most points have had detections of chlorinated VOCs. The various PSCs and other locations within and around Building 101 (Appendix A) may be the sources of the numerous hits. The highest hit was at CW34 with 38,000 ppb total chlorinated VOCs. There appear to be several sources and contaminant plumes within the Building 101 area but plumes do not seem to extend very far onto the flightline. Additional sampling data are needed, particularly under Building 101, to identify the sources of contamination and to delineate plumes.

Samples from two DPT sampling points due south of Building 101 (CW41 and CW53) contained relatively high concentrations of chlorinated VOCs at depths of up to 53 feet; samples from points to the west (CW52 and CW59) also contained low levels of chlorinated VOCs. If the possible groundwater mound under Building 101 does exist (Figures 2-19 and 2-20), these points are also located downgradient of Building 101. Because no sampling points have been established farther south of these points, more sampling data are needed to define the extent of contamination in the direction of the Bachelor's Enlisted Quarters (Buildings 6A through 70).

Another area of contamination is in the southeast corner of OU 3. Groundwater from much of OU 3 flows in this direction before discharging to the St. Johns River. The highest concentration detected was recorded in samples from well NARF-B1, which is positioned within the approximate location of PSC 15. The former paint sludge and solvent pit is a possible source of this concentration and concentrations farther downgradient. Additional sampling points are needed to delineate any plume from PSC 15.

There were also several detections of contaminants in samples collected near Building 868 in the location of military construction site P615. Concentrations of up to 1,300 ppb TCE were detected in groundwater samples collected here during the 1992 investigation by ABB-ES (Appendix B); however, less than 10 ppb were detected during the SSFP. Further investigation is needed to assess whether the contaminant plume has migrated farther downgradient.

3.0 RISK SCREENING

To more accurately focus the RI of OU 3 toward areas that present the highest risk to human health and the environment, a risk screening effort was conducted on all of the available sampling data collected during previous environmental investigations and the SSFP. The risk screening was used to provide a preliminary list of CPCs, help identify possible sources, and to geographically limit the investigation to those areas that presented an unacceptable risk.

3.1 SELECTION OF EXPOSURE ROUTES. As described in Section 2.4 on the nature and extent of contamination, the primary medium affected by contamination at OU 3 is groundwater. This conclusion was somewhat affected by the sampling methodology, which included use of a grid to select sampling points. Because samples were not specifically taken in source areas as part of the SSFP, subsurface soil samples collected above the water table during piezometer installation would potentially not tend to be contaminated. Risk screening was, therefore, limited to groundwater.

3.2 RISK SCREENING METHODOLOGY. OU 3 was divided into a grid as shown on Figure 1-4. The purpose of this grid was to define those geographic areas that contained contaminants at a level that was considered to pose a possible risk to human health. The grid was 400 feet per side. OU 3 was further divided according to the depth of the sample, 0 to 20 feet bls, 20 to 60 feet bls, and greater than 60 feet bls. Both historical and SSFP results from sampling points were combined to generate a detection list for each sampling grid at each of the three depths.

The chemicals on the detection lists were then compared to Federal maximum contaminant levels (MCLs), Federal maximum contaminant level goals (MCLGs), Florida MCLs, the Florida 1989 free from (free froms are defined in Chapter 17-3.402, Florida Administrative Code [FAC]) list (FDEP, 1989), Florida Surface Water Quality Criteria, and USEPA Region III risk-based screening values. The results of the risk screening are shown in Table K-2 of Appendix K.

Based on the level of risk, as measured by the applicable risk threshold, an attempt was made to determine an initial response for each contaminant zone as follows.

- **Zones above risk thresholds** were candidates for immediate risk reductions (i.e., accelerated threat reduction action) primarily using source control techniques that are consistent with the goal of immediately eliminating all significant threats to human health and safety.

- **Zones of uncertain risk** were candidates for further data gathering to support a risk-based response decision, including an RI and subsequent FS.

- **Zones below risk thresholds** were candidates for no further response action.

Review of the data at this point in the methodology demonstrated that the grid pattern was too large to permit the desired decision making because the geographic areas of contamination were not well defined. Risk screening was performed again;

however, this time it was performed using each sampling point. Data were then analyzed for each point rather than each grid area.

3.3 RISK SCREENING RESULTS. Preliminary CPCs, primarily chlorinated VOCs (including PCE, TCE, DCE, DCA, and vinyl chloride), BTEX compounds, and several metals, were generally found at levels above the risk screening values with the exception that no CPCs were found at levels above the Florida free from list (FDEP, 1989). Because groundwater was the primary media under consideration, and the chlorinated VOCs and BTEX compounds were the primary CPCs, it was decided to use the Florida MCLs as the risk screening values for further analysis of the data.

As discussed in Subsection 2.4.3 on the extent of contamination, the most contaminated parts of OU 3 were determined by plotting those points where one or more CPCs exceeded the Florida MCL at each of the three depths. To further measure the magnitude of the risk, locations where one or more contaminants exceeded 1 times, 10 times, and 100 times the Florida MCLs were identified for each of the three sample depth intervals. These comparisons are shown, by depth interval, on Figures 3-1, 3-2, and 3-3.

These figures indicate the Florida MCLs are exceeded over much of OU 3, but primarily at shallow depths above the upper clay unit. Most of the CPCs that exceeded Florida MCLs around Building 101 are chlorinated VOCs. High BTEX levels were generally encountered farther downgradient along the flightline.

3.4 SELECTION OF AREAS OF CONTAMINATION. This use of risk-based screening to define the nature and extent of contamination resulted in identification of six general areas of contamination (AOCs) that will be the focus of the RI (and possibly areas for accelerated threat reduction actions as defined in Chapter 8.0). The six AOCs primarily constitute those areas that exceed 100 times and 10 times the MCL. These areas are illustrated in Subsection 6.1.4. The risk screening results in each of these AOCs, along with data on historical activities, suggest the presence of a source of contamination. Most areas that only exceed 1 times the MCL were most likely downgradient plumes from the sources.

Subsection 2.4.3 provides a discussion of the analytical results and selection of AOCs. The AOCs identified as a result of the risk screening are: the dry cleaners (Building 106), Building 780 area, Building 101 East, Building 101 South, P615 area (a previous construction area), and PSC 15.

3.5 USE OF RISK SCREENING TO LIMIT THE REMEDIAL INVESTIGATION. Those areas where CPCs were not found to exceed the risk screening values will not be a focus of the RI unless data collected during the RI directs the investigation into these areas. These consist primarily of those sections of the helicopter flightline that did not show BTEX contamination.

3.6 PRELIMINARY REMEDIATION GOALS. Risk screening will be used during performance of the sampling parts of the RI to determine the limits of sampling, specifically when defining the limits of groundwater plumes. As discussed elsewhere in this document, when defining the limits of a groundwater

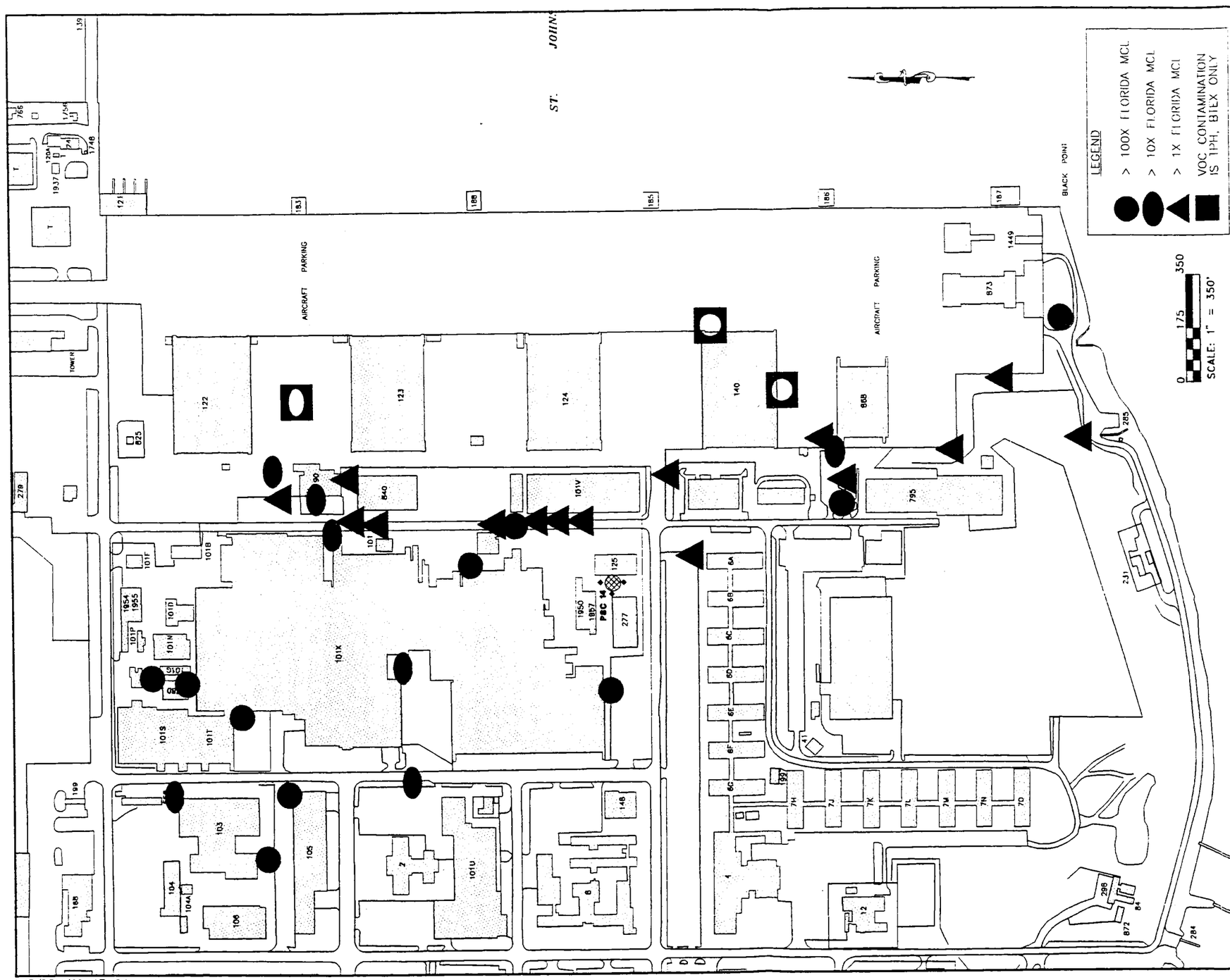

FIGURE 3-1
SAMPLING POINTS THAT EXCEED FLORIDA MAXIMUM CONTAMINANT LEVELS (DEPTHS <20 FEET BELOW LAND SURFACE)

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

OU3/DRM/08-17-94

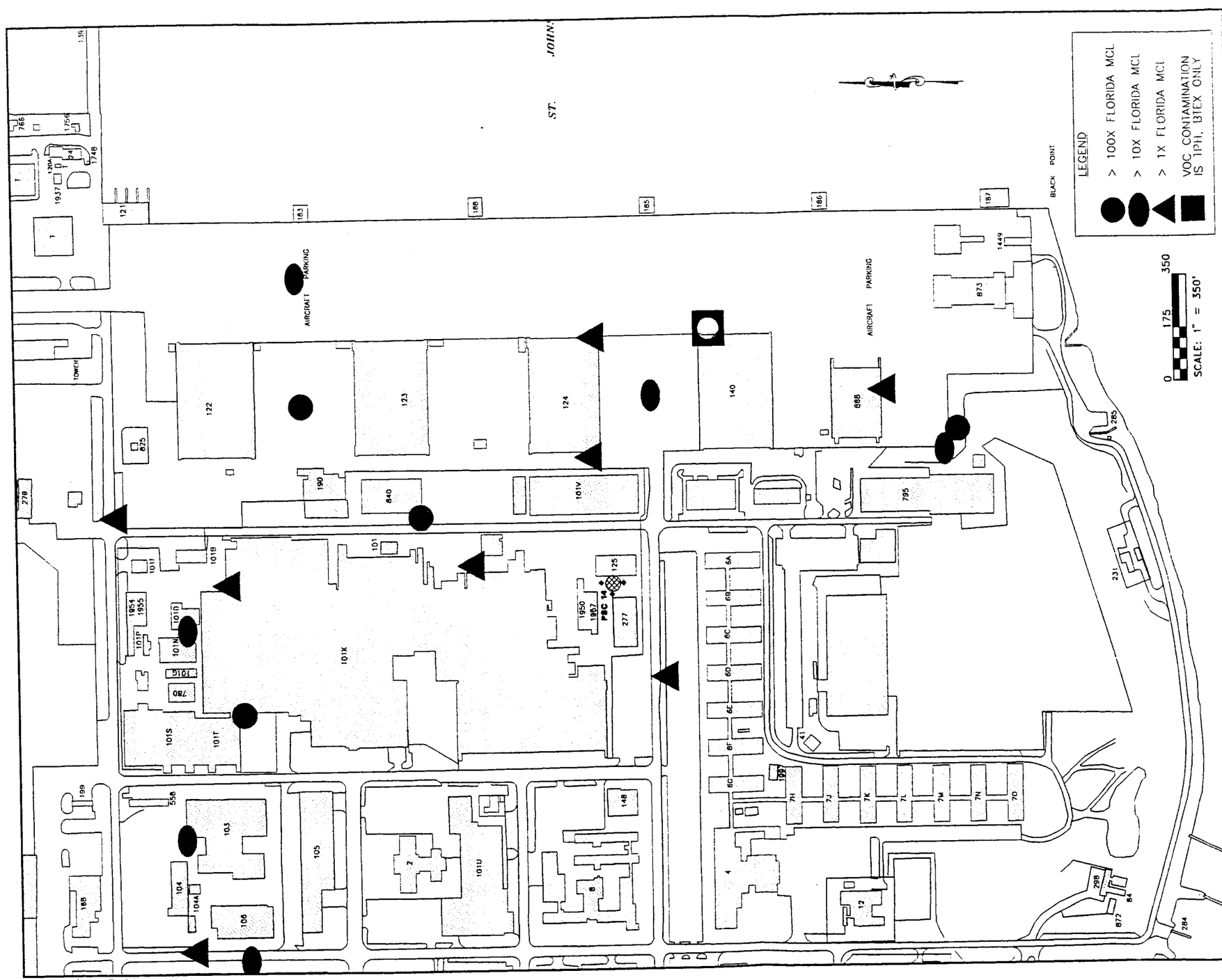

FIGURE 3-2
SAMPLING POINTS THAT EXCEED FLORIDA MAXIMUM CONTAMINANT LEVELS (DEPTHS 20 TO 60 FEET BELOW LAND SURFACE)

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRM/08-17-94

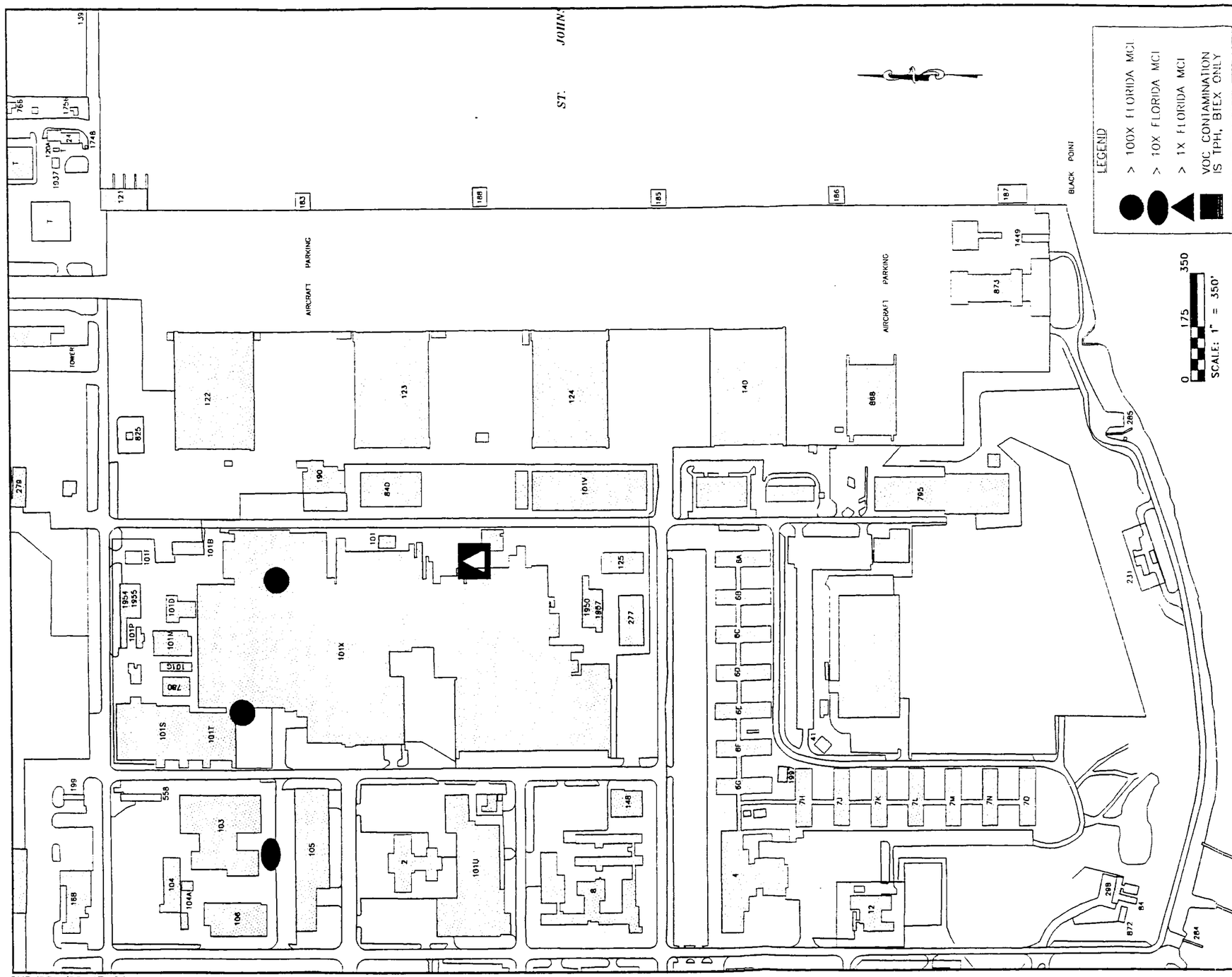

FIGURE 3-3
SAMPLING POINTS THAT EXCEED FLORIDA MAXIMUM CONTAMINANT LEVELS (DEPTHS >60 FEET BELOW LAND SURFACE)

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

OU3/DRM/08-17-94

plume, samples will be taken until all CPCs are detected below a preliminary remediation goals (PRGs).

PRGs typically represent concentration goals for individual chemicals for specific medium and land use combinations at CERCLA sites. PRGs are levels that are not expected to cause harm to the exposed population because they are based on either a target Hazard Index or cancer risk values that are considered to pose an acceptable risk.

According to USEPA guidance on development of risk-based PRGs (USEPA, 1991a), there are two general sources of chemical-specific PRGs: (1) ARARs and TBCs, and (2) risk assessment. The recommended approach for developing remedial goals is to identify PRGs at scoping, modify them as needed at the end of the RI or during the FS based on site-specific information from the risk assessment, and ultimately select remedial levels in the Record of Decision.

Following this guidance, MCLs will be used as PRGs for groundwater, when available, during the RI, unless modification is needed due to site-specific conditions. In cases where MCLs are not available, PRGs will be calculated using USEPA guidance for groundwater. For soil contamination above the water table, the revised Florida soil cleanup goals will be considered for use as PRGs, where appropriate. (Note: Florida has not issued guidance on use of the soil cleanup levels in the investigative phase of an RI/FS, nor has USEPA or the partnering teams discussed their applicability as PRGs.) Where values are not available from Florida, PRGs will be calculated using USEPA methodology for industrial soil.

4.0 REMEDIAL SCREENING

This chapter presents the remedial screening for OU 3 at NAS Jacksonville. The purpose of this chapter is to evaluate existing information pertaining to OU 3, and to identify the data requirements necessary to perform both an EE/CA and a comprehensive FS. By identifying applicable remedial technologies prior to performing the RI, the scope of the RI (Chapter 6.0) can be focused to collect data necessary to evaluate remedial technologies during the EE/CA and FS (Chapter 7.0).

4.1 SUMMARY OF OU 3 INFORMATION. Several preliminary CPCs have been identified at OU 3 during the SSFP and other previous investigations (Table 2-9). Of these preliminary CPCs, chlorinated VOCs appear to be the most prevalent. Generally, chlorinated VOCs are not considered to be indigenous to the natural subsurface and are likely to be retained as CPCs for OU 3. In addition, the chlorinated VOCs may be the result of products used at OU 3, impurities in products used, or degradation products of parent compounds. Chlorinated VOCs (specifically, aliphatic or straight-chained VOCs), which were either detected at OU 3 or could potentially exist, are presented in Table 4-1.

Biotransformation is a major mechanism that contributes to the transformation of chlorinated VOCs by dechlorination. Biotransformation can occur in conditions where certain microorganisms thrive. The presence of biotransformation by-products in groundwater samples indicates that indigenous microorganisms capable of degrading chlorinated VOCs may be present in the subsurface at OU 3.

Another transformation or transport mechanism, which contributes to the release of chlorinated VOCs, is volatilization. The chlorinated VOCs detected (and potentially present) at OU 3 exhibit vapor pressures above the range that generally divides volatile and semivolatile organic compounds (0.001 millimeters of mercury [mm Hg]). Dechlorination (resulting from biotransformation) generally increases volatility, as shown in Table 4-1. Thus, remedial technologies that optimize dechlorination and volatilization are ideal for the removal of chlorinated VOCs from the subsurface at OU 3.

4.2 TECHNOLOGY EVALUATION APPROACH AND METHODOLOGY. The comprehensive FS (and potential EE/CAs) for OU 3 will be performed in accordance with the 1990 National Oil and Hazardous Substances Contingency Plan (NCP), CERCLA, SARA, and the USEPA (1988c) guidance document, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, dated October 1988, and *Guidance on Conducting Non-time-Critical Remedial Action Under CERCLA*, dated August 1993. The selection of remedial technologies in this chapter is based on the general guidelines described in these referenced documents.

The scope of work for performing the comprehensive FS for OU 3 is presented in Chapter 7.0. Remedial screening will ensure that the scope of work for the RI is focused on collecting data necessary to support the evaluation of remedial technologies during the FS or for potential EE/CAs. Phasing of

Table 4-1
Chlorinated Aliphatic Volatile Organic Compounds (VOCs) and Vapor Pressures

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Compound	Common Synonym	Liquid Vapor Pressure (mm Hg)
Alkanes		
1,1,2,2-Tetrachloroethane		6
1,1,1,2-Tetrachloroethane		12
Tetrachloromethane	Carbon tetrachloride	115
1,1,2-Trichloroethane		23
1,1,1-Trichloroethane	Methyl chloroform	124
Trichloromethane	Chloroform	197
1,2-Dichloroethane	Ethylene dichloride	79
1,1-Dichloroethane		227
Dichloromethane	Methylene chloride	435
Chloroethane		1,010
chloromethane		4,300
Alkenes		
Tetrachloroethene	Perchloroethene	19
Trichloroethene		69
cis-1,2-Dichloroethene		200
trans-1,2-Dichloroethene		331
1,1-Dichloroethene	Vinylidene chloride	600
Choroethene	Vinyl chloride	2,980

Note: mm HG = millimeters of mercury.

remedial screening and the FS will ensure that the following objectives are achieved.

- The RI will include the collection of data required to evaluate remedial technologies during the FS and to select a final OU-wide remedial action.

- The FS will be streamlined to eliminate duplicate efforts and to target only the most applicable remedial technologies.

- If warranted, an accelerated threat reduction action will be selected and implemented in parallel to the RI to aggressively remediate selected contaminants from an identified location. The results of the IRAs would be integrated into the FS to allow for streamlining and focusing of remedial alternatives.

The selection of applicable remedial technologies for remedial screening is based on technical publications, remedial experience, and FS documents pertaining to similar CERCLA sites. During the first phase of the FS, the final selection of remedial technologies will be based the following three general criteria required by the 1990 NCP:

- effectiveness,
- implementability, and
- cost.

4.3 PRELIMINARY SCREENING OF OU-WIDE REMEDIAL TECHNOLOGIES. OU-wide remedial technologies are identified based on data collected during preliminary investigations. This preliminary screening process is designed to focus data collection efforts during the RI to gather information that directly pertains to evaluating and selecting OU-wide remedial technologies during the FS or that can be used during potential EE/CAs. Alternate remedial technologies may be selected based on data collected during the RI.

4.3.1 Preliminary OU-wide Cleanup Objectives In accordance with the 1990 NCP, the primary objective of OU-wide remediation is to reduce the potential threat to human health or to the environment. Cleanup objectives will be based on Federal ARARs and "to be considered" (TBCs), Florida ARARs and TBCs (including MCLs and "free-froms"), background concentrations of selected contaminants, and the results of the risk assessment to be performed for OU 3. Background soil and groundwater samples will be collected during the RI, and will be used to refine OU-wide cleanup objectives.

4.3.2 Identification of OU-wide General Response Actions Prior to identifying remedial technologies for OU 3, general response actions applicable to OU 3 must be identified. General response actions are broad classifications of OU 3 activities available to remediate contaminants in defined site media. For the purposes of remedial screening, site media can be grouped into soil and groundwater. General response actions potentially applicable to these two media are presented in Table 4-2.

4.3.3 Selection of OU-wide Remedial Technologies The *Remediation Technologies Screening Matrix*, prepared by the Air Force Center for Environmental Excellence (AFCEE, 1993) was used to identify applicable treatment technologies for OU 3.

Table 4-2
Operable Unit (OU)-wide General Response Actions

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Media	General Response Action
Soil	No action
	Institutional controls
	Containment
	Removal
	Treatment
	Disposal
Groundwater	No action
	Institutional controls
	Containment
	Collection
	Treatment
	Discharge

In addition to the AFCEE matrix, technical publications, remedial experience, and FS documents pertaining to similar CERCLA sites were used to identify additional remedial technologies. Remedial technologies potentially applicable to OU 3 are presented in Table 4-3.

4.3.4 Feasibility Study Data Requirements Critical data requirements for the evaluation of identified remedial technologies are presented in Table 4-4. These data are necessary to effectively evaluate and compare identified technologies during the FS and/or EE/CA. The data may not be sufficient to design and construct a final OU-wide response action, but it should provide the information required to evaluate the technical feasibility of each identified remedial technology.

4.4 PRELIMINARY SELECTION OF ACCELERATED THREAT REDUCTION TECHNOLOGIES.

Accelerated threat reduction may be desired based on data collected during previous investigations or data collected during the RI. This preliminary selection process is designed to focus data collection efforts during the RI to gather information required to select, design, and implement an accelerated threat reduction action, should such action be desired.

4.4.1 Accelerated Threat Reduction Objectives The primary objective of an accelerated threat reduction action is to reduce or eliminate the potential risks of contamination to human health or to the environment. If desired, an accelerated threat reduction action could be implemented in parallel to the RI, to aggressively remediate selected contaminants from an identified location.

4.4.2 Identification of Accelerated Threat Reduction Actions To streamline the selection process, EE/CAs will be focused on identified compounds that will likely be a significant portion of the overall OU-wide response. Because concentrations of chlorinated VOCs in groundwater have been detected in excess of ARARs and TBCs, the implementation of an accelerated threat reduction action (or IRA) for groundwater may be desired. Of the OU-wide general response actions listed in Table 4-2, either treatment or containment could potentially be used as a control measure. However, because groundwater is a target media, a containment technology must also include groundwater treatment. Thus, to streamline the selection and implementation of an accelerated threat reduction action, treatment will be the representative control measure considered for OU 3.

4.4.3 Selection of Accelerated Threat Reduction Technologies The AFCEE matrix and other technical literature were used to identify treatment technologies that primarily treat halogenated VOCs. Because chlorine is a halogen, and chlorinated VOCs in groundwater are likely to be target compounds at OU 3, treatment technologies that are designed specifically to treat halogenated VOCs in groundwater were considered. Selected treatment technologies can be implemented either *in-situ* or *ex-situ*. *In-situ* treatment technologies are self-sufficient technologies that can be implemented as accelerated threat reduction actions. *Ex-situ* treatment technologies must be combined with other response actions, or supporting technologies, to formulate complete threat reduction actions. Specifically, *ex-situ* groundwater treatment requires a combination of collection, treatment, and discharge.

Treatment and supporting technologies selected to formulate accelerated threat reduction actions at OU 3 are presented in Table 4-5, and are discussed below.

Table 4-3
Operable Unit (OU)-wide Remedial Technologies

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Media	General Response Action	Remedial Technology
Soil	No action	Natural attenuation Site monitoring
	Institutional controls	Access and use restrictions
	Containment	Capping Surface water diversion
	Removal	Mechanical excavation
	Treatment	***In-situ* Treatment** Bioremediation Bioventing Steam stripping
		***Ex-situ* Treatment** Bioremediation Chemical extraction Chemical (redox) treatment Dehalogenation Thermal desorption
	Disposal	Onsite lined landfill Offsite permitted landfill
Groundwater	No action	Natural attenuation Groundwater monitoring
	Institutional controls	Access and use restrictions Alternate water supply
	Containment	Grout sealing Slurry wall installation
	Collection	Collection trenches Extraction wells
	Treatment	***In-situ* Treatment** Bioremediation Biosparging
		***Ex-situ* Treatment** Air stripping and aeration Bioremediation Carbon adsorption Chemical (redox) treatment Oxidation
	Discharge	FOTW-authorized discharge NPDES-permitted discharge Surface drains and reinjection

Notes: FOTW = Federally Owned Treatment Works.
NPDES = National Pollutant Discharge Elimination System.

Table 4-4
Data Requirements for the Evaluation of Remedial Technologies

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Media Characteristic	Data Parameter	Pertinent Remedial Technology
Physical and Chemical Soil Characteristics	pH Moisture content Total organic carbon Petroleum hydrocarbons (fingerprint) Cation exchange capacity Heating value Leachable metals (TCLP)	***In-situ* Treatment** Natural attenuation Bioremediation Bioventing Steam stripping ***Ex-situ* Treatment** Bioremediation Chemical extraction Chemical (redox) treatment Dehalogenation Thermal desorption
Biological Soil Characteristics	Total heterotrophic bacteria TKN, ammonia, and nitrite plus nitrate Orthophosphorus	***In-situ* Treatment** Natural attenuation Bioremediation Bioventing ***Ex-situ* Treatment** Bioremediation
Physical and Chemical Groundwater Characteristics	pH Dissolved oxygen Total oil and grease Total iron Petroleum hydrocarbons (fingerprint) Total solids Total suspended solids Total dissolved solids Redox potential	***In-situ* Treatment** Bioremediation Biosparging ***Ex-situ* Treatment** Air stripping and aeration Bioremediation Carbon adsorption Chemical (Redox) treatment Oxidation
Biological Groundwater Characteristics	Biochemical oxygen demand Chemical oxygen demand Total heterotrophic bacteria TKN, ammonia, and nitrite plus nitrate Orthophosphorus	***In-situ* Treatment** Bioremediation Biosparging ***Ex-situ* Treatment** Bioremediation
Aquifer Characteristics	Grain size distribution Hydraulic conductivity Well and aquifer yield Radius of pumping influence Barriers and recharge boundaries Water table fluctuations Characteristics of shallow aquitard	**Collection** Collection trenches Extraction wells ***In-situ* Treatment** Bioremediation Biosparging **Discharge** Surface drains and reinjection

Notes: TCLP = Toxicity Characteristic Leachate Procedure.
TKN = total Kjeldahl nitrogen.

Table 4-5
Accelerated Threat Reduction
Remedial Technologies for Chlorinated Volatile Organic Compounds (VOCs) in Groundwater

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

General Response Action	Remedial Technology
Collection	Extraction wells
Treatment	***In-situ* Treatment** Biosparging
	***Ex-situ* Treatment** Air stripping and aeration Dehalogenation Oxidation
Discharge	FOTW-authorized discharge NPDES-permitted discharge

Notes: FOTW = Federally Owned Treatment Works.
NPDES = National Pollutant Discharge Elimination System.

Collection. If *ex-situ* groundwater treatment is desired, extraction wells may be applicable. Extraction wells provide an active groundwater pumping system that is dependent upon the aquifer characteristics in the vicinity of the proposed treatment area. Aquifer testing to determine the maximum sustainable pumping rate and other critical hydrologic and hydrogeologic characteristics are necessary parameters for the selection of an optimum extraction well configuration. According to the USGS, preliminary estimates predict a maximum sustainable pumping rate of less than 0.5 gpm, which may be too low for a substantial groundwater impact.

In-situ Treatment. Biosparging is proposed as a representative *in-situ* threat reduction action based on its anticipated effectiveness and its operational flexibility during implementation. Biosparging combines the effective components of vapor extraction, air sparging, and bioremediation.

Vapor-extraction wells can be screened in the vadose zone to collect organic vapors from void spaces within the unsaturated soil matrix. Air-injection wells, screened in either the vadose zone or the groundwater, can then be installed to induce air flow through the subsurface. Biotransformation can then be enhanced by the addition of nutrients, such as nitrogen and phosphorus, which are present in fertilizer. Biotransformation can also be enhanced by adding seed-microorganisms to stimulate additional biological activity, and by maintaining a sufficient moisture content in the soil. Available oxygen, nutrients, and moisture content are critical in maintaining effective biotransformation of chlorinated VOCs, and are essential in evaluating whether bioenhanced treatment is possible.

Ex-situ Treatment. Air stripping and aeration, dehalogenation, and oxidation were selected as candidate technologies for the *ex-situ* treatment of chlorinated VOCs in collected groundwater. The optimum technology could be selected based on data collected during the RI.

Air stripping and aeration is a proven technology to remove VOCs from groundwater by introducing a clean air stream in contact with the collected groundwater. Packed towers, diffused-aerators, and tray aeration systems are some common air stripping technologies that may be applicable to groundwater containing chlorinated VOCs. Significant concentrations of metals and other inorganic compounds can impede air stripping, and are critical parameters in evaluating its potential effectiveness.

Dehalogenation can be accomplished by applying a glycolate reagent (alkali polyethylene glycol [APEG] or potassium polyethylene glycol [KPEG]) to displace chlorine ions bonded to chlorinated VOCs. Dehalogenation can also be accomplished thermally, in a process that heats the groundwater to volatilize dissolved and phase-separated chlorinated VOCs. Excessive concentrations of chlorinated VOCs and metals can impede the effectiveness of dehalogenation, and are critical data requirements to evaluate its potential effectiveness.

Oxidation is a technology that can remove chlorinated VOCs from groundwater by exposing the groundwater to an oxidant. Combined oxidants, such as ultraviolet (UV) light, ozone, or hydrogen peroxide, increase the reaction and removal rate of chlorine ions from chlorinated VOCs. Critical parameters for the evaluation of oxidation include the concentration of organic or inorganic compounds that may inhibit the desired reaction or form unanticipated byproducts.

Discharge. Treated groundwater may be discharged to either (1) the sanitary sewer system for treatment at the Federally Owned Treatment Works (FOTW), or (2) a surface water drainage swale via a National Pollutant Discharge Elimination System (NPDES) permit. Upon regulatory approval, an existing NPDES permit may be modified to include the addition of treated groundwater. The best discharge option could be based on site and regulatory logistics, such as permitting requirements, regulatory agency preference, and public perception. These considerations are critical in evaluating an appropriate discharge technology.

4.4.4 Pre-Design Data Requirements Critical data requirements for the evaluation of OU-wide remedial technologies during the FS are presented in Table 4-4. Data requirements for the selected threat reduction technologies are also included in that table in the event that an accelerated threat reduction action is desired.

5.0 DATA REQUIREMENTS

This chapter identifies the data requirements necessary to characterize OU 3. Data deficiencies have been identified in characterizing site hydrogeology, the nature and extent of contamination, and site-specific parameters that may impact the effectiveness of remedial technologies. These data deficiencies will be eliminated by collecting appropriate data during the RI. These data will be used to develop a conceptual site model, to perform a baseline risk assessment on the peripheral areas of OU 3, and to conduct an FS of remedial alternatives.

The following sections present the data requirements for OU 3. Specific RI activities to be implemented during the field program are presented in Chapter 6.0. Specific sample collection methods are presented in the FSP and QA/QC procedures are presented in the QAPP; these two documents (FSP and QAPP) form the Sampling and Analysis Plan (SAP) for OU 3 (Appendix M).

5.1 HYDROGEOLOGY. The groundwater flow pathway was identified as the principal pathway for contaminant transport at OU 3 (Chapter 3.0). Due to the lack of water level data in certain areas, and anomalous measurements in others, groundwater flow directions are not well defined at OU 3. Aquifer parameters influencing groundwater flow and contaminant transport have not been determined. The continuity of the clay confining layers and their effect on groundwater and contaminant migration are also unknown. The following data requirements will be investigated during the RI to better define the hydrogeology at OU 3.

5.1.1 Verification and Delineation of Groundwater Mounds The presence of groundwater mounds under Building 101 and near the seawall will be verified to assess whether a localized westerly flow component exists. The mounds will be delineated more precisely to better understand the groundwater flow direction from potential sources at Building 101.

5.1.2 Determination of Groundwater Contours Upgradient of OU 3 Groundwater contours upgradient of OU 3 will be determined to select locations for background and upgradient sampling points.

5.1.3 Determination of Groundwater Contours South and Southwest of OU 3 Groundwater contours south and southwest of OU 3 will be determined to assess the potential for migration of contaminants from OU 3 toward the St. Johns River.

5.1.4 Calculation of Aquifer Parameters Aquifer parameters will be calculated to better characterize groundwater flow as a contaminant transport pathway.

5.2 NATURE AND EXTENT OF CONTAMINATION. Based on historical investigations and the SSFP, certain contaminants are known to exist in the subsurface at OU 3. However, full TCL and TAL analyses were not conducted in most of the previous investigations to assess the presence of all potential contaminants. The following data requirements will be investigated during the RI to better characterize the contaminants present in the subsurface, and their distribution throughout the site.

5.2.1 Identification of Contaminants A limited number of TCL and TAL analyses have been conducted at OU 3. Full TCL and TAL analyses will be conducted during the RI to develop a complete list of CPCs and contaminated media and to better assess contaminant transport pathways.

5.2.2 Establish Background Levels for Fill Area The existing background database for soil and groundwater was established at 10 locations across NAS Jacksonville in areas thought to be representative of the site and not impacted by NAS operations. Both shallow and deep background groundwater conditions were established. However, no data were collected for soil in areas that have been hydraulically filled with sediment from the St. Johns River. Therefore, background soil levels will be established for fill upgradient of OU 3 for comparison to soil samples collected within the fill at OU 3.

5.2.3 Identification of Sources Several PSCs have been identified at OU 3; however, the extent to which these sources have contributed to subsurface contamination has not been established. Each identified PSC will be investigated during the RI to better characterize each source area.

5.2.4 Delineation of Contaminant Plumes The existing analytical database indicates that there is a widespread distribution of contaminants at OU 3. Due to the number of potential sources at the site, this widespread distribution is likely the result of multiple contaminant plumes. These plumes will be delineated during the RI to focus target areas for potential remedial action.

5.2.5 Monitor Contaminants Discharging to St. Johns River The closest potential receptor for groundwater contamination is the aquatic environment of the St. Johns River. Existing monitoring wells and piezometers along the seawall and at the northeast and southeast corners of OU 3 will be sampled to assess whether OU 3-related contaminants are migrating toward and discharging to the river. However, additional wells are needed along the southern boundary of OU 3 to monitor contaminant migration in this area.

5.3 REMEDIAL TECHNOLOGY EVALUATION. Remedial screening was performed while scoping the RI to identify potential remedial technologies applicable to OU 3. Based on this screening process, data requirements have been identified that will allow a comprehensive evaluation of remedial technologies and alternatives during the FS. The following data will be collected during the RI to support a complete FS.

5.3.1 Evaluation of Soil Characteristics Physical, chemical, and biological soil characteristics are required to evaluate the potential effectiveness of treatment technologies for soil at OU 3. Physical and chemical data will be used to evaluate operational parameters for specific treatment technologies, and biological data will be used to evaluate the possibility of natural attenuation and biotransformation of contaminants in the unsaturated subsurface.

5.3.2 Evaluation of Groundwater Characteristics Physical, chemical, and biological groundwater characteristics are required to evaluate the potential effectiveness of collection and treatment technologies for groundwater at OU 3. Physical and chemical data will be used to evaluate operational parameters for specific treatment technologies, and biological data will be used to evaluate the

possibility of natural attenuation and biotransformation of contaminants in groundwater.

5.3.3 Evaluation of Aquifer Characteristics Aquifer characteristics are required to evaluate the potential effectiveness of groundwater extraction, and the feasibility of *in-situ* treatment technologies in lieu of groundwater extraction. *In-situ* aquifer testing will be performed during the RI to further assess aquifer characteristics relevant to selecting potential remedial actions.

5.4 DATA QUALITY OBJECTIVES. The USEPA has established five levels of analytical protocol under CERCLA to support data quality objectives (DQOs): DQO Levels I through V. NEESA has established corresponding levels of analytical protocol: NEESA Levels C and D (which correspond to USEPA Levels III and V) and Level E (which corresponds to USEPA Levels I, II, and V). Table 5-1 presents the description of the various levels of analytical protocol, as defined by the USEPA (1988c) guidance document, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, dated October 1988. DQOs established for the RI at OU 3 will consist of NEESA Levels C and D (USEPA Levels III and IV) analytical protocol. These levels of analytical protocol are intended to satisfy the data requirements for field screening and confirmatory sampling during the RI for OU 3. Specific laboratory analyses and data validation specifications selected for the RI are described in Chapter 6.0.

Table 5-1
Levels of Analytical Protocol

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

USEPA Level	NEESA Level	Data Uses	Types of Analysis
I	E	- Site characterization - Monitoring	- Total organic and inorganic vapors (using portable field instruments). - Field testing equipment
II	E	- Site characterization - Evaluation of alternatives - Engineering design - Monitoring	- Organic analysis by GC - Inorganic analysis by AA or XRF - Tentative compound identification - Variable detection limits
III	C	- Risk assessment - PRP determination - Site characterization - Evaluation of alternatives - Engineering design - Monitoring	- Organic Analysis by non-CLP methods - Inorganic Analysis by non-CLP methods - RCRA characteristic testing
IV	D	- Risk assessment - PRP determination - Evaluation of alternatives - Engineering design	- Organic analysis by GC/MS; - Inorganic analysis by GC/MS, AA, or ICP - Low detection limits
V	E	- Risk assessment - PRP determination	- Non-conventional parameters - Method-specific detection limits - Modification of existing methods - Appendix VIII parameters

Notes: USEPA = U.S. Environmental Protection Agency.
NEESA = Naval Energy and Environmental Support Activity.
GC = gas chromatograph.
AA = atomic adsorption.
XRF = x-ray fluorescent.
PRP = potential responsible party.
CLP = Contract Laboratory Program
RCRA = Resource Conservation and Recovery Act.
GC/MS = gas chromatography and mass spectroscopy.
ICP = inductively coupled plasma.

6.0 REMEDIAL INVESTIGATION SCOPE OF WORK

This chapter presents the rationale and framework for conducting the RI at OU 3. Specific sampling procedures are contained in the FSP and analytical protocols are contained in the QAPP. The FSP and QAPP form the SAP, which is included in Appendix M of this document.

The RI scope of work was designed with the following objectives:

- to conduct a field program and analytical program that achieves the data quality requirements identified in Chapter 5.0,
- to revise a site conceptual model,
- to perform a risk assessment, and
- to collect data needed to conduct an FS of remedial alternatives.

The scope of work for the sampling and data collection is flexible so that OU 3 can be characterized during a single field program. The RI is divided into the following five tasks, which are discussed in this chapter:

- Task 1, field program,
- Task 2, laboratory analyses,
- Task 3, data validation,
- Task 4, data evaluation and RI report, and
- Task 5, risk assessment (RA).

6.1 TASK 1, FIELD PROGRAM. The RI field program consists of activities required to (1) characterize the nature and extent of contamination, (2) characterize the geologic and hydrogeologic regime, (3) support remedial technology evaluation, and (4) support an RA. Some activities, including monitoring well installation, will be conducted in consultation with representatives of the OU 3 partnering team, which includes ABB-ES, Navy, USEPA Region IV, and FDEP personnel. Team decisions will dictate the placement of monitoring wells and other selected sampling points, and immediate feedback will be provided to field crews to avoid delays in implementing the field program.

Table 6-1 summarizes each activity planned for the field program. Because much of the program scope will depend on field-based decisions and on the analytical results from screening activities, the number and location of sampling points are estimated here and may be altered during field implementation. The following sections detail the field program in the approximate sequence of activities.

6.1.1 Mobilization and Demobilization One mobilization of sampling and monitoring equipment and supplies is planned to implement the RI field program. The field program will be conducted in consecutive shifts of 10-days work and 4-days off until the investigation is complete.

Drilling and DPT subcontractors will complete required tasks with one mobilization of drill rigs, DPT rigs, steam cleaners, generators, and other equipment. During the course of the field program, equipment will be demobilized when no longer

Table 6-1
Summary of Field Program Activities

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Activity	Description
Mobilization and Demobilization	One field mobilization and demobilization - General field program start-up and shut-down activities
Piezometer Installation and Water Level Measurements	32 shallow and deep pairs; 64 piezometers - 8 pairs (16) north and west of OU 3 - 7 pairs (14) south and southwest of OU 3 - 10 pairs (20) in areas of anomalous water levels - 7 pairs (14) outside the OU 3 area 133 groundwater level measurements (after installation) - 64 new piezometers - 42 existing wells - 27 existing piezometers
Background Soil Sampling	Three soil borings; nine soil samples (three samples per boring) - three borings in hydraulic fill area north of OU 3
Direct Push Technology (DPT) Testing and Sampling	272 DPT points; 816 groundwater samples (3 samples per DPT point) - 232 DPT points in sampling grids - 10 DPT points inside Building 101 - 30 DPT points surrounding isolated areas of contamination
Monitoring Well Installation	51 shallow and deep pairs; 102 monitoring wells - 4 pairs (8) upgradient of OU 3 - 2 pairs (4) adjacent to the St. Johns River - 36 pairs (72) to delineate contaminant plumes - 4 pairs (8) within Building 101 - 5 pairs (10) in isolated areas of contamination
Soil Borings	58 soil borings; 174 soil samples (3 samples per boring) - 51 borings from monitoring well locations - 3 borings in vicinity of PSC-14 - 4 borings in vicinity of PSC-15
Test Trenching and Soil Sampling	2 days of test trenching at PSC-15 - five soil samples from test trenches
Groundwater Sampling	145+ locations; 145+ groundwater samples - 16+ existing monitoring wells - 27+ existing piezometers - 102 new monitoring wells
Surface Soil Sampling	Eight surface soil samples - eight surface soil samples from PSC-15
Aquifer Testing	Selected slug tests and pumping tests - Up to eight single-well 1-day pumping tests - one multi-day pumping test, if feasible - eight deep monitoring well slug tests

See notes at end of table.

Table 6-1 (Continued)
Summary of Field Program Activities

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Activity	Description
Surface Water and Sediment Sampling	Six transects within the St. Johns River - nine samples along the southern boundary of OU 3 - two reference sample locations
Surveying	Approximately 400 Global Positioning System (GPS) survey locations - 272 DPT points - 61 soil boring locations (3 background; 58 OU-wide) - 6 surface soil sampling locations - delineation of PSC-15 boundary - 9 surface water and sediment sampling locations and 6 transects - 2 reference surface water and sediment sample locations 166 Theodolite and level survey locations - 102 new monitoring wells - 64 new piezometers
Water Level Measurements	235 groundwater level measurements (at end of field program) - 102 new wells - 64 new piezometers - 42 existing wells - 27 existing piezometers

Notes: OU = operable unit.
PSC = potential source of contamination.

needed. A field operations trailer and equipment storage facility will be established onsite prior to the commencement of field activities. The trailer, storage facility, and all remaining onsite equipment will be demobilized at the end of the field program.

6.1.2 Piezometer Installation and Water Level Measurements A total of 32 piezometer pairs will be installed using a DPT rig at the onset of the RI. Each pair will consist of a shallow piezometer (spanning the water table) and a deep piezometer (screened below the first encountered clay unit). A piezocone sounding will be conducted prior to the installation of piezometers in areas where the underlying stratigraphy is uncertain. Following installation, the 32 piezometer pairs will be surveyed to determine the coordinates and elevations of the water level measuring points. The survey will be conducted by a Florida-licensed surveyor, as discussed in Section 6.1.12.

When the survey is complete, the water levels in the piezometers will be measured along with the water levels in the 69 existing wells and piezometers. The water level data will be used to generate groundwater contour maps of the upper and lower surficial aquifer. The data will also be provided to USGS to assist in calibrating the OU 3 numerical groundwater model. The contour maps will be used to better assess groundwater flow directions within the upper sand unit and the sand unit below the uppermost clay. The groundwater flow directions will be used to select upgradient and background sampling locations and to aid in plume delineation by more precisely identifying downgradient directions.

Piezometer locations were selected based on the data deficiencies identified during the SSFP. The 32 shallow and deep piezometer pairs will be installed to investigate areas with little or no piezometric data and to supplement existing data in areas exhibiting anomalous contours during the SSFP. (Existing monitoring wells are shown on Figure 2-7 and piezometers installed during the SSFP are shown on Figure 2-8 in Chapter 2.0). Locations of 25 of the piezometer pairs are shown on Figure 6-1; the other 7 are located farther west of OU 3 and are indicated on Figure 6-2. The rationale used to select these locations are discussed in the following sections.

North and West of OU 3. Eight piezometer pairs will be installed north and west of the OU 3 boundaries, in areas estimated to be hydraulically upgradient of OU 3 and beyond the influence of the possible groundwater mounds (Figures 2-19 and 2-20). By further defining the groundwater flow direction in these areas, upgradient sampling locations can be established to assess whether an offsite contribution to contamination at OU 3 exists.

South and Southwest of OU 3. Seven piezometer pairs will be installed south and southwest of OU 3 in areas where there are currently no piezometric measuring points. The primary purpose of these pairs is to collect data to assist in calibrating the USGS numerical model for OU 3. The data will also be used to assess the potential for a southern component of contaminant migration from Building 101 toward the St. Johns River.

Areas of Anomalous Water Levels. Ten piezometer pairs will be installed in areas of anomalous water levels measured during the SSFP. These areas include the possible groundwater mounds near the seawall and underlying Building 101. These additional piezometric measuring points will be used to verify the existence of

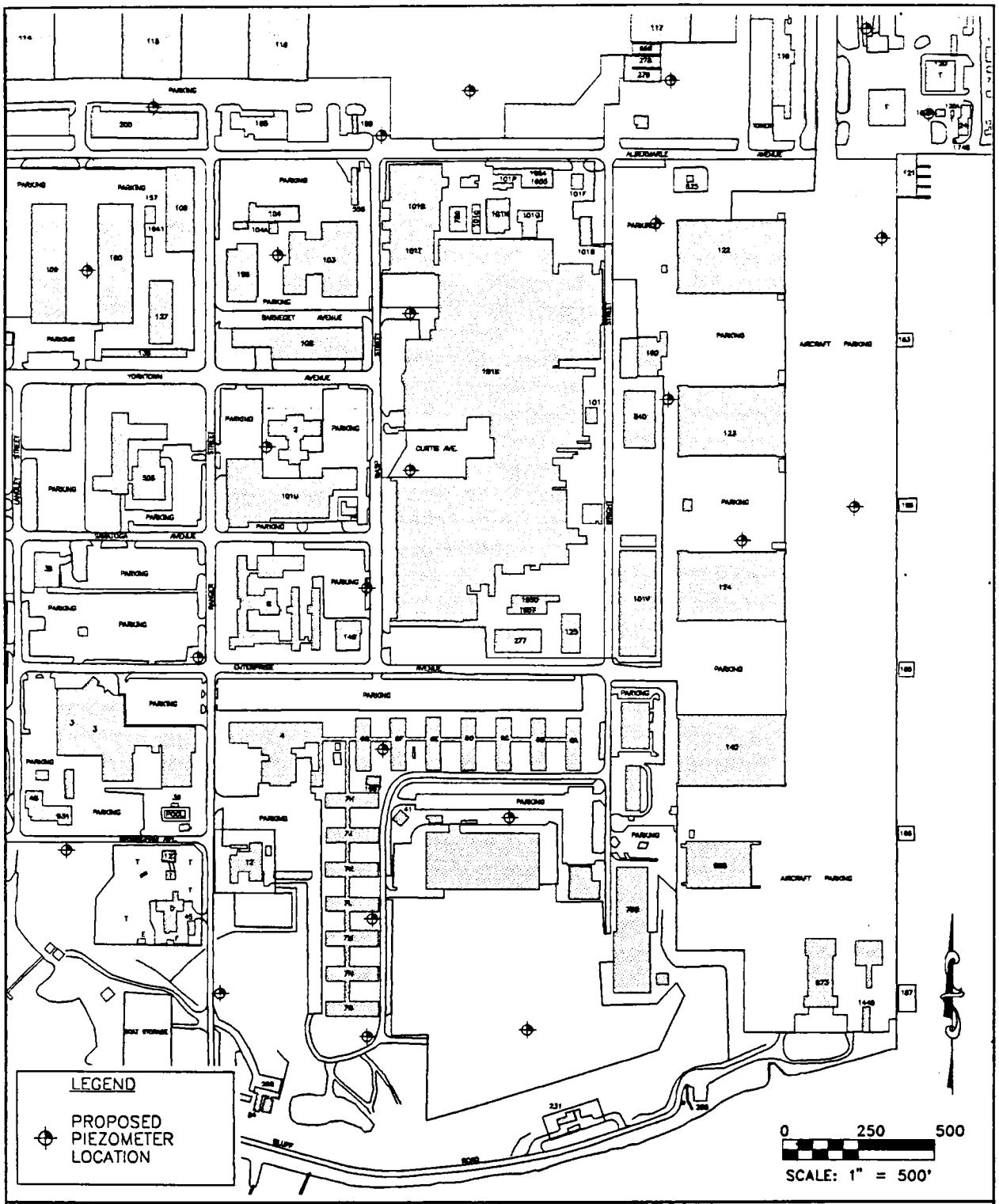

FIGURE 6-1
PROPOSED SITE PIEZOMETER LOCATIONS

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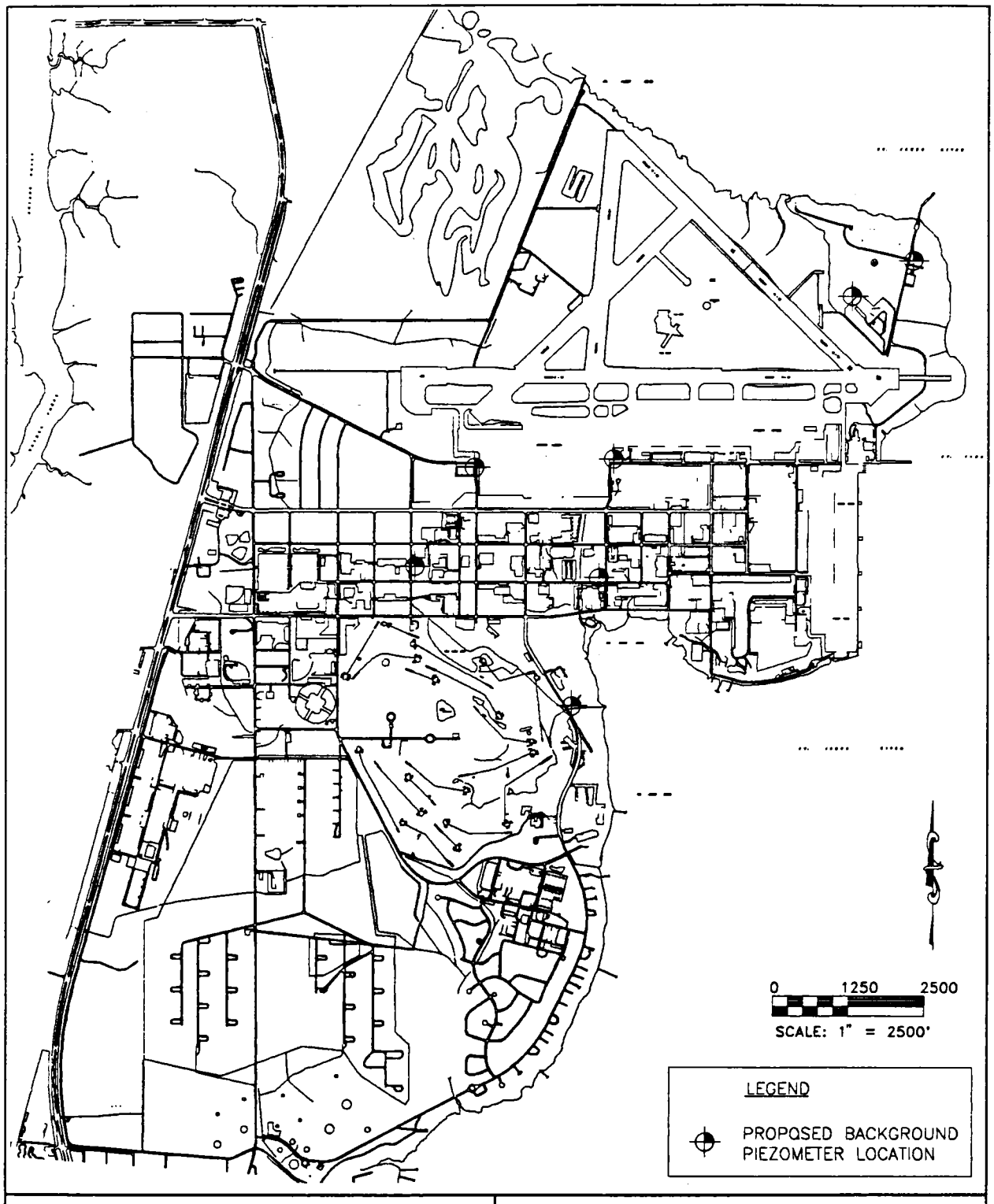

FIGURE 6-2
PROPOSED BACKGROUND PIEZOMETER LOCATIONS

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the mounds and more precisely define groundwater flow and contaminant transport directions in these areas.

Anomalous measurements were also recorded in the northeast corner of OU 3 indicating a possible break in the seawall. Additional piezometers in this area will be used to monitor the effect of the seawall on shallow groundwater flow and to better assess the potential for a break in the seawall.

Outside the OU 3 Area. The seven piezometer pairs indicated on Figure 6-2 are outside the immediate vicinity of OU 3 but within the NAS Jacksonville facility. These pairs will be installed for the sole purpose of calibrating the USGS numerical model. Data collected at these locations are not expected to have an impact on subsequent RI tasks.

6.1.3 Background Soil Sampling in Hydraulic Fill Area Site-wide background soil data for non-fill areas have been collected during the ongoing OU 1 RI/FS. These data will be used to establish background concentrations of inorganic substances in OU 3 soil. However, because much of OU 3 has been hydraulically filled with sediment from the St. Johns River (Subsection 2.1.2), there is a possibility that some OU 3 CPCs are attributable to contaminants present in the fill. To assess the concentrations of inorganic contaminants potentially contained in the fill, background soil samples will be collected from the fill area north of OU 3, following piezometer installation and gauging. This area is estimated to have fill to a depth greater than 10 feet and has not likely been impacted by OU 3 activities. There is a possibility that the area north of OU 3 has been impacted by other facility activities such as the hot refueling area in the aircraft parking area. The sampling locations will be situated as far from such activities as possible to best obtain background conditions.

Three background soil sampling locations are planned: two within a parking lot and one within an aircraft parking apron (Figure 6-3). The actual sampling locations may be shifted slightly based on the results of piezometer gauging or due to access limitations. Soil samples will be collected from three intervals at each boring: 0 to 2 feet, 2 to 4 feet, and 4 to 6 feet bls. No samples will be collected from below the water table. Six background soil samples will be submitted to the laboratory for TAL metals and TPH analyses only. Three soil samples (all from the same boring will be analyzed for full TCL and TAL analyses, and the results will be used as a comparison to the findings at OU 3 and site-wide background soil data in non-fill areas.

6.1.4 Direct Push Technology Testing and Sampling DPT testing and groundwater sampling will be performed following the completion of piezometer installation and gauging. The objectives of DPT testing and sampling are (1) to determine the continuity of relatively impermeable clay and sandy clay aquitards in each area of contamination and (2) to delineate the vertical and lateral extent of groundwater contaminant plumes that exceed PRGs. This information will subsequently be used to identify optimum locations for groundwater monitoring wells to be used for plume delineation.

A piezocone sounding will be conducted to log the local stratigraphy and to select sampling depths; a sounding will not be conducted at every sampling location if sufficient stratigraphic data exist in the vicinity. A second probe will be advanced to collect the groundwater samples. Three samples are planned at each location: one near the top of the water table, one near the top of the second clay

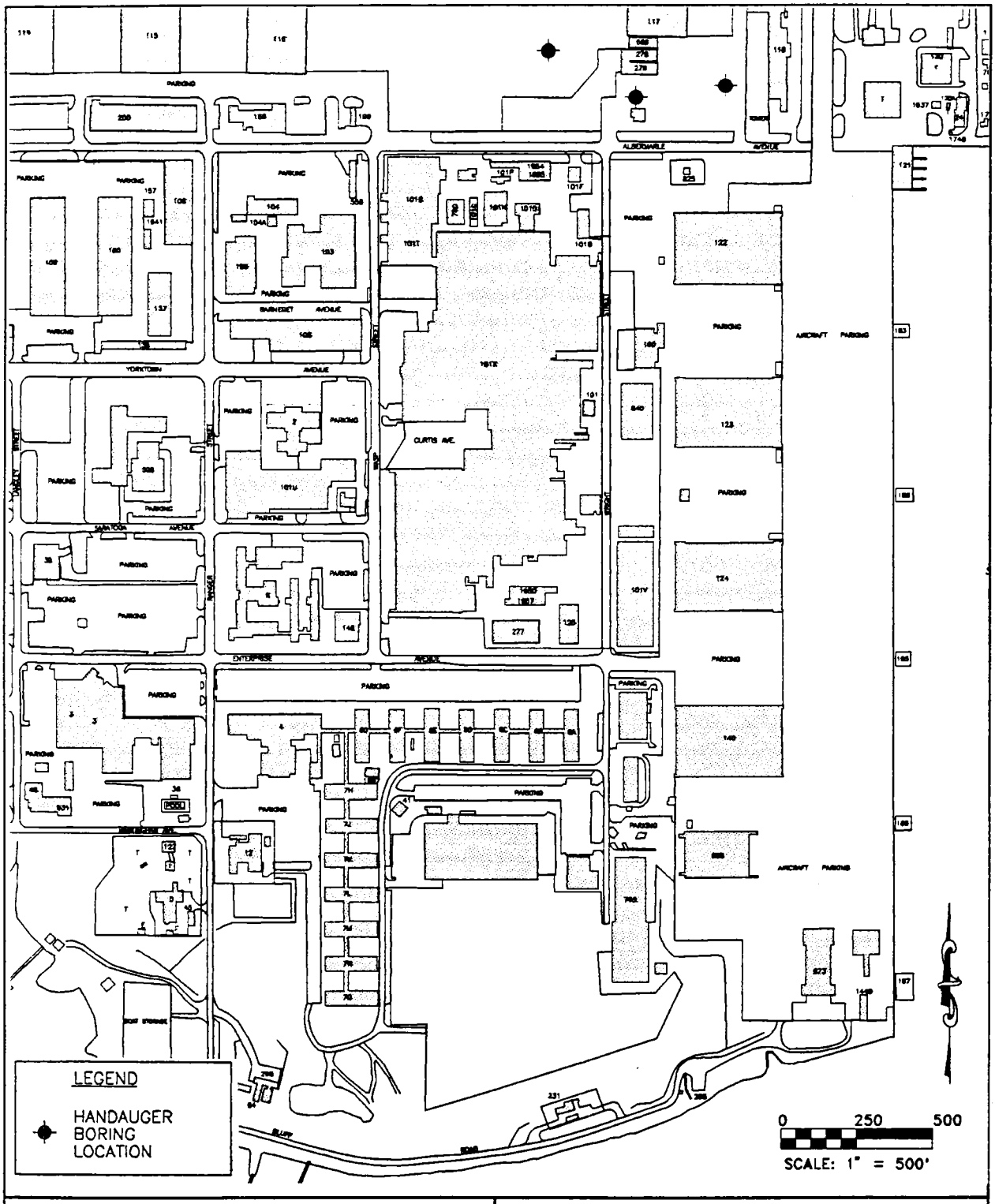

FIGURE 6-3
PROPOSED BACKGROUND SOIL SAMPLING LOCATIONS, FILL AREA

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unit encountered, and one at an intermediate depth. Sampled intervals may be limited by the presence of insufficiently permeable units. As a sample database is developed, the sampled intervals may be altered to better reflect the apparent extent of the plume. The number of potential sampling locations, as shown on Figure 6-4, may vary as a result of these field adjustments. It is uncertain at this time if all sampling locations will be required. The grids shown are the maximum number of points that may be required and are included for future costing purposes only.

Up to 272 locations will be sampled using a DPT rig; 232 locations in sampling grids, 10 inside Building 101, and 30 surrounding isolated detections of contamination. Actual DPT locations will be determined in the field as the investigation progresses to more fully delineate plumes in the upgradient, downgradient, lateral, and vertical directions. The rationale for selecting sampling locations is discussed in the following paragraphs.

Sampling Grids. Sampling grids were developed as a guide to conducting the DPT sampling effort and for estimating the total number of DPT points. To simplify developing the sampling grids, OU 3 was divided into seven general areas of contamination: the dry cleaners (Building 106), the closed-loop solvent recycling facility (Building 780), Building 101 East, Building 101 South, the P-615 construction area, PSC-15, and within Building 101. The sampling grids for these seven general areas of contamination are shown on Figure 6-4. A grid approximates the potential area that will be sampled during plume delineation in each area of contamination. The center of each box within a grid represents a potential sampling point. No grid is shown for DPT points within Building 101 because these points will be determined in the field based on accessibility of sampling locations.

The sampling within each grid will begin at each source(s) of contamination, such as the dry cleaners or the former solvent and paint sludge disposal area at PSC-15. In areas where the source of contamination is not known, such as Building 780 or the P-615 construction area, sampling will begin in the areas of the highest detected contaminant concentrations. The initial sampling locations are specified on Figure 6-4 so that plume delineation can begin in the most highly contaminated areas. The start boxes for Building 101 East and Building 101 South include all of the grid boxes along Building 101 due to the multiple potential sources within the building.

Samples will be submitted to the laboratory for a full TAL and TCL analyses with a 24-hour turnaround time. The quick turnaround time will allow rapid decisions regarding subsequent sampling points. DPT sampling will be conducted with periodic consultation with the OU 3 Partnering Team to inform them of analytical results and to discuss plume delineation strategies.

Initially, a plume will be delineated in the downgradient direction from the highest point of contamination with sampling conducted at intervals indicated by the grid spacing. The intervals are specified only as a guide, and will be increased or decreased as warranted by the analytical results. Sampling will proceed in the downgradient direction until the PRG boundary can be approximated for CPCs. The upgradient and lateral extents of the plume will then be delineated in a similar fashion.

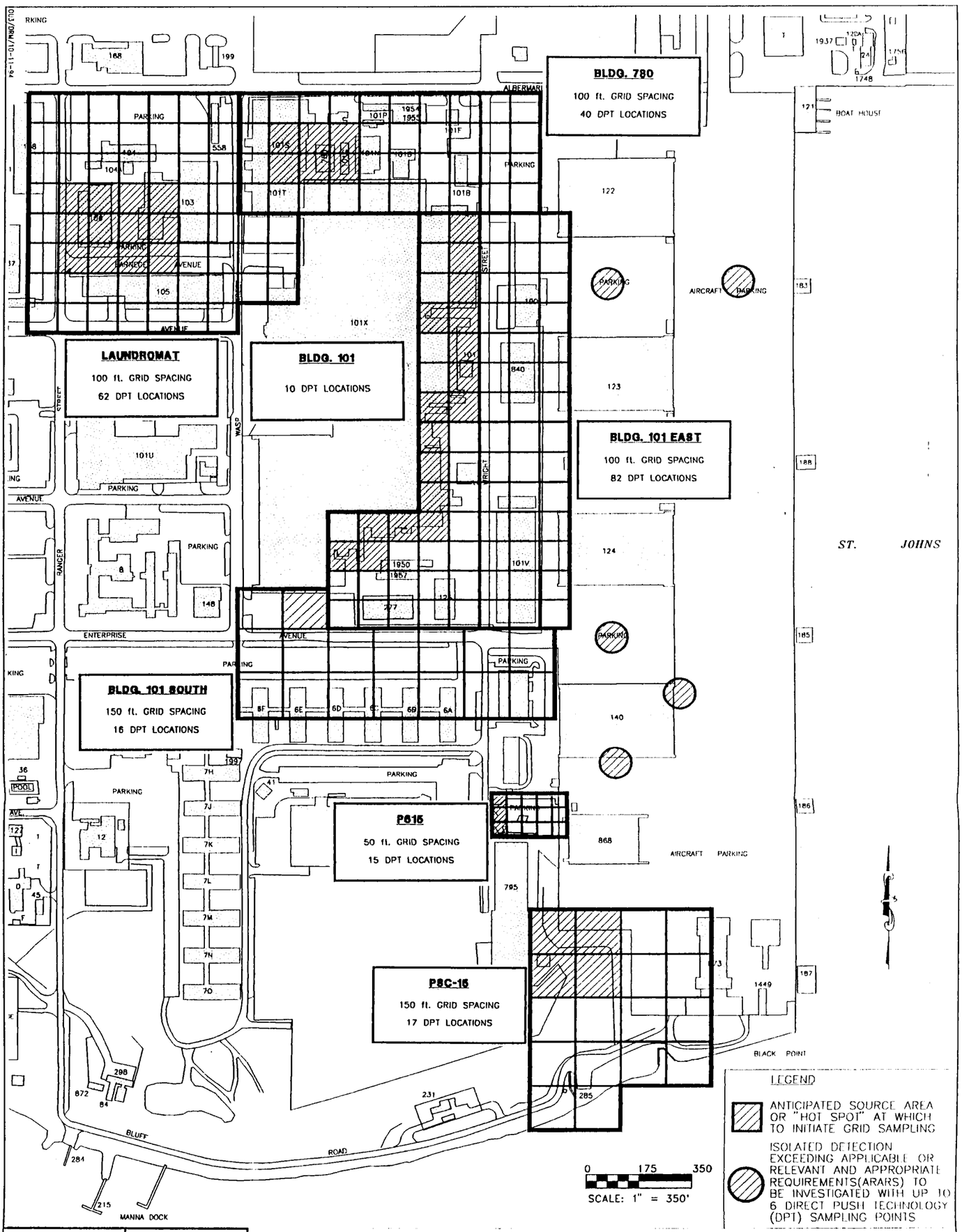

FIGURE 6-4
DIRECT PUSH TECHNOLOGY GROUNDWATER SAMPLING GRIDS

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Building 101. In addition to the DPT points within the DPT sampling grids, up to 10 sampling points will be established within Building 101. The purpose of sampling within the building is to try to locate sources of the groundwater contaminant plumes. Plumes beneath Building 101 will be delineated as much as possible; however, most areas of the building are not accessible to the DPT rig. Therefore, DPT points will be limited to those areas accessible to the rig.

Isolated Areas of Contamination. An estimated 30 DPT points (6 per plume) will be established to investigate possible plumes associated with each of the 5 isolated detections of contaminants above PRGs on the helicopter flightline. The isolated areas of contamination were detected at CW02, CS10, CW16, CW19, and CW20 and are shown on Figure 6-4. The initial sampling points will be established approximately 25 feet downgradient of the previous detections. Subsequent points will be positioned to delineate the plumes, which are expected to be localized pockets of contamination.

6.1.5 Monitoring Well Installation Monitoring wells will be installed concurrently with DPT testing and sampling. The purpose of monitoring well installation is to establish permanent monitoring points from which to collect groundwater samples that achieve RI data quality requirements and objectives (Chapter 5.0). After development, monitoring wells will serve as permanent groundwater gauging and sampling locations, and potential monitoring points for future remedial actions. Aquifer tests will also be conducted at selected wells during the field program (Subsection 6.1.11).

The monitoring wells will be installed in pairs: one shallow well spanning the water table and one deep well screened in an interval of concern. The interval of concern may include the most contaminated interval below the water table, an interval just below the vertical extent of the plume, or an interval that will intercept a plume with future migration. The deep well will be screened using professional judgment to best achieve data quality requirements.

Split-spoon sampling will be conducted for geologic reference during the drilling of all deep wells. Following hand augering to the water table to probe for underground utilities and to collect soil samples for TCL and TAL analyses (Subsection 6.1.6.1), split spoons will be driven at 5-foot intervals from the water table to the bottom of the borehole. At the six deep well locations selected for special parameter soil sampling (Subsection 6.1.6.2), split spoons will be driven at continuous intervals from the ground surface to the top of the first clay unit.

For the purposes of RI scoping, 51 groundwater monitoring well pairs are planned at OU 3:

- 4 upgradient pairs,
- 2 pairs adjacent to the St. Johns River,
- 36 pairs to delineate contaminant plumes,
- 4 pairs inside Building 101, and
- 5 pairs near isolated areas of contamination.

The following paragraphs describe the rationale and approach for the placement and installation of groundwater monitoring wells at these locations.

Upgradient Monitoring Wells. Well pairs will first be installed at four locations upgradient of OU 3. These locations will be selected based on the results of piezometer installation and gauging, and will be distributed along the western and northern boundaries of OU 3. Preliminary locations for these upgradient wells are shown on Figure 6-5. The purpose of the upgradient well pairs is to assess whether there is an offsite contribution to the contaminants detected at OU 3.

Monitoring Wells Adjacent to the St. Johns River. Following the installation of upgradient wells, two well pairs will be installed near the southern boundary of OU 3, along the St. Johns River (Figure 6-5). One well pair will be installed adjacent to NARF-12, which is screened at an intermediate depth below the water table. The second pair will be installed farther west, south of the construction area. The purpose of these well pairs is to assess whether site contaminants are discharging to the river. The wells will supplement existing wells and piezometers along the southern boundary and the seawall to the east.

Monitoring Wells to Delineate Plumes. An estimated 36 well pairs will be installed to monitor the contaminant plumes. For the purpose of scoping this RI, it was assumed that nine plumes would be delineated and four well pairs will be installed per plume.

Once a plume is delineated based on the results of DPT groundwater sampling, a telephone conference among representatives of the OU 3 Partnering Team will be conducted to determine specific locations for the groundwater monitoring wells. One monitoring well pair will be placed in the most contaminated part of each plume, and one pair will be placed approximately 20 feet downgradient of the leading edge of the plume (as defined by the PRGs). Two additional well pairs will be installed at intermediate locations within the plume. This strategy is intended to provide sufficient groundwater data to define the extent of the contaminant plume and to provide additional data for the risk assessment of the peripheral areas of OU 3.

Monitoring Wells in Building 101. Four well pairs will be installed inside Building 101 to further delineate contaminant plumes and to monitor groundwater quality close to potential sources in the building. The locations of these well pairs will be limited to those areas accessible to the drill rig and will be selected based on the DPT sampling results.

Monitoring Wells in Isolated Areas of Contamination. An estimated 10 well pairs will be required to monitor the isolated areas of contamination along the helicopter flightline. One well pair will be installed in the most contaminated part of each of the five isolated areas; one pair will be installed approximately 20 feet downgradient of the leading edge of the plume, as defined by the PRGs.

6.1.6 Soil Borings In addition to background soil sampling in the hydraulic fill area (Subsection 6.1.3), soil samples will be collected from soil borings and test trenches. This section discusses the soil samples to be collected during hand augering of shallow soil borings and during split-spoon sampling of deep monitoring well borings; test trench soil samples are discussed further in Subsection 6.1.7.

The objectives of conducting soil borings and sampling at OU 3 are (1) to characterize potential sources of contamination, (2) to assess the potential contribution of OU 3 soil contamination to groundwater contamination, and (3) to

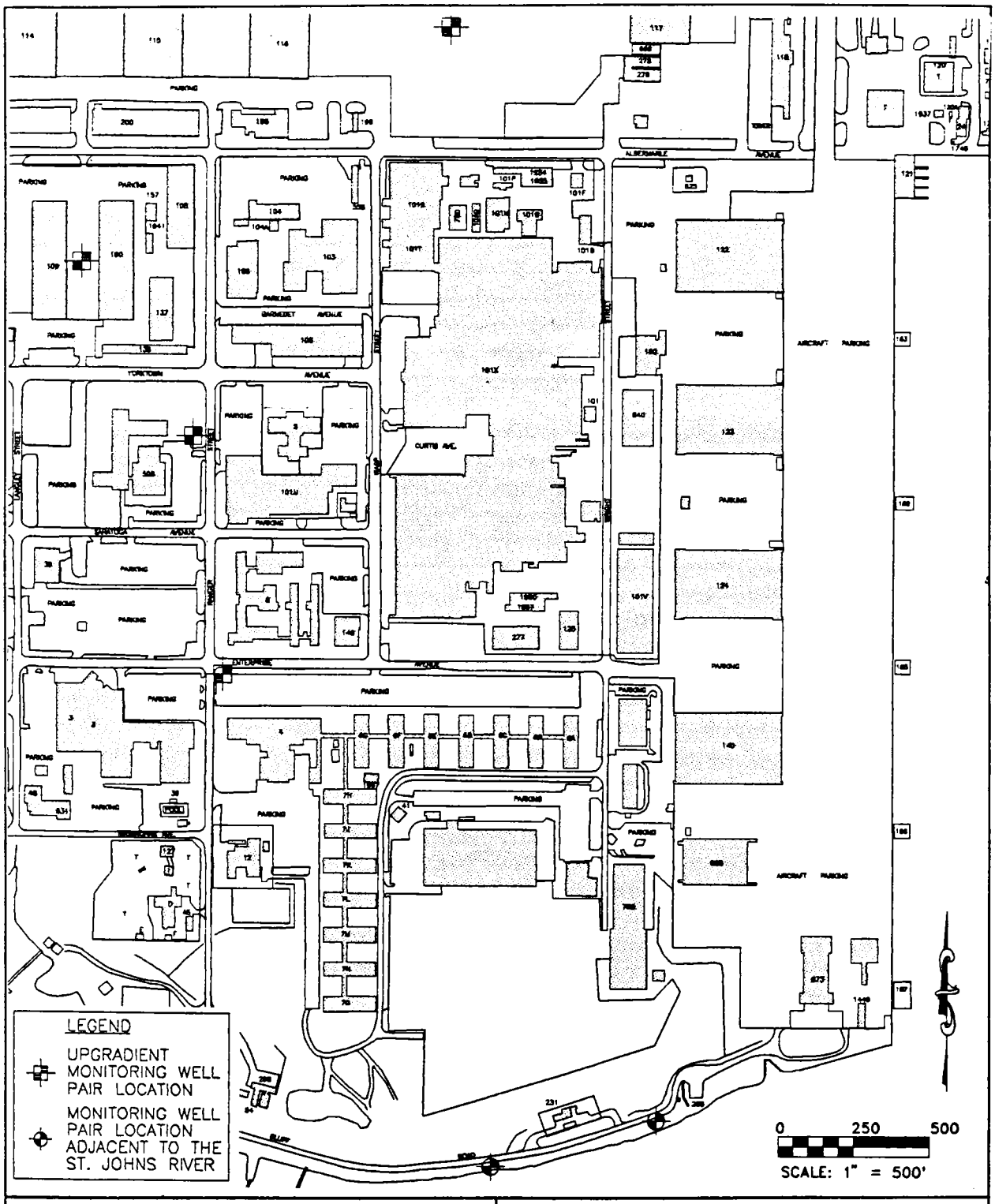

FIGURE 6-5
PROPOSED MONITORING WELL PAIRS, LOCATIONS UPGRADIENT OF OPERABLE UNIT 3 AND ADJACENT TO THE ST. JOHNS RIVER

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support remedial technology evaluation. An estimated 174 soil samples will be analyzed for full TCL and TAL analyses and 12 samples will be analyzed for special parameters. Soil samples for these analyses are discussed in the following sections.

6.1.6.1 Target Compound List and Target Analyte List (TAL) Analyses Soil samples for full TCL and TAL analyses will be collected from 58 shallow, hand augered soil borings. Shallow, hand augered soil borings will be advanced at 51 deep monitoring well locations, 3 locations at PSC-14, and 4 locations at PSC-15. Soil samples will be collected at 2-foot intervals from the ground surface to the top of the water table in each boring. Because these borings are beneath approximately 11 inches of concrete pavement, no surface soil samples (0 to 12 inches) will be collected at these locations. For the purposes of estimating the total number of samples, it was assumed that the water table is 6 feet bls and samples will be collected at 0 to 2 feet, 2 to 4 feet, and 4 to 6 feet bls, for a total of 174 samples. No TCL and TAL samples will be collected from below the water table.

Visual descriptions of the soil will be logged using the Unified Soil Classification System and samples will be submitted to an NEESA-approved laboratory for full TCL and TAL analyses. The rationale for conducting shallow, hand augered soil borings and selecting their locations is discussed in the following paragraphs.

Deep Monitoring Well Locations. Prior to the drilling and installation of each monitoring well, a shallow soil boring will be hand augered to probe the area for underground utilities. Soil samples will be collected from the hand augered borings at the 51 deep well locations only (Subsection 6.1.5); 153 samples will be collected (3 samples per well) for full TCL and TAL analyses. The purpose of sampling at these locations is to identify the extent of soil contamination at OU 3.

PSC-14. Three soil borings will be hand augered in the immediate vicinity of PSC-14, the battery acid disposal pit. The proposed locations of these borings are shown on Figure 6-6. The purpose of these borings is to assess whether potential leaks from the pits are a source of soil or groundwater contamination. The disposal pit is adjacent to Building 125 and consists of a 6- to 8-foot deep concrete pit connected to a stormwater sewer drain. The borings will be positioned on each of the three sides (north, south, and west) of the pit outside Building 125 and will be advanced to the depth of the pit. Actual locations of these borings will be determined in the field based on site access conditions. Three soil samples per boring (nine total) will be collected for full TCL and TAL analyses.

PSC-15. Four soil borings will be hand augered beneath the flightline pavement adjacent to PSC-15 (the former solvent and paint sludge disposal area). The purpose of these borings is to monitor the extent of migration of contaminants from PSC-15 northward beneath the pavement. A total of 12 soil samples will be collected (3 samples per boring) for full TCL and TAL analyses. The four boring locations are shown on Figure 6-7. Three borings will be positioned near the edge of the pavement, and one boring will be positioned about 10 feet farther north beneath the pavement. Additional soil sampling at PSC-15 will be conducted during test trenching (Subsection 6.1.7).

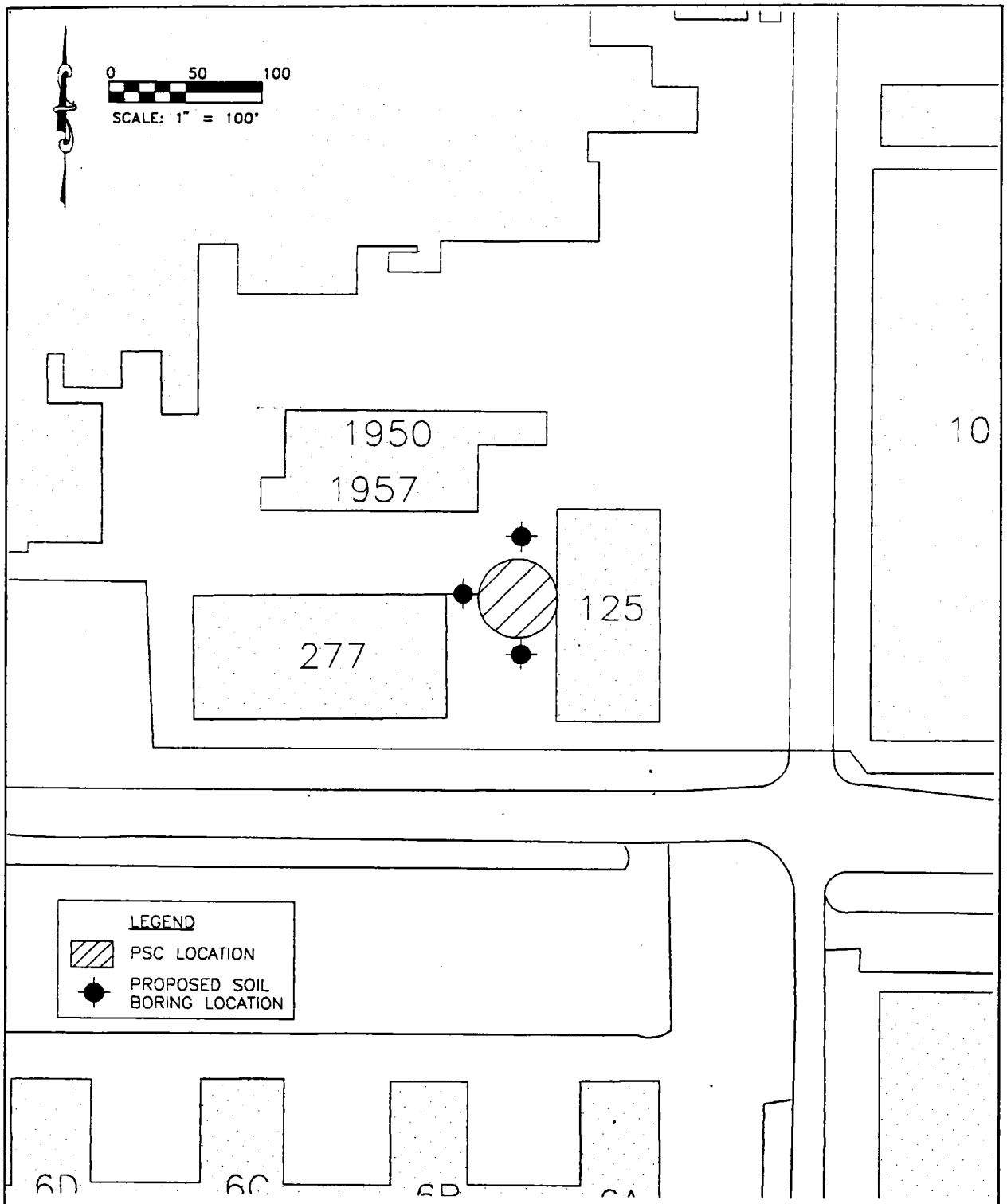

FIGURE 6-6
SOIL BORING LOCATIONS AT PSC 14

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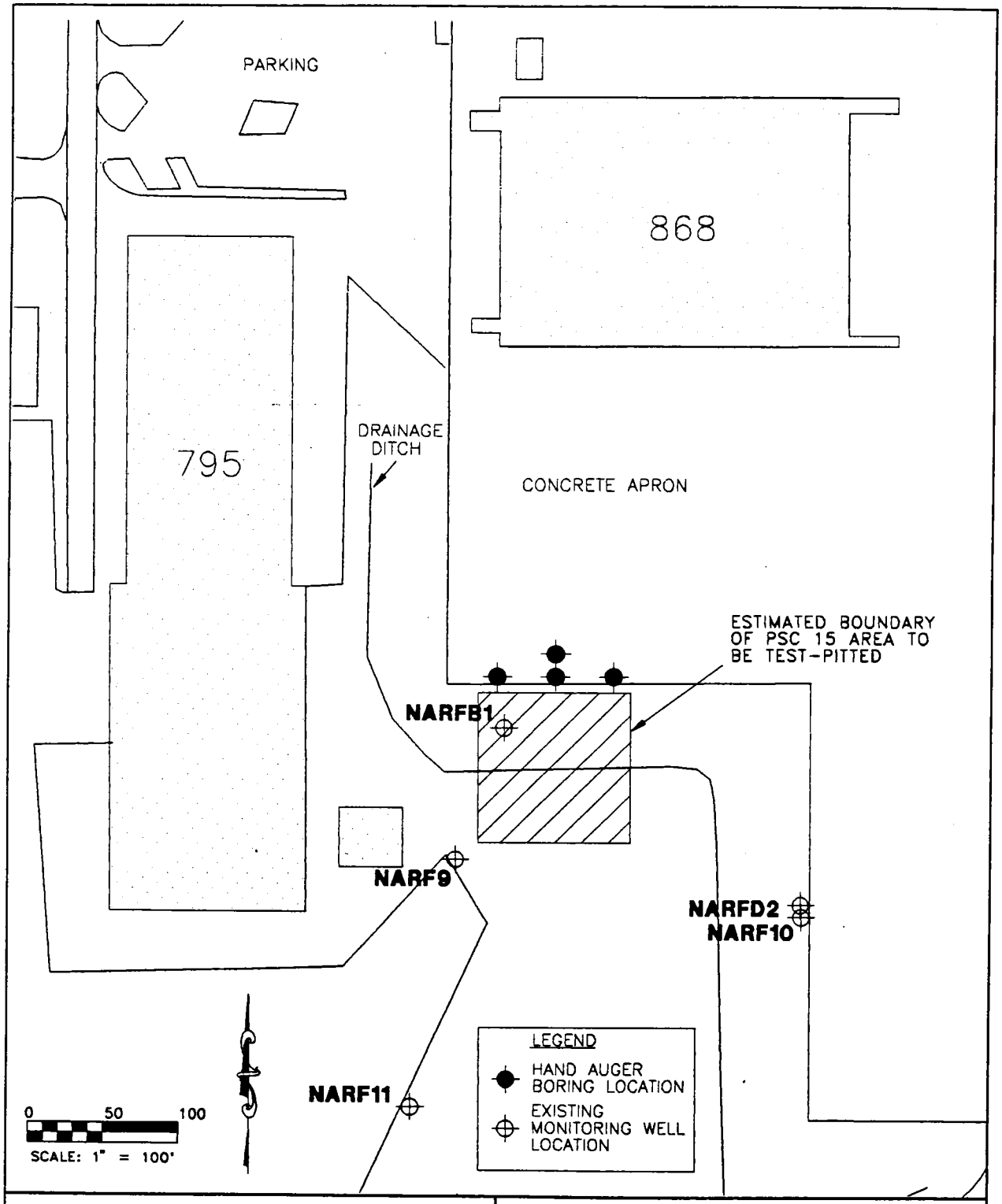

FIGURE 6-7
SOURCE AREA INVESTIGATION AT POTENTIAL SOURCE OF CONTAMINATION 15

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6.1.6.2 Special Parameters A total of 12 soil samples will be collected for analyses of the following special parameters to support remedial technology evaluation:

- pH;
- moisture content;
- total organic carbon;
- cation exchange capacity;
- heating value;
- leachable metals (toxicity characteristic leachate procedure [TCLP]);
- total heterotrophic bacteria (standard plate count);
- total Kjeldahl nitrogen (TKN), ammonia, and nitrite plus nitrate;
- orthophosphorous; and
- petroleum hydrocarbons (fingerprint).

The special parameter samples will be collected from split-spoon samples while drilling deep monitoring wells at the following six locations:

- one within the area of the Dry Cleaners (Building 106),
- one within the Building 780 area,
- two within other plume areas (as delineated by DPT sampling), and
- two within areas with hydraulic fill to at least 10 feet bls.

Actual locations will be determined in the field. Samples will be collected from two intervals at each location; one above the water table and one below the water table but above the upper clay unit.

6.1.7 Test Trenching Test trenching will be conducted with a small backhoe at the reported location of PSC-15 (Figure 6-6) to estimate the former boundaries of the solvent and paint sludge disposal area. Soil sampling will also be performed to evaluate the nature and extent of soil contamination.

Disposal is suspected to have occurred in the unpaved area south of the flightline in an area measuring approximately 100 feet by 100 feet. Trenching will begin in the anticipated centerline of the disposal area. The first trench will begin at the edge of the flightline to the east of NARFB-1 and extend southward until the northern and southern boundaries of PSC-15 are identified. Additional trenches will be excavated perpendicular to the first trench until the width of the disposal area is defined. Spacing of the trenches will be based on field judgment.

Two days of trenching are anticipated to complete the investigation. The trenches will be approximately 18 inches wide and 100 feet long. Because the depth to the former disposal area is unknown, initial trenching will be conducted to the water table (estimated to be 6 feet bls), until the disposal area is identified and characterized. Subsequent trenches will only be deep enough to expose the disposal area, which will be identified based on visual characterization, odor, and organic vapor analyzer (OVA) readings.

Three samples will be collected from the most contaminated parts of each trench (based on headspace flame ionization detector [FID] measurements and apparent staining) but only five of the total will be submitted to the laboratory for full TCL and TAL analyses. These five samples will be selected to best represent the nature and variability of the contaminated soil.

6.1.8 Surface Soil Sampling After the boundaries of PSC-15 are delineated by test trenching and soil sampling, surface soil sampling will be performed to investigate the potential for contamination of overland flow by the surface soil at the PSC. PSC-15 is located in one of the few unpaved areas of OU 3. Surface water flow through the PSC ultimately discharges to the St. Johns River to the south.

Six surface soil samples will be collected from a depth of 0 to 1 foot. Sampling locations are intended to be evenly spaced within the disposal areas. In addition, two background surface soil sampling locations will be selected during the field program with consultation with representatives of the OU 3 Partnering Team. The eight surface soil samples will be submitted to an NEESA-approved laboratory for full TCL and TAL analyses.

6.1.9 Groundwater Sampling Following installation and development of the 51 monitoring well pairs, groundwater from all newly installed wells and 43 existing wells and piezometers will be sampled including:

- the 27 piezometers installed during the SSFP,
- the 3 shallow monitoring wells paired with SSFP deep piezometers (B101MW-01, P159MW-01, and JAX873-10),
- the 2 monitoring wells bordering the St. Johns River at the southern boundary of OU 3 (NARF-4 and NARF-12) to monitor groundwater at its point of discharge to the St. Johns River to the south,
- 3 of the monitoring wells surrounding Building 873 (JAX873-3-2, JAX873-1-3, and JAX873-3-7) to monitor the extent of contaminant migration to the south toward the river,
- 4 of the monitoring wells at the northeast corner of OU 3 (NARF-16, NARF-17, NARF-18, and P159MW-04) to monitor the extent of contaminant migration to the northeast toward the river,
- 1 monitoring well near the former Building 101 underground storage tanks (USTs) (OTC-10-1) to assess the impact of the former USTs to local groundwater, and
- the 3 wells within and downgradient of PSC-15 (NARF-B1, NARF-9, and NARF-11) to supplement the 4 well pairs installed to monitor the PSC-15 contaminant plume.

All groundwater samples will be submitted to an NEESA-approved laboratory for full TCL and TAL analyses. Six of the groundwater samples will also be analyzed for special parameters to support remedial technology evaluation. The special parameter groundwater samples will be collected from shallow wells at the six locations specified for special parameter soil samples (Subsection 6.1.6). Special parameters include the following:

- total oil and grease;
- total suspended and dissolved solids;
- redox potential;
- biochemical oxygen demand;

- chemical oxygen demand;
- total heterotrophic bacteria;
- TKN, ammonia, and nitrite plus nitrate;
- orthophosphorous;
- iron;
- petroleum hydrocarbon (fingerprint); and
- filtered samples for TAL analyses.

Immediately prior to sampling, each monitoring well will be purged according to the methods described in the FSP (Appendix M-2) and field measurements of groundwater pH, conductivity, and temperature will be recorded. In addition to these measurements, dissolved oxygen will be measured at the six shallow monitoring wells specified for special parameters and each of the six adjacent deep monitoring wells.

6.1.10 Surface Water and Sediment Sampling Nine surface water and sediment samples will be collected to the south of OU 3. The purpose of this sampling is to further characterize the aquatic habitat potentially exposed to OU 3-related contaminants. The characterization will be conducted in two steps: (1) qualitative substrate mapping of aquatic habitats, and (2) surface water and sediment sampling for chemical and toxicity analyses.

Substrate mapping will be performed first to characterize water depth, sediment, and SAV. These characteristics will influence the selection of surface water and sediment sampling locations. Initially, substrate mapping will be conducted along three transects roughly perpendicular to the shore, at equidistant intervals between Black Point and the marina to the west. The transects will be approximately 500 feet long. Subsequent mapping will be conducted along three 400-foot long transects radiating from the stormwater outflow area. Approximate locations of the six transects are shown on Figure 6-8.

Sediment samples will be collected for substrate mapping at several intervals along each of the six transects, based on field judgment. Sediment will be classified according to grain-size distribution and organic content; SAV will be assessed according to presence, coverage, and composition. Secchi disk measurements of light penetration will also be taken at each location. Substrate mapping will continue along each transect, beyond the SAV zone and into the deeper demersal zone.

Once the substrate has been mapped, nine surface water and sediment sampling locations will be selected in the stormwater outflow area. Preliminary locations of the sampling points are shown on Figure 6-8. In addition to these nine sampling points, surface water and sediment samples will be collected from two reference locations to provide background data. Reference samples will be collected from an area that is not impacted by OU 3 or other known areas of contamination; the actual sampling points will be chosen upon consultation with representatives of the OU 3 Partnering Team and with the St. Johns River Water Management District officials.

All samples will be submitted (unfiltered) to an NEESA-approved laboratory for analyses. Analyses of the 11 surface water samples will include full TCL and TAL analyses, hardness, and the following special parameters:

- metals by furnace (cadmium, copper, nickel, silver, and beryllium),

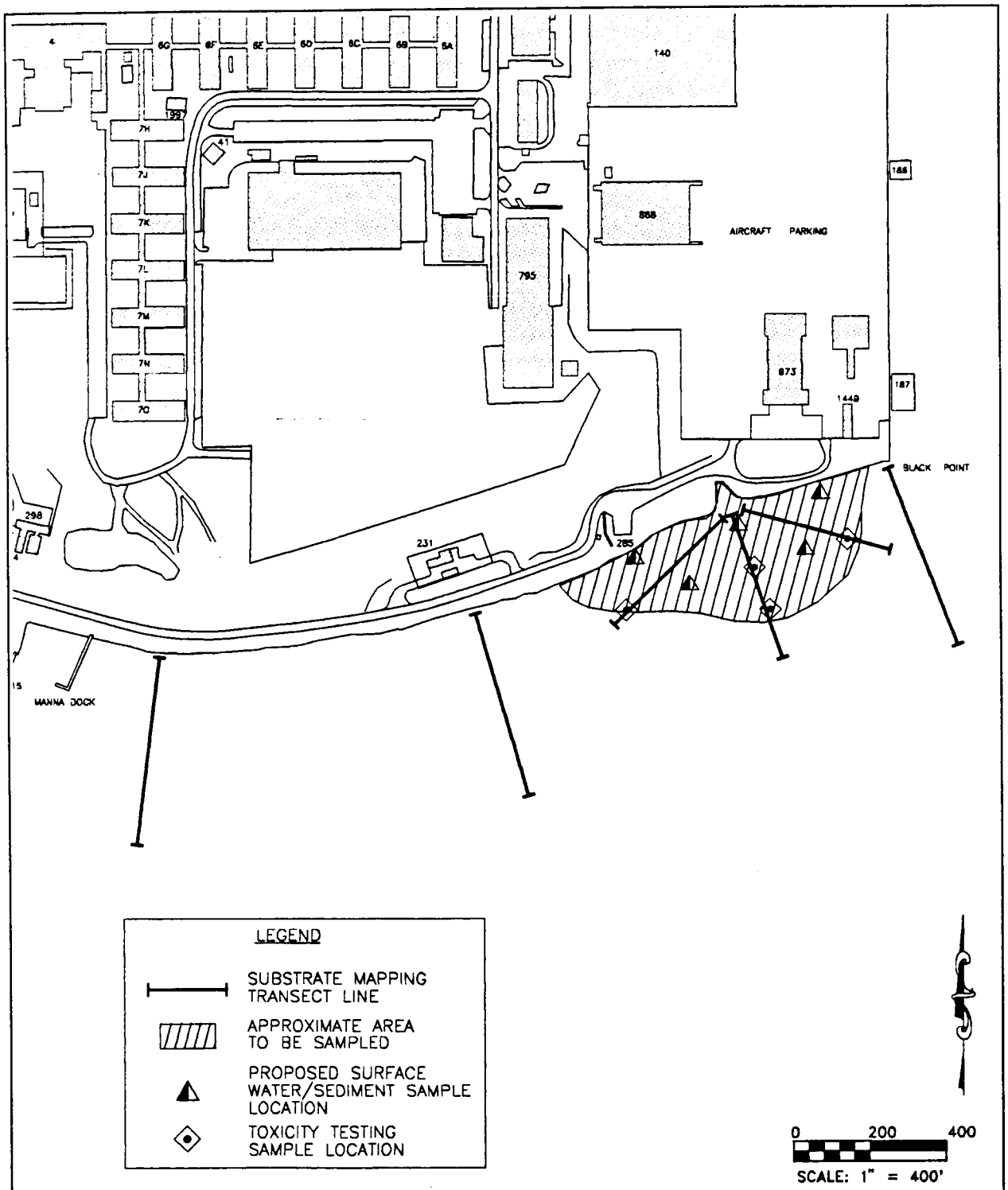

FIGURE 6-8
SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS SOUTH OF OPERABLE UNIT 3

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

OU3/DRM/08-18-94

- hexavalent chromium by colorimetric method,
- phenols by USEPA Method 8040, and
- halogenated carbons by USEPA Method 8010.

Analyses for the 11 sediment samples will include full TCL and TAL analyses and two special analyses:

- antimony by furnace, and
- polynuclear aromatic hydrocarbons (PAHs) by USEPA Method 8100.

The special analytical methods will achieve lower detection limits so that the data can be compared to the State of Florida surface water quality standards for Class III marine water (FDEP, 1992) and the USEPA *Region IV Waste Management Division Sediment Screening Values for Hazardous Waste Sites* (USEPA, 1992c).

In addition to the above analyses, 6 of the 11 sediment samples, including the 2 reference samples, will be submitted for toxicity testing (Figure 6-7). The samples will be submitted to a subcontract laboratory for a 10-day survival test with a marine amphipod (*Ampelisca abidita*) (American Society for Testing and Materials [ASTM], 1992).

6.1.11 Aquifer Testing To support the USGS numerical modeling, which is intended to identify subsurface pathways and predict exposure levels at selected exposure points, accurate values of surficial aquifer characteristics are required. Therefore, aquifer testing will be conducted to determine accurate values of aquifer characteristics for the uppermost sand unit (screened in shallow wells) and the sand unit underlying the upper clay unit (screened in deep wells). The planned pumping tests and slug tests are discussed in the following paragraphs.

Pumping Tests. The existing data for hydraulic conductivity of the surficial aquifer are available from slug tests (Subsection 2.3.3); consequently, the reliability is not sufficient to appropriately support the numerical modeling effort. It is common to conduct a pumping test of 3 to 5 days duration that will produce a drawdown cone of depression sufficient to produce data indicative of a significant part (hundreds of feet) of the aquifer. These data will then enable the calculation of reliable hydraulic conductivity values to be used in the numerical modeling.

Unfortunately, the values of hydraulic conductivity from the slug tests conducted at shallow wells (Subsection 2.3.3) indicate that the pumping rate for a standard 3- to 5-day pumping test could only be sustained at about 0.5 gpm. This low pumping rate would result in a very small cone of depression even after several days of pumping. Therefore, an alternative approach to the standard 3- to 5-day pumping test will be followed. This alternative approach consists of short duration single-well pumping tests of up to 2 or 3 hours with careful monitoring in the pumped well of both drawdown during pumping and recovery after pump shutdown. These tests will be conducted using existing monitoring wells and piezometers.

This testing will proceed according to the following steps.

(1) **Preliminary Testing** To select wells for testing and to determine the appropriate pumping rates, several of the existing wells (locations to be determined in the field) will be surged and tested by pumping for a few minutes at various pumping rates while observing drawdown levels; after pumping the recovery behavior will also be observed and recorded. The

existing slug test data will be reviewed before selecting the wells to be tested. Using these data, as many as eight wells (five shallow and three deep) across OU 3 will be selected and pumping rates determined from short duration pumping tests.

(2) **Single-Well Tests** Each of the wells or piezometer selected in Step 1 will be hydraulically tested using the determined pumping rates for a duration of 2 hours (more or less time may be spent depending upon observations made during the test). Some of the tests may be changed to "step drawdown" tests in which the pumping rate is abruptly increased during the test. After the pumping phase of these tests, the recovery of the water level will be monitored for about 1 hour, or until 90 to 95 percent of the total drawdown has recovered.

(3) **Standard Pumping Test** If the single-well testing reveals that hydraulic conductivity values of the uppermost sand unit are significantly larger than indicated by the slug testing, a standard multi-day pumping test will be conducted. The location of the pumping test, the pumping rate, and the pumping duration will be determined at that time and a pumping well and observation wells will be installed.

Data from each of the tests conducted above will be analyzed to calculate hydraulic conductivity values that will have reliability suitable for use in the USGS numerical groundwater flow.

Slug Tests. To supplement the single-well pumping test data derived from deep monitoring wells, the hydraulic conductivity of the lower sand unit will be calculated from slug tests. Both rising head and falling head slug tests will be conducted at eight deep monitoring wells. These wells will be selected in the field based on spatial distribution and the lithology of the screened interval.

6.1.12 Surveying All sampling points will be surveyed so that accurate maps of contaminant plumes and groundwater contours can be generated. Two survey techniques will be conducted: (1) theodolite and level technique, and (2) Global Positioning System (GPS) technique. The theodolite and level technique will be conducted by a Florida-licensed surveyor to survey the locations and elevations of piezometers and monitoring wells to third order accuracy. The coordinates of each monitoring well and piezometer will be referenced to the Transverse Mercator Projection for Florida, East Zone. Elevations will be referenced to the National Geodetic Vertical Datum of 1929. The survey will be conducted in two phases: (1) following the installation of piezometers (Subsection 6.1.2) and (2) following the completion of all sampling activities.

To provide quick field-determined measurements, DPT points, soil borings, and test trenches will be surveyed on a day-to-day basis using the GPS technique. GPS surveys can produce coordinate data with accuracy sufficient for the purposes of this RI and with speed necessary to develop a database in the field for plume delineation. The GPS survey will be conducted concurrently with the DPT sampling effort so that a database can be compiled containing analytical data on a coordinate system. This database will be used to map contaminant plumes in the field so that quick decisions can be made regarding plume delineation.

6.1.13 Water Level Measurement Following the completion of all sampling, aquifer testing, and surveying activities, a round of water-level measurements will be

recorded at all OU 3 piezometers and monitoring wells. The measurements will be used to generate more detailed groundwater contour maps and to further support USGS numerical modeling efforts. The contour maps will be used to assess groundwater flow directions and hydraulic gradients (and thus, groundwater flow velocities) within the surficial sand unit and the sand unit below the upper clay.

6.2 TASK 2, LABORATORY ANALYSES. The USEPA has established five levels of analytical protocol under CERCLA to support DQOs: DQO Levels I through V. NEESA has established corresponding levels of analytical protocol: NEESA Levels C and D (which correspond to USEPA Levels III and IV, respectively) and Level E (which combines USEPA levels I, II, and V). These various levels of analytical protocol were introduced and described in Chapter 5.0 of this workplan. Detailed analytical QA/QC procedures to be implemented for OU 3 are described in the QAPP.

NEESA Level C analytical protocol will be used for field screening samples collected during the RI. Field screening will include the collection of groundwater samples with a DPT drilling rig. These data will be primarily used to delineate groundwater plumes within OU 3, and to perform human health-based and ecological-based risk assessments. Level C data may not be subject to data validation. Level C analytical protocol does not require Contract Laboratory Program (CLP) analytical deliverables; however, Level C does require the use of USEPA-approved analytical methods, such as SW-846 and ASTM methods.

NEESA Level D analytical protocol will be used for confirmatory samples collected during the RI. Confirmatory sampling will include the collection of soil, sediment, groundwater (from monitoring wells), and surface water samples. These data will be primarily used to confirm data generated during field screening, to evaluate remedial technologies during the FS, and to supplement RI data with CLP analytical deliverables. Level D data generated during the RI will be subject to third-party data validation. Similar to Level C, Level D requires the use of USEPA-approved analytical methods. The difference between Levels D and C is that Level D data will be supported by CLP analytical deliverables, and will be subject to data validation.

6.3 TASK 3, DATA VALIDATION. Level D data generated during the RI will be subject to analytical data validation by a third-party data validator. . The validation process will be performed in accordance with the three USEPA laboratory data validation functional guidelines documents: pesticides and PCBs, organics, and inorganics analyses, dated February 1988, February 1988, and July 1988, respectively. Data validation requirements for NAS Jacksonville are further described in the Navy IR program workplan (Geraghty & Miller, 1991).

The data validation procedure will consist of a systematic evaluation of precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters in accordance with the procedures described in the Navy IR program workplan. Acceptance criteria based on the PARCC parameters are also described in the Navy IR program workplan. Based on these criteria, three types of data reports will be generated: (1) raw analytical data, (2) data marked (flagged) with validation qualifiers, and (3) validated (qualified) data. Associated deliverables required from the analytical laboratory and the data validator are described in the Navy IR program workplan.

6.4 TASK 4, DATA EVALUATION AND RI REPORT. The chemical and physical data collected during the RI field program will be evaluated to develop an OU 3 conceptual model, to perform a risk assessment, and to conduct an FS of remedial alternatives. The results of the data evaluation will be presented in an RI report, following the most recent USEPA RI report format.

Much of the data evaluation required for this RI will be conducted during the course of the field program so that field decisions regarding sampling locations and plume delineation are based on an up-to-date database and site model. Data evaluation activities that will occur during the field program include the following:

- assessment of groundwater flow directions and vertical gradients from piezometer and well gauging data;
- mapping of clay and sandy clay aquitards and other hydrostratigraphic units;
- construction of stratigraphic cross sections, fence diagrams, and contaminant profiles;
- comparison of contaminant concentrations to PRGs to determine extents of plumes; and
- calculation of aquifer sustainable yield based on single-well pumping tests to predict feasibility of multi-day pumping tests.

A database of DPT analytical results will be maintained in the field and will be updated on a day-to-day basis as samples are analyzed with a 24-hour turnaround. A database of stratigraphic information from piezocone soundings will also be maintained onsite. The two databases will be used to generate current cross sections, fence diagrams, and contaminant distribution maps and to enable standard evaluations, including geostatistics, to be made so that potential contaminant transport pathways can be identified during plume delineation. The GPS survey data will also be collected as new sampling points are established and will be used in the field to generate accurate cross sections, fence diagrams, and contaminant distribution maps.

With the exception of some of the DPT data, analytical data from sampling activities will be validated by a third-party validator. The analytical results will be managed and evaluated using the JAXFAX data management system (Subsection 2.4.1). Data reports that concisely present information relative to data quality requirements will be prepared.

ABB-ES has been working in concert with the USGS to evaluate the data gathered during the SSFP, and will continue in this coordinated effort during the RI.

Upon completion of the field program, all chemical, geologic, and hydrogeologic data will be evaluated to develop and refine the site conceptual model. The USGS will provide modeling of contaminant transport as well as groundwater particle tracking. Based on this output the conceptual model will characterize OU 3 and its environs and present hypotheses regarding the contaminants present, their routes of migration, and their potential impact on sensitive receptors. The mobility, persistence, bioaccumulation potential, and exposure routes of CPCs will

be evaluated. This evaluation will include factors such as groundwater transport, groundwater-surface water interactions, vadose zone transport, volatilization, advection, retardation, degradation, and transformation. USGS will be using piezometric data and aquifer characteristics from the field program to refine their OU 3 numerical model. The numerical model will assist in identifying subsurface pathways and predicting exposure levels at selected exposure points. Risk assessments and engineering studies will be based on the site conceptual model.

6.5 TASK 5, RISK ASSESSMENT (RA). The objectives of the focused RAs are to evaluate the potential current and future human health and environmental risks associated with site contaminants at OU 3. RAs will be performed at each of the study areas or sources identified during the OU 3 RI if needed to support a decision to conduct a remediation at the location in question. In addition, RAs will be conducted to assess the residual risk (after implementation of removal actions) and whether non-point source contamination warrants further remedial action. A review of preliminary investigative data has identified contaminants in soil and groundwater. The list of contaminants will be further refined during the RI. An analysis of baseline risk identifies potential risks that exist if no remedial actions or institutional controls are implemented at OU 3. The tasks involved in conducting the RA are similar for both human and ecological assessments and will include:

- Presenting data summary tables for each site for each media including all detected chemical names, their frequency of detection, the minimum and maximum detected concentration for each chemical, the units associated with the results, the minimum quantitation limits for each chemical, and the average of the detected concentrations (taking into account that original samples associated with duplicates are consistently evaluated as a pair in the baseline RA);

- identifying CPCs (different CPCs are identified for the human health and ecological assessments);

- characterizing exposures for human and ecological receptors and evaluating potential exposure routes and the extent of actual or potential exposures;

- providing dose-response information and a summary of toxicity data;

- evaluating the extent and likelihood of adverse effects to human health or the environment;

- qualitatively identifying the level of uncertainty associated with the estimated risks;

- identifying and tabulating remedial goal objectives and applicable regulatory guidance for those media that have an unacceptable risk to human health or the environment; and

- presenting in tabular form existing regulatory guidance available for the media investigated in the OU 3 baseline RA for each site (for example, Federal primary MCLs, Florida primary standards, and Florida "free froms").

In accordance with the *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Parts A and B), Interim Final* (USEPA, 1989b) and supplemental USEPA Region IV guidance (USEPA, 1991b), a quantitative RA will be produced that incorporates the results of these efforts. The environmental assessment part of this RA will follow guidelines in the *Risk Assessment Guidance for Superfund, Volume II, Environmental Evaluation Manual, Interim Final* (USEPA, 1989a).

6.5.1 Human Health Risk Assessment The objective of the human health RA is to evaluate whether or not human health or welfare is potentially at risk from exposure to contamination at, or migrating from, OU 3. The RA will evaluate possible exposure under both current and potential future land uses. Of greatest concern is potential human exposure to contaminated groundwater.

6.5.1.1 Identification of Chemicals of Potential Concern Potential OU 3-related chemicals for which data of sufficient quality are available for use in the RA are defined as CPCs. The process by which CPCs will be identified consists of the following activities: (1) sampling design strategy (data needs, DQOs, and data collection methods), (2) sample analytical selection processes (including quantitation limits), and (3) data validation and evaluation methods. The steps followed to identify CPCs are presented in Appendix O.

A preliminary list of chemicals currently expected to be included in the baseline RA was developed based on those compounds detected in groundwater at OU 3 during previous studies. The chemicals detected were presented and discussed in Section 2.4.

Summary. As part of the baseline RA, all identified CPCs will be summarized in tabular form as outlined in the *Risk Assessment Guidance for Superfund* (USEPA, 1989a).

6.5.1.2 Exposure Assessment The exposure assessment is conducted to establish pathways by which humans could potentially be exposed, the magnitude of potential human exposure, and the frequency and duration of the exposure. Reasonable maximum estimates of exposure will be developed for current and potential future land uses. The steps involved in conducting an exposure assessment include:

- characterizing the exposure setting and analyzing contaminant releases,
- identifying exposed populations,
- determining potential exposure pathways,
- estimating the exposure concentrations for each pathway,
- estimating the dose of contaminants for each pathway, and
- identifying uncertainties.

Characterization of the Exposure Setting and Analysis of Contaminant Releases. OU 3 characteristics are described in Chapter 2.0. Because of current industrial activities at OU 3, the presence of the helicopter flightline, and its proximity to the main flightline, OU 3 is likely to remain industrial for the indefinite future, even if NAS Jacksonville should be closed at a later date.

Identification of Potentially Exposed Populations. The RAs will characterize and identify the populations on or near OU 3 and the activity patterns of these groups. For purposes of these RAs, industrial-based exposure scenarios will be developed. In addition, possible future residential scenarios, although unlikely, will be developed and evaluated as agreed to during the OU 3 partnering discussions in Atlanta, Georgia, on February 15 and 16, 1994.

Occupational Exposure Scenarios. Current occupational exposures do not include exposure of employees to contaminated surface soil (0 to 12 inches deep) during outdoor activities, because most areas at OU 3 are covered with asphalt or concrete. However, should there be an area under investigation with exposed surface soil, occupational exposure to surface soil will be considered. On the other hand, exposure to subsurface soil (from the base of the concrete to the water table) during construction will be evaluated as a current and future scenario. Both scenarios involve inhalation of particulates and volatiles and dermal contact with and incidental ingestion of soil.

The future water ingestion exposure route will be evaluated using data collected from the monitoring wells screened in the surficial aquifer.

Residential Exposure Scenarios. Currently, the only residential area near OU 3, the Bachelor Enlisted Quarters, is outside the study area as currently defined. NAS Jacksonville is not scheduled to close. Even under a conservative scenario projecting future closure, it is doubtful that the land use will change from industrial to residential. Although land use is likely to remain industrial, as noted above, residential scenarios will be evaluated for OU 3.

Following USEPA Region IV guidance for evaluating Class G-1 groundwater, future scenarios will use the analytical groundwater data to determine the "worst case" estimates of risk (USEPA, 1991b). These estimates will aid in establishing risk-driven cleanup goals for the FS. Exposure pathways will include ingestion, dermal contact, and inhalation of volatiles from household water use (USEPA, 1991b). It should be noted that a child exposure to groundwater will not be considered because guidelines for Superfund only present an adult drinking water scenario. The 30 year adult exposure should be adequately conservative, especially considering future land use scenarios for OU 3, which are not likely to include residential housing.

Table 6-2 is a matrix of exposure pathways to be evaluated at OU 3.

Quantification of Exposure. For each identified exposure pathway, estimates of the magnitude, frequency, and duration of exposure will be quantified. The quantification of exposure will be conducted in two stages: (1) estimation of exposure concentrations, and (2) calculation of chemical intakes.

Exposure Concentrations. Exposure concentration refers to the average concentration (represented by the 95 percent upper confidence limit of the mean) contacted at the exposure point or points over an exposure period. Exposure concentrations for all media and pathways will be calculated using the monitoring data obtained during the RI. Analytical data from surface soil samples taken at PSC 15 will be used to model exposure concentrations from fugitive dust emissions. Reasonable maximum exposure, defined as the highest exposure that is reasonably expected to occur at OU 3, will be established.

Table 6-2
Matrix of Potential Current and Future Exposure Pathways

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Exposure Medium and Exposure Route	Residential Population	Occupational Population	Recreational
Groundwater			
Ingestion	A		
Dermal contact	A		
Inhalation of volatiles	A		
Surface soil			
Ingestion	A/C		
Dermal contact	A/C		
Inhalation of volatiles	A/C		
Inhalation of particulates	A/C		
Subsurface soil			
Ingestion		W	
Dermal contact		W	
Inhalation of volatiles		W	
Inhalation of particulates		W	
Surface water			
Ingestion			A/C
Dermal contact			A/C
Inhalation of volatiles			A/C
Sediment			
Ingestion			A/C
Dermal contact			A/C

Notes: A = adult (30-year exposure).
C = child.
W = adult worker.

The procedures and assumptions that will be used to estimate exposure concentrations at various exposure points are listed in Appendix O.

Calculations of Chemical Intake. The methods for calculating chemical-specific intakes for populations and exposure pathways selected for quantitative evaluation will be based on the *Risk Assessment Guidance for Superfund*, Section 6.6, equations (USEPA, 1989a). The equations used to estimate chemical intake and standard USEPA default parameters are provided in Appendix O. Non-standard exposure parameters (such as dermal relative absorption factors) will possibly be determined with the guidance of USEPA Region IV.

Summary. The summary exposure assessment results presented in the report will include estimated chemical-specific intakes for each pathway in tabular format, selected exposure pathways grouped by population, and summary information grouped by current and future use categories, with chronic and subchronic daily intakes summarized separately. In addition to the summary tables, sample equations for each pathway will be provided, either in the text or appendices, to aid in review of the calculations.

6.5.1.3 Toxicity Assessment The purpose of the toxicity assessment is to determine the severity of adverse effects based on the extent of exposure to a contaminant. The toxicity assessment for contaminants found at OU 3 will be accomplished in two steps: hazard identification and dose-response assessment.

Hazard identification is the process of establishing whether exposure to a chemical agent can cause an increase in the incidence of an adverse health effect (such as lung cancer or birth defects). In the dose-response assessment, the relationship between the dose of the contaminant and the incidence of adverse health effects in the exposed population is quantified. Toxicity values (reference doses [RfDs] and cancer slope factors [CSFs]) derived from the quantitative dose-response relationship are used in the risk characterization to estimate the likelihood of adverse effects occurring in humans at different exposure levels.

Sources for Toxicological Data. Sources for toxicological data include epidemiological studies, clinical studies, animal studies, and supporting data. Toxicity values for the CPCs at OU 3 will be determined from the USEPA Integrated Risk Information System (IRIS) database or Health Effects Assessment Summary Tables. These two sources will be used to provide toxicity information for any other contaminants detected at OU 3 during the subsequent investigations. Methods used to estimate risk if no toxicity values are available will possibly be determined with USEPA Region IV and FDEP risk assessment guidance.

Uncertainty Evaluation. Toxicity information for many chemicals is limited, leading to varying degrees of uncertainty associated with calculated toxicity values. The evaluation of uncertainty for the toxicity assessment will provide information regarding sources of uncertainty (that is, extrapolation from short-term to long-term exposures), degree of uncertainty associated with toxicity values (that is, the weight of evidence supporting the toxicity factor), and the consistency of different studies for the same chemical (that is, responses of various species to equivalent doses).

Summary. The toxicity assessment will be summarized, and a description of the toxic effects of each CPC in non-technical language will be provided. Information

on the effects associated with exposure to each CPC and the concentrations at which the adverse effects are expected to occur in humans will be included. The following information will be included in tabular form: toxicity values with a brief description of the source (including uncertainty factors), the degree of confidence for RfDs obtained from IRIS, absorption efficiencies, and toxicity values for appropriate exposure averaging periods (that is, acute and chronic).

6.5.1.4 Risk Characterization The risk characterization process is the final step in the baseline RA. This section of the baseline RA report will integrate the exposure and toxicity assessments into quantitative and qualitative expressions of risk. The following activities will be performed as part of the risk characterization process:

- review of toxicity and exposure assessment outputs,
- quantification of risks from individual chemicals,
- quantification of risks from multiple chemicals,
- combination of risks across exposure pathways,
- evaluation of the uncertainties associated with the entire RA process, and
- presentation (in tabular form) of the results of baseline risk characterization.

Review of Toxicity and Exposure Assessment Outputs. The information generated from the toxicity and exposure data will be reviewed. The assumptions for exposure and toxicity will be compared for consistency and validity.

Quantification of Risks from Individual Chemicals. Equations for risk calculations will be based on USEPA guidance (USEPA, 1989b). Applicable equations from the *Risk Assessment Guidance for Superfund* include those shown in Appendix O and the following.

Linear low-dose cancer risk equation:

$$\text{Risk} = \text{CDI} \times \text{SF} \qquad (1)$$

where

Risk = unitless probability of an individual developing cancer,
CDI = chronic daily intake averaged over 70 years (milligrams per kilogram per day [mg/kg/day]), and
SF = slope factor (cancer potency factor) expressed in $(\text{mg/kg/day})^{-1}$.

Noncancer hazard quotient expressed as the exposure level (or intake) per RfD (reference dose):

$$E/\text{RfD} = \text{noncancer hazard quotient} \qquad (2)$$

where

E = the exposure level and

RfD = reference dose (expressed in the same units and representing the same exposure period).

Quantification of Risks from Multiple Chemicals. To determine the risk presented by multiple chemicals over the same exposure pathway, the following procedures will be used (USEPA, 1989b): calculate the total cancer risk for each exposure pathway; determine the chronic noncancer Hazard Index (HI) for each pathway, determine the applicable subchronic or shorter term noncancer HIs, and segregate the HIs by effect if combined HIs exceed unity (performed by a qualified toxicologist only).

Uncertainty Evaluation. Given the considerable number of assumptions and estimates used during the exposure and toxicity assessments, it is important to determine the uncertainty inherent in the final assessment of risk. A qualitative uncertainty evaluation will be presented in the baseline RA report. The following steps will be taken to determine the uncertainties affecting the risk assessment:

- define the physical setting (that is, current and future land use, exposure pathways, and selection of substances for the risk assessment);
- determine the applicability of the models and assumptions used, including their potential to overestimate or underestimate risk;
- summarize the uncertainties associated with the parameters selected for intake calculations; and
- discuss the uncertainties associated with the final risk estimate (using the checklist on page 8-22 of the *Risk Assessment Guidance for Superfund* (USEPA, 1989b).

Discussion and Tabulation of the Risk Characterization. Results of the risk characterization will be presented in the baseline RA report, including:

- confidence in the identification of OU 3-related CPCs,
- relationship of contaminant concentrations to background levels,
- potential health risks at and in the near vicinity of OU 3,
- confidence in toxicity information and exposure pathways and assumptions,
- magnitude of the calculated risks relative to the remedial goals of the National Oil and Hazardous Substances Contingency Plan (cancer risk range of 10^{-4} to 10^{-6} and noncancer HI of 1.0),
- major factors driving the risk calculations (that is, routes of exposure to chemicals),
- significance and magnitude of uncertainties,
- exposed population characteristics, and
- comparison with other OU 3-specific health studies if available.

In addition, a tabular summary of the cancer risks and noncancer HIs for all exposure pathways, land uses, and chemicals will accompany the explanatory text. Examples of table formats are available in the *Risk Assessment Guidance for Superfund* (USEPA, 1989b).

Summary. A summary will be included as the final section of the baseline human health RA. The following major topics will be discussed (with appropriate summary tables included for each topic):

- CPCs,
- exposure assessment,
- toxicity assessment, and
- risk characterization.

6.5.2 Baseline Ecological Risk Assessment A baseline ecological RA will be completed for OU 3 in accordance with the *Risk Assessment Guidance for Superfund: Environmental Evaluation Manual* (USEPA, 1989a) and other guidance on ecological RAs in Superfund (USEPA, 1989b; 1989c; 1991). The purpose of the ecological RA for OU 3 is to identify and characterize potential adverse effects to ecological receptors associated with exposure to chemical contamination in environmental media. The ecological RA is composed of five elements including problem formulation, identification of ecological CPCs, exposure assessment, ecological effects assessment, and ecological risk characterization.

6.5.2.1 Problem Formulation. Problem formulation is the initial step of the ecological assessment process where the purpose and scope are defined. Problem formulation includes identification of ecological receptors, identification of exposure pathways for those receptors, and identification of the endpoints for the RA.

Identification of Ecological Receptors. An ecological receptor analysis will be conducted to characterize the aquatic and terrestrial receptors that may be affected by contamination associated with OU 3. This characterization will provide a description of the different aquatic and terrestrial habitats located at OU 3 and of the animal life expected to be found associated with these habitats. The habitats will be characterized and the ecological receptors identified based on a physical site reconnaissance, background information available for OU 3, literature information on the range and distribution of wildlife species, and interviews with local, State, and/or Federal wildlife officials. Particular emphasis will be placed on the following: assessing habitat suitability for aquatic and terrestrial organisms; assessing the potential occurrence of rare, threatened, or endangered species; and identifying wetland or other aquatic areas that may be receptors of OU 3-related contaminants. Additionally, plant communities will be described and observations of aquatic and terrestrial species will be recorded.

Identification of Exposure Pathways. Potential pathways of exposure for ecological receptors to contaminated environmental media (surface soil, sediment, surface water, and groundwater) will be evaluated. Exposure pathways will be identified for evaluation of potential risks for four groups of ecological receptors (terrestrial wildlife, aquatic receptors, terrestrial plants, and

terrestrial invertebrates). Exposure pathways will be identified at OU 3 based on information generated in the field survey. Exposure pathways describe how ecological receptors may come in contact with contamination from a hazardous waste source, and are based on identifying: (1) the contaminant source, (2) the environmental medium, and (3) the exposure route (e.g., ingestion, incidental ingestion, and dermal absorption).

An overview of potential exposure pathways for OU 3 is presented in Table 6-3. Exposure pathways for aquatic receptors (including invertebrates, plants, amphibians, algae, and fish) include direct contact with surface water, sediment, and groundwater (as it discharges to surface water). Exposure pathways for terrestrial wildlife include ingestion of soil (from PSC 15) and food items (i.e., terrestrial plants and invertebrates) that are contaminated as a result of accumulation of contamination from the soil.

Identification of Endpoints. The endpoint selection represents the ecological values to be protected. Both measurement and assessment endpoints will be identified for all four groups of receptors. Assessment endpoints represent the ecological component to be protected whereas the measurement endpoints approximate or provide a measure of the achievement of the assessment endpoint.

6.5.2.2 Selection of Ecological Chemicals of Potential Concern (ECPCs) ECPCs represent the analytes detected in media (surface soil, surface water, sediment, and groundwater) that are considered in the RA process. The results of the analyses of media (surface soil, sediment, surface water, and groundwater) from OU 3 will be summarized in tabular form including for each analyte the frequency of detection, range of detected concentrations, range of quantification limits, average concentration detected, and average concentration detected in background samples. The list of detected chemicals will be screened and a list of ECPCs will be developed. This screening process limits the number of chemicals evaluated by focusing on those chemicals expected to pose ecological risks at OU 3. The screening process will be based on comparisons of maximum detected concentrations of analytes with background concentrations, USEPA Region IV surface water and sediment screening values (USEPA, 1992), and the frequency of detection of the analyte. Analytes detected in 5 percent or less of the total samples will not be considered as ECPCs.

6.5.2.3 Ecological Exposure Assessment The purpose of the ecological exposure assessment is to evaluate the potential for ecological exposure to OU 3-related chemicals. Exposure assessment is the process of estimating or measuring the amount of an ECPC in environmental media (surface soil, surface water, sediment, food items, or groundwater) to which an ecological receptor may be exposed via respective exposure routes (ingestion or direct contact).

Contaminant exposure concentrations for aquatic receptors are the amounts of the ECPCs measured in surface water and sediment samples from OU 3. Sediment samples will be collected from some sediment sampling locations for toxicity testing. These toxicity tests represent exposure of test organisms to the actual mixture of contamination in the stream and represent a means for measurement of both exposure (bioavailability of contamination from the media to the receptor) and response.

For terrestrial wildlife species, the amount of a contaminant to which an individual is exposed depends upon the life history of the animal (weight, food

Table 6-3
Overview of Potential Exposure Pathways for Ecological Receptors

RI/FS Workplan for Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Site	Medium	Route of Exposure	Receptors Potentially Exposed
North end of seawall	Surface water and sediment	Direct contact	Fish, aquatic invertebrates, amphibians, aquatic reptiles, mammals, and aquatic plants.
		Ingestion	Birds, mammals, reptiles, and amphibians
		Consumption of prey items (contaminated as a result of exposure to surface water or sediment).	Birds, mammals, reptiles, and amphibians
	Surface soil (0 to 6 inches)	Direct contact	Terrestrial plants and soil invertebrates
		Incidental ingestion	Birds, mammals, reptiles, and invertebrates
		Consumption of prey items (contaminated as a result of exposure to soil).	Birds, mammals, reptiles, and amphibians
PSC-15	Surface soil (0 to 6 inches)	Incidental ingestion	Birds, mammals, reptiles, and invertebrates
		Direct contact	Terrestrial plants and soil invertebrates
		Consumption of prey items (contaminated as a result of exposure to soil).	Birds, mammals, reptiles, and amphibians
South end of OU 3	Surface water and sediment	Direct contact	Fish, aquatic invertebrates, amphibians, aquatic reptiles, and mammals.
		Ingestion	Birds, mammals, reptiles, and amphibians
		Consumption of prey items (contaminated as a result of exposure to surface water or sediment).	Fish, aquatic invertebrates, amphibians, reptiles, and mammals.

Notes: PSC = potential source of contamination.
OU = operable unit.

ingestion rate, water intake rate, and diet). To estimate contaminant exposures for terrestrial wildlife, representative wildlife species will be selected to represent other terrestrial species. The represented groups include the major trophic levels of a terrestrial food webs (mammals, birds, reptiles, and amphibians) including herbivores, omnivores, and carnivores. Plants and soil invertebrates are included in the exposure models as food sources for these groups.

In selecting receptors, an effort will be made to select species that are (1) documented at each area of contamination in question, (2) are likely to be exposed to contamination in surface soil, and (3) are likely to be exposed to higher doses of contaminations based on their feed activities and body size. For each of the representative wildlife species, contaminant exposures related to indirect ingestion of soil, direct ingestion of surface water, indirect ingestion of sediment, and ingestion of contaminated food items will be estimated based on a simple food chain model. The equations for the model are presented in Table 6-4.

6.5.2.4 Ecological Effects Assessment The ecological effects assessment describes the potential adverse effects associated with the identified ECPCs to ecological receptors and reflects the type of assessment endpoints selected. The methods used for identifying and characterizing ecological effects for ECPCs in surface soil, surface water, sediment, and groundwater are described in the following subsections.

Surface Soil. Potential adverse ecological effects for terrestrial wildlife are predicted for each ECPC based on available literature information. Reference toxicity values (RTVs) will be determined for each ECPC for avian and mammalian receptors. The RTV relates the concentration of a respective ECPC in an oral exposure with an adverse effect. For each ECPC identified and each representative wildlife species selected, two RTVs will be identified. A lethal RTV represents the threshold for lethal effects and is based on an oral dose lethal to 50 percent of a test population (oral LD_{50}). The lethal RTV is one-fifth of the lowest reported LD_{50} for the most closely related test species. One-fifth of an oral LD_{50} value is considered to be protective of lethal effects for 99.9 percent of individuals in a test population (USEPA, 1986). An assumption was made that the value represented by one-fifth of an oral LD_{50} would be protective of 99.9 percent of the individuals within the terrestrial wildlife populations at OU 1 and this represents a level of acceptable risk. A sublethal RTV is also identified that represents a threshold for sublethal effects. Sublethal effects are defined as those that impair or prevent reproduction, growth, or survival. The RTVs are assumed to be a measure of the goal for protection of the survival, growth, and reproduction of terrestrial wildlife populations. RTVs were derived separately for avian and mammalian species. If toxicity information is unavailable for an ECPC, it will not be possible to identify RTVs and risks associated with the predicted exposure for the respective ECPC, and the risks will not be evaluated.

Surface Water and Sediment. The measures of adverse ecological effects for terrestrial wildlife and aquatic receptors are discussed separately. Potential adverse ecological effects for terrestrial wildlife are predicted for each ECPC based on available literature information whereas adverse effects for aquatic life are directly measured for the entire mixture of ECPCs. Lethal and sublethal RTVs (described above) will be identified for each ECPC in sediment and surface water for each of the representative wildlife species.

Table 6-4
Model for Prediction of Contaminant Exposures for Representative Wildlife Species

RI/FS Workplan for Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Prediction of Contaminant Exposures Related to Surface Soil

Parameter	Description
Description	Estimates the amount of a contaminant accumulated from the soil into prey items. Estimates the amount (dose) of a contaminant the species is exposed to via incidental ingestion of contaminated surface soil and ingestion of contaminated prey items.
Exposure Point Concentration	Maximum: The maximum detected concentration of the ECPC when the sample population size is ≤ 3, and the lesser of the maximum detected concentration or the 95th percent UCL on the arithmetic mean when the sample population size is ≥ 4. Average: Average Concentration of the ECPC
Concentration of a Contaminant in a Food Item (T_N)	$$\text{Food Contaminant Concentration (mg/kg)} = BAF \times \text{Contaminant Concentration} \in \text{Soil (mg/kg)}$$ where BAF = bioaccumulation factor.
Potential Dietary Exposure (PDE)	$$PDE = \frac{[P_1 \times T_1 + P_2 \times T_2 + \ldots + P_N \times T_N + \text{soil exposure}] \times IR_{Diet} \times SFF}{BW}$$ where P_N = percent of diet composed of food item N, T_N = concentration of Contaminant in food item N (mg/kg), IR_{Diet} = food ingestion rate of receptor (kg/day), BW = body weight (kg) of receptor, and SFF = site area (acres) times exposure duration (fraction of year species expected on site) divided by home range (acres). Value cannot exceed 1.
Soil Exposure	$$\text{Soil Exposure (mg/kg)} = (\%\ \text{of Diet as Soil}) \times \text{Soil Contaminant Concentration (mg/kg)}$$

See notes at end of table.

Table 6-4 (Continued)
Model for Prediction of Contaminant Exposures for Representative Wildlife Species

RI/FS Workplan for Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Prediction of Contaminant Exposures Related to Surface Water and Sediment

Parameter	Description
Description	Estimates the amount of a contaminant concentrated from water into aquatic food items. Estimates the amount of a contaminant ingested by a species resulting from ingestion of surface waters, incidental ingestion of sediment, and ingestion of contaminated aquatic food items.
Exposure Point Concentration	Same as described above for soil.
Contaminant Concentration in Aquatic Prey Tissue (mg/kg)	$\text{Aquatic Prey Contaminant Concentration (mg/kg)} = BCF \times \text{Contaminant Concentration Surface Water (mg/l)}$ where BCF = bioconcentration factor.
Sediment Exposure	$\text{Sediment Exposure (mg/kgBW)} = \text{Sediment as \% of Diet} \times IR_{diet} \times \text{Sediment Contaminant Concentration (mg/kg)} \times \frac{1}{BW}$
Surface Water Exposure	$\text{Surface Water Contaminant Exposure (mg/kgBW)} = \text{Surface Water Contaminant Concentration (mg/l)} \times \text{Water Intake Rate (l/day)} \times \frac{1}{BW}$
Aquatic Prey Exposure	$\text{Aquatic Food Exposure (mg/kgBW)} = \text{\% Diet as Aquatic Prey} \times IR_{diet} \times \text{Aquatic Prey Contaminant Concentration (mg/kg)} \times \frac{1}{BW}$
Total Exposure Related to Surface Water and Sediment	$\text{Total Exposure (mg/kgBW)} = \text{Aquatic Prey Exposure (mg/kgBW)} + \text{Surface Water Exposure (mg/kgBW)} + \text{Sediment Exposure (mg/kgBW)}$

Notes: ECPC = ecological chemicals of potential concern.
UCL = upper confidence limit.
mg/kg = milligrams per day.
kg/day = kilograms per day.
% = percent.
mg/kgBW = milligrams per kilogram of body weight.
mg/ℓ = milligrams per liter.
ℓ/day = liters per day.

Aquatic Receptors. Potential adverse ecological effects associated with ECPCs in sediment will be evaluated by use of toxicity testing of sediment. Potential adverse ecological effects associated with ECPCs in surface water will be evaluated based on comparison of ECPC concentrations measured in surface water samples with available standards and aquatic toxicity data.

The toxicity of sediment will be evaluated by testing with a 10-day survival test with the estuarine amphipod *Ampelisca abdita* (Springborn Laboratories, 1993). The method for testing is according to ASTM guidelines for conducting sediment toxicity tests with marine invertebrates (ASTM, 1992).

The ecotoxicity assessment will also describe the toxicity of each ECPC based on the available toxicological data. The purpose will be to identify the potential toxic effects to aquatic receptors that may result from exposure(s) to ECPCs in surface water and sediment at OU 3. Toxicity testing of the sediment will provide a measure of the potential survival and reproduction of macroinvertebrates in the sediment.

Potential adverse effects associated with groundwater ECPCs are available in the form of laboratory aquatic toxicity testing results for individual ECPCs. Aquatic toxicity information for the ECPCs was obtained from searches of the USEPA AQUIRE database. ECPC concentrations measured in surface water will also be compared with available State and Federal standards including State of Florida surface water quality criteria (Chapter 17-302, FAC) and Federal ambient water quality criteria (AWQC) (USEPA, 1987).

6.5.2.5 Ecological Risk Characterization Potential adverse ecological effects will be characterized for terrestrial wildlife, terrestrial plants, and soil invertebrates resulting from exposure to ECPCs in surface soil, surface water, sediment, and groundwater. Risks will be characterized for aquatic receptors for exposures resulting from ECPCs in surface water, sediment, and groundwater.

Terrestrial Wildlife. Risks for the representative wildlife species associated with ingestion of surface soil and food will be quantitatively evaluated using Hazard Quotients (HQs), which are calculated for each ECPC by dividing the estimated potential dietary exposure (PDE) concentration (from Subsection 6.5.2.3) by the toxicological benchmark (RTV) (from Subsection 6.5.2.4). HIs are determined for each representative wildlife species by summing the HQs for all ECPCs. When the estimated PDE is less than the RTV (i.e., the HI < 1), the contaminant exposures are assumed to fall below the range considered to be associated with adverse effects for growth, reproduction, and survival (of the individual organism) and no HI risks to the wildlife populations are assumed. When the ratio is greater than one (i.e., HI > 1), a discussion of the ecological significance is included and risk is assumed.

Although this quantitative approach evaluates potential ecological effects based on studies of impacts to individual organisms, the number of affected individuals in a population presumably increases with increasing HI values; therefore, the likelihood of population level effects occurring is generally expected to increase with higher HI values.

Aquatic Receptors. Risks for aquatic receptors were characterized for each surface water and sediment sampling location based on a weight-of-evidence evaluation of the following factors:

- presence or absence of analytes in surface water and sediment samples;
- concentrations of analytes measured in surface water and sediment samples;
- responses of *A. abdita* in the sediment toxicity test;
- concentrations of ECPCs in surface water relative to reported toxicity of the ECPC in laboratory tests (AQUIRE information), AWQC, and State of Florida surface water quality standards (Chapter 17-302, FAC); and
- physical and chemical factors in the aquatic environment (other than chemical contamination).

As the analytical sediment and sediment toxicity testing samples will be collected concurrently and split for the two separate analyses, the analytical results for the sediment samples can be used to interpret the contaminant exposures for the test species (*A. abdita*) and the responses of the test population. If there are negative results in either of the bioassays, simple linear regressions will be completed to determine if a positive correlation (>0.95) exists between the concentration of an analyte in concurrent surface water or sediment samples and the adverse response in the toxicity test.

6.5.2.6 **Risk Assessment Uncertainties** Because the prediction of risk involves several uncertainties, a discussion of uncertainties will be included at the end of the risk assessment.

6.5.3 Development of Goal Objectives In the baseline RA, USEPA toxicity values and exposure information will be used to derive the quantitative risks associated with OU 3. Results of the RAs will indicate whether human or ecological receptors may potentially be at risk if exposed to chemicals detected at OU 3.

Risk-based goals consider only risks to human health and the environment and are used to develop remedial alternatives in the FS; however, remedial alternatives must also address action-specific ARARs (such as technology- or performance-based standards) and location-specific ARARs (Section 7.3).

6.5.3.1 **Human Health Remedial Goal Options** As required by Region IV guidance (USEPA, 1993), remedial goal options (RGOs) and applicable regulatory guidance are presented in tabular format in the HHRA for those media at each site that have an estimated incremental lifetime cancer risk above 10^{-4} or a total HI greater than 1. Only analytes that individually contribute cancer risk greater than 10^{-6} or an HQ greater than 0.1 for a given medium meeting the criterion for RGO calculation are included in RGO tables produced for each applicable site. Each RGO table includes the concentrations associated with cancer risk levels of 10^{-4}, 10^{-5}, and 10^{-6}; with HQs of 0.1, 1, and 10; and any State or Federal regulatory guidance available for an environmental medium.

RGOs are derived using carcinogenic and/or non-carcinogenic toxicity values and specific exposure conditions specified in the baseline RA (USEPA, 1991d). The concentrations at these risk levels are calculated using the re-arranged site-specific reasonable maximum exposure daily dose equation used in the risk assessment. Sample calculations for developing RGOs for carcinogenic and/or non-carcinogenic contaminants are provided in Appendix O. These values are intended

to provide a range of concentrations that could serve as the basis for the development of remedial alternatives in the FS.

6.5.3.2 Ecological Target Clean-up Goals Results of the risk assessment will indicate whether ecological receptors may be at risk as a result of exposures to ECPCs detected in environmental media at OU 3. Remedial goals may be necessary for ECPCs in surface soil, surface water, sediment, and groundwater.

Target cleanup concentrations will represent the residual concentrations of ECPCs that may remain in environmental media following a remedial action and not result in unacceptable risks for ecological receptors. Target cleanup concentrations will be identified that address potential risks for both aquatic and terrestrial receptors.

Aquatic target cleanup goals for sediment will be based on interpretation of the sediment toxicity testing results. Target cleanup goals for surface water will be determined based on analyses of the available toxicity information. A value will be derived that is protective of 95 percent of the species tested for adverse effects to growth, reproduction, or survival. Where available and applicable, surface water quality standards may be used as the aquatic target cleanup goal.

7.0 FEASIBILITY STUDY SCOPE OF WORK

This chapter presents the scope of work for the identification, evaluation, and selection of OU-wide remedial alternatives for OU 3 at NAS Jacksonville. This FS scope of work complements the scope of work outlined in the basic site workplan (Volume 4 of the NAS Jacksonville naval Installation Restoration program [NIRP] plan), dated September 1991 (Geraghty & Miller, 1991b).

The FS scope of work for OU 3 is based on the risk and remedial screening performed during RI/FS scoping. This FS will be an OU-wide FS, designed to address all media exhibiting levels of contamination above selected cleanup objectives including residual contamination following implementation of potential IRAs. Upon completion, the FS will support a Proposed Plan and Record of Decision (ROD) for OU 3. The evaluation of remedial technologies and alternatives will be performed in accordance with the 1990 NCP, CERCLA, SARA, and the USEPA (1988c) guidance document, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, dated October 1988. Each task will follow the general guidelines specified in the NIRP basic site workplan.

7.1 TASK 6, ESTABLISHMENT OF REMEDIAL ACTION OBJECTIVES. In accordance with the 1990 NCP, the primary objective of OU-wide remediation is to reduce the potential threat to human health or to the environment. Remedial action objectives will be established in accordance with the NIRP basic site workplan. Remedial action objectives will include the following information:

- contaminants of concern,
- exposure routes and receptors, and
- PRGs.

General response actions required to achieve preliminary remedial action objectives for soil and groundwater are identified in Chapter 4.0. If sediment or surface water is determined to require remediation, additional response actions will be identified for those media.

7.2 TASK 7, IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES. Initial risk and remedial screening were conducted for OU 3 to focus RI efforts, as outlined in the NIRP basic site workplan. Based on this screening process, remedial technologies for the removal of chlorinated VOCs from groundwater were identified. These technologies are presented in Chapter 4.0. Based on the results of samples to be collected during the RI, and the refinement of cleanup objectives, a complete list of target compounds and media will be established. If necessary, additional technologies will be identified to augment chlorinated VOC-removal technologies previously identified.

Additional remedial technologies identified during the RI (not identified in Chapter 4.0) will be compared to previously identified remedial technologies based on the following three general criteria required by the 1990 NCP:

- effectiveness,
- implementability, and
- cost.

Additionally, based on the results of data collected during the RI, "representative" technologies will be selected for specific technology groups. For example, if membrane processes (e.g., reverse osmosis, ultrafiltration, and electrodialysis) are identified as applicable *ex-situ* metals removal technologies, one representative membrane process will be retained (e.g., reverse osmosis) for the development of remedial alternatives. The representative technology will be selected based on its similarity to other technologies and its demonstrated effectiveness.

7.3 TASK 8, IDENTIFICATION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) Chemical-specific, location-specific, and action-specific ARARs and TBCs will be evaluated for their application to OU 3. A full description of each ARAR and TBC, including the rationale for inclusion, will be presented in the draft and final FS reports.

OU-wide cleanup objectives will be based on Federal ARARs and TBCs, Florida ARARs and TBCs (including MCLs and free-froms), background concentrations of naturally occurring compounds, and results of the RA to be performed for OU 3. Background soil and groundwater samples will be collected during the RI, and will be used to refine OU-wide cleanup objectives.

7.4 TASK 9, DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES. As outlined in the NIRP basic site workplan, remedial alternatives will be developed by combining compatible technologies for all media requiring remediation. The development and screening of alternatives will also integrate results and knowledge gained from any IRAs conducted. Each alternative will be evaluated as a "system" to ensure that the technologies formulating the alternatives are complementary when implemented in combination. For example, filtration of suspended solids may be required to prevent clogging of a diffused aerator. In turn, solids filtration may be preceded by increasing the pH and adding a coagulant, to increase particle size and enhance the performance of filter media.

Preliminary screening of remedial alternatives will be based on the three general criteria required by the 1990 NCP. The most appropriate alternatives will be selected for further evaluation and analysis. Alternatives that are eliminated will receive no further consideration during the FS unless additional information is obtained that warrants reconsideration. The "no-action" alternative will be retained throughout the FS as a baseline with which to compare more aggressive remedial alternatives. An estimate of the natural attenuation that occurs in the subsurface will be developed to support the evaluation of a no-action alternative.

7.5 TASK 10, DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES. As described in the NIRP basic site workplan, retained alternatives will be refined based on data collected during the RI, as well as information obtained from any applicable IRAs, and any data collected from treatability studies. Design parameters, such as process flow rates, retention times, and spatial requirements will be considered during this stage in the FS. As required by the 1990 NCP, three distinct levels of analysis will be considered: threshold criteria, primary balancing criteria, and modifying criteria. These three levels of analysis consist of the following nine criteria.

Threshold Criteria

- overall protection of human health and the environment, and
- compliance with ARARs.

Primary Balancing Criteria

- long-term effectiveness and permanence;
- reduction of toxicity, mobility, or volume through treatment;
- short-term effectiveness;
- implementability; and
- cost.

Modifying Criteria

- State acceptance, and
- community acceptance.

Of these criteria, modifying criteria (i.e., State and community acceptance) will not be considered during the initial FS evaluation. State acceptance will be evaluated based on comments received from the FDEP after review of the draft FS report, and community acceptance will be evaluated based on comments received during public notice of the Proposed Plan.

7.6 TASK 11, COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES. Upon completion of the detailed analyses of retained remedial alternatives, the retained alternatives will be compared to each other using the first seven NCP criteria. Each criteria will be compared individually to allow a non-biased comparison of the alternatives. A recommendation of desired alternatives will be included in the draft and final FS reports to facilitate the preparation of the Proposed Plan for OU 3.

7.7 TASK 12, PREPARATION OF FEASIBILITY STUDY REPORTS. Preparation of reports will be phased with the completion of the RI/FS at OU 3, and will follow the general format contained in the NIRP basic site workplan. A draft FS report will be prepared after the evaluation of the first seven 1990 NCP criteria: threshold criteria and primary balancing criteria. The final two modifying criteria (i.e., State and community acceptance) will not be included in the draft FS report. State acceptance will be evaluated based on comments received from the FDEP after review of the draft FS report, and community acceptance will be evaluated based on comments received during public notice of the Proposed Plan. Public comments received during the public notice period will be considered in selecting a final OU-wide remedial action for OU 3, and in preparing the OU-wide ROD.

8.0 ACCELERATED THREAT REDUCTION ACTION

This chapter presents a proposed approach for the implementation of an accelerated threat reduction action for OU 3 at NAS Jacksonville. The term "accelerated threat reduction action" (also referred to as a non-time critical removal action or IRA), as it is used in this chapter, pertains to an action that could be initiated prior to completion of the RI/FS. This action would have the potential for immediate contaminant reduction in areas that would presumably be remediated as part of the overall OU-wide remediation. The accelerated threat reduction action would reduce risks posed by contaminants and would reduce the time-frame required for overall OU-wide remediation while also reducing the concentration of selected contaminants and eliminating localized "hot spots."

As discussed previously, results from any implemented IRAs would be integrated into the FS, thus enabling a higher probability of meeting the remedial action objectives identified in the FS. The application of a non-time critical removal would be conducted under the administrative format of an EE/CA.

As discussed in Chapter 2.0 of this workplan, several organic and inorganic compounds have been detected at OU 3 during previous investigations. Of these compounds, chlorinated VOCs appear to be the most prevalent. Chlorinated VOCs are not generally considered to be indigenous to the natural subsurface and, thus, are likely to be retained as target compounds at OU 3. As part of the risk screening described in Chapter 3.0 of this workplan, a comparison was performed between the most stringent drinking water standards (herein referred to as MCLs) and concentrations of chlorinated VOCs detected in groundwater. Based on this comparison, the following areas of OU 3 potentially contain contamination in groundwater in excess of 100 times an MCL for one or more chlorinated VOCs:

- Dry Cleaners Area (Building 106),
- Closed-loop Solvent Recycling Facility Area (Building 780),
- South End of P3 Hangars (Building 101 South), and
- Old Engine Parts Steam Cleaning Area (Building 101 East).

Because chlorinated VOCs were detected in excess of ARARs (i.e., 100 times an MCL), it may be appropriate to consider accelerated threat reduction to reduce the concentrations of chlorinated VOCs in groundwater at one or more of these locations. If the selected accelerated threat reduction action proves effective, it could be implemented in other areas of OU 3 to aggressively remediate other locations.

The following sections present a description of remedial alternatives for the removal of chlorinated VOCs in groundwater, based on the remedial technologies identified in Chapter 4.0 of this workplan. The description of potential actions is followed by an evaluation of their applicability to OU 3, and an implementation scenario for the most appropriate action.

8.1 SELECTION OF ACCELERATED THREAT REDUCTION ACTIONS. A major mechanism that contributes to the transformation of chlorinated VOCs is biotransformation. Biotransformation can occur in conditions where certain microorganisms thrive. Dechlorination (resulting from biotransformation) generally increases volatility. The chlorinated VOCs detected at OU 3 exhibit liquid vapor pressures above the

range that generally divides volatile and semivolatile organic compounds (0.001 mm Hg). Thus, a technology that optimizes dechlorination and volatilization is ideal for the removal of chlorinated VOCs from the subsurface at OU 3. Table 8-1 presents candidate accelerated threat reduction actions using remedial technologies that are based on the principles of dechlorination and volatilization.

Table 8-1
Accelerated Threat Reduction Actions

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Accelerated Threat Reduction Action	Remedial Technology
Biosparging	***In-situ* Treatment:** Vapor extraction Air sparging Bioremediation
Collection, treatment, and discharge	**Collection:** Groundwater extraction wells ***Ex-situ* Treatment Options:** Air stripping and aeration Dehalogenation Oxidation **Discharge Options:** FOTW-authorized discharge NPDES-permitted discharge

Notes: FOTW = Federally Owned Treatment Works.
NPDES = National Pollutant Discharge Elimination System.

8.1.1 Biosparging Biosparging is an *in-situ* gas-transfer process that combines the effective components of vapor extraction, air sparging, and bioremediation. The driving force of *in-situ* gas transfer is the removal of organic vapors from the unsaturated subsurface, which alters solid to gas and liquid to gas equilibrium conditions. This shift in equilibrium increases the volatilization of VOCs adsorbed to soil and dissolved in groundwater, and removes these VOCs as organic vapors.

Vapor Extraction. A vapor extraction system consists of vapor-extraction wells connected to a vacuum blower. A schematic diagram of a vapor extraction system is presented on Figure 8-1. Vapor-extraction wells are screened in the vadose zone to collect organic vapors from void spaces within the unsaturated soil matrix. The vapor exhaust stream is then treated with vapor-phase treatment, such as granular activated carbon (GAC) or catalytic oxidation.

The subsurface vacuum induced by the extraction blowers must be controlled to prevent up-welling in the vapor-extraction wells. Up-welling of groundwater into a vapor-extraction well would reduce the surface area of the well screen, and may minimize the influence of the vapor extraction system. Up-welling can frequently be countered with groundwater depression (by groundwater extraction wells) to maintain adequate circulation through the vapor-extraction wells.

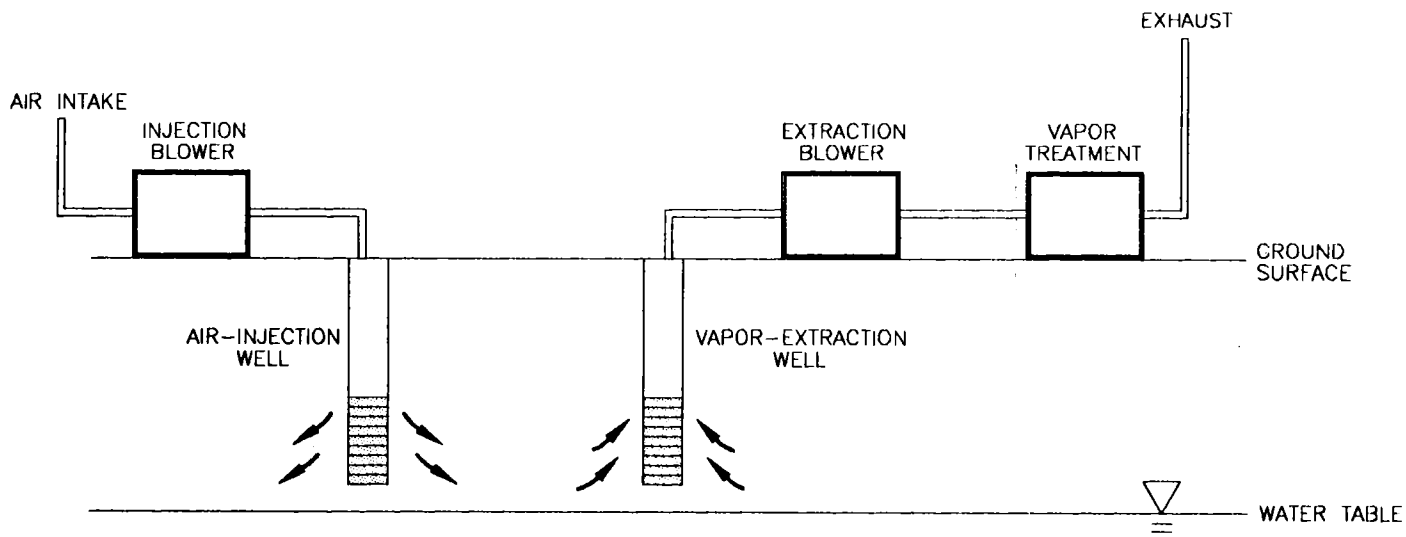

FIGURE 8-1
VAPOR EXTRACTION SYSTEM SCHEMATIC

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

SCHEMATIC/DRM/3-11-94

Vapor-extraction wells can also be combined with air-injection wells (also screened in the vadose zone) to improve air circulation through the unsaturated subsurface. The improved air circulation system promotes biotransformation of organic compounds, which is often referred to as bioventing.

Air Sparging. An air sparging system is similar to a bioventing system in that it consists of vapor-extraction wells and air-injection wells. The difference between the two systems is that in air sparging, deep air-injection wells are screened deep into the groundwater to induce air bubble diffusion through the saturated subsurface. A schematic diagram of an air sparging system in presented on Figure 8-2. Air sparging systems are similar in principle to diffused aeration systems (used in water treatment) and hypolimnetic aeration systems (used in water supply reservoirs).

Bioremediation. The introduction of oxygen into the water column and the vadose zone during air sparging promotes biotransformation of organic compounds, which is sometimes referred to as biosparging. This biotransformation can be enhanced by the addition of nutrients, such as nitrogen and phosphorus, which are present in fertilizer. Biotransformation can also be enhanced by adding seed microorganisms to stimulate additional biological activity, and by maintaining a sufficient moisture content in the soil.

8.1.2 Collection, Treatment, and Discharge Collection, treatment, and discharge would consist of groundwater extraction, *ex-situ* treatment (air stripping, aeration, dechlorination, or oxidation), and discharge (FOTW-authorized or NPDES-permitted). A schematic diagram of an *ex-situ* groundwater treatment system is presented on Figure 8-3.

Collection. Extraction wells are proposed as the method of groundwater collection should *ex-situ* treatment be desired. Based on slug tests performed at OU 3, groundwater modeling, and hydrogeologic calculations, it is estimated that a maximum sustainable aquifer pumping rate would be less than 0.5 gpm. The radius of influence at a pumping rate of 0.5 gpm would likely be insignificant relative to a target plume. It is anticipated that if groundwater extraction is selected, multiple extraction wells would be required to capture a target plume.

Treatment. Air stripping, aeration, dechlorination, or oxidation are the selected *ex-situ* treatment technologies for collected groundwater. Air stripping and aeration is a proven technology to remove VOCs from groundwater by introducing a clean air stream in contact with the collected groundwater. Packed towers, diffused-aerators, and tray aeration systems are some common air stripping technologies that may be applicable to groundwater containing chlorinated VOCs. Dehalogenation can be accomplished by applying a glycolate reagent (APEG or KPEG) to displace chlorine ions bonded to chlorinated VOCs. Dehalogenation can also be accomplished thermally, in a process that heats the groundwater to volatilize dissolved and phase-separated chlorinated VOCs. Oxidation is a technology that can remove chlorinated VOCs from groundwater by exposing the groundwater to an oxidant. Combined oxidants, such as UV light, ozone, or hydrogen peroxide, increase the reaction and removal rate of chlorine ions from chlorinated VOCs.

Solids removal may be required prior to groundwater treatment. A coagulant, such as alum, could be used to aggregate particles into a larger particle mass, and a physical flocculator could be used to separate the coagulated mass. Alternately, a chemical precipitate, such as lime and soda ash or caustic soda,

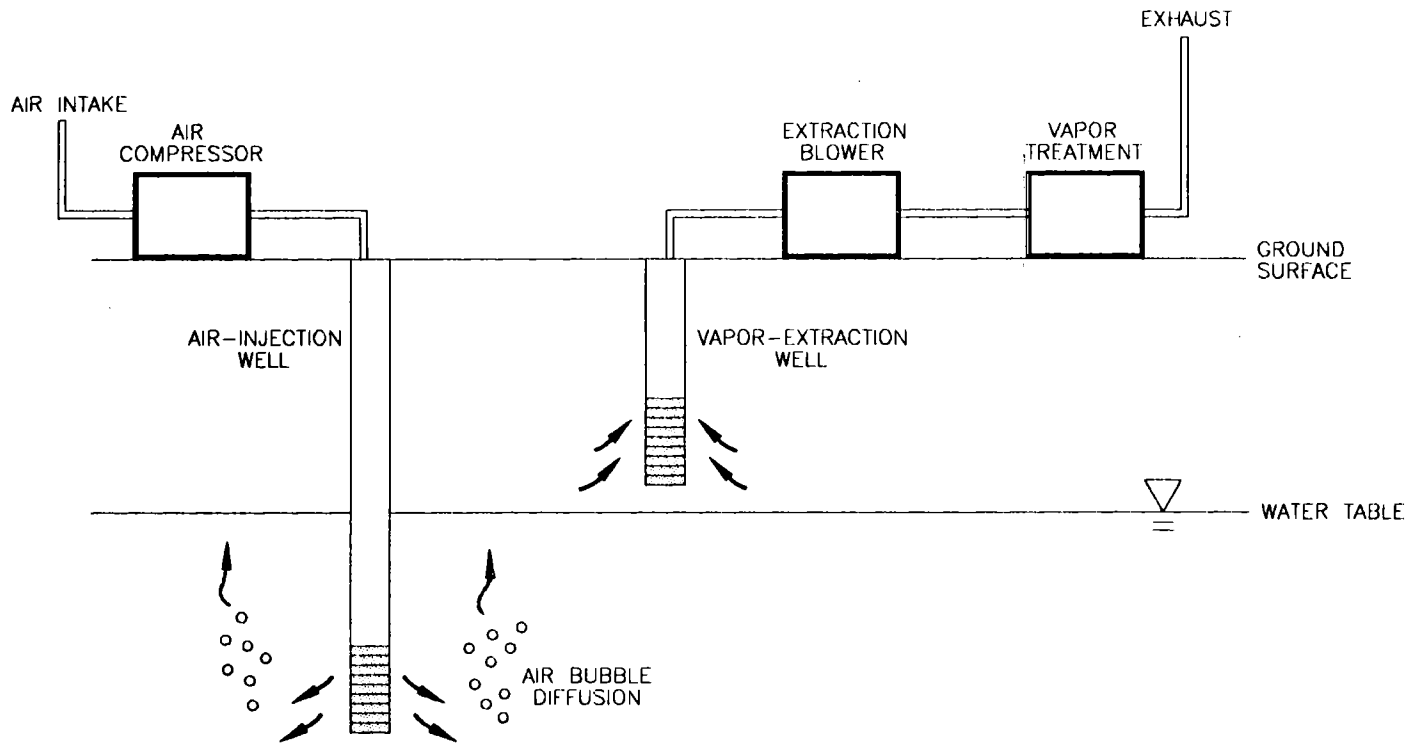

FIGURE 8-2
AIR SPARGING SYSTEM SCHEMATIC

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

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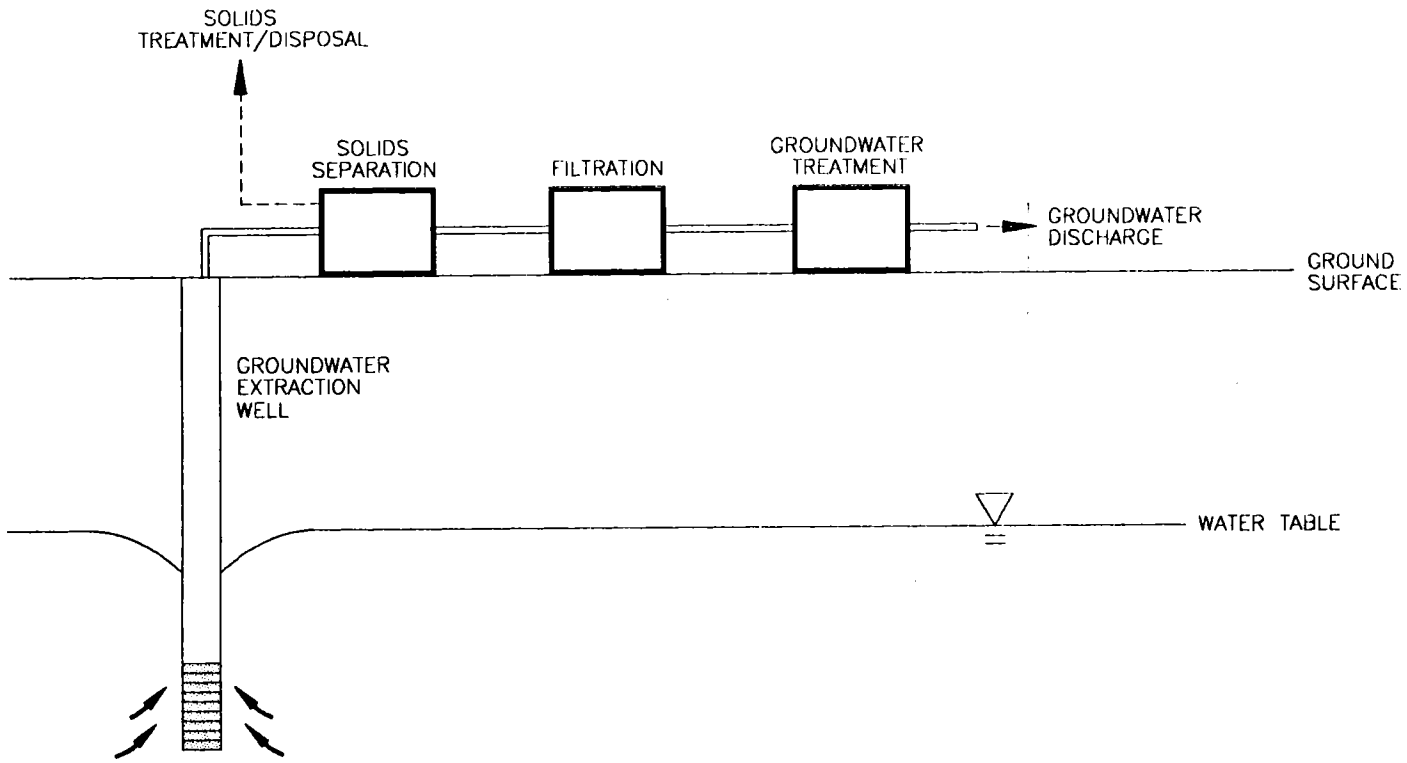

FIGURE 8-3
***EX-SITU* GROUNDWATER TREATMENT SYSTEM SCHEMATIC**

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN OPERABLE UNIT 3

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could be used to settle dissolved and suspended particles. Solids separation could then be followed with filtration to ensure the removal of suspended matter prior to treatment.

Discharge. Treated groundwater may be discharged to either (1) the sanitary sewer system for treatment at the FOTW, or (2) a surface water drainage swale via a NPDES permit. The base currently maintains several NPDES permits for surface water discharge. Upon regulatory approval, an existing NPDES permit may be modified to include the addition of treated groundwater.

8.2 EVALUATION OF ACCELERATED THREAT REDUCTION ACTIONS. Two potential candidates for accelerated threat reduction actions for OU 3 have been evaluated based on the general criteria recommended by the 1990 NCP. This evaluation is presented in Table 8-2.

Table 8-2
Evaluation of Accelerated Threat Reduction Actions

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Criteria	Biosparging	Collection, Treatment, and Discharge
Effectiveness	- Can remove VOCs in a short time period - Significantly enhances volatilization of VOCs - Can be expanded for OU-wide remediation - Can treat large horizontal extent of plume - Can remove large volume of VOCs - Reduces VOCs in groundwater - Provides aeration for microbial growth - Biotransformation increases volatilization - Deep air injection volatilizes deep chlorinated VOCs - Shallow vadose zone may limit effectiveness - Soil type may limit air permeability - May not treat deep VOCs or DNAPLs	- Well-demonstrated technology - Can treat deep vertical extent of plume - Requires extended treatment duration - Requires aquifer details prior to start-up - Reduces VOCs in collected groundwater - Can achieve only a 0.5-gpm pumping rate - Treats limited horizontal extent of plume - Rapid decrease in treatment effectiveness
Implementability	- Equipment is easily controlled and monitored - Requires low O&M - Can be expanded during operation - Air and vapor flow can be alternated - Deep air-injection wells can be added - Does not require pretreatment - Sandy subsurface is conducive to air circulation - Concrete surface aids in controlling extraction	- Equipment is easily controlled and monitored - Requires pre-treatment (solids removal) - Requires large equipment staging area - Requires solids treatment and disposal - Requires groundwater discharge
Cost	- Low equipment cost - Low O&M cost - Low permitting cost - No disposal cost	- Moderate equipment cost - High O&M cost - Low permitting cost - Moderate solids treatment and disposal cost - Moderate water discharge cost

Notes: VOC = volatile organic compound.
OU = operable unit.
DNAPLs = dense non-aqueous phase liquids.
O&M = operation and maintenance.
gpm = gallon per minute.

Based on this evaluation, it is apparent that *in-situ* treatment (biosparging) requires less logistical considerations than *ex-situ* treatment (air stripping, aeration, dechlorination, or oxidation). The estimated sustainable pumping rate for groundwater collection is less than 0.5 gpm, which would have a limited impact on a target plume. Conversely, biosparging may achieve a larger horizontal influence and allow for operational flexibility during implementation, such as the installation of additional air-injection or vapor-extraction wells, and the variation of system flow rates. Biosparging has the potential to remove a large volume of chlorinated VOCs from the subsurface of OU 3. For these reasons, biosparging is selected as the candidate accelerated threat reduction action for OU 3, should such action be desired.

It should be noted that an *in-situ* gas transfer process, such as biosparging, is most effective in areas with a larger unsaturated subsurface (greater than 20 feet to the water table). However, because the concrete surface of OU 3 has minimized the release of volatilized organic vapors, a technology designed to collect those organic vapors in a controlled manner, such as biosparging, may be extremely effective in removing bulk volumes of chlorinated VOCs. The removal of subsurface vapors would also provide void space for additional volatilization of adsorbed and dissolved organic compounds.

8.3 IMPLEMENTATION OF ACCELERATED THREAT REDUCTION ACTION. Accelerated threat reduction actions could be performed in any area of OU 3 at which elevated concentrations of chlorinated VOCs require removal. Based on the results of risk screening, the following areas of OU 3, in decreasing order of priority, are potential candidate locations:

- Dry Cleaners Area (Building 106),
- Closed-loop Solvent Recycling Facility Area (Building 780),
- South End of P3 Hangars (Building 101 South), and
- Old Engine Parts Steam Cleaning Area (Building 101 East).

Portions of a biosparging system could first be installed in the vicinity of Buildings 106 and 780. Based on the results of these systems, additional systems could be installed in other identified locations. A step-wise approach to implementing each biosparging system, and using laboratory-scale biotreatability data and pilot-scale operational data to design additional biosparging systems, would optimize accelerated threat reduction at OU 3. In the absence of biotreatability and operational data, suggested tasks for the step-wise implementation of an individual biosparging system are described below. These tasks could be paralleled for implementing additional biosparging systems.

8.3.1 Task 1, Soil-gas Survey The first task in implementing a biosparging system is to perform a soil-gas survey to (1) evaluate whether sufficient organic vapors exist in the vadose zone to warrant vapor extraction and (2) determine the optimum locations for vapor extraction. Soil-gas probes could be connected to an organic vapor monitoring device, such as a photoionization detector (PID). A PID equipped with an 11.7 electron-volt (eV) lamp produces relatively high response (good detection) for chlorinated VOCs. The results of the soil-gas survey should only be used as a "screening" step, to identify areas with the highest level of organic vapors in soil.

A grid of sampling points, spaced approximately 20 feet apart, should be used as the first step in the soil-gas survey. Because real-time data are generated while performing the survey, the selected grid spacing can easily be field adjusted. The installation of the first set of vapor-extraction wells should be based on the results of the soil-gas survey.

8.3.2 Task 2, Installation and Optimization of Vapor Extraction System The second task in implementing a biosparging system is to install the vapor extraction portion of the system. The activities suggested for the installation and optimization of a vapor extraction system are described below. These activities would optimize the extraction of organic vapors from the unsaturated subsurface, and can be combined with other wells and related equipment to create a full biosparging system.

This task consists of five parts: (1) installation of a limited number of initial vapor-extraction wells, (2) installation of associated vapor-observation wells, (3) installation of required vapor extraction equipment for start-up diagnostic tests, (4) performance of start-up diagnostic tests, and (5) installation of additional vapor-extraction wells and equipment to remediate the target plume.

(1) **Installation of Initial Vapor-extraction Wells.** Two to four initial vapor-extraction wells should be installed in the location of the highest levels of organic vapors in soil based on the soil-gas survey. These wells would be spaced 20 to 60 feet apart, and would be used to perform start-up diagnostic tests. The thickness of the vadose zone at OU 3 is generally less than 5 to 6 feet. A minimum 1-foot section of solid PVC is required above the PVC screen to prevent leakage through the annular space around the well. Thus, the maximum length of screen possible in the vadose zone is approximately 4 to 5 feet. Vapor-extraction wells should be constructed of 1-inch or 2-inch PVC, with screens that terminate at the top of the water table. If an existing groundwater monitoring well is located in an area intended for vapor extraction, and a sufficient part of the well screen is above the water table, it may be used as a vapor-extraction well.

(2) **Installation of Vapor-observation Wells.** Vapor-observation wells are required after the installation of the initial vapor-extraction wells. Four to five vapor-observation wells are suggested for each vapor-extraction well to monitor the influence of vapor extraction during start-up diagnostic testing. The use of vapor-observation wells during system start-up is similar in principle to that of groundwater-observation wells used during aquifer testing and "pump-and-treat" system start-up. Vapor-observation wells should be installed at distances of 5, 10, 20, and 30 feet from each vapor-extraction well. Vapor-observation wells should be constructed of 1-inch PVC, with screens that terminate at the top of the water table. The top of the PVC should be capped with an air-tight valve for connection to a vacuum gauge.

(3) **Installation of Vapor Extraction Equipment for Start-up Diagnostic Tests.** Regenerative blowers are traditionally used to extract organic vapors from vapor-extraction wells. Because the thickness of the vadose zone is less than 5 to 6 feet, it will be critical to prevent up-welling into the well screens. Blowers ranging from 0.5 to 2.5 horsepower will likely be sufficient for this purpose. Specific operating requirements for the full vapor extraction system would be based on the start-up diagnostic tests

(described below). Other essential equipment required for vapor extraction start-up includes PVC pipelines, a moisture separator, an inlet filter, velocity meters, temperature meters, vacuum gauges, and sampling ports.

Organic vapors extracted during system start-up diagnostic testing (and subsequent operation) must be treated prior to exhaust. Treatment options include vapor-phase GAC or a catalytic oxidation unit. Calculations are typically performed to estimate the removal rate of VOCs. Based on the estimated concentration of VOCs in the exhaust and the anticipated duration of treatment, the USEPA and the FDEP would determine whether an emissions permit or emissions monitoring and sampling is required.

(4) **Performance of Start-up Diagnostic Tests.** Two diagnostic tests should be performed to determine the number of vapor-extraction wells and required spacing to remediate the target plume: a single-well test and a multiple-well test. A single-well test consists of measuring the quantity of vapor that can be extracted as a function of the vacuum applied to the system. Vacuum and flow rates are then used to develop a system curve, and to establish the operating vacuum for the extraction system. A multiple-well test consists of measuring the vacuum at each of the selected vapor-observation wells, and evaluating the radius of influence achieved by the operating vacuum (established during the single-well test).

(5) **Installation of Additional Vapor-extraction Wells and Equipment.** Based on the results of the start-up diagnostic tests, the number of vapor-extraction wells required to influence the target plume can be assessed based on the radius of influence achieved by the applied vacuum. Additionally, based on the number of vapor-extraction wells required and the spacing between the wells, additional equipment would likely be required, such as multiple blowers and additional vapor treatment capability. Horizontal vapor-extraction wells or trenches could also be installed to optimize vapor collection in the vadose zone.

<u>8.3.3 Task 3, Installation and Optimization of Air Injection System</u> The activities suggested for enhancing the vapor extraction system with air injection are described below. This tasks consists of two parts: (1) installation of air-injection wells and (2) optimization of the air injection system. These activities are intended to increase subsurface air circulation, which should increase the rate of organic vapor volatilization and extraction. These enhancements may not be necessary if a sufficient volume of organic vapors is being removed from the subsurface. This task may be conducted concurrently with the last part of Task 2 (i.e., installation of additional vapor-extraction wells). However, it would be more conservative to ensure that the vapor extraction system is capable of collecting all of the injected air prior to beginning air injection. Ideally, air-injection wells would be surrounded by vapor-extraction wells to capture the injected air.

(1) **Installation of Air-injection Wells.** Air-injection wells can be constructed with screens in the vadose zone (i.e., bioventing) or with screens deep into the aquifer (i.e., air-sparging). Shallow air-injection wells provide unsaturated subsurface circulation that is easily controlled. Construction requirements for shallow air-injection wells are similar to those for vapor-extraction wells. Deep air-injection wells provide a method of increasing the surface area available for the volatilization of dissolved organic

compounds. The optimum construction for deep air-injection wells consists of short (5-foot to 10-foot) screened intervals on top of the shallow clay aquitard. Critical parameters for successful air bubble diffusion are the area-to-volume ratio of bubbles, and the travel distance for the bubbles to reach the water table (retention time). Bubble diameters of less than 0.5 centimeter (cm) typically possess satisfactory area-to-volume ratios, and the vertical distance between the top of the shallow clay aquitard and the water table is the optimum travel distance for the bubbles.

(2) **Optimization of Air Injection System.** Because dissolved, chlorinated VOCs are denser than water, deep air-injection wells may be more effective than shallow air-injection wells for enhancing subsurface volatilization. Each air-injection well (shallow or deep) should be surrounded by vapor-extraction wells to prevent uncontrolled volatilization. Two air-injection wells near the center of the target plume, spaced 10 to 20 feet apart, should begin to increase the volatilization of dissolved VOCs. The cumulative vapor extraction flow rate should be greater than the cumulative air-injection flow rate. It may be advisable to activate the air injection portion of the system in short durations, while continuing to operate the vapor extraction system.

8.3.4 Task 4, Enhancement of Biological Activity After operating the vapor extraction and air injection portions of the biosparging system for a defined duration, a microbial evaluation (through laboratory-scale biotreatability tests) could then be performed to evaluate whether limiting nutrients (e.g., nitrogen, phosphorus, water, etc.) are preventing the continued biotransformation of chlorinated VOCs.

Biodegradation (dechlorination) of highly chlorinated aliphatic VOCs, such as perchloroethylene, may be accomplished by anaerobic microorganisms, such as methanogens (methane producers). Conversely, biodegradation of less chlorinated aliphatic VOCs, such as vinyl chloride, may be accomplished by aerobic microorganisms such as methanotrophs (methane consumers). Selected nutrients could be introduced into the subsurface to induce the desired stage of microbial activity (i.e., anaerobic or aerobic). For example, oxygen tanks could be used to bleed additional oxygen into the air injection stream to stimulate aerobic microbial activity. Alternately, an inert gas, such as nitrogen, could be injected to stimulate anaerobic microbial activity. These refinements should be based on laboratory-scale biotreatability data and pilot-scale operational data collected from each biosparging system.

Another method of achieving the desired activity (anaerobic then aerobic) may be to operate the biosparging system aerobically for a distinct time period, then to shut the system off to allow anaerobic conditions to develop. This procedure could be repeated if determined to be effective in inducing the desired microbial activity.

8.3.5 Task 5, Installation of Groundwater Monitoring Wells While performing the installation and optimization of the biosparging system, groundwater monitoring wells should be installed to monitor the effectiveness of biosparging. These wells should be in the immediate vicinity of the biosparging system, and should be gauged and sampled periodically (i.e., monthly or quarterly).

9.0 PROJECT MANAGEMENT

This chapter describes the management structure for the RI/FS at OU 3. Project management for the OU 3 RI/FS will be performed in accordance with the procedures outlined in the Project Management Plan in Volume 1 of the Navy IR program plan (Geraghty & Miller, 1991). The proposed project organization is discussed in Section 9.1, and the proposed project schedule is discussed in Section 9.2.

9.1 PROJECT ORGANIZATION. A proposed organizational chart for the OU 3 RI/FS is presented on Figure 9-1. This chart illustrates the lines of authority and identifies key roles for the project. These key roles and responsibilities are described below.

U.S. Navy Remedial Project Manager (RPM). The U.S. Navy RPM will review and approve the project workplans and work activities for the duration of the project and will direct the coordination of U.S. Navy policy and environmental objectives. The RPM will be responsible for assuring that all project activities conducted by the contractor and its subcontractors are in agreement with the policies of the Navy and NAS Jacksonville.

Facility Installation Restoration Manager (FIRM). The FIRM will be the primary contact at OU 3. The FIRM will be responsible for the day-to-day Navy coordination of onsite activities described in the project workplans, and will assist the Navy RPM with assuring that all project activities conducted by the contractor and its subcontractors are in agreement with the policies of the Navy and NAS Jacksonville.

Program Manager. The Program Manager is responsible for the ABB-ES overall implementation of the Navy IR program within SOUTHNAVFACENGCOM. As an officer of ABB-ES, the Program Manager has authority to commit the necessary resources to ensure the accurate and timely completion of project tasks.

Installation Manager. The Installation Manager is responsible for coordinating all ABB-ES RI/FS activities at NAS Jacksonville. This administrative function provides a single point of contact for the Navy RPM and the FIRM concerning global administrative issues at NAS Jacksonville. As required, the Installation Manager will also be responsible for the following tasks:

1. coordinating with the OU 3 Task Order Manager (TOM) concerning scheduling equipment and manpower;

2. reviewing OU 3 project progress;

3. final reviewing of all OU 3 documents, plans, and drawings;

4. approving project-specific procedures;

5. ensuring that the technical, schedule, and control requirements established by the Quality Assurance Manager are enforced on the project;

6. serving as the collection point for the TOMs reporting changes and deviations from the project workplans; and

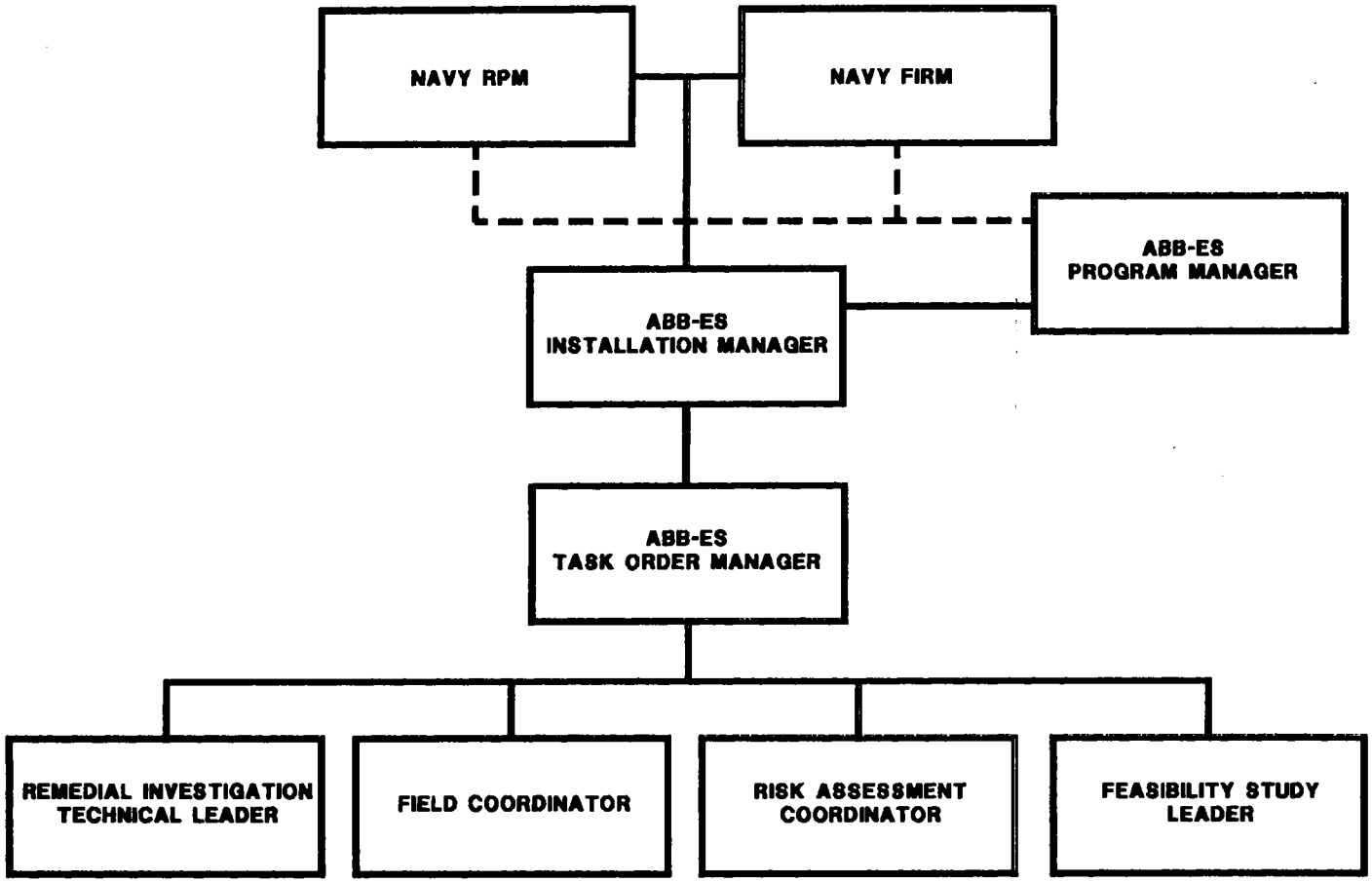

FIGURE 9-1
ORGANIZATIONAL CHART

REMEDIAL INVESTIGATION
AND FEASIBILITY STUDY
WORKPLAN
OPERABLE UNIT 3

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JACKSONVILLE, FLORIDA

SCHEMATIC/DRM/3-16-94

7. evaluating the significance of these changes or deviations to the project workplans, and reporting such items to the appropriate regulatory and Navy representatives.

TOM. The TOM for the OU 3 RI/FS will have day-to-day responsibility for conducting the work in accordance with the requirements established by the Contract Task Order. As required, the TOM will also be responsible for the following tasks:

1. assembling the project team, assigning tasks to the team, and orienting the team to the project's requirements;

2. arranging for subcontractor services;

3. developing the technical requirements and level of effort required to address each element of a specific task;

4. evaluating the appropriateness and adequacy of the technical and engineering services provided;

5. developing and monitoring of task scope, schedule, and budget;

6. integrating the efforts of all supporting disciplines and subcontractors;

7. preparing OU 3 status update reports on behalf of the Installation Manager; and

8. representing ABB-ES at Technical Review Committee and Restoration Advisory Board meetings and at project review meetings with the Navy RPM.

RI Technical Leader The RI Technical Leader will be responsible for coordination of the RI program and the RI report. As required, the RI Technical Leader will be responsible for the following tasks:

1. coordinating with the Field Operations Leader (FOL) to implement the RI field activities per the requirements of the project workplans,

2. directing the preparation of the RI report,

3. maintaining the RI project files, and

4. assisting the TOM in representing ABB-ES at Technical Review Committee and Restoration Advisory Board meetings.

FOL. The FOL, or Field Coordinator, will be responsible for interacting with the onsite FIRM to schedule the day-to-day field activities. As required, the FOL will also be responsible for the following tasks:

1. reviewing onsite activities for compliance with the project workplan,

2. preparing daily and weekly status reports,

3. monitoring ABB-ES field team and subcontractor progress, and

4. ensuring that recordkeeping meets requirements of the Contract Task Order.

Risk Assessment Coordinator. The Risk Assessment Coordinator will be responsible for planning and coordinating the human health and ecological RAs, supported by the RI data, to identify remedial goals for OU 3.

FS Leader. The FS Leader will be responsible for coordinating FS activities and for ensuring that the FS progresses in accordance with the project workplans, scope of work, and schedule. As required, the FS Leader will also be responsible for the following tasks:

1. assessing the results of RI data to use in evaluating remedial technologies for OU 3;

2. monitoring the identification, screening, and evaluation of remedial alternatives;

3. assessing the need for conducting treatability studies;

4. directing the preparation of the FS report;

5. maintaining the FS files; and

6. assisting the TOM, as required, in representing ABB-ES at Technical Review Committee and Restoration Advisory Board meetings.

Quality Assurance Manager. The Quality Assurance Manager will support the TOM, and will report directly to the Program Manager. The Quality Assurance Manager will be the liaison among the laboratories, ABB-ES, and the U.S. Navy. The Quality Assurance Manager will ensure the accuracy of the collected data through the performance of the following tasks:

1. field and laboratory performance audits (to confirm that the designated SOPs and regulatory guidance is being followed),

2. quality assurance program design for field sample collection and analytical testing,

3. field and analytical data validation audits,

4. selection of the analytical laboratory, and

5. preparation of laboratory contracts.

Health and Safety Coordinator. The Health and Safety Coordinator is responsible for OU 3 project compliance with ABB-ES corporate requirements and the NAS Jacksonville HASP. Conformance with health and safety protocols will be assessed through periodic field visits by the Health and Safety Coordinator and by daily supervision by the Site Health and Safety Officer (HSO). As required, the Health and Safety Coordinator will also be responsible for the following tasks:

1. review and approve the OU 3-specific HASP,

2. conduct field health and safety audits,

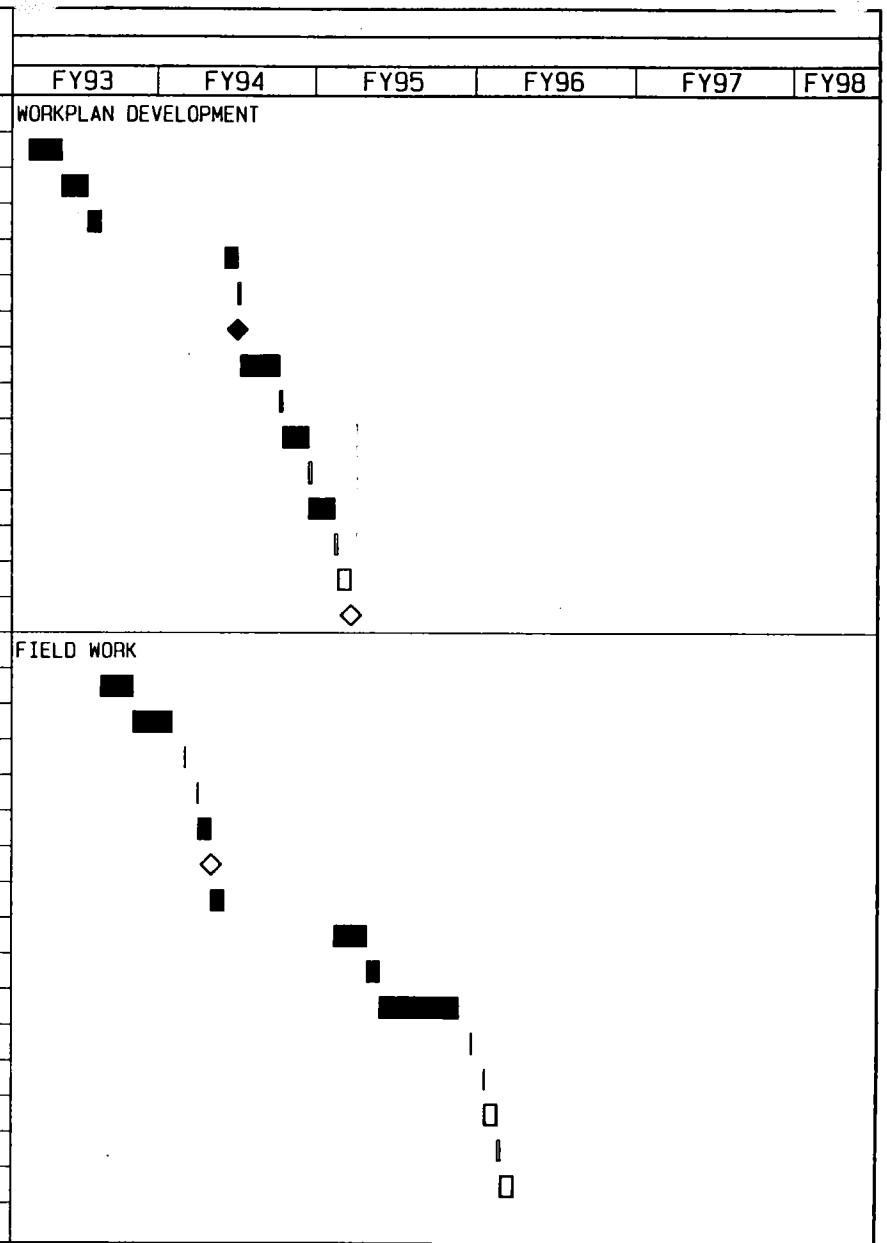
3. verify that all ABB-ES personnel working in field activities meet the health monitoring and safety training requirements, and

4. coordinate with the HSO in resolving health and safety issues that may arise during field operations.

Quality Review Board. A Quality Review Board, consisting of ABB-ES senior technical staff, will support the TOM by reviewing project activities and documentation to ensure that ABB-ES technical deliverables (1) reflect the accumulated experience of the firm, (2) are produced according to ABB-ES and Navy policy, and (3) meet the requirements of the project. The primary function of the Quality Review Board will be to support the application of technically sound methodologies and the development of technically defensible data, interpretations, and conclusions.

9.2 SCHEDULE. A conceptual project schedule for the OU 3 RI/FS is presented on Figure 9-2. This schedule is intended to graphically present the stepwise implementation and phasing of RI/FS tasks. The actual timeframe with which the RI/FS will be performed will be based upon time-critical factors, such as regulatory approval, Navy authorization, contractor and subcontractor coordination, and field logistics.

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR
AWARD WORK - RI/FS WP	10DEC92	22FEB93	75
SCOPE WP	23FEB93	23APR93	60
DEVELOP SCOPING FW NEEDS	24APR93	23MAY93	30
GENERATE DRAFT WP	5MAR94	3APR94	30
NAVY MAIL DRAFT RI/FSWP	4APR94	10APR94	7
DRAFT RI/FS WP ISSUED	4APR94		0
AGENCY R&C DRAFT WP	11APR94	9JUL94	90
AGENCY MAIL RC'S	10JUL94	16JUL94	7
NAVY ASSESS R&C'S	17JUL94	14SEP94	60
NAVY MAIL R OF RC'S	15SEP94	21SEP94	7
NAVY GENERATE FINAL RI/FS WP	15SEP94	13NOV94	60
NAVY MAIL DRAFT FINAL WP	14NOV94	20NOV94	7
RI/FS WORK PLAN GOES FINAL	21NOV94	20DEC94	30
RI/FS WP FINALIZED		20DEC94	0
AWARD SCOPING FIELD WORK	24MAY93	6AUG93	75
PERFORM SFW	7AUG93	4NOV93	90
PERFORM SAMPLING ANALYSIS	4DEC93	4DEC93	1
PERFORM DATA VALIDATION	3JAN94	3JAN94	1
PREPARE DATA REPORT	4JAN94	2FEB94	30
TRANSMIT DR		2FEB94	0
AGENCY REVIEW DR	3FEB94	4MAR94	30
AWARD WORK - FIELD WORK	14NOV94	27JAN95	75
FW MOBILIZATION	28JAN95	26FEB95	30
FIELD WORK	27FEB95	25AUG95	180
SAMPLE ANALYSIS	24SEP95	24SEP95	1
DATA VALIDATION	24OCT95	24OCT95	1
DEVELOP PCSR	25OCT95	23NOV95	30
TRANSMIT PCSR	24NOV95	30NOV95	7
AGENCY REVIEW PCSR	1DEC95	30DEC95	30



Plot Date 29MAR94
Data Date 17DEC89
Project Start 17DEC89
Project Finish 15MAR98

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

JRMP A007

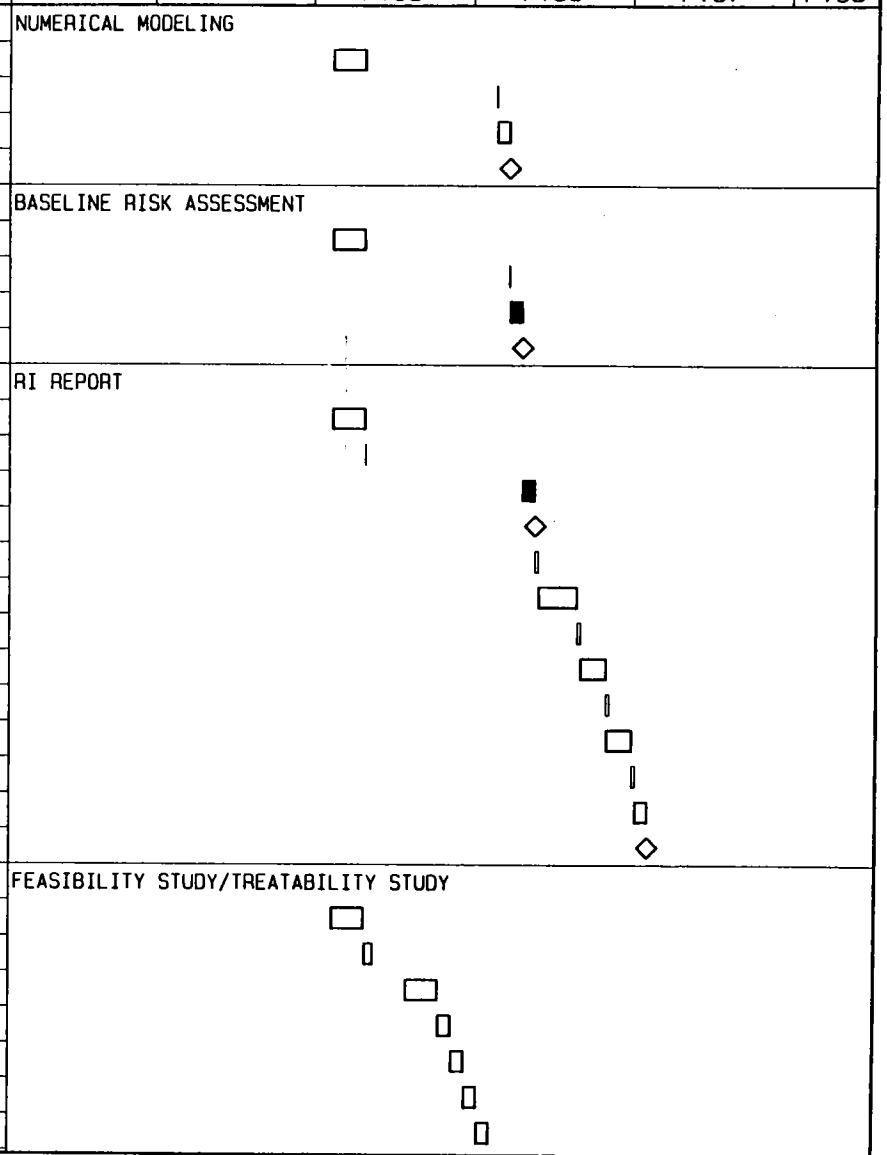
Sheet 1 of 4

SOUTHERN DIVISION
NAS JACKSONVILLE OU3 RI/FS
INSTALLATION RESTORATION MGMT PLAN

-----PROJECT SCHEDULE-----

Date	Revision	Checked	Approved

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR
NUMERICAL MODELING			
AWARD WORK - NUMERICAL MODELING	14NOV94	27JAN95	75
NUMERICAL MODELING TASKS	23NOV95	23NOV95	1
DRAFT NUMERICAL MODELING REPORT	24NOV95	23DEC95	30
TRANSMIT DRAFT NM REPORT		23DEC95	0
BASELINE RISK ASSESSMENT			
AWARD WORK - BLRA	14NOV94	27JAN95	75
BLRA TASKS	23DEC95	23DEC95	1
PREPARE DRAFT BLRA REPORT	24DEC95	22JAN96	30
TRANSMIT DRAFT BLRA		22JAN96	0
RI REPORT			
AWARD WORK - RI REPORT	14NOV94	27JAN95	75
WORK RI TASKS	28JAN95	28JAN95	1
DEVELOP DRAFT RI REPORT	23JAN96	21FEB96	30
TRANSMIT DRAFT RI REPORT		21FEB96	0
SUBMIT DRAFT RI REPORT	22FEB96	28FEB96	7
AGENCY REVIEW	29FEB96	28MAY96	90
AGENCY TRANSMIT REVIEW COMMENTS	29MAY96	4JUN96	7
NAVY REPORT ON RC'S	5JUN96	3AUG96	60
NAVY MAIL COMMENTS	4AUG96	10AUG96	7
PREPARE DRAFT FINAL	4AUG96	2OCT96	60
SUBMIT DRAFT FINAL	3OCT96	9OCT96	7
FINALIZE RI REPORT	10OCT96	8NOV96	30
RI FINALIZED		8NOV96	0
FEASIBILITY STUDY/TREATABILITY STUDY			
AWARD WORK - FEASIBILITY STUDY	14NOV94	27JAN95	75
INITIAL FS TASKS	28JAN95	17FEB95	21
AWARD WORK - TREATABILITY STUDY	4MAY95	17JUL95	75
GENERATE ROUGH TT WORK PLANS	18JUL95	16AUG95	30
GENERATE DRAFT TTWP	17AUG95	15SEP95	30
AGENCY R/C	16SEP95	15OCT95	30
NAVY R TO R/C	16OCT95	14NOV95	30



Plot Date 29MAR94
Data Date 17DEC89
Project Start 17DEC89
Project Finish 15MAR98

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

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JRMP A007

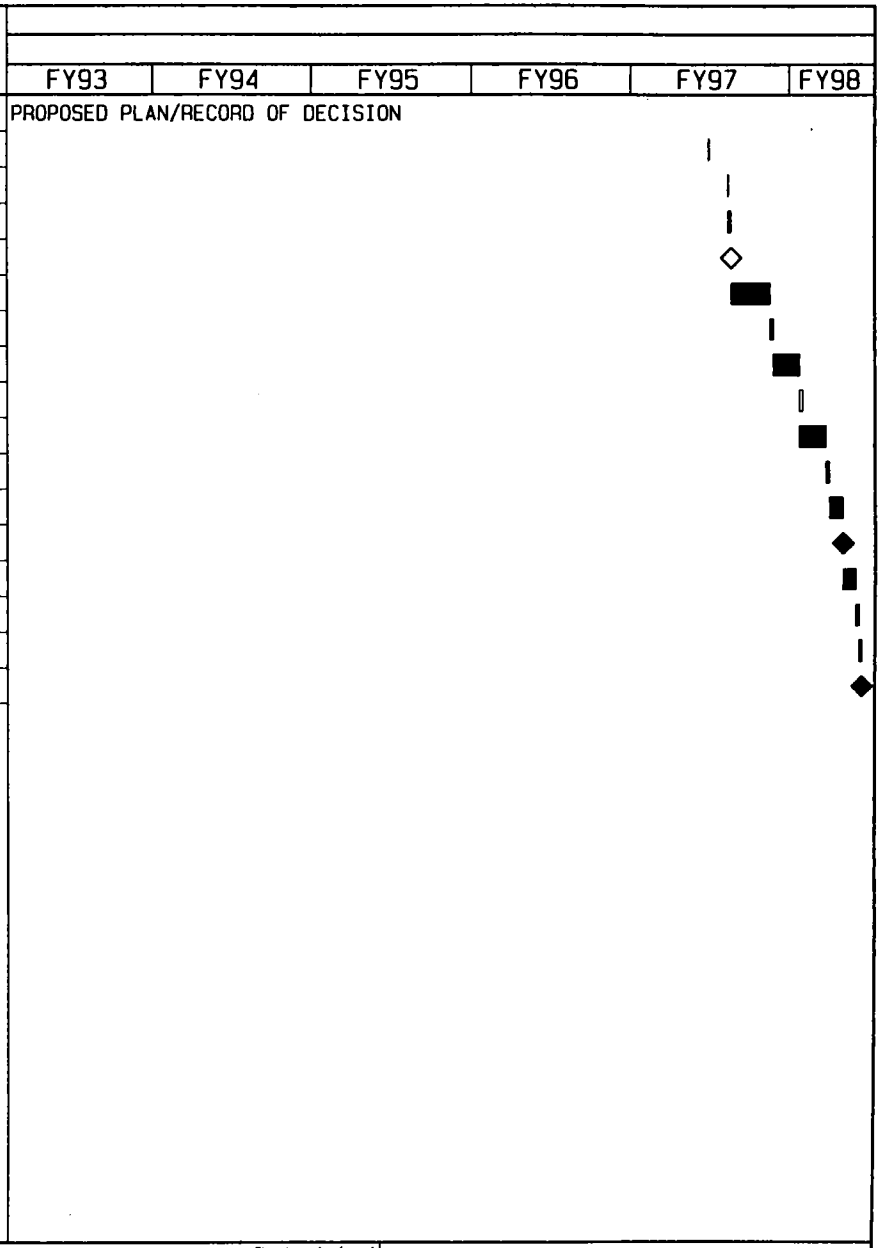
Sheet 2 of 4

SOUTHERN DIVISION
NAS JACKSONVILLE OU3 RI/FS
INSTALLATION RESTORATION MGMT PLAN

-----PROJECT SCHEDULE-----

Date	Revision	Checked	Approved

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR
HOLD PUBLIC MEETING	31MAR97	31MAR97	1
PREPARE DRAFT ROD	14MAY97	14MAY97	1
NAVY MAIL DRAFT ROD	15MAY97	21MAY97	7
DRAFT ROD SUBMITTED		21MAY97	0
AGENCY REVIEW DRAFT ROD	22MAY97	19AUG97	90
AGENCY MAILS COMMENTS	20AUG97	26AUG97	7
NAVY REPORT ON RC'S	27AUG97	25OCT97	60
NAVY COMMENTS MAILED	26OCT97	1NOV97	7
NAVY PREPARE DRAFT FINAL ROD	26OCT97	24DEC97	60
NAVY MAIL DRAFT FINAL ROD	25DEC97	31DEC97	7
ROD GOES FINAL	1JAN98	30JAN98	30
ROD FINALIZED		30JAN98	0
ROD SIGNATURE	31JAN98	1MAR98	30
PREPARE PUBLIC NOTICE	2MAR98	8MAR98	7
PUBLISH NOTICE	9MAR98	15MAR98	7
ROD FINAL & OFFICIAL		15MAR98	0



Plot Date 29MAR94
Data Date 17DEC89
Project Start 17DEC89
Project Finish 15MAR98

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Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

JAMP A007

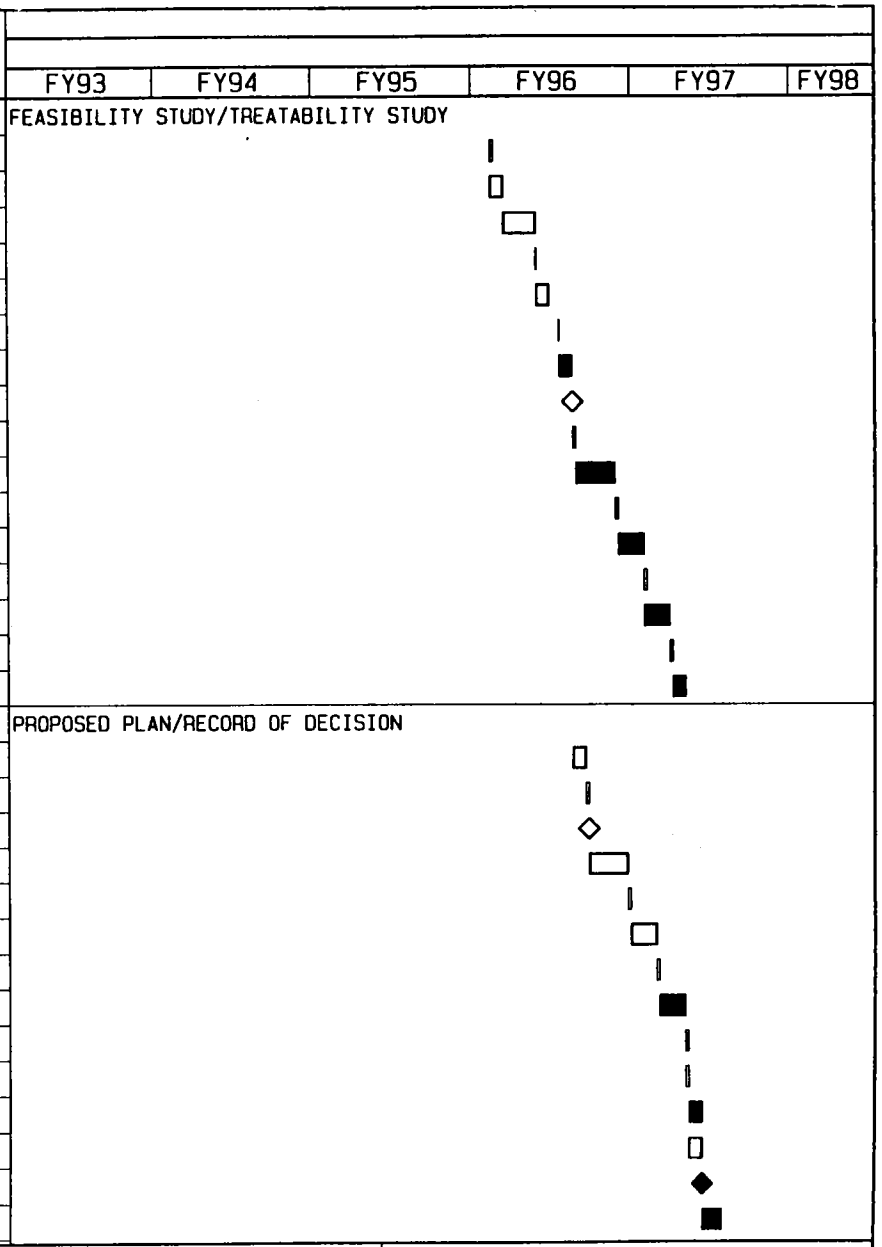
Sheet 4 of 4

SOUTHERN DIVISION
NAS JACKSONVILLE OU3 RI/FS
INSTALLATION RESTORATION MGMT PLAN

-----PROJECT SCHEDULE-----

Date	Revision	Checked	Approved

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR
TRANSMIT R TO R/C	15NOV95	21NOV95	7
GENERATE FINAL TTWP	15NOV95	14DEC95	30
AWARD TTS	15DEC95	27FEB96	75
PERFORM TTS	28FEB96	28FEB96	1
GENERATE DRAFT TT REPORT	29FEB96	29MAR96	30
PERFORM FS	21APR96	21APR96	1
GENERATE DRAFT FSR	22APR96	21MAY96	30
DRAFT FSR DELIVERED		21MAY96	0
SUBMIT DRAFT FSR	22MAY96	28MAY96	7
AGENCY REVIEW	29MAY96	26AUG96	90
NAVY RECIEVE COMMENTS	27AUG96	2SEP96	7
NAVY R ON RC'S	3SEP96	1NOV96	60
NAVY MAIL RC'S	2NOV96	8NOV96	7
PREPARE DRAFT FINAL FSR	2NOV96	31DEC96	60
SUBMIT DRAFT FINAL	1JAN97	7JAN97	7
FS REPORT GOES FINAL	8JAN97	6FEB97	30
PREPARE DRAFT PP	22MAY96	20JUN96	30
SUBMIT DRAFT PP	21JUN96	27JUN96	7
DRAFT PP ISSUED		27JUN96	0
AGENCY REVIEW	28JUN96	25SEP96	90
AGENCY MAIL COMMENTS	26SEP96	2OCT96	7
NAVY R OF RC'S	3OCT96	1DEC96	60
NAVY MAILS COMMENTS	2DEC96	8DEC96	7
PREPARE DRAFT FINAL PP	9DEC96	6FEB97	60
SUBMIT DRAFT FINAL PP	7FEB97	13FEB97	7
PREPARE PUBLIC MEETING NOTICE	7FEB97	13FEB97	7
PP GOES FINAL	14FEB97	15MAR97	30
PUBLISH PUBLIC MEETING NOTICE	14FEB97	15MAR97	30
PP PUBLISHED NOTICE		15MAR97	0
PUBLIC COMMENT PERIOD	16MAR97	29APR97	45



Plot Date 29MAR94
Data Date 17DEC89
Project Start 17DEC89
Project Finish 15MAR98

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Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

JRMP A007

Sheet 3 of 4

SOUTHERN DIVISION
NAS JACKSONVILLE OU3 RI/FS
INSTALLATION RESTORATION MGMT PLAN

-----PROJECT SCHEDULE-----

Date	Revision	Checked	Approved

REFERENCES

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APPENDIX A

Additional Locations at Operable Unit 3

Location 1. Location 1 is the potential site of releases of solvents and degreasers. The majority of the floor of the main hangar section of Building 101 is constructed of reinforced concrete. However, several areas of the flooring have been breached over time, and were replaced with steel plates supported by steel beams. Also, concrete lined hydraulic-lift shafts exist in the northeast corner of the building. The shafts are also covered with steel plates. (See Figure A-1.)

Based on the NIRP (Geraghty & Miller, 1991a), and information garnered from conversations with NAS Jacksonville personnel, the breached areas were potential sites for unauthorized disposal of spent solvents and other materials. The volume of solvents disposed was estimated in the NIRP to be as much as 2,000 gallons (1 gallon per week for 40 years based on current production levels). Any chemical used in Hangar 101, such as trichloroethene and oils, was potentially disposed beneath the floor.

In 1975, a fire occurred beneath the steel plate flooring in Hangar 101. Infiltration of waste solvents and other flammable liquids from deteriorated industrial sewer lines and/or disposal practices are potentially responsible for the presence of flammable materials under the Hangar 101 floor.

Location 2. Location 2 at Building 101 is the "Old Pump Shop". A spill of more than 150 pounds of mercury occurred in this area. NAS Jacksonville conducted a mercury removal and the recovered mercury was sent for reclaiming; however, the NIRP suggests that some mercury could potentially be present at PSC 11.

Location 3. The "Oldest Electroplating Shop (No. 1)" is located at the southeast corner of Building 101. Electroplating Shop No. 1 operated from 1962 to 1989. The electroplating processes potentially used chromic acid, nickel sulfamate, cadmium oxide, silver cyanide, potassium cyanide, sodium cyanide, copper cyanide, lead and tin fluroborate, and nickel chloride and sulfate. Prior to construction of the central industrial wastewater treatment facility, a small waste treatment facility for cyanide and chromium reduction was located adjacent to the shop. In addition, there were cross connections between the industrial and stormwater sewer systems where potential releases from breaches in these systems occurred. Asbestos removal was conducted at the site prior to demolition of the shop.

Location 4. Location 4 is the former location of the Heat Treatment and Foundry; pits and sumps are present. General types of associated foundry materials are acids, glues, metals, petroleum fuels, resins, and solvents. Raw materials, intermediate products, final products, and waste products commonly generated at heat treatment and foundries during manufacture and use include: aluminum, barium, calcium cyanamide, chlorinated naphthalenes, chlorodiphenyls, chromium, creosol, graphite, heavy metals, hydrogen fluoride, lead, magnesium oxide, manganese, nickel, phenols, polychlorinated biphenyls, tellurium, and zirconium. Other associated materials include benzene, dichloroethane, ethyl benzene, isopropanol, methanol, methyl alcohol, methylene chloride, toluene, trichloroethane, and xylenes.

Location 5. Location 5 is located in the area currently used for administrative offices. According to historical information, at least three former processes were conducted in this portion of Building 101. These former production areas were known as the Radium Room, the former Battery Shop, and the Bombsight Shop.

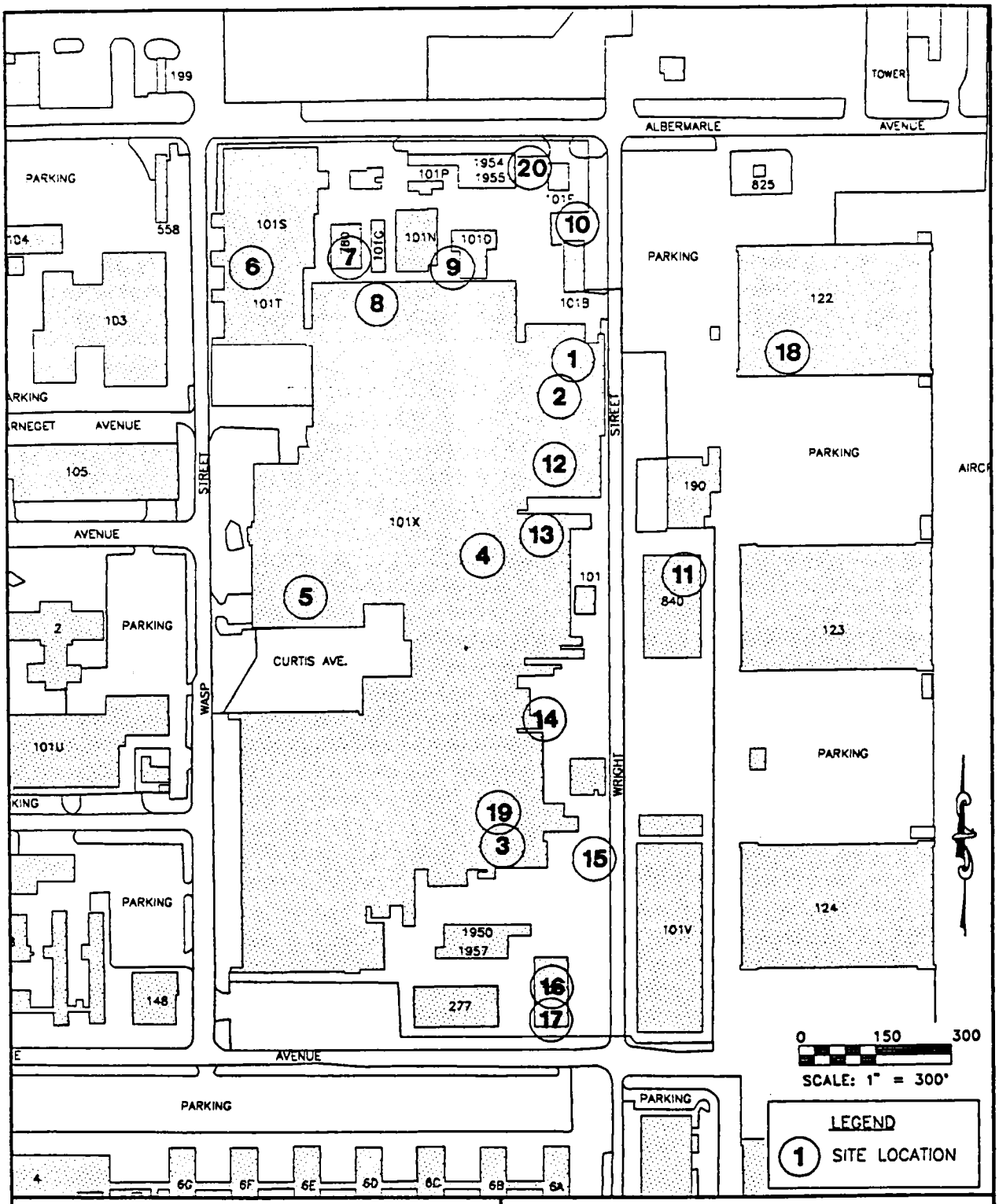

FIGURE A-1
ADITIONAL LOCATIONS DISCUSSED DURING MARCH 1993 SITE WALKOVER AT OU 3

RI/FS WORKPLAN FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DEW/11-22-93
RI/FS WP/OU3
FGB.03.95

Potential contaminants of concern at the Radium Room are radium 228, radium 226, and gross alpha and beta levels. Potential contaminants of concern at the former Battery Shop include associated materials such as alkalis, epoxy resin, pitch, plastics, and solvents. Raw materials and waste products that are common at battery shops include antimony, cadmium, cobalt, copper, lead, magnesium, manganese, mercury, nickel, picric acid, sulfuric acid, hydrogen chloride, and zinc. It was indicated during the March 16, 1993, OU 3 scoping meeting that two acid pits were formerly located at the site; one was inside and the other outside of Building 101 south of Location 5.

Potential contaminants of concern at the Bombsight Shop are metal shavings and radium paint. Radium paint contaminants include radium 226, radium 228, and alpha and beta radiation. The location has pits or sumps in the floor.

Location 6. Location 6 includes Building 101S, and former Wash Rack 101T and its floor drains. This area was used to wash airplanes. Chemicals used in this process included silicate stripper, sodium hydroxide, chromic acid, potassium permanganate, sodium chromate, sodium dichromate, 1,1,1-trichloroethane, dichloromethane, phosphoric acid, corrosion remover, steam cleaning compound, cold carbon remover, and alodine.

Location 7. Building 780 formerly housed a strip ramp and a wash rack used to strip aircraft parts. This location currently houses the new closed loop solvent recycle shop. Potential contaminants of concern at the wash rack are as discussed for Location 6. Possible stripping agents include a methylene chloride and cresylic acid blend, butyrate stripper, trichloroethane, naptha, chromium, and cyanide.

Location 8. Location 8 is the former electroplating shop located in the northwest section of Building 101. The location is currently used for anodizing. The electro-plating process potentially used chromic acid, nickel sulfamate, cadmium oxide, silver cyanide, copper cyanide, lead and tin fluroborate, and nickel chloride sulfate. Annodizing processes potentially generate chromium and nickel products. Facility personnel reported that floor drains from the area flow to the sand blast pit.

Location 9. Location 9 is a former Dope Trench potentially located between Buildings 101 and 101D. The former Dope Shop was located in Building 101D. General types of associated materials include acetates and ketones. An associated material is tetrachloroethene.

Location 10. Building 101-R is a used-drum storage area. Prior to 1991, the location was used as a flammable storage yard.

Location 11. Building 840 formerly housed the Helicopter Blade Stand where helicopter blades were spun-balanced. An aboveground storage tank (AST) was present at the location to supply fuel for the engines that spun the blades. This location is presently a foundry. Foundry-related contaminants are as discussed for Location 4.

Location 12. Building numbers 101H, 101M, and 101L were torn down and replaced with the former fuel accessory shop. The fuel accessory shop was later torn down and an acetylene plant was built at the location. The fuel accessory plant tested

fuel nozzles and valves by filling them with petroleum-based calibrating fluid. The calibrating fluid, similar to JP-5, was stored at the location in drums.

Location 13. Building 101 housed the former preservation shop and engine test cells in the center part of the building, on the western side of the structure. Airplane engines were removed from the airframe, placed on stands, and ran to test for engine malfunctions. Possible areas of releases include drains, tanks, and cross connections with storm and sanitary sewers. JP-5 aviation gasoline (AVGAS) storage tanks were removed from this site. Oil-water separators are present at this location. This location is north and west of PSC 12.

Location 14. This is a former location where engines and their components were steam cleaned. Cleaning shops were used to clean airplanes, airplane engines, and engine parts. Chemicals used in this process included silicate stripper, sodium hydroxide, chromic acid, potassium permanganate, sodium chromate, sodium dichromate, 1,1,1-trichloroethane, dichloromethane, phosphoric acid, corrosion remover, steam cleaning compound, cold carbon remover, and alodine. The cleaning system has been removed and the area paved.

Location 15. Pump Station 166, a storm sewer lift station, was removed and replaced during the industrial sewer upgrade in 1989.

Location 16. Building 125 is the former site of a Torpedo Shop and a Battery Shop. An acid pit and sump is present at the location. Potential contaminants at battery shops are as discussed for Location 5. Otto fuel was used to fuel the torpedoes.

Location 17. This site was identified as a former and current gas station location. The tanks, 4,000- to 5,000-gallon underground storage tanks (USTs), were removed in 1988 and replaced by a single AST. The USTs reportedly contained leaded gasoline.

Location 18. Hangar 122 houses a painting shop that uses a dry filter air pollution control system. Potential contaminants include acetone, xylene, cellosove, methyl ethyl ketone, toluene, 1,1,1-trichloroethane, enamels, lacquers, zinc chromate primers, thinners, and sermetal.

Location 19. Location 19 includes the former electroplating shop, the former engine painting area, and the former location for the non-destructive inspection (NDI) testing area. Adjacent to and north of this location is a former Cylinder Shop. A 1,000-gallon kerosene spill into a concrete pit reportedly occurred at the Cylinder Shop.

Location 20. Building 1760, an Industrial Lift Station, was the early collection point for the industrial drain system. The site discharged to the sanitary sewer for the East Domestic Waste Treatment Plant (EDWTP), which has been removed. When the EDWTP was in service it received industrial flows from NADEP shops (formerly NARF). Industrial effluent to sanitary sewers would be bypassed during process "upset-events" when the effluent was too concentrated for the industrial wastewater treatment plant to handle.

APPENDIX B

Results from Previous Studies

HAZARDOUS WASTE SURVEY

In 1982, Southern Division, Naval Facilities Engineering Command (SOUTHNAVFAC-ENGCOM) contracted with Water and Air Research, Inc.; Moore Gardner and Associates, Inc.; and Environmental Safety Designs, Inc., to conduct a site survey and provide an outline for a Hazardous Waste Management Plan. The purpose of the plan was to create a functional management system for compliance with the hazardous waste management regulations.

The report contains the following information:

- definitions of regulatory requirements that were applicable at that time;
- inventory of materials used in bulk or that are a listed hazardous waste;
- survey and inventory of each NAS Jacksonville area that was suspected of generation, storage, or disposal of hazardous waste;
- review of hazardous waste management practices;
- review of the NAS Jacksonville Resource Conservation and Recovery Act (RCRA) Part A application; and
- recommendations for a waste management plan.

INITIAL ASSESSMENT STUDY

In 1983, Navy Assessment and Control of Installation Pollutants (NACIP), Department of Naval Energy and Environmental Support Activity (NEESA), contracted with Fred C. Hart and Associates, Inc., to conduct an Initial Assessment Study (IAS) at NAS Jacksonville. The NACIP program is divided into three phases, with the IAS being Phase I. During this study information was collected at NADEP concerning the chemicals and nature of operations conducted at each shop. The IAS recommended PSCs 11, 12, 14, and 15 for confirmation during Phase II. Although the IAS stated that PSC 13 did not present a risk, FDER recommended its inclusion for confirmation. The Phase II confirmation is divided into two parts: (1) verification to determine the absence or presence of contamination in the soil, surface water, or groundwater at each site; and (2) a characterization study to identify the nature and extent of existing contamination. NIRP contains the IAS, and the confirmation documents.

SOIL SAMPLING AT BUILDING 101

In 1985, SOUTHNAVFACENGCOM contracted with Geraghty & Miller, Inc. (G&M), to conduct sampling and chemical analyses of soils beneath the Plating and Cleaning Shops located at Hangar 101. The assessment was conducted because of the future relocation of the Plating and Cleaning shops and plans to rehabilitate these areas for usage for other functions.

Five soil samples were collected at three locations of floor drain sumps where spent plating and wash solutions were drained prior to disposal. The five samples were analyzed by the USEPA Extract Procedure Toxicity test for metals (40 CFR 261, Appendix II), cyanide, volatile organic compounds (VOCs) by USEPA Method 624, and

acid extractable compounds (USEPA Method 625). One sample contained cyanide and was analyzed for the characteristic of reactivity.

The G&M report stated, "No hazardous waste constituents were detected in concentrations that would mandate future actions. Neither VOCs or acid extractable compounds were detected in any of the soil collected from the Plating Shop. Also, the metal concentrations of the leachate from the soils were either below the concentrations at which the soils would be considered a hazardous waste (40 CFR 261.24) or non-detectable."

Cyanide was reported to be detected at concentrations ranging from 0.46 micrograms per gram ($\mu g/g$) to 25 $\mu g/g$ and to decrease with depth. Samples that contained cyanide were determined to be non-reactive.

G&M indicated that "Based on the results of this study of the soils below the Plating Shop in Building 101, it does not appear that the soils require any special treatment or removal."

VERIFICATION STUDY

In August 1983, G&M was retained to assist the Navy in performing the Phase II NACIP program. In 1985, SOUTHNAVFACENGCOM contracted with G&M to conduct a Verification Study at the PSCs identified during the IAS. Included in this study were the five PSCs that comprise OU 3, and PSC 16. Separate verification studies were conducted for PSC 13 and PSCs 11, 12, 14, 15, and 16. As a result of the Verification Study, PSCs 11, 12, 14, and 15 were recommended for characterization due to the presence of contaminants in groundwater. The field program consisted of soil borings and monitoring well construction in OU 3. The locations of the sampling points are depicted in Figure B-1. The analytical results are presented in Tables B-1 and B-2.

The following paragraphs discuss the work conducted during the Verification Study.

PSC 13. One monitoring well, NARF-13-1, was installed at PSC 13, at a location that was reported as the approximate center of the former radium waste disposal area. An initial sample was analyzed for gross alpha only and contained 54 picocuries per liter (pCi/ℓ). A second sample was collected and analyzed for VOCs, gross alpha and beta, and radium-226, and radium-228. Gross alpha and beta were detected at concentrations of 6 and 4 pCi/ℓ, respectively (Table B-1). Radium-226 was detected at concentration of 6 pCi/ℓ. Radium-228 was not detected (< 1 pCi/ℓ). No VOCs were detected. The State and Federal drinking water standard for radium-226 is 5 pCi/ℓ. G&M concluded that the site did not pose an imminent hazard to human health or the environment, and recommended no further study of PSC 13.

PSCs 11, 12, 14, 15, and 16. Seven monitoring wells, NARF-B1 and NARF-1 through NARF-6, were installed to investigate the presence or absence of chemicals related to activities at PSCs 11, 12, 14, 15, and 16 (Figure B-1). Groundwater samples were analyzed for total organic carbon (TOC), VOCs, cyanide, and dissolved metals (cadmium, chromium, lead, and nickel).

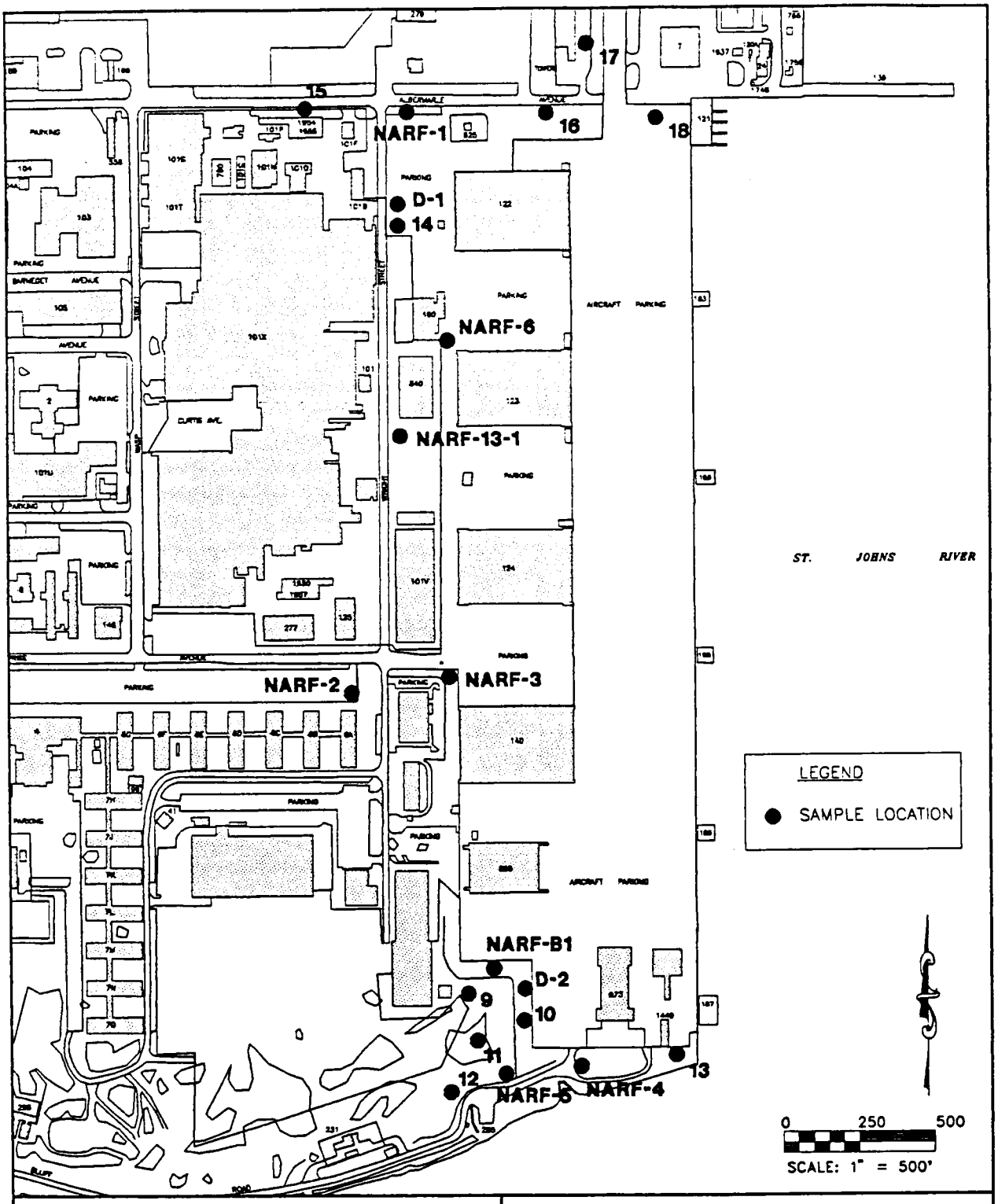

FIGURE B-1
VERIFICATION AND CHARACTERIZATION STUDIES, GERAGHTY & MILLER 1986, SAMPLING LOCATIONS

RI/FS WORKPLAN FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRM/2-28-94

Table B-1
Verification Study, Site 13

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Results of Chemical Analyses of Groundwater Samples, Existing Wells

Compound	NARF-13-1
Sample No. 1, Radioactive Analysis, pCi/ℓ	
Gross alpha	54 ± 7
Sample No. 2, Radioactive Analysis, pCi/ℓ	
Gross alpha	6 ± 3
Gross beta	4 ± 2
Radium 226	6 ± 2
Radium 228	<1
Volatiles, μg/ℓ	--
Field Parameters	
pH	6.18
Specific conductance (μmhos/cm)	NA
Temperature (°C)	25

Notes: pCi/ℓ = picocuries per liter.
μg/ℓ = micrograms per liter.
μmhos = micromhos per centimeter.
°C = degrees Celsius.
– = none detected.
NA = not analyzed.

Table B-2
Verification Study, Sites 11, 12, 14, 15, and 16

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Results of Chemical Analyses of Groundwater Samples, Existing Wells

Compound	NARF-1	NARF-2	NARF-3	NARF-4	NARF-5	NARF-6	NARF-B1
Depth	20 ft bls	16 ft bls	14 ft bls	14 ft bls	10 ft bls	11 ft bls	32 ft bls
Volatiles, μg/ℓ							
Vinyl chloride	–	–	–	270	–	–	–
Methylene chloride	0.6	–	1.8	–	–	–	–
1,1-Dichloroethene	0.3	–	0.2	12	–	16	53,500
Trans-1,2-Dichloroethene	0.4	–	2.2	1,470	7.6	190	8,000
1,1,1-Trichloroethane	0.7	–	0.5	6.2	–	22	25,500
Trichloroethene	23	3.9	6.1	170	4.9	6.0	155,300
Tetrachloroethene	–	–	–	1.8	–	–	480
Chloroform	–	–	–	–	–	5.5	–
Total Volatiles	25.0	3.9	10.8	1,930	12.5	239.5	242,780
Total Organic Carbon, mg/ℓ	3.9	<1.0	3.3	6.6	3.2	9.5	–
Cyanide, mg/ℓ	0.007	0.010	0.071	<0.005	<0.005	<0.005	<0.005
Metals, mg/ℓ	–	–	–	–	–	–	–
Field Parameters							
pH	11.88	5.51	6.07	6.81	6.17	6.35	6.73
Specific conductance (μmhos/cm)	2,010	70	360	610	550	400	610
Temperature (°C)	29	28	31	26	27	30	28

Results of Chemical Analyses of Soil Samples

Compound	NAS 15-1	NAS 15-2	NAS 15-3
EP Toxicity, mg/ℓ			
Barium	0.1	0.3	0.3
Cadmium	0.15	0.041	–
Lead	1.66	–	–
Chromium	–	0.02	–

Notes: μg/ℓ = micrograms per liter.
mg/ℓ = milligrams per liter.
μmhos/cm = micromhos per centimeter.
°C = degrees Celsius.
– = none detected.
EP = Extraction Procedure.

Eight VOCs were detected in samples from the OU 3 wells of which four compounds comprised nearly 80 percent of the VOCs detected. The compounds were TCE, trans-1,2-dichloroethene, 1,1-dichloroethene, and 1,1,1-trichloroethane. Maximum VOC levels (243 parts per million (ppm)), were found in the southeast part of PSC 15, in well NARF-B1. Traces of vinyl chloride (0.270 parts per million [ppm]) were present in samples from the inferred downgradient well, NARF-4. Total VOC levels of less than 10 ppm were present samples from in NARF-6 groundwater samples, located east of the central part of Building 101, PSCs 11 and 12. Negligible levels of VOCs were present in samples from five other wells. Cyanide was detected at concentrations less than the contract required quantitation limit (CRQL) of 0.05 micrograms per liter ($\mu g/\ell$) to 0.071 $\mu g/\ell$. Dissolved metals were not detected.

Three soil samples were collected at PSC 15 and analyzed by USEPA extraction procedure (EP) toxicity test procedure for arsenic, barium, cadmium, chromium, lead, mercury, nickel, selenium, and silver. The analytical results were either below the concentrations at which the soils would be considered a hazardous waste (40 CFR 261.24), or non-detectable.

CHARACTERIZATION PHASE

In 1986, SOUTHNAVFACENGCOM contracted with G&M to conduct an additional assessment to characterize the contamination found during the 1985 Verification Study. This Characterization Phase included the installation and sampling of 12 additional monitoring wells (NARF-7 through NARF-18) in OU 3 (Figure B-1).

Groundwater samples were collected from the 12 new wells, and from the 6 wells installed during the Verification Study (Table B-3). The groundwater samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and inorganics (11 metals). Twelve VOCs, one SVOC, and two inorganic compounds were detected in groundwater at OU 3 (Table B-3). Maximum concentrations of VOCs (13.4 ppm) were again found in samples from well B-1. No vinyl chloride was found in samples from NARF-4 during this sampling event.

The direction of groundwater flow was determined to be towards the east at gradients of 0.003 to 0.004 (3 to 4 feet of vertical drop per 1,000 feet) The groundwater flow velocity was estimated at 20 feet per year with the assumptions of hydraulic conductivity of 10^{-3} centimeters per second, a gradient of 0.004, and a porosity of 20 percent. Comparison of the water levels in the paired shallow and deep wells indicated an upward hydraulic gradient at the northern part of the NADEP and a downward hydraulic gradient at the southern part of the NADEP.

The dominant sediment encountered at the boring locations was described as silty sand. Some clay zones were encountered and were found in general to be less than 6 feet thick. At the boring location for monitoring well NARFD-1, a clay layer was found from 11 to 32 feet beneath the land surface. This clay layer was not found in NARFD-2. Both NARFD-1 and NARFD-2, were terminated at the interface of the surficial deposits and the Hawthorn Formation.

Due to the discrepancies between compounds and concentrations reported in the 1985 Verification Study and the Characterization Study, G&M recommended that all NARF wells in which contaminants had been detected be resampled.

Table B-3
Characterization Study, Sites 11, 12, 13, 14, 15, and 16

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Results of Chemical Analyses of Groundwater Samples, Existing Wells

Compound	NARF D-1	NARF D-2	NARF B1[1]	NARF-3[1]	NARF-4[1]	NARF-5[1]
Depth	68 feet bls	61 feet bls		16 feet bls		
Volatiles, µg/ℓ						
Toluene	57	35	11	–	66	6
1,1,1-Trichloroethane	3	2	>6,500	–	4	–
Carbon tetrachloride	2	2	2	–	2	2
Bromodichloromethane	6.6	–	4	–	7	–
Trichloroethane	–	3	>6,680	–	3	19
1,1,2-Trichloroethane	–	–	170	13.7	–	–
cis-1,3-Dichloropropane	–	–	–	6	–	–
Ethylbenzene	–	–	4	–	–	–
1,2-Dichloroethane	–	–	–	–	5.7	–
Total Volatiles	68.6	42	13,337	19.7	87.7	27
Base Neutral Extractables, µg/ℓ	–	–	–			
Acid Extractables, µg/ℓ						
2,4-Dimethyl phenol	–	–	5.1			
Pesticides and PCBs, µg/ℓ	–	–	–			
Metals, mg/ℓ						
Barium	0.10	0.07	0.18			
Zinc	0.04	0.02	0.03			
Field Parameters						
pH	7.51	8.55	6.41	6.68	7.21	6.91
Specific conductance (µmhos/cm)	320	240	360	160	225	210
Temperature (°C)	23	22	22	25	20	21

See notes at end of table.

Table B-3 (Continued)
Characterization Study, Sites 11, 12, 13, 14, 15, and 16

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Results of Chemical Analyses of Groundwater Samples, Existing Wells

Compound	NARF-6[1]	NARF-9	NARF-10	NARF-11	NARF-12	NARF-13
Depth		24 feet bls	16 feet bls	24 feet bls	15 feet bls	16 feet bls
Volatiles, µg/ℓ						
Toluene	8	–	–	7	–	–
1,1,1-Trichloroethane	16	–	–	–	–	–
Carbon Tetrachloride	2	–	–	–	–	–
Chloroform	–	2	–	2	–	–
Bromodichloromethane	–	2	–	2.5	–	–
1,1-Dichloroethene	–	–	1.3	–	–	–
1,2-Dichloroethane	–	–	5.5	–	–	–
Trichloroethene	–	–	9.6	–	–	–
Trans-1,2-dichloroethene	–	–	–	–	–	3.5
Total Volatiles	26	4	16.4	11.5	0	3.5
Base Neutral Extractables, µg/ℓ	–					
Acid Extractables, µg/ℓ	–					
Pesticides/PCBs, µg/ℓ	–					
Metals, mg/ℓ						
Barium	0.10					
Zinc	0.02					
Field Parameters						
pH	6.69	6.86	6.49	7.12	6.95	6.91
Specific conductance (µmhos/cm)	200	320	255	200	275	340
Temperature (°C)	24	21	21	20	20	22

See notes at end of table.

Table B-3 (Continued)
Characterization Study, Sites 11, 12, 13, 14, 15, and 16

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Results of Chemical Analyses of Groundwater Samples, Existing Wells

Compound	NARF-13-1[1]	NARF-14	NARF-15	NARF-16	NARF-17	NARF-18
Depth		14 ft bls	15 ft bls	14 ft bls	15 ft bls	15 ft bls
Volatiles, μg/ℓ						
Toluene	15	–	–	38	53	–
1,1-Dichloroethane	–	1.1	–	–	–	–
1,1,1-Trichloroethane	–	–	–	3	3	–
Bromodichloromethane	–	–	–	6	6	–
Total Volatiles	15	1.1	0	47	62	0
Field Parameters						
pH	6.71	7.42	6.85	7.45	7.30	6.87
Specific conductance (μmhos/cm)	240	580	600	490	300	370
Temperature (°C)	24	23	21	23	22	24

[1] Verification study well.

Notes: bls = below land surface
μg/ℓ = micrograms per liter (parts per billion).
mg/ℓ = milligrams per liter (parts per million).
PCBs = polychlorinated biphenyls.
μmhos/cm = micromhos per centimeter.
°C = degrees Celsius.
– = none detected.

EVALUATION OF THE STORMWATER DRAINAGE SYSTEM

In 1988, SOUTHNAVFACENGCOM contracted Robert Bates and Associates, Inc., to conduct an evaluation of cross connections of the stormwater drainage system with the domestic and industrial sewer system at NAS Jacksonville. The evaluations were conducted to identify sources of industrial and domestic wastewater entering the storm drainage system via direct discharge and/or cross contamination.

The storm sewer system generally conducts stormwater south along Wright and Wasp Streets and east along Enterprise Avenue to the aircraft apron area. Stormwater is then directed south to the St. Johns River. Stormwater collected in the northern part of NADEP is collected in a storm sewer along Albemarle Avenue. This system flows eastward along Albemarle Avenue across the aircraft parking apron, and then discharges to the St. Johns River.

Both the northern and southern storm sewers have diversion boxes, which at one time allowed dry weather flows to be directed to the domestic wastewater sewer system. Dry weather flow occurs when rainfall is not entering the storm or sanitary systems from cross connections. Use of the diversion boxes was apparently discontinued due to the large volume of flow received at the domestic wastewater treatment plant during rainfall events. Connection to the sanitary sewer was blocked off inside each diversion box prior to 1973.

Because rainfall events frequently resulted in flooding NADEP areas, a replacement storm sewer of greater capacity was proposed. The replacement storm sewer proposal included enlarging the existing storm sewers that ran along Wright and Wasp Streets and Enterprise Avenue. During construction of the storm sewer in the vicinity of Enterprise Avenue and Wright Street, the contractors' personnel complained of dizziness, nausea, and headaches, and the construction activities were postponed until a potential health hazard assessment could be completed at the site.

The following provides a summary of former discharges and cross connections to the storm sewer as reported by the Bates and Associates, Inc., study.

Building 873. An 8-inch cast iron pipe discharged quench water from a pump station at the engine test cell. The quench water contained amounts of jet fuel, carbon, and hydraulic fluid. In 1986, this discharge was diverted to the sanitary sewer system.

Drum Storage Area Catch Basin. This area, located adjacent to, and north of Building 125, was used to clean and store drums containing minimal amounts of paint thinner and paint stripper. The drums were flushed with hoses and the contents allowed to drain to a catch basin. The catch basin was originally connected to the storm sewer. At some point, a 2-inch diameter line was added to divert the flow to the sanitary sewer. The objective was to divert the dry weather flow to the sanitary sewer and the wet weather flow to the storm sewer. The 2-inch diameter pipe was plugged with debris, diverting all flow to the storm sewer. As a corrective measure, the stormwater discharge pipe was plugged with concrete.

Wash Rack Catch Basin. The wash rack catch basin inside Hangar 101 is used to collect water with oil and grease from the cleaning of engine parts and flows to the storm sewer.

Paint Stripping Catch Basin. Jet fuel drop tanks were stripped of paint at the northwest corner of Building 780. Prior to stripping, the tanks were flushed with hoses near this area. When the tanks were cleaned outside Building 780, water contaminated with jet fuel flowed to a catch basin connected to the storm sewer. A catch basin inside Building 780 connects to the industrial sewer system and the flushing operations are supposed to be conducted at this location.

Oil-Water Separator. An oil-water separator is located in the northeast corner of Hangar 101. Oil-contaminated water was pumped from a central sump and overflows were discharged directly to the storm sewer.

Building No. 190 Catch Basin. A slotted manhole and catch basin within Building 190 was connected to both the storm and industrial sewer systems. Building 120 is located northeast of the engine test cells at Building 101 across Wright Street. This part of Building 190 is a paint and decal shop. The drain was used to discharge paint thinner, excess paint, etc.

Helicopter Wash Down Area. North of Building 190 is an area used to wash down helicopters that is drained by a large catch basin. Discharges from the wash down area include surfactant, oil and grease, and carbon. The catch basin drains to both the sanitary sewer and the storm sewer.

Building 101A. Lavatory and sanitary facilities in this building are connected to the storm sewer. The building was constructed in an existing paved parking area that was drained by a catch basin. Apparently, the building's sanitary facilities were connected to the storm sewer system.

Building No. 103. Engine parts are cleaned and solvent, oil, and grease are discharged to the storm sewer in the northeast corner of the building under a lean-to roof.

Building 101W. A metal shop area is located east of the aircraft repair in Building 101W. Two sinks are connected to the storm sewer at this location. A floor drain is also at this location, and it is not known if the drain connects to either the sanitary or storm sewer systems. The floor drain was used to dispose waste oil.

Test Cell No. 12, Building No. 101. The front and rear floor drains inside the test cell are connected to the storm sewer. One storm drain in the center of the building connects to the sanitary sewer. Quench water was discharged to the drains. Test cell operations are no longer conducted at this location.

Building No. 101N. A lean-to structure located on the north side of Building 101N is used to clean and flush jet fuel tanks prior to stripping. Water hoses are used to flush out the tanks and the discharge goes to a storm sewer catch basin.

SUBSURFACE INVESTIGATION AT WRIGHT STREET

In 1988, SOUTHNAVFACENGCOM contracted with G&M to conduct an assessment of potential soil and groundwater contamination along Wright Street (Figure B-2) for the proposed repair and refurbishing of the storm sewer. The scope of work consisted of drilling 24 soil borings to obtain soil samples, converting 14 of the borings into temporary monitoring wells, conducting *in-situ* tests of aquifer properties, and chemical analyses of soil and groundwater samples (Figure B-3).

The soil samples were analyzed for the characteristics of hazardous substances including ignitability, corrosivity, reactivity, and the EP toxicity test procedure for metals. The groundwater samples were analyzed for USEPA priority pollutant organic and inorganic parameters including VOCs, SVOCs, pesticides, PCBs, cyanide, inorganics (metals), and radionuclides.

The direction of groundwater flow was not determined because the monitoring wells were placed in a straight line configuration along the storm sewer. Radial hydraulic conductivities determined from the aquifer tests ranged from 1.5×10^{-4} centimeters per second (cm/sec) to 1.5×10^{-3} cm/sec. G&M used an estimated hydraulic gradient of 0.0041 and porosity of 20 percent and the radial hydraulic conductivity data to calculate a groundwater flow velocity, which ranged from approximately 3.14 to 31 feet per year.

Sixteen USEPA priority pollutant compounds were detected in the groundwater samples. Of the 16 compounds, 10 were VOCs and 4 were inorganics and radionuclides (gross alpha and beta) (Table B-4a). The concentrations of total VOCs (sum of all detected VOCs) ranged from below detection limits in samples from five monitoring wells, to a maximum of 2,395 ppb in samples from monitoring well MW-9.

The four inorganics detected in the groundwater samples were arsenic, lead, nickel, and selenium (Table B-4b). The detected concentrations of the inorganics were below the Florida Drinking Water Standards.

Gross alpha was detected at concentrations ranging from 1 pCi/ℓ to 23 pCi/ℓ. Gross beta was detected at concentrations ranging from 5.2 pCi/ℓ to 35 pCi/ℓ (Table B-4c).

CONTAMINATION ASSESSMENT OF BUILDING 795

In 1989, SOUTHNAVFACENGCOM contracted with G&M to conduct an assessment of potential soil and groundwater contamination at the proposed site of an addition to the Fuel Accessories Overhaul Shop (FAOS) (Figure B-2). The assessment was initiated because of the proximity of the FAOS to PSC-15 (see Figure B-4). The data collected during this investigation were used to determine if contaminants related to PSC-15 would present health and safety concerns during the construction of the building addition.

The scope of work included the installation of a temporary monitoring well, and collection of soil and groundwater samples. The soil samples were analyzed for total cyanide, sulfide, and the USEPA EP toxicity test procedure for metals and Toxicity Characteristics Leaching Procedure (TCLP) constituents. The groundwater samples were analyzed for USEPA list of priority pollutants and amenable cyanide.

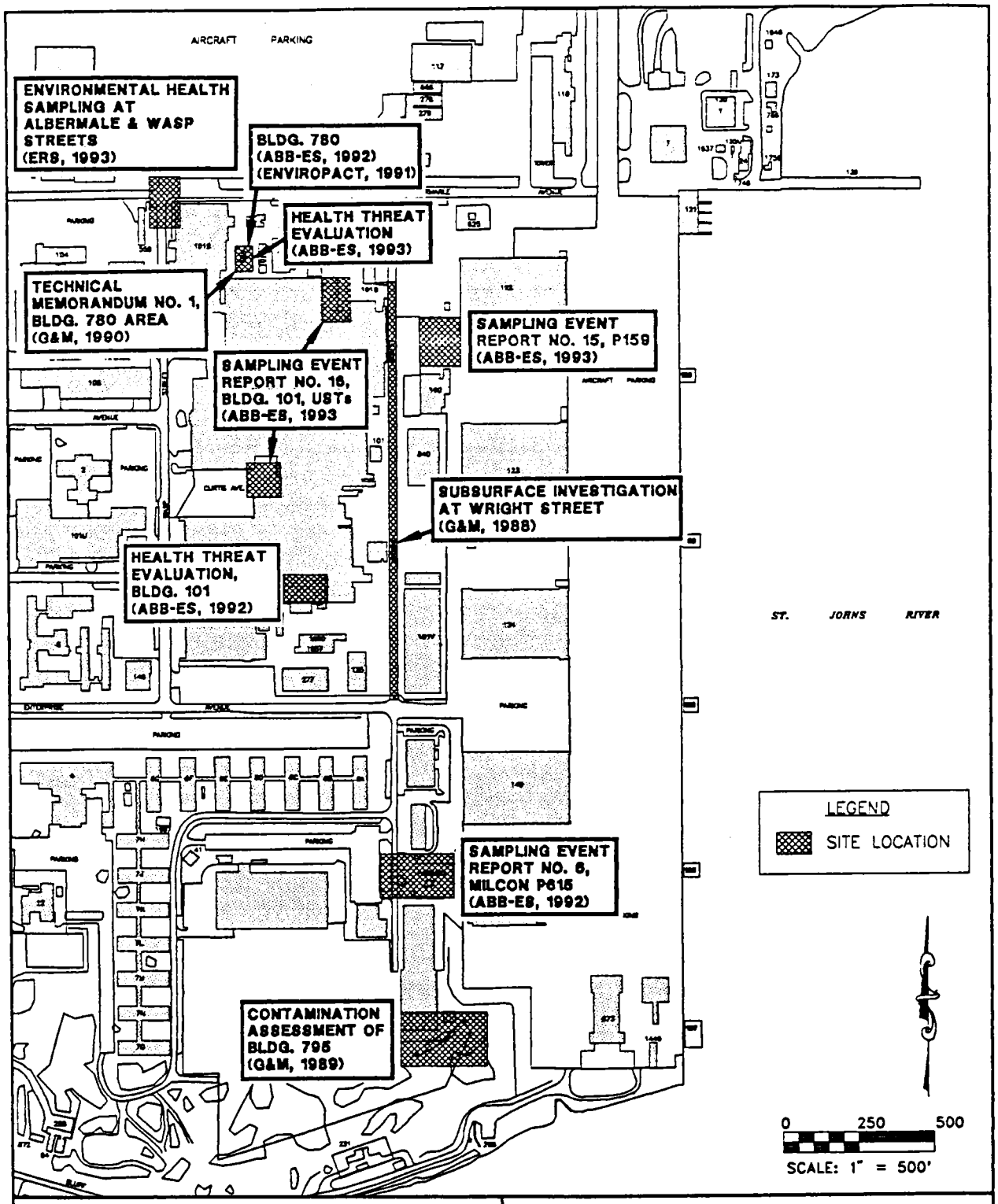

FIGURE B-2
PREVIOUS INVESTIGATION LOCATIONS AT OU 3

RI/FS WORKPLAN FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRM/11-21-93

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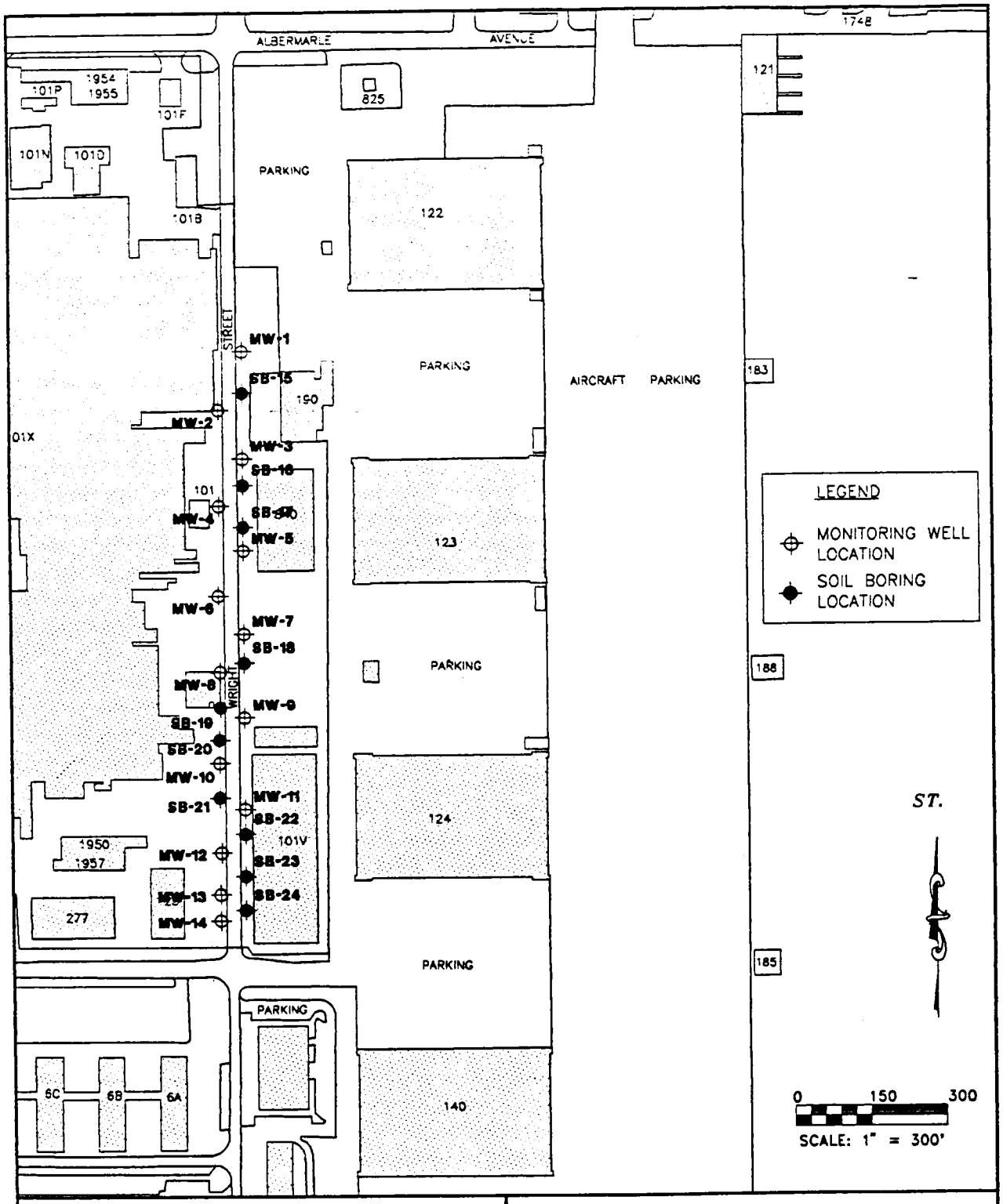


FIGURE B-3
WRIGHT STREET INVESTIGATION SOIL BORING AND MONITORING WELL LOCATIONS, GERAGHTY AND MILLER 1988

RI/FS WORKPLAN FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRM/2-28-94

Table B-4a
Constituents Detected in Groundwater Samples from Monitoring Wells Along Wright Street
RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Compound	Monitoring Well Designation													
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14
Benzene	BDL	BDL	BDL	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroethane	47	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Toluene	4	5	BDL	1	BDL	BDL	BDL	BDL	38	BDL	BDL	BDL	BDL	BDL
trans-1,2-Dichloroethene	BDL	BDL	29	BDL	40	BDL	BDL	BDL	900	43	21	BDL	BDL	BDL
Vinyl chloride	BDL	BDL	BDL	5	2	BDL	BDL	7	700	BDL	BDL	BDL	BDL	BDL
Trichloroethene	BDL	BDL	13	BDL	169	BDL	BDL	BDL	135	25	26	BDL	BDL	BDL
Trichlorofluoromethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	13	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	BDL	96	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	159	BDL	BDL	15	BDL	BDL	BDL	BDL	62	63	BDL	BDL	BDL	BDL
1,1-Dichloroethene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	560	20	BDL	BDL	BDL	BDL
Total VOCs:	210	101	42	22	211	BDL	BDL	7	2,395	164	47	BDL	BDL	BDL

Notes: Concentrations are in parts per billion.
BDL = below laboratory detection limits.
VOCs = volatile organic compounds.

Table B-4b
Constituents Detected in Groundwater Samples from Monitoring Wells Along Wright Street

RI/FS Workplan Operable Unit 3
NAS Jacksonville, Florida

Metals Detected in Groundwater, November 2, 1987

	Monitoring Well Designation					
	MW-1	MW-2	MW-3	MW-7	MW-9	MW-11
Arsenic	BDL	BDL	BDL	0.03	0.02	BDL
Lead	BDL	BDL	0.01	0.01	BDL	BDL
Nickel	BDL	0.09	BDL	BDL	BDL	BDL
Selenium	0.005	BDL	BDL	BDL	BDL	0.005

Notes: Concentrations are in parts per million.
BDL = below detection limit.

Table B-4c
Constituents Detected in Groundwater Samples from Monitoring Wells Along Wright Street

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Radionuclides Detected in Groundwater, November 2, 1987

Monitoring Well Designation	Gross Alpha	Gross Beta
MW-1	23 ± 11	3 ± 9
MW-2	4 ± 4	16 ± 5
MW-3	7 ± 6	9 ± 5
MW-4	1.4 ± 3.2	16 ± 5
MW-5	3.0 ± 3.0	12 ± 3
MW-6	6.9 ± 5.6	18 ± 5
MW-7	9.2 ± 5.7	8.6 ± 4.3
MW-8	4.7 ± 3.8	6.6 ± 3.3
MW-9	5.0 ± 5.0	40 ± 7
MW-10	0.0 ± 3.0	14 ± 5
MW-11	10 ± 7	18 ± 7
MW-12	2.3 ± 2.0	5.2 ± 2.1
MW-13	0.0 ± 1.0	6.3 ± 2.8
MW-14	0.9 ± 2.2	5.8 ± 2.7

Note: Concentrations are in picoCuries per liter.

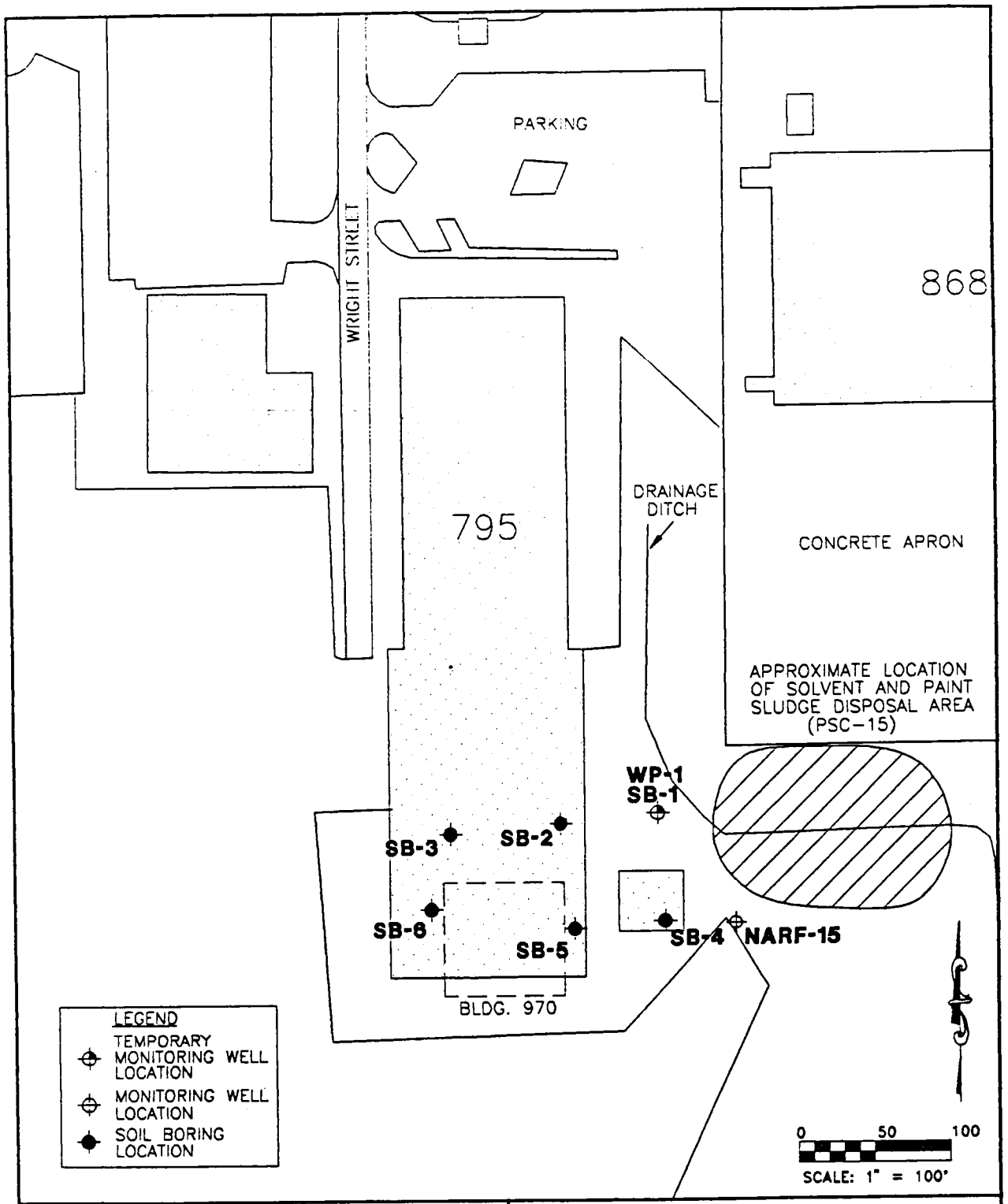


FIGURE B-4
CONTAMINATION ASSESSMENT OF BUILDING 795, GERAGHTY AND MILLER 1989

RI/FS WORKPLAN FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRM/2-28-94

The depth to groundwater beneath the FAOS was 3 to 8 feet beneath the land surface, and the horizontal direction of groundwater flow was towards the northeast, based on monitoring wells NARF-9, NARF-10, NARF-11, and NARFB-1. Therefore, the FAOS are presumed to be hydraulically upgradient of PSC-15.

Two pesticides, dieldrin (6.8 micrograms per kilogram [μg/kg]) and 4,4-DDT (2.9 μg/kg), were detected in the soil samples (Table B-5). The analytical results of the EP toxicity test were either below the concentrations at which the soils would be considered a hazardous waste or non-detectable.

None of the priority pollutant organics were detected in the groundwater sample. The only inorganic constituent detected was zinc at a concentration of 0.09 milligrams per liter (mg/ℓ). This concentration is below the Florida Drinking Water Standard of 5.0 mg/ℓ.

The conclusion in the report indicated that no constraints beyond standard accepted construction safety practices existed for workers at the site. It also stated that soil and groundwater removal could be accomplished by conventional, accepted practices with no constraints due to contamination.

NADEP ENVIRONMENTAL REGULATORY ASSESSMENT

In 1989, SOUTHNAVFACENGCOM contracted with Ecology and Environment, Inc. (E&E), to conduct an assessment for environmental compliance at NADEP. Facilities and operations were reviewed, and compliance with current and future State, Federal, local, and Navy regulations were assessed. The report identified near-term and long-term compliance deficiencies at NADEP. The following provides a summary of some of findings of the 1989 assessment relevant to OU 3.

Air Emissions. Permits for air emissions at NADEP were held by NAS Jacksonville. An air emissions inventory was prepared by the Navy's Aircraft Environmental Support Office (AESO). Shops in the aircraft and component repair and support category routinely employ solvents to clean and degrease aircraft parts and components. The three types of degreasers used in aircraft and component repair are vapor degreasers, solvent spray booths, and cold solvent baths. Almost all of the vapor degreasers use 1,1,1-trichloroethane. Freon was also reported to be used. The cold solvent degreasers and solvent spray booths use both 1,1,1-trichloroethane and PD680. Currently, NADEP is responsible for the air permit.

Wastewater. The industrial and domestic wastewater treatment plants were operated and maintained by APES International Management Services, Inc., under contract with NAS Jacksonville. Industrial wastewater was generated and included fuels, grease, oils, hydraulic fluids, halogenated and non-halogenated solvents, metals, and surfactant rinse water. Buildings 1015, 780, and 1952 were connected to the industrial sewer system. Disposal activities at NADEP also contribute oils, greases, fuels, and phenols to the domestic wastewater treatment plant. The current operator of the industrial and domestic wastewater treatment plant is F.D. Services, Inc.

Table B-5
Constituents Detected in Soil Samples, Building 795

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

	Detection Limits	SB-1	SB-3	SB-4
Sampling interval (feet, bls)		1 to 5	1 to 5	1 to 5
Parameter group		Priority pollutants	Priority pollutants	Priority pollutants
Mercury (7421)[1]	0.02	0.35	BDL	0.15
Chromium (7190)	1	8	2	2
Copper (7210)	1	7	3	BDL
Lead (7420)	5	13	8	6
Zinc (7950)	1	4	3	4
Dieldrin (8080) (ppb)	2.5	BDL	BDL	6.8
4,4-DDT (8080) (ppb)	2.5	BDL	BDL	2.9

[1]Methods according to Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846; Third Edition, November 1986.

Notes: All results in parts per million except where noted.
bls = below land surface.
BDL = below detectable laboratory limits.
ppb = parts per billion.

Stormwater. Stormwater from the aircraft maintenance operations areas ultimately flows to the St. Johns River. Improper construction, cross connections, and operations practices have resulted in contamination of the storm sewer by industrial and sanitary sources. Oil-water separators are sometimes mistaken for underground waste oil accumulation tanks. Waste oil is emptied into the oil-water separators, thereby contaminating the stormwater system.

Solid Waste. Solid waste is accumulated at 100 work stations. Solid waste is transported to large volume dumpsters, which are owned and operated by an independent contractor (Southland Waste Corporations). Scrap metal is segregated at the point of generation. The metals include stainless steel, aluminum, light steel, beryllium, copper, and nickel. Metals are recycled through the Defense Re-utilization and Marketing Office (DRMO). The current solid waste contractor is Continental Contractors, Inc.

Hazardous Waste. NAS Jacksonville holds a State RCRA permit for the hazardous waste storage facility at Building No. 144. NADEP manages its own containerized waste management system in connection with NAS Jacksonville and DRMO. NADEP maintains 24 areas for the temporary accumulation of containerized hazardous waste. These accumulation areas are considered to be RCRA, less-than-90-day storage areas. The following is a list of solvents used during the period of this study (1989), at NADEP and NAS Jacksonville.

- PD680, dry cleaning solvent;
- 1,1,1-trichloroethane;
- Freon 113;
- methylene chloride;
- methyl ethyl ketone;
- xylene;
- toluene;
- trichloroethene;
- naphtha;
- ethyl alcohol;
- acetone;
- isopar, deodorized kerosene (Mil-I-6868);
- calibrating fluid, Mil-C-7024, Type I; and
- liquid paint waste and thinner.

DRMO was indicated to be responsible for disposal of hazardous waste from NAS Jacksonville. The NAS Jacksonville Public Works Department was indicated to be responsible for disposal of blast grit, industrial wastewater treatment sludge, and domestic wastewater treatment sludge.

In response to the DOD Hazardous Waste Minimization Program, NAS Jacksonville is constructing a Solvent Recovery System to process 3,500 gallons of spent solvent per month.

SOIL AND GROUNDWATER SAMPLING AT BUILDING NO. 780

In 1990, SOUTHNAVFACENGCOM contracted with G&M to conduct an assessment of potential soil and groundwater contamination at the proposed site of a new hazardous waste treatment facility at Building No. 780 (Figure B-2). The proposed site was to be the location of the Closed-Loop Solvent Recycling Facility. The

construction plans called for replacing a portion of the building's floor and excavating selected portions of the floor. Information collected from the assessment activities were to be used to develop soil disposal plans, special groundwater handling procedures, and health and safety requirements applicable to the construction activities.

The assessment activities included the collection of soil samples, installation of temporary monitoring wells, and collection of groundwater samples (Figure B-5). The soil and groundwater samples were analyzed for VOCs, metals (total and dissolved), and total organic carbon.

The soil samples were found to contain five VOCs: 1,1-dichloroethane, 1,1-dichloroethene, 1,1,1-trichloroethane, toluene, and TCE (Table B-6a). Inorganics detected in the soil samples consisted of chromium, lead, and zinc.

The groundwater samples were found to contain 11 VOCs: 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethene, 1,1,1-trichloroethane, 2-butanone, 4-methyl 2-pentanone, chloroethane, methylene chloride, toluene, trichloroethene, and vinyl chloride (Table B-6b). Inorganics detected in the groundwater sample consisted of cadmium, nickel, and zinc.

SOIL AND GROUNDWATER SAMPLING AT MILITARY CONSTRUCTION SITE P615

In 1992, SOUTHNAVFACENGCOM contracted with ABB-ES to conduct an assessment of potential soil and groundwater contamination at the proposed site of Waste Treatment Plant Building No 1 (Military Construction Site P615, Figure B-2). The purpose of the analytical data was to determine the presence of chemical exposure hazards at the construction site and provide technical guidance regarding worker personal protection against suspected occupational hazards.

The assessment activities included the collection of soil samples, installation of temporary monitoring wells, and collection of groundwater samples (Figure B-6). The soil and groundwater samples were analyzed for target compound list (TCL) VOCs, purgeable volatile organics, TCL SVOCs, TCL pesticides and PCBs, and target analyte list (TAL) inorganics. In addition, TCLP analyses were conducted on soil samples.

The soil samples contained concentrations of two VOCs, acetone and 2-butanone; one SVOC, di-n-butylphthalate; and nine pesticide compounds, alpha-BHC, beta-BHC, delta-BHC, alpha-chlordane, gamma-chlordane, dieldrin, endrin ketone, heptachlor, and methoxychlor (Table B-7). The extract from the TCLP analysis contained only one inorganic constituent, barium. The concentration of barium did not exceed the TCLP regulatory criteria that is used to characterize material as hazardous waste.

The groundwater sample contained 2 VOCs, acetone and trichloroethene; 10 SVOCs, bis(2-ethylhexyl)phthalate, di-n-butyl phthalate, chrysene, naphthalene, 2-methylnaphthalene, acenaphthalene, dibenzofuran, fluorene, phenanthracene, and carbozol; 8 pesticides, beta-BHC, delta-BHC, gamma-BHC (lindane), heptachlor epoxide, dieldrin, 4,4'-DDE, alpha chlordane, and gamma chlordane; and 6 inorganics, aluminum, calcium, chromium, iron, potassium, and sodium (Table B-8).

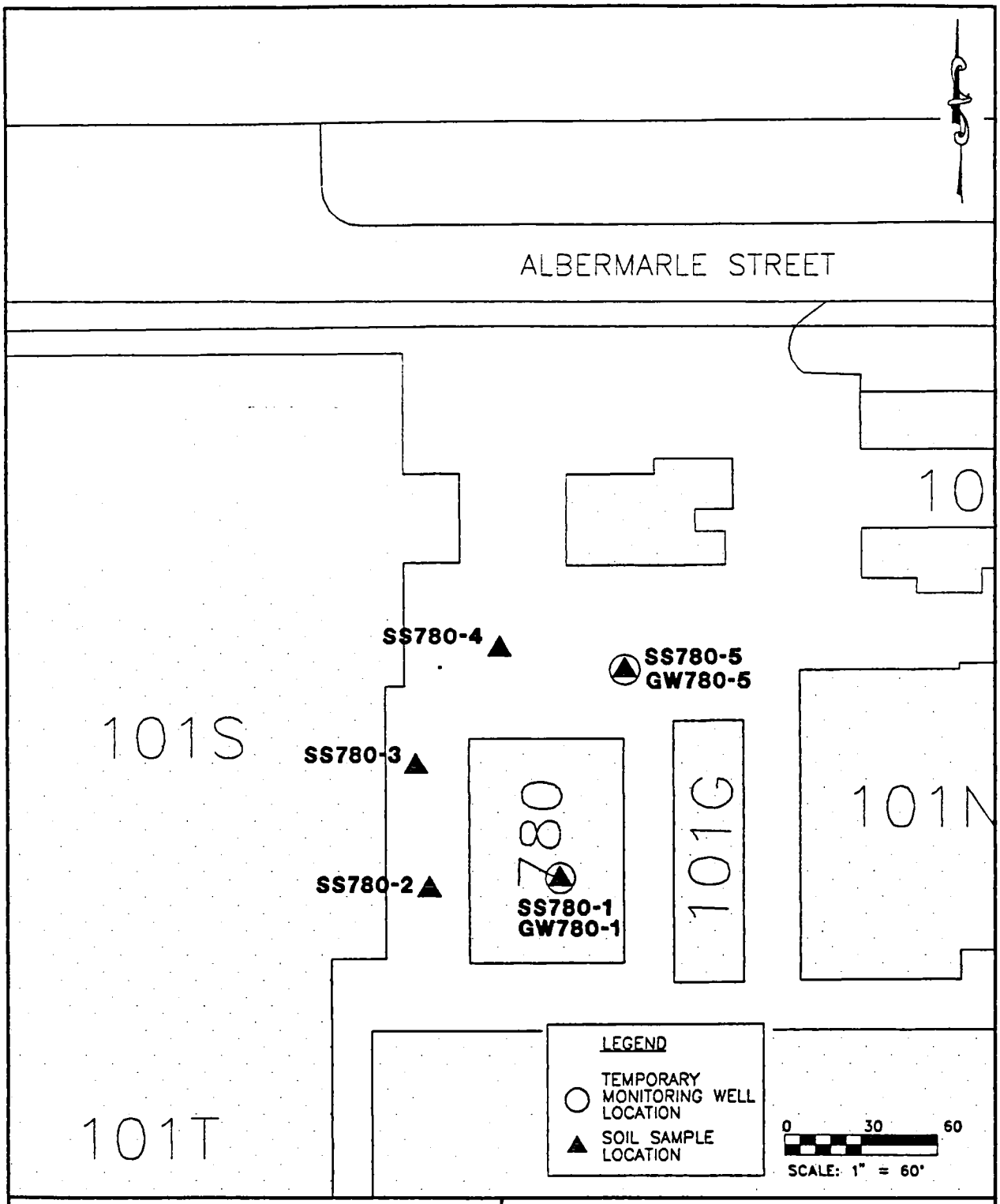


FIGURE B-5
SOIL AND GROUNDWATER SAMPLING AT BUILDING 780

RI/FS WORKPLAN FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRM/3-1-94

Table B-6a
Constituents Detected in Soil Samples Collected at Building 780 on June 1, 1990

RI/FS Workplan Operable Unit No. 3
NAS Jacksonville, Florida

Constituents[1]	Units	Sample Location					Maximum Calculated TCLP Concentration (mg/ℓ)[2]	Maximum Contaminant Level for TCLP Extracts (mg/ℓ)
		SS780-1	SS780-2	SS780-3	SS780-4	SS780-5		
Total Organic Carbon	mg/kg	110	116	119	127	115	--	--
Metals	mg/kg							
Chromium		BDL	28	5.5	2.0	5.5	1.4 (SS780-2)	5.0
Lead		4.6	22	8.8	2.6	4.8	1.1 (SS780-2)	5.0
Zinc		1.5	18	9.5	2.5	5.0	--	--
VOCs	mg/kg							
1,1-Dichloroethane		BDL	0.04	BDL	BDL	BDL	--	--
1-1-Dichloroethene		BDL	0.06	BDL	BDL	BDL	0.003 (SS780-2)	0.7
Toluene		0.04	0.04	0.07	BDL	0.056	--	--
1,1,1-Trichloroethane		0.23	6.29	0.20	BDL	0.156	--	--
Trichloroethene		BDL	0.32	BDL	BDL	BDL	0.016 (SS780-2)	0.5

[1]Constituents that were not detected in any sample are not shown.
[2]That maximum possible concentration of each constituent that could occur in the TCLP extract of a sample is calculated by assuming that 100 percent of the total concentration of the constituent in the sample is transferred to the aqueous phase of the TCLP extract. The values shown assume that the sample did not contain free liquids. Because the TCLP extract is an aqueous extract, the concentration of constituents in the extract is expressed as mg/ℓ. The sample exhibiting the highest possible TCLP extract concentration is shown in parentheses.

Notes: mg/ℓ = milligrams per liter.
mg/kg = milligrams per kilogram.
-- = criteria are not available.
BDL = below detectable laboratory limits.
VOCs = volatile organic compounds.
TCLP = Toxicity Characteristic Leaching Procedure.

Table B-6b
Constituents Detected in Groundwater Samples Collected at Building 780 on June 1, 1990

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Constituent[1]	Units	Sample Location		Florida Department of Environmental Protection Groundwater Guidance Concentrations
		GW780-1	GW780-5	
Total Organic Carbon	mg/ℓ	338	6	N/A
Metals	mg/ℓ			
Cadmium		BDL	0.0002	0.010
Nickel		0.25	BDL	0.15
Nickel, dissolved		0.16	BDL	0.15
Zinc		2.3	BDL	5
Zinc, dissolved		2.2	BDL	5
VOCs	µg/ℓ			
2-Butanone (MEK)		6,000	BDL	170
Chloroethane		4,000	220	6,300
1,1-Dichloroethane		42,000	1,440	2,400
1,1-Dichloroethene		10,000	90	7
1,2-Dichloroethene		7,000	1,500	4.2
Methylene chloride		94,000	BDL	5
4-Methyl-2-pentanone		14,000	BDL	350
Toluene		3,000	BDL	24
1,1,1-Trichloroethane		106,000	BDL	200
Trichloroethene		7,000	340	3
Vinyl chloride		2,000	340	1

[1]Constituents that were not detected in any sample are not shown.

Notes: mg/ℓ = milligrams per liter.
VOCs = volatile organic compounds.
µg/ℓ = micrograms per liter.
MEK = methyl ethyl ketone.

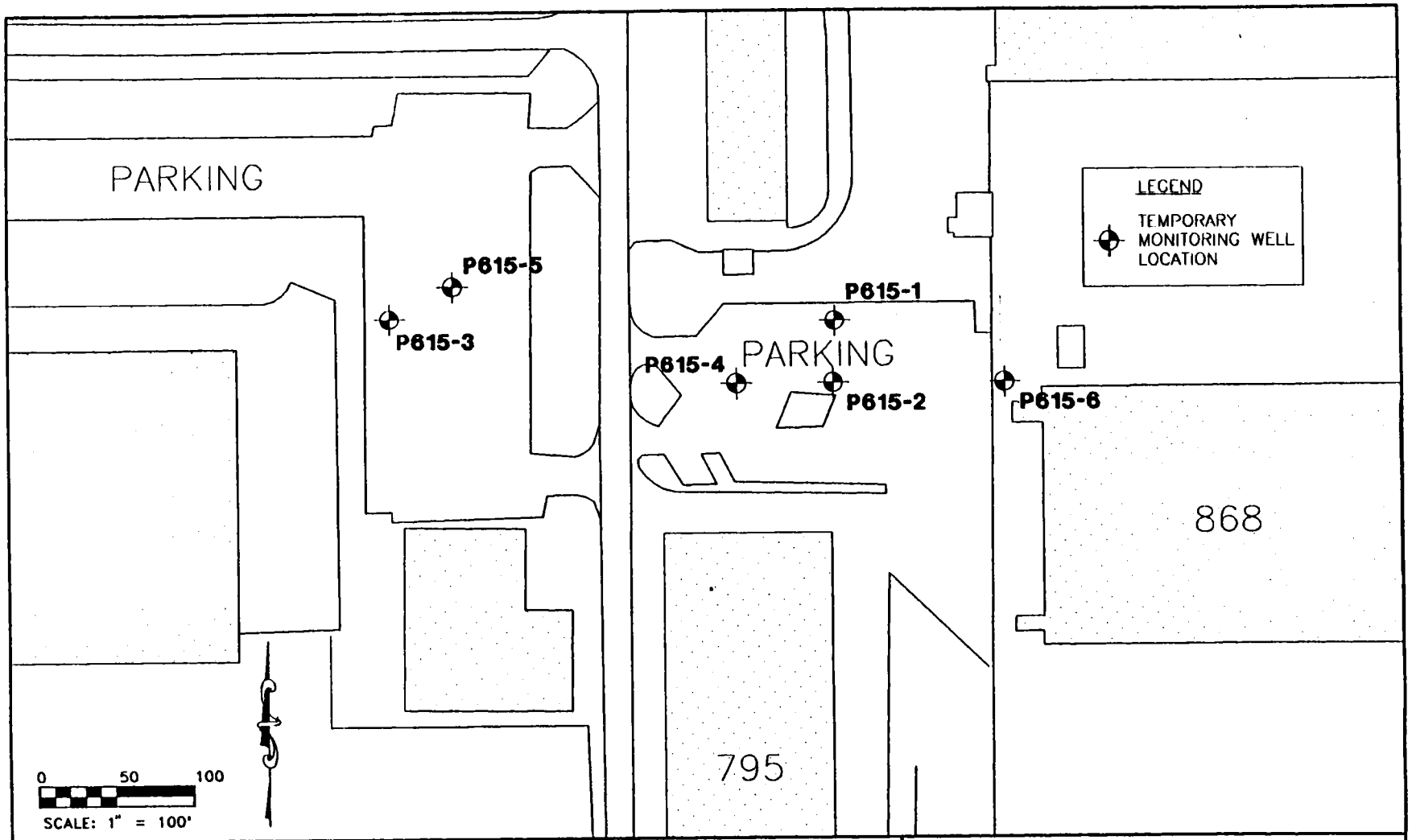


FIGURE B-6
SOIL AND GROUNDWATER SAMPLING LOCATIONS AT MILCON P615

RI/FS WORKPLAN FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRM/10-31-94

Table B-7
Constituents Detected in Soil Samples, MILCON P615

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Analyte	Concentration by Station (µg/ℓ)											
	SS01		SB01		SS02		SB02		SS03		SB03	
Inorganics												
Aluminum	11,900		5,330		10,300		3,480		684		6,870	
Antimony	9.0	U	8.6	U	8.8	U	9.1	U	7.7	U	8.6	U
Arsenic	0.24	U	0.23	U	0.23	U	0.24	U	0.20	U	0.23	U
Barium	17.8	B	11.6	B	14.3	B	20.7	B	4.5	B	17.0	B
Beryllium	0.24	J	0.23	J	0.24	UJ	0.25	UJ	0.21	UJ	0.23	UJ
Cadmium	0.73	U	0.70	U	0.71	U	0.74	U	0.63	U	0.70	U
Calcium	2,330		615	B	3,330		3,100		1,050		168	B
Chromium	13.1		8.6		12.4		16.8		1.0	U	8.1	
Cobalt	3.6	J	4.5	J	3.2	U	3.5	U	2.9	U	3.2	U
Copper	1.5	J	1.9	J	0.95	J	0.99	J	0.63	UJ	1.4	J
Iron	7,000		2,240		9,950		1,810		488		2,630	
Lead	8.5		2.6		4.8		3.7		1.5	J	5.2	
Magnesium	799	B	253	B	634	B	177	B	54.0	B	350	B
Manganese	11.4		5.4		12.4		3.7		6.9		4.2	
Potassium	742	B	292	B	652	B	229	B	69.8	J	355	B
Sodium	196	B	174	B	187	B	178	B	148	B	174	B
Thallium	0.24	U	0.23	U	0.23	U	0.24	U	0.20	U	0.23	U
Vanadium	24.6		12.9		29.7		11.4	B	2.5	J	14.1	
Zinc	11.9	J	4.0	J	9.5	J	4.0	J	2.1	J	5.06	J
Organics												
Volatile Organics												
Acetone	26	J	29	UJ	12	UJ	39	UJ	13	UJ	13	J
2-Butanone	12	UJ	12	UJ	12	UJ	3	J	11	UJ	12	UJ
Semivolatile Organics												
Di-n-butylphthalate	410	U	63	J	45	J	100	J	91	J	74	J
Pesticides/PCBs												
alpha-BHC	2.1	U	2.0	U	2.0	U	2.0	U	1.8	U	2.0	U
beta-BHC	2.1	U	0.43	UJ	0.45	UJ	0.36	UJ	1.8	U	0.35	UJ
delta-BHC	2.1	U	2.0	U	2.0	U	0.68	J	1.8	U	2.0	U
Heptachlor	2.1	U	2.0	U	2.0	U	2.0	U	1.8	U	2.0	U
Dieldrin	4.1	U	4.0	U	4.0	U	4.1	U	3.5	U	4.0	U
Methoxychlor	21	U	2.0	U	20	U	20	U	18	U	20	U
Endrin ketone	4.1	U	4.0	U	0.46	UJ	4.1	U	0.85	U	1.0	UJ
alpha-Chlordane	2.2	J	7.0	J	0.28	J	13		1.8	U	2.0	U
gamma-Chlordane	2.6		7.1		0.21	J	12		1.8	U	2.0	U

See notes at end of table.

Table B-7 (Continued)
Constituents Detected in Soil Samples, MILCON P615

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Analyte	Concentration by Station (µg/ℓ)											
	SS04		SB04		SS05		SB05		SS06		SB06	
Inorganics												
Aluminum	11,200		5,830		13,600		1,510		7,560		6,410	
Antimony	8.1	U	8.4	U	8.1	U	8.1	U	8.3	U	8.8	U
Arsenic	0.21	U	3.2		1.7	B	0.22	U	0.23	U	0.41	B
Barium	11.6	B	10.0	B	22.8	B	3.5	B	13.6	U	13.1	B
Beryllium	0.22	UJ	0.23	UJ	0.22	U	0.22	UJ	0.22	UJ	0.24	UJ
Cadmium	0.66	U	0.67	U	0.67	U	0.66	U	0.67	U	0.72	U
Calcium	1,630		3,040		1,730		127	B	8,910		11,800	
Chromium	14.1		9.8		29.6		3.5	J	11.6		11.1	
Cobalt	3.1	U	3.2	U	3.1	U	3.1	U	4.9	J	3.2	J
Copper	0.66	J	1.4	J	0.67	UJ	0.66	UJ	0.90	J	0.95	J
Iron	5,070		4,400		31,500		396		5,920		5,320	
Lead	4		6.4		10.5		1.4	J	6.5		3.6	
Magnesium	487	B	355	B	588	B	79.0	B	532	B	460	B
Manganese	8.8		6.5		9.6		3.1	B	7.5		6.2	
Potassium	391	B	314	B	600	B	91.0	J	521	B	452	B
Sodium	170	B	175	B	175	B	133	B	166	B	172	B
Thallium	0.21	U	0.23	U	0.33	J	0.22	U	0.23	U	0.24	U
Vanadium	15.0		16.2		49.2		2.4	J	17.8		22.8	
Zinc	7.9	J	10.3	J	45.9		1.3	J	5.8	J	4.8	J
Organics												
Volatile Organics												
Acetone	33	UJ	22	UJ	11	UJ	8	UJ	64	UJ	18	UJ
2-Butanone	2	UJ	12	UJ	11	UJ	11	UJ	12	UJ	12	UJ
Semivolatile Organics												
Di-n-butylphthalate	360	U	390	U	38	J	380	U	54	J	45	J
Pesticides/PCBs												
alpha-BHC	1.8	U	2.0	U	0.30	J	1.9	U	1.9	U	2.1	U
beta-BHC	1.8	U	0.34	UJ	0.44	J	1.9	U	1.9	U	0.42	UJ
delta-BHC	1.8	U	2.0	U	1.8	U	1.9	U	1.9	U	2.1	U
Heptachlor	1.8	U	0.58	J	1.8	U	1.9	U	19	U	2.1	U
Dieldrin	0.45	J	0.29	J	3.7	U	3.8	U	3.9	U	1.5	J
Methoxychlor	1.1	J	20	U	4.1	J	0.94	J	1.9	U	21	U
Endrin ketone	0.92	UJ	3.9	U	27		2.9	J	3.9	U	4.1	U
alpha-Chlordane	6.0	J	15	J	1.8	U	1.9	U	1.9	U	2.1	U
gamma-Chlordane	8.6		20		1.8	U	1.9	U	1.9	U	2.1	U

Notes: Analytes not reported herein were not detected in any of the samples. All inorganic parameter concentrations reported in milligrams per kilogram. All organic parameter concentrations reported in micrograms per kilogram.
U = The material was analyzed but not detected. The associated numerical value is the detection limit.
J = The associated numerical value is an estimate.
B = Reported concentration is greater than the laboratory instrument detection level but less than the contract required detection limit.
UJ = The material was reported by the laboratory as present at an estimated concentration that was below the laboratory quantification limit.
PCBs = polychlorinated biphenyls.
BHC = benzene hexachloride.

Table B-8
Constituents Detected in Groundwater Samples, MILCON P615

RI/FS Workplan - Operable Unit 3
NAS Jacksonville, Florida

Analyte	Concentration by Station (µg/ℓ)											
	W01		W02		W03		W04		W05		W06	
Inorganics												
Aluminum	42,500		50,800		69,100		8,920		222,000		157,000	
Arsenic	1.0	U	3.5	B	1.9	B	1.2	B	13.6		2.2	B
Barium	108	B	198	B	212		154	B	437		438	
Beryllium	1.0	U	1.0	B	2.0	B	1.0	U	5.0		3.0	B
Calcium	27,000		26,300		9,090		8,460		16,300		37,200	
Chromium	38.0		64.0		77.0		11.0		255		203	
Copper	14.0	B	18.0	B	19.0	B	11.0	B	37.0		34.0	
Iron	11,300		19,300		21,900		2,690		60,800		66,900	
Lead	9.8		11.3		8.6		9.3		22.0		21.3	
Magnesium	7,890		4,500	B	10,300		5,540		16,600		14,700	
Manganese	55.0		70.0		50.0		28.0		165		87.0	
Mercury	.20		.20	U	.41		.28		.44		.20	
Nickel	17.0		17.0	U	17.0	U	17.0	U	65		27.0	
Potassium	6,720		5,840		4,990	B	4,020	B	11,300		14,300	
Sodium	5,530		5,170		6.840		10,200		10,300		11,900	
Vanadium	53		81.0		78.0		15.0	B	270		298	
Zinc	72		153		98.0		63.0		193		131	
Organics												
Volatile Organics												
Acetone	8	J	9	J	5	J	100	U	5	J	10	U
Trichloroethene	10	U	7	J	10	U	[1]1,300		10	U	8	J
Semivolatile Organics												
Di-n-butylphthalate	1	J	2	J	2	J	1	J	1	J	3	J
Chrysene	2	J	10	U	10	U	10	U	10	U	10	U
Naphthalene	10	U	10	U	10	U	10	U	10	U	12	
2-Methylnaphthalene	10	U	10	U	10	U	10	U	10	U	1	J
Acenaphthrene	10	U	10	U	10	U	10	U	10	U	1	J
Dibenzofuran	10	U	10	U	10	U	10	U	10	U	1	J
Fluorene	10	U	10	U	10	U	10	U	10	U	1	J
Phenanthrene	10	U	10	U	10	U	10	U	10	U	0.5	J
Carbazole	10	U	10	U	10	U	10	U	10	U	0.8	J
bis(2-Ethylhexyl)phthalate	2	J	10	U	10	U	10	U	10	U	10	J
Pesticides												
beta-BHC	.05	U	.05	U	.107	J	.05	U	.05	U	.05	U
delta-BHC	.014	J	.05	U	.05	U	.05	U	.05	U	.05	U
gamma-BHC (Lindane)	.009	J	.05	U	.05	U	.05	U	.05	U	.05	U
Heptachlor expoxide	.018	J	.05	U	.05	U	.05	U	.05	U	.05	U
Dieldrin	.031	J	.19	J	.10	U	.10	U	.10	U	.032	J
4,4–DDE	.10	U	.10	U	.10	U	.10	U	.01	J	.10	U
alpha-Chlordane	.12	U	.022	J	.05	U	.05	U	.05	U	.05	U
gamma-Chlordane	.11	U	.012	J	.05	U	.05	U	.05	U	.05	U

[1]Trichloroethene concentrations in associated quality assurance samples: duplicate at 1,400.

Notes: Analytes not reported herein were not detected in any of the samples. All chemical concentrations reported in micrograms per liter.
U = The material was analyzed but not detected. The associated numerical value is the detection limit.
J = The associated numerical value is an estimate.
B = Reported concentration is greater than the laboratory instrument detection limit but less than the contract required detection limit.
BHC = benzene hexachloride.
DDE = dichlorodiphenyldichloroethylene.

The most significant contaminant was trichloroethene, which was detected in a field sample and a replicate sample at concentrations of 1,300 and 1,400 $\mu g/\ell$, respectively. The detected concentrations of chromium (203 and 255 $\mu g/\ell$) are associated with the turbidity of the groundwater sample.

Acetone, bis(2-ethylhexyl)phthalate, and di-n-butylphthalate were found in the quality control blanks and were thought to be artifacts of the laboratory or equipment decontamination.

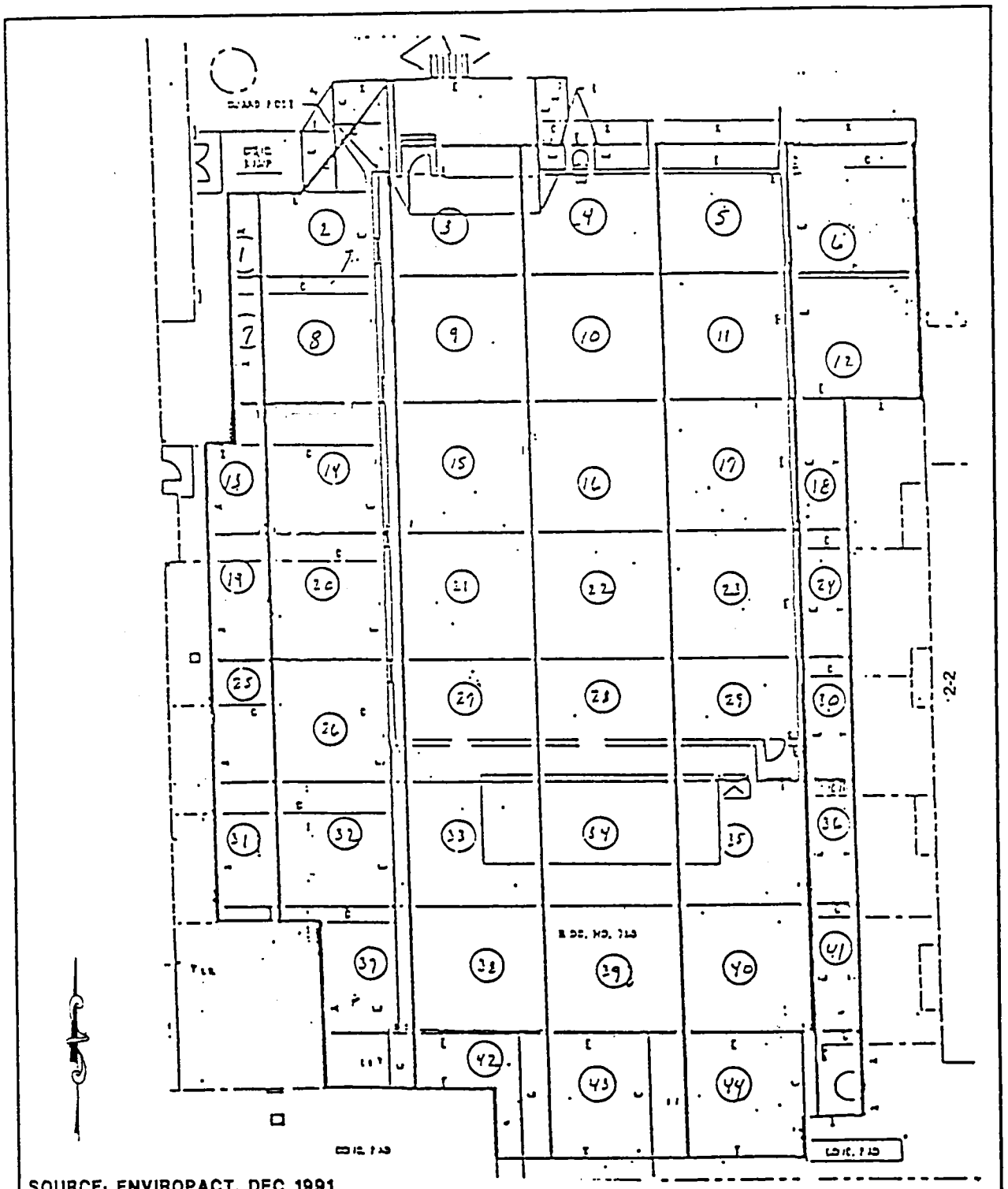
BUILDING 780 CONSTRUCTION SITE, HEALTH THREAT EVALUATION

In 1992, SOUTHNAVFACENGCOM contracted with ABB-ES to conduct a health threat evaluation at the Building 780 construction site (Figure B-2). The proposed construction project was at the Closed-Loop Solvent Recycling Facility. The purpose of the health threat evaluation was to assess the potential for construction workers and other NADEP workers to be exposed to concentrations of VOCs that could cause adverse health effects during the excavation and removal of soils at the Building 780 construction site. ABB-ES evaluated the results of three soil sampling events; conducted site visits; conducted a controlled, experimental excavation of soil at the site; and used the Research Triangle Institute Land Treatment Model to simulate the volatilization, dispersion, and concentration of VOCs emanating from construction excavations.

In 1990, G&M conducted an assessment of potential soil and groundwater contamination at the proposed construction site at Building No. 780. Soil and groundwater samples were found to contain concentrations of VOCs and inorganics constituents. Construction activities began at the site in 1991. During removal of concrete and asphalt, which covered the Building 780 site, high concentrations of VOCs were detected emanating from the exposed subgrade and the construction work was stopped.

The Navy's construction contractor retained Enviropact to collect soil samples at the site. The site was divided into 44 sampling zones and soil sample composites were collected at depths of 0 to 3 feet and 3 to 6 feet below land surface (bls) (Figure B-7). Each of the soil samples was analyzed for VOCs, and two of the soils samples were analyzed by the USEPA TCLP procedure. The analytical results indicated that VOCs were at relatively low concentrations in the northern part of the site and at higher concentrations in the western and southern parts of the site. The following presents a summary of the highest detected concentrations of the VOCs:

Compound	Concentration, $\mu g/kg$
• Bromodichloromethane	122
• Chlorobenzene	150
• Chloroform	3,120
• Dibromochloromethane	101
• 1,2-Dichlorobenzene	886
• 1,3-Dichlorobenzene	1,550
• 1,4-Dichlorobenzene	1,020
• 1,1-Dichloroethane	572
• 1,1-Dichloroethene	9,640
• Methylene chloride	2,380



SOURCE: ENVIROPACT, DEC 1991

FIGURE B-7
SOIL SAMPLE LOCATIONS AT BUILDING 780

RI/FS WORKPLAN FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

• 1,1,1-Trichloroethane	400,000
• Tetrachloroethene	6,180
• Toluene	17,100
• Trichloroethene	6,740
• Xylenes	4,500

Because the sampling protocol used by Enviropact was not adequate for decisions regarding a health threat evaluation, ABB-ES recommended another round of sampling and analysis employing appropriate soil sampling techniques to confirm or augment the existing data. The results of this sampling event confirmed the analytical results of the previous sampling events. The analytical results from Enviropact, dated December 1991, and ABB-ES, dated February 1992, are provided in Table B-9.

Concentrations of VOCs were detected in the ambient air during several site visits by ABB-ES and Navy personnel. During the first site visit, concentrations of methylene chloride, which is related to NADEP operations, were detected with a Miran™ 10X in the air surrounding the site. In addition, when soils were disturbed by foot traffic, concentrations of trichloroethene and 1,1,1-trichloroethane were detected. These compounds could not be directly attributable to volatilization from the soil because the two compounds are used at NADEP. However, it was also suggested that measurable levels of VOCs could be released when the solids were disturbed. Another site visit was made after computer simulation of high vapor pressure VOCs in the groundwater suggested that detectable concentrations of vinyl chloride might be present in the breathing zone.

During the second site visit, a Miran™ 10X was used to confirm the potential for vinyl chloride to be present at the site. Concentrations of vinyl chloride were detected in excess of 1,000 ppm in depressions made previously in 1991 to collect soil samples. Vinyl chloride was not detected in the breathing zone. A third site visit was made to confirm the presence of vinyl chloride with Dräger tube sampler. This sampling event confirmed that detectable concentrations of vinyl chloride were present in the soil, but were not detected in the breathing zone.

The controlled, experimental excavation of soil at the site consisted of excavating one 3-foot deep hole with a 4-inch diameter hand auger and excavating a 1-cubic-meter pit at locations suspected as uncontaminated and contaminated. VOCs detected within the borehole at the uncontaminated location consisted of 1,1-dichloroethene (3.5 ppm) and 1,1,1-trichloroethane (28 ppm). VOCs detected within the pit at the contaminated location consisted of vinyl chloride (30 ppm), tetrachloroethene and trichloroethene (20 ppm), and 1,1,1-trichloroethane (350 ppm). Vinyl chloride was not detected in the breathing zone at either location. 1,1,1-Trichloroethane was detected in the breathing zone at concentrations of 1.8 to 6.7 ppm at the contaminated location.

The computer simulation of the construction excavation activities was conducted to predict concentrations of airborne VOCs and determine a human health safety zone(s). The safety zone would be the distance from the excavation that would protect construction workers and NADEP employees from potential adverse health effects from exposure to VOCs during the construction excavation activities. Six VOCs were selected, based on their having the highest concentrations detected in the soil samples and their known human health hazards from exposure by inhalation. The compounds selected and concentration modeled were chloroform

Table B-9
Constituents Detected in Soil Samples, Building 780

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Sample Grid Number[1]	Chemical	Sample Depth	December 1991 (µg/kg)	Sample Depth	February 1992 (µg/kg)
1			BDL		NS
2			BDL		NS
3			BDL		NS
4			BDL		NS
5			BDL		NS
6			BDL		NS
7			BDL		NS
8			BDL		NS
9			BDL		NS
10	1,1-Dichloroethane	U	BDL	S	[2]3.3 to 11.4
	Toluene	U	BDL	S	6.2 to [2]10.8
	1,1,1-Trichloroethane	U	BDL	S	[2]136 to 265
	Trichloroethene	U	BDL	S	[2]6.7 to 15.0
	Xylenes	U	BDL	S	5.9 to [2]13.1
11			BDL		NS
12			BDL		NS
13			BDL		NS
14	1,1,1-Trichloroethane	S	282	S	86.8
	Trichloroethene	S	BDL	S	2.9
	1,1-Dichloroethane	S	BDL	S	2.8
	Toluene	S	BDL	S	7.7
	Xylenes	S	BDL	S	10.1
	1,4-Dichlorobenzene	S	137	S	BDL
	1,1,1-Trichloroethane	D	BDL	D	86.9
	Trichloroethene	D	BDL	D	3.3
	1,1-Dichloroethane	D	BDL	D	15.9
	Toluene	D	BDL	D	7.8
	Xylenes	D	BDL	D	9.1
15			BDL		NS
16			BDL		NS
17			BDL		NS
18	1,1,1-Trichloroethane	S	863		NS
	1,1,1-Trichloroethane	D	615		NS
19			BDL		NS
20			BDL		NS
21	1,1,1-Trichloroethane	S	1,920	S	36.1
	Trichloroethene	S	265	S	BDL
	Toluene	S	BDL	S	4.9
	Xylenes	S	BDL	S	9.6
22			BDL		NS
23	Methylene chloride	S	2,380	S	BDL
	Trichloroethene	S	BDL	S	22.1
	1,1,1-Trichloroethane	S	1,910	S	650
	1,1-Dichloroethane	S	255	S	2.5

See notes at end of table.

Table B-9 (Continued)
Constituents Detected in Soil Samples, Building 780

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Sample Grid Number[1]	Chemical	Sample Depth	December 1991 (µg/kg)	Sample Depth	February 1992 (µg/kg)
	Tetrachloroethene	S	BDL	S	6.7
	1,1,2-Trichloroethane	S	BDL	S	13.7
	Ethyl benzene	S	BDL	S	3.9
	Toluene	S	BDL	S	49.6
	Xylenes	S	BDL	S	33.6
	Benzo(a)anthracene	S	BDL	S	370
	Benzo(b)fluoranthene	S	BDL	S	400
	Chrysene	S	BDL	S	390
	Fluoranthene	S	BDL	S	790
	Phenanthrene	S	BDL	S	330
24	Toluene	S	1,420		NS
	Xylene	S	1,370		NS
	1,2-Dichlorobenzene	S	171		NS
	1,1-Dichloroethene	D	202		NS
	1,1,1-Trichloroethane	D	17,700		NS
	Trichloroethene	D	157		NS
	1,1-Dichloroethene	D	3,750		NS
	1,1,1-Trichloroethane	D	400,000		NS
	Trichloroethene	D	2,850		NS
25	1,1,1-Trichloroethane	U	538		NS
26	1,1,1-Trichloroethane	S	992		NS
	Trichloroethene	S	120		NS
	1,1,1-Trichloroethane	D	1,710		NS
	Trichloroethene	D	213		NS
27	1,1,1-Trichloroethane	S	160	S	35.3 to [2]14,400
	Trichloroethene	S	BDL	S	[2]1,060 to 1,070
	1,1-Dichloroethane	S	BDL	S	2,260 to [2]2,260
	1,1-Dichloroethene	S	BDL	S	840 to [2]1,080
	Methylene chloride	S	BDL	S	[2]1,050 to 1,100
	Toluene	S	BDL	S	BDL to 4.2
	Xylenes	S	BDL	S	BDL to 7.9
	2,4-Dimethylphenol	S	BDL	S	30 to [2]45
	4-Methylphenol	S	BDL	S	11 to [2]15
	2-Methylphenol	S	BDL	S	7.3 to [2]10
	Phenol	S	BDL	S	7.9 to [2]11
	1,1-Dichloroethane	D	255	D	2,260
	Methylene chloride	D	416	D	1,100
	1,1-Dichloroethene	D	255	D	840
	1,1,1-Trichloroethane	D	5,480	D	15,100
	Trichloroethene	D	220	D	1,070
	Tetrachloroethene	D	121	D	BDL
	Toluene	D	598	D	BDL
	2,4-Dimethylphenol	D	BDL	D	30
	2-Methylphenol	D	BDL	D	7.3

See notes at end of table.

Table B-9 (Continued)
Constituents Detected in Soil Samples, Building 780

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Sample Grid Number[1]	Chemical	Sample Depth	December 1991 (µg/kg)	Sample Depth	February 1992 (µg/kg)
	4-Methylphenol	D	BDL	D	11
	Phenol	D	BDL	D	7.9
28	Toluene	D	957		NS
	Methylene chloride	D	101		NS
	1,1,1-Trichloroethane	D	3,100		NS
	Trichloroethene	D	1,460		NS
	Tetrachloroethene	D	1,200		NS
29			BDL		NS
30	1,1,1-Trichloroethane	S	4,700		NS
	Trichloroethene	S	257		NS
	Toluene	D	283		NS
	Chlorobenzene	D	150		NS
	1,2-Dichlorobenzene	D	537		NS
	1,1,1-Trichloroethane	D	9,330		NS
	Trichloroethene	D	344		NS
31	1,1,1-Trichloroethane	U	843		NS
32	1,1,1-Trichloroethane	U	480		NS
33	Xylenes	S	219		NS
	1,1,1-Trichloroethane	S	993		NS
	Trichloroethene	D	177		NS
	Tetrachloroethene	D	291		NS
	1,1,1-Trichloroethane	D	4,940		NS
	Trichloroethene	D	2,210		NS
	Tetrachloroethene	D	291		NS
	1,2-Dichlorobenzene	D	102		NS
34	Barium (TCLP)	S	0.009 mg/L		NS
	Cadmium (TCLP)	S	0.040 mg/L		NS
	Chromium (TCLP)	S	0.130 mg/L		NS
	1,4-Dichlorobenzene	S	430		NS
	1,2-Dichlorobenzene	S	886		NS
	1,1,1-Trichloroethane	S	439		NS
	Tetrachloroethene	S	126		NS
34	Barium (TCLP)	D	0.001 mg/L		NS
	Cadmium (TCLP)	D	0.014 mg/L		NS
	Chromium (TCLP)	D	0.230 mg/L		NS
	Mercury (TCLP)	D	0.016 mg/L		NS
	Toluene	D	102		NS
	1,1,1-Trichloroethane	D	446		NS
	Trichloroethene	D	368		NS
35	2-Butanone	U	BDL	S	305
	Toluene	U	BDL	S	4.4
	1,1,1-Trichloroethane	U	BDL	S	51.5
	1,1,2-Trichloroethane	U	BDL	S	3.1

See notes at end of table.

Table B-9 (Continued)
Constituents Detected in Soil Samples, Building 780

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Sample Grid Number[1]	Chemical	Sample Depth	December 1991 (µg/kg)	Sample Depth	February 1992 (µg/kg)
	Xylenes	U	BDL	S	7.0
	1,1-Dichloroethane	U	BDL	S	1,880
	1,1-Dichloroethene	U	BDL	D	3,570
	1,1,1-Trichloroethane	U	BDL	D	111,000
	Trichloroethene	U	BDL	D	6,180
	Phenol	U	BDL	D	3,200
36	1,1-Dichloroethene	S	223		NS
	Chloroform	S	109		NS
	1,1,1-Trichloroethane	S	22,400		NS
	Trichloroethene	S	110		NS
	1,1,1-Trichloroethane	D	190,000		NS
	Trichloroethene	D	6,740		NS
37	1,1,1-Trichloroethane	S	316,000	S	5,460,000
	1,1-Dichloroethene	S	9,640	S	BDL
	1,1-Dichloroethane	S	572	S	BDL
	Toluene	S	17,100	S	BDL
	Xylenes	S	1,940	S	BDL
	Trichloroethene	S	18,300	S	BDL
	Tetrachloroethene	S	5,850	S	BDL
	bis(2-Ethylhexyl)phthalate	S	NR	S	950
38	1,2-Dichlorobenzene	U	251	S	NS
39	1,1,1-Trichloroethane	U	498		NS
40	1,4-Dichlorobenzene	U	126		NS
	1,2-Dichlorobenzene	U	142		NS
	1,1,1-Trichloroethane	U	1,510		NS
41	Barium (TCLP)	S	0.027 mg/L		NS
	Cadmium (TCLP)	S	0.088 mg/L		NS
	Chromium (TCLP)	S	0.029 mg/L		NS
	1,1,1-Trichloroethane	S	2,260		NS
	Methylene chloride	S	350		NS
	Trichloroethene	S	141		NS
	1,1,1-Trichloroethane	D	38,300		NS
	Trichloroethene	D	1,150		NS
42	Tetrachloroethene	S	6,180	S	13,000
	1,1,1-Trichloroethane	S	10,600	S	34,100
	Trichloroethene	S	3,270	S	5,770
	Toluene	S	2,070	S	1,860
	Xylenes	S	4,500	S	3,260
	Chloroform	S	3,120	S	BDL
	Bromodichloromethane	S	122	S	BDL
	Dibromochloromethane	S	101	S	BDL
	2-Methylnaphthalene	S	BDL	S	600
	Naphthalene	S	BDL	S	440
43	Tetrachloroethene	S	2,680	S	[2]769 - 3,440

See notes at end of table.

Table B-9 (Continued)
Constituents Detected in Soil Samples, Building 780

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Sample Grid Number	Chemical	Sample Depth	December 1991 (µg/kg)	Sample Depth	February 1992 (µg/kg)
	1,1,1-Trichloroethane	S	9,180	S	[1]12,800 - 23,100
	Trichloroethene	S	1,620	S	[1]1,120 - 2,980
	Toluene	S	364	S	1,110
	Xylenes	S	1,470	S	[1]320 - 1,850
	1,4-Dichlorobenzene	S	723	S	BDL
	1,3-Dichlorobenzene	S	209	S	BDL
	1,2-Dichlorobenzene	S	731	S	BDL
44	Xylenes	S	2,060		NS
	1,4-Dichlorobenzene	S	1,020		NS
	1,3-Dichlorobenzene	S	1,550		NS
	1,1,1-Trichloroethane	S	11,900		NS
	Trichloroethene	S	1,550		NS
	Tetrachloroethene	S	4,930		NS

[1]Results of duplicate sample.

Notes: µg/kg = micrograms per kilogram.
mg/ℓ = milligrams per liter.
TCLP = Toxicity Characteristics Leaching Procedure.
NS = not sampled.
BDL = below detection limits.
NR = no result reported.
S = shallow sample (0 to 3 feet).
D = deep sample (3 to 6 feet)

(3,120 ppm), methylene chloride (2,380 pm), tetrachloroethene (6,180 ppm), trichloroethene (6,740 ppm), 1,1,1-trichloroethane (400,000 ppm), and 1,1-dichloroethene (9,640 ppm).

Vinyl chloride was not selected because it was not detected in the breathing zone, even though it was apparently present in the experimental excavation pit. Vinyl chloride is a heavy gas, density of 2.5, and does not adhere to soil particles and cannot be adequately modeled. In addition, 1,1-dichloroethene has the same Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) of 1 ppm as vinyl chloride. Therefore, a safety zone protective against 1,1-dichloroethene should be protective against vinyl chloride.

The output of the modeling effort predicted that a condition considered hazardous to human health at an upper bound cancer risk of greater than 1 in a million ($1x10^{-6}$) or a Hazard Index of 1 could exist up to 30 meters (98.4 feet) away from the excavation site.

ENVIRONMENTAL HEALTH SAMPLING AT ALBEMARLE AVENUE AND WASP STREET

In 1993, the NAS Jacksonville Public Works Center contracted with Environmental Remediation Services, Inc. (ERS), to conduct an assessment of potential ambient air, soil, and groundwater contamination at an open excavation at the corner of Albemarle Avenue and Wasp Street (Figure B-2). The purpose of the analytical data was to determine the presence of chemical exposure hazards at the construction site and provide technical guidance regarding worker personal protection against suspected occupational hazards.

Soil samples were analyzed by USEPA Methods 8010 and 8020, the groundwater samples were analyzed by USEPA Method 601 and 602, and the air sample by USEPA Method TO-18. The sample locations were selected and mutually agreed upon by NAS Jacksonville personnel, F.D. Services, and ERS.

The soil samples were found to contain concentrations of 1,3-dichlorobenzene and 1,4-dichlorobenzene. 1,3-Dichlorobenzene was detected in four samples at concentrations of 20 μg/kg to 145 μg/kg. 1,4-Dichlorobenzene was detected in four samples at concentrations ranging from 262 μg/kg to 439 μg/kg.

The air sample was found to contain toluene at a concentration of 0.05 milligrams per cubic meters (mg/m^3) in four samples.

HEALTH THREAT EVALUATION, OLD ENGINE PROCESSING FACILITY

In 1992, SOUTHNAVFACENGCOM contracted with ABB-ES to conduct an assessment of the former electroplating shop located within the southeast part of Building 101 near the Old Engine Processing Facility (Figure B-2). The former electroplating shop contained approximately 90 tanks and 15 additional containers. The electroplating shop was divided into three separate rooms: the east room, the chrome room (central portion of the plating shop), and the west room. Seven liquid waste pretreatment tanks are located outside the building at the southeast coroner of Hangar 101, adjacent to Building 101A. The plating shop was partially closed in 1985 and has become dilapidated with numerous holes in the roof allowing rainwater

to collect in all areas of the shop. This building area was scheduled for demolition in 1993.

On Thursday, September 3, 1992, a noxious odor was reported to be emanating from the west room. Station fire department personnel entered the building area using self-contained breathing apparatus (SCBA) and attempted to identify the source of the fumes using Dräger tubes. The source and content of the fumes were not identified.

On September 9, 1992, ABB-ES and their emergency response contractor, Environmental Recovery Group, conducted a site inspection and from information gathered during this site visit subsequently prepared a site sampling and analyses plan to locate and identify the source of the reported fumes.

On September 10, 1992, entry was made into the west room; no evidence or source was identified for the noxious odors. Air samples were collected for analysis of VOCs, fuming acids, and cyanide.

On September 14 and 15, 1992, samples were collected of materials in the tanks, containers, and subfloor areas that showed signs of material spillage. On September 17, 1992, samples of potential asbestos containing materials were also collected.

Air Samples.

VOCs. The analytical results of the air samples collected on September 10, 1992, indicate that low levels of eight VOCs were detected in the air at the site. The concentrations of all these analytes were fairly uniform throughout the Western Room and did not indicate any specific potential source.

Acids. Samples for acid analyses were taken at four locations based on available information on previous tank usage. The analytical procedures quantitated the anions of hydrochloric, hydrofluoric, and phosphoric acid using the USEPA method described in EPA/600/4-79-020. The calculated air concentration of hydrochloric acid for sample location 01 was 5.61 mg/m^3.

Chloride. Only one positive result for chloride was reported--110 μg at sample location 01.

Cyanide. Samples collected in three locations were also analyzed for the presence of cyanide. The sampling locations were selected based upon reports of cyanide usage when the facility was in operation. No cyanide was detected in any sample.

Tank and Container Content Samples. All of the samples were analyzed for ignitability, pH, and presence of reactive sulfide or cyanide. None of the samples showed ignitability at less than 200 degrees Fahrenheit, the upper limit of the test. The pH of the samples ranged from 0.8 to 10.4, with 12 samples having a pH of less than 6.0 and 17 samples with a pH between 8 and 10.4.

Reactive cyanide and sulfide were analyzed by USEPA Methods 9012 and 9030, respectively. Levels of reactive cyanide ranged from 0.95 to 28.2 mg/kg in 11 samples and reactive sulfide ranged from 2.38 to 21.2 mg/kg. These concentrations are insufficient to generate significant levels of either hydrogen cyanide or hydrogen sulfide if the tank contents should become mixed with acid.

VOCs. VOCs were detected in only three samples (Table B-10). Trichloroethene (1,000 mg/kg) was detected in a sample collected at the east floor area. A sample collected from a tank also showed trichloroethene at 0.14 mg/kg and a liquid sample collected at the chrome room floor area was found to contain 0.38 mg/ℓ trichloroethene. Samples were also analyzed by TCLP methodology for VOCs. Ten samples showed positive results for trichloroethene or chloroform using this method.

SVOCs. Based on a list of the types of organic chemicals used in Building 101, the analysis focused on F001-F005 waste components during the analyses of VOCs and SVOCs in tank samples. The following compounds were analyzed for:

pyridine	hexachlorobutadiene
1,4-dichlorobenzene	2,4,5-trichlorophenol
2-methylphenol	2,4,6-trichlorophenol
3/4-methylphenol	2,4-dinitrotoluene
hexachloroethane	hexachlorobenzene

No SVOCs on this list were detected in any aqueous sample. Analysis of solid samples by TCLP methodology for the same constituents also did not detect any SVOCs.

For the solid samples, the list of SVOCs was further condensed to:

pyridine,
2-methylphenol,
3/4-methylphenol, and
nitrobenzene.

Low concentrations of pyridine and nitrobenzene were detected in every sample. Pyridine concentrations ranged from 0.33 to 0.52 mg/kg and nitrobenzene concentrations ranged from 0.12 to 0.19 mg/kg. Pyridine has a pungent unpleasant odor, which makes it a potential candidate as the odor source. However, the odor was described as "acetic acid-like" rather than pungent, which is the aroma characteristic of pyridine.

Metals. Metals were analyzed in 28 aqueous samples taken from Building 101 (Table B-11). The metals encountered most frequently were chromium, lead, cadmium, and arsenic. One sample, taken from Tank 47, was too thick to be treated as a liquid and had to be treated as a solid. The sample from this tank was found to contain 433,000 mg/kg of chromium. Twenty-two aqueous samples tested positive for chromium with ranges of 5.2 to 127,000 mg/ℓ. Similarly, cadmium ranged from 1.1 to 61,800 mg/ℓ. Lead ranged from 0.3 to 13,900 mg/ℓ.

Metals in the tank contents were not expected to pose a toxic hazard. Although the concentrations of many of these metals were elevated, they did not pose either an inhalation or a dermal hazard.

Asbestos Samples. An asbestos inspection was conducted by a USEPA-accredited asbestos surveyor on September 17, 1992. Samples were taken at 23 points within Building 101 and analyzed for asbestos using polarized light microscopy and

Table B-10
Volatile Organic Compounds Detected in Plating Shop Tanks

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Sampling Location	Trichloroethene	Chloroform
East Floor 2	1,000 mg/kg	
Tank 92	0.14 mg/kg	
Central Floor 1	0.38 mg/ℓ	
	By TCLP	**By TCLP**
East Floor 2	37.0 mg/ℓ	
Tank 55	0.026 mg/ℓ	
Tank 57	0.056 mg/ℓ	
Tank 70	0.080 mg/ℓ	
Tank 72	0.028 mg/ℓ	
Tank 82	0.099 mg/ℓ	
Tank 84	0.037 mg/ℓ	
Tank 85		0.66 mg/ℓ
Tank 88		0.071 mg/ℓ
Tank 92	0.037 mg/ℓ	

Notes: mg/kg = milligrams per kilogram.
mg/ℓ = milligrams per liter.
TCLP = Toxicity Characteristics Leaching Procedure.

Table B-11
Metals Detected in Plating Shop Tanks

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Metal	Number of Positive Detections	Average of Detected Concentrations (mg/ℓ)	Range of Detected Concentrations (mg/ℓ)
Arsenic	11	1.84	0.058 to 10.6
Cadmium	20	3,140	1.1 to 61,800
Chromium	22	9,990	5.2 to 127,000
Lead	20	1,510	0.3 to 13,900
Mercury	1	–	0.56
Selenium	1	–	0.36
Silver	2	20.7	18.8 to 22.6
		By TCLP	
Barium	34	0.77	0.29 to 2.1
Cadmium	26	47.9	0.014 to 1,090
Chromium	21	87.9	0.014 to 1,730
Lead	21	127	0.050 to 808
Mercury	17	0.13	0.00083 to 1.5
Silver	14	4.67	0.024 to 54.0

Notes: mg/ℓ = milligrams per liter.
TCLP = Toxicity Characteristics Leaching Procedure.

dispersion staining techniques in accordance with USEPA Bulk Analysis Method EPA 600/M4-82-020.

The asbestos surveyor noted that the building has a slab-on-grade foundation with metal and cement asbestos board walls. The roofing system is deteriorated with debris on the ground. Thermal system insulation consisting of pipe covering, elbow and valve coverings, tank covering, and debris was observed throughout the site, including in the loft area. The overall building condition was characterized as poor.

The surveyor attempted to obtain one sample of each type of suspect material accessible in Building 101. These samples were analyzed to determine whether they were asbestos-containing materials (ACMs). The surveyor also assessed each suspect material for friability, condition, and potential for disturbance. Friable materials by USEPA definition are those that can be crumbled, pulverized, or reduced to powder by hand pressure. Friable ACMs are usually more hazardous because they have greater potential to release airborne asbestos fibers. Material condition is rated as good, damaged, or significantly damaged. The higher the degree of damage, the more likely a material is to be capable of releasing fibers. Potential for fiber release is based on evidence of deterioration due to physical damage, water damage, air erosion, or high vibration.

Nineteen samples of thermal system insulation and insulation debris were taken in Building 101. Of these, 15 samples were found to contain varying amounts of chrysotile, amosite, and/or crocidolite asbestos. The asbestos surveyor observed that much of this material is significantly damaged and capable of releasing fibers. Two samples from the Transite wall board and wall board debris were collected. These were both found to contain 35 to 45 percent chrysotile asbestos. This material is in damaged condition. Two samples of black roofing debris were negative for asbestos.

Health Threat Evaluation. Three types of potential hazards have been identified on the basis of available data:

- an inhalation hazard due to acids,
- an inhalation hazard due to asbestos disturbed during cleanup, and
- a contact hazard due to corrosive acids and bases.

Hydrochloric acid was detected at 5.61 mg/m^3; although this value is below the PEL of 7 mg/m^3, it is a common industrial hygiene practice to recommend that respiratory protection be instituted at an action level of half the PEL.

Based on the air sampling and results of analyses of tank contents, organic vapors and cyanide are not expected to pose potential hazards at Building 101. Only low levels of VOCs were found during the air sampling, and analyses of tank contents showed mostly low levels of trichloroethene and chloroform only. No cyanide was detected in air samples, and analyses of tank contents showed only relatively low concentrations of reactive cyanide and sulfide.

The asbestos surveyor noted the presence of significantly damaged ACMs. Asbestos dust and debris on the floor of Building 101 were indicated to likely be disturbed during removal actions of the materials and fluids contained in the Plating Shop

tanks. These materials have a potential for causing an inhalation hazard for which protection must be provided.

The contents of the tanks ranged in pH from 0.8 to 10.4. If splashed on a worker during removal actions, these materials could cause injury.

On the basis of these hazards, the level of personal protective equipment appropriate for workers in this area was Level C. MSA™ GMC-H cartridges or their equivalent are recommended for respirator use. These cartridges provide protection against hydrogen chloride and a number of other common organic chemicals. GMC-H cartridges also incorporate a high efficiency particulate air (HEPA) filter adequate to protect against airborne asbestos fibers. A corrosive-resistant impermeable Tyvek™, such as Saranex™, was recommended for splash suits. Workers were advised to securely tape junctions, such as glove-and-suit and collars, to prevent possible skin contact with corrosives. In view of possible external contamination of the suits by asbestos and corrosives, a rigorous decontamination line was recommended to be established for personnel working in this site area.

SITE P-159 AND BUILDING 101 UST EVALUATION

Two field investigations were conducted concurrently at OU 3 in January 1993 (*Sampling Event Report NO. 15, Site P-159*, and *Sampling Event Report NO. 16, Building 101 Underground Storage Tanks* (ABB-ES, 1993)). The areas investigated during this field investigation are shown on Figure B-2. The purpose of the sampling event at site P-159 was to conduct a groundwater and soil evaluation, which was used to assess potential human health risks at the site (Figure B-8). This risk evaluation was conducted due to potential construction of a wash and rinse rack at the site. The site was deemed to present minimal risks to potential construction workers based on the soil and groundwater analytical results. The results are presented in Tables B-12 through B-16, which were copied from the sampling report.

Sampling Event No. 16 conducted at the UST sites at Building 101 (Figure B-9), was concurrent with the P-159 field effort (Figure B-2). The purpose of this field investigation was to assess soil and groundwater conditions in the area of onsite USTs.

The UST program at NAS Jacksonville is conducted under the guidance of the FDEP (Facility ID Number 168731736). However, locations within OU 3 where USTs appear to have released contaminants to soil and groundwater, will be included in the RI/FS at OU 3. This inclusion is in accordance with the Federal Facility Agreement (FFA) of October 1990 between the Navy, FDER, and the USEPA. Analytical results from Sampling Event Report 16 at Building 101 USTs are presented in Tables B-17 through B-20.

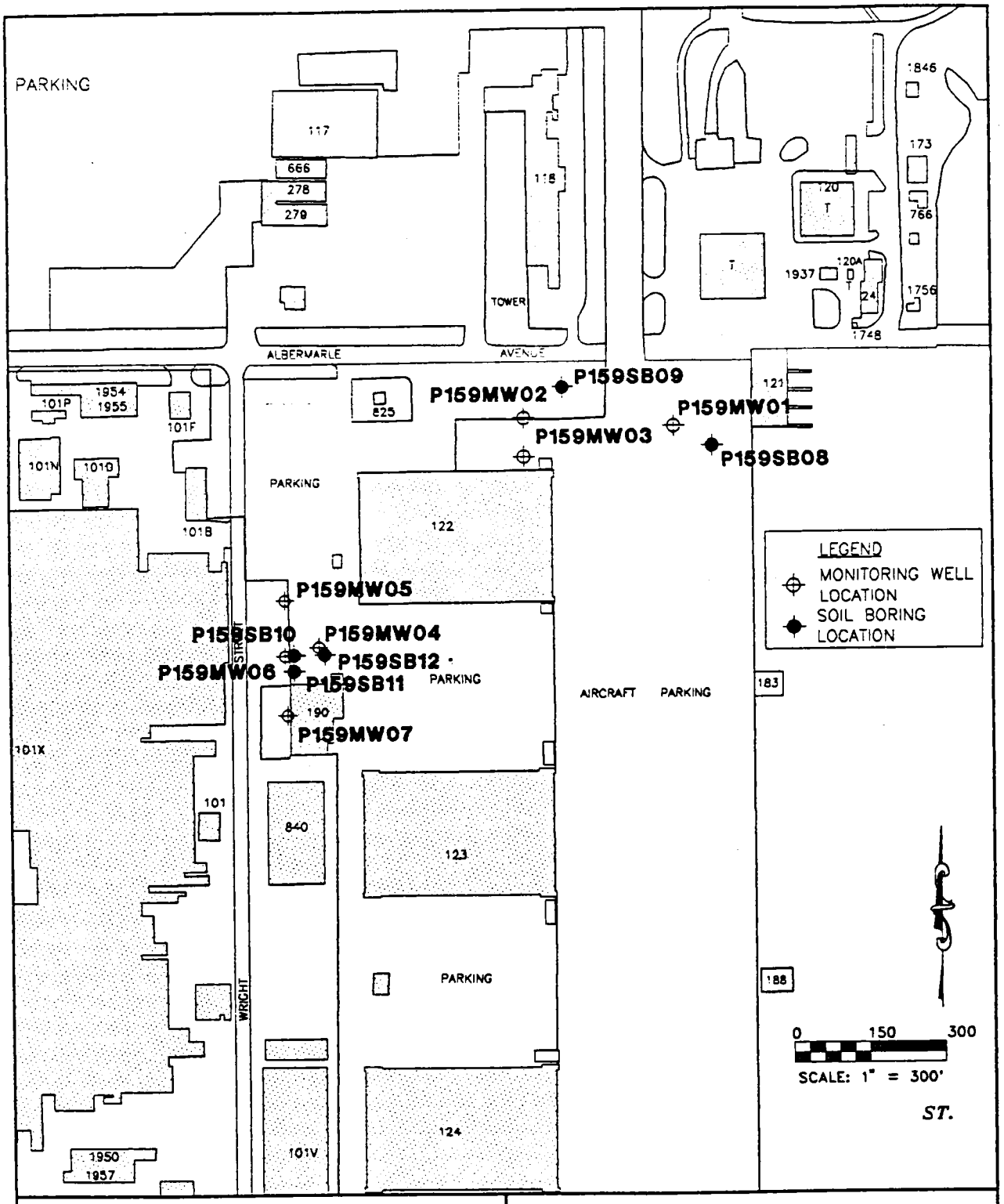


FIGURE B-8
P159 MONITORING WELL AND SOIL BORING LOCATIONS

RI/FS WORKPLAN FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRM/3-15-94

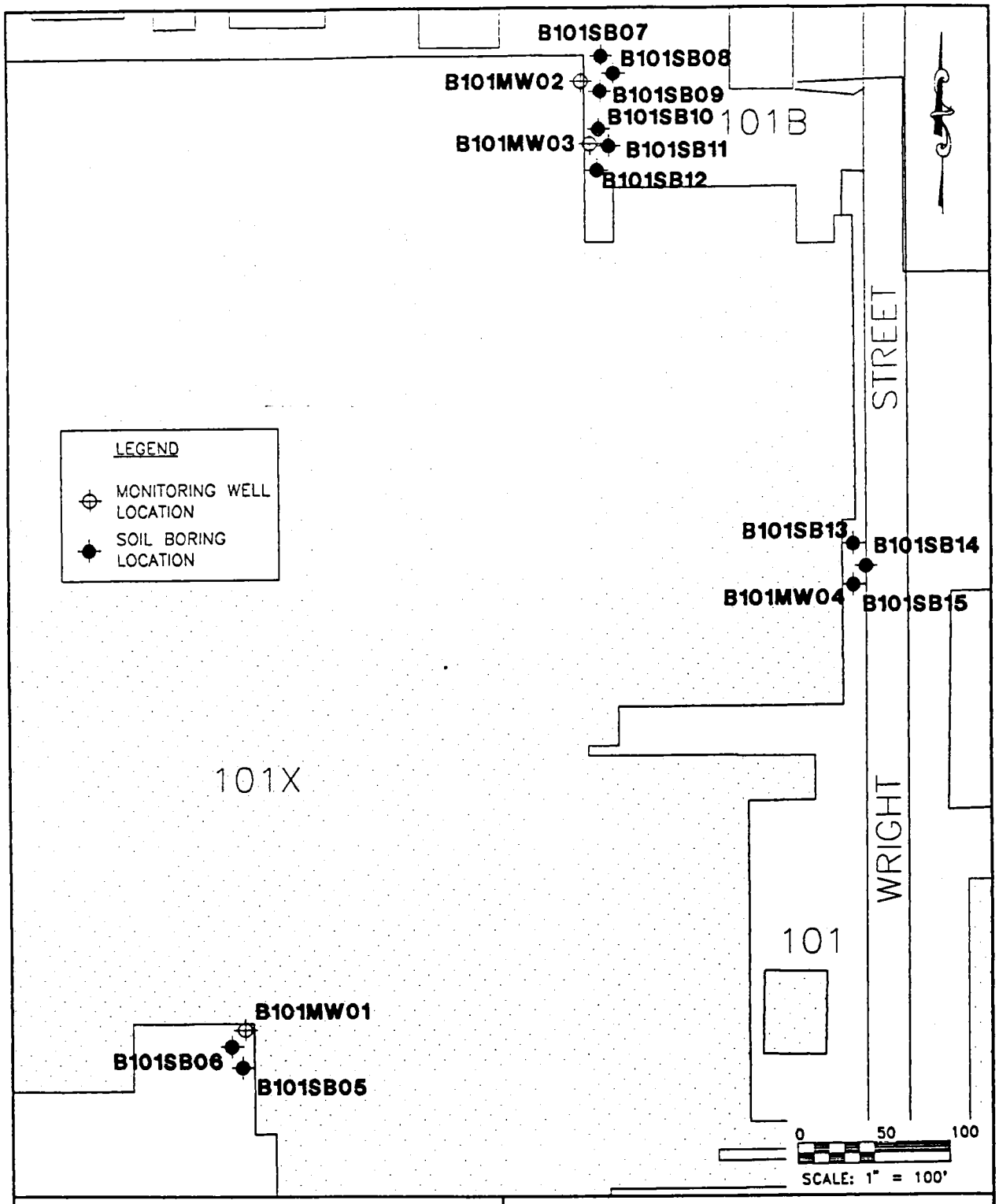


FIGURE B-9
SOIL SAMPLING AND MONITORING WELL LOCATIONS AT BUILDING 101 UST

RI/FS WORKPLAN FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRM/3-1-94

Table B-12
Summary Analytical Results for Soil Samples at Site P-159, Target Compound List (TCL) Volatile Organic Compounds (VOCs)

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Soil Boring Designation:	P-159 SB01		P-159 SB02		P-159 SB02D Duplicate		P-159 SB03		P-159 SB04		P-159 SB05		P-159 SB06		P-159 SB06D	
Analytical Parameter																
Volatile Organic Compound																
Acetone	12	U	30	U	12	U	11	U	38		33	U	30	U	27	U
2-Butanone	12	U	11	U	11	U	11	U	11	U	11	U	3	J	3	J
Tetrachloroethene	12	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U
Toluene	12	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U
Ethyl benzene	12	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U
Total xylenes	12	U	11	U	11	U	11	U	11	U	11	U	11	U	11	U

See notes at end of table.

Table B-12 (Continued)
Summary Analytical Results for Soil Samples at Site P-159, Target Compound List (TCL) Volatile Organic Compounds (VOCs)

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Soil Boring Designation:	P-159 SB07		P-159 SB08		P-159 SB09		P-159 SB10		P-159 SB11		P-159 SB12	
Analytical Parameter												
Volatile Organic Compounds												
Acetone	36	U	15	U	15	U	55		85		170	U
2-Butanone	11	U	12	U	11	U	11	U	11		25	J
Tetrachloroethene	11	U	12	U	11	U	11	U	25		110	J
Toluene	11	U	12	U	11	U	11	U	6	J	27	J
Ethyl benzene	11	U	12	U	11	U	11	U	10	J	40	J
Total xylenes	11	U	12	U	11	U	11	U	170		400	DJ

Notes: All concentrations reported as micrograms per kilogram (μg/kg).
U = indicates compound was not detected above detection limit; detection limit listed.
J = indicates an estimated value.
D = diluted sample.

Table B-13
Summary Analytical Results for Soil Samples at Site P-159, Target Compound List (TCL) Semivolatile Organic Compounds (SVOCs), and Pesticides and Polychlorinated Biphenyls (PCBs)

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Soil Boring Designation:	P-159 SB01		P-159 SB02		P-159 SB02D Duplicate		P-159 SB03		P-159 SB04		P-159 SB05		P-159 SB06		P-159 SB06D Duplicate	
Analytical Parameter																
Semivolatile Organic Compounds																
Naphthalene	390	U	380	U	380	U	350	U	380		350	U	360	U	380	U
2-Methylnaphthalene	390	U	380	U	380	U	350	U	210	J	350	U	360	U	380	U
Acenaphthene	390	U	380	U	380	U	350	U	350	U	350	U	360	U	380	U
Di-benofuran	390	U	380	U	380	U	350	U	350	U	350	U	360	U	380	U
Fluorene	390	U	380	U	380	U	350	U	350	U	350	U	360	U	380	U
Phenanthrene	390	U	380	U	380	U	350	U	350	U	350	U	360	U	380	U
Anthracene	390	U	380	U	380	U	350	U	350	U	350	U	360	U	380	U
Carbazole	390	U	380	U	380	U	350	U	350	U	350	U	360	U	380	U
Fluoranthene	390	U	380	U	380	U	350	U	59	J	350	U	360	U	380	U
Pyrene	390	U	380	U	380	U	350	U	60	J	350	U	360	U	380	U
Benzo(a)anthracene	390	U	380	U	380	U	350	U	350	U	350	U	360	U	380	U
Chrysene	390	U	380	U	380	U	350	U	350	U	350	U	360	U	380	U
bis(2-Ethylhexyl)phthalate	390	U	380	U	380	U	350	U	350	U	350	U	360	U	380	U
Benzo(b)fluoranthene	390	U	380	U	380	U	350	U	350	U	350	U	360	U	380	U
Benzo(a)pyrene	390	U	380	U	380	U	350	U	350	U	350	U	360	U	380	U
Diethylphthalate	390	U	380	U	380	U	110	J	350	U	350	U	360	U	380	U
Pesticides																
4,4-DDE	3.8	U	3.8	U	3.7	U	3.6	U	3.5	U	3.5	U	3.6	U	3.8	U
4,4-DDD	3.8	U	3.8	U	3.7	U	3.6	U	1.6	JP	3.5	U	3.6	U	2.3	J

See notes at end of table.

Table B-13 (Continued)
Summary Analytical Results for Soil Samples at Site P-159, Target Compound List (TCL) Semivolatile Organic Compounds (SVOCs), and Pesticides and Polychlorinated Biphenyls (PCBs)

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Soil Boring Designation:	P-159 SB07		P-159 SB08		P-159 SB09		P-159 SB10		P-159 SB11		P-159 SB12	
Analytical Parameter												
Semivolatile Organic Compounds												
Naphthalene	380	U	380	U	370	U	350	U	350	U	520	
2-Methylnaphthalene	380	U	380	U	370	U	350	U	350	U	130	J
Acenaphthene	380	U	380	U	370	U	350	U	350	U	93	J
Di-benofuran	380	U	380	U	370	U	350	U	350	U	83	J
Fluorene	380	U	380	U	370	U	350	U	350	U	180	J
Phenanthrene	380	U	380	U	370	U	350	U	350	U	800	
Anthracene	380	U	380	U	370	U	350	U	350	U	39	J
Carbazole	380	U	380	U	370	U	350	U	350	U	81	J
Fluoranthene	380	U	380	U	370	U	350	U	350	U	400	
Pyrene	380	U	380	U	370	U	350	U	350	U	450	
Benzo(a)anthracene	380	U	380	U	370	U	350	U	350	U	92	J
Chrysene	380	U	380	U	370	U	350	U	350	U	330	J
bis(2-Ethylhexyl)phthalate	380	U	380	U	370	U	350	U	350	U	80	J
Benzo(b)fluoranthene	380	U	380	U	370	U	350	U	350	U	540	
Benzo(a)pyrene	380	U	380	U	370	U	350	U	350	U	390	
Diethylphthalate	380	U	380	U	140	J	350	U	350	U	370	U
Pesticide												
4,4'-DDE	3.8	U	3.8	U	3.9	U	0.69	J	3.5	U	14	JP
4,4'-DDD	3.8	U	3.8	U	3.9	U	2.0	J	3.5	U	25	

Notes: All concentrations reported as micrograms per kilogram (μg/kg).
U = indicates compound not detected above analytical detection limit.
J = estimated concentration.
P = indicates greater than 25 percent difference for detected concentration between gas chromatograph columns.
DDE = dichlorophenyldichloroethene.
DDD = dichlorophenyldichloroethane.

Table B-14
Summary Analytical Results for Soil Samples at Site P-159, Target Analyte List (TAL) Inorganic Compounds

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Analytical Parameter	Soil Boring Designation															
	P-159 SB01		P-159 SB02		P-159 SB02D Duplicate		P-159 SB03		P-159 SB04		P-159 SB05		P-159 SB06		P-159 SB06D Duplicate	
Aluminum	687		106		94.2		222		75.5		320		102		202	
Antimony	2.9	UJ	2.8	UJ	2.8	UJ	2.6	UJ	2.6	UJ	2.6	U	2.6	U	2.8	U
Arsenic	1.1	B	0.16	U	0.16	U	0.26	B	0.15	U	0.23	B	0.20	B	0.27	B
Barium	4.0	J	2.2	J	2.3	J	3.0	J	2.2	J	2.2	J	1.6	J	2.3	U
Calcium	604	J	7,590	J	243	J	219	J	256	J	239	B	338	B	473	J
Chromium	2.2	J	2.4	J	4.5	J	1.7	J	1.9	J	1.8	B	0.81	U	1.7	B
Copper	2.2	J	1.5	J	2.8	J	1.7	J	2.7	J	0.87	U	1.1	U	1.4	U
Iron	1,760		191		171		620		115		388		270		453	
Lead	1.6		0.46	B	0.60	B	0.82		0.93		0.72	J	0.79	J	0.71	J
Magnesium	138	B	70.7	B	23.1	B	34.1	B	30.0	B	56.8	B	27	B	50.3	B
Manganese	5.3	J	2.2	J	2.9	J	3.1	J	2.0	J	6.9		2.9	B	5.1	
Potassium	147	B	44.0	U	44.0	U	52.3	B	41.1	U	92.1	U	45.7	U	93.9	U
Selenium	0.12	U	0.12	U	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Sodium	167	B	139	B	167	B	163	B	161	B	115	B	113	B	150	B
Vanadium	2.9	J	0.44	UJ	0.63	J	1.3	J	0.54	J	0.48	B	0.42	U	1.1	B
Zinc	5.6	J	1.6	J	2.1	J	3.0	J	2.7	J	1.7	J	0.89	J	1.7	J
Cyanide	0.18	U	0.17	U	0.17	U	0.16	U	3.4		0.16	U	0.16	U	0.17	U

See notes at end of table.

Table B-14 (Continued)
Summary Analytical Results for Soil Samples at Site P-159, Target Analyte List (TAL) Inorganic Compounds

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Analytical Parameter	Soil Boring Designation												Background Concentration Ranges for Elements in Soils	
	P-159 SB07		P-159 SB08		P-159 SB09		P-159 SB10		P-159 SB11		P-159 SB12		Eastern United States[1]	United States Sandy Soils[2]
Aluminum	182		116		1,320		151		251		614		7,000 - >10,000	
Antimony	2.8	U	2.8	UJ	7.8	UJ	2.5	UJ	2.5	UJ	3.0	J	<0.08 - 0.31	
Arsenic	0.32	B	0.49	B	1.3	B	0.17	B	0.15	U	0.89	B	<0.1 - 73	<0.01 - 300
Barium	3.1	J	2.1	J	7.7	J	4.2	J	3.1	J	5.3	J	<20 - 150	20 - 1,500
Calcium	2,260		403	J	499	J	3,370	J	685	J	42,000	J	100 - 280,000	--
Chromium	1.0	B	0.86	UJ	3.1	J	0.78	UJ	1.8	J	3.1	J	1 - 1,000	3 - 200
Copper	1.2	U	2.5	J	2.6	J	2.8	J	2.5	J	2.8	J	<1 - 7,000	1 - 70
Iron	771		391		2,250		309		385		724		<0.01 - >10	--
Lead	1.2	J	0.77		2.7		0.88		2.0		6.5		<10 - 300	10 - 70
Magnesium	61.8	B	39.4	B	156	B	86.2	B	75.0	B	345	B	50 - 50,000	--
Manganese	5.2		3.4	J	6.1	J	5.6	J	3.1	J	12.6	J	2 - 7,000	7 - 2,000
Potassium	132	U	44.6	U	177	B	40.2	U	73.9	B	120	B	50 - 37,000	--
Selenium	0.12	U	0.12	U	0.21	B	0.11	U	0.11	U	0.11	U	1 - 3.9	<0.005 - 3.5
Sodium	156	B	171	B	170	B	142	B	159	B	165	B	500 - 50,000	--
Vanadium	0.79	B	0.67	J	3.1	J	0.89	J	1.1	J	2.8	J	7 - 300	7 - 150
Zinc	1.0	J	1.8	J	4.9	J	2.4	J	2.9	J	10.4		5 - 29,000	<5 - 164
Cyanide	0.17	U	0.18	U	0.17	U	0.16	U	0.16	U	0.17	U	--	--

[1]Shacklette and Boerngen 1984, Table 2, East of Longitude 96° West.
[2]Kabata-Pendias and Pendias, 1984.

Notes: All concentrations reported as milligrams per kilogram (mg/kg).
U = compound not detected above Instrument detection limit.
J = estimated concentration.
B = detected concentrations is less than contract required detection limit but greater than instrument detection limit.
UJ = indicates compound not detected, instrument detection limit is estimated.

Table B-15
Summary Analytical Results for Groundwater Samples at Site P-159, Volatile Organic Compounds (VOCs) and Semivolatile Organic Compounds (SVOCs)

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Analytical Parameter	Sample Designation								Maximum Contaminant Levels
	P-159 MW01	P-159 MW02	P-159 MW02D	P-159 MW03	P-159 MW04	P.159 MW05	P-159 MW06	P-159 MW07	
Volatile Organic Compounds									
Vinyl chloride	10 U	10 U	10 U	10 U	27	10 U	10 U	6 J	[1]2,[2]1
Chloroethane	10 U	10 U	10 U	10 U	770 D	10 U	47	10 U	--
Methylene chloride	10 U	10 U	10 U	10 U	10 U	10 U	1 J	10 U	[2]5
Acetone	10 U	10 U	10 U	10 U	140	86	120	8 J	--
1,1'-Dichloroethene	10 U	10 U	10 U	10 U	11	10 U	10 U	10 U	[1,2]7
1,1'-Dichloroethane	10 U	10 U	10 U	10 U	440 D	10 U	15	30	--
1,2'-Dichloroethene (total)	10 U	10 U	10 U	10 U	62	10 U	10 U	7 J	--
1,2'-Dichloroethane	10 U	10 U	10 U	10 U	1 J	10 U	10 U	10 U	[1]5,[2]3
2-Butanone	10 U	10 U	10 U	10 U	9 J	6 J	10 U	10 U	--
1,1,1'-Trichloroethane	10 U	10 U	10 U	10 U	17	10 U	10 U	10 U	[1,2]200
Trichloroethene	10 U	10 U	10 U	10 U	10	10 U	10 U	130	[1]5,[2]3
Benzene	10 U	10 U	10 U	10 U	10	10 U	8 J	10 U	[1]5,[2]1
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U	210 D	10 U	10 U	10 U	--
Tetrachloroethene	10 U	10 U	10 U	10 U	5 J	10 U	10 U	10 U	[1]5,[2]3
Toluene	10 U	10 U	10 U	10 U	47	10 U	10 U	10 U	[1,2]1,000
Ethyl benzene	10 U	10 U	10 U	10 U	2 J	10 U	10 U	10 U	[1,2]700
Xylenes (total)	10 U	10 U	10 U	10 U	22	10 U	10 U	10 U	[1,2]10,000
Semivolatile Organic Compounds									
4-Methylphenol	10 U	10 U	10 U	10 U	100 U	1 J	10 U	10 U	--
Naphthalene	10 U	10 U	10 U	10 U	310	10 U	10 U	10 U	--
2-Methylnaphthalene	10 U	10 U	10 U	10 U	20 J	10 U	10 U	10 U	--
bis(2-Ethylhexyl)phthalate	10 U	10 U	10 U	10 U	100 U	3 J	10 U	2 J	[2]4

[1]U.S. Environmental Protection Agency (USEPA) Safe Drinking Water Act (SDWA) National Primary Drinking Water Regulations per 40 Code of Federal Regulations 141.
[2]Chapter 17-550, Florida Administrative Code, Safe Drinking Water Phase V Standards (1993).

Notes: All concentrations reported as micrograms per liter ($\mu g/\ell$).
U = indicates compounds not detected above instrument detection limit; instrument detection limit is listed.
J = estimated concentration.
D = indicates compound has been run at a dilution to bring concentration within range of instrument.

Table B-16
Summary Analytical Results for Groundwater Samples at Site P-159, Inorganic Parameters

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Analytical Parameter	Sample Designation																Maximum Contaminant Level
	P-159 MW01		P-159 MW02		P-159 MW02D		P-159 MW03		P-159 MW04		P-159 MW05		P-159 MW06		P-159 MW07		
Aluminum	4,070	J	4,320	J	2,770	J	2,780	J	8,260	J	10,400	J	17,800	J	1,150	J	–
Antimony	12.1	U	12.1	U	12.1	U	12.1	U	12.1	U	12.1	U	12.1	U	12.1	U	[2]6
Arsenic	48.7		9.5	B	9.7	B	3.6	B	0.70	U	6.9	B	11.6		2.6	B	[1,2]50
Barium	58.3	J	35.0	J	29.6	J	30.5	J	201	J	351	J	478	J	139	J	[1,2]2,000
Beryllium	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.89	B	2.8	B	0.50	U	[2]4
Cadmium	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.5	B	1.6	B	1.2	U	[1,2]5
Calcium	72,800		79,700		79,100		49,500		103,000		102,000		183,000		98,900		–
Chromium	3.7	U	7.4	B	3.7	U	4.0	B	6.7	B	14.4		12.1		3.7	U	[1,2]100
Cobalt	5.8	U	5.8	U	5.8	U	5.8	U	5.8	U	6.8	B	5.8	U	5.8	U	–
Copper	4.3	B	4.1	B	2.2	B	7.2	B	3.7	B	11.4	B	6.2	B	4.3	B	[1]1,300
Iron	17,600		11,300		8,300		8,720		21,100		35,900		68,800		4,070		–
Lead	7.3		4.4		3.7		6.9		9.6		10.7		21.0		4.9		[2]15
Magnesium	18,800		8,960		8,640		4,950	B	25,500		22,100		24,200		20,600		–
Manganese	697		219		216		146		101		125		303		148		–
Mercury	0.13	B	0.10	U	0.10	U	0.10	U	0.34		0.32	B	1.1		0.10	U	[1,2]2
Nickel	7.7	U	8.8	B	7.7	U	7.7	U	7.7	U	75.4		32.3	B	14.5	B	[2]100
Potassium	5,790		6,790		6,730		4,090	B	26,500		6,470		8,390		3,770	B	–
Selenium	0.50	U	1.6	J	0.50	U	0.70	B	0.97	J	0.93	J	0.50	UJ	0.60	J	[1,2]50
Silver	2.1	UJ	2.1	UJ	2.1	UJ	2.1	UJ	2.1	UJ	2.1	UJ	2.1	UJ	2.1	UJ	–
Sodium	46,000		11,100		11,100		6,420		57,400		240,000		39,300		30,300		[2]160,000
Vanadium	18.9	B	16.2	B	12.8	B	24.0	B	24.0	B	62.9		70.1		4.4	B	–
Zinc	14.6	B	12.8	B	8.0	B	20.1		15.0	B	185		67.9		221		–
Cyanide	3.0	U	5.3	B	3.0	U	3.0	U	12.6		3.0	U	3.0	U	3.0	U	[2]200

[1]U.S. Environmental Protection Agency (USEPA) Safe Drinking Water Act (SDWA) National Primary Drinking Water Regulations per 40 Code of Federal Regulations 141.
[2]Chapter 17-550, Florida Administrative Code, Safe Drinking Water Phase V Standards (1993).

Notes: All concentrations reported as micrograms per liter ($\mu g/\ell$).
U = indicates compounds not detected above instrument detection limit; instrument detection limit is listed.
J = estimated concentration.
B = detected concentration is less than contract required detection limit, but greater than laboratory instrument detection limit.
UJ = indicates compound not detected, instrument detection limit is estimated.

Table B-17
Summary Analytical Results for Soil Samples Collected at Site B101, Target Compound List (TCL) VOCs, SVOCs, and Pesticide and Polychlorinated Biphenyls (PCB) Compounds

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

QA/QC Designation	Soil Boring Designation																	
	B101 SB01		B101 SB02		B101 SB02D Duplicate		B101 SB03		B101 SB04		SB101 SB05		B101 SB06		SB101 SB07		SB101 SB08	
Sample Depth	1-3		1-3		1-3		1-3		1-3		1-3		1-3		1-3		1-3	
Analytical Parameter																		
Volatile Organic Compounds																		
Acetone	20	U	11	U	39	U	44	U	22	U	160		12	U	11	U	17	U
2-Butanone	12	U	11	U	11	U	11	U	11	U	8	J	12	U	11	U	10	U
Toluene	12	U	11	U	11	U	11	U	11	U	2	J	12	U	11	U	10	U
Ethylbenzene	12	U	11	U	11	U	11	U	11	U	68		12	U	11	U	10	U
Total xylenes	12	U	11	U	11	U	11	U	11	U	170		12	U	11	U	10	U
Chloroform	12	U	11	U	11	U	11	U	11	U	12	U	12	U	11	U	10	U
1,1-Dichloroethane	12	U	11	U	11	U	11	U	11	U	28		12	U	11	U	10	U
1,2-Dichloroethene	12	U	11	U	11	U	11	U	11	U	4	J	12	U	11	U	10	U
1,1,1-Trichloroethane	12	U	11	U	11	U	11	U	11	U	1	J	12	U	11	U	10	U
Trichloroethene	12	U	11	U	11	U	11	U	11	U	16		12	U	11	U	10	U
Semivolatile Organic Compounds																		
bis(2-Ethylhexyl) phthalate	400	U	360	U	360	U	360	U	350	U	390	U	410	U	78	J	340	U
Pesticide and PCB Compounds																		
Dieldrin	4.0	UJ	3.6	U	3.6	U	150	D	3.5	U	3.9	UJ	4.1	UJ	3.5	UJ	3.4	U
4,4'-DDE	4.0	UJ	3.6	U	3.6	U	30	J	3.5	U	3.9	UJ	2.5	J	3.5	UJ	3.4	U
4,4'-DDD	4.0	UJ	2.6	J	3.6	U	3.6	UJ	3.5	U	3.9	UJ	4.1	UJ	3.5	UJ	3.4	U
4,4'-DDT	4.0	UJ	4.4		3.6	U	56	J	3.5	U	3.9	UJ	4.0	J	3.5	UJ	3.4	U
alpha Chlordane	2.1	UJ	1.8	U	1.8	U	26	J	1.8	U	2.0	UJ	2.1	UJ	1.8	UJ	1.8	U
gamma Chlordane	2.1	UJ	1.8	U	1.8	U	21	J	1.8	U	2.0	UJ	2.1	UJ	1.8	UJ	1.1	JP
Aroclor 1254	40	UJ	36	U	36	U	36	UJ	35	U	39	UJ	41	UJ	220	J	34	U

See notes at end of table.

Table B-17 (Continued)
Summary Analytical Results for Soil Samples Collected at Site B101, Target Compound List (TCL) VOCs, SVOCs, and Pesticide and Polychlorinated Biphenyl (PCB) Compounds

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

QA/QC Designation	Soil Boring Designation															
	B101 SB09		B101 SB10		B101 SB11		B101 SB12		SB101 SB12		B101 SB13		SB101 SB14		SB101 SB15	
Sample Depth	1-3		1-3		1-3		1-3		5-6		1-3		1-3		1-3	
Analytical Parameter																
Acetone	21	U	45	U	12	U	33	U	14	U	11	U	11	U	41	U
2-Butanone	10	U	11	U	12	U	11	U	13	U	11	U	11	U	11	U
Toluene	10	U	11	U	12	U	11	U	13	U	11	U	11	U	11	U
Ethylbenzene	10	U	11	U	12	U	11	U	13	U	11	U	11	U	11	U
Total xylenes	10	U	11	U	12	U	11	U	13	U	11	U	11	U	11	U
Chloroform	10	U	11	U	12	U	2	J	13	U	11	U	11	U	11	U
1,1-Dichloroethane	10	U	11	U	12	U	11	U	13	U	11	U	11	U	11	U
1,2-Dichloroethene	10	U	11	U	12	U	11	U	13	U	11	U	11	U	11	U
1,1,1-Trichloroethane	10	U	11	U	12	U	11	U	13	U	11	U	11	U	11	U
Trichloroethene	10	U	11	U	12	U	11	U	13	U	11	U	11	U	11	U
Semivolatile Organic Compounds																
bis(2-Ethylhexyl) phthalate	340	U	370	U	390	U	57	J	44	J	370	U	370	U	350	U
Pesticide Compounds																
Dieldrin	3.4	U	3.7	U	3.9	UJ	12	J	6.7	J	1.2	JP	3.7	U	3.5	J
4,4'-DDE	3.4	U	3.7	U	3.9	UJ	2.0	J	1.7	J	3.8	U	0.88	J	4.1	
4,4'-DDD	3.4	U	3.7	U	3.9	UJ	3.7	UJ	4.2	UJ	3.8	U	3.7	U	6.4	
4,4'-DDT	3.4	U	3.7	U	3.9	UJ	4.0	J	2.8	J	3.8	U	3.7	U	2.8	J
alpha Chlordane	1.8	U	1.9	U	2.0	UJ	1.9	UJ	2.2	UJ	2.0	U	1.9	U	1.8	U
gamma Chlordane	1.8	U	1.9	U	2.0	UJ	1.9	UJ	2.2	UJ	2.0	U	1.9	U	1.8	U
Aroclor 1254	34	U	37	U	39	UJ	37	UJ	42	UJ	38	U	37	U	35	U

Notes: All concentrations reported as micrograms per kilogram (μg/kg).
VOCs = volatile organic compounds.
SVOCs = semivolatile organic compounds.
U = compound not detected above instrument detection limit.
B = reported concentrations less than contract required detection limit but greater than instrument detection limit.
J = reported concentration is an estimated value.
D = sample was diluted.
UJ = compound not detected above instrument detection limit. Instrument detection limit is estimated.

Table B-18
Summary Analytical Results for Soil Samples at Site Underground Storage Tank (UST), Inorganic Parameters

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Soil Boring Designation	B101 SB01		B101 SB02		B101 SB02D Duplicate		B101 SB03		B101 SB04		B101 SB05		B101 SB06		B101 SB07		[1]Background Concentration Range
Sample Depth	1-3		1-3		1-3		1-3		1-3		1-3		1-3		1-3		
Analytical Parameter																	
Aluminum	2,160		396		313		241		224		738		265		675		7,000 to 10,000
Antimony	3.0	U	2.6	U	2.6	U	2.6	U	2.6	U	2.9	U	3.0	U	2.6	U	0.08 to 0.31
Arsenic	1.0	B	0.46	B	0.41	B	0.41	B	0.19	B	0.33	B	0.52	B	0.49	B	<0.1 to .73
Barium	11.5	J	3.1	J	3.0	J	3.1	J	2.1	J	9.1	J	3.8	J	6.0	J	<20 to 150
Beryllium	0.49	J	0.11	UJ	0.11	UJ	0.11	UJ	0.11	UJ	0.12	UJ	0.12	UJ	0.11	UJ	<1 to 7
Calcium	7,410		266	B	255	B	3,830		407	B	2,580		11,700		50,800		100 to 280,000
Chromium	9.1		2.5		2.0	B	5.0		1.1	B	2.5		1.5	B	2.0	B	1 to 1,000
Copper	2.7	B	1.5	U	1.5	U	3.4	B	1.2	U	3.4	B	5.6	B	2.1	B	<1 to 7,000
Iron	4,460		588		592		559		566		771		396		620		<0.01 to >10
Lead	5.8	J	2.8	J	2.6	J	10.7	J	0.85	J	4.6	J	6.6	J	1.9	J	<10 to 300
Magnesium	511	B	64.2	B	60.3	B	80.4	B	70.3	B	105	B	148	B	649	B	50 to 50,000
Manganese	30.2		8.7		5.6		5.7		4.9		15.0		7.4		12.9		<2 to 7,000
Mercury	0.03	UJ	0.03	UJ	0.03	UJ	0.05	UJ	0.04	UJ	0.07	UJ	0.08	UJ	0.03	UJ	0.01 to 3.4
Nickel	3.4	B	1.7	U	1.7	U	1.7	U	1.6	U	1.8	U	1.9	U	1.6	U	5 to 700
Potassium	704	B	93.0	U	103	U	43.7	U	120	U	106	U	86.8	U	110	U	500 to 37,000
Sodium	183	B	114	B	142	B	126	B	125	B	131	B	191	B	140	B	500 to 50,000
Vanadium	5.6	B	1.2	B	1.4	B	1.3	B	1.1	B	1.4	B	0.91	B	3.1	B	<7 to 300
Zinc	8.6		1.7	J	2.9	J	14.3		1.6	J	3.3	J	1.7	J	10.3		<5 to 2,900

See notes at end of table.

Table B-18 (Continued)
Summary Analytical Results for Soil Samples, Inorganic Parameters

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Soil Boring Designation	B101 SB08		B101 SB09		B101 SB10		B101 SB11		B101 SB12		B101 SB12		B101 SB13		[1]Background Concentration Range
Sample Depth	1-3		1-3		1-3		1-3		1-3		5-6		1-3		
Analytical Parameter															
Aluminum	305		471		368		3,240		696		630		728		7,000 to 10,000
Antimony	2.5	U	2.5	U	2.7	U	2.8	U	2.7	U	3.1	U	2.8	J	0.08 to 0.31
Arsenic	0.23	B	0.29	B	0.63	B	8.8		0.66	B	0.66	B	0.16		<0.1 to .73
Barium	2.9	J	2.8	J	3.6	J	10.1	J	4.2	J	4.8	J	7.6	J	<20 to 150
Beryllium	0.10	UJ	0.10	UJ	0.11	UJ	0.12	UJ	0.11	UJ	0.13	UJ	0.11	UJ	<1 to 7
Calcium	16,900		730	B	762	B	4,000		37,300		10,900		180,000	J	100 to 280,000
Chromium	1.3	B	2.4		0.83	U	6.5		2.8		5.0		4.3	J	1 to 1,000
Copper	1.0	U	1.3	U	1.5	U	1.8	B	2.5	B	6.7		4.2	J	<1 to 7,000
Iron	459		565		1,090		3,530		1,200		1,450		575		<0.01 to >10
Lead	1.4	J	0.67	J	0.92	J	2.7	J	6.7	J	15.8	J	3.5		<10 to 300
Magnesium	188	B	109	B	80.6	B	469	B	363	B	188	B	1,030	B	50 to 50,000
Manganese	5.4		6.9		6.2		16.6		10.9		11.9		17.9	J	<2 to 7,000
Mercury	0.03	UJ	0.03	UJ	0.03	UJ	0.06	UJ	0.03	UJ	0.11	J	0.03	U	0.01 to 3.4
Nickel	1.6	U	1.6	U	1.7	U	1.8	U	1.7	U	1.9	U	1.7	UJ	5 to 700
Potassium	114	U	156	U	90.2	U	275	B	153	U	120	U	106	B	500 to 37,000
Sodium	99.9	B	122	B	136	B	117	B	167	B	201	B	232	B	500 to 50,000
Vanadium	1.5	B	1.2	B	2.2	B	6.5	B	3.2	B	2.4	B	4.3	J	<7 to 300
Zinc	2.6	J	1.4	J	2.1	J	4.5	J	7.3	J	15.7		6.2	J	<5 to 2,900

See notes at end of table.

Table B-18 (Continued)
Summary Analytical Results for Soil Samples
Inorganic Parameters

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Soil Boring Designation	B101 SB014		B101 SB015		[1]Background Concentration Range
Sample Depth	1-3		1-3		
Analytical Parameter					
Aluminum	392		659		7,000 to 10,000
Antimony	2.7	UJ	2.6	U	0.08 to 0.31
Arsenic	0.32	B	0.30	B	<0.1 to .73
Barium	8.1	J	8.1	J	<20 to 150
Beryllium	0.15	J	0.11	UJ	<1 to 7
Calcium	169,000	J	30,300		100 to 280,000
Chromium	0.84	UJ	1.5	B	1 to 1,000
Copper	3.6	J	0.92	U	<1 to 7,000
Iron	1,050		690		<0.01 to >10
Lead	6.2		4.7	J	<10 to 300
Magnesium	1,240		324	B	50 to 50,000
Manganese	125	J	12.0		<2 to 7,000
Mercury	0.03	U	0.04	UJ	0.01 to 3.4
Nickel	1.7	UJ	1.6	U	5 to 700
Potassium	99.7	B	119	U	500 to 37,000
Sodium	1,090	B	115	B	500 to 50,000
Vanadium	3.1	J	1.8	B	<7 to 300
Zinc	4.2	J	5.4	J	<5 to 2,900

[1]Background concentration range for elements in soil in eastern United States (Shacklette and Boerngen, 1984).

Notes: All concentrations reported as mg/kg.
U = compound not detected above laboratory instrument detection limit.
B = reported concentrations less than contract required detection limit but greater than instrument detection limit.
J = reported concentration is an estimated value.

Table B-19
Summary Analytical Results for Groundwater Samples at Site UST, VOC, SVOC, and Pesticides

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Analytical Parameter	Sample Designation										Maximum Contaminant Levels
	B101 MW01		B101 MW02		B101 MW02D		B101 MW03		B101 MW04		
Volatile Organic Compounds											
Vinyl chloride	10	U	3	J	3	J	10	U	5	J	[1]2 [2]1
Chloroethane	10	U	9	J	8	J	10	U	2	J	–
Acetone	340	D	20	U	11	U	6	J	37		–
1,1-Dichloroethane	1	J	10		9	J	10	U	6	J	–
1,2-Dichloroethene (total)	2	J	2	J	2	J	2	J	3	J	70,100
1,1,1-Trichloroethane	10	U	10	U	10	U	10	U	2	J	[1,2]200
Trichloroethene	10	U	10	U	10	U	10	U	4	J	[1]5 [2]3
Benzene	1	J	10	U	10	U	10	U	10	U	[1]5 [2]1
Tetrachloroethene	10	U	1	J	1	J	10	U	10	U	[1]5 [2]3
Chlorobenzene	15		10	U	10	U	10	U	10	U	[1,2]100
Ethylbenzene	10	U	6	J	5	J	10	U	10	U	[1,2]700
Xylenes (total)	10	U	8	J	6	J	3	J	10	U	[2]10,000
Semivolatile Organic Compounds											
bis(2-Chloroethyl)ether	17		10	U	10	U	10	U	10	U	–
1,4-Dichlorobenzene	2	J	10	U	10	U	10	U	10	U	75[1,2]
1,2-Dichlorobenzene	3	J	10	U	10	U	10	U	10	U	600[1,2]
2-Methylphenol	27		10	U	10	U	10	U	10	U	–
2,4-Dimethylphenol	3	J	10	U	10	U	10	U	10	U	–
Acenaphthene	1	J	10	U	10	U	10	U	10	U	–
Pesticides											
4,4'-DDD	0.10	U	0.10	U	0.32		0.10	U	0.10	U	–
4,4'-DDT	0.10	U	0.10	U	0.14		0.10	U	0.10	U	–

[1]U.S. Environmental Protection Agency (USEPA) Safe Drinking Water Act (SDWA) National Primary Drinking Water Regulations per 40 Code of Federal Regulations 141.
[2]Chapter 17-550, Florida Administrative Code, Safe Drinking Water Phase V Standards.

Notes: All concentrations reported as micrograms per liter ($\mu g/\ell$).
UST = underground storage tank.
VOC = volatile organic compound.
SVOC = semivolatile organic compound.
U = indicates compounds not detected above instrument detection limit; instrument detection limit is listed.
J = estimated concentration.
B = detected concentration is less than contract required detection limit, but greater than laboratory instrument detection limit.
D = diluted sample.
4,4'-DDD = 4,4'-dichlorophenyldichloroethane.
4,4'-DDT = 4,4'-dichlorophenyltrichloroethane.

Table B-20
Summary Analytical Results for Groundwater Samples at Site Underground Storage Tank (UST), Inorganic Parameters

RI/FS Workplan, Operable Unit 3
NAS Jacksonville, Florida

Analytical Parameter	Sample Designation										Maximum Contaminant Levels
	B101 MW01		B101 MW02		B101 MW02D		B101 MW03		B101 MW04		
Aluminum	5,370	J	4,370	J	4,140	J	3,490	J	13,400	J	–
Antimony	12.1	U	12.1	U	12.1	U	12.1	U	12.1	U	[2]6
Arsenic	2.6	B	17.1		18.1		5.0	B	8.4	B	[1,2]50
Barium	140	J	87.5	J	87.0	J	19.2	J	247	J	[1,2]2,000
Beryllium	0.54	B	2.8	B	2.8	B	0.50	U	0.93	B	[2]4
Cadmium	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	[1,2]5
Calcium	102,000		81,600		83,800		27,100		108,000		–
Chromium	61.9		6.8	B	5.6	B	6.0	B	11.2		[1,2]100
Cobalt	10.2	B	5.8	U	5.8	U	5.8	U	5.8	U	–
Copper	11.0	B	3.1	B	2.4	B	4.9	B	30.0		–
Iron	13,700		19,600		19,100		4,240		25,300		–
Lead	10.2		16.3		15.3		6.6		30.5		[2]15
Magnesium	14,500		16,900		18,300		3,070	B	18,600		–
Manganese	163		253		258		51.5		138		–
Mercury	0.21		0.26		0.16	B	0.10	U	0.46		[1,2]2
Nickel	69.8		10.7	B	10.2	B	7.7	U	18.7	B	[2]100
Potassium	9,460		10,400		10,600		1,640	B	5,130		–
Selenium	0.84	J	0.75	J	0.50	U	0.50	UJ	0.50	UJ	[1,2]50
Silver	2.1	UJ	2.1	UJ	2.1	UJ	2.1	UJ	2.1	UJ	–
Sodium	20,900		61,000		72,400		9,080		29,200		[2]160,000
Thallium	0.70	UJ	0.70	UJ	0.70	UJ	0.70	J	0.70	UJ	[2]2.0
Vanadium	35.0	B	42.1	B	39.4	B	10.6	B	46.5	B	–
Zinc	6.3	B	67.4		62.5		25.8		30.2		–
Cyanide	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	[2]200

[1]U.S. Environmental Protection Agency (USEPA) Safe Drinking Water Act (SDWA) National Primary Drinking Water Regulations per 40 Code of Federal Regulations 141.
[2]Chapter 17-550, Florida Administrative Code, Safe Drinking Water Phase V Standards.

Notes: All concentrations reported as micrograms per liter ($\mu g/\ell$).
U = indicates compounds not detected above instrument detection limit; instrument detection limit is listed.
J = estimated concentration.
B = detected concentration is less than contract required detection limit, but greater than laboratory instrument detection limit.
UJ = indicates concentration not detected above instrument detection limit. Detection limit is estimated.

APPENDIX C

Well Inventory Summary

Appendix C
Summary of Well Inventory

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Well I.D.	Total Depth from TOC (feet)	TOC Elevation (feet msl)	Depth to Water from TOC (feet)	Water Level (feet msl)	Screened Interval (feet bls)[1]	Construction Material	Well Protector Type	Cap Type	Well Condition	Well Components that Require Replacement
Installed 1993, ABB-ES:										
B101 MW01	13.0[2]	9.99	4.55	5.44	3 to 13	PVC	BDFM	LEP	good	none
B101 MW02	13.48	9.41	5.86	3.55	3 to 13	PVC	BDFM	LEP	good	none
B101 MW03	13.47	9.71	6.05	3.66	3 to 13	PVC	BDFM	LEP	good	none
B101 MW04	13.49	9.88	5.49	4.39	3 to 13	PVC	BDFM	LEP	good	none
P159 MW01	13.46	6.56	4.96	1.6	3 to 13	PVC	BDFM	LEP	good	none
P159 MW02	13.29	7.61	5.46	2.15	3 to 13	PVC	BDFM	LEP	good[3]	none
P159 MW03	12.97	8.32	6.18	2.14	3 to 13	PVC	BDFM	LEP	good[3]	none
P159 MW04	13.0[1]	8.22	NR	NR	3 to 13	PVC	BDFM	LEP	good	none
P159 MW05	13.57	9.25	6.3	2.95	3 to 13	PVC	BDFM	LEP	good[3]	none
P159 MW06	14.09	8.49	5.32	3.17	3 to 13	PVC	BDFM	LEP	good[3]	none
P159 MW07	11.45	8.72	5.23	3.49	3 to 13	PVC	BDFM	LEP	good[3]	none
Installed 1993, USACE										
JAX-873-1	12.82	7.24	6.22	1.02	3.5 to 12.5	PVC	BDFM	LEP	good[3]	cap
JAX-873-2	12.92	7.38	6.32	1.06	3.4 to 12.4	PVC	BDFM	LEP	good[3]	none
JAX-873-3	13.36	7.96	6.27	1.69	4 to 13	PVC	BDFM	LEP	good[3]	none
JAX-873-4	13.15	7.84	6.74	1.1	4 to 13	PVC	BDFM	LEP	good[3]	cap
JAX-873-5	25.1	7.94	6.85	1.09	20 to 24	PVC	BDFM	LEP	good	cap

See notes at end of table.

Appendix C (Continued)
Summary of Well Inventory

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Well I.D.	Total Depth from TOC (feet)	TOC Elevation (feet msl)	Depth to Water from TOC (ft.)	Water Level (feet msl)	Screened Interval (feet bls)[1]	Construction Material	Well Protector Type	Cap Type	Well Condition	Well Components that Require Replacement
JAX-873-6	12.60	7.08	6.35	0.73	3.5 to 12.5	PVC	BDFM	LEP	good	cap
JAX-873-7	12.16	7.28	6.34	0.94	3.5 to 12.5	PVC	BDFM	LEP	good[3]	cap
JAX-873-8	11.52	7.18	6.42	0.76	2.9 to 11.9	PVC	BDFM	LEP	good[3]	cap
JAX-873-9	13.36	8.39	7.60	0.79	4 to 13	PVC	BDFM	LEP	good	none
JAX-873-10	12.57	6.53	5.99	0.54	4 to 13	PVC	BDFM	LEP	good[3]	cap
JAX-873-11	13.80	8.7	7.65	1.05	5 to 14	PVC	BDFM	LEP	good[3]	none
Installed 1991, USACE										
JAX-873-1-1	NR	8.27	NR	NR	2.5 to12.5	PVC	FM	BT	unusable[4]	none
JAX-873-1-2	12.71	7.43	6.44	0.99	5 to 15	PVC	FM	BT	good[3]	none
JAX-873-1-3	14.29	7.78	6.68	1.1	5 to 15	PVC	FM	BT	good[3]	none
JAX-873-1-4	15.18	8.87	7.69	1.18	5 to 15	PVC	FM	BT	good	none
JAX-873-3-1	15.2	9.36	8.22	1.14	NA	PVC	FM	BT	good	none
JAX-873-3-2	15.13	8.79	7.67	1.12	NA	PVC	FM	BT	good	none
JAX-873-3-3	14.74	8.78	7.61	1.17	5 to 15	PVC	FM	BT	good[3]	none
JAX-873-4-1	14.52	7	6.23	0.77	NA	PVC	FM	BT	good	none
JAX-873-4-2	10.56	7.32	6.54	0.78	NA	PVC	FM	BT	good	none
JAX-873-4-3	14.52	7.72	6.91	0.81	NA	PVC	FM	BT	good	none

See notes at end of table.

Appendix C (Continued)
Summary of Well Inventory

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Well I.D.	Total Depth from TOC (feet)	TOC Elevation (feet msl)	Depth to Water from TOC (ft.)	Water Level (feet msl)	Screened Interval (feet bls)[1]	Construction Material	Well Protector Type	Cap Type	Well Condition	Well Components that Require Replacement
Installed 1985 G&M, Inc.										
NARF-4	13.01	8.96	8.17	0.79	8.5 to 11.5	PVC	SU	slip	good	none
NARFB-1	16.5	11.65	9.79	1.86	13 to 16	PVC	SU	slip	good	pad, lid
Installed 1986 G&M, Inc.										
NARF-9	27.5	18.39	16.34	2.05	19 to 24	PVC	SU	threaded	good[3]	none
NARF-10	17.9	NR	8.84	NR	11 to 16	PVC	SU	none	abandoned[5]	none
NARF-11	27.8	19.28	17.48	1.8	19 to 24	PVC	SU	threaded	good[3]	none
NARF-12	17.5	6.01	4.66	1.35	10 to 15	PVC	SU	slip	good	none
NARF-13	19.04	8.59	7.93	0.66	11 to 16	PVC	SU	slip	abandoned[5]	lid, cap
NARF-14	15.01	9.04	6.10	2.94	9 to 14	PVC	FM	threaded	good	cap
NARF-15	17.46	10.76	7.30	3.46	10 to 15	PVC	SU	slip	good	lid, cap
NARF-16	14.4	9.04	6.89	2.15	9 to 14	PVC	FM	slip	good	cap
NARF-17	17.37	12.15	7.99	4.16	10 to 15	PVC	SU	slip	good	lid, cap
NARF-18	15.50	8.12	5.64	2.48	10 to 15	PVC	FM	slip	good	cap
NARF D-1	55.31	8.84	3.71	5.13	58 to 68	PVC	FM	none	good	cap
NARF D-2	61.0	10.42	NR	NR	51 to 61	PVC	SU	slip	abandoned[5]	pad,casing, cap
OTC10-1	14.0	NA	NA	NA	4 TO 14	PVC	NA	NA	NA	NA
OTC10-2	13.0	NA	NA	NA	3 TO 13	PVC	NA	NA	NA	NA
OTC10-3	13.0	NA	NA	NA	3 TO 13	PVC	NA	NA	NA	NA

See notes at end of table.

Appendix C (Continued)
Summary of Well Inventory

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Well I.D.	Total Depth from TOC (feet)	TOC Elevation (feet msl)	Depth to Water from TOC (ft.)	Water Level (feet msl)	Screened Interval (feet bls)[1]	Construction Material	Well Protector Type	Cap Type	Well Condition	Well Components that Require Replacement
THE FOLLOWING MONITORING WELLS COULD NOT BE LOCATED AND ARE PRESUMED TO HAVE BEEN DESTROYED AND/OR ABANDONED.										
Installed 1985, G&M, Inc.										
NARF-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NARF-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NARF-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NARF-5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NARF-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NARF-13-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Installed 1988, G&M, Inc.										
MW-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

See notes at end of table.

Appendix C (Continued)
Summary of Well Inventory

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Well I.D.	Total Depth from TOC (feet)	TOC Elevation (feet msl)	Depth to Water from TOC (ft.)	Water Level (feet msl)	Screened Interval (feet bls)[1]	Construction Material	Well Protector Type	Cap Type	Well Condition	Well Components that Require Replacement
MW-11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[1]Information taken from construction log.
[2]Depth not measured; taken from construction log.
[3]Sediment present in bottom of well.
[4]Unusable for water-level measurements; free product in well.
[5]Abandoned as of March 1994.

Notes: TOC = top of (well) casing.
msl = mean sea level.
bls = below land surface.
FM = flush-mount protective casing with unsecured lid.
BDFM = flush-mount protective casing with bolt-down lid.
LEP = locking-expanding plug.
SU = stick-up protective casing.
BT = brass threaded cap.
G&M, Inc. = Geraghty & Miller, Inc.
USACE = U.S. Army Corps of Engineers-Savannah District.
NR = not recorded.
NA = data not available.

APPENDIX D

Geologic Logs of Soil Borings and Piezometers

Project: NAS Jacksonville OU3	**Well ID:** SB001	**Boring ID:** SB001
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 7/26/93	**Completd:** 7/30/93
Method: Mud Rotary	**Casing dia.:** / **Screen int.:** bls	**Protection level:** D
TOC elev.: Ft. MSL	**Type of OVM.:** Porta Fid / **Total dpth:** 150Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	**Well development date:**	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
				0	SAND: Dark brown to dark gray, fine grained, poorly graded, trace of organic material, dry.		SP	POSTHOLE	
5				0				HANDAUGER	∇
				0	CLAYEY SAND: Grey, poorly graded, moist.		SC	2/5/5/8	
				0	SILTY SAND: Brown to gray, fine grained, poorly graded, some white fine sand laminae, wet.		SM	8/8/9/12	
10				0	SILTY SAND: Light brown, fine grained, poorly graded, moist to wet.			8/7/8/11	
				0	SILTY SAND: Rust orange to gray brown, fine grained, some clay, wet.			3/2/3/2	
15				0	SILTY SAND: Light gray, wet, poorly graded.			2/1/2/3	
				0	CLAY: Grey with dark green mottling, wet.		CL	2/1/2/2	
				0	SANDY CLAY: Grey with dark green mottling, wet.			1/2/3/3	
20				0	SILTY SAND: Light brown, fine grained, wet.		SM	3/5/4/5	
				0	CLAY: Grey with dark green mottling, trace fine sand, wet, shell fragments from 24-24.5' bls.		CL	2/2/2/3	
25				0			Gravel	2/3/3/3	

Project: NAS Jacksonville OU3	**Well ID:** SB001		**Boring ID:** SB001
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 7/26/93	**Completd:** 7/30/93
Method: Mud Rotary	**Casing dia.:**	**Screen int.:** bls	**Protection level:** D
TOC elev.: Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 150Ft. bls	**Dpth to ∇:** 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	**Well development date:**		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
					GRAVEL: Clayey, dolomitic, wet.		Gravel		
				0	SANDY CLAY: Greyish-green, some shell fragments, wet.		CL	3/3/3/3	
				0	SANDY SILTY CLAY: Dark grayish-green, plastic, wet.			3/3/2/2	
30				0	SILTY CLAY: As above		CL	2/2/2/3	
				0	CLAY: Dark green, trace of silt, trace of shell fragments, moderate plasticity, moist.			3/3/2/3	
35				0	CLAY: As above.			3/2/3/3	
				0	CLAY: As above. SANDY CLAY: Dark green, some 1/2 cm fine grained sand laminae.		CL	3/2/3/3	
				0	SANDY CLAY: As above.			7/8/14/14	
40				0	CLAY: Light gray, some silt, thin sand laminae.		CL	7/7/6/8	
				0	SAND: Dark gray, fine grained, poorly graded, some clay, wet.		SP	2/6/6/3	
45				0	CLAYEY SAND: Dark gray, fine grained, poorly graded, trace of silt, moist.		SC	4/4/10/12	
				0	SAND: As above.		SP	2/3/6/11	
					CLAYEY SAND: As above, moderate plasticity.		SC		
				0	SAND: Dark gray, fine grained, some silty clay, plastic, moist.		SP	2/2/2/3	
50					CLAYEY SAND: Dark gray, trace of silt, fine grained, moist.		SC SP		

Project: NAS Jacksonville OU3	**Well ID:** SB001		**Boring ID:** SB001
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 7/26/93	**Completd:** 7/30/93
Method: Mud Rotary	**Casing dia.:**	**Screen int.:** bls	**Protection level:** D
TOC elev.: Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 150Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	**Well development date:**		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SAND: Light to dark gray, fine grained, poorly graded, some clay, wet.		SP	4/8/13/13	
				0	SAND: Dark gray, poorly graded, some silty clay, trace of shell fragments, moist.			8/17/18/24	
55				0	SAND: White to light gray interbedded 2" layers, fine grained, some black grains.			3/3/5/10	
				0	SAND: Light gray, very fine grained, poorly graded, trace of clay, wet.			5/4/8/19	
					SANDY CLAY: Dark gray, plastic, fine to very fine grained sand, wet.		CL		
				0	SAND: Light gray, fine grained, very poorly graded, dense, wet.		SP	8/6/22/35	
60				0	SAND: As above.			5/5/26/50	
				0	SAND: As above, yellowish-orange.			35/70/54/30	
65				0	SAND: Light gray with mottled dark gray, fine grained, poorly graded.			29/40/51/70	
				0	SAND: As above, yellowish-orange. SAND: Tan to light gray, fine grained, uniform, very dense, wet.			60/70R	
				0				20/34/45/43	
70				0	SAND: Mottled tan to light gray, fine grained, uniform, some silt- sized black grains, very dense, wet.			33/30/70R	
				0	SAND: Tan to light gray, mottled, fine grained, poorly graded, trace of clay. SAND: Tan, fine grained, poorly graded, medium dense, trace of silt- sized black grains, wet.			9/8/20/20	
75				0				25/46/72R	

Project: NAS Jacksonville OU3	**Well ID:** SB001		**Boring ID:** SB001
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 7/26/93	**Completd:** 7/30/93
Method: Mud Rotary	**Casing dia.:**	**Screen int.:** bls	**Protection level:** D
TOC elev.: Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 150Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	**Well development data:**		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 3				
				0	SAND: Light gray to dark gray, mottled, some very light brown fine grained, poorly graded, very dense, trace of shell fragments, wet.		SP	20/33/46/66	
				0	SAND: Light olive gray to yellowish orange, fine grained, uniform, very dense, trace of silt-sized black grains, moist.			13/40/75R	
80				0	SAND: Yellowish orange, fine grained, poorly graded, very dense, trace of shell fragments, moist.			42/75R	
				0	SAND: Light gray, fine grained, uniform, very dense, trace of black grains, moist.			38/64/75R	
85				0	SAND: Mottled light gray to tan, fine grained, uniform, very dense, trace of silt-sized black grains, moist.			59R	
				0	SAND: As above.			33R	
90				0				40/65R	
				0	SAND: As above, light gray to a light yellowish brown at 91.5' bls.			31/72/70/73	
				0	SAND: As above, mottled light to dark gray.			26/44R	
95				0	CLAY: Dark greenish-gray, homogeneous, creamy, stiff, dry.		CL	9/10/8/13	
100				0	SILTY SAND: Light greenish-gray, fine grained, uniform, very dense, approximately 30% shell fragments, damp, trace of clay from 100 to 102' bls.		SM	27/49/75R	

Project: NAS Jacksonville OU3		Well ID: SB001	Boring ID:SB001
Client: SOUTHNAVFACENGCOM			Job No.: 7586-26
Contractor: Groundwater Protection Inc.		Date started: 7/26/93	Compltd: 7/30/93
Method: Mud Rotary	Casing dia.:	Screen int.: bls	Protection level: D
TOC elev.: Ft. MSL	Type of OVM.: Porta Fid	Total dpth: 150Ft. bls	Dpth to ∇ 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	Well development date:		Site: NAS JAX OU3

Depth Ft.	Laboratory Sample ID	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 4				
				0	SILTY SAND: As above.		SM	26/37/43/65	
				0	SILT: Light gray, trace of sand, some silt-sized black grains, moist.		MH	4/4/8/26	
105				0	SILTY SAND: Light gray, fine grained, uniform, dense, some shell fragments, trace of black grains, magnesium rich, wet.		SM	10/22/26/33	
				0	SANDY SILT: Grey, fine grained sand, uniform, some shell fragments, trace of clay, slightly plastic, magnesium rich, damp.		MH	5/7/7/130	
				0	SANDY SILT: As above, no shell fragments.			6/9/14/30	
110				0	SILTY SAND: Grey to green, fine grained, uniform, medium dense, some clay and shell fragments, calcareous, moist.		SM	5/5/7/15	
				0	SILTY SANDY CLAY: Grey, moderate plasticity, fine grained sand, uniform, 30% shell fragments, some black grains, magnesium rich, moist.		CL / SM	7/10/12/28	
115				0	SILTY SAND: Light gray, fine grained, uniform, trace of clay, some black grains, magnesium rich, wet.			7/20/21/29	
				0	SAND: Light gray, fine grained, uniform, some silt, some black grains, very dense, wet.		SP	12/28/49/47	
				0	SILTY SAND: Light gray, fine grained, uniform, very dense, trace of black grains, moist.		SM	8/19/30/60	
120				0	SILTY SAND: As above, 30% shell fragments, some dark gray micritic dolomite fragments from 121.9 to 122.0' bls.			40/36/40/70	
				0	SILTY SAND: As above, no shell fragments, some dolomite fragments from 123.5 to 124' bls.			60R	
125				0			Gravel	3/6/15/20	

Project: NAS Jacksonville OU3	**Well ID:** SB001	**Boring ID:** SB001
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-28
Contractor: Groundwater Protection Inc.	**Date started:** 7/26/93	**Compltd:** 7/30/93
Method: Mud Rotary	**Casing dia.:** / **Screen int.:** bls	**Protection level:** D
TOC elev.: Ft. MSL	**Type of OVM.:** Porta Fid / **Total dpth:** 150Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	**Well development date:**	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 5				
				0	GRAVEL: Dark gray angular fragments fo dolomite, some silty clay, wet, with clay lenses from 125.7 to 126' bls, some shell fragments.		Gravel	6R	
				0	CLAY: Tan, trace of silt, plastic, magnesium rich, calcareous, set.		CL	18/20/43/63	
130				0	CLAY: Light gray, plastic, magnesium rich, calcareous, some fragments of dark gray micritic dolomite.			75R	
				0	SAND: Tan, fine to medium grained, moderately graded, dense, slightly calcareous, slight magnesium content, some conglomeratic pebble, shell, & rock fragments, moist.		SP	21/28/21/46	
135				0	SAND: Tan mottled with light gray, fine grained, uniform, slightly calcareous, magnesium rich, some rounded gravel.			45/47/46/55	
				0	CLAY: Dark greenish-gray, creamy, homogeneous, hard, dry to damp, some sand, calcareous, magnesium rich.		CL	19/46/25/25	
				0	CLAY: Light greenish-gray, trace of silt, creamy, homogeneous, hard, dry to damp.			7/11/18/27	
140				0	CLAY: As above.			36/42/16/25	
				0	CLAY: White, plastic, some sand, calcareous, magnesium rich, moist.			17/54/36/28	
145				0				75R	
				0	CLAY: As above, some fine grained, poorly graded sand.			33/16/17/17	
				0	CLAYEY SAND: White, fine to medium grained, poorly graded, moist, calcareous, magnesium rich.		SC	12/20/27/33	
150									

Project: NAS Jacksonville OU3	**Well ID:** SB002	**Boring ID:** SB002
Client: SOUTHNAVFACENGCOM		**Job No.:** 7588-26
Contractor: Groundwater Protection Inc.	**Date started:** 7/31/93	**Compltd:** 8/2/93
Method: Mud Rotary	**Casing dia.:** / **Screen int.:** bls	**Protection level:** D
TOC elev.: Ft. MSL	**Type of OVM.:** Porta Fid / **Total dpth:** 150Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	**Well development date:**	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
				0			SP	POSTHOLE	
5				0	SAND: White to light gray, fine grained, uniform, some silt-sized black graines, medium dense, damp to wet.			3/3/10/10	∇
				0				5/6/8/8	
				0				7/6/3/3	
10				0	SAND: As above.		SP	3/3/3/5	
				0	SILTY SAND: Light greenish-gray, fine grained, uniform, trace of clay, slightly plastic, medium dense, moist.		SM	8/7/7/9	
15				0	SILTY SAND: As above.			7/10/10/10	
				0	SILTY SAND: As above, mottled light gray-green to very pale brown, no clay.			13/16/10/9	
				0	SILTY SAND: As above, light greenish-gray mottled with pale yellow, loose.			7/4/3/5	
20				0	CLAYEY SAND: Light gray with some 1mm olive yellow laminae, fine grained, uniform, plastic, very wet.		SC	2/3/2/2	
				0	CLAYEY SAND: As above.			2/2/2/6	
25				0	CLAYEY SAND: As above.		SM	3/8/9/7	

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3	**Well ID:** SB002		**Boring ID:** SB002
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 7/31/93	**Completd:** 8/2/93
Method: Mud Rotary	**Casing dia.:**	**Screen int.:** bls	**Protection level:** D
TOC elev.: Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 150Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	**Well development date:**		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
					SILTY SAND: Brownish-yellow, fine grained, uniform, trace of clay, medium dense, moist.		SM		
				0	CLAYEY SAND: Mottled light gray to brownish-yellow, fine grained, uniform, some silt, loose, wet.		SC	2/2/3/9	
				0	SAND: Mottled light gray to brownish-yellow, fine grained, uniform, little fines, medium dense, wet.		SP	8/15/20/20	
30				0	SAND: White, fine grained uniform, medium dense, little silt-sized black grains, wet.			5/6/8/13	
				0	SAND: Light gray, fine grained, uniform, medium dense, some clay, wet. SAND: As above.			4/12/14/18	
35				0	SAND: Yellowish-orange, fine grained, uniform, medium dense, some laminations of light gray sandy clay, moist.		SC	9/9/12/14	
				0	CLAYEY SAND: Interbedded yellowish-orange, fine grained, uniform, light gray clay beds 0.5-1.0cm thick, medium, dense, slight magnesium content, moist. CLAYEY SAND: As above, less clay.			4/6/11/11	
40				0	SAND: Light gray to brownish-yellow from 39.2-40' bls, fine grained, medium dense, wet, clay lenses from 39-39.2' bls, uniform.		SP	7/13/16/18	
				0				9/18/24/35	
45				0	SAND: White, brownish-yellow, olive yellow, to yellow, fine grained, uniform, medium dense, little to some black grains, slight magnesium content to magnesium rich from 46-48' bls moist to wet.			8/22/30/36	
				4				14/33/51/63	
				1				60/52/45/35	
50				0	CLAYEY SAND: Interbedded fine grained uniform yellow sand and light gray clay. Clay in 2mm lamina between 0.5 cm sand layers, dense, moist, slightly plastic, slightly magnesium rich.		SC SP SC	3/15/28/28	

Project: NAS Jacksonville OU3		**Well ID:** SB002	**Boring ID:** SB002
Client: SOUTHNAVFACENGCOM			**Job No.:** 7588-26
Contractor: Groundwater Protection Inc.		**Date started:** 7/31/93	**Completd:** 8/2/93
Method: Mud Rotary	**Casing dia.:**	**Screen int.:** bls	**Protection level:** D
TOC elev.: Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 150Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	**Well development date:**		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SAND: Yellow, fine grained, uniform, dense, trace of fines, slight magnesium content, calcareous, wet.		SC		
					CLAYEY SAND: Light yellowish brown, fine grained, uniform, moist, calcareous, slight magnesium content.		SP	17/49/75R	
				0	SAND: Yellow, fine grained, uniform, trace of silt, very dense, moist, calcareous, slight magnesium content.			20/35/41/42	
55				0	CLAYEY SAND: Light yellowish brown, fine grained, uniform, very dense, magnesium rich, calcareous, moist.		SC	23/30/30/30	
							SP		
				0				15/25/31/43	
				0				19/22/68/53	
60									
				0				37/75R	
				0				32/55/75R	
65				0	SAND: Colors range from white, light gray, yellow, to a yellowish- brown, fine grained, uniform, very dense, trace of black grains, clay laminae between sand layers.			26/50/61/75R	
				0				16/27/42/49	
				0				19/33/75R	
70									
				0				30/75R	
				0				32/75R	
75				0				50/75R	

Project: NAS Jacksonville OU3	**Well ID:** SB002		**Boring ID:** SB002
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 7/31/93	**Completd:** 8/2/93
Method: Mud Rotary	**Casing dia.:**	**Screen int.:** bls	**Protection level:** D
TOC elev.: Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 150Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	**Well development date:**		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 3				
				0			SP	54/75R	
				0				32/68/75R	
80				0				33/24/16/25	
							CL		
				0			CL	12/13/15/18	
85				0				5/6/9/12	
				0	CLAY: Dark greenish gray, very stiff, dry to damp, magnesium rich, plastic, crumbles under hand pressure from 87-88' bls.			12/12/12/12	
90							CL		
				0	SANDY CLAY: Dark greenish gray, fine grained sand, uniform, plastic, wet.			18/39/53/53	
							SP		
				0				19/35/45/48	
95				0				11/30/42/50	
				0	SAND: Greenish-gray, fine grained, uniform, very dense, clean, magnesium rich, wet, trace of black grains, little silt.			4/17/41/70	
				0				7/25/40/32	
100							MH		

Project: NAS Jacksonville OU3	**Well ID:** SB002	**Boring ID:** SB002
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 7/31/93	**Compltd:** 8/2/93
Method: Mud Rotary	**Casing dia.:** / **Screen int.:** bls	**Protection level:** D
TOC elev.: Ft. MSL	**Type of OVM.:** Porta Fid / **Total dpth:** 150Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	**Well development date:**	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 4				
				0	SANDY SILT: Very dark gray, fine grained sand, uniform, medium dense, some shell fragments, calcareous, slight magnesium content, dry to damp.		MH	3/8/7/10	
				0	SILT: Very dark gray, grading from sandy (fine grained, uniform), to clayey (slightly plastic, little sand) below, some shell fragments, dry to damp.			11/12/18/17	
105				0	CLAYEY SILT: As above.			5/8/22/16	
				0	SILTY CLAY: Greenish gray, some sand, moderate plasticity, wet.		CL	3/5/7/10	
				0	SHELLY CLAY: Greenish gray, little sand, plastic, shell fragments, 1-4 mm, magnesium rich, calcareous, damp to moist.			8/20/40/47	
110				0	CLAYEY SAND: Light gray to white, fine to medium grained, moderately graded, very dense, 1-4mm shell fragments, magnesium rich, calcareous , moist.		SC	12/34/38/28	
				0	SHELLY CLAYEY SAND: As above, more shell fragments.			16/41/48/21	
115				0	SILTY CLAY: Greenish-gray, hard, moderate plasticity, trace (5-10%) shell fragments, magnesium rich, clacareous, dry.		CL	12/26/20/30	
				0	SILTY CLAY: Greenish-gray to dark greenish gray, extremely hard, 50% shell fragments, magneium rich, calcareous, dry.			31/41/75R	
				0	CLAY: As above, trace of silt.			19/30/30/40	
120				0	CLAY: As above, no shell fragments			75R	
				0				75R	
125				0			CL	6/4/5/10	

Project: NAS Jacksonville OU3	**Well ID:** SB002		**Boring ID:** SB002
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 7/31/93	**Compltd:** 8/2/93
Method: Mud Rotary	**Casing dia.:**	**Screen int.:** bls	**Protection level:** D
TOC elev.: Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 150Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE, & P. CRAINE	**Well development date:**		**Site:** NAS JAX OU3

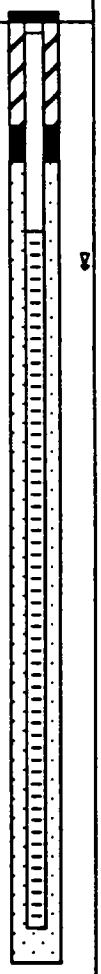
Continued from PAGE 5

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
				0	SANDY CLAY: Light gray to greenish gray, some fine sand, plastic, moist to wet, trace of rock fragments (pale yellow), clastic limestone.		CL	4/4/3/6	
				0	CLAY: Very pale brown to a greenish gray, soft, trace of rock fragments, as above.		CL	9/13/12/14	
130				0	CLAY: Greenish gray, homogeneous, plastic, damp, trace of shell fragments, calcareous, magnesium rich.			8/8/10/12	
				0	CLAY: Marbled very pale brown to dark greenish gray, as above, some silt and fine grained sand in pale zones, dry to damp.			4/4/4/6	
135				0				8/13/14/18	
				0				9/17/17/15	
				0				13/16/19/24	
140				0				20/27/24/19	
				0	SILTY CLAY: Greenish gray, some phosphate nodules 1-3mm, little sand, and shell fragments, fine to medium grained, very stiff, dry, calcareous, magnesium rich.			12/12/16/73	
145				0	SILT: Pale olive and dark olive, finely laminated, dry.		MH	75R	
				0	CLAYEY SAND: Very pale brown, fine to medium grained, very dense, some coarse sand and gravel, calcareous, magnesium rich, gravel, clastic limestone, wet.			75R	
				0	SILTY CLAY: Olive gray, some phosphate nodules and limestone fragments , calcareous, magnesium rich, wet.		SC CL	25/39/75R	
150									

Project: NAS Jacksonville OU3		Well ID: PZ001	Boring ID: PZ001
Client: SOUTHNAVFACENGCOM			Job No.: 7586-26
Contractor: Groundwater Protection Inc.		Date started: 8/03/93	Compltd: 8/03/93
Method: HSA	Casing dia.: none	Screen int.: 2.5-12.5 Ft. bls	Protection level: D
TOC elev.: 3.99 Ft. MSL	Type of OVM.: Porta Fid	Total dpth: 13Ft. bls	Dpth to ∇ 3.5 Ft. bls
ABB Rep.: M. CHEYNE	Well development date: 9/27/93		Site: NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.
				0	SAND: White-Olive gray, fine grained, uniform, some silt size black grains, some clay from 1.7 to 2.0', damp, fuel odor.		SP	PUSHED
				60	SAND: As above, no clay.			PUSHED
5				400	SAND: As above, white-very pale brown, moist.			PUSHED
10				7	SAND: White, as above, some clay, light greenish gray, 11.4 to 11.6', moderate plasticity, wet, fuel odor.		SP	5/5/3/4
15				0	SAND: As above, trace clay in 1cm nodules.		SP	1/2/2/2
20					TOTAL DEPTH = 13.0' bls LITHOLOGICAL DESCRIPTION TAKEN FROM PZ002			

Well diagram



Project: NAS Jacksonville OU3	**Well ID:** PZ002	**Boring ID:** PZ002
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/03/93	**Completd:** 8/09/93
Method: mud rotary	**Casing dia.:** 6" PVC	**Screen int.:** 82-87 Ft. bls	**Protection level:** D
TOC elev.: 4.18 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 87.5Ft. bls	**Dpth to ∇** 3.5 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/27/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ00201			0	SAND: White-olive gray, fine grained, uniform, some silt size black grains, some clay from 1.7 to 2.0', damp, fuel odor.		SP	PUSHED	
	OU3PZ00202			60	SAND: As above, no clay.			PUSHED	
5	OU3PZ00203			400	SAND: As above, white-very pale brown, moist.			PUSHED	
10				7	SAND: As above, white, some clay, light greenish gray 11.4 to 11.6', moderate plasticity, wet, fuel odor.		SP	5/5/3/4	
15				0	SAND: As above, trace clay in 1cm nodules.		SP	1/2/2/2	
20				20	SAND: White, fine grained, uniform, loose, clean, wet.		SP	2/3/4/7	
25							SM		

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Project: NAS Jacksonville OU3	Well ID: PZ002		Boring ID: PZ002
Client: SOUTHNAVFACENGCOM			Job No.: 7588-26
Contractor: Groundwater Protection Inc.		Date started: 8/03/93	Compltd: 8/09/93
Method: mud rotary	Casing dia.: 6" PVC	Screen int.: 82-87 Ft. bls	Protection level: D
TOC elev.: 4.18 Ft. MSL	Type of OVM.: Porta Fid	Total dpth: 87.5Ft. bls	Dpth to ∇ 3.5 Ft. bls
ABB Rep.: M. CHEYNE	Well development date: 9/27/93		Site: NAS JAX OU3

Depth ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				11	SILTY SAND: White to olive gray, fine grained, uniform, loose, moist to wet.		SM	2/2/2/5	
30				450	SAND: White-olive gray, fine grained, uniform, loose, moist to wet.		SP	10/2/3/5	
35				60	SAND: As above, white-light gray, wet.		SP	2/2/2/2	
40				300	SAND: As above, no odor CLAY: Black, plastic, soft, wet.		SP CL	8/6/4/5	
45				25	CLAY: As above, some silt, trace fine grained sand, moist. SAND: White, clean, fine grained, uniform, medium dense, wet, no odor.		CL SP	2/3/3/10	
50							SP		

Project: NAS Jacksonville OU3	**Well ID:** PZ002	**Boring ID:** PZ002
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/03/93	**Complt'd:** 8/09/93
Method: mud rotary	**Casing dia.:** 6" PVC	**Screen int.:** 82-87 Ft. bls	**Protection level:** D
TOC elev.: 4.18 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 87.5Ft. bls	**Dpth to ∇:** 3.5 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/27/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				1200	SAND: As above. CLAY: Black, plastic, some silt,trace fine grained sand, soft, moist, no odor		SP CL	2/3/2/5	
55				200	CLAY: Dark olvie brown, plastic, homogeneous, medium stiffness, trace silt, damp, no odor.		CL	2/2/3/4	
60				180	CLAY: Dark olive brown, some dark greenish gray, soft, plastic, some woody material, wet.		CL	8/4/2/6	
65				0	SAND: White, fine grained, uniform, very dense, some black grains, clean, wet.		SP	16/26/37/36	
70				0	SAND: As above, white to light gray.		SP	13/21/24/24	
75							SP		

Project: NAS Jacksonville OU3		**Well ID:** PZ002	**Boring ID:** PZ002
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/03/93	**Compltd:** 8/09/93
Method: mud rotary	**Casing dia.:** 6" PVC	**Screen int.:** 82-87 Ft. bls	**Protection level:** D
TOC elev.: 4.18 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 87.5Ft. bls	**Dpth to ∇** 3.5 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/27/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 3				
				0	SAND: As above		SP	12/9/9/12	
80				0	SAND: As above, yellow, trace silt size black grains.		SP	29/62/75R	
85				0	SAND: As above, reddish-yellow		SP	20/45/31/65	
90				0	CLAY: Greenish-gray, plastic, homogeneous, very stiff, dry.		CL	4/8/8/10	
					TOTAL DEPTH = 87.5' bls				
95									
100									

Project: NAS Jacksonville OU3	**Well ID:** PZ003	**Boring ID:** PZ003
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/10/93	**Compltd:** 8/11/93
Method: mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 58.2-63.2 Ft. bls **Protection level:** D
TOC elev.: 5.71 Ft. MSL	**Type of OVM:** Porta Fid	**Total dpth:** 63.7Ft. bls **Dpth to ∇:** 4.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/24/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ00301			4	SAND: Light gray, fine grained, uniform, dry.		SP	Posthole	
	OU3PZ00302			>5000	SAND: As above, wet, fuel odor.			PUSH	
5	OU3PZ00303			>5000	SAND: As above, wet, fuel odor.			PUSH	
10				18	CLAYEY SAND: Mottled light green and yellowish brown, trace small shell fragments, slight fuel odor.		SC	4/4/4/4	
15				900	SAND: Light gray, fine grained, uniform, clean, loose, slight fuel odor.		SP	4/4/5/5	
20				220	SAND: As above, dense		SP	23/23/15/10	
25							CL		

Project: NAS Jacksonville OU3	**Well ID:** PZ003	**Boring ID:** PZ003
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/10/93	**Complt'd:** 8/11/93
Method: mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 58.2-63.2 Ft. bls **Protection level:** D
TOC elev.: 5.71 Ft. MSL	**Type of OVM:** Porta Fid	**Total dpth:** 63.7Ft. bls **Dpth to ∇:** 4.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/24/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				12	CLAY: Dark greenish gray, some fine sand, stiff, plastic, dry to damp, sand present as 1 to 2 mm beds in clay beds of similar thickness		CL	6/7/6/9	
30				1	CLAY: Marbled dark greenish gray and pale brown, stiff, homogeneous, plastic, dry		CL	5/6/6/10	
35				0	CLAY: Marbled light greenish gray and pale brown, medium stiff to stiff, trace silt in brown zones, trace shell fragments, very plastic, magnesium rich, moist		CL	3/4/4/6	
40				0	CLAY: Dark greenish gray, medium stiff to stiff, some fine grained sands, homogeneous, plastic, slightly magnesium rich, moist		CL	3/2/3/7	
45				0	CLAYEY SAND: Dark greenish gray, fine grained, uniform, loose, moist to wet.		SC	3/3/6/6	
50							SC		

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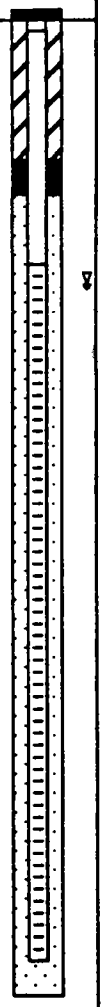
Project: NAS Jacksonville OU3	**Well ID:** PZ003	**Boring ID:** PZ003
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/10/93	**Compltd:** 8/11/93
Method: mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 58.2-63.2 Ft. bls **Protection level:** D
TOC elev.: 5.71 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 63.7Ft. bls **Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/24/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	CLAYEY SAND: As above with 4mm thick interbeded clean sands/sandy clay zones		SC	8/4/20/20	
					SAND: White to light gray, fine grained, uniform, medium dense, some silt size black grains, trace clay, wet		SP		
55				0	CLAYEY SAND: Light to dark gray with clean sands/sandy clay zones, wet.		SC	5/12/43/7	
60				N/A	CLAYEY SAND: As above		SC	7/7/9/12	
65				N/A	CLAY: Dark greenish gray, homogeneous, plastic, very stiff, dry to damp, slightly magnesium rich.		CL	5/7/9/12	
				N/A	CLAY: Greyish green, homogeneous, hard, slightly magnesium rich, dry, crumbles under hand pressure		CL	12/16/17/15	
70					TOTAL DEPTH = 63.7' bls				
75									

Project: NAS Jacksonville OU3		**Well ID:** PZ004	**Boring ID:** PZ004
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/10/93	**Completd:** 8/10/93
Method: HSA	**Casing dia.:** none	**Screen int.:** 3.5-13.5 Ft. bls	**Protection level:** D
TOC elev.: 5.64 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 14Ft. bls	**Dpth to ∇:** 3.8 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/24/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.
				4	SAND: Light gray, fine grained, uniform, dry.		SP	Posthole
				>5000	SAND: As above, wet, fuel odor.			PUSH
5				>5000	SAND: As above, wet, fuel odor.			PUSH
10				18	CLAYEY SAND: Mottled light green and yellowish brown, trace to some shell fragments, slight fuel odor.		SC	4/4/4/4
15				900	SAND: Light gray, fine grained, uniform, clean, loose, slight fuel odor.		SP	4/4/5/5
					TOTAL DEPTH = 14.0' bls LITHOLOGICAL DESCRIPTION TAKEN FROM PZ003			
20								

Well diagram



Project: NAS Jacksonville OU3	**Well ID:** PZ005	**Boring ID:** PZ005
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/12/93	**Compltd:** 8/14/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 88.5-98.5 Ft. bls **Protection level:** D
TOC elev.: 8.24 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 99.5Ft. bls **Dpth to ∇** 3.5 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/28/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ00501			0	SAND: Fill, yellow, fine grained, uniform, some silt size black grains, some laminations of rust red colors, dry.		SP	PUSHED	
	OU3PZ00502			0	SAND: As above, dry.			N/R	
	OU3PZ00503			0				N/R	
5	RP				SAND: As above, light gray, wet.				
10				0	SAND: As above		SP	2/2/2/3	
					SANDY CLAY: Light greenish gray, plastic, slightly magnesium rich, wet.		CL		
15				0	SAND: Light greenish gray, fine grained, uniform, clean, loose, wet.		SP	2/2/1/4	
20				0	CLAY: Light greenish gray, plastic, homogeneous, soft, wet.		CL	1/1/1/4	
					CLAYEY SILT: Dark brown, organic, some interbedded sand, damp, moist, humic odor.		ML		
25				0	SANDY CLAY:: Greyish green, stiff, plastic, moist, magnesium rich, strong sulphur odor.		CL	2/6/8/11	
				0	SANDY CLAY: As above.			11/12/13/13	
30									

Project: NAS Jacksonville OU3	**Well ID:** PZ005	**Boring ID:** PZ005
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/12/93	**Completed:** 8/14/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 88.5-98.5 Ft. bls **Protection level:** D
TOC elev.: 8.24 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 99.5Ft. bls **Dpth to ∇:** 3.5 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/28/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
35				0	CLAY: Grey, some fine grained sand veins, brown to light brown.		CL	3/5/6/9	
40				0	CLAY: Dark greenish gray, stiff, some shell fragments and fine grained sands, magnesium rich, calareous, plastic.		CL	3/6/6/12	
45				0	CLAY: As above.		CL	2/3/3/5	
50				0	CLAY: As above, soft.		CL	2/2/2/5	
55				0	CLAY: As above, trace fine grained sand lamina 1-2mm thick.		CL	2/2/2/5	
60							CL		

Project: NAS Jacksonville OU3	**Well ID:** PZ005	**Boring ID:** PZ005
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/12/93	**Complt'd:** 8/14/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 88.5-98.5 Ft. bls **Protection level:** D
TOC elev.: 8.24 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 99.5Ft. bls **Dpth to ∇** 3.5 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/28/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	CLAY: As above.		CL	7/4/5/9	
65				0	CLAY: As above.		CL	2/3/4/7	
70				0	CLAY: As above, no sand.		CL	3/6/6/9	
75				0	CLAY: Greyish green, some silt SAND: Light gray-white, fine grained, some silt.		CL SP	6/6/17/27	
80				0	SAND: Light greenish gray to white, fine grained, some silt.		SP	43/75R	
				0	SAND: Light grayish green, fine grained.			67/75R	
85									
90							SP		

Project: NAS Jacksonville OU3	**Well ID:** PZ005	**Boring ID:** PZ005
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/12/93	**Complt'd:** 8/14/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 88.5-98.5 Ft. bls **Protection level:** D
TOC elev.: 8.24 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 99.5Ft. bls **Dpth to ∇:** 3.5 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/28/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 3				
				0	SAND: Light gray to white, fine to medium grained.		SP	60/69/75R	
95				0	SILTY SAND: Dark greenish gray, fine grained, some shell fragments, wet.		SM	11/21/15/14	
100				0	SANDY SHELLY CLAY: Dark greenish gray, fine grained, shell fragments coarse sized, damp to wet.		CL	7/8/7/9	
				0	SHELLY CLAY: Dark greenish gray, fragments medium to coarse sized.			N/R	
105					TOTAL DEPTH = 99.5' bls				
110									
115									
120									

Project: NAS Jacksonville OU3		**Well ID:** PZ006	**Boring ID:** PZ006
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/12/93	**Compltd:** 8/12/93
Method: HSA	**Casing dia.:** none	**Screen int.:** 4-14 Ft. bls	**Protection level:** D
TOC elev.: 8.19 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 14.5Ft. bls	**Dpth to ∇:** 3.5 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
				0	SAND: Fill, yellow, fine grained, uniform, some silt size black grains, some laminations of rust red colors, dry.		SP	PUSHED	
				0	SAND: As above, dry.			N/R	∇
				0				N/R	
5					SAND: As above, light gray, wet.				
10					SAND: As above		SP		
				0	SANDY CLAY: Light greenish gray, plastic, slightly magnesium rich, wet.		CL	2/2/2/3	
15				0	SAND: Light greenish gray, fine grained, uniform, clean, loose, wet.		SP	2/2/1/4	
					TOTAL DEPTH = 14.5' bls LITHOLOGICAL DESCRIPTION TAKEN FROM PZ005				
20									

Project: NAS Jacksonville OU3	**Well ID:** PZ007	**Boring ID:** PZ007
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/12/93	**Completd:** 8/13/93
Method: mud rotary	**Casing dia.:** none	**Screen int.:** 55.5-60.5 Ft. bls **Protection level:** D
TOC elev.: 9.62 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 61Ft. bls **Dpth to ∇** 7.0 Ft. bls
ABB Rep.: M. CHEYNE/P. CRAINE	**Well development date:** 9/23/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					SAND: Yellow, fine grained,uniform, some fines.		SP		
	OU3PZ00701			6			SC	PUSHED	
	OU3PZ00702			0	CLAYEY SAND: Light gray, fine grained, uniform.			N/R	
5	OU3PZ00703 OU3PZ00703 OFFSITE			0	CLAYEY SAND: As above, interbedded rust red/light gray.			N/R	
	OU3PZ00704			0	SANDY CLAY: Bedded as above, light gray/rust red, fine grained.		CL	N/R	
	OU3PZ00705			0	CLAYEY SAND: Interbedded as above, rust red/light gray, damp.		SC	PUSHED	
10				0	CLAYEY SAND: Rust red, saturated, 12" over light brown, wet.			PUSHED	
15				0	SILTY SAND: Light gray with light olive yellow, fine to very fine grained, saturated.		SM	6/6/6/9	
20				0	SILTY SAND: As above, light gray.		SM	2/6/11/14	
25							SM		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3	**Well ID:** PZ007	**Boring ID:** PZ007
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/12/93	**Compltd:** 8/13/93
Method: mud rotary	**Casing dia.:** none	**Screen int.:** 55.5-60.5 Ft. bls **Protection level:** D
TOC elev.: 9.62 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 61Ft. bls **Dpth to ∇** 7.0 Ft. bls
ABB Rep.: M. CHEYNE/P. CRAINE	**Well development date:** 9/23/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				0	SILTY SAND: As above.		SM	3/11/17/24	
				0	SILTY SAND: As above.		SM	3/8/10/12	
30				0	SILTY SAND: As above.			7/6/5/12	
35				0	SILTY SAND: As above, trace clay @ 37'		SM	6/5/10/11	
40				0	SILTY SAND: As above, light gray to white.		SM	N/R	
45				0	SILTY SAND: As above.		SM	6/9/17/26	
50							SM		

 ABB ENVIRONMENTAL SERVICES, INC.

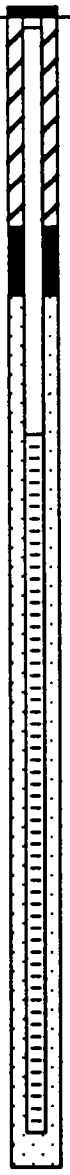
Project: NAS Jacksonville OU3	**Well ID:** PZ007	**Boring ID:** PZ007
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/12/93	**Compltd:** 8/13/93
Method: mud rotary	**Casing dia.:** none	**Screen int.:** 55.5-60.5 Ft. bls **Protection level:** D
TOC elev.: 9.62 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 61Ft. bls **Dpth to ∇** 7.0 Ft. bls
ABB Rep.: M. CHEYNE/P. CRAINE	**Well development date:** 9/23/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SILTY SAND: As above, yellow brown.		SM	N/R	
55				0	SILTY SAND: As above.		SM	29/45/32/24	
60				0	CLAY: Dark greenish gray, medium to high plasticty, soft.		CL	8/7/7/7	
				0	CLAY: As above, medium stiffness.			6/7/6/7	
65					TOTAL DEPTH = 61' bls				
70									
75									

Project: NAS Jacksonville OU3	**Well ID:** PZ008	**Boring ID:** PZ008
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/13/93	**Completd:** 8/13/93
Method: HSA	**Casing dia.:** NONE	**Screen int.:** 5.5-15.5 Ft. bls	**Protection level:** D
TOC elev.: 9.40 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 16.5Ft. bls	**Dpth to ∇** 7.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.
					SAND: Yellow, fine grained, uniform, some fines.		SP	
				6			SC	PUSHED
				0	CLAYEY SAND: Light gray, fine grained, uniform.			N/R
5				0	CLAYEY SAND: As above, interbedded rust red/light gray.			N/R
				0	SANDY CLAY: Bedded as above, light gray/rust red, fine grained.		CL	N/R
				0	CLAYEY SAND: Interbedded as above, rust red/light gray, damp.		SC	PUSHED
10				0	CLAYEY SAND: Rust red, saturated, 12" over light brown, wet.			PUSHED
15				0	SILTY SAND: Light gray with light olive yellow, fine to very fine grained, saturated.		SM	6/6/6/9
					TOTAL DEPTH = 16.5' bls LITHOLOGICAL DESCRIPTION TAKEN FROM PZ007			
20								

Well diagram



Project: NAS Jacksonville OU3	**Well ID:** PZ009	**Boring ID:** PZ009
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/14/93	**Compltd:** 8/17/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 88.5-93.5 Ft. bls / **Protection level:** D
TOC elev.: 5.90 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 94Ft. bls / **Dpth to ▽** 3.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/28/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					LIMESTONE: crushed, fill.		LS		
	OU3PZ00901			0	SILT: Light gray to black and brown mottled, trace dark green clay.		MH	PUSHED	
	OU3PZ00902			0	SILT: Light gray to black mottled with brown.			PUSHED	
5	OU3PZ00903			0	SILT: Light gray with black mottling to light brown.			PUSHED	
	OU3PZ00904			0	SILT: Light brown, trace clay.			PUSHED	
10									
15				0	CLAYEY SILT: Dark greenish gray mottled with olive yellow, some light gray fine grained sand mottled in.		ML	6/8/4/11	
20				0	CLAY: Mottled yellow brown, some fine grained light gray to white sand, damp.		CL	5/6/6/9	
				0	CLAY: Yellow brown to olive brown, some light gray mottling, trace very fine grained quartz sand.			3/3/3/6	
25							CL		

Project: NAS Jacksonville OU3	**Well ID:** PZ009	**Boring ID:** PZ009
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/14/93	**Compltd:** 8/17/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 88.5-93.5 Ft. bls / **Protection level:** D
TOC elev.: 5.90 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 94Ft. bls / **Dpth to ∇:** 3.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/28/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				0	CLAY: Light greenish gray with light yellow brown mottling, medium stiffness.		CL	3/3/4/6	
30				0	CLAY: As above with trace silt.		CL	3/3/3/5	
				0	CLAY: Dark greenish gray,stiff, some lamina of fine grained light gray sand.			3/3/4/4	
35				0	CLAY: As above, sand yellow brown.			4/6/2/3	
				0	CLAY: As above, light greenish gray 13" over CLAYEY SAND: light grayish green mottled with yellow brown.			3/3/2/3	
40				0	SILTY SAND: Light gray to white interbedded with light gray and yellow brown, fine grained, saturated.		SM	15/28/28/33	
45				0	SILTY SAND: Light gray to yellow brown, very fine to fine grained, dense, saturated.		SM	8/17/36/43	
50							SM		

Project: NAS Jacksonville OU3		**Well ID:** PZ009	**Boring ID:** PZ009
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/14/93	**Compltd:** 8/17/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 88.5-93.5 Ft. bls	**Protection level:** D
TOC elev.: 5.90 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 94Ft. bls	**Dpth to ∇:** 3.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SILTY SAND: As above, pale yellow.		SM	17/31/34/34	
55				0	SILTY SAND: Greenish gray 12" above dark gray, fine grained.		SM	47/75R	
60				0	SILTY SAND: Pale olive, fine grained, very dense.		SM	40/75R	
65				0	SILTY SAND: As above.		SM	51/75R	
70				0	SILTY SAND: Light greenish gray, fine grained, very dense, wet.		SM	81/75R	
75							CL		

Project: NAS Jacksonville OU3		**Well ID:** PZ009	**Boring ID:** PZ009
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/14/93	**Compltd:** 8/17/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 88.5-93.5 Ft. bls	**Protection level:** D
TOC elev.: 5.90 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 94Ft. bls	**Dpth to ∇:** 3.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 3				
				0	SANDY CLAY: Greenish gray, medium stiffness, medium to high plasticity, dry		CL	5/8/11/11	
				0	CLAY: Greyish green, plastic, 8" over SANDY CLAY: color as above 2" over SILTY SAND: color as above, fine grained.			13/18/33/36	
80				0	SAND: Light greenish gray, fine grained, uniform, dense, clean, some silt-size black grains, magnesium rich, wet.		SP	16/16/31/35	
85				0	SAND: As above, light gray, very dense.		SP	47/75R	
90				0	SAND: As above.		SP	36/75R	
95				0	SANDY SILTY CLAY: Dark greenish gray, soft, calcareous, sand fine grained, uniform, some shell fragments, magnesium rich, wet.		CL	2/2/4/7	
				0	SANDY SILTY CLAY: As above.			2/2/6/9	
100					TOTAL DEPTH = 94' bls				

Project: NAS Jacksonville OU3	**Well ID:** PZ010	**Boring ID:** PZ010
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/14/93	**Completd:** 8/14/93
Method: HSA	**Casing dia.:** none	**Screen int.:** 3.5-13.5 Ft. bls	**Protection level:** D
TOC elev.: 5.90 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 14Ft. bls	**Dpth to ∇** 3.0 Ft. bls
ABB Rep.: M. CHEYNE/P. CRAINE	**Well development date:** 9/28/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					LIMESTONE: crushed, fill.		LS		
				0	SILT: Light gray to black/brown mottled, trace dark green clay.		MH	PUSHED	
				0	SILT: light gray to black with brown mottled.			PUSHED	∇
5				0	SILT: Light gray with black mottling to light brown.			PUSHED	
				0	SILT: Light brown, trace clay.			PUSHED	
10									
15				0	CLAYEY SILT: Dark greenish gray mottled with olive yellow, some light gray fine grained sand mottled in.		ML	6/8/4/11	
					TOTAL DEPTH = 14.0' bls LITHOLOGICAL DESCRIPTION TAKEN FROM PZ009				
20									

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3	**Well ID:** PZ011	**Boring ID:** PZ011
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/18/93	**Completd:** 8/23/93
Method: mud rotary	**Casing dia.:** none	**Screen int.:** 87.5-92.5 bls	**Protection level:** D
TOC elev.: 9.27 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 93Ft. bls	**Dpth to ∇:** 4.0 Ft. bls
ABB Rep.: M. CHEYNE/P. CRAINE	**Well development date:** 9/27/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ01101			0			SM		
	OU3PZ01101 RP			0	SILTY SAND: Light tan, fine grained.			PUSHED	
	OU3PZ01102			0	SILTY SAND: As above, grading to clayey sand below.			PUSHED	
	OU3PZ01103			0	CLAYEY SAND: Rust red with tan mottling, some silt.		SC		
5	OU3PZ01103 MS/MD			0				PUSHED	
	OU3PZ01104			0	SILTY SAND: Light gray with rust red mottling, some clay, moist to wet.		SM	PUSHED	
				0	SILTY SAND: Light gray, fine grained, uniform, trace silt size black grains, wet.			PUSHED	
10									
15				0	CLAYEY SAND: Light gray, fine grained, uniform, medium dense, trace silt size black grains, slightly plastic, wet.		SC	4/5/5/6	
20				0	CLAYEY SAND: As above, little yellowish brown mottling.		SC	6/4/4/7	
25				0	SAND: White to light gray, fine grained, uniform, medium dense, clean, trace clay in 1mm lamina, widely spaced (>10cm), wet.		SP	13/11/10/12	
30							SP		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ011	**Boring ID:** PZ011
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/18/93	**Compltd:** 8/23/93
Method: mud rotary	**Casing dia.:** none	**Screen int.:** 87.5-92.5 bls	**Protection level:** D
TOC elev.: 9.27 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 93Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE/P. CRAINE	**Well development date:** 9/27/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				0	SAND: Yellow, fined grained, uniform, clean, dense, some silt size black grains, wet.		SP	9/12/19/20	
35				0	SAND: As above, light gray, mottled with yellow, medium dense.		SP	2/9/12/14	
40				0	SAND: Yellow, fine grained, uniform, clean, very dense, some silt size black grains, wet.		SP	22/34/52/56	
45				0	SAND: As above, pale yellow to yellow.		SP	25/21/56/55	
50				0	SAND: As above.		SP	27/37/52/46	
55				0	SAND: As above.		SP	18/37/56/42	
60							SP		

Project: NAS Jacksonville OU3	**Well ID:** PZ011	**Boring ID:** PZ011
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/18/93	**Compltd:** 8/23/93
Method: mud rotary	**Casing dia.:** none	**Screen int.:** 87.5-92.5 bls	**Protection level:** D
TOC elev.: 9.27 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 93Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE/P. CRAINE	**Well development date:** 9/27/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SAND: As above. trace light gray clay in last 3" of sample.		SP	40/52/44/42	
65				0	SAND: As above, no clay.		SP	45/66/75R	
70				0	SAND: As above.		SP	43/63/75R	
75				0	SAND: As above.		SP	54/75R	
80				0	SAND: As above.		SP	32/75R	
85				0	SAND: Brownish yellow, fine grained, some silt.		SP	38/75R	
90							SM		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ011	**Boring ID:** PZ011
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/18/93	**Compltd:** 8/23/93
Method: mud rotary	**Casing dia.:** none	**Screen int.:** 87.5-92.5 bls	**Protection level:** D
TOC elev.: 9.27 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 93Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE/P. CRAINE	**Well development date:** 9/27/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 3				
				0	SILTY SAND: Brownish yellow to light gray, some light gray clay layers.		SM	4/75R	
95				0	SILTY CLAY: Light greenish gray, some zones of fine grained sand, medium stiffness, low plasticity, dry.		CL	6/8/12/13	
				0	SILTY CLAY: As above.			14/18/22/22	
100					TOTAL DEPTH = 99' bls				
105									
110									
115									
120									

Project: NAS Jacksonville OU3	**Well ID:** PZ012	**Boring ID:** PZ012
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/23/93	**Complt'd:** 8/23/93
Method: HSA	**Casing dia.:** none	**Screen int.:** 4.5-14.5 Ft. bls	**Protection level:** D
TOC elev.: 9.22 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 15Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/27/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
				0	SILTY SAND: Light tan, fine grained.		SM	PUSHED	
				0	SILTY SAND: As above, grading to clayey sand below.			PUSHED	
5				0	CLAYEY SAND: Rust red with tan mottling, some silt.		SC	PUSHED	
				0	SILTY SAND: Light gray with rust red mottling, some clay, moist to wet.		SM	PUSHED	
				0	SILTY SAND: Light gray, fine grained, uniform, trace silt size black grains, wet.			PUSHED	
10									
15				0	CLAYEY SAND: Light gray, fine grained, uniform, medium dense, trace silt size black grains, slightly plastic, wet.		SC	4/5/5/6	
					TOTAL DEPTH = 15.0' bls LITHOLOGICAL DESCRIPTION TAKEN FROM PZ011				
20									

Project: NAS Jacksonville OU3	**Well ID:** PZ013	**Boring ID:** PZ013
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/24/93	**Compltd:** 8/26/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 62-67 Ft. bls	**Protection level:** D
TOC elev.: 8.65 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 67.5Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ01301 OU3PZ01301 OFFSITE			0	SILTY SAND: Tan to light gray, fine grained, uniform, some clay same color (1.5-2'), dry.		SM	HANDAUGER	
	OU3PZ1302			0	SAND: White, fine grained, uniform, little silt size black grains, dry.		SP	PUSHED	
5	OU3PZ1303			>5000	SAND: As above, stained light to dark gray, strong fuel odor, moist.			PUSHED	
	OU3PZ1304			>5000	SAND: As above, wet.			N/R	
10				400	CLAYEY SAND: Dark brown, fine grained, uniform, loose, wet, fuel odor.		SC	4/3/5/7	
15				20	SANDY CLAY: Mottled light greenish gray & rust red, sand is fine grained, uniform, stiff, damp.		CL	9/6/9/11	
20				0	SANDY CLAY: As above, light grayish green.		CL	3/5/8/10	
				0	SANDY CLAY: As above, mottled greenish gray, rust red & olive green. CLAY: Mottled very pale brown and light greenish gray, trace fine grained sand in 1mm lamina, very stiff, damp.			5/8/8/8	
25				0	CLAY: Color as above, homogeneous, medium stif to stiff, dry, damp.		CL	3/4/5/6	
30							CL		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ013	**Boring ID:** PZ013
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/24/93	**Completd:** 8/26/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 62-67 Ft. bls	**Protection level:** D
TOC elev.: 8.65 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 67.5Ft. bls	**Dpth to ∇:** 4.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				0	CLAY: Mottled light greenish gray & light olive brown, medium stiff to stiff.		CL	5/3/5/6	
35				0	SAND: Pale yellow with some olive yellow mottling, fine grained, uniform, very dense, some silt size black grains, clean, wet.		SP	9/24/75R	
40				0	SAND: As above.		SP	21/33/28/22	
45				0	SILTY SAND: As above, slightly finer grained, light gray, very dense.		SM	17/27/39/21	
50				0	SILTY SAND: As above, with liminations of natural organics, black, in 1-2mm laminae, very dense.		SM	8/21/24/36	
55				0	SAND: Light gray, fine grained, uniform, very dense, trace natural organics in 1-2mm beds spaced 2-5cm apart, little silt size black grains, wet.		SP	27/44/24/55	
60							SP		

 ABB ENVIRONMENTAL SERVICES, INC.

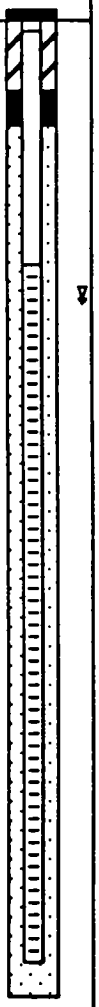
Project: NAS Jacksonville OU3	**Well ID:** PZ013	**Boring ID:** PZ013
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/24/93	**Compltd:** 8/26/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 62-67 Ft. bls	**Protection level:** D
TOC elev.: 8.65 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 67.5Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SAND: As above, white to light gray, slightly magnesium rich.		SP	57/75R	
65				0	SAND: As above, pale yellow, slightly magnesium rich.		SP	58/75R	
70				0	CLAY: Greyish green, very stiff, crumbles under hand pressure, some silt, magnesium rich, dry.		CL	6/7/11/13	
				0	CLAY: As above, hard.			15/20/23/25	
75					TOTAL DEPTH = 67.5' bls				
80									
85									
90									

Project: NAS Jacksonville OU3		**Well ID:** PZ014	**Boring ID:** PZ014
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/24/93	**Compltd:** 8/24/93
Method: HSA	**Casing dia.:** none	**Screen int.:** 3.5-13.5 bls	**Protection level:** D
TOC elev.: 8.50 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 14Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.
				0	SILTY SAND: Tan to light gray, fine grained, uniform, some clay same color (1.5-2'), dry.		SM	HANDAUGER
				0	SAND: White, fine grained, uniform, little silt size black grains, dry.		SP	PUSHED
5				>5000	SAND: As above, stained light to dark gray, strong fuel odor, moist.			PUSHED
				>5000	SAND: As above, wet.			N/R
10				400	CLAYEY SAND: Dark brown, fine grained, uniform, loose, wet, fuel odor.		SC	4/3/5/7
15				20	SANDY CLAY: Mottled light greenish gray & rust red, sand is fine grained, uniform, stiff, damp.		CL	9/6/9/11
					TOTAL DEPTH = 14' bls LITHOLOGIC DESCRIPTION TAKEN FROM PZ013			
20								

Well diagram



Project: NAS Jacksonville OU3	**Well ID:** PZ015		**Boring ID:** PZ015
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/24/93	**Compltd:** 8/24/93
Method: HSA	**Casing dia.:** none	**Screen int.:** 51-56 Ft. bls	**Protection level:** D
TOC elev.: 9.44 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 56.5Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ01501			0	SAND: White to light tan, fine grained, uniform, some silt sized black grains, loose, dry. SAND: As above, very pale brown, moist.		SP	N/R	
	OU3PZ01502			0				N/R	
5	OU3PZ01503 OU3PZ01503 RP			12	SANDY CLAY: Sand, as above 5" over sandy clay, light gray to greenish gray, grading from homogeneous clayey sand to interbedded clean white sand & light greenish gray homogeneous clay, moist.		CL	N/R	∇
10				2	SAND: Very pale brown mottled with rust red, fine grained, uniform, some fines, loose, wet, 12" over SAND, light gray, fine grained, uniform, loose, trace black grains, wet.		SP	5/2/1/2	
15				8	SAND: As above, olive.		SP	1/3/3/4	
20				2	SAND: As above with trace fines, some rock & shell fragments, some zones of bright red clayey fine grained sand.		SP	4/3/3/5	
25							SP		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ015	**Boring ID:** PZ015
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/24/93	**Completd:** 8/24/93
Method: HSA	**Casing dia.:** none	**Screen int.:** 51-56 Ft. bls	**Protection level:** D
TOC elev.: 9.44 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 56.5Ft. bls	**Dpth to ∇:** 5.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				1	SAND: light brownish gray, fine grained, uniform, loose, clean, trace 1mm sized zones of carboniferous material, black, (wood), wet, trace shell fragments, calcareous, magnesium rich.		SP	4/5/3/2	
30				0	SAND: As above, only trace calcareous, medium dense.		SP	11/6/6/8	
35				0	SAND: As above, medium dense.		SP	3/8/10/5	
40				0	SAND: As above, no carbonate, no shells, no wood, slightly magnesium rich, dense 18" over SAND, light greenish gray, trace clay, magnesium rich, fine grained, uniform, dense.		SP	3/13/23/23	
45				0	SAND: White, fine grained, uniform, dense, trace silt sized black grains, clean, wet.		SP	N/R	
50							SP		

Project: NAS Jacksonville OU3		**Well ID:** PZ015	**Boring ID:** PZ015
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/24/93	**Compltd:** 8/24/93
Method: HSA	**Casing dia.:** none	**Screen int.:** 51-56 Ft. bls	**Protection level:** D
TOC elev.: 9.44 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 56.5Ft. bls	**Dpth to ∇:** 5.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SAND: As above, medium dense.		SP	7/8/12/10	
55				0	SAND: As above, dense, 18" over CLAY: Dark gray, medium stiff, homogeneous pure clay, high plasticity, damp to moist.		SP	21/25/8/7	
				0	SHELLY CLAY: As above with 40% shell fragments, damp.		CL	6/6/10/11	
60					TOTAL DEPTH = 56.5' bls				
65									
70									
75									

Project: NAS Jacksonville OU3		**Well ID:** PZ016	**Boring ID:** PZ016
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/25/93	**Completd:** 8/27/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 48.5-53.5 bls	**Protection level:** D
TOC elev.: 10.80 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 54Ft. bls	**Dpth to ▽** 7.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ01601			0	SILTY SAND: Light brown, fine to medium grained, moderate graded, some pebbles, some clay, dry.		SM	HANDAUGER	
	OU3PZ01602			0	SILTY SAND: Very pale brown to pale yellow, fine grained, uniform, some rust red mottling, dry.			HANDAUGER	
5	OU3PZ01603			0	SILTY SAND: As above, moist to wet @ 6', dry above.			HANDAUGER	
10				0	CLAY: Light greenish gray, some light brown mottling, trace fine grained sand, stiff, dry to damp, magnesium rich, high plasticity.		CL	4/6/10/10	
15				0	SANDY CLAY: Mottled light greenish gray & rust red, sand is fine grained, low plasticity, magnesium rich, moist to wet.		CL	3/3/6/6	
20				0	SANDY CLAY: Mottled light gray & reddish yellow, soft to medium stiffness, high plasticity, wet.		CL	7/9/9/10	
25							CL		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ016	**Boring ID:** PZ016
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/25/93	**Compltd:** 8/27/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 48.5-53.5 bls	**Protection level:** D
TOC elev.: 10.80 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 54Ft. bls	**Dpth to ∇** 7.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				0	SANDY CLAY: As above, 17" over CLAYEY SAND: Reddish yellow mottled with light gray, fine grained, uniform, loose, wet, slightly magnesium rich.		CL	4/2/5/7	
30				0	CLAYEY SAND: As above.		SC	12/14/18/15	
35				0	SAND: Mottled yellow & olive yellow, fine grained, uniform, dense to very dense, trace silt sized black grains, trace fines in some zones, otherwise clean, wet, some clastic limestone fragments, tan @35-35.2'		SP	14/19/30/45	
40				0	SAND: Pale yellow white, fine grained, uniform, clean, very dense, some greenish gray clay present as 4mm laminations 1.5cm apart, from 41'to 41.7', magnesium rich, wet.		SP	21/38/34/32	
45				0	SAND: As above, light gray white, with clay laminae.		SP	18/17/23/28	
50							SP		

Project: NAS Jacksonville OU3		**Well ID:** PZ016	**Boring ID:** PZ016
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/25/93	**Completd:** 8/27/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 48.5-53.5 bls	**Protection level:** D
TOC elev.: 10.80 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 54Ft. bls	**Dpth to ∇** 7.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SAND: As above		SP	19/31/27/35	
55				0	CLAY: Black, homogeneous, high plasticity, soft, medium stiffness, slightly magnesium rich, damp to moist.		CH	2/2/3/5	
				0	CLAY: As above.			6/7/6/6	
					SANDY CLAY: Black, high plasticity, damp to moist.		CL		
60					TOTAL DEPTH = 54' bls				
65									
70									
75									

Project: NAS Jacksonville OU3		**Well ID:** PZ017	**Boring ID:** PZ017
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/25/93	**Completd:** 8/25/93
Method: HSA	**Casing dia.:** none	**Screen int.:** 3.5-13.5 Ft. bls	**Protection level:** D
TOC elev.: 10.77 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 14Ft. bls	**Dpth to ∇:** 7.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
				0	SILTY SAND: Light brown, fine to medium grained, moderately graded, some pebbles, some clay, dry.		SM	HANDAUGER	
				0	SILTY SAND: Very pale brown to pale yellow, fine grained, uniform, some rust red mottling, dry.			HANDAUGER	
5				0	SILTY SAND: As above, moist to wet @ 6', dry above.			HANDAUGER	
10				0	CLAY: Light greenish gray, some light brown mottling, trace fine grained sand, stiff, dry to damp, magnesium rich, high plasticity.		CL	4/6/10/10	
15				0	SANDY CLAY: Mottled light greenish gray to rust red, sand is fine grained, low plasticity, magnesium rich, moist to wet.		CL	3/3/6/8	
					TOTAL DEPTH = 14.0' bls				
					LITHOLOGICAL DESCRIPTION TAKEN FROM PZ018				
20									

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ018	**Boring ID:** PZ018
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/26/93	**Compltd:** 8/28/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 68-73 Ft. bls	**Protection level:** D
TOC elev.: 9.20 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 73.5Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE/P. CRAINE	**Well development date:** 9/23/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ01801			0	SILTY SAND: Light gray brown, fine grained, moderately graded, some pebbles,dry.		SM	HANDAUGER	
	OU3PZ01802			0	SILTY SAND: As above, uniform, dry.			HANDAUGER	
5	OU3PZ01803			0	CLAYEY SAND: Pale brown to light greenish gray, fine grained, uniform, wet @ 5.5.		SC	HANDAUGER	
10				160	SAND: Light gray to dark brown, mottled, fine grained, uniform, loose, wet, 12" over SANDY CLAY: Light greenish gray, sand is fine grained, uniform, low to medium plasticity, slightly magnesium rich, wet.		SP CL	3/3/3/6	
15				4	CLAYEY SAND: Light grayish green, fine grained, uniform, medium dense, slightly magnesium rich, wet.		SC	6/7/8/11	
20				6	CLAY: Light greenish gray mottled with very pale brown, trace fine sand from 20-21.4', some shells from 21.4-22', magnesium rich, high plasticity, medium stiff to stiff, damp.		CL	4/5/2/7	
				0	CLAY: Very pale brown mottled with light greenish gray, homogeneous, stiff, high plasticity, dry to damp, calcareous, magnesium rich.			6/6/8/10	
25				0	CLAY: As above.		CL	10/8/8/11	
30							CL		

 ABB ENVIRONMENTAL SERVICES, INC.

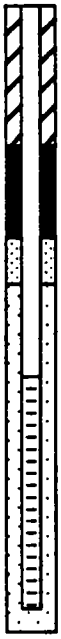
Project: NAS Jacksonville OU3		**Well ID:** PZ018	**Boring ID:** PZ018
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/26/93	**Completd:** 8/28/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 68-73 Ft. bls	**Protection level:** D
TOC elev.: 9.20 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 73.5Ft. bls	**Dpth to ∇:** 4.0 Ft. bls
ABB Rep.: M. CHEYNE/P. CRAINE	**Well development date:** 9/23/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				0	CLAY: As above, some silt, some sand, medium stiff to stiff.		CL	4/6/7/8	
35				0	SANDY CLAY: Dark gray, high plasticity, sand is fine grained, uniform, magnesium rich, moist 18" over CLAYEY SAND: Light gray mottled with olive yellow, fine grained, uniform, slightly plastic, moist, wet.		CL SC	2/12/12/17	
40				0	SAND: Light gray,fine grained, uniform, some clay, medium dense, slightly plastic, slightly magnesium rich, wet.		SP	2/3/8/19	
45				0	SANDY CLAY: Mottled light gray & olive brown, highly plastic, magnesium rich, damp to moist, 18" over SAND: light gray, fine grained, uniform, some clay, medium dense, slightly plastic, slightly magnesium rich, wet.		CL SP	18/23/30/25	
50				0	CLAYEY SAND: Dark gray, fine grained, uniform, loose, very wet.		SC	2/1/3/5	
55				0	SAND: White to light gray, fine grained, uniform, medium dense, some gray clay, 56.8-57', wet.		SP	11/7/13/13	
60							SP		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ018	**Boring ID:** PZ018
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/26/93	**Completd:** 8/28/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 68-73 Ft. bls	**Protection level:** D
TOC elev.: 9.20 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 73.5Ft. bls	**Dpth to ∇:** 4.0 Ft. bls
ABB Rep.: M. CHEYNE/P. CRAINE	**Well development date:** 9/23/93		**Site:** NAS JAX OU3

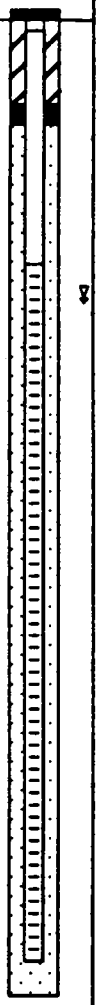
Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SAND: As above, trace clay 61-62'.		SP	7/11/36/60	
65				0	SAND: As above,very dense, trace clay in 2mm laminations 66.7-67', wet.		SP	28/75R	
70				0	SAND: As above.		SP	39/70/75R	
75				0	CLAY: Greenish gray, stiff to very stiff, little silt, dry, crumbles under hand pressure, some shell fragments, magnesium rich, moderate plasticity.		CL	4/5/10/12	
				0	CLAY: As above.			11/17/18/21	
80					TOTAL DEPTH = 73.5' bls				
85									
90									



Project: NAS Jacksonville OU3	**Well ID:** PZ019	**Boring ID:** PZ019
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/26/93	**Completd:** 8/26/93
Method: HSA	**Casing dia.:** none	**Screen int.:** 3.5-13.5 Ft. bls	**Protection level:** D
TOC elev.: 9.15 Ft. MSL	**Type of OVM:** Porta Fid	**Total dpth:** 14Ft. bls	**Dpth to ∇:** 4.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/23/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.
				0	SILTY SAND: Light gray brown, fine grained, moderately graded, some pebbles,dry.		SM	HANDAUGER
				0	SILTY SAND: As above, uniform, dry.			HANDAUGER
5				0	CLAYEY SAND: Pale brown to light greenish gray, fine grained, uniform, wet @ 5.5.		SC	HANDAUGER
10				160	SAND: Light gray to dark brown, mottled, fine grained, uniform, loose, wet, 12" over SANDY CLAY: Light greenish gray, sand is fine grained, uniform, low to medium plasticity, slightly magnesium rich, wet.		SP CL	3/3/3/6
15				4	CLAYEY SAND: Light grayish green, fine grained, uniform, medium dense, slightly magnesium rich, wet.		SC	6/7/8/11
					TOTAL DEPTH = 14.0' bls LITHOLOGICAL DESCRIPTION TAKEN FROM PZ018			
20								

Well diagram



Project: NAS Jacksonville OU3	**Well ID:** PZ020		**Boring ID:** PZ020
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/31/93	**Complt'd:** 9/11/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 84-89 Ft. bls	**Protection level:** D
TOC elev.: 10.04 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 89.5Ft. bls	**Dpth to ∇:** 5.0 Ft. bls
ABB Rep.: M. CHEYNE/D. DOPKIN/P. CR	**Well development date:** 9/27/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ02001			1	SILTY SAND: Crushed limestone 6" over SILTY SAND: Dark brown 4" over SILTY SAND: Light gray, very fine to fine grained.		SM	HANDAUGER	
	OU3PZ02002			1				HANDAUGER	
	OU3PZ02002 RP				SILTY SAND: Tan, some rust red mottling, very fine to fine grained, damp.				
	OU3PZ02002 OFFSITE								
	OU3PZ02002 OFFSITE MS/MD				SILTY SAND: As above 6" over SAND: Grey, fine to very fine grained 4" over SANDY SILT: Grey, trace to some organics, very fine to fine grained.				
5	OU3PZ02003			200				HANDAUGER	
10				8	CLAYEY SILTY SAND: Light gray to very pale brown, fine grained, uniform, medium dense, slightly plastic, damp to dry.		ML	8/8/12/15	
15				0	CLAYEY SAND: Light greenish gray, fine grained, uniform, medium dense, magnesium rich, damp to moist.		SC	5/6/8/8	
20				0	CLAY: Light greenish gray, stiff, trace sand, some shell fragments, high plasticity, dry to damp.		CL	5/4/7/9	
				0	CLAY: Marbled very pale brown and light greenish gray, very stiff, little shell fragments, trace sand in 1mm stringers spaced at 10cm, dry.			5/6/9/7	
25							CL		

Project: NAS Jacksonville OU3		**Well ID:** PZ020	**Boring ID:** PZ020
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/31/93	**Completd:** 9/11/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 84-89 Ft. bls	**Protection level:** D
TOC elev.: 10.04 Ft. MSL	**Type of OVM:** Porta Fid	**Total dpth:** 89.5Ft. bls	**Dpth to ▽:** 5.0 Ft. bls
ABB Rep.: M. CHEYNE/D. DOPKIN/P. CRA	**Well development date:** 9/27/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				0	SILTY CLAY: Dark greenish gray, some yellowish-brown mottling, soft, trace shell fragments, trace thin seams of clean white quartz sand, moderate plasticity, magnesium rich.		CL	3/5/7/15	
30				0	SILTY CLAY: Dark greenish gray, soft, moderate plasticity, trace shell fragments.		CL	2/2/3/5	
35				0	SILTY CLAY: Dark greenish gray, soft, moderate plasticity, some shelly stratifications and lenses of dark grayish-green sand, magnesium rich.		CL	2/2/4/4	
40				0	SILTY CLAY: As above.		CL	2/2/5/7	
45				0	SILTY CLAY: As above.		CL	2/2/2/4	
50							CL		

Project: NAS Jacksonville OU3	**Well ID:** PZ020		**Boring ID:** PZ020
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/31/93	**Complt'd:** 9/11/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 84-89 Ft. bls	**Protection level:** D
TOC elev.: 10.04 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 89.5Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE/D. DOPKIN/P. CRA	**Well development date:** 9/27/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SILTY CLAY: As above.		CL	5/4/5/5	
55				0	SILTY CLAY: As above.		CL	2/2/2/6	
60				1	SILTY CLAY: As above, no shells.		CL	2/2/5/8	
65				3	SILTY CLAY: As above, with shells 1.7' above CLAYEY SAND: Greenish- gray, fine grained, some clay, calcareous.		CL SC	3/3/3/6	
70				9	SAND: Fine to medium grained, trace fines, loose, shelly, magnesium and carbonate present.		SP	8/15/12/8	
75							SP		

Project: NAS Jacksonville OU3		**Well ID:** PZ020	**Boring ID:** PZ020
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/31/93	**Compltd:** 9/11/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 84-89 Ft. bls	**Protection level:** D
TOC elev.: 10.04 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 89.5Ft. bls	**Dpth to ∇** 5.0 Ft. bls
ABB Rep.: M. CHEYNE/D. DOPKIN/P. CR	**Well development date:** 9/27/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 3				
				14	SAND: Light gray to gray, fine to medium grained, clean, loose, some magnesium present.		SP	34/49/60/75	
80				1	SAND: As above.		SP	39/50/75R	
85				1	SAND: As above.		SP	36/59/54/75	
90				0	CLAYEY SAND: greenish gray, fine grained, dense, slightly cohesive.		SC	20/22/25/23	
95				0	CLAY: Dark greenish gray, some silt, very hard, dry, crumbly.		CL	9/16/17/21	
				0	CLAY: As above.			20/27/27/31	
100					TOTAL DEPTH = 89.5' bls				

Project: NAS Jacksonville OU3	**Well ID:** PZ021		**Boring ID:** PZ021
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/30/93	**Completd:** 8/30/93
Method: HSA	**Casing dia.:** none	**Screen int.:** 3-13 Ft. bls	**Protection level:** D
TOC elev.: 9.99 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 13.0Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M.CHEYNE	**Well development date:** 9/27/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
				1	SILTY SAND: Crushed limestone 6" over SILTY SAND: Dark brown 4" over SILTY SAND: Light gray, very fine to fine grained.		SM	HANDAUGER	
				1	SILTY SAND: Tan, some rust red mottling, very fine to fine grained, damp.			HANDAUGER	
5				200	SILTY SAND: As above 6" over SAND: Grey fine to very fine grained 4" over SANDY SILT: Grey, trace to some organics, very fine to fine grained.			HANAUGER	
10				8	CLAYEY SILTY SAND: Light gray to very pale brown, fine grained, uniform, medium dense, magnesium rich, slightly plastic, damp to dry.		ML	8/8/12/15	
15				0	CLAYEY SAND: Light gray, fine grained, uniform, medium dense, magnesium rich, damp to moist.		SC	5/6/6/8	
					TOTAL DEPTH = 13.0' bls LITHOLOGICAL DESCRIPTION TAKEN FROM PZ020				
20									

Project: NAS Jacksonville OU3		**Well ID:** PZ022	**Boring ID:** PZ022
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 9/8/93	**Completd:** 9/10/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 77-82 Ft. bls	**Protection level:** D
TOC elev.: 10.14 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 82.5Ft. bls	**Dpth to ∇** 1.9 Ft. bls
ABB Rep.: D. DOPKIN/ P. CRAINE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ02201			0	CRUSHED LIMESTONE: 8" over SILTY SAND: Dark brown, trace of fine to medium gravel 3" over CLAY: with white fine grained sand 6" over SILT: Black, trace of organics and sand, moist.		LS	HANDAUGER	
	OU3PZ02201 RP						SM		
	OU3PZ02201 MS/MD						CL		
							MH		
	OU3PZ02202			20	SILT: Black, moist to dry 20 " over SILTY SAND: Light gray to light brown, very fine grained, saturated at 3.5' bls.		SM	HANDAUGER	
5									
10				200	SAND: Greenish-gray, fine to very fine grained, trace of clay, some clayey seams.		SP	4/6/6/8	
15				0	SAND: As above, less clay, loose.		SP	4/5/5/7	
					CLAY: Dark gray, silty, soft.		CL		
					SAND: Dark gray to greenish gray, yellowish-brown mottling, fine grained, poorly graded.		SP		
20				15	SAND: Pale green, fine grained, poorly graded.		SP	4/4/7/8	
					CLAY: Gray to greenish-gray, soft, moderately plastic, little silt.		CL		
				0	CLAY: As above, some very thin seams of white fine grained quartz sand, some yellowish-brown mottled intervals.			2/3/4/5	
					CLAYEY SAND: Light gray, very fine grained, cohesive.				
25							SP		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ022	**Boring ID:** PZ022
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 9/8/93	**Compltd:** 9/10/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 77-82 Ft. bls	**Protection level:** D
TOC elev.: 10.14 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 82.5Ft. bls	**Dpth to ∇** 1.9 Ft. bls
ABB Rep.: D. DOPKIN/ P. CRAINE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				0	SAND: White to light gray, fine grained quartz, poorly graded, clean, loose, some magnesium content, upper 0.2' is clayey.		SP	7/11/8/17	
30				0	SAND: Light brownish-gray, fine grained, trace of silt. SAND: As from 25-27' bls, some yellowish-brown mottling, thin black seams, trace of black grains.		SP	12/34/22/27	
35				0	SAND: As from 30-30.6' bls. CLAYEY SAND: Light gray, fine grained with little clay. SAND: White to light gray as above. CLAYEY SAND: Gray, cohesive.		SP SC SP SC	15/15/19/15	
40				0	SAND: White to light gray, as above. SAND & SANDY CLAY: Alternating 1/4" - 1/2" layers of brownish-yellow and gray sandy clay, magnesium content, fine grained sand.		SP CL	2/3/10/8	
45				0	SAND: Light gray, fine grained quartz, poorly graded, some thin black seams.		SP	16/28/32/30	
50							SP		

Project: NAS Jacksonville OU3		**Well ID:** PZ022	**Boring ID:** PZ022
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 9/8/93	**Complt'd:** 9/10/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 77-82 Ft. bls	**Protection level:** D
TOC elev.: 10.14 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 82.5Ft. bls	**Dpth to ∇:** 1.9 Ft. bls
ABB Rep.: D. DOPKIN/ P. CRAINE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SAND: As above, no clayey seams, gray clay layer at base of spoon.		SP	5/11/10/16	
55				0	SAND: White, fine grained quartz, poorly graded, sub-rounded, clean loose, trace of black and muscovite grains.		SP	21/45/75R	
60				0	SAND: As above.		SP	28/75R	
65				0	SAND: As above.		SP	56/75R	
70				0	SAND: As above, some faint black seams, some magnesium.		SP	40/75R	
75							SP		

Project: NAS Jacksonville OU3		**Well ID:** PZ022	**Boring ID:** PZ022
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 9/8/93	**Completd:** 9/10/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 77-82 Ft. bls	**Protection level:** D
TOC elev.: 10.14 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 82.5Ft. bls	**Dpth to ∇** 1.9 Ft. bls
ABB Rep.: D. DOPKIN/ P. CRAINE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 3				
				0	SAND: Light gray, fine to some medium grained quartz, few black seams.		SP	67/75R	
80				1	CLAYEY SAND: Greenish-gray, fine to very fine grained with a trace of clay that increases with depth, cohesive, some white, clean, fine grained quartz sand seams.		SC	17/17/27/42	
85				0	CLAY: Very silty, very hard and stiff, low plasticity, magnesium rich.		CL	7/12/20/23	
				0	SAND: As above.		SP	16/15/29/30	
90					TOTAL DEPTH = 82.5' bls				
95									
100									

Project: NAS Jacksonville OU3	**Well ID:** PZ023	**Boring ID:** PZ023
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-28
Contractor: Groundwater Protection Inc.	**Date started:** 8/28/93	**Compltd:** 9/14/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 75-80 Ft. bls	**Protection level:** D
TOC elev.: 9.23 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 80.5Ft. bls	**Dpth to ∇:** 4.0 Ft. bls
ABB Rep.: M. CHEYNE/ D. DOPKIN	**Well development date:** 9/27/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ02301			0	SILTY SAND: Crushed limestone 3" over silty sand, light brown, very fine to fine grained, loose, dry,		SM	HANDAUGER	
	OU3PZ02302			0	SILTY SAND: As above.			HANDAUGER	
5	OU3PZ02303			50	SILTY SAND: As above, yellow brown to light gray.			HANDAUGER	
10				220	SAND: Light gray, fine grained, uniform, medium dense, little fines, trace black natural organics, sewer odor, slightly magnesium rich, wet.		SP	5/10/17/11	
15				0	CLAYEY SAND: Light greenish gray, fine grained, uniform, trace silt, slightly plastic, loose, slightly magnesium rich, moist.		SC	8/4/4/8	
20				0	CLAYEY SAND: As above.		SC	9/4/2/2	
25							SC		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ023	**Boring ID:** PZ023
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/28/93	**Compltd:** 9/14/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 75-80 Ft. bls	**Protection level:** D
TOC elev.: 9.23 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 80.5Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE/ D. DOPKIN	**Well development date:** 9/27/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				0	CLAYEY SAND: As above 3" over CLAY: light greenish gray, soft, trace sand, high plasticity 6" over CLAYEY SAND: As above 5".		SC CL SC	2/3/3/4	
				0	CLAY: As above, 6" over SAND: Mottled light greenish gray and olive yellow, fine grained, uniform, loose, wet.		CL SP	1/1/1/5	
30				3	CLAYEY SAND: As above, light greenish gray mottled with pale olive, loose, wet.		SC	2/2/2/2	
35				2	CLAY: Dark gray to black, homogeneous, very plastic, slightly magnesium rich, damp to moist, soft.		CL	1/2/2/3	
				2	CLAY: As above.			1/1/2/4	
40				0	SAND: Grey, fine grained, poorly graded, loose, clean.		SP	14/12/21/29	
45				0	SAND: As above.		SP	16/19/18/18	
50							PT		

Project: NAS Jacksonville OU3	**Well ID:** PZ023	**Boring ID:** PZ023
Client: SOUTHNAVFACENGCOM		**Job No.:** 7588-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/28/93	**Complt'd:** 9/14/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 75-80 Ft. bls	**Protection level:** D
TOC elev.: 9.23 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 80.5Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE/ D. DOPKIN	**Well development date:** 9/27/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				50	SANDY SILT: Alternating layers of sand, as above, and black clayey, sandy silt, organic-rich, some wood chips, peaty.		PT	36/26/10/22	
55				0	SAND: Light gray, fine grained, poorly graded, loose, clean.		SP	36/75R	
60				1	SAND: As above.		SP	65/75R	
65				0	SAND: As above.		SP	53/75R	
70				0	CLAYEY SAND: Grey, fine to very fine grained, poorly graded, cohesive, trace magnesium.		SC	22/30/42/33	
75							SC		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ023	**Boring ID:** PZ023
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/28/93	**Compltd:** 9/14/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 75-80 Ft. bls	**Protection level:** D
TOC elev.: 9.23 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 80.5Ft. bls	**Dpth to ∇** 4.0 Ft. bls
ABB Rep.: M. CHEYNE/ D. DOPKIN	**Well development date:** 9/27/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 3				
				0	CLAYEY SAND: As above.		SC	10/13/21/27	
80				0	SILTY CLAY: Greenish gray, very hard, trace fine sand in thin lamina, dry, crumbly.		CL	5/8/11/15	
				0	SILTY CLAY: As above.			16/21/25/25	
85					TOTAL DEPTH = 80.5' bls				
90									
95									
100									

Project: NAS Jacksonville OU3	**Well ID:** PZ024	**Boring ID:** PZ024
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/28/93	**Compltd:** 8/28/93
Method: HSA	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 3.5-13.5 Ft. bls	**Protection level:** D
TOC elev.: 9.04 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 14.0Ft. bls	**Dpth to ∇** 6.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/27/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.
	OU3PZ02301			0	SILTY SAND: Crushed limestone 3" over silty sand, light brown, very fine to fine grained, loose, dry,		SM	HANDAUGER
	OU3PZ02302			0	SILTY SAND: As above.			HANDAUGER
5	OU3PZ02303			50	SILTY SAND: As above, yellow brown to light gray.			HANDAUGER
10				220	SAND: Light gray, fine grained, uniform, medium dense, little fines, trace black natural organics, sewer odor, slightly magnesium rich, wet.		SP	5/10/17/11
15				0	CLAYEY SAND: Light greenish gray, fine grained, uniform, trace silt, slightly plastic, loose, slightly magnesium rich, moist.		SC	8/4/4/8
					TOTAL DEPTH = 14.0' bls LITHOLOGICAL DESCRIPTION TAKEN FROM PZ023			
20								

Well diagram

Project: NAS Jacksonville OU3		**Well ID:** PZ025	**Boring ID:** PZ025
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 9/8/93	**Compltd:** 9/13/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 80-85 Ft. bls	**Protection level:** D
TOC elev.: 10.69 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 85.5Ft. bls	**Dpth to ∇** 3.9 Ft. bls
ABB Rep.: D. DOPKIN/ P. CRAINE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ02501			0	SILT: Brown, mottled with white		MH	HANDAUGER	
	OU3PZ02502			0				HANDAUGER	
	OU3PZ02502 OFFSITE				CLAYEY SAND: Mottled brown, black, and brownish-yellow, and white, fine to very fine grained.		SC		
	OU3PZ02502 OFFSITE RP								
5	OU3PZ02502 OFFSITE MS/MD				SAND: Light gray to tan below 5.5' to a very dark gray from 6-6.1' bls , fine to very fine grained, poorly graded, trace of silt from 6-6.1', damp.		SP		
	OU3PZ02503						wood		
				3	Wood Chips SAND: White, fine grained quartz, poorly graded, loose, very moist.		SP	10/15/13/13	
10				0			SP	4/3/3/4	
					SAND: Light greenish-gray with some yellowish-brown mottling, fine to to medium grained, some magnesium.				
15							CL		
				0	CLAY: Gray to greenish-gray with yellowish-brown mottling, hard, stiff , some silt, trace of fine grained sand lenses.			5/4/5/6	
				0				4/4/5/6	
20									
25							CL		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ025	**Boring ID:** PZ025
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 9/8/93	**Completd:** 9/13/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 80-85 Ft. bls	**Protection level:** D
TOC elev.: 10.69 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 85.5Ft. bls	**Dpth to ∇** 3.9 Ft. bls
ABB Rep.: D. DOPKIN/ P. CRAINE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				0	SILTY CLAY: Gray, soft, sticky, low plasticity. SAND: Gray, fine grained, poorly graded, slightly choensive.		CL SP	2/5/7/6	
30				0	SAND: Stratified layers of white clean fine grained quartz sand, and light brownish gray fine grained quartz sand, some brownish-yellow seams. SILTY CLAY: Gray, 1/4" thin seams.		SP CL	6/15/13/27	
35				0	SAND & SILTY CLAY: As above		SP CL	10/12/21/26	
40				0	SAND: As above, gray		SP	5/5/8/14	
45				0	CLAYEY SAND: Gray, fine to medium grained with little clay. SAND: As above.		SC SP	13/21/26/46	
50							SP		

 ABB ENVIRONMENTAL SERVICES, INC.

Project: NAS Jacksonville OU3		**Well ID:** PZ025	**Boring ID:** PZ025
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 9/8/93	**Complt'd:** 9/13/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 80-85 Ft. bls	**Protection level:** D
TOC elev.: 10.69 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 85.5Ft. bls	**Dpth to ∇:** 3.9 Ft. bls
ABB Rep.: D. DOPKIN/ P. CRAINE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2				
				0	SAND: Light gray, fine grained quartz, trace of black grains, faint dark gray laminae of more black layers, little magnesium.		SP	36/75R	
55				0	SAND: As above, appears to be slough.		SP	27/75R	
60				0	SAND: As above.		SP	15/44/75R	
65				2	SAND: As above.		SP	23/53/75R	
70				0	SAND: As above.		SP	70/75R	
75							SP		

Project: NAS Jacksonville OU3		**Well ID:** PZ025	**Boring ID:** PZ025
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 9/8/93	**Completd:** 9/13/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 80-85 Ft. bls	**Protection level:** D
TOC elev.: 10.69 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 85.5Ft. bls	**Dpth to ▽** 3.9 Ft. bls
ABB Rep.: D. DOPKIN/ P. CRAINE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 3				
				2	SAND: As above.		SP	50/75R	
80				1	SAND & SANDY CLAY: Gray with two seams of dark gray sandy clay, sand is mostly loose, clay is cohesive, no plasticity.		SP	35/75R	
85				0	CLAYEY SAND: Dark greenish-gray, fine grained quartz in a clay matrix, slightly plastic.		SC CL	5/11/17/20	
				0	SILTY CLAY: Dark grayish-green, very hard, crumbly, sticky when wet, magnesium rich, abundant shell fragments from 87.5-88' bls.			8/18/23/20	
90					TOTAL DEPTH = 89' bls				
95									
100									

Project: NAS Jacksonville OU3	**Well ID:** PZ026		**Boring ID:** PZ026
Client: SOUTHNAVFACENGCOM			**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.		**Date started:** 9/13/93	**Compltd:** 9/13/93
Method: HSA	**Casing dia.:** 2" SCH. 40 PVC	**Screen int.:** 3-13 Ft. bls	**Protection level:** D
TOC elev.: 10.86 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 13.5Ft. bls	**Dpth to ∇** 6.2 Ft. bls
ABB Rep.: D. DOPKIN/ P. CRAINE	**Well development date:** 9/28/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					SILT: Brown, mottled with white		MH		
				0				POSTHOLE	
					CLAYEY SAND: Mottled brown, black, and brownish-yellow, and white, fine to very fine grained.		SC		
5					SAND: Light gray to tan below 5.5' to a very dark gray from 6-6.1' bls , fine to very fine grained, poorly graded, trace of silt from 6-6.1', damp.		SP		
					Wood Chips		wood		
				3	SAND: White, fine grained quartz, poorly graded, loose, very moist.		SP	10/5/13/13	
10									
				0	SAND: Light greenish-gray with some yellowish-brown mottling, fine to to medium grained, some magnesium.		SP	4/3/3/4	
15									
				0			CL	5/4/5/6	
					CLAY: Gray to greenish-gray with yellowish-brown mottling, hard, stiff , some silt, trace of fine grained sand lenses.				
				0	TOTAL DEPTH = 13.5' bls			4/4/5/6	
					LITHOLOGICAL DESCRIPTION TAKEN FROM PZ025				
20									

Project: NAS Jacksonville OU3	**Well ID:** PZ027	**Boring ID:** PZ027
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/30/93	**Compltd:** 9/01/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 78.5-88.5 Ft. bls / **Protection level:** D
TOC elev.: 6.68 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 88.5Ft. bls / **Dpth to ∇** 6.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/27/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
	OU3PZ02701			0	SILTY SAND: Pale yellow, fine to very fine grained, uniform, loose, some black grains, dry.		SM	HANDAUGER	
	OU3PZ02701 OFFSITE				SILTY SAND: As above, 17" over SANDY CLAY: Dark greenish gray, moderate plasticity, damp, moist, sand is fine grained, uniform.				
	OU3PZ02702			0				N/R	
							SC		
5	OU3PZ02703			0	CLAYEY SAND: Light gray with thin lamina of greenish gray clay, moist to wet,			N/R	
	OU3PZ02704			0	CLAYEY SAND: As above, wet.			N/R	
							SP		
10				12	SAND: Light gray to pale yellow, fine grained, uniform, trace black silt grains, slightly magnesium rich, wet.			9/6/6/5	
							SP		
15				50	SAND: As above 17" over SANDY CLAY: Light greenish gray, stiff, moist, damp, medium plasticity, slightly magnesium rich.		SC	5/5/6/5	
							SP		
20				8	SAND/CLAYEY SAND: As above.		SC	6/5/6/9	
							SP		
25				4	SAND: Light gray to pale yellow (probable slough) 12" over CLAY: Dark greenish gray mottled with very pale brown, medium stiff, damp, slightly magnesium rich.		CL	4/6/4/5	
							SP		
				7	SAND/CLAY: As above.		CL	6/6/8/8	

Project: NAS Jacksonville OU3	**Well ID:** PZ027	**Boring ID:** PZ027
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/30/93	**Compltd:** 9/01/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 78.5-88.5 Ft. bls **Protection level:** D
TOC elev.: 6.68 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 88.5Ft. bls **Dpth to ∇** 6.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/27/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 1				
				0	CLAY : As above.		CL	5/11/10/12	
33									
				0	CLAYEY SAND: Light gray, fine grained, uniform, loose, moderate plasticity, wet, 18" over SAND: Yellow, fine grained, uniform, clean, loose, wet.		SC SP	1/2/3/11	
38									
				0	CLAYEY SAND: White to light gray with some brownish yellow clay present as beds of sandy clay occuring intermittently between clean white quartz sands, fine grained, little black silt grains, loose, medium dense, wet, clay slightly magnesium rich.		SC	4/3/6/12	
43									
				0	CLAYEY SAND: Light gray, fine grained, uniform, loose, moderate plasticity.		SC	9/9/7/3	
48									
				0	SAND: Light greenish gray to gray, fine grained, uniform, little silt sized black grains, trace clay in thin lamina spaced between clean sand, very dense.		SP	9/25/75R	
53									
				0	SAND: White to light gray, fine grained, uniform, dense, little silt sized black grains, clean, wet.		SP	12/20/22/20	

Project: NAS Jacksonville OU3		**Well ID:** PZ027	**Boring ID:** PZ027
Client: SOUTHNAVFACENGCOM			**Job No.:** 7588-26
Contractor: Groundwater Protection Inc.		**Date started:** 8/30/93	**Compltd:** 9/01/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 78.5-88.5 Ft. bls	**Protection level:** D
TOC elev.: 6.68 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 88.5Ft. bls	**Dpth to ∇** 6.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/27/93		**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 2		SP		
61				0	SAND: As above.		SP	28/31/23/29	
66				0	SAND: As above.		SP	15/27/23/29	
71				0	SAND: As above.		SP	47/75R	
76				0	SAND: As above, pale green, trace silt.		SP	33/56/75R	
81				0	SAND: As above.		SP	25/41/68/75R	

Project: NAS Jacksonville OU3	**Well ID:** PZ027	**Boring ID:** PZ027
Client: SOUTHNAVFACENGCOM		**Job No.:** 7586-26
Contractor: Groundwater Protection Inc.	**Date started:** 8/30/93	**Completd:** 9/01/93
Method: HSA & mud rotary	**Casing dia.:** 6" SCH. 40 PVC	**Screen int.:** 78.5-88.5 Ft. bls **Protection level:** D
TOC elev.: 6.68 Ft. MSL	**Type of OVM.:** Porta Fid	**Total dpth:** 88.5Ft. bls **Dpth to ∇** 6.0 Ft. bls
ABB Rep.: M. CHEYNE	**Well development date:** 9/27/93	**Site:** NAS JAX OU3

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diagram
					Continued from PAGE 3				
				0	SAND: As above.		SP	14/32/49/59	
89									
				0	SANDY CLAY: Dark gray, medium plasticity, magnesium rich, calcareous, little to some shell fragments, moist.		CL	5/7/17/17	
				0	SANDY CLAY: As above 4" over CLAYEY SAND: Light gray, well graded, fine to coarse grained, some pebbles, subrounded, 25% shell fragments, medium plasticity, very dense, some rock fragments of calcite cemented sandstone.		SC	18/26/20/31	
94									
				0	WEATHERED LIMESTONE: White, clayey, clastic. consists of subangular quartz grains fine to coarse, fine to coarse shell fragments, some pebble size indurated fragments, matrix of white lime mud, clayey, wet.		LS	17/22/28/27	
99									
				0	GRAVELLY SAND: Fine to coarse grained, dark gray, some lime mud, white to gray, some small pebbles, some weathered shell fragments, grading into SILTY CLAY: Dark gray, extremely hard, dry, magnesium rich, calcareous, homogeneous.		GP	33/19/40/75R	
104				0	SILTY CLAY: As above.		CL	29/40/51/35	
109					TOTAL DEPTH = 88.5' bls				

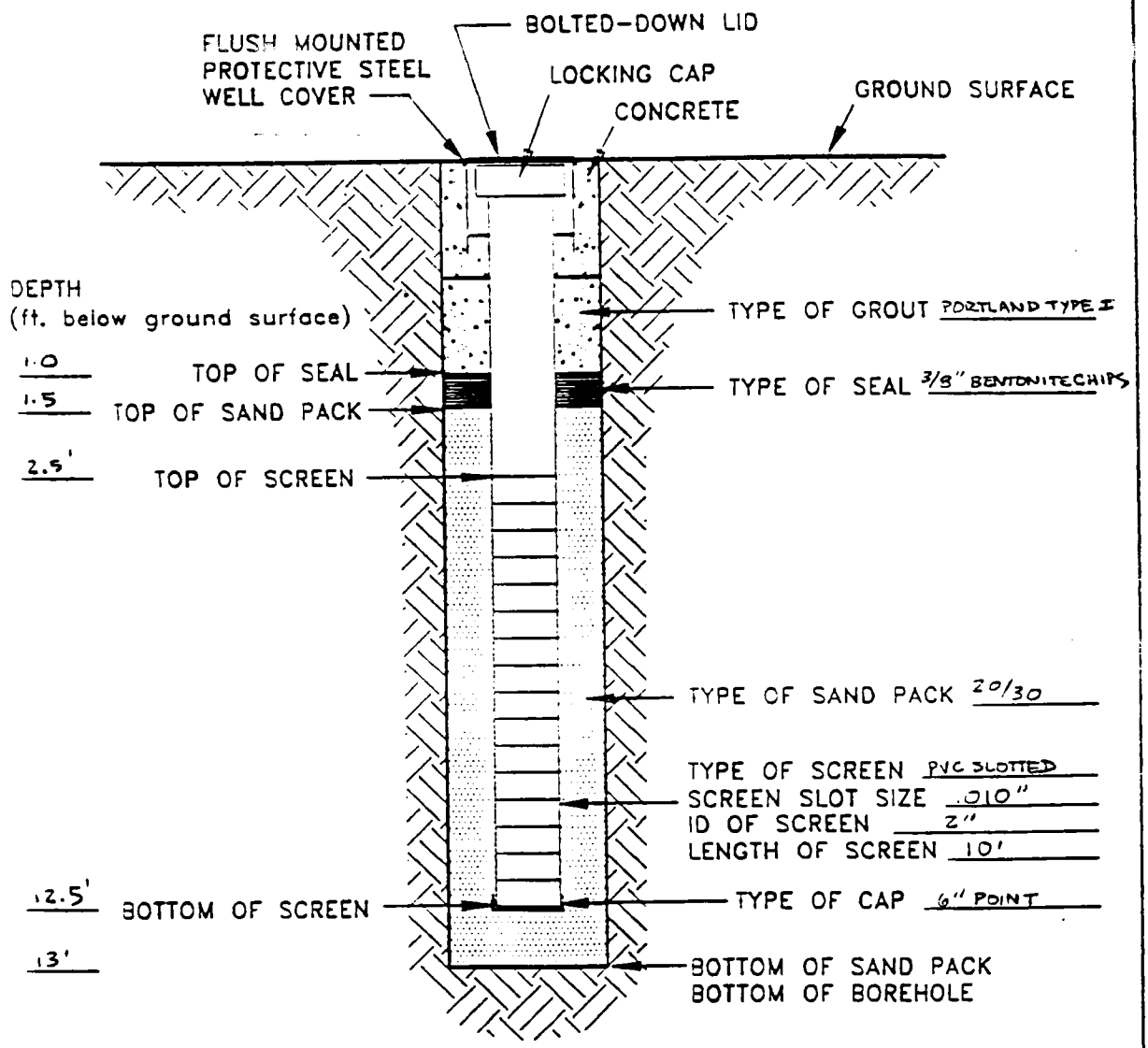
APPENDIX E

Piezometer Installation Records

NOTE

See Table 2-4, on page 2-24, for additional information not provided on the following piezometer installation logs.

Project Name NAS JAX OU3 SCOP.	Boring Diameter 8"	Well No./Piezometer No. OU3PZ001
Project No. 07586-36	Well Inside Diameter 2"	Date Installed 8.03.93
Drilling Co. GROUNDWATER	Well Material 2" SCH.40 PVC	Drilling Method 4 1/4" HSA
Field Scientist M. CHEYNE	Top of Well Elevation 3.99' MSL	Development Method CENTRIFUGAL
Depth to Groundwater 2.5' BLS	GS Elevation 4.35' MSL	

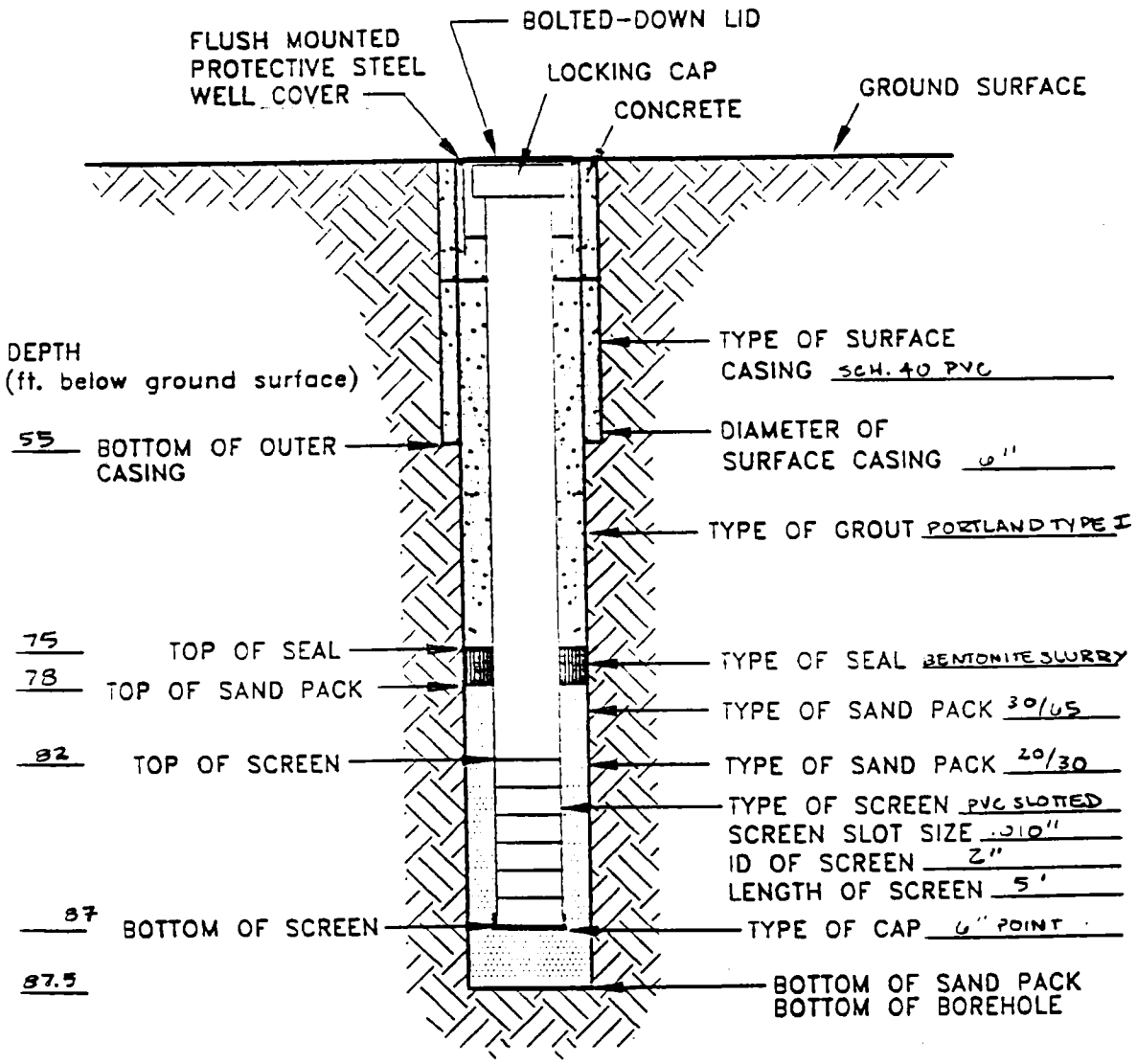


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASNAX OU3 SCOPING	Boring Diameter 6" & 12"	Well No./Piezometer No. OU3PZ002
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8.09.93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH.40 PVC	Drilling Method 8 1/4" HSA + 8" MUD
Field Scientist M. CHEYNE	Top of Well Elevation 4.18' MSL	Development Method AIR LIFT
Depth to Groundwater 1.5' BLS	GS Elevation 4.40' MSL	

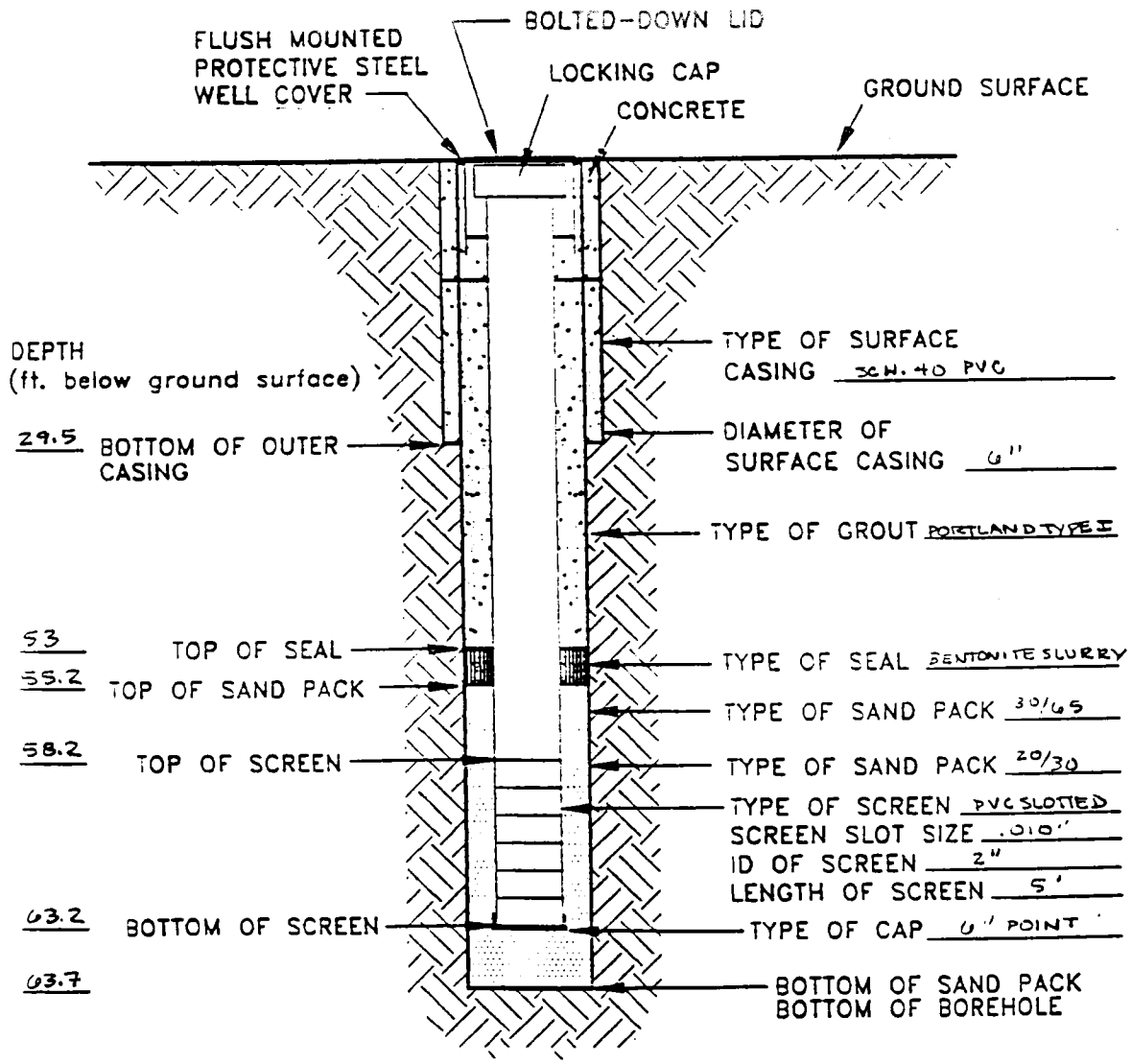


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 12 ± 6"	Well No./Piezometer No. OU3PZ003
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8-11-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 8 1/4" HSA + 6" MUD
Field Scientist M. CHEYNE	Top of Well Elevation 5.71 MSL	Development Method AIRLIFT
Depth to Groundwater 1.3' BLS	GS Elevation 5.90 MSL	

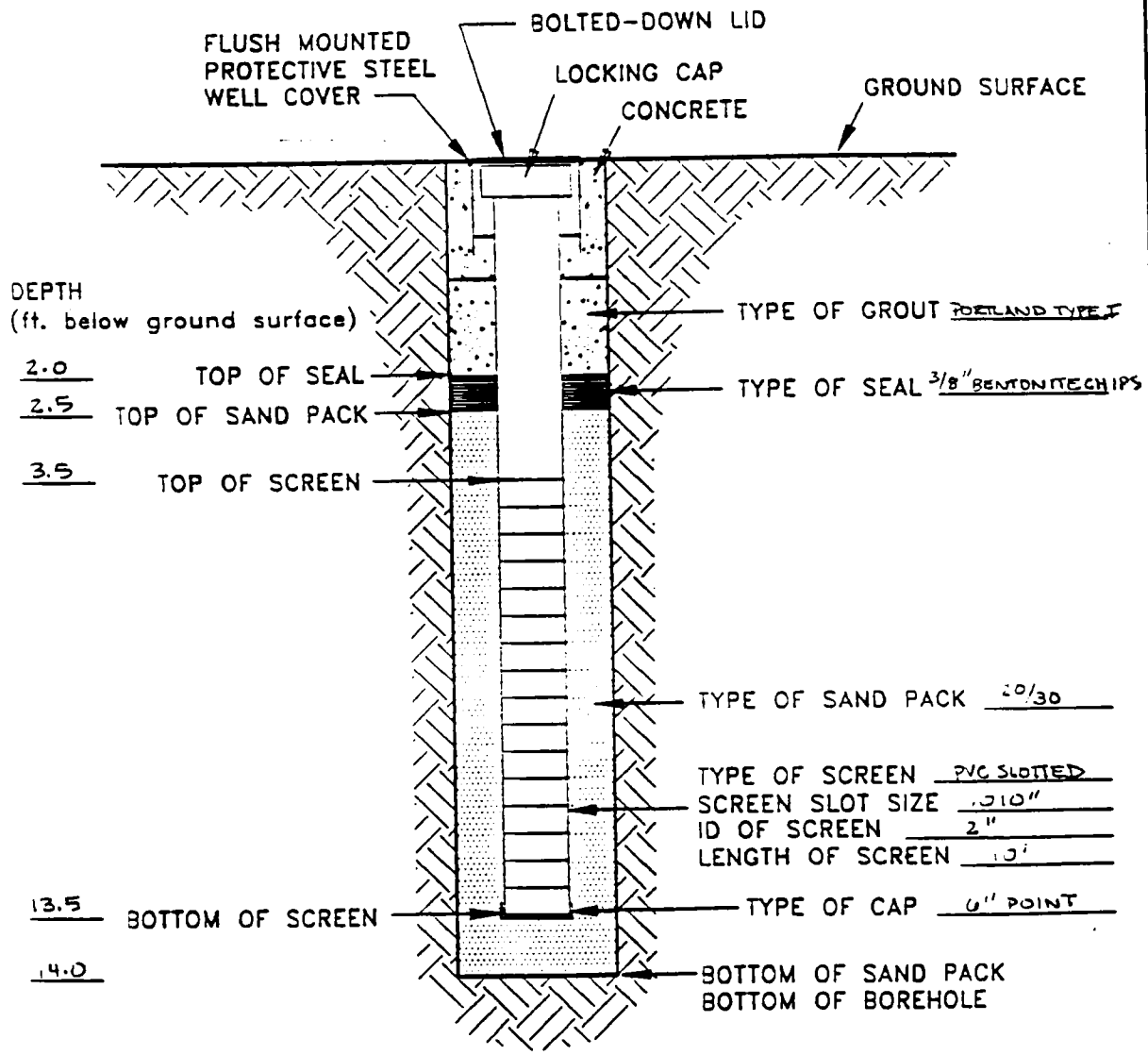


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NAS JAX OU3 SCOPING	Boring Diameter 8"	Well No./Piezometer No. OU3P2004
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8-10-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 4 1/4" HSA
Field Scientist M. CHEYNE	Top of Well Elevation 5.64 MSL	Development Method CENTRIFUGAL
Depth to Groundwater 3' BLS	GS Elevation 5.88 MSL	

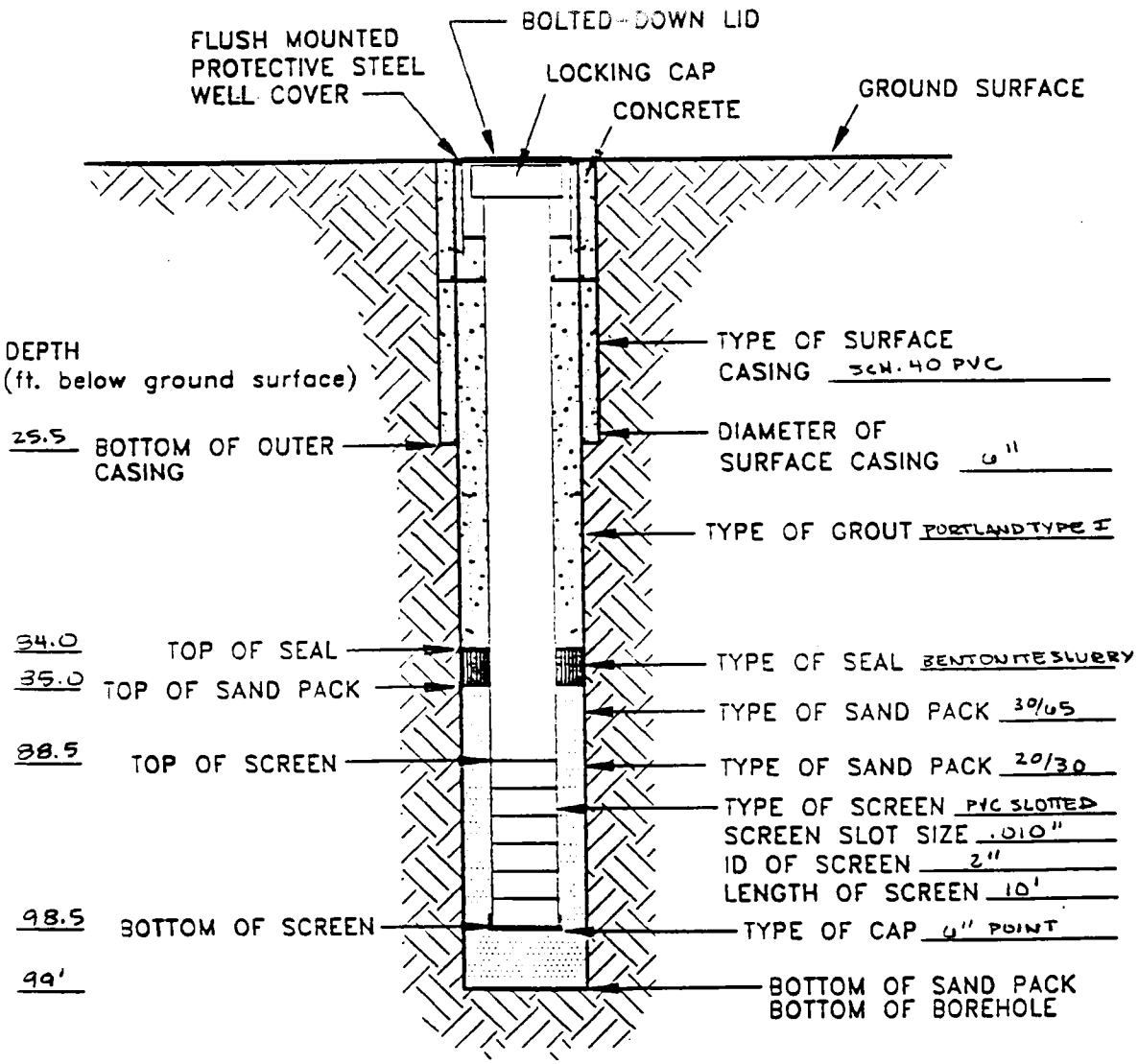


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NAS JAX OU3 SCOPING	Boring Diameter 12" & 6"	Well No./Piezometer No. OU3T2005
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8.14.93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 8 1/4" HSA & 6" MUD
Field Scientist M. CHEYNE & P. CRAINE	Top of Well Elevation 8.24' MSL	Development Method AIRLIFT
Depth to Groundwater 5.0 BLS	GS Elevation 8.44' MSL	

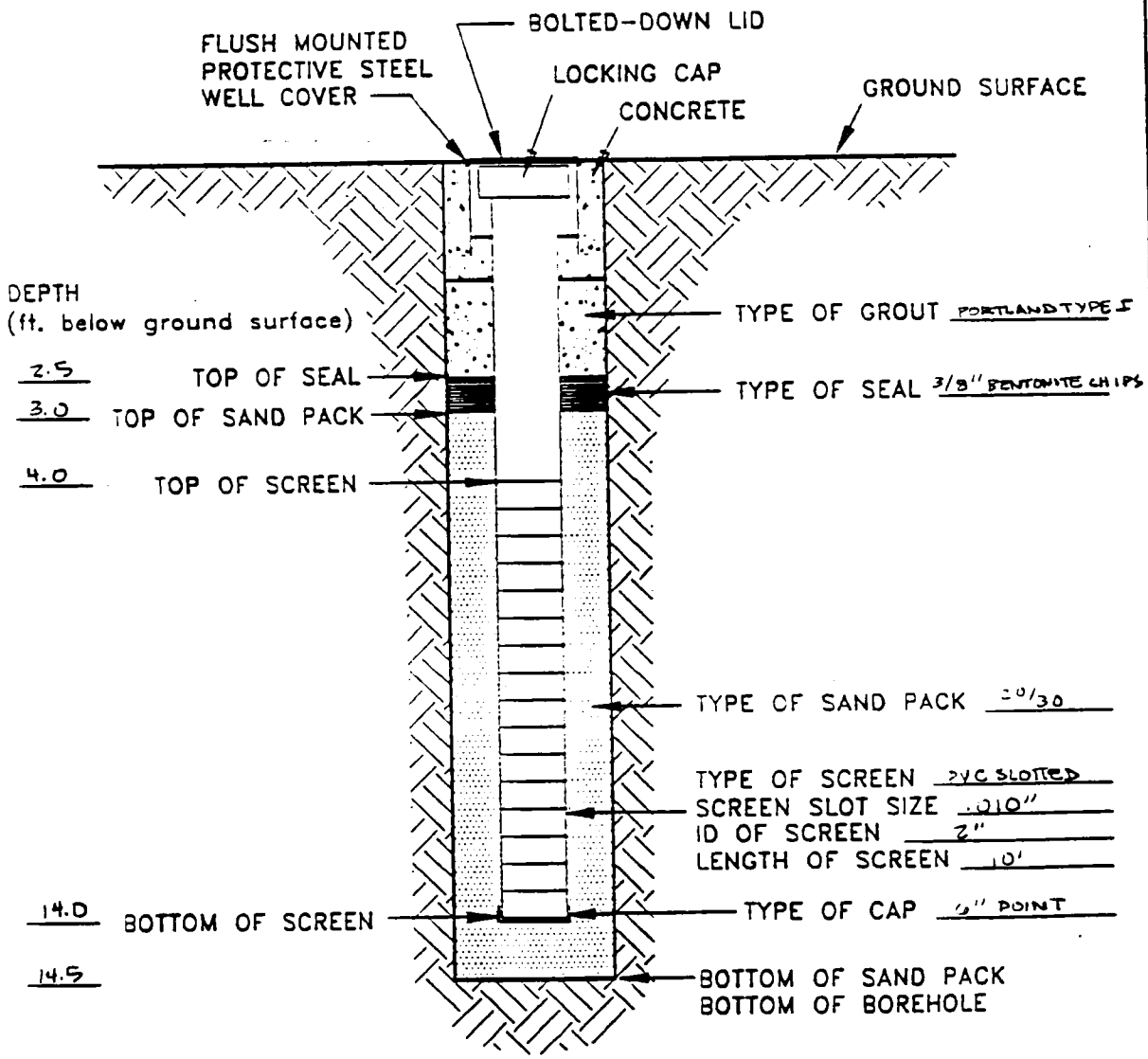


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NAS JAX OU3 SCOPING	Boring Diameter 8"	Well No./Piezometer No. OU3PZ006
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8.12.93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 4 1/4" HSA
Field Scientist M. CHEYNE	Top of Well Elevation 8.19' MSL	Development Method CENTRIFUGAL
Depth to Groundwater 4.0 BLS	GS Elevation 3.47' MSL	

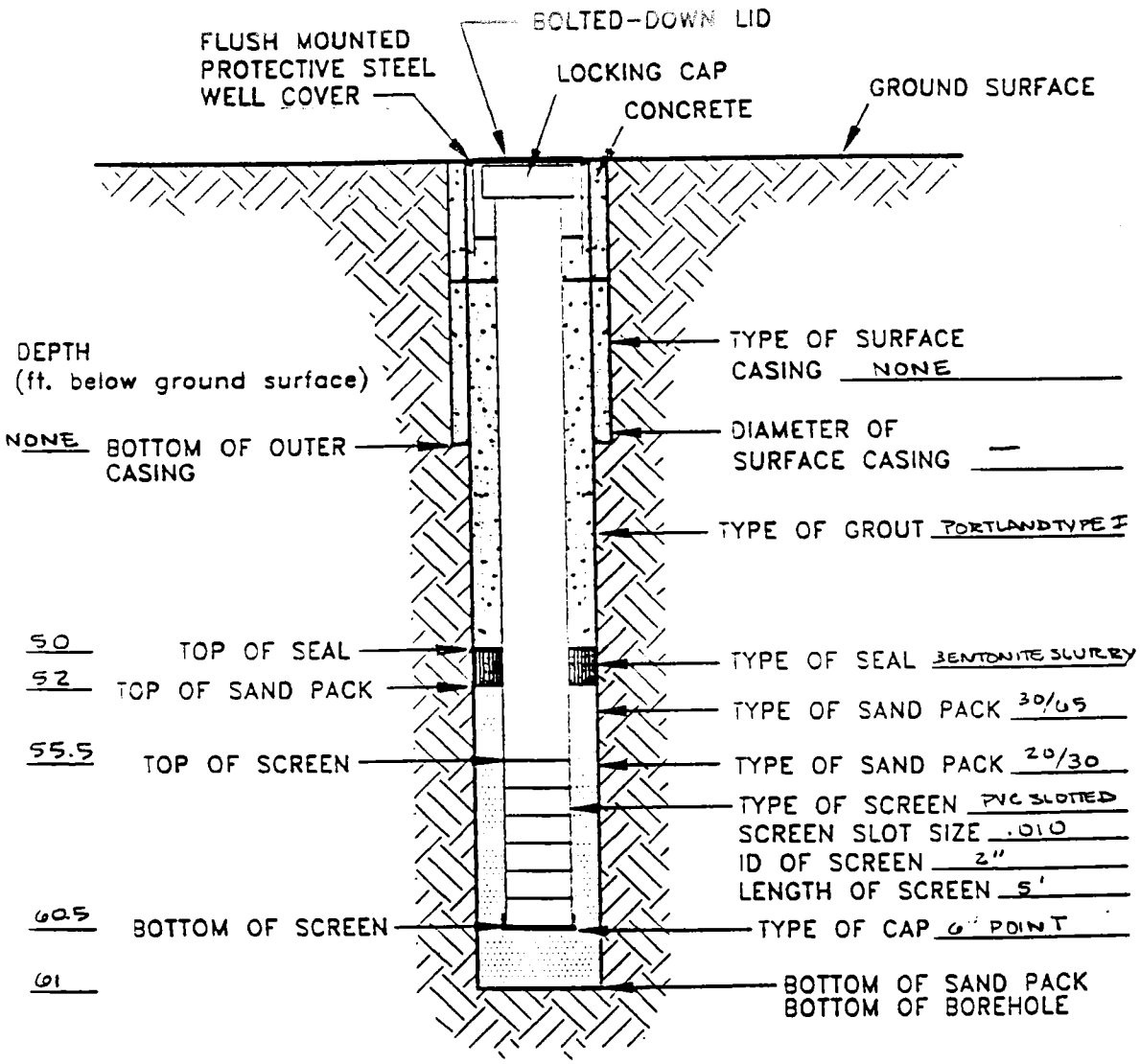


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 6"	Well No./Piezometer No. OU3P2007
Project No. 07586.03	Well Inside Diameter 2"	Date Installed 8-13-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 6" MUD ROTARY
Field Scientist M. CHEYNE P. CRAINE	Top of Well Elevation 9.62 MSL	Development Method AIRLIFT
Depth to Groundwater 6.5 BLS	GS Elevation 9.81 MSL	

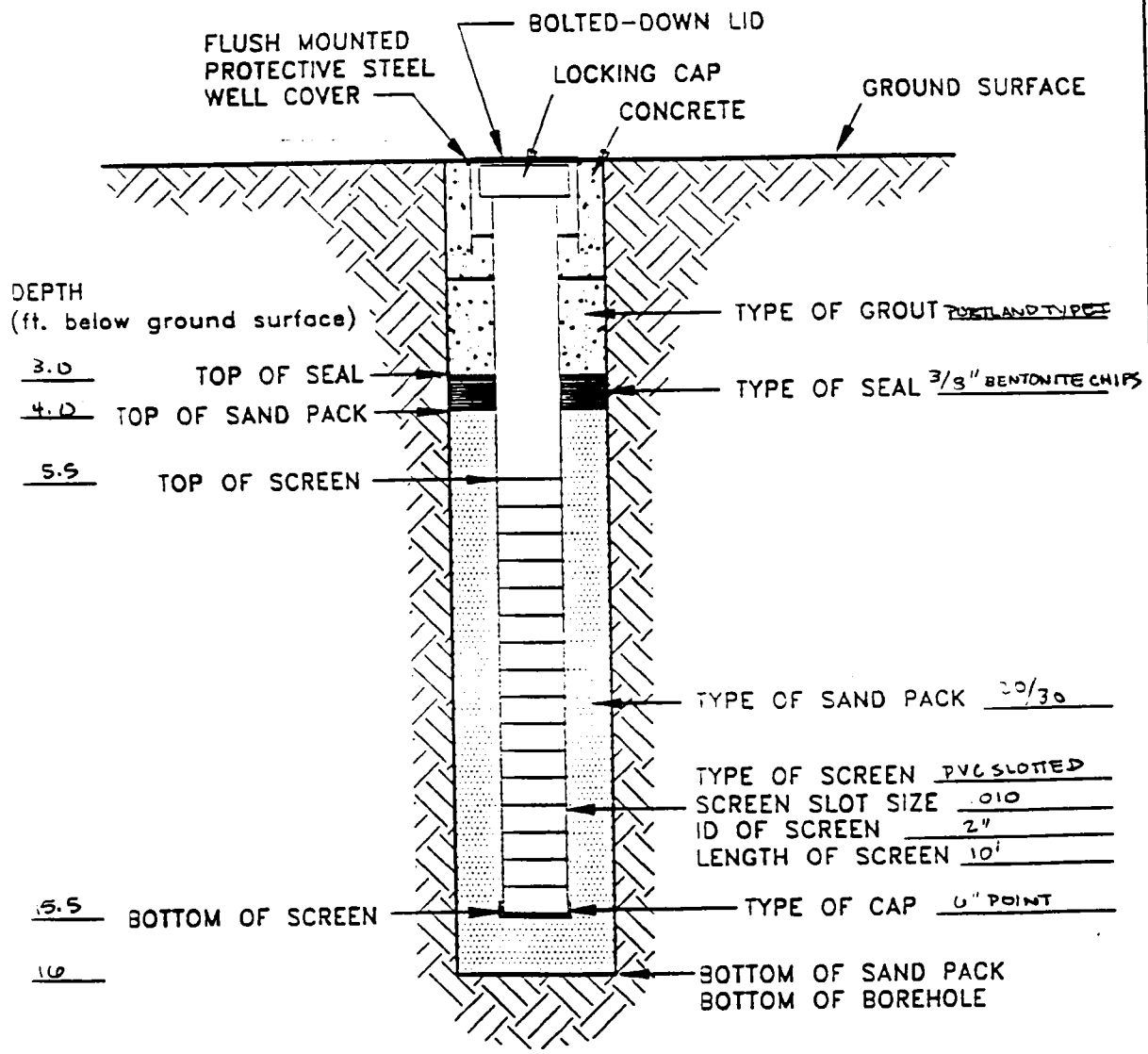


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 8"	Well No./Piezometer No. OU3PZ008
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8-13-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 4"/4" HSA
Field Scientist P. CRAINE	Top of Well Elevation 9.40 MSL	Development Method CENTRIFUGAL
Depth to Groundwater 6.5 BLS	GS Elevation 9.83 MSL	

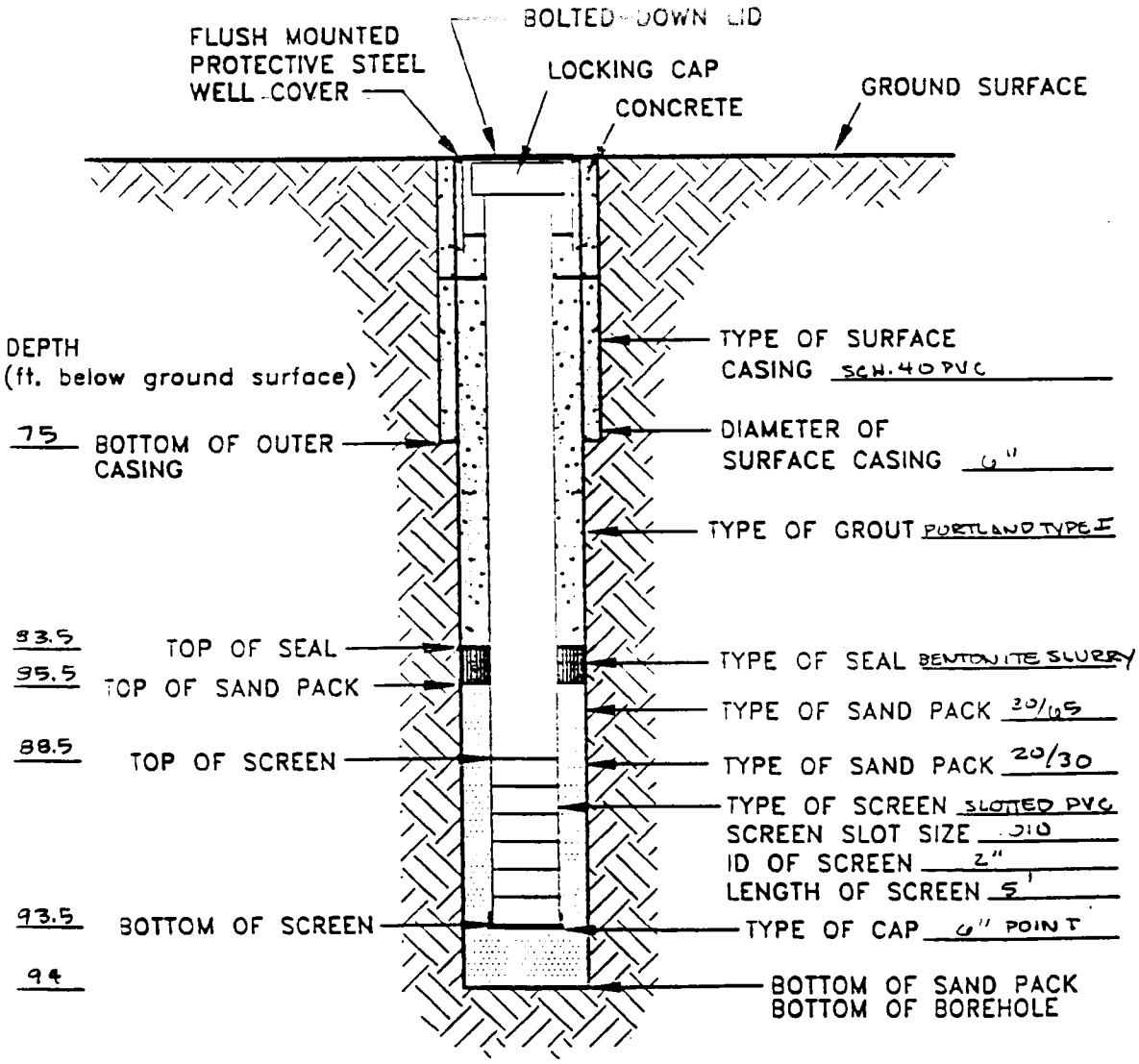


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 6" & 12"	Well No./Piezometer No. OU3PZ009
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8.17.93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 8 1/4" HSA & 6" MUD
Field Scientist M. CHEYNE P. CRAINE	Top of Well Elevation 5.90' MSL	Development Method AIRLIFT
Depth to Groundwater 4.3 BLS	GS Elevation 6.17' MSL	

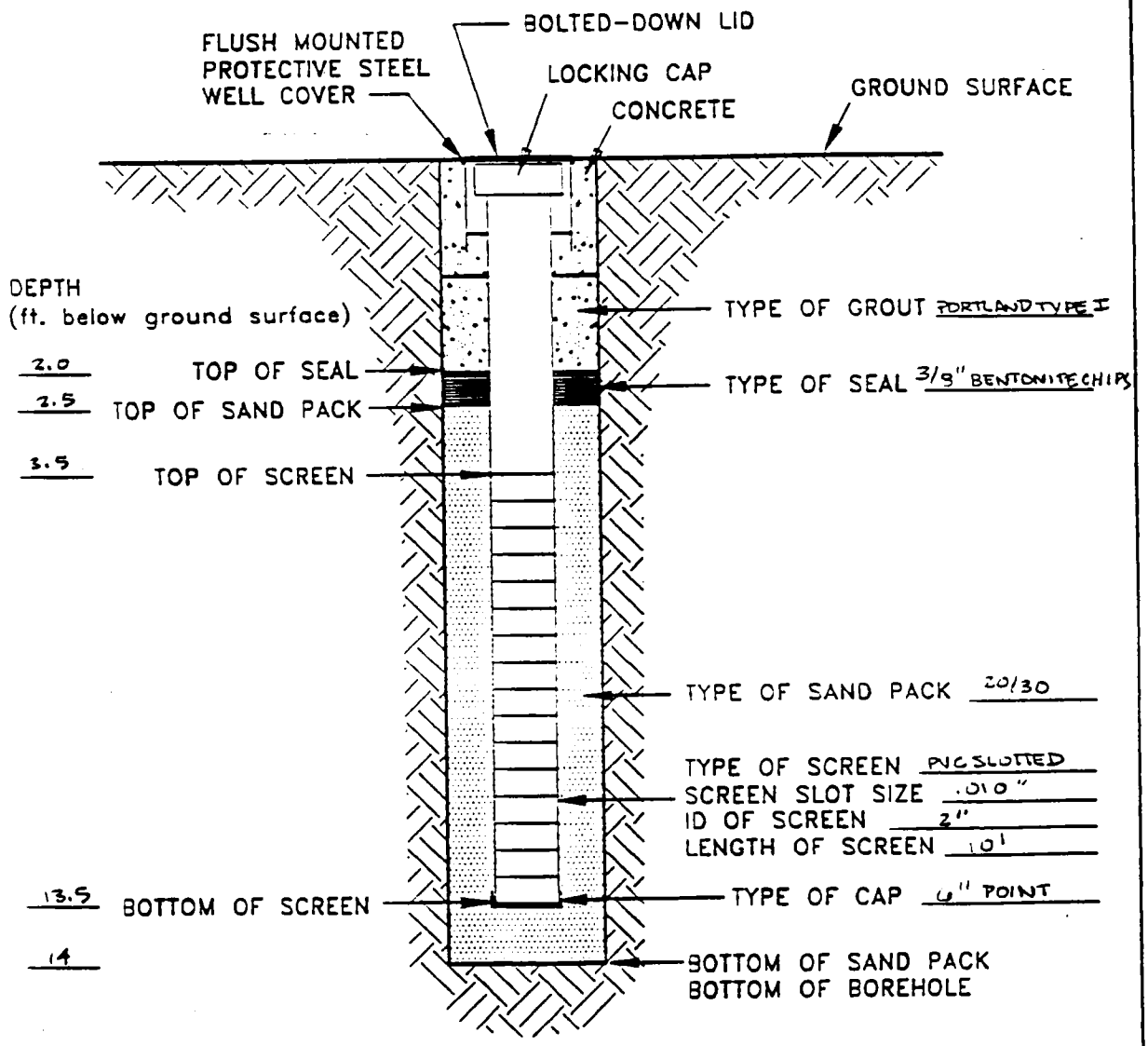


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 8"	Well No./Piezometer No. OU3PZ010
Project No. 07580.86	Well Inside Diameter 2"	Date Installed 8.16.93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH.40 PVC	Drilling Method 4'1/4" HSA
Field Scientist M.CHEYNE	Top of Well Elevation 5.90' MSL	Development Method CENTRIFUGAL
Depth to Groundwater 2.7 BLS	GS Elevation 6.14' MSL	

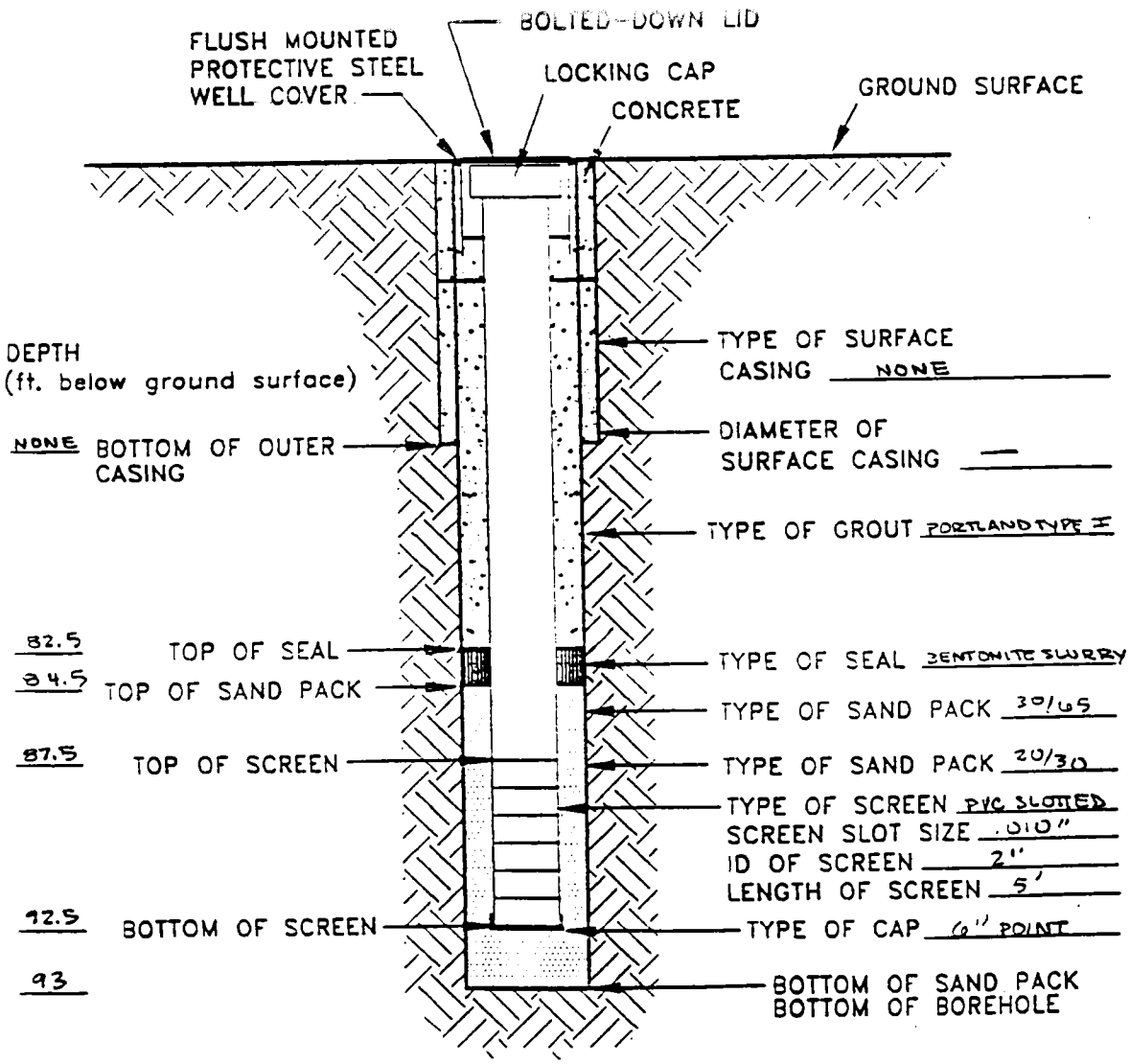


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NAS JAX OU3 SCOPING	Boring Diameter 6"	Well No./Piezometer No. OU3PZ011
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8-23-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH.40 PVC	Drilling Method 6" HYDROTARY
Field Scientist M. CHEYNE D. CRAINE	Top of Well Elevation 9.27' MSL	Development Method AIRLIFT
Depth to Groundwater 3.6 BLS	GS Elevation 9.46' MSL	

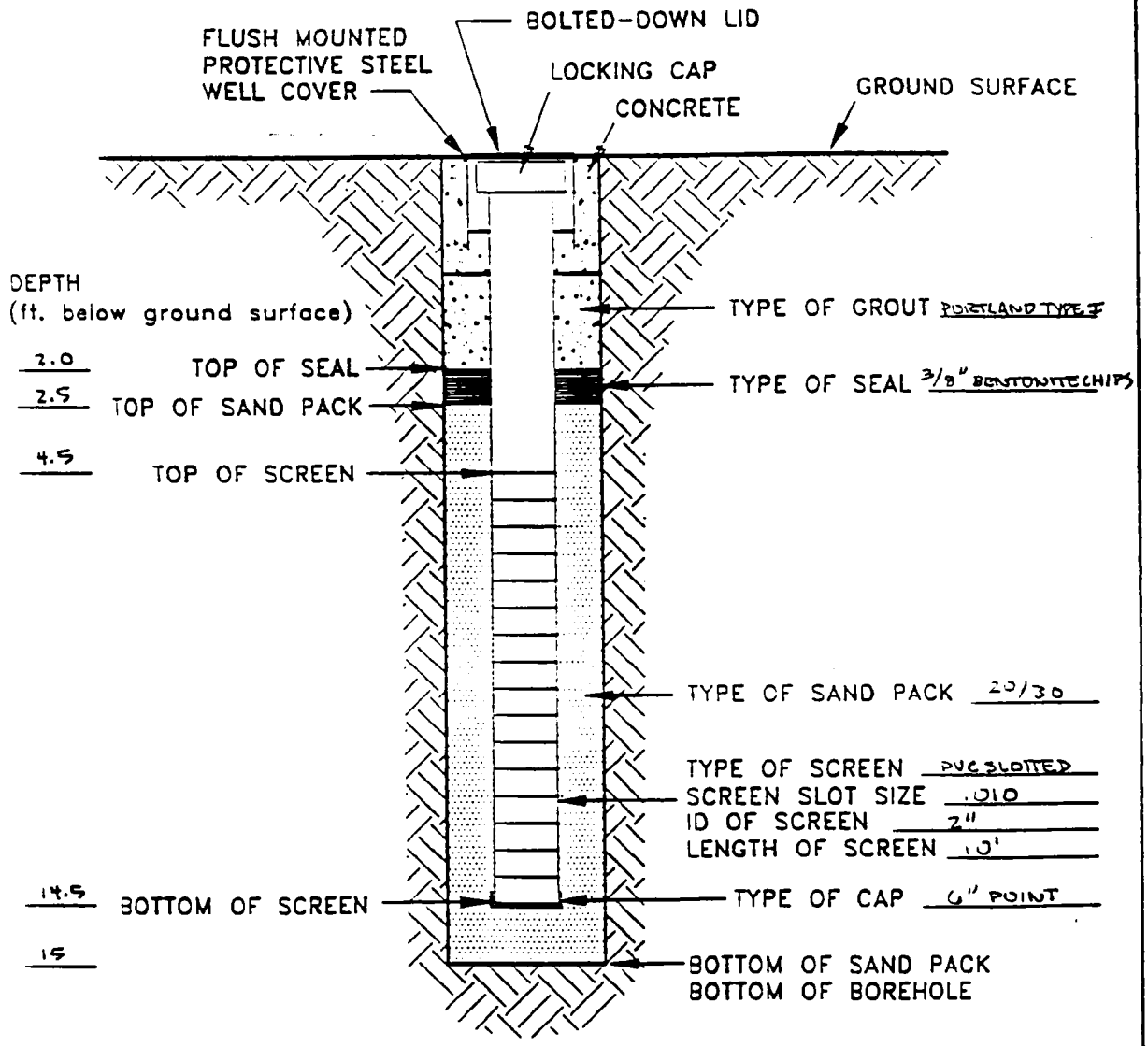


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NAS JAX OU3 SCOPING	Boring Diameter 8"	Well No./Piezometer No. OU3PE012
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8-23-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 4 1/4" HSA
Field Scientist M. CHEYNE	Top of Well Elevation 9.22' MSL	Development Method CENTRIFUGAL
Depth to Groundwater 6.5 BLS	GS Elevation 9.45' MSL	

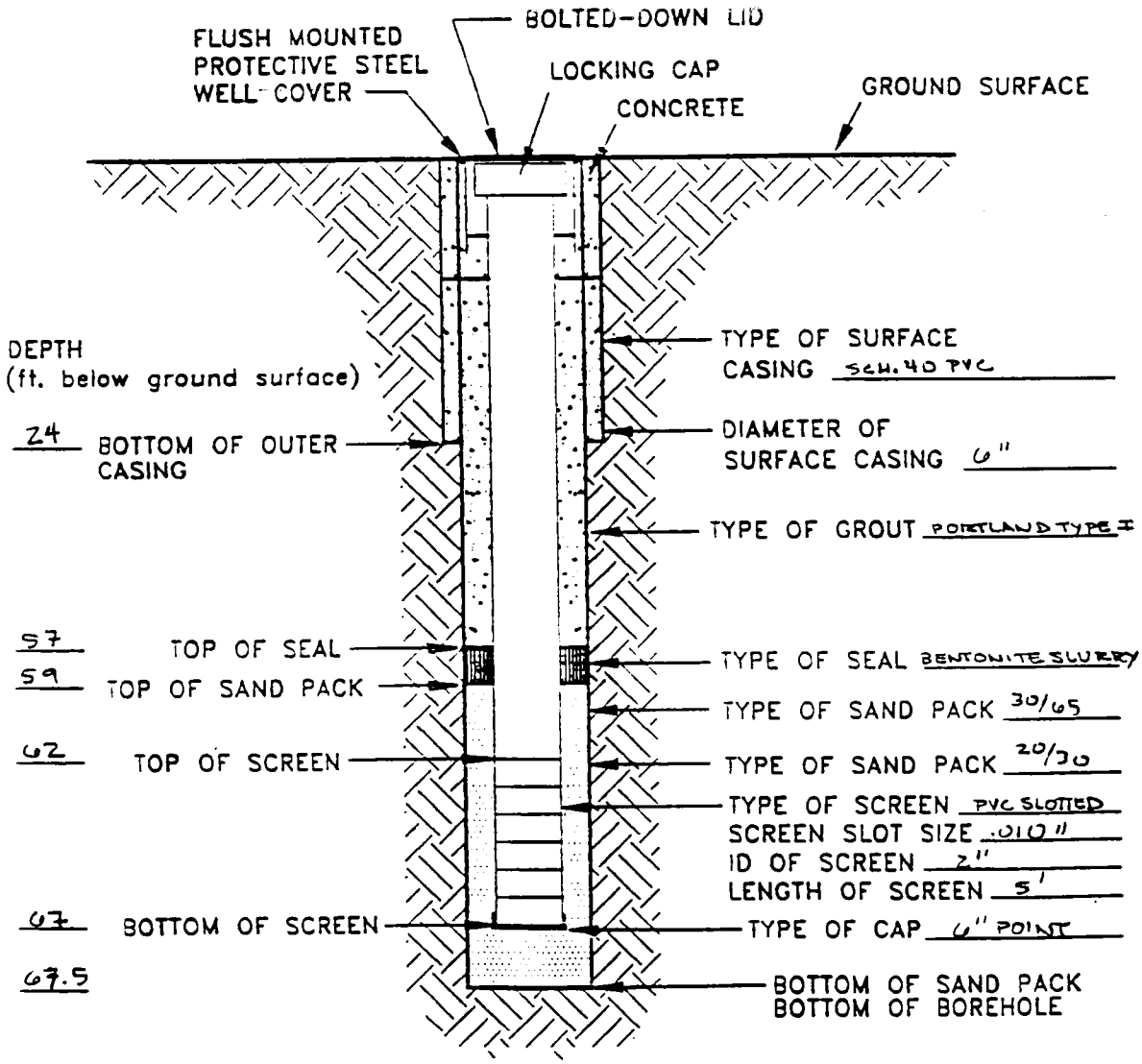


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NAS JAX OU 3 SCOPING	Boring Diameter 6" & 12"	Well No./Piezometer No. OU3PZ013
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8-26-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 8 1/4" HSA + 6" MUD
Field Scientist M. GHEYNE	Top of Well Elevation 8.65' MSL	Development Method AIRLIFT
Depth to Groundwater 3.5 BLS	GS Elevation 8.89' MSL	

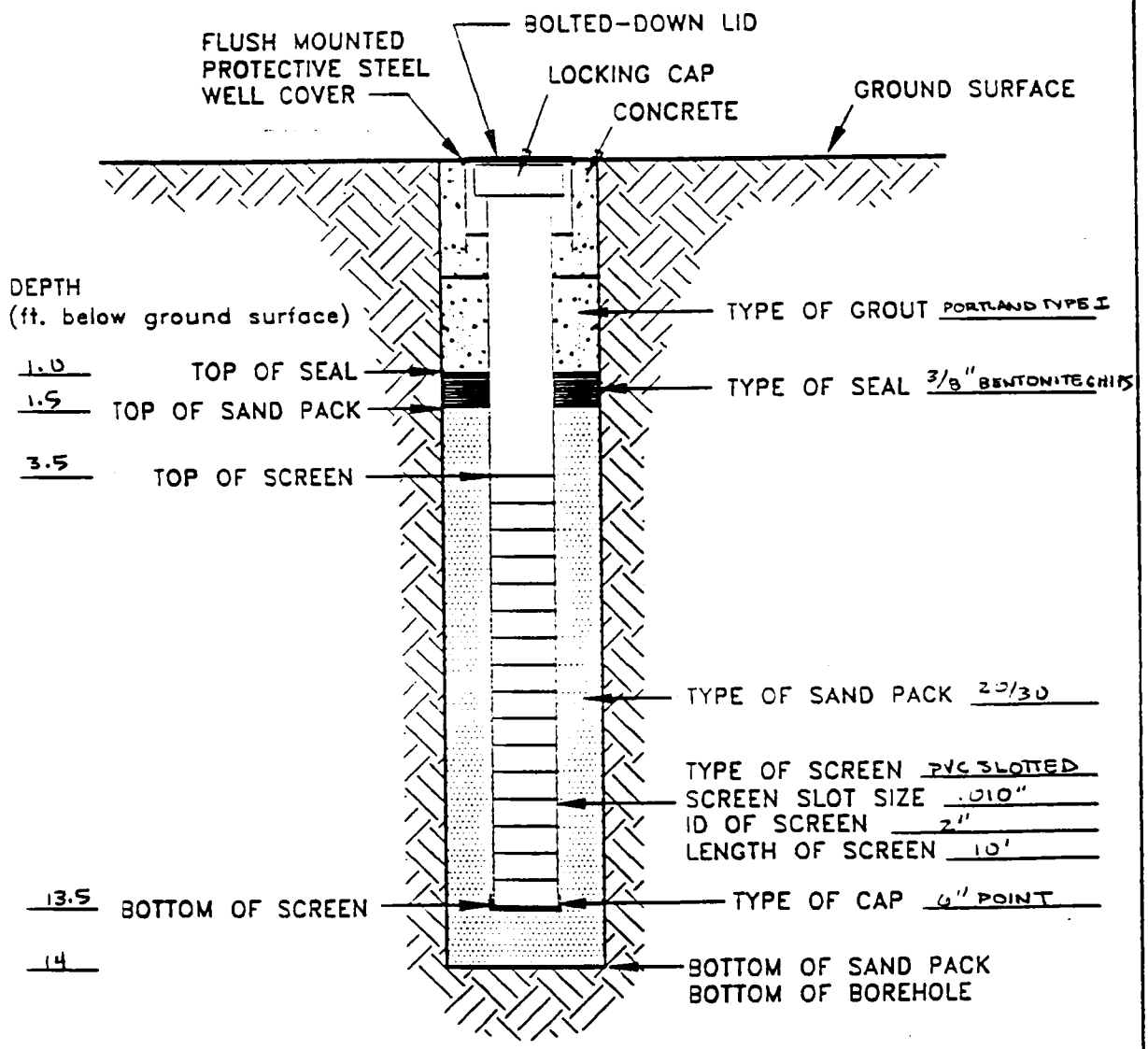


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAXOU3 SCOPING	Boring Diameter 8"	Well No./Piezometer No. OU3PZ014
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8.24.93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH.40 PVC	Drilling Method 4'/4" HSA
Field Scientist M.CHEYNE	Top of Well Elevation 8.50' MSL	Development Method CENTRIFUGAL
Depth to Groundwater 5.5 BLS	GS Elevation 8.85' MSL	

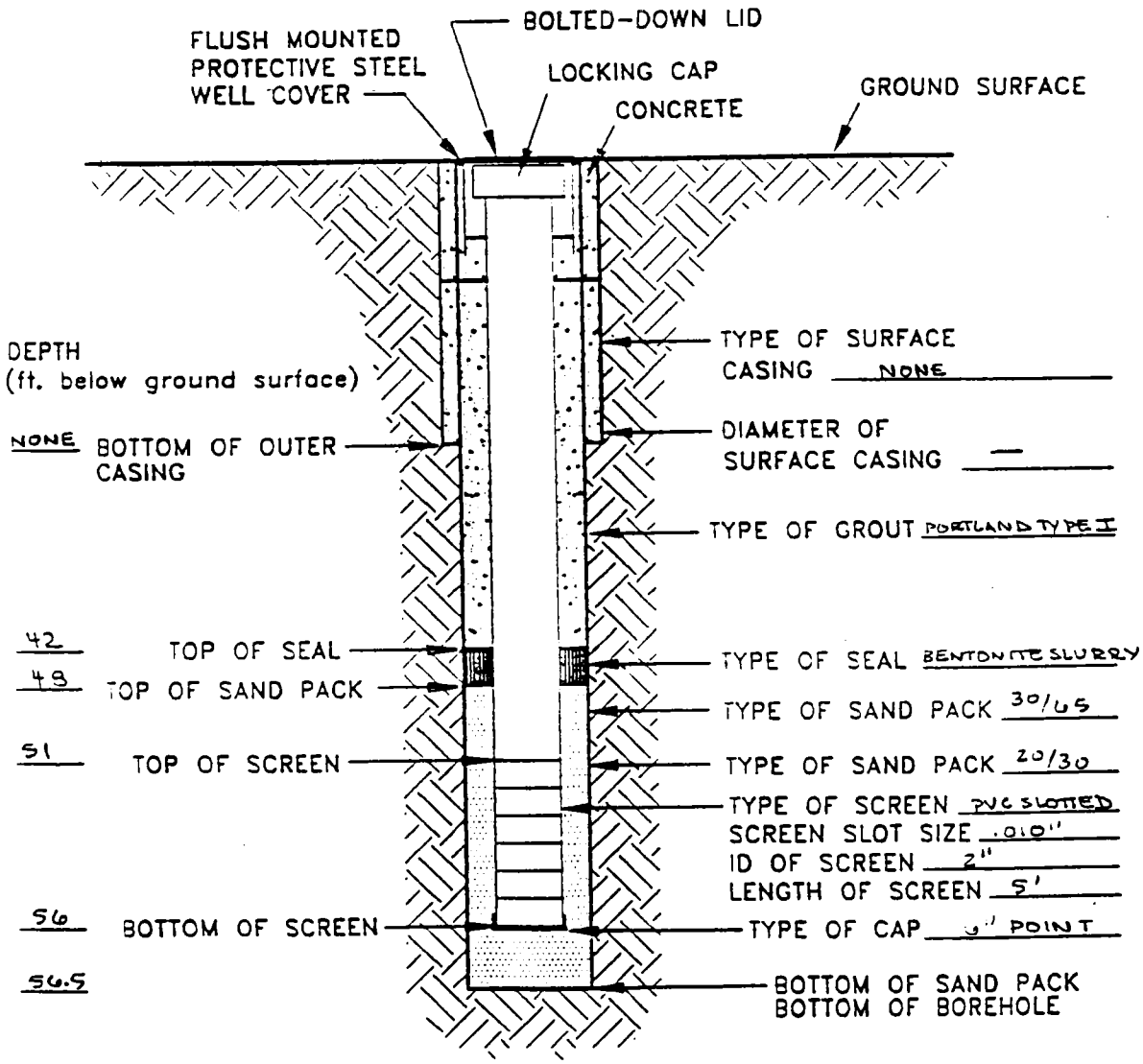


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 8"	Well No./Piezometer No. OU3PZ015
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8-24-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH-40 PVC	Drilling Method 4 1/4" HSA
Field Scientist M. CHEYNE	Top of Well Elevation 9.44' MSL	Development Method AIRLIFT
Depth to Groundwater 4.9 BLS	GS Elevation 9.66' MSL	

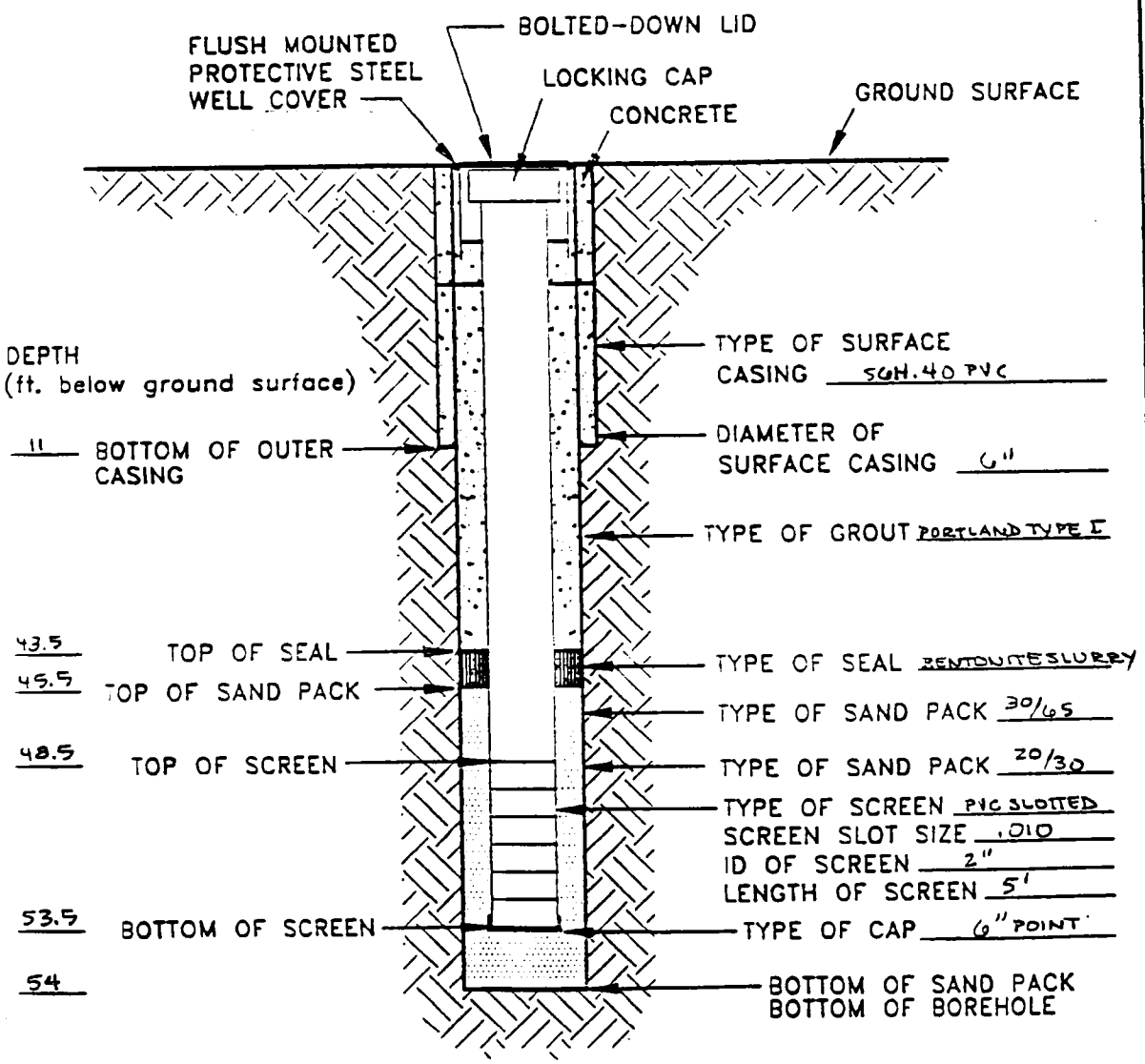


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 14" & 6"	Well No./Piezometer No. DU3P2D1G
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8.27.93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH.40 PVC	Drilling Method 10 1/4" HSA + 6" MUD
Field Scientist M.CHEVNE	Top of Well Elevation 10.80' MSL	Development Method AIRLIFT
Depth to Groundwater 7.5 BLS	GS Elevation 11.02' MSL	

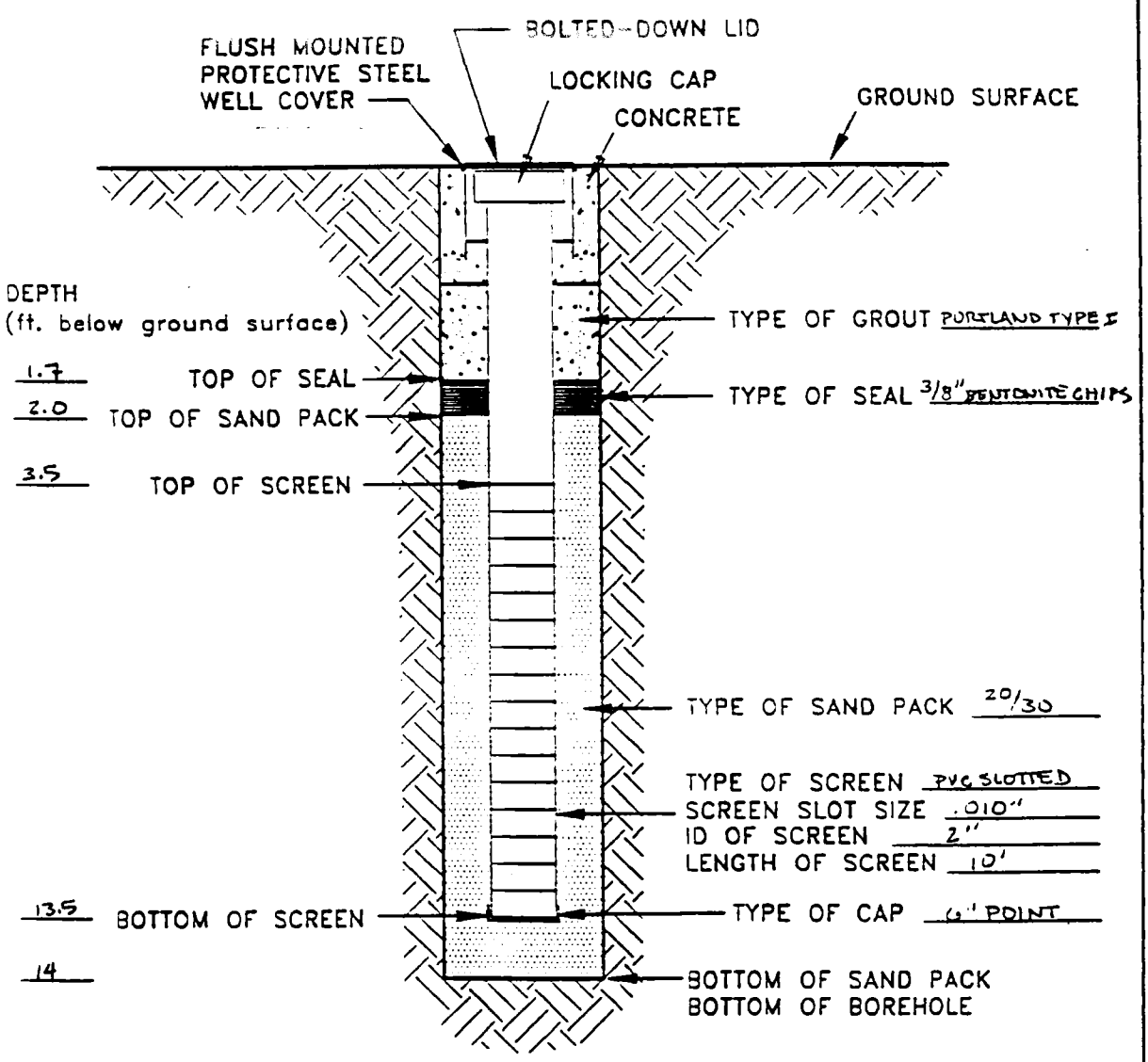


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX003 SCOPING	Boring Diameter 8"	Well No./Piezometer No. OU3P2017
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8-25-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH.40 PVC	Drilling Method 4'1/4" HSA
Field Scientist M.CHEYNE	Top of Well Elevation 10.77' MSL	Development Method CENTRIFUGAL
Depth to Groundwater 6.8 BLS	GS Elevation 10.94' MSL	

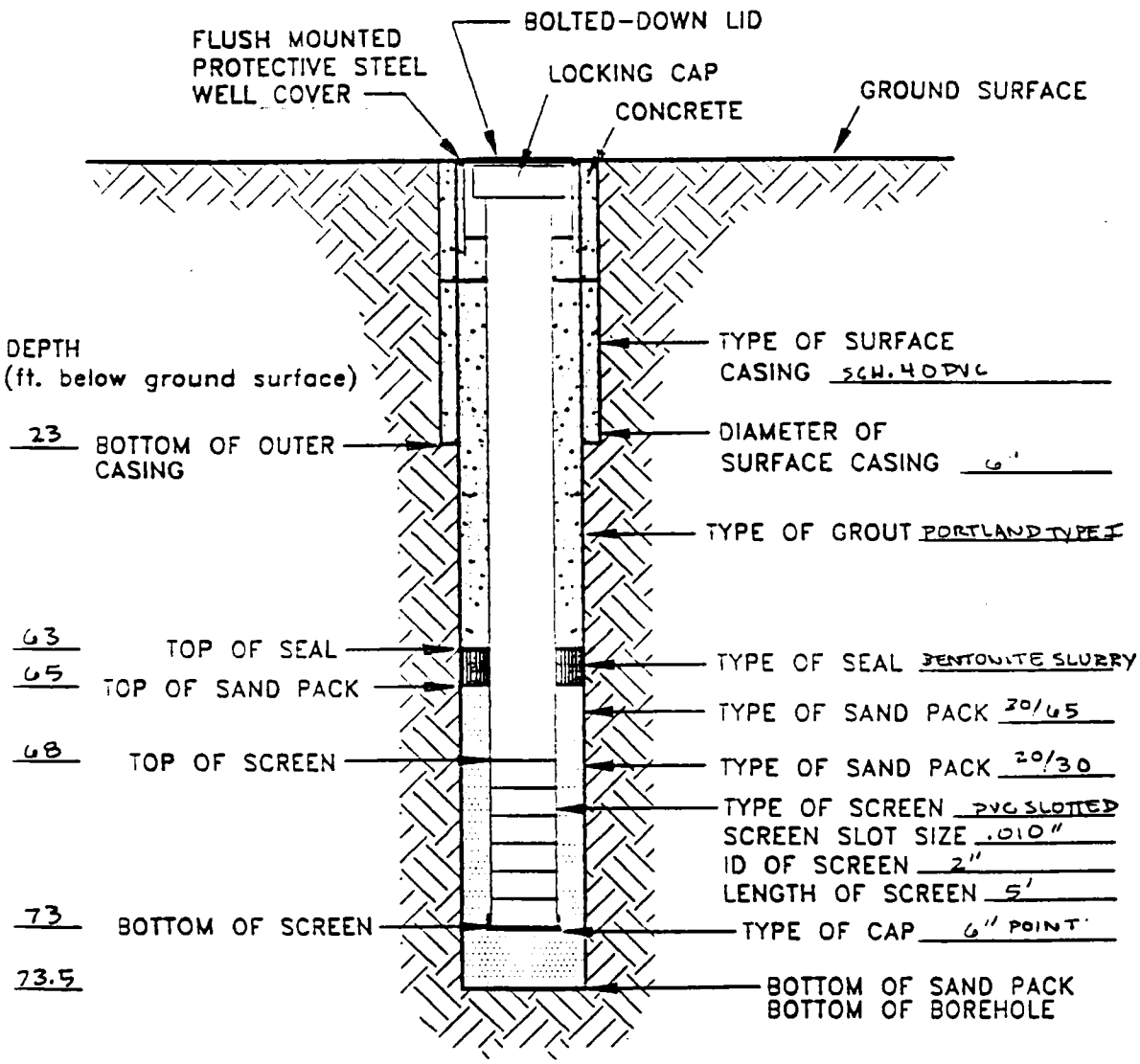


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 14" & 6"	Well No./Piezometer No. OU3PZ018
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8-28-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 10'/4" HSA + MUD (6")
Field Scientist M. CHEYNE	Top of Well Elevation 9.20' MSL	Development Method AIRLIFT
Depth to Groundwater 3.5 BLS	GS Elevation 9.43' MSL	

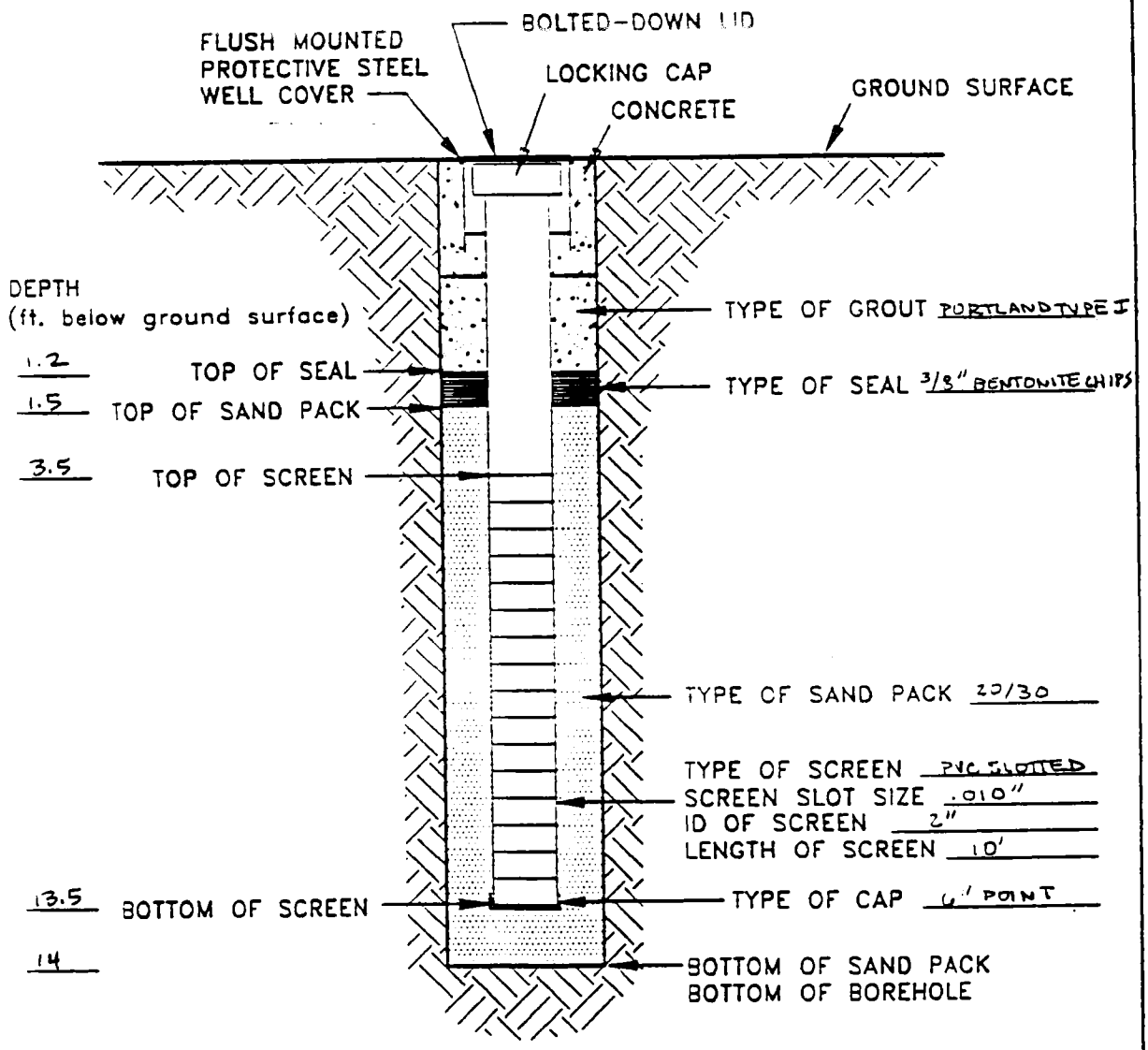


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NAS JAX OU3 SCOPING	Boring Diameter 8"	Well No./Piezometer No. OU3PZ019
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8-26-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 4 1/4" HSA
Field Scientist M. CHEYNE	Top of Well Elevation 9.15' MSL	Development Method CENTRIFUGAL
Depth to Groundwater 5.8 BLS	GS Elevation 9.34' MSL	

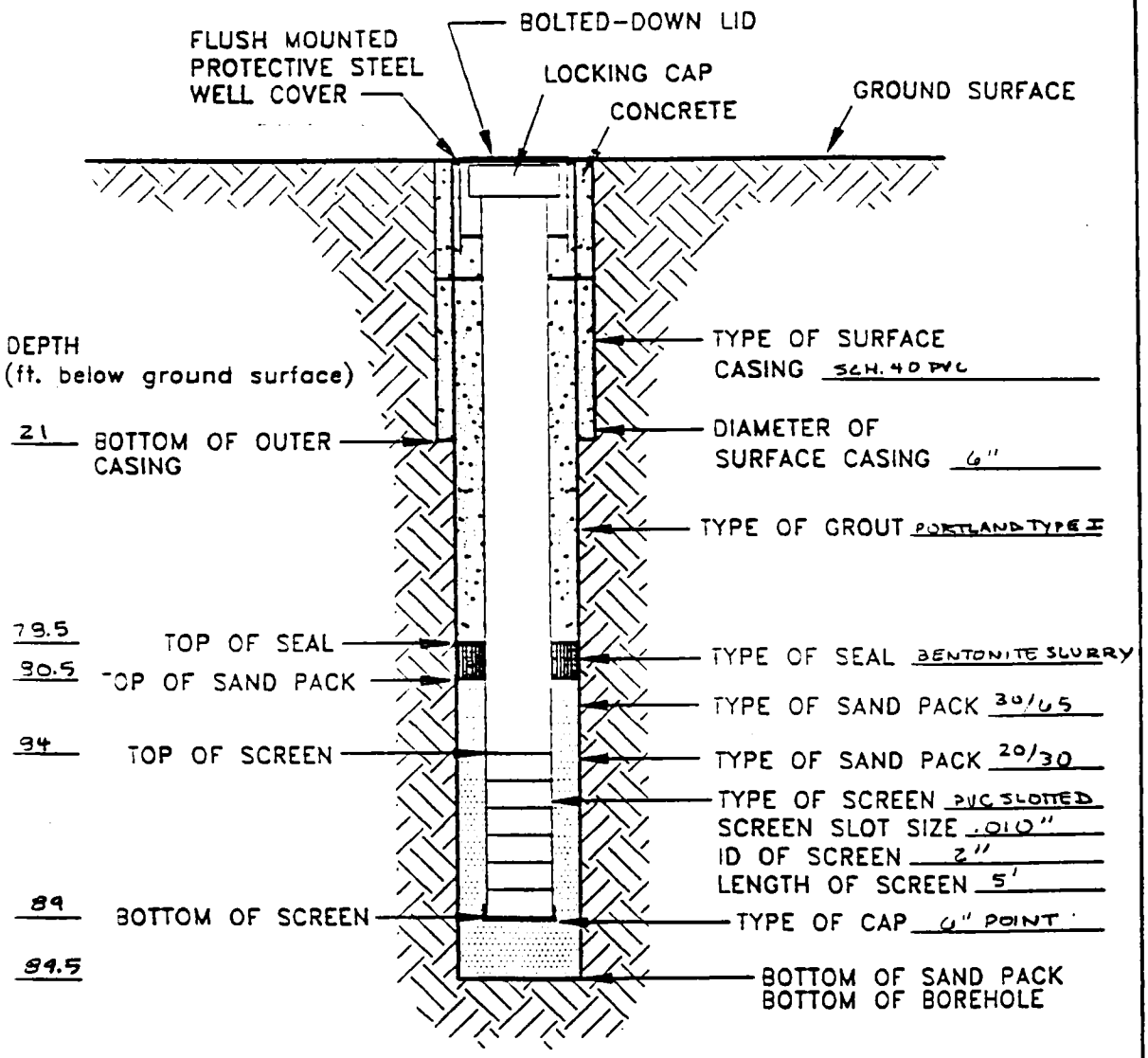


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 12" & 6"	Well No./Piezometer No. OU3P2020
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 9-11-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 8"/4" HSA + 6" MUD
Field Scientist M. CHEYNE D. DOPKIN P. GRAINE	Top of Well Elevation 10.04' MSL	Development Method AIRLIFT
Depth to Groundwater 4.7 BLS	GS Elevation 10.28' MSL	

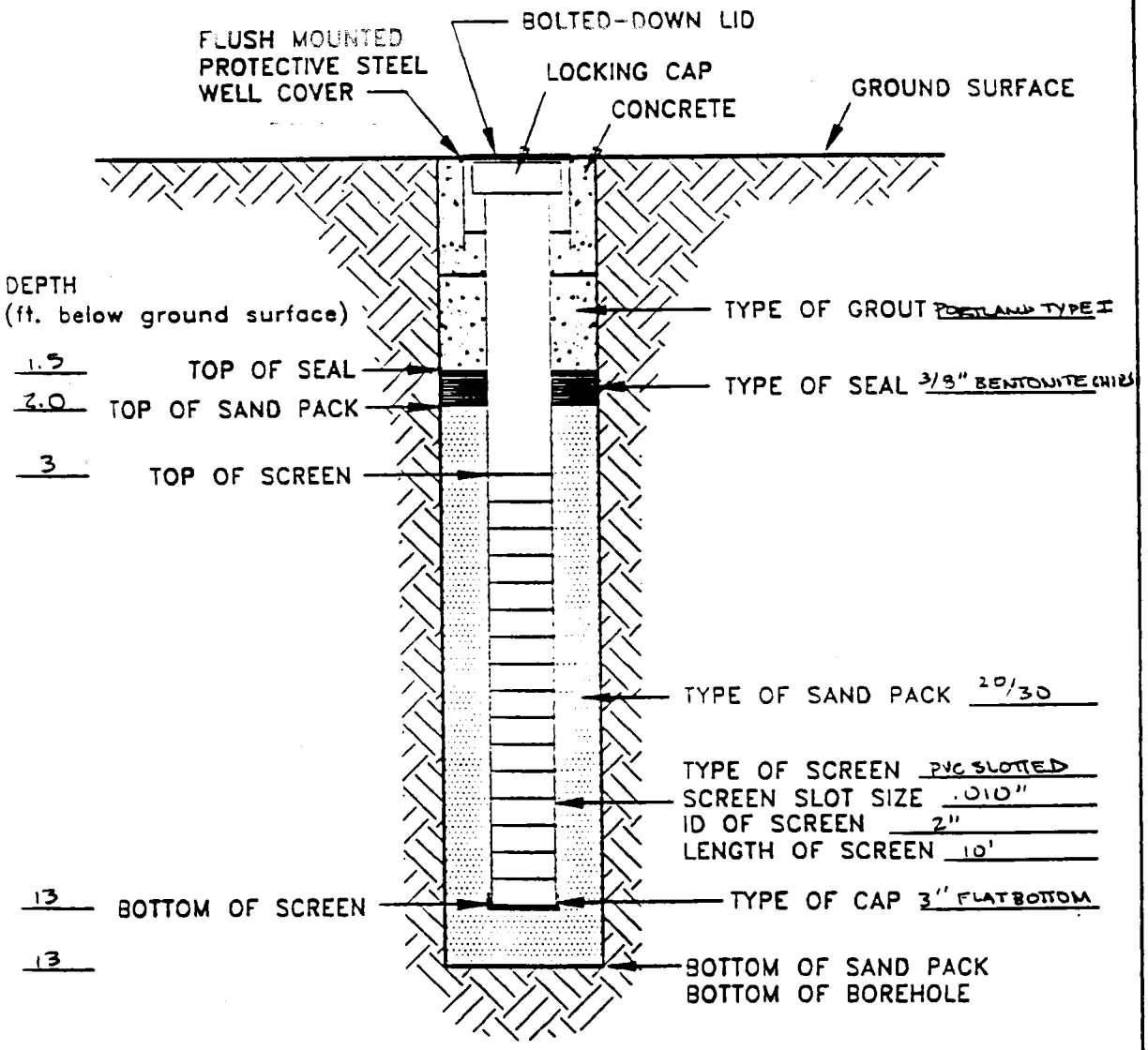


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 8"	Well No./Piezometer No. OU3PZ021
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 8-30-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH.40 PVC	Drilling Method 4 1/4" HSA
Field Scientist M. CHEYNE	Top of Well Elevation 9.99' MSL	Development Method CENTRIFUGAL
Depth to Groundwater 5.2 BLS	GS Elevation 10.25' MSL	

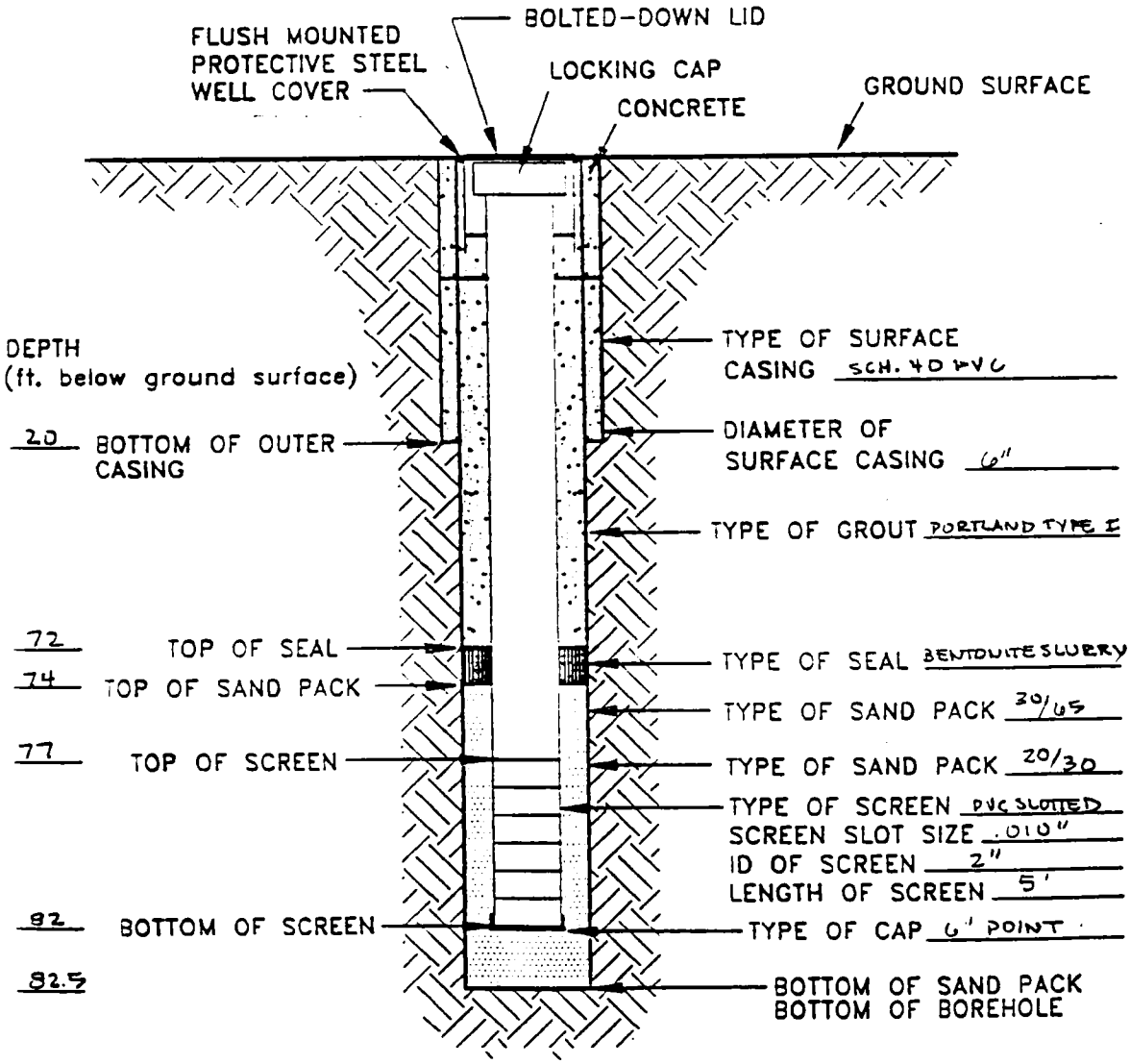


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NAS JAX OU3 SCOPING	Boring Diameter 12" & 6"	Well No./Piezometer No. OU3PZ022
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 9.10.93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 8 1/4" HSA + 6" MUD
Field Scientist D. DOPKIN P. GRAVES	Top of Well Elevation 10.14' MSL	Development Method AIRLIFT
Depth to Groundwater 1.9 BLS	GS Elevation 10.41' MSL	

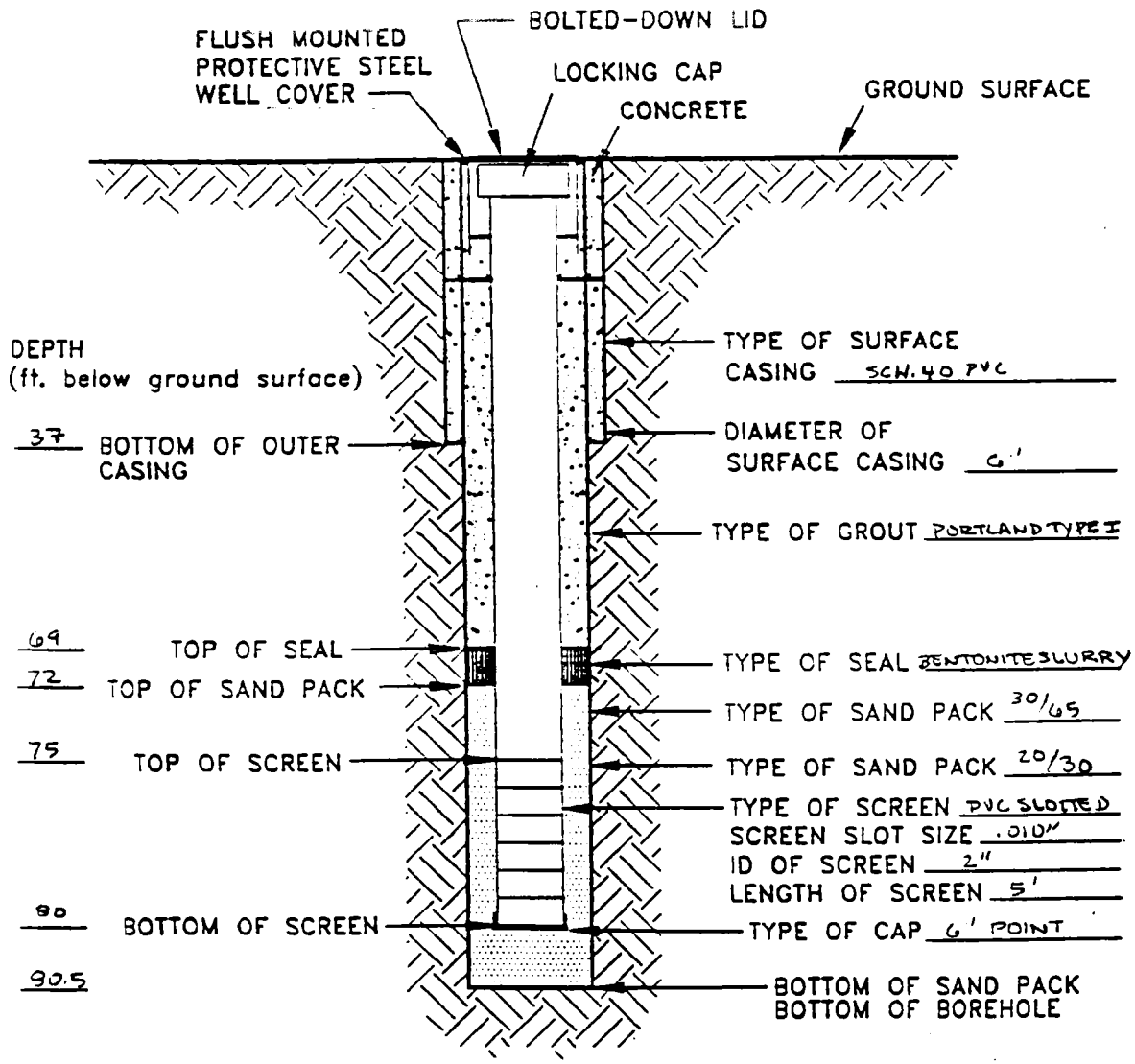


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAXOU3 SCOPING	Boring Diameter 14" & 6"	Well No./Piezometer No. OU3PE023
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 9.14.93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 10 1/4" HSA + 6" MUD
Field Scientist M. CHEYNE, P. CRANE D. DOPKIN	Top of Well Elevation 9.23' MSL	Development Method AIRLIFT
Depth to Groundwater 2.5 BLS	GS Elevation 9.49' MSL	

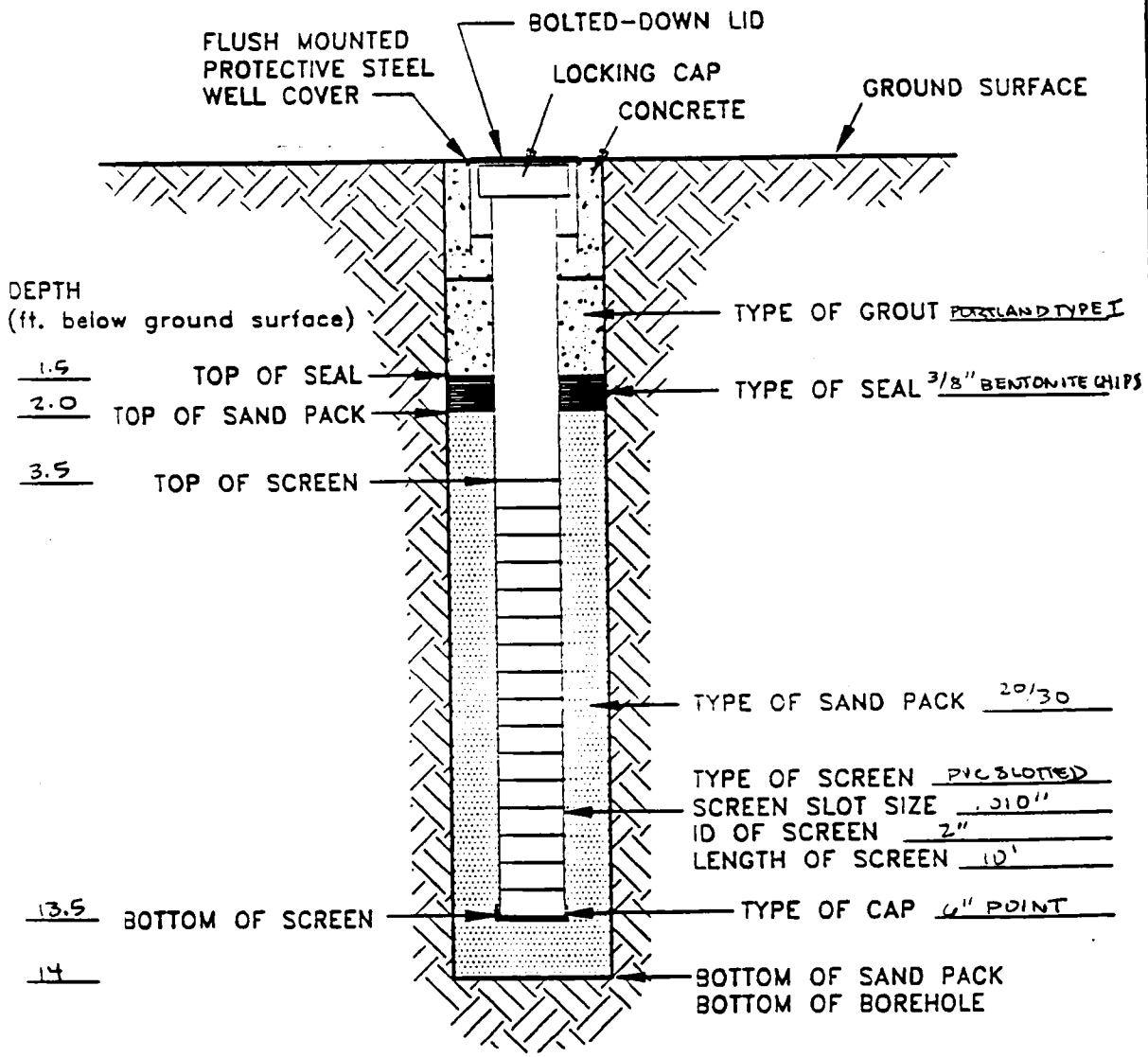


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NAS JAX OU3 SCOPING	Boring Diameter 12"	Well No./Piezometer No. OU3PZ024
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 3-28-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 4 1/4" HSA
Field Scientist M. CHEYNE	Top of Well Elevation 9.04' MSL	Development Method CENTRIFUGAL
Depth to Groundwater 6.0 BLS	GS Elevation 9.33' MSL	

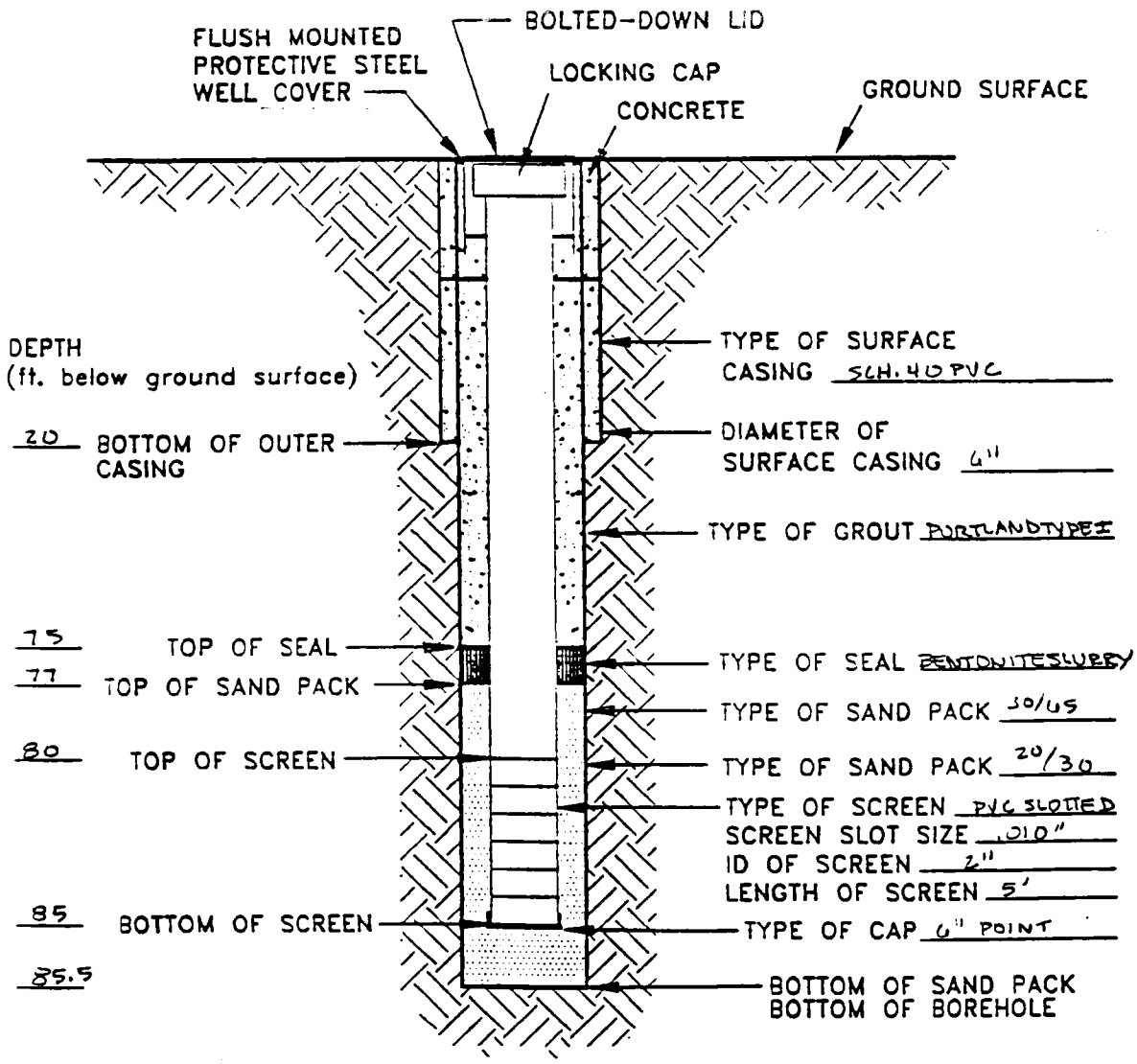


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 12" & 6"	Well No./Piezometer No. OU3PZ025
Project No. 07584.36	Well Inside Diameter 2"	Date Installed 9.13.93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH.40 PVC	Drilling Method 8"/4" HSA + 6" MUD
Field Scientist P. CRAINE D. DOPKIN	Top of Well Elevation 10.69' MSL	Development Method AIRLIFT
Depth to Groundwater 3.9 BLS	GS Elevation 10.94' MSL	

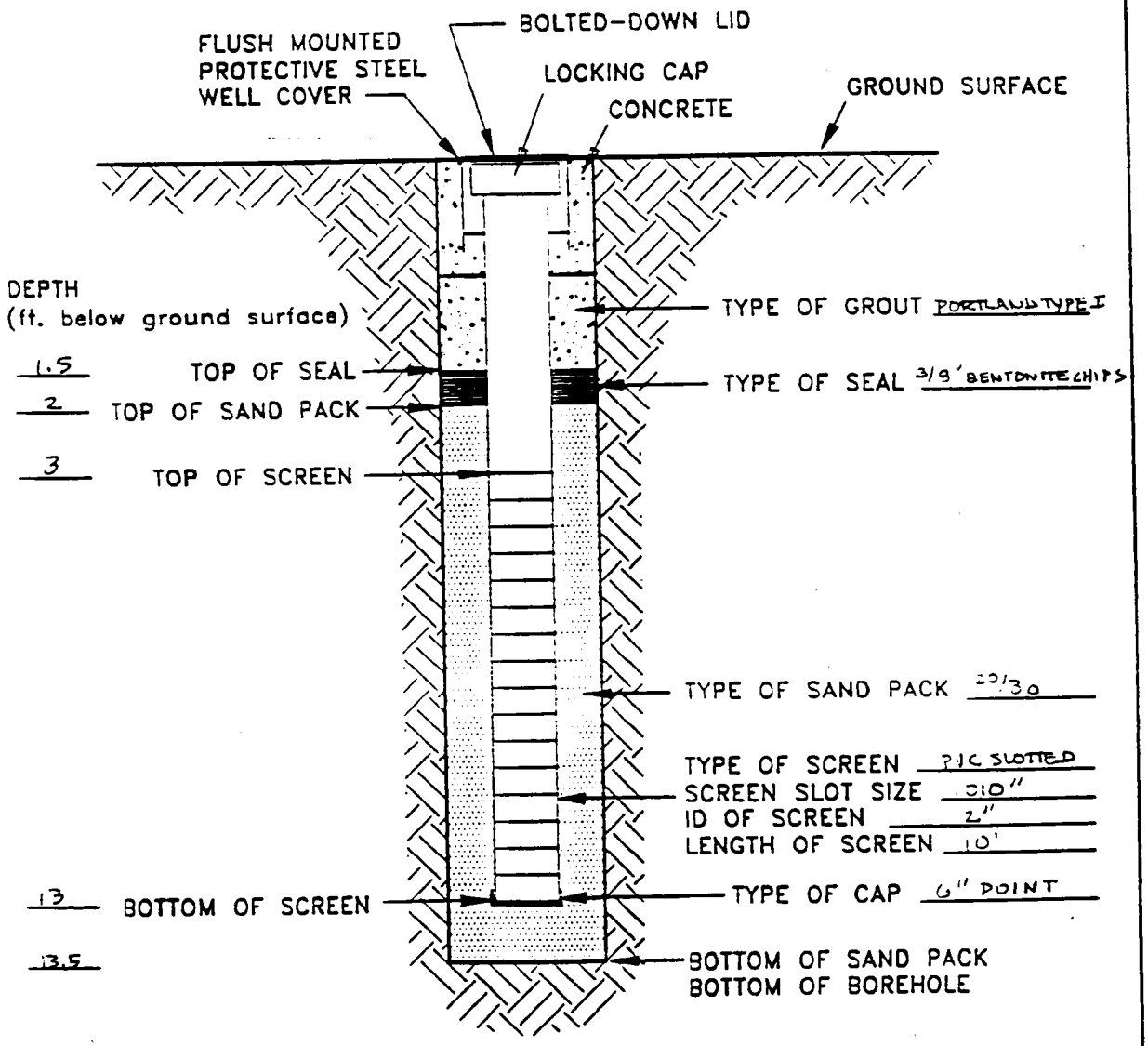


DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NAS JAX OU3 SCOPING	Boring Diameter 8"	Well No./Piezometer No. OU3PZ02G
Project No. 07586.86	Well Inside Diameter 2"	Date Installed 9-13-93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH.40 PVC	Drilling Method 4 1/4" HSA
Field Scientist D. DOPKIN	Top of Well Elevation 10.86' MSL	Development Method CENTRIFUGAL
Depth to Groundwater 6.2 BLS	GS Elevation 11.12' MSL	

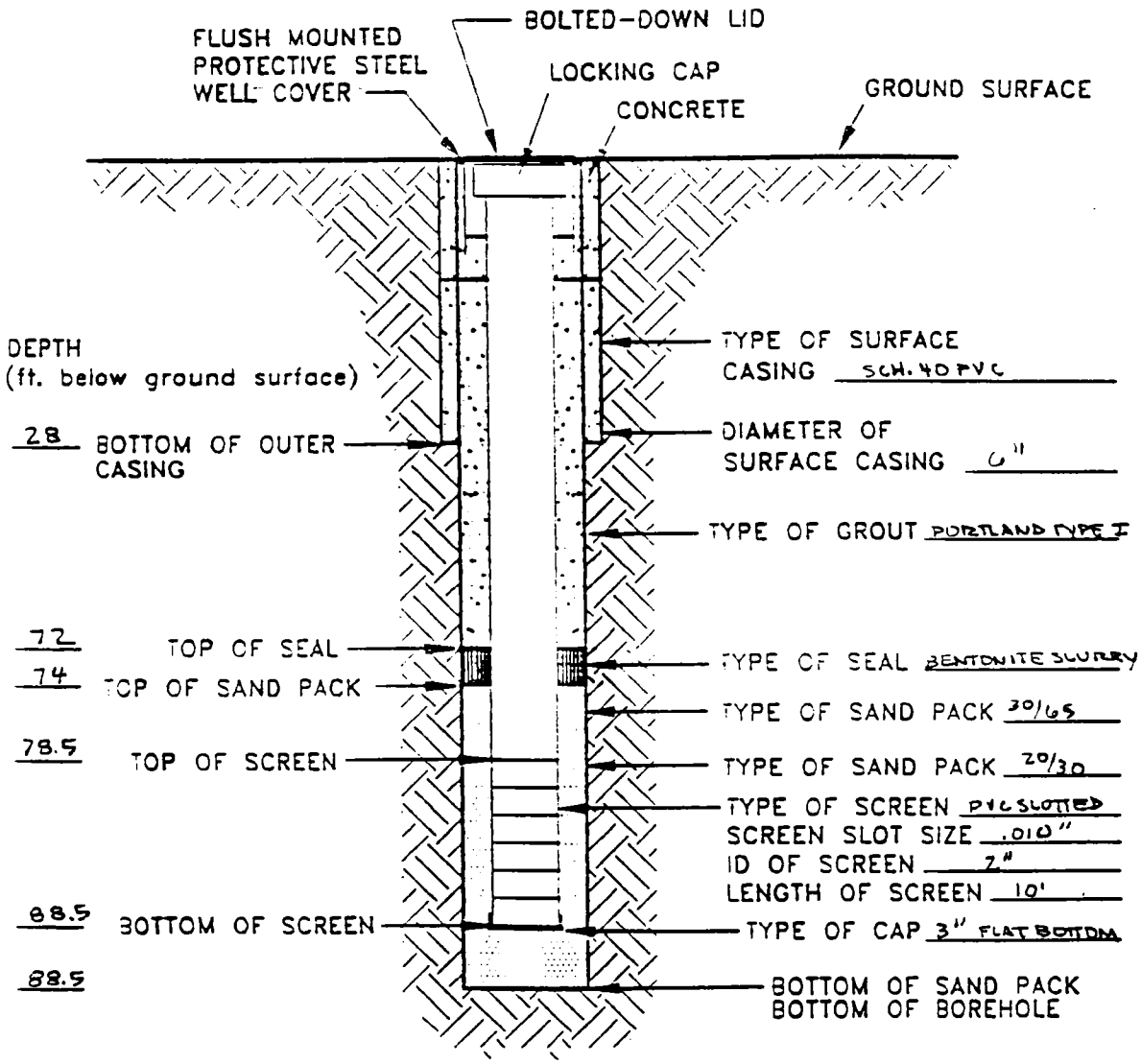


SHALLOW PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

Project Name NASJAX OU3 SCOPING	Boring Diameter 14" & 6"	Well No./Piezometer No. 003P2027
Project No. 07586.36	Well Inside Diameter 2"	Date Installed 9.01.93
Drilling Co. GROUNDWATER PROTECTION	Well Material SCH. 40 PVC	Drilling Method 10'/4" HSA + 6" MUD
Field Scientist M. CHEYNE	Top of Well Elevation 6.48' MSL	Development Method AIRLIFT
Depth to Groundwater 2.6 BLS	GS Elevation 6.98' MSL	



DEEP PIEZOMETER INSTALLATION RECORD

SCOPING STUDY FIELD WORK AT OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

APPENDIX E

Piezometer Development Logs

(Copied from pages 51-92 in Field Book #6
for the NAS JAXS OU 3 Scoping Study Field Program)

9.27.93 (78)

P2001 STARTTIME 1610

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1610	31.7	460	6.57	V. MUDDY, MUCH SAND, GREY	STEADY FLOW
1616	30.6	500	6.36		
[illegible]	30.4	490	6.42	TRANSPARENT, CLEAR, V. SLIGHT FOG	
1630	30.2	720	6.44	" "	
1645	30.5	500	6.47	" "	
1650	30.5	500	6.45	" "	

STOPTIME 1650

9.27.93

P2002 STARTTIME 1620

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1620	26.4	300	8.77	V. MUDDY, MUCH SAND/ SILT, GREY	STEADY, HEAVY FLOW
1627	26.5	335	7.18	TRANSPARENT, CLEAR, V. SLIGHT FOG	
1636	25.4	310	7.02	" "	
1645	25.2	280	6.82	TRANSPARENT, CLEAR, COLORLESS	

STOPTIME 1645

TOTAL VOL. PURGED, BOTH WELLS
N ≈ 350 GALLONS

(79)

9-24-93

PZ003 DEVELOPMENT (D) START TIME: 0817

6" TREMIE USED, 1" STRIKE-UP

TIME	TEMP	COND µMHOS	pH	TURBIDITY	COMMENT
0820	24.9°C	500	7.65	GREY, MUDDY, MUCH SAND	STEADY FLOW
0823	24.7°C	235	7.29	SLIGHTLY CLOUDY, ALMOST TRANSPARENT	
0830	24.5°C	210	7.13	"	
0835	24.5°C	203	7.05	"	
0840	24.5°C	200	7.04	TRANSPARENT, SLIGHT FOG	
0845	24.5	180	6.97	"	
		STOP TIME:	0845		
		RESTART TIME:	0915		
0920	24.5	190	6.99	"	
0925	24.4	180	6.97	TRANSPARENT, V. SLIGHT FOG	TOTAL PURGE ~300 GAL
0935	24.6	180	6.95	TRANSPARENT, CLEAR	
0940	24.5	177	6.93	TRANSPARENT, CLEAR, COLORLESS	
		STOP TIME	0940		

65

PZ004 DEVELOPMENT (3) START TIME 0807

TIME	TEMP	COND µMHOS	pH	TURBIDITY	COMMENT
0810	28.3 (~~77.2~~)	600	6.63	SLIGHTLY CLOUDY LT. GREY	HIGH FLOW RATE
0815	28.0 ~~77.2°~~	600	6.60	TRANSPARENT, SLIGHT FOG, YELLOW TINT	(700 GAL/15 MIN)
0823	28.6	550	6.66	TRANSPARENT, ~~CLEAR~~ SLIGHT FOG, YELLOW TINT (MG)	
		STOP TIME	0825		
		RE START TIME	0915		
0920	28.5	570	6.68	TRANSPARENT, V. SLIGHT FOG	
0929	28.3	570	6.64	TRANSPARENT, CLEAR, SLIGHT YELLOW TINT	
		STOP TIME	0930		

TOTAL PURGE ~400 GAL

63

PZ005 (D) START TIME 1125

95" TREMIE

TIME	TEMP	COND (MMHOS)	pH	TURBIDITY	COMMENT
1125	25.0	620	7.36	SLIGHTLY CLOUDY	STEADY FLOW, SLOW!
1130	24.6	1100	8.05	V. CLOUDY, MUCH SILT	(~5 GPM)
1140	23.6	870	8.00	CLOUDY, SOME SILT	
1155	25.0	750	8.01	CLOUDY	
1210	25.1	600	8.05	" "	
1220	24.1	600	8.02	SEMITRANSPARENT, FOGGED, COLORLESS	
1230	24.3	600	8.05	" "	
1235	24.1	600	8.05	" "	

STOP TIME 1235

TOTAL VOL. PURGED ~225 GALLONS BOTH WELLS

9-28-92

(87)

PZ006 START TIME: 1113

TIME	TEMP	COND (μMHOS)	pH	TURBIDITY	COMMENT
1113	31.1	280	6.65	V. MUDDY, MUCH SILT/SAND	FUEL-ODOR
1120	30.3	320	6.69	SLIGHTLY CLOUDY	INTERMITTANT FLOW (~2-3 GPM)
1130	29.6	295	6.72	", ALMOST TRANSPARENT	
1140	30.1	310	6.72	" "	FLOW INCREASED TO ~5 GPM
1155	30.1	335	6.57	TRANSPARENT, CLEAR V. SLIGHT FOG	ORGANIC, WEATHERED
1200	30.6	315	6.40	TRANSPARENT, CLEAR, COLORLESS	FUEL ODOR PERSISTS
1210	30.8	310	6.41	" "	

STOP TIME 1210

9-28-92

(88)

9-23-93

PZ007 DEVELOPMENT STARTTIME 1500
• 60' TREMIEUSED

TIME	TEMP	COND (μMHOS)	pH	TURBIDITY	COMMENT
1500	27.7°C	1100	7.73	V. MUDDY, CREAM COLOR V. SANDY	
1510	25.3°C	380	7.20	SLIGHTLY CLOUDY	
1525	25.6	305	6.70	"	
1535	26.3	285	6.84	TRANSPARENT, V. SLIGHT FOG, SLIGHT YELLOW TINT	
1545	25.3	285	6.92		
1553	25.2	250	6.90	TRANSPARENT, CLEAR	
1557	25.4	260	6.89	"	

STOP TIME: 1557

TOTAL PURGE 320 GALLONS BOTH WELLS

THURSDAY

59

9-23-93

58

PZ008 DEVELOPMENT STARTTIME 1450

TIME	TEMP	COND (μMHOS)	pH	TURBIDITY	COMMENT
1450	36.8°C	900	6.66	V. MUDDY, CREAM COLOR, V. SANDY	FLOW INTERMITTENT, BUT FASTER THAN PREVIOUS WELLS
1458	29.2°C	380	6.12	GREY, SLIGHTLY MUDDY	(~3-6 GAL/MIN)
1507	31.6°C	500	6.03	SLIGHTLY CLOUDY	SHOOTS 1/2 GAL, WAIT 15 SEC, SHOOT 1/2 GAL
1510	29.1°C	250	5.62	SLIGHTLY CLOUDY, ALMOST TRANSPARANT	
1525	29.3	350	5.55	TRANSPARANT, V. SLIGHT FOG	
1535	29.3	210	5.53	TRANSPARENT, CLEAR	

STOP TIME 1535

THURSDAY

PZ009 (D) STARTTIME: 0815
90' TREMIE

TIME	TEMP	COND (μMHOS)	pH	TURBIDITY	COMMENT
0816	23.3°C	500	7.78	CLOUDY, GREY, SOME SAND	STEADY, HEAVY FLOW
0825	22.9	400	7.77	SLIGHTLY CLOUDY	(~150 GAL/15 MIN)
0835	23.2	400	7.82	" "	
0845	22.7	385	7.81	" "	
0855	22.8		7.89	SLIGHTLY CLOUDY, ALMOST TRANSPARENT	
		STOPTIME 0835			
		STARTTIME 0918			
0930	23.3	390	7.65	TRANSPARENT, CLEAR, COLORLESS	
0940	23.4		7.65	TRANSPARENT, SLIGHT FOG	
0950	22.9	365	7.73	" "	
1000	23.4	365	7.72	" V. SLIGHT FOG	
1005	23.7	380	7.78	TRANSPARENT, CLEAR, COLORLESS	
		STOP TIME 1005		(TOTAL PURGE BOTH WELLS ~700 GAL)	

85

PZ010 (S) STARTTIME: 0808

TIME	TEMP	COND (μMHOS)	pH	TURBIDITY	COMMENT
0808	26.3	680	6.35	V. MUDDY, GREY, MUCH SAND/SILT	INTERMITTANT FLOW
0816	30.1	700	6.78	" "	
0825	31.5	700	6.96	CLOUDY, YELLOW-BROWN TINT	
0835	31.3	700	7.00	" "	
0845	31.0	700	7.07	SLIGHTLY CLOUDY, YELLOW TINT	
0855	30.2	700	7.10	" "	
		STOPTIME 0855			
		STARTTIME 0918			
0930	31.1	700	6.87	" "	
0940	31.7	700	6.88	SLIGHTLY CLOUDY, ALMOST TRANSPARENT	
0950	30.0	700	6.99	TRANSPARENT, SLIGHT FOG, YELLOW TINT	
1000	30.5	700	6.86	TRANSPARENT, CLEAR, YELLOW TINT (LOOKS LIKE BEER)	
1005	30.8	700	6.91	" "	
		STOPTIME 1005			

8-28-93 BD

KUKRENY

83

9.27.93

PZ011 (D) STARTTIME: 1355

90' TREVIE

TIME	TEMP	COND (μMHOS)	pH	TURBIDITY	COMMENT
1355	26.2	430	7.53	V. MUDDY, MUCH SAND/SILT, BROWN	MODERATE FLOW, STEADY
1405	25.3	335	6.82	CLOUDY	
1415	26.2	300	6.88	"	
1425	25.5	255	6.73	"	
1442	25.6°C	230	6.55	SLIGHTLY CLOUDY	
1456	~~24~~ 25.8°C	230	6.56	", ALMOST ~~CLEAR~~ (MK) TRANSPARENT	
1507	25.6°C	220	6.56	" "	
1515	25.5	213	6.57	TRANSPARENT, SLIGHT FOG	
1520	25.5	212	6.59	" "	

STOP TIME 1520

TOTAL VOL. PURGED BOTH WELLS ~170 GAL

MONDAY

(11)

9.27.93

PZ012 (S) STARTTIME: 1345

TIME	TEMP	COND (μMHOS)	pH	TURBIDITY	COMMENT
1345	31.1°C	250	5.68	LT BROWN MUDDY, MUCH SAND	INTERMITTANT FLOW (~1-2 GPM)
1352	33.3	195	6.09	CLOUDY, TRACE SAND	
1355	34.9°C	300	6.56	CLOUDY	
1405	37.3	190	6.59	SLIGHTLY CLOUDY	
1415	38.2	190	6.47	ALMOST TRANSPARENT " ", SLIGHT YELLOW TINT	
1425	35.6	187	6.61	TRANSPARENT, SLIGHT FOG	
1432	38.7	200	6.49	TRANSPARENT, CLEAR, V. SLIGHT FOG	
1442	37.0	190	6.61	" "	
1450	38.9°C	195	6.46	TRANSPARENT, CLEAR	
1455	40.9°C	200	6.46	" "	

STOPTIME 1455

MONDAY

(10)

PZ013 (D) STARTTIME 1646

9.23.93 (60)

TIME	TREMIE TEMP	COND (μMHOS)	pH	TURBIDITY	COMMENT
1646	27.4	1200	7.92	SLIGHTLY CLOUDY LT. GREY, TRACE SAND	
1655	25.3	390	7.74	NO SAND, SLIGHTLY CLOUDY	
1705	26.3	265	7.12	SLIGHTLY CLOUDY, ALMOST TRANSPARENT	
1715	26.5	35	7.05	TRANSPARENT, SLIGHT FOG, SLIGHT YELLOW TINT	
1725	26.3	210	7.05	AS ABOVE, V. SLIGHT FOG	
1732	26.5	200	6.87	TRANSPARENT, SLIGHT YELLOW TINT	
1736	25.9	200	6.80	" "	

STOP TIME 1736

THURSDAY

PZ014 (S) STARTTIME 1637

9.23.93

TIME	TEMP	COND (μMHOS)	PH	TURBIDITY	COMMENT
1637	32.7	1150	6.34	V. MUDDY, CHOCOLATE BROWN, ABUNDANT SAND/SILT	FLOW INTERMITTANT, ~1/2 GAL/30 SEC FUEL ODOR
1644	32.4	1300	6.50	"	
1655	32.4	1100	6.52	SLIGHTLY CLOUDY, YELLOW-BROWN TINT TRACE SAND	
1705	32.7	1300	6.55	SLIGHTLY CLOUDY, YELLOW-BROWN TINT	
1715	33.6	1000	6.53	SLIGHTLY CLOUDY, YELLOW TINT, ALMOST TRANSPARENT	
1725	34.8	1200	6.64	" "	
1732	34.3	1200	6.68	" "	
1742	35.2	1200	6.64	" "	FUEL ODOR PERSISTS
1750	34.4	1100	6.57	"	
1800	35.8	1100	6.68	"	

STOP TIME 1800

TOTAL PURGE VOL BOTH WELLS ~ 320 GAL

THURSDAY (61)

9-24-93

PZ015 DEVELOPMENT STARTTIME 1040

.55' TREMIE USED

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1040	25.2°C	340	7.11	GREY, MUDDY, MUCH SAND	(MC) ~~SLIGHTLY T~~
1048	24.7	230	6.80	SLIGHTLY CLOUDY TRACE SAND	PUMPS 300 GAL/ 45 MINUTES
1055	24.5	230	6.62	SLIGHTLY CLOUDY, ALMOST TRANSPARENT	
1100	24.6	230	6.54	" "	
1110	24.7	230	(MC) ~~6.44~~ 6.55	TRANSPARENT, FOGGED	
1118	24.6	220	6.55	TRANSPARENT SLIGHT FOG SLIGHT YELLOW TINT	
1125	24.7	220	6.49	TRANSPARENT, 1 SLIGHT FOG, SLIGHT YELLOW TINT	
		STOPTIME 1130			
		RESTARTTIME 1148			
1200	24.8	220	6.48	"	
1210	24.8	210	6.49	" NO COLOR	
1215	24.7	200	6.43	TRANSPARENT, CLEAR, COLORLESS	
		STOPTIME 1215			

(67)

9-23-93

PZ016 DEVELOPMENT START TIME: ~~1200~~ 1315

.55' OF TREMIE, TO BOTTOM (6" ABOVE)

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1317	–	900	7.79	V. TURBID, GREY, SOME SAND	
1325	26.4°C	420	7.24	SLIGHTLY CLOUDY, ALMOST TRANSPARENT	
1335	25.4°C	380	7.09	TRANSPARENT, SLIGHT FOG	
1345	25.9°C	380	7.05	TRANSPARENT, V. SLIGHT FOG SLIGHT YELLOW TINT	
1350	25.5°C	370	7.00	"	
1357	25.7°C	800 * SEE COMMENT	6.95	"	HIGH COND POSSI DUE TO WATER PASSING OVER MY SWEATY HAND
1400	25.9°C	380	6.90	TRANSPARENT, CLEAR, SLIGHT YELLOW TINT	

STOP TIME: 1400

ESTIMATED PURGE ~~200-250~~ 200 GALLONS (MC 9-23)

THURSDAY

(57)

PZ017 DEVELOPMENT START TIME: ~~1300~~ 1300 (HC)

9.23.93

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1305	94.3°F	430	6.00	SLIGHTLY FOGGED, SOME SAND	INTERMITTENT FLOW
1315	93.8°F	400	6.92	" "	" "
1325	26.4°C	420	7.24		PZ016 DATA, MISTAKE

STOP TIME: 1350

ESTIMATED PURGE: 5 GALLONS

THURSDAY

(35)

PB017 START TIME 1725

9.28.93 (92)

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1725	30.3	275	5.68	CLOUDY, SOME SILT/SAND	PUMP RUNS FOR 8 MINUTES, PRODUCES 2-4 GALLONS INTERMITTANTLY THEN WE SHUT IT DOWN TO RECHARGE
1750	32.0	340	6.19	" "	PUMPED IN 1/2 GAL (3 MIN)
1808	31.8	350	6.14	SLIGHTLY CLOUDY	" "
1810	32.8	360	5.91	" "	ONE CYCLE, SAMPLED @ 1ST WATER + JUST B4 PUMP WAS SHUT DOWN
1825	29.7	360	6.22	TRANSPARENT, FOGGED, YELLOW TINT	SAME
1827	30.9	360	6.17		NOTE AS ABOVE

STOP TIME 1827 TO

9-23-93

PZ018 DEVELOPMENT

- WELL 73.5' DEEP
- RUNDOWN 70' TERMIE

START TIME: 10:15 9/23/93

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1020		900		GREY, MUDDY, MUCH SAND	STEADY FLOW
1025		450		GREY, (WARM?), SOME SILT/SAND	"
1030		270		SLIGHTLY MUDDY, (LIGHT GREY), NO SAND	"
1035	26°C	230		PALE GREY, SLIGHTLY CLOUDY	"
1045	26.0°C	200		SLIGHT FOG, ALMOST TRANSPARANT	"
1050	26.1°C	180		SLIGHTLY BETTER	"
1100	27.0	190		"	
1110	26.0	200		TRANSPARANT, V. SLIGHT FOG	"
1115	26.0	200		TRANSPARANT, CLEAR	

STOP TIME 11:15

THURSDAY

(53)

9-23-93

PZ019 DEVELOPMENT START TIME: 0947 9/23/93

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1000		500		V. TURBID, SANDY	INTERMITTANT FLOW
1007		500		CLEARING, TR SAND	"
1015		500		CLEARING, YELLOWISH, TR SAND	"
1020		500		TRANSPARENT, SLIGHT FOG, YELLOW	"
1025		500		"	"
1030		500		TRANSPARANT, YELLOW (LOOKS LIKE MILLER BEER)	"
1035	18°C	500		AS ABOVE	"
1045	"	500		"	"
1050	"	500		"	"
1100	"	500		"	"

STOP TIME 1100

THURSDAY

(51)

PZ020(D) STARTTIME 0905

90' TREMIE

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
0905	24.8	600	7.78	GREY, MUCH SAND/SILT	STEADY FLOW
0910	24.5	440	7.63	GREY, V. CLOUDY, TR. SAND	(N 100 GAL/30 MIN)
0920	24.5	275	7.17	CLOUDY	
0930	24.5	225	7.00	CLOUDY	
0940	24.7	200	7.00	SLIGHTLY CLOUDY	
0950	24.4	190	6.86	SLIGHTLY CLOUDY, ALMOST TRANSPARENT	
1000	24.4	180	6.93	SLIGHTLY TRANSPARENT (SEE HAND THROUGH JAR), FOGGED	
1010	24.6	180	6.93	TRANSPARENT, SLIGHT FOG	

STOPTIME 1010

~~TOTAL PURGE BOTH WELLS ~ 340 GALLONS~~

9-27-93

MONDAY

(7)

PZ021(S) STARTTIME 0850

(7a)

TIME	TEMP	COND µMHOS	pH	TURBIDITY	COMMENT
0850	27.9°C	600	6.28	MILKY GREY-BROWN; MUCH SAND	INTERMITTENT FLOW
0857	30.2°C	850	6.51	"	(N 1 GPM)
0903	32.0°C	1000	6.77	CLOUDY, TR. SILT	
0910	32.9°C	1150	6.84	CLOUDY	
0920	33.2°C	1150	6.88	"	
0930	33.8°C	1200	6.88	SLIGHTLY CLOUDY	
0940	32.8°C	1200	6.89	"	
0950	33.0°C	1200	6.89	SLIGHTLY CLOUDY ALMOST TRANSPARENT	
1000	33.4°C	1100	6.90	TRANSPARENT, SLIGHT FOG	
1010	33.9°C	1200	6.91	"	

9-27-93

MONDAY

9.28.93

P2022 STARTTIME 1605

80' TREMIE

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1605	25.6	590	6.99	V. CLOUDY, MUCH SILT/SAND	STEADY FLOW ~300 GAL/45 MIN.
1612	25.2	215	6.49	CLOUDY	
1620	24.7	190	6.26	"	
1630	24.7	160	6.19	SLIGHTLY CLOUDY	
1640	24.7	145	6.14	"	
1650	24.7	170	6.14	TRANSPARENT, & SLIGHT FOG, V. SLIGHT YELLOW TINT	
1655	24.7	170	6.12	" "	

STOPTIME 1655

TOTAL PURGE 350 GALLONS

(a)

9.27.93

P2023 (D) STARTTIME 1108

80' TREMIE

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1108	26.0	650	7.68	CLOUDY, MUCH SAND	

STOPTIME 1115 — NOT GETTING FLOW - MUST PULL TREMIE + CHECK HOSE + HARDWARE @ END. CHECKED OUT OK.

STARTTIME 1128 SLOW FLOW

1135	25.6°C	375	7.75	CLOUDY	
1140	24.9	340	7.71	SLIGHTLY CLOUDY	
1150	25.6	315	7.45	TRANSPARENT, FOGGED, YELLOW TINT	
1202	26.2	300	7.16	TRANSPARENT, SLIGHT YELLOW TINT, SLIGHT FOG	
1210	26.5	290	7.15	" "	
1217	26.5	290	7.22	TRANSPARENT, CLEAR	

STOPTIME 1217

TOTAL PURGE BOTH WELLS (23, 24) = ~100 GAL

MONDAY

(c)

9.27.93 MONDAY

PZ024 (S) START TIME: 1055

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1055	30.8°C	550	6.50	V. MUDDY, MUCH SAND, BROWN	ALMOST STEADY FLOW
1104	32.7°C	460	6.38	" "	
1110	33.7°C	550	7.00	" "	INTERMITTANT FLOW
1130	35.2	600	6.80	SLIGHTLY CLOUDY, ALMOST TRANSPARENT YELLOW TINT	
1140	32.9	~~340~~ 620 (MC)	6.85	TRANSPARENT SLIGHT FOG, SLIGHT YELLOW TINT	
1150	34.7°C	620	6.92	" "	
1202	35.2	650	6.89	" "	
1210	35.1	650	6.89	TRANSPARENT, CLEAR, V. SLIGHT FOG	

STOPTIME 1210

73

PZ025 (D) 85' TREMIE

START TIME 1410

88

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1410	25.8°C	600	6.65	CLOUDY, MUCH SILT/SAND	
1418	25.8°C	322	6.13	CLOUDY	
1430	26.2	280	6.16	SLIGHTLY CLOUDY	
1445	26.6	275	6.14	TRANSPARENT, SLIGHT FOG, YELLOW TINT	
1500	26.8	265	6.07	TRANSPARENT, CLEAR SLIGHT YELLOW TINT	
1505	26.3	260	6.04	TRANSPARENT, CLEAR SLIGHT YELLOW TINT	

STOPTIME 1505

9.28.93

PZ026(S) STARTTIME: 1400

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1400	33.5	320	5.80	V.MUDDY, GREY, MUCH SILT/SAND	INTERMITTANT FLOW
1407	33.6	245	5.60	" "	
1418	34.2	265	5.82	CLOUDY	
1430	35.0	265	5.86	SLIGHTLY CLOUDY	
1445	35.9	295	5.85	TRANSPARENT, SLIGHT FOG, YELLOW TINT	
1500	35.9	295	5.87	TRANSPARENT, CLEAR, YELLOW TINT	
1505	35.0	295	5.94	" "	

STOPTIME 1505

TOTAL VOL PURGED BOTA WELLS (~350 GAL)

9.28.93

89

PZ027 DEVELOPMENT
85' TREMIE

STARTTIME 1725

80

TIME	TEMP	COND (µMHOS)	pH	TURBIDITY	COMMENT
1725	26.0	1150	7.75	V.MUDDY, MUCH SAND/SILT	STEADY HEAVY FLOW
1732	25.2	600	7.53	CLOUDY, SOME SAND	
1740	25.0	422	7.45	" "	
1750	24.7	335	7.33	" "	
1805	24.9	290	7.17	SLIGHTLY CLOUDY	
1815	24.8	270	7.17	SLIGHTLY CLOUDY, ALMOST TRANSPARENT	
1825	24.8	260	7.15	" "	

STOPTIME 1825

APPENDIX F

CPT Logs

CONE PENETRATION TESTING

The cone penetration test (CPT) method of subsurface exploration uses a heavy, enclosed box truck to push a string of 2-inch diameter steel rods into the ground. A hydraulic press inside the truck smoothly presses the rods, and the dead weight of the truck provides a reaction force to resist the upward pressure exerted on the rods by the subsurface soils.

THE CONE PENETROMETER INSTRUMENT.

To interpret subsurface soil types, a special cone is fitted at the leading end of the rod string. The cone is instrumented with piezoelectric pressure sensors in the cone tip and strain gauges in a friction sleeve behind the cone to measure tip resistance and sleeve friction during penetration. For an American Society for Testing and Materials (ASTM) standard cone penetrometer (ASTM standard D3441-86), the cone has an angle of 60 degrees from vertical, a cone surface area of 10 square centimeters, and a sleeve surface area of 150 square centimeters.

In addition to pressure sensors and strain guages, a porous ceramic filter is built into or above the cone tip, with a pressure sensor just behind the filter to measure pore water pressure. A cone penetrometer instrumented in this way is often referred to as a *piezocone penetrometer*. A cone equipped with only pressure sensors in the cone tip and strain guages in the sleeve is known as a *friction cone penetrometer*. Both types of penetrometer are illustrated in Figure 1.

THE CONE PENETRATION TEST.

During a cone penetration test, the cone is pressed through the subsurface at a constant rate of 2 centimeters per second. The cone produces analog electronic output of cone tip resistance, sleeve friction, and dynamic pore water pressure. These data are recorded digitally on magnetic media every two centimeters. The data are processed by computer to produce a hard-copy log displaying the data versus depth and a stratigraphic column of soil type interpreted automatically from the data.

CONE PENETRATION TEST DATA INTERPRETATION.

Soil type is interpreted from the cone data by a series of empirical relationships between the tip resistance and the ratio of sleeve friction to tip resistance which correlate to the mean diameter (D_{50}) of the tested soil.

In general, both tip resistance and sleeve friction are high for sands, and the ratio of sleeve friction to tip resistance is less than 2 percent. For clay, both tip resistance and sleeve friction are low, and the ratio of sleeve friction to tip resistance exceeds 4 percent. Mixtures of sand and clay are more difficult to differentiate on a generalized basis. To reliably interpret such mixed soils and distinguish between them, the CPT data should be calibrated to the site of interest. This is accomplished by performing one or more CPTs at locations where conventional borings have also been performed, producing soil samples for visual inspection. CPT response for a known soil type can then be observed, allowing interpretation of similar soil types at other locations where soil samples are not collected. Such a calibration performed at NAS Jacksonville

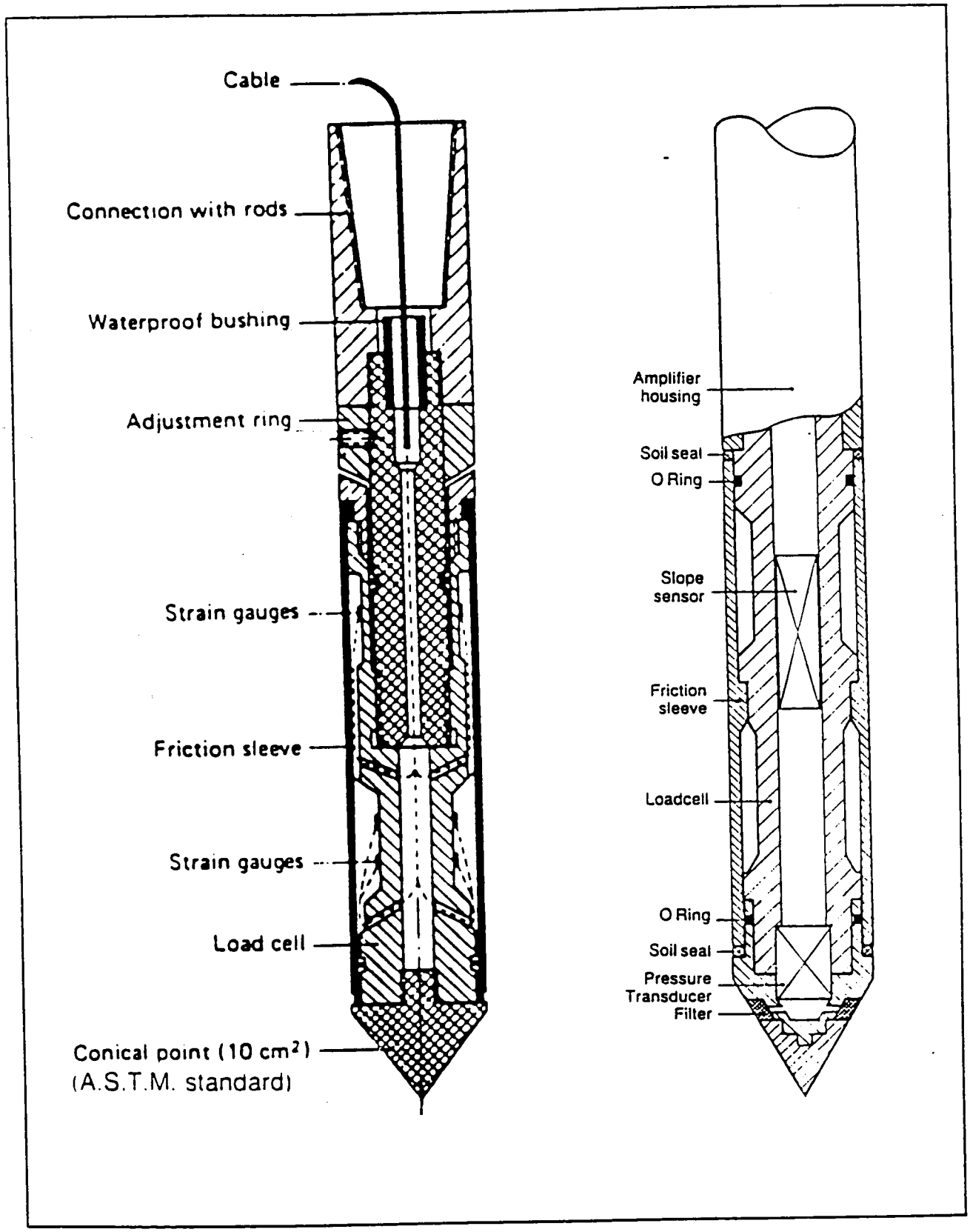


Figure 1 - Friction cone penetrometer (left) and piezocone penetrometer (right).

OU 3 during the Scoping Study field program in 1993 produced the following criteria by which sandy clay (clay with approximately 20 to 50 percent sand) and clayey sand (sand with approximately 20 to 50 percent clay) were distinguished:

- Clayey sand was found to exhibit tip resistance between 50 and 100 tons per square foot (TSF), sleeve friction of 1 to 3 TSF, and a ratio of sleeve friction to tip resistance between 2 and 4 percent.

- Sandy clay was found to exhibit tip resistance less than 50 TSF, sleeve friction less than 1 TSF, and a ratio of sleeve friction to tip resistance between 2 and 4 percent.

Further qualitative observations reinforcing these interpretations of soil type were that the readings of sleeve friction and tip resistance would oscillate dramatically within an interval of clayey sand, producing a saw-tooth plot, but these data would vary only slightly in a clay stratum, producing a nearly straight line or smoth bumps in the plot. Also, dynamic pore water pressure would jump to very high levels in soils that could not dissipate the dynamic pressures caused by the cone penetration (such as clays). In soils that instantly dissipate excess pore pressure (sands), however, the dynamic pore pressure remained hydrosatatic, increasing linearly with depth.

HYDRAULIC CONDUCTIVITY TESTING.

Readings of pore water pressure are used qualitatively in interpretation of soil type, as described above. Pore pressure data can also be used quantitatively to calculate hydraulic conductivity in low permeability soils such as clay or sandy clay. To perform a hydraulic conductivity test, penetration is paused with the cone tip positioned in the stratum to be tested. The motion of the cone during a CPT causes a dynamic pore water pressure in excess of the natural hydrostatic pressure. When penetration is paused, this dynamic, excess pressure begins to dissipate. The decay of pore pressure is recorded, allowing computation of hydraulic conductivity by a method that exploits the theory of consolidation for clays. Each such test requires approximately thirty minutes. The test can only be done in low permeability soils because pore pressure decay must be measured over time, but excess pore pressure dissipates instantly in permeable soils such as sand.

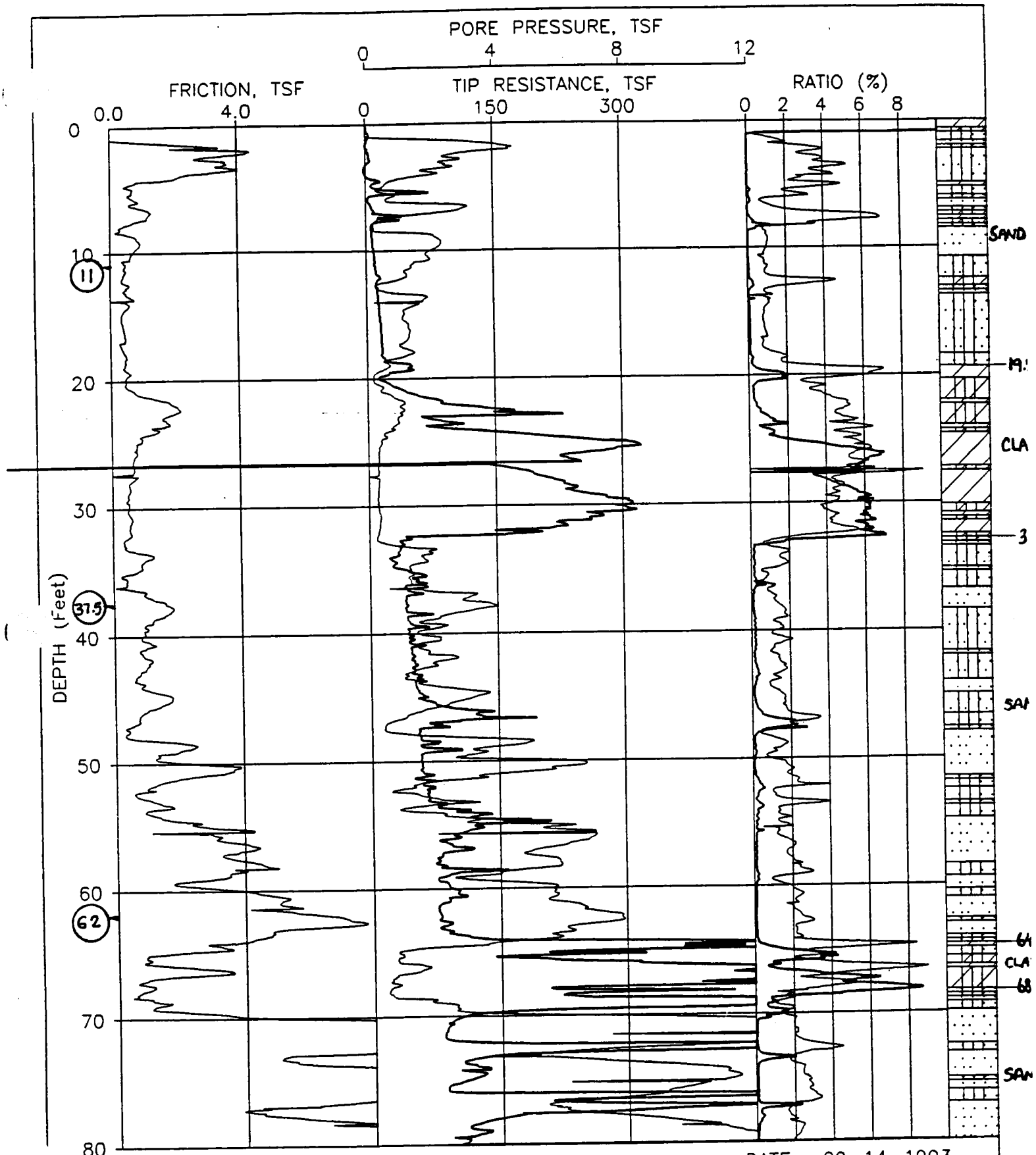
APPENDIX F

This page explains the data illustrated on each of the Fugro Geosciences CPT logs found in this appendix. Each log consists of a depth scale on the far left, in units of feet below land surface, three columns of cone penetrometer output, each with a horizontal units scale, and on the far right, a graphic log of soil stratigraphy.

The far left column of CPT data is the sleeve friction, in units of tons per square foot (TSF). The second column displays two measurements: the bold line is the dynamic pore water pressure and the normal-weight line is the cone tip resistance. Both are in units of tons per square foot, with the pore pressure scale ranging from zero to 12 TSF, and the tip resistance from zero to 450 TSF. The third column displays two ratios. The normal weight line is the ratio, in percent, of sleeve friction to tip resistance. The bold line was not used in interpretation.

The graphic log on the far right illustrates the interpreted soil type versus depth using the correlations of Robertson and Campanella (1984). The speckled pattern indicates sand, diagonal bars indicate clay, and vertical bars indicate an intermediate or difficult to quantify material such as silt or very fine sand.

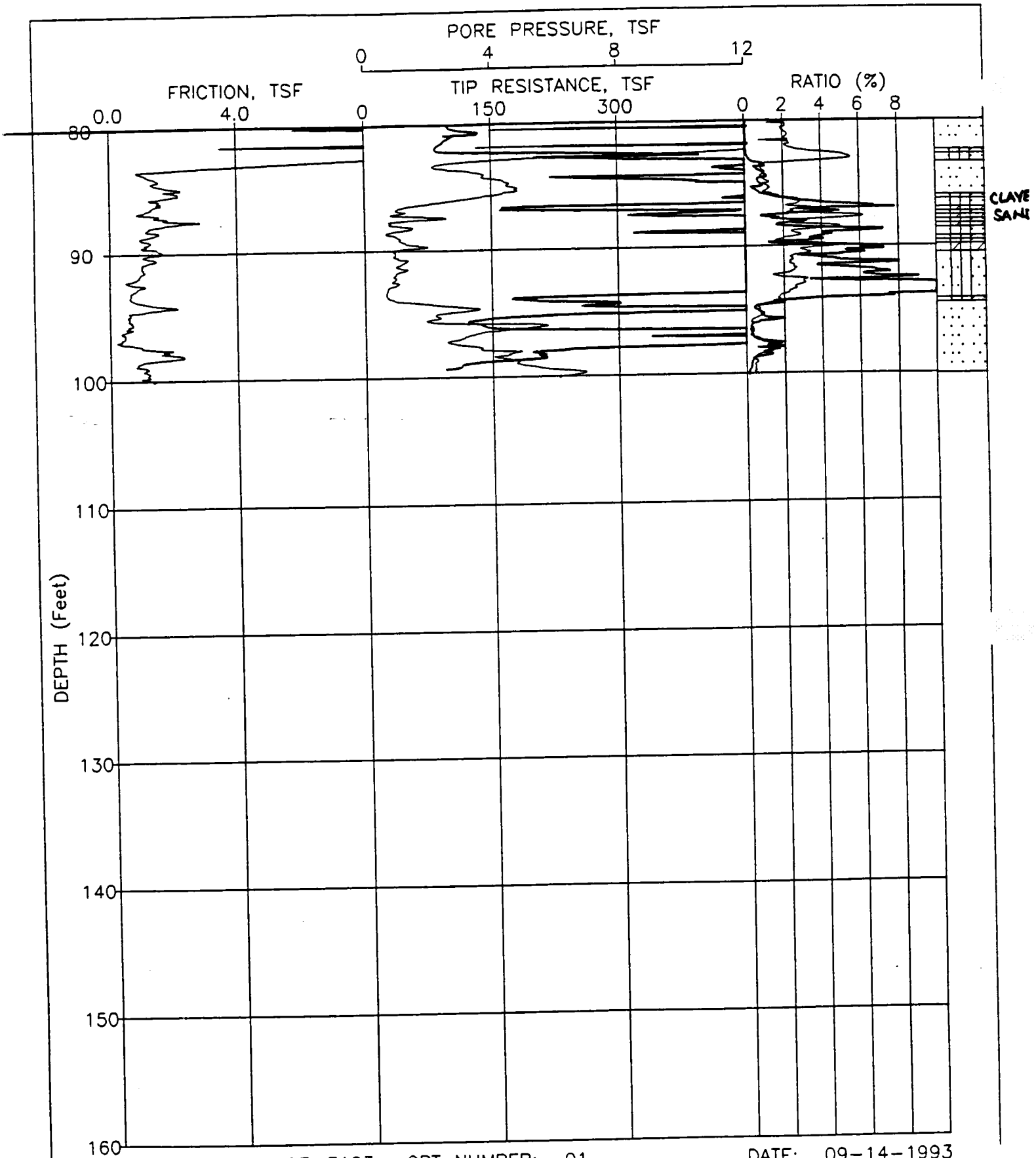
In the depth scale on the far left has been penciled, inside small circles, the depth(s) ar which DPT groundwater samples were collected at that DPT location. On the far right, the re-interpreted soil stratigraphy is penciled in. Soil stratigraphy was manually re-interpreted from the plots of sleeve friction, tip resistance, pore pressure, and ratio. This re-interpretation was done for two reasons: 1) to incorporate the results of CPT calibration which allows for the distinction of sandy clay and clayey sand; and 2) to simplify the automated interpretation into mappable stratigraphic units that were detected in multiple locations at OU 3.



JOB NUMBER: 93-3103 CPT NUMBER: 01 DATE: 09-14-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

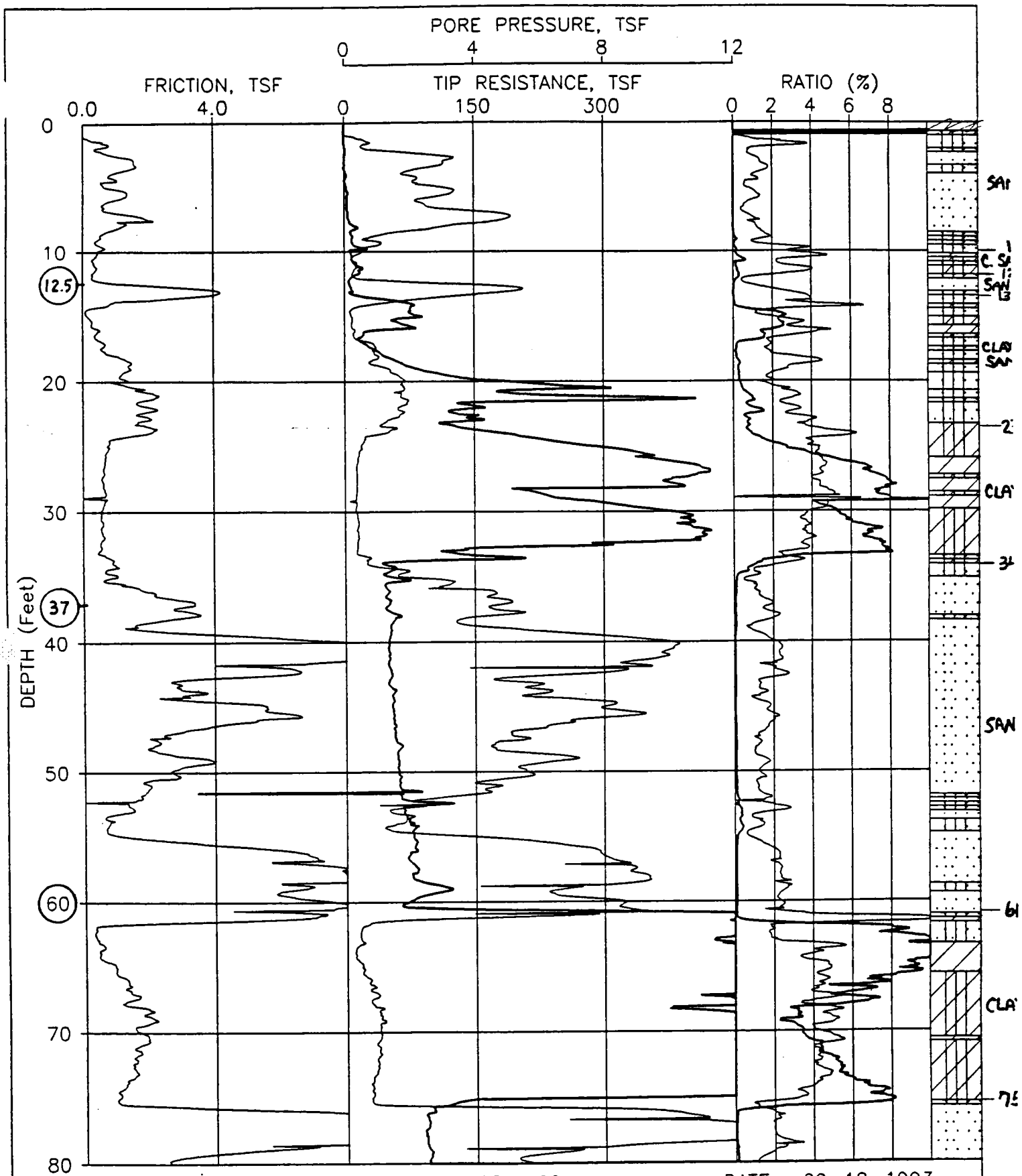
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 01 DATE: 09-14-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

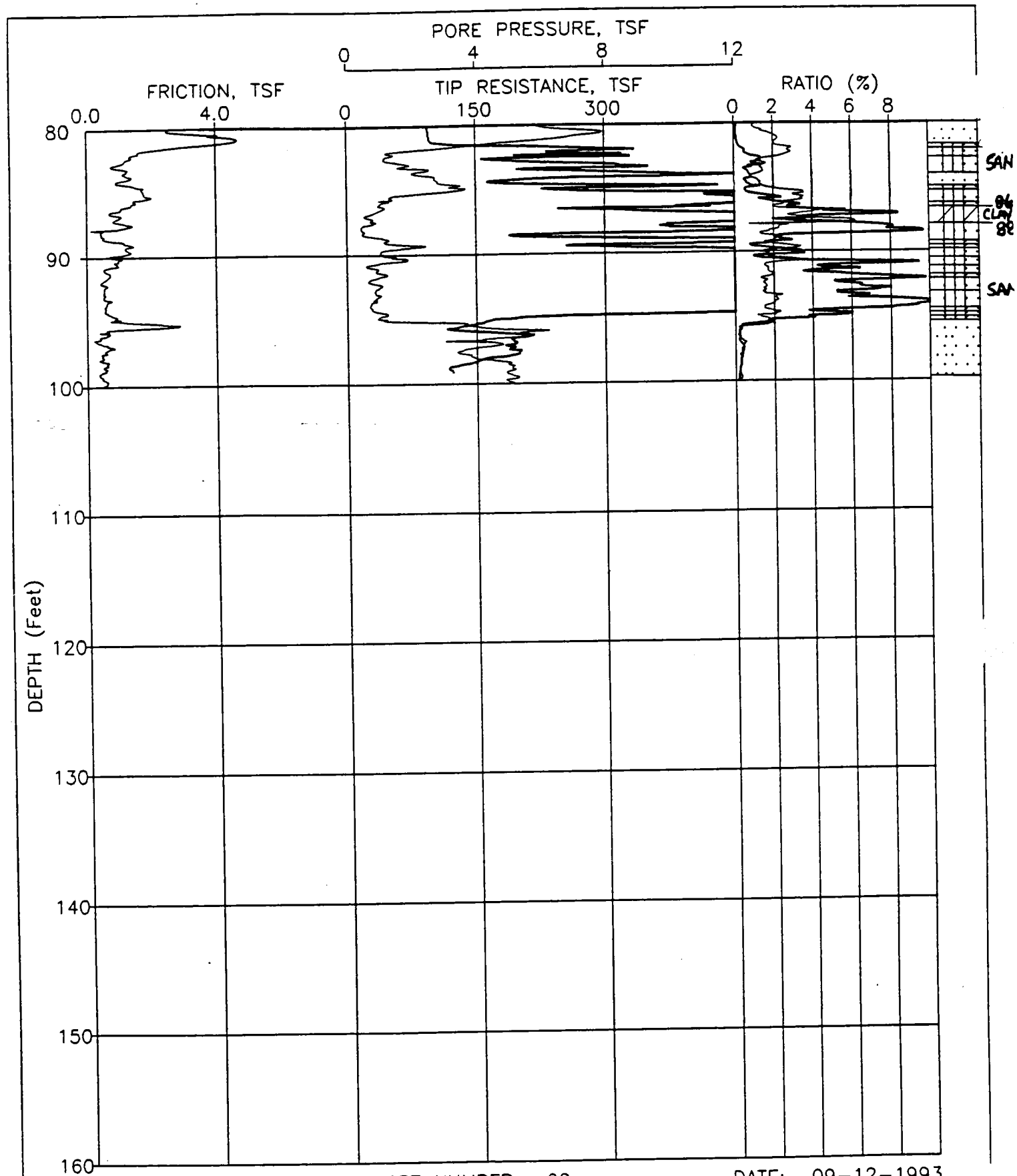
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 02 DATE: 09-12-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

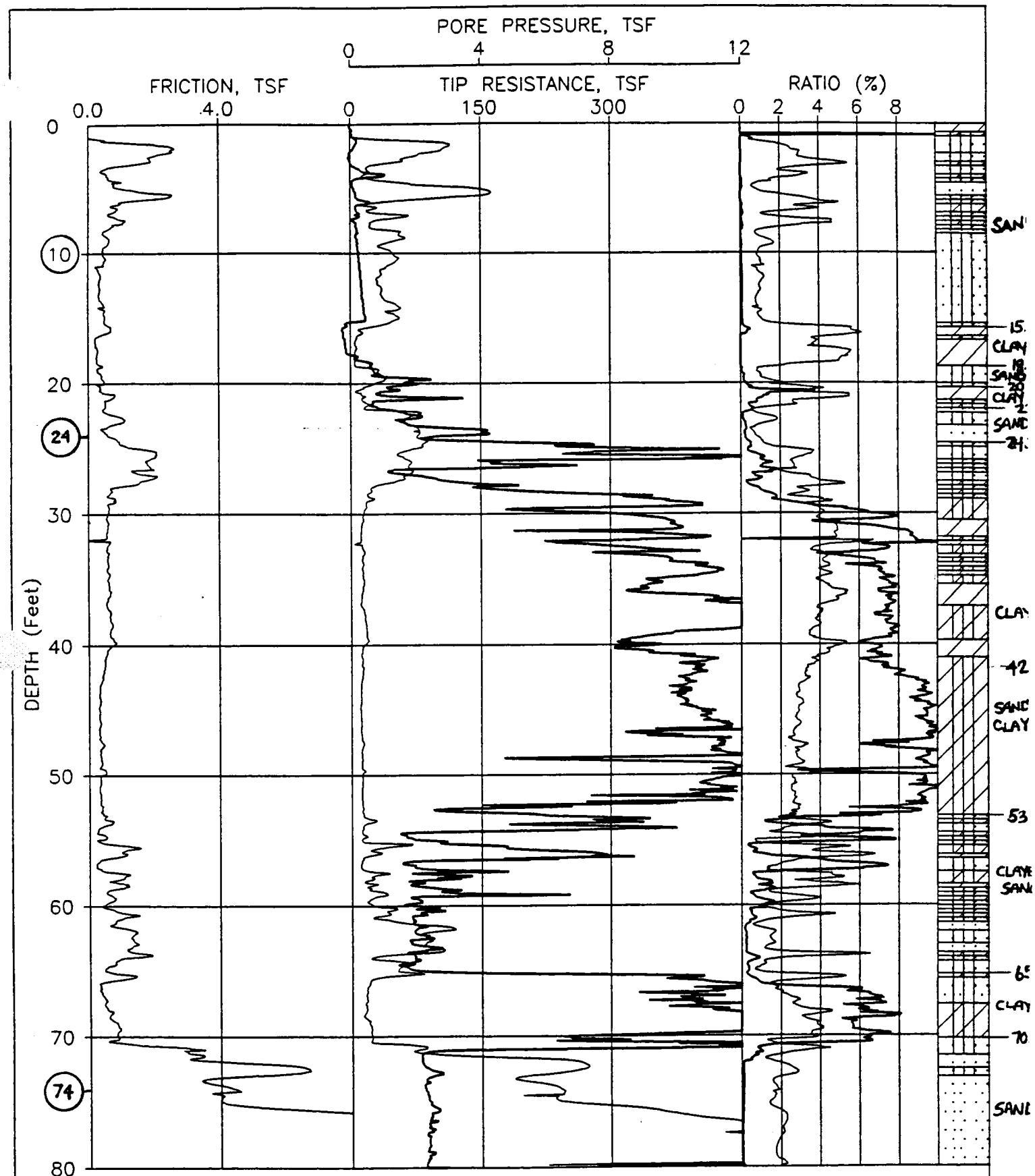
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 02 DATE: 09-12-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

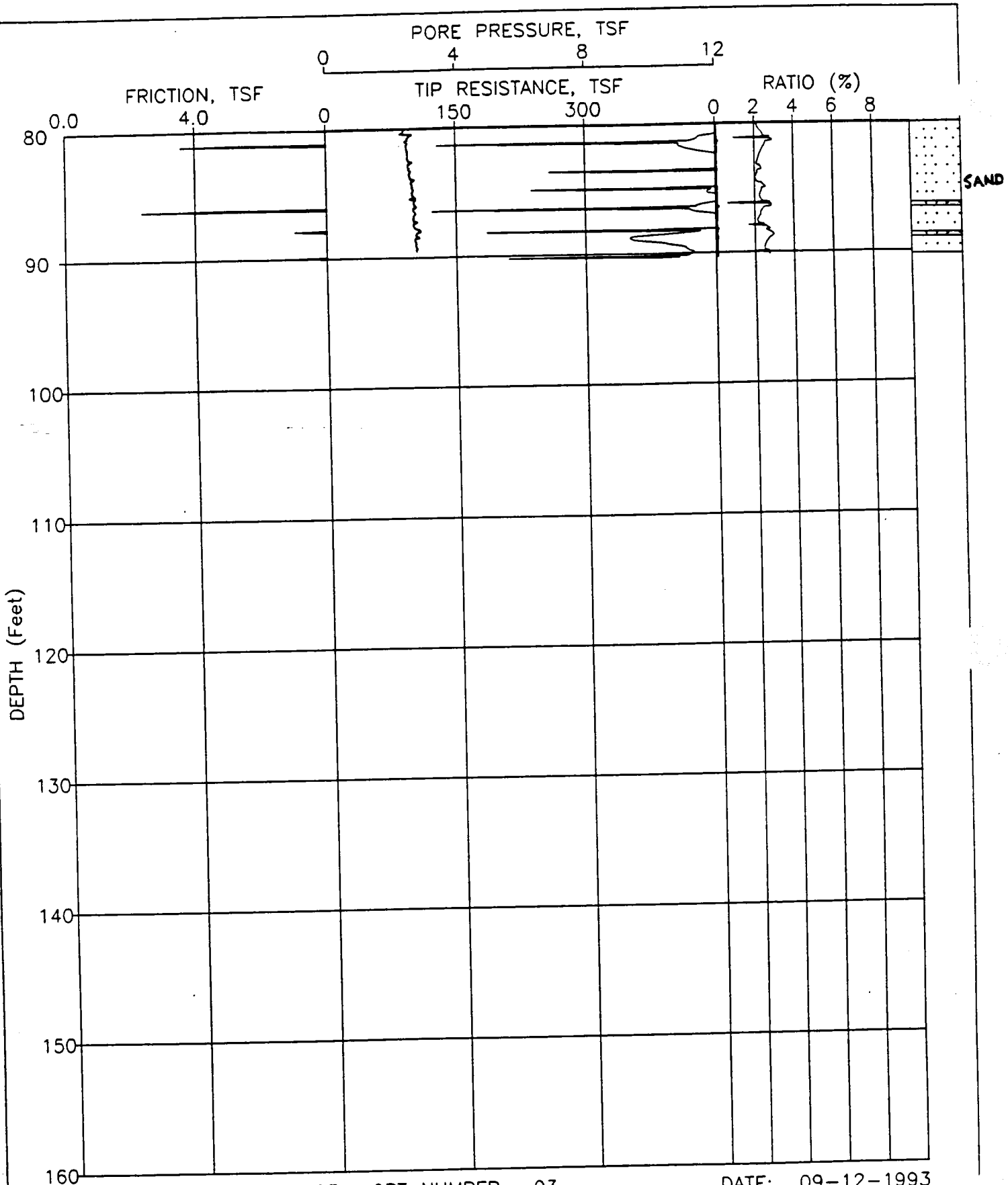
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 03 DATE: 09-12-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

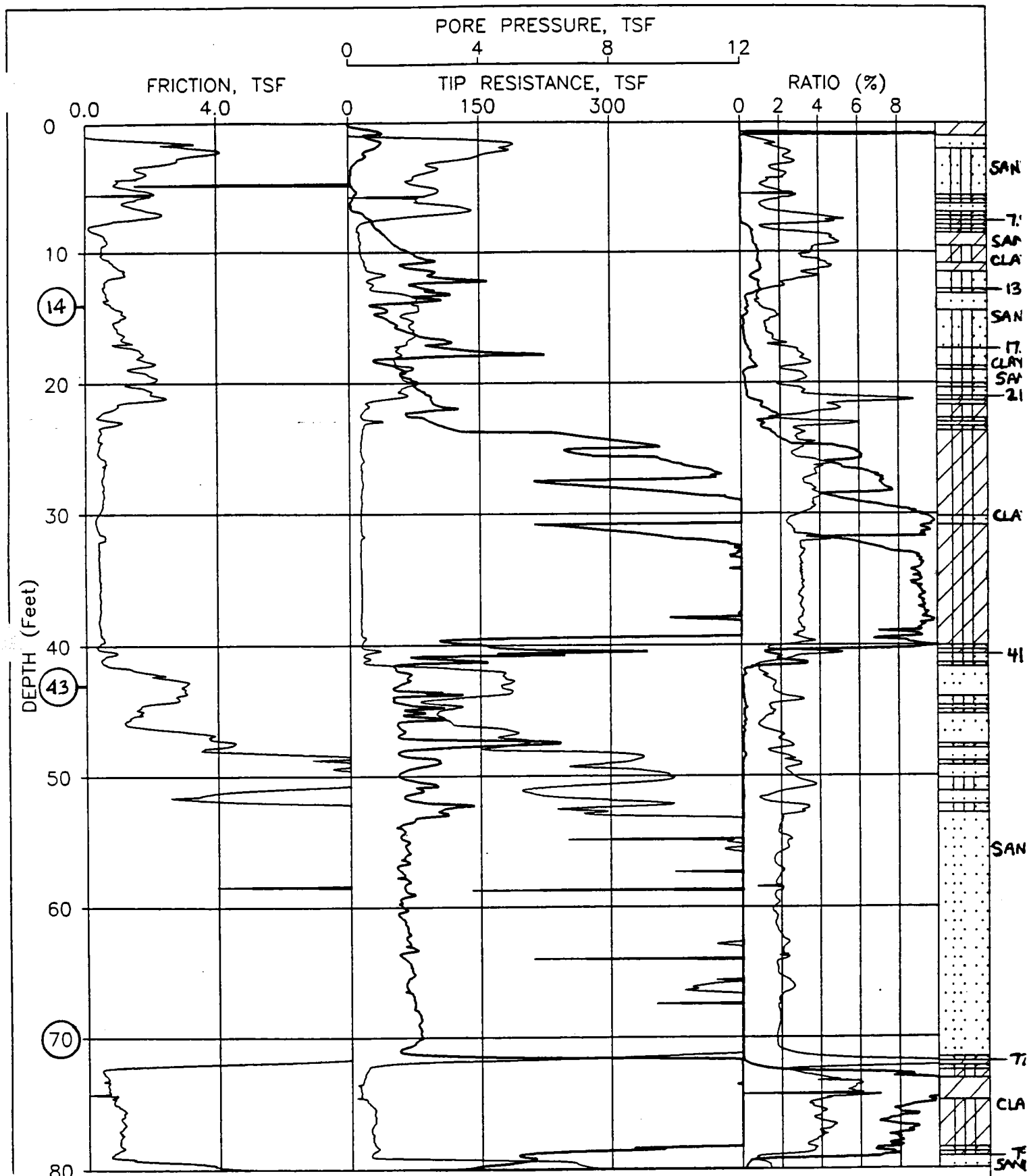
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 03 DATE: 09-12-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

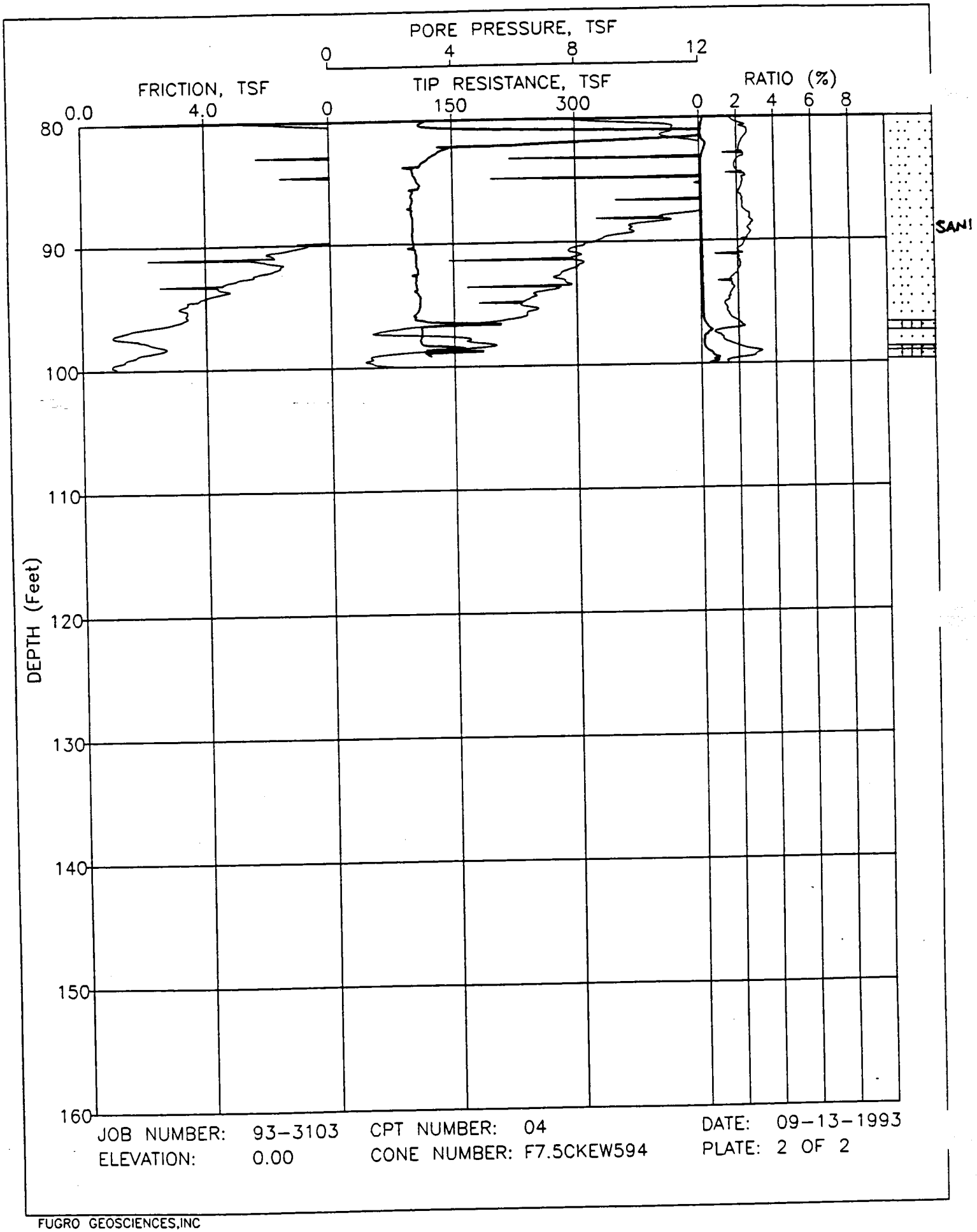
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 04 DATE: 09-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

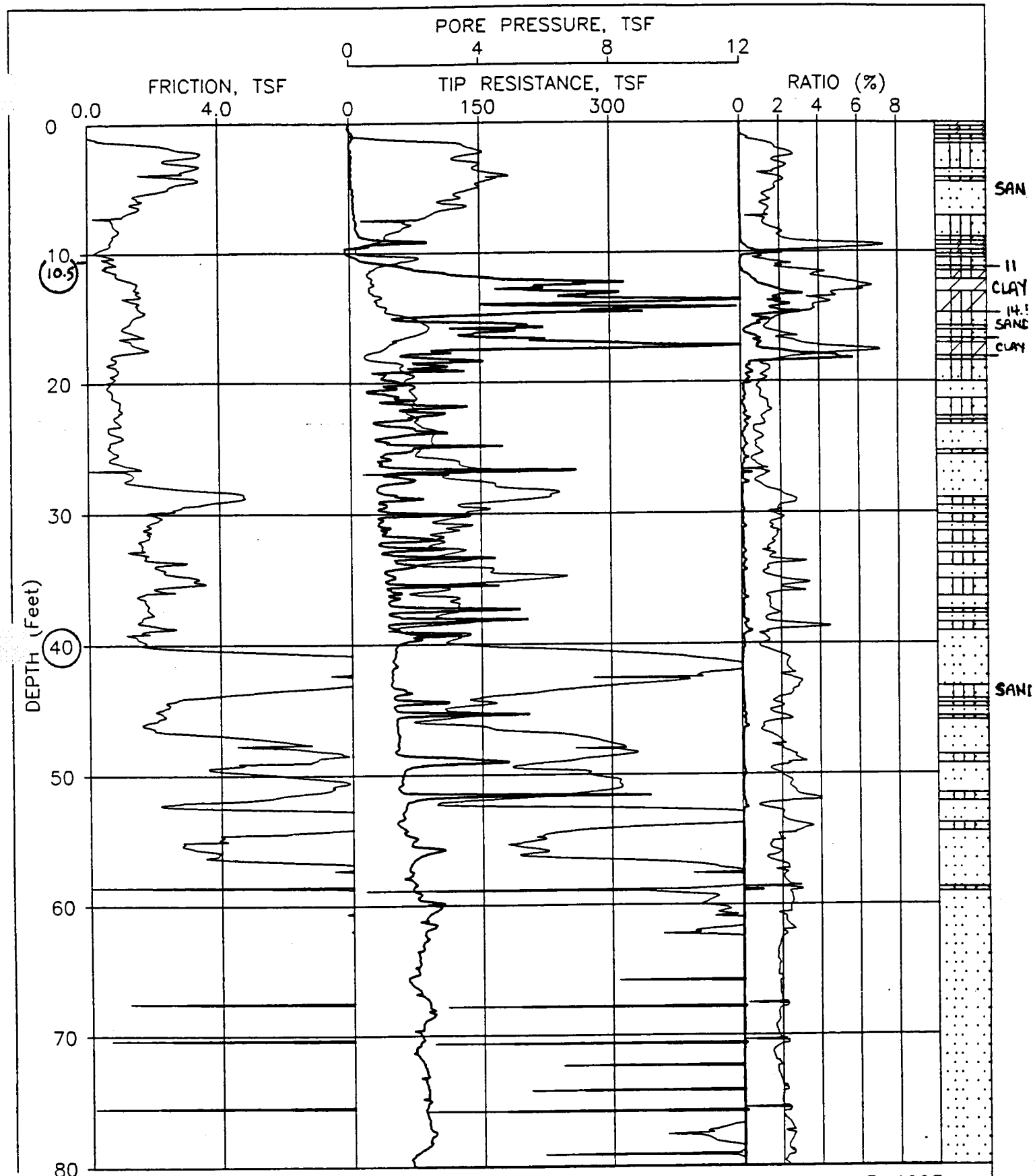
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 04 DATE: 09-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

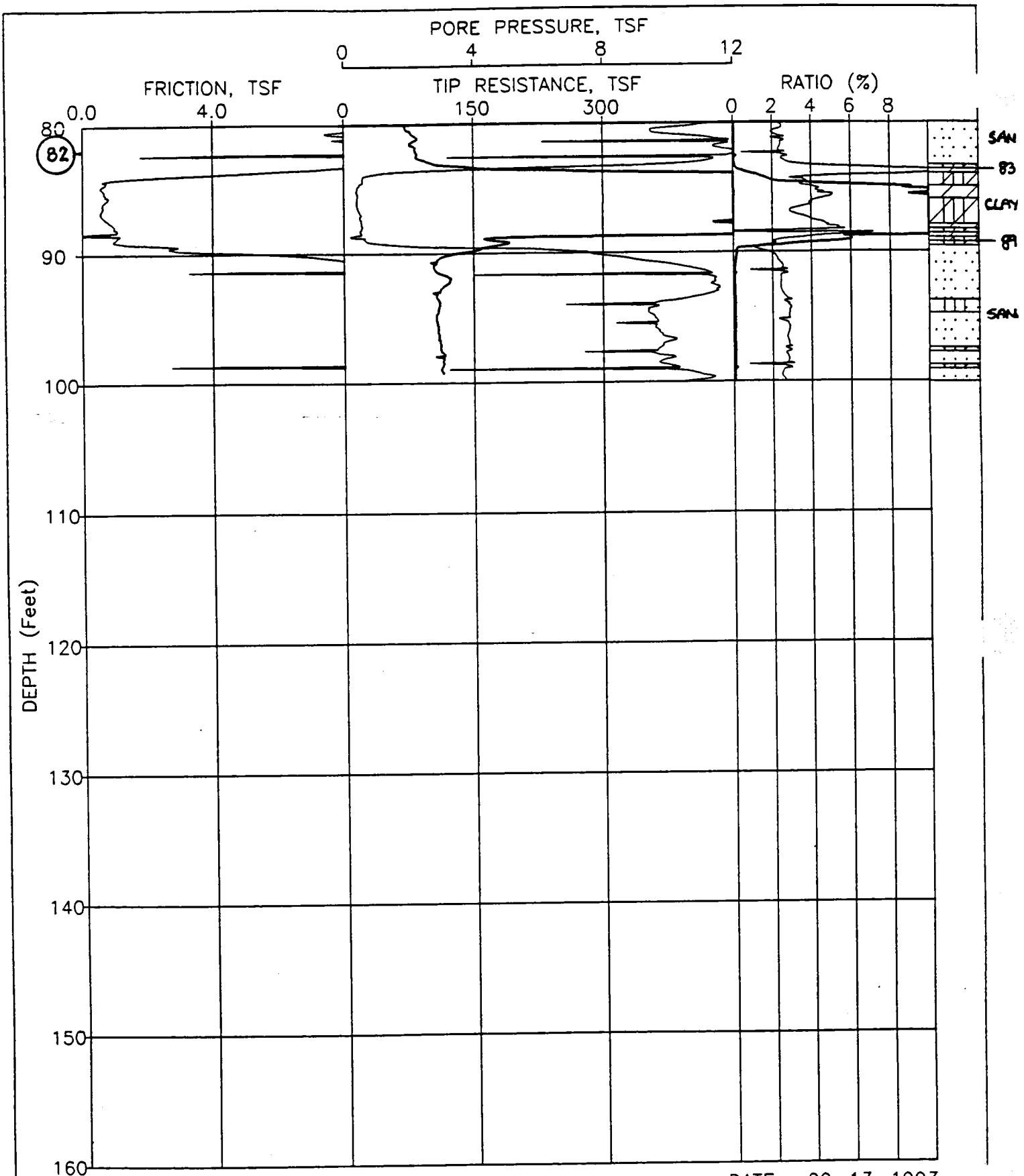
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 05 DATE: 09-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

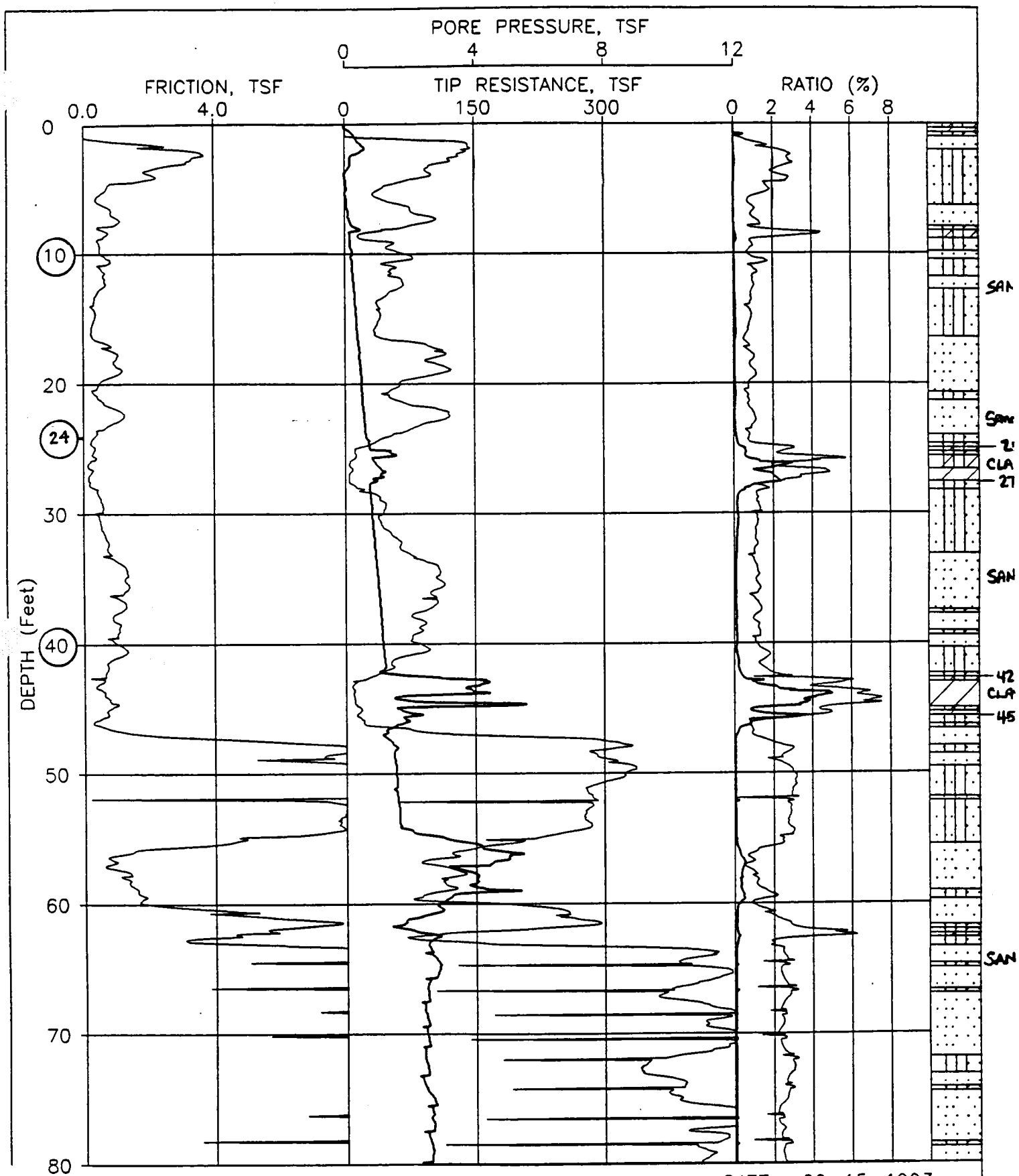
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 05 DATE: 09-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

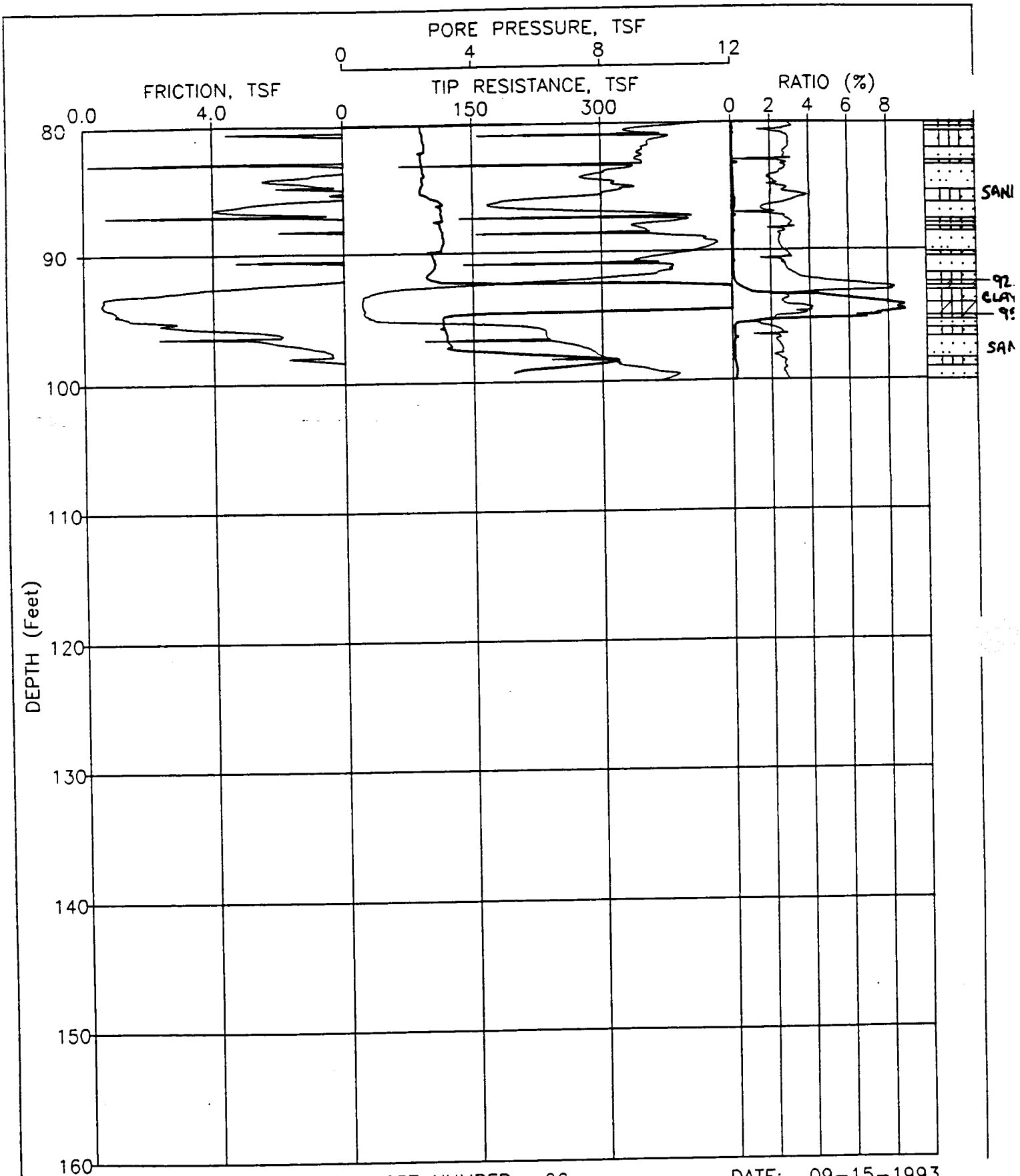
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 06 DATE: 09-15-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

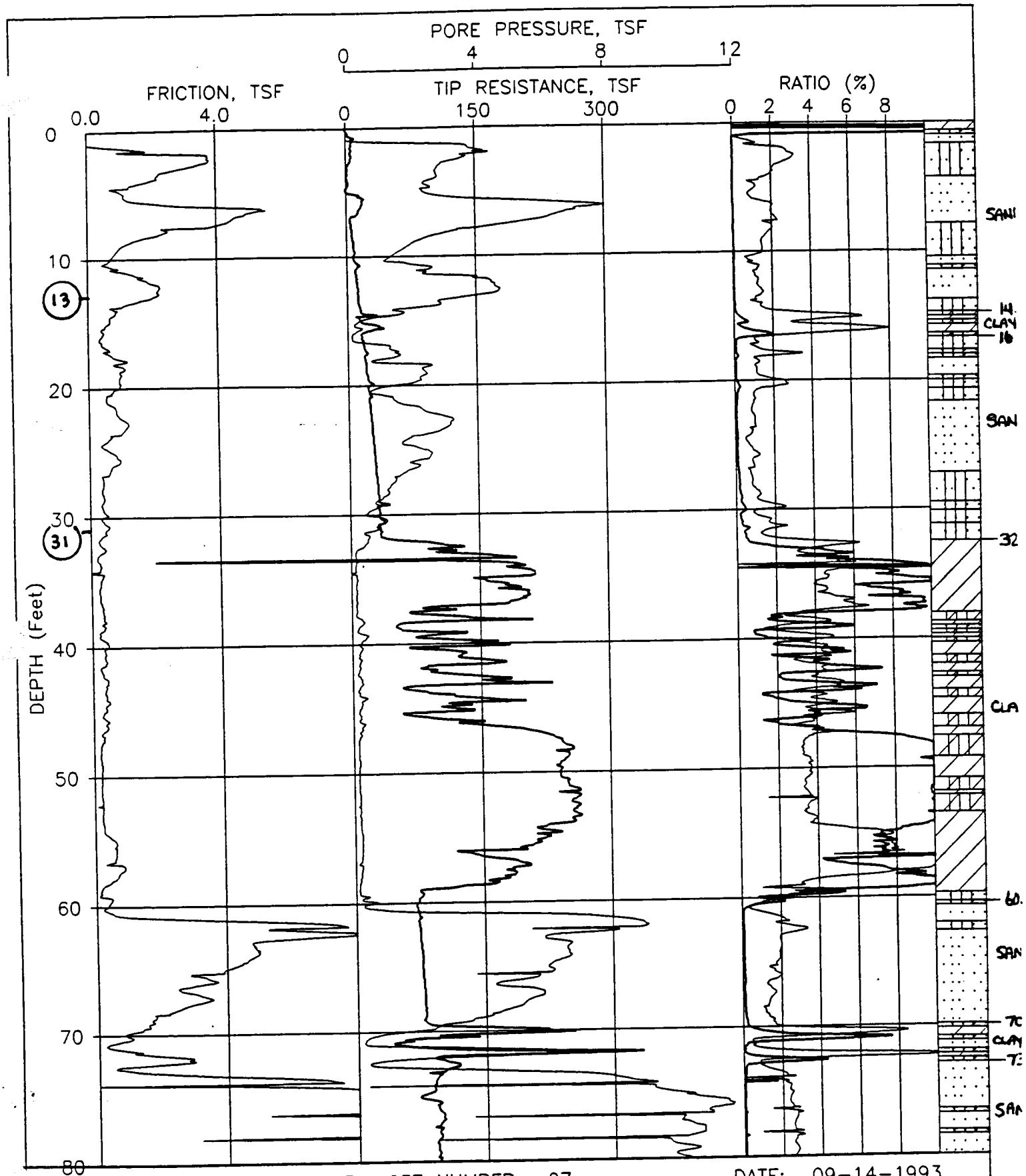
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 06 DATE: 09-15-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

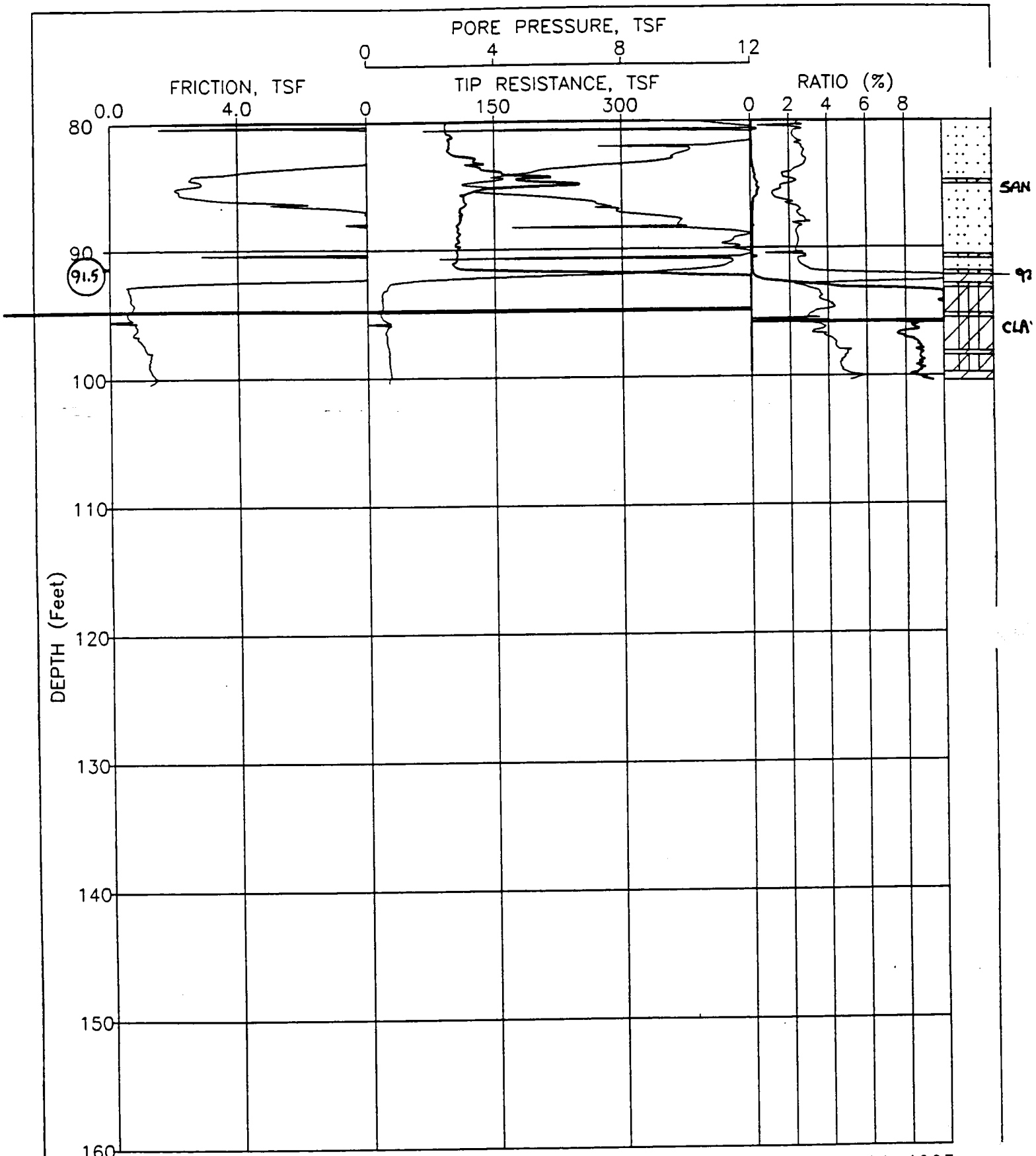
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 07 DATE: 09-14-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

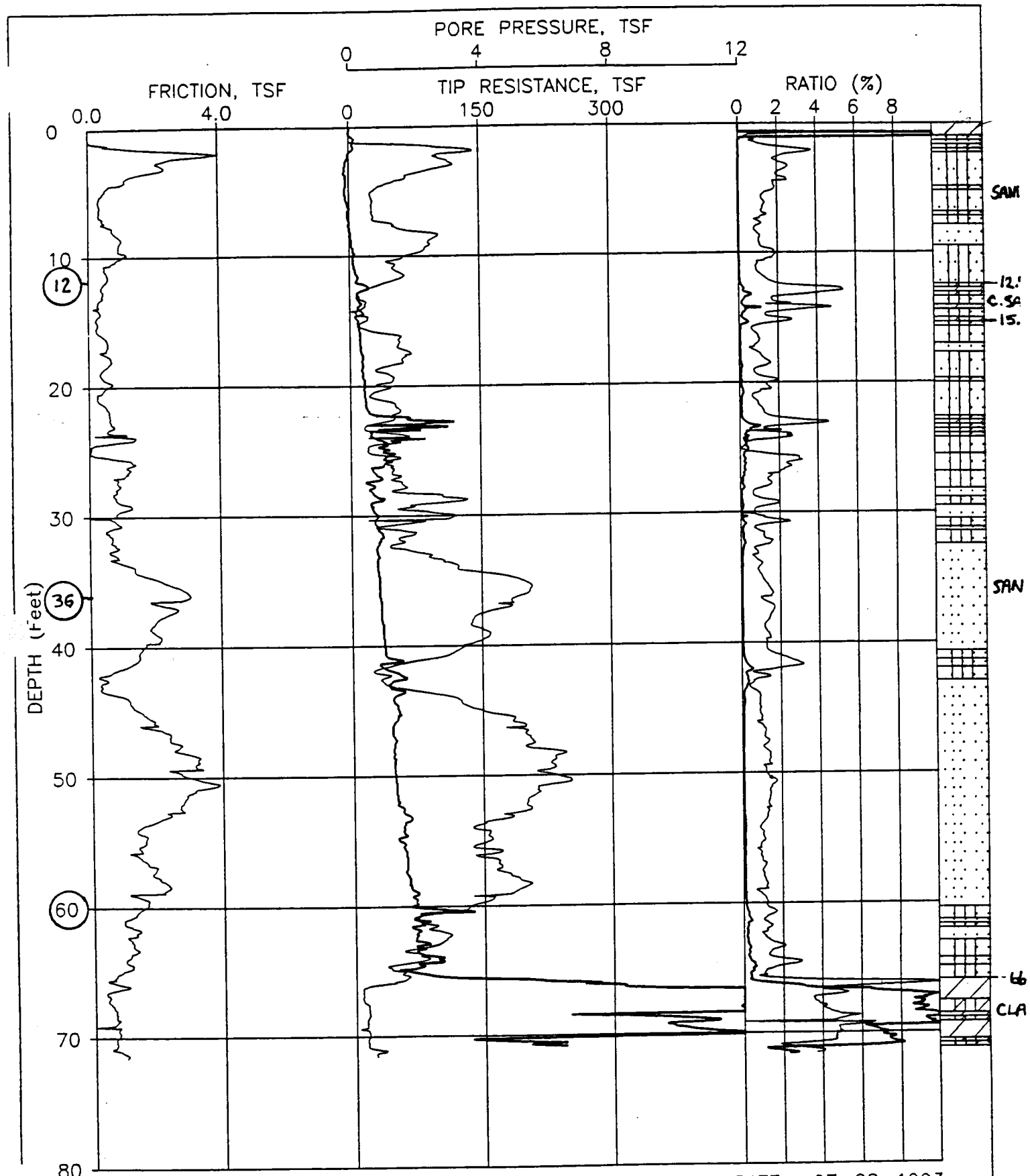
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 07 DATE: 09-14-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

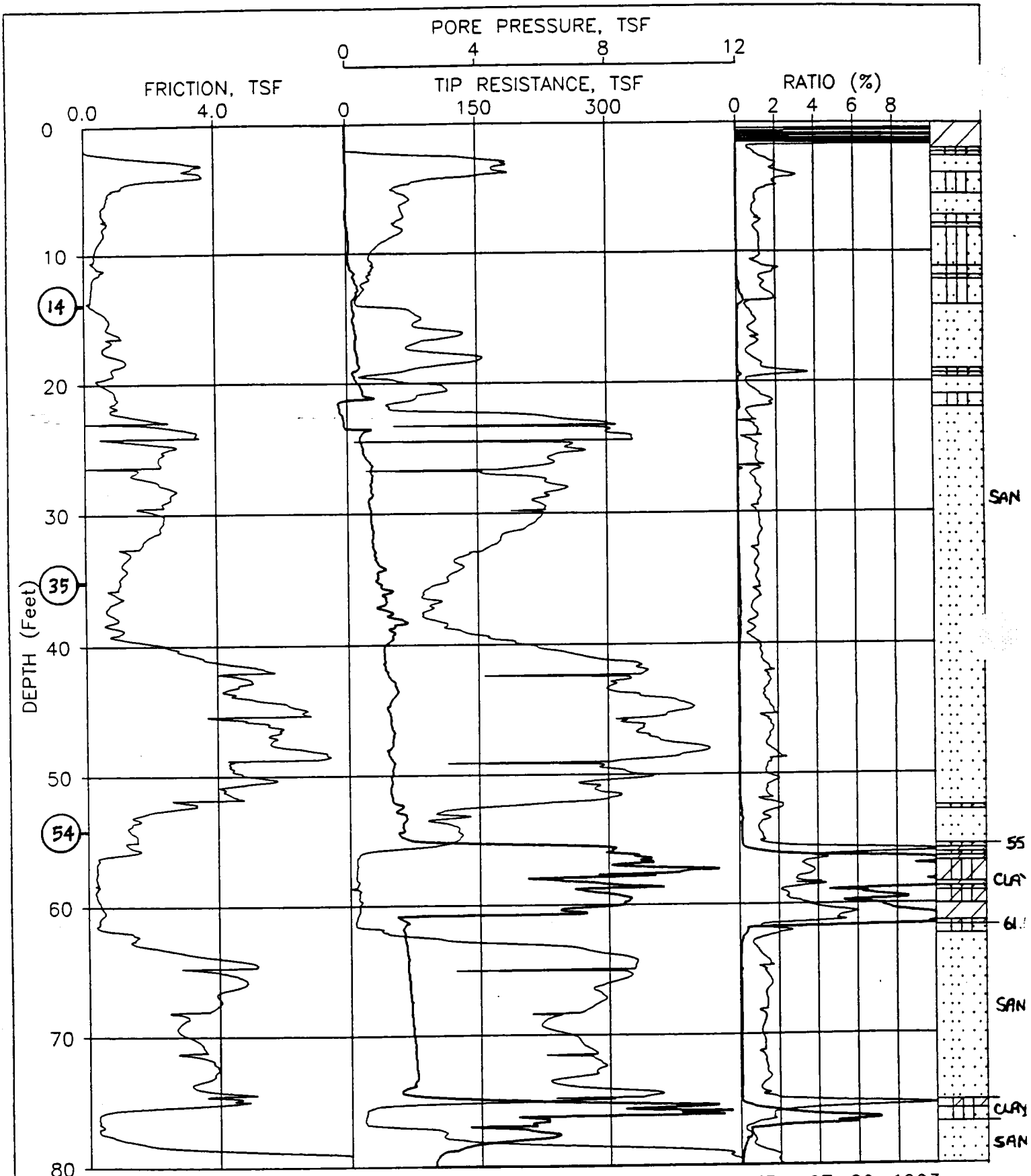
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3031 CPT NUMBER: 08 DATE: 07-28-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 1

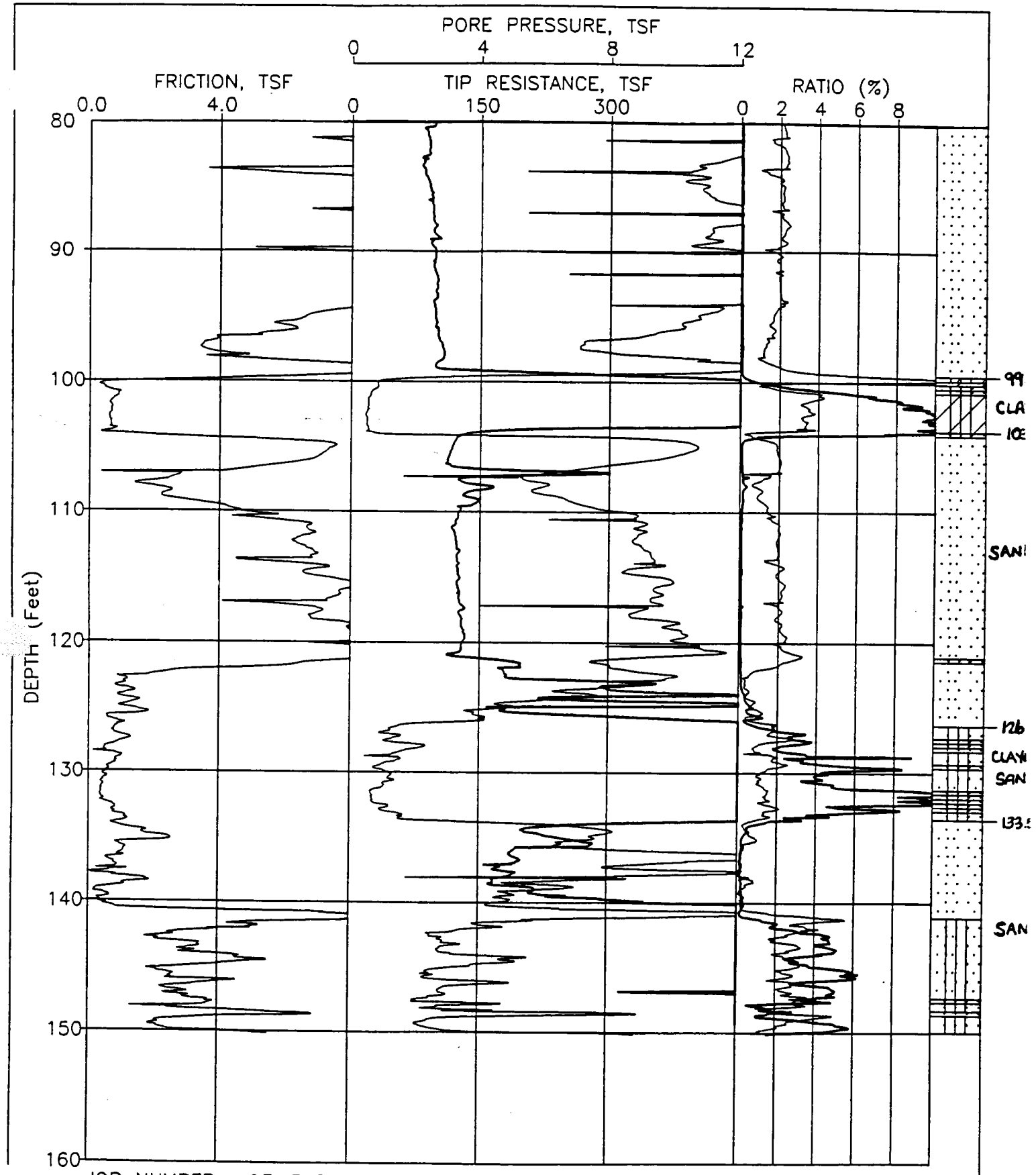
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 09 DATE: 07-29-1993

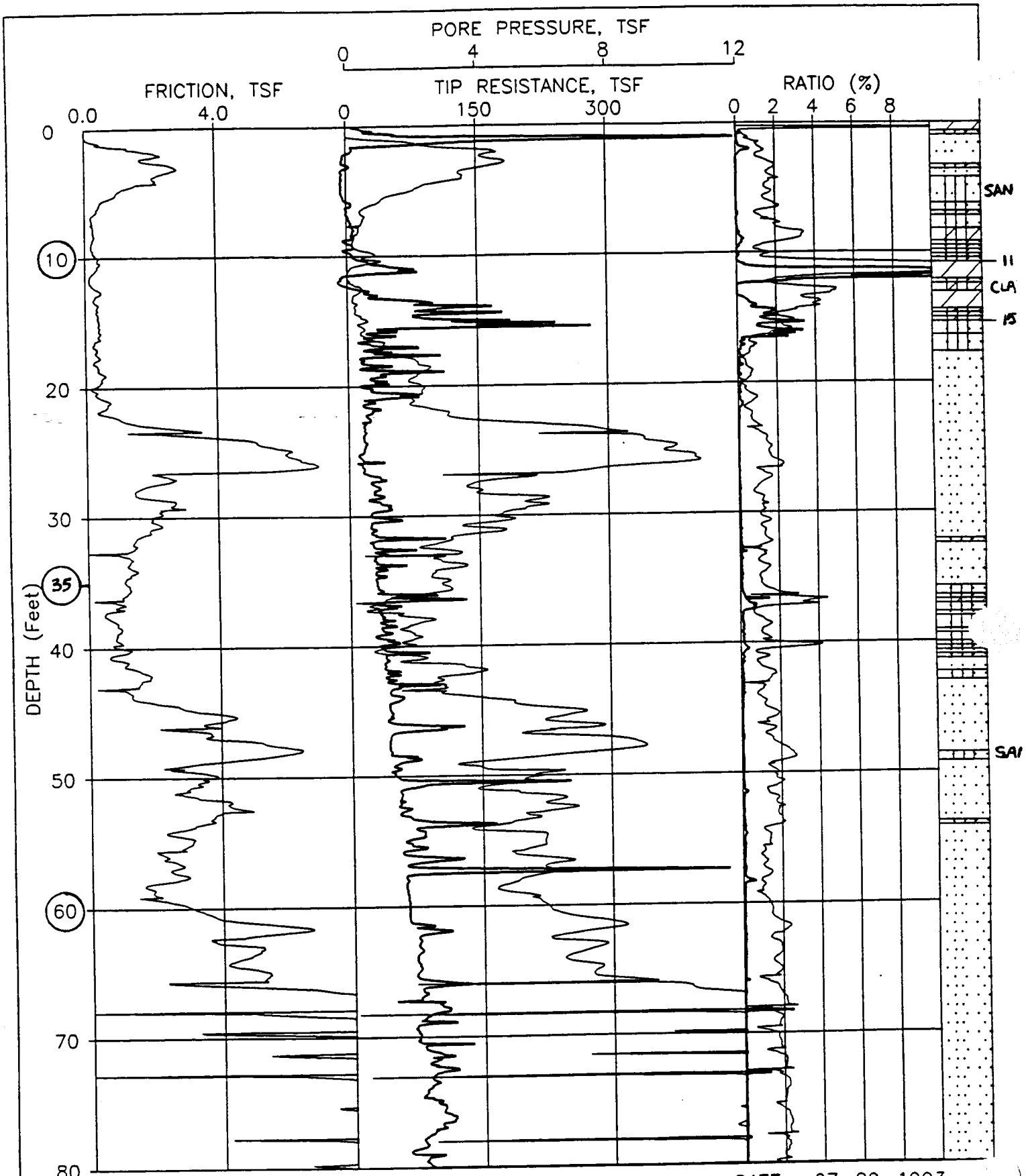
ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 09 DATE: 07-29-1993
ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

FUGRO GEOSCIENCES,INC

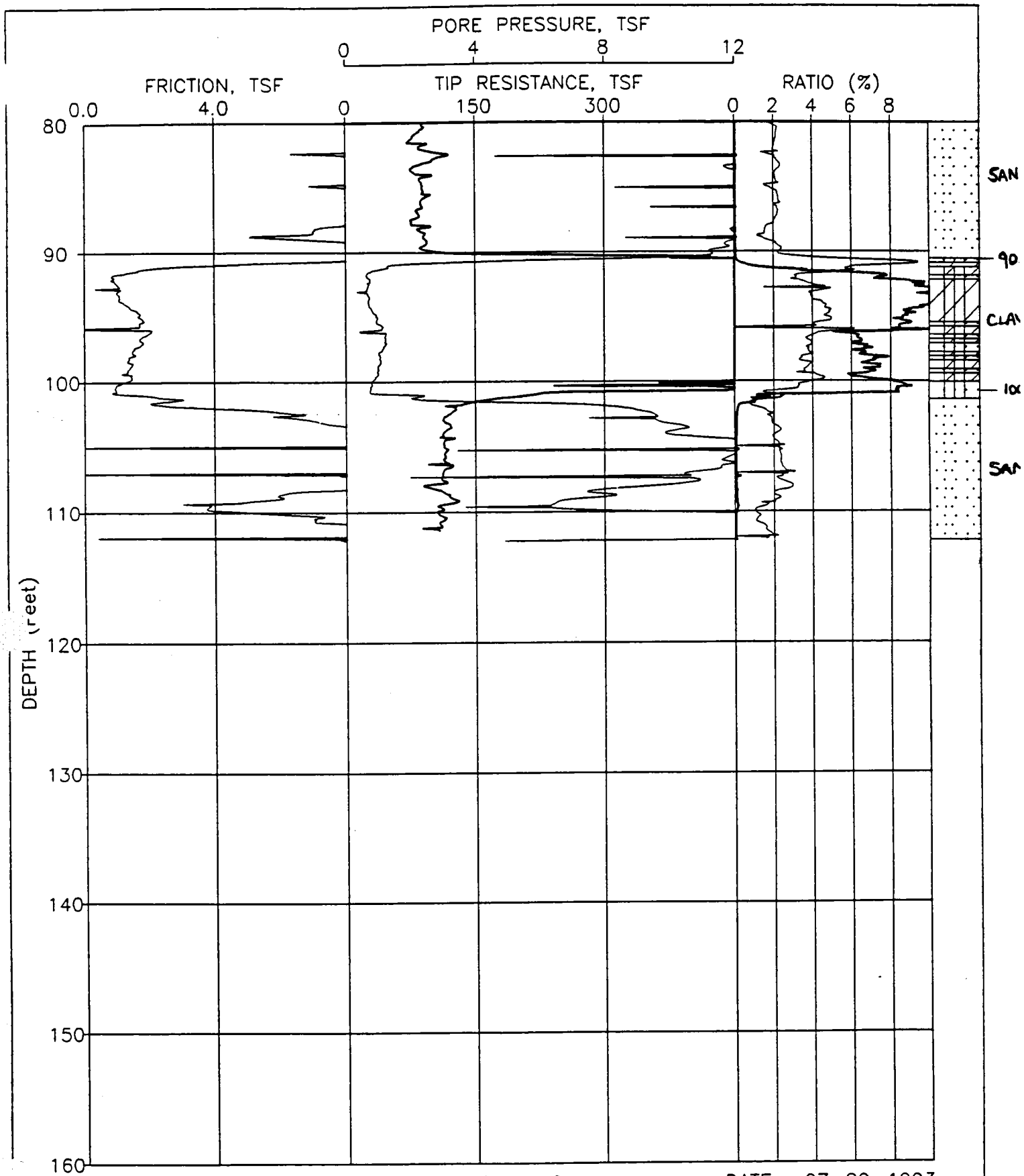


JOB NUMBER: 93-3131
ELEVATION: 0.00

CPT NUMBER: 10
CONE NUMBER: F7.5CKEW560

DATE: 07-29-1993
PLATE: 1 OF 2

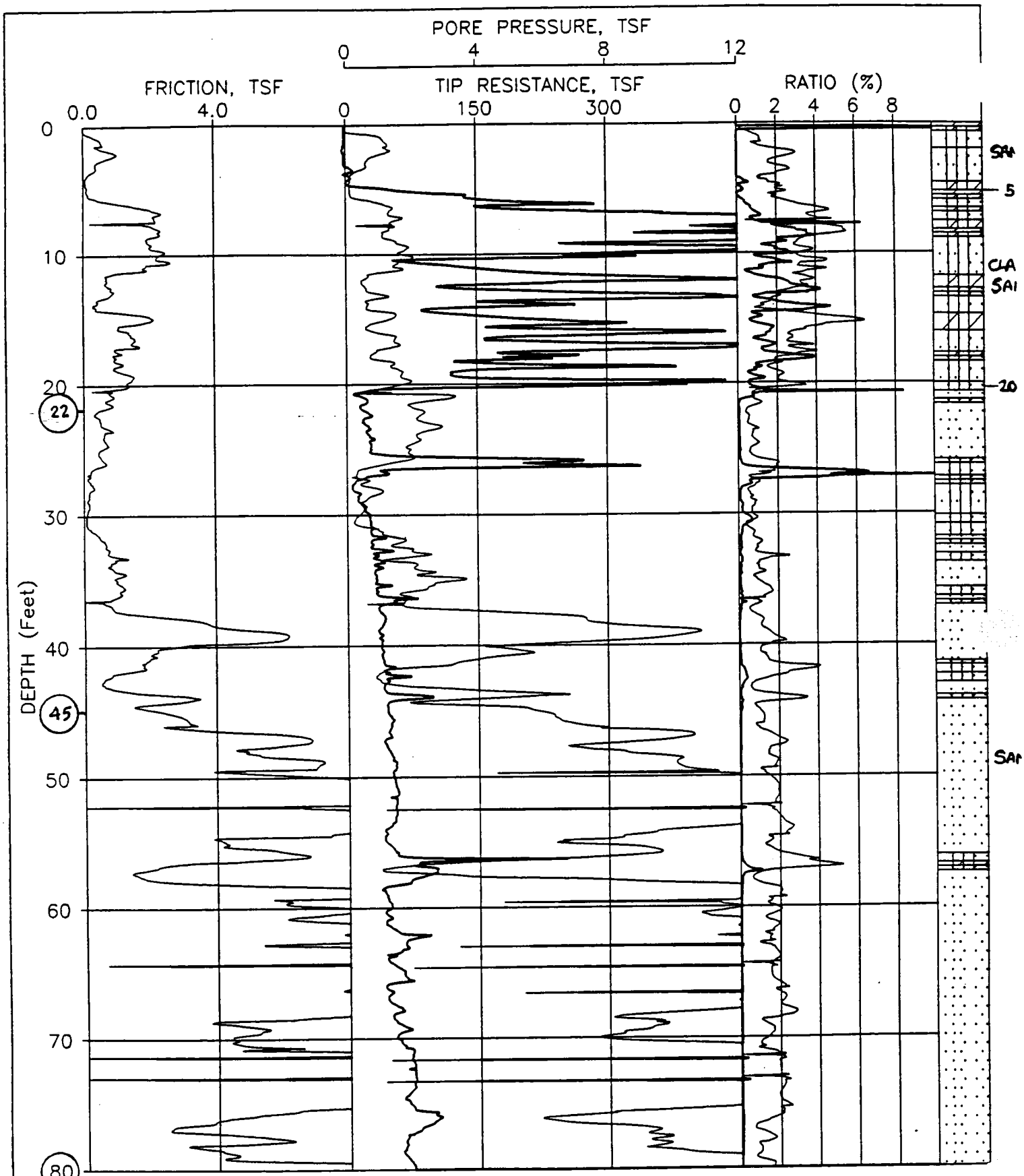
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 10 DATE: 07-29-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

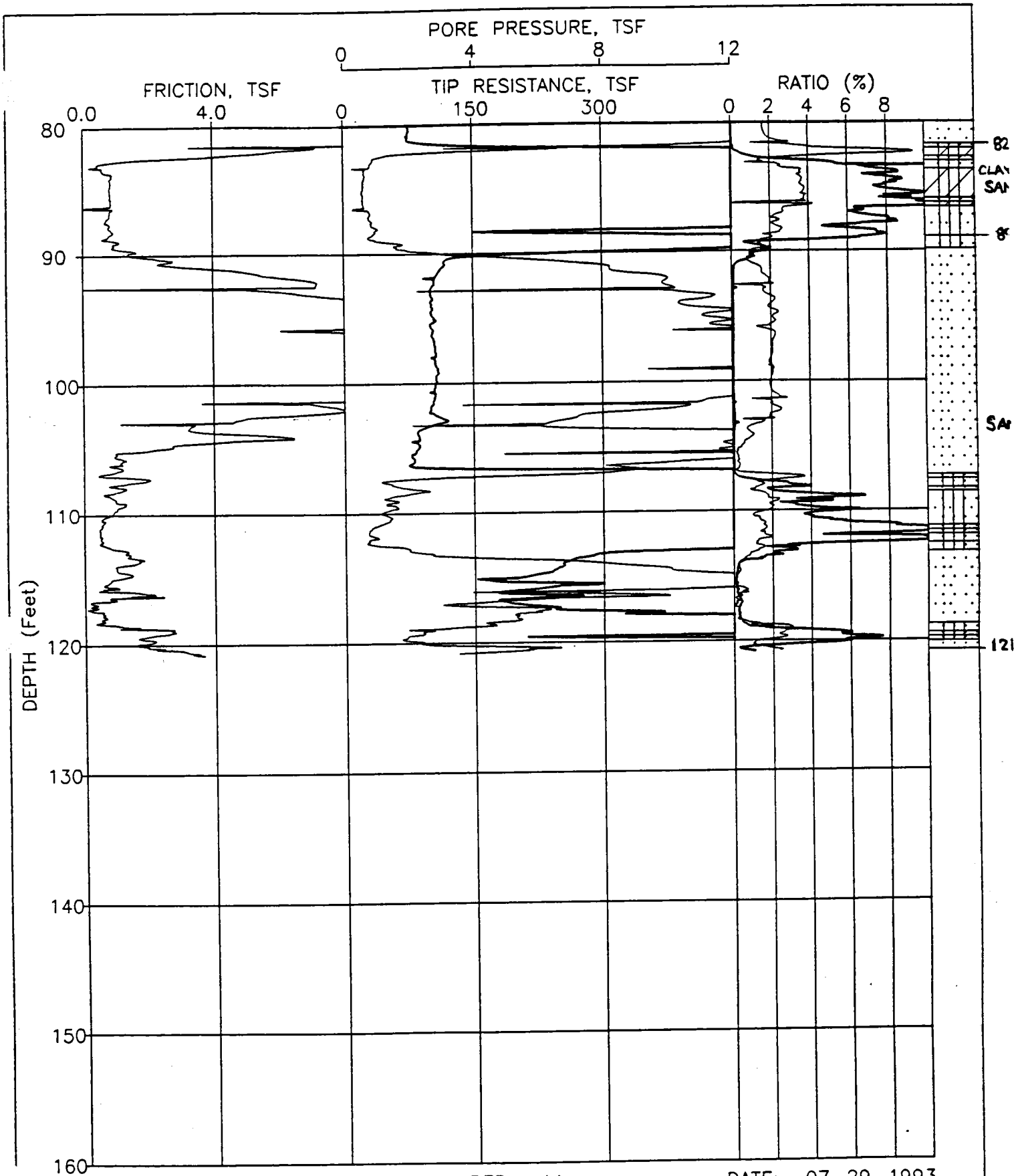
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 11 DATE: 07-29-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

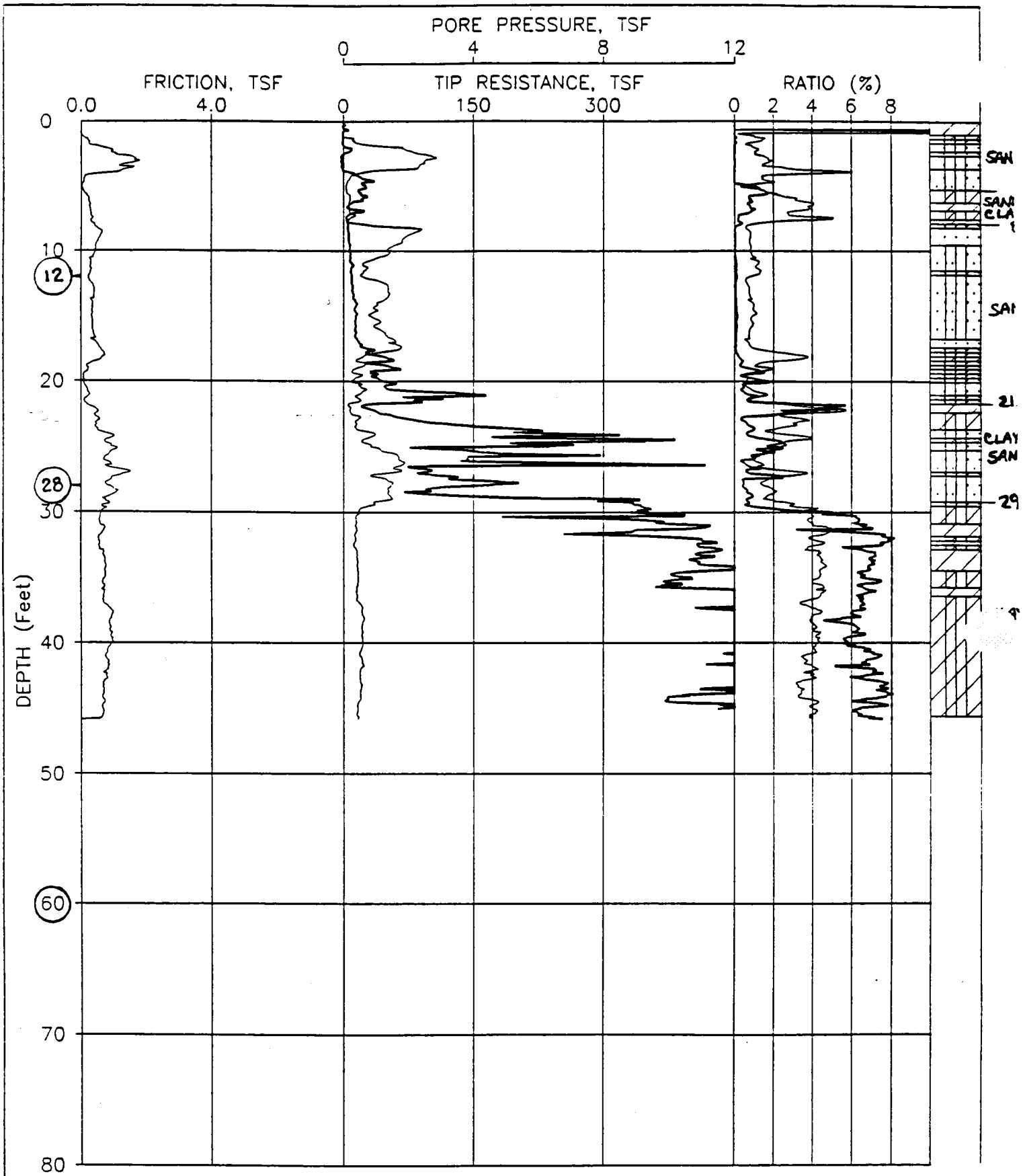
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 11 DATE: 07-29-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

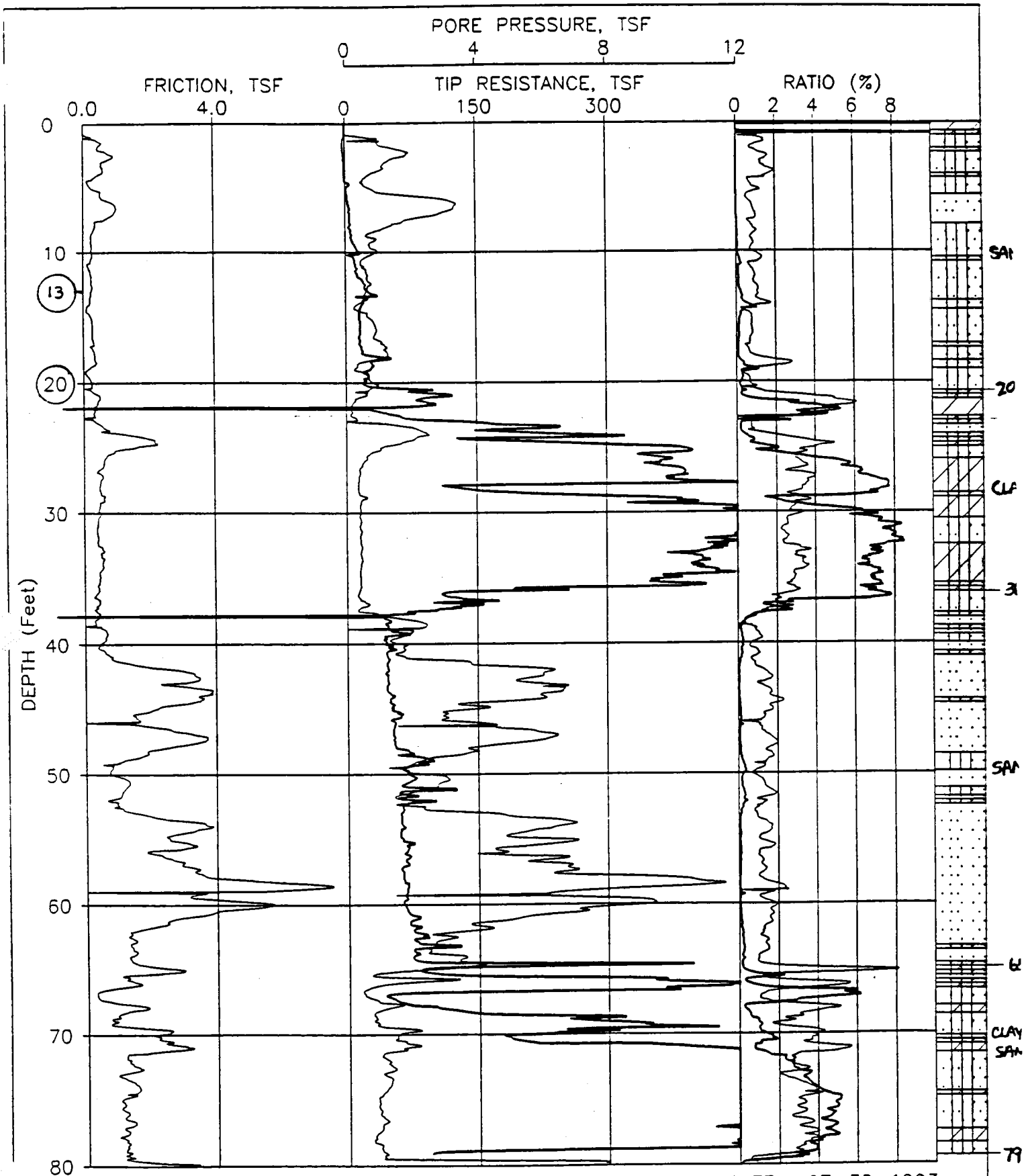
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 12 DATE: 07-30-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 1

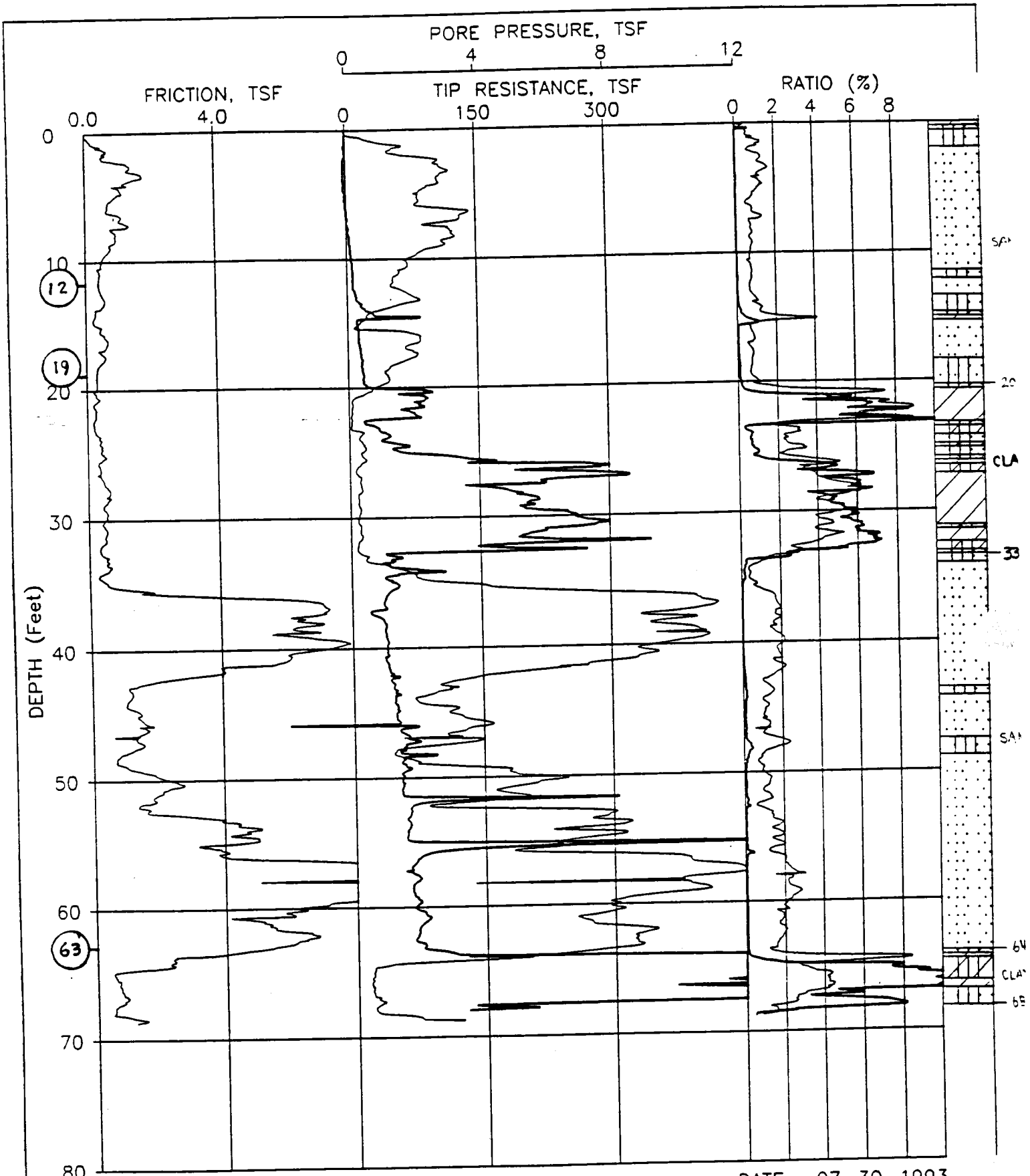
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 13 DATE: 07-30-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 1

FUGRO GEOSCIENCES,INC



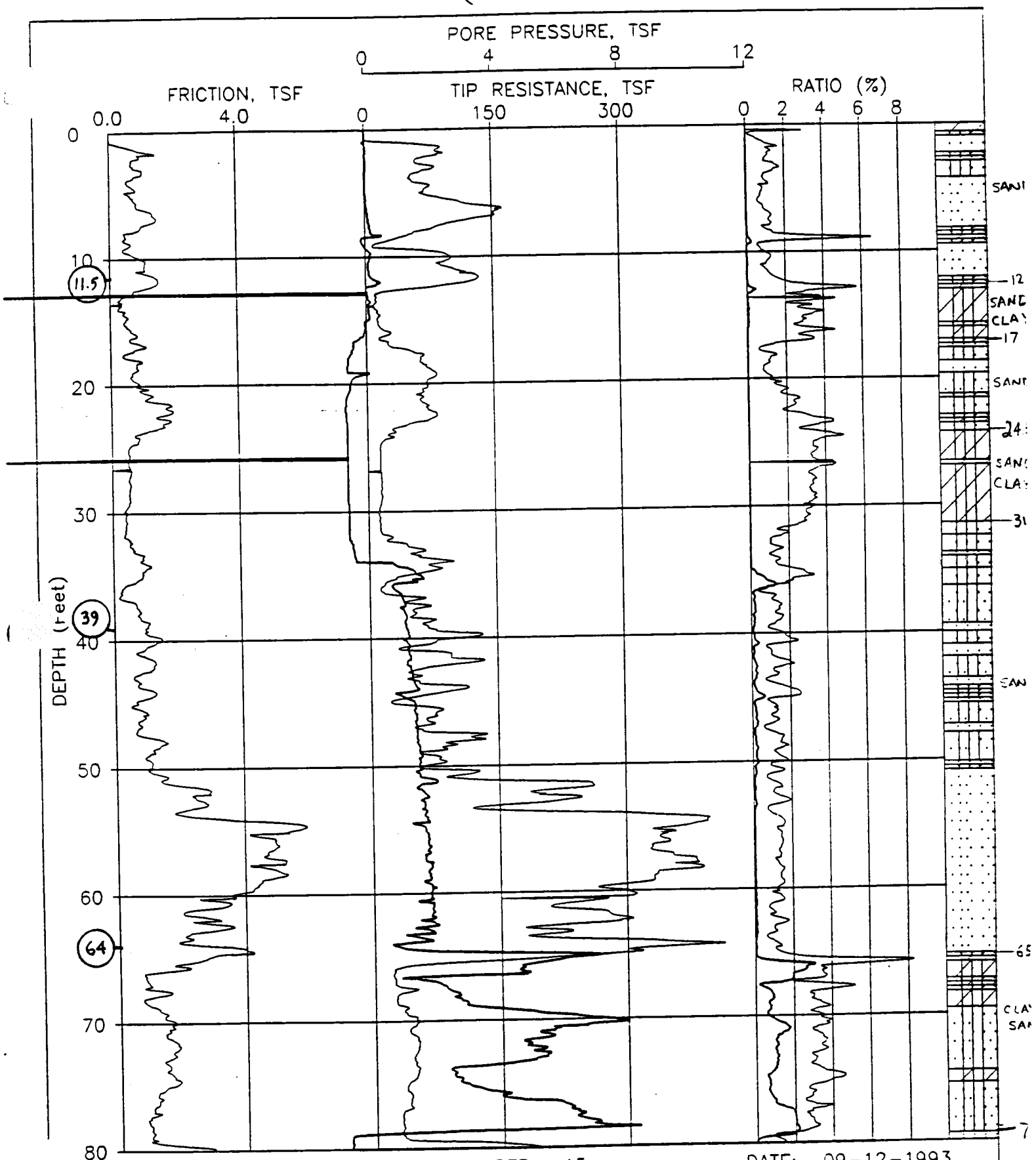
JOB NUMBER: 93-3131
ELEVATION: 0.00

CPT NUMBER: 14
CONE NUMBER: F7.5CKEW560

DATE: 07-30-1993
PLATE: 1 OF 1

FUGRO GEOSCIENCES,INC

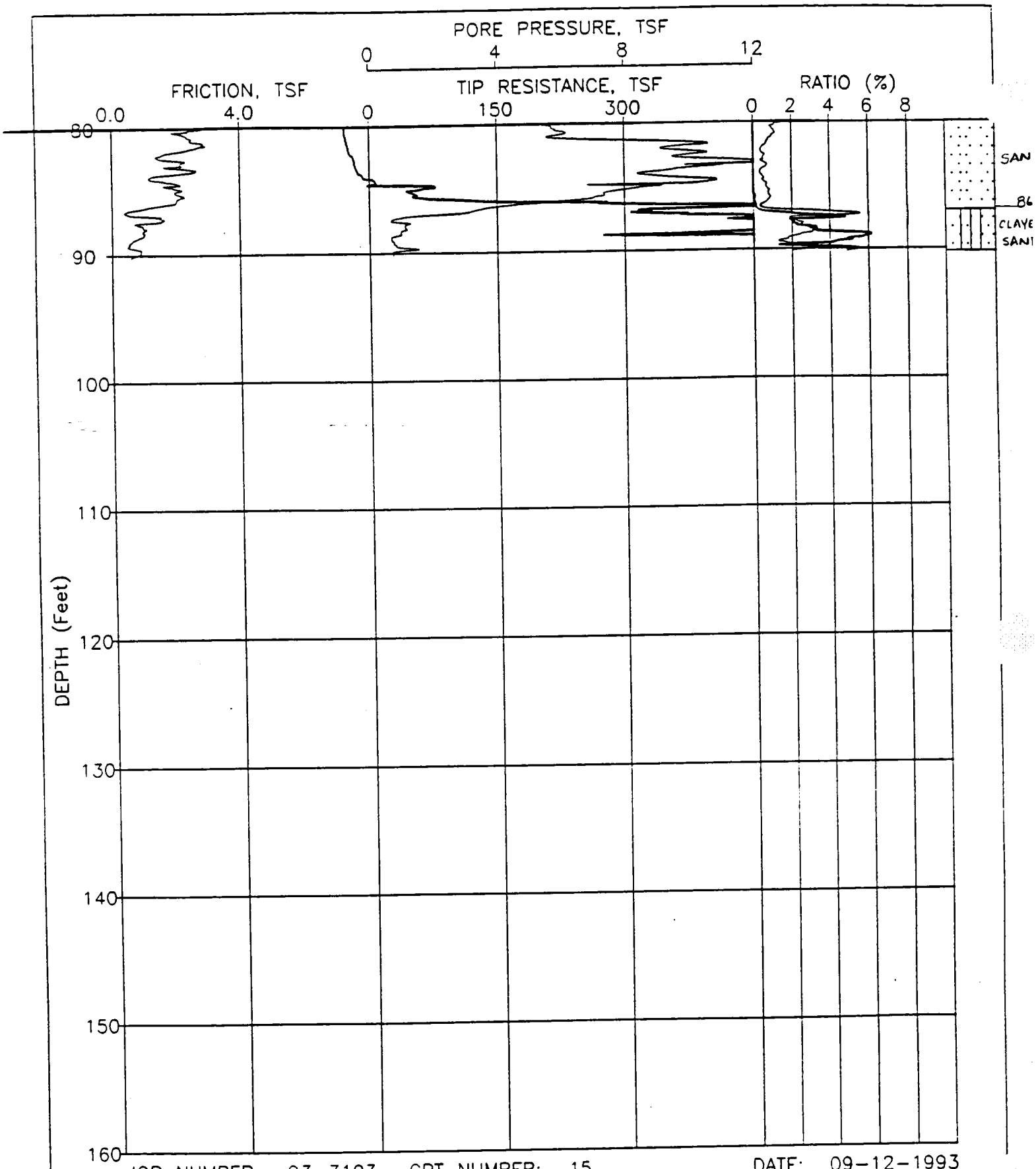
(SIDE-MOUNTED PIEZOMETRIC SENSOR)



JOB NUMBER: 93-3103 CPT NUMBER: 15 DATE: 09-12-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW230 PLATE: 1 OF 2

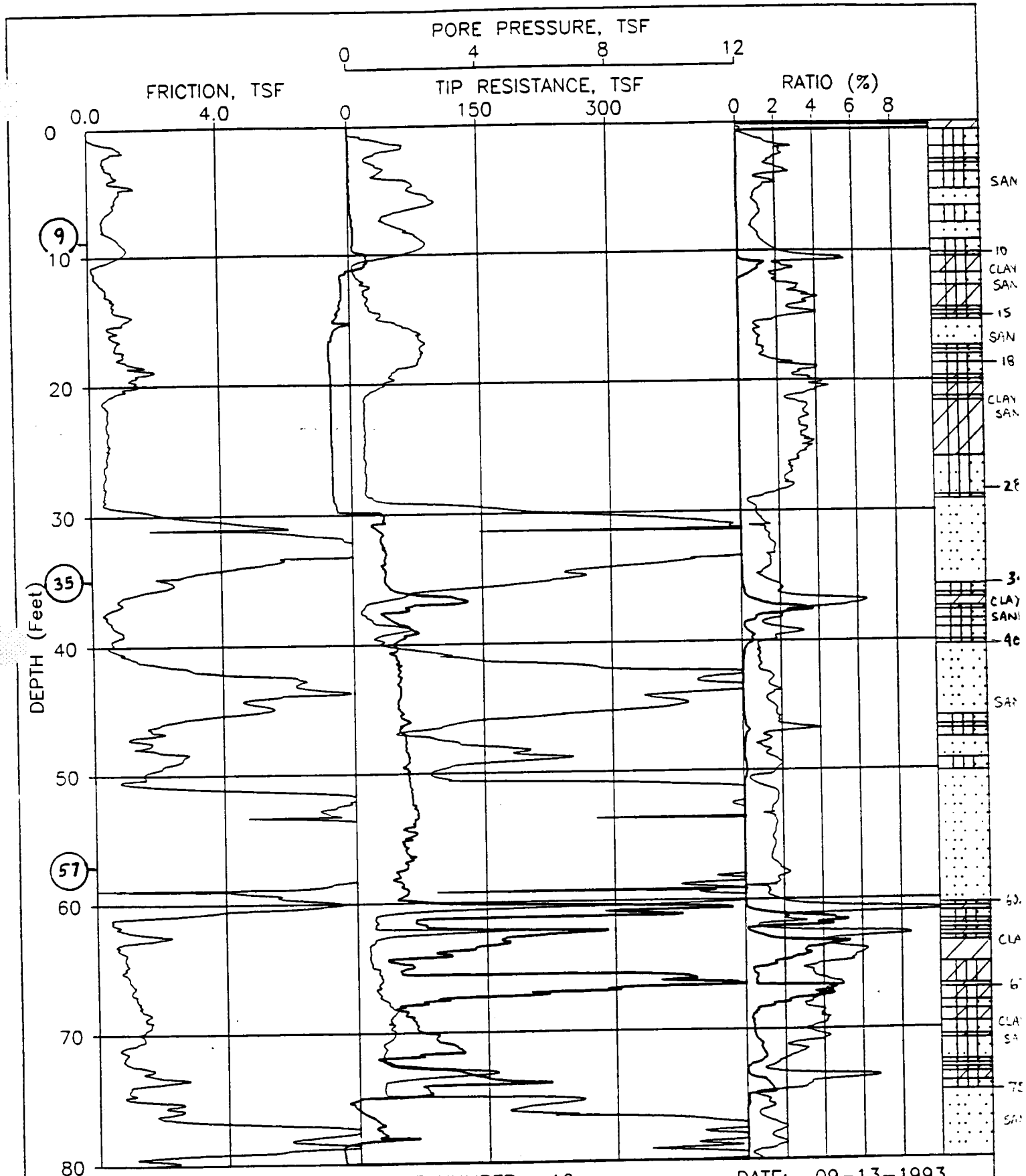
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 15 DATE: 09-12-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW230 PLATE: 2 OF 2

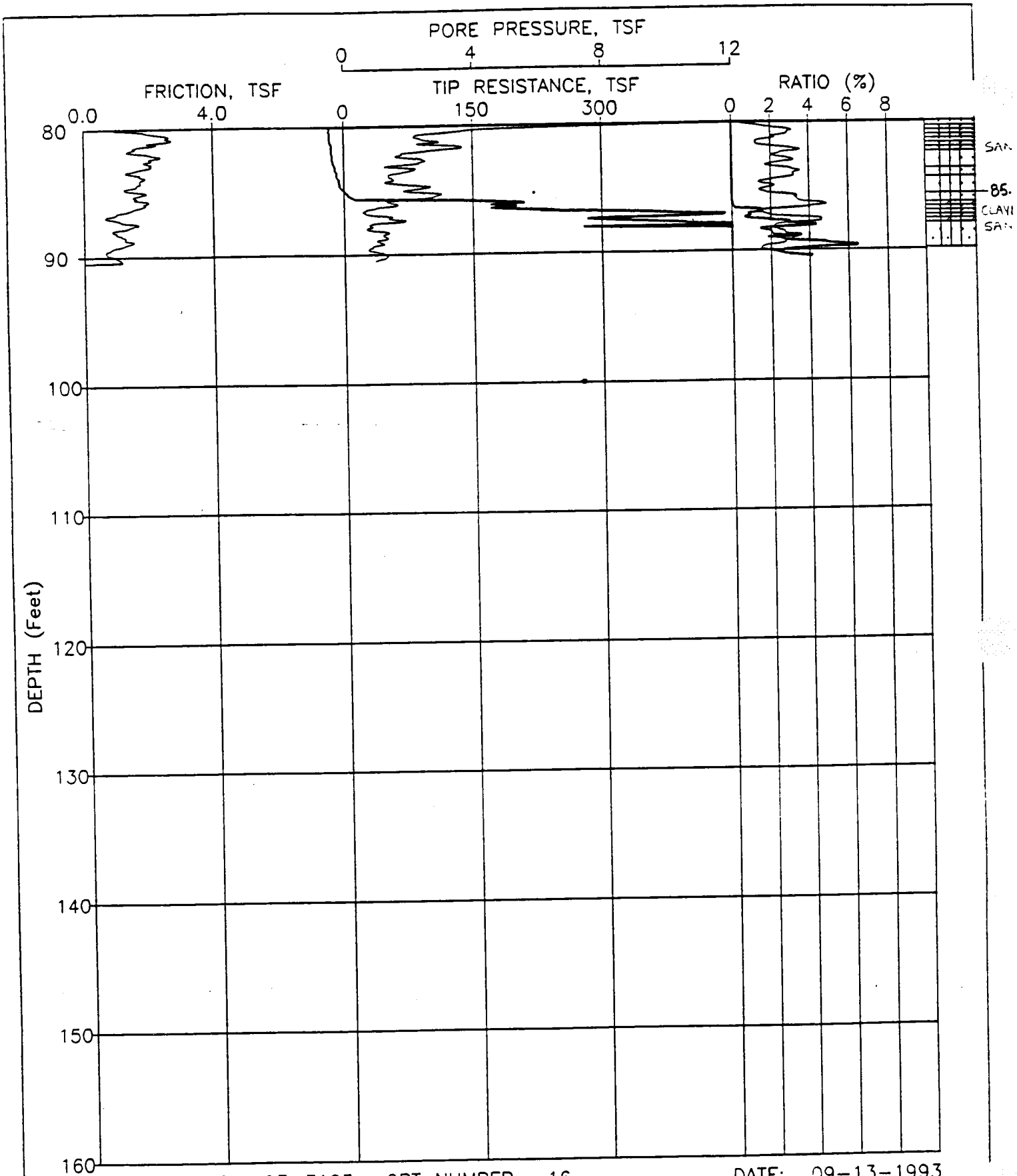
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 16 DATE: 09-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW230 PLATE: 1 OF 2

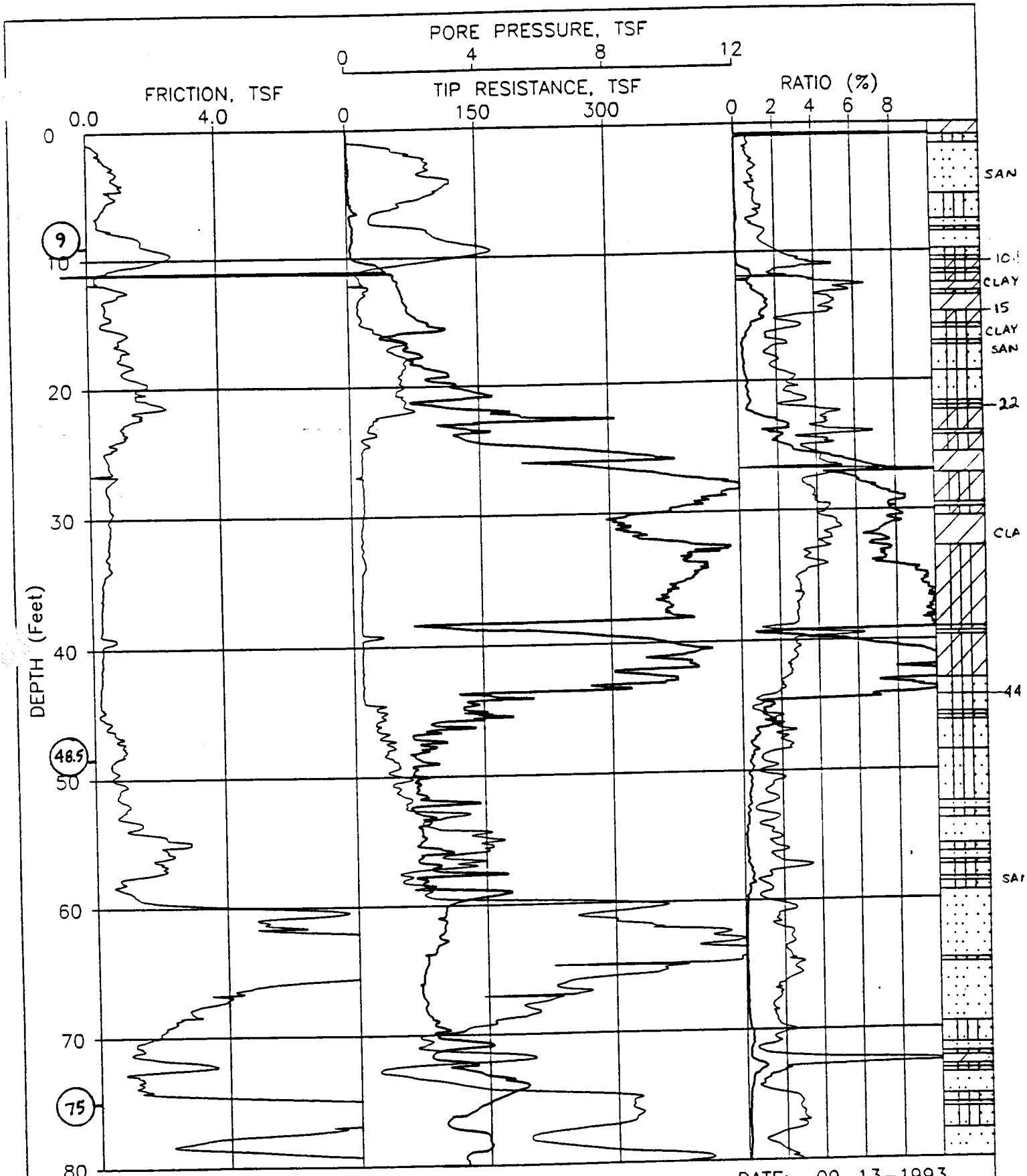
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 16 DATE: 09-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW230 PLATE: 2 OF 2

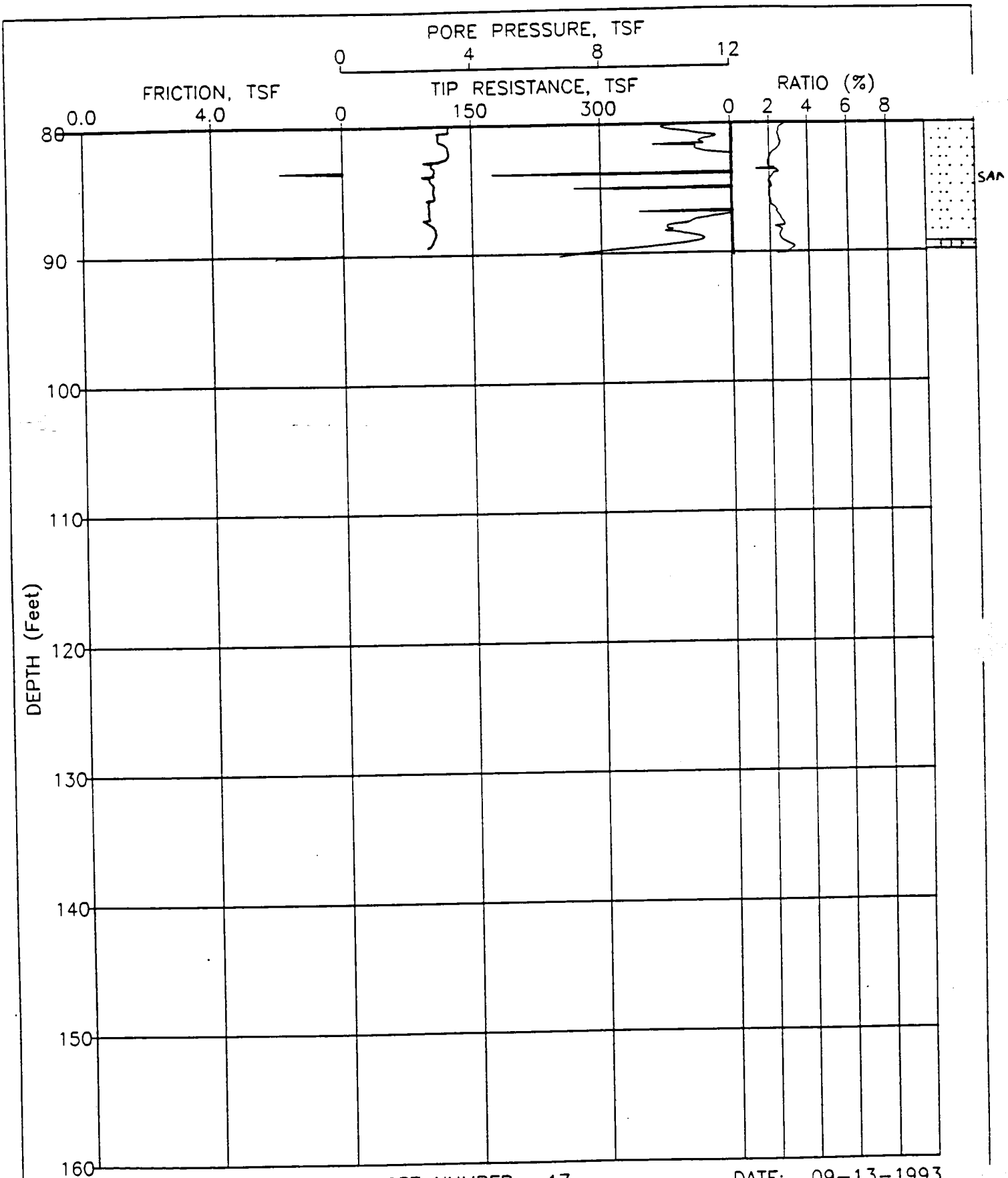
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 17 DATE: 09-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

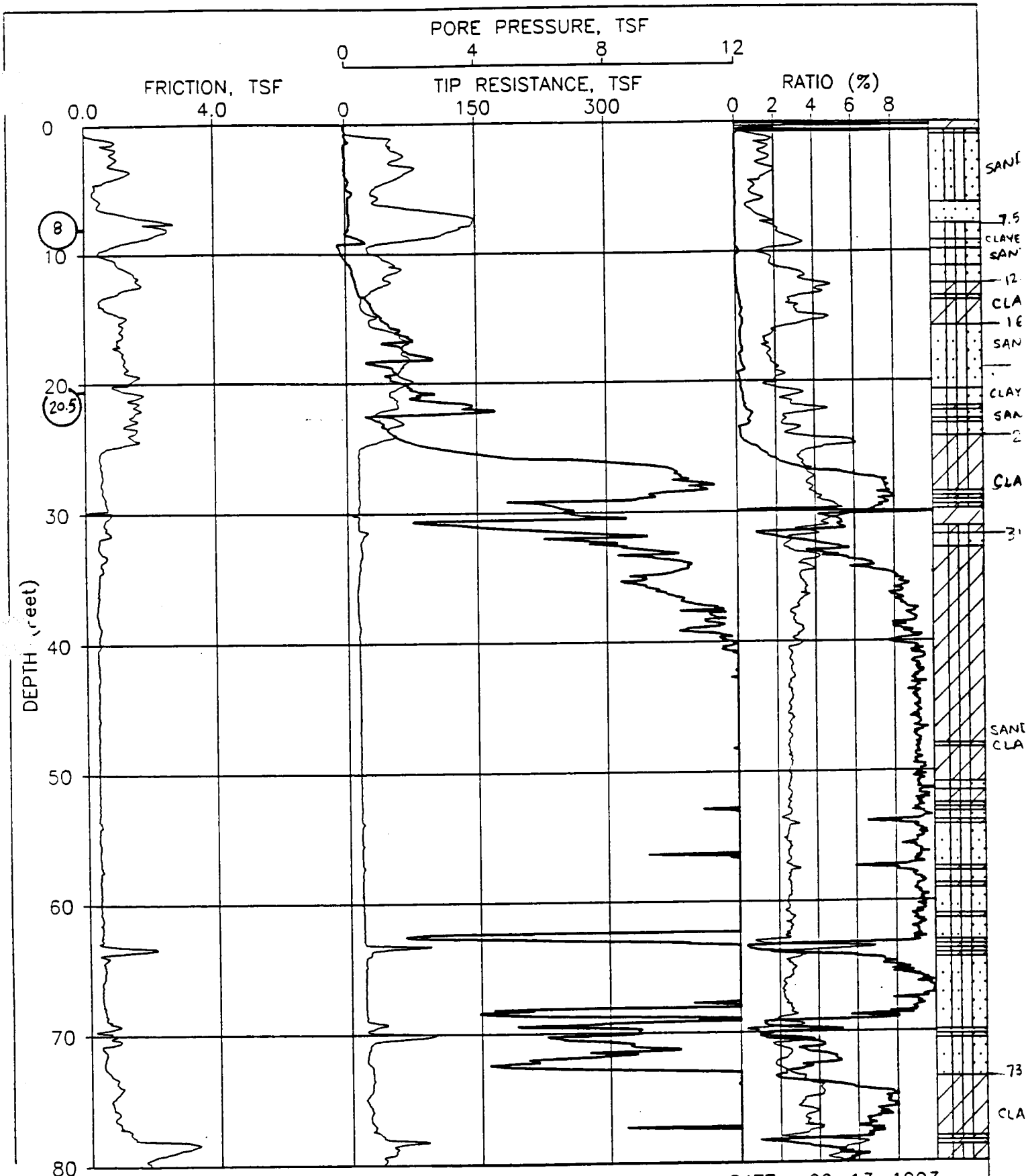
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 17 DATE: 09-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

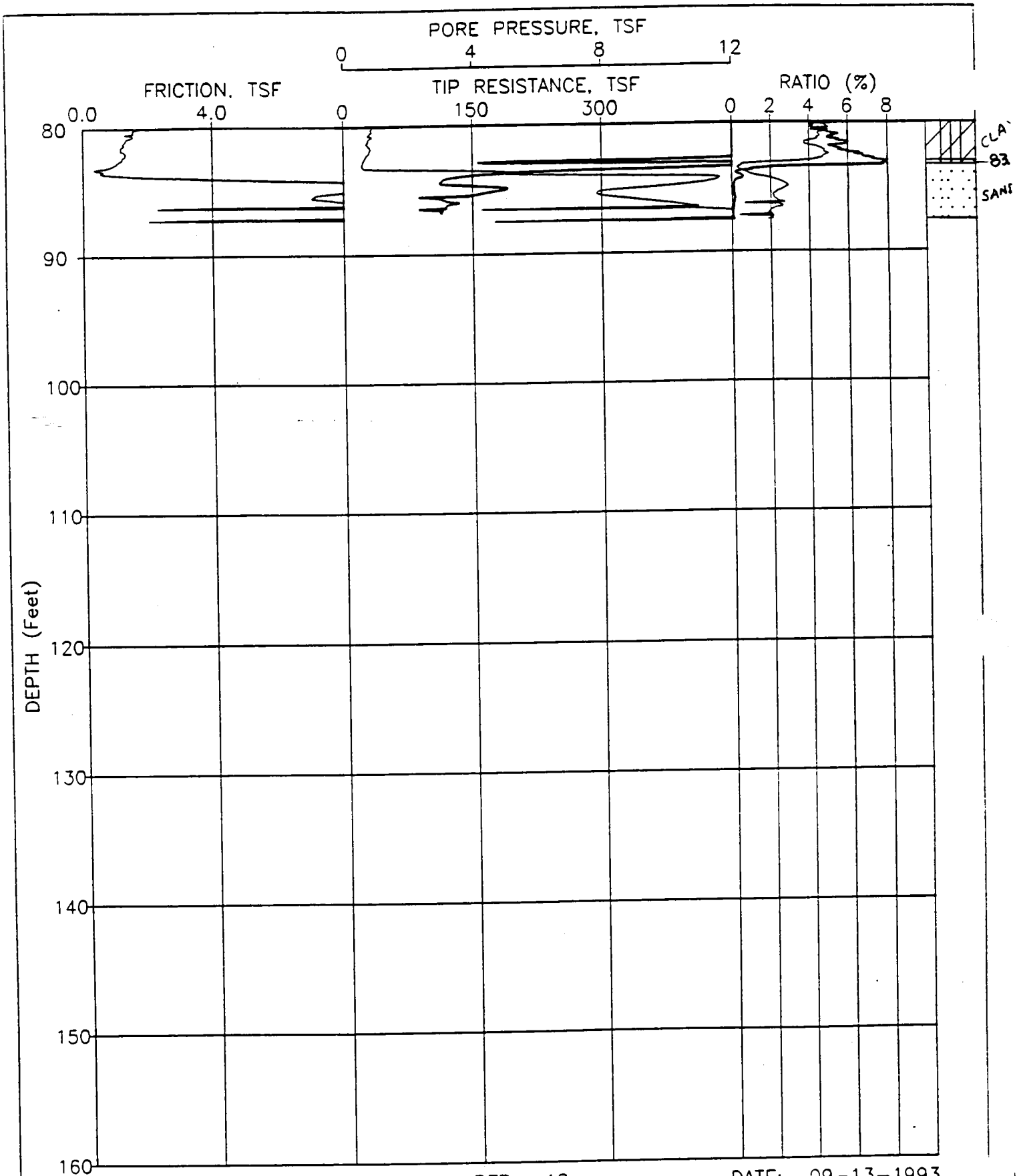
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 18 DATE: 09-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

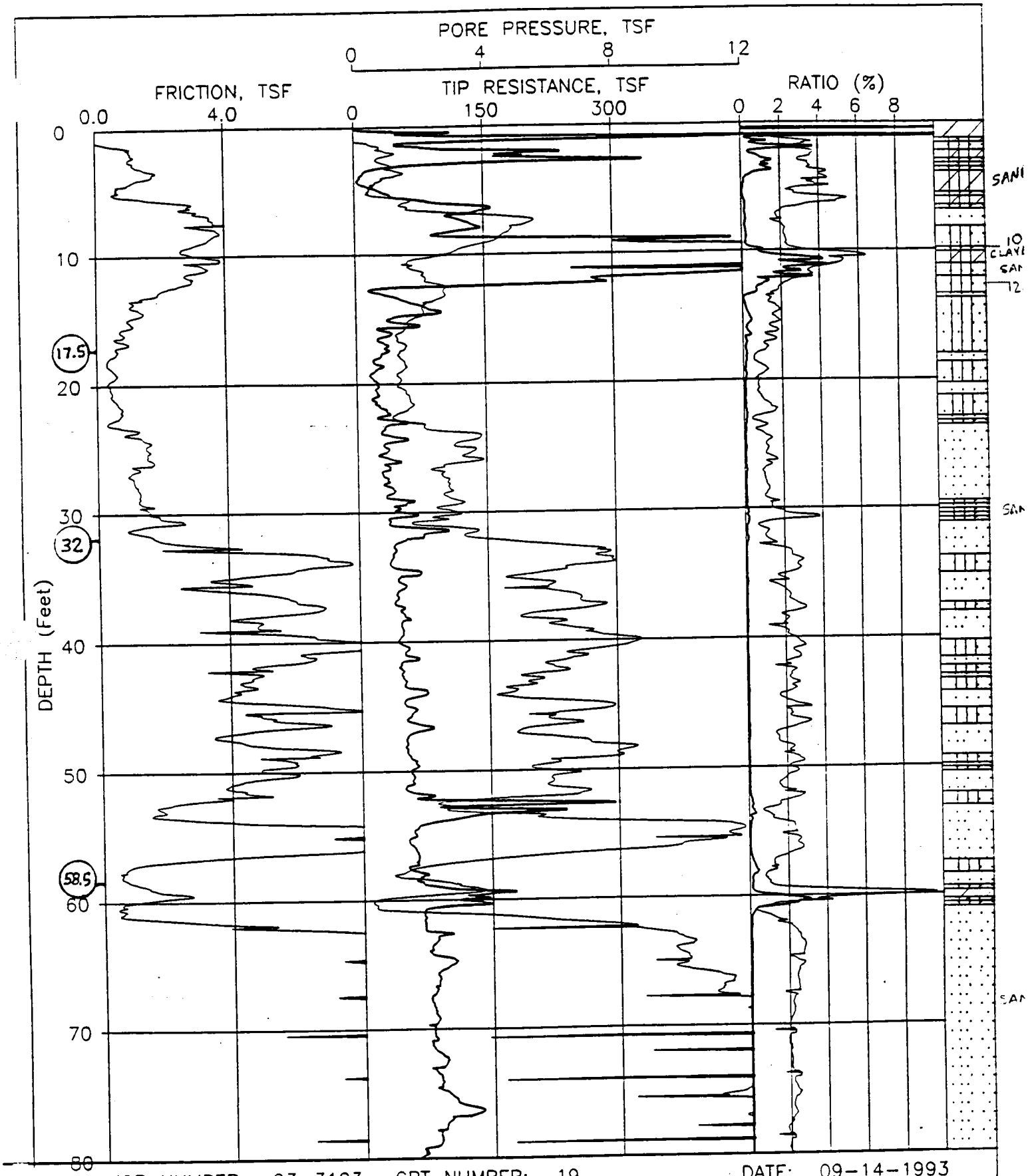
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 18 DATE: 09-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

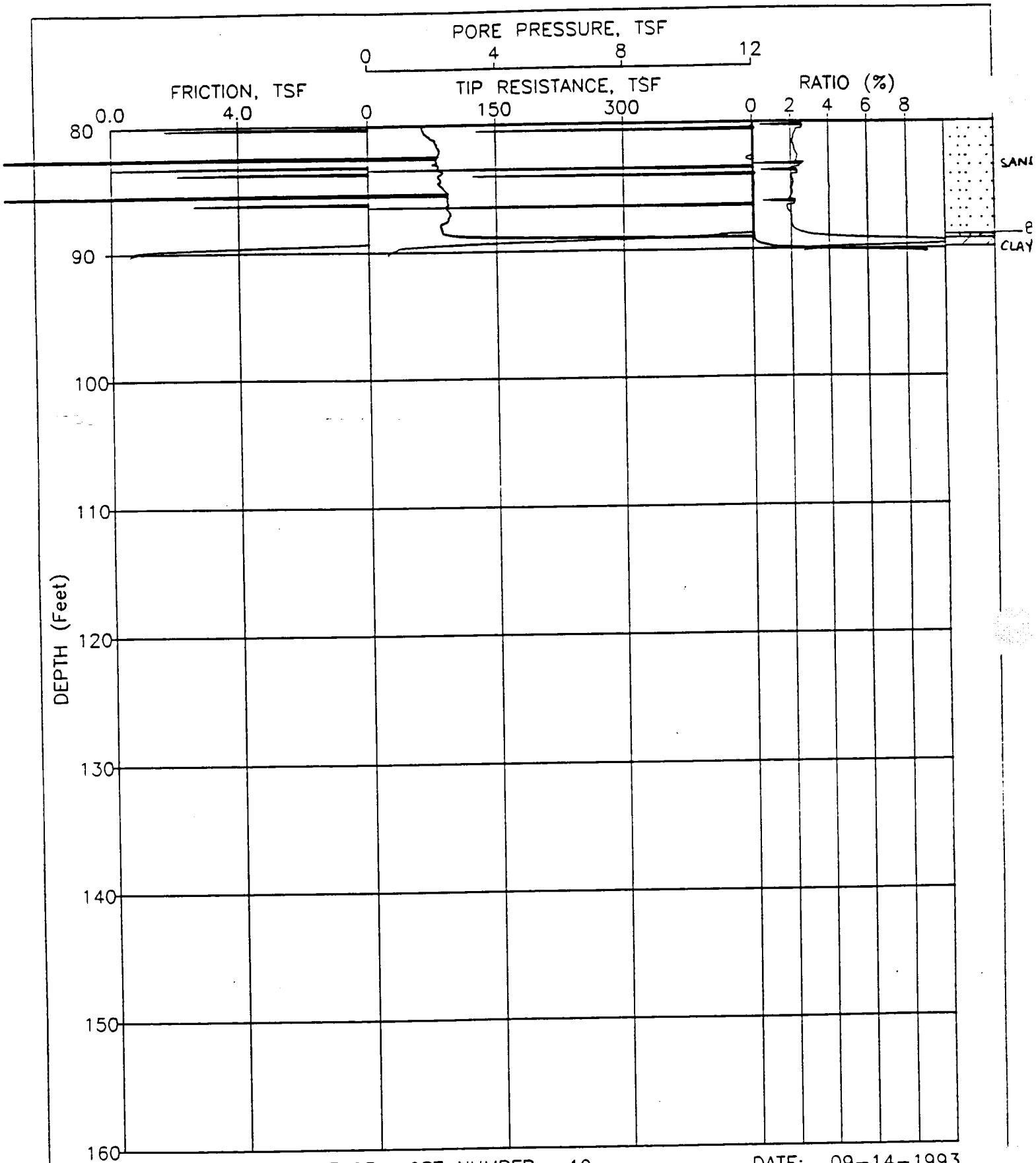
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 19 DATE: 09-14-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

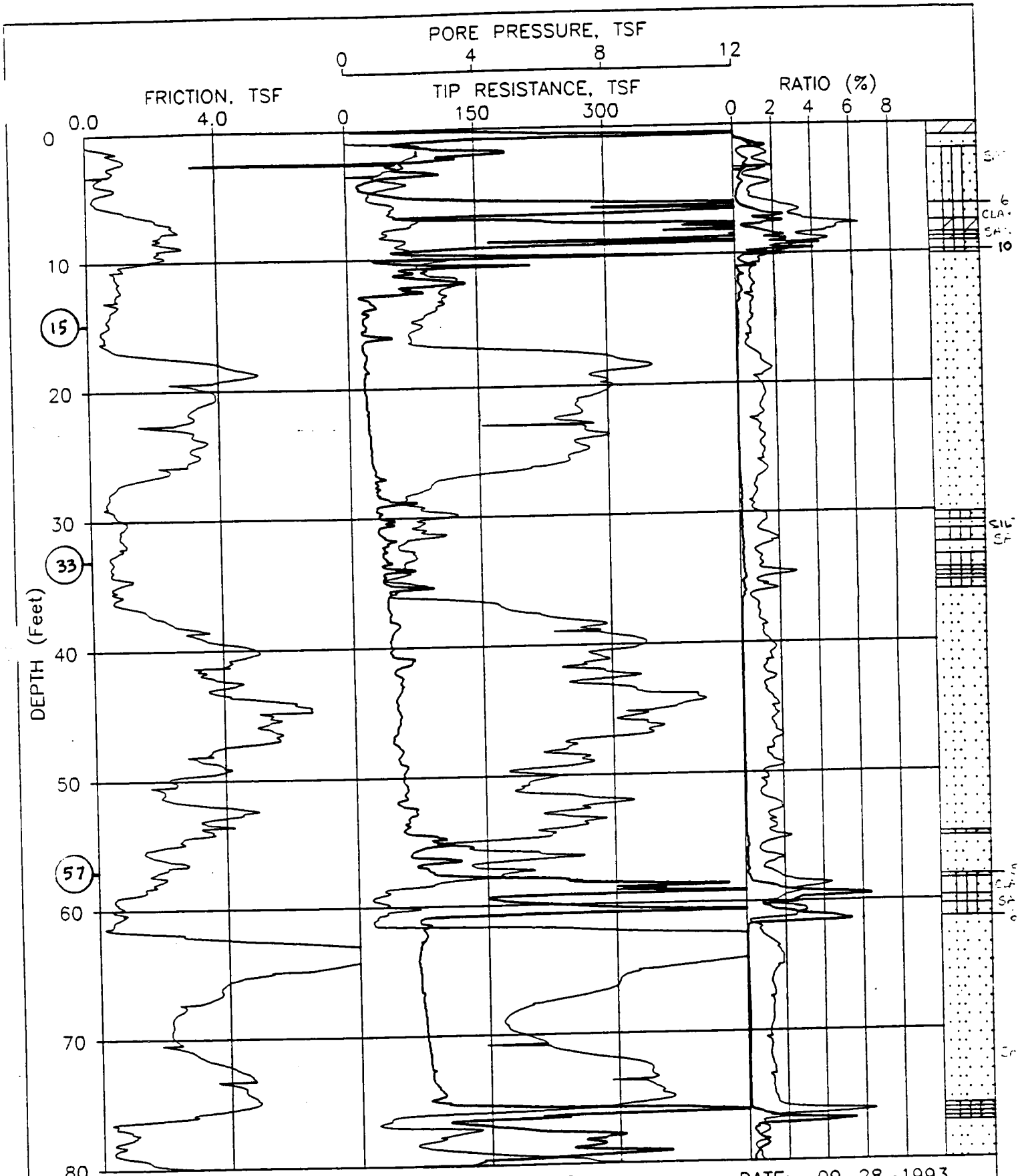
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 19 DATE: 09-14-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

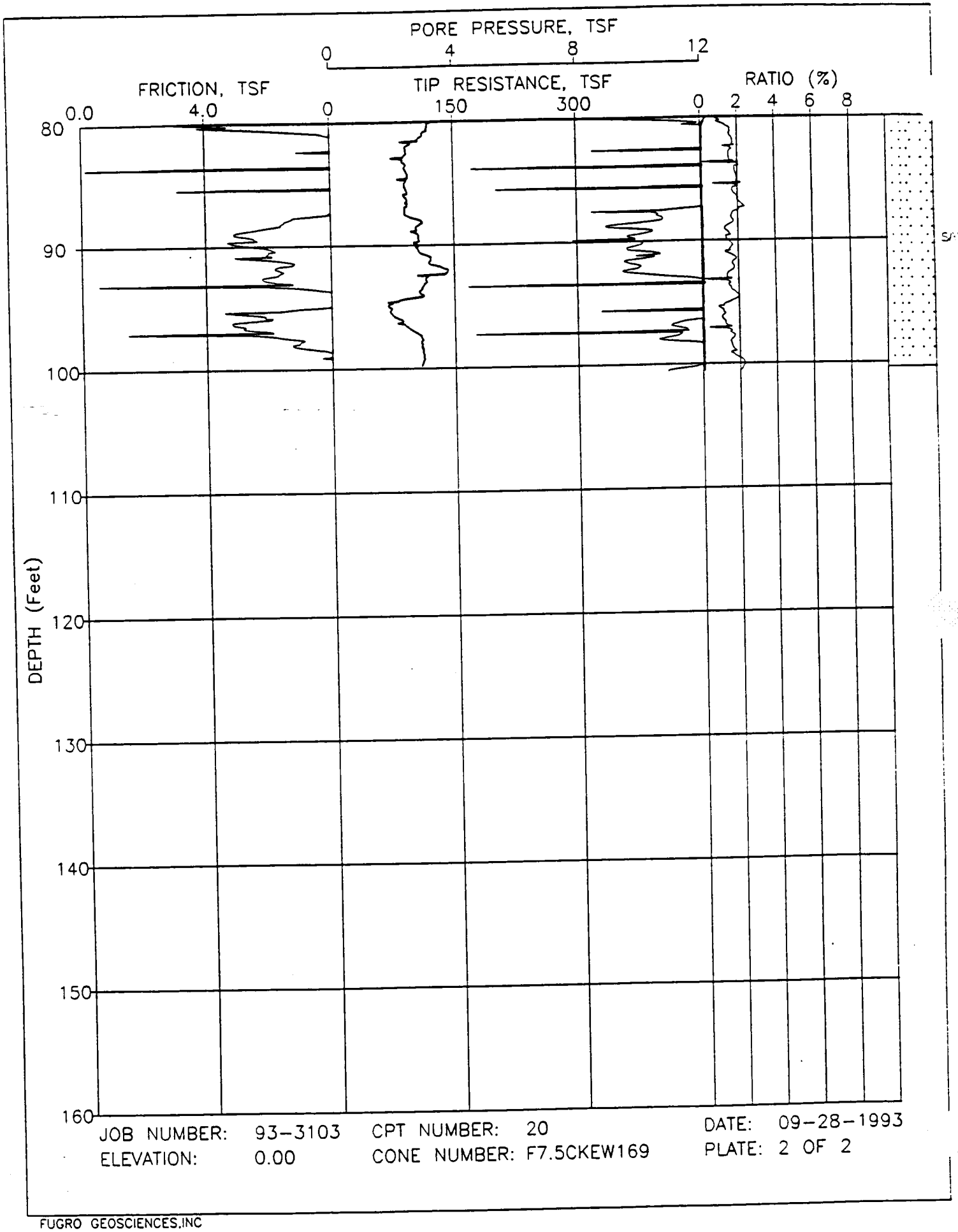
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 20 DATE: 09-28-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW169 PLATE: 1 OF 2

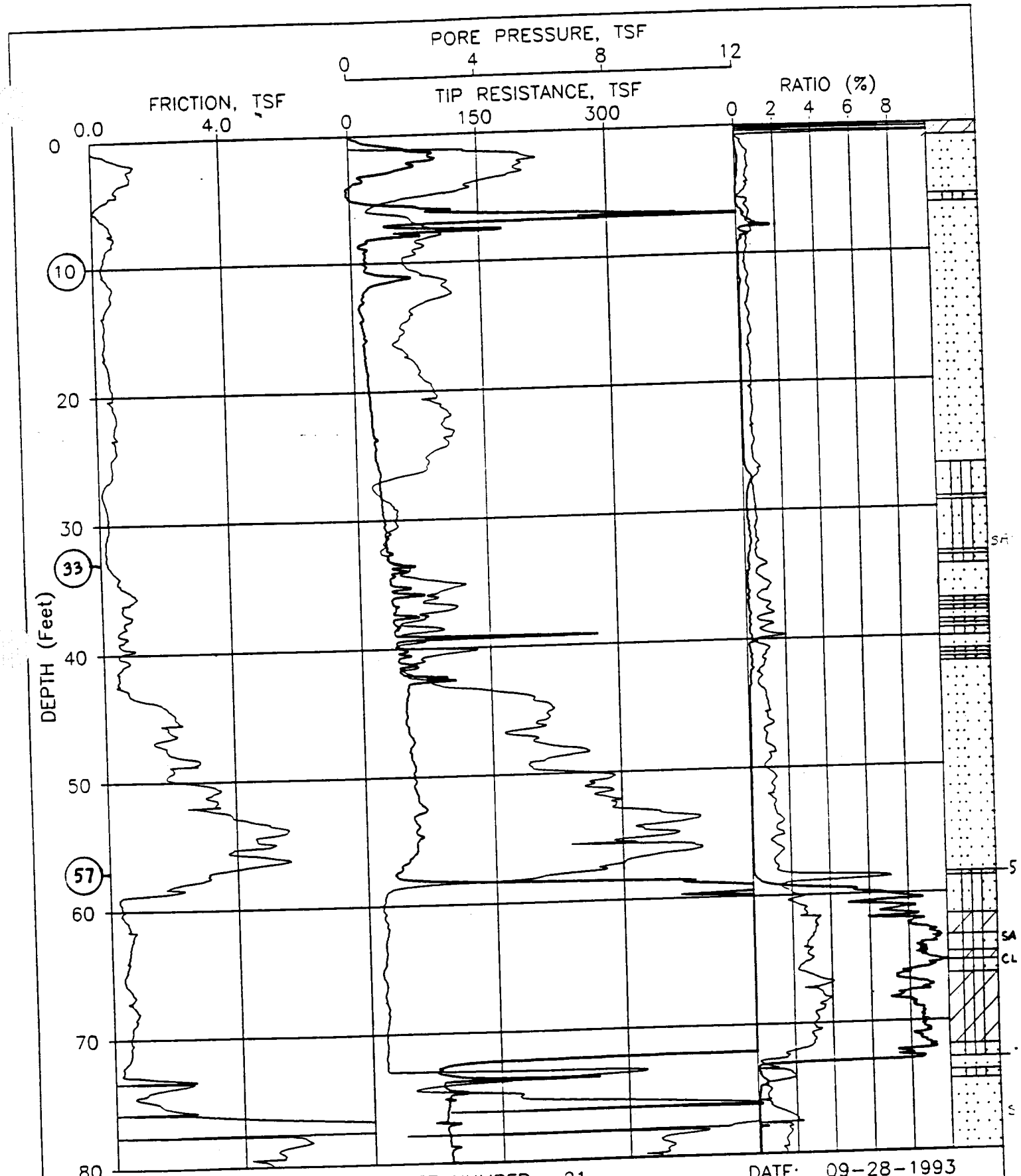
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 20 DATE: 09-28-1993

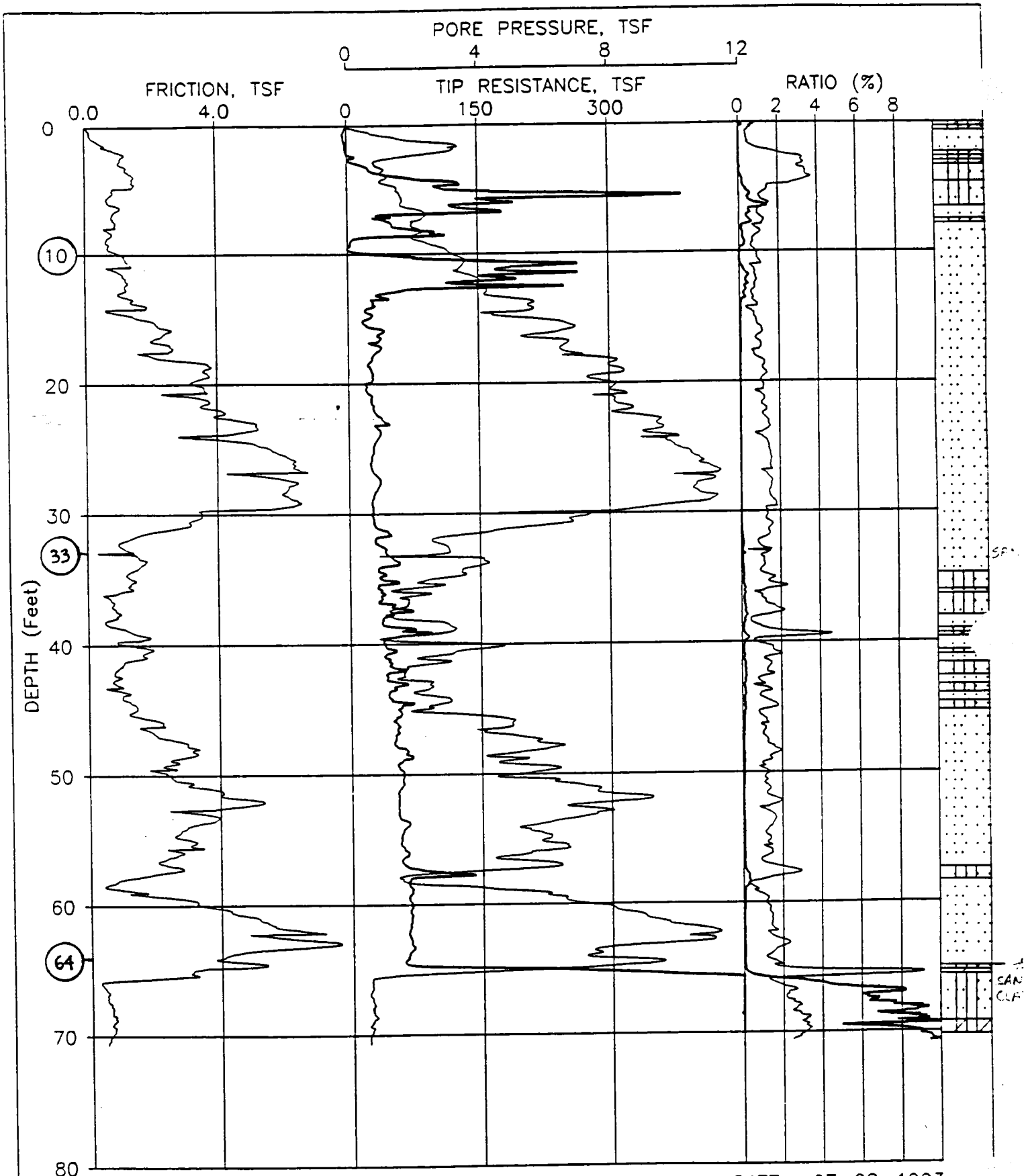
ELEVATION: 0.00 CONE NUMBER: F7.5CKEW169 PLATE: 2 OF 2

FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103
ELEVATION: 0.00
CPT NUMBER: 21
CONE NUMBER: F7.5CKEW169
DATE: 09-28-1993
PLATE: 1 OF 2

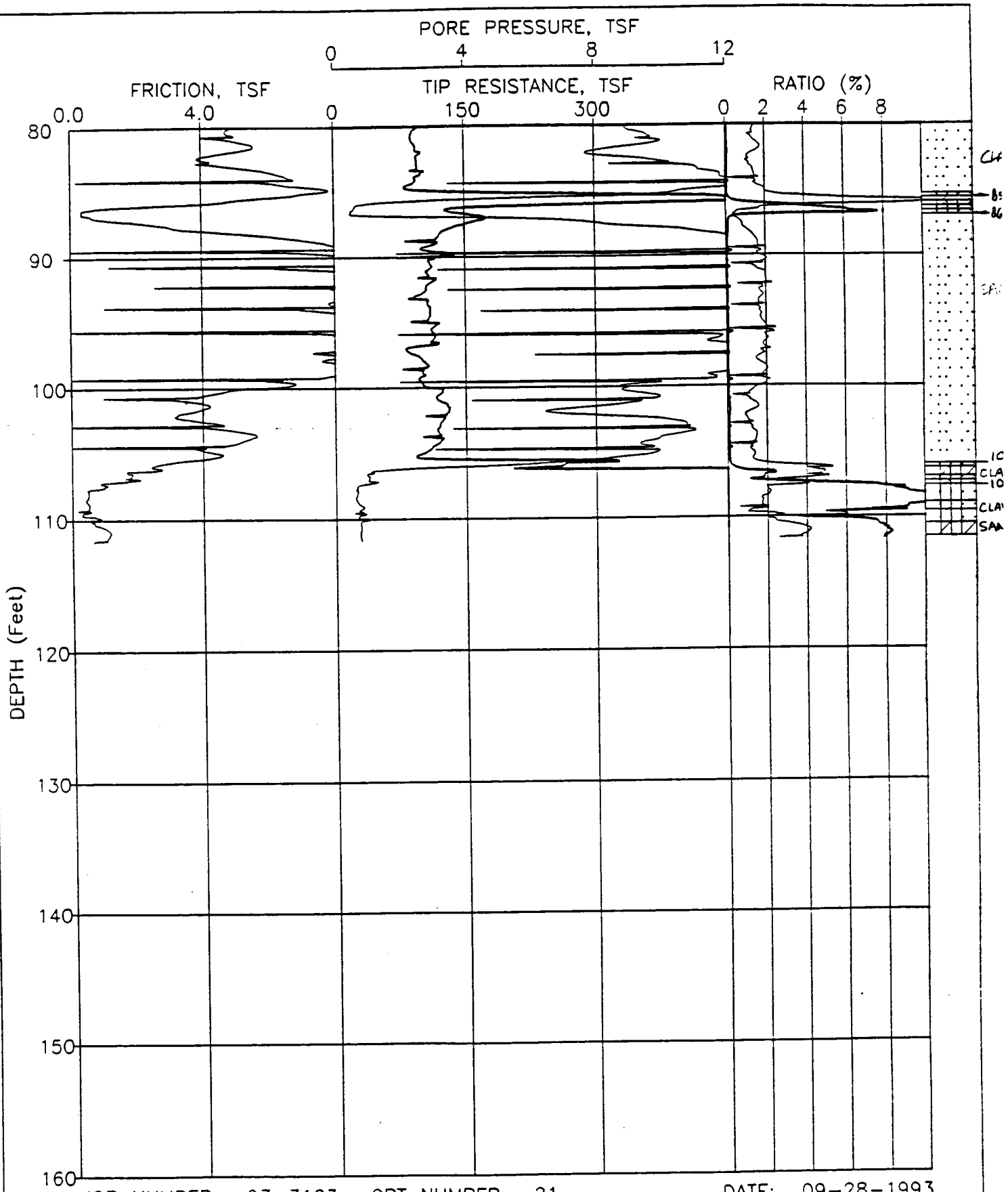
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3031 CPT NUMBER: 22 DATE: 07-28-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 1

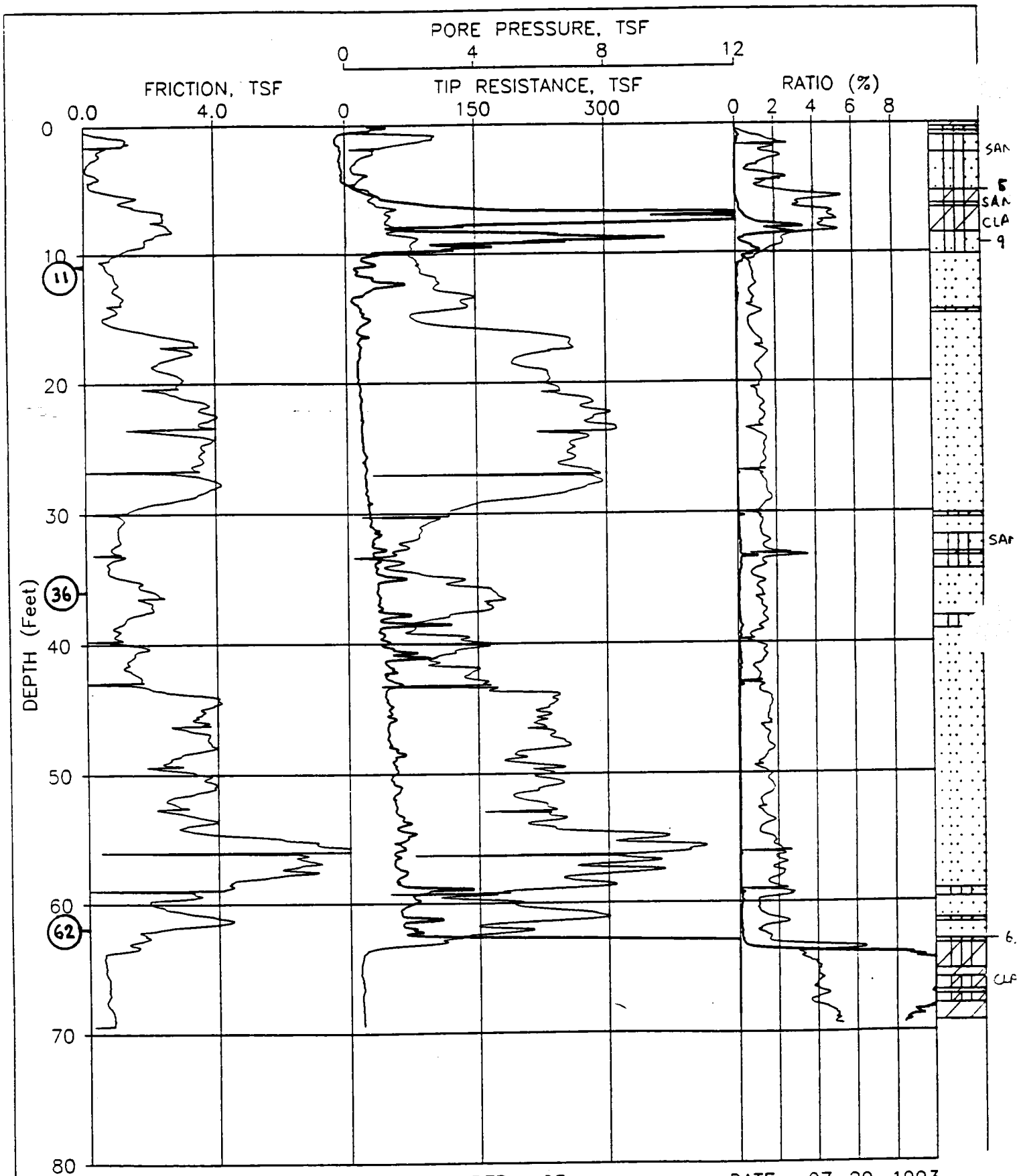
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 21 DATE: 09-28-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW169 PLATE: 2 OF 2

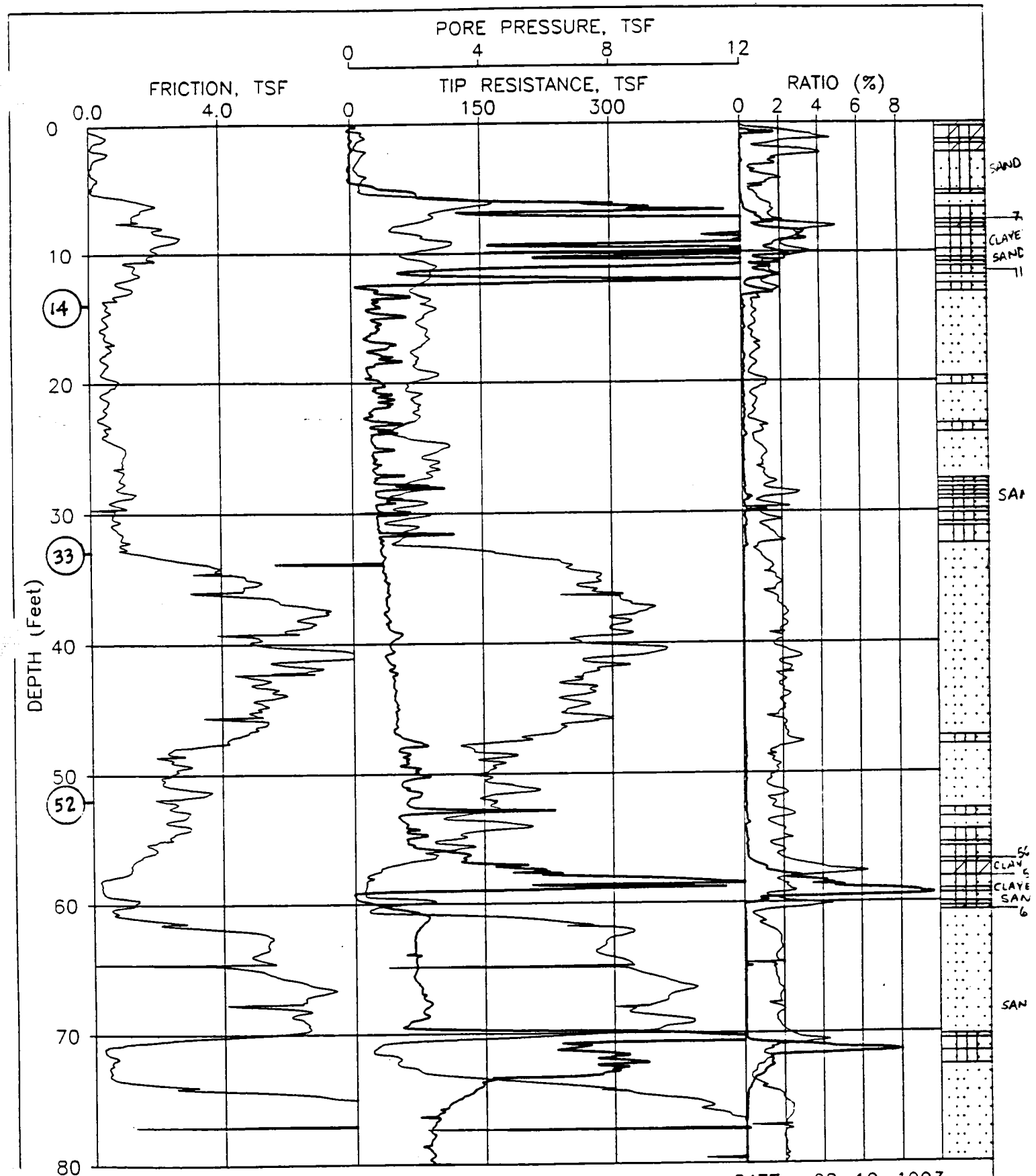
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 23 DATE: 07-29-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 1

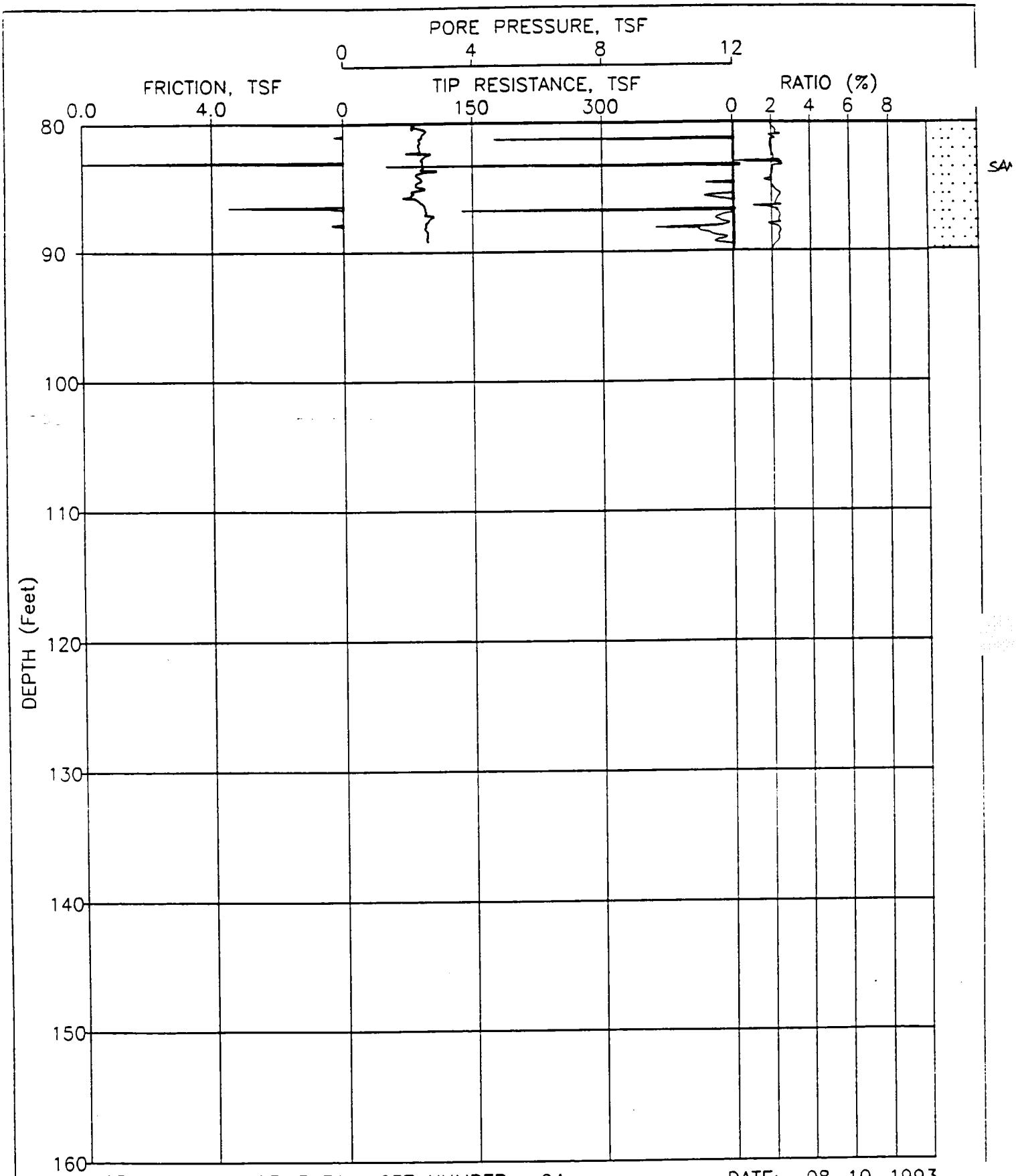
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 24 DATE: 08-10-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

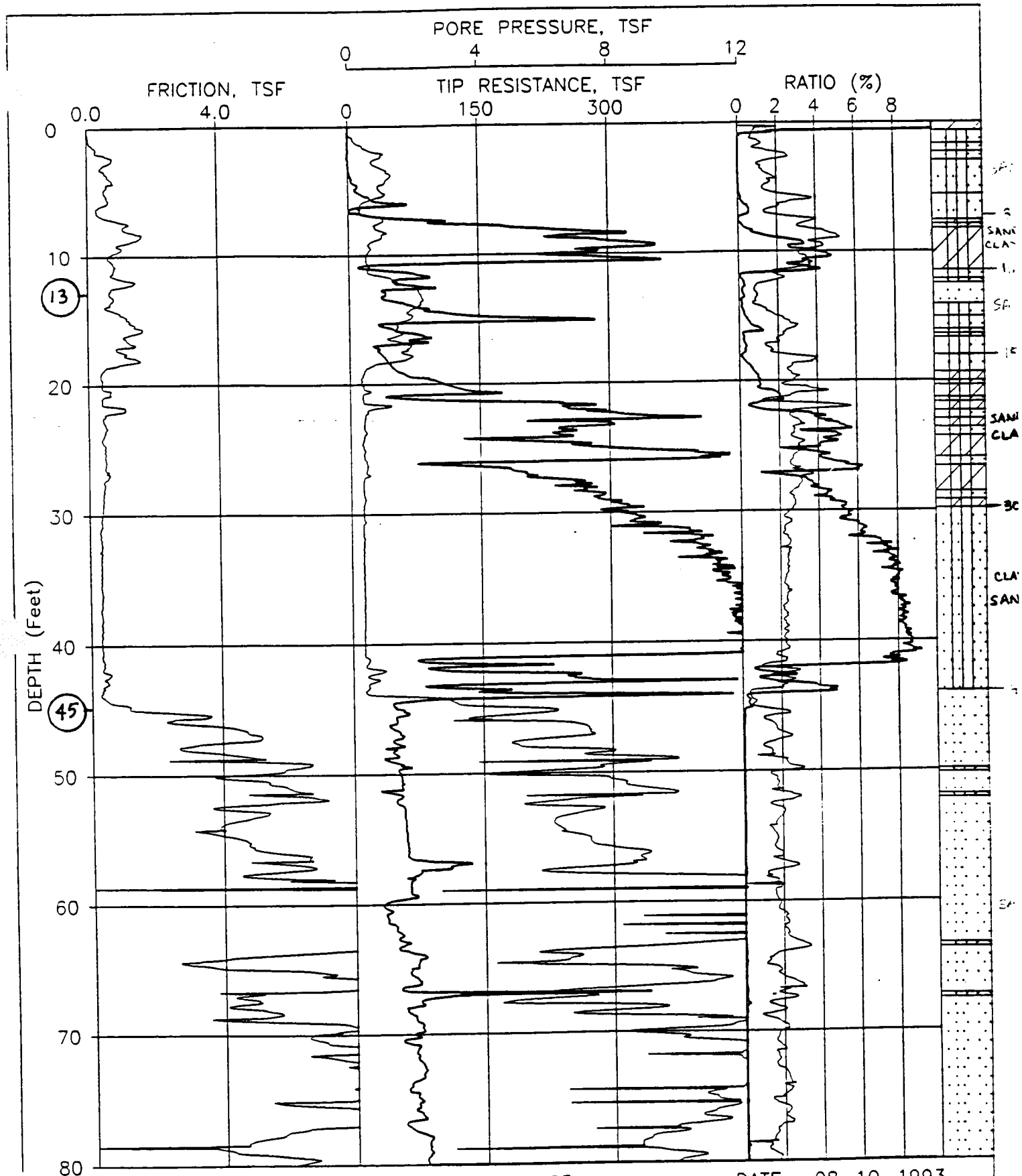
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 24 DATE: 08-10-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

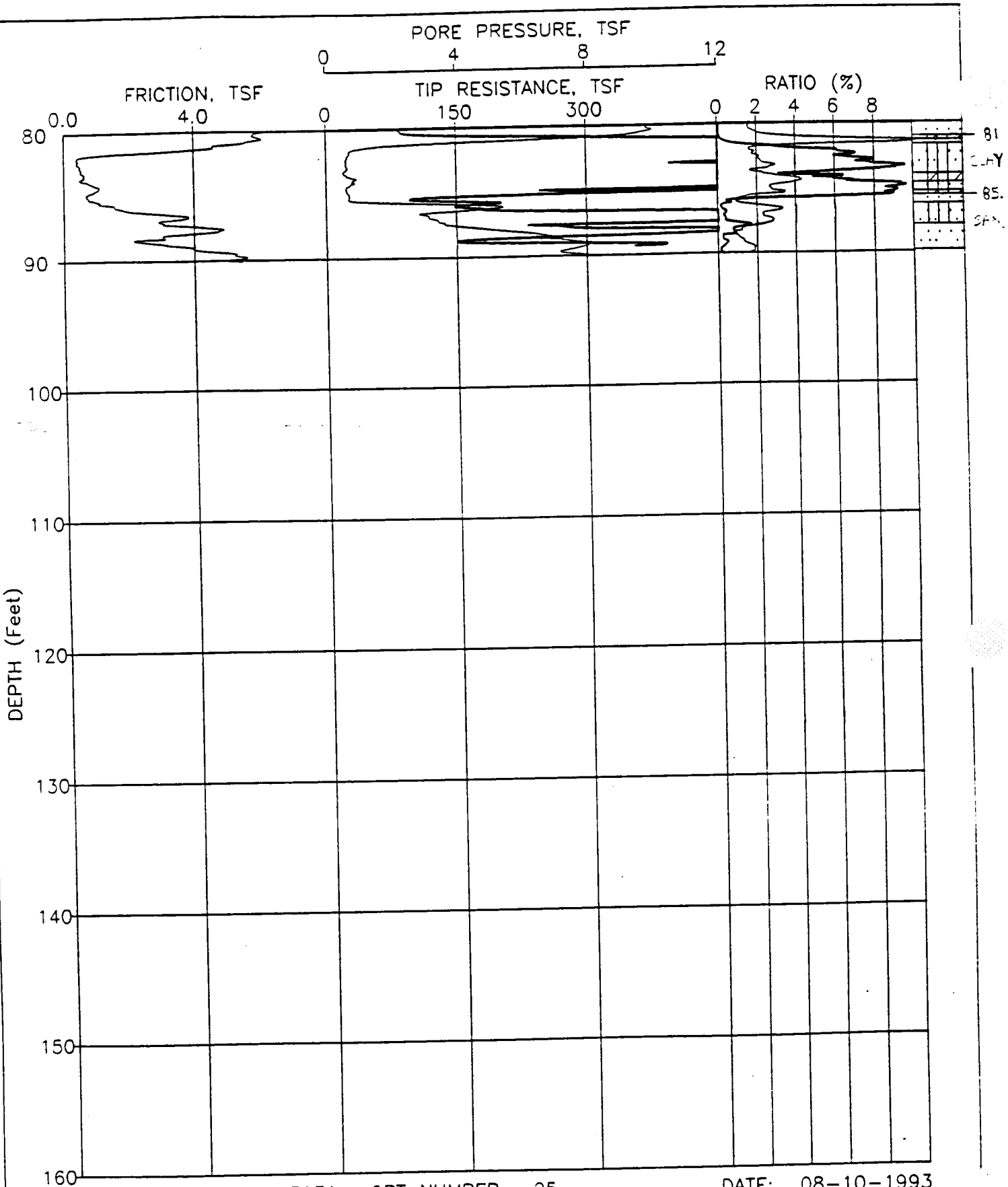
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 25 DATE: 08-10-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

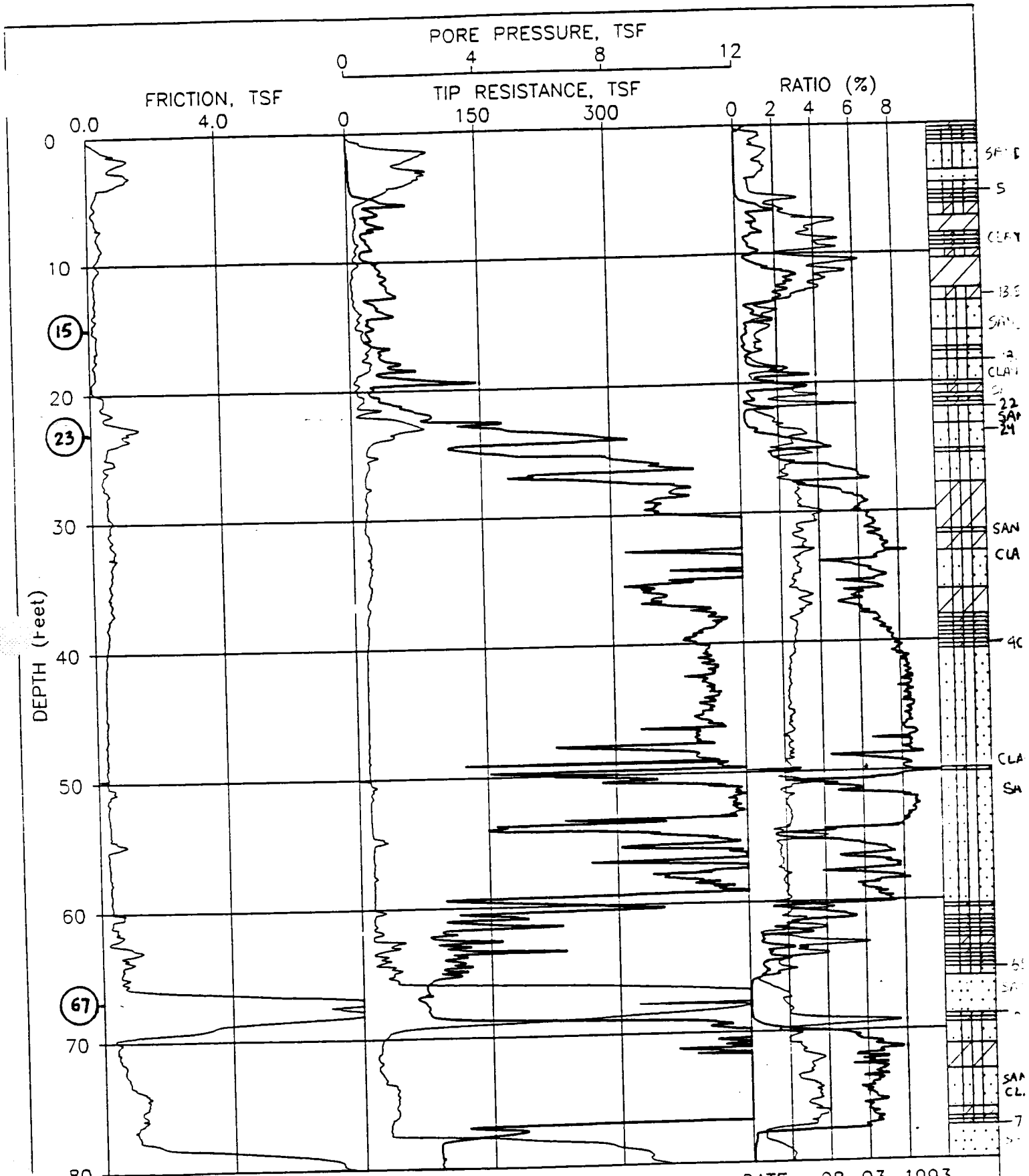
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 25 DATE: 08-10-1993

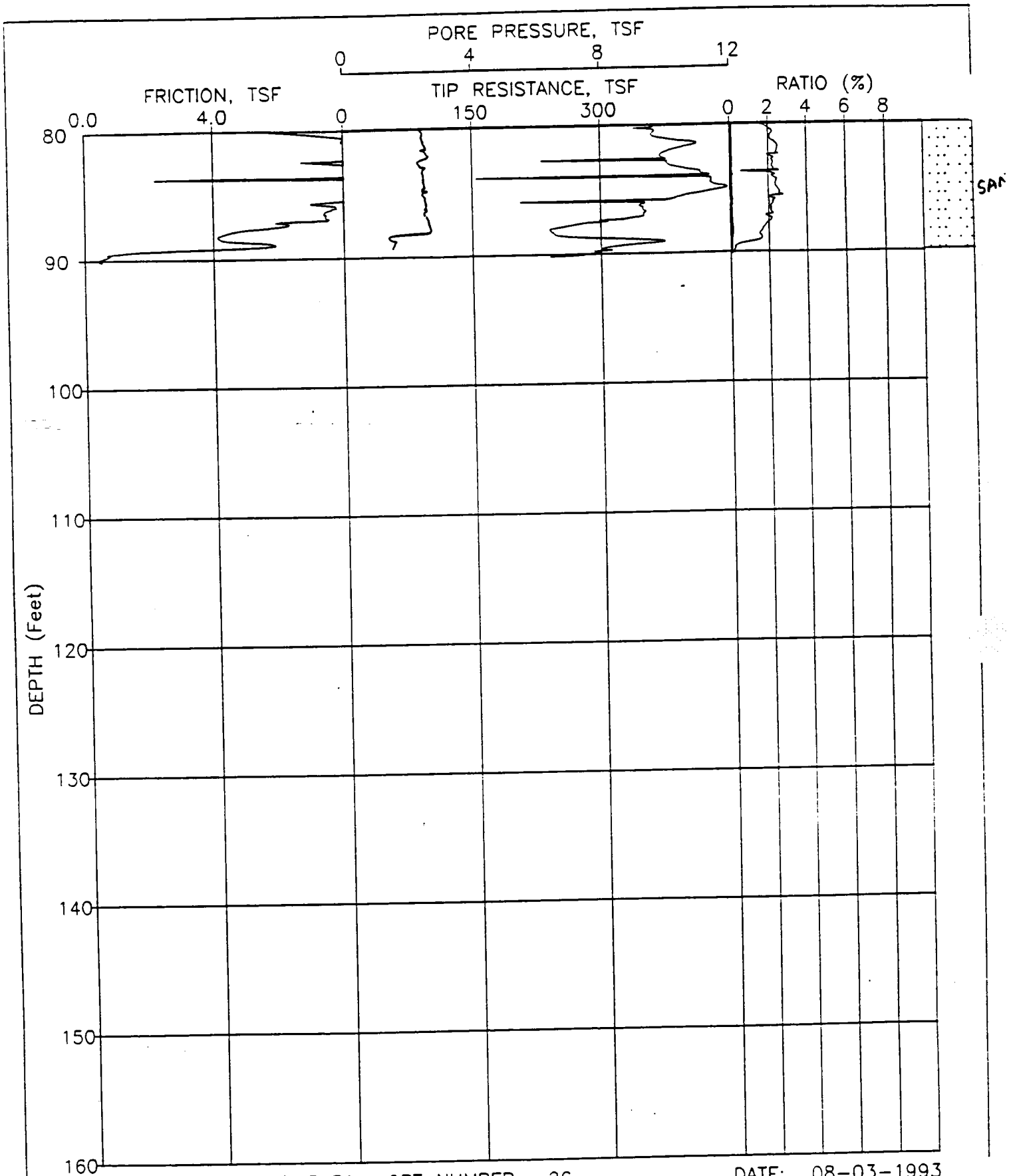
ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131
ELEVATION: 0.00
CPT NUMBER: 26
CONE NUMBER: F7.5CKEW594
DATE: 08-03-1993
PLATE: 1 OF 2

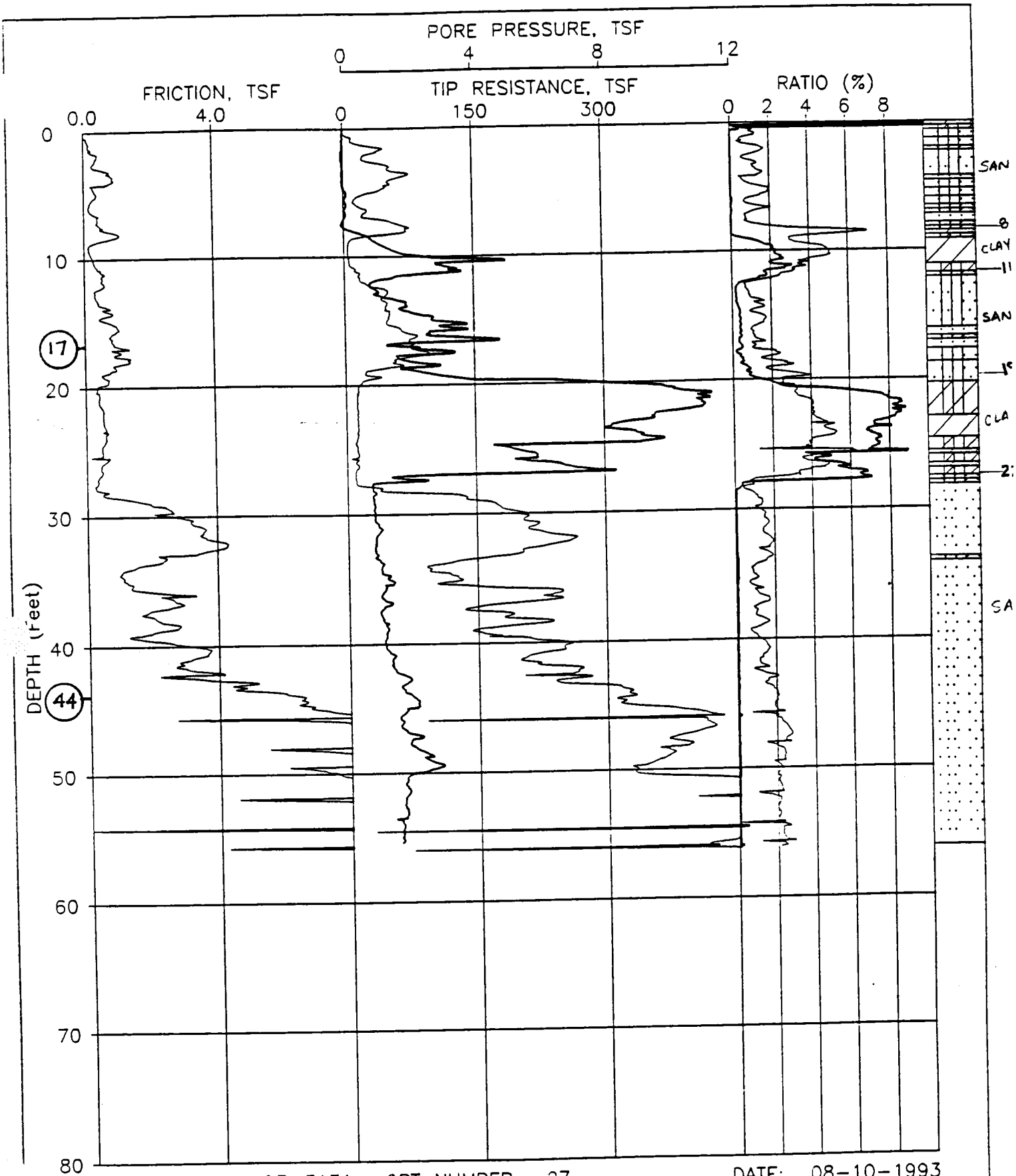
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 26 DATE: 08-03-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

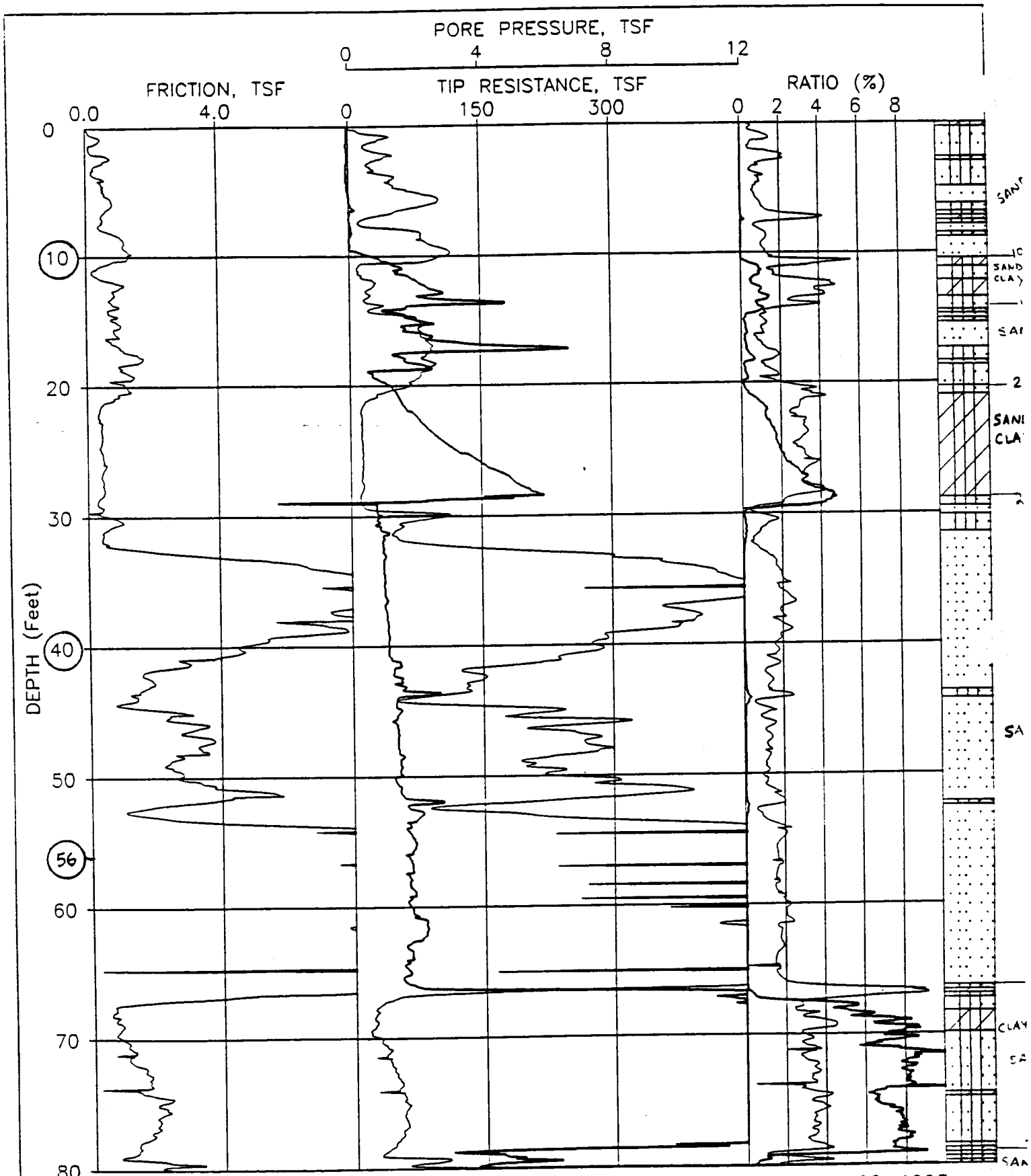
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 27 DATE: 08-10-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 1

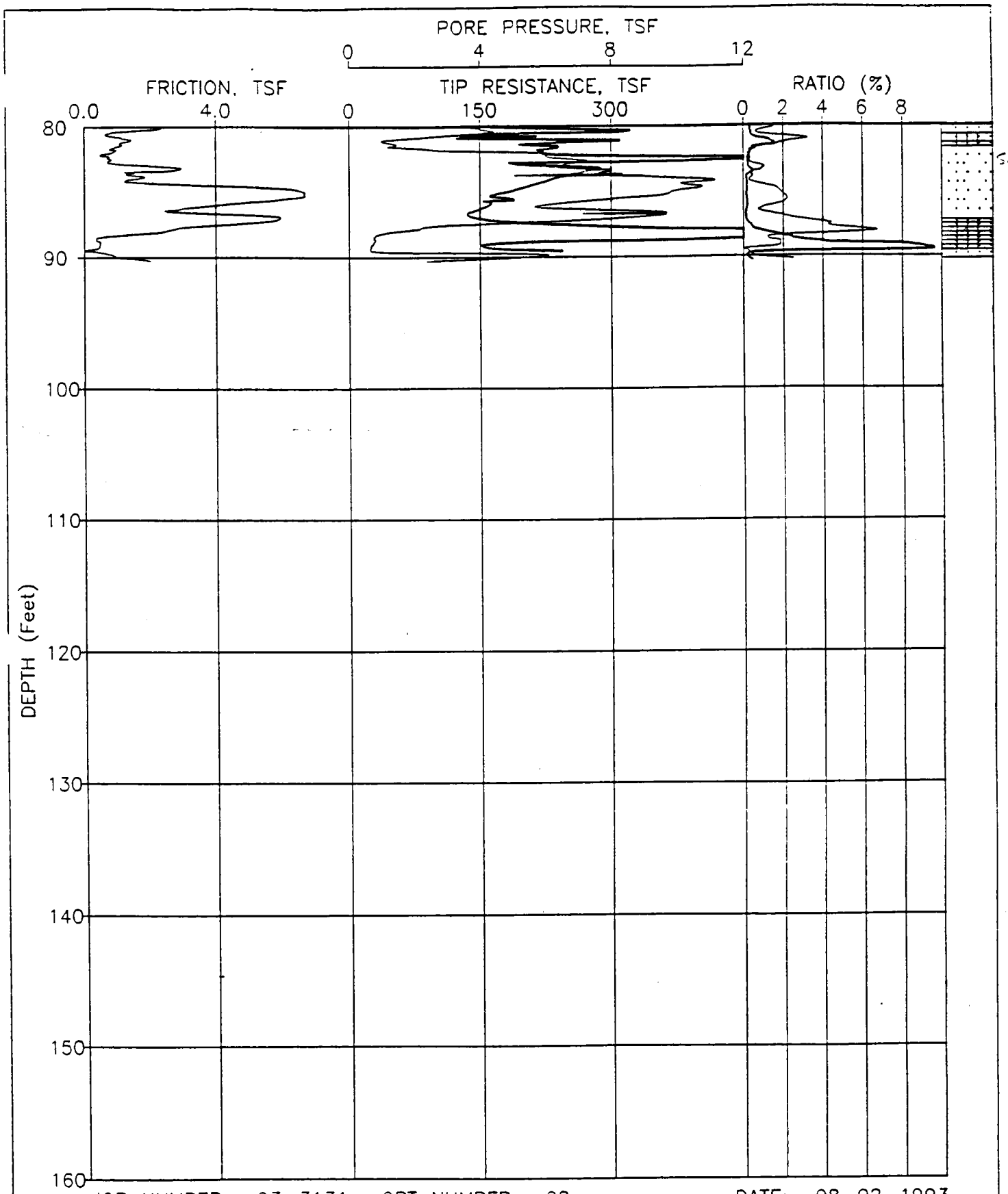
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 28 DATE: 08-02-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

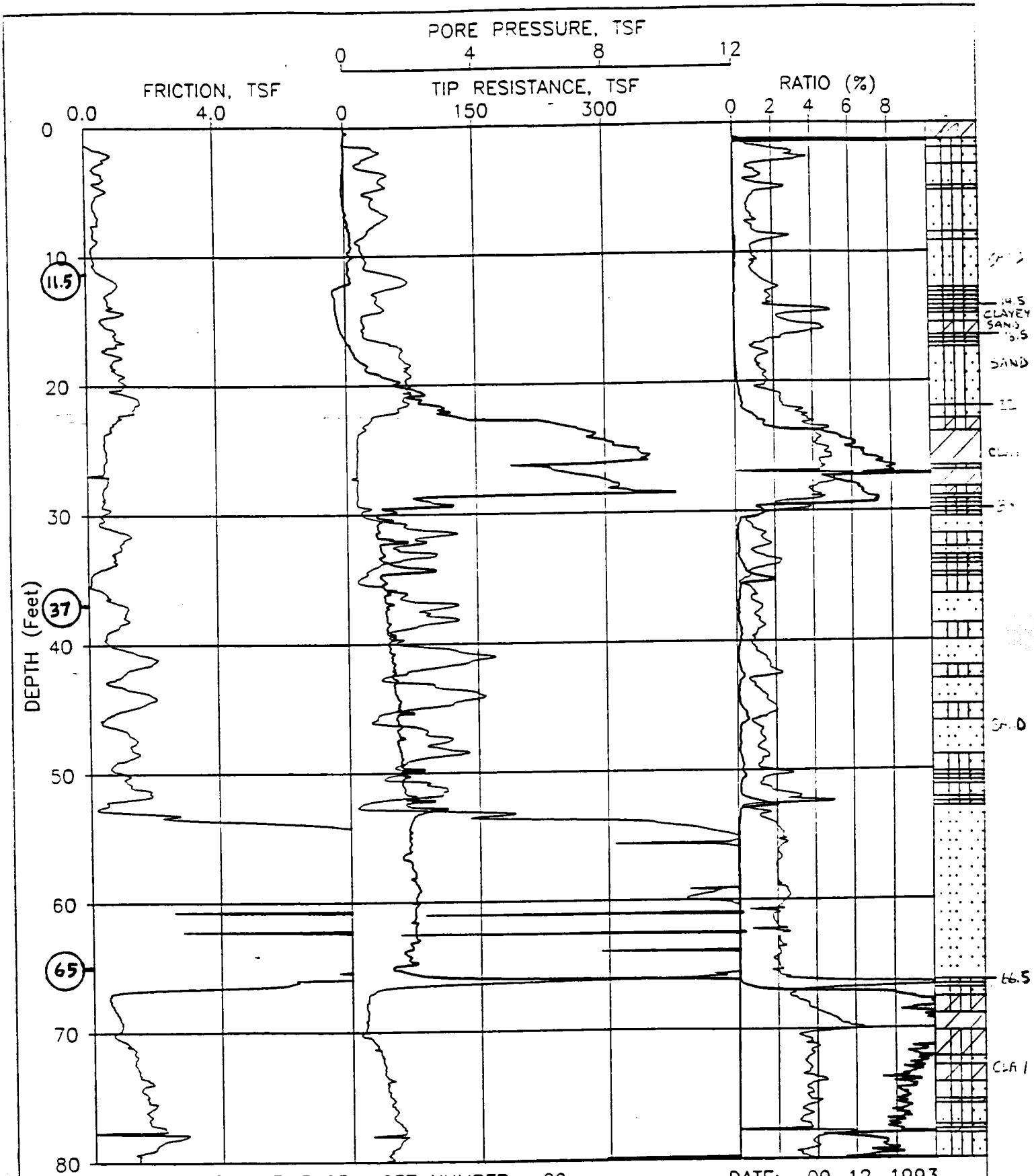
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 28 DATE: 08-02-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

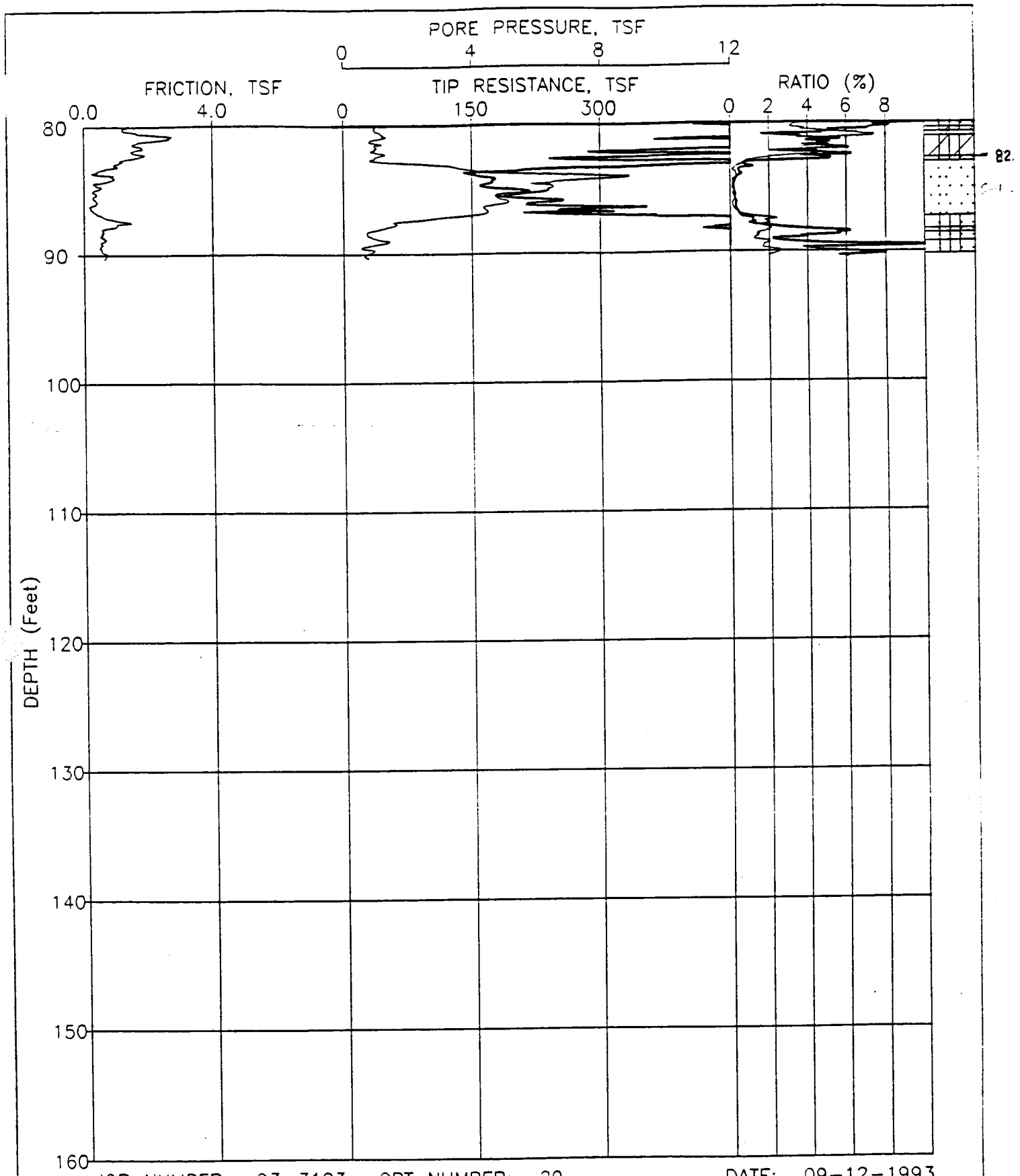
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 29 DATE: 09-12-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

FUGRO GEOSCIENCES,INC

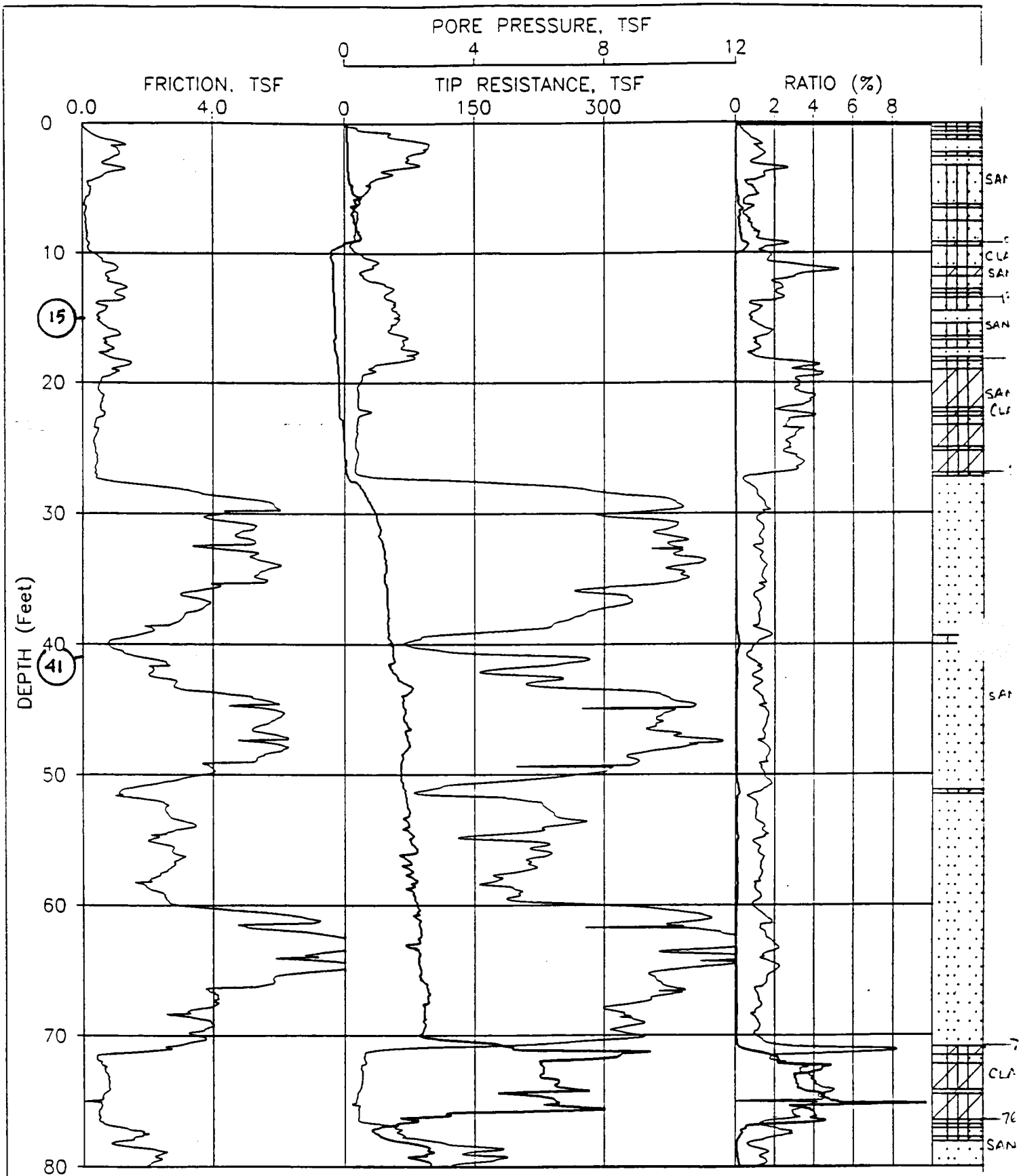


JOB NUMBER: 93-3103 CPT NUMBER: 29 DATE: 09-12-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

FUGRO GEOSCIENCES,INC

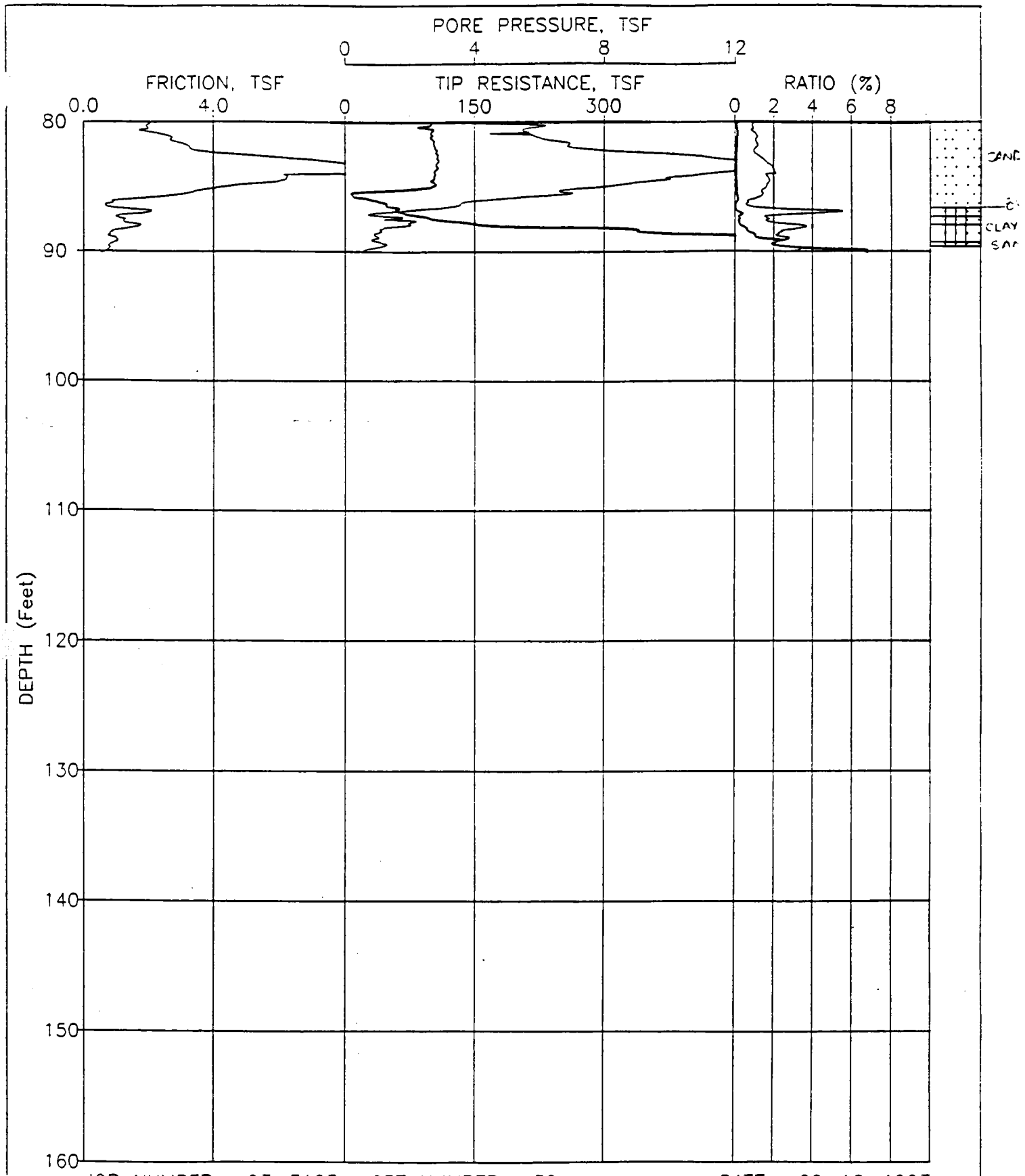
(SIDE-MOUNTED PIEZO TRANSDUCER)



JOB NUMBER: 93-3103 CPT NUMBER: 30 DATE: 09-12-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW230 PLATE: 1 OF 2

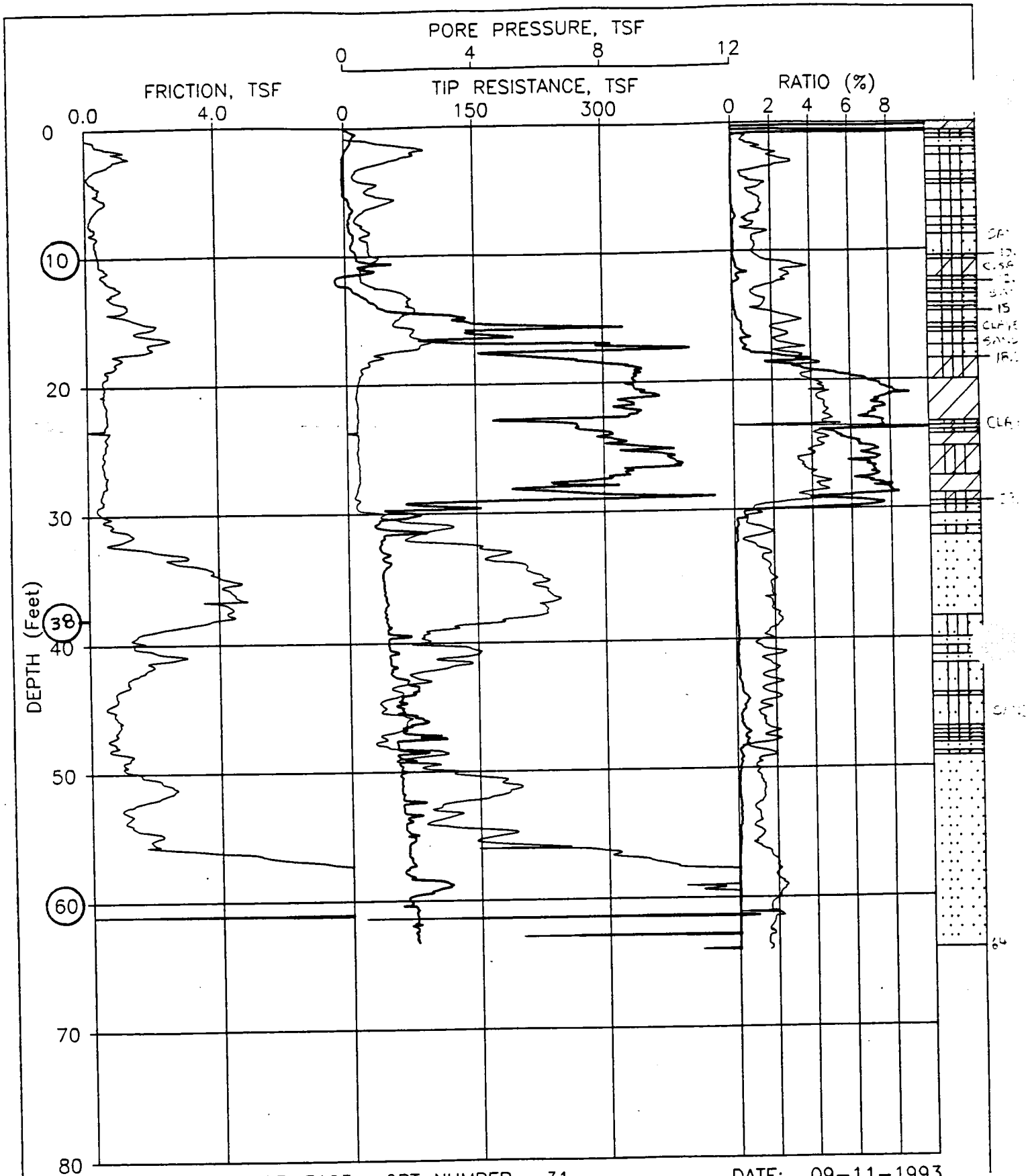
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 30 DATE: 09-12-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW230 PLATE: 2 OF 2

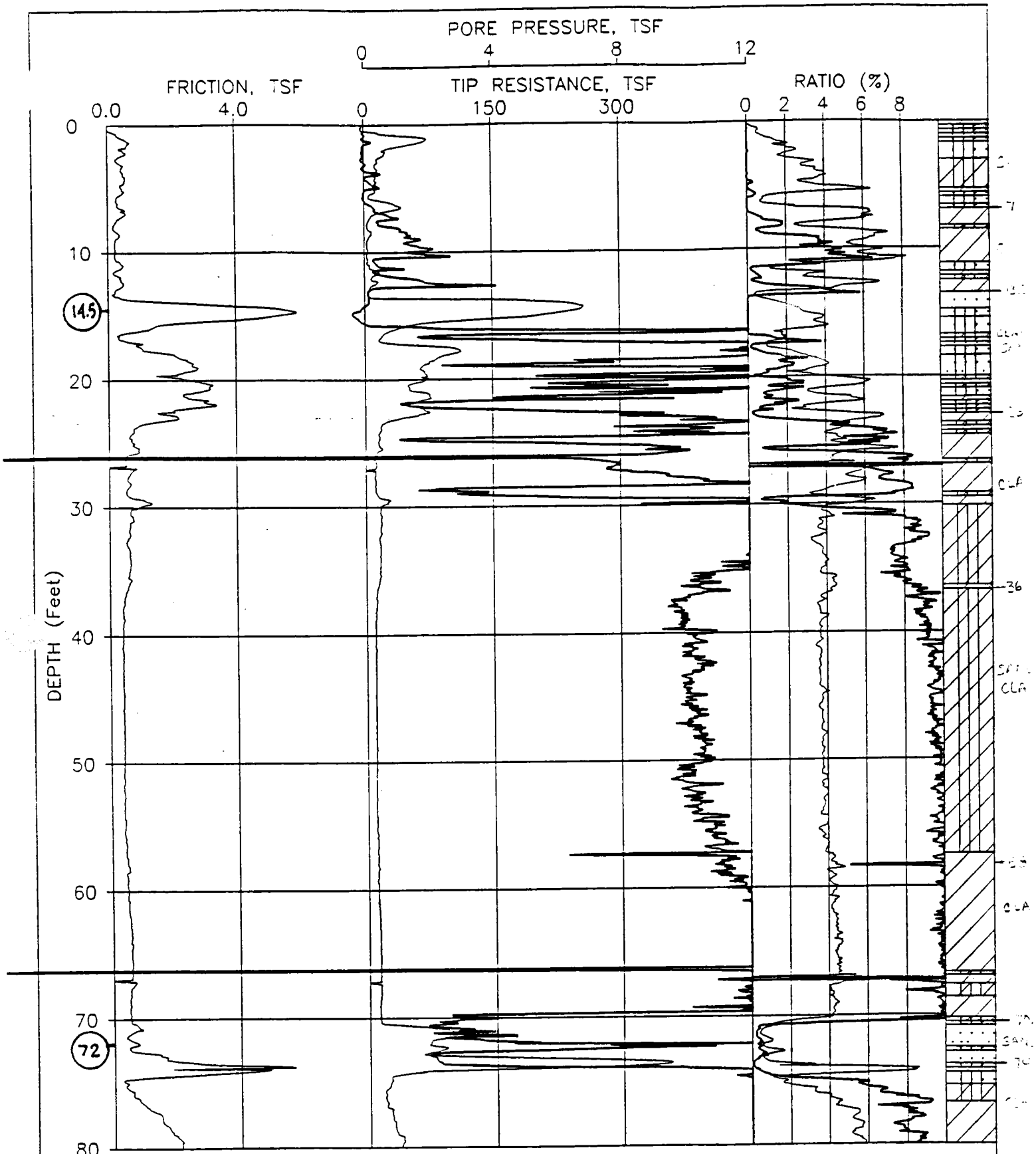
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 31 DATE: 09-11-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 1

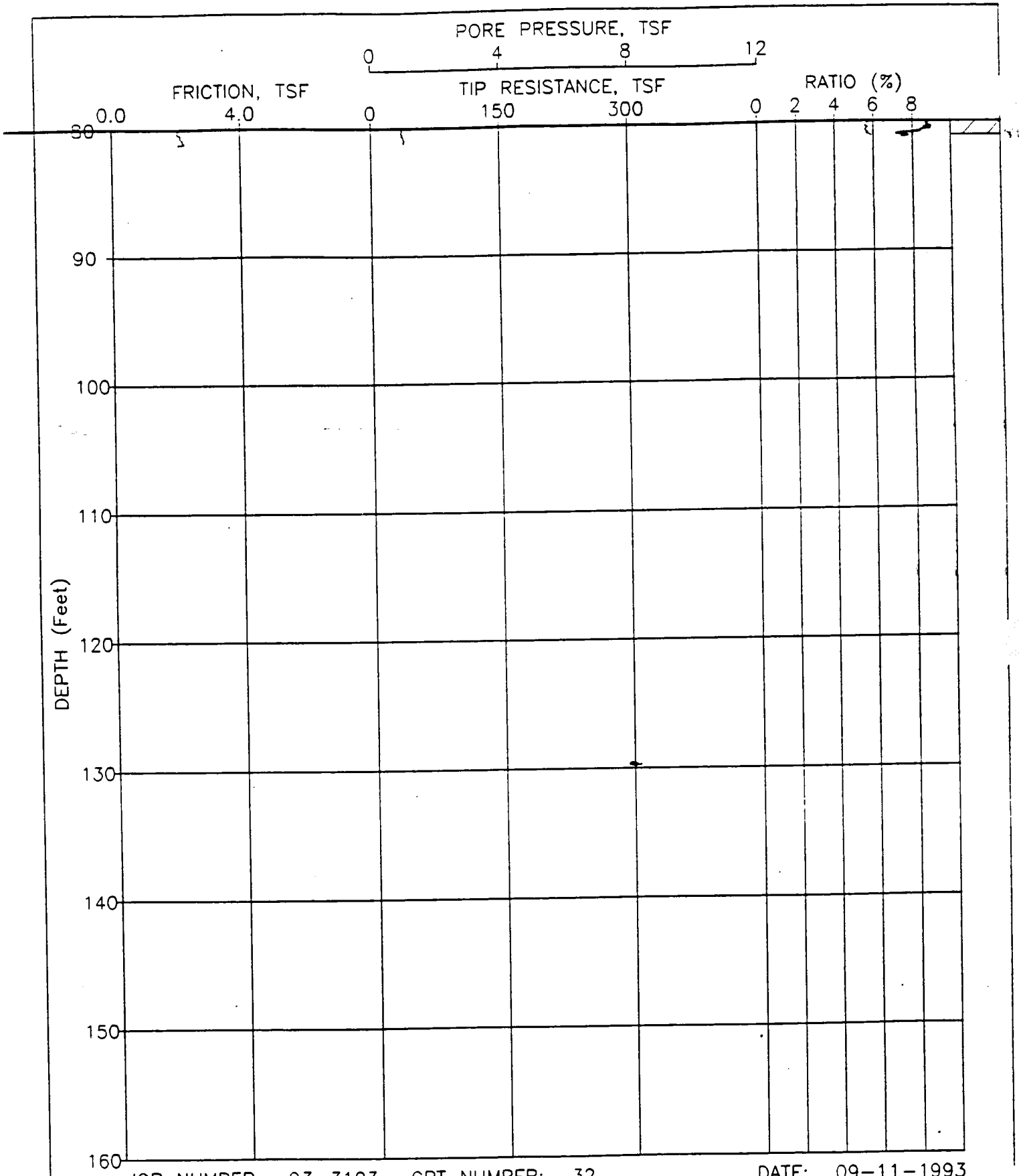
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 32 DATE: 09-11-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 2

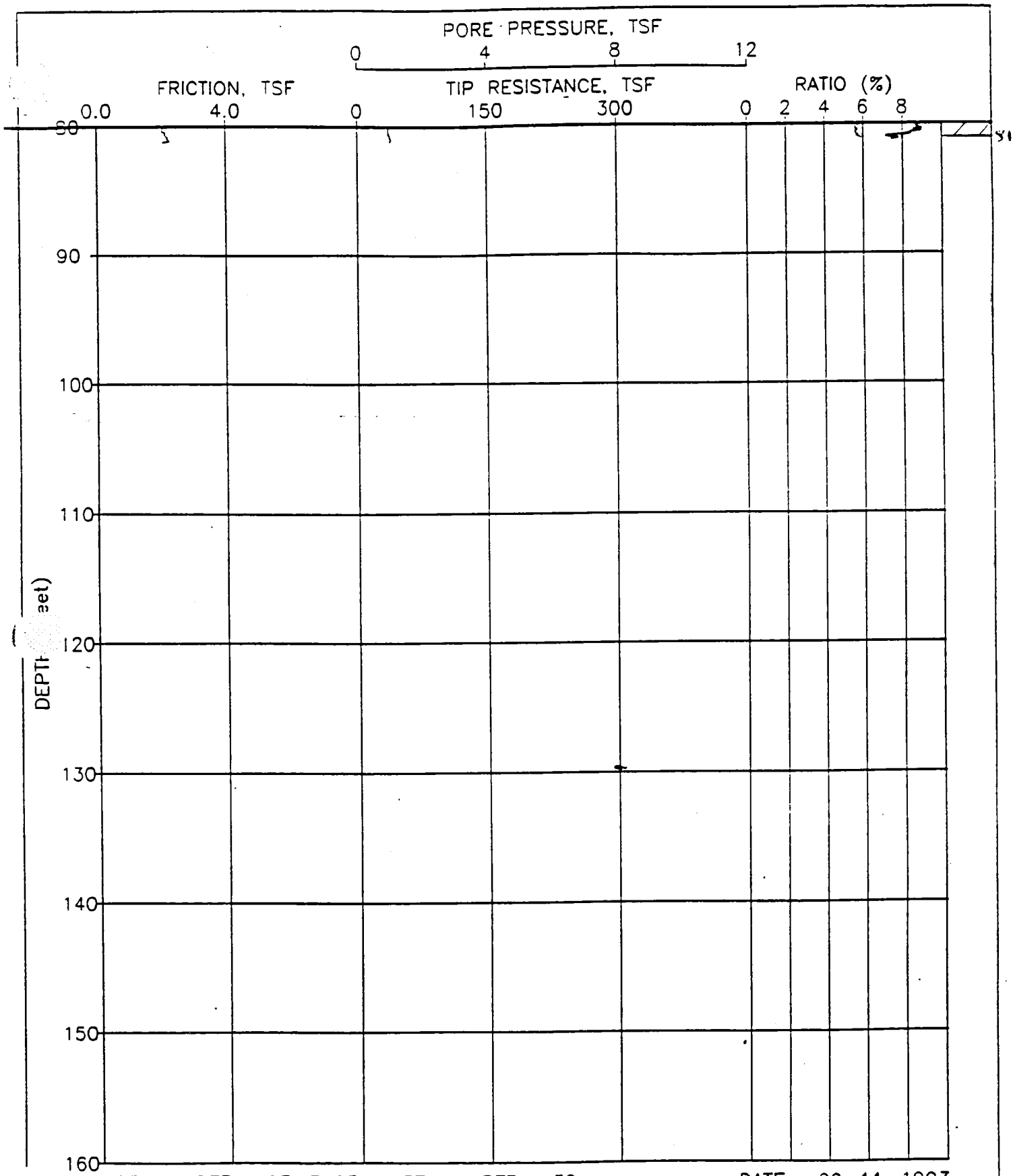
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 32 DATE: 09-11-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

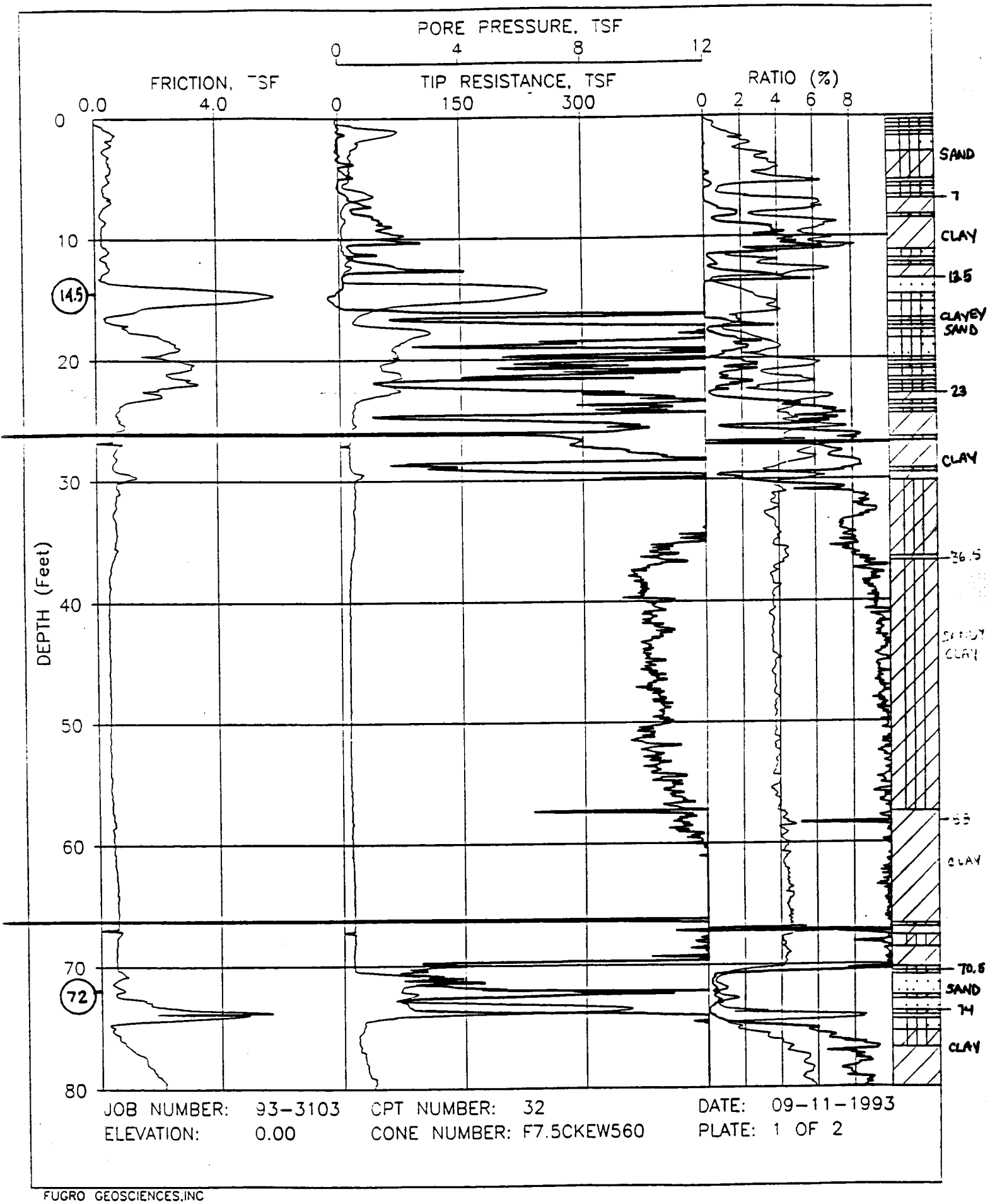
FUGRO GEOSCIENCES,INC



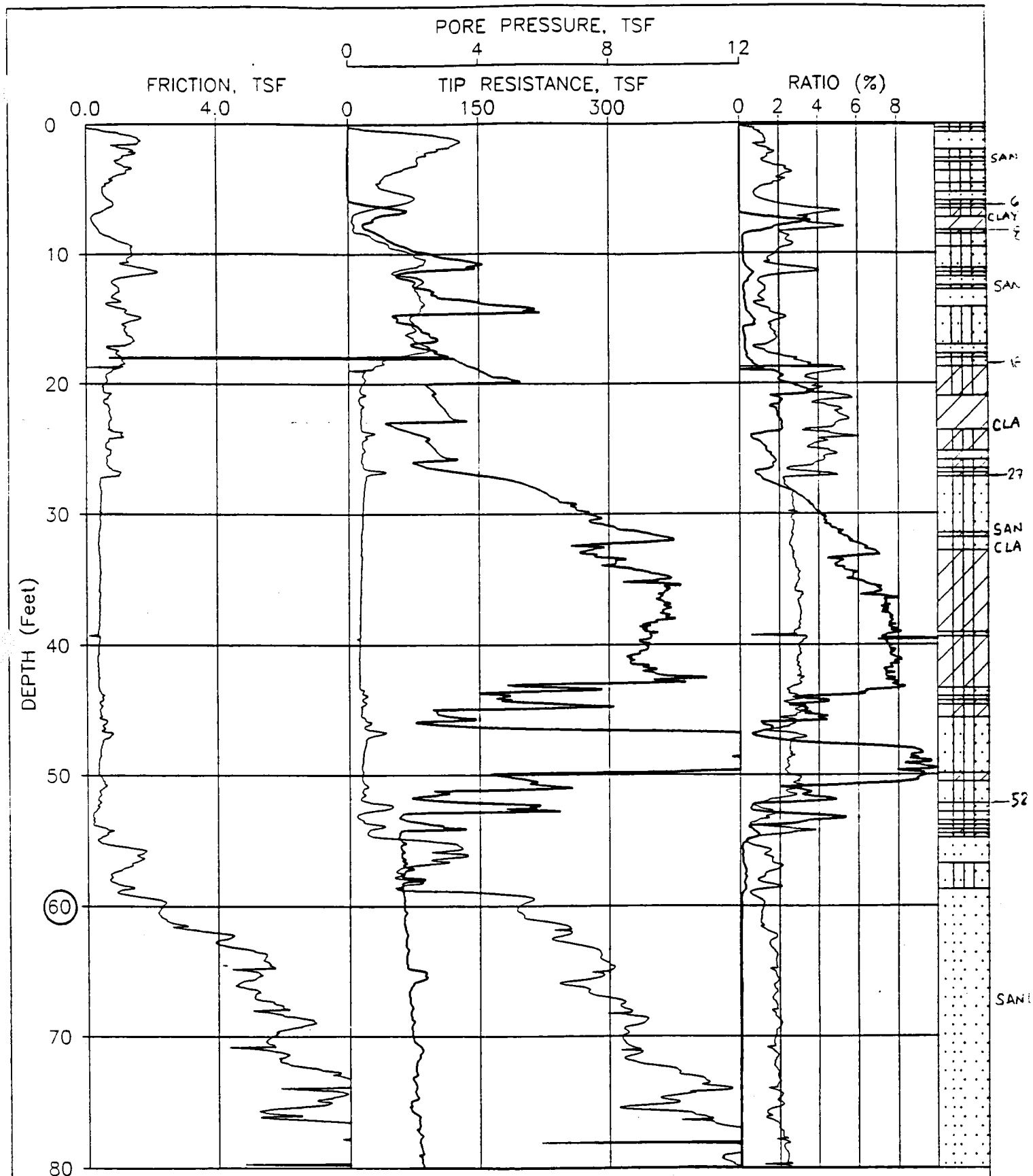
JOB NUMBER: 93-3103 CPT NUMBER: 32 DATE: 09-11-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

FUGRO GEOSCIENCES,INC



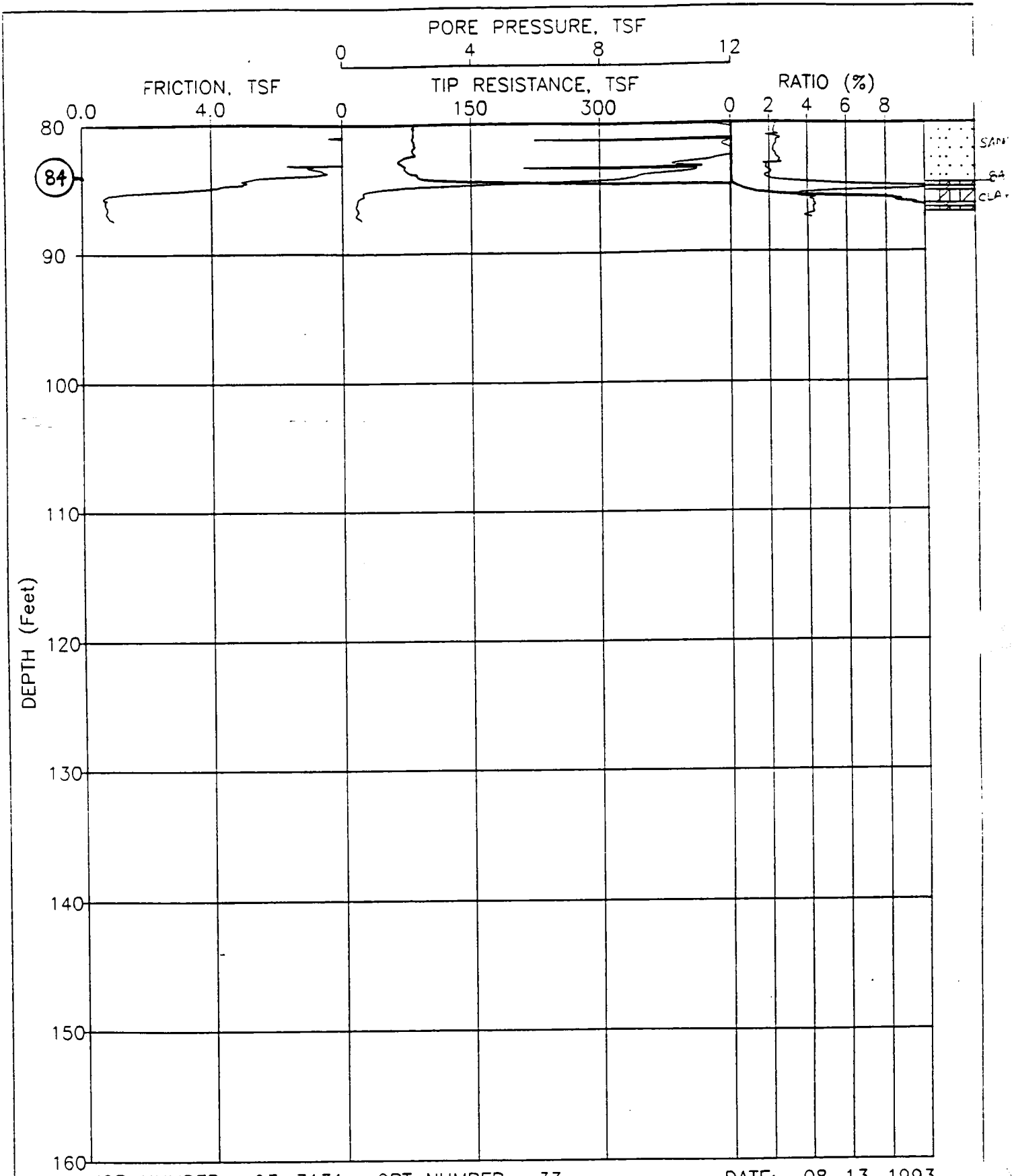
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 33 DATE: 08-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 2

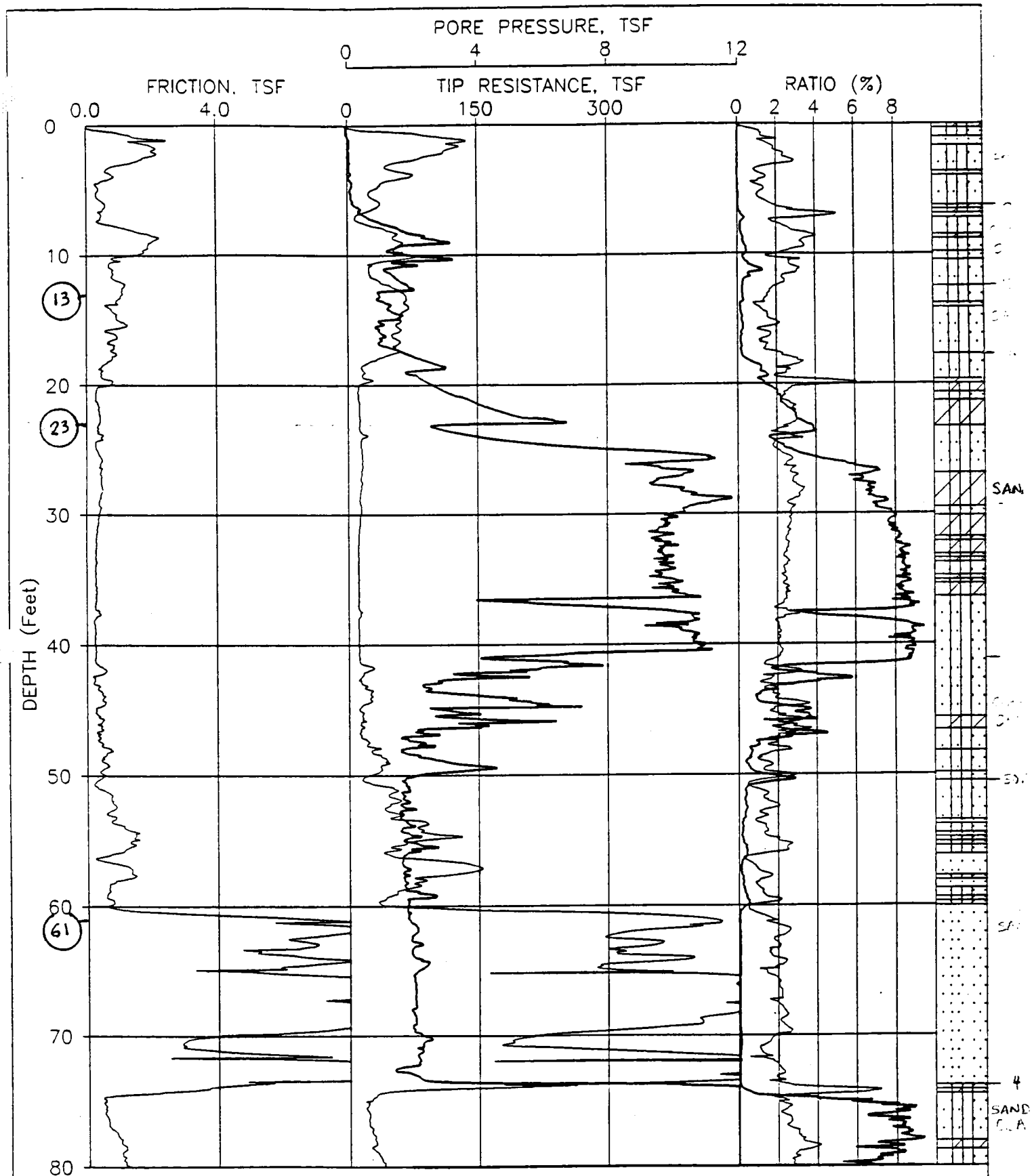
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 33 DATE: 08-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

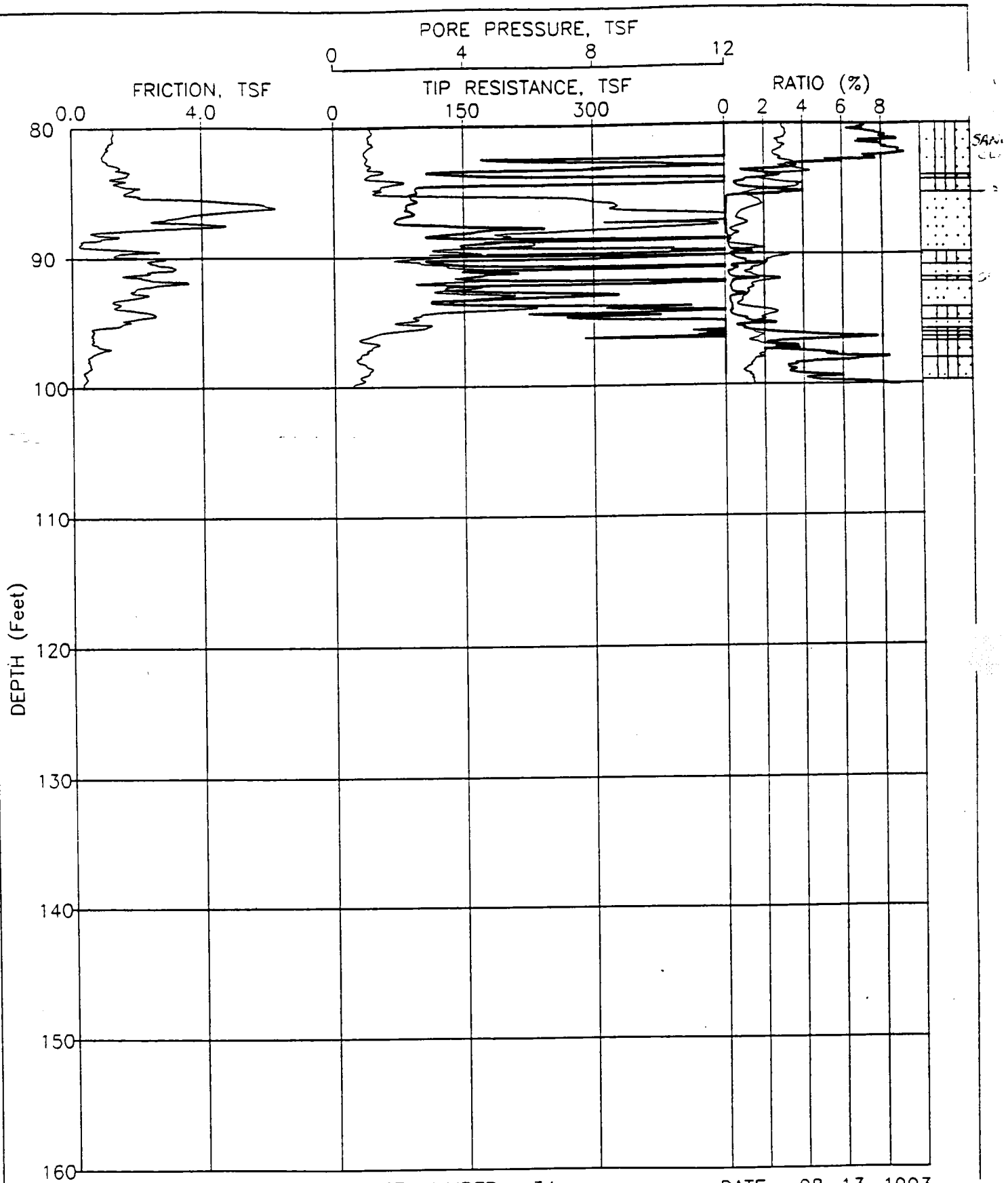
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 34 DATE: 08-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

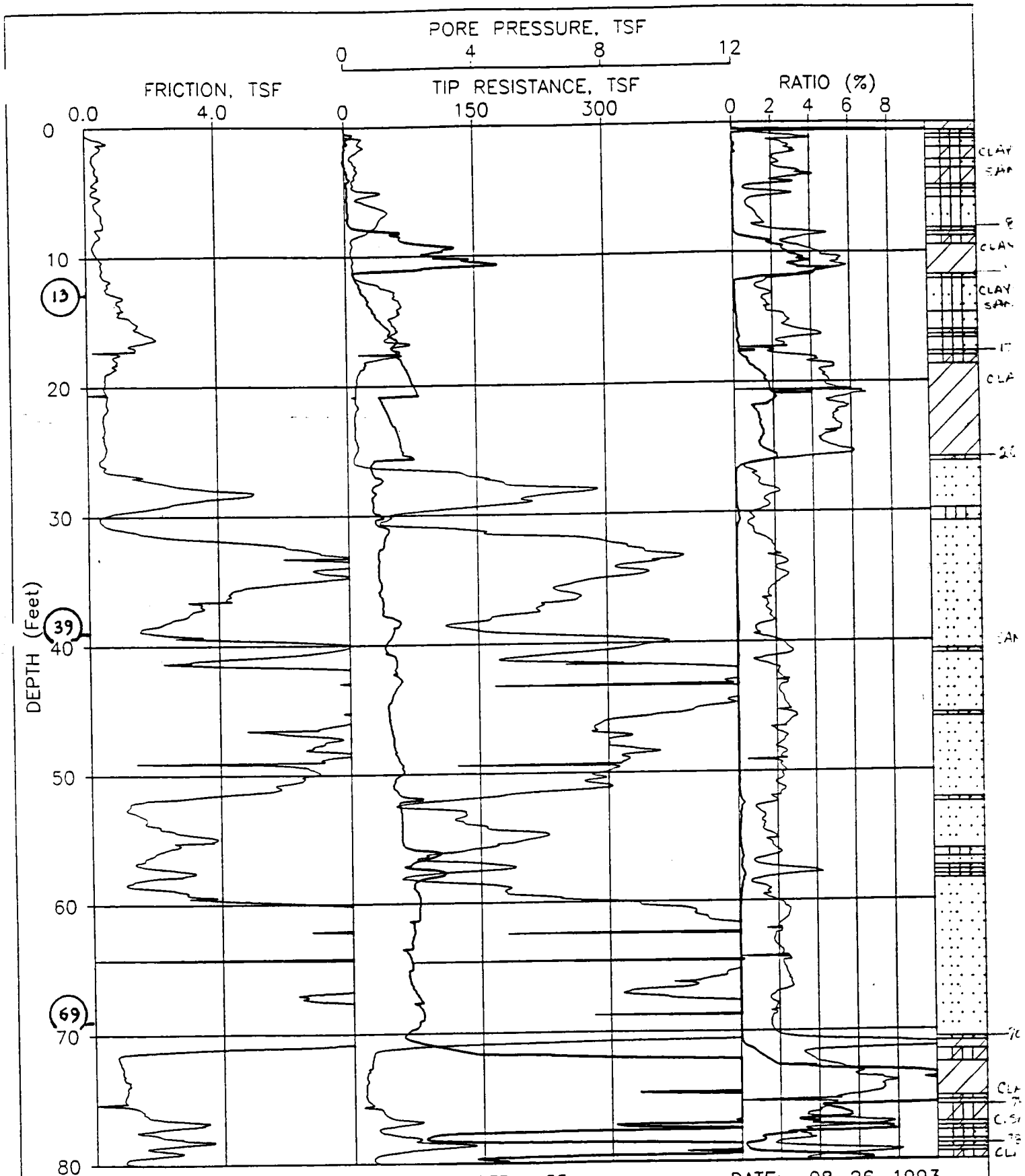
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 34 DATE: 08-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

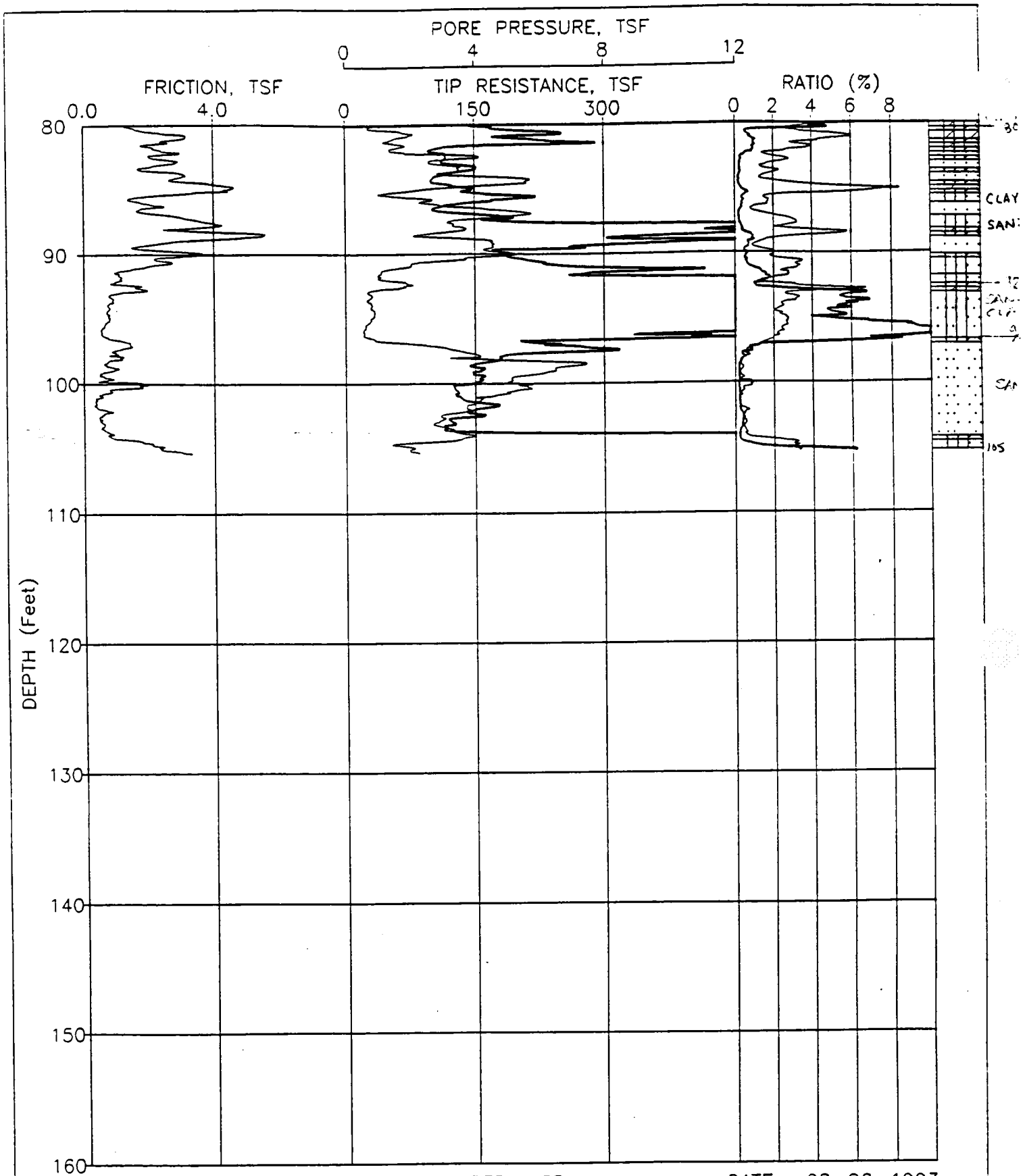
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 35 DATE: 08-26-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 2

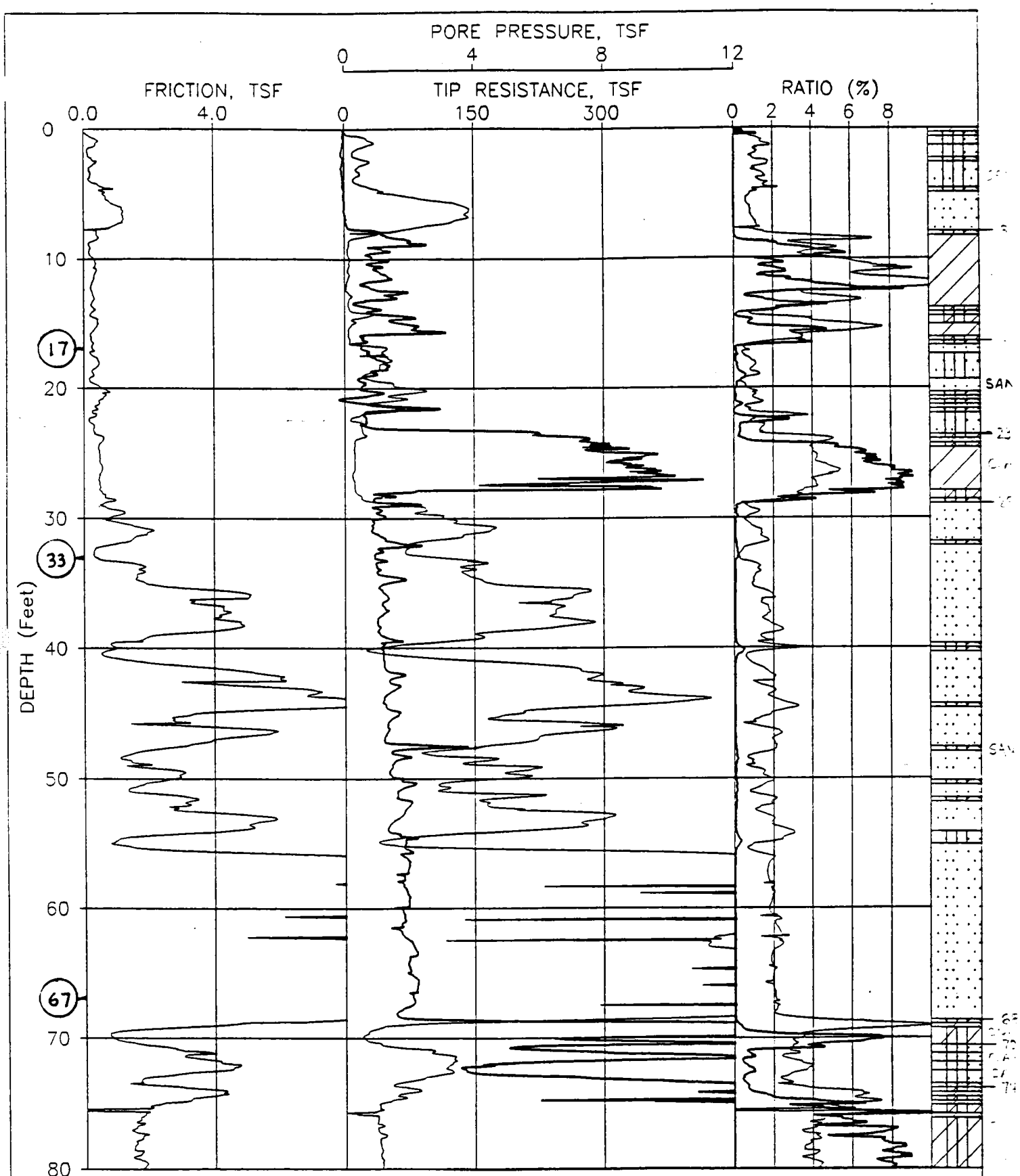
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 35 DATE: 08-26-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

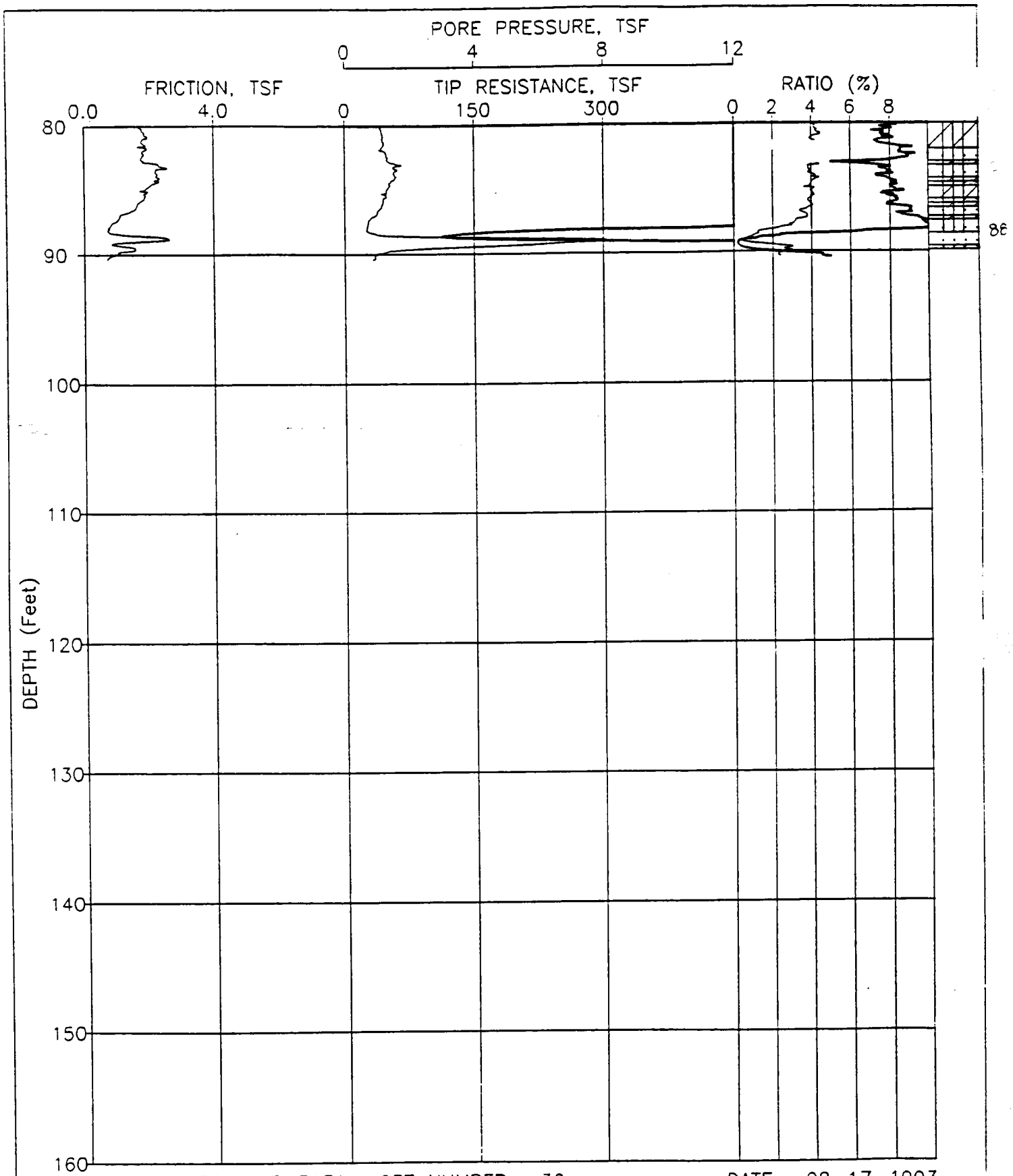
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 36 DATE: 08-17-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 2

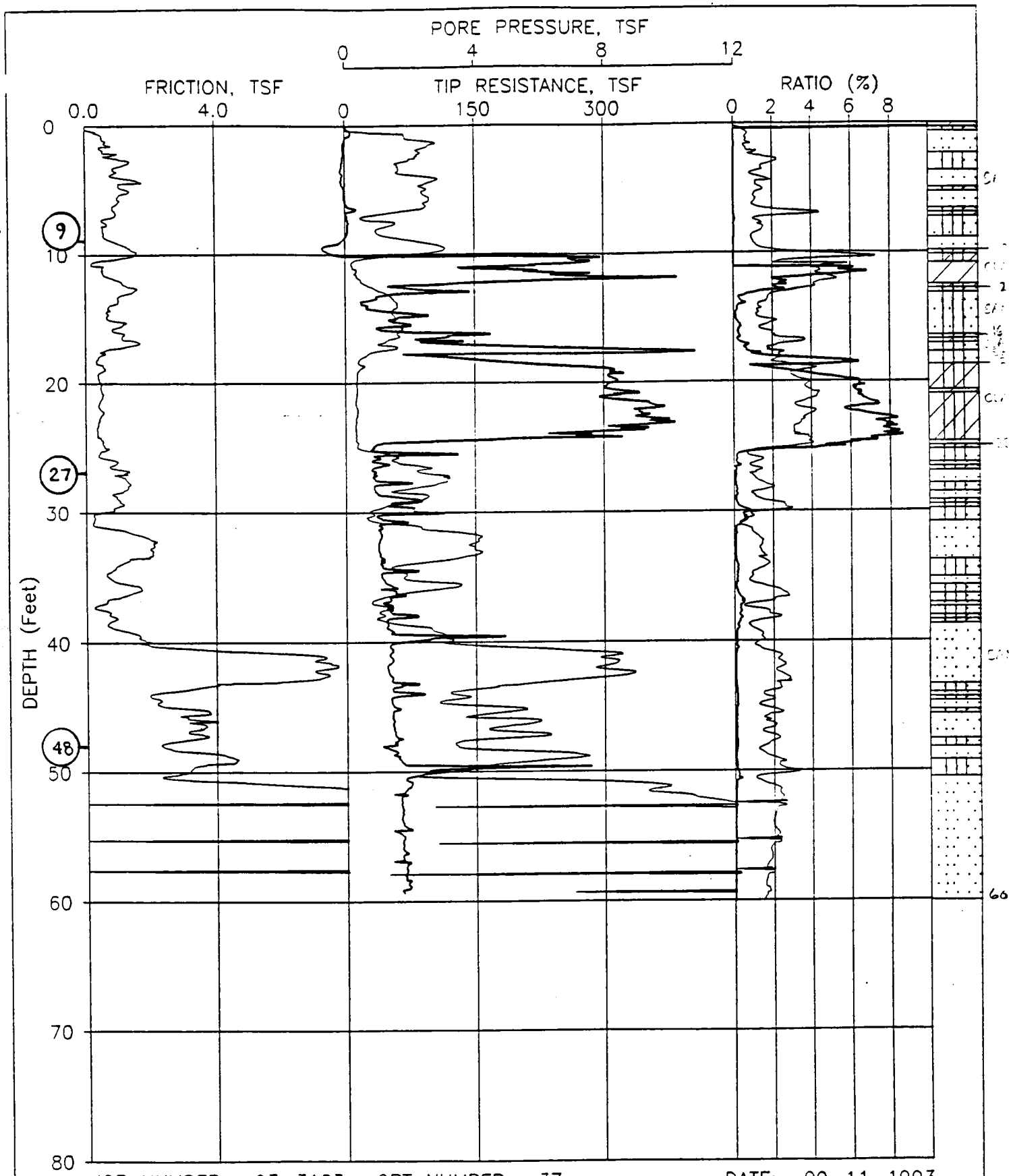
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 36 DATE: 08-17-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

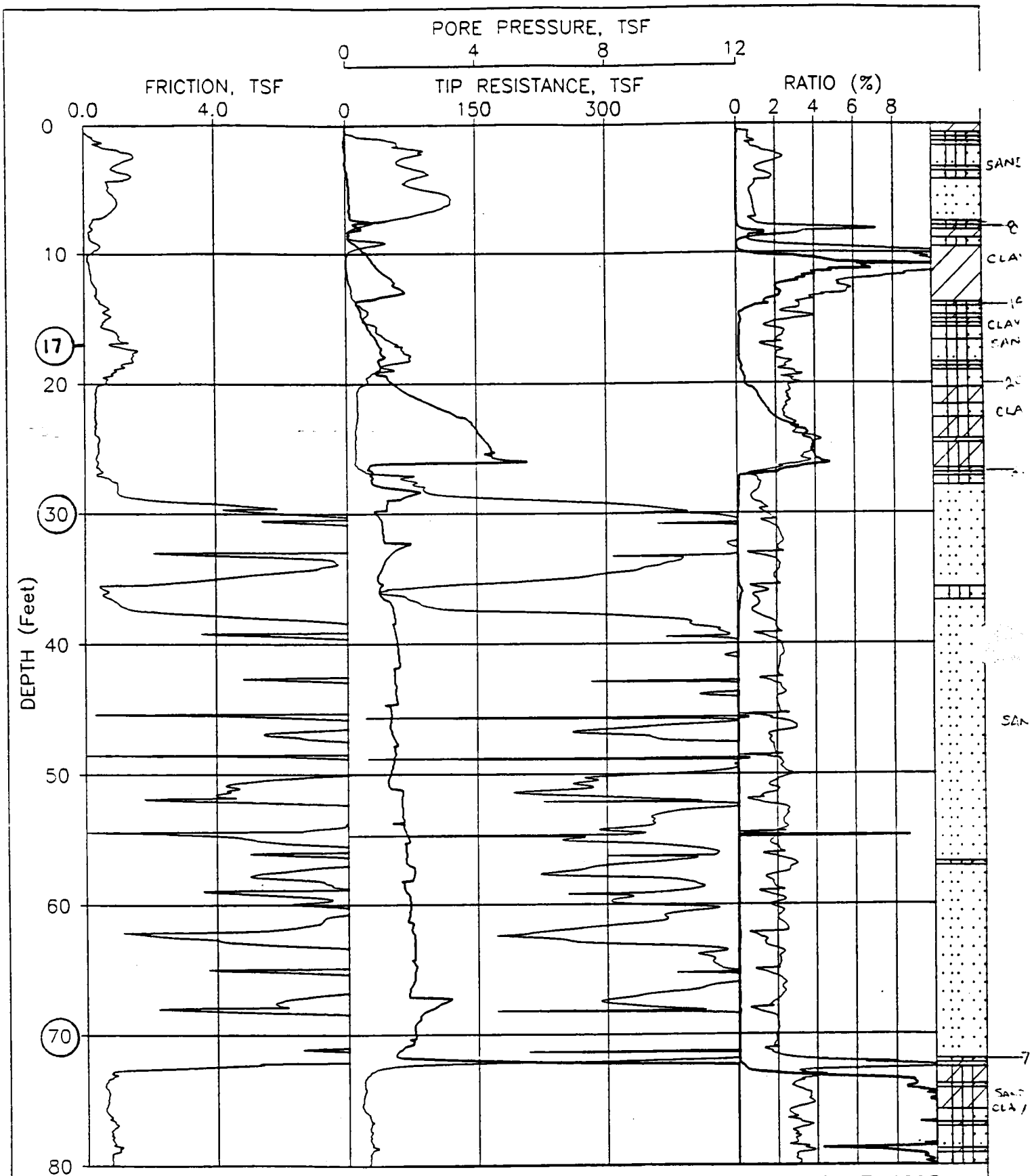
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 37 DATE: 09-11-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 1

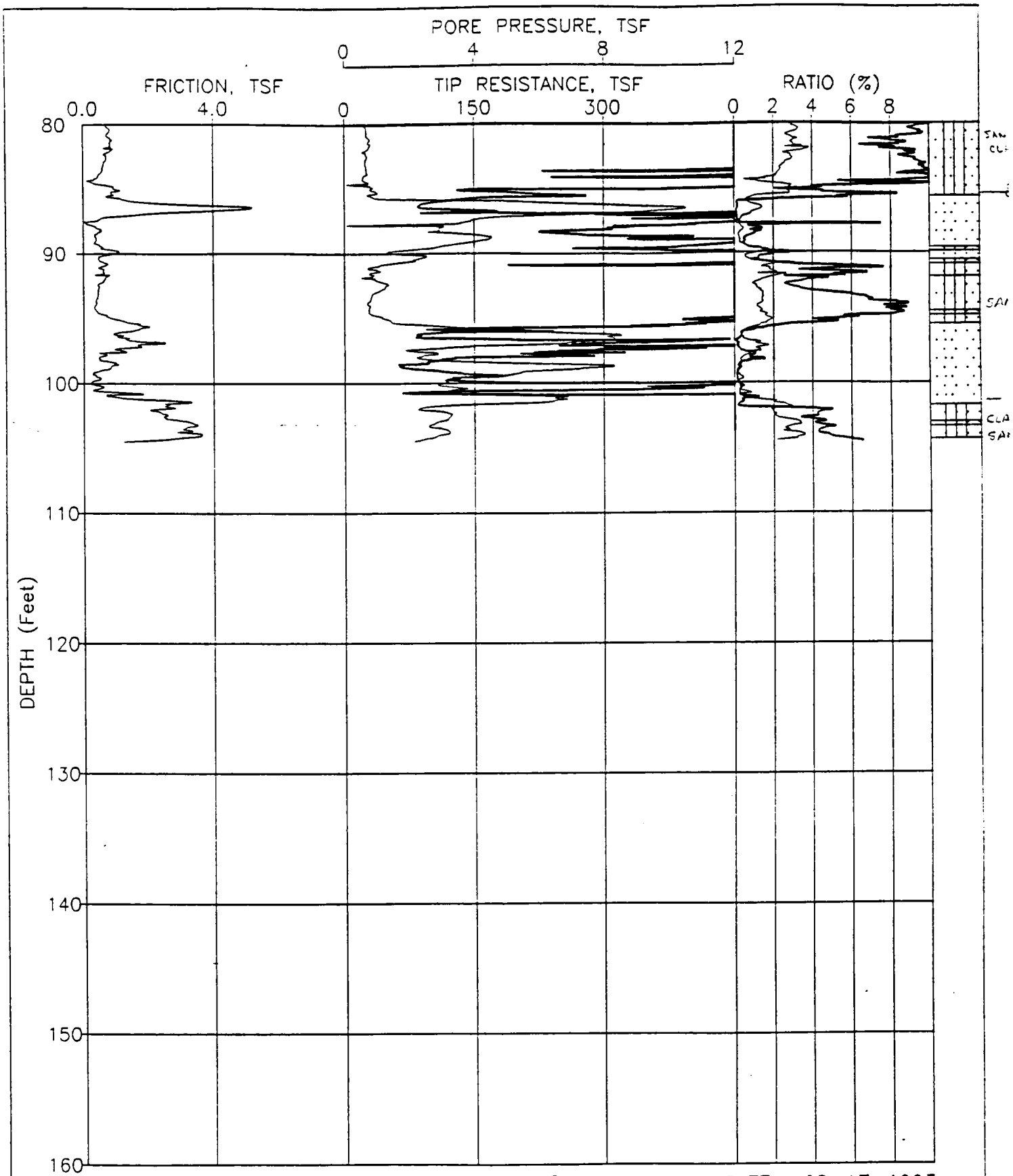
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 38 DATE: 08-17-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

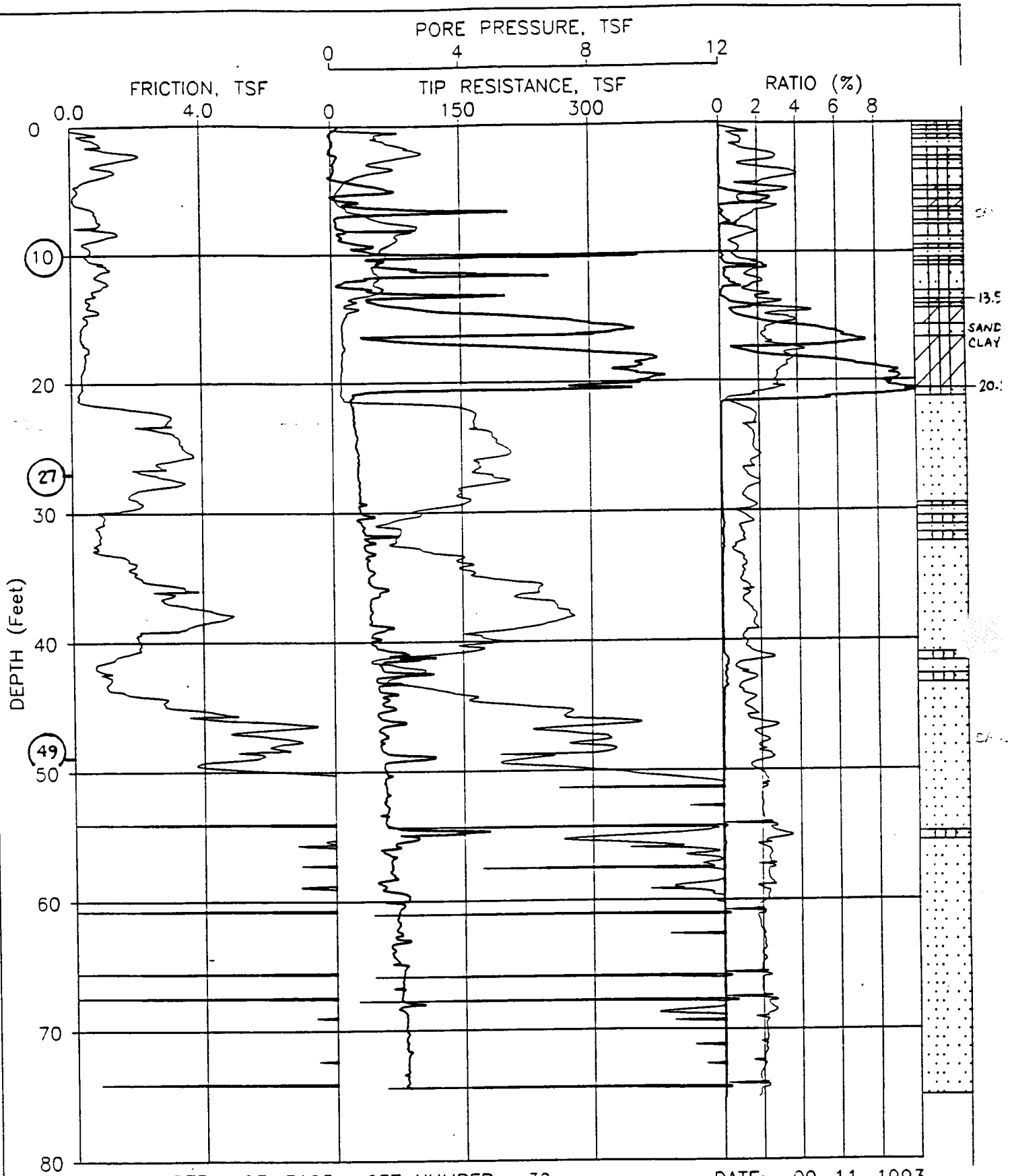
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 38 DATE: 08-17-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

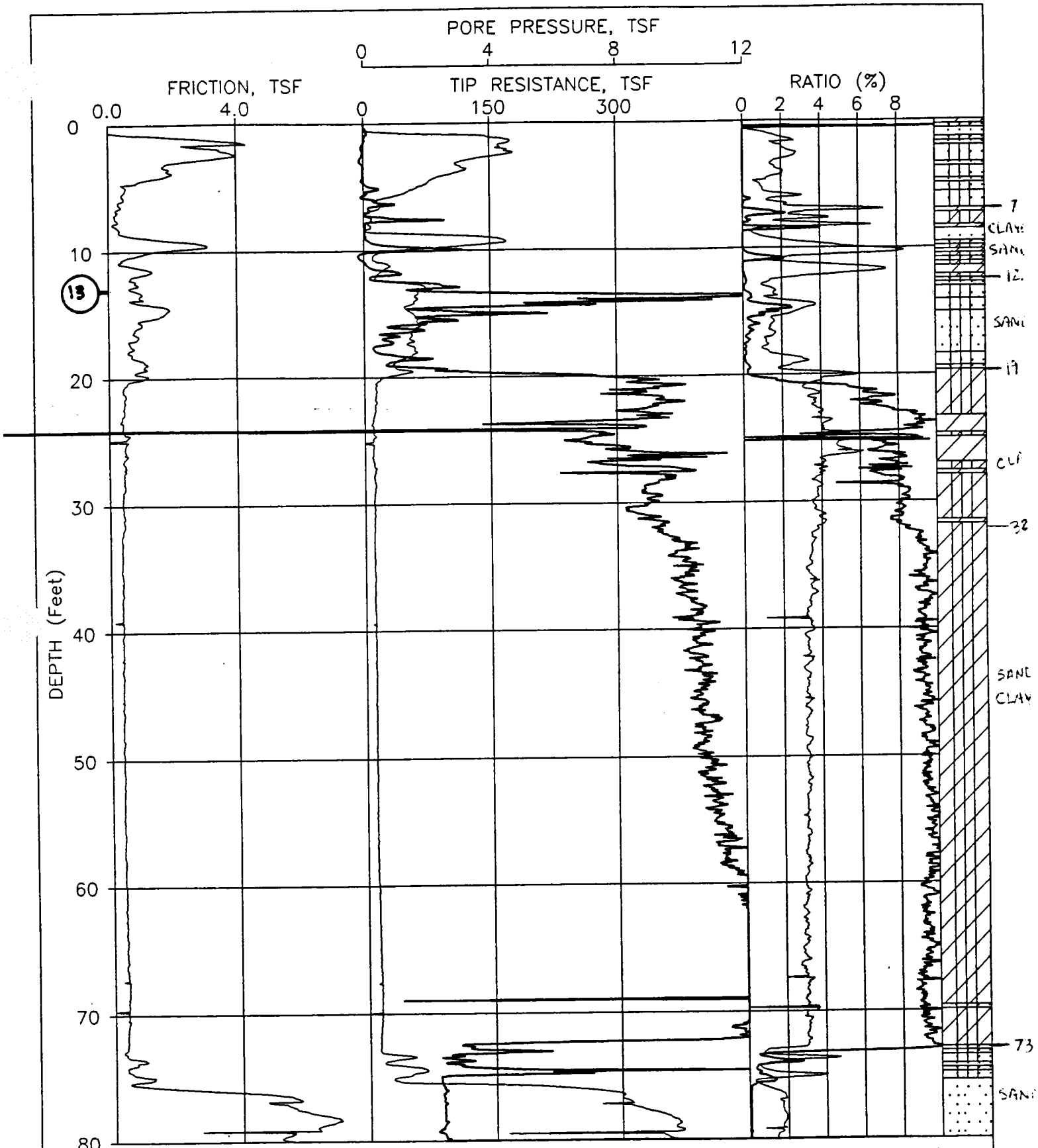
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 39 DATE: 09-11-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 1

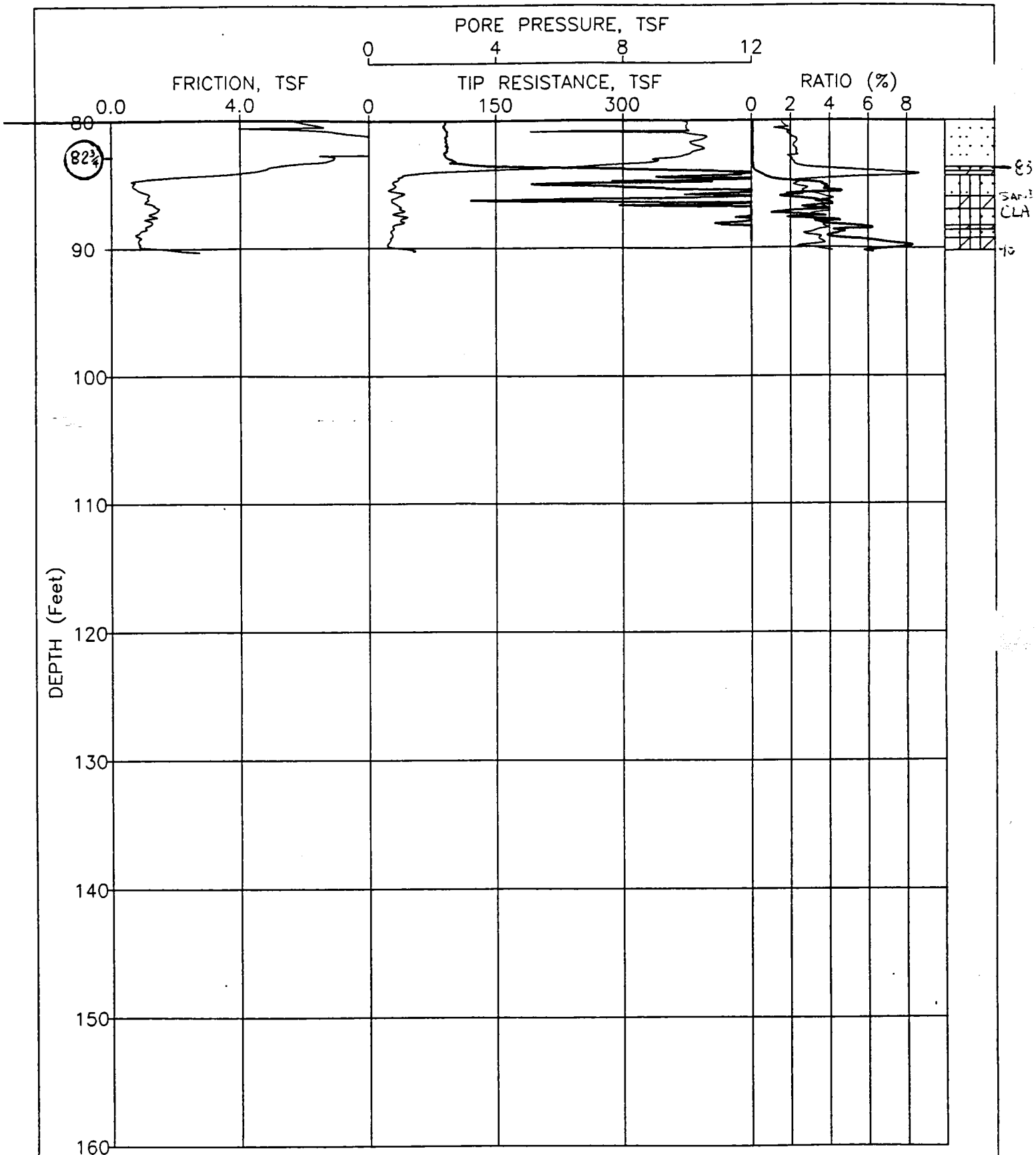
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 40 DATE: 09-10-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

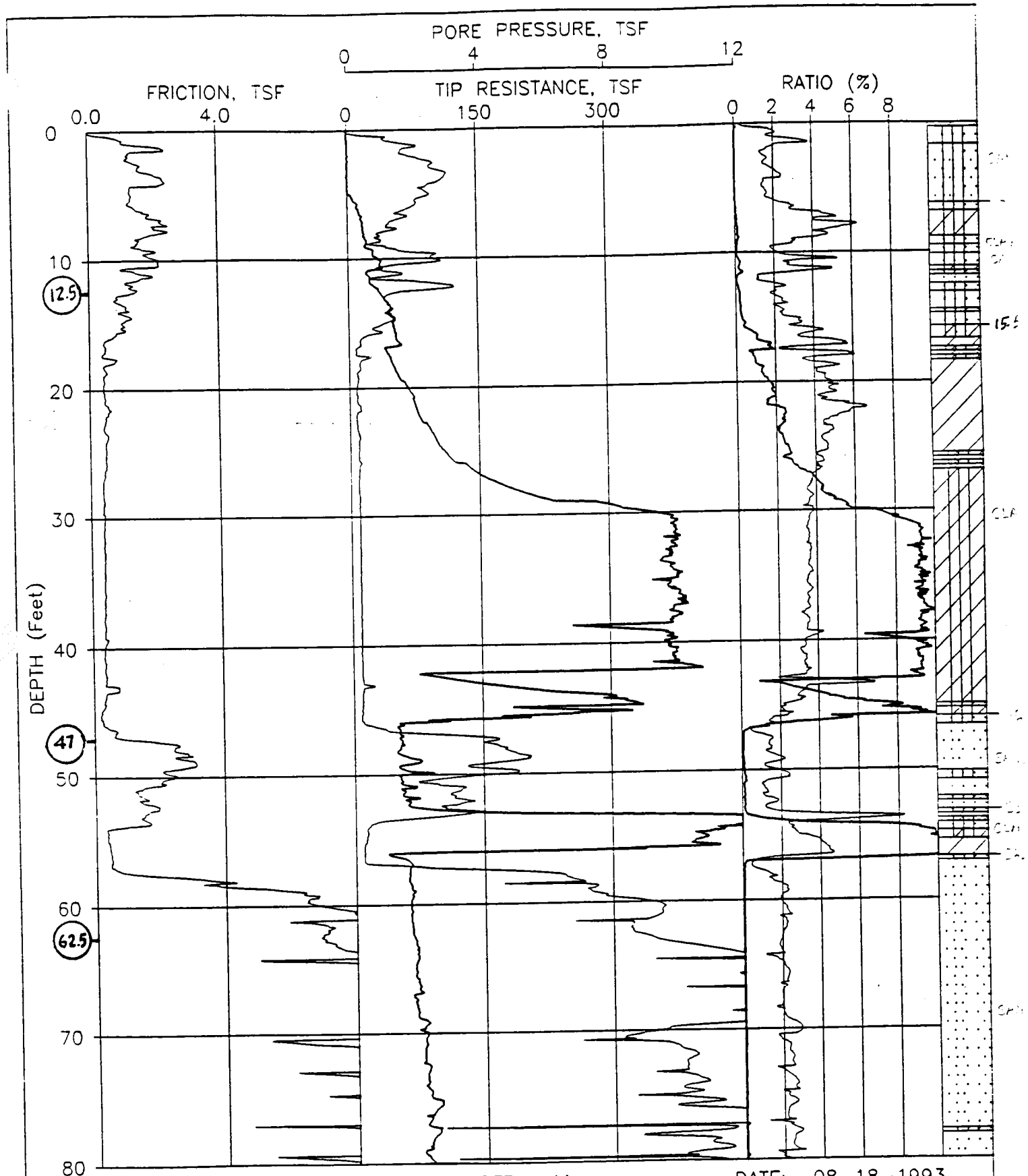
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 40 DATE: 09-10-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

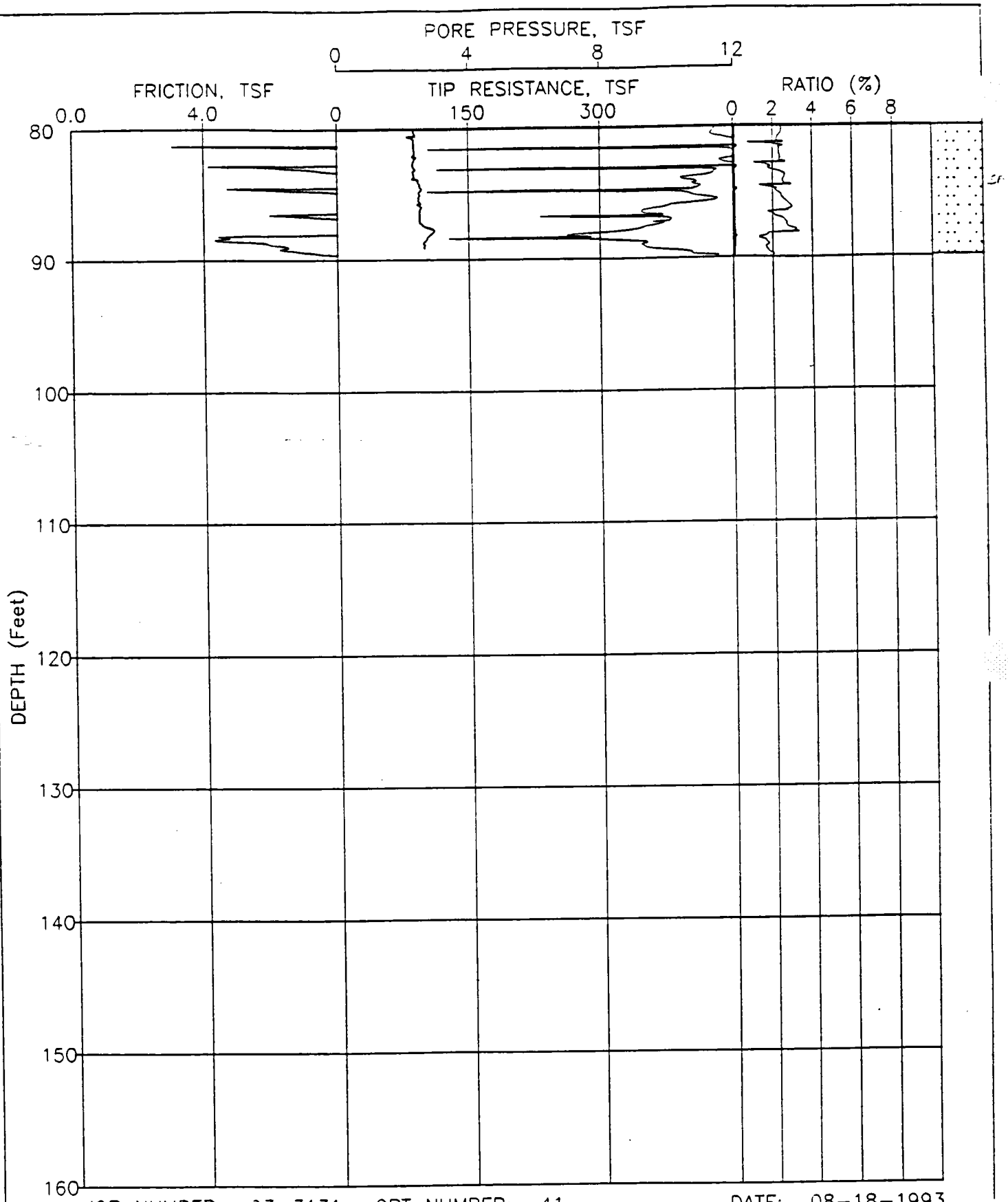
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 41 DATE: 08-18-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 2

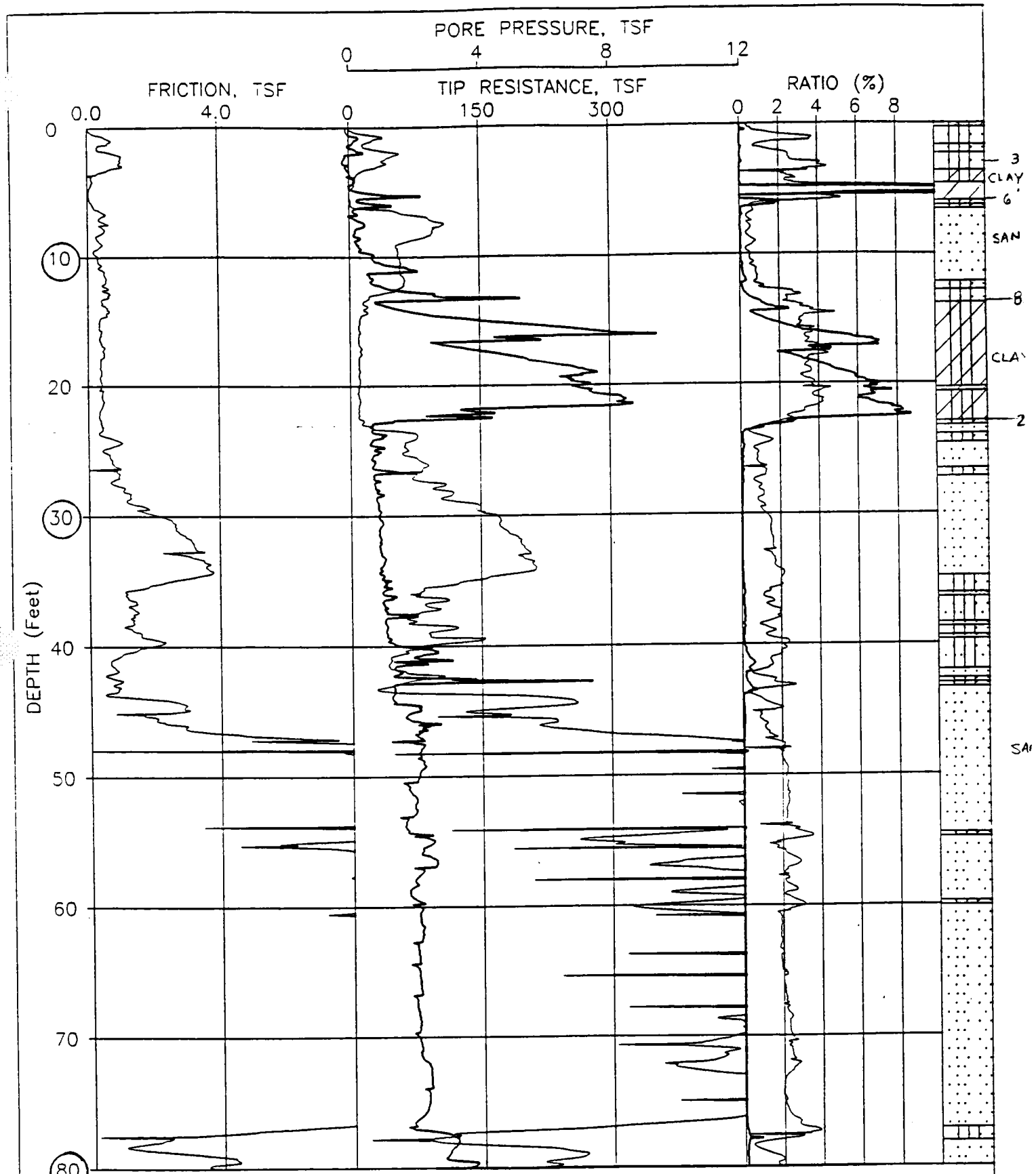
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 41 DATE: 08-18-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

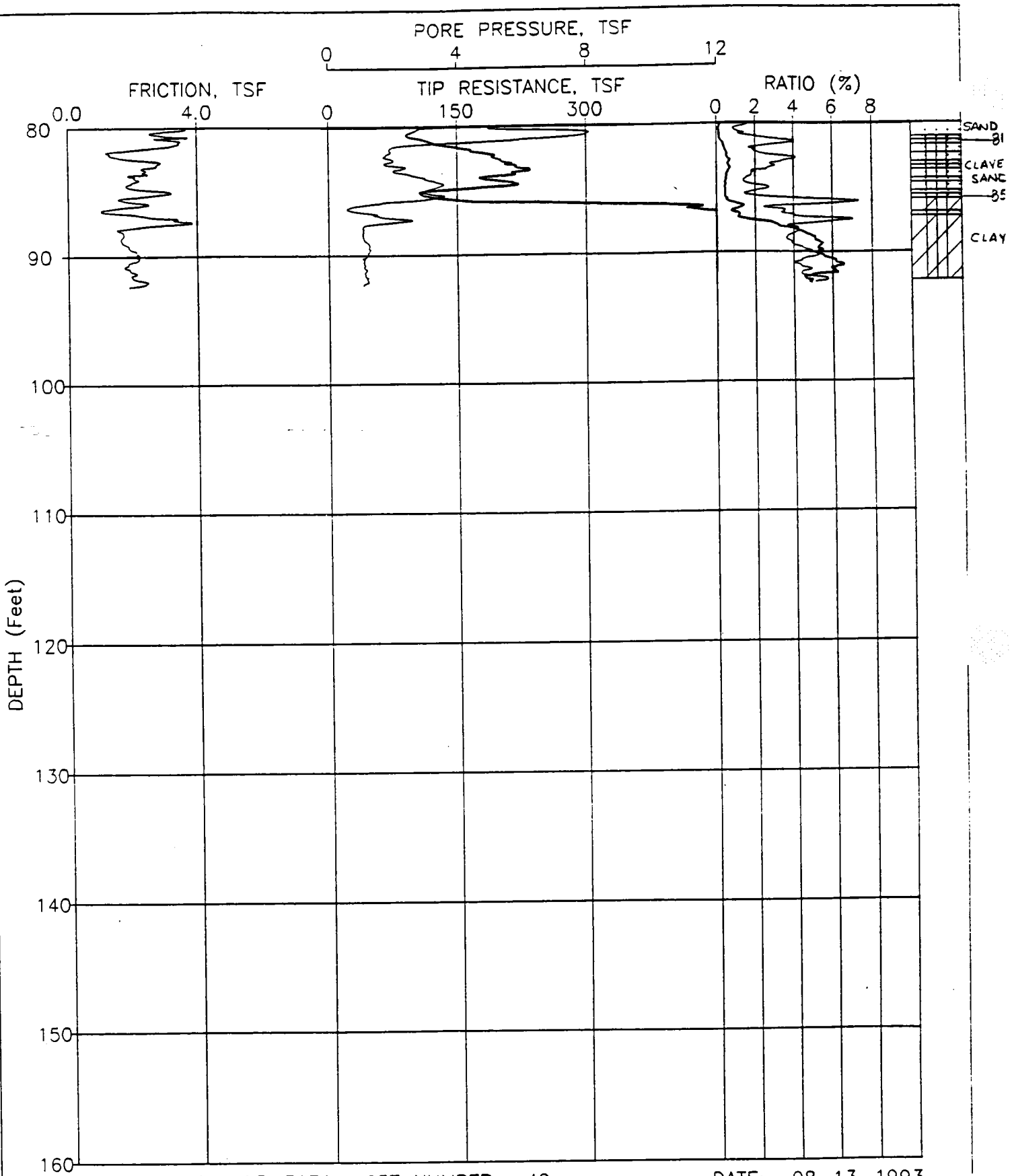
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 42 DATE: 08-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 2

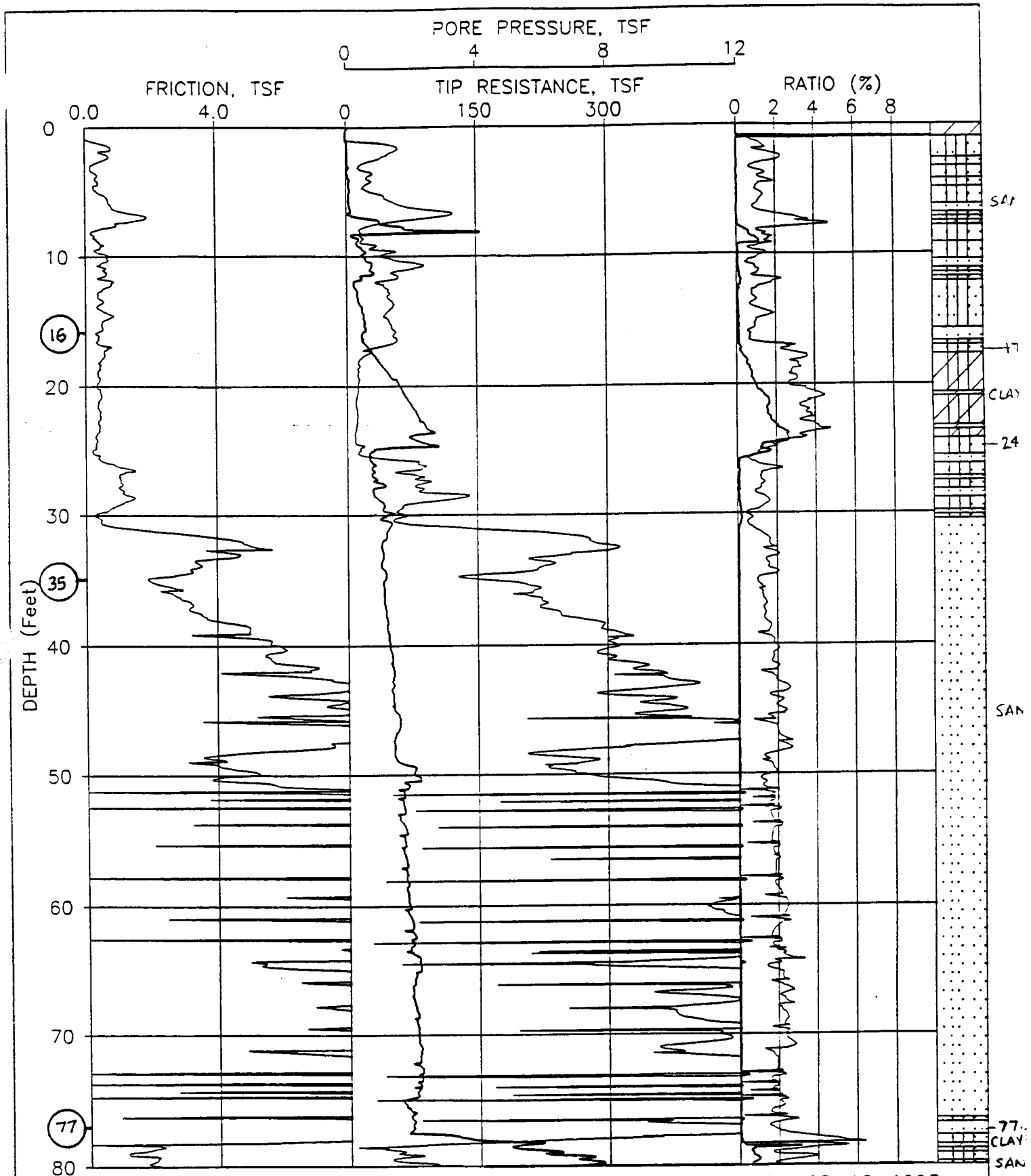
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 42 DATE: 08-13-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

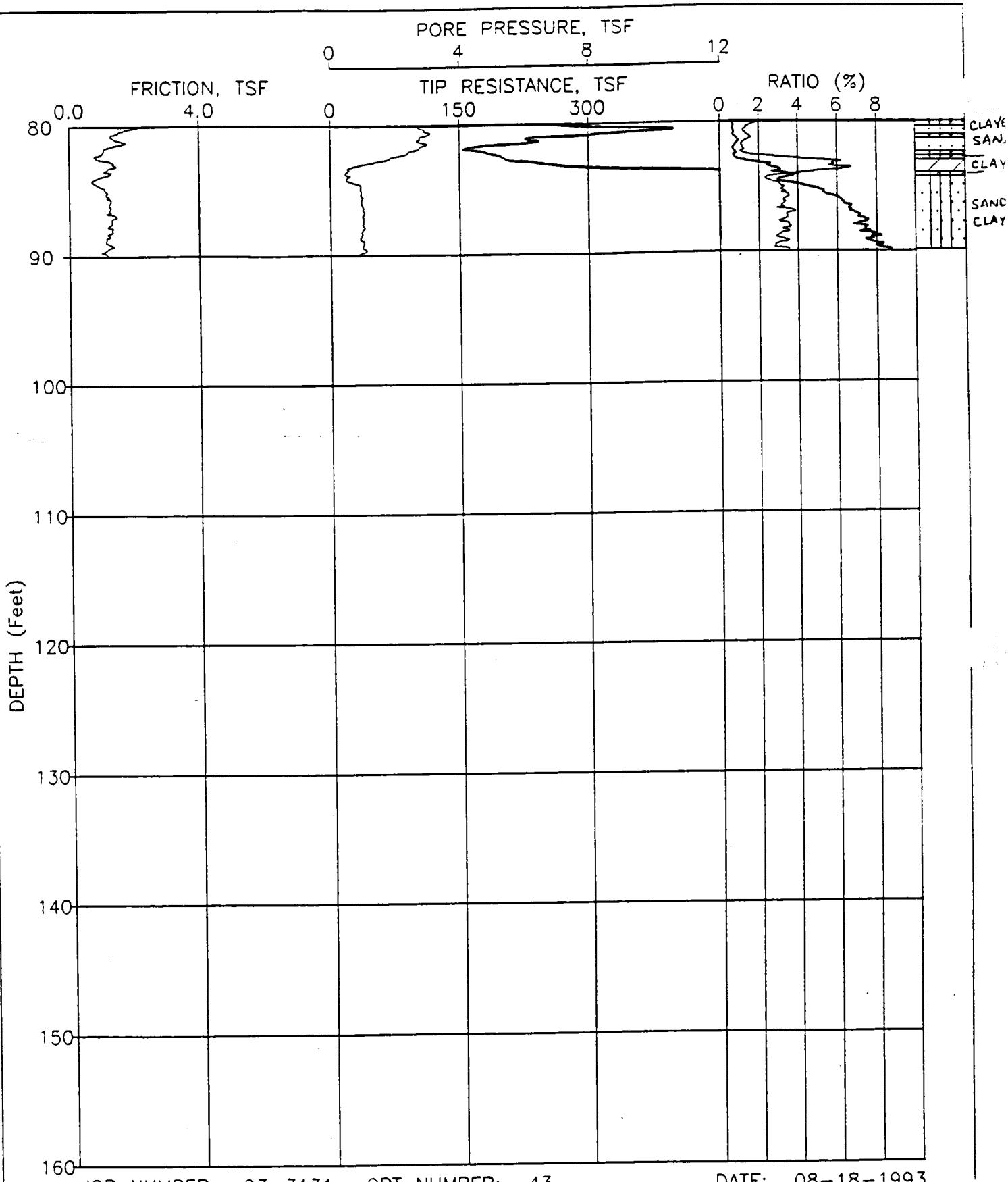
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 43 DATE: 08-18-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

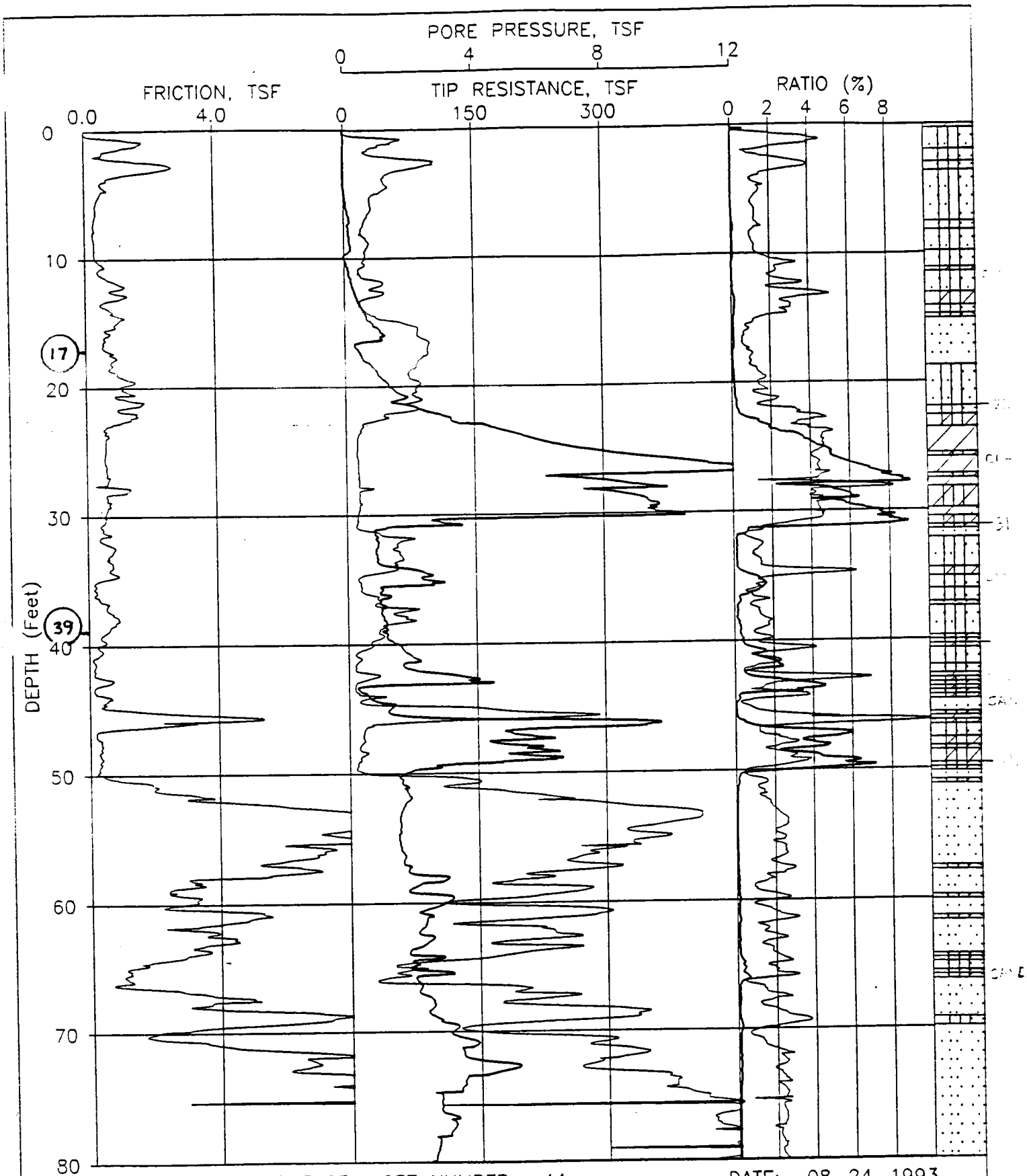
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3131 CPT NUMBER: 43 DATE: 08-18-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

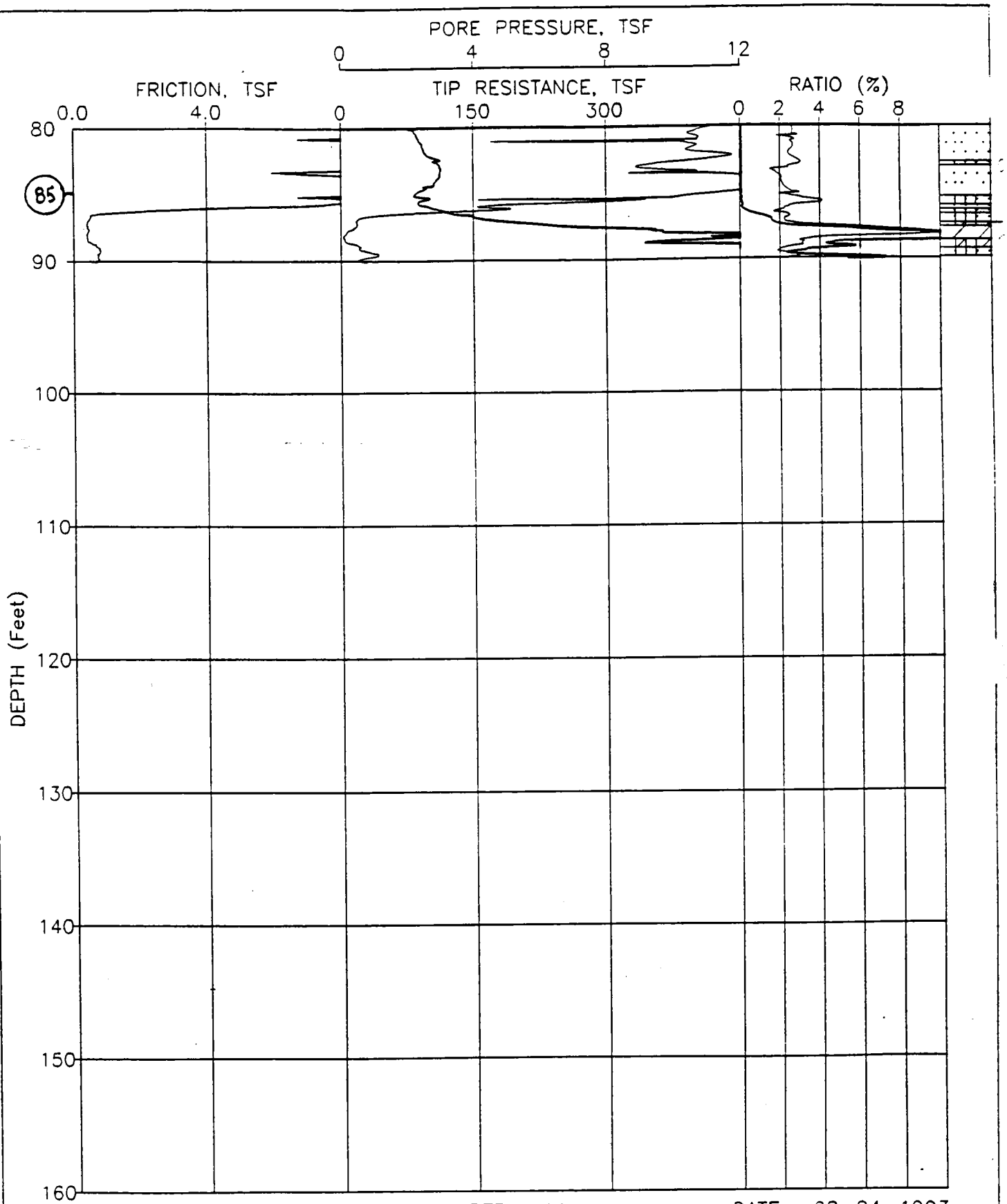
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 44 DATE: 08-24-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 2

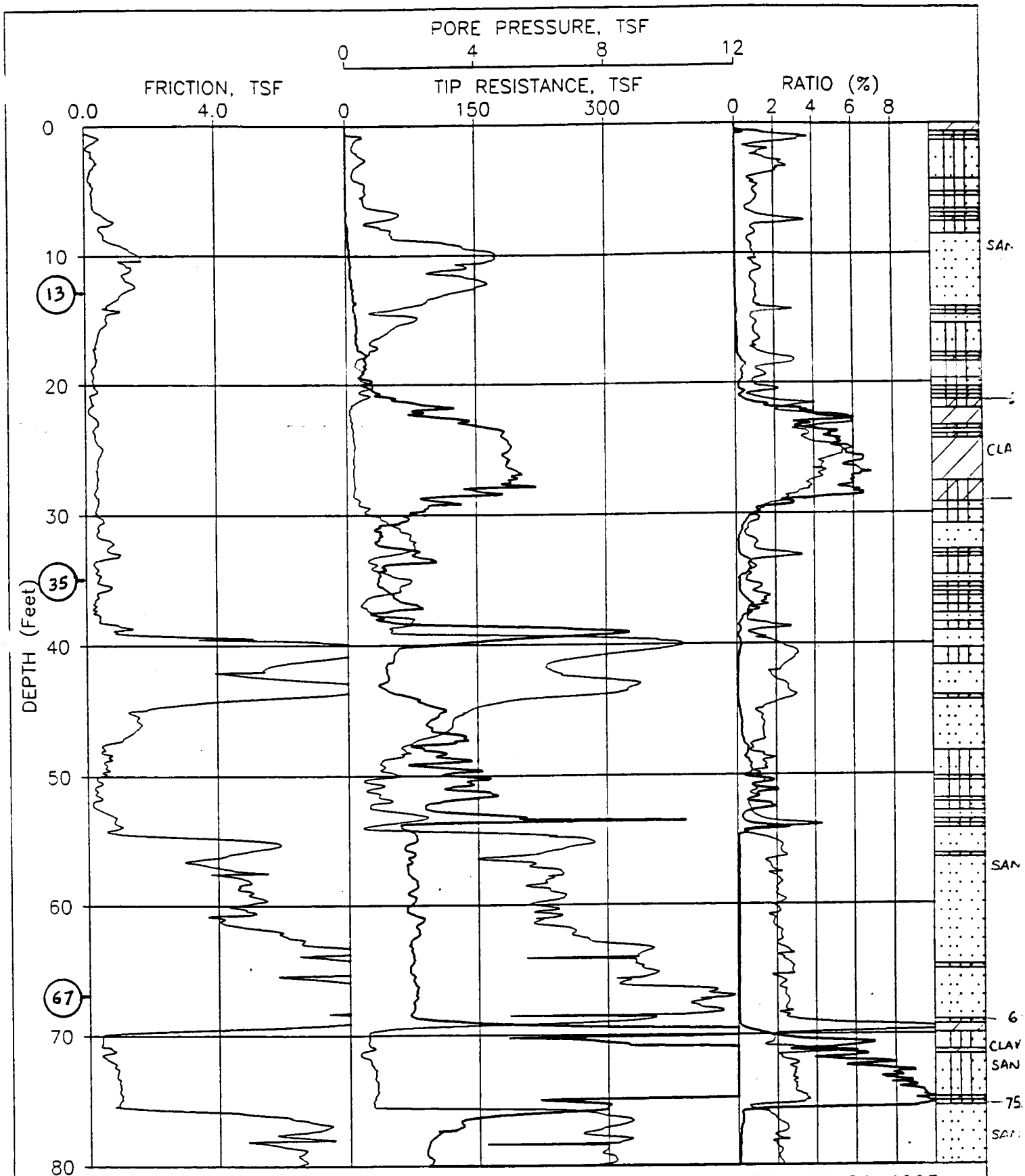
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 44 DATE: 08-24-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

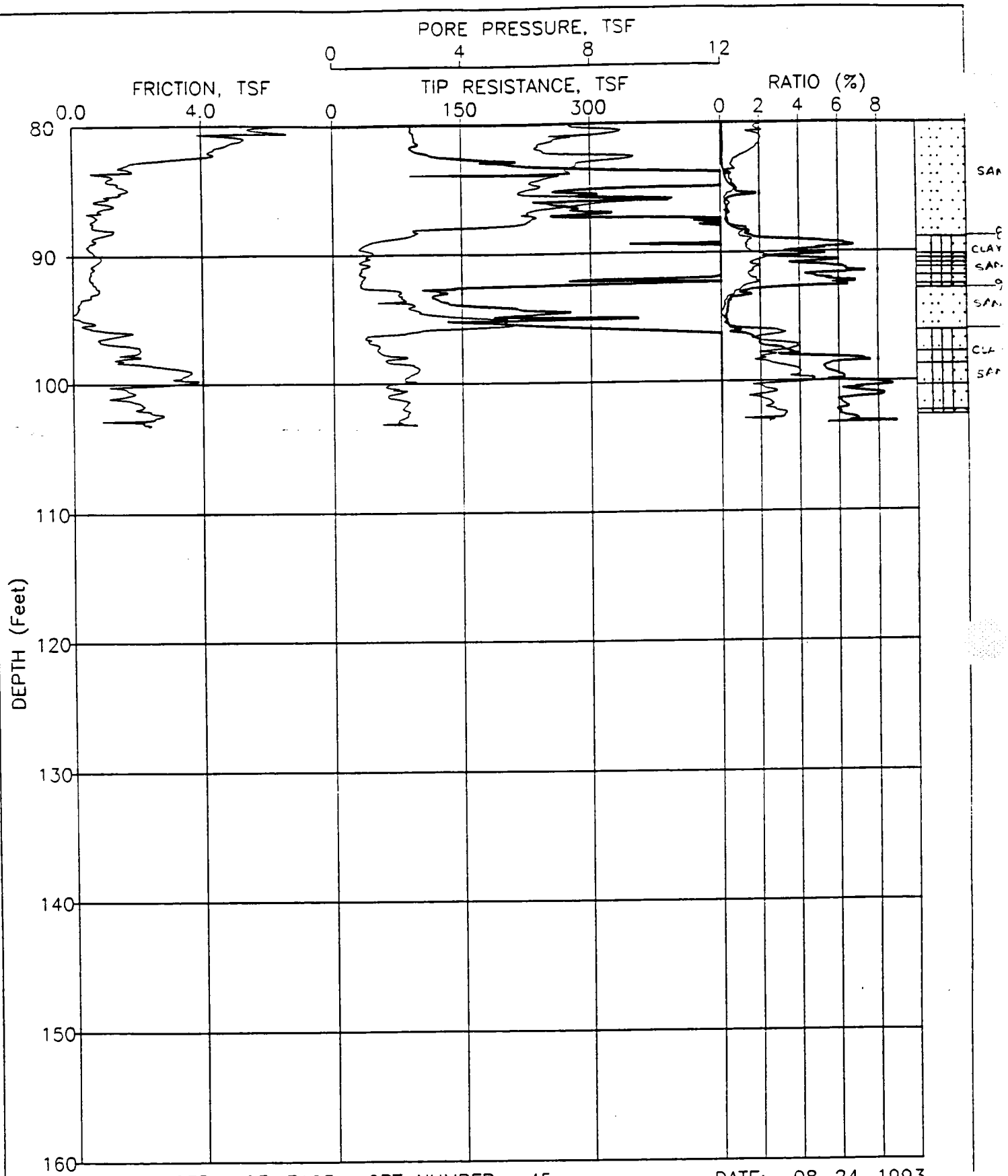
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 45 DATE: 08-24-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

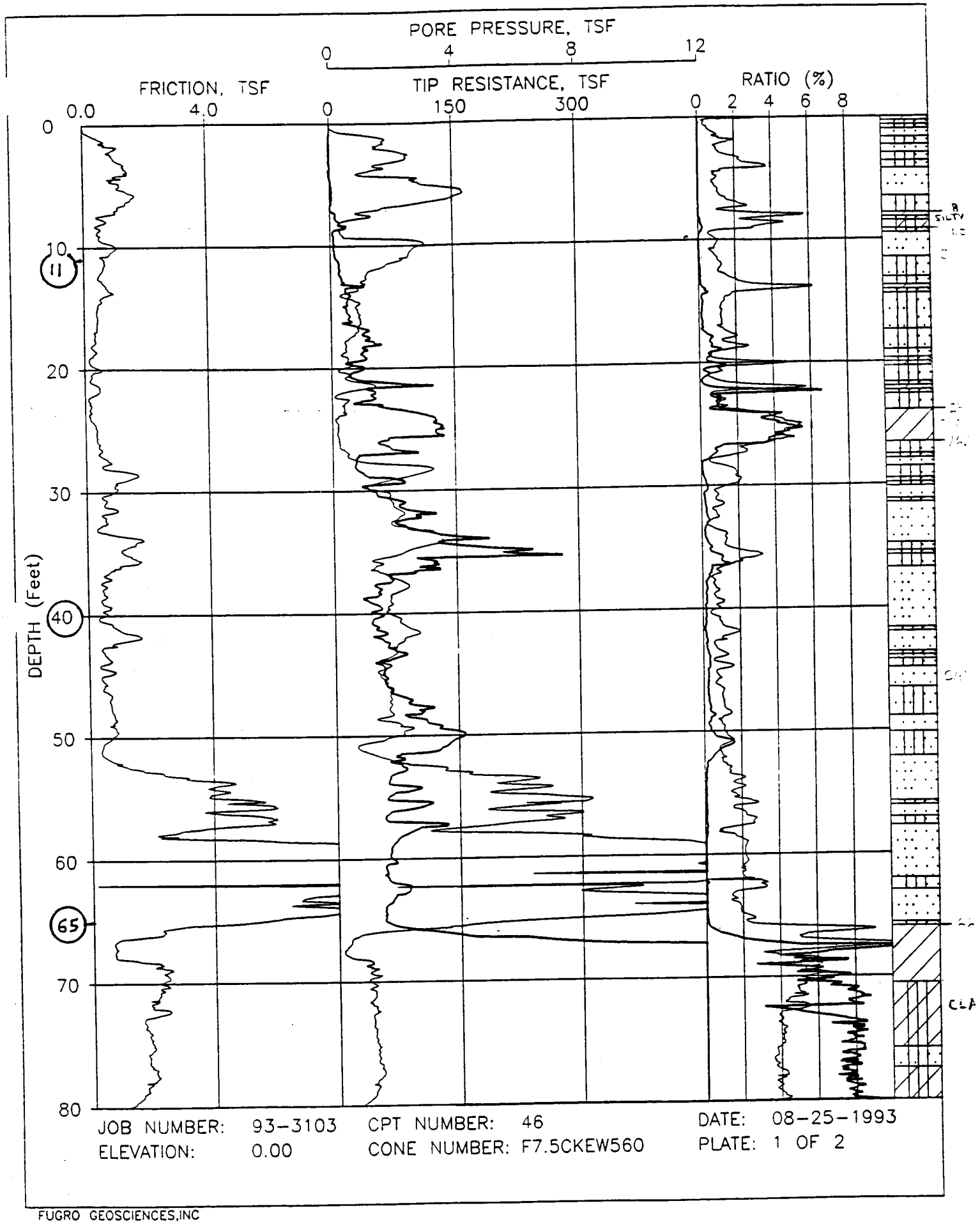
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 45 DATE: 08-24-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

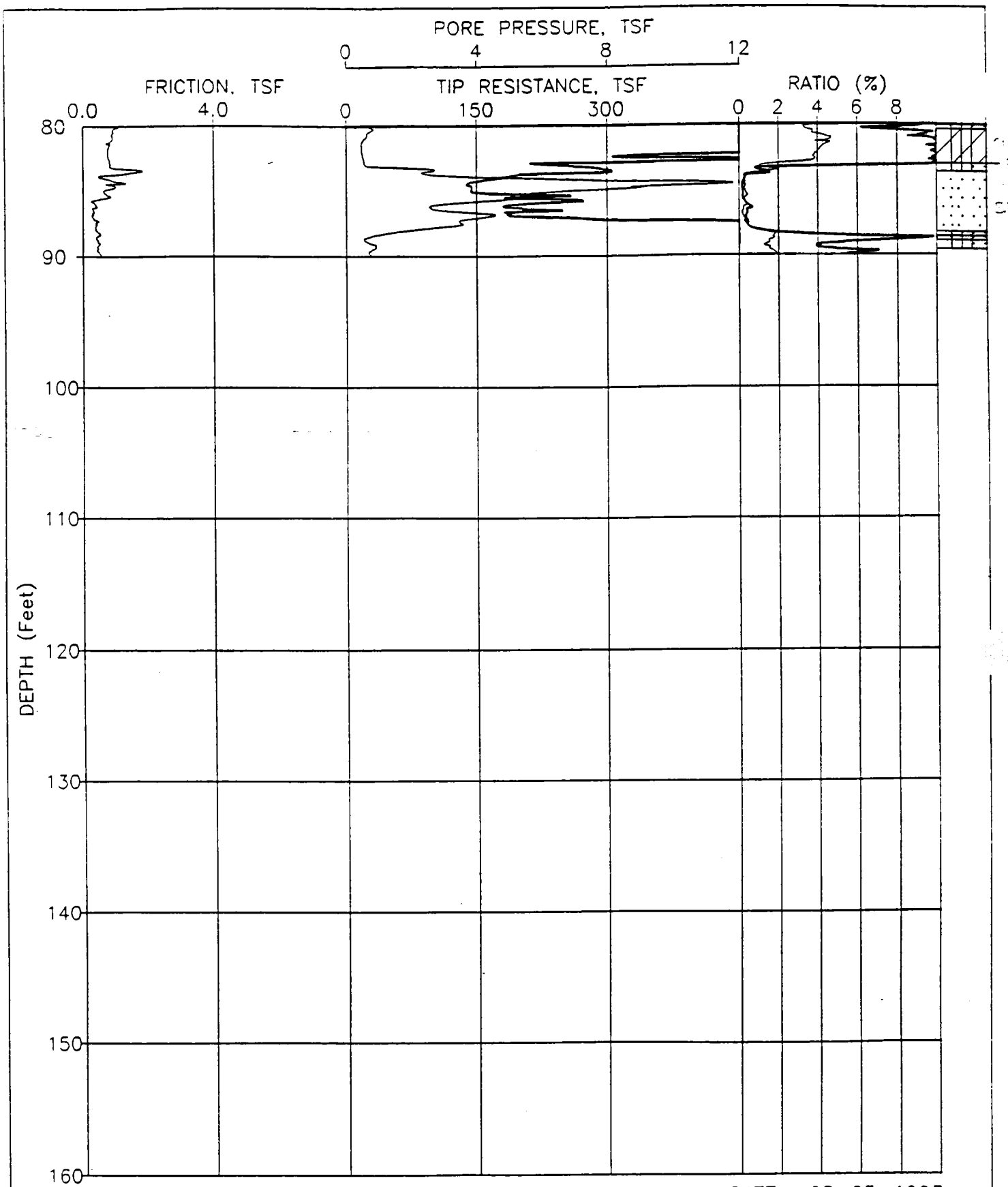
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 46 DATE: 08-25-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 2

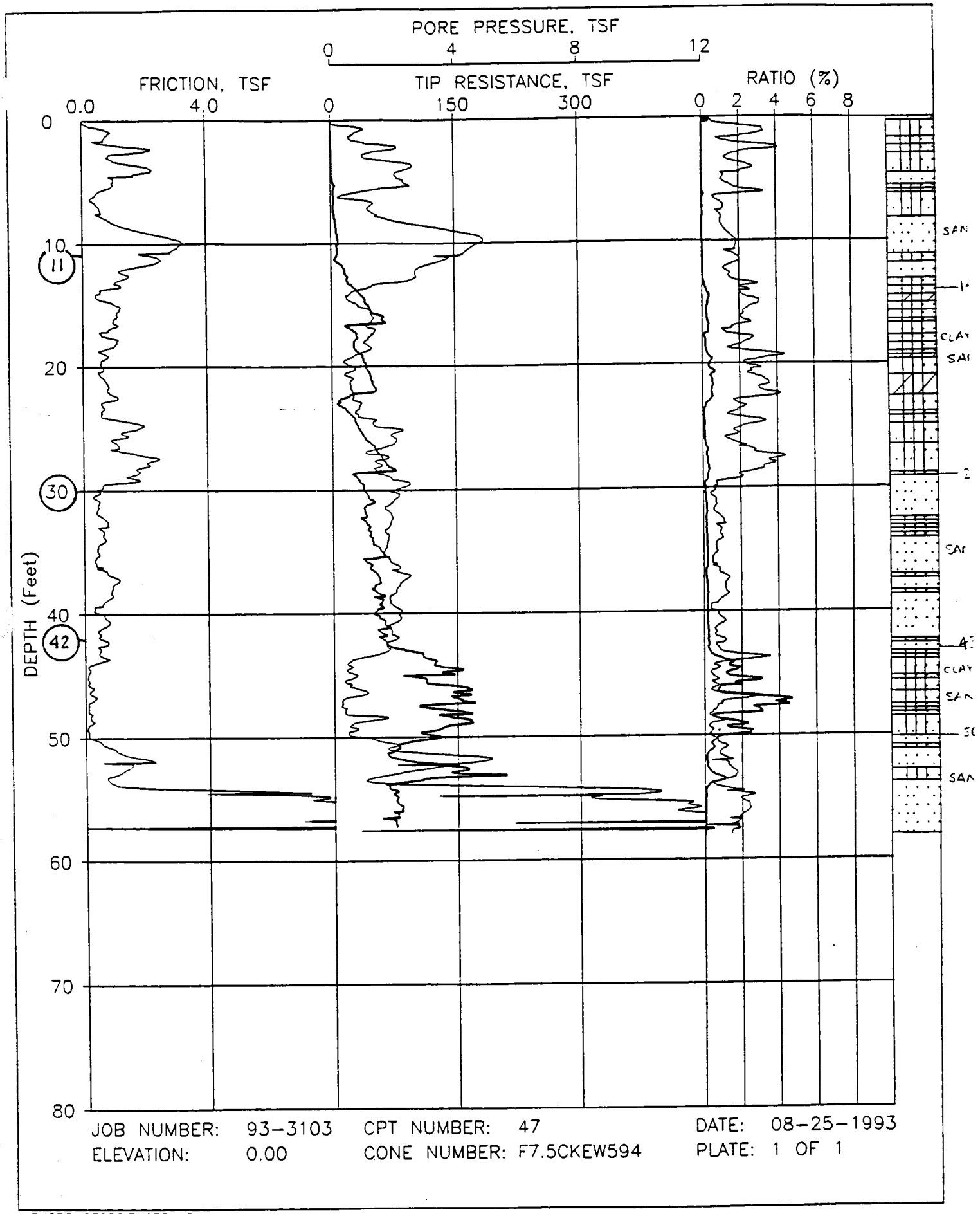
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 46 DATE: 08-25-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

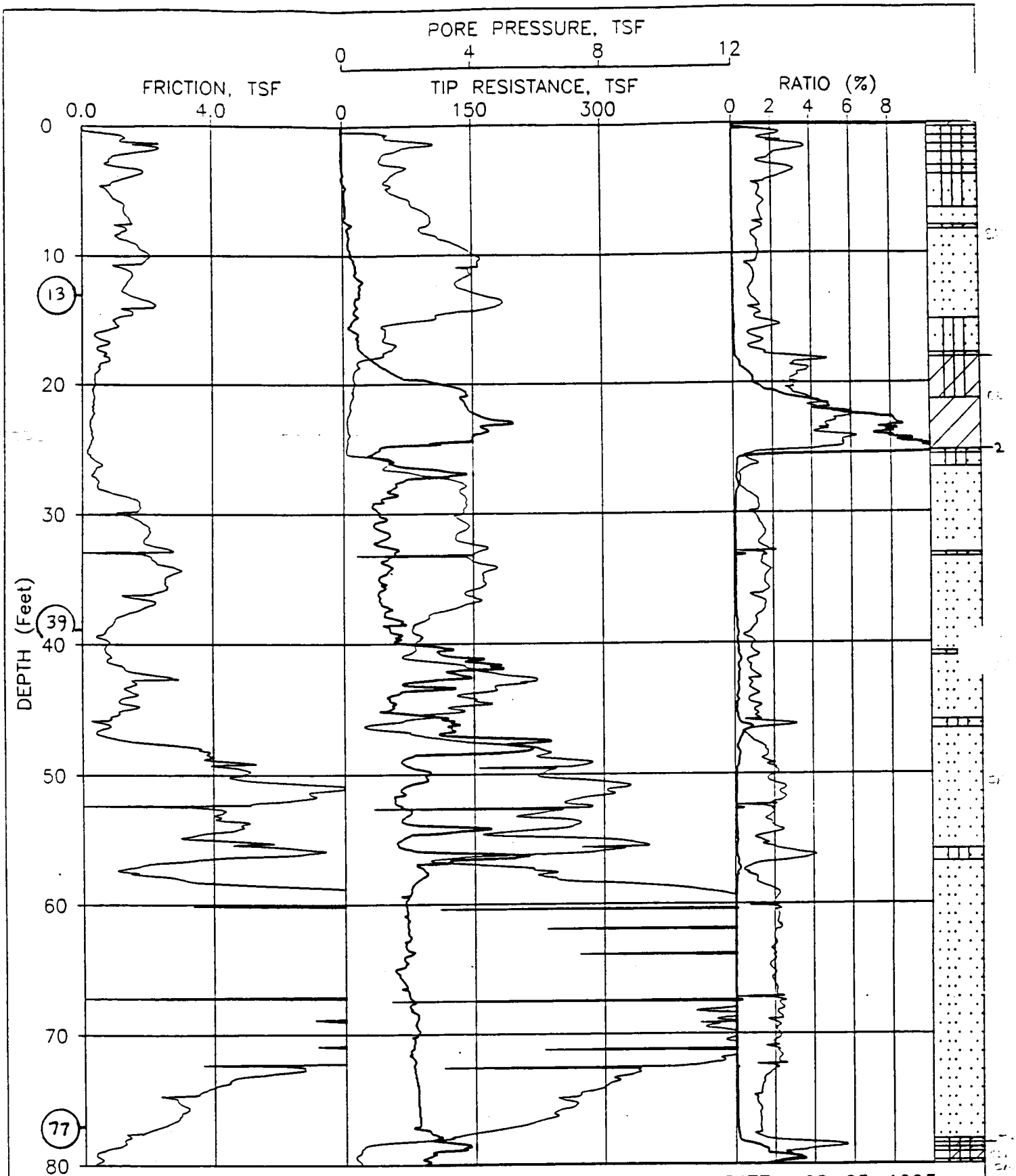
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 47 DATE: 08-25-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 1

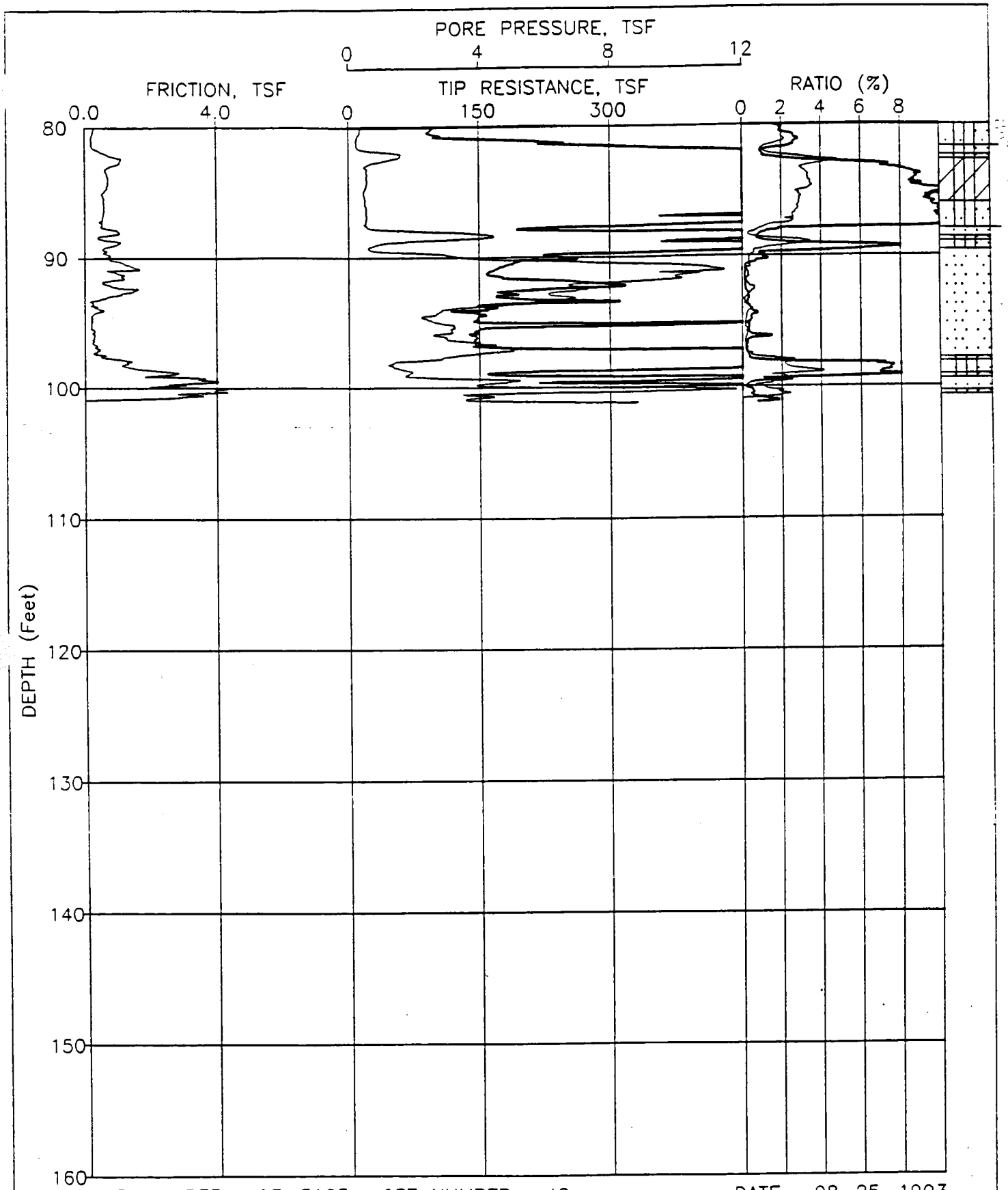
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 48 DATE: 08-25-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

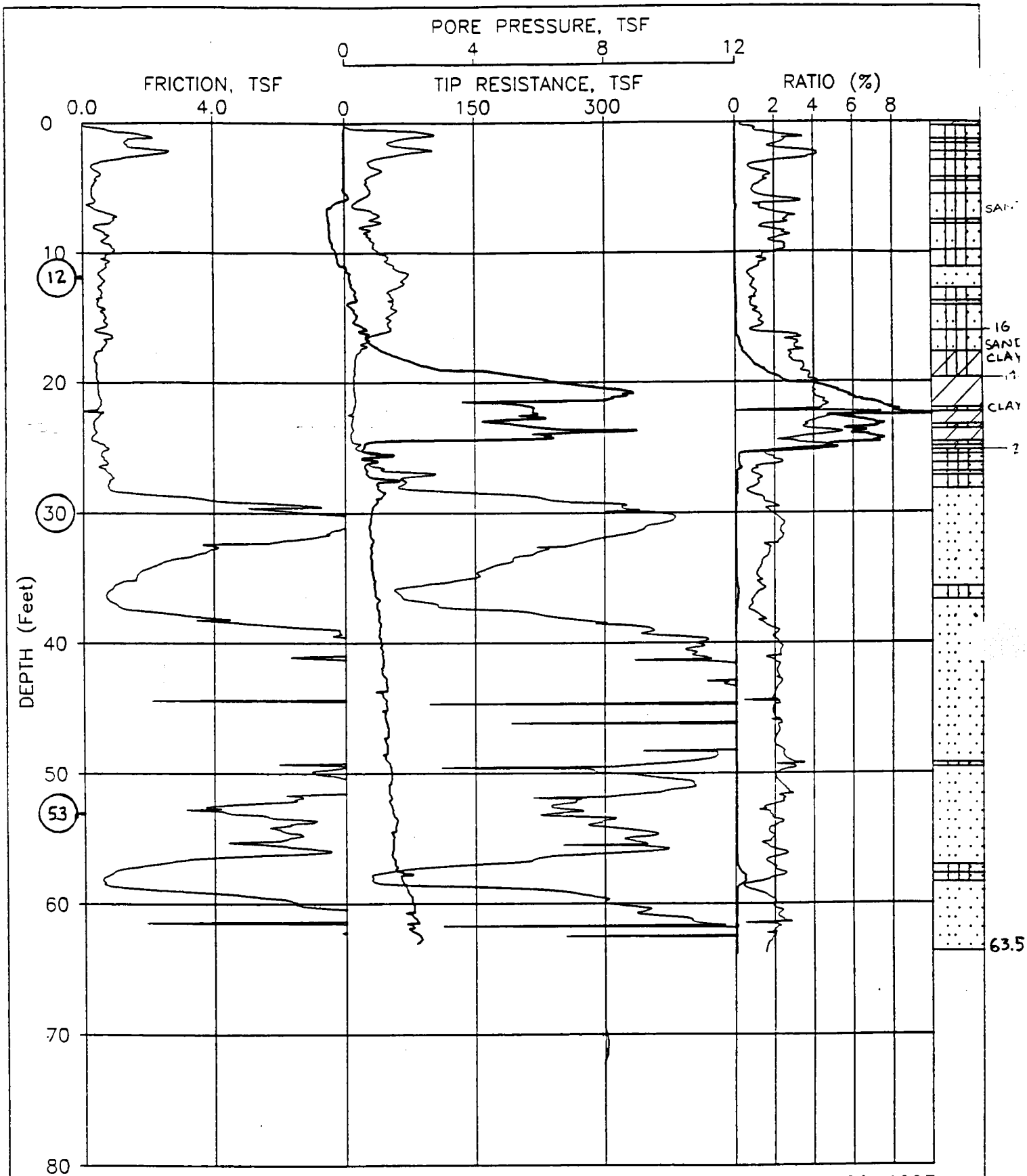
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 48 DATE: 08-25-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

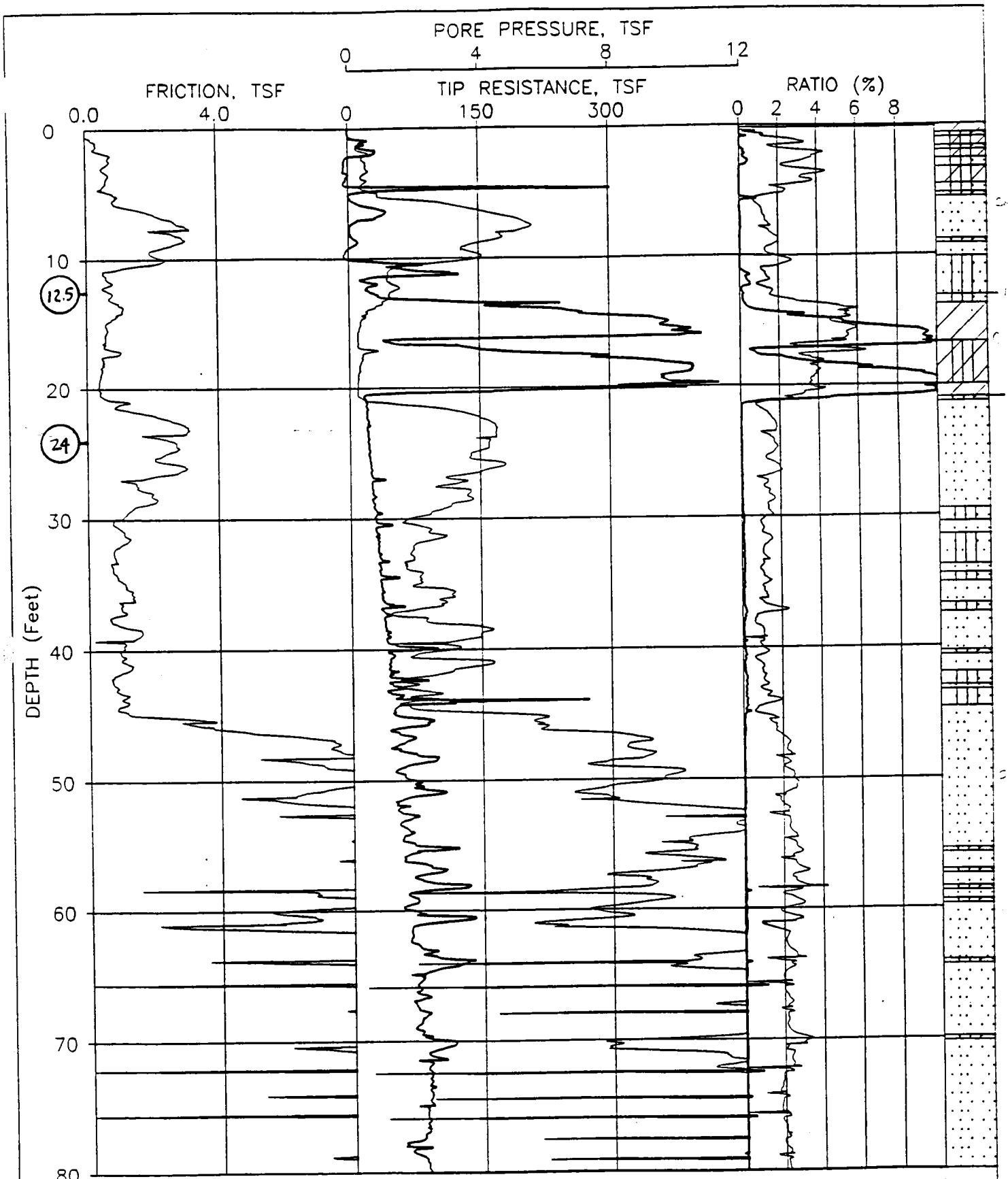
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 49 DATE: 08-26-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 1

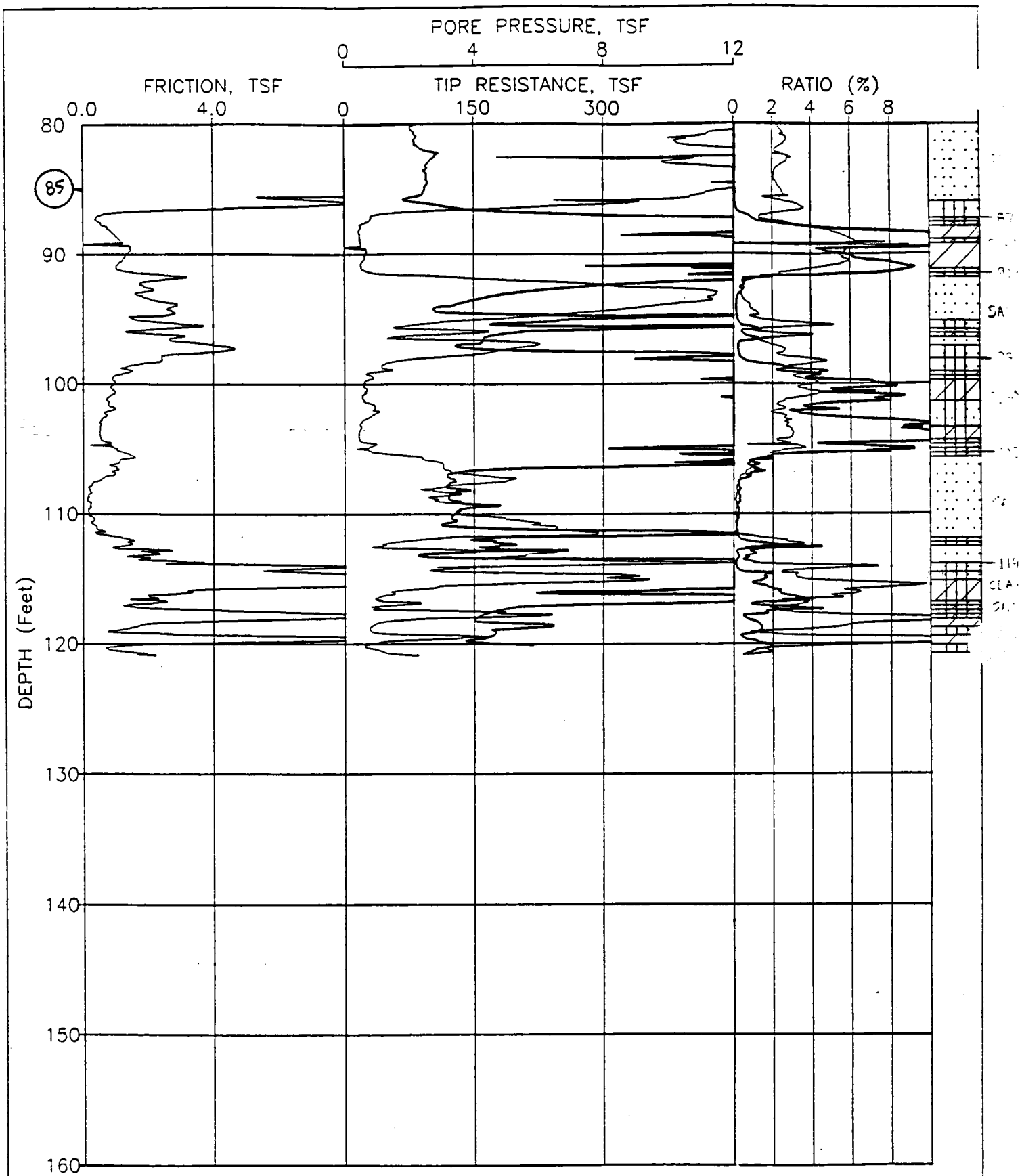
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 50 DATE: 08-31-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 2

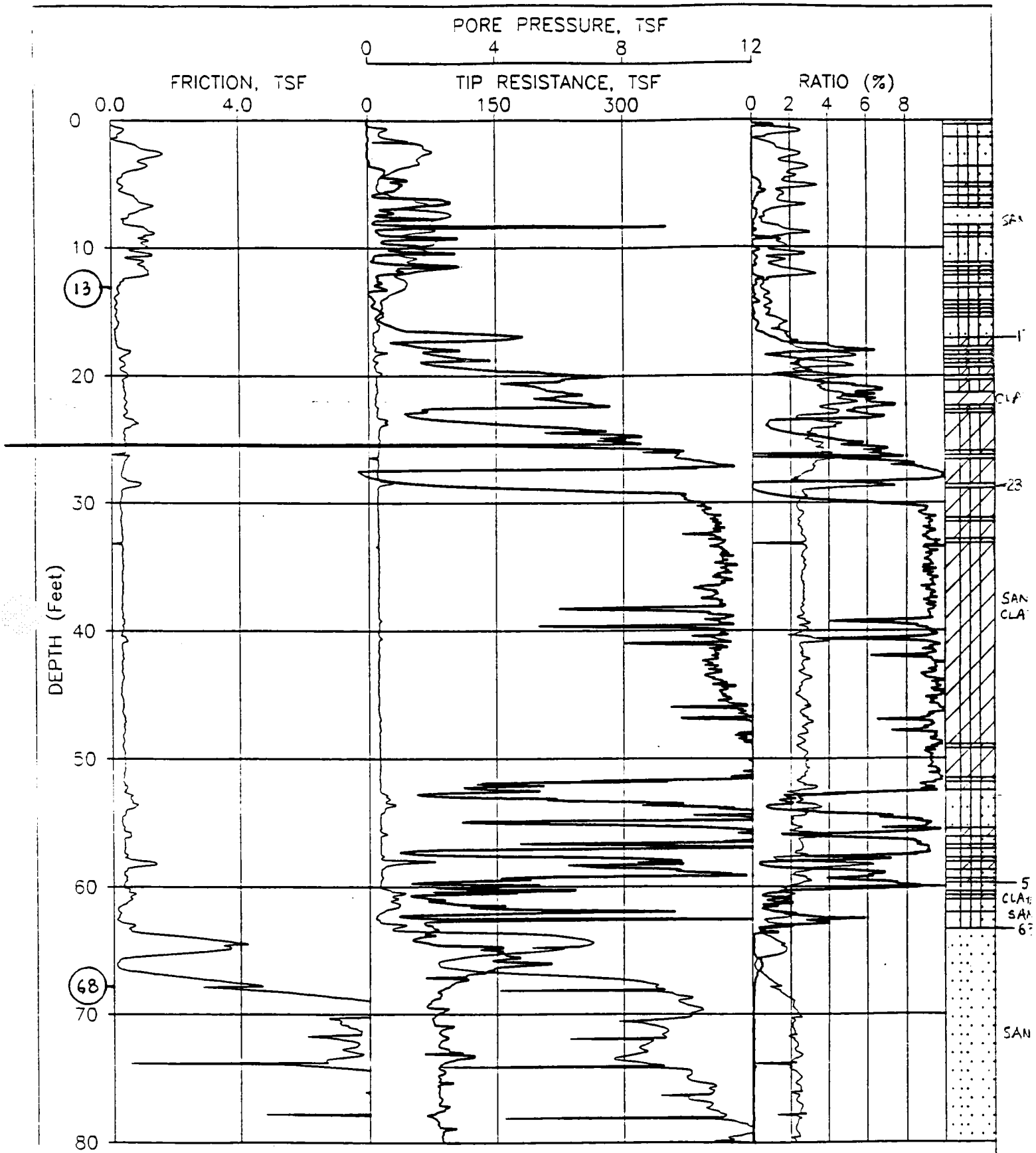
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 50 DATE: 08-31-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

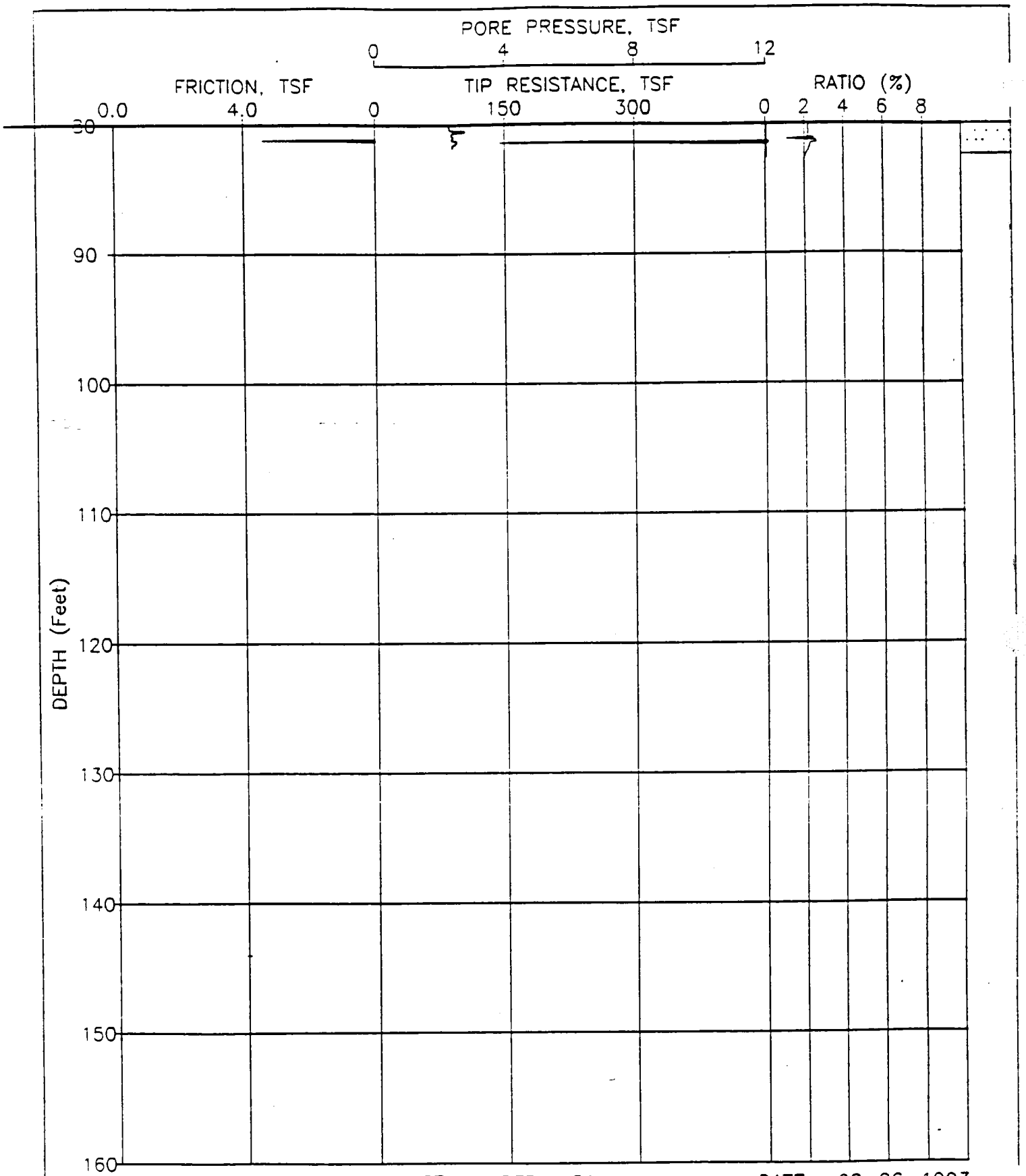
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 51 DATE: 08-26-1993

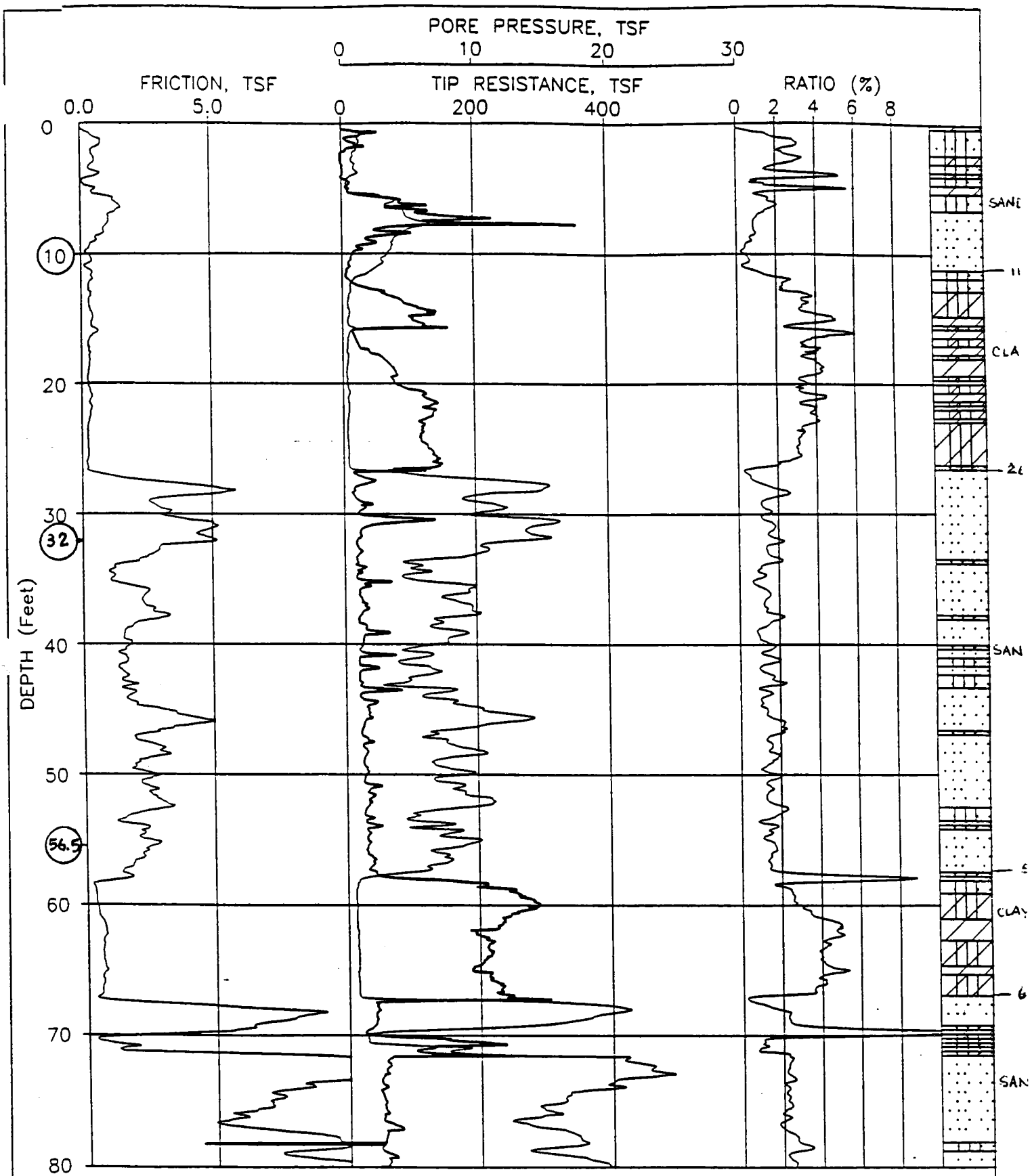
ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 51 DATE: 08-26-1993

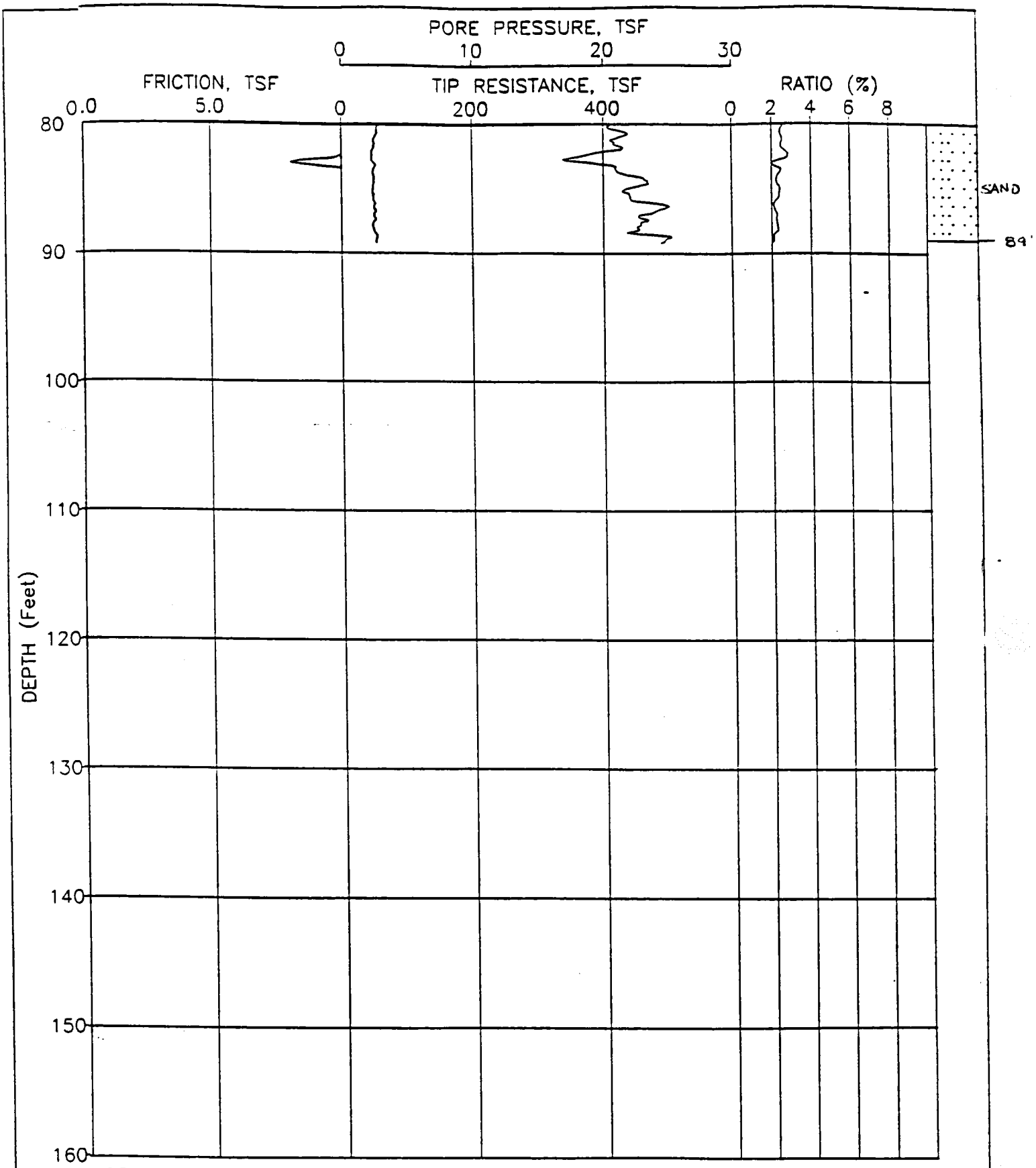
ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2



JOB NUMBER: 93-3103 CPT NUMBER: 52 DATE: 08-30-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

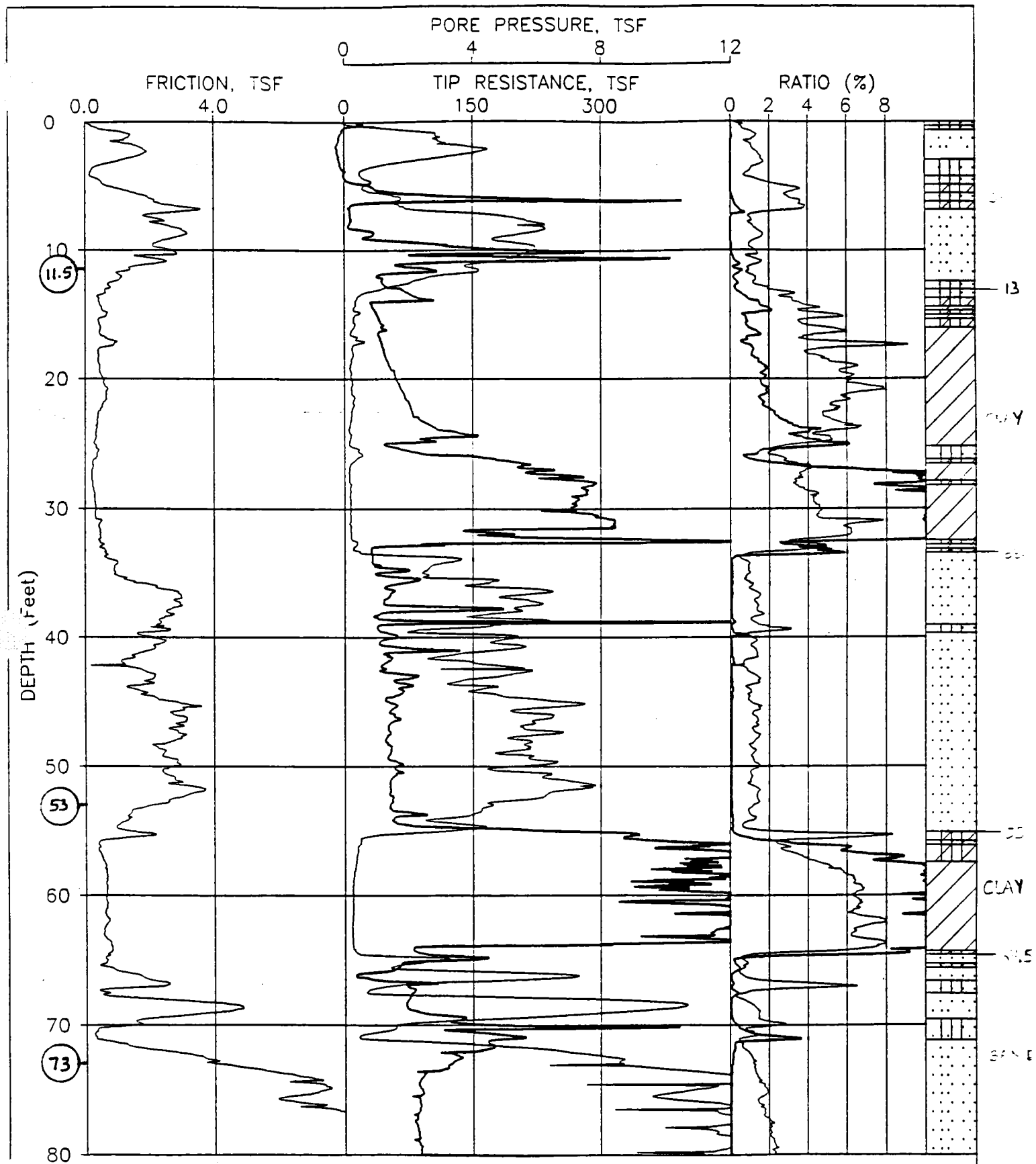
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 52 DATE: 08-30-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

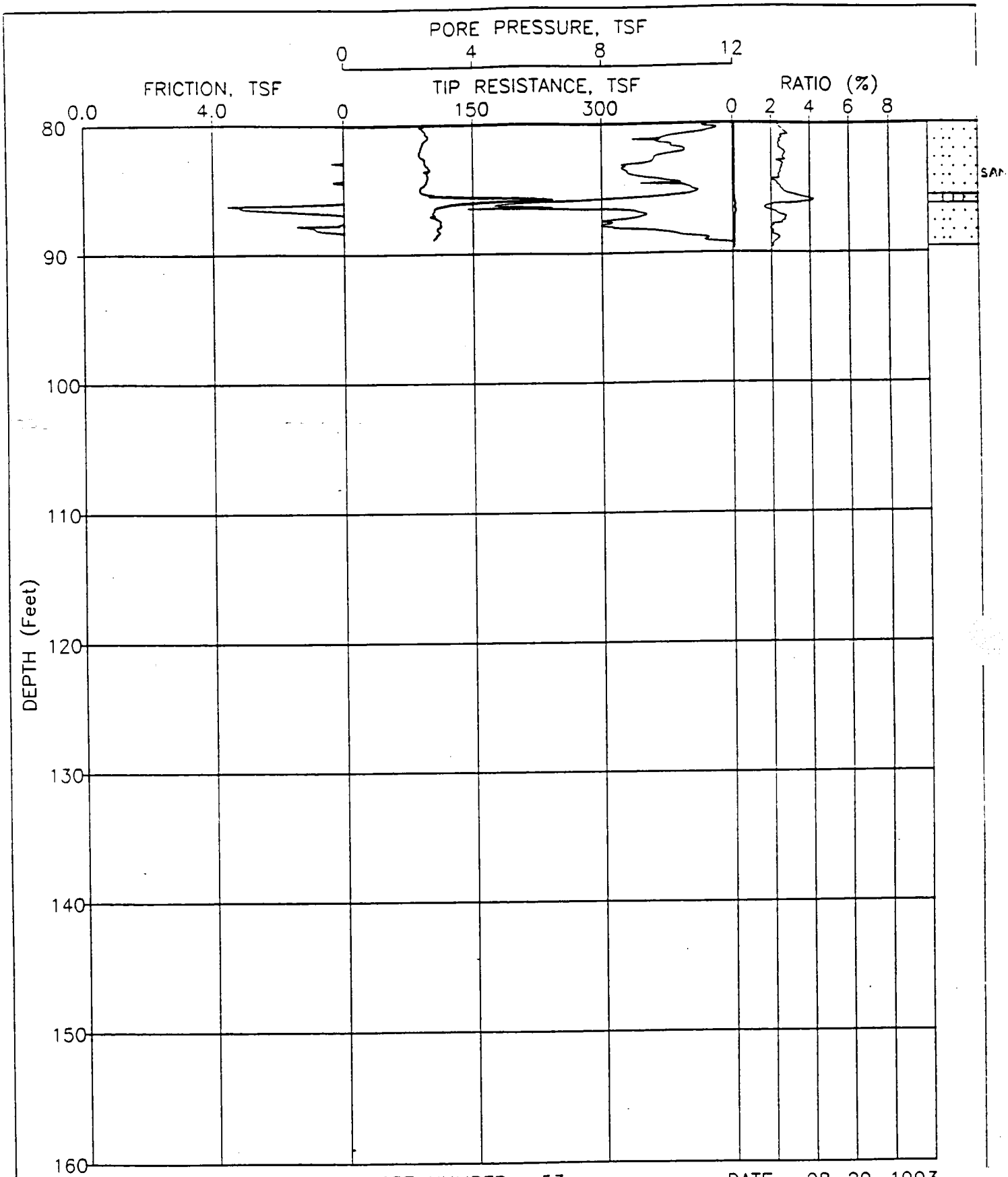
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 53 DATE: 08-29-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 2

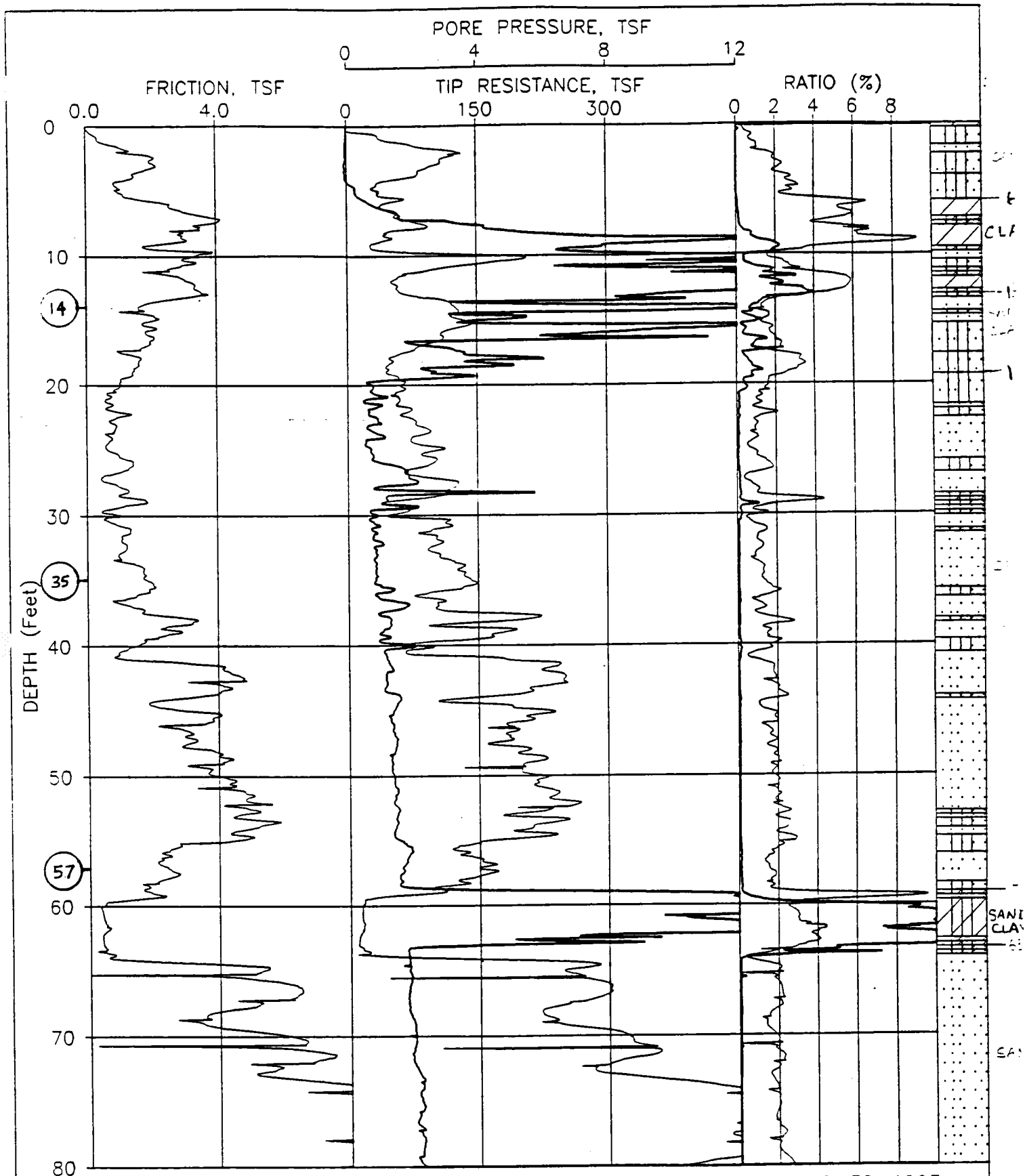
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 53 DATE: 08-29-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

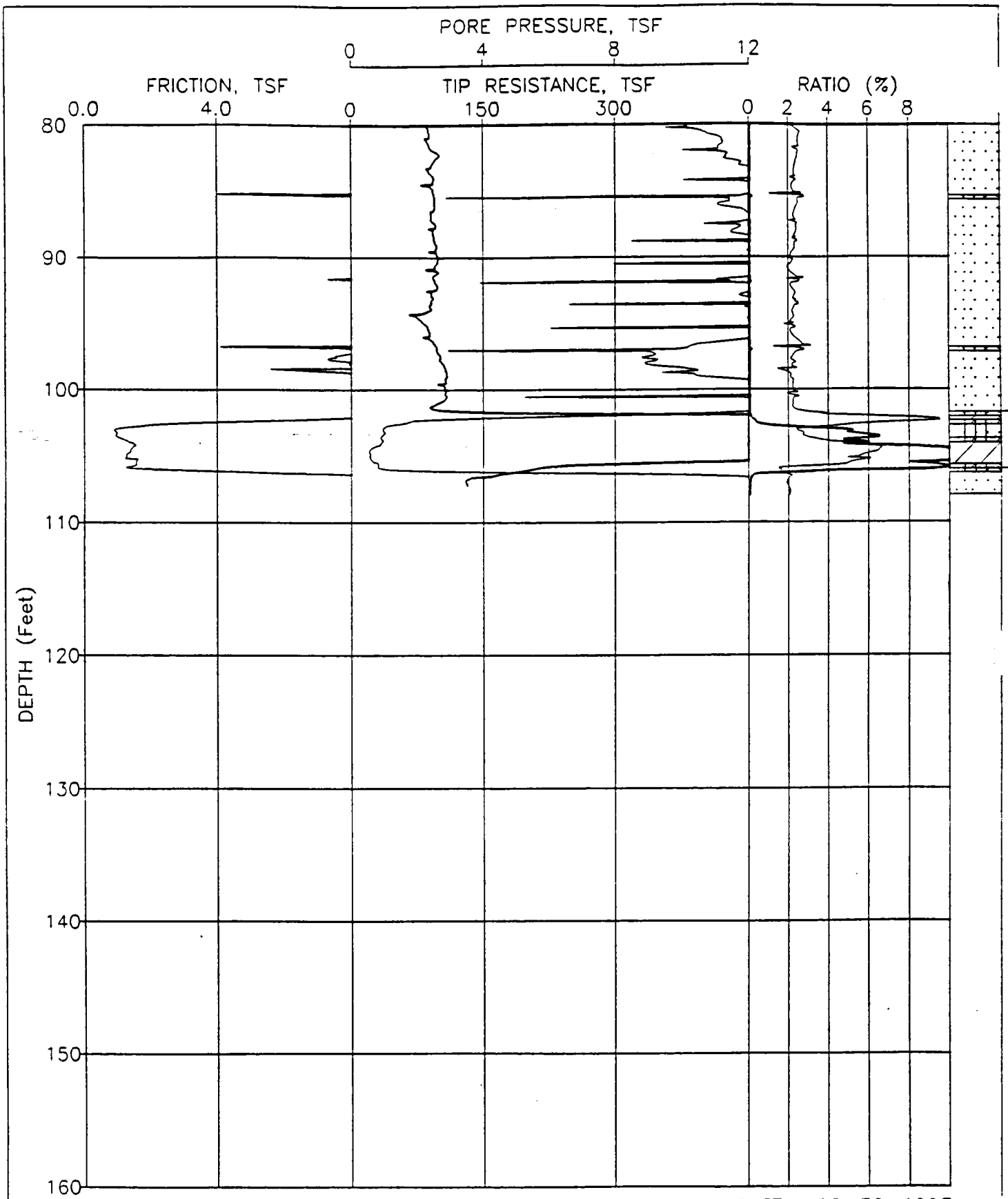
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 54 DATE: 08-30-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 1 OF 2

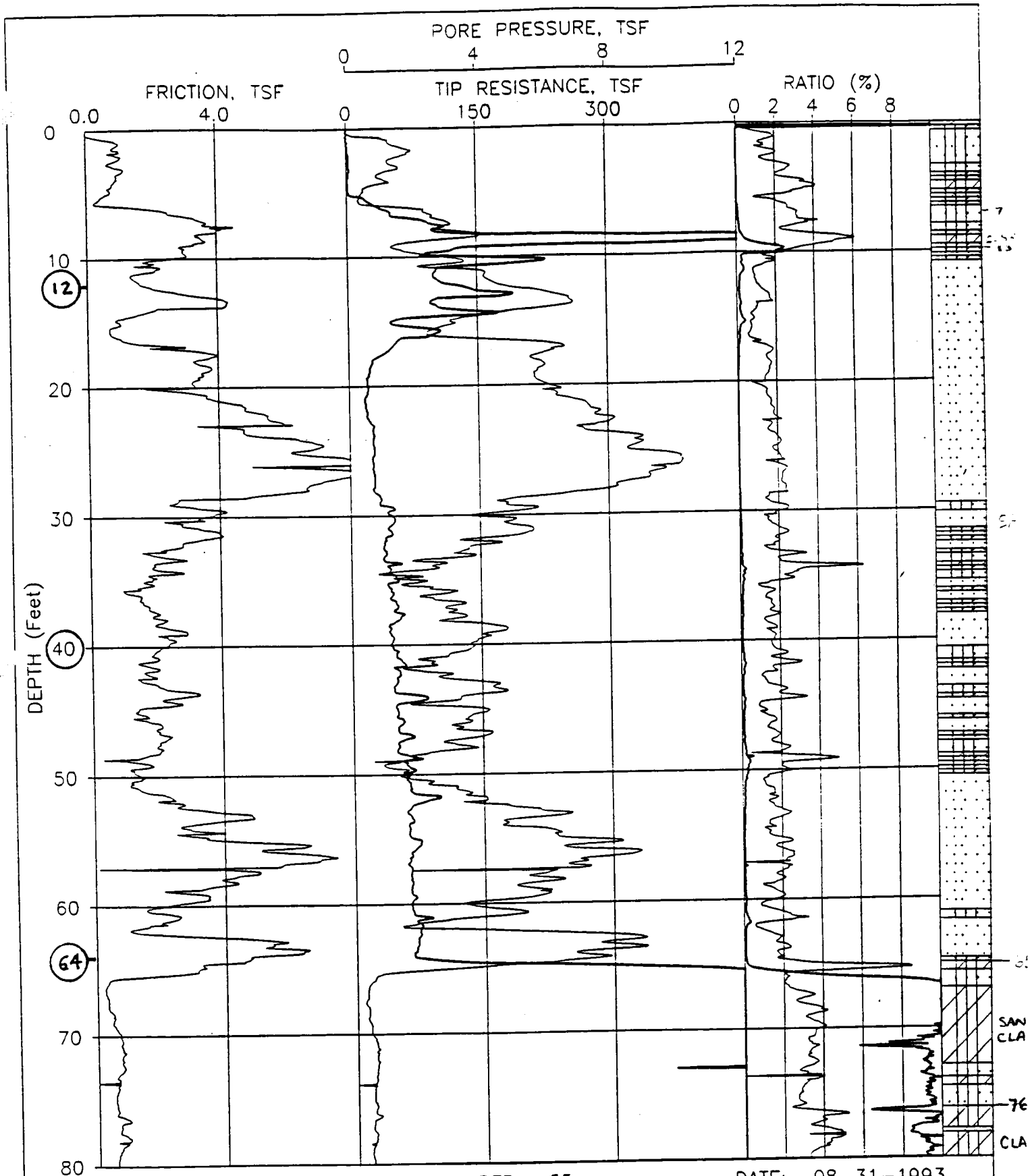
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 54 DATE: 08-30-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW560 PLATE: 2 OF 2

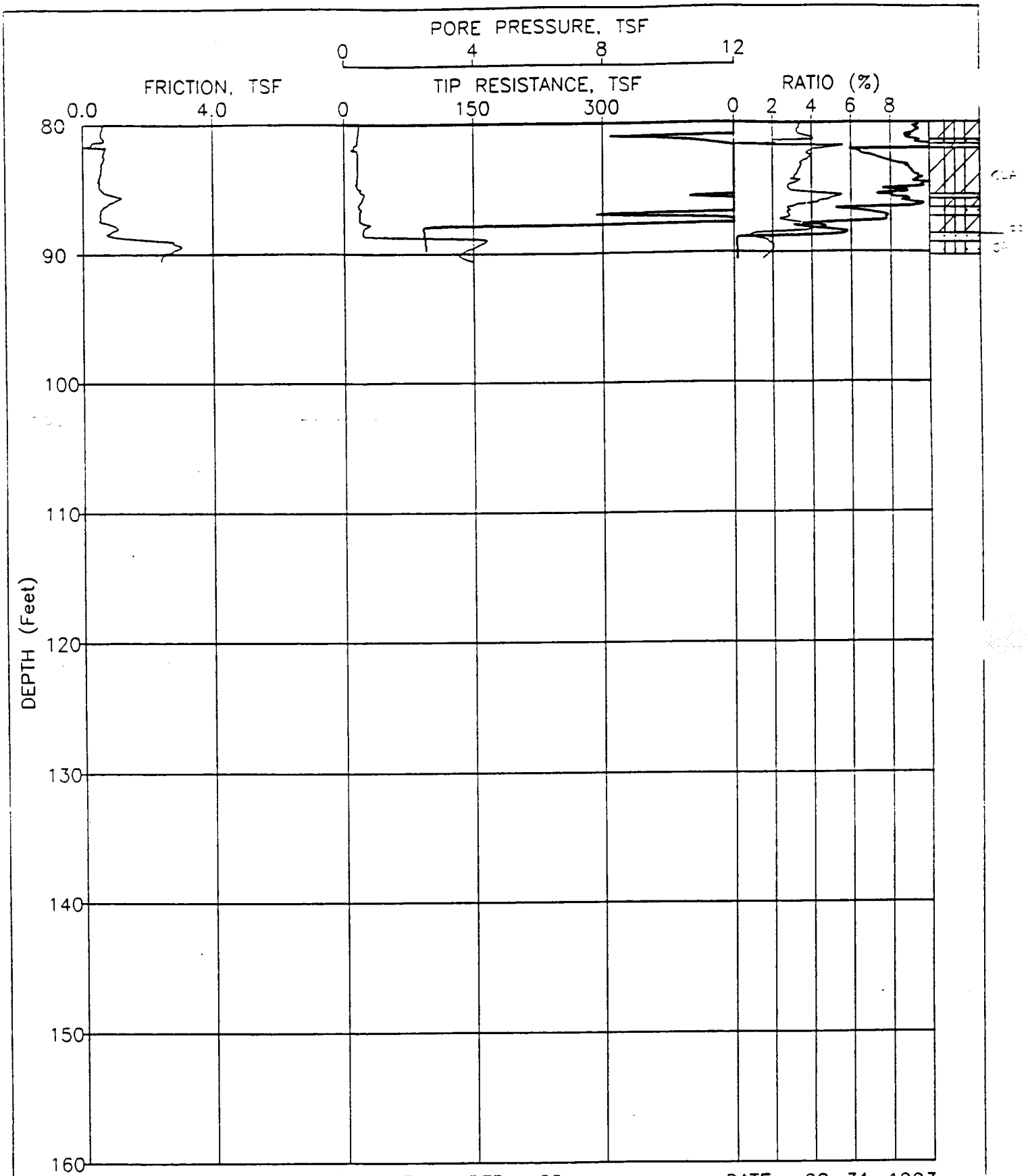
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 55 DATE: 08-31-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

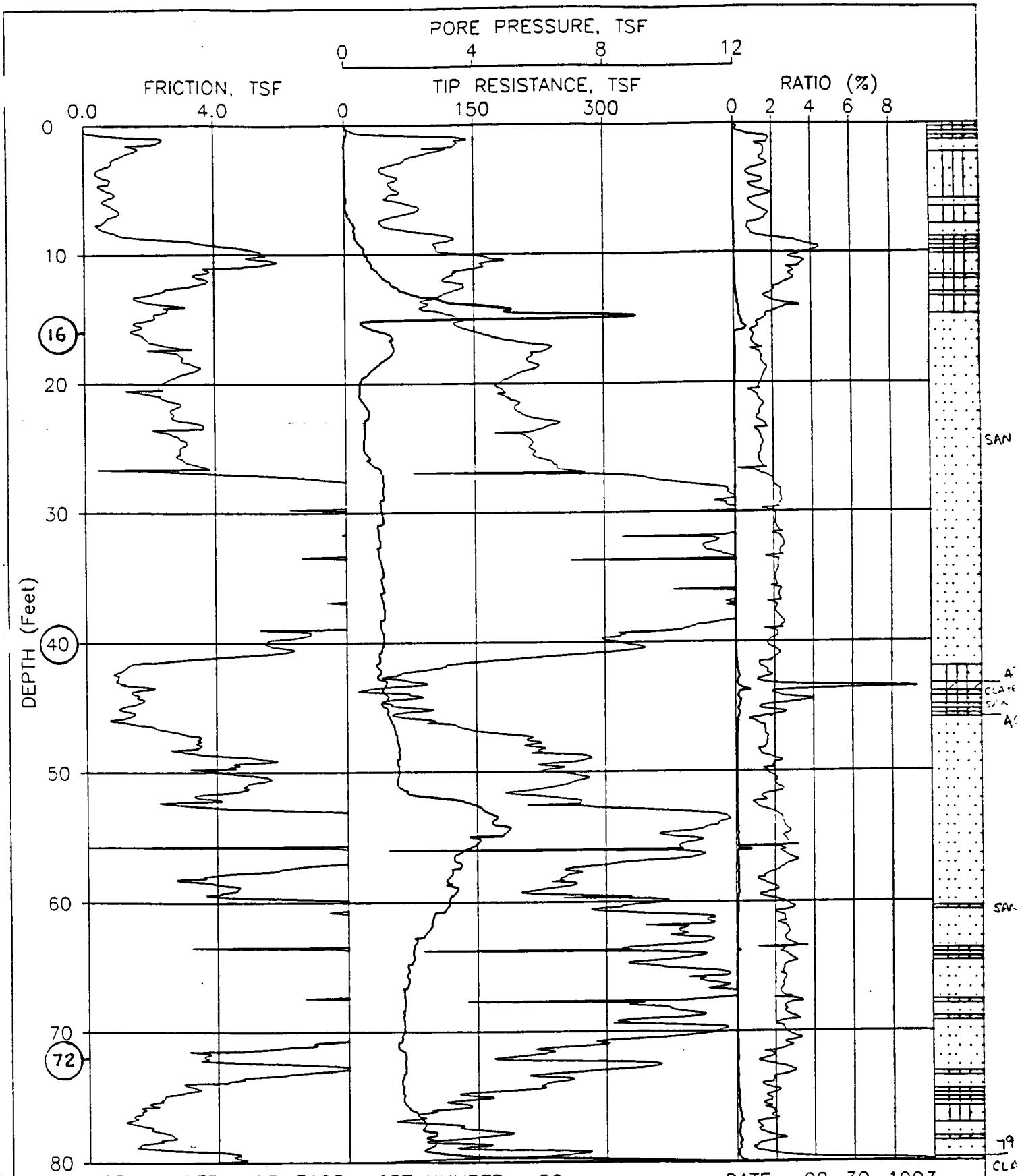
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 55 DATE: 08-31-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

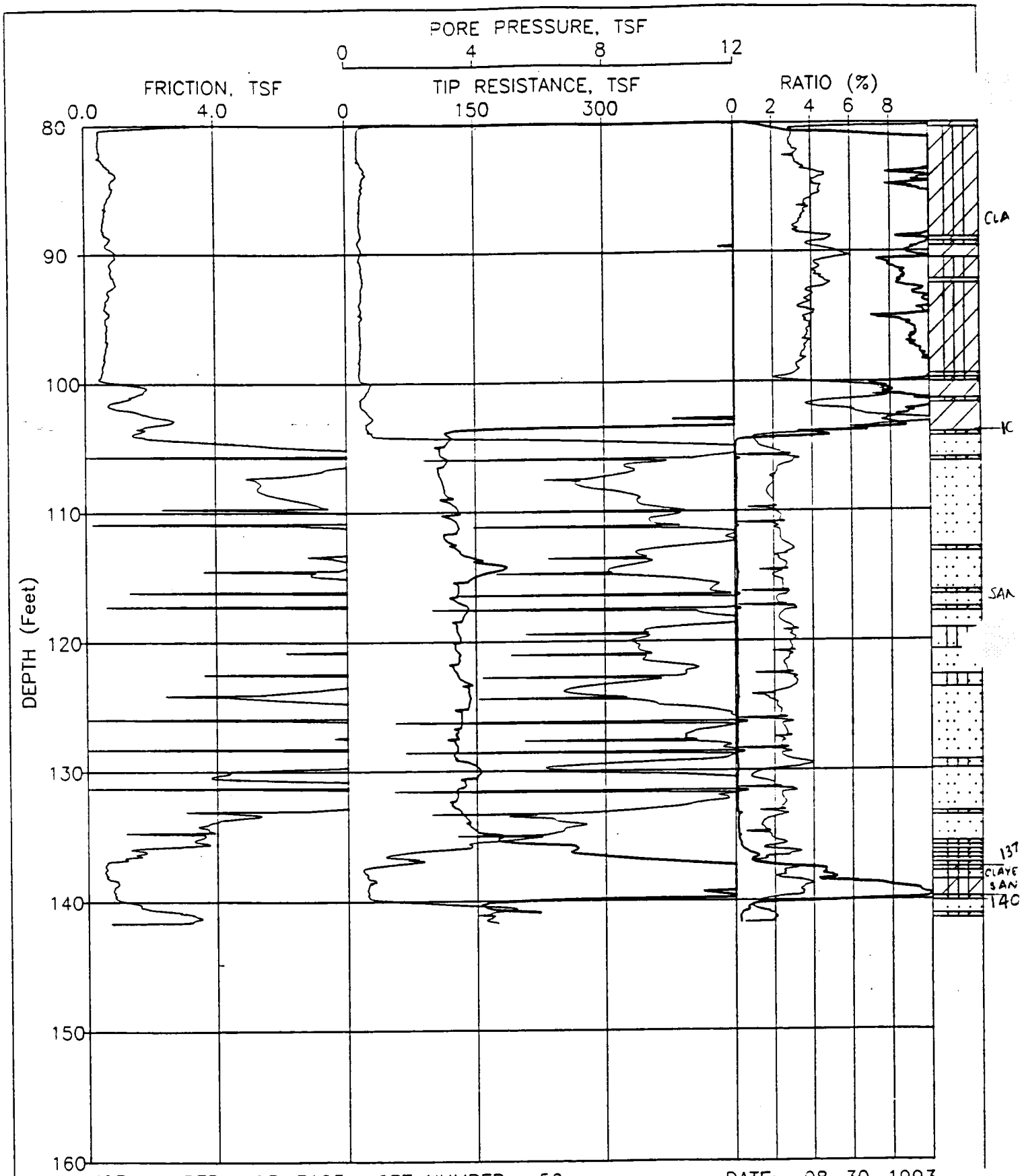
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 56 DATE: 08-30-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

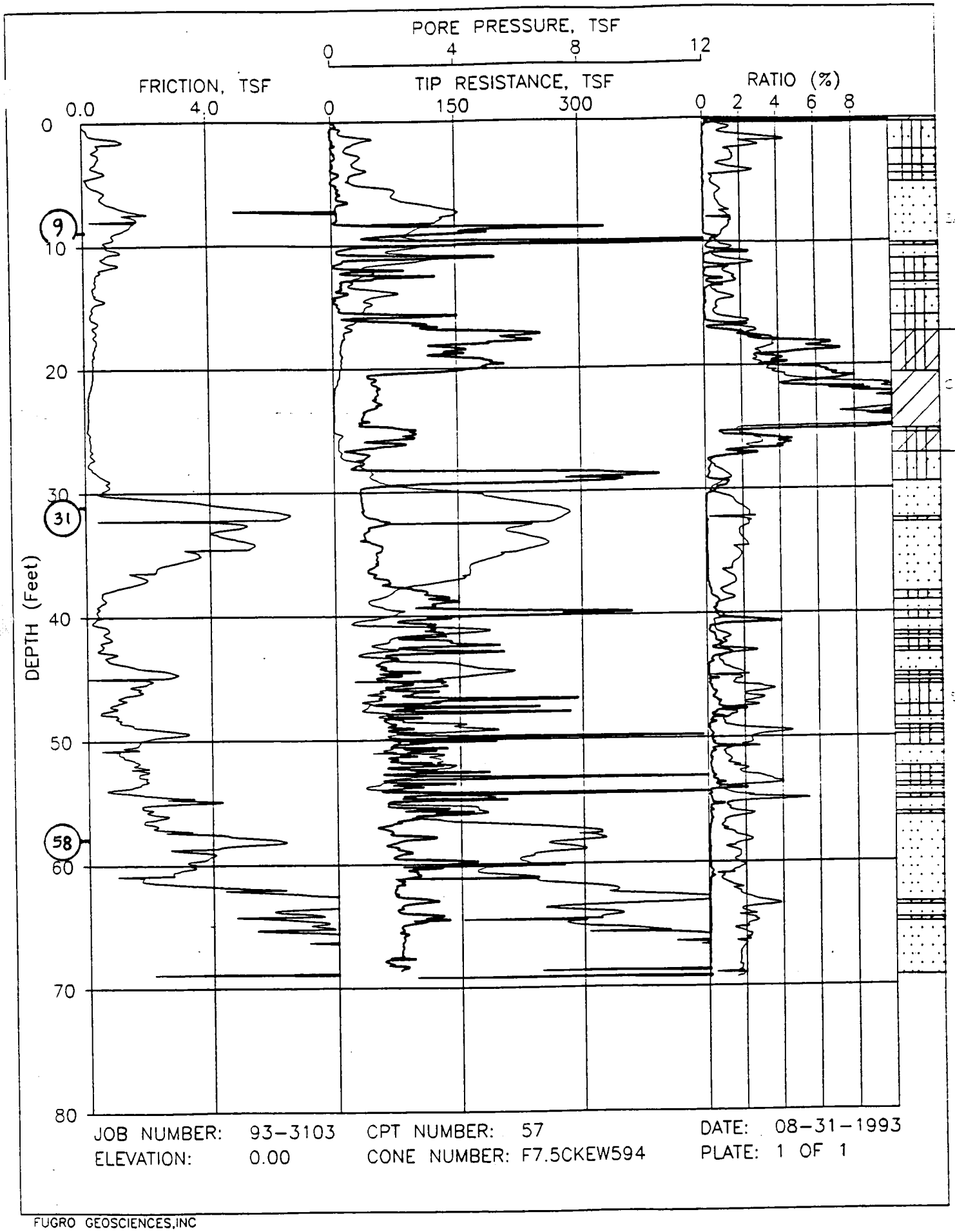
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 56 DATE: 08-30-1993

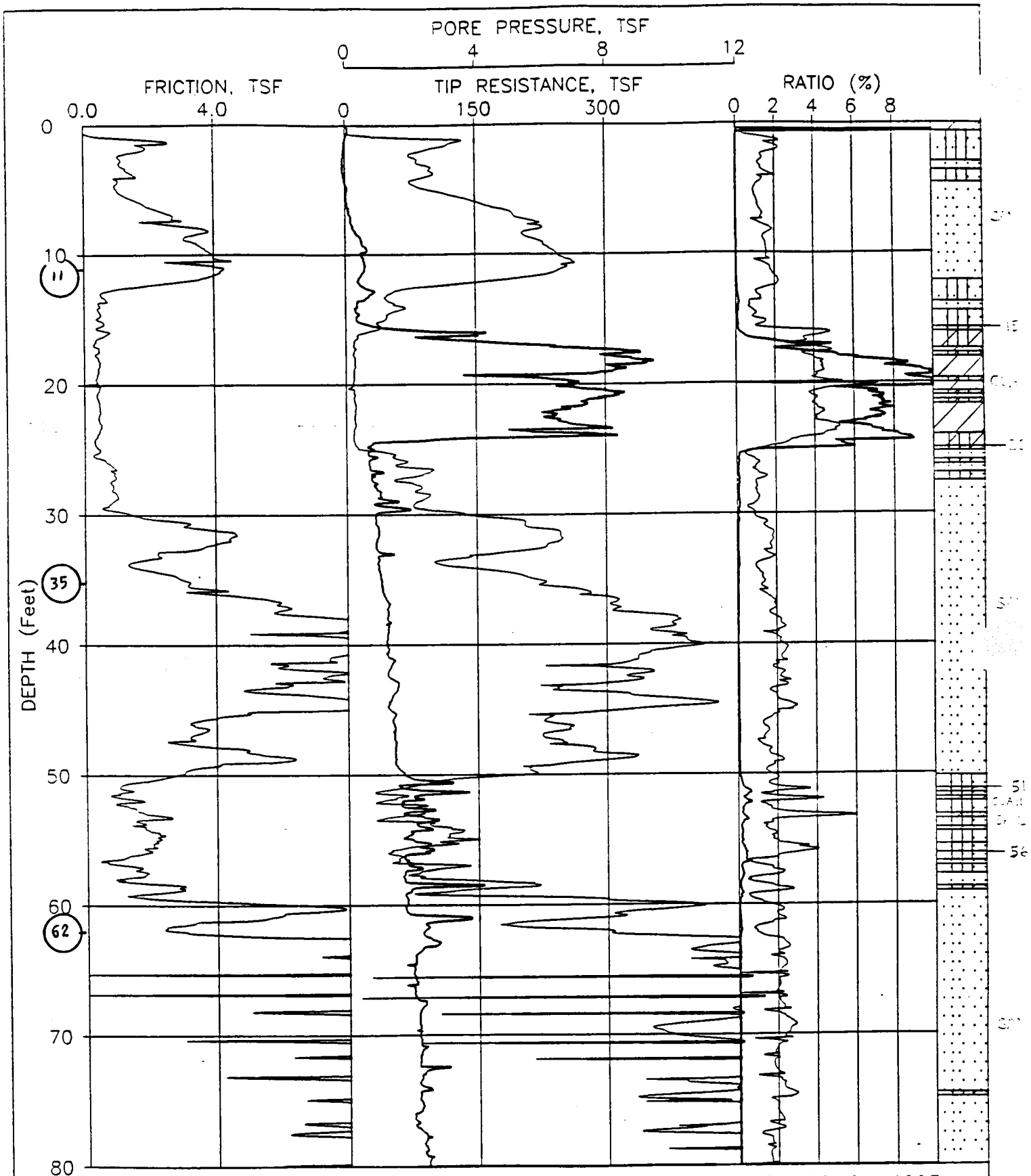
ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 57 DATE: 08-31-1993
ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 1

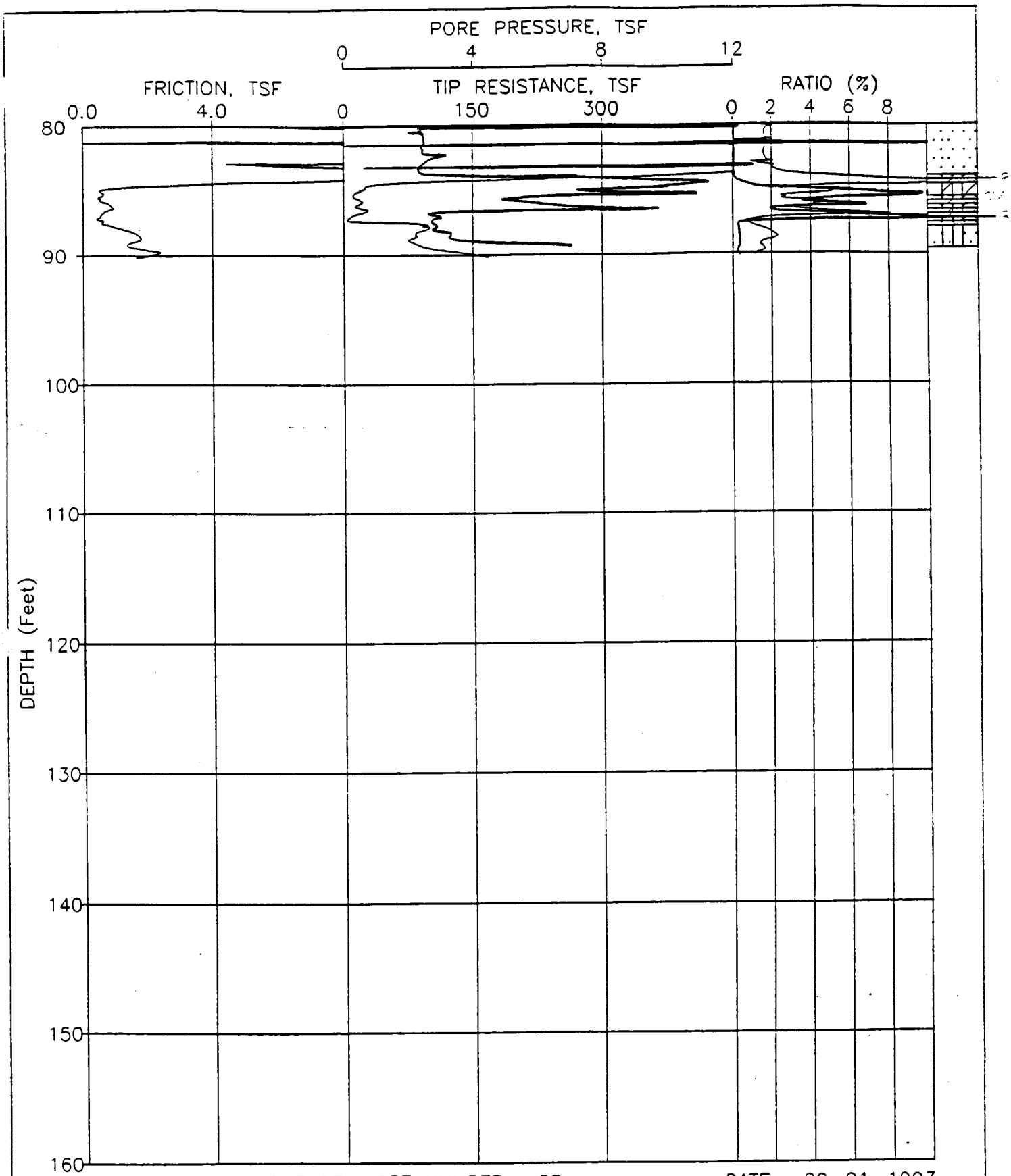
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 58 DATE: 09-01-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

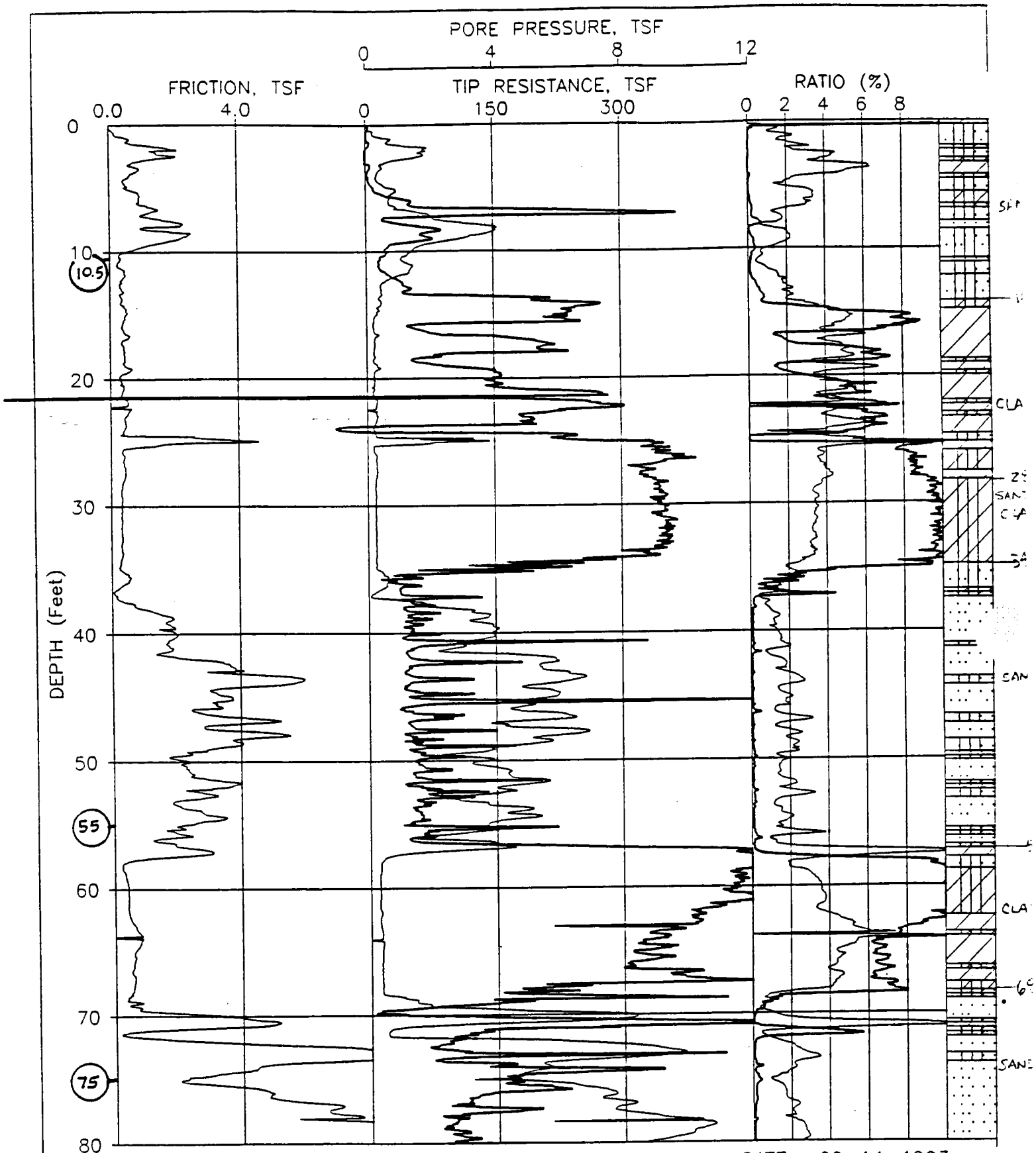
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT. NUMBER: 58 DATE: 09-01-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

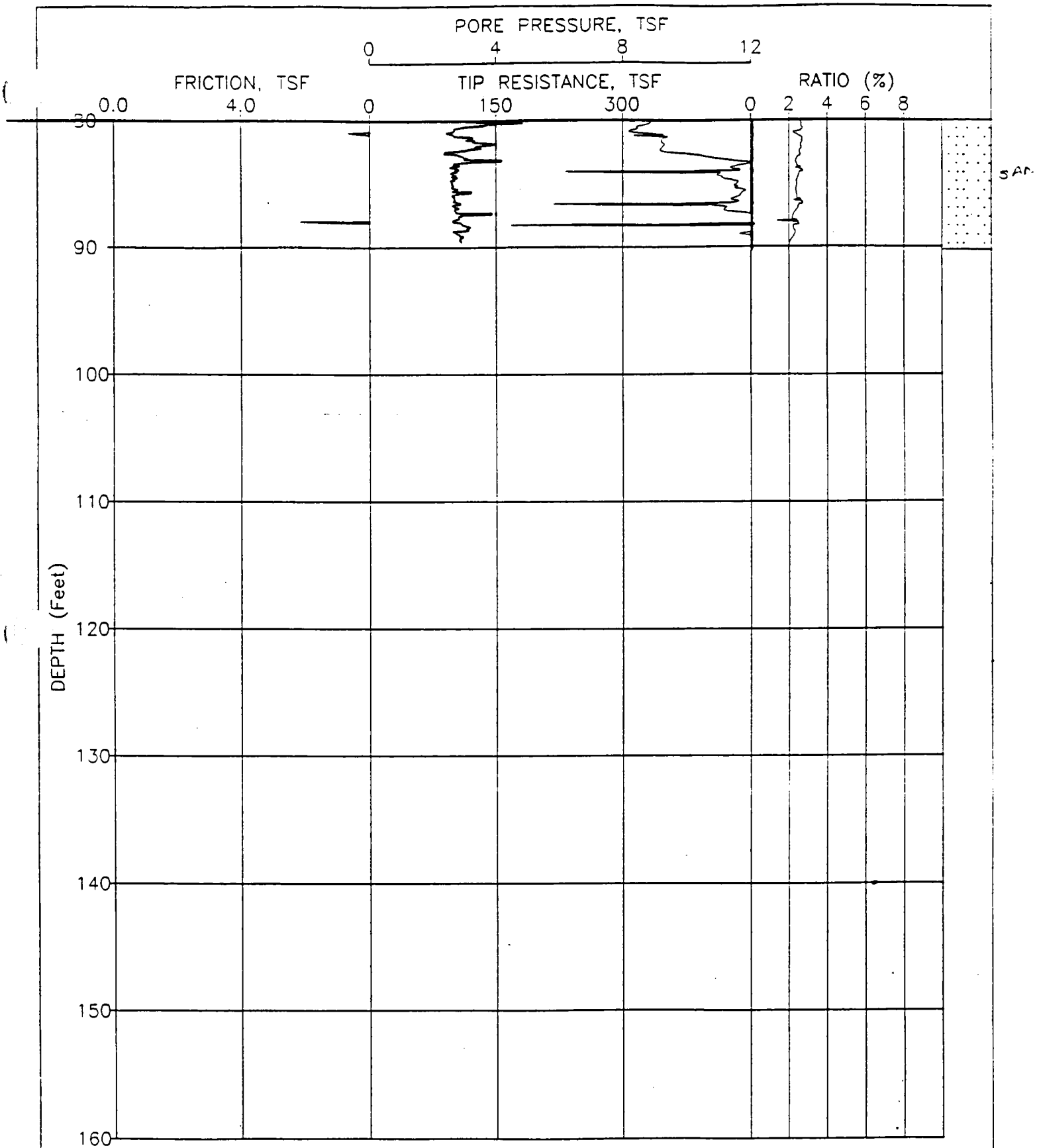
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 59 DATE: 09-14-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

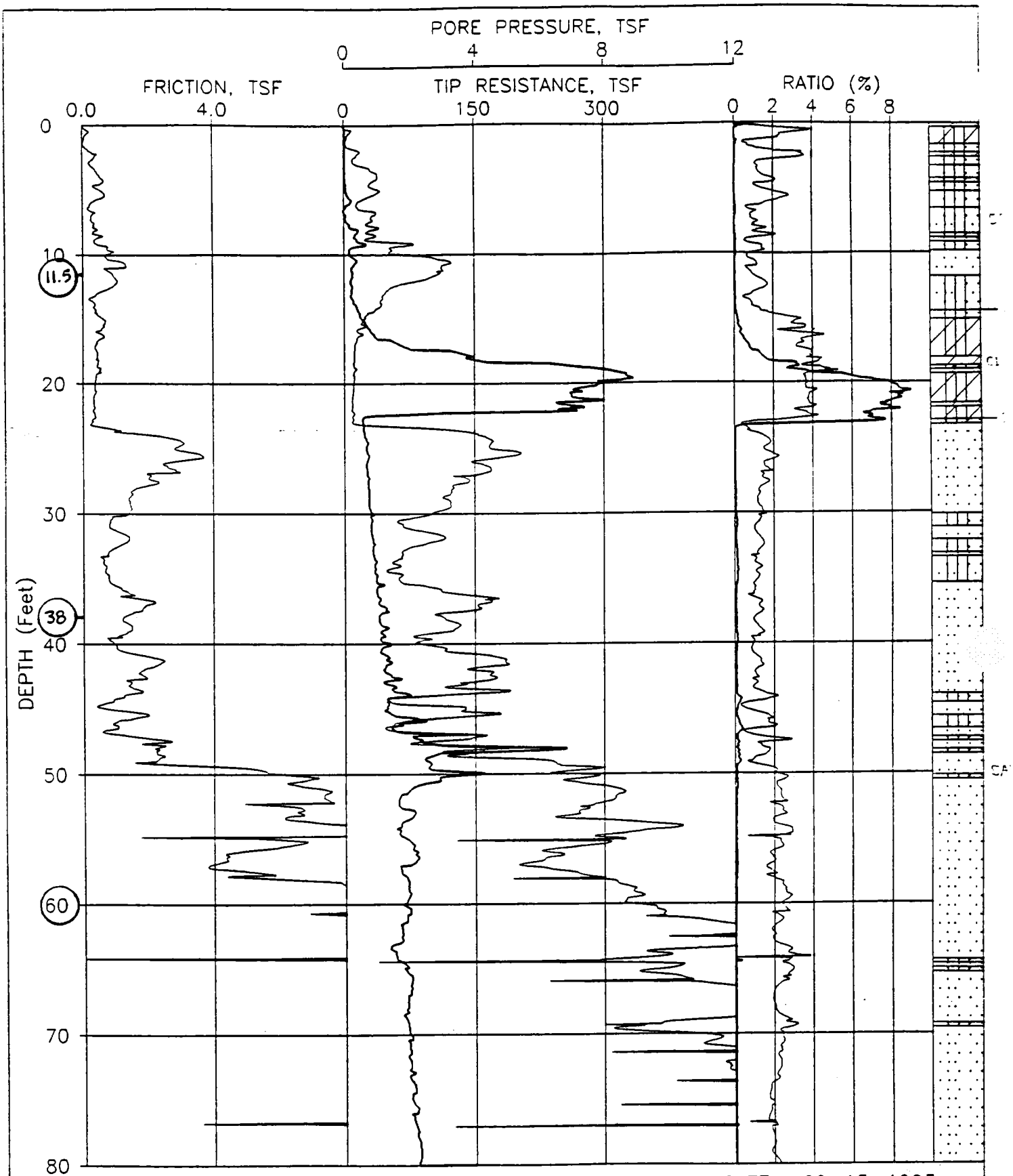
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 59 DATE: 09-14-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

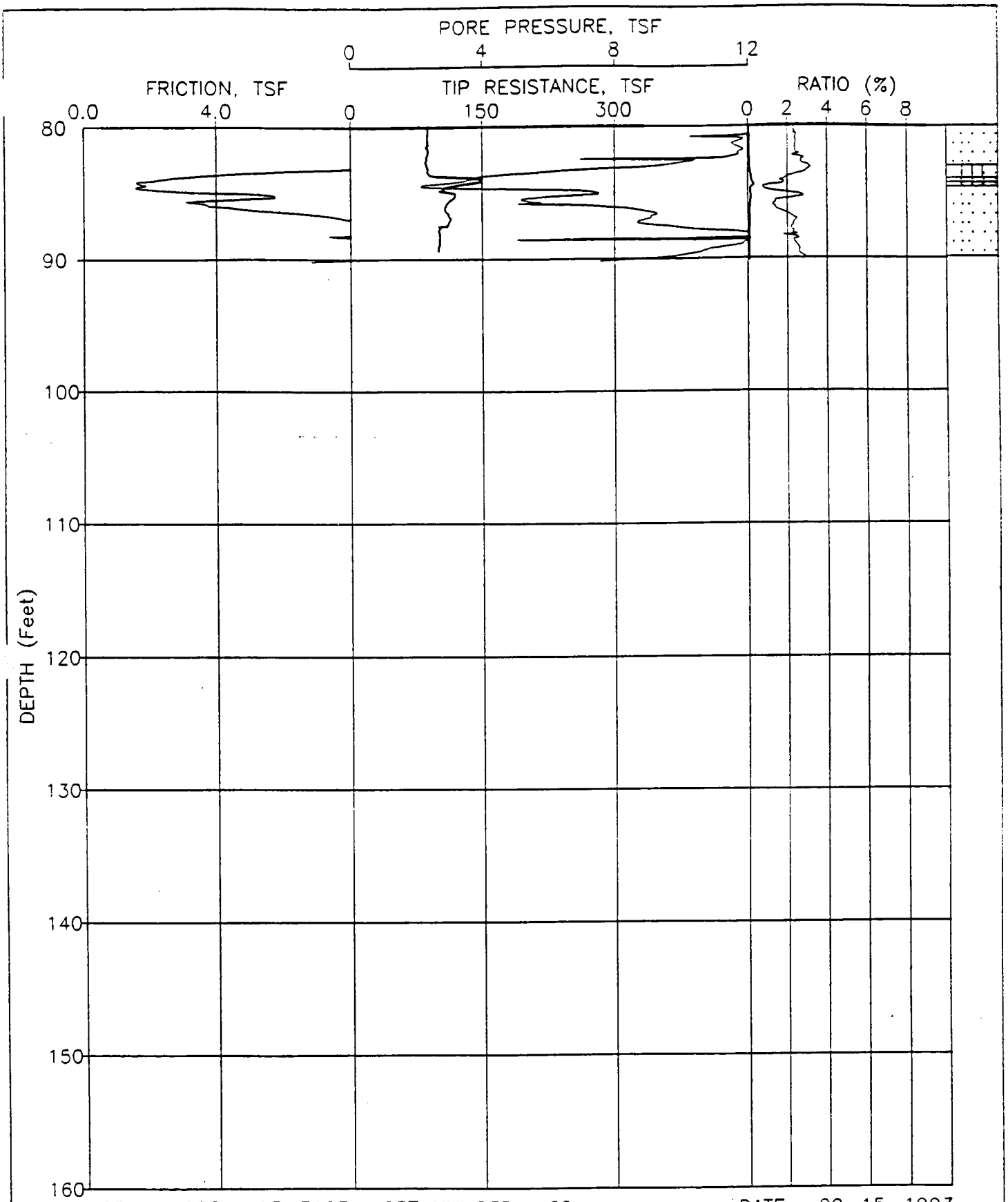
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 60 DATE: 09-15-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

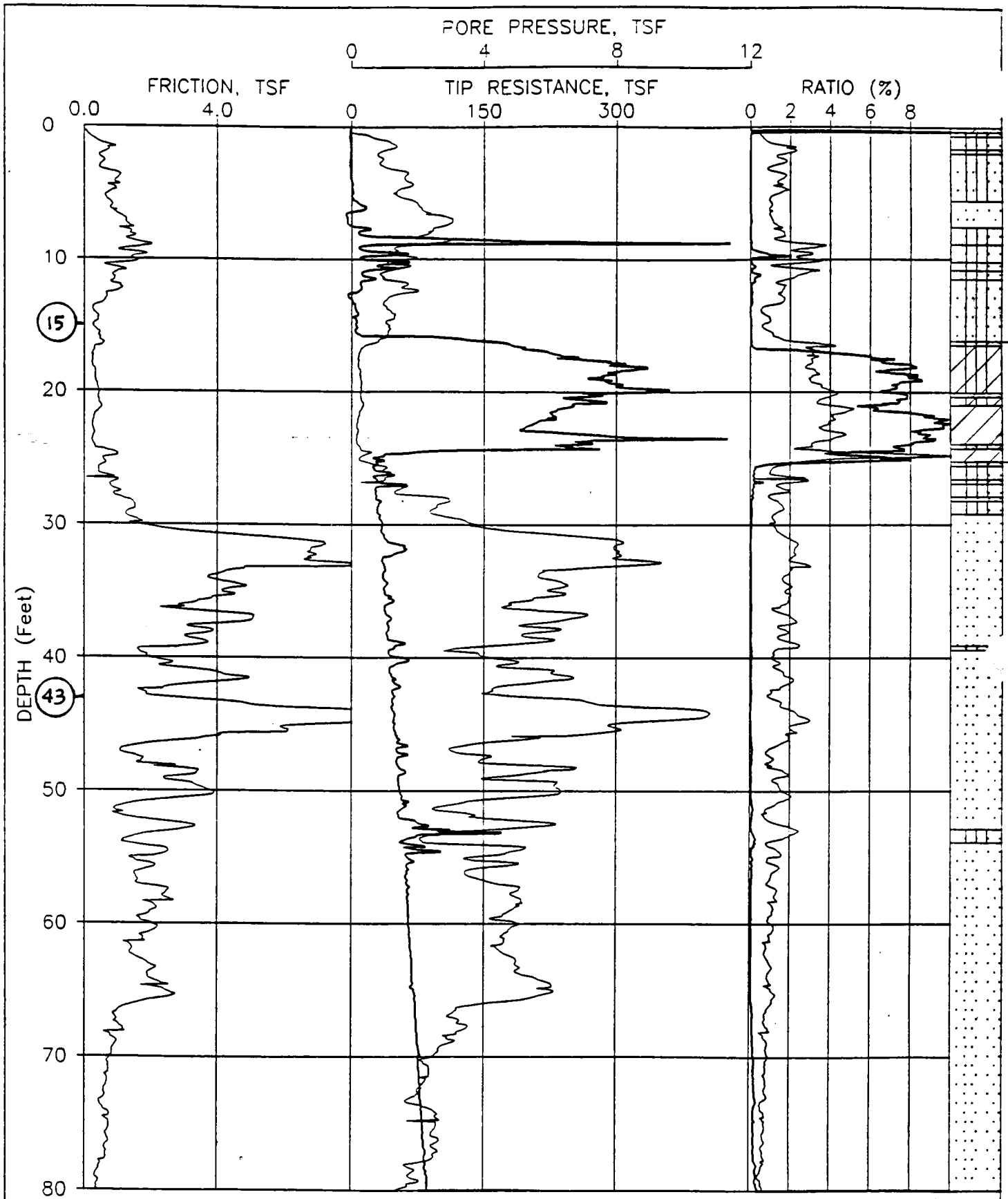
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 60 DATE: 09-15-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

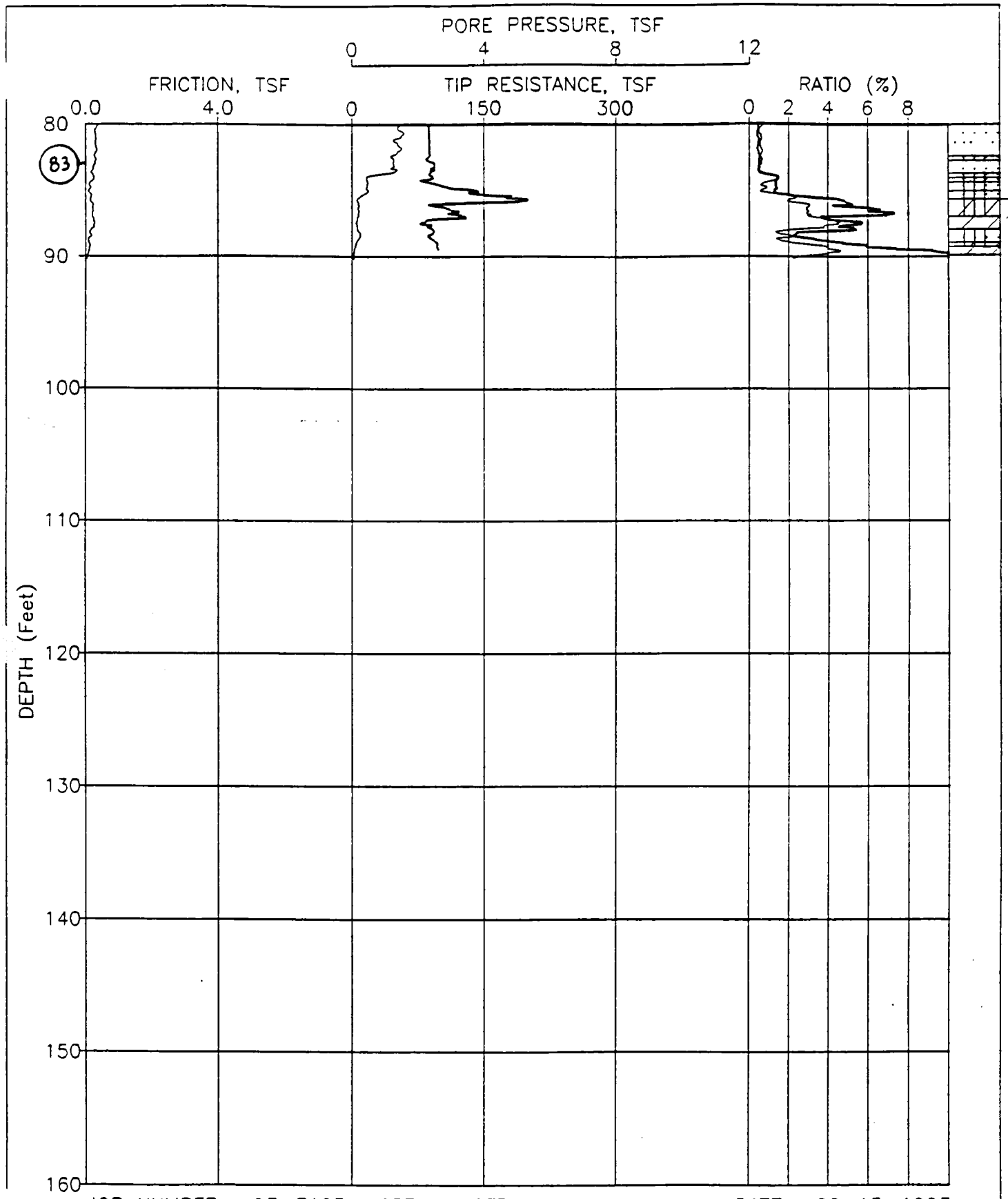
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 61 DATE: 09-15-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

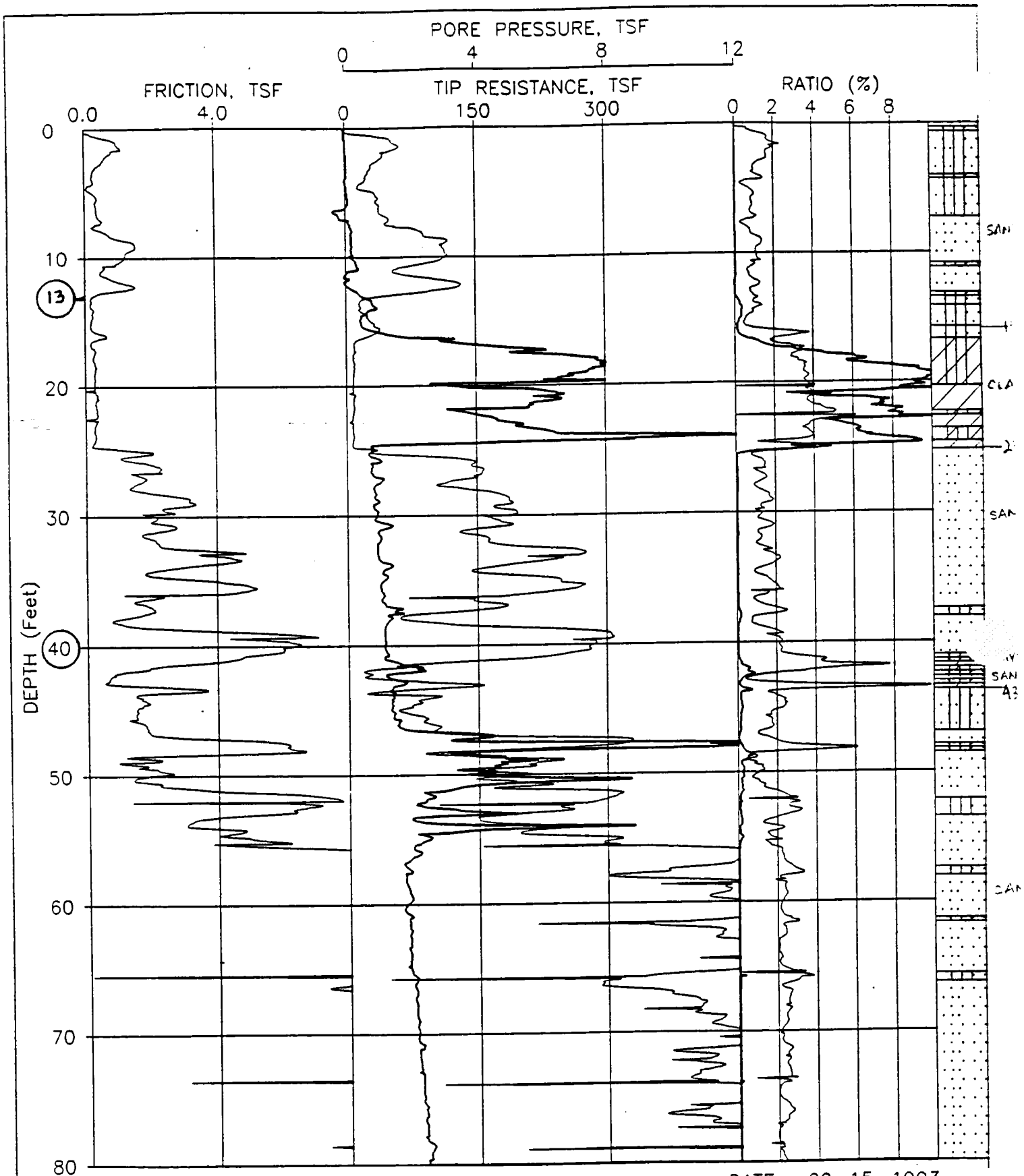
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 61 DATE: 09-15-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

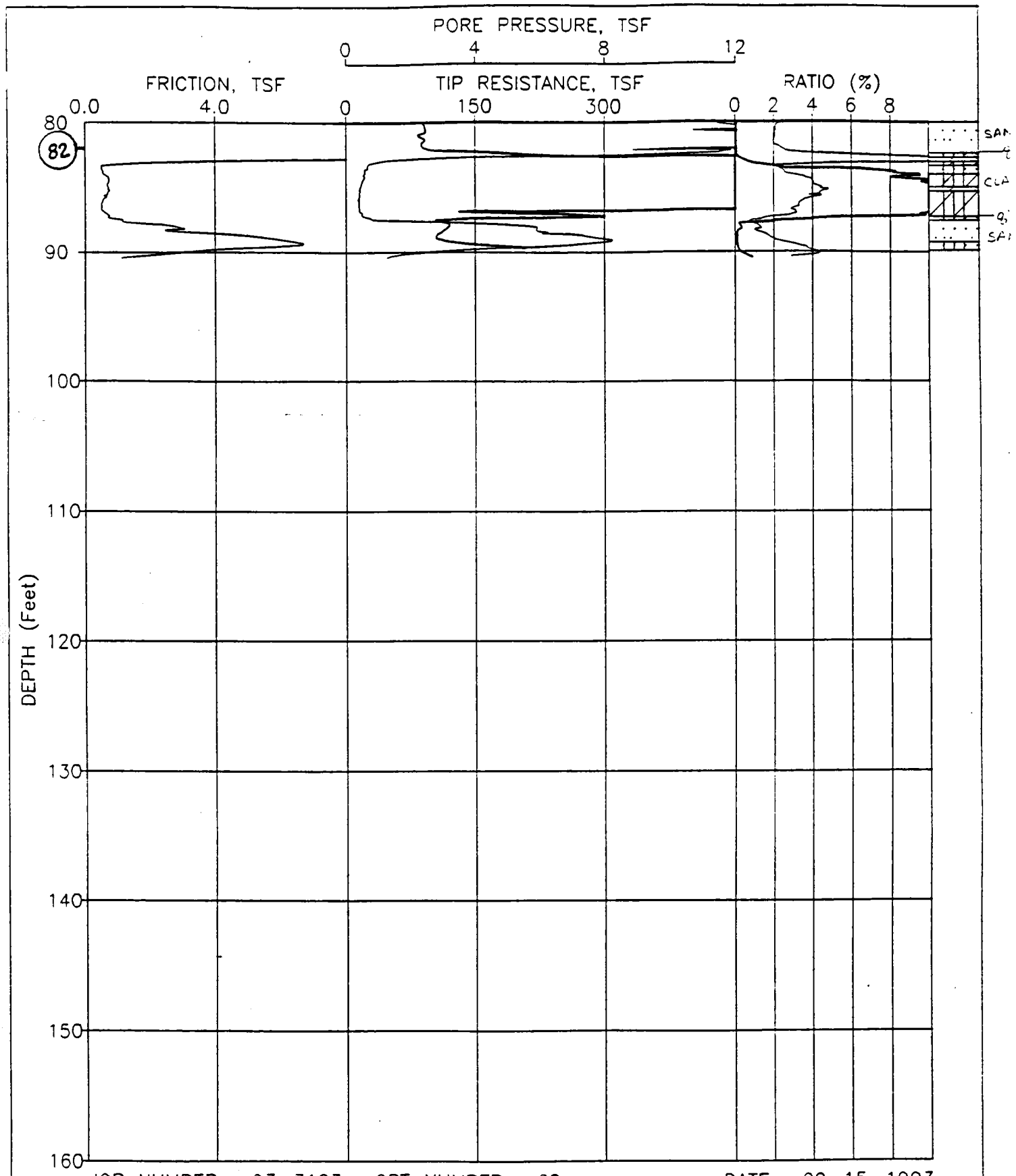
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 62 DATE: 09-15-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

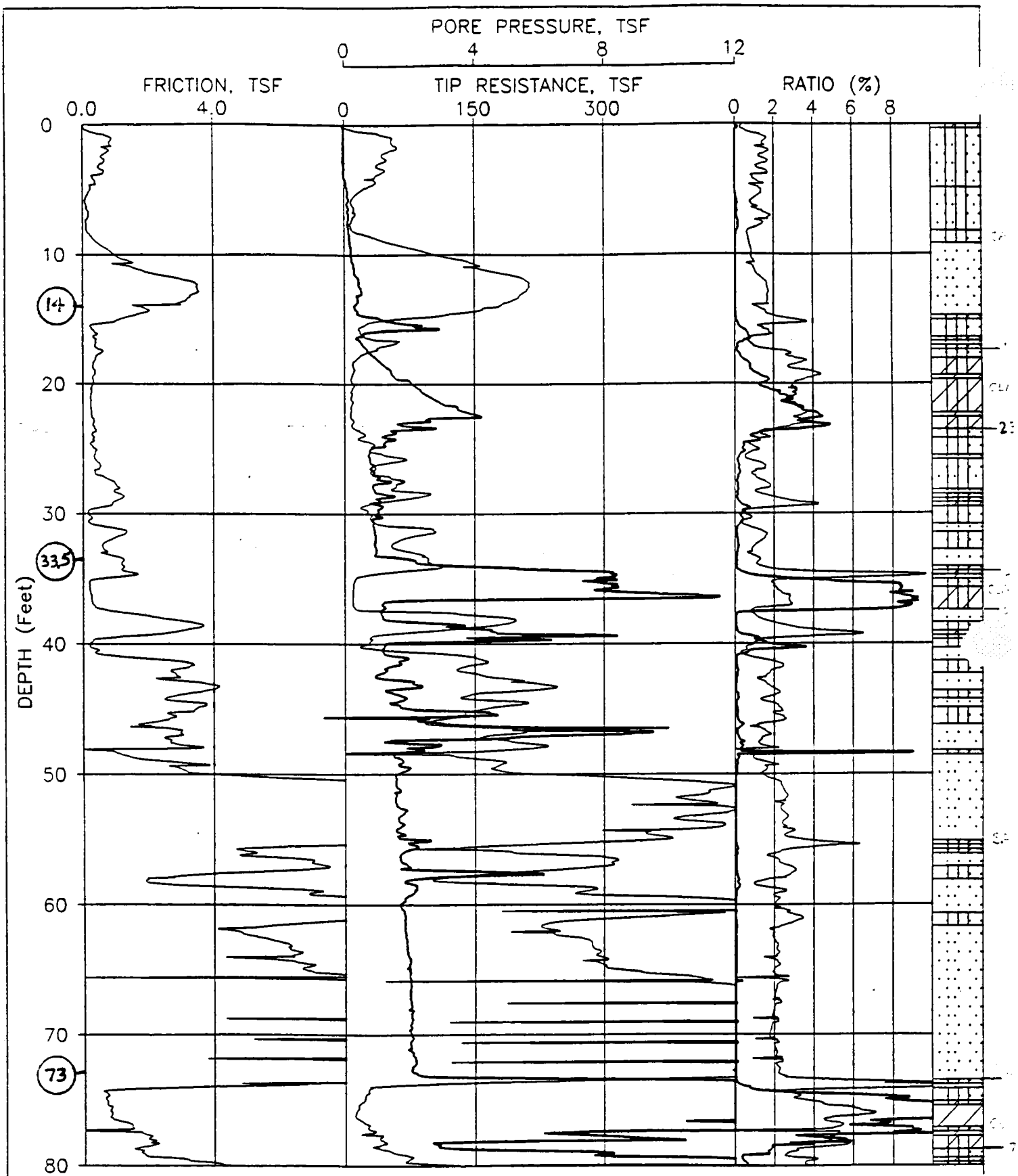
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 62 DATE: 09-15-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

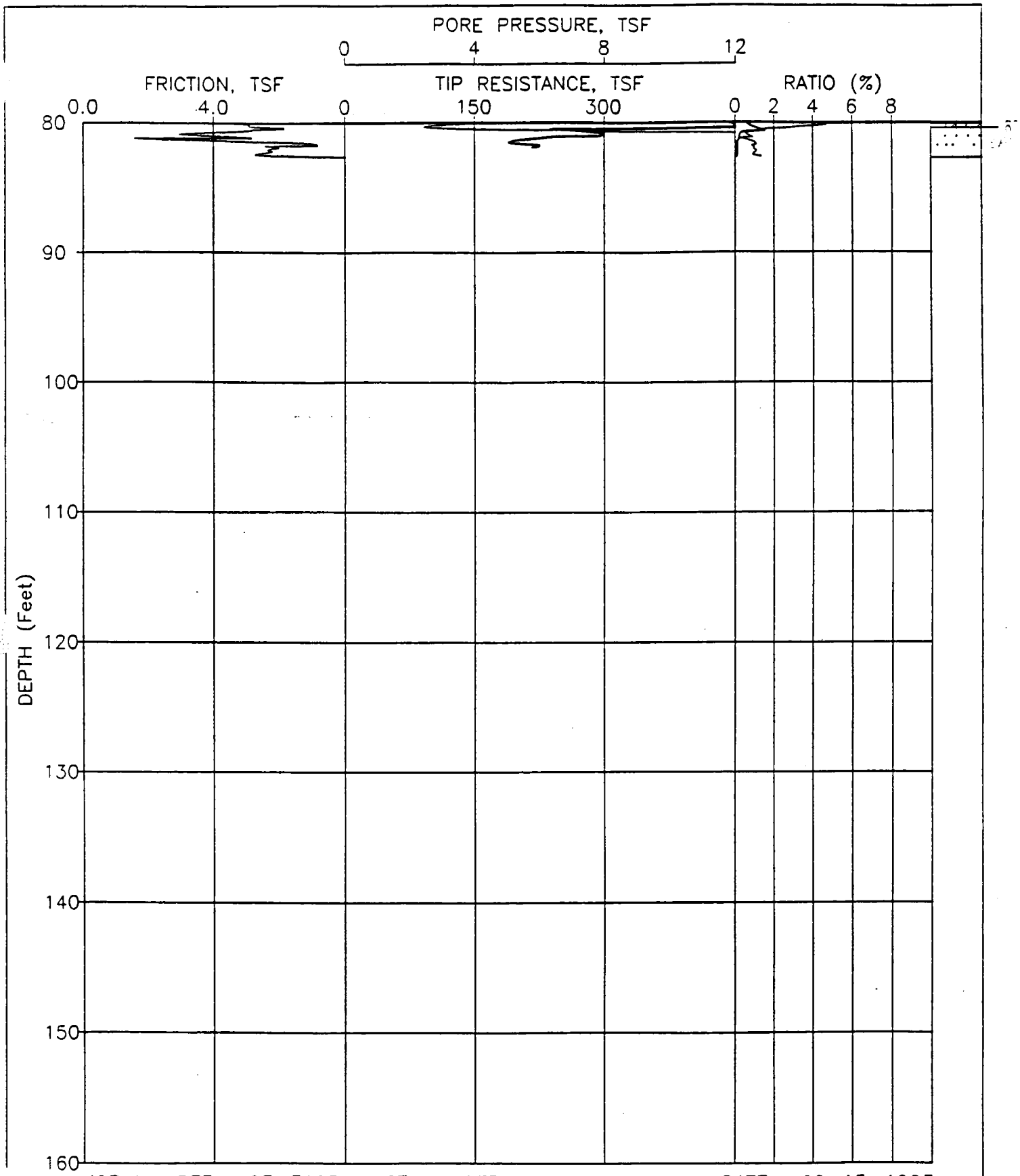
FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 63 DATE: 09-15-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 1 OF 2

FUGRO GEOSCIENCES,INC



JOB NUMBER: 93-3103 CPT NUMBER: 63 DATE: 09-15-1993

ELEVATION: 0.00 CONE NUMBER: F7.5CKEW594 PLATE: 2 OF 2

FUGRO GEOSCIENCES,INC

APPENDIX G

Survey Data Summary

Appendix G-1
Location and Elevation of Piezometers and Existing Monitoring Wells

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Piezometer/Well I.D.	X Coordinate[1]	Y Coordinate[1]	TOC Elevation[2]	Surface Elevation[2]
PZ001	445739.538	2141005.706	3.99	4.35
PZ002	445739.748	2141000.490	4.18	4.40
PZ003	445740.127	2142850.603	5.71	5.90
PZ004	445739.860	2142588.222	5.64	5.88
PZ005	445261.662	2142195.854	8.24	8.44
PZ006	445261.584	2142202.634	8.19	8.47
PZ007	445075.418	2140948.499	9.62	9.81
PZ008	445075.414	2140955.198	9.40	9.83
PZ009	445739.947	2141968.979	5.90	6.17
PZ010	445739.922	2141976.445	5.90	6.14
PZ011	445291.968	2141500.148	9.27	9.46
PZ012	445291.987	2141506.024	9.22	9.45
PZ013	445292.35	2142744.824	8.65	8.89
PZ014	445292.189	2142752.096	8.50	8.85
PZ015	445603.492	2140269.537	9.44	9.66
PZ016	444714.517	2141599.618	10.80	11.02
PZ017	444714.731	2141605.241	10.77	10.94
PZ018	444792.207	2142277.886	9.20	9.43
PZ019	444792.305	2142283.719	9.15	9.34
PZ020	444310.576	2141806.572	10.04	10.28
PZ021	444310.936	2141813.310	9.99	10.25
PZ022	444318.556	2142437.408	10.14	10.41
PZ023	444277.720	2143239.956	9.23	9.49
PZ024	444278.066	2143244.189	9.04	9.33
PZ025	443903.427	2142525.304	10.69	10.94
PZ026	443902.895	2142532.939	10.86	11.12
PZ027	445614.302	2143244.395	6.68	6.98

See notes at end of table.

Appendix G-1 (Continued)
Location and Elevation of
Piezometers and Existing Monitoring Wells

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Piezometer/Well I.D.	X Coordinate[1]	Y Coordinate[1]	TOC Elevation[2]	Surface Elevation[2]
B101 MW01	444321.004	2142444.509	9.99	10.45
B101 MW02	444546.892	2143070.898	9.41	9.75
B101 MW03	444552.654	2143029.631	9.71	10.01
B101 MW04	444722.209	2142749.074	9.88	10.20
P159 MW01	445611.379	2143244.565	6.56	7.00
P159 MW02	445315.103	2143261.527	7.61	8.03
P159 MW03	445315.027	2143184.546	8.32	8.63
P159 MW04	444905.274	2142808.595	8.22	8.61
P159 MW05	444837.627	2142902.67	9.25	9.52
P159 MW06	444837.711	2142790.908	8.49	8.92
P159 MW07	444842.074	2142674.205	8.72	9.54
JAX-873-1	445379.161	2140425.541	7.24	7.59
JAX-873-2	445392.395	2140375.384	7.38	7.60
JAX-873-3	445426.323	2140369.781	7.96	8.32
JAX-873-4	445415.767	2140401.814	7.84	8.16
JAX-873-5	445418.817	2140391.350	7.94	8.14
JAX-873-6	445564.760	2140585.072	7.08	7.34
JAX-873-7	445561.217	2140459.805	7.28	7.63
JAX-873-8	445563.813	2140368.390	7.18	7.56
JAX-873-9	445399.718	2140284.286	8.39	8.60
JAX-873-10	445601.076	2140283.548	6.53	6.78
JAX-873-11	445447.590	2140386.425	8.70	8.99
JAX-873-1-1	445426.385	2140421.058	8.27	8.46
JAX-873-1-2	445391.847	2140425.065	7.43	7.73
JAX-873-1-3	445391.334	2140463.684	7.78	8.11
JAX-873-1-4	445434.002	2140464.677	8.87	8.96

See notes at end of table.

Appendix G-1 (Continued)
Location and Elevation of
Piezometers and Existing Monitoring Wells

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Piezometer/Well I.D.	X Coordinate[1]	Y Coordinate[1]	TOC Elevation[2]	Surface Elevation[2]
JAX-873-3-1	445457.785	2140588.705	9.36	9.65
JAX-873-3-2	445457.285	2140597.525	8.79	9.16
JAX-873-3-3	445436.497	2140596.130	8.78	8.12
JAX-873-4-1	445504.414	2140231.382	7.00	7.00
JAX-873-4-2	445482.227	2140231.098	7.32	7.20
JAX-873-4-3	445482.760	2140246.661	7.72	7.70
OTC10-1	444711.672	2142318.432	9.44	9.66
OTC10-2	444711.610	2142302.426	9.55	9.69
OTC10-3	444694.770	2142301.646	9.85	9.98
NARF-4	445397.675	2140199.847	8.96	7.57
NARFB-1	445026.715	2140513.281	11.65	9.40
NARF-9	444994.529	2140425.438	18.39	15.2
NARF-11	444965.140	2140260.219	19.28	16.8
NARF-12	444915.844	2139961.319	6.01	4.00
NARF-13	445637.500	2140211.349	8.59	6.60
NARF-14	444784.969	2142988.403	9.04	8.31
NARF-15	444437.485	2143354.141	10.76	8.60
NARF-16	445278.622	2143376.503	9.04	9.46
NARF-17	445442.642	2143604.841	12.15	10.34
NARF-18	445691.022	2143387.146	8.12	8.33
NARFD-1	444785.007	2142992.404	8.84	9.30
NARFD-2	445222.743	2140395.723	10.42	9.92

[1]Transverse Mercator Projection, Florida East Zone (NAS 1983).
[2]Based on National Geodetic Survey control monument, Mulberry Camera 1381 GSS (NGVD 1929).

Note: TOC = top of (well) casing.

Appendix G-2
Location and Elevation of
CPT Soundings and DPT Groundwater Sampling Points

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Location I.D.	X Coordinate[1]	Y Coordinate[1]	Surface Elevation[2]
CW01	445583.383	2143149.745	7.18
CW02	445586.561	2142749.045	7.10
CW03	445585.352	2142350.047	7.00
CW04	445587.518	2141946.994	7.37
CW05	445584.745	2141549.707	7.54
CW06	445585.134	2141150.023	7.17
CW07	445587.070	2140750.565	5.22
CW08	445382.956	2140552.405	9.22
CW09	445385.782	2140950.249	9.79
CW10	445395.821	2141349.800	9.72
CW11	445382.851	2141740.541	9.04
CW12	445384.146	2142149.957	8.50
CW13	445386.553	2142544.490	8.66
CW14	445383.204	2142948.995	8.68
CW15	445181.704	2143152.044	8.91
CW16	445158.520	2142741.155	8.86
CW17	445189.683	2142300.073	8.82
CW18	445181.605	2141979.752	8.80
CW19	445169.657	2141547.299	9.51
CW20	445184.025	2141112.829	10.00
CW21	445187.180	2140748.934	9.58
CW22	444983.269	2140555.224	10.00
CW23	444986.119	2140950.471	10.00
CW24	444984.021	2141393.675	9.90
CW25	444979.949	2141755.209	9.35
CW26	444944.994	2142149.196	8.65
CW27	444981.868	2142543.760	8.97
CW28	444982.796	2142935.382	9.19
CW29	444783.260	2143149.368	9.88
CW30	444789.162	2142746.365	9.40
CW31	444786.660	2142347.641	9.41
CW32	444759.427	2141949.683	9.12
CW33	444653.209	2141687.399	11.01

See notes at end of table.

Appendix G-2 (Continued)
Location and Elevation of
CPT Soundings and DPT Groundwater Sampling Points

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Location I.D.	X Coordinate[1]	Y Coordinate[1]	Surface Elevation[2]
CW34	444621.884	2142160.341	9.65
CW35	444716.525	2142628.326	9.75
CW36	444563.502	2142977.834	10.26
CW37	444425.609	2143130.765	10.11
CW38	444563.702	2142823.978	10.38
CW39	444285.460	2142393.544	10.16
CW40	444372.538	2141867.910	9.77
CW41	444209.033	2141692.262	10.30
CW42	444213.099	2142243.405	10.31
CW43	444130.605	2142940.759	10.38
CW44	445725.275	2143457.349	9.09
CW45	445256.421	2143450.479	10.54
CW46	444725.700	2143428.535	10.90
CW47	444174.859	2143415.143	11.40
CW48	443866.654	2143163.856	10.74
CW49	443863.554	2142781.089	12.50
CW50	443907.579	2142367.062	11.90
CW51	443871.118	2141959.415	11.59
CW52	443800.812	2141585.366	10.70
CW53	444247.932	2141492.388	11.01
CW54	444688.208	2141432.767	13.40
CW55	444681.719	2140909.171	12.90
CW56	444677.315	2140320.846	17.30
CW57	443723.473	2143142.739	10.10
CW58	443665.372	2142845.645	11.76
CW59	443666.067	2141594.312	11.40
CW60	443732.159	2142380.610	13.90
CW61	443360.880	2142761.459	13.80
CW62	443314.600	2142932.947	13.10
CW63	443357.954	2143113.841	12.50

[1]Transverse Mercator Projection, Florida East Zone (NAS 1983)
[2]Based on National Geodetic Survey control monument, Mulberry Camera 1381 GSS (NGVD 1929)

APPENDIX H

Water Level Elevation Measurements

Appendix H
Water Level Elevation Measurements

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Piezometer/ Well I.D.	Elevation TOC (ft.)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)
		DATE: 9-22-93		DATE: 11-18-93		DATE: 12-16-93 to 12-17-93		DATE: 1-27-94	
PZ001	3.99	2.45	1.54	2.52	1.47	2.75	1.24	2.84	1.15
PZ002	4.18	1.52	2.66	1.41	2.77	1.71	2.47	1.65	2.53
PZ003	5.71	1.27	4.44	1.13	4.58	1.31	4.40	1.33	4.38
PZ004	5.64	3.29	2.35	3.04	2.6	3.33	2.31	3.50	2.14
PZ005	8.24	4.96	3.28	5.31	2.93	5.13	3.11	5.35	2.89
PZ006	8.19	4.05	4.14	3.44	4.75	3.83	4.36	3.65	4.54
PZ007	9.62	6.47	3.15	6.01	3.61	6.65	2.97	6.63	2.99
PZ008	9.40	6.47	2.93	5.79	3.61	6.44	2.96	6.51	2.89
PZ009	5.90	4.30	1.60	2.82	3.08	2.95	2.95	3.09	2.81
PZ010	5.90	2.73	3.17	1.32	4.58	2.97	2.93	2.89	3.01
PZ011	9.27	3.63	5.64	6.30	2.97	6.47	2.80	6.53	2.74
PZ012	9.22	6.48	2.74	6.24	2.98	6.59	2.63	6.71	2.51
PZ013	8.65	3.55	5.10	3.61	5.04	3.75	4.90	3.86	4.79
PZ014	8.50	5.55	2.95	4.84	3.66	5.21	3.29	5.12	3.38
PZ015	9.44	4.87	4.57	4.58	4.86	4.90	4.54	5.08	4.36
PZ016	10.80	7.55	3.25	7.09	3.71	7.61	3.19	7.49	3.31
PZ017	10.77	6.82	3.95	6.55	4.22	7.00	3.77	6.87	3.90

See notes at end of table.

Appendix H (Continued)
Water Level Elevation Measurements

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Piezometer/ Well I.D.	Elevation TOC (ft.)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)
		DATE: 9-22-93		DATE: 11-18-93		DATE: 12-16-93 to 12-17-93		DATE: 1-27-94	
PZ018	9.20	3.53	5.67	3.37	5.83	3.59	5.61	3.70	5.50
PZ019	9.15	5.80	3.35	5.53	3.62	5.81	3.34	5.94	3.21
PZ020	10.04	4.69	5.35	5.98	4.06	6.26	3.78	6.15	3.89
PZ021	9.99	5.23	4.76	5.08	4.91	5.28	4.71	5.21	4.78
PZ022	10.14	1.93	8.21	3.93	6.21	4.19	5.95	4.16	5.98
PZ023	9.23	2.50	6.73	3.17	6.06	2.96	6.27	5.92	3.31
PZ024	9.04	5.99	3.05	5.79	3.25	5.92	3.12	3.00	6.04
PZ025	10.69	3.88	6.81	4.11	6.58	4.35	6.34	4.32	6.37
PZ026	10.86	6.17	4.69	5.79	5.07	6.24	4.62	5.85	5.01
PZ027	6.68	2.62	4.06	3.45	3.23	3.47	3.21	3.77	2.91
B101 MW01	9.99	4.51	5.48	4.42	6.57	4.54	5.45	4.50	5.49
B101 MW02	9.41	5.82	3.59	5.64	3.7	5.82	3.59	5.59	3.82
B101 MW03	9.71	5.98	3.73	5.82	3.89	6.00	3.71	5.79	3.92
B101 MW04	9.88	5.63	4.25	5.66	4.22	5.63	4.25	5.42	4.46
P159 MW01	6.56	4.60	1.96	4.58	1.98	4.49	2.07	4.66	1.90
P159 MW02	7.61	5.27	2.34	5.26	2.35	4.96	2.65	5.01	2.60
P159 MW03	8.32	6.00	2.32	5.98	2.34	5.67	2.65	5.74	2.58

See notes at end of table.

Appendix H (Continued)
Water Level Elevation Measurements

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Piezometer/ Well I.D.	Elevation TOC (ft.)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)
		DATE: 9-22-93		DATE: 11-18-93		DATE: 12-16-93 to 12-17-93		DATE: 1-27-94	
P159 MW04	8.22	5.30	2.92	5.27	2.95	5.04	3.18	4.89	3.33
P159 MW05	9.25	6.32	2.93	6.31	2.94	6.17	3.08	6.03	3.22
P159 MW06	8.49	5.38	3.11	5.36	3.13	5.16	3.33	4.98	3.51
P159 MW07	8.72	5.41	3.31	5.41	3.31	5.23	3.49	5.00	3.72
JAX-873-1	7.24	5.55	1.69	4.51	2.73	5.62	1.62	6.18	1.06
JAX-873-2	7.38	5.71	1.67	5.61	1.77	5.82	1.56	6.30	1.08
JAX-873-3	7.96	6.37	1.59	6.28	1.68	6.47	1.49	6.95	1.01
JAX-873-4	7.84	6.17	1.67	6.09	1.75	6.27	1.57	6.75	1.09
JAX-873-5	7.94	6.24	1.70	6.01	1.93	6.36	1.58	6.81	1.13
JAX-873-6	7.08	5.66	1.42	5.56	1.52	5.71	1.37	6.15	0.93
JAX-873-7	7.28	5.71	1.57	5.67	1.61	5.83	1.45	6.29	0.99
JAX-873-8	7.18	5.66	1.52	5.63	1.55	5.79	1.39	6.20	0.98
JAX-873-9	8.39	6.80	1.59	6.76	1.63	6.99	1.40	7.45	0.94
JAX-873-10	6.53	5.11	1.42	5.02	1.51	5.18	1.35	5.56	0.97
JAX-873-11	8.70	7.04	1.66	6.98	1.72	7.17	1.53	8.00	0.70
JAX-873-1-1	8.27	NR	NR	6.48	1.79	6.68	1.59	NR	NR
JAX-873-1-2	7.45	5.77	1.66	NR	NR	5.87	1.56	7.00	0.43

See notes at end of table.

Appendix H (Continued)
Water Level Elevation Measurements

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Piezometer/ Well I.D.	Elevation TOC (ft.)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)
		DATE: 9-22-93		DATE: 11-18-93		DATE: 12-16-93 to 12-17-93		DATE: 1-27-94	
JAX-873-1-3	7.78	6.05	1.73	6.01	1.77	6.17	1.61	6.66	1.12
JAX-873-1-4	8.87	7.11	1.76	7.07	1.80	7.25	1.62	7.71	1.16
JAX-873-3-1	9.36	7.69	1.67	NR	NR	7.73	1.63	8.20	1.16
JAX-873-3-2	8.79	7.13	1.66	6.97	1.82	7.15	1.64	7.64	1.15
JAX-873-3-3	8.78	7.07	1.71	6.89	1.89	7.10	1.68	7.55	1.23
JAX-873-4-1	7.00	NR	NR	NR	NR	NR	NR	NR	NR
JAX-873-4-2	7.32	5.82	1.50	NR	NR	NR	NR	NR	NR
JAX-873-4-3	7.72	6.19	1.53	NR	NR	NR	NR	NR	NR
NARF-4	8.96	7.38	1.58	7.39	1.57	7.42	1.54	7.37	1.59
NARFB-1	11.65	9.08	2.57	8.64	3.01	9.43	2.22	9.25	2.40
NARF-9	18.39	15.47	2.92	14.89	3.50	15.73	2.66	15.49	2.90
NARF-11	19.28	16.60	2.68	15.96	3.32	16.76	2.52	16.52	2.76
NARF-12	6.01	3.90	2.11	NR	NR	NR	NR	NR	NR
NARF-13	8.59	NR	NR	NR	NR	NR	NR	NR	NR
NARF-14	9.04	6.07	2.97	5.86	3.18	5.84	3.20	5.41	3.63
NARF-15	10.76	7.44	3.32	NR	NR	NR	NR	NR	NR
NARF-16	9.04	6.78	2.26	6.42	2.62	5.51	3.53	6.34	2.70

See notes at end of table.

Appendix H (Continued)
Water Level Elevation Measurements

RI/FS Workplan, Operable Unit 3
NAS Jacksonville
Jacksonville, Florida

Piezometer/ Well I.D.	Elevation TOC (ft.)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)	Depth to Water from TOC (feet)	Water Level (feet MSL)
		DATE: 9-22-93		DATE: 11-18-93		DATE: 12-16-93 to 12-17-93		DATE: 1-27-94	
NARF-17	12.15	7.90	4.25	6.17	5.98	7.74	4.41	7.31	4.84
NARF-18	8.12	5.51	2.61	6.21	1.91	6.45	1.67	5.33	2.79
NARF D-1	8.84	2.77	6.07	2.65	6.19	2.59	6.25	2.69	6.15
NARF D-2	10.42	NR	NR	7.66	2.76	8.36	2.06	8.19	2.23

Notes: TOC = top of (well) casing.
MSL = mean sea level.
NR = not recorded.

APPENDIX I

Geologic Cross-Sections C-C', E-E', and G-G'

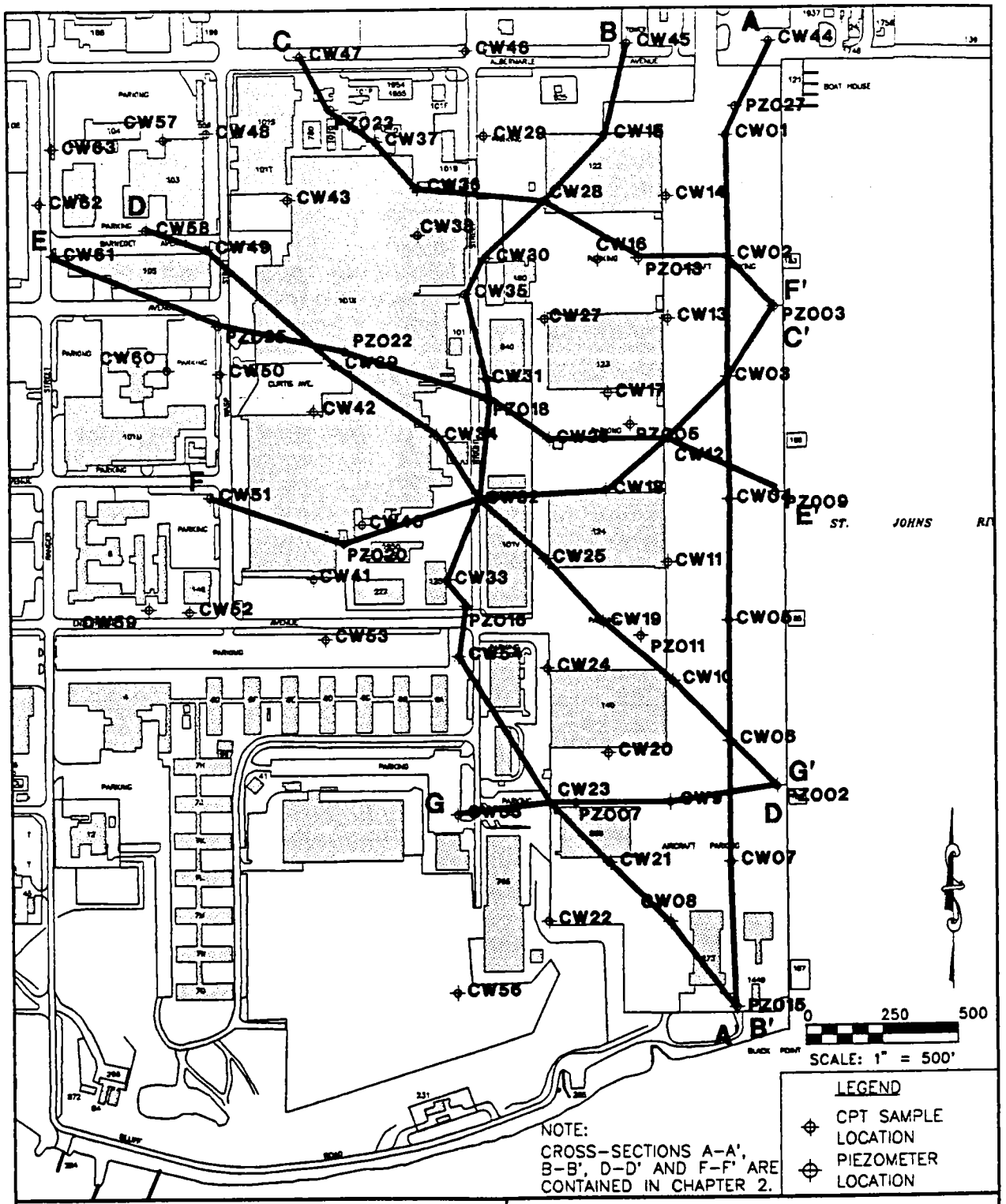
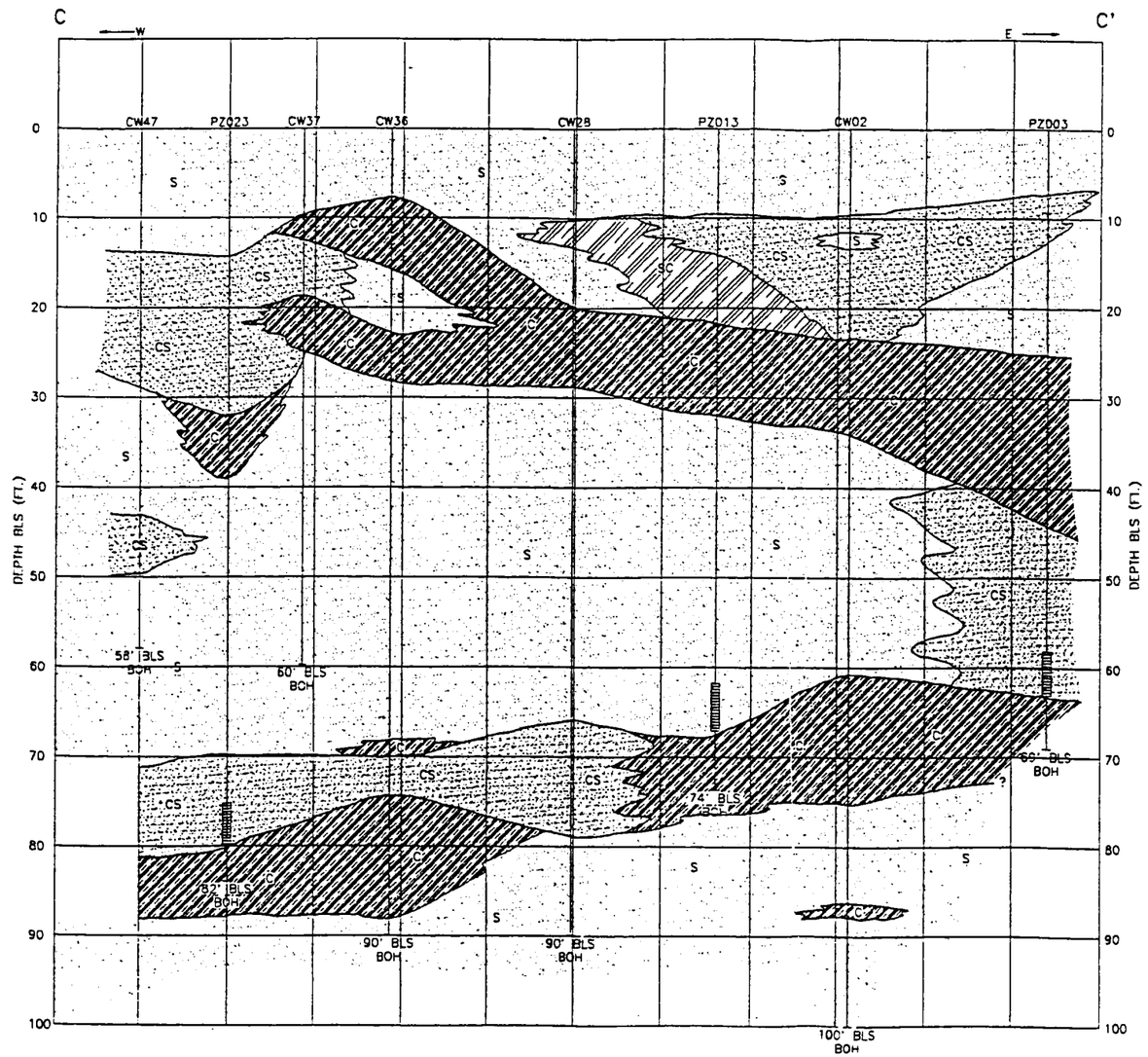


FIGURE I-1
LOCATIONS OF CROSS-SECTION LINES

RI/FS WORKPLAN FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRM/10-10-94



LEGEND

- S: SAND
- CS: CLAYEY SAND
- SC: SANDY CLAY
- C: CLAY
- UNKNOWN CONTACT
- INFERRED CONTACT
- SCREENED INTERVAL
- BOH — BOTTOM OF HOLE
- BLS — BELOW LAND SURFACE

0 100 200 400 FEET

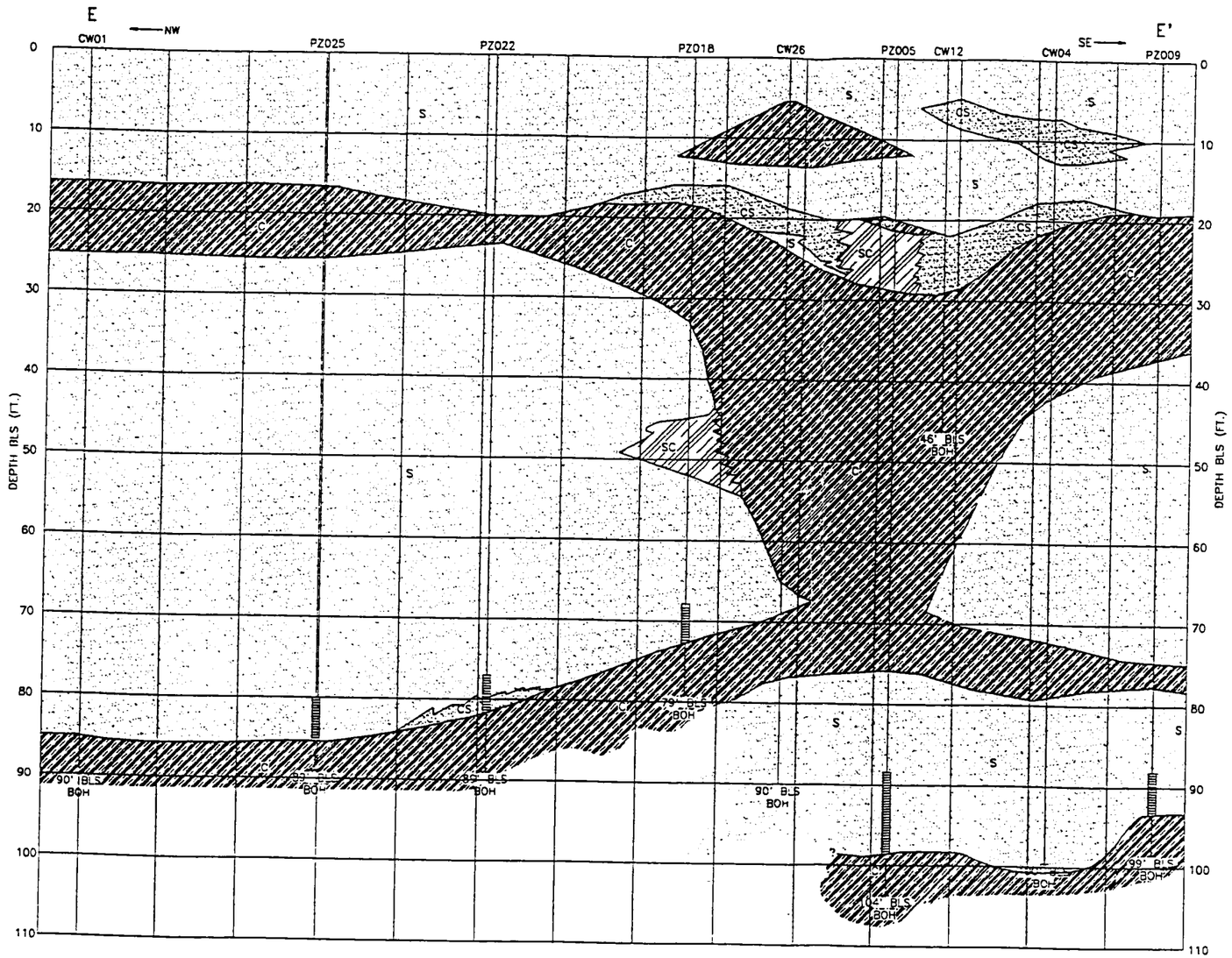
VERTICAL EXAGGERATION 20:1

FIGURE I-1
GEOLOGIC CROSS-SECTION
C - C'

RI/FS WORKPLAN
FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

7586SC-C/DRM/3-7-94



LEGEND

- S: SAND
- CS: CLAYEY SAND
- SC: SANDY CLAY
- C: CLAY
- UNKNOWN CONTACT
- INFERRED CONTACT
- SCREENED INTERVAL
- BOH BOTTOM OF HOLE
- BLS BELOW LAND SURFACE

0 100 200 400 FEET

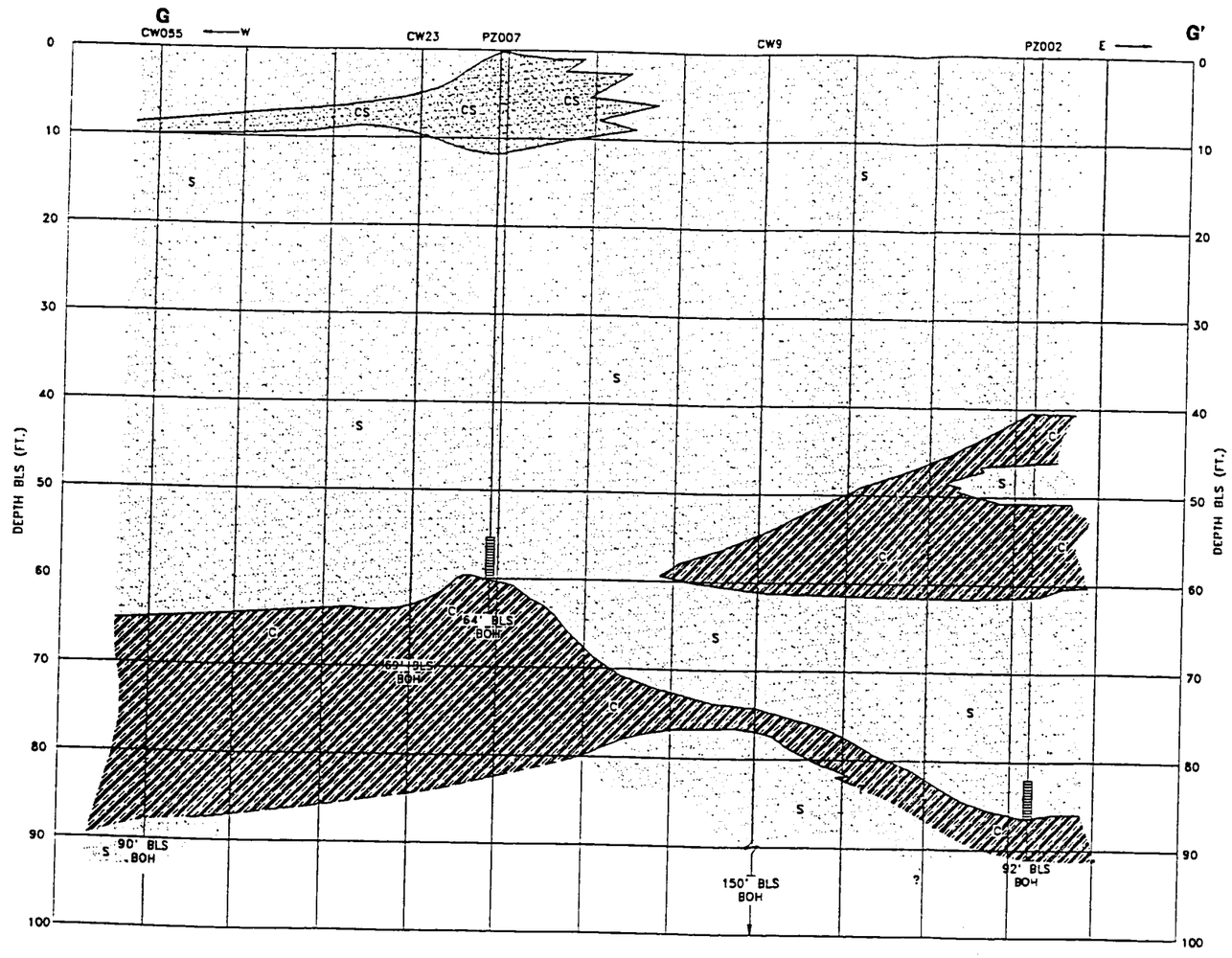
VERTICAL EXAGGERATION 20:1

FIGURE I-2
GEOLOGIC CROSS-SECTION
E - E'

RI/FS WORKPLAN
FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

7586_EE/DRM/3-8-94



LEGEND

- S: SAND
- CS: CLAYEY SAND
- SC: SANDY CLAY
- C: CLAY
- UNKNOWN CONTACT
- INFERRED CONTACT
- SCREENED INTERVAL
- BOH — BOTTOM OF HOLE
- BLS — BELOW LAND SURFACE

0 50 100 200

VERTICAL EXAGGERATION 10:1

FIGURE I-3
GEOLOGIC CROSS-SECTION
G - G'

RI/FS WORKPLAN
FOR OU 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

7586S_CC/DRM/3-8-94

APPENDIX J

Dissipation Test Curves and Example Calculation of K_h

PROJECT	COMP BY	JOB NO.
EXAMPLE CALCULATION OF K_h:	DD	07586-03
	CHK BY	DATE

CALCULATE COEFFICIENT OF CONSOLIDATION (C_h) FOR THE CLAY LAYER:

$$C_h = \frac{T_{50}\, r^2}{t_{50}}$$

T_{50} = dimensionless time factor corresponding to 50% of excess pore pressure
3.5 for cone sensing piezocones

r = radius of piezocone = 0.70 in = 0.058 ft

t_{50} = elapsed time from start of dissipation test to 50% dissipation of excess pore pressure (value from graph)

$$C_h = \frac{3.5 \times 0.058^2}{t_{50}} = \frac{0.0119}{t_{50}} \quad (ft^2/sec)$$

CALCULATE THE CONSTRAINED MODULUS (M) FOR THE CLAY

$$M = \alpha_m q_c$$

α_m = constrained modulus coeff. (Assume = 5)
q_c = measured cone tip resistance (from TABLE) TSF (ton/ft^2)

CALCULATE K_h hydraulic conductivity in horizontal direction

$$K_h = \frac{C_h \gamma_w}{M}$$

γ_w = unit weight of water ($62.46\ lb/ft^3$) = $0.0312\ ton/ft^3$

$$\frac{C_h \times 0.0312\ ton/ft^3}{M}$$

(See Table 2-7 Page 2-46)

APPENDIX K

Analytical Results

K-1 Chemical Table

K-2 Detected Chemicals in Environmental Media

K-3 Database Sample Inventory

Table K-1

Chemical Table

Table K-1, Chemical Table, provides an alphanumeric summary of elements, chemicals, and chemical groups analyzed during the SSFP and detected in environmental media (SSFP and previous investigations) along with associated ARARs and solubility in water. A minus 1 (-1) in any of the fields indicates that there was no ARAR standard or that the information was not available (e.g., solubility in water). the column headings refer to the following.

CAS No.: Chemical Abstract Service Number

Group:
- A - chemical identified during analyses of samples by the onsite field laboratory during the SSFP.
- B - chemical identified during analyses of samples by the offsite laboratory during the SSFP.
- C - chemical identified by the offsite laboratory during analyses of samples collected prior to the SSFP.

Units: ppm = parts per million

ppb = parts per billion

SDWA MCL: Safe Drinking Water Act maximum contaminant level

SDWA MCLG: Safe Drinking Water Act maximum contaminant level goal

FL MCL: Florida maximum contaminant level

Tap Water: USEPA Region III risk tables, potable water use

C soil: USEPA Region III risk tables, construction soil

R soil: USEPA Region III risk tables, residential soil

Table Description

Table K-1, Chemical Table, provides an alphanumeric summary of elements, chemicals, and chemical groups analyzed during the SSFP and detected in environmental media (SSFP and previous investigations) along with associated ARARs and solubility in water. A minus 1 (-1) in any of the fields indicates that there was no ARAR standard or that the information was not available (e.g. solubility in water).

cord#	PARAMETER	CAS_NO	CLASS	GROUP	UNITS	SDWA_MCL	SDWA_MCLG	FL_MCL	SOLUBILITY
1	1,1,1-Trichloroethane	71-55-6	VOA	B	ppb	200.00000	200.00000	200.00000	1500000.00000
2	1,1,2,2-Tetrachloroethane	79-34-5	VOA	B	ppb	-1.00000	-1.00000	-1.00000	2900000.00000
3	1,1,2-Trichloroethane	79-00-5	VOA	A	ppb	5.00000	3.00000	5.00000	4500000.00000
4	1,1-Dichloroethane	75-34-3	VOA	A	ppb	-1.00000	-1.00000	-1.00000	5500000.00000
5	1,1-Dichloroethene	75-35-4	VOA	A	ppb	7.00000	7.00000	7.00000	2250000.00000
6	1,2,4-Trichlorobenzene	120-82-1	SVOA	B	ppb	70.00000	70.00000	70.00000	30000.00000
7	1,2-Dichlorobenzene	95-50-1	VOA	A	ppb	600.00000	600.00000	600.00000	100000.00000
8	1,2-Dichloroethane	107-06-2	VOA	A	ppb	5.00000	0.00000	3.00000	8520000.00000
9	1,2-Dichloroethene (total)	540-59-0	VOA	B	ppb	-1.00000	-1.00000	-1.00000	4900000.00000
10	1,2-Dichloropropane	78-87-5	VOA	B	ppb	5.00000	0.00000	5.00000	2700000.00000
11	1,3-Dichlorobenzene	541-73-1	VOA	A	ppb	600.00000	600.00000	-1.00000	123000.00000
12	1,4-Dichlorobenzene	106-46-7	VOA	A	ppb	75.00000	75.00000	75.00000	79000.00000
13	2,2'-oxybis(1-Chloropropane)	108-60-1	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
14	2,4,5-Trichlorophenol	95-95-4	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	1190000.00000
15	2,4,6-Trichlorophenol	88-06-2	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	800000.00000
16	2,4-Dichlorophenol	120-83-2	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	4600000.00000
17	2,4-Dimethylphenol	105-67-9	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
18	2,4-Dinitrophenol	51-28-5	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	5600000.00000
19	2,4-Dinitrotoluene	121-14-2	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	240000.00000
20	2,6-Dinitrotoluene	606-20-2	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	1320000.00000
21	2-Butanone	78-93-3	VOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
22	2-Chloronaphthalene	91-58-7	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
23	2-Chlorophenol	95-57-8	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
24	2-Hexanone	591-78-6	VOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
25	2-Methylnaphthalene	91-57-6	SVOA	B	ppb	-1.00000	-1.00000	100.00000	-1.00000
26	2-Methylphenol	95-48-7	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
27	2-Nitroaniline	88-74-4	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
28	2-Nitrophenol	88-75-5	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
29	3,3'-Dichlorobenzidine	91-94-1	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	4000.00000
30	3-Nitroaniline	99-09-2	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
31	4,4'-DDD	72-54-8	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	100.00000
32	4,4'-DDE	72-55-9	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	40.00000
33	4,4'-DDT	50-29-3	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	5.00000
34	4,6-Dinitro-2-Methylphenol	534-52-1	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	290000.00000
35	4-Bromophenyl-phenylether	101-55-3	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
36	4-Chloro-3-Methylphenol	59-50-7	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
37	4-Chloroaniline	106-47-8	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
38	4-Chlorophenyl-phenylether	7005-72-3	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
39	4-Methyl-2-Pentanone	108-10-1	VOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
40	4-Methylphenol	106-44-5	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
41	4-Nitroaniline	100-01-6	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
42	4-Nitrophenol	100-02-7	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
43	Acenaphthene	83-32-9	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	3420.00000
44	Acenaphthylene	208-96-8	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	3930.00000
45	Acetone	67-64-1	VOA	B	ppb	-1.00000	-1.00000	-1.00000	1000000000.00000
46	Aldrin	309-00-2	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	180.00000
47	Aluminum	7429-90-5	Metal	B	ppm	0.50000	0.20000	0.20000	0.00000
48	Anthracene	120-12-7	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	45.00000
49	Antimony	7440-36-0	Metal	B	ppm	0.00600	0.00600	0.00600	0.00000
50	Aroclor-1016	12674-11-2	Pest/PCB	A	ppb	0.50000	0.00000	0.50000	-1.00000
51	Aroclor-1221	11104-28-2	Pest/PCB	A	ppb	0.50000	0.00000	0.50000	-1.00000
52	Aroclor-1232	11141-16-5	Pest/PCB	A	ppb	0.50000	0.00000	0.50000	-1.00000
53	Aroclor-1242	53469-21-9	Pest/PCB	A	ppb	0.50000	0.00000	0.50000	-1.00000
54	Aroclor-1248	12672-29-6	Pest/PCB	A	ppb	0.50000	0.00000	0.50000	-1.00000
55	Aroclor-1254	11097-69-1	Pest/PCB	A	ppb	0.50000	0.00000	0.50000	-1.00000
56	Aroclor-1260	11096-82-5	Pest/PCB	A	ppb	0.50000	0.00000	0.50000	-1.00000
57	Arsenic	7440-38-2	Metal	A	ppm	0.05000	-1.00000	0.05000	0.00000
58	Barium	7440-39-3	Metal	B	ppm	2.00000	2.00000	2.00000	0.00000
59	Barium (TCLP)	7440-39-3	Metal	C	ppm	2.00000	2.00000	2.00000	0.00000
60	Benzene	71-43-2	VOA	A	ppb	5.00000	0.00000	1.00000	1750000.00000
61	Benzo(a)Anthracene	56-55-3	SVOA	B	ppb	0.10000	0.00000	-1.00000	5.70000
62	Benzo(a)Pyrene	50-32-8	SVOA	B	ppb	0.20000	0.00000	0.20000	1.20000
63	Benzo([illegible] oranthene	205-99-2	SVOA	B	ppb	0.20000	0.00000	-1.00000	14.00000
64	Benzo([illegible] Perylene	191-24-2	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	0.70000

65	Benzo(k)Fluoranthene	207-08-9	SVOA	B	ppb	0.20000	0.00000	-1.00000	4.30000
66	Beryllium	7440-41-7	Metal	B	ppm	0.00400	0.00400	0.00400	0.00000
67	Bromodichloromethane	75-27-4	VOA	A	ppb	100.00000	0.00000	100.00000	0.00000
68	Bromoform	75-25-2	VOA	B	ppb	100.00000	0.00000	100.00000	3010000.00000
69	Bromomethane	74-83-9	VOA	B	ppb	-1.00000	-1.00000	-1.00000	0.00000
70	Butylbenzylphthalate	85-68-7	SVOA	B	ppb	100.00000	0.00000	-1.00000	-1.00000
71	Cadmium	7440-43-9	Metal	A	ppm	0.00500	0.00500	0.00500	-1.00000
72	Cadmium (TCLP)	7440-43-9	Metal	C	ppm	0.00500	0.00500	0.00500	0.00000
73	Calcium	7440-70-2	Metal	B	ppm	-1.00000	-1.00000	-1.00000	0.00000
74	Carbazole	86-74-8	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
75	Carbon Disulfide	75-15-0	VOA	B	ppb	-1.00000	-1.00000	-1.00000	2940000.00000
76	Carbon Tetrachloride	56-23-5	VOA	A	ppb	5.00000	0.00000	3.00000	757000.00000
77	Chlordane	57-74-9	Pest/PCB	A	ppb	2.00000	0.00000	2.00000	560.00000
78	Chlorobenzene	108-90-7	VOA	B	ppb	100.00000	100.00000	100.00000	466000.00000
79	Chloroethane	75-00-3	VOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
80	Chloroform	67-66-3	VOA	A	ppb	100.00000	0.00000	100.00000	8200000.00000
81	Chloromethane	74-87-3	VOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
82	Chromium	7440-47-3	Metal	A	ppm	0.10000	0.10000	0.10000	0.00000
83	Chromium (TCLP)	7440-47-3	Metal	C	ppm	0.10000	0.10000	0.10000	0.00000
84	Chrysene	218-01-9	SVOA	B	ppb	0.20000	0.00000	-1.00000	1.80000
85	Cobalt	7440-48-4	Metal	B	ppm	-1.00000	-1.00000	-1.00000	0.00000
86	Copper	7440-50-8	Metal	B	ppm	0.10000	1.30000	1.00000	0.00000
87	Cyanide		Anion	B	ppm	0.20000	0.20000	0.20000	0.00000
88	Di-n-Butylphthalate	84-74-2	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
89	Di-n-Octyl Phthalate	117-84-0	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
90	Dibenz(a,h)Anthracene	53-70-3	SVOA	B	ppb	0.30000	0.00000	-1.00000	0.50000
91	Dibenzofuran	132-64-9	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
92	Dibromochloromethane	124-48-1	VOA	B	ppb	100.00000	0.00000	100.00000	-1.00000
93	Dieldrin	60-57-1	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	195.00000
94	Diethylphthalate	84-66-2	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	896000.00000
95	Dimethylphthalate	131-11-3	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
96	Endosulfan I	959-98-8	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	0.00000
97	Endosulfan II	33213-65-9	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	0.00000
98	*Endosulfan sulfate	1031-07-8	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	0.00000
99	Endrin	72-20-8	Pest/PCB	A	ppb	2.00000	2.00000	2.00000	-1.00000
100	Endrin aldehyde	7421-36-3	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	-1.00000
101	Endrin ketone	53494-70-5	Pest/PCB	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
102	Ethylbenzene	100-41-4	VOA	A	ppb	700.00000	700.00000	700.00000	152000.00000
103	Fluoranthene	206-44-0	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	206.00000
104	Fluorene	86-73-7	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	1690.00000
105	Heptachlor	76-44-8	Pest/PCB	A	ppb	0.40000	0.00000	0.40000	180.00000
106	Heptachlor epoxide	1024-57-3	Pest/PCB	A	ppb	0.20000	0.00000	0.20000	350.00000
107	Hexachlorobenzene	118-74-1	SVOA	B	ppb	1.00000	0.00000	1.00000	6.00000
108	Hexachlorobutadiene	87-68-3	SVOA	B	ppb	-1.00000	0.10000	-1.00000	150.00000
109	Hexachlorocyclopentadiene	77-47-4	SVOA	B	ppb	50.00000	50.00000	50.00000	2100.00000
110	Hexachloroethane	67-72-1	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	50000.00000
111	Indeno(1,2,3-cd)Pyrene	193-39-5	SVOA	B	ppb	0.40000	0.00000	0.40000	0.53000
112	Iron	7439-89-6	Metal	B	ppm	0.30000	0.00000	0.30000	0.00000
113	Isophorone	78-59-1	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	0.00000
114	Lead	7439-92-1	Metal	A	ppm	0.01500	0.00000	0.01500	-1.00000
115	Magnesium	7439-95-4	Metal	B	ppm	-1.00000	-1.00000	-1.00000	0.00000
116	Manganese	7439-96-5	Metal	B	ppm	0.05000	0.00020	0.05000	0.00000
117	Mercury	7439-97-6	Metal	B	ppm	0.00200	0.00200	0.00200	0.00000
118	Mercury (TCLP)	7439-97-6	Metal	C	ppm	0.00200	0.00200	0.00200	0.00000
119	Methoxychlor	72-43-5	Pest/PCB	B	ppb	40.00000	40.00000	40.00000	-1.00000
120	Methylene Chloride	75-09-2	VOA	B	ppb	5.00000	0.00000	5.00000	-1.00000
121	N-Nitroso-Di-n-Propylamine	621-64-7	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
122	N-Nitrosodiphenylamine (1)	86-30-6	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
123	Naphthalene	91-20-3	SVOA	B	ppb	-1.00000	-1.00000	100.00000	-1.00000
124	Nickel	7440-02-0	Metal	A	ppm	0.10000	0.10000	0.10000	0.00000
125	Nitrobenzene	98-95-3	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	1900000.00000
126	Pentachlorophenol	87-86-5	SVOA	B	ppb	1.00000	0.00000	1.00000	14000.00000
127	Phenanthrene	85-01-8	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	1000.00000
128	Phenol	108-95-2	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	93000000.00000
129	Potassium	7440-09-7	Metal	B	ppm	-1.00000	-1.00000	-1.00000	0.00000
130	Pyrene	129-00-0	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	132.00000

131	Selenium	7782-49-2	Metal	B	ppm	0.05000	0.05000	0.05000	0.00000
132	Silver	7440-22-4	Metal	B	ppm	0.10000	-1.00000	0.10000	0.00000
133	Sodium	7440-23-5	Metal	B	ppm	-1.00000	-1.00000	160.00000	0.00000
134	Styrene	100-42-5	VOA	B	ppb	100.00000	100.00000	100.00000	0.00000
135	Tetrachloroethene	127-18-4	VOA	A	ppb	5.00000	0.00000	3.00000	150000.00000
136	Thallium	7440-28-0	Metal	B	ppm	0.00200	0.00050	0.00200	0.00000
137	Toluene	108-88-3	VOA	A	ppb	1000.00000	1000.00000	1000.00000	535000.00000
138	Total Petroleum Hydrocarbons		TPH	A	ppm	-1.00000	-1.00000	5.00000	-1.00000
139	Toxaphene	8001-35-2	Pest/PCB	A	ppb	3.00000	0.00000	3.00000	500.00000
140	Trichloroethene	79-01-6	VOA	A	ppb	5.00000	0.00000	3.00000	1100000.00000
141	Trichlorofluoromethane	75-69-4	VOA	C	ppb	-1.00000	-1.00000	-1.00000	1100000.00000
142	Unknown HC as o-Xylene		VOA	A	ppb	-1.00000	-1.00000	-1.00000	198000.00000
143	Vanadium	7440-62-2	Metal	B	ppm	-1.00000	-1.00000	-1.00000	0.00000
144	Vinyl Chloride	75-01-4	VOA	B	ppb	2.00000	0.00000	1.00000	2670000.00000
145	Xylene (total)	1330-20-7	VOA	B	ppb	10000.00000	10000.00000	10000.00000	198000.00000
146	Zinc	7440-66-6	Metal	B	ppm	5.00000	-1.00000	5.00000	0.00000
147	alpha-BHC	319-84-6	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	1630.00000
148	alpha-Chlordane	5103-71-9	Pest/PCB	B	ppb	2.00000	0.00000	2.00000	-1.00000
149	beta-BHC	319-85-7	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	240.00000
150	bis(2-Chloroethoxy)Methane	111-91-1	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	-1.00000
151	bis(2-Chloroethyl)Ether	111-44-4	SVOA	B	ppb	-1.00000	-1.00000	-1.00000	10200000.00000
152	bis(2-Ethylhexyl)Phthalate	117-81-7	SVOA	B	ppb	6.00000	0.00000	4.00000	0.00000
153	cis-1,2-Dichloroethene	156-59-2	VOA	A	ppb	70.00000	70.00000	70.00000	3500000.00000
154	cis-1,3-Dichloropropane		VOA	C	ppb	-1.00000	-1.00000	-1.00000	-1.00000
155	cis-1,3-Dichloropropene	10061-01-5	VOA	B	ppb	-1.00000	0.00000	-1.00000	-1.00000
156	delta-BHC	319-86-8	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000	31400.00000
157	gamma-BHC (Lindane)	58-89-9	Pest/PCB	A	ppb	0.20000	0.00000	0.20000	7800.00000
158	gamma-Chlordane	5103-74-2	Pest/PCB	B	ppb	2.00000	0.00000	2.00000	-1.00000
159	m/p-Xylene	108-38-3	VOA	A	ppb	10000.00000	10000.00000	10000.00000	198000.00000
160	o-Xylene	95-47-6	VOA	A	ppb	10000.00000	10000.00000	10000.00000	175000.00000
161	trans-1,2-Dichloroethene	156-60-5	VOA	A	ppb	100.00000	100.00000	100.00000	6300000.00000
162	trans-1,3-Dichloropropene	10061-02-6	VOA	B	ppb	-1.00000	0.00000	-1.00000	-1.00000

ord#	PARAMETER	CAS_NO	CLASS	GROUP	UNITS	TAP_WATER	C_SOIL	R_SOIL
1	1,1,1-Trichloroethane	71-55-6	VOA	B	ppb	130.00000	9200000.00000	700000.00000
2	1,1,2,2-Tetrachloroethane	79-34-5	VOA	B	ppb	0.07000	14000.00000	8500.00000
3	1,1,2-Trichloroethane	79-00-5	VOA	A	ppb	5900.00000	3100000000.00000	230000000.00000
4	1,1-Dichloroethane	75-34-3	VOA	A	ppb	81.00000	10000000.00000	780000.00000
5	1,1-Dichloroethene	75-35-4	VOA	A	ppb	0.05800	4800.00000	2800.00000
6	1,2,4-Trichlorobenzene	120-82-1	SVOA	B	ppb	1.80000	1000000.00000	78000.00000
7	1,2-Dichlorobenzene	95-50-1	VOA	A	ppb	37.00000	9200000.00000	700000.00000
8	1,2-Dichloroethane	107-06-2	VOA	A	ppb	0.16000	31000.00000	19000.00000
9	1,2-Dichloroethene (total)	540-59-0	VOA	B	ppb	5.50000	920000.00000	70000.00000
10	1,2-Dichloropropane	78-87-5	VOA	B	ppb	0.21000	42000.00000	25000.00000
11	1,3-Dichlorobenzene	541-73-1	VOA	A	ppb	54.00000	9100000.00000	700000.00000
12	1,4-Dichlorobenzene	106-46-7	VOA	A	ppb	0.59000	120000.00000	71000.00000
13	2,2'-oxybis(1-Chloropropane)	108-60-1	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
14	2,4,5-Trichlorophenol	95-95-4	SVOA	B	ppb	370.00000	10000000.00000	780000.00000
15	2,4,6-Trichlorophenol	88-06-2	SVOA	B	ppb	7.70000	260000.00000	150000.00000
16	2,4-Dichlorophenol	120-83-2	SVOA	B	ppb	11.00000	310000.00000	23000.00000
17	2,4-Dimethylphenol	105-67-9	SVOA	B	ppb	73.00000	2000000.00000	160000.00000
18	2,4-Dinitrophenol	51-28-5	SVOA	B	ppb	7.30000	200000.00000	16000.00000
19	2,4-Dinitrotoluene	121-14-2	SVOA	B	ppb	7.30000	200000.00000	16000.00000
20	2,6-Dinitrotoluene	606-20-2	SVOA	B	ppb	0.13000	4200.00000	2500.00000
21	2-Butanone	78-93-3	VOA	B	ppb	180.00000	5100000.00000	390000.00000
22	2-Chloronaphthalene	91-58-7	SVOA	B	ppb	290.00000	8200000.00000	630000.00000
23	2-Chlorophenol	95-57-8	SVOA	B	ppb	18.00000	510000.00000	39000.00000
24	2-Hexanone	591-78-6	VOA	B	ppb	-1.00000	-1.00000	-1.00000
25	2-Methylnaphthalene	91-57-6	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
26	2-Methylphenol	95-48-7	SVOA	B	ppb	180.00000	5100000.00000	390000.00000
27	2-Nitroaniline	88-74-4	SVOA	B	ppb	0.22000	6100.00000	470.00000
28	2-Nitrophenol	88-75-5	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
29	3,3'-Dichlorobenzidine	91-94-1	SVOA	B	ppb	0.19000	6400.00000	3800.00000
30	3-Nitroaniline	99-09-2	SVOA	B	ppb	11.00000	310000.00000	23000.00000
31	4,4'-DDD	72-54-8	Pest/PCB	A	ppb	0.35000	12000.00000	7100.00000
32	4,4'-DDE	72-55-9	Pest/PCB	A	ppb	0.25000	8400.00000	5000.00000
33	4,4'-DDT	50-29-3	Pest/PCB	A	ppb	0.25000	8400.00000	3900.00000
34	4,6-Dinitro-2-Methylphenol	534-52-1	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
35	4-Bromophenyl-phenylether	101-55-3	SVOA	B	ppb	210.00000	5900000.00000	450000.00000
36	4-Chloro-3-Methylphenol	59-50-7	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
37	4-Chloroaniline	106-47-8	SVOA	B	ppb	15.00000	410000.00000	31000.00000
38	4-Chlorophenyl-phenylether	7005-72-3	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
39	4-Methyl-2-Pentanone	108-10-1	VOA	B	ppb	180.00000	5100000.00000	390000.00000
40	4-Methylphenol	106-44-5	SVOA	B	ppb	18.00000	510000.00000	39000.00000
41	4-Nitroaniline	100-01-6	SVOA	B	ppb	11.00000	310000.00000	23000.00000
42	4-Nitrophenol	100-02-7	SVOA	B	ppb	11.00000	310000.00000	23000.00000
43	Acenaphthene	83-32-9	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
44	Acenaphthylene	208-96-8	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
45	Acetone	67-64-1	VOA	B	ppb	370.00000	10000000.00000	780000.00000
46	Aldrin	309-00-2	Pest/PCB	A	ppb	0.00500	170.00000	100.00000
47	Aluminum	7429-90-5	Metal	B	ppm	11.00000	300000.00000	23000.00000
48	Anthracene	120-12-7	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
49	Antimony	7440-36-0	Metal	B	ppm	-1.00000	-1.00000	-1.00000
50	Aroclor-1016	12674-11-2	Pest/PCB	A	ppb	0.01100	370.00000	220.00000
51	Aroclor-1221	11104-28-2	Pest/PCB	A	ppb	0.01100	370.00000	220.00000
52	Aroclor-1232	11141-16-5	Pest/PCB	A	ppb	0.01100	370.00000	220.00000
53	Aroclor-1242	53469-21-9	Pest/PCB	A	ppb	0.01100	370.00000	220.00000
54	Aroclor-1248	12672-29-6	Pest/PCB	A	ppb	0.01100	370.00000	220.00000
55	Aroclor-1254	11097-69-1	Pest/PCB	A	ppb	0.01100	370.00000	220.00000
56	Aroclor-1260	11096-82-5	Pest/PCB	A	ppb	0.01100	370.00000	220.00000
57	Arsenic	7440-38-2	Metal	A	ppm	0.00110	31.00000	2.30000
58	Barium	7440-39-3	Metal	B	ppm	0.26000	7200.00000	550.00000
59	Barium (TCLP)	7440-39-3	Metal	C	ppm	0.26000	7200.00000	550.00000
60	Benzene	71-43-2	VOA	A	ppb	0.49000	99000.00000	59000.00000
61	Benzo(a)Anthracene	56-55-3	SVOA	B	ppb	0.08000	2700.00000	1600.00000
62	Benzo(a)Pyrene	50-32-8	SVOA	B	ppb	0.01200	390.00000	230.00000
63	Benzo(b)Fluoranthene	205-99-2	SVOA	B	ppb	0.09500	3200.00000	1900.00000

64	Benzo(g,h,i)Perylene	191-24-2	SVOA	B	ppb	0.55000	18000.00000	11000.00000
65	Benzo(k)Fluoranthene	207-08-9	SVOA	B	ppb	0.22000	7400.00000	4400.00000
66	Beryllium	7440-41-7	Metal	B	ppm	0.00002	0.67000	0.40000
67	Bromodichloromethane	75-27-4	VOA	A	ppb	0.11000	22000.00000	13000.00000
68	Bromoform	75-25-2	VOA	B	ppb	3.10000	360000.00000	160000.00000
69	Bromomethane	74-83-9	VOA	B	ppb	0.87000	140000.00000	11000.00000
70	Butylbenzylphthalate	85-68-7	SVOA	B	ppb	730.00000	20000000.00000	1600000.00000
71	Cadmium	7440-43-9	Metal	A	ppm	0.00180	51.00000	3.90000
72	Cadmium (TCLP)	7440-43-9	Metal	C	ppm	0.00180	51.00000	3.90000
73	Calcium	7440-70-2	Metal	B	ppm	-1.00000	-1.00000	-1.00000
74	Carbazole	86-74-8	SVOA	B	ppb	4.30000	140000.00000	85000.00000
75	Carbon Disulfide	75-15-0	VOA	B	ppb	2.10000	10000000.00000	780000.00000
76	Carbon Tetrachloride	56-23-5	VOA	A	ppb	0.22000	22000.00000	5500.00000
77	Chlordane	57-74-9	Pest/PCB	A	ppb	0.06600	2200.00000	470.00000
78	Chlorobenzene	108-90-7	VOA	B	ppb	3.90000	2000000.00000	160000.00000
79	Chloroethane	75-00-3	VOA	B	ppb	71.00000	2000000.00000	160000.00000
80	Chloroform	67-66-3	VOA	A	ppb	0.21000	470000.00000	78000.00000
81	Chloromethane	74-87-3	VOA	B	ppb	1.90000	220000.00000	130000.00000
82	Chromium	7440-47-3	Metal	A	ppm	0.01800	100000.00000	7800.00000
83	Chromium (TCLP)	7440-47-3	Metal	C	ppm	-1.00000	-1.00000	-1.00000
84	Chrysene	218-01-9	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
85	Cobalt	7440-48-4	Metal	B	ppm	0.00100	-1.00000	-1.00000
86	Copper	7440-50-8	Metal	B	ppm	0.14000	3800.00000	290.00000
87	Cyanide		Anion	B	ppm	-1.00000	-1.00000	-1.00000
88	Di-n-Butylphthalate	84-74-2	SVOA	B	ppb	370.00000	10000000.00000	780000.00000
89	Di-n-Octyl Phthalate	117-84-0	SVOA	B	ppb	73.00000	2000000.00000	160000.00000
90	Dibenz(a,h)Anthracene	53-70-3	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
91	Dibenzofuran	132-64-9	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
92	Dibromochloromethane	124-48-1	VOA	B	ppb	0.17000	34000.00000	20000.00000
93	Dieldrin	60-57-1	Pest/PCB	A	ppb	0.00530	180.00000	110.00000
94	Diethylphthalate	84-66-2	SVOA	B	ppb	2900.00000	82000000.00000	6300000.00000
95	Dimethylphthalate	131-11-3	SVOA	B	ppb	37000.00000	1000000000.00000	78000000.00000
96	Endosulfan I	959-98-8	Pest/PCB	A	ppb	0.18000	5100.00000	390.00000
97	Endosulfan II	33213-65-9	Pest/PCB	A	ppb	0.18000	5100.00000	390.00000
98	*Endosulfan sulfate	1031-07-8	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000
99	Endrin	72-20-8	Pest/PCB	A	ppb	1.10000	31000.00000	2300.00000
100	Endrin aldehyde	7421-36-3	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000
101	Endrin ketone	53494-70-5	Pest/PCB	B	ppb	-1.00000	-1.00000	-1.00000
102	Ethylbenzene	100-41-4	VOA	A	ppb	130.00000	1000000.00000	780000.00000
103	Fluoranthene	206-44-0	SVOA	B	ppb	150.00000	4100000.00000	310000.00000
104	Fluorene	86-73-7	SVOA	B	ppb	150.00000	4100000.00000	310000.00000
105	Heptachlor	76-44-8	Pest/PCB	A	ppb	0.00310	640.00000	380.00000
106	Heptachlor epoxide	1024-57-3	Pest/PCB	A	ppb	0.00160	310.00000	100.00000
107	Hexachlorobenzene	118-74-1	SVOA	B	ppb	0.00880	1800.00000	1100.00000
108	Hexachlorobutadiene	87-68-3	SVOA	B	ppb	0.18000	37000.00000	16000.00000
109	Hexachlorocyclopentadiene	77-47-4	SVOA	B	ppb	0.01500	720000.00000	55000.00000
110	Hexachloroethane	67-72-1	SVOA	B	ppb	0.61000	100000.00000	7800.00000
111	Indeno(1,2,3-cd)Pyrene	193-39-5	SVOA	B	ppb	0.04200	1400.00000	840.00000
112	Iron	7439-89-6	Metal	B	ppm	-1.00000	-1.00000	-1.00000
113	Isophorone	78-59-1	SVOA	B	ppb	90.00000	3000000.00000	1600000.00000
114	Lead	7439-92-1	Metal	A	ppm	0.00000	0.01000	0.00078
115	Magnesium	7439-95-4	Metal	B	ppm	-1.00000	-1.00000	-1.00000
116	Manganese	7439-96-5	Metal	B	ppm	0.01800	14300.00000	39.00000
117	Mercury	7439-97-6	Metal	B	ppm	0.00110	31.00000	2.30000
118	Mercury (TCLP)	7439-97-6	Metal	C	ppm	0.00110	31.00000	2.30000
119	Methoxychlor	72-43-5	Pest/PCB	B	ppb	18.00000	510000.00000	39000.00000
120	Methylene Chloride	75-09-2	VOA	B	ppb	5.40000	380000.00000	230000.00000
121	N-Nitroso-Di-n-Propylamine	621-64-7	SVOA	B	ppb	0.01200	410.00000	240.00000
122	N-Nitrosodiphenylamine (1)	86-30-6	SVOA	B	ppb	17.00000	580000.00000	350000.00000
123	Naphthalene	91-20-3	SVOA	B	ppb	150.00000	4100000.00000	310000.00000
124	Nickel	7440-02-0	Metal	A	ppm	0.07300	2000.00000	160.00000
125	Nitrobenzene	98-95-3	SVOA	B	ppb	0.34000	51000.00000	3900.00000
126	Pentachlorophenol	87-86-5	SVOA	B	ppb	0.71000	24000.00000	14000.00000
127	Phenanthrene	85-01-8	SVOA	B	ppb	110.00000	3000000.00000	230000.00000
128	Phenol	108-95-2	SVOA	B	ppb	2200.00000	61000000.00000	4700000.00000
129	Potass	7440-09-7	Metal	B	ppm	-1.00000	-1.00000	-1.00000

130	Pyrene	129-00-0	SVOA	B	ppb	110.00000	3100000.00000	230000.00000
131	Selenium	7782-49-2	Metal	B	ppm	0.01800	510.00000	39.00000
132	Silver	7440-22-4	Metal	B	ppm	0.01800	510.00000	39.00000
133	Sodium	7440-23-5	Metal	B	ppm	-1.00000	-1.00000	-1.00000
134	Styrene	100-42-5	VOA	B	ppb	0.47000	95000.00000	57000.00000
135	Tetrachloroethene	127-18-4	VOA	A	ppb	1.40000	55000.00000	33000.00000
136	Thallium	7440-28-0	Metal	B	ppm	-1.00000	-1.00000	-1.00000
137	Toluene	108-88-3	VOA	A	ppb	75.00000	20000000.00000	1600000.00000
138	Total Petroleum Hydrocarbons		TPH	A	ppm	-1.00000	-1.00000	-1.00000
139	Toxaphene	8001-35-2	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000
140	Trichloroethene	79-01-6	VOA	A	ppb	2.10000	260000.00000	47000.00000
141	Trichlorofluoromethane	75-69-4	VOA	C	ppb	130.00000	31000000.00000	2300000.00000
142	Unknown HC as o-Xylene		VOA	A	ppb	-1.00000	-1.00000	-1.00000
143	Vanadium	7440-62-2	Metal	B	ppm	0.02600	720.00000	55.00000
144	Vinyl Chloride	75-01-4	VOA	B	ppb	0.02500	1500.00000	900.00000
145	Xylene (total)	1330-20-7	VOA	B	ppb	1200.00000	200000000.00000	16000000.00000
146	Zinc	7440-66-6	Metal	B	ppm	1.10000	31000.00000	2300.00000
147	alpha-BHC	319-84-6	Pest/PCB	A	ppb	0.01400	450.00000	270.00000
148	alpha-Chlordane	5103-71-9	Pest/PCB	B	ppb	-1.00000	-1.00000	-1.00000
149	beta-BHC	319-85-7	Pest/PCB	A	ppb	0.04700	1600.00000	950.00000
150	bis(2-Chloroethoxy)Methane	111-91-1	SVOA	B	ppb	-1.00000	-1.00000	-1.00000
151	bis(2-Chloroethyl)Ether	111-44-4	SVOA	B	ppb	0.01200	2600.00000	1500.00000
152	bis(2-Ethylhexyl)Phthalate	117-81-7	SVOA	B	ppb	6.10000	200000.00000	120000.00000
153	cis-1,2-Dichloroethene	156-59-2	VOA	A	ppb	6.10000	1000000.00000	78000.00000
154	cis-1,3-Dichloropropane		VOA	C	ppb	-1.00000	-1.00000	-1.00000
155	cis-1,3-Dichloropropene	10061-01-5	VOA	B	ppb	0.10000	16000.00000	2300.00000
156	delta-BHC	319-86-8	Pest/PCB	A	ppb	-1.00000	-1.00000	-1.00000
157	gamma-BHC (Lindane)	58-89-9	Pest/PCB	A	ppb	0.06600	2200.00000	1300.00000
158	gamma-Chlordane	5103-74-2	Pest/PCB	B	ppb	-1.00000	-1.00000	-1.00000
159	m/p-Xylene	108-38-3	VOA	A	ppb	140.00000	200000000.00000	16000000.00000
160	o-Xylene	95-47-6	VOA	A	ppb	140.00000	200000000.00000	16000000.00000
161	trans-1,2-Dichloroethene	156-60-5	VOA	A	ppb	12.00000	2000000.00000	160000.00000
162	trans-1,3-Dichloropropene	10061-02-6	VOA	B	ppb	0.10000	16000.00000	2300.00000

Table K-2

Detected Chemicals in Environmental Media

Table K-2, Detected Chemicals in Environmental Media, presents a summary of elements and chemicals detected by locaiton in subsurface soil and groundwater (SSFP and previous investigations) sorted by media (soil or groundwater) and depth interval (0 to 20 feet bls, 20 feet to 60 feet bls, and greater than 60 feet bls).

Table K-3 contains a cross-reference between the sample identificaiton and the sampling event (SSFP and previous investigations).

Data in the various columns are broken down as follows:

Date: the date the sample sas submitted;

Group: refers to when and where the sample was analyzed;
Group A, data genreated by onsiote field laboraoty under the SSFP
Group B, data generated by offsite laboroaty under the SSFP;
Group C, data generated by offsite laboroaty in 1993; and
Group D, data generated by offsite laboroaty prior to 1993.

Grid: location of sample point based on grid included with this table;

Result: laboratory reported concentration;

Qualifier: data qualifiers are:
E = estiamted (onsite lab) and
B, J = Contract Laboratory Program (CLP) data qualifiers.

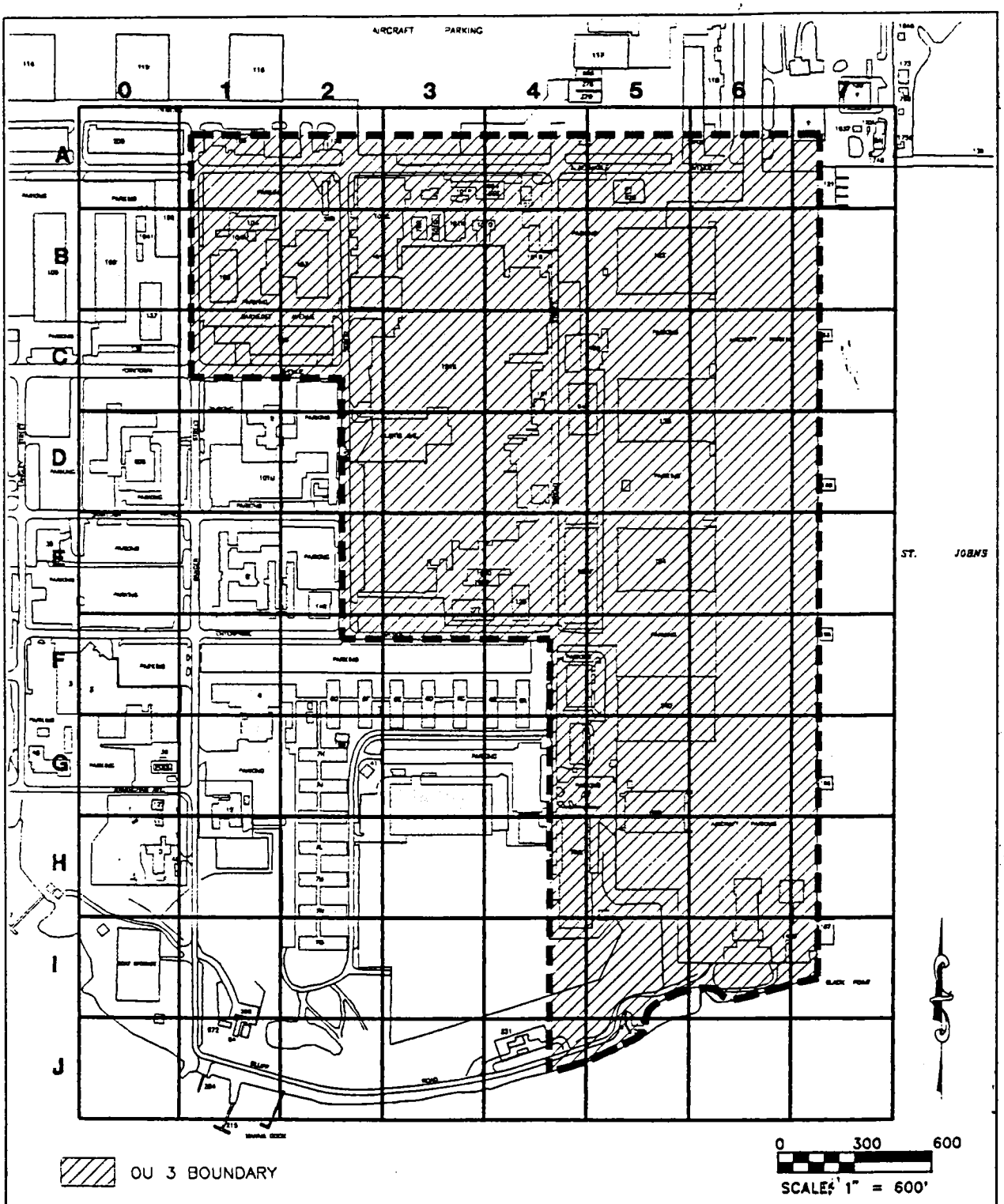
Depth: the depth below land surface at which th esample was collected;

ARAR and Risk Flags: The ARAR flag field provides for a screen against MCLs and MCLGs wehre appropriate and, for groundwater data, a comparison against 1 percent and 10 percent of maximum solubility to assist in determining the potential for free product. Specific flag explanations are as follows:

An upper case letter indicates an exceedance of the specificed numerical value, whereas a lower case letter signifies that the contaminant concentration is below the specified numerical value (individual numerical values located in table K-1).

A or a, Federal MCL comparison completed
B or b, Federal MCLG comparison completed
C or c, Flroida MCL comparison completed
D or d, 1 percent of maximum chemical solubility in water comparison
E or e, 10 percent of maximum chemical solubility in water comparison

Water Samples



OPERABLE UNIT 3
GRID PATTERN

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN
OPERABLE UNIT 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

REPORT: JAX OU3 - SAMPLE ANALYSIS DETAIL BY DEPTH RANGE AND SAMPLE ID
SAMPLE: WATER
FILE : U3_DATA.DBF
DATE : 01/11/94

?TH RANGE : Less than 20 ft
OLUMN LABELS: Date, Group, Grid, Result, Qualifier, Depth, ARAR & RISK Flags
AR MULTIPLIER: 1

SAMPLE ID: U3B101MW01

Metal (ppm)							
Aluminum	02/01/93	C	D3	5.370	J	13.0	ABC**fZ--
Arsenic	02/01/93	C	D3	0.003	B	13.0	a*c**Fz--
Barium	02/01/93	C	D3	0.140	J	13.0	abc**f*--
Beryllium	02/01/93	C	D3	0.001	B	13.0	abc**FZ--
Calcium	02/01/93	C	D3	102.000		13.0	*******--
Chromium	02/01/93	C	D3	0.062		13.0	abc**FZ--
Cobalt	02/01/93	C	D3	0.010	B	13.0	*****F*--
Copper	02/01/93	C	D3	0.011	B	13.0	abc**fZ--
Iron	02/01/93	C	D3	13.700		13.0	ABC****--
Lead	02/01/93	C	D3	0.010		13.0	aBc**FZ--
Magnesium	02/01/93	C	D3	14.500		13.0	*******--
Manganese	02/01/93	C	D3	0.163		13.0	ABC**F*--
Mercury	02/01/93	C	D3	0.000		13.0	abc**fZ--
Nickel	02/01/93	C	D3	0.070		13.0	abc**fZ--
Potassium	02/01/93	C	D3	9.460		13.0	*******--
Selenium	02/01/93	C	D3	0.001	J	13.0	abc**fz--
Sodium	02/01/93	C	D3	20.900		13.0	**c****--
Vanadium	02/01/93	C	D3	0.035	B	13.0	*****F*--
Zinc	02/01/93	C	D3	0.006	B	13.0	a*c**fz--
SVOA (ppb)							
2,4-Dimethylphenol	02/01/93	C	D3	3.000	J	13.0	*****f*--
2-Methylphenol	02/01/93	C	D3	27.000		13.0	*****f*--
Acenaphthene	02/01/93	C	D3	1.000	J	13.0	***de**--
bis(2-Chloroethyl)Ether	02/01/93	C	D3	17.000		13.0	***deF*--
VOA (ppb)							
1,1-Dichloroethane	02/01/93	C	D3	1.000	J	13.0	***defz--
1,2-Dichlorobenzene	02/01/93	C	D3	3.000	J	13.0	abcdef*--
1,2-Dichloroethene (total)	02/01/93	C	D3	2.000	J	13.0	***def*--
1,4-Dichlorobenzene	02/01/93	C	D3	2.000	J	13.0	abcdeF*--
Acetone	02/01/93	C	D3	340.000	D	13.0	***def*--
Benzene	02/01/93	C	D3	1.000	J	13.0	aBcdeFz--
Chlorobenzene	02/01/93	C	D3	15.000		13.0	abcdeF*--

SAMPLE ID: U3B101MW02

Metal (ppm)							
Aluminum	02/01/93	C	B4	4.370	J	13.0	ABC**fZ--
Arsenic	02/01/93	C	B4	0.017		13.0	a*c**Fz--
Barium	02/01/93	C	B4	0.087	J	13.0	abc**f*--
Beryllium	02/01/93	C	B4	0.003	B	13.0	abc**FZ--
Calcium	02/01/93	C	B4	81.600		13.0	*******--
Chromium	02/01/93	C	B4	0.007	B	13.0	abc**fz--
Copper	02/01/93	C	B4	0.003	B	13.0	abc**fZ--
Iron	02/01/93	C	B4	19.600		13.0	ABC****--
Lead	02/01/93	C	B4	0.016		13.0	ABC**FZ--
Magnesium	02/01/93	C	B4	16.900		13.0	*******--
Manganese	02/01/93	C	B4	0.253		13.0	ABC**F*--
Mercury	02/01/93	C	B4	0.000		13.0	abc**fZ--

Nickel	02/01/93	C	B4	0.011	B	13.0	abc**fZ--
Potassium	02/01/93	C	B4	10.400		13.0	*******--
Selenium	02/01/93	C	B4	0.001	J	13.0	abc**fz--
Sodium	02/01/93	C	B4	61.000		13.0	**c****--
Vanadium	02/01/93	C	B4	0.042	B	13.0	*****F*--
Zinc	02/01/93	C	B4	0.067		13.0	a*c**fz
VOA (ppb)							
1,1-Dichloroethane	02/01/93	C	B4	10.000		13.0	***defZ--
1,2-Dichloroethene (total)	02/01/93	C	B4	2.000	J	13.0	***def*--
Chloroethane	02/01/93	C	B4	9.000	J	13.0	*****f*--
Ethylbenzene	02/01/93	C	B4	6.000	J	13.0	abcdef*--
Tetrachloroethene	02/01/93	C	B4	1.000	J	13.0	aBcdef*--
Vinyl Chloride	02/01/93	C	B4	3.000	J	13.0	ABCdeF*--
Xylene (total)	02/01/93	C	B4	8.000	J	13.0	abcdef*--

SAMPLE ID: U3B101MW03

Metal (ppm)							
Aluminum	02/01/93	C	B4	3.490	J	13.0	ABC**fZ--
Arsenic	02/01/93	C	B4	0.005	B	13.0	a*c**Fz--
Barium	02/01/93	C	B4	0.019	J	13.0	abc**f*--
Calcium	02/01/93	C	B4	27.100		13.0	*******--
Chromium	02/01/93	C	B4	0.006	B	13.0	abc**fz--
Copper	02/01/93	C	B4	0.005	B	13.0	abc**fZ--
Iron	02/01/93	C	B4	4.240		13.0	ABC****--
Lead	02/01/93	C	B4	0.007		13.0	aBc**FZ--
Magnesium	02/01/93	C	B4	3.070	B	13.0	*******--
Manganese	02/01/93	C	B4	0.052		13.0	ABC**F*--
Potassium	02/01/93	C	B4	1.640	B	13.0	*******--
Sodium	02/01/93	C	B4	9.080		13.0	**c****
Thallium	02/01/93	C	B4	0.001	J	13.0	aBc***z-
Vanadium	02/01/93	C	B4	0.011	B	13.0	*****f*--
Zinc	02/01/93	C	B4	0.026		13.0	a*c**fz--
VOA (ppb)							
1,2-Dichloroethene (total)	02/01/93	C	B4	2.000	J	13.0	***def*--
Acetone	02/01/93	C	B4	6.000	J	13.0	***def*--
Xylene (total)	02/01/93	C	B4	3.000	J	13.0	abcdef*--

SAMPLE ID: U3B101MW04

Metal (ppm)							
Aluminum	02/01/93	C	C4	13.400	J	13.0	ABC**FZ--
Arsenic	02/01/93	C	C4	0.008	B	13.0	a*c**Fz--
Barium	02/01/93	C	C4	0.247	J	13.0	abc**f*--
Beryllium	02/01/93	C	C4	0.001	B	13.0	abc**FZ--
Calcium	02/01/93	C	C4	108.000		13.0	*******--
Chromium	02/01/93	C	C4	0.011		13.0	abc**fz--
Copper	02/01/93	C	C4	0.030		13.0	abc**fZ--
Iron	02/01/93	C	C4	25.300		13.0	ABC****--
Lead	02/01/93	C	C4	0.031		13.0	ABC**FZ--
Magnesium	02/01/93	C	C4	18.600		13.0	*******--
Manganese	02/01/93	C	C4	0.138		13.0	ABC**F*--
Mercury	02/01/93	C	C4	0.000		13.0	abc**fZ--
Nickel	02/01/93	C	C4	0.019	B	13.0	abc**fZ-
Potassium	02/01/93	C	C4	5.130		13.0	*******-
Sodium	02/01/93	C	C4	29.200		13.0	**c****--
Vanadium	02/01/93	C	C4	0.047	B	13.0	*****F*--
Zinc	02/01/93	C	C4	0.030		13.0	a*c**fz--
VOA (ppb)							

1,1,1-Trichloroethane	02/01/93	C	C4	2.000 J	13.0	abcdefz--
1,1-Dichloroethane	02/01/93	C	C4	6.000 J	13.0	***defZ--
1,2-Dichloroethene (total)	02/01/93	C	C4	3.000 J	13.0	***def*--
Acetone	02/01/93	C	C4	37.000	13.0	***def*--
Chloroethane	02/01/93	C	C4	2.000 J	13.0	*****f*--
Trichloroethene	02/01/93	C	C4	4.000 J	13.0	aBCdeF*--
Vinyl Chloride	02/01/93	C	C4	5.000 J	13.0	ABCdeF*--

SAMPLE ID: U3CW01A02

SAMPLE ID: U3CW02A02

SAMPLE ID: U3CW02A03

SAMPLE ID: U3CW03A02

SAMPLE ID: U3CW04A02

SAMPLE ID: U3CW10A01

Metal (ppm)						
Arsenic	08/03/93	A	F6	4.100	10.0	A*C**FZ--
TPH (ppm)						
Total Petroleum Hydrocarbons	08/03/93	A	F6	763.000	10.0	**C****--
VOA (ppb)						
1,1-Dichloroethane	08/03/93	A	F6	1.700	10.0	***defZ--
cis-1,2-Dichloroethene	08/03/93	A	F6	2.100	10.0	abcdef*--
Trichloroethene	08/03/93	A	F6	1.000	10.0	aBcdef*--

SAMPLE ID: U3CW10A02

SAMPLE ID: U3CW10A03

SAMPLE ID: U3CW11A01

SAMPLE ID: U3CW11A02

SAMPLE ID: U3CW11A03

SAMPLE ID: U3CW12A01

Metal (ppm)						
Arsenic	08/09/93	A	D6	1.100	12.0	A*C**FZ--

SAMPLE ID: U3CW13A01

VOA (ppb)						
1,2-Dichloroethane	08/02/93	A	C6	1.000	13.0	aBcdeF*--

SAMPLE ID: U3CW14A02

Metal (ppm)							
Aluminum	08/02/93	B	B6	4.080		19.0	ABC**fZ--
Arsenic	08/02/93	B	B6	0.030		19.0	a*c**Fz
Barium	08/02/93	B	B6	0.091		19.0	abc**f*-
Cadmium	08/02/93	B	B6	0.001		19.0	abc**fZ--
Calcium	08/02/93	B	B6	86.400		19.0	*******--
Chromium	08/02/93	B	B6	0.083		19.0	abc**FZ--
Cobalt	08/02/93	B	B6	0.007		19.0	*****F*--
Copper	08/02/93	B	B6	0.036		19.0	abc**fZ--
Iron	08/02/93	B	B6	78.600		19.0	ABC****--
Lead	08/02/93	B	B6	0.006		19.0	aBc**FZ--
Magnesium	08/02/93	B	B6	47.200		19.0	*******--
Manganese	08/02/93	B	B6	0.518		19.0	ABC**F*--
Nickel	08/02/93	B	B6	0.050		19.0	abc**fZ--
Potassium	08/02/93	B	B6	11.200		19.0	*******--
Sodium	08/02/93	B	B6	209.000		19.0	**C****--
Vanadium	08/02/93	B	B6	0.029		19.0	*****F*--
Zinc	08/02/93	B	B6	0.114		19.0	a*c**fZ--
SVOA (ppb)							
Diethylphthalate	08/02/93	B	B6	3.000	BJ	19.0	***def*--
VOA (ppb)							
Acetone	08/02/93	B	B6	7.000	BJ	19.0	***def*--
Benzene	08/02/93	B	B6	1.000	BJ	19.0	aBcdeFz--

SAMPLE ID: U3CW16A01

TPH (ppm)							
Total Petroleum Hydrocarbons	09/29/93	A	C5	350.000		9.0	**C****--

SAMPLE ID: U3CW16A02

SAMPLE ID: U3CW17A02

SAMPLE ID: U3CW18A01

Metal (ppm)							
Arsenic	09/25/93	A	E5	1.600		8.0	A*C**FZ--

SAMPLE ID: U3CW19A02

SAMPLE ID: U3CW20A01

TPH (ppm)							
Total Petroleum Hydrocarbons	09/29/93	A	G5	200.000		15.0	**C****--
VOA (ppb)							
Benzene	09/29/93	A	G5	150.000	E	15.0	ABCdeFZ-

SAMPLE ID: U3CW21A02

SAMPLE ID: U3CW21A03

SAMPLE ID: U3CW22A01

VOA (ppb)

cis-1,2-Dichloroethene	08/02/93	A	H5	2.800	10.0	abcdef*--
Trichloroethene	08/02/93	A	H5	12.000	10.0	ABCdeF*--

SAMPLE ID: U3CW22A02

SAMPLE ID: U3CW22A03

SAMPLE ID: U3CW23A01

VOA (ppb)

1,1,2-Trichloroethane	08/02/93	A	G5	7.200	11.0	ABCdef*--
cis-1,2-Dichloroethene	08/02/93	A	G5	13.000	11.0	abcdeF*--
Trichloroethene	08/02/93	A	G5	120.000 E	11.0	ABCdeF*--

SAMPLE ID: U3CW23A03

SAMPLE ID: U3CW24A01

VOA (ppb)

1,2-Dichlorobenzene	08/12/93	A	F5	5.900	14.0	abcdef*--

MPLE ID: U3CW25A01

Metal (ppm)

Arsenic	08/11/93	A	E5	1.000	13.0	A*C**FZ--

SAMPLE ID: U3CW25A02

SAMPLE ID: U3CW26A02

SAMPLE ID: U3CW28A01

Metal (ppm)

Arsenic	08/09/93	A	B5	1.900	10.0	A*C**FZ--

SAMPLE ID: U3CW28A03

SAMPLE ID: U3CW29A01

Metal (ppm)

Arsenic	09/23/93	A	B4	1.200	11.5	A*C**FZ--

SAMPLE ID: U3CW29A02

SAMPLE ID: U3CW30A01

VOA (ppb)						
Trichloroethene	09/24/93	A	C4	1.000	15.0	aBcdef*--

SAMPLE ID: U3CW31A02

SAMPLE ID: U3CW31A03

SAMPLE ID: U3CW32A01

Metal (ppm)						
Arsenic	09/24/93	A	E4	1.600	14.5	A*C**FZ--
VOA (ppb)						
1,1-Dichloroethane	09/24/93	A	E4	17.000	14.5	***defZ--
cis-1,2-Dichloroethene	09/24/93	A	E4	85.000 E	14.5	ABCdeF*--
Trichloroethene	09/24/93	A	E4	3.100	14.5	aBCdeF*--

SAMPLE ID: U3CW34A01

Metal (ppm)						
Aluminum	08/16/93	B	D4	5.250	13.0	ABC**fZ--
Arsenic	08/16/93	B	D4	0.003 B	13.0	a*c**Fz--
Barium	08/16/93	B	D4	0.098 B	13.0	abc**f*--
Beryllium	08/16/93	B	D4	0.002 B	13.0	abc**FZ--
Calcium	08/16/93	B	D4	15.800	13.0	*******--
Chromium	08/16/93	B	D4	0.019	13.0	abc**Fz--
Cobalt	08/16/93	B	D4	0.010 B	13.0	*****F*--
Copper	08/16/93	B	D4	0.004 B	13.0	abc**fZ
Iron	08/16/93	B	D4	12.400	13.0	ABC****-
Lead	08/16/93	B	D4	0.003	13.0	aBc**Fz--
Magnesium	08/16/93	B	D4	5.760	13.0	*******--
Manganese	08/16/93	B	D4	0.115	13.0	ABC**F*--
Nickel	08/16/93	B	D4	0.102	13.0	ABC**FZ--
Potassium	08/16/93	B	D4	1.430 B	13.0	*******--
Sodium	08/16/93	B	D4	40.800	13.0	**c****--
Vanadium	08/16/93	B	D4	0.014 B	13.0	*****f*--
Zinc	08/16/93	B	D4	0.040	13.0	a*c**fz--
SVOA (ppb)						
Phenol	08/16/93	B	D4	2.000 J	13.0	***defz--
VOA (ppb)						
1,1,2-Trichloroethane	08/16/93	B	D4	5.000 J	13.0	aBcdef*--
1,1-Dichloroethene	08/16/93	A	D4	36.000	13.0	ABCdeFZ--
1,1-Dichloroethene	08/16/93	B	D4	33.000	13.0	ABCdeFZ--
1,2-Dichloroethene (total)	08/16/93	B	D4	3500.000 E	13.0	***deF*--
1,2-Dichloroethene (total)	08/16/93	B	D4	5300.000	13.0	***deF*--
Acetone	08/16/93	B	D4	24.000	13.0	***def*--
Chloroform	08/16/93	B	D4	3.000 J	13.0	aBcdeF*--
Chloromethane	08/16/93	B	D4	12.000	13.0	*****F*--
cis-1,2-Dichloroethene	08/16/93	A	D4	4900.000 E	13.0	ABCdeF*--
Tetrachloroethene	08/16/93	A	D4	31.000	13.0	ABCdeF*--
Toluene	08/16/93	B	D4	27.000	13.0	abcdef*--
trans-1,2-Dichloroethene	08/16/93	A	D4	38.000	13.0	abcdeF*-
Trichloroethene	08/16/93	A	D4	6900.000 E	13.0	ABCdeF*-
Trichloroethene	08/16/93	B	D4	4500.000 E	13.0	ABCdeF*--
Trichloroethene	08/16/93	B	D4	19000.000	13.0	ABCDeF*--
Vinyl Chloride	08/16/93	B	D4	1700.000 E	13.0	ABCdeF*--
Vinyl Chloride	08/16/93	B	D4	1700.000 J	13.0	ABCdeF*--

SAMPLE ID: U3CW34A02

SAMPLE ID: U3CW34A03

SAMPLE ID: U3CW35A01

VOA (ppb)

Benzene	08/26/93	A	C4	9.500	13.0	ABCdeFz--
cis-1,2-Dichloroethene	08/26/93	A	C4	30.000	13.0	abcdeF*--
Trichloroethene	08/26/93	A	C4	200.000	13.0	ABCdeF*--

SAMPLE ID: U3CW35A02

SAMPLE ID: U3CW36A01

VOA (ppb)

1,1-Dichloroethane	08/23/93	A	B4	2.300	17.0	***defZ--

SAMPLE ID: U3CW37A01

Metal (ppm)

Arsenic	09/27/93	A	B3	1.500	9.0	A*C**FZ--

SAMPLE ID: U3CW37A02

SAMPLE ID: U3CW37A03

SAMPLE ID: U3CW38A01

VOA (ppb)

1,1-Dichloroethane	08/17/93	A	C4	3.800	17.0	***defZ--

SAMPLE ID: U3CW38A02

SAMPLE ID: U3CW38A03

SAMPLE ID: U3CW39A01

Metal (ppm)

Arsenic	09/22/93	A	D3	1.000	10.0	A*C**FZ--

VOA (ppb)

cis-1,2-Dichloroethene	09/22/93	A	D3	12.000	10.0	abcdeF*--
Trichloroethene	09/22/93	A	D3	72.000 E	10.0	ABCdeF*--

SAMPLE ID: U3CW40A01

Metal (ppm)

Arsenic	09/22/93	A	E3	1.800	13.0	A*C**FZ--

SAMPLE ID: U3CW41A01

Metal (ppm)						
Arsenic	08/25/93	A	E3	2.200	12.5	A*C**FZ--
VOA (ppb)						
cis-1,2-Dichloroethene	08/25/93	A	E3	490.000	12.5	ABCdeF*-
Tetrachloroethene	08/25/93	A	E3	2200.000 E	12.5	ABCDeF*--
trans-1,2-Dichloroethene	08/25/93	A	E3	8.200	12.5	abcdef*--
Trichloroethene	08/25/93	A	E3	220.000	12.5	ABCdeF*--

SAMPLE ID: U3CW41A02

SAMPLE ID: U3CW43A01

TPH (ppm)						
Total Petroleum Hydrocarbons	08/24/93	A	B3	1000.000	16.0	**C****--

SAMPLE ID: U3CW43A02

SAMPLE ID: U3CW43A03

SAMPLE ID: U3CW47A02

SAMPLE ID: U3CW48A01

VOA (ppb)						
1,2-Dichloroethane	08/28/93	A	B2	1.000	13.0	aBcdeF*--
cis-1,2-Dichloroethene	08/28/93	A	B2	1300.000	13.0	ABCdeF*--
trans-1,2-Dichloroethene	08/28/93	A	B2	3.900	13.0	abcdef*--
Trichloroethene	08/28/93	A	B2	51.000	13.0	ABCdeF*--

SAMPLE ID: U3CW48A02

SAMPLE ID: U3CW48A03

SAMPLE ID: U3CW49A01

Metal (ppm)						
Arsenic	08/28/93	A	C2	1.000	12.0	A*C**FZ--
VOA (ppb)						
trans-1,2-Dichloroethene	08/28/93	A	C2	520.000	12.0	ABCdeF*--
Trichloroethene	08/28/93	A	C2	580.000	12.0	ABCdeF*--

SAMPLE ID: U3CW49A02

SAMPLE ID: U3CW49A03

SAMPLE ID: U3CW50A01

VOA (ppb)

Tetrachloroethene	09/08/93	A	D2	1.000	12.5	aBcdef*--
Trichloroethene	09/08/93	A	D2	32.000	12.5	ABCdeF*--

(PLE ID: U3CW50A02

SAMPLE ID: U3CW52A01

Metal (ppm)

Arsenic	09/09/93	A	F2	2.200	10.0	A*C**FZ--

SAMPLE ID: U3CW52A02

SAMPLE ID: U3CW52A03

SAMPLE ID: U3CW53A02

SAMPLE ID: U3CW55A02

SAMPLE ID: U3CW56A03

SAMPLE ID: U3CW57A02

MPLE ID: U3CW57A03

SAMPLE ID: U3CW58A01

VOA (ppb)

cis-1,2-Dichloroethene	09/08/93	A	B1	3200.000 E	11.0	ABCdeF*--
Tetrachloroethene	09/08/93	A	B1	9600.000 E	11.0	ABCDeF*--
trans-1,2-Dichloroethene	09/08/93	A	B1	5400.000 E	11.0	ABCdeF*--
Trichloroethene	09/08/93	A	B1	1000.000 E	11.0	ABCdeF*--

SAMPLE ID: U3CW58A02

SAMPLE ID: U3CW58A03

SAMPLE ID: U3CW59A01

Metal (ppm)

Arsenic	09/20/93	A	F1	1.200	10.5	A*C**FZ--

SAMPLE ID: U3CW59A02

MPLE ID: U3CW59A03

SAMPLE ID: U3CW60A01

Metal (ppm)

Arsenic	09/22/93	A	D2	1.000	11.5	A*C**FZ--
VOA (ppb)						
Trichloroethene	09/22/93	A	D2	1.000	11.5	aBcdef*--

SAMPLE ID: U3CW60A03

SAMPLE ID: U3CW62A02

SAMPLE ID: U3CW62A03

SAMPLE ID: U3CW63A01

VOA (ppb)						
cis-1,2-Dichloroethene	09/22/93	A	B1	2.600	14.0	abcdef*--
trans-1,2-Dichloroethene	09/22/93	A	B1	1.100	14.0	abcdef*--

SAMPLE ID: U3CW63A02

SAMPLE ID: U3CW63A03

SAMPLE ID: U3GW7801

Metal (ppm)						
Nickel	06/01/90	D	B3	0.250	6.0	ABC**FZ
Nickel	06/01/90	D	B3	0.160	6.0	ABC**FZ
Zinc	06/01/90	D	B3	2.300	6.0	a*c**FZ--
Zinc	06/01/90	D	B3	2.200	6.0	a*c**FZ--
VOA (ppb)						
1,1,1-Trichloroethane	06/01/90	D	B3	106000.000	6.0	ABCDeFz--
1,1-Dichloroethane	06/01/90	D	B3	42000.000	6.0	***deFZ--
1,1-Dichloroethene	06/01/90	D	B3	10000.000	6.0	ABCdeFZ--
1,2-Dichloroethene (total)	06/01/90	D	B3	7000.000	6.0	***deF*--
2-Butanone	06/01/90	D	B3	6000.000	6.0	*****F*--
4-Methyl-2-Pentanone	06/01/90	D	B3	14000.000	6.0	*****F*--
Chloroethane	06/01/90	D	B3	4000.000	6.0	*****F*--
Methylene Chloride	06/01/90	D	B3	94000.000	6.0	ABC**FZ--
Toluene	06/01/90	D	B3	3000.000	6.0	ABCdeF*--
Trichloroethene	06/01/90	D	B3	7000.000	6.0	ABCdeF*--
Vinyl Chloride	06/01/90	D	B3	2000.000	6.0	ABCdeF*--

SAMPLE ID: U3GW7805

Metal (ppm)						
Cadmium	06/01/90	D	A3	0.000	6.0	abc**fz--
VOA (ppb)						
1,1-Dichloroethane	06/01/90	D	A3	1440.000	6.0	***deFZ--
1,1-Dichloroethene	06/01/90	D	A3	90.000	6.0	ABCdeFZ
1,2-Dichloroethene (total)	06/01/90	D	A3	1500.000	6.0	***deF*
Chloroethane	06/01/90	D	A3	220.000	6.0	*****F*--
Trichloroethene	06/01/90	D	A3	340.000	6.0	ABCdeF*--
Vinyl Chloride	06/01/90	D	A3	340.000	6.0	ABCdeF*--

SAMPLE ID: U3MW1

Metal (ppm)						
Selenium	01/01/88	D	B4	0.005	9.0	abc**fz--
VOA (ppb)						
1,1-Dichloroethane	01/01/88	D	B4	159.000	9.0	***deFZ--
Chloroethane	01/01/88	D	B4	47.000	9.0	*****f*--
Toluene	01/01/88	D	B4	4.000	9.0	abcdef*--

SAMPLE ID: U3MW10

VOA (ppb)						
1,1-Dichloroethane	01/01/88	D	E4	63.000	12.0	***defZ--
1,1-Dichloroethene	01/01/88	D	E4	20.000	12.0	ABCdeFZ--
trans-1,2-Dichloroethene	01/01/88	D	E4	43.000	12.0	abcdeF*--
Trichloroethene	01/01/88	D	E4	25.000	12.0	ABCdeF*--
Trichlorofluoromethane	01/01/88	D	E4	13.000	12.0	***def*--

SAMPLE ID: U3MW11

Metal (ppm)						
Selenium	01/01/88	D	E4	0.005	12.5	abc**fz--
VOA (ppb)						
trans-1,2-Dichloroethene	01/01/88	D	E4	21.000	12.5	abcdeF*--
Trichloroethene	01/01/88	D	E4	26.000	12.5	ABCdeF*--

IPLE ID: U3MW2

Metal (ppm)						
Nickel	01/01/88	D	C4	0.090	10.0	abc**FZ--
VOA (ppb)						
1,1,1-Trichloroethane	01/01/88	D	C4	96.000	10.0	abcdefz--
Toluene	01/01/88	D	C4	5.000	10.0	abcdef*--

SAMPLE ID: U3MW3

Metal (ppm)						
Lead	01/01/88	D	C4	0.010	10.0	aBc**FZ--
VOA (ppb)						
trans-1,2-Dichloroethene	01/01/88	D	C4	29.000	10.0	abcdeF*--
Trichloroethene	01/01/88	D	C4	13.000	10.0	ABCdeF*--

SAMPLE ID: U3MW4

VOA (ppb)						
1,1-Dichloroethane	01/01/88	D	C4	15.000	10.0	***defZ--
Benzene	01/01/88	D	C4	1.000	10.0	aBcdeFz--
Toluene	01/01/88	D	C4	1.000	10.0	abcdef*--
Vinyl Chloride	01/01/88	D	C4	5.000	10.0	ABCdeF*--

SAMPLE ID: U3MW5

VOA (ppb)						
trans-1,2-Dichloroethene	01/01/88	D	D4	40.000	10.0	abcdeF*--

Trichloroethene	01/01/88	D	D4	169.000	10.0	ABCdeF*--
Vinyl Chloride	01/01/88	D	D4	2.000	10.0	aBCdeF*--

SAMPLE ID: U3MW7

Metal (ppm)						
Arsenic	01/01/88	D	D4	0.030	11.0	a*c**Fz--
Lead	01/01/88	D	D4	0.010	11.0	aBc**FZ--

SAMPLE ID: U3MW8

VOA (ppb)						
Vinyl Chloride	01/01/88	D	D4	7.000	11.0	ABCdeF*--

SAMPLE ID: U3MW9

Metal (ppm)						
Arsenic	01/01/88	D	E4	0.020	11.0	a*c**Fz--
VOA (ppb)						
1,1-Dichloroethane	01/01/88	D	E4	62.000	11.0	***defZ--
1,1-Dichloroethene	01/01/88	D	E4	560.000	11.0	ABCdeFZ--
Toluene	01/01/88	D	E4	38.000	11.0	abcdef*--
trans-1,2-Dichloroethene	01/01/88	D	E4	900.000	11.0	ABCdeF*--
Trichloroethene	01/01/88	D	E4	135.000	11.0	ABCdeF*--
Vinyl Chloride	01/01/88	D	E4	700.000	11.0	ABCdeF*--

SAMPLE ID: U3NARF1

SAMPLE ID: U3NARF10

VOA (ppb)						
1,1-Dichloroethene	01/01/86	D	I5	1.300	16.0	abcdeFz--
1,2-Dichloroethane	01/01/86	D	I5	5.500	16.0	ABCdeF*--
Trichloroethene	01/01/86	D	I5	9.600	16.0	ABCdeF*--

SAMPLE ID: U3NARF11

SAMPLE ID: U3NARF13

VOA (ppb)						
trans-1,2-Dichloroethene	01/01/86	D	I6	3.500	16.0	abcdef*--

SAMPLE ID: U3NARF131

VOA (ppb)						
Toluene	01/01/86	D	D4	15.000	12.5	abcdef*--

SAMPLE ID: U3NARF14

VOA (ppb)						
1,1-Dichloroethane	01/01/86	D	B4	1.100	14.0	***defz--

SAMPLE ID: U3NARF16

VOA (ppb)

1,1,1-Trichloroethane	01/01/86	D	A5	3.000	14.0	abcdefz--
Bromodichloromethane	01/01/86	D	A5	6.000	14.0	aBc**F*--
Toluene	01/01/86	D	A5	38.000	14.0	abcdef*--

SAMPLE ID: U3NARF17

VOA (ppb)

1,1,1-Trichloroethane	01/01/86	D	A6	3.000	15.0	abcdefz--
Bromodichloromethane	01/01/86	D	A6	6.000	15.0	aBc**F*--
Toluene	01/01/86	D	A6	53.000	15.0	abcdef*--

SAMPLE ID: U3NARF2

VOA (ppb)

Trichloroethene	01/01/85	D	F4	3.900	16.0	aBCdeF*--

SAMPLE ID: U3NARF3

VOA (ppb)

1,1,1-Trichloroethane	01/01/85	D	F5	0.500	14.0	abcdefz--
1,1,2-Trichloroethane	01/01/85	D	F5	13.700	14.0	ABCdef*--
1,1-Dichloroethene	01/01/85	D	F5	0.200	14.0	abcdeFz--
cis-1,3-Dichloropropane	01/01/85	D	F5	6.000	14.0	*******--
Methylene Chloride	01/01/85	D	F5	1.800	14.0	aBc**fz--
trans-1,2-Dichloroethene	01/01/85	D	F5	2.200	14.0	abcdef*--
Trichloroethene	01/01/85	D	F5	6.100	14.0	ABCdeF*--

SAMPLE ID: U3NARF4

VOA (ppb)

1,1,1-Trichloroethane	01/01/85	D	I6	6.200	14.0	abcdefz--
1,1,1-Trichloroethane	01/01/85	D	I6	4.000	14.0	abcdefz--
1,1,1-Trichloroethane	01/01/85	D	I6	3.000	14.0	abcdefz--
1,1-Dichloroethene	01/01/85	D	I6	12.000	14.0	ABCdeFZ--
1,2-Dichloroethane	01/01/85	D	I6	5.700	14.0	ABCdeF*--
Bromodichloromethane	01/01/85	D	I6	7.000	14.0	aBc**F*--
Carbon Tetrachloride	01/01/85	D	I6	2.000	14.0	aBcdeFz--
Tetrachloroethene	01/01/85	D	I6	1.800	14.0	aBcdeF*--
Toluene	01/01/85	D	I6	66.000	14.0	abcdef*--
trans-1,2-Dichloroethene	01/01/85	D	I6	1470.000	14.0	ABCdeF*--
Trichloroethene	01/01/85	D	I6	170.000	14.0	ABCdeF*--
Vinyl Chloride	01/01/85	D	I6	270.000	14.0	ABCdeF*--

SAMPLE ID: U3NARF5

VOA (ppb)

1,1,1-Trichloroethane	01/01/85	D	I6	19.000	10.0	abcdefz--
Carbon Tetrachloride	01/01/85	D	I6	2.000	10.0	aBcdeFz--
Toluene	01/01/85	D	I6	6.000	10.0	abcdef*--
trans-1,2-Dichloroethene	01/01/85	D	I6	7.600	10.0	abcdef*--
Trichloroethene	01/01/85	D	I6	4.900	10.0	aBCdeF*--

SAMPLE ID: U3NARF6

Metal (ppm)

Barium	01/01/85	D	C5	0.100	11.0	abc**f*--

Zinc	01/01/85	D	C5	0.020	11.0	a*c**fz--
VOA (ppb)						
1,1,1-Trichloroethane	01/01/85	D	C5	22.000	11.0	abcdefz--
1,1,1-Trichloroethane	01/01/85	D	C5	16.000	11.0	abcdefz--
1,1-Dichloroethene	01/01/85	D	C5	16.000	11.0	ABCdeFZ
Carbon Tetrachloride	01/01/85	D	C5	2.000	11.0	aBcdeFz--
Chloroform	01/01/85	D	C5	5.500	11.0	aBcdeF*--
Toluene	01/01/85	D	C5	8.000	11.0	abcdef*--
trans-1,2-Dichloroethene	01/01/85	D	C5	190.000	11.0	ABCdeF*--
Trichloroethene	01/01/85	D	C5	6.000	11.0	ABCdeF*--

SAMPLE ID: U3NARF9

SAMPLE ID: U3NARFB1

SAMPLE ID: U3NARFD1

SAMPLE ID: U3NARFD2

SAMPLE ID: U3P159MW01

Metal (ppm)							
Aluminum	02/01/93	C	A6	4.070	J	13.0	ABC**fZ--
Arsenic	02/01/93	C	A6	0.049		13.0	a*c**Fz--
Barium	02/01/93	C	A6	0.058	J	13.0	abc**f*--
Calcium	02/01/93	C	A6	72.800		13.0	*******
Copper	02/01/93	C	A6	0.004	B	13.0	abc**fZ-
Iron	02/01/93	C	A6	17.600		13.0	ABC****--
Lead	02/01/93	C	A6	0.007		13.0	aBc**FZ--
Magnesium	02/01/93	C	A6	18.800		13.0	*******--
Manganese	02/01/93	C	A6	0.697		13.0	ABC**F*--
Mercury	02/01/93	C	A6	0.000	B	13.0	abc**fZ--
Potassium	02/01/93	C	A6	5.790		13.0	*******--
Sodium	02/01/93	C	A6	46.000		13.0	**c****--
Vanadium	02/01/93	C	A6	0.019	B	13.0	*****f*--
Zinc	02/01/93	C	A6	0.015	B	13.0	a*c**fz--

SAMPLE ID: U3P159MW02

Anion (ppm)							
Cyanide	02/01/93	C	A6	0.005	B	13.0	abc***Z--
Metal (ppm)							
Aluminum	02/01/93	C	A6	4.320	J	13.0	ABC**fZ--
Arsenic	02/01/93	C	A6	0.010	B	13.0	a*c**Fz--
Barium	02/01/93	C	A6	0.035	J	13.0	abc**f*--
Calcium	02/01/93	C	A6	79.700		13.0	*******--
Chromium	02/01/93	C	A6	0.007	B	13.0	abc**fz--
Copper	02/01/93	C	A6	0.004	B	13.0	abc**fZ--
Iron	02/01/93	C	A6	11.300		13.0	ABC****--
Lead	02/01/93	C	A6	0.004		13.0	aBc**Fz-
Magnesium	02/01/93	C	A6	8.960		13.0	*******-
Manganese	02/01/93	C	A6	0.219		13.0	ABC**F*--
Nickel	02/01/93	C	A6	0.009	B	13.0	abc**fZ--
Potassium	02/01/93	C	A6	6.790		13.0	*******--
Selenium	02/01/93	C	A6	0.002	J	13.0	abc**fz--
Sodium	02/01/93	C	A6	11.100		13.0	**c****--

Vanadium	02/01/93	C	A6	0.016	B	13.0	*****f*--
Zinc	02/01/93	C	A6	0.013	B	13.0	a*c**fz--

SAMPLE ID: U3P159MW03

Metal (ppm)							
Aluminum	02/01/93	C	B6	2.780	J	13.0	ABC**fZ--
Arsenic	02/01/93	C	B6	0.004	B	13.0	a*c**Fz--
Barium	02/01/93	C	B6	0.031	J	13.0	abc**f*--
Calcium	02/01/93	C	B6	49.500		13.0	*******--
Chromium	02/01/93	C	B6	0.004	B	13.0	abc**fz--
Copper	02/01/93	C	B6	0.007	B	13.0	abc**fZ--
Iron	02/01/93	C	B6	8.720		13.0	ABC****--
Lead	02/01/93	C	B6	0.007		13.0	aBc**FZ--
Magnesium	02/01/93	C	B6	4.950	B	13.0	*******--
Manganese	02/01/93	C	B6	0.146		13.0	ABC**F*--
Potassium	02/01/93	C	B6	4.090	B	13.0	*******--
Selenium	02/01/93	C	B6	0.001	B	13.0	abc**fz--
Sodium	02/01/93	C	B6	6.420		13.0	**c****--
Vanadium	02/01/93	C	B6	0.024	B	13.0	*****f*--
Zinc	02/01/93	C	B6	0.020		13.0	a*c**fz--

SAMPLE ID: U3P159MW04

Anion (ppm)							
Cyanide	02/01/93	C	C5	0.013		13.0	abc***Z--
Metal (ppm)							
Aluminum	02/01/93	C	C5	8.260	J	13.0	ABC**fZ--
Barium	02/01/93	C	C5	0.201	J	13.0	abc**f*--
Calcium	02/01/93	C	C5	103.000		13.0	*******--
Chromium	02/01/93	C	C5	0.007	B	13.0	abc**fz--
Copper	02/01/93	C	C5	0.004	B	13.0	abc**fZ--
Iron	02/01/93	C	C5	21.100		13.0	ABC****--
Lead	02/01/93	C	C5	0.010		13.0	aBc**FZ--
Magnesium	02/01/93	C	C5	25.500		13.0	*******--
Manganese	02/01/93	C	C5	0.101		13.0	ABC**F*--
Mercury	02/01/93	C	C5	0.000		13.0	abc**fZ--
Potassium	02/01/93	C	C5	26.500		13.0	*******--
Selenium	02/01/93	C	C5	0.001	J	13.0	abc**fz--
Sodium	02/01/93	C	C5	57.400		13.0	**c****--
Vanadium	02/01/93	C	C5	0.024	B	13.0	*****f*--
Zinc	02/01/93	C	C5	0.015	B	13.0	a*c**fz--
SVOA (ppb)							
2-Methylnaphthalene	02/01/93	C	C5	20.000	J	13.0	**c****--
Naphthalene	02/01/93	C	C5	310.000		13.0	**C**F*--
VOA (ppb)							
1,1,1-Trichloroethane	02/01/93	C	C5	17.000		13.0	abcdefz--
1,1-Dichloroethane	02/01/93	C	C5	440.000	D	13.0	***deFZ--
1,1-Dichloroethene	02/01/93	C	C5	11.000		13.0	ABCdeFZ--
1,2-Dichloroethane	02/01/93	C	C5	1.000	J	13.0	aBcdeF*--
1,2-Dichloroethene (total)	02/01/93	C	C5	62.000		13.0	***deF*--
2-Butanone	02/01/93	C	C5	9.000	J	13.0	*****f*--
4-Methyl-2-Pentanone	02/01/93	C	C5	210.000	D	13.0	*****F*--
Acetone	02/01/93	C	C5	140.000		13.0	***def*--
Benzene	02/01/93	C	C5	10.000		13.0	ABCdeFz--
Chloroethane	02/01/93	C	C5	770.000	D	13.0	*****F*--
Ethylbenzene	02/01/93	C	C5	2.000	J	13.0	abcdef*--
Tetrachloroethene	02/01/93	C	C5	5.000	J	13.0	aBCdeF*--
Toluene	02/01/93	C	C5	47.000		13.0	abcdef*--

Trichloroethene	02/01/93	C	C5	10.000		13.0	ABCdeF*--
Vinyl Chloride	02/01/93	C	C5	27.000		13.0	ABCdeF*--
Xylene (total)	02/01/93	C	C5	22.000		13.0	abcdef*--

SAMPLE ID: U3P159MW05

Metal (ppm)							
Aluminum	02/01/93	C	B4	10.400	J	13.0	ABC**fZ--
Arsenic	02/01/93	C	B4	0.007	B	13.0	a*c**Fz--
Barium	02/01/93	C	B4	0.351	J	13.0	abc**F*--
Beryllium	02/01/93	C	B4	0.001	B	13.0	abc**FZ--
Cadmium	02/01/93	C	B4	0.002	B	13.0	abc**fZ--
Calcium	02/01/93	C	B4	102.000		13.0	*******--
Chromium	02/01/93	C	B4	0.014		13.0	abc**fz--
Cobalt	02/01/93	C	B4	0.007	B	13.0	*****F*--
Copper	02/01/93	C	B4	0.011	B	13.0	abc**fZ--
Iron	02/01/93	C	B4	35.900		13.0	ABC****--
Lead	02/01/93	C	B4	0.011		13.0	aBc**FZ--
Magnesium	02/01/93	C	B4	22.100		13.0	*******--
Manganese	02/01/93	C	B4	0.125		13.0	ABC**F*--
Mercury	02/01/93	C	B4	0.000	B	13.0	abc**fZ--
Nickel	02/01/93	C	B4	0.075		13.0	abc**FZ--
Potassium	02/01/93	C	B4	6.470		13.0	*******--
Selenium	02/01/93	C	B4	0.001	J	13.0	abc**fz--
Sodium	02/01/93	C	B4	240.000		13.0	**C****--
Vanadium	02/01/93	C	B4	0.063		13.0	*****F*--
Zinc	02/01/93	C	B4	0.185		13.0	a*c**fZ--
SVOA (ppb)							
4-Methylphenol	02/01/93	C	B4	1.000	J	13.0	*****f*--
bis(2-Ethylhexyl)Phthalate	02/01/93	C	B4	3.000	J	13.0	aBc**f*-
VOA (ppb)							
2-Butanone	02/01/93	C	B4	6.000	J	13.0	*****f*--
Acetone	02/01/93	C	B4	86.000		13.0	***def*--

SAMPLE ID: U3P159MW06

Metal (ppm)							
Aluminum	02/01/93	C	C4	17.800	J	13.0	ABC**FZ--
Arsenic	02/01/93	C	C4	0.012		13.0	a*c**Fz--
Barium	02/01/93	C	C4	0.478	J	13.0	abc**F*--
Beryllium	02/01/93	C	C4	0.003	B	13.0	abc**FZ--
Cadmium	02/01/93	C	C4	0.002	B	13.0	abc**fZ--
Calcium	02/01/93	C	C4	183.000		13.0	*******--
Chromium	02/01/93	C	C4	0.012		13.0	abc**fz--
Copper	02/01/93	C	C4	0.006	B	13.0	abc**fZ--
Iron	02/01/93	C	C4	68.800		13.0	ABC****--
Lead	02/01/93	C	C4	0.021		13.0	ABC**FZ--
Magnesium	02/01/93	C	C4	24.200		13.0	*******--
Manganese	02/01/93	C	C4	0.303		13.0	ABC**F*--
Mercury	02/01/93	C	C4	0.001		13.0	abc**fZ--
Nickel	02/01/93	C	C4	0.032	B	13.0	abc**fZ--
Potassium	02/01/93	C	C4	8.390		13.0	*******--
Sodium	02/01/93	C	C4	39.300		13.0	**c****--
Vanadium	02/01/93	C	C4	0.070		13.0	*****F*-
Zinc	02/01/93	C	C4	0.068		13.0	a*c**fz--
VOA (ppb)							
1,1-Dichloroethane	02/01/93	C	C4	15.000		13.0	***defZ--
Acetone	02/01/93	C	C4	120.000		13.0	***def*--
Benzene	02/01/93	C	C4	8.000	J	13.0	ABCdeF*--

Chloroethane	02/01/93	C	C4	47.000		13.0	*****f*--
Methylene Chloride	02/01/93	C	C4	1.000	J	13.0	aBc**fz--

MPLE ID: U3P159MW07

Metal (ppm)							
Aluminum	02/01/93	C	C4	1.150	J	13.0	ABC**fz--
Arsenic	02/01/93	C	C4	0.003	B	13.0	a*c**Fz--
Barium	02/01/93	C	C4	0.139	J	13.0	abc**f*--
Calcium	02/01/93	C	C4	98.900		13.0	*******--
Copper	02/01/93	C	C4	0.004	B	13.0	abc**fZ--
Iron	02/01/93	C	C4	4.070		13.0	ABC****--
Lead	02/01/93	C	C4	0.005		13.0	aBc**Fz--
Magnesium	02/01/93	C	C4	20.600		13.0	*******--
Manganese	02/01/93	C	C4	0.148		13.0	ABC**F*--
Nickel	02/01/93	C	C4	0.015	B	13.0	abc**fZ--
Potassium	02/01/93	C	C4	3.770	B	13.0	*******--
Selenium	02/01/93	C	C4	0.001	J	13.0	abc**fz--
Sodium	02/01/93	C	C4	30.300		13.0	**c****--
Vanadium	02/01/93	C	C4	0.004	B	13.0	*****f*--
Zinc	02/01/93	C	C4	0.221		13.0	a*c**fZ--
SVOA (ppb)							
bis(2-Ethylhexyl)Phthalate	02/01/93	C	C4	2.000	J	13.0	aBc**f*--
VOA (ppb)							
1,1-Dichloroethane	02/01/93	C	C4	30.000		13.0	***defZ--
1,2-Dichloroethene (total)	02/01/93	C	C4	7.000	J	13.0	***deF*--
Acetone	02/01/93	C	C4	8.000	J	13.0	***def*--
Trichloroethene	02/01/93	C	C4	130.000		13.0	ABCdeF*--
Vinyl Chloride	02/01/93	C	C4	6.000	J	13.0	ABCdeF*--

SAMPLE ID: U3W01

Metal (ppm)							
Aluminum	03/11/92	D	G5	42500.000		15.0	ABC**FZ--
Barium	03/11/92	D	G5	108.000	B	15.0	ABC**F*--
Calcium	03/11/92	D	G5	27000.000		15.0	*******--
Chromium	03/11/92	D	G5	38.000		15.0	ABC**FZ--
Copper	03/11/92	D	G5	14.000	B	15.0	ABC**FZ--
Iron	03/11/92	D	G5	11300.000		15.0	ABC****--
Lead	03/11/92	D	G5	9.800		15.0	ABC**FZ--
Magnesium	03/11/92	D	G5	7890.000		15.0	*******--
Manganese	03/11/92	D	G5	55.000		15.0	ABC**F*--
Mercury	03/11/92	D	G5	0.200		15.0	ABC**FZ--
Nickel	03/11/92	D	G5	17.000		15.0	ABC**FZ--
Potassium	03/11/92	D	G5	6720.000		15.0	*******--
Sodium	03/11/92	D	G5	5530.000		15.0	**C****--
Vanadium	03/11/92	D	G5	53.000		15.0	*****F*--
Zinc	03/11/92	D	G5	72.000		15.0	A*C**FZ--
Pest/PCB (ppb)							
delta-BHC	03/11/92	D	G5	0.014	J	15.0	***de**--
Dieldrin	03/11/92	D	G5	0.031	J	15.0	***deFZ--
gamma-BHC (Lindane)	03/11/92	D	G5	0.009	J	15.0	aBcdefz--
Heptachlor epoxide	03/11/92	D	G5	0.018	J	15.0	aBcdeF*--
SVOA (ppb)							
bis(2-Ethylhexyl)Phthalate	03/11/92	D	G5	2.000	J	15.0	aBc**f*--
Chrysene	03/11/92	D	G5	2.000	J	15.0	AB*DE**--
Di-n-Butylphthalate	03/11/92	D	G5	1.000	J	15.0	*****f*--

VOA (ppb)							
Acetone	03/11/92	D	G5	8.000	J	15.0	***def*--

SAMPLE ID: U3W02

Metal (ppm)							
Aluminum	03/11/92	D	G5	50800.000		15.0	ABC**FZ--
Arsenic	03/11/92	D	G5	3.500	B	15.0	A*C**FZ--
Barium	03/11/92	D	G5	198.000	B	15.0	ABC**F*--
Beryllium	03/11/92	D	G5	1.000	B	15.0	ABC**FZ--
Calcium	03/11/92	D	G5	26300.000		15.0	*******--
Chromium	03/11/92	D	G5	64.000		15.0	ABC**FZ--
Copper	03/11/92	D	G5	18.000	B	15.0	ABC**FZ--
Iron	03/11/92	D	G5	19300.000		15.0	ABC****--
Lead	03/11/92	D	G5	11.300		15.0	ABC**FZ--
Magnesium	03/11/92	D	G5	4500.000	B	15.0	*******--
Manganese	03/11/92	D	G5	70.000		15.0	ABC**F*--
Potassium	03/11/92	D	G5	5840.000		15.0	*******--
Sodium	03/11/92	D	G5	5170.000		15.0	**C****--
Vanadium	03/11/92	D	G5	81.000		15.0	*****F*--
Zinc	03/11/92	D	G5	153.000		15.0	A*C**FZ--
Pest/PCB (ppb)							
alpha-Chlordane	03/11/92	D	G5	0.022	J	15.0	aBc****--
Dieldrin	03/11/92	D	G5	0.190	J	15.0	***deFZ--
gamma-Chlordane	03/11/92	D	G5	0.012	J	15.0	aBc****--
SVOA (ppb)							
Di-n-Butylphthalate	03/11/92	D	G5	2.000	J	15.0	*****f*--
VOA (ppb)							
Acetone	03/11/92	D	G5	9.000	J	15.0	***def*--
Trichloroethene	03/11/92	D	G5	7.000	J	15.0	ABCdeF*--

SAMPLE ID: U3W03

Metal (ppm)							
Aluminum	03/11/92	D	G4	69100.000		17.0	ABC**FZ--
Arsenic	03/11/92	D	G4	1.900	B	17.0	A*C**FZ--
Barium	03/11/92	D	G4	212.000		17.0	ABC**F*--
Beryllium	03/11/92	D	G4	2.000	B	17.0	ABC**FZ--
Calcium	03/11/92	D	G4	9090.000		17.0	*******--
Chromium	03/11/92	D	G4	77.000		17.0	ABC**FZ--
Copper	03/11/92	D	G4	19.000	B	17.0	ABC**FZ--
Iron	03/11/92	D	G4	21900.000		17.0	ABC****--
Lead	03/11/92	D	G4	8.600		17.0	ABC**FZ--
Magnesium	03/11/92	D	G4	10300.000		17.0	*******--
Manganese	03/11/92	D	G4	50.000		17.0	ABC**F*--
Mercury	03/11/92	D	G4	0.410		17.0	ABC**FZ--
Potassium	03/11/92	D	G4	4990.000	B	17.0	*******--
Sodium	03/11/92	D	G4	6.840		17.0	**c****--
Vanadium	03/11/92	D	G4	78.000		17.0	*****F*--
Zinc	03/11/92	D	G4	98.000		17.0	A*C**FZ--
Pest/PCB (ppb)							
beta-BHC	03/11/92	D	G4	0.107	J	17.0	***deFZ-
SVOA (ppb)							
Di-n-Butylphthalate	03/11/92	D	G4	2.000	J	17.0	*****f*--
VOA (ppb)							
Acetone	03/11/92	D	G4	5.000	J	17.0	***def*--

SAMPLE ID: U3W04

Metal (ppm)							
Aluminum	03/11/92	D	G4	8920.000		15.0	ABC**FZ--
Arsenic	03/11/92	D	G4	1.200	B	15.0	A*C**FZ--
Barium	03/11/92	D	G4	154.000	B	15.0	ABC**F*--
Calcium	03/11/92	D	G4	8460.000		15.0	*******--
Chromium	03/11/92	D	G4	11.000		15.0	ABC**FZ--
Copper	03/11/92	D	G4	11.000	B	15.0	ABC**FZ--
Iron	03/11/92	D	G4	2690.000		15.0	ABC****--
Lead	03/11/92	D	G4	9.300		15.0	ABC**FZ--
Magnesium	03/11/92	D	G4	5540.000		15.0	*******--
Manganese	03/11/92	D	G4	28.000		15.0	ABC**F*--
Mercury	03/11/92	D	G4	0.280		15.0	ABC**FZ--
Potassium	03/11/92	D	G4	4020.000	B	15.0	*******--
Sodium	03/11/92	D	G4	10200.000		15.0	**C****--
Vanadium	03/11/92	D	G4	15.000	B	15.0	*****F*--
Zinc	03/11/92	D	G4	63.000		15.0	A*C**FZ--
SVOA (ppb)							
Di-n-Butylphthalate	03/11/92	D	G4	1.000	J	15.0	*****f*--
VOA (ppb)							
Trichloroethene	03/11/92	D	G4	1300.000		15.0	ABCDeF*--

SAMPLE ID: U3W05

Metal (ppm)							
Aluminum	03/11/92	D	G4	222000.000		15.0	ABC**FZ--
Arsenic	03/11/92	D	G4	13.600		15.0	A*C**FZ--
Barium	03/11/92	D	G4	437.000		15.0	ABC**F*--
Beryllium	03/11/92	D	G4	5.000		15.0	ABC**FZ--
Calcium	03/11/92	D	G4	16300.000		15.0	*******--
Chromium	03/11/92	D	G4	255.000		15.0	ABC**FZ--
Copper	03/11/92	D	G4	37.000		15.0	ABC**FZ--
Iron	03/11/92	D	G4	60800.000		15.0	ABC****--
Lead	03/11/92	D	G4	22.000		15.0	ABC**FZ--
Magnesium	03/11/92	D	G4	16600.000		15.0	*******--
Manganese	03/11/92	D	G4	165.000		15.0	ABC**F*--
Mercury	03/11/92	D	G4	0.440		15.0	ABC**FZ--
Nickel	03/11/92	D	G4	65.000		15.0	ABC**FZ--
Potassium	03/11/92	D	G4	11300.000		15.0	*******--
Sodium	03/11/92	D	G4	10300.000		15.0	**C****--
Vanadium	03/11/92	D	G4	270.000		15.0	*****F*--
Zinc	03/11/92	D	G4	193.000		15.0	A*C**FZ--
Pest/PCB (ppb)							
4,4'-DDE	03/11/92	D	G4	0.010	J	15.0	***def*--
SVOA (ppb)							
Di-n-Butylphthalate	03/11/92	D	G4	1.000	J	15.0	*****f*--
VOA (ppb)							
Acetone	03/11/92	D	G4	5.000	J	15.0	***def*--

SAMPLE ID: U3W06

Metal (ppm)							
Aluminum	03/11/92	D	G5	157000.000		13.0	ABC**FZ--
Arsenic	03/11/92	D	G5	2.200	B	13.0	A*C**FZ--

Barium	03/11/92	D	G5	438.000		13.0	ABC**F*--
Beryllium	03/11/92	D	G5	3.000	B	13.0	ABC**FZ--
Calcium	03/11/92	D	G5	37200.000		13.0	*******--
Chromium	03/11/92	D	G5	203.000		13.0	ABC**FZ--
Copper	03/11/92	D	G5	34.000		13.0	ABC**FZ--
Iron	03/11/92	D	G5	66900.000		13.0	ABC****
Lead	03/11/92	D	G5	21.300		13.0	ABC**FZ-
Magnesium	03/11/92	D	G5	14700.000		13.0	*******--
Manganese	03/11/92	D	G5	87.000		13.0	ABC**F*--
Mercury	03/11/92	D	G5	0.200		13.0	ABC**FZ--
Nickel	03/11/92	D	G5	27.000		13.0	ABC**FZ--
Potassium	03/11/92	D	G5	14300.000		13.0	*******--
Sodium	03/11/92	D	G5	11900.000		13.0	**C****--
Vanadium	03/11/92	D	G5	298.000		13.0	*****F*--
Zinc	03/11/92	D	G5	131.000		13.0	A*C**FZ--
Pest/PCB (ppb)							
Dieldrin	03/11/92	D	G5	0.032	J	13.0	***deFZ--
SVOA (ppb)							
2-Methylnaphthalene	03/11/92	D	G5	1.000	J	13.0	**c****--
Acenaphthene	03/11/92	D	G5	1.000	J	13.0	***de**--
bis(2-Ethylhexyl)Phthalate	03/11/92	D	G5	10.000	J	13.0	ABC**F*--
Carbazole	03/11/92	D	G5	0.800	J	13.0	*****f*--
Di-n-Butylphthalate	03/11/92	D	G5	3.000	J	13.0	*****f*--
Dibenzofuran	03/11/92	D	G5	1.000	J	13.0	*******--
Fluorene	03/11/92	D	G5	1.000	J	13.0	***def*--
Naphthalene	03/11/92	D	G5	12.000		13.0	**c**f*--
Phenanthrene	03/11/92	D	G5	0.500	J	13.0	***def*--
VOA (ppb)							
Trichloroethene	03/11/92	D	G5	8.000	J	13.0	ABCdeF*-

*** End of Report ***

REPORT: JAX OU3 - SAMPLE ANALYSIS DETAIL BY DEPTH RANGE AND SAMPLE ID
SAMPLE: WATER
FILE : U3_DATA.DBF
TE : 03/23/94

DEPTH RANGE : 20 to 60 ft
COLUMN LABELS: Date, Group, Grid, Result, Qualifier, Depth, ARAR & RISK Flags
AR MULTIPLIER: 1

SAMPLE ID: U3B101MW01

SAMPLE ID: U3B101MW02

SAMPLE ID: U3B101MW03

SAMPLE ID: U3B101MW04

SAMPLE ID: U3CW01A02

Metal (ppm)						
Aluminum	09/27/93	B	B6	43.400	37.5	ABC**FZ--
Calcium	09/27/93	B	B6	12.800	37.5	*******--
Chromium	09/27/93	B	B6	0.291	37.5	ABC**FZ--
Copper	09/27/93	B	B6	0.084	37.5	abc**fZ--
Iron	09/27/93	B	B6	230.000	37.5	ABC****--
Lead	09/27/93	B	B6	0.009	37.5	aBc**FZ--
Magnesium	09/27/93	B	B6	8.870	37.5	*******--
Manganese	09/27/93	B	B6	0.331	37.5	ABC**F*--
Nickel	09/27/93	B	B6	0.082	37.5	abc**FZ--
Sodium	09/27/93	B	B6	10.200	37.5	**c****--
Vanadium	09/27/93	B	B6	0.111	37.5	*****F*--
Zinc	09/27/93	B	B6	0.220	37.5	a*c**fZ--
VOA (ppb)						
Chloromethane	09/27/93	B	B6	19.000	37.5	*****F*--
Methylene Chloride	09/27/93	B	B6	3.000 J	37.5	aBc**fz--

SAMPLE ID: U3CW02A02

VOA (ppb)						
Trichloroethene	09/26/93	A	C6	42.000	37.0	ABCdeF*--

SAMPLE ID: U3CW02A03

VOA (ppb)						
Trichloroethene	09/26/93	A	C6	23.000	60.0	ABCdeF*--

SAMPLE ID: U3CW03A02

VOA (ppb)						
Toluene	09/26/93	A	D6	8.300	24.0	abcdef*--

SAMPLE ID: U3CW04A02

Metal (ppm)						
Aluminum	09/26/93	B	E6	39.400	43.0	ABC**FZ--
Arsenic	09/26/93	A	E6	1.500	43.0	A*C**FZ--
Calcium	09/26/93	B	E6	58.600	43.0	*******--
Chromium	09/26/93	B	E6	0.200	43.0	ABC**FZ--
Copper	09/26/93	B	E6	0.061	43.0	abc**fZ
Iron	09/26/93	B	E6	45.500	43.0	ABC****--
Lead	09/26/93	B	E6	0.012	43.0	aBc**FZ--
Magnesium	09/26/93	B	E6	12.700	43.0	*******--
Manganese	09/26/93	B	E6	0.464	43.0	ABC**F*--
Nickel	09/26/93	B	E6	0.087	43.0	abc**FZ--
Potassium	09/26/93	B	E6	6.830	43.0	*******--
Sodium	09/26/93	B	E6	38.400	43.0	**c****--
Vanadium	09/26/93	B	E6	0.080	43.0	*****F*--
Zinc	09/26/93	B	E6	0.238	43.0	a*c**fZ--
VOA (ppb)						
Chloromethane	09/26/93	B	E6	7.000 J	43.0	*****F*--
Methylene Chloride	09/26/93	B	E6	2.000 J	43.0	aBc**fz--

SAMPLE ID: U3CW10A01

SAMPLE ID: U3CW10A02

Metal (ppm)						
Antimony	08/03/93	B	F6	0.040 B	35.0	ABC***z--
Arsenic	08/03/93	A	F6	1.400	35.0	A*C**FZ--
Arsenic	08/03/93	B	F6	0.038	35.0	a*c**Fz--
Barium	08/03/93	B	F6	0.011 B	35.0	abc**f*--
Calcium	08/03/93	B	F6	14.500	35.0	*******-
Cobalt	08/03/93	B	F6	0.006 B	35.0	*****F*-
Iron	08/03/93	B	F6	3.260	35.0	ABC****--
Lead	08/03/93	B	F6	0.001 B	35.0	aBc**Fz--
Magnesium	08/03/93	B	F6	3.410 B	35.0	*******--
Manganese	08/03/93	B	F6	0.104	35.0	ABC**F*--
Potassium	08/03/93	B	F6	1.350 B	35.0	*******--
Sodium	08/03/93	B	F6	15.000	35.0	**c****--
Thallium	08/03/93	B	F6	0.001 B	35.0	aBc***z--
Vanadium	08/03/93	B	F6	0.003 B	35.0	*****f*--
Zinc	08/03/93	B	F6	0.011 B	35.0	a*c**fz--
Pest/PCB (ppb)						
gamma-BHC (Lindane)	08/03/93	B	F6	0.018 JP	35.0	aBcdefz--
TPH (ppm)						
Total Petroleum Hydrocarbons	08/03/93	A	F6	508.000	35.0	**C****--
VOA (ppb)						
Acetone	08/03/93	B	F6	10.000 B	35.0	***def*--
Carbon Disulfide	08/03/93	B	F6	67.000	35.0	***deF*--
Chloromethane	08/03/93	B	F6	3.000 J	35.0	*****F*--

SAMPLE ID: U3CW10A03

TPH (ppm)						
Total Petroleum Hydrocarbons	08/03/93	A	F6	678.000	60.0	**C****-
VOA (ppb)						
Trichloroethene	08/03/93	A	F6	2.400	60.0	aBcdeF*--

SAMPLE ID: U3CW11A01

Metal (ppm)						
Arsenic	08/04/93	A	E6	1.800	22.0	A*C**FZ--
VOA (ppb)						
Trichloroethene	08/04/93	A	E6	4.200	22.0	aBCdeF*--

SAMPLE ID: U3CW11A02

Metal (ppm)						
Arsenic	08/04/93	A	E6	1.700	45.0	A*C**FZ--

SAMPLE ID: U3CW11A03

SAMPLE ID: U3CW12A01

SAMPLE ID: U3CW13A01

SAMPLE ID: U3CW14A02

SAMPLE ID: U3CW16A01

SAMPLE ID: U3CW16A02

Metal (ppm)						
Aluminum	09/29/93	B	C5	19.800	35.0	ABC**FZ--
Calcium	09/29/93	B	C5	21.900	35.0	*******--
Chromium	09/29/93	B	C5	0.692	35.0	ABC**FZ--
Copper	09/29/93	B	C5	0.669	35.0	Abc**FZ--
Iron	09/29/93	B	C5	34.900	35.0	ABC****--
Lead	09/29/93	B	C5	0.012	35.0	aBc**FZ--
Magnesium	09/29/93	B	C5	5.470	35.0	*******--
Manganese	09/29/93	B	C5	0.392	35.0	ABC**F*--
Nickel	09/29/93	B	C5	0.309	35.0	ABC**FZ--
Sodium	09/29/93	B	C5	16.700	35.0	**c****--
Vanadium	09/29/93	B	C5	0.071	35.0	*****F*--
Zinc	09/29/93	B	C5	0.098	35.0	a*c**fZ--
VOA (ppb)						
cis-1,2-Dichloroethene	09/29/93	A	C5	1.000	35.0	abcdef*--
Methylene Chloride	09/29/93	B	C5	27.000 J	35.0	ABC**Fz--
Trichloroethene	09/29/93	A	C5	172.000 E	35.0	ABCdeF*--
Trichloroethene	09/29/93	B	C5	2800.000	35.0	ABCdeF*--

SAMPLE ID: U3CW17A02

Metal (ppm)						
Aluminum	09/24/93	B	D5	70.300	48.5	ABC**FZ--
Arsenic	09/24/93	A	D5	1.800	48.5	A*C**FZ--
Arsenic	09/24/93	B	D5	0.044	48.5	a*c**Fz--
Beryllium	09/24/93	B	D5	0.006	48.5	ABC**FZ--
Calcium	09/24/93	B	D5	88.400	48.5	*******--
Chromium	09/24/93	B	D5	0.230	48.5	ABC**FZ--
Copper	09/24/93	B	D5	0.082	48.5	abc**fZ--
Iron	09/24/93	B	D5	139.000	48.5	ABC****--

Lead	09/24/93	B	D5	0.044	48.5	ABC**FZ--
Magnesium	09/24/93	B	D5	28.000	48.5	*******--
Manganese	09/24/93	B	D5	1.820	48.5	ABC**F*--
Nickel	09/24/93	B	D5	0.076	48.5	abc**FZ--
Potassium	09/24/93	B	D5	14.400	48.5	*******--
Sodium	09/24/93	B	D5	26.900	48.5	**c****
Vanadium	09/24/93	B	D5	0.169	48.5	*****F*--
Zinc	09/24/93	B	D5	0.295	48.5	a*c**fZ--
SVOA (ppb)						
Phenol	09/24/93	B	D5	3.000 J	48.5	***defz--
VOA (ppb)						
Acetone	09/24/93	B	D5	18.000	48.5	***def*--

SAMPLE ID: U3CW18A01

SAMPLE ID: U3CW19A02

VOA (ppb)						
Benzene	09/29/93	A	F5	64.000 E	32.0	ABCdeFz--
Trichloroethene	09/29/93	A	F5	58.000 E	32.0	ABCdeF*--

SAMPLE ID: U3CW20A01

SAMPLE ID: U3CW21A02

VOA (ppb)						
Trichloroethene	09/29/93	A	H5	3.500	33.0	aBCdeF*--

SAMPLE ID: U3CW21A03

Metal (ppm)						
Arsenic	09/29/93	A	H5	1.800	57.0	A*C**FZ--

SAMPLE ID: U3CW22A01

SAMPLE ID: U3CW22A02

VOA (ppb)						
1,1,2-Trichloroethane	08/02/93	A	H5	1.000	33.0	abcdef*--
cis-1,2-Dichloroethene	08/02/93	A	H5	2.200	33.0	abcdef*--
trans-1,2-Dichloroethene	08/02/93	A	H5	2.200	33.0	abcdef*--
Trichloroethene	08/02/93	A	H5	120.000 E	33.0	ABCdeF*--

SAMPLE ID: U3CW22A03

SAMPLE ID: U3CW23A01

SAMPLE ID: U3CW23A03

SAMPLE ID: U3CW24A01

SAMPLE ID: U3CW25A01

`MPLE ID: U3CW25A02

Anion (ppm)						
Cyanide	08/11/93	B	E5	0.002 B	45.0	abc***Z--
Metal (ppm)						
Aluminum	08/11/93	B	E5	0.031 B	45.0	abc**fz--
Antimony	08/11/93	B	E5	0.025 B	45.0	ABC***z--
Arsenic	08/11/93	B	E5	0.026	45.0	a*c**Fz--
Barium	08/11/93	B	E5	0.009 B	45.0	abc**f*--
Calcium	08/11/93	B	E5	68.800	45.0	*******--
Chromium	08/11/93	B	E5	0.003 B	45.0	abc**fz--
Copper	08/11/93	B	E5	0.009 B	45.0	abc**fZ--
Iron	08/11/93	B	E5	0.474	45.0	ABC****--
Magnesium	08/11/93	B	E5	10.700	45.0	*******--
Manganese	08/11/93	B	E5	0.393	45.0	ABC**F*--
Potassium	08/11/93	B	E5	4.250 B	45.0	*******--
Sodium	08/11/93	B	E5	27.900	45.0	**c****--
Zinc	08/11/93	B	E5	0.008 B	45.0	a*c**fz--
SVOA (ppb)						
Di-n-Butylphthalate	08/11/93	B	E5	4.000 BJ	45.0	*****f*--
VOA (ppb)						
Carbon Disulfide	08/11/93	B	E5	5.000 J	45.0	***deF*--
Tetrachloroethene	08/11/93	A	E5	7.000	45.0	ABCdeF*--
Tetrachloroethene	08/11/93	B	E5	10.000	45.0	ABCdeF*--
Trichloroethene	08/11/93	A	E5	2.300	45.0	aBcdeF*--
Trichloroethene	08/11/93	B	E5	4.000 J	45.0	aBCdeF*--

SAMPLE ID: U3CW26A02

Metal (ppm)						
Arsenic	08/12/93	A	D5	2.100	23.0	A*C**FZ--

SAMPLE ID: U3CW28A01

SAMPLE ID: U3CW28A03

Metal (ppm)						
Arsenic	08/09/93	A	B5	1.000	56.0	A*C**FZ--

SAMPLE ID: U3CW29A01

SAMPLE ID: U3CW29A02

VOA (ppb)						
cis-1,2-Dichloroethene	09/23/93	A	B4	6.400	37.0	abcdeF*--

SAMPLE ID: U3CW30A01

SAMPLE ID: U3CW31A02

Metal (ppm)

Aluminum	09/23/93	B	D4	65.300	38.0	ABC**FZ--
Arsenic	09/23/93	B	D4	0.030	38.0	a*c**Fz--
Calcium	09/23/93	B	D4	23.000	38.0	*******--
Chromium	09/23/93	B	D4	0.215	38.0	ABC**FZ--
Copper	09/23/93	B	D4	0.057	38.0	abc**fZ
Iron	09/23/93	B	D4	65.000	38.0	ABC****
Lead	09/23/93	B	D4	0.022	38.0	ABC**FZ--
Magnesium	09/23/93	B	D4	13.900	38.0	*******--
Manganese	09/23/93	B	D4	0.579	38.0	ABC**F*--
Nickel	09/23/93	B	D4	0.072	38.0	abc**fZ--
Potassium	09/23/93	B	D4	8.140	38.0	*******--
Sodium	09/23/93	B	D4	16.100	38.0	**c****--
Vanadium	09/23/93	B	D4	0.186	38.0	*****F*--
Zinc	09/23/93	B	D4	0.325	38.0	a*c**fZ--

VOA (ppb)

1,1,2-Trichloroethane	09/23/93	B	D4	2.000 J	38.0	abcdef*--
1,1-Dichloroethene	09/23/93	B	D4	3.000 J	38.0	abcdeFz--
1,2-Dichloroethene (total)	09/23/93	B	D4	2.000 J	38.0	***def*--
Acetone	09/23/93	B	D4	26.000	38.0	***def*--
Carbon Disulfide	09/23/93	B	D4	97.000	38.0	***deF*--
Chloroform	09/23/93	B	D4	3.000 J	38.0	aBcdeF*--
Chloromethane	09/23/93	B	D4	14.000	38.0	*****F*--
Tetrachloroethene	09/23/93	A	D4	60.000	38.0	ABCdeF*--
Tetrachloroethene	09/23/93	B	D4	40.000	38.0	ABCdeF*--
Trichloroethene	09/23/93	A	D4	6100.000 E	38.0	ABCdeF*--
Trichloroethene	09/23/93	B	D4	3200.000 E	38.0	ABCdeF*--
Trichloroethene	09/23/93	B	D4	9800.000	38.0	ABCdeF*--

SAMPLE ID: U3CW31A03

VOA (ppb)

Trichloroethene	09/23/93	A	D4	2.300	60.0	aBcdeF*--

SAMPLE ID: U3CW32A01

SAMPLE ID: U3CW34A01

SAMPLE ID: U3CW34A02

VOA (ppb)

Trichloroethene	08/16/93	A	D4	7.200	23.0	ABCdeF*--

SAMPLE ID: U3CW34A03

SAMPLE ID: U3CW35A01

SAMPLE ID: U3CW35A02

VOA (ppb)

Trichloroethene	08/26/93	A	C4	1.000	39.0	aBcdef*

SAMPLE ID: U3CW36A01

SAMPLE ID: U3CW37A01

SAMPLE ID: U3CW37A02

VOA (ppb)						
Trichloroethene	09/27/93	A	B3	62.000 E	27.0	ABCdeF*--

SAMPLE ID: U3CW37A03

Metal (ppm)						
Arsenic	09/27/93	A	B3	1.600	48.0	A*C**FZ--

SAMPLE ID: U3CW38A01

SAMPLE ID: U3CW38A02

VOA (ppb)						
1,1,1-Trichloroethane	08/17/93	A	C4	1.000	30.0	abcdefz--
1,1-Dichloroethane	08/17/93	A	C4	1.000	30.0	***defz--
Trichloroethene	08/17/93	A	C4	25.000	30.0	ABCdeF*--

SAMPLE ID: U3CW38A03

SAMPLE ID: U3CW39A01

SAMPLE ID: U3CW40A01

SAMPLE ID: U3CW41A01

SAMPLE ID: U3CW41A02

Metal (ppm)						
Aluminum	08/25/93	B	E3	13.700	47.0	ABC**FZ--
Calcium	08/25/93	B	E3	66.400	47.0	*******--
Chromium	08/25/93	B	E3	0.150	47.0	ABC**FZ--
Copper	08/25/93	B	E3	0.035	47.0	abc**fZ--
SVOA (ppb)						
Phenol	08/25/93	B	E3	3.000 J	47.0	***defz--
VOA (ppb)						
Chloromethane	08/25/93	B	E3	8.000 J	47.0	*****F*--
Tetrachloroethene	08/25/93	A	E3	2.900	47.0	aBcdeF*--
Tetrachloroethene	08/25/93	B	E3	10.000	47.0	ABCdeF*--
Trichloroethene	08/25/93	B	E3	2.000 J	47.0	aBcdef*--

SAMPLE ID: U3CW43A01

SAMPLE ID: U3CW43A02

VOA (ppb)						
cis-1,2-Dichloroethene	08/24/93	A	B3	88.000 E	35.0	ABCdeF*--
Tetrachloroethene	08/24/93	A	B3	17.000	35.0	ABCdeF*--

trans-1,2-Dichloroethene	08/24/93	A	B3	2.300	35.0	abcdef*--
Trichloroethene	08/24/93	A	B3	4400.000 E	35.0	ABCdeF*--

SAMPLE ID: U3CW43A03

SAMPLE ID: U3CW47A02

Metal (ppm)						
Aluminum	08/28/93	B	A3	42.900	30.0	ABC**FZ--
Arsenic	08/28/93	A	A3	1.000	30.0	A*C**FZ--
Arsenic	08/28/93	B	A3	0.012	30.0	a*c**Fz--
Barium	08/28/93	B	A3	0.410	30.0	abc**F*--
Beryllium	08/28/93	B	A3	0.003	30.0	abc**FZ--
Calcium	08/28/93	B	A3	42.500	30.0	*******--
Chromium	08/28/93	B	A3	0.156	30.0	ABC**FZ--
Cobalt	08/28/93	B	A3	0.035	30.0	*****F*--
Copper	08/28/93	B	A3	0.046	30.0	abc**fZ--
Iron	08/28/93	B	A3	148.000	30.0	ABC****--
Magnesium	08/28/93	B	A3	30.800	30.0	*******--
Manganese	08/28/93	B	A3	1.030	30.0	ABC**F*--
Nickel	08/28/93	B	A3	0.085	30.0	abc**FZ--
Potassium	08/28/93	B	A3	6.090	30.0	*******--
Silver	08/28/93	B	A3	0.007	30.0	a*c**fZ--
Sodium	08/28/93	B	A3	43.900	30.0	**c****--
Vanadium	08/28/93	B	A3	0.072	30.0	*****F*--
Zinc	08/28/93	B	A3	0.361	30.0	a*c**fZ--
SVOA (ppb)						
Phenol	08/28/93	B	A3	2.000 J	30.0	***defz--
VOA (ppb)						
Acetone	08/28/93	B	A3	14.000	30.0	***def*--
Chloromethane	08/28/93	B	A3	11.000	30.0	*****F*--
Methylene Chloride	08/28/93	B	A3	1.000 J	30.0	aBc**fz--
Trichloroethene	08/28/93	B	A3	1.000 J	30.0	aBcdef*--

SAMPLE ID: U3CW48A01

SAMPLE ID: U3CW48A02

VOA (ppb)						
cis-1,2-Dichloroethene	08/28/93	A	B2	2.500	39.0	abcdef*--

SAMPLE ID: U3CW48A03

SAMPLE ID: U3CW49A01

SAMPLE ID: U3CW49A02

VOA (ppb)						
Trichloroethene	08/28/93	A	C2	1.100	30.0	aBcdef*-

SAMPLE ID: U3CW49A03

Metal (ppm)						
Arsenic	08/28/93	A	C2	1.000	53.0	A*C**FZ--

SAMPLE ID: U3CW50A01

MPLE ID: U3CW50A02

Metal (ppm)

Aluminum	09/08/93	B	D2	2.040	24.0	ABC**fZ--
Arsenic	09/08/93	B	D2	0.002	24.0	a*c**Fz--
Barium	09/08/93	B	D2	0.062	24.0	abc**f*--
Calcium	09/08/93	B	D2	20.800	24.0	*******--
Chromium	09/08/93	B	D2	0.022	24.0	abc**Fz--
Cobalt	09/08/93	B	D2	0.007	24.0	*****F*--
Copper	09/08/93	B	D2	0.006	24.0	abc**fZ--
Iron	09/08/93	B	D2	8.500	24.0	ABC****--
Lead	09/08/93	B	D2	0.001	24.0	aBc**Fz--
Magnesium	09/08/93	B	D2	5.700	24.0	*******--
Manganese	09/08/93	B	D2	0.290	24.0	ABC**F*--
Nickel	09/08/93	B	D2	0.015	24.0	abc**fZ--
Potassium	09/08/93	B	D2	2.040	24.0	*******--
Sodium	09/08/93	B	D2	16.400	24.0	**c****--
Vanadium	09/08/93	B	D2	0.006	24.0	*****f*--
Zinc	09/08/93	B	D2	0.044	24.0	a*c**fz--

VOA (ppb)

Acetone	09/08/93	B	D2	22.000	24.0	***def*--
Carbon Disulfide	09/08/93	B	D2	41.000	24.0	***deF*--
Methylene Chloride	09/08/93	B	D2	2.000 J	24.0	aBc**fz--

MPLE ID: U3CW52A01

SAMPLE ID: U3CW52A02

Metal (ppm)

Arsenic	09/09/93	A	F2	2.500	32.0	A*C**FZ--

VOA (ppb)

Tetrachloroethene	09/09/93	A	F2	1.000	32.0	aBcdef*--
Trichloroethene	09/09/93	A	F2	1.000	32.0	aBcdef*--

SAMPLE ID: U3CW52A03

Metal (ppm)

Arsenic	09/09/93	A	F2	1.000	56.5	A*C**FZ--

SAMPLE ID: U3CW53A02

Metal (ppm)

Aluminum	08/29/93	B	F3	43.800	53.0	ABC**FZ--
Arsenic	08/29/93	B	F3	0.023	53.0	a*c**Fz--
Barium	08/29/93	B	F3	0.190	53.0	abc**f*--
Beryllium	08/29/93	B	F3	0.018	53.0	ABC**FZ--
Calcium	08/29/93	B	F3	44.000	53.0	*******--
Chromium	08/29/93	B	F3	0.553	53.0	ABC**FZ--
Cobalt	08/29/93	B	F3	0.021	53.0	*****F*--
Copper	08/29/93	B	F3	0.118	53.0	Abc**fZ--
Iron	08/29/93	B	F3	87.600	53.0	ABC****--
Lead	08/29/93	B	F3	0.019	53.0	ABC**FZ--
Magnesium	08/29/93	B	F3	15.800	53.0	*******--

Manganese	08/29/93	B	F3	0.647	53.0	ABC**F*--
Nickel	08/29/93	A	F3	1.000	53.0	ABC**FZ--
Nickel	08/29/93	B	F3	0.181	53.0	ABC**FZ--
Potassium	08/29/93	B	F3	10.300	53.0	*******--
Sodium	08/29/93	B	F3	15.500	53.0	**c****--
Vanadium	08/29/93	B	F3	0.130	53.0	*****F*
Zinc	08/29/93	B	F3	0.230	53.0	a*c**fZ
VOA (ppb)						
Acetone	08/29/93	B	F3	92.000	53.0	***def*--
Chloromethane	08/29/93	B	F3	30.000	53.0	*****F*--
Methylene Chloride	08/29/93	B	F3	35.000	53.0	ABC**Fz--

SAMPLE ID: U3CW55A02

Metal (ppm)						
Aluminum	09/09/93	B	G4	11.600	40.0	ABC**FZ--
Arsenic	09/09/93	B	G4	0.005	40.0	a*c**Fz--
Barium	09/09/93	B	G4	0.064	40.0	abc**f*--
Calcium	09/09/93	B	G4	8.430	40.0	*******--
Chromium	09/09/93	B	G4	0.081	40.0	abc**FZ--
Copper	09/09/93	B	G4	0.024	40.0	abc**fZ--
Iron	09/09/93	B	G4	26.000	40.0	ABC****--
Lead	09/09/93	B	G4	0.002	40.0	aBc**Fz--
Magnesium	09/09/93	B	G4	6.360	40.0	*******--
Manganese	09/09/93	B	G4	0.110	40.0	ABC**F*--
Nickel	09/09/93	B	G4	0.024	40.0	abc**fZ--
Potassium	09/09/93	B	G4	4.320	40.0	*******--
Selenium	09/09/93	B	G4	0.003	40.0	abc**fz--
Sodium	09/09/93	B	G4	11.000	40.0	**c****--
Vanadium	09/09/93	B	G4	0.031	40.0	*****F*
Zinc	09/09/93	B	G4	0.076	40.0	a*c**fz
SVOA (ppb)						
Phenol	09/09/93	B	G4	3.000 J	40.0	***defz--
VOA (ppb)						
Acetone	09/09/93	B	G4	39.000	40.0	***def*--
Acetone	09/09/93	B	G4	80.000	40.0	***def*--
Carbon Disulfide	09/09/93	B	G4	380.000 E	40.0	***deF*--
Carbon Disulfide	09/09/93	B	G4	260.000	40.0	***deF*--

SAMPLE ID: U3CW56A03

SAMPLE ID: U3CW57A02

VOA (ppb)						
cis-1,2-Dichloroethene	09/08/93	A	B2	32.000	31.0	abcdeF*--
Trichloroethene	09/08/93	A	B2	50.000 E	31.0	ABCdeF*--

SAMPLE ID: U3CW57A03

VOA (ppb)						
cis-1,2-Dichloroethene	09/08/93	A	B2	33.000	58.0	abcdeF*
Tetrachloroethene	09/08/93	A	B2	1.000	58.0	aBcdef*
Trichloroethene	09/08/93	A	B2	5.000	58.0	aBCdeF*--

SAMPLE ID: U3CW58A01

SAMPLE ID: U3CW58A02

VOA (ppb)

Tetrachloroethene	09/08/93	A	B1	1.000		35.0	aBcdef*--
Trichloroethene	09/08/93	A	B1	12.000		35.0	ABCdeF*--

SAMPLE ID: U3CW58A03

SAMPLE ID: U3CW59A01

SAMPLE ID: U3CW59A02

Metal (ppm)

Aluminum	09/20/93	B	F1	39.900		55.0	ABC**FZ--
Antimony	09/20/93	B	F1	0.013	BN	55.0	ABC***z--
Arsenic	09/20/93	B	F1	0.028		55.0	a*c**Fz--
Barium	09/20/93	B	F1	0.135	B	55.0	abc**f*--
Beryllium	09/20/93	B	F1	0.003	B	55.0	abc**FZ--
Calcium	09/20/93	B	F1	21.000		55.0	*******--
Chromium	09/20/93	B	F1	0.244		55.0	ABC**FZ--
Cobalt	09/20/93	B	F1	0.008	B	55.0	*****F*--
Copper	09/20/93	B	F1	0.064	*	55.0	abc**fZ--
Iron	09/20/93	B	F1	64.700		55.0	ABC****--
Lead	09/20/93	B	F1	0.026		55.0	ABC**FZ--
Magnesium	09/20/93	B	F1	8.500		55.0	*******--
Manganese	09/20/93	B	F1	0.348		55.0	ABC**F*--
Mercury	09/20/93	B	F1	0.000	B	55.0	abc**fZ--
Nickel	09/20/93	B	F1	0.079		55.0	abc**FZ--
Potassium	09/20/93	B	F1	6.510		55.0	*******--
Sodium	09/20/93	B	F1	12.600	E	55.0	**c****--
Vanadium	09/20/93	B	F1	0.067		55.0	*****F*--
Zinc	09/20/93	B	F1	0.206		55.0	a*c**fZ--

SVOA (ppb)

Diethylphthalate	09/20/93	B	F1	7.000	J	55.0	***def*--
Phenol	09/20/93	B	F1	35.000		55.0	***defz--

VOA (ppb)

Carbon Disulfide	09/20/93	B	F1	110.000		55.0	***deF*--
Methylene Chloride	09/20/93	B	F1	3.000	BJ	55.0	aBc**fz--

SAMPLE ID: U3CW59A03

SAMPLE ID: U3CW60A01

SAMPLE ID: U3CW60A03

Metal (ppm)

Aluminum	09/22/93	B	D2	36.900		60.0	ABC**FZ--
Arsenic	09/22/93	A	D2	1.000		60.0	A*C**FZ--
Calcium	09/22/93	B	D2	7.280		60.0	*******--
Chromium	09/22/93	B	D2	0.084		60.0	abc**FZ--
Copper	09/22/93	B	D2	0.053		60.0	abc**fZ--
Iron	09/22/93	B	D2	59.300		60.0	ABC****--
Lead	09/22/93	B	D2	0.005		60.0	aBc**Fz--
Manganese	09/22/93	B	D2	0.285		60.0	ABC**F*--
Sodium	09/22/93	B	D2	13.700		60.0	**c****--

Vanadium	09/22/93	B	D2	0.077	60.0	*****F*--
Zinc	09/22/93	B	D2	0.190	60.0	a*c**fZ--
SVOA (ppb)						
Phenol	09/22/93	B	D2	6.000 J	60.0	***defz-
VOA (ppb)						
Carbon Disulfide	09/22/93	B	D2	140.000	60.0	***deF*--
Chloromethane	09/22/93	B	D2	10.000	60.0	*****F*--

SAMPLE ID: U3CW62A02

VOA (ppb)						
cis-1,2-Dichloroethene	09/21/93	A	B1	34.000	40.0	abcdeF*--
trans-1,2-Dichloroethene	09/21/93	A	B1	2.800	40.0	abcdef*--
Trichloroethene	09/21/93	A	B1	70.000	40.0	ABCdeF*--

SAMPLE ID: U3CW62A03

SAMPLE ID: U3CW63A01

SAMPLE ID: U3CW63A02

Metal (ppm)						
Arsenic	09/22/93	A	B1	1.000	33.5	A*C**FZ--
Chromium	09/22/93	A	B1	1.000	33.5	ABC**FZ--
VOA (ppb)						
Chloroform	09/22/93	A	B1	1.000	33.5	aBcdeF*-
cis-1,2-Dichloroethene	09/22/93	A	B1	13.000	33.5	abcdeF*--
Trichloroethene	09/22/93	A	B1	21.000	33.5	ABCdeF*--

SAMPLE ID: U3CW63A03

SAMPLE ID: U3GW7801

SAMPLE ID: U3GW7805

SAMPLE ID: U3MW1

SAMPLE ID: U3MW10

SAMPLE ID: U3MW11

SAMPLE ID: U3MW2

SAMPLE ID: U3MW3

SAMPLE ID: U3MW4

SAMPLE ID: U3MW5

SAMPLE ID: U3MW7

SAMPLE ID: U3MW8

SAMPLE ID: U3MW9

SAMPLE ID: U3NARF1

VOA (ppb)

1,1,1-Trichloroethane	01/01/85	D	A4	0.700	20.0	abcdefz--	-1.000 -1.000 -1.00
1,1-Dichloroethene	01/01/85	D	A4	0.300	20.0	abcdeFz--	-1.000 -1.000 -1.00
Methylene Chloride	01/01/85	D	A4	0.600	20.0	aBc**fz--	-1.000 -1.000 -1.00
trans-1,2-Dichloroethene	01/01/85	D	A4	0.400	20.0	abcdef*--	-1.000 -1.000 -1.00
Trichloroethene	01/01/85	D	A4	23.000	20.0	ABCdeF*--	-1.000 -1.000 -1.00

SAMPLE ID: U3NARF10

SAMPLE ID: U3NARF11

VOA (ppb)

Bromodichloromethane	01/01/86	D	I5	2.500	24.0	aBc**F*--	-1.000 -1.000 -1.00
Chloroform	01/01/86	D	I5	2.000	24.0	aBcdeF*--	-1.000 -1.000 -1.00
Toluene	01/01/86	D	I5	7.000	24.0	abcdef*--	-1.000 -1.000 -1.00

SAMPLE ID: U3NARF13

SAMPLE ID: U3NARF131

SAMPLE ID: U3NARF14

SAMPLE ID: U3NARF16

SAMPLE ID: U3NARF17

SAMPLE ID: U3NARF2

SAMPLE ID: U3NARF3

SAMPLE ID: U3NARF4

SAMPLE ID: U3NARF5

SAMPLE ID: U3NARF6

SAMPLE ID: U3NARF9

VOA (ppb)						
Bromodichloromethane	01/01/86	D	H5	2.000	24.0	aBc**F*--
Chloroform	01/01/86	D	H5	2.000	24.0	aBcdeF*--

SAMPLE ID: U3NARFB1

Metal (ppm)						
Barium	01/01/86	D	H5	0.180	32.0	abc**f*--
Zinc	01/01/86	D	H5	0.030	32.0	a*c**fz--
SVOA (ppb)						
2,4-Dimethylphenol	01/01/86	D	H5	5.100	32.0	*****f*--
VOA (ppb)						
1,1,1-Trichloroethane	01/01/86	D	H5	25500.000	32.0	ABCDeFz--
1,1,1-Trichloroethane	01/01/86	D	H5	6500.000	32.0	ABCdeFz--
1,1,1-Trichloroethane	01/01/86	D	H5	6680.000	32.0	ABCdeFz--
1,1,2-Trichloroethane	01/01/86	D	H5	170.000	32.0	ABCdef*--
1,1-Dichloroethene	01/01/86	D	H5	53500.000	32.0	ABCDeFZ--
Bromodichloromethane	01/01/86	D	H5	4.000	32.0	aBc**F*--
Carbon Tetrachloride	01/01/86	D	H5	2.000	32.0	aBcdeFz--
Ethylbenzene	01/01/86	D	H5	4.000	32.0	abcdef*·
Tetrachloroethene	01/01/86	D	H5	480.000	32.0	ABCdeF*-
Toluene	01/01/86	D	H5	11.000	32.0	abcdef*--
trans-1,2-Dichloroethene	01/01/86	D	H5	8000.000	32.0	ABCdeF*--
Trichloroethene	01/01/86	D	H5	155300.000	32.0	ABCDEF*--

SAMPLE ID: U3NARFD1

SAMPLE ID: U3NARFD2

SAMPLE ID: U3P159MW01

SAMPLE ID: U3P159MW02

SAMPLE ID: U3P159MW03

SAMPLE ID: U3P159MW04

SAMPLE ID: U3P159MW05

SAMPLE ID: U3P159MW06

SAMPLE ID: U3P159MW07

SAMPLE ID: U3W01

SAMPLE ID: U3W02

SAMPLE ID: U3W03

SAMPLE ID: U3W04

SAMPLE ID: U3W05

SAMPLE ID: U3W06

*** End of Report ***

REPORT: JAX OU3 - SAMPLE ANALYSIS DETAIL BY DEPTH RANGE AND SAMPLE ID
SAMPLE: WATER
FILE : U3_DATA.DBF
DATE : 03/23/94

DEPTH RANGE : Greater than 60 ft
COLUMN LABELS: Date, Group, Grid, Result, Qualifier, Depth, ARAR & RISK Flags
AR MULTIPLIER: 1

SAMPLE ID: U3B101MW01

SAMPLE ID: U3B101MW02

SAMPLE ID: U3B101MW03

SAMPLE ID: U3B101MW04

SAMPLE ID: U3CW01A02

SAMPLE ID: U3CW02A02

SAMPLE ID: U3CW02A03

SAMPLE ID: U3CW03A02

SAMPLE ID: U3CW04A02

SAMPLE ID: U3CW10A01

SAMPLE ID: U3CW10A02

SAMPLE ID: U3CW10A03

SAMPLE ID: U3CW11A01

SAMPLE ID: U3CW11A02

SAMPLE ID: U3CW11A03

Metal (ppm)

Arsenic	08/04/93	A	E6	1.300	80.0	A*C**FZ--

SAMPLE ID: U3CW12A01

SAMPLE ID: U3CW13A01

SAMPLE ID: U3CW14A02

SAMPLE ID: U3CW16A01

SAMPLE ID: U3CW16A02

SAMPLE ID: U3CW17A02

SAMPLE ID: U3CW18A01

SAMPLE ID: U3CW19A02

SAMPLE ID: U3CW20A01

SAMPLE ID: U3CW21A02

SAMPLE ID: U3CW21A03

SAMPLE ID: U3CW22A01

SAMPLE ID: U3CW22A02

SAMPLE ID: U3CW22A03

VOA (ppb)

Trichloroethene	08/02/93	A	H5	1.200	64.0	aBcdef*--

SAMPLE ID: U3CW23A01

SAMPLE ID: U3CW23A03

VOA (ppb)

Trichloroethene	08/02/93	A	G5	1.000	62.0	aBcdef*--

SAMPLE ID: U3CW24A01

SAMPLE ID: U3CW25A01

SAMPLE ID: U3CW25A02

SAMPLE ID: U3CW26A02

SAMPLE ID: U3CW28A01

SAMPLE ID: U3CW28A03

SAMPLE ID: U3CW29A01

SAMPLE ID: U3CW29A02

SAMPLE ID: U3CW30A01

SAMPLE ID: U3CW31A02

SAMPLE ID: U3CW31A03

SAMPLE ID: U3CW32A01

SAMPLE ID: U3CW34A01

SAMPLE ID: U3CW34A02

SAMPLE ID: U3CW34A03

TPH (ppm)

Total Petroleum Hydrocarbons	08/16/93	A	D4	1218.000	61.0	**C****--

SAMPLE ID: U3CW35A01

SAMPLE ID: U3CW35A02

SAMPLE ID: U3CW36A01

SAMPLE ID: U3CW37A01

SAMPLE ID: U3CW37A02

SAMPLE ID: U3CW37A03

SAMPLE ID: U3CW38A01

SAMPLE ID: U3CW38A02

SAMPLE ID: U3CW38A03

VOA (ppb)

Trichloroethene	08/17/93	A	C4	5.400	70.0	ABCdeF*--

SAMPLE ID: U3CW39A01

SAMPLE ID: U3CW40A01

SAMPLE ID: U3CW41A01

SAMPLE ID: U3CW41A02

SAMPLE ID: U3CW43A01

SAMPLE ID: U3CW43A02

SAMPLE ID: U3CW43A03

VOA (ppb)

cis-1,2-Dichloroethene	08/24/93	A	B3	5.100	77.0	abcdef*--
Trichloroethene	08/24/93	A	B3	6.800	77.0	ABCdeF*--

SAMPLE ID: U3CW47A02

SAMPLE ID: U3CW48A01

SAMPLE ID: U3CW48A02

SAMPLE ID: U3CW48A03

VOA (ppb)

cis-1,2-Dichloroethene	08/28/93	A	B2	5.400	77.0	abcdef*--

SAMPLE ID: U3CW49A01

SAMPLE ID: U3CW49A02

SAMPLE ID: U3CW49A03

SAMPLE ID: U3CW50A01

SAMPLE ID: U3CW50A02

SAMPLE ID: U3CW52A01

SAMPLE ID: U3CW52A02

SAMPLE ID: U3CW52A03

SAMPLE ID: U3CW53A02

SAMPLE ID: U3CW55A02

SAMPLE ID: U3CW56A03

Metal (ppm)

Arsenic	09/10/93	A	I4	1.000	72.0	A*C**FZ--
Cadmium	09/10/93	A	I4	1.100	72.0	ABC**FZ--

SAMPLE ID: U3CW57A02

SAMPLE ID: U3CW57A03

SAMPLE ID: U3CW58A01

SAMPLE ID: U3CW58A02

SAMPLE ID: U3CW58A03

VOA (ppb)

cis-1,2-Dichloroethene	09/08/93	A	B1	39.000	62.0	abcdeF*--
Tetrachloroethene	09/08/93	A	B1	5.000	62.0	aBCdeF*--
trans-1,2-Dichloroethene	09/08/93	A	B1	4.000	62.0	abcdef*--
Trichloroethene	09/08/93	A	B1	220.000	62.0	ABCdeF*--

SAMPLE ID: U3CW59A01

SAMPLE ID: U3CW59A02

SAMPLE ID: U3CW59A03

Metal (ppm)

Arsenic	09/20/93	A	F1	1.000	75.0	A*C**FZ--

SAMPLE ID: U3CW60A01

SAMPLE ID: U3CW60A03

SAMPLE ID: U3CW62A02

SAMPLE ID: U3CW62A03

VOA (ppb)

cis-1,2-Dichloroethene	09/21/93	A	B1	1.600	82.0	abcdef*-

SAMPLE ID: U3CW63A01

SAMPLE ID: U3CW63A02

SAMPLE ID: U3CW63A03

VOA (ppb)

Chloroform	09/22/93	A	B1	1.000	73.0	aBcdeF*--
cis-1,2-Dichloroethene	09/22/93	A	B1	19.000	73.0	abcdeF*--

SAMPLE ID: U3GW7801

SAMPLE ID: U3GW7805

SAMPLE ID: U3MW1

SAMPLE ID: U3MW10

SAMPLE ID: U3MW11

SAMPLE ID: U3MW2

SAMPLE ID: U3MW3

SAMPLE ID: U3MW4

SAMPLE ID: U3MW5

SAMPLE ID: U3MW7

SAMPLE ID: U3MW8

SAMPLE ID: U3MW9

SAMPLE ID: U3NARF1

SAMPLE ID: U3NARF10

SAMPLE ID: U3NARF11

SAMPLE ID: U3NARF13

SAMPLE ID: U3NARF131

SAMPLE ID: U3NARF14

SAMPLE ID: U3NARF16

SAMPLE ID: U3NARF17

SAMPLE ID: U3NARF2

SAMPLE ID: U3NARF3

SAMPLE ID: U3NARF4

SAMPLE ID: U3NARF5

SAMPLE ID: U3NARF6

SAMPLE ID: U3NARF9

SAMPLE ID: U3NARFB1

SAMPLE ID: U3NARFD1

Metal (ppm)						
Barium	01/01/86	D	B4	0.100	68.0	abc**f*--
Zinc	01/01/86	D	B4	0.040	68.0	a*c**fz--
VOA (ppb)						
1,1,1-Trichloroethane	01/01/86	D	B4	3.000	68.0	abcdefz--
Bromodichloromethane	01/01/86	D	B4	6.600	68.0	aBc**F*--
Carbon Tetrachloride	01/01/86	D	B4	2.000	68.0	aBcdeFz--
Toluene	01/01/86	D	B4	57.000	68.0	abcdef*--

SAMPLE ID: U3NARFD2

Metal (ppm)						
Barium	01/01/86	D	H5	0.070	61.0	abc**f*--
Zinc	01/01/86	D	H5	0.020	61.0	a*c**fz--
VOA (ppb)						
1,1,1-Trichloroethane	01/01/86	D	H5	2.000	61.0	abcdefz--
1,1,1-Trichloroethane	01/01/86	D	H5	3.000	61.0	abcdefz--
Carbon Tetrachloride	01/01/86	D	H5	2.000	61.0	aBcdeFz--
Toluene	01/01/86	D	H5	35.000	61.0	abcdef*--

SAMPLE ID: U3P159MW01

SAMPLE ID: U3P159MW02

SAMPLE ID: U3P159MW03

SAMPLE ID: U3P159MW04

SAMPLE ID: U3P159MW05

SAMPLE ID: U3P159MW06

MPLE ID: U3P159MW07

SAMPLE ID: U3W01

SAMPLE ID: U3W02

SAMPLE ID: U3W03

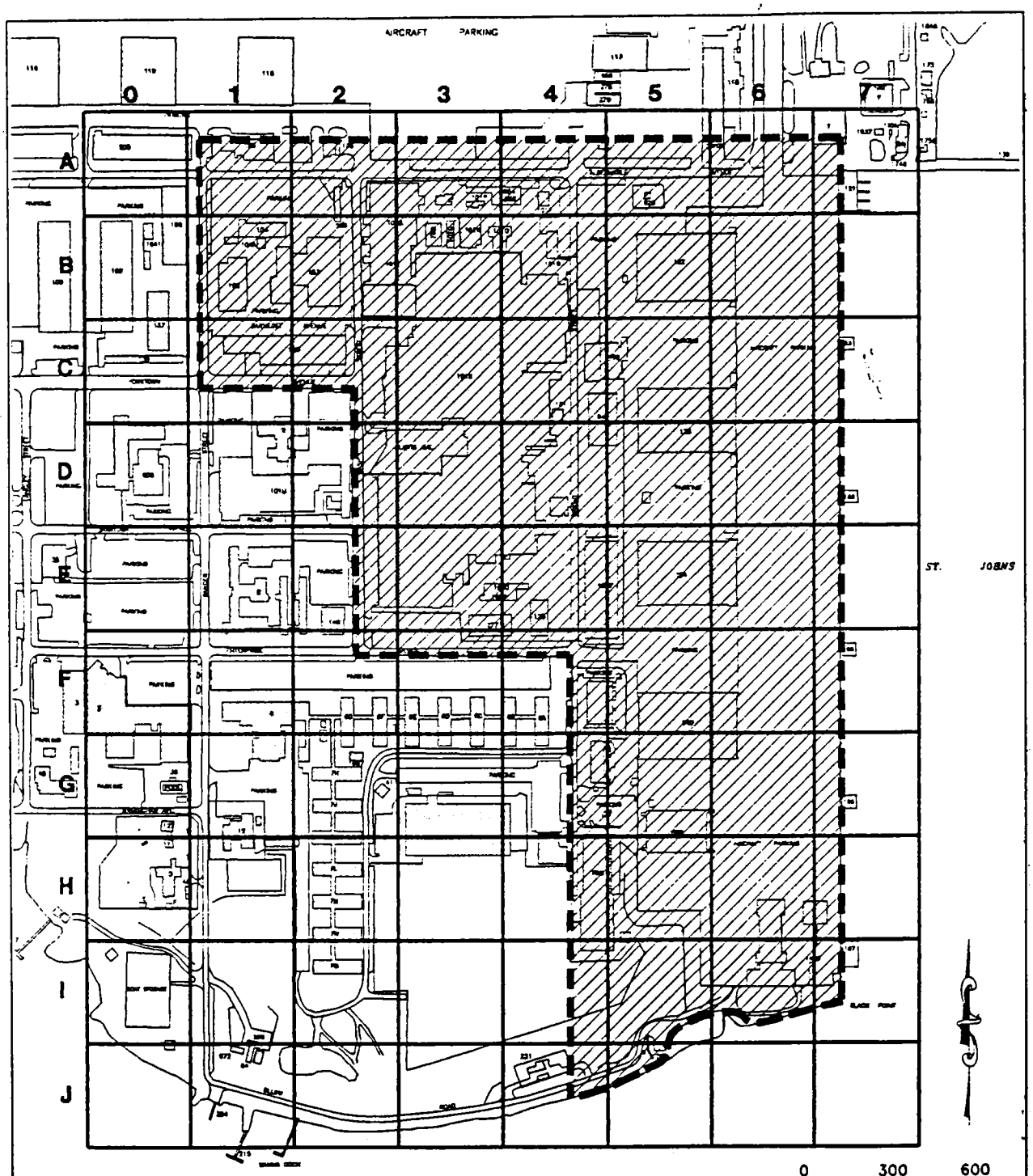
SAMPLE ID: U3W04

SAMPLE ID: U3W05

SAMPLE ID: U3W06

*** End of Report ***

Soil Samples



OPERABLE UNIT 3
GRID PATTERN

REMEDIAL INVESTIGATION
AND FEASIBILITY STUDY
WORKPLAN
OPERABLE UNIT 3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

REPORT: JAX OU3 - SAMPLE ANALYSIS DETAIL BY DEPTH RANGE AND SAMPLE ID
SAMPLE: SOIL
FILE : U3_DATA.DBF
DATE : 03/23/94

DEPTH RANGE : Less than 20 ft
COLUMN LABELS: Date, Group, Grid, Result, Qualifier, Depth, ARAR & RISK Flags
ARAR MULTIPLIER: 1

SAMPLE ID: U310S

VOA (ppb)

1,1,1-Trichloroethane	02/01/92	D	B3	265.000	1.5	-------gh
1,1-Dichloroethane	02/01/92	D	B3	11.400	1.5	-------gh
Toluene	02/01/92	D	B3	6.200	1.5	-------gh
Trichloroethene	02/01/92	D	B3	15.000	1.5	-------gh
Xylene (total)	02/01/92	D	B3	5.900	1.5	-------gh

SAMPLE ID: U314D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	86.900	4.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	15.900	4.5	-------gh
Toluene	12/01/91	D	B3	7.800	4.5	-------gh
Trichloroethene	12/01/91	D	B3	3.300	4.5	-------gh
Xylene (total)	12/01/91	D	B3	9.100	4.5	-------gh

SAMPLE ID: U314S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	282.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	86.800	1.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	2.800	1.5	-------gh
1,4-Dichlorobenzene	12/01/91	D	B3	137.000	1.5	-------gh
Toluene	12/01/91	D	B3	7.700	1.5	-------gh
Trichloroethene	12/01/91	D	B3	2.900	1.5	-------gh
Xylene (total)	12/01/91	D	B3	10.100	1.5	-------gh

SAMPLE ID: U318D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	615.000	4.5	-------gh

SAMPLE ID: U318S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	863.000	1.5	-------gh

SAMPLE ID: U321S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	1920.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	36.100	1.5	-------gh
Toluene	12/01/91	D	B3	4.900	1.5	-------gh
Trichloroethene	12/01/91	D	B3	265.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	9.600	1.5	-------gh

SAMPLE ID: U323S

SVOA (ppb)

Benzo(a)Anthracene	12/01/91	D	B3	370.000	1.5	-------r
Benzo(b)Fluoranthene	12/01/91	D	B3	400.000	1.5	-------
Chrysene	12/01/91	D	B3	390.000	1.5	-------*
Fluoranthene	12/01/91	D	B3	790.000	1.5	-------gh
Phenanthrene	12/01/91	D	B3	330.000	1.5	-------gh

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	1910.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	650.000	1.5	-------gh
1,1,2-Trichloroethane	12/01/91	D	B3	13.700	1.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	255.000	1.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	2.500	1.5	-------gh
Ethylbenzene	12/01/91	D	B3	3.900	1.5	-------gh
Methylene Chloride	12/01/91	D	B3	2380.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	6.700	1.5	-------gh
Toluene	12/01/91	D	B3	49.600	1.5	-------gh
Trichloroethene	12/01/91	D	B3	22.100	1.5	-------gh
Xylene (total)	12/01/91	D	B3	33.600	1.5	-------gh

SAMPLE ID: U324D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	17700.000	4.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	400000.000	4.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	202.000	4.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	3750.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	157.000	4.5	-------g
Trichloroethene	12/01/91	D	B3	2850.000	4.5	-------g

SAMPLE ID: U324S

VOA (ppb)

1,2-Dichlorobenzene	12/01/91	D	B3	171.000	1.5	-------gh
Toluene	12/01/91	D	B3	1420.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	1370.000	1.5	-------gh

SAMPLE ID: U325U

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	538.000	4.5	-------gh

SAMPLE ID: U326D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	1710.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	213.000	4.5	-------gh

SAMPLE ID: U326S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	992.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	120.000	1.5	-------gh

SAMPLE ID: U327D

SVOA (ppb)

2,4-Dimethylphenol	12/01/91	D	B3	30.000	4.5	-------gh
2-Methylphenol	12/01/91	D	B3	7.300	4.5	-------gh
4-Methylphenol	12/01/91	D	B3	11.000	4.5	-------gh
Phenol	12/01/91	D	B3	7.900	4.5	-------gh

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	5480.000	4.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	15100.000	4.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	255.000	4.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	2260.000	4.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	255.000	4.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	840.000	4.5	-------gh
Methylene Chloride	12/01/91	D	B3	416.000	4.5	-------gh
Methylene Chloride	12/01/91	D	B3	1100.000	4.5	-------gh
Tetrachloroethene	12/01/91	D	B3	121.000	4.5	-------gh
Toluene	12/01/91	D	B3	598.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	220.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	1070.000	4.5	-------gh

SAMPLE ID: U327S

SVOA (ppb)

2,4-Dimethylphenol	12/01/91	D	B3	30.000	1.5	-------gh
2-Methylphenol	12/01/91	D	B3	7.300	1.5	-------gh
4-Methylphenol	12/01/91	D	B3	11.000	1.5	-------gh
Phenol	12/01/91	D	B3	7.900	1.5	-------gh

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	160.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	35.300	1.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	2260.000	1.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	840.000	1.5	-------gh
Methylene Chloride	12/01/91	D	B3	1100.000	1.5	-------gh
Toluene	12/01/91	D	B3	4.200	1.5	-------gh
Trichloroethene	12/01/91	D	B3	1070.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	7.900	1.5	-------gh

SAMPLE ID: U328D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	3100.000	4.5	-------gh
Methylene Chloride	12/01/91	D	B3	101.000	4.5	-------gh
Tetrachloroethene	12/01/91	D	B3	1200.000	4.5	-------gh
Toluene	12/01/91	D	B3	957.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	1460.000	4.5	-------gh

SAMPLE ID: U330D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	9330.000	4.5	-------gh
1,2-Dichlorobenzene	12/01/91	D	B3	537.000	4.5	-------gh
Chlorobenzene	12/01/91	D	B3	150.000	4.5	-------gh
Toluene	12/01/91	D	B3	283.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	344.000	4.5	-------gh

SAMPLE ID: U330S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	4700.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	257.000	1.5	-------gh

SAMPLE ID: U331U

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	843.000	4.5	-------gh

SAMPLE ID: U332U

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	480.000	4.5	-------gh

SAMPLE ID: U333D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	4940.000	4.5	-------gh
1,2-Dichlorobenzene	12/01/91	D	B3	102.000	4.5	-------gh
Tetrachloroethene	12/01/91	D	B3	291.000	4.5	-------gh
Tetrachloroethene	12/01/91	D	B3	291.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	177.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	2210.000	4.5	-------gh

SAMPLE ID: U333S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	993.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	219.000	1.5	-------g

SAMPLE ID: U334D

Metal (ppm)

Barium (TCLP)	12/01/91	D	B3	0.000	4.5	-------gh
Cadmium (TCLP)	12/01/91	D	B3	0.000	4.5	-------gh
Chromium (TCLP)	12/01/91	D	B3	0.000	4.5	-------**
Mercury (TCLP)	12/01/91	D	B3	0.000	4.5	-------gh

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	446.000	4.5	-------gh
Toluene	12/01/91	D	B3	102.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	368.000	4.5	-------gh

SAMPLE ID: U334S

Metal (ppm)

Barium (TCLP)	12/01/91	D	B3	0.000	1.5	-------gh
Cadmium (TCLP)	12/01/91	D	B3	0.000	1.5	-------gh
Chromium (TCLP)	12/01/91	D	B3	0.000	1.5	-------**

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	439.000	1.5	-------gh
1,2-Dichlorobenzene	12/01/91	D	B3	886.000	1.5	-------g
1,4-Dichlorobenzene	12/01/91	D	B3	430.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	126.000	1.5	-------gh

SAMPLE ID: U335D

SVOA (ppb)

Phenol	02/01/92	D	B3	3200.000	4.5	-------gh

VOA (ppb)

1,1,1-Trichloroethane	02/01/92	D	B3	111000.000	4.5	-------gh
1,1-Dichloroethene	02/01/92	D	B3	3570.000	4.5	-------gH
Trichloroethene	02/01/92	D	B3	6180.000	4.5	-------gh

SAMPLE ID: U335S

VOA (ppb)

1,1,1-Trichloroethane	02/01/92	D	B3	51.500	1.5	-------gh
1,1,2-Trichloroethane	02/01/92	D	B3	3.100	1.5	-------gh
1,1-Dichloroethane	02/01/92	D	B3	1880.000	1.5	-------gh
2-Butanone	02/01/92	D	B3	305.000	1.5	-------gh
Toluene	02/01/92	D	B3	4.400	1.5	-------gh
Xylene (total)	02/01/92	D	B3	7.000	1.5	-------gh

SAMPLE ID: U336D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	190000.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	6740.000	4.5	-------gh

SAMPLE ID: U336S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	22400.000	1.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	223.000	1.5	-------gh
Chloroform	12/01/91	D	B3	109.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	110.000	1.5	-------gh

SAMPLE ID: U337S

SVOA (ppb)

bis(2-Ethylhexyl)Phthalate	12/01/91	D	B3	950.000	1.5	-------gh

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	316000.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	5460000.000	1.5	-------gH
1,1-Dichloroethane	12/01/91	D	B3	572.000	1.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	9640.000	1.5	-------GH
Tetrachloroethene	12/01/91	D	B3	5850.000	1.5	-------gh
Toluene	12/01/91	D	B3	17100.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	18300.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	1940.000	1.5	-------gh

SAMPLE ID: U338U

VOA (ppb)

1,2-Dichlorobenzene	12/01/91	D	B3	251.000	4.5	-------gh

MPLE ID: U339U

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	498.000	4.5	-------gh

SAMPLE ID: U340U

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	1510.000	4.5	-------gh
1,2-Dichlorobenzene	12/01/91	D	B3	142.000	4.5	-------gh
1,4-Dichlorobenzene	12/01/91	D	B3	126.000	4.5	-------g

SAMPLE ID: U341D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	38300.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	1150.000	4.5	-------gh

SAMPLE ID: U341S

Metal (ppm)

Barium (TCLP)	12/01/91	D	B3	0.000	1.5	-------gh
Cadmium (TCLP)	12/01/91	D	B3	0.000	1.5	-------gh
Chromium (TCLP)	12/01/91	D	B3	0.000	1.5	-------**

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	2260.000	1.5	-------gh
Methylene Chloride	12/01/91	D	B3	350.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	141.000	1.5	-------gh

SAMPLE ID: U342S

SVOA (ppb)

2-Methylnaphthalene	12/01/91	D	B3	600.000	1.5	-------g
Naphthalene	12/01/91	D	B3	440.000	1.5	-------gh

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	10600.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	34100.000	1.5	-------gh
Bromodichloromethane	12/01/91	D	B3	122.000	1.5	-------gh
Chloroform	12/01/91	D	B3	3120.000	1.5	-------gh
Dibromochloromethane	12/01/91	D	B3	101.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	6180.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	13000.000	1.5	-------gh
Toluene	12/01/91	D	B3	2070.000	1.5	-------gh
Toluene	12/01/91	D	B3	1860.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	3270.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	5770.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	4500.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	3260.000	1.5	-------gh

SAMPLE ID: U343S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	9180.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	23100.000	1.5	-------gh
1,2-Dichlorobenzene	12/01/91	D	B3	731.000	1.5	-------gh
1,3-Dichlorobenzene	12/01/91	D	B3	209.000	1.5	-------gh
1,4-Dichlorobenzene	12/01/91	D	B3	723.000	1.5	-------g
Tetrachloroethene	12/01/91	D	B3	2680.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	3440.000	1.5	-------gh
Toluene	12/01/91	D	B3	364.000	1.5	-------gh
Toluene	12/01/91	D	B3	1110.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	1620.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	2980.000	1.5	-------gh

Xylene (total)	12/01/91	D	B3	1470.000		1.5	-------gh
Xylene (total)	12/01/91	D	B3	1850.000		1.5	-------gh

SAMPLE ID: U344S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	11900.000		1.5	-------gh
1,3-Dichlorobenzene	12/01/91	D	B3	1550.000		1.5	-------gh
1,4-Dichlorobenzene	12/01/91	D	B3	1020.000		1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	4930.000		1.5	-------gh
Trichloroethene	12/01/91	D	B3	1550.000		1.5	-------gh
Xylene (total)	12/01/91	D	B3	2060.000		1.5	-------gh

SAMPLE ID: U3B101SB01

Metal (ppm)

Aluminum	01/20/93	C	D3	2160.000		2.0	-------gh
Arsenic	01/20/93	C	D3	1.000	B	2.0	-------gh
Barium	01/20/93	C	D3	11.500	J	2.0	-------gh
Beryllium	01/20/93	C	D3	0.490	J	2.0	-------gH
Calcium	01/20/93	C	D3	7410.000		2.0	-------**
Chromium	01/20/93	C	D3	9.100		2.0	-------gh
Copper	01/20/93	C	D3	2.700	B	2.0	-------gh
Iron	01/20/93	C	D3	4460.000		2.0	-------**
Lead	01/20/93	C	D3	5.800	J	2.0	-------GH
Magnesium	01/20/93	C	D3	511.000	B	2.0	-------**
Manganese	01/20/93	C	D3	30.200		2.0	-------gh
Nickel	01/20/93	C	D3	3.400	B	2.0	-------gh
Potassium	01/20/93	C	D3	704.000	B	2.0	-------**
Sodium	01/20/93	C	D3	183.000	B	2.0	-------**
Vanadium	01/20/93	C	D3	5.600	B	2.0	-------gh
Zinc	01/20/93	C	D3	8.600		2.0	-------gh

SAMPLE ID: U3B101SB014

Metal (ppm)

Aluminum	01/24/93	C	C4	392.000		2.0	-------gh
Arsenic	01/24/93	C	C4	0.320	B	2.0	-------gh
Barium	01/24/93	C	C4	8.100	J	2.0	-------gh
Beryllium	01/24/93	C	C4	0.150	J	2.0	-------gh
Calcium	01/24/93	C	C4	169000.000	J	2.0	-------**
Copper	01/24/93	C	C4	3.600	J	2.0	-------gh
Iron	01/24/93	C	C4	1050.000		2.0	-------**
Lead	01/24/93	C	C4	6.200		2.0	-------GH
Magnesium	01/24/93	C	C4	1240.000		2.0	-------**
Manganese	01/24/93	C	C4	125.000	J	2.0	-------gH
Potassium	01/24/93	C	C4	99.700	B	2.0	-------**
Sodium	01/24/93	C	C4	1090.000	B	2.0	-------**
Vanadium	01/24/93	C	C4	3.100	J	2.0	-------gh
Zinc	01/24/93	C	C4	4.200	J	2.0	-------gh

SAMPLE ID: U3B101SB015

Metal (ppm)

Aluminum	01/23/93	C	C4	659.000		2.0	-------gh
Arsenic	01/23/93	C	C4	0.300	B	2.0	-------gh
Barium	01/23/93	C	C4	8.100	J	2.0	-------gh
Calcium	01/23/93	C	C4	30300.000		2.0	-------**
Chromium	01/23/93	C	C4	1.500	B	2.0	-------gh
Iron	01/23/93	C	C4	690.000		2.0	-------**

Lead	01/23/93	C	C4	4.700	J	2.0	-------GH
Magnesium	01/23/93	C	C4	324.000	B	2.0	-------**
Manganese	01/23/93	C	C4	12.000		2.0	-------gh
Sodium	01/23/93	C	C4	115.000	B	2.0	-------**
Vanadium	01/23/93	C	C4	1.800	B	2.0	-------gh
Zinc	01/23/93	C	C4	5.400	J	2.0	-------

SAMPLE ID: U3B101SB02

Metal (ppm)

Aluminum	01/22/93	C	B4	396.000		2.0	-------gh
Arsenic	01/22/93	C	B4	0.460	B	2.0	-------gh
Barium	01/22/93	C	B4	3.100	J	2.0	-------gh
Calcium	01/22/93	C	B4	266.000	B	2.0	-------**
Chromium	01/22/93	C	B4	2.500		2.0	-------gh
Iron	01/22/93	C	B4	588.000		2.0	-------**
Lead	01/22/93	C	B4	2.800	J	2.0	-------GH
Magnesium	01/22/93	C	B4	64.200	B	2.0	-------**
Manganese	01/22/93	C	B4	8.700		2.0	-------gh
Sodium	01/22/93	C	B4	114.000	B	2.0	-------**
Vanadium	01/22/93	C	B4	1.200	B	2.0	-------gh
Zinc	01/22/93	C	B4	1.700	J	2.0	-------gh

Pest/PCB (ppb)

4,4'-DDD	01/22/93	C	B4	2.600	J	2.0	-------gh
4,4'-DDT	01/22/93	C	B4	4.400		2.0	-------gh

SAMPLE ID: U3B101SB03

Metal (ppm)

Aluminum	01/20/93	C	B4	241.000		2.0	-------g
Arsenic	01/20/93	C	B4	0.410	B	2.0	-------gh
Barium	01/20/93	C	B4	3.100	J	2.0	-------gh
Calcium	01/20/93	C	B4	3830.000		2.0	-------**
Chromium	01/20/93	C	B4	5.000		2.0	-------gh
Copper	01/20/93	C	B4	3.400	B	2.0	-------gh
Iron	01/20/93	C	B4	559.000		2.0	-------**
Lead	01/20/93	C	B4	10.700	J	2.0	-------GH
Magnesium	01/20/93	C	B4	80.400	B	2.0	-------**
Manganese	01/20/93	C	B4	5.700		2.0	-------gh
Sodium	01/20/93	C	B4	126.000	B	2.0	-------**
Vanadium	01/20/93	C	B4	1.300	B	2.0	-------gh
Zinc	01/20/93	C	B4	14.300		2.0	-------gh

Pest/PCB (ppb)

4,4'-DDE	01/20/93	C	B4	30.000	J	2.0	-------gh
4,4'-DDT	01/20/93	C	B4	56.000	J	2.0	-------gh
alpha-Chlordane	01/20/93	C	B4	26.000	J	2.0	-------**
Dieldrin	01/20/93	C	B4	150.000	D	2.0	-------gH
gamma-Chlordane	01/20/93	C	B4	21.000	J	2.0	-------**

SAMPLE ID: U3B101SB04

Metal (ppm)

Aluminum	01/23/93	C	C4	224.000		2.0	-------g
Arsenic	01/23/93	C	C4	0.190	B	2.0	-------g
Barium	01/23/93	C	C4	2.100	J	2.0	-------gh
Calcium	01/23/93	C	C4	407.000	B	2.0	-------**
Chromium	01/23/93	C	C4	1.100	B	2.0	-------gh
Iron	01/23/93	C	C4	566.000		2.0	-------**
Lead	01/23/93	C	C4	0.850	J	2.0	-------GH

Magnesium	01/23/93	C	C4	70.300	B	2.0	-------**
Manganese	01/23/93	C	C4	4.900		2.0	-------gh
Sodium	01/23/93	C	C4	125.000	B	2.0	-------**
Vanadium	01/23/93	C	C4	1.100	B	2.0	-------gh
Zinc	01/23/93	C	C4	1.600	J	2.0	-------gh

SAMPLE ID: U3B101SB05

Metal (ppm)

Aluminum	01/19/93	C	D3	738.000		2.0	-------gh
Arsenic	01/19/93	C	D3	0.330	B	2.0	-------gh
Barium	01/19/93	C	D3	9.100	J	2.0	-------gh
Calcium	01/19/93	C	D3	2580.000		2.0	-------**
Chromium	01/19/93	C	D3	2.500		2.0	-------gh
Copper	01/19/93	C	D3	3.400	B	2.0	-------gh
Iron	01/19/93	C	D3	771.000		2.0	-------**
Lead	01/19/93	C	D3	4.600	J	2.0	-------GH
Magnesium	01/19/93	C	D3	105.000	B	2.0	-------**
Manganese	01/19/93	C	D3	15.000		2.0	-------gh
Sodium	01/19/93	C	D3	131.000	B	2.0	-------**
Vanadium	01/19/93	C	D3	1.400	B	2.0	-------gh
Zinc	01/19/93	C	D3	3.300	J	2.0	-------gh

SAMPLE ID: U3B101SB06

Metal (ppm)

Aluminum	01/19/93	C	D3	265.000		2.0	-------gh
Arsenic	01/19/93	C	D3	0.520	B	2.0	-------gh
Barium	01/19/93	C	D3	3.800	J	2.0	-------gh
Calcium	01/19/93	C	D3	11700.000		2.0	-------**
Chromium	01/19/93	C	D3	1.500	B	2.0	-------gh
Copper	01/19/93	C	D3	5.600	B	2.0	-------gh
Iron	01/19/93	C	D3	396.000		2.0	-------**
Lead	01/19/93	C	D3	6.600	J	2.0	-------GH
Magnesium	01/19/93	C	D3	148.000	B	2.0	-------**
Manganese	01/19/93	C	D3	7.400		2.0	-------gh
Sodium	01/19/93	C	D3	191.000	B	2.0	-------**
Vanadium	01/19/93	C	D3	0.910	B	2.0	-------gh
Zinc	01/19/93	C	D3	1.700	J	2.0	-------gh

Pest/PCB (ppb)

4,4'-DDE	01/19/93	C	D3	2.500	J	2.0	-------gh
4,4'-DDT	01/19/93	C	D3	4.000	J	2.0	-------gh

SAMPLE ID: U3B101SB07

Metal (ppm)

Aluminum	01/21/93	C	B4	675.000		2.0	-------gh
Arsenic	01/21/93	C	B4	0.490	B	2.0	-------gh
Barium	01/21/93	C	B4	6.000	J	2.0	-------gh
Calcium	01/21/93	C	B4	50800.000		2.0	-------**
Chromium	01/21/93	C	B4	2.000	B	2.0	-------gh
Copper	01/21/93	C	B4	2.100	B	2.0	-------gh
Iron	01/21/93	C	B4	620.000		2.0	-------**
Lead	01/21/93	C	B4	1.900	J	2.0	-------GH
Magnesium	01/21/93	C	B4	649.000	B	2.0	-------**
Manganese	01/21/93	C	B4	12.900		2.0	-------gh
Sodium	01/21/93	C	B4	140.000	B	2.0	-------**
Vanadium	01/21/93	C	B4	3.100	B	2.0	-------gh
Zinc	01/21/93	C	B4	10.300		2.0	-------gh

SAMPLE ID: U3B101SB08

Metal (ppm)

Aluminum	01/21/93	C	B4	305.000		2.0	-------gh
Arsenic	01/21/93	C	B4	0.230	B	2.0	-------g
Barium	01/21/93	C	B4	2.900	J	2.0	-------gh
Calcium	01/21/93	C	B4	16900.000		2.0	-------**
Chromium	01/21/93	C	B4	1.300	B	2.0	-------gh
Iron	01/21/93	C	B4	459.000		2.0	-------**
Lead	01/21/93	C	B4	1.400	J	2.0	-------GH
Magnesium	01/21/93	C	B4	188.000	B	2.0	-------**
Manganese	01/21/93	C	B4	5.400		2.0	-------gh
Sodium	01/21/93	C	B4	99.900	B	2.0	-------**
Vanadium	01/21/93	C	B4	1.500	B	2.0	-------gh
Zinc	01/21/93	C	B4	2.600	J	2.0	-------gh

SAMPLE ID: U3B101SB09

Metal (ppm)

Aluminum	01/21/93	C	B4	471.000		2.0	-------gh
Arsenic	01/21/93	C	B4	0.290	B	2.0	-------gh
Barium	01/21/93	C	B4	2.800	J	2.0	-------gh
Calcium	01/21/93	C	B4	730.000	B	2.0	-------**
Chromium	01/21/93	C	B4	2.400		2.0	-------gh
Iron	01/21/93	C	B4	565.000		2.0	-------**
Lead	01/21/93	C	B4	0.670	J	2.0	-------GH
Magnesium	01/21/93	C	B4	109.000	B	2.0	-------**
Manganese	01/21/93	C	B4	6.900		2.0	-------gh
Sodium	01/21/93	C	B4	122.000	B	2.0	-------**
Vanadium	01/21/93	C	B4	1.200	B	2.0	-------g
Zinc	01/21/93	C	B4	1.400	J	2.0	-------gh

SAMPLE ID: U3B101SB10

Metal (ppm)

Aluminum	01/21/93	C	B4	368.000		2.0	-------gh
Arsenic	01/21/93	C	B4	0.630	B	2.0	-------gh
Barium	01/21/93	C	B4	3.600	J	2.0	-------gh
Calcium	01/21/93	C	B4	762.000	B	2.0	-------**
Iron	01/21/93	C	B4	1090.000		2.0	-------**
Lead	01/21/93	C	B4	0.920	J	2.0	-------GH
Magnesium	01/21/93	C	B4	80.600	B	2.0	-------**
Manganese	01/21/93	C	B4	6.200		2.0	-------gh
Sodium	01/21/93	C	B4	136.000	B	2.0	-------**
Vanadium	01/21/93	C	B4	2.200	B	2.0	-------gh
Zinc	01/21/93	C	B4	2.100	J	2.0	-------gh

SAMPLE ID: U3B101SB11

Metal (ppm)

Aluminum	01/20/93	C	B4	3240.000		2.0	-------gh
Arsenic	01/20/93	C	B4	8.800		2.0	-------gH
Barium	01/20/93	C	B4	10.100	J	2.0	-------gh
Calcium	01/20/93	C	B4	4000.000		2.0	-------*
Chromium	01/20/93	C	B4	6.500		2.0	-------g
Copper	01/20/93	C	B4	1.800	B	2.0	-------gh
Iron	01/20/93	C	B4	3530.000		2.0	-------**
Lead	01/20/93	C	B4	2.700	J	2.0	-------GH
Magnesium	01/20/93	C	B4	469.000	B	2.0	-------**
Manganese	01/20/93	C	B4	16.600		2.0	-------gh

Potassium	01/20/93	C	B4	275.000	B	2.0	-------**
Sodium	01/20/93	C	B4	117.000	B	2.0	-------**
Vanadium	01/20/93	C	B4	6.500	B	2.0	-------gh
Zinc	01/20/93	C	B4	4.500	J	2.0	-------gh

AMPLE ID: U3B101SB12

Metal (ppm)							
Aluminum	01/20/93	C	B4	696.000		2.0	-------gh
Arsenic	01/20/93	C	B4	0.660	B	2.0	-------gh
Barium	01/20/93	C	B4	4.200	J	2.0	-------gh
Calcium	01/20/93	C	B4	37300.000		2.0	-------**
Chromium	01/20/93	C	B4	2.800		2.0	-------gh
Copper	01/20/93	C	B4	2.500	B	2.0	-------gh
Iron	01/20/93	C	B4	1200.000		2.0	-------**
Lead	01/20/93	C	B4	6.700	J	2.0	-------GH
Magnesium	01/20/93	C	B4	363.000	B	2.0	-------**
Manganese	01/20/93	C	B4	10.900		2.0	-------gh
Sodium	01/20/93	C	B4	167.000	B	2.0	-------**
Vanadium	01/20/93	C	B4	3.200	B	2.0	-------gh
Zinc	01/20/93	C	B4	7.300	J	2.0	-------gh
Pest/PCB (ppb)							
4,4'-DDE	01/20/93	C	B4	2.000	J	2.0	-------gh
4,4'-DDT	01/20/93	C	B4	4.000	J	2.0	-------gh
Dieldrin	01/20/93	C	B4	12.000	J	2.0	-------gh
SVOA (ppb)							
bis(2-Ethylhexyl)Phthalate	01/20/93	C	B4	57.000	J	2.0	-------gh
VOA (ppb)							
Chloroform	01/20/93	C	B4	2.000	J	2.0	-------gh

SAMPLE ID: U3B101SB12B

Metal (ppm)							
Aluminum	01/20/93	C	B4	630.000		5.5	-------gh
Arsenic	01/20/93	C	B4	0.660	B	5.5	-------gh
Barium	01/20/93	C	B4	4.800	J	5.5	-------gh
Calcium	01/20/93	C	B4	10900.000		5.5	-------**
Chromium	01/20/93	C	B4	5.000		5.5	-------gh
Copper	01/20/93	C	B4	6.700		5.5	-------gh
Iron	01/20/93	C	B4	1450.000		5.5	-------**
Lead	01/20/93	C	B4	15.800	J	5.5	-------GH
Magnesium	01/20/93	C	B4	188.000	B	5.5	-------**
Manganese	01/20/93	C	B4	11.900		5.5	-------gh
Mercury	01/20/93	C	B4	0.110	J	5.5	-------gh
Sodium	01/20/93	C	B4	201.000	B	5.5	-------**
Vanadium	01/20/93	C	B4	2.400	B	5.5	-------gh
Zinc	01/20/93	C	B4	15.700		5.5	-------gh

SAMPLE ID: U3B101SB13

Metal (ppm)							
Aluminum	01/24/93	C	C4	728.000		2.0	-------gh
Antimony	01/24/93	C	C4	2.800	J	2.0	-------**
Arsenic	01/24/93	C	C4	0.160		2.0	-------gh
Barium	01/24/93	C	C4	7.600	J	2.0	-------gh
Calcium	01/24/93	C	C4	180000.000	J	2.0	-------**
Chromium	01/24/93	C	C4	4.300	J	2.0	-------gh
Copper	01/24/93	C	C4	4.200	J	2.0	-------gh

Iron	01/24/93	C	C4	575.000		2.0	-------**
Lead	01/24/93	C	C4	3.500		2.0	-------GH
Magnesium	01/24/93	C	C4	1030.000	B	2.0	-------**
Manganese	01/24/93	C	C4	17.900	J	2.0	-------gh
Potassium	01/24/93	C	C4	106.000	B	2.0	-------**
Sodium	01/24/93	C	C4	232.000	B	2.0	-------
Vanadium	01/24/93	C	C4	4.300	J	2.0	-------g
Zinc	01/24/93	C	C4	6.200	J	2.0	-------gh
Pest/PCB (ppb)							
Dieldrin	01/24/93	C	C4	1.200	JP	2.0	-------gh

SAMPLE ID: U3P159SB01

Metal (ppm)							
Aluminum	01/26/93	C	A6	687.000		3.0	-------gh
Arsenic	01/26/93	C	A6	1.100	B	3.0	-------gh
Barium	01/26/93	C	A6	4.000	J	3.0	-------gh
Calcium	01/26/93	C	A6	604.000	J	3.0	-------**
Chromium	01/26/93	C	A6	2.200	J	3.0	-------gh
Copper	01/26/93	C	A6	2.200	J	3.0	-------gh
Iron	01/26/93	C	A6	1760.000		3.0	-------**
Lead	01/26/93	C	A6	1.600		3.0	-------GH
Magnesium	01/26/93	C	A6	138.000	B	3.0	-------**
Manganese	01/26/93	C	A6	5.300	J	3.0	-------gh
Potassium	01/26/93	C	A6	147.000	B	3.0	-------**
Sodium	01/26/93	C	A6	167.000	B	3.0	-------**
Vanadium	01/26/93	C	A6	2.900	J	3.0	-------gh
Zinc	01/26/93	C	A6	5.600	J	3.0	-------gh

SAMPLE ID: U3P159SB02

Metal (ppm)							
Aluminum	01/25/93	C	A6	106.000		3.0	-------gh
Barium	01/25/93	C	A6	2.200	J	3.0	-------gh
Calcium	01/25/93	C	A6	7590.000	J	3.0	-------**
Chromium	01/25/93	C	A6	2.400	J	3.0	-------gh
Copper	01/25/93	C	A6	1.500	J	3.0	-------gh
Iron	01/25/93	C	A6	191.000		3.0	-------**
Lead	01/25/93	C	A6	0.460	B	3.0	-------GH
Magnesium	01/25/93	C	A6	70.700	B	3.0	-------**
Manganese	01/25/93	C	A6	2.200	J	3.0	-------gh
Sodium	01/25/93	C	A6	139.000	B	3.0	-------**
Zinc	01/25/93	C	A6	1.600	J	3.0	-------gh

SAMPLE ID: U3P159SB03

Metal (ppm)							
Aluminum	01/26/93	C	B6	222.000		3.0	-------gh
Arsenic	01/26/93	C	B6	0.260	B	3.0	-------gh
Barium	01/26/93	C	B6	3.000	J	3.0	-------gh
Calcium	01/26/93	C	B6	219.000	J	3.0	-------**
Chromium	01/26/93	C	B6	1.700	J	3.0	-------gh
Copper	01/26/93	C	B6	1.700	J	3.0	-------gh
Iron	01/26/93	C	B6	620.000		3.0	-------
Lead	01/26/93	C	B6	0.820		3.0	-------C
Magnesium	01/26/93	C	B6	34.100	B	3.0	-------**
Manganese	01/26/93	C	B6	3.100	J	3.0	-------gh
Potassium	01/26/93	C	B6	52.300	B	3.0	-------**
Sodium	01/26/93	C	B6	163.000	B	3.0	-------**
Vanadium	01/26/93	C	B6	1.300	J	3.0	-------gh

Zinc	01/26/93	C	B6	3.000	J	3.0	-------gh
SVOA (ppb)							
Diethylphthalate	01/26/93	C	B6	110.000	J	3.0	-------gh

SAMPLE ID: U3P159SB04

Anion (ppm)							
Cyanide	01/25/93	C	C5	3.400		3.0	-------**
Metal (ppm)							
Aluminum	01/25/93	C	C5	75.500		3.0	-------gh
Barium	01/25/93	C	C5	2.200	J	3.0	-------gh
Calcium	01/25/93	C	C5	256.000	J	3.0	-------**
Chromium	01/25/93	C	C5	1.900	J	3.0	-------gh
Copper	01/25/93	C	C5	2.700	J	3.0	-------gh
Iron	01/25/93	C	C5	115.000		3.0	-------**
Lead	01/25/93	C	C5	0.930		3.0	-------GH
Magnesium	01/25/93	C	C5	30.000	B	3.0	-------**
Manganese	01/25/93	C	C5	2.000	J	3.0	-------gh
Sodium	01/25/93	C	C5	161.000	B	3.0	-------**
Vanadium	01/25/93	C	C5	0.540	J	3.0	-------gh
Zinc	01/25/93	C	C5	2.700	J	3.0	-------gh
Pest/PCB (ppb)							
4,4'-DDD	01/25/93	C	C5	1.600	JP	3.0	-------gh
SVOA (ppb)							
2-Methylnaphthalene	01/25/93	C	C5	210.000	J	3.0	-------**
Fluoranthene	01/25/93	C	C5	59.000	J	3.0	-------gh
Naphthalene	01/25/93	C	C5	380.000		3.0	-------gh
Pyrene	01/25/93	C	C5	60.000	J	3.0	-------gh
VOA (ppb)							
Acetone	01/25/93	C	C5	38.000		3.0	-------gh

SAMPLE ID: U3P159SB05

Metal (ppm)							
Aluminum	01/23/93	C	B4	320.000		3.0	-------gh
Arsenic	01/23/93	C	B4	0.230	B	3.0	-------gh
Barium	01/23/93	C	B4	2.200	J	3.0	-------gh
Calcium	01/23/93	C	B4	239.000	B	3.0	-------**
Chromium	01/23/93	C	B4	1.800	B	3.0	-------gh
Iron	01/23/93	C	B4	388.000		3.0	-------**
Lead	01/23/93	C	B4	0.720	J	3.0	-------GH
Magnesium	01/23/93	C	B4	56.800	B	3.0	-------**
Manganese	01/23/93	C	B4	6.900		3.0	-------gh
Sodium	01/23/93	C	B4	115.000	B	3.0	-------**
Vanadium	01/23/93	C	B4	0.480	B	3.0	-------gh
Zinc	01/23/93	C	B4	1.700	J	3.0	-------gh

SAMPLE ID: U3P159SB06

Metal (ppm)							
Aluminum	01/23/93	C	C4	102.000		3.0	-------gh
Arsenic	01/23/93	C	C4	0.200	B	3.0	-------gh
Barium	01/23/93	C	C4	1.600	J	3.0	-------gh
Calcium	01/23/93	C	C4	338.000	B	3.0	-------**
Iron	01/23/93	C	C4	270.000		3.0	-------**
Lead	01/23/93	C	C4	0.790	J	3.0	-------GH

Magnesium	01/23/93	C	C4	27.000	B	3.0	-------**
Manganese	01/23/93	C	C4	2.900	B	3.0	-------gh
Sodium	01/23/93	C	C4	113.000	B	3.0	-------**
Zinc	01/23/93	C	C4	0.890	J	3.0	-------gh
VOA (ppb)							
2-Butanone	01/23/93	C	C4	3.000	J	3.0	-------gh

SAMPLE ID: U3P159SB07

Metal (ppm)							
Aluminum	01/22/93	C	C4	182.000		3.0	-------gh
Arsenic	01/22/93	C	C4	0.320	B	3.0	-------gh
Barium	01/22/93	C	C4	3.100	J	3.0	-------gh
Calcium	01/22/93	C	C4	2260.000		3.0	-------**
Chromium	01/22/93	C	C4	1.000	B	3.0	-------gh
Iron	01/22/93	C	C4	771.000		3.0	-------**
Lead	01/22/93	C	C4	1.200	J	3.0	-------GH
Magnesium	01/22/93	C	C4	61.800	B	3.0	-------**
Manganese	01/22/93	C	C4	5.200		3.0	-------gh
Sodium	01/22/93	C	C4	156.000	B	3.0	-------**
Vanadium	01/22/93	C	C4	0.790	B	3.0	-------gh
Zinc	01/22/93	C	C4	1.000	J	3.0	-------gh

SAMPLE ID: U3P159SB08

Metal (ppm)							
Aluminum	01/25/93	C	A6	116.000		3.0	-------gh
Arsenic	01/25/93	C	A6	0.490	B	3.0	-------g
Barium	01/25/93	C	A6	2.100	J	3.0	-------g
Calcium	01/25/93	C	A6	403.000	J	3.0	-------**
Copper	01/25/93	C	A6	2.500	J	3.0	-------gh
Iron	01/25/93	C	A6	391.000		3.0	-------**
Lead	01/25/93	C	A6	0.770		3.0	-------GH
Magnesium	01/25/93	C	A6	39.400	B	3.0	-------**
Manganese	01/25/93	C	A6	3.400	J	3.0	-------gh
Sodium	01/25/93	C	A6	171.000	B	3.0	-------**
Vanadium	01/25/93	C	A6	0.670	J	3.0	-------gh
Zinc	01/25/93	C	A6	1.800	J	3.0	-------gh

SAMPLE ID: U3P159SB09

Metal (ppm)							
Aluminum	01/26/93	C	A6	1320.000		3.0	-------gh
Arsenic	01/26/93	C	A6	1.300	B	3.0	-------gh
Barium	01/26/93	C	A6	7.700	J	3.0	-------gh
Calcium	01/26/93	C	A6	499.000	J	3.0	-------**
Chromium	01/26/93	C	A6	3.100	J	3.0	-------gh
Copper	01/26/93	C	A6	2.600	J	3.0	-------gh
Iron	01/26/93	C	A6	2250.000		3.0	-------**
Lead	01/26/93	C	A6	2.700		3.0	-------GH
Magnesium	01/26/93	C	A6	156.000	B	3.0	-------**
Manganese	01/26/93	C	A6	6.100	J	3.0	-------gh
Potassium	01/26/93	C	A6	177.000	B	3.0	-------**
Selenium	01/26/93	C	A6	0.210	B	3.0	-------g
Sodium	01/26/93	C	A6	170.000	B	3.0	-------**
Vanadium	01/26/93	C	A6	3.100	J	3.0	-------gh
Zinc	01/26/93	C	A6	4.900	J	3.0	-------gh
SVOA (ppb)							
Diethylphthalate	01/26/93	C	A6	140.000	J	3.0	-------gh

SAMPLE ID: U3P159SB10

Metal (ppm)							
Aluminum	01/24/93	C	B4	151.000		3.0	-------gh
Arsenic	01/24/93	C	B4	0.170	B	3.0	-------gh
Barium	01/24/93	C	B4	4.200	J	3.0	-------gh
Calcium	01/24/93	C	B4	3370.000	J	3.0	-------**
Copper	01/24/93	C	B4	2.800	J	3.0	-------gh
Iron	01/24/93	C	B4	309.000		3.0	-------**
Lead	01/24/93	C	B4	0.880		3.0	-------GH
Magnesium	01/24/93	C	B4	86.200	B	3.0	-------**
Manganese	01/24/93	C	B4	5.600	J	3.0	-------gh
Sodium	01/24/93	C	B4	142.000	B	3.0	-------**
Vanadium	01/24/93	C	B4	0.890	J	3.0	-------gh
Zinc	01/24/93	C	B4	2.400	J	3.0	-------gh
Pest/PCB (ppb)							
4,4'-DDD	01/24/93	C	B4	2.000	J	3.0	-------gh
4,4'-DDE	01/24/93	C	B4	0.690	J	3.0	-------gh
VOA (ppb)							
Acetone	01/24/93	C	B4	55.000		3.0	-------gh

SAMPLE ID: U3P159SB11

Metal (ppm)							
Aluminum	01/24/93	C	C4	251.000		3.0	-------gh
Barium	01/24/93	C	C4	3.100	J	3.0	-------gh
Calcium	01/24/93	C	C4	685.000	J	3.0	-------**
Chromium	01/24/93	C	C4	1.800	J	3.0	-------gh
Copper	01/24/93	C	C4	2.500	J	3.0	-------gh
Iron	01/24/93	C	C4	385.000		3.0	-------**
Lead	01/24/93	C	C4	2.000		3.0	-------GH
Magnesium	01/24/93	C	C4	75.000	B	3.0	-------**
Manganese	01/24/93	C	C4	3.100	J	3.0	-------gh
Potassium	01/24/93	C	C4	73.900	B	3.0	-------**
Sodium	01/24/93	C	C4	159.000	B	3.0	-------**
Vanadium	01/24/93	C	C4	1.100	J	3.0	-------gh
Zinc	01/24/93	C	C4	2.900	J	3.0	-------gh
VOA (ppb)							
2-Butanone	01/24/93	C	C4	11.000		3.0	-------gh
Acetone	01/24/93	C	C4	85.000		3.0	-------gh
Ethylbenzene	01/24/93	C	C4	10.000	J	3.0	-------gh
Tetrachloroethene	01/24/93	C	C4	25.000		3.0	-------gh
Toluene	01/24/93	C	C4	6.000	J	3.0	-------gh
Xylene (total)	01/24/93	C	C4	170.000		3.0	-------gh

SAMPLE ID: U3P159SB12

Metal (ppm)							
Aluminum	01/24/93	C	C5	614.000		3.0	-------gh
Antimony	01/24/93	C	C5	3.000	J	3.0	-------**
Arsenic	01/24/93	C	C5	0.890	B	3.0	-------gh
Barium	01/24/93	C	C5	5.300	J	3.0	-------gh
Calcium	01/24/93	C	C5	42000.000	J	3.0	-------**
Chromium	01/24/93	C	C5	3.100	J	3.0	-------gh
Copper	01/24/93	C	C5	2.800	J	3.0	-------gh
Iron	01/24/93	C	C5	724.000		3.0	-------**
Lead	01/24/93	C	C5	6.500		3.0	-------GH

Magnesium	01/24/93	C	C5	345.000	B	3.0	-------**
Manganese	01/24/93	C	C5	12.600	J	3.0	-------gh
Potassium	01/24/93	C	C5	120.000	B	3.0	-------**
Sodium	01/24/93	C	C5	165.000	B	3.0	-------**
Vanadium	01/24/93	C	C5	2.800	J	3.0	-------c
Zinc	01/24/93	C	C5	10.400		3.0	-------
Pest/PCB (ppb)							
4,4'-DDD	01/24/93	C	C5	25.000		3.0	-------gh
4,4'-DDE	01/24/93	C	C5	14.000	JP	3.0	-------gh
SVOA (ppb)							
2-Methylnaphthalene	01/24/93	C	C5	130.000	J	3.0	-------**
Acenaphthene	01/24/93	C	C5	93.000	J	3.0	-------**
Anthracene	01/24/93	C	C5	39.000	J	3.0	-------**
Benzo(a)Anthracene	01/24/93	C	C5	92.000	J	3.0	-------gh
Benzo(a)Pyrene	01/24/93	C	C5	390.000		3.0	-------gH
Benzo(b)Fluoranthene	01/24/93	C	C5	540.000		3.0	-------gh
bis(2-Ethylhexyl)Phthalate	01/24/93	C	C5	80.000	J	3.0	-------gh
Carbazole	01/24/93	C	C5	81.000	J	3.0	-------gh
Chrysene	01/24/93	C	C5	330.000	J	3.0	-------**
Dibenzofuran	01/24/93	C	C5	83.000	J	3.0	-------**
Fluoranthene	01/24/93	C	C5	400.000		3.0	-------gh
Fluorene	01/24/93	C	C5	180.000	J	3.0	-------gh
Naphthalene	01/24/93	C	C5	520.000		3.0	-------gh
Phenanthrene	01/24/93	C	C5	800.000		3.0	-------gh
Pyrene	01/24/93	C	C5	450.000		3.0	-------gh
VOA (ppb)							
2-Butanone	01/24/93	C	C5	25.000	J	3.0	-------gh
Ethylbenzene	01/24/93	C	C5	40.000	J	3.0	-------gh
Tetrachloroethene	01/24/93	C	C5	110.000	J	3.0	-------
Toluene	01/24/93	C	C5	27.000	J	3.0	-------gh
Xylene (total)	01/24/93	C	C5	400.000	DJ	3.0	-------gh

SAMPLE ID: U3PZ00201

Metal (ppm)							
Arsenic	08/03/93	A	G7	18.000		1.0	-------gH
Chromium	08/03/93	A	G7	2.000		1.0	-------gh
Lead	08/03/93	A	G7	12.000		1.0	-------GH
TPH (ppm)							
Total Petroleum Hydrocarbons	08/03/93	A	G7	3126.000		1.0	-------**
VOA (ppb)							
Benzene	08/03/93	A	G7	1200.000	E	1.0	-------gh
Ethylbenzene	08/03/93	A	G7	4300.000	E	1.0	-------gh
m/p-Xylene	08/03/93	A	G7	2800.000	E	1.0	-------gh
o-Xylene	08/03/93	A	G7	1400.000	E	1.0	-------gh
Unknown HC as o-Xylene	08/03/93	A	G7	79000.000		1.0	-------**

SAMPLE ID: U3PZ00202

Metal (ppm)							
Arsenic	08/03/93	A	G7	22.000		3.0	-------(
Chromium	08/03/93	A	G7	2.000		3.0	-------gh
Lead	08/03/93	A	G7	14.000		3.0	-------GH
TPH (ppm)							
Total Petroleum Hydrocarbons	08/03/93	A	G7	99.000		3.0	-------**

VOA (ppb)							
Ethylbenzene	08/03/93	A	G7	18.000		3.0	-------gh

SAMPLE ID: U3PZ00203

Metal (ppm)							
Chromium	08/03/93	A	G7	6.000		5.0	-------gh
Lead	08/03/93	A	G7	6.000		5.0	-------GH
TPH (ppm)							
Total Petroleum Hydrocarbons	08/03/93	A	G7	102.000		5.0	-------**
VOA (ppb)							
Benzene	08/03/93	A	G7	290.000	E	5.0	-------gh
Ethylbenzene	08/03/93	A	G7	820.000	E	5.0	-------gh
m/p-Xylene	08/03/93	A	G7	510.000	E	5.0	-------gh
o-Xylene	08/03/93	A	G7	260.000	E	5.0	-------gh
Toluene	08/03/93	A	G7	26.000		5.0	-------gh
Unknown HC as o-Xylene	08/03/93	A	G7	14000.000		5.0	-------**

SAMPLE ID: U3PZ00301

Metal (ppm)							
Arsenic	08/10/93	A	C7	26.000		1.0	-------gH
Lead	08/10/93	A	C7	2.000		1.0	-------GH

SAMPLE ID: U3PZ00302

Metal (ppm)							
Arsenic	08/10/93	A	C7	32.000		3.0	-------GH
Lead	08/10/93	A	C7	2.000		3.0	-------GH
TPH (ppm)							
Total Petroleum Hydrocarbons	08/10/93	A	C7	266.000		3.0	-------**

SAMPLE ID: U3PZ00303

Metal (ppm)							
Arsenic	08/10/93	A	C7	36.000		5.0	-------GH
Chromium	08/10/93	A	C7	2.000		5.0	-------gh
Lead	08/10/93	A	C7	2.000		5.0	-------GH
TPH (ppm)							
Total Petroleum Hydrocarbons	08/10/93	A	C7	220.000		5.0	-------**
VOA (ppb)							
Ethylbenzene	08/10/93	A	C7	1200.000		5.0	-------gh
m/p-Xylene	08/10/93	A	C7	380.000	E	5.0	-------gh
o-Xylene	08/10/93	A	C7	260.000	E	5.0	-------gh
Unknown HC as o-Xylene	08/10/93	A	C7	32000.000		5.0	-------**

SAMPLE ID: U3PZ00501

Metal (ppm)							
Chromium	08/12/93	A	D5	4.000		1.0	-------gh
Lead	08/12/93	A	D5	2.000		1.0	-------GH
Nickel	08/12/93	A	D5	2.000		1.0	-------gh

SAMPLE ID: U3PZ00502

Metal (ppm)						
Chromium	08/12/93	A	D5	4.000	3.0	-------gh

SAMPLE ID: U3PZ00503

Metal (ppm)						
Chromium	08/12/93	A	D5	2.000	5.0	-------gh
TPH (ppm)						
Total Petroleum Hydrocarbons	08/12/93	A	D5	60.000	5.0	-------**

SAMPLE ID: U3PZ00701

Metal (ppm)						
Arsenic	08/02/93	A	G5	98.000	1.0	-------GH
Chromium	08/02/93	A	G5	12.000	1.0	-------gh
Lead	08/02/93	A	G5	12.000	1.0	-------GH
Nickel	08/02/93	A	G5	6.000	1.0	-------gh
TPH (ppm)						
Total Petroleum Hydrocarbons	08/02/93	A	G5	59.000	1.0	-------**

SAMPLE ID: U3PZ00702

Metal (ppm)						
Arsenic	08/02/93	A	G5	4.000	3.0	-------[illegible]
Chromium	08/02/93	A	G5	12.000	3.0	-------
Lead	08/02/93	A	G5	6.000	3.0	-------Gh
Nickel	08/02/93	A	G5	6.000	3.0	-------gh

SAMPLE ID: U3PZ00703

Anion (ppm)						
Cyanide	08/02/93	B	G5	0.260 B	5.0	-------**
Metal (ppm)						
Aluminum	08/02/93	B	G5	5650.000	5.0	-------gh
Arsenic	08/02/93	B	G5	2.100 B	5.0	-------gh
Barium	08/02/93	B	G5	24.900 B	5.0	-------gh
Beryllium	08/02/93	B	G5	0.270 B	5.0	-------gh
Calcium	08/02/93	B	G5	823.000 B	5.0	-------**
Chromium	08/02/93	A	G5	10.000	5.0	-------gh
Chromium	08/02/93	B	G5	8.400	5.0	-------gh
Copper	08/02/93	B	G5	1.600 B	5.0	-------gh
Iron	08/02/93	B	G5	1850.000	5.0	-------**
Lead	08/02/93	A	G5	8.000	5.0	-------GH
Lead	08/02/93	B	G5	8.100	5.0	-------GH
Magnesium	08/02/93	B	G5	459.000 B	5.0	-------**
Manganese	08/02/93	B	G5	2.200 B	5.0	-------gh
Nickel	08/02/93	A	G5	4.000	5.0	-------gh
Potassium	08/02/93	B	G5	223.000 B	5.0	-------**
Sodium	08/02/93	B	G5	37.200 B	5.0	-------
Vanadium	08/02/93	B	G5	13.500	5.0	-------gh
Zinc	08/02/93	B	G5	2.400 B	5.0	-------gh
SVOA (ppb)						
Di-n-Butylphthalate	08/02/93	B	G5	2000.000 B	5.0	-------gh

VOA (ppb)						
Acetone	08/02/93	B	G5	43.000	5.0	-------gh
Methylene Chloride	08/02/93	B	G5	14.000	5.0	-------gh

PLE ID: U3PZ00704

Metal (ppm)						
Chromium	08/02/93	A	G5	10.000	7.0	-------gh
Lead	08/02/93	A	G5	6.000	7.0	-------GH
Nickel	08/02/93	A	G5	4.000	7.0	-------gh

SAMPLE ID: U3PZ00705

Metal (ppm)						
Chromium	08/02/93	A	G5	12.000	9.0	-------gh
Lead	08/02/93	A	G5	4.000	9.0	-------GH
Nickel	08/02/93	A	G5	6.000	9.0	-------gh

SAMPLE ID: U3PZ00901

Metal (ppm)						
Arsenic	08/14/93	A	E7	110.000	1.0	-------GH
Lead	08/14/93	A	E7	38.000	1.0	-------GH

SAMPLE ID: U3PZ00902

Metal (ppm)						
Lead	08/14/93	A	E7	8.000	3.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/14/93	A	E7	118.000	3.0	-------**

SAMPLE ID: U3PZ00903

Metal (ppm)						
Arsenic	08/14/93	A	E7	24.000	5.0	-------gH
Lead	08/14/93	A	E7	22.000	5.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/14/93	A	E7	63.000	5.0	-------**

SAMPLE ID: U3PZ00904

Metal (ppm)						
Arsenic	08/14/93	A	E7	8.000	7.0	-------gH
Lead	08/14/93	A	E7	4.000	7.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/14/93	A	E7	59.000	7.0	-------**

MPLE ID: U3PZ01101

Metal (ppm)						
Arsenic	08/18/93	A	F6	8.000	1.0	-------gH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/18/93	A	F6	224.000	1.0	-------**

SAMPLE ID: U3PZ01102

Metal (ppm)						
Chromium	08/18/93	A	F6	8.000	3.0	-------
Lead	08/18/93	A	F6	4.000	3.0	-------Gh

SAMPLE ID: U3PZ01103

Metal (ppm)						
Chromium	08/18/93	A	F6	4.000	5.0	-------gh
Lead	08/18/93	A	F6	4.000	5.0	-------GH

SAMPLE ID: U3PZ01104

Metal (ppm)						
Chromium	08/18/93	A	F6	10.000	7.0	-------gh

SAMPLE ID: U3PZ01301

Metal (ppm)						
Aluminum	08/24/93	B	C6	7010.000	1.0	-------gh
Arsenic	08/24/93	A	C6	2.000	1.0	-------gh
Calcium	08/24/93	B	C6	1890.000	1.0	-------**
Chromium	08/24/93	B	C6	13.300	1.0	-------gh
Iron	08/24/93	B	C6	6270.000	1.0	-------**
Lead	08/24/93	A	C6	10.000	1.0	-------GH
Manganese	08/24/93	B	C6	16.100	1.0	-------
Vanadium	08/24/93	B	C6	14.800	1.0	-------g
Zinc	08/24/93	B	C6	8.700	1.0	-------gh

SAMPLE ID: U3PZ01302

Metal (ppm)						
Lead	08/24/93	A	C6	2.000	3.0	-------GH
VOA (ppb)						
m/p-Xylene	08/24/93	A	C6	21.000	3.0	-------gh
o-Xylene	08/24/93	A	C6	21.000	3.0	-------gh
Toluene	08/24/93	A	C6	68.000	3.0	-------gh

SAMPLE ID: U3PZ01303

Metal (ppm)						
Arsenic	08/24/93	A	C6	18.000	5.0	-------gH
Lead	08/24/93	A	C6	6.000	5.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/24/93	A	C6	178.000	5.0	-------**
VOA (ppb)						
Ethylbenzene	08/24/93	A	C6	1100.000 E	5.0	-------(
m/p-Xylene	08/24/93	A	C6	2200.000 E	5.0	-------g
o-Xylene	08/24/93	A	C6	940.000 E	5.0	-------gh
Toluene	08/24/93	A	C6	12000.000 E	5.0	-------gh
Unknown HC as o-Xylene	08/24/93	A	C6	140000.000	5.0	-------**

SAMPLE ID: U3PZ01304

Metal (ppm)							
Arsenic	08/24/93	A	C6	16.000		7.0	-------gH
Lead	08/24/93	A	C6	6.000		7.0	-------GH
TPH (ppm)							
Total Petroleum Hydrocarbons	08/24/93	A	C6	3856.000		7.0	-------**
VOA (ppb)							
Benzene	08/24/93	A	C6	130.000		7.0	-------gh
Ethylbenzene	08/24/93	A	C6	890.000	E	7.0	-------gh
m/p-Xylene	08/24/93	A	C6	2300.000	E	7.0	-------gh
o-Xylene	08/24/93	A	C6	1200.000	E	7.0	-------gh
Toluene	08/24/93	A	C6	15000.000	E	7.0	-------gh
Unknown HC as o-Xylene	08/24/93	A	C6	130000.000		7.0	-------**

SAMPLE ID: U3PZ01501

Metal (ppm)							
Lead	08/24/93	A	I6	2.000		1.0	-------GH

SAMPLE ID: U3PZ01502

Metal (ppm)							
Arsenic	08/24/93	A	I6	24.000		3.0	-------gH
Chromium	08/24/93	A	I6	20.000		3.0	-------gh
Lead	08/24/93	A	I6	2.000		3.0	-------GH
Nickel	08/24/93	A	I6	2.000		3.0	-------gh

SAMPLE ID: U3PZ01503

Metal (ppm)							
Arsenic	08/24/93	A	I6	32.000		5.0	-------GH
Chromium	08/24/93	A	I6	4.000		5.0	-------gh
Lead	08/24/93	A	I6	4.000		5.0	-------GH

SAMPLE ID: U3PZ01601

Metal (ppm)							
Arsenic	08/25/93	A	F4	4.000		1.0	-------gH
Chromium	08/25/93	A	F4	2.000		1.0	-------gh
Lead	08/25/93	A	F4	6.000		1.0	-------GH

SAMPLE ID: U3PZ01602

Metal (ppm)							
Arsenic	08/25/93	A	F4	4.000		3.0	-------gH
Lead	08/25/93	A	F4	4.000		3.0	-------GH

SAMPLE ID: U3PZ01603

Metal (ppm)							
Chromium	08/25/93	A	F4	2.000		5.0	-------gh

SAMPLE ID: U3PZ02001

Metal (ppm)						
Arsenic	08/26/93	A	E3	22.000	1.0	-------gH
Lead	08/26/93	A	E3	2.000	1.0	-------GH

SAMPLE ID: U3PZ02002

Metal (ppm)						
Iron	08/26/93	B	E3	543.000	3.0	-------**
Lead	08/26/93	A	E3	2.000	3.0	-------GH
Lead	08/26/93	B	E3	1.160	3.0	-------GH
Selenium	08/26/93	B	E3	1.800	3.0	-------gh
SVOA (ppb)						
Di-n-Butylphthalate	08/26/93	B	E3	170.000 BJ	3.0	-------gh
VOA (ppb)						
Acetone	08/26/93	B	E3	44.000	3.0	-------gh

SAMPLE ID: U3PZ02003

Metal (ppm)						
Lead	08/26/93	A	E3	4.000	5.0	-------GH

SAMPLE ID: U3PZ02201

Metal (ppm)						
Arsenic	08/27/93	A	C3	4.000	1.0	-------gH
Lead	08/27/93	A	C3	10.000	1.0	-------GH

SAMPLE ID: U3PZ02202

Metal (ppm)						
Lead	08/27/93	A	C3	4.000	3.0	-------GH

SAMPLE ID: U3PZ02301

Metal (ppm)						
Arsenic	08/27/93	A	A3	22.000	1.0	-------gH
Chromium	08/27/93	A	A3	28.000	1.0	-------gh
Lead	08/27/93	A	A3	16.000	1.0	-------GH

SAMPLE ID: U3PZ02302

Metal (ppm)						
Arsenic	08/27/93	A	A3	200.000	3.0	-------GH
Chromium	08/27/93	A	A3	6.000	3.0	-------gh
Lead	08/27/93	A	A3	8.000	3.0	-------GH

SAMPLE ID: U3PZ02501

Metal (ppm)						
Chromium	08/28/93	A	C2	2.000	1.0	-------g

SAMPLE ID: U3PZ02502

Metal (ppm)

Aluminum	08/28/93	B	C2	460.000	3.0	-------gh
Arsenic	08/28/93	B	C2	2.290	3.0	-------gh
Chromium	08/28/93	B	C2	2.290	3.0	-------gh
Iron	08/28/93	B	C2	22.900	3.0	-------**
Lead	08/28/93	A	C2	2.000	3.0	-------GH
Lead	08/28/93	B	C2	0.670	3.0	-------GH
Manganese	08/28/93	B	C2	3.430	3.0	-------gh
Vanadium	08/28/93	B	C2	11.400	3.0	-------gh
Zinc	08/28/93	B	C2	4.580	3.0	-------gh
SVOA (ppb)						
Benzo(a)Anthracene	08/28/93	B	C2	100.000 J	3.0	-------gh
Benzo(a)Pyrene	08/28/93	B	C2	97.000 J	3.0	-------gh
Benzo(b)Fluoranthene	08/28/93	B	C2	130.000 J	3.0	-------gh
Benzo(g,h,i)Perylene	08/28/93	B	C2	74.000 J	3.0	-------gh
Benzo(k)Fluoranthene	08/28/93	B	C2	120.000 J	3.0	-------gh
Chrysene	08/28/93	B	C2	110.000 J	3.0	-------**
Di-n-Butylphthalate	08/28/93	B	C2	270.000 BJ	3.0	-------gh
Fluoranthene	08/28/93	B	C2	80.000 J	3.0	-------gh
Indeno(1,2,3-cd)Pyrene	08/28/93	B	C2	67.000 J	3.0	-------gh
Pyrene	08/28/93	B	C2	78.000 J	3.0	-------gh

SAMPLE ID: U3PZ02701

Metal (ppm)						
Aluminum	08/30/93	B	A6	450.000	1.0	-------gh
Calcium	08/30/93	B	A6	1140.000	1.0	-------**
Chromium	08/30/93	B	A6	2.270	1.0	-------gh
Iron	08/30/93	B	A6	230.000	1.0	-------**
Lead	08/30/93	A	A6	4.000	1.0	-------GH
Manganese	08/30/93	B	A6	3.410	1.0	-------gh
Pest/PCB (ppb)						
4,4'-DDD	08/30/93	B	A6	8.000	1.0	-------gh
4,4'-DDE	08/30/93	B	A6	9.800	1.0	-------gh
SVOA (ppb)						
Di-n-Butylphthalate	08/30/93	B	A6	280.000 BJ	1.0	-------gh
TPH (ppm)						
Total Petroleum Hydrocarbons	08/30/93	A	A6	715.000	1.0	-------**
VOA (ppb)						
Acetone	08/30/93	B	A6	9.000 J	1.0	-------gh

SAMPLE ID: U3PZ02702

Metal (ppm)						
Chromium	08/30/93	A	A6	4.000	3.0	-------gh

SAMPLE ID: U3PZ02704

Metal (ppm)						
Chromium	08/30/93	A	A6	6.000	7.0	-------gh

SAMPLE ID: U3SB01

Metal (ppm)						
Aluminum	03/09/92	D	G5	5330.000	3.0	-------gh
Barium	03/09/92	D	G5	11.600 B	3.0	-------gh

Beryllium	03/09/92	D	G5	0.230	J	3.0	-------gh
Calcium	03/09/92	D	G5	615.000	B	3.0	-------**
Chromium	03/09/92	D	G5	8.600		3.0	-------gh
Cobalt	03/09/92	D	G5	4.500	J	3.0	-------**
Copper	03/09/92	D	G5	1.900	J	3.0	-------[illegible]
Iron	03/09/92	D	G5	2240.000		3.0	-------
Lead	03/09/92	D	G5	2.600		3.0	-------GH
Magnesium	03/09/92	D	G5	253.000	B	3.0	-------**
Manganese	03/09/92	D	G5	5.400		3.0	-------gh
Potassium	03/09/92	D	G5	292.000	B	3.0	-------**
Sodium	03/09/92	D	G5	174.000	B	3.0	-------**
Vanadium	03/09/92	D	G5	12.900		3.0	-------gh
Zinc	03/09/92	D	G5	4.000	J	3.0	-------gh
Pest/PCB (ppb)							
alpha-Chlordane	03/09/92	D	G5	7.000	J	3.0	-------**
gamma-Chlordane	03/09/92	D	G5	7.100		3.0	-------**
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G5	63.000	J	3.0	-------gh

SAMPLE ID: U3SB02

Metal (ppm)							
Aluminum	03/09/92	D	G5	3480.000		3.0	-------gh
Barium	03/09/92	D	G5	20.700	B	3.0	-------gh
Calcium	03/09/92	D	G5	3100.000		3.0	-------**
Chromium	03/09/92	D	G5	16.800		3.0	-------gh
Copper	03/09/92	D	G5	0.990	J	3.0	-------gh
Iron	03/09/92	D	G5	1810.000		3.0	-------[illegible]
Lead	03/09/92	D	G5	3.700		3.0	-------[illegible]
Magnesium	03/09/92	D	G5	177.000	B	3.0	-------**
Manganese	03/09/92	D	G5	3.700		3.0	-------gh
Potassium	03/09/92	D	G5	229.000	B	3.0	-------**
Sodium	03/09/92	D	G5	178.000	B	3.0	-------**
Vanadium	03/09/92	D	G5	11.400	B	3.0	-------gh
Zinc	03/09/92	D	G5	4.000	J	3.0	-------gh
Pest/PCB (ppb)							
alpha-Chlordane	03/09/92	D	G5	13.000		3.0	-------**
delta-BHC	03/09/92	D	G5	0.680	J	3.0	-------**
gamma-Chlordane	03/09/92	D	G5	12.000		3.0	-------**
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G5	100.000	J	3.0	-------gh
VOA (ppb)							
2-Butanone	03/09/92	D	G5	3.000	J	3.0	-------gh

SAMPLE ID: U3SB03

Metal (ppm)							
Aluminum	03/09/92	D	G4	6870.000		2.0	-------gh
Barium	03/09/92	D	G4	17.000	B	2.0	-------gh
Calcium	03/09/92	D	G4	168.000	B	2.0	-------**
Chromium	03/09/92	D	G4	8.100		2.0	-------[illegible]
Copper	03/09/92	D	G4	1.400	J	2.0	-------gh
Iron	03/09/92	D	G4	2630.000		2.0	-------**
Lead	03/09/92	D	G4	5.200		2.0	-------GH
Magnesium	03/09/92	D	G4	350.000	B	2.0	-------**
Manganese	03/09/92	D	G4	4.200		2.0	-------gh
Potassium	03/09/92	D	G4	355.000	B	2.0	-------**

Sodium	03/09/92	D	G4	174.000	B	2.0	-------**
Vanadium	03/09/92	D	G4	14.100		2.0	-------gh
Zinc	03/09/92	D	G4	5.060	J	2.0	-------gh
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G4	74.000	J	2.0	-------gh
VOA (ppb)							
Acetone	03/09/92	D	G4	13.000	J	2.0	-------gh
SAMPLE ID: U3SB04							
Metal (ppm)							
Aluminum	03/09/92	D	G4	5830.000		3.5	-------gh
Arsenic	03/09/92	D	G4	3.200		3.5	-------gH
Barium	03/09/92	D	G4	10.000	B	3.5	-------gh
Calcium	03/09/92	D	G4	3040.000		3.5	-------**
Chromium	03/09/92	D	G4	9.800		3.5	-------gh
Copper	03/09/92	D	G4	1.400	J	3.5	-------gh
Iron	03/09/92	D	G4	4400.000		3.5	-------**
Lead	03/09/92	D	G4	6.400		3.5	-------GH
Magnesium	03/09/92	D	G4	355.000	B	3.5	-------**
Manganese	03/09/92	D	G4	6.500		3.5	-------gh
Potassium	03/09/92	D	G4	314.000	B	3.5	-------**
Sodium	03/09/92	D	G4	175.000	B	3.5	-------**
Vanadium	03/09/92	D	G4	16.200		3.5	-------gh
Zinc	03/09/92	D	G4	10.300	J	3.5	-------gh
Pest/PCB (ppb)							
alpha-Chlordane	03/09/92	D	G4	15.000	J	3.5	-------**
Dieldrin	03/09/92	D	G4	0.290	J	3.5	-------gh
gamma-Chlordane	03/09/92	D	G4	20.000		3.5	-------**
Heptachlor	03/09/92	D	G4	0.580	J	3.5	-------gh
SAMPLE ID: U3SB05							
Metal (ppm)							
Aluminum	03/09/92	D	G4	1510.000		3.0	-------gh
Barium	03/09/92	D	G4	3.500	B	3.0	-------gh
Calcium	03/09/92	D	G4	127.000	B	3.0	-------**
Chromium	03/09/92	D	G4	3.500	J	3.0	-------gh
Iron	03/09/92	D	G4	396.000		3.0	-------**
Lead	03/09/92	D	G4	1.400	J	3.0	-------GH
Magnesium	03/09/92	D	G4	79.000	B	3.0	-------**
Manganese	03/09/92	D	G4	3.100	B	3.0	-------gh
Potassium	03/09/92	D	G4	91.000	J	3.0	-------**
Sodium	03/09/92	D	G4	133.000	B	3.0	-------**
Vanadium	03/09/92	D	G4	2.400	J	3.0	-------gh
Zinc	03/09/92	D	G4	1.300	J	3.0	-------gh
Pest/PCB (ppb)							
Endrin ketone	03/09/92	D	G4	2.900	J	3.0	-------**
Methoxychlor	03/09/92	D	G4	0.940	J	3.0	-------gh
MPLE ID: U3SB06							
Metal (ppm)							
Aluminum	03/09/92	D	G5	6410.000		3.0	-------gh
Arsenic	03/09/92	D	G5	0.410	B	3.0	-------gh
Barium	03/09/92	D	G5	13.100	B	3.0	-------gh
Calcium	03/09/92	D	G5	11800.000		3.0	-------**

Chromium	03/09/92	D	G5	11.100		3.0	-------gh
Cobalt	03/09/92	D	G5	3.200	J	3.0	-------**
Copper	03/09/92	D	G5	0.950	J	3.0	-------gh
Iron	03/09/92	D	G5	5320.000		3.0	-------**
Lead	03/09/92	D	G5	3.600		3.0	-------GH
Magnesium	03/09/92	D	G5	460.000	B	3.0	-------
Manganese	03/09/92	D	G5	6.200		3.0	-------gh
Potassium	03/09/92	D	G5	452.000	B	3.0	-------**
Sodium	03/09/92	D	G5	172.000	B	3.0	-------**
Vanadium	03/09/92	D	G5	22.800		3.0	-------gh
Zinc	03/09/92	D	G5	4.800	J	3.0	-------gh
Pest/PCB (ppb)							
Dieldrin	03/09/92	D	G5	1.500	J	3.0	-------gh
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G5	45.000	J	3.0	-------gh

SAMPLE ID: U3SB1

Metal (ppm)							
Chromium	01/01/89	D	I5	8.000		5.0	-------gh
Copper	01/01/89	D	I5	7.000		5.0	-------gh
Lead	01/01/89	D	I5	13.000		5.0	-------GH
Mercury	01/01/89	D	I5	0.350		5.0	-------gh
Zinc	01/01/89	D	I5	4.000		5.0	-------gh

SAMPLE ID: U3SB101SB05

VOA (ppb)							
1,1,1-Trichloroethane	01/19/93	C	D3	1.000	J	2.0	-------g..
1,1-Dichloroethane	01/19/93	C	D3	28.000		2.0	-------gh
1,2-Dichloroethene (total)	01/19/93	C	D3	4.000	J	2.0	-------gh
2-Butanone	01/19/93	C	D3	8.000	J	2.0	-------gh
Acetone	01/19/93	C	D3	160.000		2.0	-------gh
Ethylbenzene	01/19/93	C	D3	68.000		2.0	-------gh
Toluene	01/19/93	C	D3	2.000	J	2.0	-------gh
Trichloroethene	01/19/93	C	D3	16.000		2.0	-------gh
Xylene (total)	01/19/93	C	D3	170.000		2.0	-------gh

SAMPLE ID: U3SB101SB07

Pest/PCB (ppb)							
Aroclor-1254	01/21/93	C	B4	220.000	J	2.0	-------gh
SVOA (ppb)							
bis(2-Ethylhexyl)Phthalate	01/21/93	C	B4	78.000	J	2.0	-------gh

SAMPLE ID: U3SB101SB08

Pest/PCB (ppb)							
gamma-Chlordane	01/21/93	C	B4	1.100	JP	2.0	-------**

SAMPLE ID: U3SB101SB12

Pest/PCB (ppb)							
4,4'-DDE	01/20/93	C	B4	1.700	J	5.5	-------gh
4,4'-DDT	01/20/93	C	B4	2.800	J	5.5	-------gh
Dieldrin	01/20/93	C	B4	6.700	J	5.5	-------gh

SVOA (ppb)							
bis(2-Ethylhexyl)Phthalate	01/20/93	C	B4	44.000	J	5.5	-------gh

MPLE ID: U3SB101SB14

Pest/PCB (ppb)							
4,4'-DDE	01/24/93	C	C4	0.880	J	2.0	-------gh

SAMPLE ID: U3SB101SB15

Pest/PCB (ppb)							
4,4'-DDD	01/23/93	C	C4	6.400		2.0	-------gh
4,4'-DDE	01/23/93	C	C4	4.100		2.0	-------gh
4,4'-DDT	01/23/93	C	C4	2.800	J	2.0	-------gh
Dieldrin	01/23/93	C	C4	3.500	J	2.0	-------gh

SAMPLE ID: U3SB3

Metal (ppm)							
Chromium	01/01/89	D	I4	2.000		5.0	-------gh
Copper	01/01/89	D	I4	3.000		5.0	-------gh
Lead	01/01/89	D	I4	8.000		5.0	-------GH
Zinc	01/01/89	D	I4	3.000		5.0	-------gh

SAMPLE ID: U3SB4

Metal (ppm)							
Chromium	01/01/89	D	I5	2.000		5.0	-------gh
Lead	01/01/89	D	I5	6.000		5.0	-------GH
Mercury	01/01/89	D	I5	0.150		5.0	-------gh
Zinc	01/01/89	D	I5	4.000		5.0	-------gh
Pest/PCB (ppb)							
4,4'-DDT	01/01/89	D	I5	2.900		5.0	-------gh
Dieldrin	01/01/89	D	I5	6.800		5.0	-------gh

SAMPLE ID: U3SS01

Metal (ppm)							
Aluminum	03/09/92	D	G5	11900.000		1.0	-------gh
Barium	03/09/92	D	G5	17.800	B	1.0	-------gh
Beryllium	03/09/92	D	G5	0.240	J	1.0	-------gh
Calcium	03/09/92	D	G5	2330.000		1.0	-------**
Chromium	03/09/92	D	G5	13.100		1.0	-------gh
Cobalt	03/09/92	D	G5	3.600	J	1.0	-------**
Copper	03/09/92	D	G5	1.500	J	1.0	-------gh
Iron	03/09/92	D	G5	7000.000		1.0	-------**
Lead	03/09/92	D	G5	8.500		1.0	-------GH
Magnesium	03/09/92	D	G5	799.000	B	1.0	-------**
Manganese	03/09/92	D	G5	11.400		1.0	-------gh
Potassium	03/09/92	D	G5	742.000	B	1.0	-------**
Sodium	03/09/92	D	G5	196.000	B	1.0	-------**
Vanadium	03/09/92	D	G5	24.600		1.0	-------gh
Zinc	03/09/92	D	G5	11.900	J	1.0	-------gh
Pest/PCB (ppb)							
alpha-Chlordane	03/09/92	D	G5	2.200	J	1.0	-------**
gamma-Chlordane	03/09/92	D	G5	2.600		1.0	-------**

VOA (ppb)							
Acetone	03/09/92	D	G5	26.000	J	1.0	-------gh

SAMPLE ID: U3SS02

Metal (ppm)							
Aluminum	03/09/92	D	G5	10300.000		1.0	-------gh
Barium	03/09/92	D	G5	14.300	B	1.0	-------gh
Calcium	03/09/92	D	G5	3330.000		1.0	-------**
Chromium	03/09/92	D	G5	12.400		1.0	-------gh
Copper	03/09/92	D	G5	0.950	J	1.0	-------gh
Iron	03/09/92	D	G5	9950.000		1.0	-------**
Lead	03/09/92	D	G5	4.800		1.0	-------GH
Magnesium	03/09/92	D	G5	634.000	B	1.0	-------**
Manganese	03/09/92	D	G5	12.400		1.0	-------gh
Potassium	03/09/92	D	G5	652.000	B	1.0	-------**
Sodium	03/09/92	D	G5	187.000	B	1.0	-------**
Vanadium	03/09/92	D	G5	29.700		1.0	-------gh
Zinc	03/09/92	D	G5	9.500	J	1.0	-------gh
Pest/PCB (ppb)							
alpha-Chlordane	03/09/92	D	G5	0.280	J	1.0	-------**
gamma-Chlordane	03/09/92	D	G5	0.210	J	1.0	-------**
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G5	45.000	J	1.0	-------gh

SAMPLE ID: U3SS03

Metal (ppm)							
Aluminum	03/09/92	D	G4	684.000		1.0	-------gh
Barium	03/09/92	D	G4	4.500	B	1.0	-------gh
Calcium	03/09/92	D	G4	1050.000		1.0	-------**
Iron	03/09/92	D	G4	488.000		1.0	-------**
Lead	03/09/92	D	G4	1.500	J	1.0	-------GH
Magnesium	03/09/92	D	G4	54.000	B	1.0	-------**
Manganese	03/09/92	D	G4	6.900		1.0	-------gh
Potassium	03/09/92	D	G4	69.800	J	1.0	-------**
Sodium	03/09/92	D	G4	148.000	B	1.0	-------**
Vanadium	03/09/92	D	G4	2.500	J	1.0	-------gh
Zinc	03/09/92	D	G4	2.100	J	1.0	-------gh
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G4	91.000	J	1.0	-------gh

SAMPLE ID: U3SS04

Metal (ppm)							
Aluminum	03/09/92	D	G4	11200.000		1.0	-------gh
Barium	03/09/92	D	G4	11.600	B	1.0	-------gh
Calcium	03/09/92	D	G4	1630.000		1.0	-------**
Chromium	03/09/92	D	G4	14.100		1.0	-------gh
Copper	03/09/92	D	G4	0.660	J	1.0	-------gh
Iron	03/09/92	D	G4	5070.000		1.0	-------*
Lead	03/09/92	D	G4	4.000		1.0	-------Gh
Magnesium	03/09/92	D	G4	487.000	B	1.0	-------**
Manganese	03/09/92	D	G4	8.800		1.0	-------gh
Potassium	03/09/92	D	G4	391.000	B	1.0	-------**
Sodium	03/09/92	D	G4	170.000	B	1.0	-------**
Vanadium	03/09/92	D	G4	15.000		1.0	-------gh

Zinc	03/09/92	D	G4	7.900	J	1.0	-------gh
Pest/PCB (ppb)							
alpha-Chlordane	03/09/92	D	G4	6.000	J	1.0	-------**
Dieldrin	03/09/92	D	G4	0.450	J	1.0	-------gh
gamma-Chlordane	03/09/92	D	G4	8.600		1.0	-------**
Methoxychlor	03/09/92	D	G4	1.100	J	1.0	-------gh

SAMPLE ID: U3SS05

Metal (ppm)							
Aluminum	03/09/92	D	G4	13600.000		1.0	-------gh
Arsenic	03/09/92	D	G4	1.700	B	1.0	-------gh
Barium	03/09/92	D	G4	22.800	B	1.0	-------gh
Calcium	03/09/92	D	G4	1730.000		1.0	-------**
Chromium	03/09/92	D	G4	29.600		1.0	-------gh
Iron	03/09/92	D	G4	31500.000		1.0	-------**
Lead	03/09/92	D	G4	10.500		1.0	-------GH
Magnesium	03/09/92	D	G4	588.000	B	1.0	-------**
Manganese	03/09/92	D	G4	9.600		1.0	-------gh
Potassium	03/09/92	D	G4	600.000	B	1.0	-------**
Sodium	03/09/92	D	G4	175.000	B	1.0	-------**
Thallium	03/09/92	D	G4	0.330	J	1.0	-------**
Vanadium	03/09/92	D	G4	49.200		1.0	-------gh
Zinc	03/09/92	D	G4	45.900		1.0	-------gh
Pest/PCB (ppb)							
alpha-BHC	03/09/92	D	G4	0.300	J	1.0	-------gh
beta-BHC	03/09/92	D	G4	0.440	J	1.0	-------gh
Endrin ketone	03/09/92	D	G4	27.000		1.0	-------**
Methoxychlor	03/09/92	D	G4	4.100	J	1.0	-------gh
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G4	38.000	J	1.0	-------gh

SAMPLE ID: U3SS06

Metal (ppm)							
Aluminum	03/09/92	D	G5	7560.000		1.0	-------gh
Calcium	03/09/92	D	G5	8910.000		1.0	-------**
Chromium	03/09/92	D	G5	11.600		1.0	-------gh
Cobalt	03/09/92	D	G5	4.900	J	1.0	-------**
Copper	03/09/92	D	G5	0.900	J	1.0	-------gh
Iron	03/09/92	D	G5	5920.000		1.0	-------**
Lead	03/09/92	D	G5	6.500		1.0	-------GH
Magnesium	03/09/92	D	G5	532.000	B	1.0	-------**
Manganese	03/09/92	D	G5	7.500		1.0	-------gh
Potassium	03/09/92	D	G5	521.000	B	1.0	-------**
Sodium	03/09/92	D	G5	166.000	B	1.0	-------**
Vanadium	03/09/92	D	G5	17.800		1.0	-------gh
Zinc	03/09/92	D	G5	5.800	J	1.0	-------gh
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G5	54.000	J	1.0	-------gh

MPLE ID: U3SS7801

Metal (ppm)							
Lead	06/01/90	D	B3	4.600		1.0	-------GH
Zinc	06/01/90	D	B3	1.500		1.0	-------gh

VOA (ppb)						
1,1,1-Trichloroethane	06/01/90	D	B3	230.000	1.0	-------gh
Toluene	06/01/90	D	B3	40.000	1.0	-------gh

SAMPLE ID: U3SS7802

Metal (ppm)						
Chromium	06/01/90	D	B3	28.000	1.0	-------gh
Lead	06/01/90	D	B3	22.000	1.0	-------GH
Zinc	06/01/90	D	B3	18.000	1.0	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	06/01/90	D	B3	6290.000	1.0	-------gh
1,1-Dichloroethane	06/01/90	D	B3	40.000	1.0	-------gh
1,1-Dichloroethene	06/01/90	D	B3	60.000	1.0	-------gh
Toluene	06/01/90	D	B3	40.000	1.0	-------gh
Trichloroethene	06/01/90	D	B3	320.000	1.0	-------gh

SAMPLE ID: U3SS7803

Metal (ppm)						
Chromium	06/01/90	D	B3	5.500	1.0	-------gh
Lead	06/01/90	D	B3	8.800	1.0	-------GH
Zinc	06/01/90	D	B3	9.500	1.0	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	06/01/90	D	B3	200.000	1.0	-------gh
Toluene	06/01/90	D	B3	70.000	1.0	-------gh

SAMPLE ID: U3SS7804

Metal (ppm)						
Chromium	06/01/90	D	A3	2.000	1.0	-------gh
Lead	06/01/90	D	A3	2.600	1.0	-------GH
Zinc	06/01/90	D	A3	2.500	1.0	-------gh

SAMPLE ID: U3SS7805

Metal (ppm)						
Chromium	06/01/90	D	A3	5.500	1.0	-------gh
Lead	06/01/90	D	A3	4.800	1.0	-------GH
Zinc	06/01/90	D	A3	5.000	1.0	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	06/01/90	D	A3	156.000	1.0	-------gh
Toluene	06/01/90	D	A3	56.000	1.0	-------gh

*** End of Report ***

REPORT: JAX OU3 - SAMPLE ANALYSIS DETAIL BY DEPTH RANGE AND SAMPLE ID
SAMPLE: SOIL
FILE : U3_DATA.DBF
TE : 03/23/94

DEPTH RANGE : 20 to 60 ft
COLUMN LABELS: Date, Group, Grid, Result, Qualifier, Depth, ARAR & RISK Flags
AR MULTIPLIER: 1

SAMPLE ID: U310S

SAMPLE ID: U314D

SAMPLE ID: U314S

SAMPLE ID: U318D

SAMPLE ID: U318S

SAMPLE ID: U321S

SAMPLE ID: U323S

AMPLE ID: U324D

SAMPLE ID: U324S

SAMPLE ID: U325U

SAMPLE ID: U326D

SAMPLE ID: U326S

SAMPLE ID: U327D

SAMPLE ID: U327S

SAMPLE ID: U328D

SAMPLE ID: U330D

SAMPLE ID: U330S

SAMPLE ID: U331U

SAMPLE ID: U332U

SAMPLE ID: U333D

SAMPLE ID: U333S

SAMPLE ID: U334D

SAMPLE ID: U334S

SAMPLE ID: U335D

SAMPLE ID: U335S

SAMPLE ID: U336D

SAMPLE ID: U336S

SAMPLE ID: U337S

SAMPLE ID: U338U

SAMPLE ID: U339U

SAMPLE ID: U340U

SAMPLE ID: U341D

SAMPLE ID: U341S

SAMPLE ID: U342S

SAMPLE ID: U343S

SAMPLE ID: U344S

SAMPLE ID: U3B101SB01

SAMPLE ID: U3B101SB014

SAMPLE ID: U3B101SB015

SAMPLE ID: U3B101SB02

SAMPLE ID: U3B101SB03

SAMPLE ID: U3B101SB04

SAMPLE ID: U3B101SB05

SAMPLE ID: U3B101SB06

SAMPLE ID: U3B101SB07

SAMPLE ID: U3B101SB08

SAMPLE ID: U3B101SB09

SAMPLE ID: U3B101SB10

SAMPLE ID: U3B101SB11

SAMPLE ID: U3B101SB12

SAMPLE ID: U3B101SB12B

SAMPLE ID: U3B101SB13

SAMPLE ID: U3P159SB01

SAMPLE ID: U3P159SB02

SAMPLE ID: U3P159SB03

SAMPLE ID: U3P159SB04

SAMPLE ID: U3P159SB05

SAMPLE ID: U3P159SB06

SAMPLE ID: U3P159SB07

SAMPLE ID: U3P159SB08

SAMPLE ID: U3P159SB09

SAMPLE ID: U3P159SB10

SAMPLE ID: U3P159SB11

SAMPLE ID: U3P159SB12

SAMPLE ID: U3PZ00201

SAMPLE ID: U3PZ00202

SAMPLE ID: U3PZ00203

SAMPLE ID: U3PZ00301

SAMPLE ID: U3PZ00302

SAMPLE ID: U3PZ00303

SAMPLE ID: U3PZ00501

SAMPLE ID: U3PZ00502

SAMPLE ID: U3PZ00503

SAMPLE ID: U3PZ00701

SAMPLE ID: U3PZ00702

SAMPLE ID: U3PZ00703

SAMPLE ID: U3PZ00704

SAMPLE ID: U3PZ00705

SAMPLE ID: U3PZ00901

SAMPLE ID: U3PZ00902

SAMPLE ID: U3PZ00903

SAMPLE ID: U3PZ00904

SAMPLE ID: U3PZ01101

SAMPLE ID: U3PZ01102

SAMPLE ID: U3PZ01103

SAMPLE ID: U3PZ01104

SAMPLE ID: U3PZ01301

SAMPLE ID: U3PZ01302

SAMPLE ID: U3PZ01303

SAMPLE ID: U3PZ01304

SAMPLE ID: U3PZ01501

SAMPLE ID: U3PZ01502

SAMPLE ID: U3PZ01503

SAMPLE ID: U3PZ01601

SAMPLE ID: U3PZ01602

SAMPLE ID: U3PZ01603

SAMPLE ID: U3PZ02001

SAMPLE ID: U3PZ02002

SAMPLE ID: U3PZ02003

SAMPLE ID: U3PZ02201

SAMPLE ID: U3PZ02202

SAMPLE ID: U3PZ02301

SAMPLE ID: U3PZ02302

SAMPLE ID: U3PZ02501

SAMPLE ID: U3PZ02502

SAMPLE ID: U3PZ02701

SAMPLE ID: U3PZ02702

SAMPLE ID: U3PZ02704

SAMPLE ID: U3SB01

SAMPLE ID: U3SB02

SAMPLE ID: U3SB03

SAMPLE ID: U3SB04

SAMPLE ID: U3SB05

SAMPLE ID: U3SB06

SAMPLE ID: U3SB1

SAMPLE ID: U3SB101SB05

SAMPLE ID: U3SB101SB07

SAMPLE ID: U3SB101SB08

SAMPLE ID: U3SB101SB12

SAMPLE ID: U3SB101SB14

SAMPLE ID: U3SB101SB15

SAMPLE ID: U3SB3

SAMPLE ID: U3SB4

SAMPLE ID: U3SS01

SAMPLE ID: U3SS02

SAMPLE ID: U3SS03

IPLE ID: U3SS04

SAMPLE ID: U3SS05

SAMPLE ID: U3SS06

SAMPLE ID: U3SS7801

SAMPLE ID: U3SS7802

SAMPLE ID: U3SS7803

SAMPLE ID: U3SS7804

SAMPLE ID: U3SS7805

*** End of Report ***

REPORT: JAX OU3 - SAMPLE ANALYSIS DETAIL BY DEPTH RANGE AND SAMPLE ID
SAMPLE: SOIL
FILE : U3_DATA.DBF
DATE : 03/23/94

DEPTH RANGE : Greater than 60 ft
COLUMN LABELS: Date, Group, Grid, Result, Qualifier, Depth, ARAR & RISK Flags
AR MULTIPLIER: 1

SAMPLE ID: U310S

SAMPLE ID: U314D

SAMPLE ID: U314S

SAMPLE ID: U318D

SAMPLE ID: U318S

SAMPLE ID: U321S

SAMPLE ID: U323S

SAMPLE ID: U324D

SAMPLE ID: U324S

SAMPLE ID: U325U

SAMPLE ID: U326D

SAMPLE ID: U326S

SAMPLE ID: U327D

SAMPLE ID: U327S

SAMPLE ID: U328D

SAMPLE ID: U330D

SAMPLE ID: U330S

SAMPLE ID: U331U

SAMPLE ID: U332U

'PLE ID: U333D

SAMPLE ID: U333S

SAMPLE ID: U334D

SAMPLE ID: U334S

SAMPLE ID: U335D

SAMPLE ID: U335S

SAMPLE ID: U336D

SAMPLE ID: U336S

SAMPLE ID: U337S

PLE ID: U338U

SAMPLE ID: U339U

SAMPLE ID: U340U

SAMPLE ID: U341D

SAMPLE ID: U341S

SAMPLE ID: U342S

SAMPLE ID: U343S

SAMPLE ID: U344S

SAMPLE ID: U3B101SB01

MPLE ID: U3B101SB014

SAMPLE ID: U3B101SB015

SAMPLE ID: U3B101SB02

SAMPLE ID: U3B101SB03

SAMPLE ID: U3B101SB04

SAMPLE ID: U3B101SB05

SAMPLE ID: U3B101SB06

SAMPLE ID: U3B101SB07

SAMPLE ID: U3B101SB08

SAMPLE ID: U3B101SB09

SAMPLE ID: U3B101SB10

SAMPLE ID: U3B101SB11

SAMPLE ID: U3B101SB12

SAMPLE ID: U3B101SB12B

SAMPLE ID: U3B101SB13

SAMPLE ID: U3P159SB01

SAMPLE ID: U3P159SB02

SAMPLE ID: U3P159SB03

SAMPLE ID: U3P159SB04

SAMPLE ID: U3P159SB05

SAMPLE ID: U3P159SB06

SAMPLE ID: U3P159SB07

SAMPLE ID: U3P159SB08

SAMPLE ID: U3P159SB09

SAMPLE ID: U3P159SB10

SAMPLE ID: U3P159SB11

SAMPLE ID: U3P159SB12

SAMPLE ID: U3PZ00201

SAMPLE ID: U3PZ00202

SAMPLE ID: U3PZ00203

SAMPLE ID: U3PZ00301

SAMPLE ID: U3PZ00302

SAMPLE ID: U3PZ00303

SAMPLE ID: U3PZ00501

SAMPLE ID: U3PZ00502

SAMPLE ID: U3PZ00503

SAMPLE ID: U3PZ00701

SAMPLE ID: U3PZ00702

SAMPLE ID: U3PZ00703

SAMPLE ID: U3PZ00704

SAMPLE ID: U3PZ00705

SAMPLE ID: U3PZ00901

SAMPLE ID: U3PZ00902

SAMPLE ID: U3PZ00903

SAMPLE ID: U3PZ00904

SAMPLE ID: U3PZ01101

SAMPLE ID: U3PZ01102

SAMPLE ID: U3PZ01103

SAMPLE ID: U3PZ01104

SAMPLE ID: U3PZ01301

SAMPLE ID: U3PZ01302

SAMPLE ID: U3PZ01303

SAMPLE ID: U3PZ01304

SAMPLE ID: U3PZ01501

SAMPLE ID: U3PZ01502

SAMPLE ID: U3PZ01503

SAMPLE ID: U3PZ01601

SAMPLE ID: U3PZ01602

SAMPLE ID: U3PZ01603

SAMPLE ID: U3PZ02001

SAMPLE ID: U3PZ02002

SAMPLE ID: U3PZ02003

SAMPLE ID: U3PZ02201

SAMPLE ID: U3PZ02202

SAMPLE ID: U3PZ02301

SAMPLE ID: U3PZ02302

SAMPLE ID: U3PZ02501

SAMPLE ID: U3PZ02502

SAMPLE ID: U3PZ02701

SAMPLE ID: U3PZ02702

SAMPLE ID: U3PZ02704

SAMPLE ID: U3SB01

SAMPLE ID: U3SB02

SAMPLE ID: U3SB03

SAMPLE ID: U3SB04

SAMPLE ID: U3SB05

SAMPLE ID: U3SB06

SAMPLE ID: U3SB1

SAMPLE ID: U3SB101SB05

SAMPLE ID: U3SB101SB07

SAMPLE ID: U3SB101SB08

SAMPLE ID: U3SB101SB12

SAMPLE ID: U3SB101SB14

SAMPLE ID: U3SB101SB15

SAMPLE ID: U3SB3

SAMPLE ID: U3SB4

SAMPLE ID: U3SS01

SAMPLE ID: U3SS02

SAMPLE ID: U3SS03

SAMPLE ID: U3SS04

SAMPLE ID: U3SS05

SAMPLE ID: U3SS06

SAMPLE ID: U3SS7801

SAMPLE ID: U3SS7802

SAMPLE ID: U3SS7803

SAMPLE ID: U3SS7804

SAMPLE ID: U3SS7805

*** End of Report ***

Table K-3

Database Sample Summary

Table Description

Table K-3, OU 3 Database Summary, provides a complete listing of all samples taken and analyzed under all environmental studies, within the operable unit. The column headings refer to the follow:

Record #	as identified in the database;
X Sample ID	refers to the field sample identification;
Sample ID	refers to the sample identification in the database;
Sample Date	date sample was submitted;
Sample Type	media from which sample was collected;
Grid	refers to location on accompanying grid;
Depth	depth below land surface at which sample was collected;
X, Y Coord:	below refer to survey coordinates for sample location; and
Z Coord:	refers to the surveyed ground elevation for each ample location.

* = A minus 1 (-1) indicates that survey data was not available for these sample locations. Approximate locations for these sample points are shown on the Figures in Appendix B.

Source:

SSFP - OU 3 is from Scoping Study Field Program;

RI/FS workplan identifies the table in Appendix B of this workplan where the data can be found:

Ser15 refers to ABB-ES's Sampling Event Report 15 for the 159 Investigation (see Appendix B);

Ser16 refers to ABB-ES's Sampling Event Report 16 for the UST investigation at Building 101 (see Appendix B).

Table Description

Table K-2, Detected Chemicals in Environmental Media, presents a summary of elements and chemicals detected by location in subsurface soil and groundwater (SSFP and previous investigations) sorted by media (soil or groundwater) and depth interval (0 feet to 20 feet bls, 20 feet to 60 feet bls, and greater than 60 feet bls).

Table K-3 contains a cross-reference between the sample identification and the sampling event (SSFP and previous investigations).

Data in the various colums are broken down as follows:

Date: the date the sample was submitted;

Group: refers to when and where the sample was analyzed;

Group A, data generated by onsite field laboratory under the SSFP;
Group B, data generated by offsite laboratory under the SSFP;
Group C, data generated by offsite laboratory in 1993; and
Group D, data generated by offsite laboratory prior to 1993.

Grid: location of sample point based on grid included with this table;

Result: laboratory reported concentration;

Qualifier: data qualifiers are:

E - estimated (onsite lab) and
B, J - Contract Laboratory Program (CLP) data qualifiers.

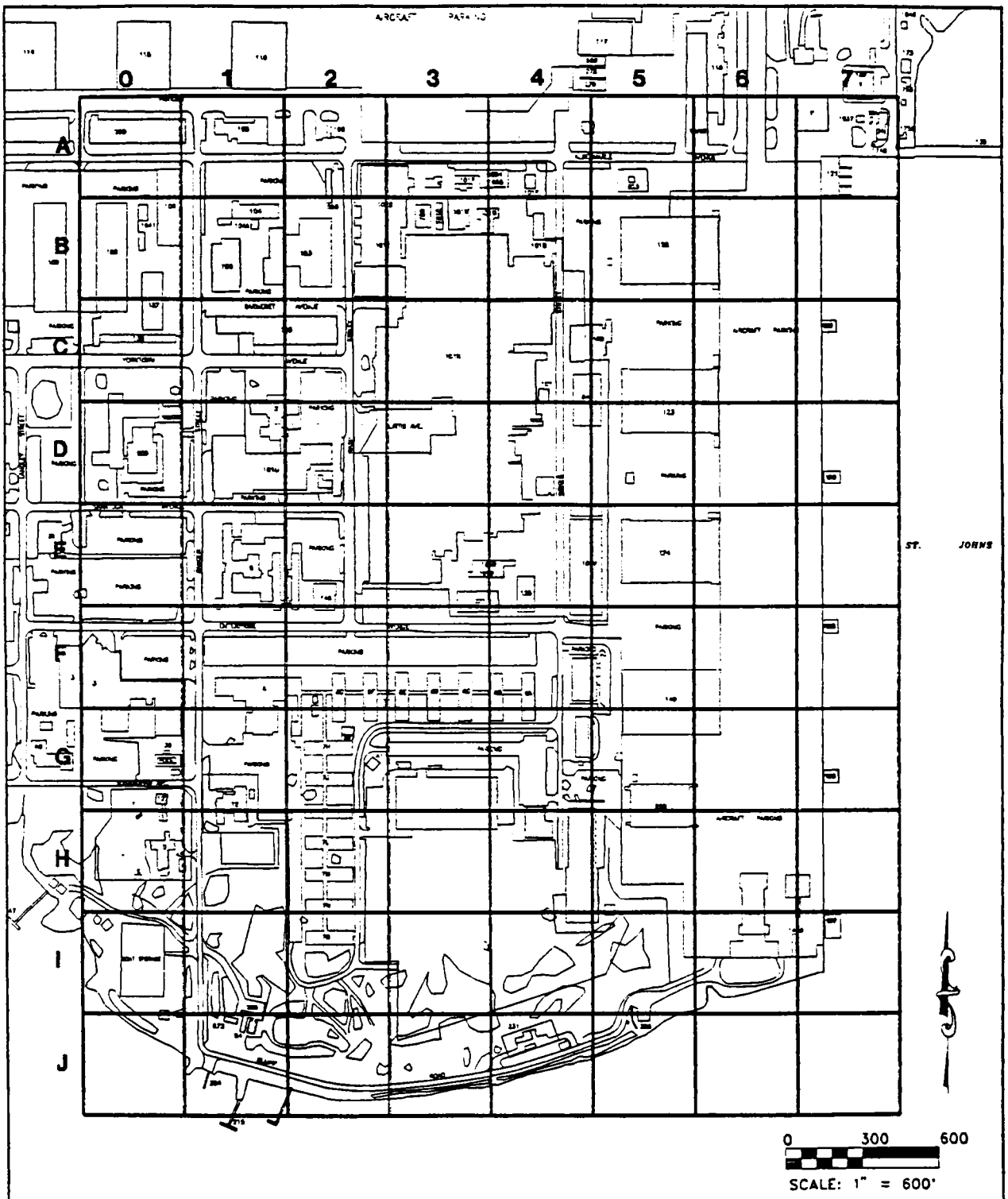
Depth: the depth below land surface at which the sample was collected;

ARAR and Risk Flags: The ARAR flag field provides for a screen against MCLs and MCLGs where appropriate and, for groundwater data, a comparison against 1 percent and 10 percent of maximum solubility to assist in determining the potential for free product. Specific flag explanations are as follows:

An upper case letter indicates and exceedance of the specified numerical value, whereas a lower case letter signifies that the contaminant concentration is below the specified numerical value (individual numerical values located in Table K-1).

A or a, Federal MCL comparison completed;
B or b, Federal MCLG comparison completed;
C or c, Florida MCL comparison completed;
D or d, 1 percent of maximum chemical solubility in water comparison;
E or e, 10 percent of maximum chemical solubility in water comparison;

F or f, Comparison to EPA Region III Risk Table--Tap Water;
G or g, Comparison to EPA Region III Risk Table--Construction Soil;
H or h, Comparison to EPA Region III Risk Table--Residential Soil;
Z or z, Comparison to Florida Surface Water Quality Criteria for Class III Marine Waters; and
* no information available in reference table (Table K-1) for comparison to be completed.



OU3 GRID PATTERN

RI/FS WORKPLAN FOR OU3

NAS JACKSONVILLE JACKSONVILLE, FLORIDA

OU3/DRM/11-30-93

REPORT: JAX OU3 - SAMPLE ANALYSIS DETAIL BY DEPTH RANGE AND SAMPLE ID
SAMPLE: SOIL
FILE : U3_DATA.DBF
DATE : 03/23/94

DEPTH RANGE : Less than 20 ft
COLUMN LABELS: Date, Group, Grid, Result, Qualifier, Depth, ARAR & RISK Flags
AR MULTIPLIER: 1

SAMPLE ID: U310S

VOA (ppb)

1,1,1-Trichloroethane	02/01/92	D	B3	265.000	1.5	-------gh
Toluene	02/01/92	D	B3	6.200	1.5	-------gh
Trichloroethene	02/01/92	D	B3	15.000	1.5	-------gh
Xylene (total)	02/01/92	D	B3	5.900	1.5	-------gh

SAMPLE ID: U314D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	86.900	4.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	15.900	4.5	-------gh
Toluene	12/01/91	D	B3	7.800	4.5	-------gh
Trichloroethene	12/01/91	D	B3	3.300	4.5	-------gh
Xylene (total)	12/01/91	D	B3	9.100	4.5	-------gh

SAMPLE ID: U314S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	282.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	86.800	1.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	2.800	1.5	-------gh
1,4-Dichlorobenzene	12/01/91	D	B3	137.000	1.5	-------gh
Toluene	12/01/91	D	B3	7.700	1.5	-------gh
Trichloroethene	12/01/91	D	B3	2.900	1.5	-------gh
Xylene (total)	12/01/91	D	B3	10.100	1.5	-------gh

SAMPLE ID: U318D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	615.000	4.5	-------gh

SAMPLE ID: U318S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	863.000	1.5	-------gh

SAMPLE ID: U321S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	1920.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	36.100	1.5	-------gh
Toluene	12/01/91	D	B3	4.900	1.5	-------g
Trichloroethene	12/01/91	D	B3	265.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	9.600	1.5	-------gh

SAMPLE ID: U323S

SVOA (ppb)

Benzo(a)Anthracene	12/01/91	D	B3	370.000	1.5	-------gh
Benzo(b)Fluoranthene	12/01/91	D	B3	400.000	1.5	-------gh
Chrysene	12/01/91	D	B3	390.000	1.5	-------**
Fluoranthene	12/01/91	D	B3	790.000	1.5	-------gh
Phenanthrene	12/01/91	D	B3	330.000	1.5	-------gh

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	1910.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	650.000	1.5	-------gh
1,1,2-Trichloroethane	12/01/91	D	B3	13.700	1.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	255.000	1.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	2.500	1.5	-------gh
Ethylbenzene	12/01/91	D	B3	3.900	1.5	-------gh
Methylene Chloride	12/01/91	D	B3	2380.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	6.700	1.5	-------gh
Toluene	12/01/91	D	B3	49.600	1.5	-------gh
Trichloroethene	12/01/91	D	B3	22.100	1.5	-------gh
Xylene (total)	12/01/91	D	B3	33.600	1.5	-------gh

SAMPLE ID: U324D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	17700.000	4.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	400000.000	4.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	202.000	4.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	3750.000	4.5	-------gH
Trichloroethene	12/01/91	D	B3	157.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	2850.000	4.5	-------gh

PLE ID: U324S

VOA (ppb)

1,2-Dichlorobenzene	12/01/91	D	B3	171.000	1.5	-------gh
Toluene	12/01/91	D	B3	1420.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	1370.000	1.5	-------gh

SAMPLE ID: U325U

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	538.000	4.5	-------gh

SAMPLE ID: U326D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	1710.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	213.000	4.5	-------gh

SAMPLE ID: U326S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	992.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	120.000	1.5	-------gh

PLE ID: U327D

SVOA (ppb)

2,4-Dimethylphenol	12/01/91	D	B3	30.000	4.5	-------gh
2-Methylphenol	12/01/91	D	B3	7.300	4.5	-------gh
4-Methylphenol	12/01/91	D	B3	11.000	4.5	-------gh

Phenol	12/01/91	D	B3	7.900	4.5	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	5480.000	4.5	-------g
1,1,1-Trichloroethane	12/01/91	D	B3	15100.000	4.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	255.000	4.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	2260.000	4.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	255.000	4.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	840.000	4.5	-------gh
Methylene Chloride	12/01/91	D	B3	416.000	4.5	-------gh
Methylene Chloride	12/01/91	D	B3	1100.000	4.5	-------gh
Tetrachloroethene	12/01/91	D	B3	121.000	4.5	-------gh
Toluene	12/01/91	D	B3	598.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	220.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	1070.000	4.5	-------gh

SAMPLE ID: U327S

SVOA (ppb)						
2,4-Dimethylphenol	12/01/91	D	B3	30.000	1.5	-------gh
2-Methylphenol	12/01/91	D	B3	7.300	1.5	-------gh
4-Methylphenol	12/01/91	D	B3	11.000	1.5	-------gh
Phenol	12/01/91	D	B3	7.900	1.5	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	160.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	35.300	1.5	-------gh
1,1-Dichloroethane	12/01/91	D	B3	2260.000	1.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	840.000	1.5	-------gh
Methylene Chloride	12/01/91	D	B3	1100.000	1.5	-------gh
Toluene	12/01/91	D	B3	4.200	1.5	-------g
Trichloroethene	12/01/91	D	B3	1070.000	1.5	-------g
Xylene (total)	12/01/91	D	B3	7.900	1.5	-------gh

SAMPLE ID: U328D

VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	3100.000	4.5	-------gh
Methylene Chloride	12/01/91	D	B3	101.000	4.5	-------gh
Tetrachloroethene	12/01/91	D	B3	1200.000	4.5	-------gh
Toluene	12/01/91	D	B3	957.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	1460.000	4.5	-------gh

SAMPLE ID: U330D

VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	9330.000	4.5	-------gh
1,2-Dichlorobenzene	12/01/91	D	B3	537.000	4.5	-------gh
Chlorobenzene	12/01/91	D	B3	150.000	4.5	-------gh
Toluene	12/01/91	D	B3	283.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	344.000	4.5	-------gh

SAMPLE ID: U330S

VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	4700.000	1.5	-------/
Trichloroethene	12/01/91	D	B3	257.000	1.5	-------g

SAMPLE ID: U331U

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	843.000	4.5	-------gh

SAMPLE ID: U332U

VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	480.000	4.5	-------gh

SAMPLE ID: U333D

VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	4940.000	4.5	-------gh
1,2-Dichlorobenzene	12/01/91	D	B3	102.000	4.5	-------gh
Tetrachloroethene	12/01/91	D	B3	291.000	4.5	-------gh
Tetrachloroethene	12/01/91	D	B3	291.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	177.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	2210.000	4.5	-------gh

SAMPLE ID: U333S

VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	993.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	219.000	1.5	-------gh

SAMPLE ID: U334D

Metal (ppm)						
Barium (TCLP)	12/01/91	D	B3	0.000	4.5	-------gh
Cadmium (TCLP)	12/01/91	D	B3	0.000	4.5	-------gh
Chromium (TCLP)	12/01/91	D	B3	0.000	4.5	-------**
Mercury (TCLP)	12/01/91	D	B3	0.000	4.5	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	446.000	4.5	-------gh
Toluene	12/01/91	D	B3	102.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	368.000	4.5	-------gh

SAMPLE ID: U334S

Metal (ppm)						
Barium (TCLP)	12/01/91	D	B3	0.000	1.5	-------gh
Cadmium (TCLP)	12/01/91	D	B3	0.000	1.5	-------gh
Chromium (TCLP)	12/01/91	D	B3	0.000	1.5	-------**
VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	439.000	1.5	-------gh
1,2-Dichlorobenzene	12/01/91	D	B3	886.000	1.5	-------gh
1,4-Dichlorobenzene	12/01/91	D	B3	430.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	126.000	1.5	-------gh

SAMPLE ID: U335D

SVOA (ppb)						
Phenol	02/01/92	D	B3	3200.000	4.5	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	02/01/92	D	B3	111000.000	4.5	-------gh
1,1-Dichloroethene	02/01/92	D	B3	3570.000	4.5	-------gH
Trichloroethene	02/01/92	D	B3	6180.000	4.5	-------gh

SAMPLE ID: U335S

VOA (ppb)

1,1,1-Trichloroethane	02/01/92	D	B3	51.500	1.5	-------g
1,1,2-Trichloroethane	02/01/92	D	B3	3.100	1.5	-------g
1,1-Dichloroethane	02/01/92	D	B3	1880.000	1.5	-------gh
2-Butanone	02/01/92	D	B3	305.000	1.5	-------gh
Toluene	02/01/92	D	B3	4.400	1.5	-------gh
Xylene (total)	02/01/92	D	B3	7.000	1.5	-------gh

SAMPLE ID: U336D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	190000.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	6740.000	4.5	-------gh

SAMPLE ID: U336S

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	22400.000	1.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	223.000	1.5	-------gh
Chloroform	12/01/91	D	B3	109.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	110.000	1.5	-------gh

SAMPLE ID: U337S

SVOA (ppb)

bis(2-Ethylhexyl)Phthalate	12/01/91	D	B3	950.000	1.5	-------gh

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	316000.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	5460000.000	1.5	-------gH
1,1-Dichloroethane	12/01/91	D	B3	572.000	1.5	-------gh
1,1-Dichloroethene	12/01/91	D	B3	9640.000	1.5	-------GH
Tetrachloroethene	12/01/91	D	B3	5850.000	1.5	-------gh
Toluene	12/01/91	D	B3	17100.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	18300.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	1940.000	1.5	-------gh

SAMPLE ID: U338U

VOA (ppb)

1,2-Dichlorobenzene	12/01/91	D	B3	251.000	4.5	-------gh

SAMPLE ID: U339U

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	498.000	4.5	-------gh

SAMPLE ID: U340U

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	1510.000	4.5	-------gh
1,2-Dichlorobenzene	12/01/91	D	B3	142.000	4.5	-------g
1,4-Dichlorobenzene	12/01/91	D	B3	126.000	4.5	-------g

SAMPLE ID: U341D

VOA (ppb)

1,1,1-Trichloroethane	12/01/91	D	B3	38300.000	4.5	-------gh
Trichloroethene	12/01/91	D	B3	1150.000	4.5	-------gh

SAMPLE ID: U341S

Metal (ppm)						
Barium (TCLP)	12/01/91	D	B3	0.000	1.5	-------gh
Cadmium (TCLP)	12/01/91	D	B3	0.000	1.5	-------gh
Chromium (TCLP)	12/01/91	D	B3	0.000	1.5	-------**
VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	2260.000	1.5	-------gh
Methylene Chloride	12/01/91	D	B3	350.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	141.000	1.5	-------gh

SAMPLE ID: U342S

SVOA (ppb)						
2-Methylnaphthalene	12/01/91	D	B3	600.000	1.5	-------**
Naphthalene	12/01/91	D	B3	440.000	1.5	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	10600.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	34100.000	1.5	-------gh
Bromodichloromethane	12/01/91	D	B3	122.000	1.5	-------gh
Chloroform	12/01/91	D	B3	3120.000	1.5	-------gh
Dibromochloromethane	12/01/91	D	B3	101.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	6180.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	13000.000	1.5	-------gh
Toluene	12/01/91	D	B3	2070.000	1.5	-------gh
Toluene	12/01/91	D	B3	1860.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	3270.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	5770.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	4500.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	3260.000	1.5	-------gh

SAMPLE ID: U343S

VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	9180.000	1.5	-------gh
1,1,1-Trichloroethane	12/01/91	D	B3	23100.000	1.5	-------gh
1,2-Dichlorobenzene	12/01/91	D	B3	731.000	1.5	-------gh
1,3-Dichlorobenzene	12/01/91	D	B3	209.000	1.5	-------gh
1,4-Dichlorobenzene	12/01/91	D	B3	723.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	2680.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	3440.000	1.5	-------gh
Toluene	12/01/91	D	B3	364.000	1.5	-------gh
Toluene	12/01/91	D	B3	1110.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	1620.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	2980.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	1470.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	1850.000	1.5	-------gh

SAMPLE ID: U344S

VOA (ppb)						
1,1,1-Trichloroethane	12/01/91	D	B3	11900.000	1.5	-------gh
1,3-Dichlorobenzene	12/01/91	D	B3	1550.000	1.5	-------gh
1,4-Dichlorobenzene	12/01/91	D	B3	1020.000	1.5	-------gh
Tetrachloroethene	12/01/91	D	B3	4930.000	1.5	-------gh
Trichloroethene	12/01/91	D	B3	1550.000	1.5	-------gh
Xylene (total)	12/01/91	D	B3	2060.000	1.5	-------gh

SAMPLE ID: U3B101SB01

Metal (ppm)

Aluminum	01/20/93	C	D3	2160.000		2.0	-------gh
Arsenic	01/20/93	C	D3	1.000	B	2.0	-------gh
Barium	01/20/93	C	D3	11.500	J	2.0	-------gh
Beryllium	01/20/93	C	D3	0.490	J	2.0	-------gH
Calcium	01/20/93	C	D3	7410.000		2.0	-------**
Chromium	01/20/93	C	D3	9.100		2.0	-------gh
Copper	01/20/93	C	D3	2.700	B	2.0	-------gh
Iron	01/20/93	C	D3	4460.000		2.0	-------**
Lead	01/20/93	C	D3	5.800	J	2.0	-------GH
Magnesium	01/20/93	C	D3	511.000	B	2.0	-------**
Manganese	01/20/93	C	D3	30.200		2.0	-------gh
Nickel	01/20/93	C	D3	3.400	B	2.0	-------gh
Potassium	01/20/93	C	D3	704.000	B	2.0	-------**
Sodium	01/20/93	C	D3	183.000	B	2.0	-------**
Vanadium	01/20/93	C	D3	5.600	B	2.0	-------gh
Zinc	01/20/93	C	D3	8.600		2.0	-------gh

SAMPLE ID: U3B101SB014

Metal (ppm)

Aluminum	01/24/93	C	C4	392.000		2.0	-------gh
Arsenic	01/24/93	C	C4	0.320	B	2.0	-------gh
Barium	01/24/93	C	C4	8.100	J	2.0	-------gh
Beryllium	01/24/93	C	C4	0.150	J	2.0	-------gh
Calcium	01/24/93	C	C4	169000.000	J	2.0	-------**
Copper	01/24/93	C	C4	3.600	J	2.0	-------g
Iron	01/24/93	C	C4	1050.000		2.0	-------*
Lead	01/24/93	C	C4	6.200		2.0	-------GH
Magnesium	01/24/93	C	C4	1240.000		2.0	-------**
Manganese	01/24/93	C	C4	125.000	J	2.0	-------gH
Potassium	01/24/93	C	C4	99.700	B	2.0	-------**
Sodium	01/24/93	C	C4	1090.000	B	2.0	-------**
Vanadium	01/24/93	C	C4	3.100	J	2.0	-------gh
Zinc	01/24/93	C	C4	4.200	J	2.0	-------gh

SAMPLE ID: U3B101SB015

Metal (ppm)

Aluminum	01/23/93	C	C4	659.000		2.0	-------gh
Arsenic	01/23/93	C	C4	0.300	B	2.0	-------gh
Barium	01/23/93	C	C4	8.100	J	2.0	-------gh
Calcium	01/23/93	C	C4	30300.000		2.0	-------**
Chromium	01/23/93	C	C4	1.500	B	2.0	-------gh
Iron	01/23/93	C	C4	690.000		2.0	-------**
Lead	01/23/93	C	C4	4.700	J	2.0	-------GH
Magnesium	01/23/93	C	C4	324.000	B	2.0	-------**
Manganese	01/23/93	C	C4	12.000		2.0	-------gh
Sodium	01/23/93	C	C4	115.000	B	2.0	-------**
Vanadium	01/23/93	C	C4	1.800	B	2.0	-------gh
Zinc	01/23/93	C	C4	5.400	J	2.0	-------gh

SAMPLE ID: U3B101SB02

Metal (ppm)

Aluminum	01/22/93	C	B4	396.000		2.0	-------gh
Arsenic	01/22/93	C	B4	0.460	B	2.0	-------gh
Barium	01/22/93	C	B4	3.100	J	2.0	-------gh
Calcium	01/22/93	C	B4	266.000	B	2.0	-------**

Chromium	01/22/93	C	B4	2.500		2.0	-------gh
Iron	01/22/93	C	B4	588.000		2.0	-------**
Lead	01/22/93	C	B4	2.800	J	2.0	-------GH
Magnesium	01/22/93	C	B4	64.200	B	2.0	-------**
Manganese	01/22/93	C	B4	8.700		2.0	-------gh
Sodium	01/22/93	C	B4	114.000	B	2.0	-------**
Vanadium	01/22/93	C	B4	1.200	B	2.0	-------gh
Zinc	01/22/93	C	B4	1.700	J	2.0	-------gh
Pest/PCB (ppb)							
4,4'-DDD	01/22/93	C	B4	2.600	J	2.0	-------gh
4,4'-DDT	01/22/93	C	B4	4.400		2.0	-------gh

SAMPLE ID: U3B101SB03

Metal (ppm)							
Aluminum	01/20/93	C	B4	241.000		2.0	-------gh
Arsenic	01/20/93	C	B4	0.410	B	2.0	-------gh
Barium	01/20/93	C	B4	3.100	J	2.0	-------gh
Calcium	01/20/93	C	B4	3830.000		2.0	-------**
Chromium	01/20/93	C	B4	5.000		2.0	-------gh
Copper	01/20/93	C	B4	3.400	B	2.0	-------gh
Iron	01/20/93	C	B4	559.000		2.0	-------**
Lead	01/20/93	C	B4	10.700	J	2.0	-------GH
Magnesium	01/20/93	C	B4	80.400	B	2.0	-------**
Manganese	01/20/93	C	B4	5.700		2.0	-------gh
Sodium	01/20/93	C	B4	126.000	B	2.0	-------**
Vanadium	01/20/93	C	B4	1.300	B	2.0	-------gh
Zinc	01/20/93	C	B4	14.300		2.0	-------gh
Pest/PCB (ppb)							
4,4'-DDE	01/20/93	C	B4	30.000	J	2.0	-------gh
4,4'-DDT	01/20/93	C	B4	56.000	J	2.0	-------gh
alpha-Chlordane	01/20/93	C	B4	26.000	J	2.0	-------**
Dieldrin	01/20/93	C	B4	150.000	D	2.0	-------gH
gamma-Chlordane	01/20/93	C	B4	21.000	J	2.0	-------**

SAMPLE ID: U3B101SB04

Metal (ppm)							
Aluminum	01/23/93	C	C4	224.000		2.0	-------gh
Arsenic	01/23/93	C	C4	0.190	B	2.0	-------gh
Barium	01/23/93	C	C4	2.100	J	2.0	-------gh
Calcium	01/23/93	C	C4	407.000	B	2.0	-------**
Chromium	01/23/93	C	C4	1.100	B	2.0	-------gh
Iron	01/23/93	C	C4	566.000		2.0	-------**
Lead	01/23/93	C	C4	0.850	J	2.0	-------GH
Magnesium	01/23/93	C	C4	70.300	B	2.0	-------**
Manganese	01/23/93	C	C4	4.900		2.0	-------gh
Sodium	01/23/93	C	C4	125.000	B	2.0	-------**
Vanadium	01/23/93	C	C4	1.100	B	2.0	-------gh
Zinc	01/23/93	C	C4	1.600	J	2.0	-------gh

SAMPLE ID: U3B101SB05

Metal (ppm)							
Aluminum	01/19/93	C	D3	738.000		2.0	-------gh
Arsenic	01/19/93	C	D3	0.330	B	2.0	-------gh
Barium	01/19/93	C	D3	9.100	J	2.0	-------gh
Calcium	01/19/93	C	D3	2580.000		2.0	-------**
Chromium	01/19/93	C	D3	2.500		2.0	-------gh
Copper	01/19/93	C	D3	3.400	B	2.0	-------gh
Iron	01/19/93	C	D3	771.000		2.0	-------**

Lead	01/19/93	C	D3	4.600	J	2.0	-------GH
Magnesium	01/19/93	C	D3	105.000	B	2.0	-------**
Manganese	01/19/93	C	D3	15.000		2.0	-------gh
Sodium	01/19/93	C	D3	131.000	B	2.0	-------**
Vanadium	01/19/93	C	D3	1.400	B	2.0	-------g
Zinc	01/19/93	C	D3	3.300	J	2.0	-------gh

SAMPLE ID: U3B101SB06

Metal (ppm)							
Aluminum	01/19/93	C	D3	265.000		2.0	-------gh
Arsenic	01/19/93	C	D3	0.520	B	2.0	-------gh
Barium	01/19/93	C	D3	3.800	J	2.0	-------gh
Calcium	01/19/93	C	D3	11700.000		2.0	-------**
Chromium	01/19/93	C	D3	1.500	B	2.0	-------gh
Copper	01/19/93	C	D3	5.600	B	2.0	-------gh
Iron	01/19/93	C	D3	396.000		2.0	-------**
Lead	01/19/93	C	D3	6.600	J	2.0	-------GH
Magnesium	01/19/93	C	D3	148.000	B	2.0	-------**
Manganese	01/19/93	C	D3	7.400		2.0	-------gh
Sodium	01/19/93	C	D3	191.000	B	2.0	-------**
Vanadium	01/19/93	C	D3	0.910	B	2.0	-------gh
Zinc	01/19/93	C	D3	1.700	J	2.0	-------gh
Pest/PCB (ppb)							
4,4'-DDE	01/19/93	C	D3	2.500	J	2.0	-------gh
4,4'-DDT	01/19/93	C	D3	4.000	J	2.0	-------gh

SAMPLE ID: U3B101SB07

Metal (ppm)							
Aluminum	01/21/93	C	B4	675.000		2.0	-------gh
Arsenic	01/21/93	C	B4	0.490	B	2.0	-------gh
Barium	01/21/93	C	B4	6.000	J	2.0	-------gh
Calcium	01/21/93	C	B4	50800.000		2.0	-------**
Chromium	01/21/93	C	B4	2.000	B	2.0	-------gh
Copper	01/21/93	C	B4	2.100	B	2.0	-------gh
Iron	01/21/93	C	B4	620.000		2.0	-------**
Lead	01/21/93	C	B4	1.900	J	2.0	-------GH
Magnesium	01/21/93	C	B4	649.000	B	2.0	-------**
Manganese	01/21/93	C	B4	12.900		2.0	-------gh
Sodium	01/21/93	C	B4	140.000	B	2.0	-------**
Vanadium	01/21/93	C	B4	3.100	B	2.0	-------gh
Zinc	01/21/93	C	B4	10.300		2.0	-------gh

SAMPLE ID: U3B101SB08

Metal (ppm)							
Aluminum	01/21/93	C	B4	305.000		2.0	-------gh
Arsenic	01/21/93	C	B4	0.230	B	2.0	-------gh
Barium	01/21/93	C	B4	2.900	J	2.0	-------gh
Calcium	01/21/93	C	B4	16900.000		2.0	-------**
Chromium	01/21/93	C	B4	1.300	B	2.0	-------gh
Iron	01/21/93	C	B4	459.000		2.0	-------**
Lead	01/21/93	C	B4	1.400	J	2.0	-------GH
Magnesium	01/21/93	C	B4	188.000	B	2.0	-------**
Manganese	01/21/93	C	B4	5.400		2.0	-------c'
Sodium	01/21/93	C	B4	99.900	B	2.0	-------
Vanadium	01/21/93	C	B4	1.500	B	2.0	-------gh
Zinc	01/21/93	C	B4	2.600	J	2.0	-------gh

SAMPLE ID: U3B101SB09

Metal (ppm)

Aluminum	01/21/93	C	B4	471.000		2.0	-------gh
Arsenic	01/21/93	C	B4	0.290	B	2.0	-------gh
Barium	01/21/93	C	B4	2.800	J	2.0	-------gh
Calcium	01/21/93	C	B4	730.000	B	2.0	-------**
Chromium	01/21/93	C	B4	2.400		2.0	-------gh
Iron	01/21/93	C	B4	565.000		2.0	-------**
Lead	01/21/93	C	B4	0.670	J	2.0	-------GH
Magnesium	01/21/93	C	B4	109.000	B	2.0	-------**
Manganese	01/21/93	C	B4	6.900		2.0	-------gh
Sodium	01/21/93	C	B4	122.000	B	2.0	-------**
Vanadium	01/21/93	C	B4	1.200	B	2.0	-------gh
Zinc	01/21/93	C	B4	1.400	J	2.0	-------gh

SAMPLE ID: U3B101SB10

Metal (ppm)

Aluminum	01/21/93	C	B4	368.000		2.0	-------gh
Arsenic	01/21/93	C	B4	0.630	B	2.0	-------gh
Barium	01/21/93	C	B4	3.600	J	2.0	-------gh
Calcium	01/21/93	C	B4	762.000	B	2.0	-------**
Iron	01/21/93	C	B4	1090.000		2.0	-------**
Lead	01/21/93	C	B4	0.920	J	2.0	-------GH
Magnesium	01/21/93	C	B4	80.600	B	2.0	-------**
Manganese	01/21/93	C	B4	6.200		2.0	-------gh
Sodium	01/21/93	C	B4	136.000	B	2.0	-------**
Vanadium	01/21/93	C	B4	2.200	B	2.0	-------gh
Zinc	01/21/93	C	B4	2.100	J	2.0	-------gh

?LE ID: U3B101SB11

Metal (ppm)

Aluminum	01/20/93	C	B4	3240.000		2.0	-------gh
Arsenic	01/20/93	C	B4	8.800		2.0	-------gH
Barium	01/20/93	C	B4	10.100	J	2.0	-------gh
Calcium	01/20/93	C	B4	4000.000		2.0	-------**
Chromium	01/20/93	C	B4	6.500		2.0	-------gh
Copper	01/20/93	C	B4	1.800	B	2.0	-------gh
Iron	01/20/93	C	B4	3530.000		2.0	-------**
Lead	01/20/93	C	B4	2.700	J	2.0	-------GH
Magnesium	01/20/93	C	B4	469.000	B	2.0	-------**
Manganese	01/20/93	C	B4	16.600		2.0	-------gh
Potassium	01/20/93	C	B4	275.000	B	2.0	-------**
Sodium	01/20/93	C	B4	117.000	B	2.0	-------**
Vanadium	01/20/93	C	B4	6.500	B	2.0	-------gh
Zinc	01/20/93	C	B4	4.500	J	2.0	-------gh

SAMPLE ID: U3B101SB12

Metal (ppm)

Aluminum	01/20/93	C	B4	696.000		2.0	-------gh
Arsenic	01/20/93	C	B4	0.660	B	2.0	-------gh
Barium	01/20/93	C	B4	4.200	J	2.0	-------gh
Calcium	01/20/93	C	B4	37300.000		2.0	-------**
Chromium	01/20/93	C	B4	2.800		2.0	-------gh
Copper	01/20/93	C	B4	2.500	B	2.0	-------gh
Iron	01/20/93	C	B4	1200.000		2.0	-------**
Lead	01/20/93	C	B4	6.700	J	2.0	-------GH
Magnesium	01/20/93	C	B4	363.000	B	2.0	-------**
Manganese	01/20/93	C	B4	10.900		2.0	-------gh
Sodium	01/20/93	C	B4	167.000	B	2.0	-------**
Vanadium	01/20/93	C	B4	3.200	B	2.0	-------gh

Zinc	01/20/93	C	B4	7.300 J	2.0	-------gh
Pest/PCB (ppb)						
4,4'-DDE	01/20/93	C	B4	2.000 J	2.0	-------gh
4,4'-DDT	01/20/93	C	B4	4.000 J	2.0	-------gh
Dieldrin	01/20/93	C	B4	12.000 J	2.0	-------gl
SVOA (ppb)						
bis(2-Ethylhexyl)Phthalate	01/20/93	C	B4	57.000 J	2.0	-------gh
VOA (ppb)						
Chloroform	01/20/93	C	B4	2.000 J	2.0	-------gh

SAMPLE ID: U3B101SB12B

Metal (ppm)						
Aluminum	01/20/93	C	B4	630.000	5.5	-------gh
Arsenic	01/20/93	C	B4	0.660 B	5.5	-------gh
Barium	01/20/93	C	B4	4.800 J	5.5	-------gh
Calcium	01/20/93	C	B4	10900.000	5.5	-------**
Chromium	01/20/93	C	B4	5.000	5.5	-------gh
Copper	01/20/93	C	B4	6.700	5.5	-------gh
Iron	01/20/93	C	B4	1450.000	5.5	-------**
Lead	01/20/93	C	B4	15.800 J	5.5	-------GH
Magnesium	01/20/93	C	B4	188.000 B	5.5	-------**
Manganese	01/20/93	C	B4	11.900	5.5	-------gh
Mercury	01/20/93	C	B4	0.110 J	5.5	-------gh
Sodium	01/20/93	C	B4	201.000 B	5.5	-------**
Vanadium	01/20/93	C	B4	2.400 B	5.5	-------gh
Zinc	01/20/93	C	B4	15.700	5.5	-------gh

SAMPLE ID: U3B101SB13

Metal (ppm)						
Aluminum	01/24/93	C	C4	728.000	2.0	-------gh
Antimony	01/24/93	C	C4	2.800 J	2.0	-------**
Arsenic	01/24/93	C	C4	0.160	2.0	-------gh
Barium	01/24/93	C	C4	7.600 J	2.0	-------gh
Calcium	01/24/93	C	C4	180000.000 J	2.0	-------**
Chromium	01/24/93	C	C4	4.300 J	2.0	-------gh
Copper	01/24/93	C	C4	4.200 J	2.0	-------gh
Iron	01/24/93	C	C4	575.000	2.0	-------**
Lead	01/24/93	C	C4	3.500	2.0	-------GH
Magnesium	01/24/93	C	C4	1030.000 B	2.0	-------**
Manganese	01/24/93	C	C4	17.900 J	2.0	-------gh
Potassium	01/24/93	C	C4	106.000 B	2.0	-------**
Sodium	01/24/93	C	C4	232.000 B	2.0	-------**
Vanadium	01/24/93	C	C4	4.300 J	2.0	-------gh
Zinc	01/24/93	C	C4	6.200 J	2.0	-------gh
Pest/PCB (ppb)						
Dieldrin	01/24/93	C	C4	1.200 JP	2.0	-------gh

SAMPLE ID: U3P159SB01

Metal (ppm)						
Aluminum	01/26/93	C	A6	687.000	3.0	-------gh
Arsenic	01/26/93	C	A6	1.100 B	3.0	-------c
Barium	01/26/93	C	A6	4.000 J	3.0	-------[illegible]
Calcium	01/26/93	C	A6	604.000 J	3.0	-------**
Chromium	01/26/93	C	A6	2.200 J	3.0	-------gh
Copper	01/26/93	C	A6	2.200 J	3.0	-------gh
Iron	01/26/93	C	A6	1760.000	3.0	-------**

Lead	01/26/93	C	A6	1.600	3.0	-------GH
Magnesium	01/26/93	C	A6	138.000 B	3.0	-------**
Manganese	01/26/93	C	A6	5.300 J	3.0	-------gh
Potassium	01/26/93	C	A6	147.000 B	3.0	-------**
Sodium	01/26/93	C	A6	167.000 B	3.0	-------**
Vanadium	01/26/93	C	A6	2.900 J	3.0	-------gh
Zinc	01/26/93	C	A6	5.600 J	3.0	-------gh

SAMPLE ID: U3P159SB02

Metal (ppm)						
Aluminum	01/25/93	C	A6	106.000	3.0	-------gh
Barium	01/25/93	C	A6	2.200 J	3.0	-------gh
Calcium	01/25/93	C	A6	7590.000 J	3.0	-------**
Chromium	01/25/93	C	A6	2.400 J	3.0	-------gh
Copper	01/25/93	C	A6	1.500 J	3.0	-------gh
Iron	01/25/93	C	A6	191.000	3.0	-------**
Lead	01/25/93	C	A6	0.460 B	3.0	-------GH
Magnesium	01/25/93	C	A6	70.700 B	3.0	-------**
Manganese	01/25/93	C	A6	2.200 J	3.0	-------gh
Sodium	01/25/93	C	A6	139.000 B	3.0	-------**
Zinc	01/25/93	C	A6	1.600 J	3.0	-------gh

SAMPLE ID: U3P159SB03

Metal (ppm)						
Aluminum	01/26/93	C	B6	222.000	3.0	-------gh
Arsenic	01/26/93	C	B6	0.260 B	3.0	-------gh
Barium	01/26/93	C	B6	3.000 J	3.0	-------gh
Calcium	01/26/93	C	B6	219.000 J	3.0	-------**
Chromium	01/26/93	C	B6	1.700 J	3.0	-------gh
Copper	01/26/93	C	B6	1.700 J	3.0	-------gh
Iron	01/26/93	C	B6	620.000	3.0	-------**
Lead	01/26/93	C	B6	0.820	3.0	-------GH
Magnesium	01/26/93	C	B6	34.100 B	3.0	-------**
Manganese	01/26/93	C	B6	3.100 J	3.0	-------gh
Potassium	01/26/93	C	B6	52.300 B	3.0	-------**
Sodium	01/26/93	C	B6	163.000 B	3.0	-------**
Vanadium	01/26/93	C	B6	1.300 J	3.0	-------gh
Zinc	01/26/93	C	B6	3.000 J	3.0	-------gh
SVOA (ppb)						
Diethylphthalate	01/26/93	C	B6	110.000 J	3.0	-------gh

SAMPLE ID: U3P159SB04

Anion (ppm)						
Cyanide	01/25/93	C	C5	3.400	3.0	-------**
Metal (ppm)						
Aluminum	01/25/93	C	C5	75.500	3.0	-------gh
Barium	01/25/93	C	C5	2.200 J	3.0	-------gh
Calcium	01/25/93	C	C5	256.000 J	3.0	-------**
Chromium	01/25/93	C	C5	1.900 J	3.0	-------gh
Copper	01/25/93	C	C5	2.700 J	3.0	-------gh
Iron	01/25/93	C	C5	115.000	3.0	-------**
Lead	01/25/93	C	C5	0.930	3.0	-------GH
Magnesium	01/25/93	C	C5	30.000 B	3.0	-------**
Manganese	01/25/93	C	C5	2.000 J	3.0	-------gh
Sodium	01/25/93	C	C5	161.000 B	3.0	-------**
Vanadium	01/25/93	C	C5	0.540 J	3.0	-------gh
Zinc	01/25/93	C	C5	2.700 J	3.0	-------gh

Pest/PCB (ppb)						
4,4'-DDD	01/25/93	C	C5	1.600 JP	3.0	-------gh
SVOA (ppb)						
2-Methylnaphthalene	01/25/93	C	C5	210.000 J	3.0	-------*
Fluoranthene	01/25/93	C	C5	59.000 J	3.0	-------gh
Naphthalene	01/25/93	C	C5	380.000	3.0	-------gh
Pyrene	01/25/93	C	C5	60.000 J	3.0	-------gh
VOA (ppb)						
Acetone	01/25/93	C	C5	38.000	3.0	-------gh

SAMPLE ID: U3P159SB05

Metal (ppm)						
Aluminum	01/23/93	C	B4	320.000	3.0	-------gh
Arsenic	01/23/93	C	B4	0.230 B	3.0	-------gh
Barium	01/23/93	C	B4	2.200 J	3.0	-------gh
Calcium	01/23/93	C	B4	239.000 B	3.0	-------**
Chromium	01/23/93	C	B4	1.800 B	3.0	-------gh
Iron	01/23/93	C	B4	388.000	3.0	-------**
Lead	01/23/93	C	B4	0.720 J	3.0	-------GH
Magnesium	01/23/93	C	B4	56.800 B	3.0	-------**
Manganese	01/23/93	C	B4	6.900	3.0	-------gh
Sodium	01/23/93	C	B4	115.000 B	3.0	-------**
Vanadium	01/23/93	C	B4	0.480 B	3.0	-------gh
Zinc	01/23/93	C	B4	1.700 J	3.0	-------gh

SAMPLE ID: U3P159SB06

Metal (ppm)						
Aluminum	01/23/93	C	C4	102.000	3.0	-------gh
Arsenic	01/23/93	C	C4	0.200 B	3.0	-------gh
Barium	01/23/93	C	C4	1.600 J	3.0	-------gh
Calcium	01/23/93	C	C4	338.000 B	3.0	-------**
Iron	01/23/93	C	C4	270.000	3.0	-------**
Lead	01/23/93	C	C4	0.790 J	3.0	-------GH
Magnesium	01/23/93	C	C4	27.000 B	3.0	-------**
Manganese	01/23/93	C	C4	2.900 B	3.0	-------gh
Sodium	01/23/93	C	C4	113.000 B	3.0	-------**
Zinc	01/23/93	C	C4	0.890 J	3.0	-------gh
VOA (ppb)						
2-Butanone	01/23/93	C	C4	3.000 J	3.0	-------gh

SAMPLE ID: U3P159SB07

Metal (ppm)						
Aluminum	01/22/93	C	C4	182.000	3.0	-------gh
Arsenic	01/22/93	C	C4	0.320 B	3.0	-------gh
Barium	01/22/93	C	C4	3.100 J	3.0	-------gh
Calcium	01/22/93	C	C4	2260.000	3.0	-------**
Chromium	01/22/93	C	C4	1.000 B	3.0	-------gh
Iron	01/22/93	C	C4	771.000	3.0	-------**
Lead	01/22/93	C	C4	1.200 J	3.0	-------GH
Magnesium	01/22/93	C	C4	61.800 B	3.0	-------**
Manganese	01/22/93	C	C4	5.200	3.0	-------
Sodium	01/22/93	C	C4	156.000 B	3.0	-------
Vanadium	01/22/93	C	C4	0.790 B	3.0	-------gh
Zinc	01/22/93	C	C4	1.000 J	3.0	-------gh

SAMPLE ID: U3P159SB08

Metal (ppm)							
Aluminum	01/25/93	C	A6	116.000		3.0	-------gh
Arsenic	01/25/93	C	A6	0.490	B	3.0	-------gh
Barium	01/25/93	C	A6	2.100	J	3.0	-------gh
Calcium	01/25/93	C	A6	403.000	J	3.0	-------**
Copper	01/25/93	C	A6	2.500	J	3.0	-------gh
Iron	01/25/93	C	A6	391.000		3.0	-------**
Lead	01/25/93	C	A6	0.770		3.0	-------GH
Magnesium	01/25/93	C	A6	39.400	B	3.0	-------**
Manganese	01/25/93	C	A6	3.400	J	3.0	-------gh
Sodium	01/25/93	C	A6	171.000	B	3.0	-------**
Vanadium	01/25/93	C	A6	0.670	J	3.0	-------gh
Zinc	01/25/93	C	A6	1.800	J	3.0	-------gh

SAMPLE ID: U3P159SB09

Metal (ppm)							
Aluminum	01/26/93	C	A6	1320.000		3.0	-------gh
Arsenic	01/26/93	C	A6	1.300	B	3.0	-------gh
Barium	01/26/93	C	A6	7.700	J	3.0	-------gh
Calcium	01/26/93	C	A6	499.000	J	3.0	-------**
Chromium	01/26/93	C	A6	3.100	J	3.0	-------gh
Copper	01/26/93	C	A6	2.600	J	3.0	-------gh
Iron	01/26/93	C	A6	2250.000		3.0	-------**
Lead	01/26/93	C	A6	2.700		3.0	-------GH
Magnesium	01/26/93	C	A6	156.000	B	3.0	-------**
Manganese	01/26/93	C	A6	6.100	J	3.0	-------gh
Potassium	01/26/93	C	A6	177.000	B	3.0	-------**
Selenium	01/26/93	C	A6	0.210	B	3.0	-------gh
Sodium	01/26/93	C	A6	170.000	B	3.0	-------**
Vanadium	01/26/93	C	A6	3.100	J	3.0	-------gh
Zinc	01/26/93	C	A6	4.900	J	3.0	-------gh
SVOA (ppb)							
Diethylphthalate	01/26/93	C	A6	140.000	J	3.0	-------gh

SAMPLE ID: U3P159SB10

Metal (ppm)							
Aluminum	01/24/93	C	B4	151.000		3.0	-------gh
Arsenic	01/24/93	C	B4	0.170	B	3.0	-------gh
Barium	01/24/93	C	B4	4.200	J	3.0	-------gh
Calcium	01/24/93	C	B4	3370.000	J	3.0	-------**
Copper	01/24/93	C	B4	2.800	J	3.0	-------gh
Iron	01/24/93	C	B4	309.000		3.0	-------**
Lead	01/24/93	C	B4	0.880		3.0	-------GH
Magnesium	01/24/93	C	B4	86.200	B	3.0	-------**
Manganese	01/24/93	C	B4	5.600	J	3.0	-------gh
Sodium	01/24/93	C	B4	142.000	B	3.0	-------**
Vanadium	01/24/93	C	B4	0.890	J	3.0	-------gh
Zinc	01/24/93	C	B4	2.400	J	3.0	-------gh
Pest/PCB (ppb)							
4,4'-DDD	01/24/93	C	B4	2.000	J	3.0	-------gh
4,4'-DDE	01/24/93	C	B4	0.690	J	3.0	-------gh
VOA (ppb)							
Acetone	01/24/93	C	B4	55.000		3.0	-------gh

SAMPLE ID: U3P159SB11

Metal (ppm)

Aluminum	01/24/93	C	C4	251.000	3.0	-------gh
Barium	01/24/93	C	C4	3.100 J	3.0	-------gh
Calcium	01/24/93	C	C4	685.000 J	3.0	-------**
Chromium	01/24/93	C	C4	1.800 J	3.0	-------gh
Copper	01/24/93	C	C4	2.500 J	3.0	-------gh
Iron	01/24/93	C	C4	385.000	3.0	-------**
Lead	01/24/93	C	C4	2.000	3.0	-------GH
Magnesium	01/24/93	C	C4	75.000 B	3.0	-------**
Manganese	01/24/93	C	C4	3.100 J	3.0	-------gh
Potassium	01/24/93	C	C4	73.900 B	3.0	-------**
Sodium	01/24/93	C	C4	159.000 B	3.0	-------**
Vanadium	01/24/93	C	C4	1.100 J	3.0	-------gh
Zinc	01/24/93	C	C4	2.900 J	3.0	-------gh
VOA (ppb)						
2-Butanone	01/24/93	C	C4	11.000	3.0	-------gh
Acetone	01/24/93	C	C4	85.000	3.0	-------gh
Ethylbenzene	01/24/93	C	C4	10.000 J	3.0	-------gh
Tetrachloroethene	01/24/93	C	C4	25.000	3.0	-------gh
Toluene	01/24/93	C	C4	6.000 J	3.0	-------gh
Xylene (total)	01/24/93	C	C4	170.000	3.0	-------gh

SAMPLE ID: U3P159SB12

Metal (ppm)						
Aluminum	01/24/93	C	C5	614.000	3.0	-------gh
Antimony	01/24/93	C	C5	3.000 J	3.0	-------**
Arsenic	01/24/93	C	C5	0.890 B	3.0	-------gh
Barium	01/24/93	C	C5	5.300 J	3.0	-------gh
Calcium	01/24/93	C	C5	42000.000 J	3.0	-------**
Chromium	01/24/93	C	C5	3.100 J	3.0	-------gh
Copper	01/24/93	C	C5	2.800 J	3.0	-------gh
Iron	01/24/93	C	C5	724.000	3.0	-------*
Lead	01/24/93	C	C5	6.500	3.0	-------GH
Magnesium	01/24/93	C	C5	345.000 B	3.0	-------**
Manganese	01/24/93	C	C5	12.600 J	3.0	-------gh
Potassium	01/24/93	C	C5	120.000 B	3.0	-------**
Sodium	01/24/93	C	C5	165.000 B	3.0	-------**
Vanadium	01/24/93	C	C5	2.800 J	3.0	-------gh
Zinc	01/24/93	C	C5	10.400	3.0	-------gh
Pest/PCB (ppb)						
4,4'-DDD	01/24/93	C	C5	25.000	3.0	-------gh
4,4'-DDE	01/24/93	C	C5	14.000 JP	3.0	-------gh
SVOA (ppb)						
2-Methylnaphthalene	01/24/93	C	C5	130.000 J	3.0	-------**
Acenaphthene	01/24/93	C	C5	93.000 J	3.0	-------**
Anthracene	01/24/93	C	C5	39.000 J	3.0	-------**
Benzo(a)Anthracene	01/24/93	C	C5	92.000 J	3.0	-------gh
Benzo(a)Pyrene	01/24/93	C	C5	390.000	3.0	-------gH
Benzo(b)Fluoranthene	01/24/93	C	C5	540.000	3.0	-------gh
bis(2-Ethylhexyl)Phthalate	01/24/93	C	C5	80.000 J	3.0	-------gh
Carbazole	01/24/93	C	C5	81.000 J	3.0	-------gh
Chrysene	01/24/93	C	C5	330.000 J	3.0	-------**
Dibenzofuran	01/24/93	C	C5	83.000 J	3.0	-------**
Fluoranthene	01/24/93	C	C5	400.000	3.0	-------gh
Fluorene	01/24/93	C	C5	180.000 J	3.0	-------gh
Naphthalene	01/24/93	C	C5	520.000	3.0	-------gh
Phenanthrene	01/24/93	C	C5	800.000	3.0	-------g
Pyrene	01/24/93	C	C5	450.000	3.0	-------g
VOA (ppb)						
2-Butanone	01/24/93	C	C5	25.000 J	3.0	-------gh
Ethylbenzene	01/24/93	C	C5	40.000 J	3.0	-------gh

Tetrachloroethene	01/24/93	C	C5	110.000 J	3.0	-------gh
Toluene	01/24/93	C	C5	27.000 J	3.0	-------gh
Xylene (total)	01/24/93	C	C5	400.000 DJ	3.0	-------gh

SAMPLE ID: U3PZ00201

Metal (ppm)						
Arsenic	08/03/93	A	G7	18.000	1.0	-------gH
Chromium	08/03/93	A	G7	2.000	1.0	-------gh
Lead	08/03/93	A	G7	12.000	1.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/03/93	A	G7	3126.000	1.0	-------**
VOA (ppb)						
Benzene	08/03/93	A	G7	1200.000 E	1.0	-------gh
Ethylbenzene	08/03/93	A	G7	4300.000 E	1.0	-------gh
m/p-Xylene	08/03/93	A	G7	2800.000 E	1.0	-------gh
o-Xylene	08/03/93	A	G7	1400.000 E	1.0	-------gh
Unknown HC as o-Xylene	08/03/93	A	G7	79000.000	1.0	-------**

SAMPLE ID: U3PZ00202

Metal (ppm)						
Arsenic	08/03/93	A	G7	22.000	3.0	-------gH
Chromium	08/03/93	A	G7	2.000	3.0	-------gh
Lead	08/03/93	A	G7	14.000	3.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/03/93	A	G7	99.000	3.0	-------**
VOA (ppb)						
Ethylbenzene	08/03/93	A	G7	18.000	3.0	-------gh

SAMPLE ID: U3PZ00203

Metal (ppm)						
Chromium	08/03/93	A	G7	6.000	5.0	-------gh
Lead	08/03/93	A	G7	6.000	5.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/03/93	A	G7	102.000	5.0	-------**
VOA (ppb)						
Benzene	08/03/93	A	G7	290.000 E	5.0	-------gh
Ethylbenzene	08/03/93	A	G7	820.000 E	5.0	-------gh
m/p-Xylene	08/03/93	A	G7	510.000 E	5.0	-------gh
o-Xylene	08/03/93	A	G7	260.000 E	5.0	-------gh
Toluene	08/03/93	A	G7	26.000	5.0	-------gh
Unknown HC as o-Xylene	08/03/93	A	G7	14000.000	5.0	-------**

SAMPLE ID: U3PZ00301

Metal (ppm)						
Arsenic	08/10/93	A	C7	26.000	1.0	-------gH
Lead	08/10/93	A	C7	2.000	1.0	-------GH

SAMPLE ID: U3PZ00302

Metal (ppm)						
Arsenic	08/10/93	A	C7	32.000	3.0	-------GH

Lead	08/10/93	A	C7	2.000	3.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/10/93	A	C7	266.000	3.0	-------**

SAMPLE ID: U3PZ00303

Metal (ppm)						
Arsenic	08/10/93	A	C7	36.000	5.0	-------GH
Chromium	08/10/93	A	C7	2.000	5.0	-------gh
Lead	08/10/93	A	C7	2.000	5.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/10/93	A	C7	220.000	5.0	-------**
VOA (ppb)						
Ethylbenzene	08/10/93	A	C7	1200.000	5.0	-------gh
m/p-Xylene	08/10/93	A	C7	380.000 E	5.0	-------gh
o-Xylene	08/10/93	A	C7	260.000 E	5.0	-------gh
Unknown HC as o-Xylene	08/10/93	A	C7	32000.000	5.0	-------**

SAMPLE ID: U3PZ00501

Metal (ppm)						
Chromium	08/12/93	A	D5	4.000	1.0	-------gh
Lead	08/12/93	A	D5	2.000	1.0	-------GH
Nickel	08/12/93	A	D5	2.000	1.0	-------gh

SAMPLE ID: U3PZ00502

Metal (ppm)						
Chromium	08/12/93	A	D5	4.000	3.0	-------gh

SAMPLE ID: U3PZ00503

Metal (ppm)						
Chromium	08/12/93	A	D5	2.000	5.0	-------gh
TPH (ppm)						
Total Petroleum Hydrocarbons	08/12/93	A	D5	60.000	5.0	-------**

SAMPLE ID: U3PZ00701

Metal (ppm)						
Arsenic	08/02/93	A	G5	98.000	1.0	-------GH
Chromium	08/02/93	A	G5	12.000	1.0	-------gh
Lead	08/02/93	A	G5	12.000	1.0	-------GH
Nickel	08/02/93	A	G5	6.000	1.0	-------gh
TPH (ppm)						
Total Petroleum Hydrocarbons	08/02/93	A	G5	59.000	1.0	-------**

SAMPLE ID: U3PZ00702

Metal (ppm)						
Arsenic	08/02/93	A	G5	4.000	3.0	-------g
Chromium	08/02/93	A	G5	12.000	3.0	-------gh
Lead	08/02/93	A	G5	6.000	3.0	-------GH
Nickel	08/02/93	A	G5	6.000	3.0	-------gh

SAMPLE ID: U3PZ00703

Anion (ppm)						
Cyanide	08/02/93	B	G5	0.260 B	5.0	-------**
Metal (ppm)						
Aluminum	08/02/93	B	G5	5650.000	5.0	-------gh
Arsenic	08/02/93	B	G5	2.100 B	5.0	-------gh
Barium	08/02/93	B	G5	24.900 B	5.0	-------gh
Beryllium	08/02/93	B	G5	0.270 B	5.0	-------gh
Calcium	08/02/93	B	G5	823.000 B	5.0	-------**
Chromium	08/02/93	A	G5	10.000	5.0	-------gh
Chromium	08/02/93	B	G5	8.400	5.0	-------gh
Copper	08/02/93	B	G5	1.600 B	5.0	-------gh
Iron	08/02/93	B	G5	1850.000	5.0	-------**
Lead	08/02/93	A	G5	8.000	5.0	-------GH
Lead	08/02/93	B	G5	8.100	5.0	-------GH
Magnesium	08/02/93	B	G5	459.000 B	5.0	-------**
Manganese	08/02/93	B	G5	2.200 B	5.0	-------gh
Nickel	08/02/93	A	G5	4.000	5.0	-------gh
Potassium	08/02/93	B	G5	223.000 B	5.0	-------**
Sodium	08/02/93	B	G5	37.200 B	5.0	-------**
Vanadium	08/02/93	B	G5	13.500	5.0	-------gh
Zinc	08/02/93	B	G5	2.400 B	5.0	-------gh
SVOA (ppb)						
Di-n-Butylphthalate	08/02/93	B	G5	2000.000 B	5.0	-------gh
VOA (ppb)						
Acetone	08/02/93	B	G5	43.000	5.0	-------gh
Methylene Chloride	08/02/93	B	G5	14.000	5.0	-------gh

SAMPLE ID: U3PZ00704

Metal (ppm)						
Chromium	08/02/93	A	G5	10.000	7.0	-------gh
Lead	08/02/93	A	G5	6.000	7.0	-------GH
Nickel	08/02/93	A	G5	4.000	7.0	-------gh

SAMPLE ID: U3PZ00705

Metal (ppm)						
Chromium	08/02/93	A	G5	12.000	9.0	-------gh
Lead	08/02/93	A	G5	4.000	9.0	-------GH
Nickel	08/02/93	A	G5	6.000	9.0	-------gh

SAMPLE ID: U3PZ00901

Metal (ppm)						
Arsenic	08/14/93	A	E7	110.000	1.0	-------GH
Lead	08/14/93	A	E7	38.000	1.0	-------GH

SAMPLE ID: U3PZ00902

Metal (ppm)						
Lead	08/14/93	A	E7	8.000	3.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/14/93	A	E7	118.000	3.0	-------**

SAMPLE ID: U3PZ00903

Metal (ppm)						
Arsenic	08/14/93	A	E7	24.000	5.0	-------gH
Lead	08/14/93	A	E7	22.000	5.0	-------GI
TPH (ppm)						
Total Petroleum Hydrocarbons	08/14/93	A	E7	63.000	5.0	-------**

SAMPLE ID: U3PZ00904

Metal (ppm)						
Arsenic	08/14/93	A	E7	8.000	7.0	-------gH
Lead	08/14/93	A	E7	4.000	7.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/14/93	A	E7	59.000	7.0	-------**

SAMPLE ID: U3PZ01101

Metal (ppm)						
Arsenic	08/18/93	A	F6	8.000	1.0	-------gH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/18/93	A	F6	224.000	1.0	-------**

SAMPLE ID: U3PZ01102

Metal (ppm)						
Chromium	08/18/93	A	F6	8.000	3.0	-------g
Lead	08/18/93	A	F6	4.000	3.0	-------GH

SAMPLE ID: U3PZ01103

Metal (ppm)						
Chromium	08/18/93	A	F6	4.000	5.0	-------gh
Lead	08/18/93	A	F6	4.000	5.0	-------GH

SAMPLE ID: U3PZ01104

Metal (ppm)						
Chromium	08/18/93	A	F6	10.000	7.0	-------gh

SAMPLE ID: U3PZ01301

Metal (ppm)						
Aluminum	08/24/93	B	C6	7010.000	1.0	-------gh
Arsenic	08/24/93	A	C6	2.000	1.0	-------gh
Calcium	08/24/93	B	C6	1890.000	1.0	-------**
Chromium	08/24/93	B	C6	13.300	1.0	-------gh
Iron	08/24/93	B	C6	6270.000	1.0	-------**
Lead	08/24/93	A	C6	10.000	1.0	-------GH
Manganese	08/24/93	B	C6	16.100	1.0	-------gh
Vanadium	08/24/93	B	C6	14.800	1.0	-------gh
Zinc	08/24/93	B	C6	8.700	1.0	-------(

SAMPLE ID: U3PZ01302

Metal (ppm)

Lead	08/24/93	A	C6	2.000	3.0	-------GH
VOA (ppb)						
m/p-Xylene	08/24/93	A	C6	21.000	3.0	-------gh
o-Xylene	08/24/93	A	C6	21.000	3.0	-------gh
Toluene	08/24/93	A	C6	68.000	3.0	-------gh

SAMPLE ID: U3PZ01303

Metal (ppm)						
Arsenic	08/24/93	A	C6	18.000	5.0	-------gH
Lead	08/24/93	A	C6	6.000	5.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/24/93	A	C6	178.000	5.0	-------**
VOA (ppb)						
Ethylbenzene	08/24/93	A	C6	1100.000 E	5.0	-------gh
m/p-Xylene	08/24/93	A	C6	2200.000 E	5.0	-------gh
o-Xylene	08/24/93	A	C6	940.000 E	5.0	-------gh
Toluene	08/24/93	A	C6	12000.000 E	5.0	-------gh
Unknown HC as o-Xylene	08/24/93	A	C6	140000.000	5.0	-------**

SAMPLE ID: U3PZ01304

Metal (ppm)						
Arsenic	08/24/93	A	C6	16.000	7.0	-------gH
Lead	08/24/93	A	C6	6.000	7.0	-------GH
TPH (ppm)						
Total Petroleum Hydrocarbons	08/24/93	A	C6	3856.000	7.0	-------**
VOA (ppb)						
Benzene	08/24/93	A	C6	130.000	7.0	-------gh
Ethylbenzene	08/24/93	A	C6	890.000 E	7.0	-------gh
m/p-Xylene	08/24/93	A	C6	2300.000 E	7.0	-------gh
o-Xylene	08/24/93	A	C6	1200.000 E	7.0	-------gh
Toluene	08/24/93	A	C6	15000.000 E	7.0	-------gh
Unknown HC as o-Xylene	08/24/93	A	C6	130000.000	7.0	-------**

SAMPLE ID: U3PZ01501

Metal (ppm)						
Lead	08/24/93	A	I6	2.000	1.0	-------GH

SAMPLE ID: U3PZ01502

Metal (ppm)						
Arsenic	08/24/93	A	I6	24.000	3.0	-------gH
Chromium	08/24/93	A	I6	20.000	3.0	-------gh
Lead	08/24/93	A	I6	2.000	3.0	-------GH
Nickel	08/24/93	A	I6	2.000	3.0	-------gh

SAMPLE ID: U3PZ01503

Metal (ppm)						
Arsenic	08/24/93	A	I6	32.000	5.0	-------GH
Chromium	08/24/93	A	I6	4.000	5.0	-------gh
Lead	08/24/93	A	I6	4.000	5.0	-------GH

SAMPLE ID: U3PZ01601

Metal (ppm)						
Arsenic	08/25/93	A	F4	4.000	1.0	-------gF
Chromium	08/25/93	A	F4	2.000	1.0	-------g
Lead	08/25/93	A	F4	6.000	1.0	-------GH

SAMPLE ID: U3PZ01602

Metal (ppm)						
Arsenic	08/25/93	A	F4	4.000	3.0	-------gH
Lead	08/25/93	A	F4	4.000	3.0	-------GH

SAMPLE ID: U3PZ01603

Metal (ppm)						
Chromium	08/25/93	A	F4	2.000	5.0	-------gh

SAMPLE ID: U3PZ02001

Metal (ppm)						
Arsenic	08/26/93	A	E3	22.000	1.0	-------gH
Lead	08/26/93	A	E3	2.000	1.0	-------GH

SAMPLE ID: U3PZ02002

Metal (ppm)						
Iron	08/26/93	B	E3	543.000	3.0	-------**
Lead	08/26/93	A	E3	2.000	3.0	-------G
Lead	08/26/93	B	E3	1.160	3.0	-------GH
Selenium	08/26/93	B	E3	1.800	3.0	-------gh
SVOA (ppb)						
Di-n-Butylphthalate	08/26/93	B	E3	170.000 BJ	3.0	-------gh
VOA (ppb)						
Acetone	08/26/93	B	E3	44.000	3.0	-------gh

SAMPLE ID: U3PZ02003

Metal (ppm)						
Lead	08/26/93	A	E3	4.000	5.0	-------GH

SAMPLE ID: U3PZ02201

Metal (ppm)						
Arsenic	08/27/93	A	C3	4.000	1.0	-------gH
Lead	08/27/93	A	C3	10.000	1.0	-------GH

SAMPLE ID: U3PZ02202

Metal (ppm)						
Lead	08/27/93	A	C3	4.000	3.0	-------G

SAMPLE ID: U3PZ02301

Metal (ppm)						
Arsenic	08/27/93	A	A3	22.000	1.0	-------gH

Chromium	08/27/93	A	A3	28.000	1.0	-------gh
Lead	08/27/93	A	A3	16.000	1.0	-------GH

PLE ID: U3PZ02302

Metal (ppm)						
Arsenic	08/27/93	A	A3	200.000	3.0	-------GH
Chromium	08/27/93	A	A3	6.000	3.0	-------gh
Lead	08/27/93	A	A3	8.000	3.0	-------GH

SAMPLE ID: U3PZ02501

Metal (ppm)						
Chromium	08/28/93	A	C2	2.000	1.0	-------gh

SAMPLE ID: U3PZ02502

Metal (ppm)						
Aluminum	08/28/93	B	C2	460.000	3.0	-------gh
Arsenic	08/28/93	B	C2	2.290	3.0	-------gh
Chromium	08/28/93	B	C2	2.290	3.0	-------gh
Iron	08/28/93	B	C2	22.900	3.0	-------**
Lead	08/28/93	A	C2	2.000	3.0	-------GH
Lead	08/28/93	B	C2	0.670	3.0	-------GH
Manganese	08/28/93	B	C2	3.430	3.0	-------gh
Vanadium	08/28/93	B	C2	11.400	3.0	-------gh
Zinc	08/28/93	B	C2	4.580	3.0	-------gh
SVOA (ppb)						
Benzo(a)Anthracene	08/28/93	B	C2	100.000 J	3.0	-------gh
Benzo(a)Pyrene	08/28/93	B	C2	97.000 J	3.0	-------gh
Benzo(b)Fluoranthene	08/28/93	B	C2	130.000 J	3.0	-------gh
Benzo(g,h,i)Perylene	08/28/93	B	C2	74.000 J	3.0	-------gh
Benzo(k)Fluoranthene	08/28/93	B	C2	120.000 J	3.0	-------gh
Chrysene	08/28/93	B	C2	110.000 J	3.0	-------**
Di-n-Butylphthalate	08/28/93	B	C2	270.000 BJ	3.0	-------gh
Fluoranthene	08/28/93	B	C2	80.000 J	3.0	-------gh
Indeno(1,2,3-cd)Pyrene	08/28/93	B	C2	67.000 J	3.0	-------gh
Pyrene	08/28/93	B	C2	78.000 J	3.0	-------gh

SAMPLE ID: U3PZ02701

Metal (ppm)						
Aluminum	08/30/93	B	A6	450.000	1.0	-------gh
Calcium	08/30/93	B	A6	1140.000	1.0	-------**
Chromium	08/30/93	B	A6	2.270	1.0	-------gh
Iron	08/30/93	B	A6	230.000	1.0	-------**
Lead	08/30/93	A	A6	4.000	1.0	-------GH
Manganese	08/30/93	B	A6	3.410	1.0	-------gh
Pest/PCB (ppb)						
4,4'-DDD	08/30/93	B	A6	8.000	1.0	-------gh
4,4'-DDE	08/30/93	B	A6	9.800	1.0	-------gh
SVOA (ppb)						
Di-n-Butylphthalate	08/30/93	B	A6	280.000 BJ	1.0	-------gh
TPH (ppm)						
Total Petroleum Hydrocarbons	08/30/93	A	A6	715.000	1.0	-------**
VOA (ppb)						
Acetone	08/30/93	B	A6	9.000 J	1.0	-------gh

SAMPLE ID: U3PZ02702

Metal (ppm)						
Chromium	08/30/93	A	A6	4.000	3.0	-------g

SAMPLE ID: U3PZ02704

Metal (ppm)						
Chromium	08/30/93	A	A6	6.000	7.0	-------gh

SAMPLE ID: U3SB01

Metal (ppm)						
Aluminum	03/09/92	D	G5	5330.000	3.0	-------gh
Barium	03/09/92	D	G5	11.600 B	3.0	-------gh
Beryllium	03/09/92	D	G5	0.230 J	3.0	-------gh
Calcium	03/09/92	D	G5	615.000 B	3.0	-------**
Chromium	03/09/92	D	G5	8.600	3.0	-------gh
Cobalt	03/09/92	D	G5	4.500 J	3.0	-------**
Copper	03/09/92	D	G5	1.900 J	3.0	-------gh
Iron	03/09/92	D	G5	2240.000	3.0	-------**
Lead	03/09/92	D	G5	2.600	3.0	-------GH
Magnesium	03/09/92	D	G5	253.000 B	3.0	-------**
Manganese	03/09/92	D	G5	5.400	3.0	-------gh
Potassium	03/09/92	D	G5	292.000 B	3.0	-------*
Sodium	03/09/92	D	G5	174.000 B	3.0	-------**
Vanadium	03/09/92	D	G5	12.900	3.0	-------gh
Zinc	03/09/92	D	G5	4.000 J	3.0	-------gh
Pest/PCB (ppb)						
alpha-Chlordane	03/09/92	D	G5	7.000 J	3.0	-------**
gamma-Chlordane	03/09/92	D	G5	7.100	3.0	-------**
SVOA (ppb)						
Di-n-Butylphthalate	03/09/92	D	G5	63.000 J	3.0	-------gh

SAMPLE ID: U3SB02

Metal (ppm)						
Aluminum	03/09/92	D	G5	3480.000	3.0	-------gh
Barium	03/09/92	D	G5	20.700 B	3.0	-------gh
Calcium	03/09/92	D	G5	3100.000	3.0	-------**
Chromium	03/09/92	D	G5	16.800	3.0	-------gh
Copper	03/09/92	D	G5	0.990 J	3.0	-------gh
Iron	03/09/92	D	G5	1810.000	3.0	-------**
Lead	03/09/92	D	G5	3.700	3.0	-------GH
Magnesium	03/09/92	D	G5	177.000 B	3.0	-------**
Manganese	03/09/92	D	G5	3.700	3.0	-------gh
Potassium	03/09/92	D	G5	229.000 B	3.0	-------**
Sodium	03/09/92	D	G5	178.000 B	3.0	-------**
Vanadium	03/09/92	D	G5	11.400 B	3.0	-------gh
Zinc	03/09/92	D	G5	4.000 J	3.0	-------gh
Pest/PCB (ppb)						
alpha-Chlordane	03/09/92	D	G5	13.000	3.0	-------**
delta-BHC	03/09/92	D	G5	0.680 J	3.0	-------**
gamma-Chlordane	03/09/92	D	G5	12.000	3.0	-------*
SVOA (ppb)						
Di-n-Butylphthalate	03/09/92	D	G5	100.000 J	3.0	-------gh

VOA (ppb)							
2-Butanone	03/09/92	D	G5	3.000	J	3.0	-------gh
LE ID: U3SB03							
Metal (ppm)							
Aluminum	03/09/92	D	G4	6870.000		2.0	-------gh
Barium	03/09/92	D	G4	17.000	B	2.0	-------gh
Calcium	03/09/92	D	G4	168.000	B	2.0	-------**
Chromium	03/09/92	D	G4	8.100		2.0	-------gh
Copper	03/09/92	D	G4	1.400	J	2.0	-------gh
Iron	03/09/92	D	G4	2630.000		2.0	-------**
Lead	03/09/92	D	G4	5.200		2.0	-------GH
Magnesium	03/09/92	D	G4	350.000	B	2.0	-------**
Manganese	03/09/92	D	G4	4.200		2.0	-------gh
Potassium	03/09/92	D	G4	355.000	B	2.0	-------**
Sodium	03/09/92	D	G4	174.000	B	2.0	-------**
Vanadium	03/09/92	D	G4	14.100		2.0	-------gh
Zinc	03/09/92	D	G4	5.060	J	2.0	-------gh
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G4	74.000	J	2.0	-------gh
VOA (ppb)							
Acetone	03/09/92	D	G4	13.000	J	2.0	-------gh
SAMPLE ID: U3SB04							
Metal (ppm)							
Aluminum	03/09/92	D	G4	5830.000		3.5	-------gh
Arsenic	03/09/92	D	G4	3.200		3.5	-------gH
Barium	03/09/92	D	G4	10.000	B	3.5	-------gh
Calcium	03/09/92	D	G4	3040.000		3.5	-------**
Chromium	03/09/92	D	G4	9.800		3.5	-------gh
Copper	03/09/92	D	G4	1.400	J	3.5	-------gh
Iron	03/09/92	D	G4	4400.000		3.5	-------**
Lead	03/09/92	D	G4	6.400		3.5	-------GH
Magnesium	03/09/92	D	G4	355.000	B	3.5	-------**
Manganese	03/09/92	D	G4	6.500		3.5	-------gh
Potassium	03/09/92	D	G4	314.000	B	3.5	-------**
Sodium	03/09/92	D	G4	175.000	B	3.5	-------**
Vanadium	03/09/92	D	G4	16.200		3.5	-------gh
Zinc	03/09/92	D	G4	10.300	J	3.5	-------gh
Pest/PCB (ppb)							
alpha-Chlordane	03/09/92	D	G4	15.000	J	3.5	-------**
Dieldrin	03/09/92	D	G4	0.290	J	3.5	-------gh
gamma-Chlordane	03/09/92	D	G4	20.000		3.5	-------**
Heptachlor	03/09/92	D	G4	0.580	J	3.5	-------gh
SAMPLE ID: U3SB05							
Metal (ppm)							
Aluminum	03/09/92	D	G4	1510.000		3.0	-------gh
Barium	03/09/92	D	G4	3.500	B	3.0	-------gh
Calcium	03/09/92	D	G4	127.000	B	3.0	-------**
Chromium	03/09/92	D	G4	3.500	J	3.0	-------gh
Iron	03/09/92	D	G4	396.000		3.0	-------**
Lead	03/09/92	D	G4	1.400	J	3.0	-------GH
Magnesium	03/09/92	D	G4	79.000	B	3.0	-------**
Manganese	03/09/92	D	G4	3.100	B	3.0	-------gh
Potassium	03/09/92	D	G4	91.000	J	3.0	-------**
Sodium	03/09/92	D	G4	133.000	B	3.0	-------**

Vanadium	03/09/92	D	G4	2.400 J	3.0	-------gh
Zinc	03/09/92	D	G4	1.300 J	3.0	-------gh
Pest/PCB (ppb)						
Endrin ketone	03/09/92	D	G4	2.900 J	3.0	-------*
Methoxychlor	03/09/92	D	G4	0.940 J	3.0	-------gh

SAMPLE ID: U3SB06

Metal (ppm)						
Aluminum	03/09/92	D	G5	6410.000	3.0	-------gh
Arsenic	03/09/92	D	G5	0.410 B	3.0	-------gh
Barium	03/09/92	D	G5	13.100 B	3.0	-------gh
Calcium	03/09/92	D	G5	11800.000	3.0	-------**
Chromium	03/09/92	D	G5	11.100	3.0	-------gh
Cobalt	03/09/92	D	G5	3.200 J	3.0	-------**
Copper	03/09/92	D	G5	0.950 J	3.0	-------gh
Iron	03/09/92	D	G5	5320.000	3.0	-------**
Lead	03/09/92	D	G5	3.600	3.0	-------GH
Magnesium	03/09/92	D	G5	460.000 B	3.0	-------**
Manganese	03/09/92	D	G5	6.200	3.0	-------gh
Potassium	03/09/92	D	G5	452.000 B	3.0	-------**
Sodium	03/09/92	D	G5	172.000 B	3.0	-------**
Vanadium	03/09/92	D	G5	22.800	3.0	-------gh
Zinc	03/09/92	D	G5	4.800 J	3.0	-------gh
Pest/PCB (ppb)						
Dieldrin	03/09/92	D	G5	1.500 J	3.0	-------gh
SVOA (ppb)						
Di-n-Butylphthalate	03/09/92	D	G5	45.000 J	3.0	-------gh

SAMPLE ID: U3SB1

Metal (ppm)						
Chromium	01/01/89	D	I5	8.000	5.0	-------gh
Copper	01/01/89	D	I5	7.000	5.0	-------gh
Lead	01/01/89	D	I5	13.000	5.0	-------GH
Mercury	01/01/89	D	I5	0.350	5.0	-------gh
Zinc	01/01/89	D	I5	4.000	5.0	-------gh

SAMPLE ID: U3SB101SB05

VOA (ppb)						
1,1,1-Trichloroethane	01/19/93	C	D3	1.000 J	2.0	-------gh
1,1-Dichloroethane	01/19/93	C	D3	28.000	2.0	-------gh
1,2-Dichloroethene (total)	01/19/93	C	D3	4.000 J	2.0	-------gh
2-Butanone	01/19/93	C	D3	8.000 J	2.0	-------gh
Acetone	01/19/93	C	D3	160.000	2.0	-------gh
Ethylbenzene	01/19/93	C	D3	68.000	2.0	-------gh
Toluene	01/19/93	C	D3	2.000 J	2.0	-------gh
Trichloroethene	01/19/93	C	D3	16.000	2.0	-------gh
Xylene (total)	01/19/93	C	D3	170.000	2.0	-------gh

SAMPLE ID: U3SB101SB07

Pest/PCB (ppb)						
Aroclor-1254	01/21/93	C	B4	220.000 J	2.0	-------gh
SVOA (ppb)						
bis(2-Ethylhexyl)Phthalate	01/21/93	C	B4	78.000 J	2.0	-------gh

SAMPLE ID: U3SB101SB08

Pest/PCB (ppb)						
gamma-Chlordane	01/21/93	C	B4	1.100 JP	2.0	-------**

SAMPLE ID: U3SB101SB12

Pest/PCB (ppb)						
4,4'-DDE	01/20/93	C	B4	1.700 J	5.5	-------gh
4,4'-DDT	01/20/93	C	B4	2.800 J	5.5	-------gh
Dieldrin	01/20/93	C	B4	6.700 J	5.5	-------gh
SVOA (ppb)						
bis(2-Ethylhexyl)Phthalate	01/20/93	C	B4	44.000 J	5.5	-------gh

SAMPLE ID: U3SB101SB14

Pest/PCB (ppb)						
4,4'-DDE	01/24/93	C	C4	0.880 J	2.0	-------gh

SAMPLE ID: U3SB101SB15

Pest/PCB (ppb)						
4,4'-DDD	01/23/93	C	C4	6.400	2.0	-------gh
4,4'-DDE	01/23/93	C	C4	4.100	2.0	-------gh
4,4'-DDT	01/23/93	C	C4	2.800 J	2.0	-------gh
Dieldrin	01/23/93	C	C4	3.500 J	2.0	-------gh

SAMPLE ID: U3SB3

Metal (ppm)						
Chromium	01/01/89	D	I4	2.000	5.0	-------gh
Copper	01/01/89	D	I4	3.000	5.0	-------gh
Lead	01/01/89	D	I4	8.000	5.0	-------GH
Zinc	01/01/89	D	I4	3.000	5.0	-------gh

SAMPLE ID: U3SB4

Metal (ppm)						
Chromium	01/01/89	D	I5	2.000	5.0	-------gh
Lead	01/01/89	D	I5	6.000	5.0	-------GH
Mercury	01/01/89	D	I5	0.150	5.0	-------gh
Zinc	01/01/89	D	I5	4.000	5.0	-------gh
Pest/PCB (ppb)						
4,4'-DDT	01/01/89	D	I5	2.900	5.0	-------gh
Dieldrin	01/01/89	D	I5	6.800	5.0	-------gh

SAMPLE ID: U3SS01

Metal (ppm)						
Aluminum	03/09/92	D	G5	11900.000	1.0	-------gh
Barium	03/09/92	D	G5	17.800 B	1.0	-------gh
Beryllium	03/09/92	D	G5	0.240 J	1.0	-------gh
Calcium	03/09/92	D	G5	2330.000	1.0	-------**
Chromium	03/09/92	D	G5	13.100	1.0	-------gh
Cobalt	03/09/92	D	G5	3.600 J	1.0	-------**
Copper	03/09/92	D	G5	1.500 J	1.0	-------gh
Iron	03/09/92	D	G5	7000.000	1.0	-------**

Lead	03/09/92	D	G5	8.500		1.0	-------GH
Magnesium	03/09/92	D	G5	799.000	B	1.0	-------**
Manganese	03/09/92	D	G5	11.400		1.0	-------gh
Potassium	03/09/92	D	G5	742.000	B	1.0	-------**
Sodium	03/09/92	D	G5	196.000	B	1.0	-------*
Vanadium	03/09/92	D	G5	24.600		1.0	-------gh
Zinc	03/09/92	D	G5	11.900	J	1.0	-------gh
Pest/PCB (ppb)							
alpha-Chlordane	03/09/92	D	G5	2.200	J	1.0	-------**
gamma-Chlordane	03/09/92	D	G5	2.600		1.0	-------**
VOA (ppb)							
Acetone	03/09/92	D	G5	26.000	J	1.0	-------gh

SAMPLE ID: U3SS02

Metal (ppm)							
Aluminum	03/09/92	D	G5	10300.000		1.0	-------gh
Barium	03/09/92	D	G5	14.300	B	1.0	-------gh
Calcium	03/09/92	D	G5	3330.000		1.0	-------**
Chromium	03/09/92	D	G5	12.400		1.0	-------gh
Copper	03/09/92	D	G5	0.950	J	1.0	-------gh
Iron	03/09/92	D	G5	9950.000		1.0	-------**
Lead	03/09/92	D	G5	4.800		1.0	-------GH
Magnesium	03/09/92	D	G5	634.000	B	1.0	-------**
Manganese	03/09/92	D	G5	12.400		1.0	-------gh
Potassium	03/09/92	D	G5	652.000	B	1.0	-------**
Sodium	03/09/92	D	G5	187.000	B	1.0	-------**
Vanadium	03/09/92	D	G5	29.700		1.0	-------gh
Zinc	03/09/92	D	G5	9.500	J	1.0	-------gh
Pest/PCB (ppb)							
alpha-Chlordane	03/09/92	D	G5	0.280	J	1.0	-------**
gamma-Chlordane	03/09/92	D	G5	0.210	J	1.0	-------**
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G5	45.000	J	1.0	-------gh

SAMPLE ID: U3SS03

Metal (ppm)							
Aluminum	03/09/92	D	G4	684.000		1.0	-------gh
Barium	03/09/92	D	G4	4.500	B	1.0	-------gh
Calcium	03/09/92	D	G4	1050.000		1.0	-------**
Iron	03/09/92	D	G4	488.000		1.0	-------**
Lead	03/09/92	D	G4	1.500	J	1.0	-------GH
Magnesium	03/09/92	D	G4	54.000	B	1.0	-------**
Manganese	03/09/92	D	G4	6.900		1.0	-------gh
Potassium	03/09/92	D	G4	69.800	J	1.0	-------**
Sodium	03/09/92	D	G4	148.000	B	1.0	-------**
Vanadium	03/09/92	D	G4	2.500	J	1.0	-------gh
Zinc	03/09/92	D	G4	2.100	J	1.0	-------gh
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G4	91.000	J	1.0	-------gh

SAMPLE ID: U3SS04

Metal (ppm)							
Aluminum	03/09/92	D	G4	11200.000		1.0	-------gh
Barium	03/09/92	D	G4	11.600	B	1.0	-------gh
Calcium	03/09/92	D	G4	1630.000		1.0	-------**

Chromium	03/09/92	D	G4	14.100		1.0	-------gh
Copper	03/09/92	D	G4	0.660	J	1.0	-------gh
Iron	03/09/92	D	G4	5070.000		1.0	-------**
Lead	03/09/92	D	G4	4.000		1.0	-------GH
Magnesium	03/09/92	D	G4	487.000	B	1.0	-------**
Manganese	03/09/92	D	G4	8.800		1.0	-------gh
Potassium	03/09/92	D	G4	391.000	B	1.0	-------**
Sodium	03/09/92	D	G4	170.000	B	1.0	-------**
Vanadium	03/09/92	D	G4	15.000		1.0	-------gh
Zinc	03/09/92	D	G4	7.900	J	1.0	-------gh
Pest/PCB (ppb)							
alpha-Chlordane	03/09/92	D	G4	6.000	J	1.0	-------**
Dieldrin	03/09/92	D	G4	0.450	J	1.0	-------gh
gamma-Chlordane	03/09/92	D	G4	8.600		1.0	-------**
Methoxychlor	03/09/92	D	G4	1.100	J	1.0	-------gh

SAMPLE ID: U3SS05

Metal (ppm)							
Aluminum	03/09/92	D	G4	13600.000		1.0	-------gh
Arsenic	03/09/92	D	G4	1.700	B	1.0	-------gh
Barium	03/09/92	D	G4	22.800	B	1.0	-------gh
Calcium	03/09/92	D	G4	1730.000		1.0	-------**
Chromium	03/09/92	D	G4	29.600		1.0	-------gh
Iron	03/09/92	D	G4	31500.000		1.0	-------**
Lead	03/09/92	D	G4	10.500		1.0	-------GH
Magnesium	03/09/92	D	G4	588.000	B	1.0	-------**
Manganese	03/09/92	D	G4	9.600		1.0	-------gh
Potassium	03/09/92	D	G4	600.000	B	1.0	-------**
Sodium	03/09/92	D	G4	175.000	B	1.0	-------**
Thallium	03/09/92	D	G4	0.330	J	1.0	-------**
Vanadium	03/09/92	D	G4	49.200		1.0	-------gh
Zinc	03/09/92	D	G4	45.900		1.0	-------gh
Pest/PCB (ppb)							
alpha-BHC	03/09/92	D	G4	0.300	J	1.0	-------gh
beta-BHC	03/09/92	D	G4	0.440	J	1.0	-------gh
Endrin ketone	03/09/92	D	G4	27.000		1.0	-------**
Methoxychlor	03/09/92	D	G4	4.100	J	1.0	-------gh
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G4	38.000	J	1.0	-------gh

SAMPLE ID: U3SS06

Metal (ppm)							
Aluminum	03/09/92	D	G5	7560.000		1.0	-------gh
Calcium	03/09/92	D	G5	8910.000		1.0	-------**
Chromium	03/09/92	D	G5	11.600		1.0	-------gh
Cobalt	03/09/92	D	G5	4.900	J	1.0	-------**
Copper	03/09/92	D	G5	0.900	J	1.0	-------gh
Iron	03/09/92	D	G5	5920.000		1.0	-------**
Lead	03/09/92	D	G5	6.500		1.0	-------GH
Magnesium	03/09/92	D	G5	532.000	B	1.0	-------**
Manganese	03/09/92	D	G5	7.500		1.0	-------gh
Potassium	03/09/92	D	G5	521.000	B	1.0	-------**
Sodium	03/09/92	D	G5	166.000	B	1.0	-------**
Vanadium	03/09/92	D	G5	17.800		1.0	-------gh
Zinc	03/09/92	D	G5	5.800	J	1.0	-------gh
SVOA (ppb)							
Di-n-Butylphthalate	03/09/92	D	G5	54.000	J	1.0	-------gh

SAMPLE ID: U3SS7801

Metal (ppm)						
Lead	06/01/90	D	B3	4.600	1.0	-------G
Zinc	06/01/90	D	B3	1.500	1.0	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	06/01/90	D	B3	230.000	1.0	-------gh
Toluene	06/01/90	D	B3	40.000	1.0	-------gh

SAMPLE ID: U3SS7802

Metal (ppm)						
Chromium	06/01/90	D	B3	28.000	1.0	-------gh
Lead	06/01/90	D	B3	22.000	1.0	-------GH
Zinc	06/01/90	D	B3	18.000	1.0	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	06/01/90	D	B3	6290.000	1.0	-------gh
1,1-Dichloroethane	06/01/90	D	B3	40.000	1.0	-------gh
1,1-Dichloroethene	06/01/90	D	B3	60.000	1.0	-------gh
Toluene	06/01/90	D	B3	40.000	1.0	-------gh
Trichloroethene	06/01/90	D	B3	320.000	1.0	-------gh

SAMPLE ID: U3SS7803

Metal (ppm)						
Chromium	06/01/90	D	B3	5.500	1.0	-------gh
Lead	06/01/90	D	B3	8.800	1.0	-------GH
Zinc	06/01/90	D	B3	9.500	1.0	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	06/01/90	D	B3	200.000	1.0	-------gh
Toluene	06/01/90	D	B3	70.000	1.0	-------gh

SAMPLE ID: U3SS7804

Metal (ppm)						
Chromium	06/01/90	D	A3	2.000	1.0	-------gh
Lead	06/01/90	D	A3	2.600	1.0	-------GH
Zinc	06/01/90	D	A3	2.500	1.0	-------gh

SAMPLE ID: U3SS7805

Metal (ppm)						
Chromium	06/01/90	D	A3	5.500	1.0	-------gh
Lead	06/01/90	D	A3	4.800	1.0	-------GH
Zinc	06/01/90	D	A3	5.000	1.0	-------gh
VOA (ppb)						
1,1,1-Trichloroethane	06/01/90	D	A3	156.000	1.0	-------gh
Toluene	06/01/90	D	A3	56.000	1.0	-------gh

*** End of Report ***

Table K-3

Database Sample Summary

Table Description

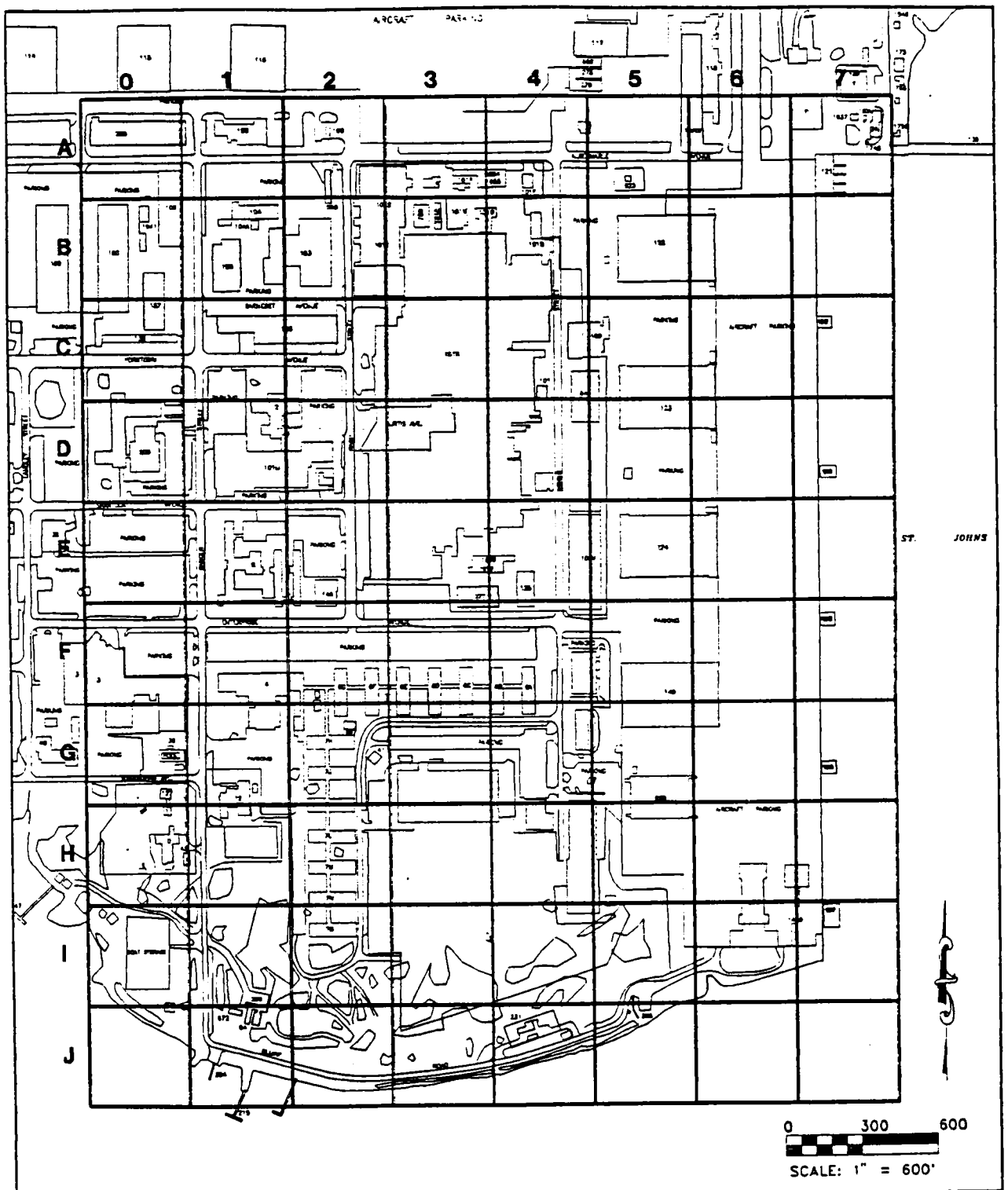
Table K-3, OU 3 Database Summary, provides a complete listing of all samples taken and analyzed under all envrionmental studies within the operable unit. The column headings refer to the following:

Record #: as identified in the database;
X Sample ID: refers to the field sample identification;
Sample ID: refers to the sample identification in the database;
Sample Date: date sample was submitted;
Sample Type: media from which sample was collected;
Grid: refers to location on accompanying grid;
Depth: depth below land surface at which sample was collected;
X, Y Coord*: refer to survey coordinates for sample location;
Z Coord*: refers to the surveyed ground elevation for each sample location;

* A minus 1 (-1) indicates that survey data was not available for these sample locations.

Source:

SSFP-OU 3 is from Scoping Study Field Program;
RI/FS Workplan identifies the table in Appendix B of this Workplan where the data can be found;
Ser15 refers to ABB-ES's Sampling Event Report 15 for the P-159 Investgation (see Appendix B);
Ser16 refers to ABB-ES's Sampling Event Report 16 for the UST investigation at Building 101 (see Appendix B).



OU3 GRID PATTERN

RI/FS WORKPLAN FOR OU3

NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

OU3/DRW/11-30-93

65	OU3CW23A01	U3CW23A01	08/02/93	WATER	G5	11.0	444986.119	2140950.471	10.00	SSFP - OU3;
66	OU3CW23A02	U3CW23A02	08/02/93	WATER	G5	36.0	444986.119	2140950.471	10.00	SSFP - OU3;
67	OU3CW23A03	U3CW23A03	08/02/93	WATER	G5	62.0	444986.119	2140950.471	10.00	SSFP - OU3;
68	OU3CW24A01	U3CW24A01	08/12/93	WATER	F5	14.0	444984.021	2141393.675	9.90	SSFP - OU3;
69	OU3CW24A02	U3CW24A02	08/12/93	WATER	F5	33.0	444984.021	2141393.675	9.90	SSFP - OU3;
70	OU3CW24A03	U3CW24A03	08/12/93	WATER	F5	52.0	444984.021	2141393.675	9.90	SSFP - OU3;
71	OU3CW25A01	U3CW25A01	08/11/93	WATER	E5	13.0	444979.949	2141755.209	9.35	SSFP - OU3;
72	OU3CW25A02	U3CW25A02	08/11/93	WATER	E5	45.0	444979.949	2141755.209	9.35	SSFP - OU3;
73	OU3CW26A01	U3CW26A01	08/12/93	WATER	D5	15.0	444994.994	2142149.196	8.65	SSFP - OU3;
74	OU3CW26A02	U3CW26A02	08/12/93	WATER	D5	23.0	444994.994	2142149.196	8.65	SSFP - OU3;
75	OU3CW26A03	U3CW26A03	08/12/93	WATER	D5	67.0	444994.994	2142149.196	8.65	SSFP - OU3;
76	OU3CW27A02	U3CW27A02	08/12/93	WATER	C5	17.0	444981.868	2142543.760	8.97	SSFP - OU3;
77	OU3CW27A03	U3CW27A03	08/12/93	WATER	C5	44.0	444981.868	2142543.760	8.97	SSFP - OU3;
78	OU3CW28A01	U3CW28A01	08/09/93	WATER	B5	10.0	444982.796	2142935.382	9.19	SSFP - OU3;
79	OU3CW28A02	U3CW28A02	08/09/93	WATER	B5	40.0	444982.796	2142935.382	9.19	SSFP - OU3;
80	OU3CW28A03	U3CW28A03	08/09/93	WATER	B5	56.0	444982.796	2142935.382	9.19	SSFP - OU3;
81	U3CW29A01	U3CW29A01	09/23/93	WATER	B4	11.5	444783.260	2143149.368	9.88	SSFP - OU3;
82	U3CW29A02	U3CW29A02	09/23/93	WATER	B4	37.0	444783.260	2143149.368	9.88	SSFP - OU3;
83	U3CW29A03	U3CW29A03	09/23/93	WATER	B4	65.0	444783.260	2143149.368	9.88	SSFP - OU3;
84	UWCW30A01	U3CW30A01	09/24/93	WATER	C4	15.0	444789.162	2142746.365	9.40	SSFP - OU3;
85	U3CW30A02	U3CW30A02	09/24/93	WATER	C4	41.0	444789.162	2142746.365	9.40	SSFP - OU3;
86	U3CW31A01	U3CW31A01	09/23/93	WATER	D4	10.0	444786.660	2142347.641	9.41	SSFP - OU3;
87	U3CW31A02	U3CW31A02	09/23/93	WATER	D4	38.0	444786.660	2142347.641	9.41	SSFP - OU3;
88	U3CW31A03	U3CW31A03	09/23/93	WATER	D4	60.0	444786.660	2142347.641	9.41	SSFP - OU3;
89	UWCW32A01	U3CW32A01	09/24/93	WATER	E4	14.5	444759.427	2141949.683	9.12	SSFP - OU3;
90	U3CW32A02	U3CW32A02	09/24/93	WATER	E4	72.0	444759.427	2141949.683	9.12	SSFP - OU3;
91	OU3CW33A02	U3CW33A02	08/15/93	WATER	E4	60.0	444653.209	2141687.399	11.01	SSFP - OU3;
92	OU3CW33A03	U3CW33A03	08/15/93	WATER	E4	84.0	444653.209	2141687.399	11.01	SSFP - OU3;
93	OU3CW34A01	U3CW34A01	08/16/93	WATER	D4	13.0	444621.884	2142160.341	9.65	SSFP - OU3;
94	OU3CW34A02	U3CW34A02	08/16/93	WATER	D4	23.0	444621.884	2142160.341	9.65	SSFP - OU3;
95	OU3CW34A03	U3CW34A03	08/16/93	WATER	D4	61.0	444621.884	2142160.341	9.65	SSFP - OU3;
96	CW35A01	U3CW35A01	08/26/93	WATER	C4	13.0	444716.525	2142628.326	9.75	SSFP - OU3;
97	CW35A02	U3CW35A02	08/26/93	WATER	C4	39.0	444716.525	2142628.326	9.75	SSFP - OU3;
98	CW35A03	U3CW35A03	08/26/93	WATER	C4	69.0	444716.525	2142628.326	9.75	SSFP - OU3;
99	CW36A01	U3CW36A01	08/23/93	WATER	B4	17.0	444563.502	2142977.834	10.26	SSFP - OU3;
100	CW36A02	U3CW36A02	08/23/93	WATER	B4	33.0	444563.502	2142977.834	10.26	SSFP - OU3;
101	CW36A03	U3CW36A03	08/23/93	WATER	B4	67.0	444563.502	2142977.834	10.26	SSFP - OU3;
102	U3CW37A01	U3CW37A01	09/27/93	WATER	B3	9.0	444425.609	2143130.765	10.11	SSFP - OU3;
103	U3CW37A02	U3CW37A02	09/27/93	WATER	B3	27.0	444425.609	2143130.765	10.11	SSFP - OU3;
104	U3CW37A03	U3CW37A03	09/27/93	WATER	B3	48.0	444425.609	2143130.765	10.11	SSFP - OU3;
105	OU3CW38A01	U3CW38A01	08/17/93	WATER	C4	17.0	444563.702	2142823.978	10.38	SSFP - OU3;
106	OU3CW38A02	U3CW38A02	08/17/93	WATER	C4	30.0	444563.702	2142823.978	10.38	SSFP - OU3;
107	OU3CW38A03	U3CW38A03	08/17/93	WATER	C4	70.0	444563.702	2142823.978	10.38	SSFP - OU3;
108	OU3CW39A01	U3CW39A01	09/22/93	WATER	D3	10.0	444285.460	2142393.544	10.16	SSFP - OU3;
109	OU3CW39A02	U3CW39A02	09/22/93	WATER	D3	27.0	444285.460	2142393.544	10.16	SSFP - OU3;
110	OU3CW39A03	U3CW39A03	09/22/93	WATER	D3	49.0	444285.460	2142393.544	10.16	SSFP - OU3;
111	U3CW40A01	U3CW40A01	09/22/93	WATER	E3	13.0	444372.538	2141867.910	9.77	SSFP - OU3;
112	U3CW40A02	U3CW40A02	09/22/93	WATER	E3	83.0	444372.538	2141867.910	9.77	SSFP - OU3;
113	CW41A01	U3CW41A01	08/25/93	WATER	E3	12.5	444209.033	2141692.262	10.30	SSFP - OU3;
114	CW41A02	U3CW41A02	08/25/93	WATER	E3	47.0	444209.033	2141692.262	10.30	SSFP - OU3;
115	CW41A03	U3CW41A03	08/25/93	WATER	E3	62.5	444209.033	2141692.262	10.30	SSFP - OU3;
116	OU3CW42A01	U3CW42A01	08/14/93	WATER	D3	10.0	444213.099	2142243.405	10.31	SSFP - OU3;
117	OU3CW42A02	U3CW42A02	08/14/93	WATER	D3	30.0	444213.099	2142243.405	10.31	SSFP - OU3;
118	OU3CW42A03	U3CW42A03	08/14/93	WATER	D3	80.0	444213.099	2142243.405	10.31	SSFP - OU3;
119	CW43A01	U3CW43A01	08/24/93	WATER	B3	16.0	444130.605	2142940.759	10.38	SSFP - OU3;
120	CW43A02	U3CW43A02	08/24/93	WATER	B3	35.0	444130.605	2142940.759	10.38	SSFP - OU3;
121	CW43A03	U3CW43A03	08/24/93	WATER	B3	77.0	444130.605	2142940.759	10.38	SSFP - OU3;
122	CW44A01	U3CW44A01	08/27/93	WATER	A7	17.0	445725.275	2143457.349	9.09	SSFP - OU3;
123	CW44A02	U3CW44A02	08/27/93	WATER	A7	39.0	445725.275	2143457.349	9.09	SSFP - OU3;
124	CW44A03	U3CW44A03	08/27/93	WATER	A7	85.0	445725.275	2143457.349	9.09	SSFP - OU3;
125	CW45A01	U3CW45A01	08/27/93	WATER	A5	13.0	445256.421	2143450.479	10.54	SSFP - OU3;
126	CW45A02	U3CW45A02	08/27/93	WATER	A5	35.0	445256.421	2143450.479	10.54	SSFP - OU3;
127	CW45A03	U3CW45A03	08/27/93	WATER	A5	67.0	445256.421	2143450.479	10.54	SSFP - OU3;
128	CW46A	U3CW46A01	08/27/93	WATER	A4	11.0	444725.700	2143428.735	10.90	SSFP - OU3;
129	CW46A	U3CW46A02	08/27/93	WATER	A4	40.0	444725.700	2143[illegible]	10.90	SSFP - OU3;
130	CW46A	U3CW46A03	08/27/93	WATER	A4	65.0	444725.700	2143[illegible]	10.90	SSFP - OU3;

Record#	X_SAMP_ID	SAMP_ID	SAMP_DATE	SAMP_TYPE	GRID	DEPTH	X_COORD	Y_COORD	Z_COORD	SOURCE
1	U3CW01A01	U3CW01A01	09/27/93	WATER	B6	11.0	445583.383	2143149.745	7.18	SSFP - OU3;
2	U3CW01A02	U3CW01A02	09/27/93	WATER	B6	37.5	445583.383	2143149.745	7.18	SSFP - OU3;
3	U3CW01A03	U3CW01A03	09/27/93	WATER	B6	62.0	445583.383	2143149.745	7.18	SSFP - OU3;
4	U3CW02A01	U3CW02A01	09/26/93	WATER	C6	12.5	445586.561	2142749.045	7.10	SSFP - OU3;
5	U3CW02A02	U3CW02A02	09/26/93	WATER	C6	37.0	445586.561	2142749.045	7.10	SSFP - OU3;
6	U3CW02A03	U3CW02A03	09/26/93	WATER	C6	60.0	445586.561	2142749.045	7.10	SSFP - OU3;
7	U3CW03A01	U3CW03A01	09/26/93	WATER	D6	10.0	445585.352	2142350.047	7.00	SSFP - OU3;
8	U3CW03A02	U3CW03A02	09/26/93	WATER	D6	24.0	445585.352	2142350.047	7.00	SSFP - OU3;
9	U3CW03A03	U3CW03A03	09/26/93	WATER	D6	74.0	445585.352	2142350.047	7.00	SSFP - OU3;
10	U3CW04A01	U3CW04A01	09/26/93	WATER	E6	14.0	445587.518	2141946.994	7.37	SSFP - OU3;
11	U3CW04A02	U3CW04A02	09/26/93	WATER	E6	43.0	445587.518	2141946.994	7.37	SSFP - OU3;
12	U3CW04A03	U3CW04A03	09/26/93	WATER	E6	70.0	445587.518	2141946.994	7.37	SSFP - OU3;
13	U3CW05A01	U3CW05A01	09/25/93	WATER	F6	10.5	445584.745	2141549.707	7.54	SSFP - OU3;
14	U3CW05A02	U3CW05A02	09/25/93	WATER	F6	40.0	445584.745	2141549.707	7.54	SSFP - OU3;
15	U3CW05A03	U3CW05A03	09/25/93	WATER	F6	82.0	445584.745	2141549.707	7.54	SSFP - OU3;
16	U3CW06A01	U3CW06A01	09/25/93	WATER	G6	10.0	445585.134	2141150.023	7.17	SSFP - OU3;
17	U3CW06A02	U3CW06A02	09/25/93	WATER	G6	24.0	445585.134	2141150.023	7.17	SSFP - OU3;
18	U3CW06A03	U3CW06A03	09/25/93	WATER	G6	40.0	445585.134	2141150.023	7.17	SSFP - OU3;
19	U3CW07A01	U3CW07A01	09/27/93	WATER	H6	13.0	445587.070	2140750.565	5.22	SSFP - OU3;
20	U3CW07A02	U3CW07A02	09/27/93	WATER	H6	31.0	445587.070	2140750.565	5.22	SSFP - OU3;
21	U3CW07A03	U3CW07A03	09/27/93	WATER	H6	91.5	445587.070	2140750.565	5.22	SSFP - OU3;
22	OU3CW08A01	U3CW08A01	07/30/93	WATER	H6	12.0	445382.956	2140552.405	9.22	SSFP - OU3;
23	OU3CW08A02	U3CW08A02	07/30/93	WATER	H6	36.0	445382.956	2140552.405	9.22	SSFP - OU3;
24	OU3CW08A03	U3CW08A03	07/30/93	WATER	H6	60.0	445382.956	2140552.405	9.22	SSFP - OU3;
25	OU3CW09A01	U3CW09A01	07/31/93	WATER	G6	14.0	445385.782	2140950.249	9.79	SSFP - OU3;
26	OU3CW09A02	U3CW09A02	07/31/93	WATER	G6	35.0	445385.782	2140950.249	9.79	SSFP - OU3;
27	OU3CW09A03	U3CW09A03	07/31/93	WATER	G6	54.0	445385.782	2140950.249	9.79	SSFP - OU3;
28	OU3CW10A01	U3CW10A01	08/03/93	WATER	F6	10.0	445395.821	2141349.800	9.72	SSFP - OU3;
29	OU3CW10A02	U3CW10A02	08/03/93	WATER	F6	35.0	445395.821	2141349.800	9.72	SSFP - OU3;
30	OU3CW10A03	U3CW10A03	08/03/93	WATER	F6	60.0	445395.821	2141349.800	9.72	SSFP - OU3;
31	OU3CW11A01	U3CW11A01	08/04/93	WATER	E6	22.0	445382.851	2141740.541	9.04	SSFP - OU3;
32	OU3CW11A02	U3CW11A02	08/04/93	WATER	E6	45.0	445382.851	2141740.541	9.04	SSFP - OU3;
33	OU3CW11A03	U3CW11A03	08/04/93	WATER	E6	80.0	445382.851	2141740.541	9.04	SSFP - OU3;
34	OU3CW12A01	U3CW12A01	08/09/93	WATER	D6	12.0	445384.146	2142149.957	8.50	SSFP - OU3;
35	OU3CW12A02	U3CW12A02	08/09/93	WATER	D6	28.0	445384.146	2142149.957	8.50	SSFP - OU3;
36	OU3CW12A03	U3CW12A03	08/09/93	WATER	D6	60.0	445384.146	2142149.957	8.50	SSFP - OU3;
37	OU3CW13A01	U3CW13A01	08/02/93	WATER	C6	13.0	445386.553	2142544.490	8.66	SSFP - OU3;
38	OU3CW13A02	U3CW13A02	08/02/93	WATER	C6	20.0	445386.553	2142544.490	8.66	SSFP - OU3;
39	OU3CW14A01	U3CW14A01	08/02/93	WATER	B6	12.0	445383.204	2142948.995	8.68	SSFP - OU3;
40	OU3CW14A02	U3CW14A02	08/02/93	WATER	B6	19.0	445383.204	2142948.995	8.68	SSFP - OU3;
41	OU3CW14A03	U3CW14A03	08/02/93	WATER	B6	63.0	445383.204	2142948.995	8.68	SSFP - OU3;
42	U3CW15A01	U3CW15A01	09/24/93	WATER	B5	11.5	445181.704	2143152.044	8.91	SSFP - OU3;
43	U3CW15A02	U3CW15A02	09/24/93	WATER	B5	39.0	445181.704	2143152.044	8.91	SSFP - OU3;
44	U3CW15A03	U3CW15A03	09/24/93	WATER	B5	64.0	445181.704	2143152.044	8.91	SSFP - OU3;
45	U3CW16A01	U3CW16A01	09/29/93	WATER	C5	9.0	445158.520	2142741.155	8.86	SSFP - OU3;
46	U3CW16A02	U3CW16A02	09/29/93	WATER	C5	35.0	445158.520	2142741.155	8.86	SSFP - OU3;
47	U3CW16A03	U3CW16A03	09/29/93	WATER	C5	57.0	445158.520	2142741.155	8.86	SSFP - OU3;
48	U3CW17A01	U3CW17A01	09/24/93	WATER	D5	9.0	445189.683	2142300.073	8.82	SSFP - OU3;
49	U3CW17A02	U3CW17A02	09/24/93	WATER	D5	48.5	445189.683	2142300.073	8.82	SSFP - OU3;
50	U3CW17A03	U3CW17A03	09/24/93	WATER	D5	75.0	445189.683	2142300.073	8.82	SSFP - OU3;
51	U3CW18A01	U3CW18A01	09/25/93	WATER	E5	8.0	445181.605	2141979.752	8.80	SSFP - OU3;
52	U3CW18A02	U3CW18A02	09/25/93	WATER	E5	20.5	445181.605	2141979.752	8.80	SSFP - OU3;
53	U3CW19A01	U3CW19A01	09/29/93	WATER	F5	17.5	445169.657	2141547.299	9.51	SSFP - OU3;
54	U3CW19A02	U3CW19A02	09/29/93	WATER	F5	32.0	445169.657	2141547.299	9.51	SSFP - OU3;
55	U3CW19A03	U3CW19A03	09/29/93	WATER	F5	58.5	445169.657	2141547.299	9.51	SSFP - OU3;
56	U3CW20A01	U3CW20A01	09/29/93	WATER	G5	15.0	445184.025	2141112.829	10.00	SSFP - OU3;
57	U3CW20A02	U3CW20A02	09/29/93	WATER	G5	33.0	445184.025	2141112.829	10.00	SSFP - OU3;
58	U3CW20A03	U3CW20A03	09/29/93	WATER	G5	57.0	445184.025	2141112.829	10.00	SSFP - OU3;
59	U3CW21A01	U3CW21A01	09/29/93	WATER	H5	10.0	445187.180	2140748.934	9.58	SSFP - OU3;
60	U3CW21A02	U3CW21A02	09/29/93	WATER	H5	33.0	445187.180	2140748.934	9.58	SSFP - OU3;
61	U3CW21A03	U3CW21A03	09/29/93	WATER	H5	57.0	445187.180	2140748.934	9.58	SSFP - OU3;
62	OU3CW22A01	U3CW22A01	08/02/93	WATER	H5	10.0	444983.269	2140555.224	10.00	SSFP - OU3;
63	OU3CW22A02	U3CW22A02	08/02/93	WATER	H5	33.0	444983.269	2140555.224	10.00	SSFP - OU3;
64	OU3CW22A03	U3CW22A03	08/02/93	WATER	H5	64.0	444983.269	2140555.224	10.00	SSFP - OU3;

197	OU3PZ00903	U3PZ00903	08/14/93	SOIL	E7	5.0	445739.947	2141968.979	5.90	SSFP - OU3;
198	OU3PZ00904	U3PZ00904	08/14/93	SOIL	E7	7.0	445739.947	2141968.979	5.90	SSFP - OU3;
199	PZ01101	U3PZ01101	08/18/93	SOIL	F6	1.0	445291.968	2141500.148	9.27	SSFP - OU3;
200	PZ01102	U3PZ01102	08/18/93	SOIL	F6	3.0	445291.968	2141500.148	9.27	SSFP - OU3;
201	PZ01103	U3PZ01103	08/18/93	SOIL	F6	5.0	445291.968	2141500.148	9.27	SSFP - OU3;
202	PZ01104	U3PZ01104	08/18/93	SOIL	F6	7.0	445291.968	2141500.148	9.27	SSFP - OU3;
203	OU3PZ01301	U3PZ01301	08/24/93	SOIL	C6	1.0	445292.350	2142744.824	8.65	SSFP - OU3;
204	OU3PZ01302	U3PZ01302	08/24/93	SOIL	C6	3.0	445292.350	2142744.824	8.65	SSFP - OU3;
205	OU3PZ01303	U3PZ01303	08/24/93	SOIL	C6	5.0	445292.350	2142744.824	8.65	SSFP - OU3;
206	OU3PZ01304	U3PZ01304	08/24/93	SOIL	C6	7.0	445292.350	2142744.824	8.65	SSFP - OU3;
207	OU3PZ01501	U3PZ01501	08/24/93	SOIL	I6	1.0	445603.492	2140269.537	9.44	SSFP - OU3;
208	OU3PZ01502	U3PZ01502	08/24/93	SOIL	I6	3.0	445603.492	2140269.537	9.44	SSFP - OU3;
209	OU3PZ01503	U3PZ01503	08/24/93	SOIL	I6	5.0	445603.492	2140269.537	9.44	SSFP - OU3;
210	OU3PZ01601	U3PZ01601	08/25/93	SOIL	F4	1.0	444714.517	2141599.618	10.80	SSFP - OU3;
211	OU3PZ01602	U3PZ01602	08/25/93	SOIL	F4	3.0	444714.517	2141599.618	10.80	SSFP - OU3;
212	OU3PZ01603	U3PZ01603	08/25/93	SOIL	F4	5.0	444714.517	2141599.618	10.80	SSFP - OU3;
213	OU3PZ01801	U3PZ01801	08/25/93	SOIL	D4	1.0	444792.207	2142277.886	9.20	SSFP - OU3;
214	OU3PZ01802	U3PZ01802	08/25/93	SOIL	D4	3.0	444792.207	2142277.886	9.20	SSFP - OU3;
215	OU3PZ01803	U3PZ01803	08/25/93	SOIL	D4	5.0	444792.207	2142277.886	9.20	SSFP - OU3;
216	OU3PZ02001	U3PZ02001	08/26/93	SOIL	E3	1.0	444310.576	2141806.572	10.04	SSFP - OU3;
217	OU3PZ02002	U3PZ02002	08/26/93	SOIL	E3	3.0	444310.576	2141806.572	10.04	SSFP - OU3;
218	OU3PZ02003	U3PZ02003	08/26/93	SOIL	E3	5.0	444310.576	2141806.572	10.04	SSFP - OU3;
219	OU3PZ02201	U3PZ02201	08/27/93	SOIL	C3	1.0	444318.556	2142437.408	10.14	SSFP - OU3;
220	OU3PZ02202	U3PZ02202	08/27/93	SOIL	C3	3.0	444318.556	2142437.408	10.14	SSFP - OU3;
221	OU3PZ02301	U3PZ02301	08/27/93	SOIL	A3	1.0	444277.720	2143239.956	9.23	SSFP - OU3;
222	OU3PZ02302	U3PZ02302	08/27/93	SOIL	A3	3.0	444277.720	2143239.956	9.23	SSFP - OU3;
223	OU3PZ02303	U3PZ02303	08/27/93	SOIL	A3	5.0	444277.720	2143239.956	9.23	SSFP - OU3;
224	OU3PZ02501	U3PZ02501	08/28/93	SOIL	C2	1.0	443903.427	2142525.304	10.69	SSFP - OU3;
225	OU3PZ02502	U3PZ02502	08/28/93	SOIL	C2	3.0	443903.427	2142525.304	10.69	SSFP - OU3;
226	OU3PZ02503	U3PZ02503	08/28/93	SOIL	C2	5.0	443903.427	2142525.304	10.69	SSFP - OU3;
227	OU3PZ2701	U3PZ02701	08/30/93	SOIL	A6	1.0	445614.302	2143244.395	6.68	SSFP - OU3;
228	OU3PZ2702	U3PZ02702	08/30/93	SOIL	A6	3.0	445614.302	2143244.395	6.68	SSFP - OU3;
229	OU3PZ2703	U3PZ02703	08/30/93	SOIL	A6	5.0	445614.302	2143244.395	6.68	SSFP - OU3;
230	OU3PZ2704	U3PZ02704	08/30/93	SOIL	A6	7.0	445614.302	2143244.395	6.68	SSFP - OU3;
231	10S	U310S	02/01/92	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
232	10U	U310U	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
233	14D	U314D	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
234	14S	U314S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
235	18D	U318D	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
236	18S	U318S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
237	21S	U321S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
238	23S	U323S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
239	24D	U324D	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
240	24S	U324S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
241	25U	U325U	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
242	26D	U326D	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
243	26S	U326S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
244	27D	U327D	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
245	27S	U327S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
246	28D	U328D	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
247	30D	U330D	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
248	30S	U330S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
249	31U	U331U	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
250	32U	U332U	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
251	33D	U333D	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
252	33S	U333S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
253	34D	U334D	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
254	34S	U334S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
255	35D	U335D	02/01/92	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
256	35S	U335S	02/01/92	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
257	35U	U335U	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
258	36D	U336D	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
259	36S	U336S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
260	37S	U337S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
261	38U	U338U	12/01/91	SOIL	B3	4.5	-1.000	-1	-1.00	RI/FS Work Plan - OU3; Table 2-9
262	39U	U339U	12/01/91	SOIL	B3	4.5	-1.000	-1	-1.00	RI/FS Work Plan - OU3; Table 2-9

131	CW47A01	U3CW47A01	08/28/93	WATER	A3	11.0	444174.859	2143415.143	11.40	SSFP - OU3;
132	CW47A02	U3CW47A02	08/28/93	WATER	A3	30.0	444174.859	2143415.143	11.40	SSFP - OU3;
133	CW47A03	U3CW47A03	08/28/93	WATER	A3	42.0	444174.859	2143415.143	11.40	SSFP - OU3;
134	CW48A01	U3CW48A01	08/28/93	WATER	B2	13.0	443866.654	2143163.856	10.74	SSFP - OU3;
135	CW48A02	U3CW48A02	08/28/93	WATER	B2	39.0	443866.654	2143163.856	10.74	SSFP - OU3;
136	CW48A03	U3CW48A03	08/28/93	WATER	B2	77.0	443866.654	2143163.856	10.74	SSFP - OU3;
137	CW49A01	U3CW49A01	08/28/93	WATER	C2	12.0	443863.554	2142781.089	12.50	SSFP - OU3;
138	CW49A02	U3CW49A02	08/28/93	WATER	C2	30.0	443863.554	2142781.089	12.50	SSFP - OU3;
139	CW49A03	U3CW49A03	08/28/93	WATER	C2	53.0	443863.554	2142781.089	12.50	SSFP - OU3;
140	OU3CW50A01	U3CW50A01	09/08/93	WATER	D2	12.5	443907.579	2142367.062	11.90	SSFP - OU3;
141	OU3CW50A02	U3CW50A02	09/08/93	WATER	D2	24.0	443907.579	2142367.062	11.90	SSFP - OU3;
142	OU3CW50A03	U3CW50A03	09/09/93	WATER	D2	85.0	443907.579	2142367.062	11.90	SSFP - OU3;
143	CW51A01	U3CW51A01	08/29/93	WATER	E2	13.0	443871.118	2141959.415	11.59	SSFP - OU3;
144	CW51A02	U3CW51A02	08/29/93	WATER	E2	68.0	443871.118	2141959.415	11.59	SSFP - OU3;
145	OU3CW52A01	U3CW52A01	09/09/93	WATER	F2	10.0	443800.812	2141585.366	10.70	SSFP - OU3;
146	OU3CW52A02	U3CW52A02	09/09/93	WATER	F2	32.0	443800.812	2141585.366	10.70	SSFP - OU3;
147	OU3CW52A03	U3CW52A03	09/09/93	WATER	F2	56.5	443800.812	2141585.366	10.70	SSFP - OU3;
148	CW53A01	U3CW53A01	08/29/93	WATER	F3	11.5	444247.932	2141492.388	11.01	SSFP - OU3;
149	CW53A02	U3CW53A02	08/29/93	WATER	F3	53.0	444247.932	2141492.388	11.01	SSFP - OU3;
150	OU3CW53A03	U3CW53A03	08/30/93	WATER	F3	73.0	444247.932	2141492.388	11.01	SSFP - OU3;
151	OU3CW54A01	U3CW54A01	09/09/93	WATER	F4	14.0	444688.208	2141432.767	13.40	SSFP - OU3;
152	OU3CW54A02	U3CW54A02	09/09/93	WATER	F4	35.0	444688.208	2141432.767	13.40	SSFP - OU3;
153	OU3CW54A03	U3CW54A03	09/09/93	WATER	F4	57.0	444688.208	2141432.767	13.40	SSFP - OU3;
154	OU3CW55A01	U3CW55A01	09/09/93	WATER	G4	12.0	444681.719	2140909.171	12.90	SSFP - OU3;
155	OU3CW55A02	U3CW55A02	09/09/93	WATER	G4	40.0	444681.719	2140909.171	12.90	SSFP - OU3;
156	OU3CW55A03	U3CW55A03	09/10/93	WATER	G4	64.0	444681.719	2140909.171	12.90	SSFP - OU3;
157	OU3CW56A01	U3CW56A01	09/10/93	WATER	I4	16.0	444677.315	2140320.846	17.30	SSFP - OU3;
158	OU3CW56A02	U3CW56A02	09/10/93	WATER	I4	40.0	444677.315	2140320.846	17.30	SSFP - OU3;
159	OU3CW56A03	U3CW56A03	09/10/93	WATER	I4	72.0	444677.315	2140320.846	17.30	SSFP - OU3;
160	OU3CW57A01	U3CW57A01	09/08/93	WATER	B2	9.0	443723.473	2143142.739	10.10	SSFP - OU3;
161	OU3CW57A02	U3CW57A02	09/08/93	WATER	B2	31.0	443723.473	2143142.739	10.10	SSFP - OU3;
162	OU3CW57A03	U3CW57A03	09/08/93	WATER	B2	58.0	443723.473	2143142.739	10.10	SSFP - OU3;
163	OU3CW58A01	U3CW58A01	09/08/93	WATER	B1	11.0	443665.372	2142845.645	11.76	SSFP - OU3;
164	OU3CW58A02	U3CW58A02	09/08/93	WATER	B1	35.0	443665.372	2142845.645	11.76	SSFP - OU3;
165	OU3CW58A03	U3CW58A03	09/08/93	WATER	B1	62.0	443665.372	2142845.645	11.76	SSFP - OU3;
166	OU3CW59A01	U3CW59A01	09/20/93	WATER	F1	10.5	443666.067	2141594.312	11.40	SSFP - OU3;
167	OU3CW59A02	U3CW59A02	09/20/93	WATER	F1	55.0	443666.067	2141594.312	11.40	SSFP - OU3;
168	OU3CW59A03	U3CW59A03	09/20/93	WATER	F1	75.0	443666.067	2141594.312	11.40	SSFP - OU3;
169	OU3CW60A01	U3CW60A01	09/22/93	WATER	D2	11.5	443732.159	2142380.610	13.90	SSFP - OU3;
170	OU3CW60A02	U3CW60A02	09/22/93	WATER	D2	38.0	443732.159	2142380.610	13.90	SSFP - OU3;
171	OU3CW60A03	U3CW60A03	09/22/93	WATER	D2	60.0	443732.159	2142380.610	13.90	SSFP - OU3;
172	OU3CW61A01	U3CW61A01	09/21/93	WATER	C1	15.0	443360.880	2142761.459	13.80	SSFP - OU3;
173	OU3CW61A02	U3CW61A02	09/21/93	WATER	C1	43.0	443360.880	2142761.459	13.80	SSFP - OU3;
174	OU3CW61A03	U3CW61A03	09/21/93	WATER	C1	83.0	443360.880	2142761.459	13.80	SSFP - OU3;
175	OU3CW62A01	U3CW62A01	09/21/93	WATER	B1	13.0	443314.600	2142932.947	13.10	SSFP - OU3;
176	OU3CW62A02	U3CW62A02	09/21/93	WATER	B1	40.0	443314.600	2142932.947	13.10	SSFP - OU3;
177	OU3CW62A03	U3CW62A03	09/21/93	WATER	B1	82.0	443314.600	2142932.947	13.10	SSFP - OU3;
178	OU3CW63A01	U3CW63A01	09/22/93	WATER	B1	14.0	443357.954	2143113.841	2.50	SSFP - OU3;
179	OU3CW63A02	U3CW63A02	09/22/93	WATER	B1	33.5	443357.954	2143113.841	2.50	SSFP - OU3;
180	OU3CW63A03	U3CW63A03	09/22/93	WATER	B1	73.0	443357.954	2143113.841	2.50	SSFP - OU3;
181	OU3PZ00201	U3PZ00201	08/03/93	SOIL	G7	1.0	445739.748	2141000.490	4.18	SSFP - OU3;
182	OU3PZ00202	U3PZ00202	08/03/93	SOIL	G7	3.0	445739.748	2141000.490	4.18	SSFP - OU3;
183	OU3PZ00203	U3PZ00203	08/03/93	SOIL	G7	5.0	445739.748	2141000.490	4.18	SSFP - OU3;
184	OU3PZ00301	U3PZ00301	08/10/93	SOIL	C7	1.0	445740.127	2142580.603	5.71	SSFP - OU3;
185	OU3PZ00302	U3PZ00302	08/10/93	SOIL	C7	3.0	445740.127	2142580.603	5.71	SSFP - OU3;
186	OU3PZ00303	U3PZ00303	08/10/93	SOIL	C7	5.0	445740.127	2142580.603	5.71	SSFP - OU3;
187	OU3PZ00501	U3PZ00501	08/12/93	SOIL	D5	1.0	445261.662	2142195.854	8.24	SSFP - OU3;
188	OU3PZ00502	U3PZ00502	08/12/93	SOIL	D5	3.0	445261.662	2142195.854	8.24	SSFP - OU3;
189	OU3PZ00503	U3PZ00503	08/12/93	SOIL	D5	5.0	445261.662	2142195.854	8.24	SSFP - OU3;
190	OU3PZ00701	U3PZ00701	08/02/93	SOIL	G5	1.0	445075.418	2140948.499	9.62	SSFP - OU3;
191	OU3PZ00702	U3PZ00702	08/02/93	SOIL	G5	3.0	445075.418	2140948.499	9.62	SSFP - OU3;
192	OU3PZ00703	U3PZ00703	08/02/93	SOIL	G5	5.0	445075.418	2140948.499	9.62	SSFP - OU3;
193	OU3PZ00704	U3PZ00704	08/02/93	SOIL	G5	7.0	445075.418	2140948.499	9.62	SSFP - OU3;
194	OU3PZ00705	U3PZ00705	08/02/93	SOIL	G5	9.0	445075.418	2140948.499	9.62	SSFP - OU3;
195	OU3PZ00901	U3PZ00901	08/14/93	SOIL	E7	1.0	445739.947	2141968.979	5.90	SSFP - OU3;
196	OU3PZ00902	U3PZ00902	08/14/93	SOIL	E7	3.0	445739.947	2141968.979	5.90	SSFP - OU3;

329	W04	U3W04	03/11/92	WATER	G4	15.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-8
330	W05	U3W05	03/11/92	WATER	G4	15.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-8
331	W06	U3W06	03/11/92	WATER	G5	13.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-8
332	P-159 SB01	U3P159SB01	01/26/93	SOIL	A6	3.0	-1.000	-1.000	-1.00	SER15; 4-1, 4-2, 4-3
333	P-159 SB02	U3P159SB02	01/25/93	SOIL	A6	3.0	-1.000	-1.000	-1.00	SER15; 4-1, 4-2, 4-3
334	P-159 SB02D	U3P159SB02D	01/25/93	SOIL	A6	3.0	-1.000	-1.000	-1.00	SER15; 4-1, 4-2, 4-3
335	P-159 SB03	U3P159SB03	01/26/93	SOIL	B6	3.0	-1.000	-1.000	-1.00	SER15; 4-1, 4-2, 4-3
336	P-159 SB04	U3P159SB04	01/25/93	SOIL	C5	3.0	-1.000	-1.000	-1.00	SER15; 4-1, 4-2, 4-3
337	P-159 SB05	U3P159SB05	01/23/93	SOIL	B4	3.0	-1.000	-1.000	-1.00	SER15; 4-1, 4-2, 4-3
338	P-159 SB06	U3P159SB06	01/23/93	SOIL	C4	3.0	-1.000	-1.000	-1.00	SER15; 4-1, 4-2, 4-3
339	P-159 SB06D	U3P159SB06D	01/23/93	SOIL	C4	3.0	-1.000	-1.000	-1.00	SER15; 4-1, 4-2, 4-3
340	P-159 SB07	U3P159SB07	01/22/93	SOIL	C4	3.0	-1.000	-1.000	-1.00	SER15; 4-1 (c), 4-2 (c), 4-3 (c)
341	P-159 SB08	U3P159SB08	01/25/93	SOIL	A6	3.0	-1.000	-1.000	-1.00	SER15; 4-1 (c), 4-2 (c), 4-3 (c)
342	P-159 SB09	U3P159SB09	01/26/93	SOIL	A6	3.0	-1.000	-1.000	-1.00	SER15; 4-1 (c), 4-2 (c), 4-3 (c)
343	P-159 SB10	U3P159SB10	01/24/93	SOIL	B4	3.0	-1.000	-1.000	-1.00	SER15; 4-1 (c), 4-2 (c), 4-3 (c)
344	P-159 SB11	U3P159SB11	01/24/93	SOIL	C4	3.0	-1.000	-1.000	-1.00	SER15; 4-1 (c), 4-2 (c), 4-3 (c)
345	P-159 SB12	U3P159SB12	01/24/93	SOIL	C5	3.0	-1.000	-1.000	-1.00	SER15; 4-1 (c), 4-2 (c), 4-3 (c)
346	P-159 MW01	U3P159MW01	02/01/93	WATER	A6	13.0	-1.000	-1.000	-1.00	SER15; 4-4, 4-5
347	P-159 MW02	U3P159MW02	02/01/93	WATER	A6	13.0	-1.000	-1.000	-1.00	SER15; 4-4, 4-5
348	P-159 MW02D	U3P159MW02D	02/01/93	WATER	A6	13.0	-1.000	-1.000	-1.00	SER15; 4-4, 4-5
349	P-159 MW03	U3P159MW03	02/01/93	WATER	B6	13.0	-1.000	-1.000	-1.00	SER15; 4-4, 4-5
350	P-159 MW04	U3P159MW04	02/01/93	WATER	C5	13.0	-1.000	-1.000	-1.00	SER15; 4-4, 4-5
351	P-159 MW06	U3P159MW06	02/01/93	WATER	C4	13.0	-1.000	-1.000	-1.00	SER15; 4-4, 4-5
352	P-159 MW07	U3P159MW07	02/01/93	WATER	C4	13.0	-1.000	-1.000	-1.00	SER15; 4-4, 4-5
353	P-159 MW05	U3P159MW05	02/01/93	WATER	B4	13.0	-1.000	-1.000	-1.00	SER15; 4-4, 4-5
354	B101 SB01	U3B101SB01	01/20/93	SOIL	D3	2.0	-1.000	-1.000	-1.00	SER16; 4-1, 4-2
355	B101 SB02	U3B101SB02	01/22/93	SOIL	B4	2.0	-1.000	-1.000	-1.00	SER16; 4-1, 4-2
356	B101 SB02D	U3B101SB02D	01/22/93	SOIL	B4	2.0	-1.000	-1.000	-1.00	SER16; 4-1, 4-2
357	B101 SB03	U3B101SB03	01/20/93	SOIL	B4	2.0	-1.000	-1.000	-1.00	SER16; 4-1, 4-2
358	B101 SB04	U3B101SB04	01/23/93	SOIL	C4	2.0	-1.000	-1.000	-1.00	SER16; 4-1, 4-2
359	B101 SB06	U3B101SB06	01/19/93	SOIL	D3	2.0	-1.000	-1.000	-1.00	SER16; 4-1, 4-2
360	SB101 SB05	U3SB101SB05	01/19/93	SOIL	D3	2.0	-1.000	-1.000	-1.00	SER16; 4-1
361	SB101 SB07	U3SB101SB07	01/21/93	SOIL	B4	2.0	-1.000	-1.000	-1.00	SER16; 4-1
362	SB101 SB08	U3SB101SB08	01/21/93	SOIL	B4	2.0	-1.000	-1.000	-1.00	SER16; 4-1
363	B101 SB09	U3B101SB09	01/21/93	SOIL	B4	2.0	-1.000	-1.000	-1.00	SER16; 4-1 (c), 4-2 (c1)
364	B101 SB10	U3B101SB10	01/21/93	SOIL	B4	2.0	-1.000	-1.000	-1.00	SER16; 4-1 (c), 4-2 (c1)
365	B101 SB11	U3B101SB11	01/20/93	SOIL	B4	2.0	-1.000	-1.000	-1.00	SER16; 4-1 (c), 4-2 (c1)
366	B101 SB12	U3B101SB12	01/20/93	SOIL	B4	2.0	-1.000	-1.000	-1.00	SER16; 4-1 (c), 4-2 (c1)
367	B101 SB13	U3B101SB13	01/24/93	SOIL	C4	2.0	-1.000	-1.000	-1.00	SER16; 4-1 (c)
368	SB101 SB12	U3SB101SB12	01/20/93	SOIL	B4	5.5	-1.000	-1.000	-1.00	SER16; 4-1 (c)
369	SB101 SB14	U3SB101SB14	01/24/93	SOIL	C4	2.0	-1.000	-1.000	-1.00	SER16; 4-1 (c)
370	SB101 SB15	U3SB101SB15	01/23/93	SOIL	C4	2.0	-1.000	-1.000	-1.00	SER16; 4-1 (c)
371	B101 SB05	U3B101SB05	01/19/93	SOIL	D3	2.0	-1.000	-1.000	-1.00	SER16; 4-2
372	B101 SB07	U3B101SB07	01/21/93	SOIL	B4	2.0	-1.000	-1.000	-1.00	SER16; 4-2
373	B101 SB08	U3B101SB08	01/21/93	SOIL	B4	2.0	-1.000	-1.000	-1.00	SER16; 4-2 (c1)
374	B101 SB12B	U3B101SB12B	01/20/93	SOIL	B4	5.5	-1.000	-1.000	-1.00	SER16; 4-2 (c1)
375	B101 SB014	U3B101SB014	01/24/93	SOIL	C4	2.0	-1.000	-1.000	-1.00	SER16; 4-2 (c2)
376	B101 SB015	U3B101SB015	01/23/93	SOIL	C4	2.0	-1.000	-1.000	-1.00	SER16; 4-2 (c2)
377	B101 MW01	U3B101MW01	02/01/93	WATER	D3	13.0	-1.000	-1.000	-1.00	SER16; 4-3, 4-4
378	B101 MW02	U3B101MW02	02/01/93	WATER	B4	13.0	-1.000	-1.000	-1.00	SER16; 4-3, 4-4
379	B101 MW02D	U3B101MW02D	02/01/93	WATER	B4	13.0	-1.000	-1.000	-1.00	SER16; 4-3, 4-4
380	B101 MW03	U3B101MW03	02/01/93	WATER	B4	13.0	-1.000	-1.000	-1.00	SER16; 4-3, 4-4
381	B101 MW04	U3B101MW04	02/01/93	WATER	C4	13.0	-1.000	-1.000	-1.00	SER16; 4-3, 4-4

263	40U	U340U	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
264	41D	U341D	12/01/91	SOIL	B3	4.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
265	41S	U341S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
266	42S	U342S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
267	43S	U343S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
268	44S	U344S	12/01/91	SOIL	B3	1.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-9
269	GW780-1	U3GW7801	06/01/90	WATER	B3	6.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-6b
270	GW780-5	U3GW7805	06/01/90	WATER	A3	6.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-6b
271	MW-1	U3MW1	01/01/88	WATER	B4	9.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
272	MW-10	U3MW10	01/01/88	WATER	E4	12.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
273	MW-11	U3MW11	01/01/88	WATER	E4	12.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
274	MW-12	U3MW12	01/01/88	WATER	E4	12.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
275	MW-13	U3MW13	01/01/88	WATER	E4	13.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
276	MW-14	U3MW14	01/01/88	WATER	E4	13.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
277	MW-2	U3MW2	01/01/88	WATER	C4	10.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
278	MW-3	U3MW3	01/01/88	WATER	C4	10.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
279	MW-4	U3MW4	01/01/88	WATER	C4	10.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
280	MW-5	U3MW5	01/01/88	WATER	D4	10.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
281	MW-6	U3MW6	01/01/88	WATER	D4	11.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
282	MW-7	U3MW7	01/01/88	WATER	D4	11.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
283	MW-8	U3MW8	01/01/88	WATER	D4	11.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
284	MW-9	U3MW9	01/01/88	WATER	E4	11.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-4a
285	NARF B1	U3NARFB1	01/01/86	WATER	H5	32.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3
286	NARF D-1	U3NARFD1	01/01/86	WATER	B4	68.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3
287	NARF D-2	U3NARFD2	01/01/86	WATER	H5	61.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3
288	NARF-1	U3NARF1	01/01/85	WATER	A4	20.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-2
289	NARF-10	U3NARF10	01/01/86	WATER	I5	16.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3 (c1)
290	NARF-11	U3NARF11	01/01/86	WATER	I5	24.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3 (c1)
291	NARF-12	U3NARF12	01/01/86	WATER	I5	15.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3 (c1)
292	NARF-13	U3NARF13	01/01/86	WATER	I6	16.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3 (c1)
293	NARF-13-1	U3NARF131	01/01/86	WATER	D4	12.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3 (c2)
294	NARF-14	U3NARF14	01/01/86	WATER	B4	14.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3 (c2)
295	NARF-15	U3NARF15	01/01/86	WATER	A3	15.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3 (c2)
296	NARF-16	U3NARF16	01/01/86	WATER	A5	14.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3 (c2)
297	NARF-17	U3NARF17	01/01/86	WATER	A6	15.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3 (c2)
298	NARF-18	U3NARF18	01/01/86	WATER	A7	15.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3 (c2)
299	NARF-2	U3NARF2	01/01/85	WATER	F4	16.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-2
300	NARF-3	U3NARF3	01/01/85	WATER	F5	14.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-2
301	NARF-4	U3NARF4	01/01/85	WATER	I6	14.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-2
302	NARF-5	U3NARF5	01/01/85	WATER	I6	10.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-2
303	NARF-6	U3NARF6	01/01/85	WATER	C5	11.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-2
304	NARF-9	U3NARF9	01/01/86	WATER	H5	24.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-3 (c1)
305	NARF-B1	U3NARFB1	01/01/85	WATER	H5	32.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-2
306	SB-1	U3SB1	01/01/89	SOIL	I5	5.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-5
307	SB-3	U3SB3	01/01/89	SOIL	I4	5.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-5
308	SB-4	U3SB4	01/01/89	SOIL	I5	5.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-5
309	SB01	U3SB01	03/09/92	SOIL	G5	3.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7
310	SB02	U3SB02	03/09/92	SOIL	G5	3.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7
311	SB03	U3SB03	03/09/92	SOIL	G4	2.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7
312	SB04	U3SB04	03/09/92	SOIL	G4	3.5	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7 (c)
313	SB05	U3SB05	03/09/92	SOIL	G4	3.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7 (c)
314	SB06	U3SB06	03/09/92	SOIL	G5	3.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7 (c)
315	SS01	U3SS01	03/09/92	SOIL	G5	1.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7
316	SS02	U3SS02	03/09/92	SOIL	G5	1.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7
317	SS03	U3SS03	03/09/92	SOIL	G4	1.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7
318	SS04	U3SS04	03/09/92	SOIL	G4	1.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7 (c)
319	SS05	U3SS05	03/09/92	SOIL	G4	1.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7 (c)
320	SS06	U3SS06	03/09/92	SOIL	G5	1.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-7 (c)
321	SS780-1	U3SS7801	06/01/90	SOIL	B3	1.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-6a
322	SS780-2	U3SS7802	06/01/90	SOIL	B3	1.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-6a
323	SS780-3	U3SS7803	06/01/90	SOIL	B3	1.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-6a
324	SS780-4	U3SS7804	06/01/90	SOIL	A3	1.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-6a
325	SS780-5	U3SS7805	06/01/90	SOIL	A3	1.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-6a
326	W01	U3W01	03/11/92	WATER	G5	15.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-8
327	W02	U3W02	03/11/92	WATER	G5	15.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-8
328	W03	U3W03	03/11/92	WATER	G4	17.0	-1.000	-1.000	-1.00	RI/FS Work Plan - OU3; Table 2-8

APPENDIX L

Maps