N00213.AR.001532
NAS KEY WEST
5090.3a

FINAL REPORT ADMINISTRATIVE DOCUMENTS SITES 1,3,4,5,7,8,9 AND 10 NAS KEY WEST FL

02/01/1990

IT CORPORATION

FINAL REPORT

FEBRUARY 1990

ADMINISTRATIVE DOCUMENTS

SITES 1, 3, 4, 5, 7, 8, 9, AND 10

CONTAMINATION INVESTIGATION

NAVAL AIR STATION - KEY WEST

KEY WEST, FLORIDA

CONTRACT NO. N62467-88-C-0196

Prepared By:

IT CORPORATION

3012 U.S. HIGHWAY 301 NORTH, SUITE 1000

TAMPA, FLORIDA 33619

DISTRIBUTION LIST

RECIPIENT	NO. OF COPIES
SOUTHERN DIVISION, NAVAL FACILITIES ENGINEERING COMMAND	3
PUBLIC WORKS ENGINEERING, NAS-KEY WEST	15
MARTIN MARIETTA ENERGY SYSTEMS	0
ROBERT D. STEPHENS, IT-TAMPA	1
JO ANNE GARRETT, IT-KNOXVILLE	1
LEGGETTE, BRASHEARS, & GRAHAM, INC.	2
MARK HAMPTON, IT-TAMPA	1
PROJECT FILE	1
PROJECT FILE - UNBOUND	1
REPORT FILE	1

453005\P1DSTLST.BB3

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved OMB No 0704-0188

1a. REPORT SECURITY CLASSIFICATION: Unclassified	1b. RESTRICTIVE MARKINGS: None
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE: N/A	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION: IT Corporation; 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION: Southern Division, Naval Facilities Engineering Command
6c. ADDRESS (City, State, and ZIP Code): 3012 US Hwy. 301, North, Suite 1000, Tampa FL 33619	7b. ADDRESS (City, State, and ZIP Code): 2155 Eagle Drive, P.O. Box 10068, Charleston SC 29411
8a. NAME OF FUNDING/SPONSORING ORGANIZATION: See 7a; 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER: N62467-88-C-0196
8c. ADDRESS (City, State, and ZIP Code): See 7b	10. SOURCE OF FUNDING NUMBERS: PROGRAM ELEMENT NO; PROJECT NO.; TASK NO; WORK UNIT ACCESSION NO

11. TITLE (Include Security Classification): Administrative Documents; Sites 1,3,4,5,7,8,9, and 10

12. PERSONAL AUTHOR(S)

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final	FROM ____ TO ____	1990 February 23	

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	NAS-Key West CERCLIA R1/FS Project Management Plan, Quality Assurance Project Plan Site Management Plan, Field Sampling Plan *

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The administration documents for the NAS-Key West RF1 consist of the Project Management Plan, Site Management Plan, Data Management Plan, Sampling and Analysis Plan, and Health and Safety Plan.

The Project Management Plan provides a brief overview of the Navy Installation Restoration Program, including a brief discussion of its history and legal and regulatory basis. This document also outlines the overall action to be performed both in the remedial investigation and subsequent feasibility studies and remedial actions.

The Site Management Plan documents the data quality objectives (DQO) and the applicable ad revelant or appropriate requirements for the project. The Data Management Plan is an overview of techniques IT Corporation will utilize for tracking data generated during the R1/FS.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT: ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION: Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL: Robert Moser	22b. TELEPHONE (Include Area Code): (803)743-0573; 22c. OFFICE SYMBOL: 11519

DD Form 1473, JUN 86 — Previous editions are obsolete. — SECURITY CLASSIFICATION OF THIS PAGE

S/N 0102-LF-014-6603

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

19 - continued

The sampling and analysis plan is a two-part document consiting of the Quality Assurance Project Plan and the Field Sampling Plan. These two documents describe sampling procedures and quality assurance procedures IT Corporation will use for the NAS-Key West R1/FS.

The Health and Safety Plan describes IT Health and Safety program, and identifies the factors of this program effect the performance of the remedial investigation of NAS-Key West.

* 18 continued -
Sampling and Analysis Plan
Data Management Plan
Health and Safety Plan.

ADMINISTRATIVE DOCUMENTS
NAVAL AIR STATION-KEY WEST (UIC N00213)
KEY WEST, FLORIDA

PREPARED FOR

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA
CONTRACT NO. N62467-88-C-0196

PREPARED BY

IT CORPORATION
3012 U.S. HIGHWAY 301 N., SUITE 1000
TAMPA, FLORIDA 33619

FEBRUARY 1990

PROJECT MANAGEMENT PLAN
NAVAL AIR STATION-KEY WEST (UIC N00213)
KEY WEST, FLORIDA

PREPARED FOR

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA
CONTRACT NO. N62467-88-C-0196

PREPARED BY

IT CORPORATION
3012 U.S. HIGHWAY 301 N., SUITE 1000
TAMPA, FLORIDA 33619

FEBRUARY 1990

TABLE OF CONTENTS

	PAGE
LIST OF TABLES/LIST OF FIGURES (combined)	iii
ACRONYMS AND SYMBOLS	iv
1.0 INTRODUCTION	1-1
1.1 RELATIONSHIP BETWEEN THE U.S. DEPARTMENT OF THE NAVY, U.S. ENVIRONMENTAL PROTECTION AGENCY AND THE STATE OF FLORIDA	1-1
1.2 NAVY IRP	1-1
1.3 OBJECTIVES OF THE NAS-KEY WEST RI/FS	1-2
2.0 SITE DESCRIPTIONS	2-1
2.1 SITE 1 - TRUMAN ANNEX REFUSE DISPOSAL AREA	2-1
2.2 SITE 2 - TRUMAN ANNEX TRANSFORMER OIL DISPOSAL AREA	2-1
2.3 SITE 3 - TRUMAN ANNEX DDT MIXING AREA	2-1
2.4 SITE 4 - BOCA CHICA OPEN DISPOSAL AREA	2-2
2.5 SITE 5 - BOCA CHICA DDT MIXING AREA	2-3
2.6 SITE 6 - DREDGERS KEY REFUSE DISPOSAL AREA	2-3
2.7 SITE 7 - FLEMING KEY NORTH LANDFILL	2-3
2.8 SITE 8 - FLEMING KEY SOUTH LANDFILL	2-4
2.9 SITE 9 - TRUMBO POINT ANNEX FUEL FARM AND PIERS	2-4
2.10 SITE 10 - BOCA CHICA FIRE FIGHTING TRAINING AREA	2-4
3.0 SUMMARY OF INVESTIGATIONS CONDUCTED AT NAS-KEY WEST	3-1
3.1 INITIAL ASSESSMENT STUDY	3-1
3.2 CONFIRMATION STUDY	3-1
3.3 SUBSURFACE HYDROCARBON INVESTIGATION	3-1
3.4 NO FURTHER ACTION RECOMMENDATION	3-1
4.0 THE APPROACH TO THE NAS-KEY WEST RI/FS	4-1
5.0 OVERVIEW OF THE REMEDIAL RESPONSE PROCESS	5-1
5.1 REMEDIAL INVESTIGATION	5-1
5.2 FEASIBILITY STUDY	5-2
5.3 REMEDIAL ACTION	5-5
5.3.1 Remedial Design	5-5
5.3.2 Construction	5-6
5.3.3 Operations and Maintenance	5-6
5.4 ROLE OF INITIAL TASKS IN THE NAS-KEY WEST RI/FS	5-6
6.0 INITIAL TASKS OF THE RI/FS	6-1
6.1 WORK PLANS	6-1
6.2 SITE INSPECTION FOR SITES 2 AND 6	6-1
6.3 RI/FS ADMINISTRATIVE PLANS - SMP, PMP, DMP, SAP, AND HSP OF SITES 1, 3, 4, 5, 7, 8, 9 AND 10	6-1
6.3.1 Site Management Plan	6-1
6.3.2 Data Management Plan	6-1
6.3.3 Sampling and Analysis Plan	6-2
6.3.4 Health and Safety Plan	6-2
6.4 COMMUNITY RELATIONS PLAN OUTLINE FOR SITES 1, 2, 3, 4, 5, 6, 7, 8, 9 AND 10	6-2
6.5 REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN FOR SITES 1, 3, 4, 5, 7, 8, 9, AND 10	6-2

TABLE OF CONTENTS (continued)

PAGE

6.6 BASE LINE RISK ASSESSMENT REPORT FOR SITE 3 6-2
6.7 TREATABILITY STUDY IMPLEMENTATION PLAN FOR SITE 9 6-2
6.8 GENERAL 6-3
7.0 PROJECT SCHEDULES 7-1
8.0 PROJECT ORGANIZATION 8-1
TABLES
FIGURES
APPENDIX A - RESUMES

LIST OF TABLES

TABLE NO.	TITLE
1-1	COMPARISON OF REGULATORY WASTE REMEDIATION PROGRAMS
5-1	REMEDIAL RESPONSE OBJECTIVES

LIST OF FIGURES

FIGURE NO.	TITLE
2-1	LOCATIONS OF NAVAL ACTIVITIES AND STUDY SITES
2-2	INVESTIGATION AND SAMPLING LOCATIONS TRUMAN ANNEX REFUSE DISPOSAL AREA, SITE 1
2-3	SITE LAYOUT TRUMAN ANNEX TRANSFORMER OIL DISPOSAL AREA, SITE 2
2-4	INVESTIGATION AND SAMPLING LOCATIONS TRUMAN ANNEX DDT MIXING AREA, SITE 3
2-5	INVESTIGATION AND SAMPLING LOCATIONS BOCA CHICA OPEN DISPOSAL AREA, SITE 4
2-6	INVESTIGATION AND SAMPLING LOCATIONS BOCA CHICA DDT MIXING AREA, SITE 5
2-7	SITE LAYOUT DREDGERS KEY REFUSE DISPOSAL AREA, SITE 6
2-8	INVESTIGATION AND SAMPLING LOCATIONS FLEMING KEY NORTH LANDFILL, SITE 7
2-9	INVESTIGATION AND SAMPLING LOCATIONS FLEMING KEY SOUTH LANDFILL, SITE 8
2-10	INVESTIGATION AND SAMPLING LOCATIONS TRUMBO POINT ANNEX FUEL FARM AND PIERS, SITE 9
2-11	INVESTIGATION AND SAMPLING LOCATIONS BOCA CHICA FIRE FIGHTING TRAINING AREA, SITE 10
4-1	REMEDIAL RESPONSE PROCESS
7-1	PRELIMINARY RI/FS SCHEDULE
7-2	PROPOSED PROJECT SCHEDULE
8-1	PROJECT ORGANIZATION CHART

ACRONYMS AND SYMBOLS

TITLE	DEFINITION
ACGIH	American Council of Governmental and Industrial Hygienist
ADI	Average Daily Intake
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society of Testing and Materials
BW	Body Weight
CAG	Carcinogenic Assessment Group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGA	Combustible Gas Analyzer (Exposimeter)
CLP	USEPA Contract Laboratory Program
CNO	Chief of Naval Operations
CPR	Cardio Pulmonary Resuscitation
CRPO	Community Relations Plan Outline
CRQL	Contract Required Quantification Limits
C_s	Concentration of Soil
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DDT	Dichloro-Diphenyl-Trichloroethane
DDD	Dichloro-Diphenyl-Dichloroethane
DDE	Dichloro-Diphenyl-Dichloro-Ethylene
DMP	Data Management Plan
DOD	U.S. Department of Defense
DOT	U.S. Department of Transportation
DPDO	Defense Property Disposal Office
DQO	Data Quality Objectives
EFD	Engineering Field Division
EIC	Engineer-in-Charge
EP	Extraction Procedure/Exposure Period
FAC	Florida Administrative Code
FDER	Florida Department of Environmental Regulations
FEV/FVC	Forced Expiratory Volume/Forced Vital Capacity
FGFFC	Florida Game and Fresh Water Fish Commission
FID	Flame Ionization Detector

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
FOC	Field Operations Coordinator
FS	Feasibility Study
FSP	Field Sampling Plan
GAC	Granular Activated Carbon
G&M	Geraghty and Miller
gpm	Gallons per Minute
HRS	Hazard Ranking System
HSC	Health and Safety Coordinator
HSP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments of 1984
IAS	Initial Assessment Study
IBM PC	International Business Machine Corp. Personal Computer
ICRP	International Council on Radiation Protection
IR	Average Soil Ingestion Rate
IRP	Installation Restoration Program
IT	IT Corporation
ITAS	IT Analytical Services
LBG	Leggette, Brashears, and Graham, Inc.
LEL	Lower Explosive Limit
LIMS	Laboratory Information Management Systems
mg/kg	Milligrams/Kilogram
mg/L	Milligrams/Liter
MS DOS	Microsoft Disk Operating System
MSA	Mine Safety Administration
MSL	Mean Sea Level
NACIP	Navy Assessment and Control of Installation Pollutants
NAS	Naval Air Station
NAVENENVSA	Naval Energy and Environmental Support Activity
NAVFACENGCOM	Navy Facilities Engineering Command

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
NCP	National Oil and Hazardous Substances Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NEPPS	Naval Environmental Protection Support Service
NFA	No Further Action
NIOSH	National Institute of Occupational Safety and Health
NPSS	Naval Environmental Protection Support Service
OSHA	Occupational Health and Safety Administration
OVA	Organic Vapor Analyzer
PAO	Public Affairs Officer
PC	Personal Computer
PCB	Polychlorinated Biphenyl
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PMP	Project Management Plan
ppb	Parts per Billion
PPE	Personnel Protection Equipment
ppm	Parts per Million
q	Cancer Potency Factor
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
R	Acceptable Incremental Lifetime Cancer Risk
RA	Risk Assessment or Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RV	Recreational Vehicle
SAP	Sampling and Analysis Plan

TITLE	DEFINITION
SARA	Superfund Amendments and Re-authorization Act
SCBA	Self Contained Breathing Apparatus
SI	Site Inspection
SMAC 20	Simultaneous Analysis Complete
SOUTHDIV	Southern Division, Naval Facilities Engineering Command
SOW	Statement of Work
TCL	Target Compound List
TDS	Total Dissolved Solids
TLV	Threshold Limit Value
TRC	Technical Review Committee
ug/L	Micrograms/Liter
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds
WBGT	Wet Globe Bulb Temperature Index

1.0 INTRODUCTION

This Remedial Investigation and Feasibility Study (RI/FS) Project Management Plan (PMP) describes the overall approach to be taken for the Southern Division (SOUTHDIV) Naval Facilities Engineering Command, for integrating the results of previous investigations conducted under the Department of Defense Installation and Restoration Program (IRP) at the Naval Air Station (NAS) Key West into the RI/FS Process. The approach described herein will be followed so that all future work will be in compliance with the National Oil and Hazardous Substances Contingency Plan (NCP) as modified by the Superfund Amendments and the Re-authorization Act of 1986 (SARA). This plan is intended to be a living document to be amended as is necessary and to be used as (1) a planning document by SOUTHDIV in structuring an interagency agreement, if required, between the Department of Defense, and federal and state regulatory agencies, and (2) a management tool by SOUTHDIV to scope, modify, and track the progress of the NAS-Key West work. The plan will be updated as new data are obtained during the Remedial Investigation (RI), as the scope of new Risk Assessment (RA) and Feasibility Study (FS) tasks are defined, and as new priorities are established by the SOUTHDIV and/or regulatory agencies. The updates of this Plan will be the primary means of keeping all appropriate regulatory agencies informed and therefore involved in the performance of the specified work at NAS-Key West.

1.1 RELATIONSHIP BETWEEN THE U.S. DEPARTMENT OF THE NAVY, U.S. ENVIRONMENTAL PROTECTION AGENCY AND THE STATE OF FLORIDA

The IRP, the United States Environmental Protection Agency (USEPA), and the State of Florida Department of Environmental Regulation (FDER) "Superfund" programs are designed to respond to the release or threatened release of hazardous substances into the environment. The USEPA and the FDER "Superfund" programs are based on the procedures described in the NCP and its amendments. Each of these programs acknowledge and solicit guidance from other relevant and appropriate federal, state, and local programs. A comparison of these three programs is shown in Table 1-1.

The objectives and the approach of the NAS-Key West RI/FS described within this management plan are recognized within each of the federal and state cleanup programs. The IRP Program recognizes this plan as a RI/FS activity. The federal and state programs categorize this plan under the RI/FS process.

The following sections describe the origin of IRP, the long-range objectives of the RI/FS and the specific objectives of the RI/FS at NAS-Key West.

1.2 NAVY IRP

In 1976, the U.S. Department of Defense (DOD) developed the IRP. The purpose of the IRP is to assess and control (1) the migration of environmental contamination that may have resulted from past operations and disposal practices at DOD facilities, and (2) the probable migration of hazardous contaminants. In response to the Resource Conservation and Recovery Act of 1976 (RCRA), and in anticipation of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, the legislation that authorizes the USEPA "Superfund" program), DOD issued a Defense Environmental Quality Program Policy Memorandum (DEQPPM) dated June 1980 (DEQPPM 80-6), that required the identification of past hazardous waste disposal sites at DOD agency installations. The Chief of Naval Operations (CNO) initiated the Naval Installation and Control of Pollutants (NACIP) program in OPNAVNOTE 6240 of 11 September 1980, which was superseded by OPNAVINST 5090.1 of 26 May 1983. The NACIP Program has been replaced by the IRP in a coordinated effort throughout DOD.

The IRP is divided into the following four-phase program:

- Phase I - Problem Identification/Records Search
- Phase II - Problem Confirmation and Qualification
- Phase III - Technology Base Development
- Phase IV - Operations

The phase I work has been completed at NAS-Key West. Some phase II work where the sites identified in phase I are individually evaluated with respect to their potential threat to human health has also been completed. The work described in this PMP will continue the phase II work for eight sites at NAS-Key West. Two sites are being proposed for no further action and are described in a separate document. Included in this SOW is the verification of the presence of contamination, and information regarding migration pathways. Phase III of the IRP program is the implementation of the research and technology development required for objective assessment of environmental effect or remedial technologies. Phase IV involves the construction and implementation of remedial alternatives.

1.3 OBJECTIVES OF THE NAS-KEY WEST RI/FS

The long-range objectives of the RI/FS programs are to assess the extent and magnitude of contamination from past waste disposal and spill sites, and to select appropriate remedies consistent with the NCP for those sites that pose a threat to human health, welfare, or the environment. The goals for the selection of the remedial alternatives are to:

- Select remedies that will protect human health and the environment
- Select remedies that are consistent with Navy land use plans
- Attain Applicable or Relevant and Appropriate Requirements (ARARs) as an end result of remediation
- Select remedies that use permanent solutions and alternative technologies to the maximum extent practical
- Provide cost-effective remedies
- Consider the use of interim RAs

The primary objective of the current RI efforts is to integrate the results from previous and proposed investigations at NAS-Key West in order to provide the information that is necessary and sufficient to conduct RA and FA. This integration involves determining which sites pose a threat to human health and the environment, and which sites do not. As the first step in integrating past, present and future data collection efforts, the following tasks will be performed for Sites 1, 3, 4, 5, 7, 8, 9, and 10:

- Review previous work, assess its adequacy for use in the RI and eventually in the RA and/or FS, and determine if the previously recommended remedies are appropriate within the RI/FS process
- Prepare the necessary procedural and administrative plans to control the quality and flow of information collected during the RI
- Identify pathways for each site
- Identify ARARs for the RI
- Conduct additional site characterizations, as necessary
- Prepare site specific RI report

Other support efforts will be performed before most of the tasks listed above can be initiated. Examples of such efforts include the preparation of (1) a Site Management Plan (SMP), (2) a Data Management Plan (DMP), (3) a Sampling and Analysis Plan (SAP), (4) a Health and Safety Plan (HSP), and RI/FS Work Plans for Sites 1, 3, 4, 5, 7, 8, 9, and 10. Other efforts include preparation of a Community Relations Plan Outline (CRPO) for sites 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10, and preparation of a Treatability Study Implementation Plan for site 9.

2.0 SITE DESCRIPTIONS

NAS-Key West is located approximately 150 miles southwest of Miami on the last major island of the Florida Keys. The general location of NAS-Key West is shown on the area map in Figure 2-1. It is connected to the mainland by the Overseas Highway (U.S. Highway No. 1). Tourism is the primary industry in the Key West area. Visitors are attracted by the tropical climate and the beautiful island setting. Fishing is the second most important industry with shrimping accounting for half the total catch.

2.1 SITE 1 - TRUMAN ANNEX REFUSE DISPOSAL AREA

The Truman Annex Refuse Disposal Area is located along the southern shore of Truman Annex on Key West as shown on Figure 2-1. The site is reported to cover an area of approximately seven acres, including the antenna field and the area to the immediate north. A detailed map of the site is shown in Figure 2-2, which shows the locations of the proposed work.

The subsurface at this site consists of landfill material in a shallow fill area with the landfill reportedly extending beyond the natural shoreline. Previous investigations reported that ground water in the area is approximately two to three feet below land surface and flow is in a southerly direction towards the Atlantic Ocean.

From 1952 until the mid-1960's, the Truman Annex Refuse Disposal Area was used for general refuse disposal and open burning. No restrictions were placed on the types of wastes disposed of at the site and it is believed that, in addition to general refuse, waste paint, thinners and solvents were also sent here for disposal.

2.2 SITE 2 - TRUMAN ANNEX TRANSFORMER OIL DISPOSAL AREA

The transformer oil disposal area, shown in detail in Figure 2-3, is located near Fort Zachary Taylor. The location of this site is shown on Figure 2-1. The gravel covered parking lot, designated Site 2, is approximately 0.5 acres in size with no surface vegetation. The parking lot surrounds the Defense Property Disposal Office, with a warehouse and offices immediately adjacent to the site. The site is approximately 1,000 feet from the ocean and is only a few feet above sea level. Because the site is on the edge of Navy property, it is partially, but not completely, fenced in. Fort Zachary Taylor, a Florida State Park, adjoins the site on one side. While the entire Annex is restricted to military personnel, Site 2 is subject to some pedestrian traffic from the warehouse and offices. The site is one quarter mile east of the Key West National Wild Life Refuge, and three and one quarter miles south of the Great White Heron National Refuge Area.

2.3 SITE 3 - TRUMAN ANNEX DDT MIXING AREA

The Truman Annex DDT Mixing Area is located at the site of Building 265, which has been demolished. The location of this site is shown on Figure 2-1, the vicinity map. Figure 2-4 is a site plan. The site covers an area of about 0.25 acres and is located about 1,100 feet inland from the coastline in an area subject to vehicular and pedestrian traffic. The site is underlain by the highly permeable Miami Oolite and has no surface water features are present. It is reported that ground water is about two to three feet below land surface and flows south toward the Atlantic Ocean; however, no monitoring wells have been installed at the site to confirm this information.

From the 1940's to the early 1970's, the location was used as a DDT mixing area. Powdered DDT concentrate was mixed with water and temporarily stored in 55-gallon drums both inside and outside the former building. The mixed solution was transferred to trucks for dispersal. Discharge of the DDT mixture at the site was by unintentional spillage.

2.4 SITE 4 - BOCA CHICA OPEN DISPOSAL AREA

The Boca Chica Open Disposal Area is located in the southeastern part of Boca Chica Key, between the perimeter road and Geiger Creek as shown on the vicinity map in Figure 2-1. A detailed site map for Site 4 is shown in Figure 2-5. The site was operated as an open disposal and burning area from 1942, when the NAS was first established on Boca Chica, until the area was closed in the mid-1960's. The site received general refuse and waste associated with the operation and maintenance of aircraft. These wastes might have included waste oils, hydraulic fluids, paint thinners and solvents.

About 2,600 tons of waste from the NAS were reportedly disposed of and burned at this site annually. Whenever possible, this burning area was cleared of any remaining debris left over from the burning process and the debris was deposited in an area of unknown dimensions to the north of the burning area. Because the burning operation was not a controlled process, all wastes may not have been completely destroyed. There may exist residual wastes within the burn area and/or the debris zone.

The open disposal area (Site 4) consists of two areas, one the burn area and the other is a debris area. The burn area is presently clear of any debris with the exception of four abandoned above-ground tanks and a scrap iron rod pile located in the northwest portion of the burn area. Around one tank, the sides, foundations, and ground are covered with an unknown black asphalt-like substance. The remaining three tanks are clustered together next to a scrap iron rod pile. Much of the southern area is subject to tidal inundation.

The debris area, of unknown size, has a predominant thick cover of mangrove trees, spotted with open areas of surface water. Debris can still be seen lying among the mangroves and in these open areas.

The presence of mangrove trees are indicative of a salt water environment, and, therefore some connection to the sea must exist. This fact establishes the debris zone as a wetlands which is protected by state and federal dredge and fill regulations.

2.5 SITE 5 - BOCA CHICA DDT MIXING AREA

The Boca Chica DDT Mixing Area is located next to a man-made drainage ditch, that is connected to a large borrow pit, along the west side of Runway 13 as shown on Figure 2-6. DDT mixing operations were conducted at this site in Building 915 (demolished in 1982) from the 1940's to the early 1970's. DDT contamination at the site reportedly resulted from spillage. Two above-ground tanks on concrete foundations (a 500-gallon mixing tank and a 1,000-gallon storage tank) were located to the west of the building. During the removal of the tanks, some spillage reportedly occurred.

It has been verbally reported that the pesticides were mixed with waste fuel oil. Mixing with fuel oil allowed the pesticide to remain floating on the surface of any standing water in order to destroy insect larvae.

A slight odor of pesticide was detectable at the site during the on-site survey. A man-made drainage ditch is located just south of the site. Drainage from the ditch is to a large borrow pit to the east. The area near the demolition building is partly covered with sparse grass, while the ditch has medium sized mangroves around the banks.

2.6 SITE 6 - DREDGERS KEY REFUSE DISPOSAL AREA

The island is approximately 250 acres in size (Naval Energy and Environmental Support Activity, 1985), with the refuse disposal area, Site 6, covering roughly 20 acres, as shown in Figure 2-7. The site is classified as a wetland, and is located 1 1/2 mile south of the Great White Heron National Refuge Area and two miles east of the Key West National Wild Life Refuge. From about 1942-1948, the site was used as an open disposal area and burning grounds for volume reduction of wastes. Wastes disposed of here were reportedly non-hazardous and bulky in nature. Most of the wastes disposed of at this site were generated by the NAS; however, the city of Key West did use the site for disposal for some of their wastes. Material from the disposal site was removed to South Fleming Key in the years 1948 to 1951, and the area was filled and graded to permit construction of the Sigsbee Park Navy Housing Project. The island is now covered by Navy housing, with the exception of the eastern portion, which was a disposal site. An Recreational Vehicle (RV) park was installed in 1987-1988 adjacent to the site and is currently in use.

2.7 SITE 7 - FLEMING KEY NORTH LANDFILL

Fleming Key North Landfill shown in Figure 2-8 covers approximately 30 acres on the northern end of Fleming Key as shown on the vicinity map in Figure 2-1. Reportedly, 4,000 to 5,000 tons annually of unknown wastes were disposed into excavated trenches between 1952 and 1962. The trenches were typically cut 25 feet wide, 10 feet deep and 500 to 1,000 feet in length.

In 1977, a building housing the U.S. Department of Agriculture Animal Import Center was constructed over a portion of the landfill. During the construction, wastes were excavated and transferred to an area immediately to the west.

Ground water in the area is approximately three to four feet below the surface over much of the site and during trenching it is reported that saline ground water was encountered.

2.8 SITE 8 - FLEMING KEY SOUTH LANDFILL

The South Landfill Fleming Key shown on Figure 2-9 covers approximately 45 acres on the southern end of Fleming Key as shown on the vicinity map in Figure 2-1. Reportedly, as much as 8,000 tons annually of unknown wastes were disposal of at the landfill annually between 1962 and 1982. Beginning in 1966, the public works disposal activities of the City of Key West were combined with those of the Navy.

The open-trench disposal method was practiced at this site, with the trenches constructed in a manner similar to that at the Fleming Key North Landfill. Reportedly, the trenches were partially full of sea water when the wastes were placed in the trenches. Wet garbage was placed directly into one end of the trench and combustible wastes were taken to the western portion of the site and burned. The ashes and unburned wastes were then deposited into an area in the western portion of the site.

2.9 SITE 9 - TRUMBO POINT ANNEX FUEL FARM AND PIERS

The Trumbo Point Tank Farm shown on Figure 2-10 is located east of the piers at the Trumbo Point Annex, as shown on the vicinity map in Figure 2-1. The Annex was constructed in 1918 as a seaplane base using dredged materials. Since 1942, the annex was used as of fuel storage and distribution point. Fuel is received at this facility from tankers and then distributed by buried transmission lines to either Truman Annex or NAS-Boca Chica. Fuels that have been stored at this site include No. 6 fuel oil, Bunker C oil, diesel, aviation gasoline, JP-4 and JP-5.

2.10 SITE 10 - BOCA CHICA FIRE FIGHTING TRAINING AREA

The Fire Fighting Training Area shown on Figure 2-11 is located immediately west of the southern blimp pad as shown on the vicinity map in Figure 2-1. The fire training facility consists of two unlined circular pits approximately 20 feet in diameter and 2 to 3-feet in depth. The pits are surrounded by a gravel apron. The fire pit area is used about 5 to 10 times per year. Each time a training session occurs, flammable liquids (JP-5, waste oils, or hydraulic fluids) are poured onto mock airplanes within the pit and ignited. The area surrounding the airplanes show visible evidence of burning and oil staining.

3.0 SUMMARY OF INVESTIGATIONS CONDUCTED AT NAS-KEY WEST

This section summarizes the investigations and action taken to date in response to contamination at NAS-Key West. The results of the activities described here in constitute the body of information that forms the basis of the proposed RI efforts.

3.1 INITIAL ASSESSMENT STUDY

In 1984 as a part of the NACIP Program, an Initial Assessment Study (IAS) records search was initiated to identify and rank possible sources of hazardous waste contamination at NAS-Key West. The Phase I records search for all NAS-Key West which was conducted by Envirodyne Engineers and completed in 1985 identified eight potential contaminated sites. The IAS concluded that six sites warrant further investigation and recommended a contamination study consisting of actual sampling for these sites.

3.2 CONFIRMATION STUDY

In 1986-87, confirmation studies were conducted on NAS-Key West to assess the potential for ground water pollution at the six disposal sites identified in the IAS. These sites were added to the investigations. The confirmation studies which were conducted by Geraghty and Miller (G&M) included soil borings, installation of ground water monitoring wells, aquifer testing and sampling and analysis to characterize ground water contamination on NAS-Key West. Of the nine sites investigated, eight were recommended for further investigation, and one was recommended for no further action.

3.3 SUBSURFACE HYDROCARBON INVESTIGATION

In 1986, G&M also conducted a subsurface hydrocarbon investigation of the Trumbo Point Annex Fuel Farm. This study, through soil borings and the installation of ground water monitoring wells, confirmed the presence of hydrocarbons in the ground water at Trumbo Point Annex. Recommendations were also made regarding further tests for the design of a hydrocarbon recovery system and installation of monitoring wells to further define the horizontal extent of the free phase hydrocarbon plume.

3.4 NO FURTHER ACTION RECOMMENDATION

Two sites, Site 2 - Truman Annex Transformer Oil Disposal Area and Site 6 - Dredgers Key Refuse Disposal Area, are being considered for "No Further Action" recommendations. Waste materials do not currently exist at either site. In the case of Site 2 only low concentrations of residual PCBs were found in the surficial soils by G&M. All waste material from Site 6 have been removed and relocated to Site 8, Fleming Key South Landfill.

4.0 THE APPROACH TO THE NAS-KEY WEST RI/FS

This section presents the approach for the RI/FS process applying to the NAS-Key West studies. The approach presented in this PMP integrates previously collected data and data from the future work at NAS-Key West into the RI/FS process. The goal of the study is to work toward obtaining compliance with federal and state regulations. The RI/FS process will fulfill the requirements of the NCP, as amended by SARA of 1986. This process will lead to the implementation of final remediation actions. This RI/FS will also be in accordance with the applicable provisions of Section 3004U and 3004V of RCRA. Section 5.1 describes the NAS-Key West RI/FS.

The major aspects of the RI/FS are review, comparison, and decision-making. A review is conducted on the existing site data, including an evaluation of public health and environmental impacts. Following this review, a comparison is made between the existing data and the needs and requirements of the NCP. Decisions about appropriate actions are based on the results of this comparison. The appropriate actions could be one or more of the following:

- Implement immediate corrective action
- No further action
- Collect additional data for the RI/FS, or
- Proceed with the FS evaluation

The decision making process uses RA methods to integrate the data collection activities of the RI with the evaluation activities of the FS. The RA identifies further data needs to be addressed in the RI or the FS. The RA evaluates the significance of public health and environmental impacts, and supports decisions of no further action, immediate corrective action, or proceeding with the selection of remedial alternatives with the FS.

The review, comparison, and decision making aspects are initiated early in the RI/FS, and are repeated throughout the remedial response process. The relationship between these aspects of an RI/FS are presented in Figure 4-1 and are associated with the RI, RA and the FS activities. As applied to the sites at NAS-Key West, the review and comparison aspects are mostly associated with the RI. Within the RI, the decisions to collect additional data at a site are based on a review of existing data, and a comparison with the "necessary and sufficient" requirements. Additionally, the RA includes the decision making aspects as shown in Figure 4-1. Based on a review of available data, and comparison with requirements specified in the RA, decisions will be made to initiate appropriate actions at a site.

The following procedure will be applied in developing strategies for site characterization and remediation. When appropriate, the sites will be investigated either:

- Individually
- Grouped with adjacent sites
- Grouped by similar waste characteristics

This procedure is intended to realize an economy of resources for site characterization, selection, design, and implementation of the RAs. Thus, the term "site" as used in this management plan, refers to any of the three cases listed above.

Application of the three major aspects of the RI/FS (review, comparison, and decision making) to the current situation at NAS-Key West is presented here. This discussion focuses on the ten investigated sites, and new sites that may be included into the RI/FS process as a result of future studies at the activity. Ten sites have been investigated to date at NAS-Key West. The location of these sites are shown in Figures 2-1. In order to address these sites in the RI/FS, these sites will undergo a data review and data quality assessment in the RI. This review will involve an assessment of the amount and quality of site characterization, sampling, and data analyses. Based on the results of the data review, the investigated sites may follow one of two paths through the RI/FS. If sufficient data are available to characterize the nature and extent of the problem, the sites may proceed to the RA (the decision making process) and the FS. If, however, additional data are required to determine the nature and extent of the problem, additional data will be collected by field investigations.

Based on a preliminary review of the data from the previous investigation, it is expected that additional environmental data will be needed to fully characterize eight of the ten sites. The preliminary investigation showed that the available data included minimal information on air quality/air emissions, surface water, soil, sediment and ground water data and that the exposure pathways had not been fully studied to date. Furthermore, the flow of ground water had not been established. Following the collection of the appropriate data, the investigation will then proceed to the RA. The investigatory process described above may also be used for a RCRA Facilities Investigation (RFI) for any site at NAS-Key West. An RFI may be required for some of the sites at NAS-Key West as a permit condition by the FDER under the permit provision of the Hazardous and Solid Waste Amendments of 1984 (HSWA). FDER is currently reviewing the NAS-Key West Permit Application.

The decision making aspect of the RA will determine future actions for these eight sites. Some of these actions involve initiating immediate corrective action or collecting additional data. Following collection of necessary and sufficient data, the sites may proceed to the FS, or may require "no further action". Similarly in the FS, data will be reviewed and compared to the "necessary and sufficient" requirements. Decisions will be made to collect additional data, to screen and evaluate RA alternatives, or to select the appropriate RA. Following completion of the FS the selected RA will then be implemented for the investigated sites.

5.0 OVERVIEW OF THE REMEDIAL RESPONSE PROCESS

The NCP has established procedures for identifying, evaluating, and selecting RAs to respond to the release or potential release of hazardous substances to the environment. The remedial response process generally includes the following sequence of activity: RI, FS, remedial design (RD), RA, and operation and maintenance. Figure 4-1 illustrates the relationships between these activities and shows decision making aspects of the RI/FS process. The following sections are presented for the reader unfamiliar with the remedial response process under the NCP. Readers familiar with this process may wish to proceed to Section 5.4 Role of Initial Tasks in the NAS-Key West RI/FS.

5.1 REMEDIAL INVESTIGATION

The RI emphasizes data collection and site characterization undertaken to determine the nature and extent of contamination caused by the release of hazardous substances from waste sites and the impact to public health and environment. The RI is performed concurrently in an independent fashion with the FS. The RI process consists of:

- Scoping
- Site characterization
- Bench- and pilot-scale studies
- Remedial Investigation Report
- Baseline RA

The initial activity in the RI is scoping. Scoping is primarily concerned with the collection and evaluation of existing data. In the scoping process, the RI objectives are determined. Data gaps and potential remedial response actions are identified, preliminary work plans are prepared and reviewed, and data collection tasks are specified. Associated with the scoping efforts are a variety of support activities including preparation of planning documents, such as field investigation sampling plans, quality assurance project plans (QAPPs), data management procedures and health and safety plans.

Site characterization is the major focus of the RI. Site characterization involves the collection and analysis of data needed to develop a basic understanding about the waste sources, the routes for contaminant migration, and the environmental and human receptors that may be affected. The results of data collection and analysis are used to support identification screening and development of appropriate remedial technologies in the FS. These results are also used in a RA to evaluate the magnitude and kinds of potential public health or environmental impacts.

Several types of investigations are performed during site characterization. These investigations collect data that are "necessary and sufficient" to evaluate and select RAs. These include investigations of:

- Source and waste characteristics
- Sediments
- Ground water
- Surface water
- Soils
- Air

Bench- and pilot-scale studies may be needed in the RI to obtain sufficient data to select a remedial alternative. The scope of bench- and pilot-scale studies includes, but is not limited to, investigations about waste treatability, scale-up of innovative technologies, technology application issues and evaluation of specific alternatives.

The RI report summarizes the data collected and documents conclusions drawn from all investigations.

5.2 FEASIBILITY STUDY

The FS is based on the RI results. Site investigations in the RI are conducted to obtain information needed to identify, select and evaluate RA alternatives in the FS. The evaluation and screening of alternatives is based on technological, public health, cost and environmental considerations. The FS process consists of the following activities:

- Define problems and develop general response objectives and actions
- Identify and screen remedial technologies
- Formulate and screen remedial alternatives
- Conduct detailed analysis of remaining alternatives
- Summarize alternative evaluations
- Develop conceptual design
- Document record of decision
- Prepare FS report

The first step in the FS is to identify existing health and environmental problems using the information from the RI. The RI data are also used to develop the list of the remedial technology response categories. This begins the process of selecting and grouping technologies into remedial alternatives.

Remedial response (cleanup) objectives are developed early in the RI/FS process and are based on public health and environmental concerns and requirements of applicable state and federal statutes. These cleanup objectives aid in the selection of RAs that provide adequate protection of public health and welfare, and the environment. Examples of remedial response objectives are listed in Table 5-1.

Response action categories are generalized categories of cleanup actions developed and selected to deal with the environmental problems identified in the RI. For example, a broad category selected for dealing with contaminated ground water may include extraction, treatment, and disposal.

General response actions are based on site information from the RI and are developed early in the RI/FS process. The general response actions must include the "no action" alternative as a baseline against which other actions can be measured.

Once the site concern has been characterized and response objectives and actions identified, the next step is to identify potential technologies that will mitigate the individual environmental and health problems.

After identification, potentially applicable technologies are screened to eliminate those technologies that (1) are considered unproven, (2) are difficult to implement, (3) have inherent technical or physical limitations and are not suited for application at the site, or (4) may not achieve cleanup objectives within a reasonable time. This screening process is based primarily upon environmental and health criteria, however, economics are also considered.

Remedial alternatives are formulated by combining technologies to address all contaminant pathways and points of exposure. Once a list of RA alternatives is developed, alternatives are screened to eliminate those which are economically or technically not feasible. Alternatives that satisfy the remedial response objectives and contribute substantially to the protection of public health, welfare, and the environment are considered further.

Those alternatives which remain after screening are then subjected to a detailed analysis. The objective of this analysis is to select the alternative which most economically meets the goals set forth in the remedial response. Each alternative is evaluated for the following factors:

- Technical considerations
- Environmental concerns
- Public health concerns
- Economics

The remedial alternatives developed are evaluated within the requirements of CERCLA and the NCP. These alternatives are associated with one or more of the following categories:

- Alternatives for treatment or disposal at a facility approved by USEPA, as appropriate

- Alternatives which <u>attain</u> applicable or relevant and appropriate federal public health or environmental requirements

- As appropriate, alternatives which <u>exceed</u> applicable or relevant and appropriate public health or environmental requirements

- Alternatives which do not attain applicable or relevant and appropriate public health or environmental requirements but will reduce the likelihood of present or future threat from the hazardous substances. This must include an alternative which closely approaches the level of protection provided by the ARARs and meets CERCLA's objective of adequately protecting public health, welfare, and environment

- A no-action alternative

Once the detailed analysis of the remedial alternatives is completed, the findings and results of the evaluation are summarized in a final report. The report will describe each alternative and delineate the advantages and disadvantages of each alternative. The description of each alternative will include the following specific elements:

- Combined technologies that make up the remedial alternative

- Control, storage, treatment, and/or disposal requirements

- Special engineering, safety, environmental, public health and welfare, or other considerations that affect the feasibility of each alternative

- Operation, maintenance, and monitoring requirements; short- and long-term

- Aspects of the public health or environmental concerns that the alternative will or will not control

- Implementation schedule

Based upon these factors, one of the alternatives will be selected for further development. This development includes the following:

- Special engineering considerations and studies required for final design

- Operation, maintenance, and monitoring requirements

- Transportation plans and disposal needs

- Temporary storage requirements

- Description of the environmental and public health problems

- Recommended means of mitigating environmental and public health problems.

A record of decision (ROD) is used by the USEPA to document the formal approval of a remedial action (RA). The ROD is used for recommending a RA and providing sufficient information for definition of the remedial alternatives and the site requirements. Each ROD presents supporting documentation, defines the recommended remedy, and describes the operation and maintenance activities.

The FS report summarizes the site information and recommends the appropriate RA alternative. This report summarizes and addresses public comments on the conceptual design presented in the FS report.

5.3 REMEDIAL ACTION

The RA consists of RD, construction, and operation and maintenance. Each of these activities is briefly described below.

5.3.1 Remedial Design

The RD activity begins upon completion of the FS and acceptance of the conceptual design for the recommended alternative. The RD clearly defines and specifies the recommended RA in a competitive bid document. Bid specifications are used to procure the design for use in the construction phase. The RD generally includes:

- Key elements of remedial alternative

- Project schedule

- Design criteria

- Property and field surveying

- Preliminary design

- Final design

- Resident engineering services

- Design services during construction

- Community relations support

5.3.2 Construction

Construction of the RA begins upon completion of the RD. The contractor constructs the RA following the design. As-built drawings and manuals for operation and maintenance as well as start-up of the RA are included in this activity.

5.3.3 Operations and Maintenance

Operations and maintenance activities begin after the RA has been constructed. These activities are required to ensure the effectiveness of the operation of the RA alternative after it has been completed and is in operation. The operations and maintenance activities can be conducted by NAS-Key West personnel or a civilian contractor. Required regulatory records are to be maintained.

5.4 ROLE OF INITIAL TASKS IN THE NAS-Key West RI/FS

Previous investigations conducted at NAS-Key West have focused primarily on the movement of contaminants in ground water. These investigations have provided valuable information, but it is apparent, based on a review of the available reports, that additional data are required to fully characterize the nature and extent of the eight known sites. Other possible routes of exposure, besides the ground water, have only been minimally addressed. For example, surface soil samples have not been collected specifically for the purpose of evaluating the dermal or direct contact exposure route from the soils to the Navy personnel. In addition, analysis of surface waters have not been performed. Data is not available to verify whether the airborne route of exposure is a significant pathway for contaminants to impact activity or civilian population.

The first activity of the RI/FS will be a detailed review of available information and initiation of additional site characterization studies. The first tasks of the RI/FS are the preparation of administrative plans and documents describing proposed actions. These documents are:

- RI/FS administrative plans for Sites 1, 3, 4, 5, 7, 8, 9, and 10
    - SMP
    - PMP
    - DMP
    - SAP
    - HSP
- CRPO for Sites 1-10
- RI/FS work plans for Sites 1, 3, 4, 5, 7, 8, 9, and 10
- Baseline RA Report for Site 3
- Treatability Study Implementation Plan for Site 9
- A proposed HRS score for Sites 2 and 6
- "No Further Action" documents for Sites 2 and 6

The preparation of the work plans for the sites at NAS-Key West is a scoping activity within the RI/FS. This effort will be done for the eight sites identified in the SOW. As new sites are discovered, data about these sites will be reviewed and evaluated. In the preparation of the work plans, existing reports and records from previous investigations will be reviewed. Activity personnel familiar with historical waste handling and disposal practices will be interviewed as appropriate. The results of this task will provide information to the RA and help scope successive tasks.

The scope of the RI/FS Data Base Management System as described in the DMP will be identified as part of the initial task. The RI/FS Data Base Management System will provide efficient handling and integration of data currently in the NAS-Key West data base and data collected during the RI/FS. The Data Base Management System will be compatible with existing SOUTHDIV information management systems.

A SAP including a quality assurance plan, field methods, and sampling procedures is required in scoping priority, performing additional data collection or field investigations. The SAP will be prepared to direct all RI field investigations including the pathway characterizations, hydrologic assessments and waste characterizations.

A HSP will be prepared prior to performing any field investigation and updated as is necessary. Additionally, a SMP (SMP) will be required which will be prepared prior to actual implementation of any work. Support to the implementation of the community relations program will be provided in the form of a Community Relations Plan (CRPO) Outline.

RI/FS study work plans characterizing initial field investigations, will also be prepared. The plans will describe how data is to be gathered at sites to determine the potential for exposure to air emissions, surface water or sediment, or direct contact with contaminated soils. These potential exposures will be evaluated in the RA.

6.0 INITIAL TASKS OF THE RI/FS

As described in Section 4.0, the RI/FS will involve a series of activities aimed at determining a need for, and type of, RA for all investigated contamination sites that pose a risk to public health. These activities (tasks) will proceed in parallel at different sites, the result of which is that various tasks in RI/FS process may be ongoing at one time.

Tasks have been identified at this time which would start the integration of all the previous and ongoing work performed at NAS-Key West under the IRP. The process as described in Section 4.0 is designed to meet USEPA guidelines under CERCLA, SARA, and the regulatory requirements of the State of Florida. These tasks are aimed at reviewing and consolidating the existing information into a form that is usable for the RI/FS. New data developed in the initial tasks, data gaps identified in the course of these activities, and standard approaches for performing work in the RI/FS will be used to identify and scope the subsequent tasks in the RI/FS process. The following paragraphs describe the work to be performed in the beginning phase of the RI/FS.

6.1 WORK PLANS

The first tasks to be performed under the RI phase of the RI/FS is to prepare work plans.

6.2 SITE INSPECTION FOR SITES 2 AND 6

IT will prepare a hazard ranking score (HRS) for Sites 2 and 6, complete USEPA's Site Inspection (SI) forms for Sites 2 and 6, and prepare no further action responses/document for Sites 2 and 6.

These documents will be based on information and technical analysis generated during the initial assessment and verification study. The HRS and SI forms will be prepared in accordance with the current USEPA guidance documents. The No Further Action (NFA) document will be prepared using available information and engineering judgement.

6.3 RI/FS ADMINISTRATIVE PLANS - SMP, DMP, SAP, AND HSP FOR SITES 1, 3, 4, 5, 7, 8, 9, AND 10

Administrative documents delineate the procedures used for site investigations. The plans prepared are intended to provide a means of assuring that quality data is gathered in a timely and safe manner. These documents are the SMP, DMP, SAP, and HSP.

6.3.1 Site Management Plan

IT will submit a SMP for all field work in accordance with the SOW. This plan provides a record of the investigation objectives and identifies the Applicable or Relevant and Appropriate Requirements (ARARs). It also identifies the Data Quality Objectives (DQO).

6.3.2 Data Management Plan

The DMP addresses the data and report processing procedures, project file requirements, and project related progress reporting procedures and documents.

This plan provides the formats to be used to present the data, including data reduction. All data and reports shall be provided on five and one quarter inch floppy disk in a format accessible to IBM PC-compatible machines using MS-DOS and Enable software.

6.3.3 Sampling and Analysis Plan

IT will submit a SAP which consists of two parts: (1) a QAPP that describes how the DQO's will be achieved; and (2) a field sampling plan (FSP) that provides guidance for all field work. The SAP will be written in accordance with current USEPA, FDER, and Navy guidance.

6.3.4 Health and Safety Plan

IT will submit a HSP for all key personnel expected to conduct site work. The HSP will include any needed site-specific safety requirements. The plan will conform to current USEPA guidance documents. The plan follows requirements of 29 CFR 1910.120 (l)(l) and (l)(2), and any subsequent amendments. Subcontractor personnel are also covered by this plan.

6.4 COMMUNITY RELATIONS PLAN OUTLINE (CRPO) FOR SITES 1, 2, 3, 4, 5, 6, 7, 8, 9, AND 10

IT will outline the requirements of the public involvement in activities and decisions made about the sites under investigation. The CRPO will address the current EPA and Navy guidance for community relations at Superfund sites.

6.5 REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN FOR SITES 1, 3, 4, 5, 7, 8, 9 AND 10

IT will propose methodology and procedures to characterize the waste to determine the presence of contamination and migration potential. IT will consider all recommendations from all current documents on the eight sites and all regulator comments on current documents. The work plans will include but not be limited to the following:

- Waste characterization
- Hydrogeologic investigation
- Soil and sediments investigation
- Surface water investigation
- Air investigation

6.6 BASE LINE RISK ASSESSMENT REPORT FOR SITE 3

IT will prepare a base line RA to identify the contaminants of concern, assess toxicity, identify the exposure pathways and receptors, and will provide recommendation for corrective actions for Site 3. IT will review the current use of the site as a Sunday School play yard.

6.7 TREATABILITY STUDY IMPLEMENTATION PLAN FOR SITE 9

IT will prepare and submit a Treatability Study Implementation Plan for the means of providing a pilot study work plan for the remediation of subsurface liquid-phase hydrocarbons near Tank D-4 at the Trumbo Point Annex Fuel Farm.

IT will provide a plan of action to implement the pilot study work plan developed by G&M. This plan will be based on an infiltration gallery, which will comply with all environmental regulations and activity regulations. IT will address all logistics for storage of recovered product and required treatment.

6.8 GENERAL

At the close of the initial field investigation, the data will be reduced and evaluated to determine the need for subsequent field/laboratory studies. Upon completion of these, a baseline RA will be performed to identify the impact to human health and the environment. Simultaneously, the FS, RAs, and remedial planning tasks will begin. At the conclusion of these, a final report will be generated and submitted to SOUTHDIV for their approval.

The investigation tasks (elements) will include field work, laboratory analysis, report generation and ongoing community relations. Additional field investigations may be required depending on the findings of the initial work. Additional investigations will require the same work elements, i.e., field work, laboratory analysis, report generation and community relations.

IT will prepare and submit all of the reports, in accordance with Section III, Part I of SOUTHDIV's Statement of Work (Contract No. N62467-88-C-0196). A 90 percent complete draft will be submitted to governmental representatives for review. Following government review, IT will include any appropriate comments into the draft final and final report. The DMP includes a description of the types of reports to be generated, as well as the types of analysis contained in them.

7.0 PROJECT SCHEDULES

Project schedules are prepared because resources available to the project must be effectively allocated. The purpose of the RI is the characterization (nature and extent) of the contamination so that options for site remediation can be investigated during the FS. The relationship between the scheduling of these two activities is shown in Figure 7-1. We have assumed that work performed in the field investigation to be completed before FS and RAs are pursued.

The schedule for the RI, which addresses the requirements of the SOW, is shown in Figure 7-2. The schedule allows for sufficient time for field investigations, laboratory analysis, and report generation. The field work (borings, monitoring wells, sampling) for all the eight sites is assumed to be performed at the same time. Time is also allocated for report review by SOUTHDIV and the Technical Review Committee (TRC). Community relations is shown as an ongoing aspect of the RI.

8.0 PROJECT ORGANIZATION

The project organization can be seen on the Project Organization Chart in Figure 8-1. IT will manage and direct the program from IT's Tampa, Florida office using the project team approach. This approach consolidates and streamlines communications within the project team and SOUTHDIV. This management system allows IT to assemble a team to meet the exact technical requirements of each task using resources from wherever they may reside within the company. The following paragraphs describe the organizational structure and the management procedures that will utilized for the NAS-Key West Project, and briefly states the credentials of the key personnel. Resumes of the key personnel that will be engaged for this assignment are contained in Appendix A of this document.
IT's proposed management structure for the NAS-Key West program is shown in Figure 8-1. In assembling this management team, we have selected highly experienced professionals as the key mangers; additional personnel will be assigned as needed from our resource pool of professionals.

The Project Director will be Mr. James Colella. Mr. Colella is a senior technical professional with over 15 years of experience in a broad range of environmental consulting activities. Mr. Colella has been highly successful in the past as Project Director for major environmental assessments, ground water investigations and remediation projects. His role will be to commit personnel as is necessary, assist in technical meetings, and review project deliverables.

Mr. Colella will be supported by Mr. Robert Stephens, as Project Manager. Mr. Stephens will be the point contact for the EIC and be responsible for the day-to-day management and coordination of the project activities. Mr. Stephens will be responsible for detailed project planning and oversight of office and site activities, and for the preparation of the final report and community relations. Mr. Stephens has over 18 years of experience in investigations of ground water contamination, ground water resources, injection well systems and well testing in numerous geographic and geologic regions. Mr. Stephens has directed site remediation activities on over 75 sites. Mr. Stephens is a Certified Emergency Response Manager by the USEPA and the Phosphorus Manufacturers Association.

Mr. Michael Jones will be the project's QA Officer and Ms. Sally Musick will be the Health and Safety Coordinator. Mr. J. Buerhop will be the Field Operations Coordinator for all field work including that of Leggette, Brashears, and Graham, Inc., a subcontractor. Mr. Mark Hampton will be the project Hydrogeologist and Mr. B. Stephenson will be the ITAS Laboratory Coordinator. Mr. J. Buerhop, Mr. M. Hampton, Mr. B. Stephenson, Mr. M. Jones, and Ms. S. Musick will all report directly to Mr. R. Stephens.

Other IT personnel who may assist in the field activities, technical review process and support any other tasks that might arise during this investigation are identified in Appendix A.

453005\P1PROMNG.RS3

TABLE 1-1. COMPARISON OF REGULATORY WASTE REMEDIATION PROGRAMS
CONTAMINATION ASSESSMENT
NAS-Key West
KEY WEST, FLORIDA

	Agency	Department of Defense USN	USEPA	Florida Department of Environmental Regulation
	Program	Installation Restoration Program	Remedial Investigation/ Feasibility Study Process	Contamination Assessment
Objective	Procedures			
Determine Nature and Extent of the Problem		Records Search Preliminary Assessment Site Visits Site Characterization Risk Assessment	Remedial Investigation Preliminary Assessment Site Inspections	Discovery Site Characterization Contamination Assessment
Development and Selection of Remedial Actions		Evaluation of Alternatives, including "No Further Action" alternative	Feasibility Study	Remedial Action Plan
Provide Public Comment Period for Review of Selected Remedial Alternative		Public Comment	Public Comment Public Hearing Public Workshop	Public Comment Public Hearing Public Workshop
Acceptance of Remedial Action		Record of Decision	Record of Decision	Remedial Action Plan
Develop Remedial Design		Remedial Design	Remedial Design	
Develop Remedial Construction			Remedial Action Construction	Implementation
Attain Post Closure		Operation and Maintenance	Operation and Maintenance	Implementation
Delist Sites		Delisting	Delisting	Certification

TABLE 5.1 REMEDIAL RESPONSE OBJECTIVES

Media	Short-Term	Long-Term
Ground Water	• Prevent further contaminant migration	• Cleanup ground water so that contaminants will not produce an unacceptable health or adverse effect on public environment.
	• Minimize ground water flow through the known waste sites	• Reduce the contaminant loads in the area ground water to background levels
	• Manage community and site area ground water which may adversely affect public health or the environment	• Manage ground water in various site areas until contaminant concentrations are below levels which would adversely affect public health or environment, and natural contaminant background levels are restored
Surface Water	• Minimize surface infiltration on site in areas of know soil/waste contamination	• Manage surface water on site until the site attains cleanup standards for soil and ground water
	• Route runoff and runon in and near areas of known soil/waste contamination to prevent surface water contamination	
Air	• Prevent air emissions from the site which may adversely affect public health and/or the environment	• Maintain state and federal air quality standards for all emissions originating in the site
		• Prevent and control contaminated air emissions during the implementation of remedial actions

TABLE 5.1 (Continued)

Media	Short-Term	Long-Term
Soil/Waste	• Prevent ground water contact with site soil/waste and/or reduce the soil contaminant level	• Treat, excavate and/or isolate on-site soil/waste adverse effects on the ground water basin
		• Prohibit any use of known contaminated on-site areas until the soil contaminant levels can no longer adversely affect the public health or the environment
	• Continue to manage the on-site areas to prevent intrusion and direct contact by the general public	

148277

DRAWN BY	WMB 3/12/84	CHECKED BY / APPROVED BY	SAM / RDS	8/15/84 / 8/16/84	DRAWING NUMBER	453005-A1

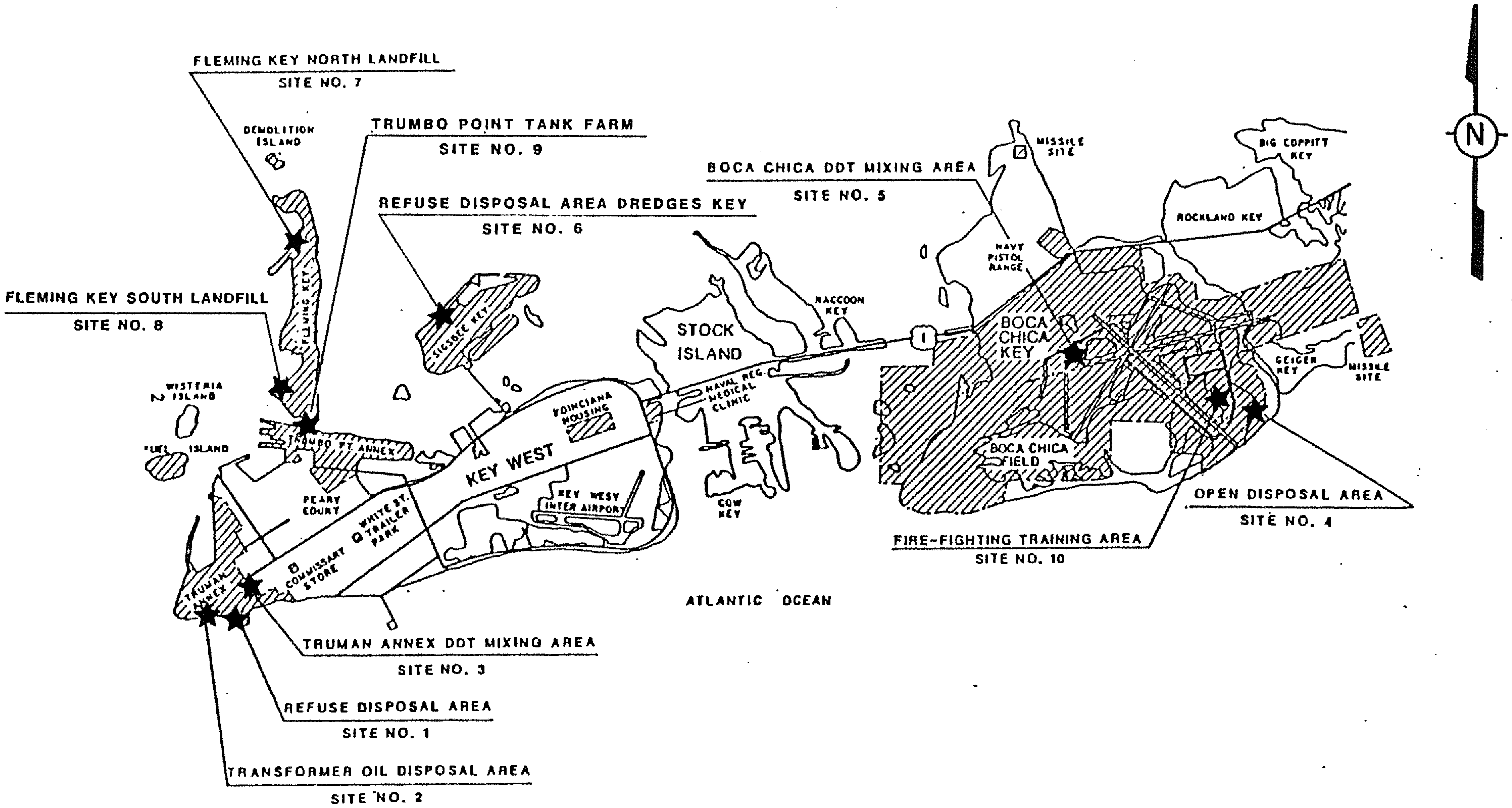


FIGURE 2-1

LOCATIONS OF NAVAL ACTIVITIES AND STUDY SITES

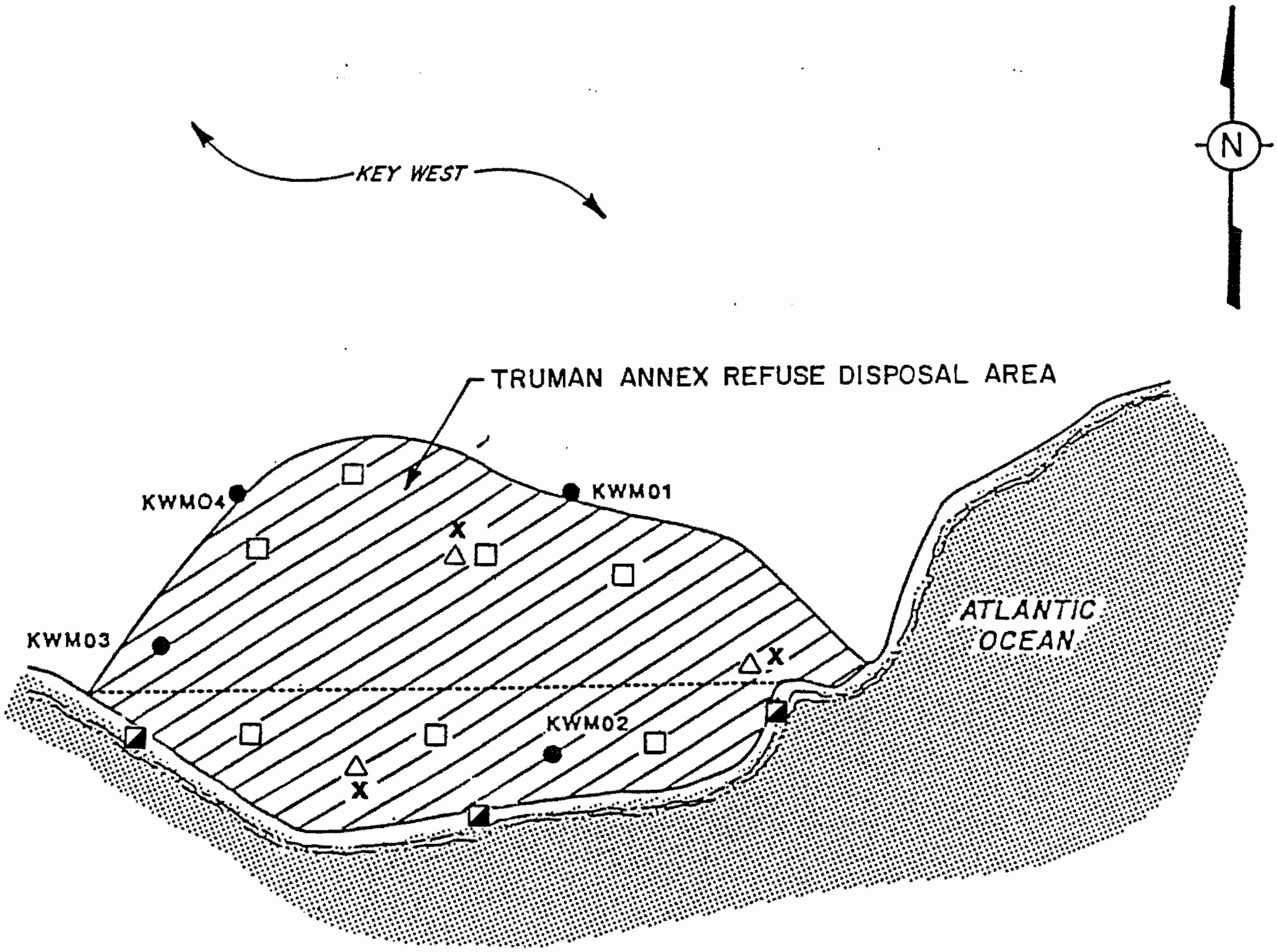
NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.

DRAWING NUMBER 453005-A2
CHECKED BY
APPROVED BY
DRAWN BY
REV.1/2-1-90/C.K.R



LEGEND:

- ● KWM01 EXISTING MONITORING WELL
- X PROPOSED MONITORING WELL
- □ PROPOSED TEST PIT
- △ PROPOSED EXPLORATORY BORING LOCATION
- -------- PROPOSED AIR QUALITY SURVEY TRANSECT
- ◪ PROPOSED SEDIMENT SAMPLING LOCATION

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.

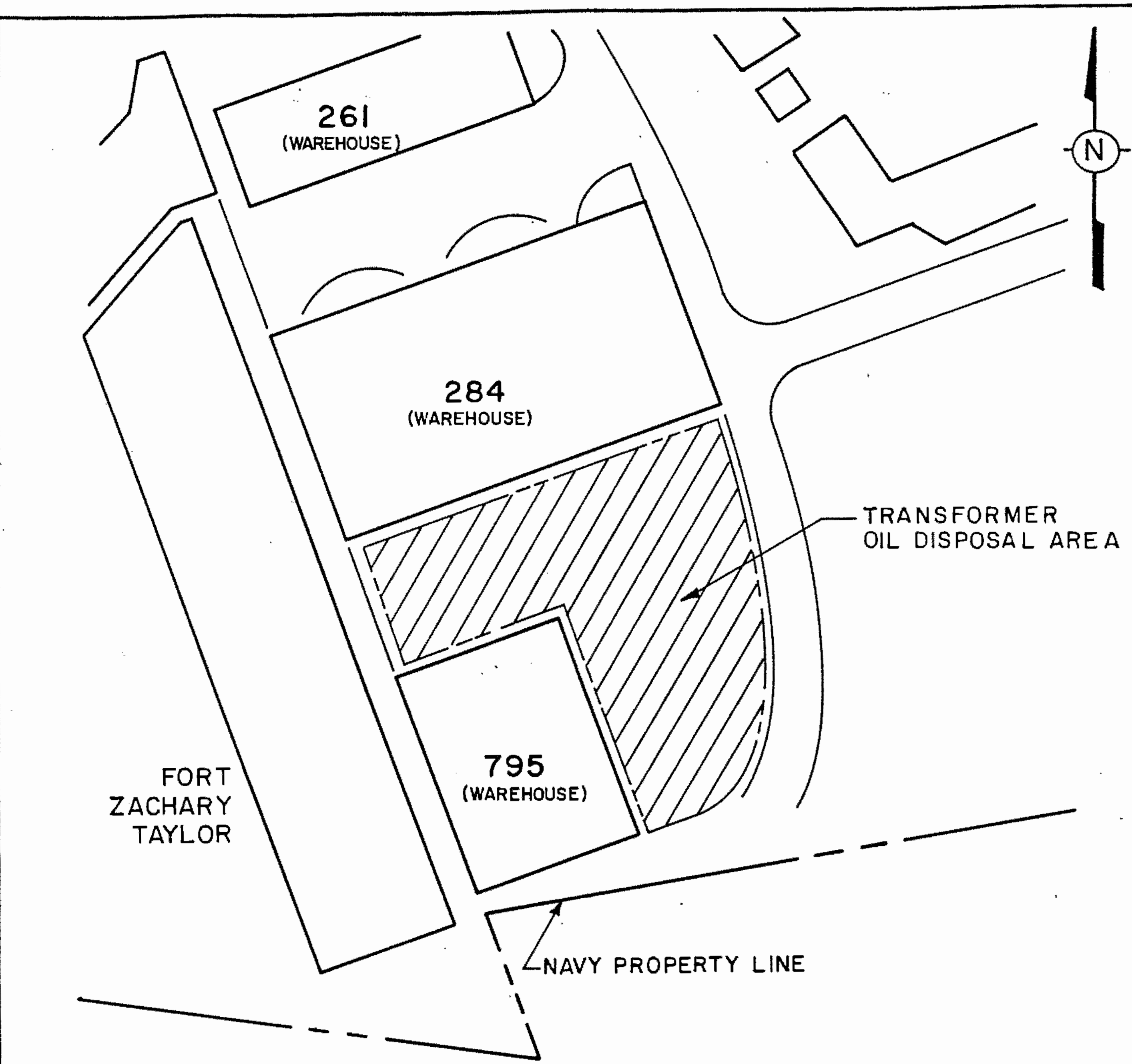
FIGURE 2-2

INVESTIGATION & SAMPLING LOCATIONS
TRUMAN ANNEX
REFUSE DISPOSAL AREA
SITE 1

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

148277



DRAWING NUMBER 453005-A3

CHECKED BY / APPROVED BY / DRAWN BY

FIGURE 2-3

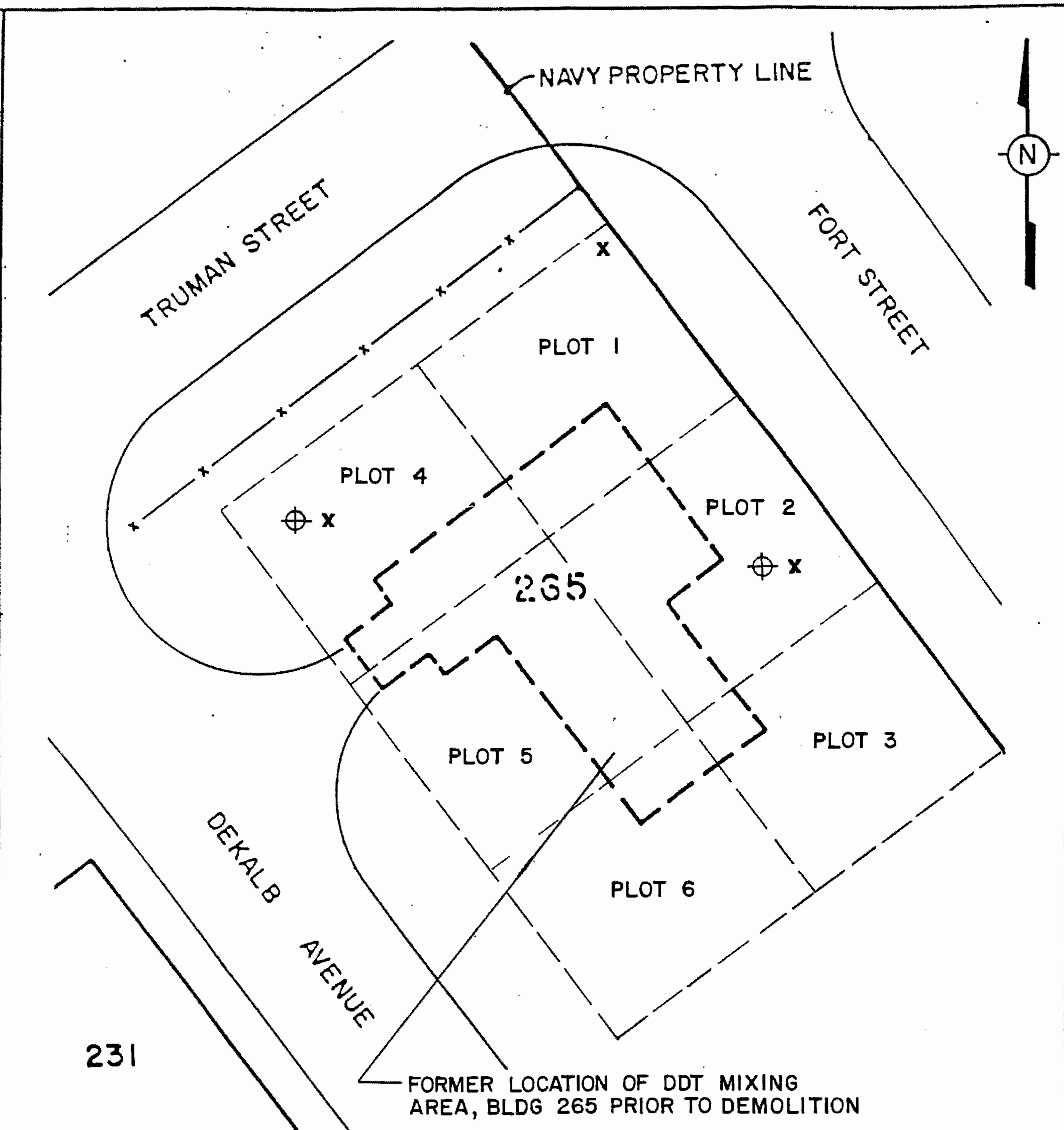
SITE LAYOUT
TRUMAN ANNEX
TRANSFORMER OIL DISPOSAL AREA
SITE 2

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

NOT TO SCALE

SOURCE: U.S. NAVY



LEGEND

- x PROPOSED MONITORING WELL LOCATION
- ⊕ PROPOSED SOIL BORING LOCATION
- --- SOIL SAMPLING PLOT BOUNDARY
- —x— FENCE

NOT TO SCALE

SOURCE: U.S. NAVY

FIGURE 2-4

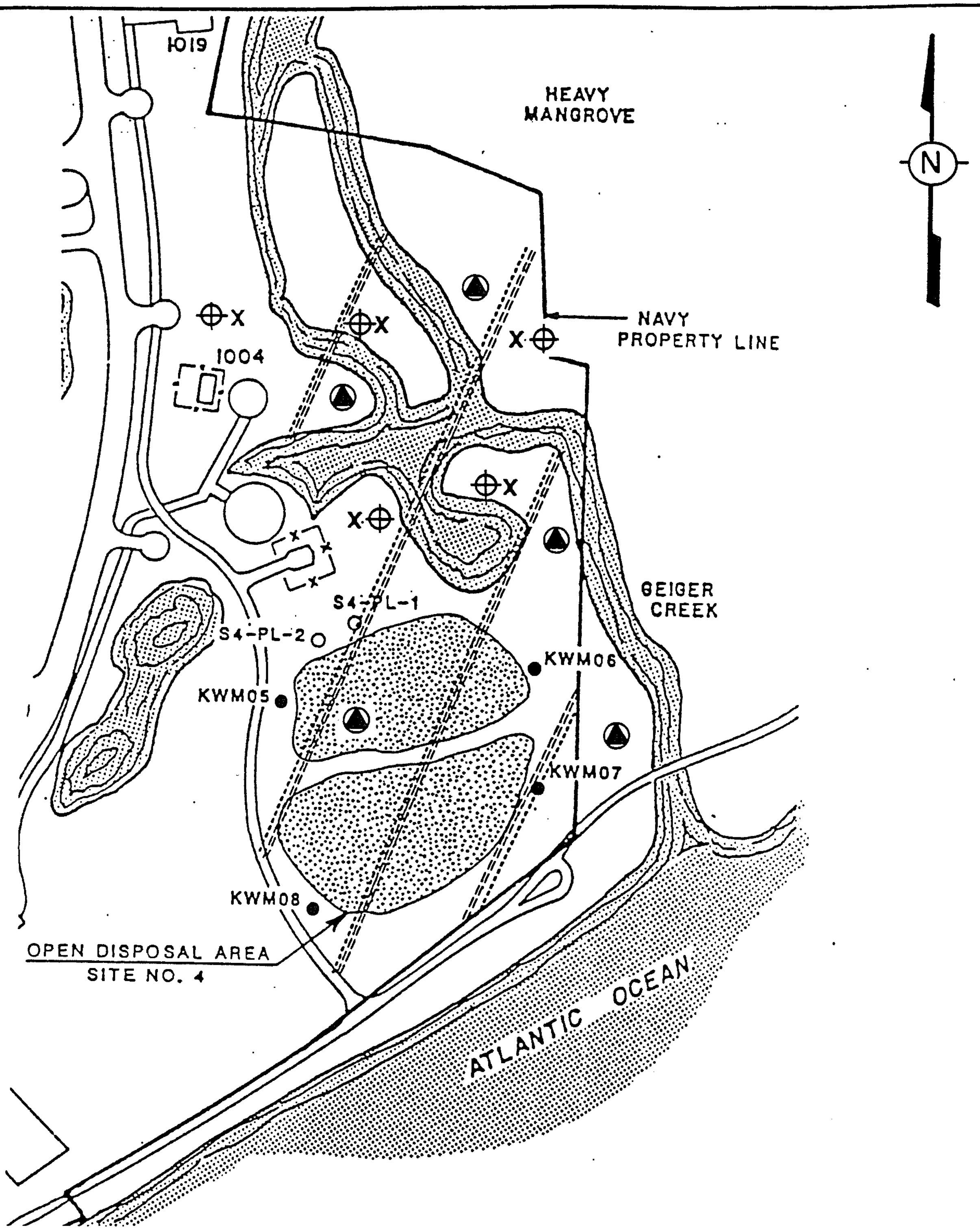
INVESTIGATION & SAMPLING LOCATIONS
TRUMAN ANNEX
DDT MIXING AREA
SITE 3

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER 453005-A4

148277



DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER 453005-A5

LEGEND

- ● KWM01 — EXISTING MONITORING WELL
- X — PROPOSED MONITORING WELL
- ======== — PROPOSED WASTE CHARACTERIZATION TRANSECTS
- S4-PL-1 ○ — PREVIOUS SOIL BORING LOCATION
- ------------ — PROPOSED AIR QUALITY SURVEY TRANSECT
- ⊕ — PROPOSED SOIL BORING
- ▲ — PROPOSED SOIL SAMPLING LOCATION

SOURCE: GERAGHTY AND MILLER, INC. NOT TO SCALE

FIGURE 2-5

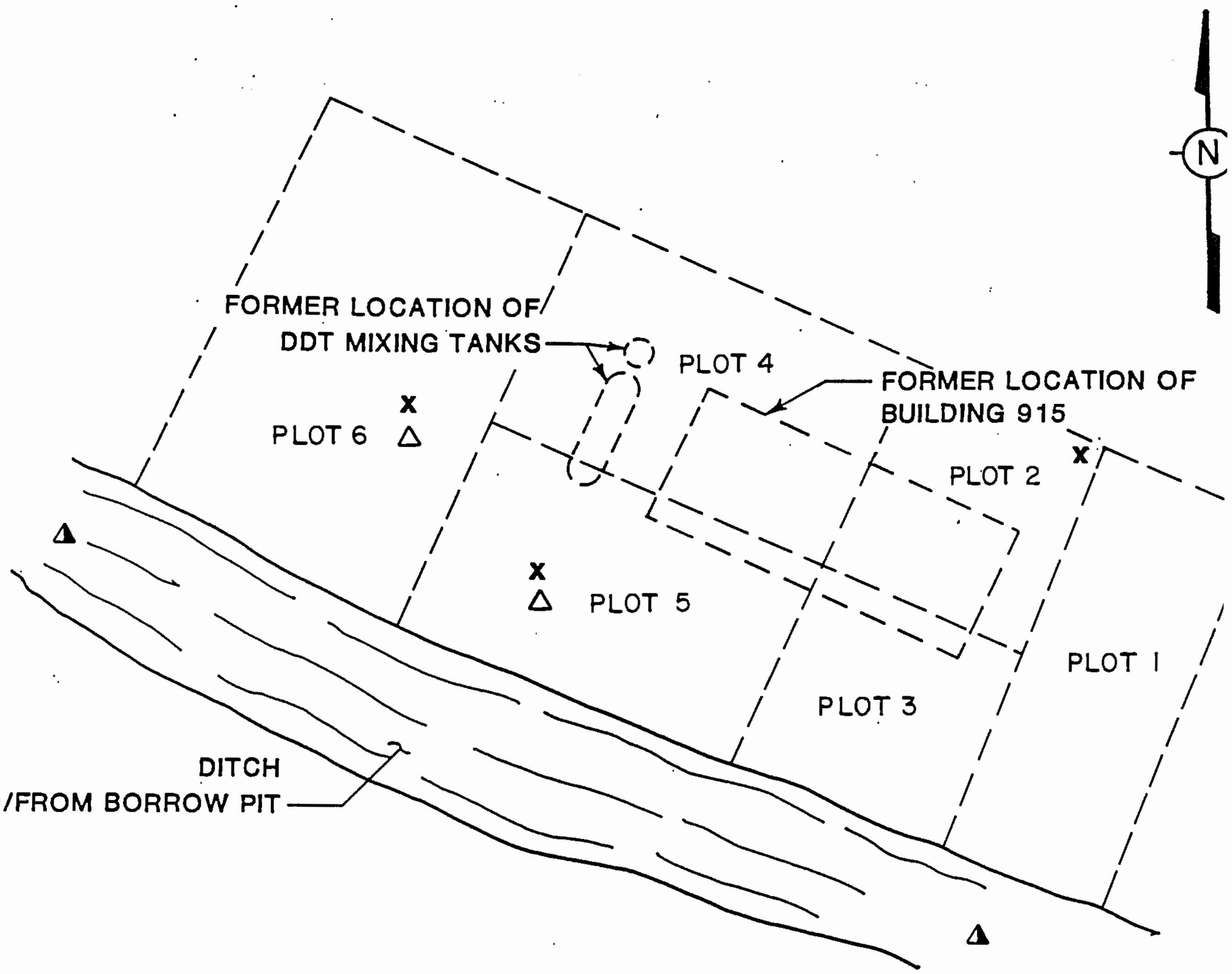
INVESTIGATION & SAMPLING LOCATION
BOCA CHICA
OPEN DISPOSAL AREA
SITE 4

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

148277

DRAWING NUMBER 453005-A6
CHECKED BY
APPROVED BY
DRAWN BY



LEGEND

- x PROPOSED MONITORING WELL
- △ PROPOSED EXPLORATORY BORING LOCATION
- ▲ PROPOSED SURFACE WATER / SEDIMENT SAMPLING LOCATION
- ---- SOIL SAMPLING PLOT BOUNDARY

NOT TO SCALE

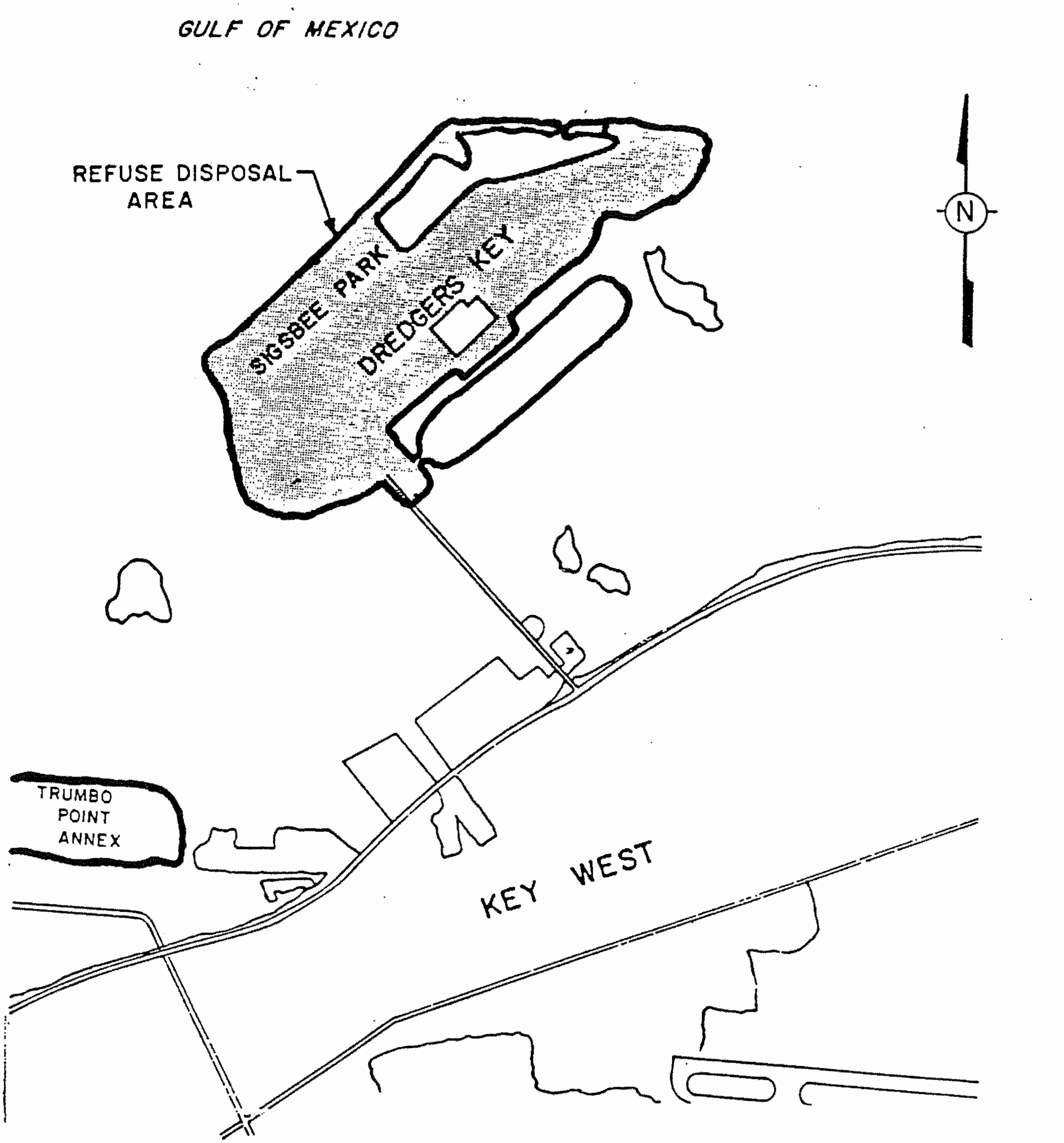
SOURCE: U.S. NAVY

FIGURE 2-6

INVESTIGATION & SAMPLING LOCATION
BOCA CHICA
DDT MIXING AREA
SITE 5

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION



LEGEND

NAVY PROPERTY LINE

NOT TO SCALE

SOURCE: U.S. NAVY

FIGURE 2-7

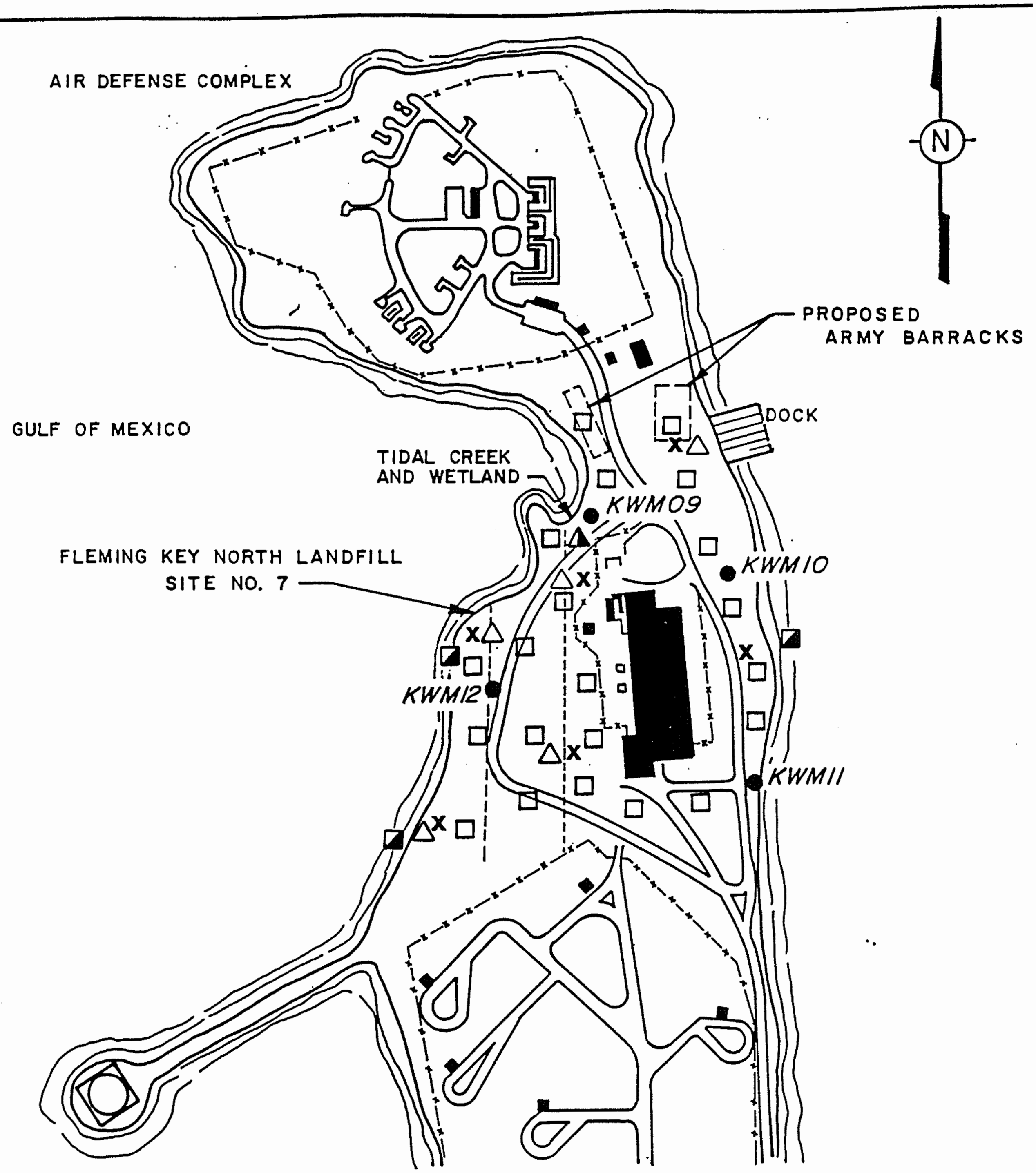
SITE LAYOUT
DREDGERS KEY
REFUSE DISPOSAL AREA
SITE 6

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER 453005-A7

148277



LEGEND

- ● EXISTING MONITORING WELL
- X PROPOSED MONITORING WELL
- □ PROPOSED TEST PIT
- ---- PROPOSED AIR QUALITY SURVEY TRANSECT
- △ SOIL BORING
- ▲ PROPOSED SURFACE WATER/ SEDIMENT SAMPLING LOCATION
- ◪ PROPOSED SEDIMENT SAMPLING LOCATION
- ■ EXISTING BUILDINGS OR STRUCTURES

SOURCE: GERAGHTY AND MILLER, INC.

NOT TO SCALE

FIGURE 2-8

INVESTIGATION & SAMPLING LOCATIONS
FLEMING KEY
NORTH LANDFILL
SITE 7

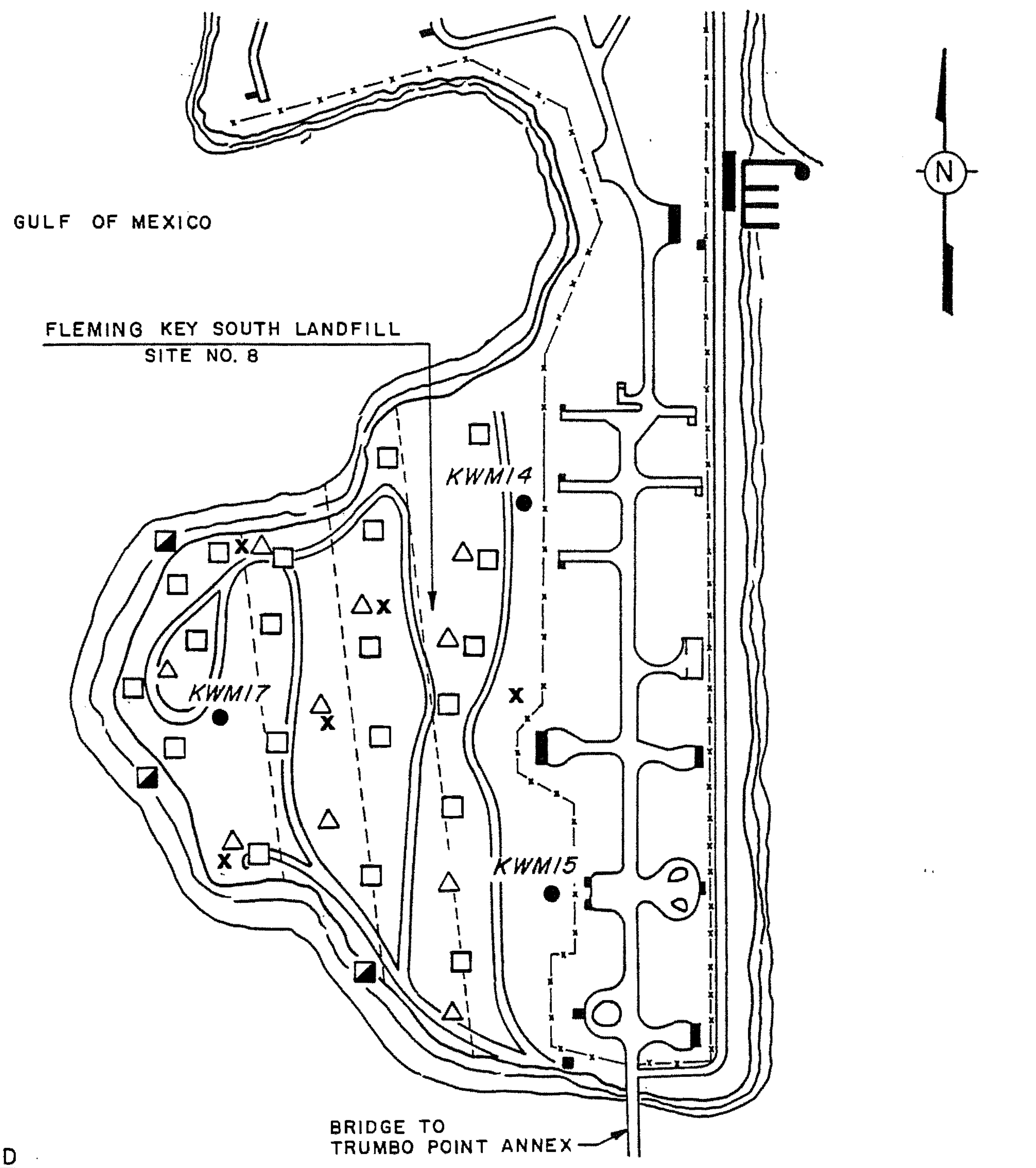
NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER 453005-A8

REV.1/2-1-90/C.K.R

148277



LEGEND

- ● EXISTING MONITORING WELL
- X PROPOSED MONITORING WELL
- □ PROPOSED TEST PIT
- △ PROPOSED EXPLORATORY BORING LOCATION
- ------ AIR QUALITY TRANSECTS
- ◪ PROPOSED SEDIMENT SAMPLING LOCATION
- ■ EXISTING BUILDINGS OR STRUCTURES

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.

FIGURE 2-9

INVESTIGATION & SAMPLING LOCATIONS
FLEMING KEY
SOUTH LANDFILL
SITE 8

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWING NUMBER 453005-A9
CHECKED BY
APPROVED BY
DRAWN BY
REV.1/2-1-90/C.K.R

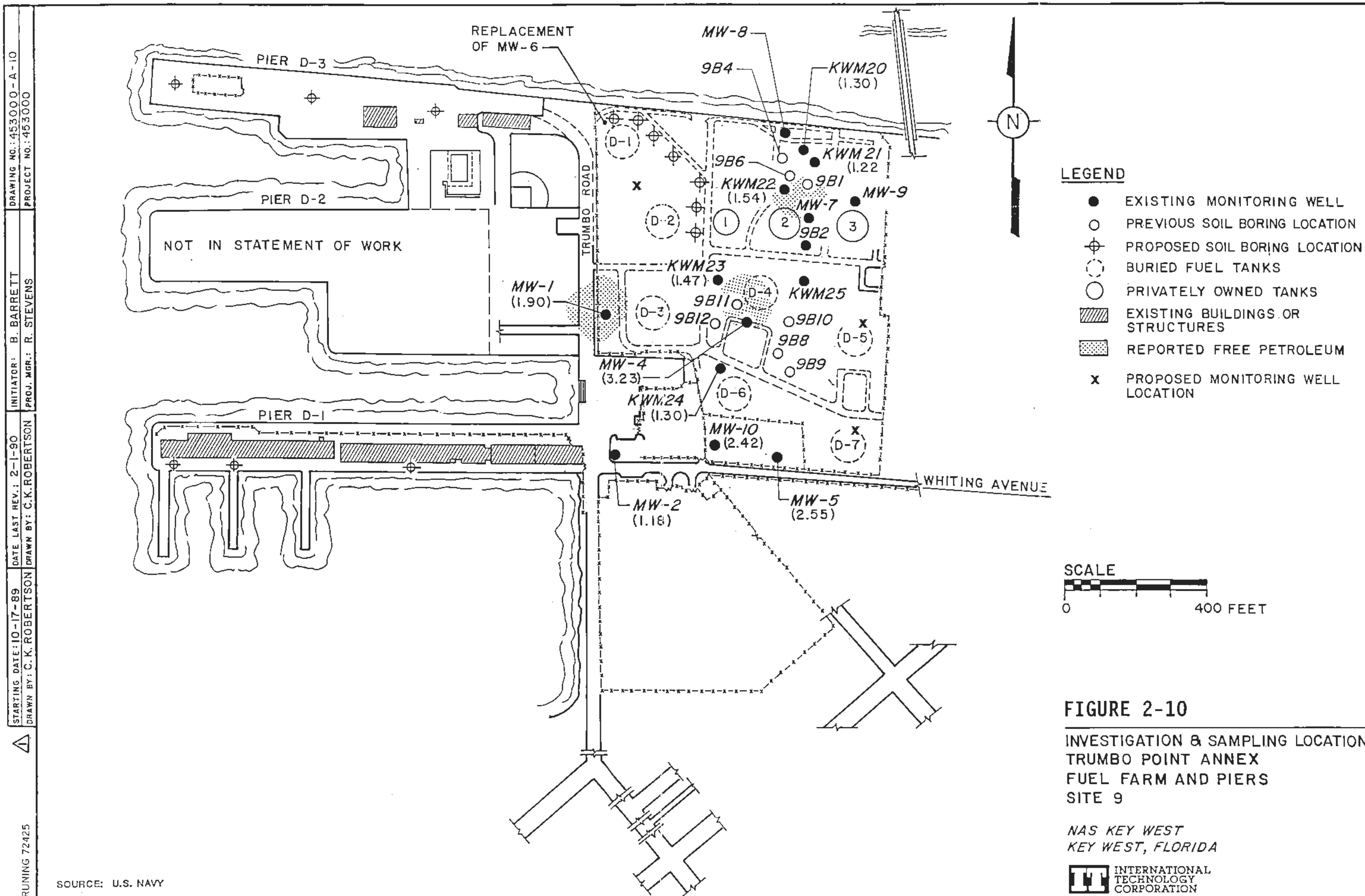
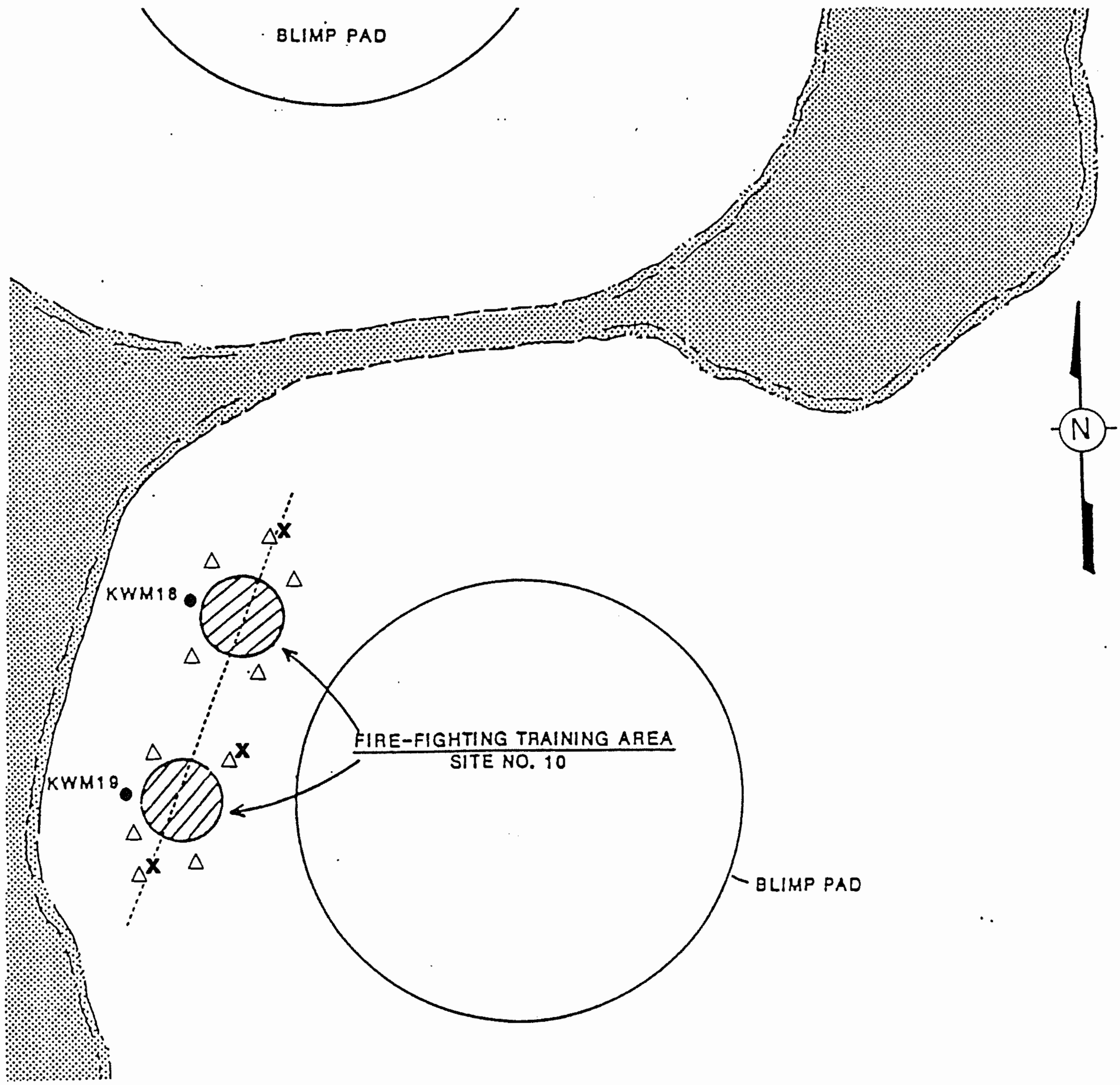


FIGURE 2-10

INVESTIGATION & SAMPLING LOCATIONS
TRUMBO POINT ANNEX
FUEL FARM AND PIERS
SITE 9

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION



LEGEND

● KWM01	EXISTING MONITORING WELL
X	PROPOSED MONITORING WELL
△	PROPOSED EXPLORATORY BORING LOCATION
------------	PROPOSED AIR QUALITY SURVEY TRANSECT

FIGURE 2-11

INVESTIGATIONS & SAMPLING LOCATIONS
BOCA CHICA
FIRE FIGHTING TRAINING AREA
SITE 10

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.

DRAWING NUMBER 453005-A11
CHECKED BY
APPROVED BY
DRAWN BY

148277

FIGURE 4-1
REMEDIAL RESPONSE PROCESS

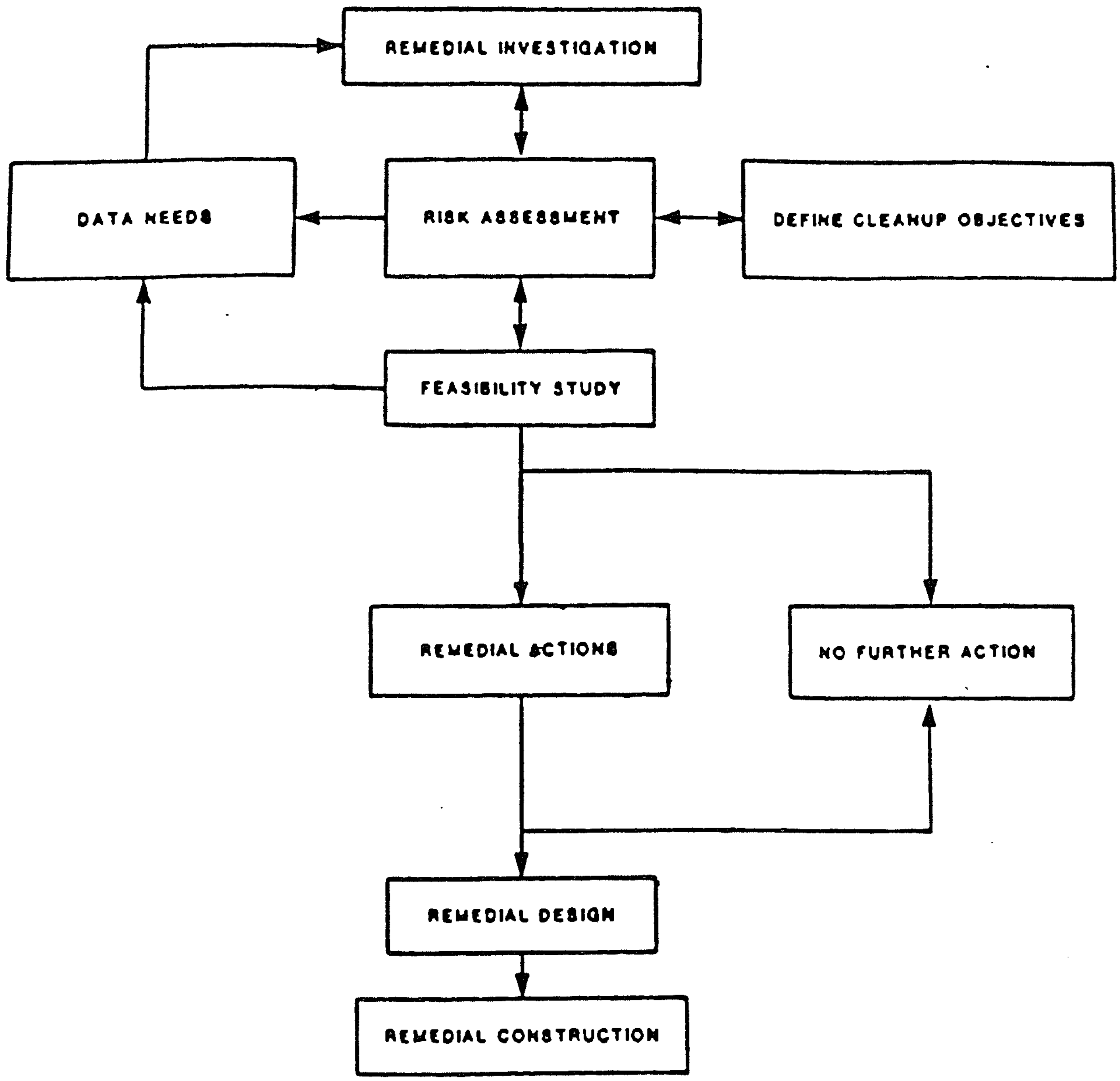
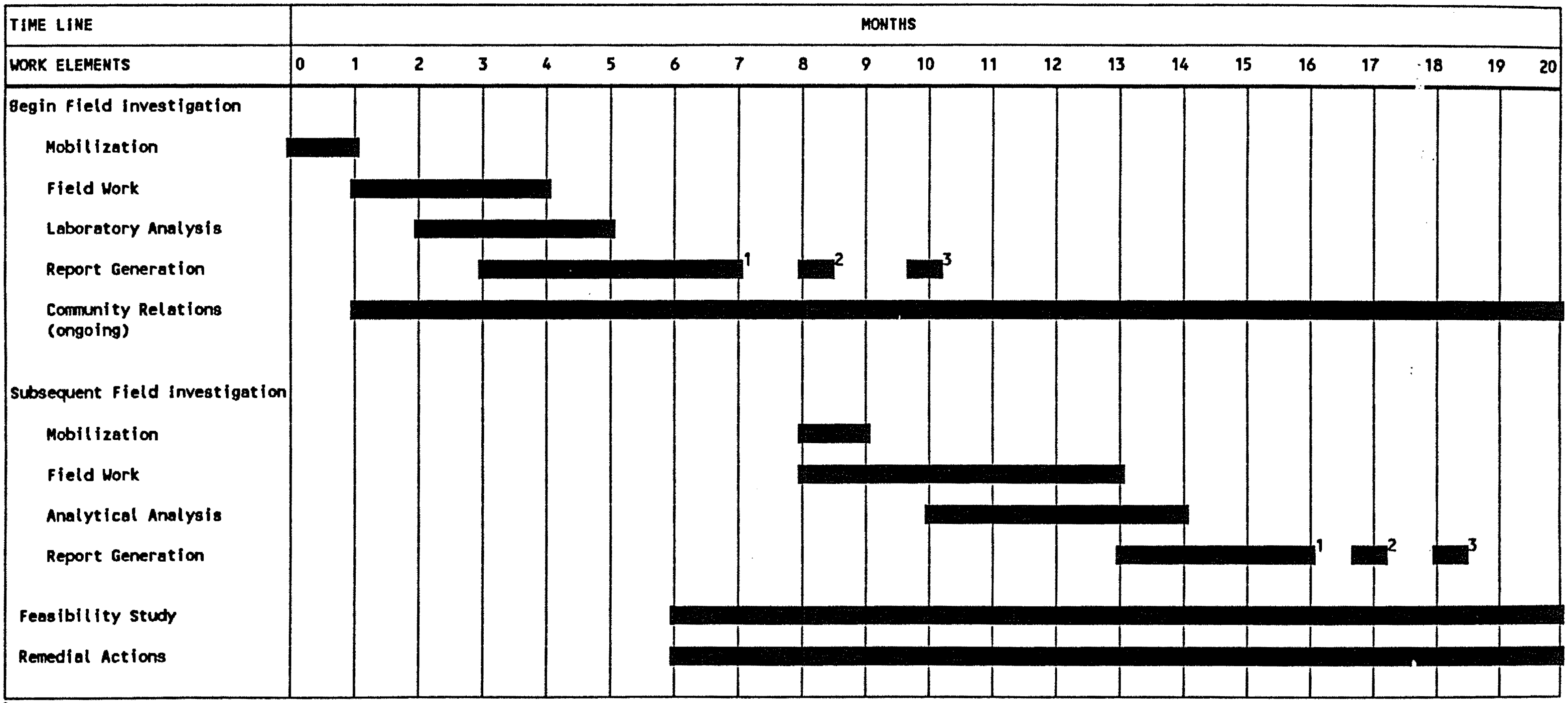


FIGURE 7-1
PRELIMINARY RI/FS SCHEDULE
CONTAMINATION ASSESSMENTS
NAS-Key West
KEY WEST, FLORIDA



1 90% Draft
2 Draft Final
3 Final

FIGURE 7-2
PROPOSED PROJECT SCHEDULE
CONTAMINATION ASSESSMENTS
NAS-Key West
KEY WEST, FLORIDA

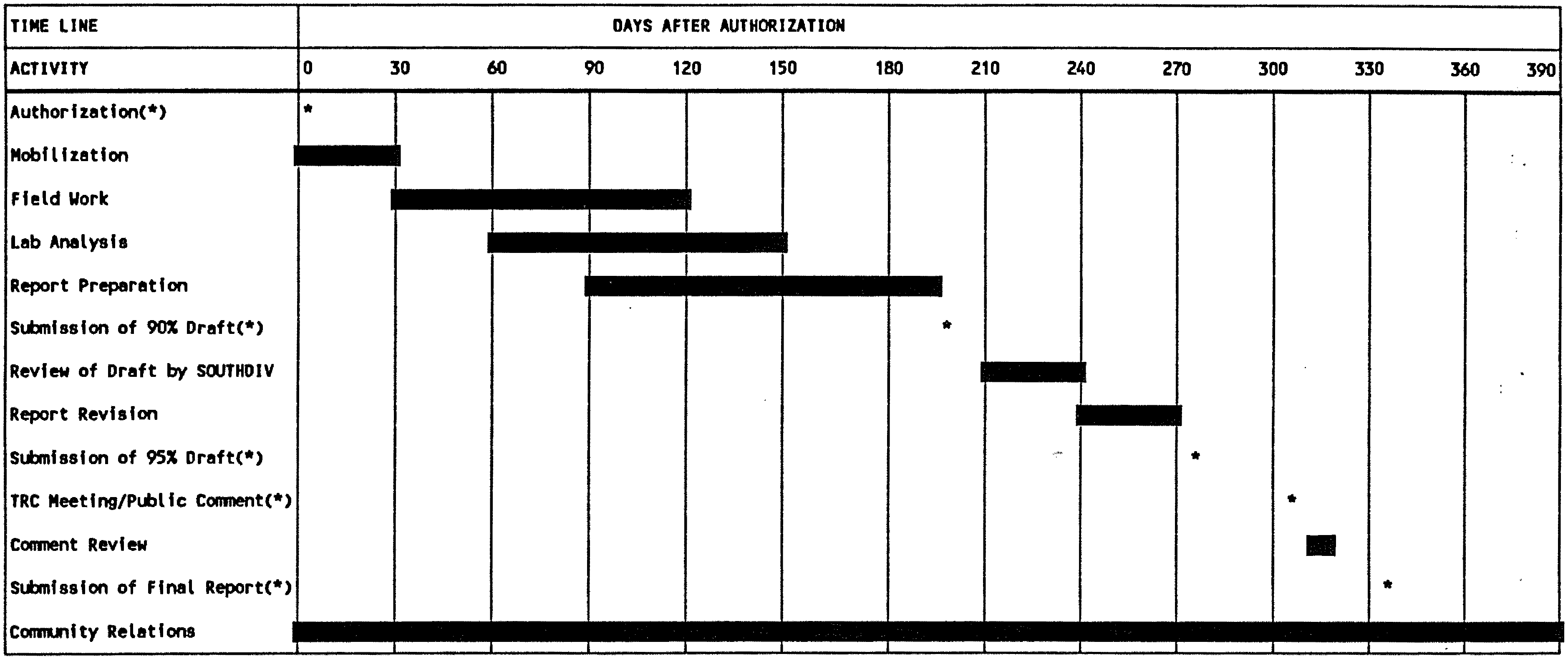
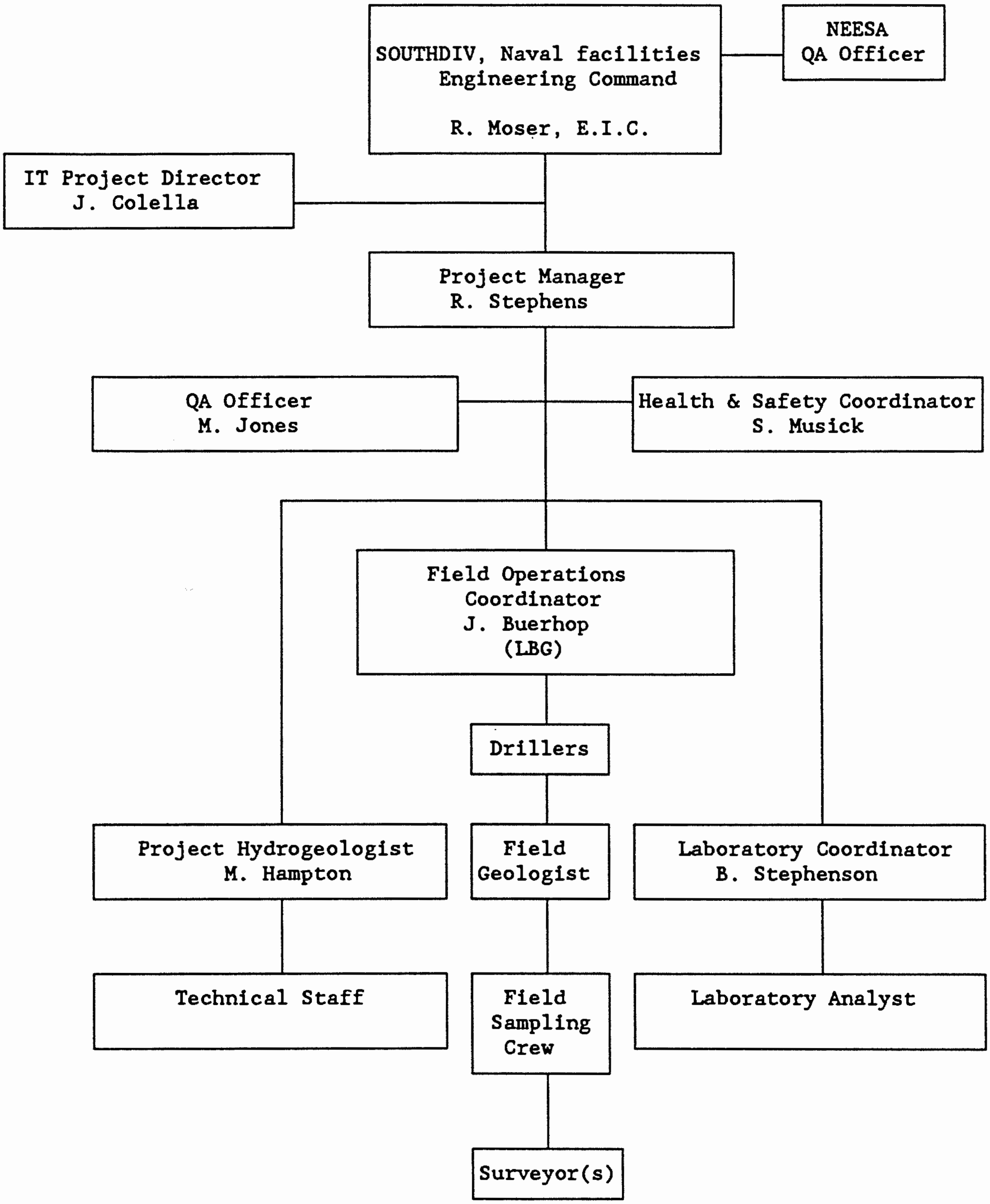


FIGURE 8-1
PROJECT ORGANIZATION CHART
CONTAMINATION ASSESSMENT
NAS-KEY WEST
KEY WEST, FLORIDA



APPENDIX A

RESUMES

JAMES C. COLELLA

Professional Qualifications

Mr. Colella is a Civil Engineer with over fourteen years of experience in the design and operation of waste disposal facilities. He has held technical and management positions as a consultant on waste disposal projects (investigation, design, operation) for industry, private, and government clients. His experience includes the performance of:

- Site selection investigations for new facilities.
- Engineering analysis (stability, hydrologic, hydraulic) associated with the design of a new disposal facility or remediation of an existing facility in accordance with appropriate regulations.
- Remedial investigation/feasibility studies (RI/FS) of hazardous waste sites.
- Construction plans, specifications, and bid documents for remedial designs.

Education

Graduate courses toward M.S., Civil Engineering, University of Pittsburgh, Pittsburgh, Pennsylvania

B.S., Civil Engineering, University of Pittsburgh, Pittsburgh, Pennsylvania; 1974

B.A., Mathematics, St. Vincent College, Latrobe, Pennsylvania; 1974

Experience and Background

1987 - Present — General Manager-Engineering, Tampa Office, IT Corporation, Tampa, Florida. Responsible for the overall management of engineering in the Tampa Office, including remedial investigations and feasibility studies, site assessments, design and field management, RCRA Part-B applications, site closure plans, environmental audits, underground storage tank assessment, waste characterization studies, and computer modeling for hazardous and non-hazardous waste projects.

1985 - 1987 — Section Manager, Civil/Geotechnical Design Engineering IT Corporation, Pittsburgh, Pennsylvania. Responsible for technical assistance in RI/FS projects and design of landfills (hazardous and non-hazardous) and associated structures. In conjunction, manages numerous projects and performs administrative responsibilities.

Duties include:

- o Management of a staff of engineers/scientists in performance of a remedial action design (slurry wall, impermeable cap, ground water extraction and treatment) for a Superfund site through the U.S. Corps of Engineers (COE), Kansas City District.

- o Management and technical support in a site selection study (design and economic considerations, site conditions, costs) for regional, national, or multiple sittings of a landfill and incinerator to handle various waste streams from an industrial client.

- o Interaction with local, state, and federal regulatory agencies in the preparation of appropriate permit applications, negotiations for permits, and implementation of operational plans according to the regulations.

As the Section Manager of the Civil/Geotechnical Design Group, manages a staff of engineers/scientists in performing similar projects. These responsibilities include: Coordinating and scheduling project work and staffing; providing supervision and direction for the interfacing with clients; and maintaining corporate quality control procedures in the performance of the projects. In addition, evaluates and develops scope of work and associated budgets and prepares proposals for new work.

1984 - 1985 <u>Project Manager, NUS Corporation, PEC Division, Pittsburgh, Pennsylvania</u>. Developed work plans and budgets and prepared proposals to investigate, evaluate, and/or design hazardous waste disposal facilities. In addition, provided technical assistance in the performance of the project as well as being project manager (budget and schedule tracking). Served as a project manager in the U.S. Environmental Protection Agency (EPA) Superfund project in areas of supervisory, planning, reviewing, implementation, and interpretation of results for the RI/FS. Performed such duties for four Superfund sites. Also served as the Assistant Manager of Projects for the EPA, Region III for technical quality, budget requirements, and schedule changes for all Region III Superfund projects.

1974 - 1983 <u>Senior Project Engineer, D'Appolonia Consulting Engineers, Inc., Pittsburgh, Pennsylvania</u>. Developed extensive experience in the design and operation of solid-waste disposal facilities for coal refuse, ash wastes, paper waste, steel processing wastes, and hazardous wastes. Duties included:

- o Managing a staff of engineers/scientists and/or performed site investigations, engineering analyses, economic evaluations, and construction supervision for waste disposal facilities (hazardous and non-hazardous).

- o Performing surficial and subsurface investigations and engineering analyses for designs, investigations, and economic evaluations of over 50 waste disposal projects related to the coal industry in Pennsylvania, Kentucky, Virginia, West Virginia, and Ohio.

- o Developing construction plans, specifications, and bid packages to implement the design.

- o Providing liaison for clients with regulatory agencies.

- o Preparing appropriate state and federal permit applications, National Pollution Discharge Elimination System (NPDES), and portions of Resource Conservation Recovery Act (RCRA) Part B applications.

Registrations/Certifications

Registered Professional Engineer: Pennsylvania, Alabama Florida

ROBERT D. STEPHENS

Professional Qualifications

Mr. Stephens has 18 years of diversified experience in the environmental field, serving as a regulator, consultant, and industrial representative in both a project management and program management capacity. Industrial areas covered include organic chemical specialties, utilities, agricultural pesticides, fertilizer intermediates, mining, inorganic chemicals, food treatment including incineration, aggregates, construction, coatings and polymers, catalysts, and hazardous waste remediation and disposal from varied industrial and military resources. His fields of competence include program management, project management, industrial wastewater treatment, solid and hazardous waste disposal and remediation, emergency response cleanup, shock sensitive chemical handling and disposal, siting studies for grassroots mining and industrial facilities, bio-assay and biological assessments, radiological analysis, environmental auditing, environmental regulation analysis, hydrogeologic evaluations and community relations. He is a Certified Emergency Response Manager by USEPA and a Certified Emergency Response Manager by the Phosphorus Management Manufacturers Association. He has responded to over 50 transportation related hazardous materials incidents. He has directed Site Remediation Activities on over 75 sites. The contract value at five of these sites was in excess of $1 million each. He has directed Site Remediation Activities for a GO.CO Site to remove chemical warfare material.

Education

B.S., Biology, Berea College, Berea, Kentucky; 1971
Graduate Studies, Environmental Engineering
University of Cincinnati, Cincinnati, Ohio

Experience and Background

1989 - Present
<u>Project Manager, IT Corporation, Tampa, Florida</u>
Responsible for management of environmental projects based in the Tampa Office. Additional duties include marketing, client liaison, business development, regulatory interface, remediation evaluation, and proposal preparation.

1987 - 1988
<u>Site Manager Corn Husker Army Ammunition Incineration Project, IT Corporation, Grand Island, Nebraska</u>
Responsible for site management of a 360 ton per day hazardous waste incinerator with a staff of 45. This project is the first on-site thermal treatment project under superfund in the United States. Maintained 24-hour per day production on the first hybrid thermal treatment system (HTTS) unit (incinerator) placed in the field by IT Corporation. Responsible for US Army COE interface, administration of the site, safety of the site,

production, interface with project management, employee morale, and contract compliance. Managed the first trial burn of the HTTS Unit demonstrating 99.9999 destruction removal efficiency (DRE) of the HTTS compared to 99.99 DRE required by regulation. Conducted trial burn on schedule without mechanical, personnel, or analytical problems.

1986 - 1987 Manager - Permitting and Community Relations Group - IT Corporation, Knoxville, Tennessee
Responsible for coordination and management of all permitting activities for four major thermal treatment projects. All four projects involved permitting under air pollution, water pollution, and RCRA requirements. Additionally, two projects required permitting under the TSCA requirements. Managed and coordinated all community relations efforts for the Technology Projects Group in Knoxville, Tennessee. Coordinated all proposal efforts for the Technology Projects Group in Knoxville, Tennessee. Coordinated all proposal efforts for technology projects group ensuring that all proposals were consistent and of high quality. Responsible for advising management of regulatory requirements and changes. Negotiated permit conditions for company and client projects.

1985 - 1986 Manager, Emergency-Remedial-Technical Projects Group, GSX Services, Inc., Greensboro, North Carolina
Responsible for coordination and management with government and private industry in the fields of industrial and hazardous waste. (Primary area of operation is east of Mississippi River). Maintained client interface, marketed company services; negotiated with regulatory authorities to protect company and client interests; negotiated contracts; maintained personnel readiness for 24-hour emergency response capabilities; made oral and written presentation of findings; managed 24 people on a day-to-day basis; and was responsible for P & L statement. Increased gross sales to 8 million with a net income of 20 percent.

1984 - 1986 Vice President, Environmental Analysis Corporation, Richmond, Virginia
Responsible for coordination and management of all technical phases of environmental consulting firm dealing with private industry in the areas of air pollution, water pollution, and solid and hazardous waste. Maintained client interface; marketed company services; negotiated with regulatory authorities; and made oral and written presentations of findings.

ROBERT D. STEPHENS

1980 - 1984 <u>Manager, Environmental Control, Chemical Projects Division, Mobil Chemical Company, Richmond, Virginia</u>
Responsible for the environmental integrity of all division facilities including 50 operating units at 27 plant locations throughout the U.S. with annual operating costs for pollution control exceeding $40 million on total assets of $600 million. Annual capital investment on pollution control was $5 million.

- o Designed, authored, and implemented a procedure, ultimately adopted company-wide to perform environmental audits. Managed program to audit division plants. Program resulted in substantial savings and reduced liability under environmental laws.

- o Directed preparation of a "Part B" hazardous waste permit application for a major phosphorus-based chemical operation in South Carolina. Instituted novel approach resulting in approval of application without modification by regulatory authorities.

- o Designed, conducted, and managed environmental studies to modify NPDES permit requirements of phosphoric acid production facility. Efforts resulted in a 1,500 percent increase in discharge limits.

1978 - 1980 <u>Director, Environmental Permitting, South Fort Meade Project, Mobil Chemical Company, Nichols, Florida</u>
Structured, staffed, and directed an environmental permitting effort to obtain required federal permits for an 18,000-acre grassroots phosphate mine. OBtained federal permit in record time and for one-third the cost of similar permitting projects.

1974- 1977 <u>Project Manager, Pedco Environmental Specialists, Orlando, Florida</u>
Duties included:

- o Chief technical investigator on various contracts dealing with all phases of air pollution control and management.

- o Promoted to project and field office manager of contract with "Florida Sulfur Oxides Study, Inc." to assess impact of electric utility discharges on the Florida environment.

1971- 1973 <u>Environmental Specialist, Kentucky Department of Health, Division of Air Pollution Control, Covington,</u>

Kentucky
Regional manager for a nine-county region in northern Kentucky. Responsible for all phases of air pollution control within the region including permitting, enforcement, and ambient monitoring.

Certifications

Explosives Safety Officer

Professional Affiliations

Air Pollution Control Association
Water Pollution Control Federation

Publications

Stephens, Robert, 1971, "Water Quality in Rural Madison County", Kentucky Department of Health, Division of Sanitary Engineering.

Stephens, Robert and Paul Cash, 1983, "Evaluation of the Mobil Ground Water Assessment Protocol at the Mobil Chemical Company, Charleston, South Carolina Site", Mobile Chemical Company, Phosphorus Division.

Stephens, Robert, 1984, "Biological Studies of Paddys Run Creek, Fernald, Ohio", Mobil Chemical Company, Chemical Products Division.

Stephens, Robert and JoAnn Garrett, 1988, "Permitting and the Public", Proceedings of the 5th National Conference on Hazardous Wastes and Hazardous Materials, 1988, Las Vegas, Nevada.

STEVEN E. BRUDER

Professional Qualifications

Mr. Bruder is a Project Manager with training in hydrogeology, augmented with training and experience in project management at various levels in both environmental and business applications. Areas of experience covered are hazardous waste site audits, and clean-up, environmental audits, underground storage tank investigations, pond closures, landfill assessments, both clean and contaminated water studies, the development and scheduling of well drilling programs, mine planning involving waste disposal and reclamation of mined lands, stream channel reclamation, and sampling analysis plans. He has background experience in marketing, work plans, and bid proposal estimates for projects.

Education

M.B.A. Degree, University of South Florida, Tampa, Florida, 1985

B.S., Geology, University of South Florida, Tampa, Florida, 1979

Experience and Background

1989 - Present — Project Geologist, IT Corporation, Tampa, Florida
Responsible for hazardous waste site and tank audits, pond closures, water studies, clean and contaminated, well drilling programs, evaluation studies for SAP, RI/FS, RAP and CAP's, along with proposal and work plan write ups.

1989 - 1988 — Hydrogeologist/Environmental Planner, Dames and Moore, Inc., Tampa, Florida. Responsible for hazardous waste site audits, water pollution studies and clean-up, well drilling programs, result evaluation studies and report write-ups along with storage tanks and asbestos surveys.

1988 - 1987 — Project Superintendent, Eagle Demolition, Inc., Tampa, Florida. Responsible for marketing of the firm and running various projects, from partial to complete demolition of structures, doing interior strip-outs of buildings, and outside removal and replacements, including underground storage tanks.

Steven E. Bruder

1987 - 1983

Owner, What's Up Doc, Odessa, Florida. Responsible for management of crews, scheduling of jobs, marketing/advertising of the firm, and estimating job costs for bids. What's Up Dock specialized in docks, boathouses, decking, boardwalks, and home additions.

1981 - 1980

Geologist/Environmental Planner, Dames and Moore Inc., Lakeland, Florida. Responsible to evaluate, design, and schedule phosphate mining complexes, from initial permits and testing to final reclamation. Also worked on various waste disposal and reclamation methods, along with hydrogeologic tests and pollution studies. Another aspect was dealing with Environmental Impact Statements and D.R.I. studies.

1980 - 1979

Geologist/Environmental Planner, Zellars-Williams, Inc., Lakeland, Florida. Responsible for mine planning in phosphate mines, from evaluation drilling and testing, to recovery and scheduling. Other areas of work were in coal, waste disposal, and reclamation of mined out lands.

RESUME\R1RESUME.SB3

MARK W. HAMPTON

Professional Qualifications

Seven years of diversified experience as a hydrogeologist for state government, research and development, and hydrologic consulting firms. Through the combination of geologic and hydrogeologic skills, expertise is provided in the characterization of hydrogeologic settings to determine how and to what extent contamination will migrate. Experience includes: Supervise and contribute to technical/hydrogeological research projects ranging from studies of hazardous waste sites to major research and development programs of the United States Air Force. Directed and coordinated geologic and hydrologic activities of subcontractors to determine potential sites for a high level nuclear waste repository in the Gulf Coast Region. Designed detailed ground water monitoring plans, preparation of test plans and procedures for aquifer analysis, designed site characterization tests. Conducted work related to monitoring well network design and installation around waste disposal ponds, perform single/multi-well hydraulic tests to determine aquifer properties, evaluated ground water data to determine ground water flow velocities and directions as well as the source, concentration and fate at dissolved constituents. Instructed workshops on ground water analysis and ground water monitoring.

Education

M.S., Geology, University of Wisconsin, Milwaukee, Wisconsin, 1985.

B.A., Geology, University of Wisconsin, Milwaukee, Wisconsin, 1979.

Experience and Background

1989 - Present — Senior Project Hydrogeologist, International Technology Corporation, Tampa, Florida
Responsible for planning, performing, and supervising of EPA Superfund, RI/FS projects, and Navy Installation Restoration Program - Key West, Florida.

1988 - 1989 — Project Manager, Environmental Resources Management South, Tampa, Florida
Responsible for planning and conducting project work requiring independent evaluation, as well as selection, and if, necessary, substantial adaptation and modification of standard techniques, procedures, and criteria. Also responsible for assurance of technical

quality including adherence to federal and state regulations. Project experience includes:

- o Contamination Assessment at a Town Gas Plant site that required characterizing the 3-dimensional hydrogeological flow system.

- o Involvement in several property transfer assessments requiring soil/ground water sampling and analysis.

- o Hydrogeology Task Manager on a Superfund project involving supervision of personnel and subcontractors in the installation and sampling of monitor wells, as well as subsequent analysis of all hydrogeologic data.

1984 - 1988 Research Scientist/Hydrogeologist, Battelle Memorial Institute, Battelle Columbus Division, Columbus, Ohio
Primary responsibility was to supervise and contribute to technical/hydrogeologic research projects. Project Leader for the contamination assessment of the Air Force Reserve Base at General Billy Mitchell Field, Wisconsin. In a similar project at the Arnold Air Force Station, Tennessee, he was responsible for evaluating the ground water flow system at the site. Other related work included preparing the ground water portion of RCRA closure plans for the Oak Ridge Y-12 plant in Tennessee, and evaluating their ground water data base in relation to the permitting needs. Technical areas included: characterization of ground water flow systems, monitoring well network design, ground water flow analysis, ground water resource evaluation, and numerical modeling.

Gulf Coast Basin Coordinator/hydrogeologist, Office of Nuclear Waste Isolation
Through interaction with client (Department of Energy) personnel, he managed the geological and hydrological activities of the Gulf Coast Geologic Manager (Earth Technology Corporation). Investigations included analysis of basin hydrology, regional ground water flow, evaluation of regional uplift, structure and stratigraphy of candidate site. Duties also included technical review of contractor deliverables and as a troubleshooter for internal, contractor and client operational problems occurring in the Gulf Coast.

In the role of Hydrogeologist, his technical responsibilities included designing detailed ground water monitoring plans, and preparation of test plans and procedures for aquifer analyses. Other technical work included analysis of geomorphic data to evaluate the effects of uplift within the Gulf Coast Region.

1982 - 1984 <u>Assistant Hydrologist, Illinois State Water Survey, Champaign, Illinois</u>

While at the Survey, he was involved in developing a hydrogeologic mechanism which assessed the risk hazardous waste would have on human health via ground water. He developed travel time estimates of contaminant movement to a discharging well. He also developed a ground water monitoring network at a fly ash disposal pond and supervised its installation. In addition, he was responsible for characterizing the hydrogeology, determining aquifer properties using a single well hydraulic test, potentiometric surface mapping, determining ground water flow rates and directions as well as recommending a well sampling protocol.

During this period, he also conducted production/multi-well hydraulic tests and analyzed their data to determine aquifer properties. Other activities included designing public supply wells, evaluating hydrogeologic data for a potential ground water supply as well as evaluating the hydraulic interference of high capacity wells on neighboring wells. He has also instructed workshops concerning methods of evaluating aquifer test data and ground water data interpretation and statistical analyses.

Publications

Hampton, M.W. and O'Hearn, M., 1984. Ground Water Monitoring at Wood River Power Station's Ash Disposal and Renovated Ash Disposal Area, Prepared for the Illinois Power Company, 34 pages.

Gibb, J.P., Barcelona, M.S., Schock, S.C. and Hampton, M.W., 1984. Hazardous Waste in Ogle and Winnebago Counties: Potential Risk Via Ground Water Due to Past and Present Activities, Illinois State Water Survey Contract Report, 66 pages.

MICHAEL J. JONES

Professional Qualifications

Mr. Jones is a civil engineer with experience in PCB and hazardous waste management programs, site remediation, multi-faceted construction management, facility maintenance, computerized management information systems, project planning and budget, explosives and personnel management.

Education

B. S., Civil Engineering, Auburn University, Auburn, Alabama; 1978

Experience and Background

1989 — <u>Engineer, IT Corporation, Tampa, Florida</u>
Provides assistance project management, engineering, administrative, and field support for hazardous waste related projects.

1979 - 1988 — <u>Commissioned Officer United States Marine Corps.</u>
Rank of Captain. Experience includes:

- Coordinator PCB management program
- Environmental review of construction designs and existing facilities
- Project Manager for emergency demolition and disposal of explosive hazardous chemicals and poisons.
- Development and implementation of a computer-enhanced maintenance management system for controlling work effort in facilities maintenance branch.
- Project Manager for several construction and engineering support operations in Korea, Phillipines, Okinawa, Japan and California.
- Personnel Management and job counseling including Drug and Alcohol and Family Services counseling.

1975 - 1978 — <u>Student at Auburn University</u>
Attended Auburn University under the Navy Enlisted Science Education Program; B.S. Degree in Civil Engineering, GPA 2.21/3.0.

1969 - 1975 — <u>Enlisted Man, United States Marine Corps</u>
Avionics Test Equipment Calibration and Repairman with additional duties in Quality Assurance.

MILITARY DECORATIONS/AWARDS

Navy Commendation Medal
Navy Achievement Medal
Navy Unit Commendation
Good Conduct Medal w/2 stars
National Defense Medal
Sea Service Deployment Ribbon
Commanding General's Certificate of Commendation
Inspector General's Certificate of Commendation
(3) Letters of Appreciation

PROFESSIONAL SOCIETIES

Associate Member of American Society of Civil Engineers (ASCE)

Member Retired Officers Association

CERTIFICATIONS

Mr. Jones has completed forty (40) hours of training in Hazards and Protection and Site Remediation which satisfies OSHA's 29 CFR 1910.120 40-hour training requirements.

SALLY A. MUSICK

Professional Qualifications

Ms. Musick is a pharmacologist/toxicologist with special emphasis on central nervous system pharmacology and drugs of abuse. Most recently, her experience has been in analytical chemistry. With an additional degree in economics, she has had experience with federal gas and energy regulations.

Education

M.S., Pharmacology and Toxicology, Medical College of Virginia, Virginia Commonwealth University, Richmond, Virginia, 1988

B.S., Biology and Economics (double major), College of William and Mary, Williamsburg, Virginia, 1984

Experience and Background

Present - 1989 — Assistant Project Scientist, International Technology Corporation, Tampa, Florida. Ms. Musick has performed as the lead investigator in preparing a baseline risk assessment for the Department of Naval Facilities. She has also assisted in performing numerous environmental assessments, chemical toxicity profiles, chemical remediation, and environmental sampling. She played a key role in the preparation of a risk assessment at a DOE Facility in Ohio.

1989 - 1988 — Laboratory Technician, Philip Morris, Richmond, Virginia Responsible for chemical analysis of tobacco samples in research and development lab.

1985 - — Analyst I, Vanguard Technologies Corporation, Fairfax, Virginia. Collected and analyzed Federal Energy Regulatory Commission gas and energy statistics for compilation of Department of Energy handbooks.

1984 - 1983 — Volunteer Nurses' Assistant, Williamsburg Community Hospital, Williamsburg, Virginia. Assisted health care specialists with emergency room duties.

RESUME\MUSICK.SM3

BARRY A. STEPHENSON

Professional Qualifications

Barry Stephenson is a professional chemist with 18 years of experience in the collection and chemical analysis of environmental samples and 5 years of experience teaching in the physical sciences area. He has worked in supervision of analytical laboratory personnel and laboratory administration for more than 15 years, including laboratory management, project design, sales and customer service and contract administration, as well as hands-on experience in field collection and laboratory analysis. Project experience includes direction of sampling and analysis for hazardous waste incinerator trial burns, Occupational Safety and Health Administration (OSHA) and industrial hygiene field surveys, polychlorinated biphenyl (PCB) cleanups, National Pollutant Discharge System (NPDES) monitoring programs, surface and ground water assessments, waste characterization, and hazardous waste site assessments. Currently he has responsibility for IT's Field Analytical and Sampling Group. This group has been structured to provide coordination of activities between IT Operations and IT Analtyical Services. The Field Analytical Group is responsible for assuring that projects which involve analytical testing are appropriately designed for establishing field sampling and data management guidelines and for providing quality assurance/quality control direction to field collection projects.

Education

- M.S., Science Education, University of Tennessee, Knoxville, Tennessee; 1970
- B.S., Chemistry, Biology, and Physics, University of Tennessee at Martin, Martin, Tennessee; 1965
- OEO Fellowship in Physical Sciences, University of Tennessee, Knoxville, Tennessee; Summer 1979
- NSF Fellowship in HPP Physics, Oak Ridge Associated Universities, Oak Ridge, Tennessee; Summer 1968
- NSF Fellowship in PSSC Physics, Auburn University, Auburn, Alabama; Summer 1967
- "Recognition of Occupational Health Hazards," National Institute for Occupational Safety and Health and American Industrial Hygiene Association, New Orleans, Louisiana; (40 hour course) February 1976

Professional Affiliations

- American Chemical Society
- American Industrial Hygiene Association
- American Society for Testing and Materials

Experience and Background

1984 - Present: Manager, Field Analytical and Sampling, IT Corporation, Knoxville Tennessee. Responsible for management of Eastern and Western Division offices of FAS Group provides coordination of field sampling and field analytical support for combined IT Operations/IT Analytical Services Projects.

- o General management of administrative and support functions of FAS.
- o Technical input as analytical chemist to project design for field sampling projects.

1983 - 1984 General Manager, IT Analytical Services, Stewart Laboratories, which was acquired by IT Corporation in July 1981, Knoxville, Tennessee. Responsible for operations of analytical service laboratory engaged in analysis of environmental samples and hazardous materials for inorganic and organic constituents. Supervised day-to-day activities.

1981 - 1983 Manager of Customer Service, Sales and Marketing, IT Analytical Services, Stewart Laboratories Division, Knoxville, Tennessee. Responsible for coordination of sales and marketing for analytical testing laboratory. Duties included contract administration, client contact, project design, proposal and report writing, and supervision of field collection projects.

1974 - 1981 Assistant Vice-President, Manager of Administrative Services, Stewart Laboratories, Knoxville, Tennessee. Served as member of management group for independent analytical testing laboratory with primary responsibility for marketing. Duties included contract administration, client contact, project design, proposal and report writing, and supervision of some field collection projects.

1973 - 1974 Manager of Administrative Services, Stewart Laboratories, Knoxville, Tennessee. Supervisor for sales, marketing, purchasing, proposals, and special reports. Also served as member of field services work pool.

1970 - 1973 Director of Analytical Services, Stewart Laboratories, Knoxville, Tennessee. Supervisor of chemists and technicians in independent analytical testing laboratory. Primary business of the laboratory was analysis of trace metals and classical parameters in environmental samples.

1969 - 1970 Physics Instructor, Oak Ridge Associated Universities, Oak Ridge Tennessee. Taught laboratory course in Harvard Project Physics to junior college instructors. During this time, also completed work on Master's Degree in OEO Fellowship program.

1968 - 1970 Analyst, Stewart Laboratories, Knoxville, Tennessee. Performed general laboratory duties in sample preparation analysis of water and wastewater samples, and operated atomic absorption spectrometer. Part-time employment.

1965 - 1969 Chemistry and Physics Instructor, Roane County Schools, Kingston, Tennessee. Taught chemistry and physics to high school juniors and seniors. Wrote and taught advanced science course in introductory biochemistry.

Publications

Stephenson, B. A., 1979, "Screening Techniques for Toxic Pollutants," presented at General Electric Environmental Seminar, Orlando, Florida.

Stephenson, B. A., 1970, "An Investigation of the Composition -- Lattic Parameter -- Oxygen Potential of the U-Eu-O System," Master's Thesis, University of Tennessee, Knoxville, Tennessee.

SITE MANAGEMENT PLAN
NAVAL AIR STATION-KEY WEST (UIC N00213)
KEY WEST, FLORIDA

PREPARED FOR:

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA
CONTRACT NO. N62467-88-C-0196

PREPARED BY:

IT CORPORATION
3012 U.S. HIGHWAY 301 N., SUITE 1000
TAMPA, FLORIDA 33619

OCTOBER 1989

TABLE OF CONTENTS

PAGE

ACRONYMS AND SYMBOLS ii
1.0 INTRODUCTION 1-1
1.1 IDENTIFICATION OF SITES 1-1
1.2 PROJECT OBJECTIVES 1-1
1.3 ADMINISTRATIVE DOCUMENTS 1-2
2.0 SITE BACKGROUND 2-1
2.1 SITE 1 - TRUMAN ANNEX REFUSE DISPOSAL AREA 2-1
2.2 SITE 3 - TRUMAN ANNEX DDT MIXING AREA 2-1
2.3 SITE 4 - BOCA CHICA OPEN DISPOSAL AREA 2-1
2.4 SITE 5 - BOCA CHICA DDT MIXING AREA 2-2
2.5 SITE 7 - FLEMING KEY NORTH LANDFILL 2-2
2.6 SITE 8 - FLEMING KEY SOUTH LANDFILL 2-2
2.7 SITE 9 - TRUMBO POINT ANNEX FUEL FARM AND PIERS 2-2
2.8 SITE 10 - BOCA CHICA FIRE FIGHTING TRAINING AREA 2-2
3.0 DATA QUALITY OBJECTIVES 3-1
4.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) 4-1
TABLE 4-1 - APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

ACRONYMS AND SYMBOLS

TITLE	DEFINITION
ACGIH	American Council of Governmental and Industrial Hygienist
ADI	Average Daily Intake
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society of Testing and Materials
BW	Body Weight
CAG	Carcinogenic Assessment Group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGA	Combustible Gas Analyzer (Exposimeter)
CLP	USEPA Contract Laboratory Program
CNO	Chief of Naval Operations
CPR	Cardio Pulmonary Resuscitation
CRPO	Community Relations Plan Outline
CRQL	Contract Required Quantification Limits
C_s	Concentration of Soil
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DDT	Dichloro-Diphenyl-Trichloroethane
DDD	Dichloro-Diphenyl-Dichloroethane
DDE	Dichloro-Diphenyl-Dichloro-Ethylene
DMP	Data Management Plan
DOD	U.S. Department of Defense
DOT	U.S. Department of Transportation
DPDO	Defense Property Disposal Office
DQO	Data Quality Objectives
EFD	Engineering Field Division
EIC	Engineer-in-Charge
EP	Extraction Procedure/Exposure Period
FAC	Florida Administrative Code
FDER	Florida Department of Environmental Regulations
FEV/FVC	Forced Expiratory Volume/Forced Vital Capacity
FGFFC	Florida Game and Fresh Water Fish Commission
FID	Flame Ionization Detector

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
FOC	Field Operations Coordinator
FS	Feasibility Study
FSP	Field Sampling Plan
GAC	Granular Activated Carbon
G&M	Geraghty and Miller
gpm	Gallons per Minute
HRS	Hazard Ranking System
HSC	Health and Safety Coordinator
HSP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments of 1984
IAS	Initial Assessment Study
IBM PC	International Business Machine Corp. Personal Computer
ICRP	International Council on Radiation Protection
IR	Average Soil Ingestion Rate
IRP	Installation Restoration Program
IT	IT Corporation
ITAS	IT Analytical Services
LBG	Leggette, Brashears, and Graham, Inc.
LEL	Lower Explosive Limit
LIMS	Laboratory Information Management Systems
mg/kg	Milligrams/Kilogram
mg/L	Milligrams/Liter
MS DOS	Microsoft Disk Operating System
MSA	Mine Safety Administration
MSL	Mean Sea Level
NACIP	Navy Assessment and Control of Installation Pollutants
NAS	Naval Air Station
NAVENENVSA	Naval Energy and Environmental Support Activity
NAVFACENGCOM	Navy Facilities Engineering Command

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
NCP	National Oil and Hazardous Substances Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NEPPS	Naval Environmental Protection Support Service
NFA	No Further Action
NIOSH	National Institute of Occupational Safety and Health
NPSS	Naval Environmental Protection Support Service
OSHA	Occupational Health and Safety Administration
OVA	Organic Vapor Analyzer
PAO	Public Affairs Officer
PC	Personal Computer
PCB	Polychlorinated Biphenyl
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PMP	Project Management Plan
ppb	Parts per Billion
PPE	Personnel Protection Equipment
ppm	Parts per Million
q	Cancer Potency Factor
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
R	Acceptable Incremental Lifetime Cancer Risk
RA	Risk Assessment or Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RV	Recreational Vehicle
SAP	Sampling and Analysis Plan

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
SARA	Superfund Amendments and Re-authorization Act
SCBA	Self Contained Breathing Apparatus
SI	Site Inspection
SMAC 20	Simultaneous Analysis Complete
SOUTHDIV	Southern Division, Naval Facilities Engineering Command
SOW	Statement of Work
TCL	Target Compound List
TDS	Total Dissolved Solids
TLV	Threshold Limit Value
TRC	Technical Review Committee
ug/L	Micrograms/Liter
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds
WBGT	Wet Globe Bulb Temperature Index

1.0 INTRODUCTION

The Site Management Plan (SMP) provides a record of the investigation objectives that will be used by IT Corporation (IT) at the Naval Air Station (NAS) Key West, Florida sites to complete the Statement of Work (SOW). These methods and procedures will maintain the focus of the investigation(s) and achieve data quality objectives (DQO). The SMP is applicable to all work performed by IT and its subcontractors throughout the investigation of the sites. Applicable or Relevant and Appropriate Requirements (ARARs) are also addressed for the investigative studies.

1.1 IDENTIFICATION OF SITES

The objectives of the remedial investigative activities at the sites are to confirm, and characterize the presence of environmental contamination and to provide data to support future risk assessments (RA) and feasibility studies (FS) at the following eight sites:

- Site 1 - Truman Annex Refuse Disposal Area
- Site 3 - Truman Annex DDT Mixing Area
- Site 4 - Boca Chica Open Disposal Area
- Site 5 - Boca Chica DDT Mixing Area
- Site 7 - Fleming Key North Landfill
- Site 8 - Fleming Key South Landfill
- Site 9 - Trumbo Point Annex Fuel Farm and Piers
- Site 10 - Boca Chica Fire Fighting Training Area

Project activities will include the installation of ground water monitoring wells, collection of ground water samples, surface water samples, sediment samples, soils samples, ambient air monitoring, waste characterization, chemical analysis of samples and report writing. A brief description of each site and applicable background information is provided in Section 2.0 of the SMP.

1.2 PROJECT OBJECTIVES

In accordance with the SOW, the objectives of this study are:

- To conduct an investigation of potential contamination sources at Sites 1, 3, 5, 7, 8, 9, and 10
- To obtain quantitative data on concentrations of contaminants within and in the vicinity of the potential sources at all sites
- To confirm the presence or absence of contamination at each of the sites and, if possible, the direction of migration of contaminants

based on the properties of the contaminant, the environmental setting and the hydrogeology of each site

- To assess the risk to the environment and to human health that may be represented by contaminant migration at Site 3 only

While conducting the investigations of individual sites, IT also will integrate the data obtained with that already in existence to develop a more comprehensive basis for further environmental studies and remedial action planning.

If situations requiring prompt remedial action are found, IT will advise the Navy immediately and recommend actions to be taken.

1.3 ADMINISTRATIVE DOCUMENTS

IT has prepared the Project Management Plan (PMP) as a cover document within which are enclosed the following four site-specific administration plans:

- Site Management Plan (SMP)
- Data Management Plan (DMP)
- Sampling and Analysis Plan (SAP), which includes the Quality Assurance Project Plan (QAPP) and the Field Sampling Plan (FSP)
- Health and Safety Plan (HSP)

Each of these plans have been prepared as a stand-alone document, but together they compliment and complete the administrative plans for the SOW to be performed. The SMP references the work plans, SAP, HSP, and DMP for the actual efforts to be performed and how they will be accomplished. The administrative plans present the detailed procedures which are referenced by the work plans to the actual implementation and field and laboratory quality assurances. The HSP presents the appropriate health and safety requirements for the performance of work by site personnel. The DMP provides methods for the compilation of the data into a useable format.

2.0 SITE BACKGROUND

The NAS-Key West sites covered by this SMP are:

- Site 1 - Truman Annex Refuse Disposal Area
- Site 3 - Truman Annex DDT Mixing Area
- Site 4 - Boca Chica Open Disposal Area
- Site 5 - Boca Chica DDT Mixing Area
- Site 7 - Fleming Key North Landfill
- Site 8 - Fleming Key South Landfill
- Site 9 - Trumbo Point Annex Fuel Farm and Piers
- Site 10 - Boca Chica Fire Fighting Training Area

2.1 SITE 1 - TRUMAN ANNEX REFUSE DISPOSAL AREA

The Truman Annex Refuse Disposal Area is located along the southern shore of Truman Annex on Key West. The site covers an area of approximately seven acres, including the antenna field and the area to the immediate north.

From 1952 until the mid-1960's, the site was used for general refuse disposal and open burning. No restrictions were placed on the types of wastes disposed of at the site and it is believed that, in addition to general refuse, waste paint, thinners and solvents were also disposed of at the site.

2.2 SITE 3 - TRUMAN ANNEX DDT MIXING AREA

The Truman Annex DDT Mixing Area is located at the site of Building 265, which has been demolished. The site covers an area of about 0.25 acres and is located about 1,100 feet inland from the coastline in an area subject to vehicular and pedestrian traffic.

From the 1940's to the early 1970's, the location was used as a DDT mixing area. Powdered DDT concentrate was mixed with water and temporarily stored in 55-gallon drums both inside and outside the former building. The mixed solution was transferred to trucks for dispersal. Discharge at the site was by unintentional spillage.

2.3 SITE 4 - BOCA CHICA OPEN DISPOSAL AREA

The Boca Chica Open Disposal Area is located between a perimeter road and Geiger Creek. This area is low and reported as being subject to tidal flooding. Tall mangroves are growing in shallow standing saltwater in Geiger Creek.

This ten acre site was used a an open disposal area from 1942 until the mid-1960's. No restrictions were placed on the types of waste disposed of at the site. Typical wastes included primarily general refuse, and possible waste oils, hydraulic fluids, paints, paint thinners and solvents. It may have also included wastes associated with the operation and maintenance of aircraft. During the operation of the disposal area, it is reported that approximately 2,600 tons of waste was disposed at the site annually, by burning. Following burning the wastes were pushed by bulldozer; no trenching occurred at this site.

2.4 SITE 5 - BOCA CHICA DDT MIXING AREA

The Boca Chica DDT Mixing Area is located next to a man-made drainage ditch connected to a large borrow pit along the west side of Runway 13. DDT mixing operations were conducted on this site in Building 915 (demolished in 1982) from the 1940's to the early 1970's. Disposal at the site was not intentional but probably resulted from spillage. Two above-ground tanks on concrete foundations (a 500-gallon mixing tank and a 1,000-gallon storage tank) were located to the west of the building. During the removal of the tanks, some spillage reportedly occurred.

2.5 SITE 7 - FLEMING KEY NORTH LANDFILL

Fleming Key North Landfill covers approximately 30 acres on the northern end of Fleming Key. Reportedly, 4,000 to 5,000 tons of unknown wastes were disposed into excavated trenches annually between 1952 and 1962. The trenches were typically cut 25 feet wide, 10 feet deep and 500 to 1,000 feet in length.

In 1977, a building housing the U.S. Department of Agriculture Animal Import Center was constructed over a portion of the landfill. During the construction, wastes were excavated and transferred to an area immediately to the west.

2.6 SITE 8 - FLEMING KEY SOUTH LANDFILL

Fleming Key South Landfill is located on the southern end of Fleming Key and covers approximately 45 acres. This landfill was started in 1962 and operated until 1980. The site received approximately 4,000 to 5,000 tons of waste from the Naval Station annually from 1962 to 1966. By the late 1970s, annual waste disposal had increased to approximately 8,600 tons. Wastes typically disposed at this site included general refuse, sewage sludge, and other items such as waste oil, hydraulic fluid, paint, thinner and solvents from the Air Station shops. The site was operated as trench and fill and covered daily. Wet garbage was placed at one end of the trench and combustible wastes were taken to the western area of the site and burned. Since the burning operation was not controlled, not all wastes were completely destroyed.

2.7 SITE 9 - TRUMBO POINT ANNEX FUEL FARM AND PIERS

The Fuel Farm and Piers are located east of the piers at the Trumbo Point Annex. The Annex was constructed in 1918 as a seaplane base using dredged materials. Fuel is received at this facility from tankers and then distributed by buried transmission lines to either Truman Annex or NAS - Boca Chica. Fuels that have been stored at this site include No. 6 fuel oil, Bunker C oil, diesel, aviation gasoline, JP-4 and JP-5.

2.8 SITE 10 - BOCA CHICA FIRE FIGHTING TRAINING AREA

The Fire Fighting Training Area is located immediately west of the southern blimp pad. The fire training facility consists of two unlined circular pits approximately 20 feet in diameter. The pits are surrounded by a gravel apron.

The fire pit area is used occasionally during the year. Each time a training session occurs, flammable liquids such as JP-5, waste oils, or hydraulic fluids are poured onto mock airplanes within the pit and ignited. The area surrounding the vehicles shows visible evidence of burning and oil staining.

3.0 DATA QUALITY OBJECTIVES

DQO are developed to ensure that samples are properly obtained and analyzed to provide representative data. Sampling techniques to be utilized are described in Section 5.0 of the FSP. Field and laboratory data generation are discussed within the QAPP and the laboratory specific attachment to the IT Analytical Services (ITAS) Quality Assurance (QA) Manual.

DQOs are further supported through the determination of Quality Control (QC) Levels. These QC levels are identified in the Comprehensive Environmental Responsibility, Compensation and Liability Act (CERCLA), the level of QC for this project is defined by NEESA and in the SOW as Level C.

The QC requirements for Level C are:

- Laboratory performance evaluation samples
- Laboratory audit
- QA plan review
- Use of USEPA approved analytical methods
- Monthly progress reviews
- 10 percent field duplicates
- Final Review of Data

The use of the QC guidelines and following of QAPP will result in data which is representative of existing field conditions. This quality data can then be used to perform FS and RA later within activities at these sites.

4.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Applicable or Relevant and Appropriate Requirements (ARARs) are defined by 40 CFR 300.6 as:

> "Applicable Requirements means those Federal requirements that would be legally applicable, whether directly, or incorporated by a Federally authorized State program, if the response actions were not undertaken pursuant to CERCLA section 104 or 106."
>
> "Relevant and Appropriate Requirements are those Federal requirements that while not "applicable" are designed to apply to problems sufficiently similar to those encountered at CERCLA sites that their application is appropriate. Requirements may be relevant and appropriate if they would be "applicable" but for jurisdictional restrictions associated with the requirement."

Further guidance on ARARs selection and criteria are provided by USEPA's Draft Guidance Document "CERCLA Compliance with other Laws Manual", August 11, 1988, and USEPA's Final Interim "Guidance Manual for Conducting Remedial Investigations and Feasibility Studies under CERCLA", October 1988.

The Key West sites have potential for contaminating soil, ground water, and surface waters. Chemical specific ARARs that may apply to these sites are as follows:

- Proposed rules under Support S of the RCRA Regulations may be relevant and appropriate requirements that can apply to releases of contaminants to soil and ground water at Key West. Table 4-1 lists these requirements.
- Water quality criteria from the Clean Water Act may be relevant and appropriate requirements for surface waters around Key West because of extensive fishing that takes place in the area. Table 4-1 lists these requirements.
- Water quality criteria as per FDER Regulation 17-3 for surface and ground water will apply to the sites based on the sites water classifications (i.e. Class II, III, etc.).

The following FDER regulations may also apply to the Key West sites:

- 17-27 Mangrove Protection Policy
- 17-25 Stormwater Discharge Regulations
- 17-70 Petroleum Contamination Site Cleanup Criteria

- 17-532 Water Well Permitting and Construction Requirements

In addition to the preceding, the following are also sources of possible ARAR's:

- Endangered Species Act of 1973
- EPA's Statement of Policy on Protection of Nations Wetlands (38FR10834, March 20, 1973); Executive Order 11990, Protection of Wetlands;
- Coastal Zone Management Act

When the RA has been completed for the sites, new ARARs may be proposed as per 40 CFR 300.68 (f).

453005\P1SITMGT.MJ3

Table 4-1
APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS (ARARs)
NAS-KEY WEST
KEY WEST, FLORIDA

INORGANICS

CAS NO.	PARAMETERS	WATER (ug/L) CAL[1]
	Antimony	14
7440-38-2	Arsenic	50
7440-39-3	Barium	1,000
	Beryllium	170
7440-43-9	Cadmium	10
7440-47-3	Chromium VI	50
	Cyanide	700
7439-92-1	Lead	50
7439-97-6	Mercury	2
	Nickel	70
7782-49-2	Selenium	10
7440-22-4	Silver	50

PESTICIDES/PCBs

CAS NO.	PARAMETERS	WATER (ug/L) CAL[1]
309-00-2	Aldrin	.0021
72-20-8	Endrin	.20
58-89-9	Lindane	4.0
72-43-5	Methoxychlor	100
8001-35-2	Toxaphene	5.0
5103-71-9	α-chlordane	.027
57-74-9	y-chlordane	.027
72-54-8	4,4'-DDD	.15
72-55-9	4,4'-DDE	.1
50-29-3	4,4'-DDT	.1
115-25-7	Endosulfan	1.8
76-44-8	Heptachlor	.0078
1024-57-3	Heptachlor epoxide	.0039
	Polychlorinated biphenyls	.0046

[1] CAL - Corrective Action Limits as per proposed rule for RCRA Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities - Subpart S

ORGANICS

CAS NO.	PARAMETERS	WATER (ug/L) CAL[1]
88-06-2	2,4,6-Trichlorophenol	1.8
71-55-6	1,1,1-Trichloroethane	200
108-95-2	Phenol	1400
107-06-2	1,2-Dichloroethane	5
87-86-5	Pentachlorophenol	1000
71-43-2	Benzene	5
51-28-5	2,4-Dinitrophenol	70
56-23-5	Carbon tetrachloride	5
120-83-2	2,4-Dichlorophenol	100
120-82-1	1,2,4-Trichlorobenzene	700
98-95-3	Nitrobenzene	18
75-01-4	Vinyl chloride	2
67-72-1	Hexachloroethane	25
75-27-4	Bromodichloromethane	700
84-66-2	Diethylphthalate	28,000
75-25-2	Bromoform	700
74-83-9	Bromomethane	14
117-81-7	Bis(2-ethylhexyl)phthalate	700
67-66-3	Chloroform	5.7
75-09-2	Methylene chloride	4.7
79-00-5	1,1,2-Trichloroethane	6.1
79-34-5	1,1,2,2-Tetrachloroethane	1.8
108-88-3	Toluene	10,000
67-64-1	Acetone	3,500
75-15-0	Carbon Disulfide	3,500
108-90-7	Chlorobenzene	1,000
100-41-4	Ethylbenzene	3,500
100-42-5	Styrene	7,000
1330-20-7	Xylenes	70,000
87-68-3	Hexachlorobutadiene	4.5
77-47-4	Hexachlorocyclopentadiene	240

[1] CAL - Corrective Action Limits as per proposed rule for RCRA Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities - Subpart S

INORGANICS

CAS NO.	PARAMETERS	SOIL (mg/kg) CAL[1]
	Antimony	6.8
7440-39-3	Barium	850
	Beryllium	85
	Chromium VI	85
	Cyanide	340
7440-22-4	Silver	51
	Nickel	340

PESTICIDES/PCBs

CAS NO.	PARAMETERS	SOIL (mg/kg) CAL[1]
309-00-2	Aldrin	.021
58-89-9	Lindane	.27
8001-35-2	Toxaphene	.32
5103-71-9	α-Chlordane	.27
57-74-9	y-Chlordane	.27
72-54-8	4,4'-DDD	1.5
72-55-9	4,4'-DDE	1
50-29-3	4,4'-DDT	1
115-25-7	Endosulfan	.85
76-44-8	Heptachlor	.078
1024-57-3	Heptachlor epoxide	.038
	Polychlorinated biphenyls	.045

[1] CAL - Corrective Action Limits as per proposed rule for RCRA Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities - Subpart S

Table 4-1 (continued)
APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS (ARARs)
NAS-KEY WEST
KEY WEST, FLORIDA

ORGANICS

CAS NO.	PARAMETERS	SOIL (mg/kg) CAL[1]
71-55-6	1,1,1-Trichloroethane	1500
107-06-2	1,2-Dichloroethane	3.8
56-23-5	Carbon tetrachloride	2.7
75-27-4	Bromodichloromethane	340
75-25-2	Bromoform	340
74-83-9	Bromomethane	6.8
67-66-3	Chloroform	57
75-09-2	Methylene chloride	47
79-34-5	1,1,2,2-Tetrachloroethane	18
108-88-3	Toluene	5100
79-00-5	1,1,2-Trichloroethane	61
117-81-7	Bis(2-ethylhexyl)phthalate	340
84-66-2	Diethylphthalate	14,000
67-72-1	Hexachloroethane	250
98-95-3	Nitrobenzene	8.5
120-82-1	1,2,4-Trichlorobenzene	340
120-83-2	2,4-Dichlorophenol	51
51-28-5	2,4-Dinitrophenol	34
87-86-5	Pentachlorophenol	510
108-95-2	Phenol	680
88-06-2	2,4,6-Trichlorophenol	18
67-64-1	Acetone	1,700
75-15-0	Carbon disulfide	1,700
108-90-7	Chlorobenzene	510
100-41-4	Ethyl benzene	1,700
100-42-5	Styrene	3,400
1330-20-7	Xylenes	34,000
87-68-3	Hexachlorobutadiene	34
77-47-4	Hexachlorocyclopentadiene	120

[1] CAL - Corrective Action Limits as per proposed rule for RCRA Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities - Subpart S

CHEMICAL NAME	FISH CONSUMPTION Only (mg/l)
Acrolein	7.8x10-01
Acrylonitrile	6.5x10-04
Aldrin	7.9x10-08
Antimony and compounds	45
Arsenic and compounds	1.8x10-05
Benzene	4.0x10-02
Benzidine	5.3x10-04
Beryllium and compounds	1.2x10-04
Carbon tetrachloride	6.9x10-03
Chlordane	4.8x10-07
Chloroform	1.8x10-02
Chromium III and compounds	3433
DDT	2.4x10-08
Dibutylphthalate	154
Dichlorobenzenes	2.6
3,3'-Dichlorobenzidine	2x10-05
1,2-Dichloroethane (EDC)	2.4x10-01
Dichlorethylenes	1.9x10-03
1,3-Dichloropropane	14.1
Dieldrin	7.6x10-08
Diethylphthalate	1800
Dimethylphthalate	2900
Endosulfan	1.6x10-01
Ethylbenzene	3.3
Fluoranthene	5.4x10-02
Fluorides	4.0
n-Nitrosodiphenylamine	1.6x10-02
N-Nitrosopyrrolidine	9.2x10-02
Pentachlorobenzene	8.5x10-02
Polychlorinated biphenyls (PCBs)	7.9x10-08
Radionuclides, Gross alpha activity	15 pCi/l
Radium 226 and 228	5 pCi/l

CHEMICAL NAME	FISH CONSUMPTION Only (mg/l)
Selenium and compounds	1.0x10-02
Silver and compounds	5.0x10-02
Strontium-90	8 pCi/l
1,2,4,5-Tetrachlorobenzene	4.8x10-02
1,1,2,2-Tetrachloroethane	1.1x10-02
Tetrachloroethylene	8.9x10-03
Thallium and compounds	4.8x10-02
Heptachlor	2.9x10-07
Hexachlorobenzene	7.4x10-07
Hexachlorobutadiene	5x10-02
alpha-Hexachlorocyclohexane (HCCH)	3.1x10-05
Technical-HCCH	4.1x10-05
Hexachloroethane	8.74x10-03
Mercury and compounds (Inorganic)	1.5x10-04
Nickel and compounds	1x10-01
Toluene	420
Toxaphene	7.3x10-07
1,1,1-Trichloroethane	1000
1,1,2-Trichloroethane	4.2x10-02
Trichloroethylene	8.1x10-02
2,4,6-Trichlorophenol	3.6x10-03
Vinyl chloride	5.3x10-01

Federal water quality criteria (FWQC) are not legally enforceable standards, but are potentially relevant and appropriate to CERCLA actions. CERCLA §121(d)(2)(B)(i) requires consideration of four factors when determining whether FWQC are relevant and appropriate: (1) the designated or potential use of the surface or ground water, (2) the environmental media affected, (3) the purposes for which such criteria were developed, and (4) the latest information available.

Table 4-1 (continued)
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
GROUND WATER GUIDANCE CONCENTRATIONS*
FEBRUARY 1989
NAS KEY WEST
KEY WEST, FLORIDA

CAS #	Parameter	Guidance* Concentration (ug/L)
83-32-9	Acenaphthene	20
208-96-8	Acenaphthylene	10
67-64-1	Acetone	700
5094-66-6	Acifluorfen (Blazer)	10
107-02-8	Acrolein (Propenal)	110
79-06-1	Acrylamide (2-Propeneamide)	1
107-13-1	Acrylonitrile	2.5
15972-60-8	Alachlor	1.5
116-06-3	Aldicarb (Temik)	10
	Aldicarb sulfoxide	10
1646-88-4	Aldicarb sulfone	40**
309-00-2	Aldirn	0.05
	Alpha, gross****	15 pCi/L
834-12-8	Ametryn	60
7773-06-0	Ammonium sulfamate	2,000
120-12-7	Anthracene	10
7440-36-0	Antimony	29
	Arsenic****	50
1332-21-4	Asbestos***	7 million fibers/L
1912-24-9	Atrazine	3
	Barium****	1,000
114-26-1	Baygon (Propoxur)	10
25057-89-0	Bentazone	20
71-43-2	Benzene****	1
	Benzenehexachloride (See Hexachlorocyclohexane)	
92-87-5	Benzidine	10
56-55-3	Benzo(a)anthracene	10
205-99-2	Benzo(b)fluoranthene	10
207-08-9	Benzo(k)fluoranthene	10

CAS #	Parameter	Guidance* Concentration (ug/L)
191-24-2	Benzo(g,h,i)perylene	10
50-32-8	Benzo(a)pyrene	10
7440-41-7	Beryllium	5
	BHC (See Hexachlorocyclohexane)	
92-52-4	Biphenyl	10
314-40-9	Bromacil	90
75-27-4	Bromodichloromethane (See Trihalomethane)	
75-25-2	Bromoform (See Trihalomethane)	
74-83-9	Bromomethane (Methyl bromide)	20
101-55-3	4-Bromophenyl phenyl ether	10
78-93-3	2-Butanone (See Methyl ethyl ketone)	
123-86-4	n-Butyl acetate	43
2008-41-5	Butylate	700
85-68-7	Butyl benzyl phthalate	1,400
85-70-1	Butyl phthalyl butyl glycolate	120,000
	Cadmium****	10
63-25-2	Carbaryl (Sevin)	700
1563-66-2	Carbofuran	36
108-95-2	Carbolic acid (See Phenol)	
56-23-5	Carbon tetrachloride**** (Tetrachloromethane)	3
5234-68-4	Carboxin	700
133-90-4	Chloramben	100
57-74-9	Chlordane	0.1
	Chloride****	250,000
108-90-7	Chlorobenzene	10

CAS #	Parameter	Guidance* Concentration (ug/L)
124-48-1	Chlorodibromomethane (See Trihalomethane)	
106-89-8	1-Chloro-2,3-epoxypropane (See Epichlorohydrin)	
75-00-3	Chloroethane (Ethyl chloride)	6,300
111-91-1	bis(2-Chloroethoxy) methane	10
75-01-4	Chloroethylene**** (Vinyl chloride)	1
111-44-4	bis(2-Chloroethyl)ether (Dichloroethyl ether)	10
110-75-8	2-Chloroethyl vinyl ether (Vinyl 2-chloroethyl ether)	1
67-66-3	Chloroform (See Trihalomethane)	
108-60-1	bis(2-Chloroisopropyl) ether	10
74-87-3	Chloromethane (Methyl chloride)	3,800
542-88-1	bis(Chloromethyl) ether	10
59-50-7	4-Chloro-3-methyl phenol (p-chloro-m-cresol)	3,000
94-74-6	4-Chloro-2-methyl-phenoxy aetic acid (See MCPA)	
91-58-7	2-Chloronaphthalene	10
108-43-0	3-Chlorophenol	10
106-48-9	4-Chlorophenol	10
7005-72-3	4-Chlorophenyl phenyl ether	10
76-06-2	Chloropicrin	7.3
1897-45-6	Chlorothalonil (Bravo)	2
	Chromium****	50
218-01-9	Chrysene	10

Table 4-1 (continued)
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
GROUND WATER GUIDANCE CONCENTRATIONS*
FEBRUARY 1989
NAS KEY WEST
KEY WEST, FLORIDA

CAS #	Parameter	Guidance* Concentration (ug/L)
	Color****	15 (color unit)
	Copper****	1000
21725-46-2	Cyanazine	30
57-12-5	Cyanide	154
94-75-7	2,4-D****	100
1861-32-1	Dacthal (DCPA)	4,000
75-99-0	Dalapon (2,2-Dichloro-propionic acid)	200
50-29-3	DDT	0.1
2303-16-4	Diallate	10
333-41-5	Diazinon	10
53-70-3	Dibenzo(a,h)anthracene	10
124-48-1	Dibromochloromethane (See Trihalomethane)	
96-12-8	1,2-Dibromo-3-chloropropane (DBCP)	0.025
106-93-4	1,2-Dibromoethane**** (Ethylene Dibromide,EDB)	0.02
84-74-2	Di-n-butyl phthalate	700
1918-00-9	Dicamba	200
95-50-1	o-Dichlorobenzene (1,2-Dichlorobenzene)	10
541-73-1	m-Dichlorobenzene (1,3-Dichlorobenzene)	10
106-46-7	p-Dichlorobenzene**** (1,4-Dichlorobenzene)	75
91-94-1	3,3-Dichlorobenzidine	20
75-27-4	Dichlorobromomethane (See Trihalomethane)	
75-71-8	Dichlorodifluoromethane (Freon 12)	1,400
75-34-3	1,1-Dichloroethane	2,400

CAS #	Parameter	Guidance* Concentration (ug/L)
107-06-2	1,2-Dichloroethane**** (Ethylene dichloride)	3
75-35-4	1,1-Dichloroethylene**** (Vinylidene chloride)	7
156-59-2	cis-1,2-Dichloroethylene	4.2
156-60-5	trans-1,2-Dichloroethylene	4.2
111-44-4	Dichloroethyl ether (See bis(2-Chloro-ethyl) ether)	
108-60-1	Dichloroisopropyl ether (See bis(2-Chloroisopropyl) ether)	
75-09-2	Dichloromethane (See Methylene chloride)	
542-88-1	Dichloromethyl ether (See bis(Chloromethyl ether)	
576-24-9	2,3-Dichlorophenol	10
120-83-2	2,4-Dichlorophenol	10
583-78-8	2,5-Dichlorophenol	10
87-65-0	2,6-Dichlorophenol	10
95-77-2	3,4-Dichlorophenol	10
78-87-5	1,2-Dichloropropane	1
542-75-6	1,3-Dichloropropene (DCP, Telone)	1
60-57-1	Dieldrin	0.05
117-81-7	Di(2-ethylhexyl)phthalate	14
84-66-2	Diethyl phthalate	5,600
67239-16-1	Dimethrin	2,000
105-67-9	2,4-Dimethyl phenol (2,4-Xylenol)	400
131-11-3	Dimethyl phthalate	70,000
534-52-1	4,6-Dinitro-o-cresol (2-Methyl-4,6-dinitrophenol)	50
51-28-5	2,4-Dinitrophenol	70

CAS #	Parameter	Guidance* Concentration (ug/L)
121-14-2	2,4-Dinitrotoluene	10
608-20-2	2,6-Dinitrotoluene	10
88-85-7	Dinoseb	7
117-84-0	Di-n-octyl phthalate	10
123-91-1	p-Doxane (1,4-Dioxane)	10
1746-01-6	Dioxin (See 2,3,7,8-Tetra chlorodibenzo-p-dioxin)	
957-51-7	Diphenamid	200
122-66-7	1,2-Diphenyl hydrazine	10
298-04-4	Disulfoton	10
330-54-1	Diuron	10
15-29-7	Endosulfan (alpha + beta)	0.4
1031-07-8	Endosulfan sulfate	0.3
145-73-3	Endothall	100
72-20-8	Endrin****	0.2
7421-93-4	Endrin aldehyde	0.1
106-89-8	Epichlorohydrin (unstable in H_2O)	10
75-21-8	1,2-Epoxyethane (See Ethylene oxide)	
563-12-2	Ethion	14
141-78-6	Ethyl acetate	100
100-41-4	Ethylbenzene	2
75-00-3	Ethylchloride (See Chloroethane)	
166-93-4	Ethylene dibromide**** (EDB, 1,2-Dibromoethane)	0.02
107-06-2	Ethylene dichloride**** (1,2-Dichloroethane)	3
107-21-1	Ethylene glycol	7,000
75-21-8	Ethylene oxide (unstable in H_2O)	10

CAS #	Parameter	Guidance* Concentration (ug/L)
96-45-7	Ethylene thiourea (2-imidazolidinethione)	0.5
84-72-0	Ethyl phthalate ethyl glycolate	17,500
22224-92-6	Fenamiphos	10
2164-17-2	Fluometuron	90
206-44-0	Fluoranthene (Idryl)	42
86-73-7	Fluorene	10
	Fluoride****	4,000
	Fluoride****	2,000
75-69-4	Fluorotrichloromethane (See Trichloromono fluoromethane)	
	Foaming agents****	500
944-22-9	Fonofos	10
50-00-0	Formaldehyde	50
1071-83-6	Glyphosate (Roundup)	700
76-44-8	Heptachlor	0.076
1024-57-3	Heptachlor epoxide	0.1
118-74-1	Hexachlorobenzene (HCB)	10
87-68-3	Hexachlorobutadiene	10
319-84-6	alpha-Hexachlorocyclohexane (BHC)	0.05
319-85-7	beta-Hexachlorocyclohexane (BHC)	0.05
58-89-9	gamma-Hexachlorocyclohexane**** (Lindane)	4
319-86-8	delta-Hexachlorocyclohexane (BHC)	0.05
77-47-4	Hexachlorocyclopentadiene	10
67-72-1	Hexachloroethane	10
110-54-3	n-Hexane	10

CAS #	Parameter	Guidance* Concentration (ug/L)
51235-04-2	Hexazinone (Velpar)	200
206-44-0	Idryl (See Fluoranthene)	
96-45-7	2-Imidazolidinethione (See Ethylene thiourea)	
193-39-5	Indeno(1,2,3-cd) pyrene	10
	Iron****	300
78-59-1	Isoacetophorone (See Isophorone)	
78-59-1	Isophorone	1,050
98-82-8	Isopropyl benzene (Cumene)	10
	Lead****	50
58-89-9	Lindane****	4
330-55-2	Linuron	22
123-33-1	Maleic hydrazide	4,000
12327-38-2	Maneb	75
	Manganese****	50
94-74-6	MCPA (4-Chloro-2-methylphenoxy acetic acid)	1,000
	Mercury****	2
10265-92-6	Methamidophos	18
16752-77-5	Methomyl	200
72-43-5	Methoxychlor****	100
74-83-9	Methyl bromide (See Bromomethane)	
74-87-3	Methyl chloride (See Chloromethane)	
534-52-1	2-Methyl-4,6-dinitrophenol (See 4,6-Dinitro-o-cresol)	
75-09-2	Methylene chloride (Dichloromethane)	5

CAS #	Parameter	Guidance* Concentration (ug/L)
78-93-3	Methyl ethyl ketone (MEK, 2-Butanone)	170 #
60-34-4	Methyl hydrazine	10
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	350 #
298-00-0	Methyl parathion	10
51218-45-2	Metolachlor	100
21087-64-9	Metribuzin	200
2385-85-5	Mirex	3.5
91-20-3	Napthalene	10
7440-02-0	Nickel	150
	Nitrate (as N)****	10,000
	Nitrite (as N)	1,000
98-95-3	Nitrobenzene	30
88-75-5	2-Nitrophenol (o-Nitrophenol)	20
100-02-7	4-Nitrophenol (p-Nitrophenol)	10
924-16-3	N-Nitrosodi-n-butylamine	10
55-18-5	N-Nitrosodiethylamine	10
62-75-9	N-Nitrosodimethylamine	20
86-30-6	N-Nitrosodiphenylamine	10
759-73-9	N-Nitroso-N-ethylurea	10
684-93-5	N-Nitroso-N-methylurea	10
621-64-7	N-Nitrosodi-n-propylamine	10
930-55-2	Nitrosopyrrolidine	10
	Odor****	3 T.O.N.
23135-22-0	Oxamyl (Vydate)	175
75-21-8	Oxirane (See Ethylene oxide)	
1910-42-5	Paraquat	30
608-93-5	Pentachlorobenzene	120
87-86-5	Pentachlorophenol (PCP)	30

Table 4-1 (continued)
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
GROUND WATER GUIDANCE CONCENTRATIONS*
FEBRUARY 1989
NAS KEY WEST
KEY WEST, FLORIDA

CAS #	Parameter	Guidance* Concentration (ug/L)
127-18-4	Perchloroethylene**** (Tetrachloroethylene)	3
	pH****	6.5-8.5 (standard units)
85-01-8	Phenathrene	10
108-95-2	Phenol (Carbolic acid)	20
103-85-8	N-Phenylthiourea	1,400
1918-02-1	Picloram	500
1336-36-3	Polychlorinated Biphenyls (PCBs)	0.5
1610-18-0	Prometon	100
23950-58-5	Pronamide	50
1918-16-7	Propachlor	90
139-40-2	Propazine	10
107-02-8	Propenal (See Acrolein)	
76-06-1	2-Propeneamide (See Acrylamide)	
122-42-9	Propham	100
129-00-0	Pyrene	10
	Radium-226+228****	5 pCi/L
	Selenium****	10
	Silver****	50
93-72-1	Silvex (2,4,5-TP)****	10
122-34-9	Simazine	10
	Sodium****	160,000
100-42-5	Styrene (Vinyl benzene)	1
	Sulfate****	250,000
93-76-5	2,4,5-T (See 2,4,5-Trichlorophenoxyacetic acid)	
	TDS (Total Dissolved Solids) ****	500,000
34014-18-1	Tebuthiuron	500
116-06-3	Temik (See Aldicarb)	
5902-51-2	Terbacil	90

CAS #	Parameter	Guidance* Concentration (ug/L)
13071-79-9	Terbufos	10
95-94-3	1,2,4,5-Tetrachlorobenzene	35
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD, Dioxin)	0.01
79-34-5	1,1,2,2-Tetrachloroethane	1
127-18-4	Tetrachloroethylene**** (Perchloroethylene)	3
56-23-5	Tetrachloromethane**** (Carbon tetrachloride)	3
7440-28-0	Thallium	10
108-88-3	Toluene	24
636-21-5	o-Toluidine hydrochloride	10
	Total Dissolved Solids**** (TDS)	500,00
8001-35-2	Toxaphene****	5
73-72-1	2,4,5-TP (Silvex)****	10
75-25-2	Tribromomethane (See Bromoform)	
120-82-1	1,2,4-Trichlorobenzene	140
71-55-6	1,1,1-Trichloroethane****	200
79-00-5	1,1,2-Trichloroethane	1
79-01-6	Trichloroethene**** (Trichloroethylene, TCE)	3
67-66-3	Trichloromomethane (See Chloroform)	
75-69-4	Trichloromonoflurome thane	2,400
95-95-4	2,4,5-Trichlorophenol	10
88-06-2	2,4,6-Trichlorophenol	10
93-76-5	2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	70
1582-09-8	Trifluralin	10
	Trihalomethanes (total)****	100

CAS #	Parameter	Guidance* Concentration (ug/L)
	Trimethyl benzenes (total)	10
786-19-6	Trithion	12
100-42-5	Vinyl benzene (See Stryene)	
75-01-4	Vinyl chloride**** (Chloroethylene)	1
110-75-8	Vinyl 2-chloroethyl ether (See 2-Chloroethyl vinyl ether)	
107-13-1	Vinyl cyanide (See Acroylonitrile)	
75-35-4	Vinylidene chloride**** (1,1-Dichloroethylene)	7
1330-20-7	Xylenes (total)	50
105-67-9	2,4-Xylenol (See 2,4-Dimethylphenol)	
	Zinc****	5,000
12122-67-7	Zineb	14

Notes:

* The concentrations in this table are only to be used as a screening guideline for ground water contamination. These concentrations are not standards and without further justification can not be used as standards.

** Guidance Concentration for Aldicarb Sulfone in the presence of aldicarb or aldicarb sulfoxide is 10 ug/L.

*** Guidance Concentration applies to asbestos fibers exceeding 10 um in length.

**** Florida primary or secondary drinking water standards FAC 17-550.310-320.

Organoleptic threshold date may necessitate a lower guidance concentration.

T.O.N. Threshold Odor Number

DATA MANAGEMENT PLAN
NAVAL AIR STATION-KEY WEST (UIC N00213)
KEY WEST, FLORIDA

PREPARED FOR

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA
CONTRACT NO. N62467-88-C-0196

PREPARED BY

IT CORPORATION
3012 U.S. HIGHWAY 301 NORTH, SUITE 1000
TAMPA, FLORIDA 33619

FEBRUARY 1990

TABLE OF CONTENTS

	PAGE
LIST OF FIGURES	ii
ACRONYMS AND SYMBOLS	iii
1.0 INTRODUCTION	1-1
2.0 DATA HANDLING/REPORTS	2-1
2.1 DATA GENERATION	2-1
2.2 DATA REDUCTION	2-1
2.2.1 Field Data Reduction	2-1
2.2.2 Laboratory Information Management Systems	2-1
2.3 DATA REPORTING	2-2
2.3.1 Reduced Data Reporting	2-2
2.3.2 Tabular Data Reporting	2-2
3.0 REPORT FORMAT	3-1
3.1 PROGRESS REPORTS	3-1
3.2 FINAL REPORTS	3-1
4.0 PROJECT RECORD MAINTENANCE	4-1
4.1 FILE COPY	4-1
4.2 ELECTRONIC DATA	4-1
FIGURE 4-1 - IT RECORD MAINTENANCE FORM	
APPENDIX A - FIELD DATA FORMS	
APPENDIX B - IT CALCULATION FORM	
APPENDIX C - MONITOR WELL COMPLETION FORM	
APPENDIX D - ITAS CERTIFICATION OF ANALYSIS	
APPENDIX E - EXAMPLES OF DATA SUMMARY TABLES	
APPENDIX F - FILING CATEGORIES	

ACRONYMS AND SYMBOLS

TITLE	DEFINITION
ACGIH	American Council of Governmental and Industrial Hygienist
ADI	Average Daily Intake
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society of Testing and Materials
BW	Body Weight
CAG	Carcinogenic Assessment Group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGA	Combustible Gas Analyzer (Exposimeter)
CLP	USEPA Contract Laboratory Program
CNO	Chief of Naval Operations
CPR	Cardio Pulmonary Resuscitation
CRPO	Community Relations Plan Outline
CRQL	Contract Required Quantification Limits
C_s	Concentration of Soil
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DDT	Dichloro-Diphenyl-Trichloroethane
DDD	Dichloro-Diphenyl-Dichloroethane
DDE	Dichloro-Diphenyl-Dichloro-Ethylene
DMP	Data Management Plan
DOD	U.S. Department of Defense
DOT	U.S. Department of Transportation
DPDO	Defense Property Disposal Office
DQO	Data Quality Objectives
EFD	Engineering Field Division
EIC	Engineer-in-Charge
EP	Extraction Procedure/Exposure Period
FAC	Florida Administrative Code
FDER	Florida Department of Environmental Regulations
FEV/FVC	Forced Expiratory Volume/Forced Vital Capacity
FGFFC	Florida Game and Fresh Water Fish Commission
FID	Flame Ionization Detector

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
FOC	Field Operations Coordinator
FS	Feasibility Study
FSP	Field Sampling Plan
GAC	Granular Activated Carbon
G&M	Geraghty and Miller
gpm	Gallons per Minute
HRS	Hazard Ranking System
HSC	Health and Safety Coordinator
HSP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments of 1984
IAS	Initial Assessment Study
IBM PC	International Business Machine Corp. Personal Computer
ICRP	International Council on Radiation Protection
IR	Average Soil Ingestion Rate
IRP	Installation Restoration Program
IT	IT Corporation
ITAS	IT Analytical Services
LBG	Leggette, Brashears, and Graham, Inc.
LEL	Lower Explosive Limit
LIMS	Laboratory Information Management Systems
mg/kg	Milligrams/Kilogram
mg/L	Milligrams/Liter
MS DOS	Microsoft Disk Operating System
MSA	Mine Safety Administration
MSL	Mean Sea Level
NACIP	Navy Assessment and Control of Installation Pollutants
NAS	Naval Air Station
NAVENENVSA	Naval Energy and Environmental Support Activity
NAVFACENGCOM	Navy Facilities Engineering Command

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
NCP	National Oil and Hazardous Substances Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NEPPS	Naval Environmental Protection Support Service
NFA	No Further Action
NIOSH	National Institute of Occupational Safety and Health
NPSS	Naval Environmental Protection Support Service
OSHA	Occupational Health and Safety Administration
OVA	Organic Vapor Analyzer
PAO	Public Affairs Officer
PC	Personal Computer
PCB	Polychlorinated Biphenyl
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PMP	Project Management Plan
ppb	Parts per Billion
PPE	Personnel Protection Equipment
ppm	Parts per Million
q	Cancer Potency Factor
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
R	Acceptable Incremental Lifetime Cancer Risk
RA	Risk Assessment or Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RV	Recreational Vehicle
SAP	Sampling and Analysis Plan

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
SARA	Superfund Amendments and Re-authorization Act
SCBA	Self Contained Breathing Apparatus
SI	Site Inspection
SMAC 20	Simultaneous Analysis Complete
SOUTHDIV	Southern Division, Naval Facilities Engineering Command
SOW	Statement of Work
TCL	Target Compound List
TDS	Total Dissolved Solids
TLV	Threshold Limit Value
TRC	Technical Review Committee
ug/L	Micrograms/Liter
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds
WBGT	Wet Globe Bulb Temperature Index

1.0 INTRODUCTION

IT Corporation (IT) developed this Data Management Plan (DMP) for the Naval Air Station (NAS) Key West Remedial Investigation (RI). Data to be handled consists of field measurements and analytical data related to the specific sites identified at NAS-Key West.

Data reduction and reporting methods are presented within this report. Also included are examples of typical data and report formats and project file maintenance methods.

2.0 DATA HANDLING/REPORTS

This section covers the generation, reduction and reporting of data developed at the NAS-Key West sites.

2.1 DATA GENERATION

Data is generated through field investigation and laboratory analyses. These data are generated directly as instrument readings or visual observations. The raw data is recorded as it is generated on field data forms. The field data forms which may be used during this project include:

- Field Activity Daily Log
- Field Activity Daily Log Continuation Sheet
- Field Equipment Calibration Record
- Sample Collection Log
- Monitor Well Installation Sheet
- Monitor Well Installation Sketch
- Visual Classification of Soils
- Tailgate Safety Meeting
- Chain of Custody Record
- Request for Analysis

Examples of these forms are included in Appendix A.

2.2 DATA REDUCTION

Raw data produced in the field or laboratory will need to be reduced to a usable format. This reduction of data involves the calculation of analytical results from output generated by following the analytical methods as described in the Sampling and Analysis Plan (SAP). The output of these methods may include instrument responses or other intermediate information which will need to be converted to a usable data report.

2.2.1 Field Data Reduction

Field data that could be recorded, for example, includes pH, temperature, specific conductance, organic vapor concentrations, visual classification of soils and ground water elevations. Methods used for data reduction are specified in Part I, Section 8.0 of the SAP. All data reduction calculations will be performed on calculation forms shown in Appendix B.

2.2.2 Laboratory Information Management System

IT Analytical Services (ITAS) laboratories are equipped with sophisticated computerized laboratory information management systems (LIMS) to schedule and track samples from receipt at the laboratory to final reporting. These systems allow for rapid access to sample status information. In addition, ITAS can provide complete data management services, integrating analysis results with related site or project data, providing direct electronic transfer of data, providing statistical analysis of data, etc.

Each ITAS laboratory utilizes a state-of-the art LIMS and analytical instrumentation for sample tracking, scheduling and reporting. These systems utilize both commercially available and customized software. They are used to track the course of a sample through the laboratory, from sample receipt to analysis, to final report to archiving. The LIMS in the individual ITAS laboratories are electronically linked to each other, to field stations and to central management.

ITAS provides a full range of data management services to meet our client's needs. In the simplest case, data generated by laboratory analyses are entered and stored in the LIMS, where they are available for various customized sorting, selecting and reporting operations.

2.3 DATA REPORTING

The final report submitted to the Southern Division of the Facilities Engineering Command (SOUTHDIV) will include both reduced and summarized tabular data. These data will be presented as described below.

2.3.1 Reduced Data Reporting

Reduced data will be reported in the appendix of the final report. This data will be presented in the forms shown in the Appendix C and Appendix D. Appendix C contains an example of a well completion report which consist of a completed soil classification form, a complete monitor well completion form and a completed monitor well installation sketch. Appendix D contains an example of a certificate of analysis presenting analytical data.

2.3.2 Tabular Data Reporting

Summary data tables will be included in the final report. These tables will be a matrix with environmental monitoring parameters for the respective medium (ground water, surface water, soil/sediment and air). Example data summary tables are shown in Appendix E. These tables show monitoring well identification and chemical water quality data. These tables were computer generated as described in Section 4.2 of this document.

3.0 REPORT FORMAT

Example formats for reports sent to SOUTHDIV in regards to the work performed at NAS-Key West are presented in this section. All reports will conform to IT report standards.

3.1 PROGRESS REPORTS

Progress reports will be made to SOUTHDIV. The reports will be prepared in letter report format. Monthly laboratory and work progress reports will be submitted to SOUTHDIV by the 15th day of the following month. These reports will present the status of all activities at the end of the month and activities planned for the current and next month.

3.2 FINAL REPORTS

The final report to be prepared for submittal to SOUTHDIV will contain the following sections:

- Title Page
- Foreword
- Executive Summary
- Table of Contents
- Introduction
- Field Investigations
- Findings/Data Summary
- QC Summary
- Conclusions/Recommendations
- Appendices

The title page will contain the title of the report, specifying the work performed, site, contract number and client.

The foreword will provide an area for signature by IT and Navy personnel including project managers and Quality Assurance Officers (QAO).

The executive summary will provide a brief review of the findings of the report. This summary will be limited to a maximum of two pages.

Table of contents will list all sections contained in the report including

tables, figures and appendices, each of which will be listed on separate pages as appropriate.
The introduction provides an overview of the project sites investigated and scope of the investigation. It also relates the work and QA plans to the study.

The field investigation section will include a brief discussion of the sites investigated during the study and a description of the work performed under the Statement of Work (SOW). The findings and data summary section will present the findings of the investigations from both the field and laboratory analytical programs. The analytical data will not include "below detection limits" results.

The findings/data summary section will contain a summary of pertinent data collected during the field investigations and from previous investigations.

The QC summary will be a overview of Quality Assurance/Quality Control (QA/QC) performances during the analysis of samples. In this summary, IT will discuss results of blanks, duplicate analyses and rinsate samples. A discussion of laboratory quality control procedures and results will be included with all samples which do not conform to QA procedures and the corrective action taken will be noted. A discussion of the acceptance criterion for non-conforming data will also be included.

The conclusions/recommendations section will report conclusions that can be drawn from the data including the degree to which the effort achieved the Data Quality Objectives. The conclusions will report on the confirmation and quantification of the presence of contaminants and identify data gaps, if any. Recommendations for additional investigations to fill data gaps or for remedial actions will also be included in this section, as appropriate. If "No Further Action" is a recommendation, justification will be provided.

The appendices to the final report will include all raw data developed during the study. This includes well installation logs, field activity logs, sampling logs, site safety documentation (Tailgate Safety Meetings), laboratory analysis reports and field equipment calibration reports.

4.0 PROJECT RECORD MAINTENANCE

Project records will be maintained at the IT Tampa Office. The files will include both file copy and electronically stored information.

4.1 FILE COPY

All data gathered and reports prepared during the scope of the project will be placed in selected categories of the NAS-Key West project file. These filing categories are shown in Appendix F. The project manager will be responsible for assigning proper file categories to all the NAS-Key West data. This will be accomplished by placing a completed IT Record Maintenance Form, shown in Figure 4-1, on all documents with the proper filing category.

4.2 ELECTRONIC DATA

All reports to SOUTHDIV will be prepared using a personal computer (PC). These reports will be generated using the software package WordPerfect, Version 5.0. Field data such as activity logs will also be entered into the computer through WordPerfect. These WordPerfect files will be converted to the .DCA format which is readable by Enable Software. Laboratory data will be compiled into a spreadsheet format using Lotus 1-2-3, which can be read by Enable Software. All electronic data will be supplied to SOUTHDIV both as hard copy and on a 5.25 inch floppy disk.

453005/P1DATMAN.BB3

FIGURE 4-1
IT RECORD MAINTENANCE FORM

INTERNATIONAL
TECHNOLOGY
CORPORATION

RECORD MAINTENANCE

PROJECT NUMBER: ______________________________

PROJECT NAME: ______________________________

SUBMITTED BY: ______________________________

SUGGESTED FILE CATEGORY ______________________________

____

TITLE OF FILE ______________________________

____

____

APPENDIX A
FIELD DATA FORMS

TABLE OF CONTENTS

Field Activity Daily Log	A-1
Field Activity Daily Log Continuation Sheet	A-2
Field Equipment Calibration Record	A-3
Sample Collection Log (Front-Side)	A-4
Sample Collection Log (Back-Side)	A-5
Monitor Well Installation Sheet	A-6
Monitor Well Installation Sketch	A-7
Visual Classification of Soils (Front-Side)	A-8
Visual Classification of Soils (Back-Side)	A-9
Tailgate Safety Meeting	A-10
Chain-of-Custody Record	A-11
Request for Analysis	A-12

INTERNATIONAL TECHNOLOGY CORPORATION

FIELD ACTIVITY DAILY LOG

DAILY LOG	
DATE	
NO.	
SHEET	OF

PROJECT NAME	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE DATE:

327A-7-86

INTERNATIONAL TECHNOLOGY CORPORATION

FIELD ACTIVITY DAILY LOG CONTINUATION SHEET

DAILY LOG			
DATE			
NO.			
SHEET	OF		

PROJECT NAME	PROJECT NO.
FIELD ACTIVITY SUBJECT	
DESCRIPTION ON DAILY ACTIVITIES AND EVENTS	

63-3-88

FIELD EQUIPMENT CALIBRATION RECORD[1]

PROJECT NAME ____________________ DATE __________

PROJECT NUMBER ____________________ PERSONNEL __________

EQUIPMENT IDENTIFICATION ____________________

EQUIPMENT NAME ____________________

REQUIRED CALIBRATION PERIOD ____________________

CALIBRATION TECHNIQUE[2] ____________________

REMARKS ____________________

NOTES: (1) THIS RECORD SHALL BE COMPLETED FOR ALL EQUIPMENT CALIBRATED IN THE FIELD.

(2) IF APPLICABLE, CITE REFERENCE

INTERNATIONAL TECHNOLOGY CORPORATION

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

SAMPLE COLLECTION LOG

PROJECT NAME ______________________________

SAMPLE NO. ______________________________

SAMPLE LOCATION ______________________________

SAMPLE TYPE ______________________________

COMPOSITE ______ YES ______ NO

COMPOSITE TYPE ______________________________

DEPTH OF SAMPLE ______________________________

WEATHER ______________________________

CONTAINERS USED	AMOUNT COLLECTED

COMMENTS:

PREPARED BY: ______________________

COMMENTS: (Continued)	DATE
	TIME
	PAGE ____ OF ____
	PAGE
	PROJECT NO.

PREPARED BY: ____________________

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK; I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE ______ OF ______ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY, I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS, WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - lL GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC; 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR).
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

125-10-85

IT CORPORATION

MONITOR WELL INSTALLATION SHEET

PROJECT NAME ____________________ FIELD ENG./GEO. ____________ DATE ________
PROJECT NO. ____________________ CHECKED BY ____________ DATE ________
BORING NO. ____________________
DATE OF INSTALLATION ____________

BOREHOLE DRILLING

DRILLING METHOD ____________	TYPE OF BIT ____________
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID ______ FROM ______ TO ______	SIZE ______ FROM ______ TO ______
FLUID ______ FROM ______ TO ______	SIZE ______ FROM ______ TO ______

DESCRIPTION

TYPE ____________	RISER PIPE MATERIAL ____________
DIAMETER OF PERFORATED SECTION ______	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. ______ I.D. ______
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS ______
AVERAGE SIZE OF PERFORATIONS ______	JOINING METHOD ______
TOTAL PERFORATED AREA ______	____________

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH ______	OTHER PROTECTION ______
PROTECTIVE PIPE O.D. ______	____________

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE				
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP	BOTTOM	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP				
BOTTOM OF BOREHOLE				
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS ____

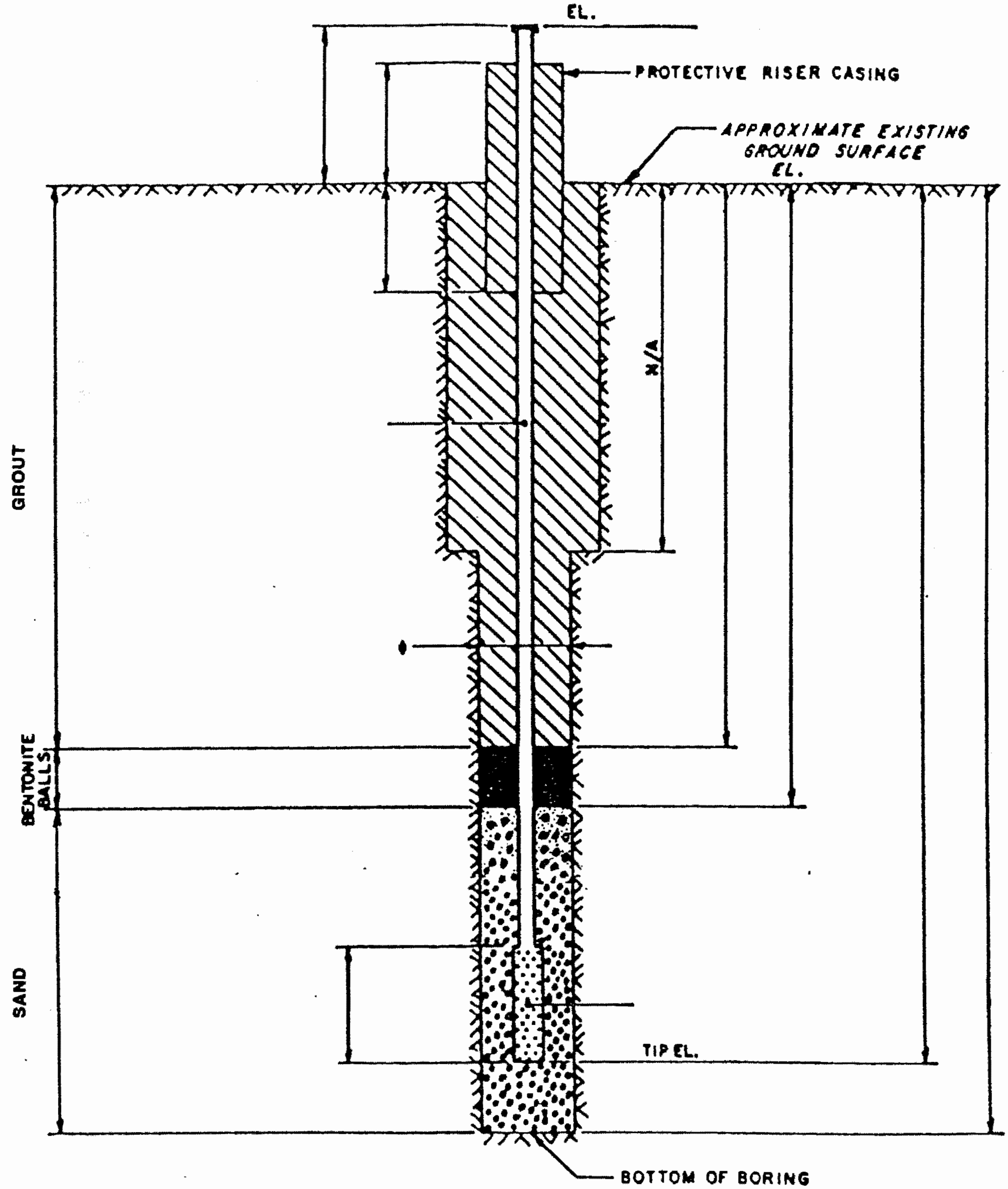
INTERNATIONAL TECHNOLOGY CORPORATION

MONITOR WELL INSTALLATION SKETCH

PROJECT NAME ____________ INSTALLED BY ________ DATE ________

PROJECT NO. ____________ CHECKED BY ________ DATE ________

BORING NO. ____________



INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER:	PROJECT NAME:	
BORING NUMBER:	COORDINATES:	DATE:
ELEVATION:	GWL: Depth Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST:	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS:		PAGE OF

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS

NOTES:

243A-3-86

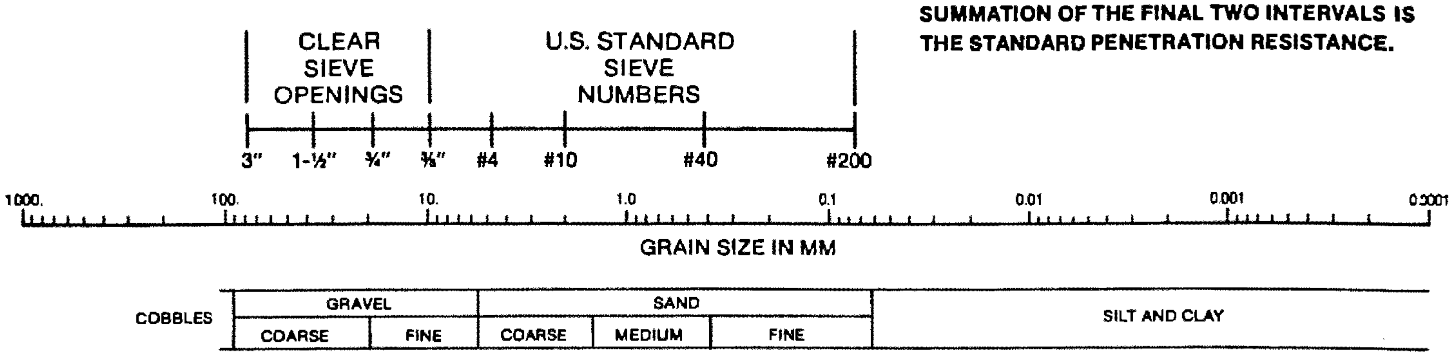
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 to 0.50
MEDIUM STIFF	0.50 to 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE(*)
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

(*) **STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.**



USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND—CLAY MIXTURES

FINE- GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

TAILGATE SAFETY MEETING

Division/Subsidiary ______________________ Facility ______________________

Date ______________ Time ______________ Job Number ______________

Customer ______________________ Address: ______________________

Specific Location ______________________

Type of Work ______________________

Chemicals Used ______________________

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment ______________________

____

Chemical Hazards ______________________

____

Physical Hazards ______________________

____

Emergency Procedures ______________________

____

Hospital / Clinic ______________ Phone ( ) ______________ Paramedic Phone ( ) ______________

Hospital Address ______________________

Special Equipment ______________________

____

Other ______________________

____

ATTENDEES

NAME PRINTED	SIGNATURE

Meeting conducted by:

NAME PRINTED	SIGNATURE

Supervisor ______________________ Manager ______________________

36-8-85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. ____________

C/C Control No. 130239

PROJECT NAME/NUMBER ____________ LAB DESTINATION ____________

SAMPLE TEAM MEMBERS ____________ CARRIER/WAYBILL NO. ____________

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.

Special Instructions: ____________

Possible Sample Hazards: ____________

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: ____________

   Received By: ____________

2. Relinquished By: ____________

   Received By: ____________

3. Relinquished By: ____________

   Received by: ____________

4. Relinquished By: ____________

   Received By: ____________

WHITE - To accompany samples
YELLOW - Field copy

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 128680
C/C Control No. ____________

PROJECT NAME ____________
PROJECT NUMBER ____________
PROJECT MANAGER ____________
BILL TO ____________
____
____
PURCHASE ORDER NO. ____________

DATE SAMPLES SHIPPED ____________
LAB DESTINATION ____________
LABORATORY CONTACT ____________
SEND LAB REPORT TO ____________
____
____
DATE REPORT REQUIRED ____________
PROJECT CONTACT ____________
PROJECT CONTACT PHONE NO. ____________

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions

TURNAROUND TIME REQUIRED: (Rush must be approved by the Project Manager.)

Normal ________ **Rush** ________ (Subject to rush surcharge)

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances)

Nonhazard ______ **Flammable** ______ **Skin Irritant** ______ **Highly Toxic** ______ **Other** ____________ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, and disposal.)

Return to Client ______ **Disposal by Lab** ______

FOR LAB USE ONLY

Received By ____________ **Date/Time** ____________

WHITE - Original, to accompany samples
YELLOW - Field copy

APPENDIX B

IT CALCULATION FORM

INTERNATIONAL TECHNOLOGY CORPORATION

By________ Date ________ Subject ____________________ Sheet No.____ of ____

Chkd. By____ Date________ ____________________ Proj. No. ________

APPENDIX C
MONITOR WELL COMPLETION FORM

WELL COMPLETION REPORT (USE BALL POINT PEN - PRESS FIRMLY) PERMIT NO. 89-0509

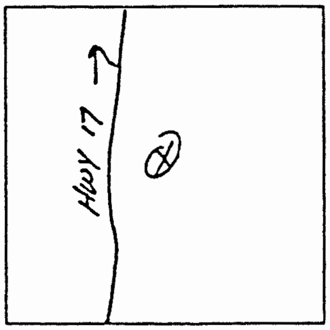
United States Navy — Owner
Address: —
City: Jacksonville
State: Fl.
Zip: —

Contractor's Signature: [signature]
License No.: 7039
Completion Date: 5-9-89
CASING DEPTH: 10
Total Depth: 15

Driller's Signature: Michael Rice
Registration No.: —

Type of work: Construct ✓ Repair ____ Abandon ____
Well Use: Private ____ Public ____ Monitor ✓ Irrigation ____
Industrial ____ Recharge ____ Other ____
Method: Rotary ____ Cable Tool ____ Jet ____ Combination ____
Other Auger
Casing: Black Steel ____ Galvanized ____ PVC ✓ Other ____
Screened From 10 Ft. to 15 Ft.
Bags of Grout 2 Interval Grouted 0 Ft. to 5 Ft.
Static Water Level 4 Ft. below Top of Casing
Pumping Water Level ____ Ft. after ____ Hrs. at ____ GPM
Pump Size ____ H.P. Capacity ____ GPM

N



WELL LOCATION
Address Hwy 17 Jacksonville Naval Air base
Subdivision ____ Lot # ____
Latitude - Longitude
County Duval
Section 23 Township 3S Range 27E Located Near ____

Grout	Casing		Depth (ft.)		Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size, type of material. Note any cavities. Indicate producing zones. Attach additional sheet if necessary.
Thickness & Depth	Diam.	Depth	From	To	
4"x5'	2	10	0	8	brown sand
			8	12	TAN clayey sand
			12	13	grey clay
					Well # 7
					20/30 sand
					grout

Cuttings sent to District? ( ) Yes (✓) No

Well 4-18

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058	PROJECT NAME: NAS J-VILLE		
BORING NUMBER: 4-18	COORDINATES:		DATE: 5/9/89
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/9/89
ENGINEER/GEOLOGIST: Bruder	Depth	Date/Time	DATE COMPLETED: 5/9/89
DRILLING METHODS: Auger			PAGE OF

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				Clean white sand	SP			Start 1505 hrs. Finish 1540 hrs.
				@ 3' grading to light brown cream sand				
5				= 7' some water going to light gray sand				
10				= 10' getting more clay @ 10-15%				
				Bottom 13' gray clay plastic some sand in it still				Sand Pack 7' Bentonite 2'
15								

NOTES:

243A-3-86

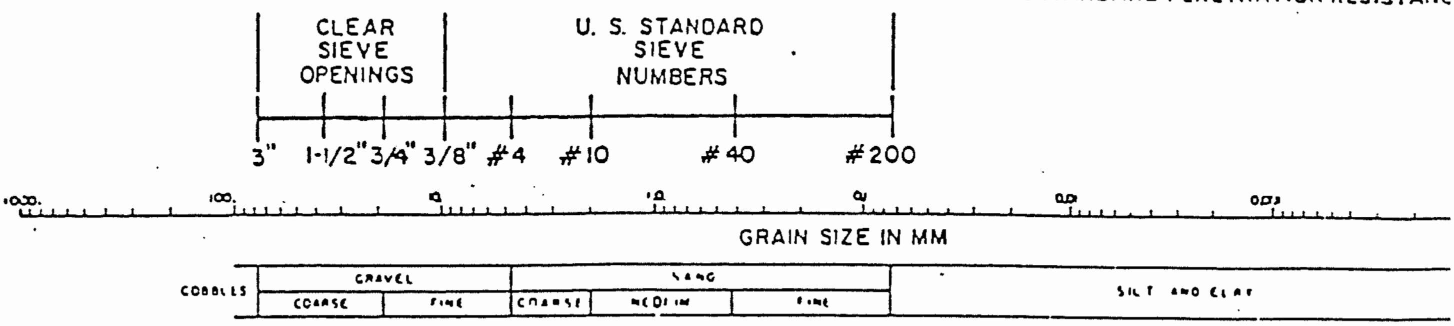
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 TO 0.50
MEDIUM STIFF	0.50 TO 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOIL

DENSITY	STANDARD PENETRATION RESISTANCE (1)
VERY LOOSE	0 – 4
LOOSE	5 – 10
MEDIUM DENSE	11 – 30
DENSE	31 – 50
VERY DENSE	OVER 50

(1) STANDARD PENETRATION RESISTANCE IS THE NUMBER BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLI FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN INCHES AND THE NUMBER OF BLOWS RECORDED FOR EA 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANC



U S C S CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICIT ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT

IT CORPORATION

MONITOR WELL INSTALLATION SHEET

PROJECT NAME NAS J-VILLE
PROJECT NO. 453058
BORING NO. 4-18

FIELD ENG./GEO. BRUDER DATE 5/9/89
CHECKED BY HAMPTON DATE 7/27/89

DATE OF INSTALLATION 5/9/89

BOREHOLE DRILLING

DRILLING METHOD AUGER	TYPE OF BIT
DRILLING FLUID (S) USED: NONE	CASING SIZE (S) USED:
FLUID ___ FROM ___ TO ___	SIZE ___ FROM ___ TO ___
FLUID ___ FROM ___ TO ___	SIZE ___ FROM ___ TO ___

DESCRIPTION

TYPE SCH 40 PVC	RISER PIPE MATERIAL SCH 40 PVC
DIAMETER OF PERFORATED SECTION 2"	RISER PIPE DIAMETERS:
PERFORATION TYPE: MANUFACTURED	O.D. 2 1/4 I.D. 2
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10'
AVERAGE SIZE OF PERFORATIONS 0.10	JOINING METHOD FLUSH TREAD
TOTAL PERFORATED AREA 5'	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5'	OTHER PROTECTION 5 X 5 CONCRETE PAD
PROTECTIVE PIPE O.D. 6"	W/4 STEEL POSTS

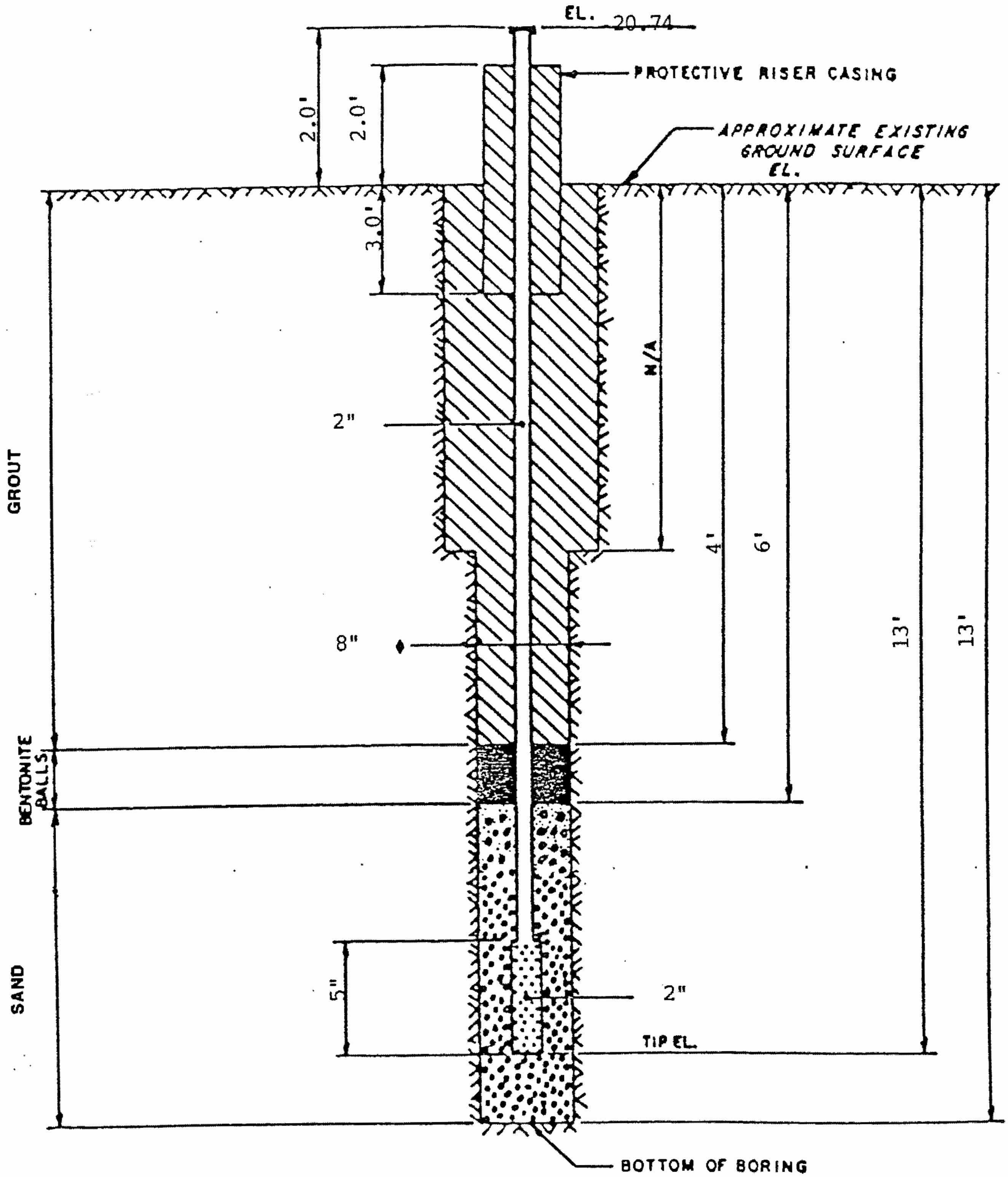
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)				ELEVATION (MSL)			
TOP OF RISER PIPE	+2				20.74			
GROUND SURFACE	0.0				18.70			
BOTTOM OF PROTECTIVE PIPE	-3				15.70			
BOREHOLE FILL MATERIALS:								
GROUT TYPE I PORTLAND	TOP	0	BOTTOM	4	TOP	18.70	BOTTOM	14.70
BENTONITE 3/8" PELLETS	TOP	4	BOTTOM	6	TOP	14.70	BOTTOM	12.70
SAND 20/30 SILICA	TOP	6	BOTTOM	13	TOP	12.70	BOTTOM	5.70
GRAVEL NA	TOP	-	BOTTOM	-	TOP	-	BOTTOM	-
PERFORATED SECTION	TOP	8	BOTTOM	13	TOP	10.70	BOTTOM	5.70
PIEZOMETER TIP	NA				NA			
BOTTOM OF BOREHOLE	13				5.70			
GWL AFTER INSTALLATION	NA				NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☒ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS

INTERNATIONAL TECHNOLOGY CORPORATION

MONITOR WELL INSTALLATION SKETCH

PROJECT NAME NAS J-VILLE
INSTALLED BY BRUDER DATE 5/9/89
PROJECT NO. 453058
CHECKED BY HAMPTON DATE 7/27/89
BORING NO. 4-18



APPENDIX D
ITAS CERTIFICATION OF ANALYSIS

CERTIFICATE OF ANALYSIS

IT Corporation
3012 Highway 301 N., Suite 1000
Tampa, Florida 33619
ATTN: Mike Jones

August 22, 1989

Job Number: ITET 43774

P.O. Number: 453058

This is the Certificate of Analysis for the following samples:

Client Project ID:	NAS JAX
Date Received by Lab:	07/21/89
Number of Samples:	Six (6)
Sample Type:	Water

I. Introduction

On 07/21/89, six (6) water samples arrived at the ITAS-Knoxville, Tennessee laboratory from the NAS JAX project via the IT-Tampa office. The list of analytical tests performed, as well as date of receipt and analysis, can be found in the attached report.

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. Each set of data will include sample identification information and the analytical results. Please note that all data are blank corrected, i.e., if any compound is found in the corresponding laboratory blank, it is subtracted from the analytical result before it is reported.

The total organic halide (TOX) analyses were performed at the IT-Mixed Waste Laboratory (MWL) in Oak Ridge, Tennessee. A copy of that report will follow.

The samples were analyzed for the requested volatile organic compounds by gas chromatography/mass spectroscopy (GC/MS) according to SW-846 method 8240.

Reviewed and Approved:

Alyce Moore
Alyce Moore
Laboratory Manager

II. Analytical Results/Methodology (continued)

The samples were analyzed for the requested semivolatile compounds (o-cresol and phenol) by GC/MS according to SW-846 method 8270.

The samples were analyzed for drinking water pesticides and herbicides by gas chromatography/electron capture detection (GC-ECD) based on EPA method 608 and Standard Methods 509B, respectively.

The samples were analyzed for total organic carbon (TOC) by chemical wet oxidation/infrared detection using EPA method 415.1.

The samples were analyzed for the requested total and dissolved metals by Cold Vapor Atomic Absorption Spectroscopy (CVAA), Graphite Furnace Atomic Absorption Spectroscopy (GFAA) and Inductively Coupled Plasma Spectroscopy (ICP) using SW-846 methods 3010, 3020, 7421, 7740, 7470 and 6010.

The samples were analyzed for complexed cyanide by manual distillation/colorimetric determination using EPA method 335.2.

The samples were analyzed for hexavalent chromium according to Standard Methods 312B.

III. Quality Control

Routine laboratory level I QC was followed.

The volatiles analyses were performed on 08/03/89 by purge and trap with J&W DB-624 Megabore column on a Finnigan OWA GC/MS/DS. The semivolatiles analyses were performed on 07/31, 08/01 and 8/09/89 by direct injection of sample extract on a Restek RTX-5 capillary column on a Finnigan 4500 GC/MS/DS. The volatiles runs went well; all surrogate and internal standard recoveries were within QC limits. There were some non-target peaks seen early in the chromatogram that were not characterized. The semivolatiles runs also went well, except that the extract for sample 4-20D showed poor surrogate recoveries. The sample was reextracted (beyond the RCRA holding time) using a portion of the sample preserved with sodium hydroxide (NaOH) for cyanide analysis. The recoveries for the reextraction were good: both original and reextraction results were reported. The semivolatiles were extracted by acid-neutral extraction, which allowed for generally lower quantitation limits than usual; however, some extracts were diluted prior to analysis due to their appearance. There were no other problems, QC or otherwise, seen in final data review.

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

III. Quality Control (continued)

The samples were extracted for drinking water pesticides and herbicides on 07/25-27/89 and analyzed on 08/01-03/89. No problems were encountered.

The samples were analyzed for TOC on 07/25/89. No problems were encountered.

The samples were digested on 07/28/89 for ICP. The samples for mercury analysis were prepared just prior to analysis. The CVAA analysis for mercury was performed on 07/24/89; the remaining metals were analyzed by ICP on 07/31/89. All run QC was acceptable.

The samples were analyzed for complexed cyanide on 08/01/89 and for hexavalent chromium on 07/21/89. No problems were encountered with either analysis.

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

VOLATILE ORGANIC ANALYSIS

Results in μg/liter (ppb)

Sample Matrix: Water

Client Sample ID: Lab Sample ID:	Method Blank VB0803	4-18-7/89 JJ3113	4-18D-7/89 JJ3114
benzene	5 U	5 U	5 U
carbon tetrachloride	5 U	5 U	5 U
1,2-dichloroethane	5 U	5 U	5 U
1,2-dichloropropane	5 U	5 U	5 U
methylene chloride	3 J	5 U	5 U
tetrachloroethene	5 U	5 U	5 U
1,1,1-trichloroethane	5 U	2 J	2 J
trichloroethene	5 U	5 U	5 U
vinyl chloride	10 U	10 U	10 U
1,2,3-trichloropropane	5 U	5 U	5 U

U = Compound was analyzed for but not detected. The number is the detection limit for the sample.
J = Indicates an estimated value less than the detection limit.

Date of Analysis: 08/03/89

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

WATER SURROGATE PERCENT RECOVERY SUMMARY

Sample No.	VOLATILE Toluene-D8 (88-110%)*	BFB (86-115%)*	1,2 Dichloroethane-D4 (76-114%)*
Method Blank	91	90	88
4-18-7/89	92	89	90
4-18D-7/89	99	96	93
4-20-7/89	95	94	88
4-20D-7/89	96	95	91
4-21-7/89	97	96	90
4-21D-7/89	90	90	85

*Values in parenthesis represent USEPA contract required QC limits.

IT Corporation
August 22, 1989

Client Project ID: NAS JAX

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
Job Number: ITET 43774

SEMIVOLATILE ORGANIC COMPOUNDS

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: Method Blank 1
Lab Sample ID: BL4538

Compound	Concentration
Phenol	5 U
o-Cresol	5 U

U = Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Extracted: 07/26/89
Date Analyzed: 07/31/89

IT Corporation
August 22, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITET 43774

WATER SURROGATE PERCENT RECOVERY SUMMARY

	SEMI-VOLATILE					
Sample No.	Nitro-Benzene-D5 (35-114%)*	2-Fluoro-Biphenyl (43-116%)*	Terphenyl-D14 (33-141%)*	Phenol-D5 (10-94%)*	2-Fluoro-Phenol (21-100%)*	2,4,6 Tribromo-Phenol (10-123%)*
4-18-7/89	72	64	69	28	38	88
4-18D-7/89	78	68	73	28	41	93
4-20-7/89	77	73	83	33	46	91
4-20D-7/89	29 **	25 **	31 **	9 **	14 **	39
4-21-7/89	67	69	66	28	43	73
4-21D-7/89	65	63	92	26	41	85
Method Blank 1	71	59	77	24	39	80
4-20D-7/89R	55	50	78	29	38	77
Method Blank 2	64	58	90	21	35	90

*Values in parenthesis represent USEPA contract required QC limits.
**Values are outside of contract required QC limits.

IT Corporation
August 22, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITET 43774

DRINKING WATER PESTICIDES AND HERBICIDES ANALYSIS

Results in mg/liter (ppm)

Sample Matrix: Water

Client Sample ID: Lab Sample ID:	4-18-7/89 JJ3143	4-18D-7/89 JJ3144	4-20-7/89 JJ3145	4-20D-7/89 JJ3146
Lindane	0.0001 U	0.0001 U	0.0001 U	0.0001 U
Endrin	0.0001 U	0.0001 U	0.0001 U	0.0001 U
Methoxychlor	0.0001 U	0.0001 U	0.0001 U	0.0001 U
Toxaphene	0.0004 U	0.0004 U	0.0004 U	0.0004 U
2,4-D	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Silvex	0.0001 U	0.0001 U	0.0001 U	0.0001 U

U = Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date of Extraction: 07/25/89 - 07/27/89
Date of Analysis: 08/01/89 - 08/03/89

IT Corporation
August 22, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITET 43774

TOTAL ORGANIC CARBON ANALYSIS

Results in mg/liter (ppm)

Sample Matrix: Water

Client Sample ID	Lab Sample ID	Result
4-18-7/89	JJ3119	13
4-18D-7/89	JJ3120	13
4-20-7/89	JJ3121	10
4-20D-7/89	JJ3122	11
4-21-7/89	JJ3123	4
4-21D-7/89	JJ3124	2
Method Blank	D0141	1 U

U = Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date of Analysis: 07/25/89

IT Corporation
August 22, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITET 43774

TOTAL METALS ANALYSIS

Results in mg/liter (ppm)

Sample Matrix: Water

Client Sample ID:	Method Blank
Lab Sample ID:	PBWC0369
Arsenic	0.04 U
Barium	0.002 U
Cadmium	0.005 U
Chromium	0.01 U
Lead	0.03 U
Nickel	0.02 U
Selenium	0.06 U
Silver	0.005 U
Vanadium	0.01 U
Zinc	0.020
Mercury	NR

U = Compound was analyzed for but not detected. The number is the detection limit for the sample.
NR = Not required.

Date Digested: 07/28/89
Date Analyzed: CVAA - 07/24/89
ICP - 07/31/89

IT Corporation
August 22, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITET 43774

TOTAL METALS ANALYSIS

Results in mg/liter (ppm)

Sample Matrix: Water

Client Sample ID: / Lab Sample ID:	4-18-7/89 JJ3149	4-18D-7/89 JJ3150	4-20-7/89 JJ3151	4-20D-7/89 JJ3152
Arsenic	0.04 U	0.04 U	0.04 U	0.04 U
Barium	0.066	0.080	0.25	0.22
Cadmium	0.005 U	0.005 U	0.005 U	0.005 U
Chromium	0.02	0.05	0.06	0.08
Lead	0.03	0.04	0.06	0.06
Nickel	0.02 U	0.02 U	0.02 U	0.02 U
Selenium	0.06 U	0.06 U	0.06 U	0.06 U
Silver	0.005 U	0.005 U	0.005 U	0.005 U
Vanadium	0.02	0.09	0.12	0.13
Zinc	0.047	0.056	0.033	0.17
Mercury	0.001 U	0.001 U	0.001 U	0.001 U

U = Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Digested: 07/28/89
Date Analyzed: CVAA - 07/24/89
ICP - 07/31/89

IT Corporation
August 22, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITET 43774

COMPLEXED CYANIDE ANALYSIS

Results in mg/liter (ppm)

Sample Matrix: Water

Client Sample ID	Lab Sample ID	Result
Method Blank	P0270	0.01 U
4-18-7/89	JJ3137	0.05
4-18D-7/89	JJ3138	0.01 U
4-20-7/89	JJ3139	0.01
4-20D-7/89	JJ3140	0.01 U
4-21-7/89	JJ3141	0.01 U
4-21D-7/89	JJ3142	0.01 U

U = Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Analyzed: 08/01/89

APPENDIX E
EXAMPLES OF DATA SUMMARY TABLES

LIST OF TABLES

TABLE NO.	TITLE
1	SURVEY DATA
2	GROUND WATER ELEVATIONS
3	QUALITY ASSURANCE SAMPLES ANALYTICAL RESULTS
4	SUMMARY GROUND WATER SAMPLING ANALYTICAL RESULTS

APPENDIX E

Table 1
Survey Data

Monitoring Well Number	Northing[1]	Easting[1]	ELEVATIONS Top of Casing	Ground
4-17	2,146,378.60	284,468.27	(20.93)	(19.0)
4-17-D	2,146,383.05	284,469.65	(21.00)	(19.1)
4-18	2,146,359.87	284,532.21	(20.74)	(18.7)
4-18-D	2,146,355.76	284,535.51	(20.76)	(18.8)
4-19	2,146,352.98	284,497.55	(20.29)	(18.4)
4-19-D	2,146,354.23	284,502.24	(20.52)	(18.4)
4-20	2,146,314.59	284,484.36	(20.81)	(18.6)
4-20-D	2,146,318.70	284,487.54	(20.67)	(18.6)
4-21	2,146,311.51	284,536.12	(20.45)	(18.0)
4-21-D	2,146,314.19	284,532.05	(19.95)	(18.1)
4-22	2,146,278.77	284,471.86	(20.68)	(18.7)
4-22-D	2,146,282.61	284,457.26	(20.59)	(18.6)
4-23	2,146,264.78	284,485.81	(20.66)	(18.6)
4-23-D	2,146,268.65	284,488.38	(20.75)	(18.6)

[1] State of Florida Plane Coordinate System

APPENDIX E (continued)

Table 2
Ground Water Elevations

Well No.	Top of Casing[1] Elevations ft. (MSL)	G.W. Elevations FT. (MSL)[2] May	June
4-4	21.28	-	13.98
4-5	20.62	-	14.02
4-9	23.52	-	13.67
4-10	20.75	-	14.03
4-11	20.63	-	13.96
4-12D	20.94	14.04	13.90
4-13	20.59	14.22	14.11
4-13D	20.70	-	-
4-14	20.57	14.15	14.14
4-15	20.46	14.00	13.90
4-16	20.69	14.32	14.25
4-17	20.93	13.70	13.90
4-17D	21.00	13.63	13.52
4-18	20.74	13.36	13.25
4-18D	20.76	12.61	13.28
4-19	20.29	13.47	13.57
4-19D	20.52	13.59	13.49
4-20	20.81	13.93	13.83
4-20D	20.67	13.88	13.77
4-21	20.45	13.65	13.57
4-21D	19.95	13.17	13.53
4-22	20.68	13.98	13.90
4-22D	20.59	13.84	13.94
4-23	20.66	14.10	13.89
4-23D	20.75	14.05	13.95

- Not Measured

[1] Elevations for wells 4-4 through 4-16 were obtained from the Geraghty and Miller Plume Delineation Report. The elevations for wells 4-17 through 4-23D were obtained from Table 1.

[2] Mean Sea Level

APPENDIX E (continued)

Table 3
Quality Assurance Samples
Analytical Results

Parameters	Permit Standard[2]	Analytical Method Detection Limits	Split Sample 4-19D	Rinsate Sample	Trip Blank
Indicator Parameters (40 CFR 264.98(a))					
pH (Field)	6.5-8.5[1]	N/A	N/A	N/A	N/A
Specific Conductance (Field)(umho/cm)			N/A	N/A	N/A
Total Organic Halogen[3] (mg/l)		.01	<.01	<.01	.014
Total Organic Carbon (mg/l)		1	17	<1	<.1
F006 Parameters (40 CFR 261 Appendix VII)					
Cadmium (mg/l)	Background	.005	.007	-	.010
Chromium, Hexavalent (mg/l)	Background	.02	<.02	-	<.02
Cyanide, Total (mg/l)	Background	.01	<.01	-	<.01
Nickel (mg/l)	Background	.02	.02	-	<.02
Drinking Water Supply Parameters (40 CFR 264.94)					
Arsenic (mg/l)	0.05	.03	<3	-	<.03
Barium (mg/l)	1.0	.005	.19	-	.005
Chromium (mg/l)	0.05	.01	.08	-	<.01
Lead (mg/l)	0.05	.002	.088	-	<.002
Mercury (mg/l)	0.002	.001	<.001	-	<.001
Selenium (mg/l)	0.01	.002[6]	<.19	-	<.002
Silver (mg/l)	0.05	.005	<.005	-	<.005
FAC Ch. 17-28.700 and 17-4.246 Parameters					
Benzene (ug/l)	Background	5	<5	<5	<5
Carbon Tetrachloride (ug/l)	Background	5	<5	<5	<5
Chloroform (ug/l)	Background	5	<5	<5	<5
Methylene Chloride (ug/l)	Background	5	<5	<5	<5
o-Cresol (ug/l)	Background	5	<10	<5	<5

Table 3
Quality Assurance Samples
Analytical Results

Parameters	Permit Standard[2]	Analytical Method Detection Limits	Split Sample 4-19D	Rinsate Sample	Trip Blank
		Indicator Parameters (40 CFR 264.98(a))			
Phenol (ug/l)	Background	5	<10	<5	<5
Sulfide (ug/l)	Background	.2	<.2	<.2	<.2
Tetrachloroethylene (ug/l)	Background	5	<5	<5	<5
Trichloroethylene (ug/l)	Background	5	<5	<5	<5
Toluene (ug/l)	Background	5	<5	<5	<5
Vanadium (ug/l)	Background	.01	.12	-	<.01
Vinyl Chloride (ug/l)	Background	10	<10	<10	<10
Xylene (ug/l)	Background	5	<5	<5	<5
Zinc (ug/l)	5[1]	.02	.21	-	<.095
1,1-Dichloroethane (ug/l)	Background	5	<5	<5	<5
1,2-Dichloroethane (ug/l)	Background	5	<5	<5	<5
1,1,1-Trichloroethane (ug/l)	Background	5	<5	<5	<5

1 Florida Drinking Water Standard
2 Background as defined by Specific Condition 54 of the Hazardous Waste Operation Permit for surface impoundment and a hazardous waste storage unit issued October 10, 1988. Based on the last four quarterly reports, all background levels should be Below Detection Limits (BDL)
3 Average of Duplicate Samples
4 Detection limit higher than normal due to sample matrix interferences
N/A: Not Applicable
- : Not Analyzed (sample bottle top came off in shipment)

APPENDIX E (continued)
Table 4
Summary
Ground Water Sampling Analytical Results

Parameters	Permit Standard[2]	Analytical Method Detection Limits	4-17	4-18	4-19	4-20	4-21	4-22	4-23	4-17D	4-18D	4-19D	4-20D	4-21D	4-22D	4-23D
Indicator Parameters (40 CFR 264.98(a))																
pH (Field)	6.5-8.5[1]		6.5	6.9	7.6	4.9	7.2	6.9	4.5	9.5	11.1	6.9	6.6	13.2	11.1	10.0
Specific Conductance (Field)(umho/cm)			92	175	150	300	1580	250	145	690	1230	410	280	2350	1000	278
Total Organic Halogen[3] (mg/l)		.01	.014	.040	<.01	.039	<.01	<.01	.0329	<.01	.08	.0367	.01	.011	.0396	<.01
Total Organic Carbon (mg/l)		1	7	23	6	10	8	16	3	3	10	16	12	4	4	4
F006 Parameters (40 CFR 261 Appendix VII)																
Cadmium (mg/l)	Background	.005	.011	.008	<.005	.009	.006	<.005	.015	.008	.007	<.005	.010	.007	<.005	.005
Chromium, Hexavalent (mg/l)	Background	.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
Cyanide, Total (mg/l)	Background	.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Nickel (mg/l)	Background	.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
Drinking Water Supply Parameters (40 CFR 264.94)																
Arsenic (mg/l)	0.05	.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03
Barium (mg/l)	1.0	.005	.17	.064	.056	.30	.22	.10	.10	.073	.13	.19	.28	.12	0.012	.17
Chromium (mg/l)	0.05	.01	.05	.01	.02	.06	.07	.02	.01	.02	.06	.09	.09	.02	.02	.08
Lead (mg/l)	0.05	.002	0.047	.014	.022	.053	.048	.022	.020	.040	.041	.057	.058	.045	.032	.044
Mercury (mg/l)	0.002	.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Selenium (mg/l)	0.01	.002[4]	<.018	<.003	<.005	<.015	<.017	<.010	<.014	<.010	<.005	<.014	<.018	<.002	<.010	<.003
Silver (mg/l)	0.05	.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005

APPENDIX E (continued)

Table 4 (continued)
Summary
Ground Water Sampling Analytical Results

Parameters	Permit Standard[2]	Analytical Method Detection Limits	4-17	4-18	4-19	4-20	4-21	4-22	4-23	4-17D	4-18D	4-19D	4-20D	4-21D	4-22D	4-23D
							FAC Ch. 17-28.700 and 17-4.246 Parameters									
Benzene (ug/l)	Background	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon Tetrachloride (ug/l)	Background	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform (ug/l)	Background	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methylene Chloride (ug/l)	Background	5	<5	<5	<5	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
o-Cresol (ug/l)	Background	5	<5	<5	<10	19	<5	<10	<10	<5	<5	<10	<5	<5	<10	<5
Phenol (ug/l)	Background	5[5]	<5	<5	<10	250	<5	<10	<10	<5	<5	<10	<5	<5	<10	<5
Sulfide (mg/l)	Background	.2	<.2	<.2	<.2	7.6	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Tetrachloroethylene (ug/l)	Background	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethylene (ug/l)	Background	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene (ug/l)	Background	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vanadium (mg/l)	Background	.01	.06	.01	.02	.09	0.8	.03	.02	.05	.09	.13	.13	.02	.04	.11
Vinyl Chloride (ug/l)	Background	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Xylene (ug/l)	Background	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Zinc (mg/l)	5[1]	.02	.089	0.070	0.071	.11	.11	.049	.16	.086	.12	.18	.22	0.011	.11	.17
1,1-dichloroethane (ug/l)	Background	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-dichloroethane (ug/l)	Background	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,1-trichloroethane (ug/l	Background	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

1 Florida Drinking Water Standard
2 Background as defined by Specific Condition 54 of the Hazardous Waste Operation Permit for surface impoundment and a hazardous waste storage unit issued October 10, 1988. Based on the last four quarterly reports, all background levels should be Below Detection Limits (BDL)
3 Average of Duplicate Samples
4 Detection limit higher than normal due to sample matrix interferences
5 Variances in detection limits are due to dilution factors. Samples were diluted based on appearance.

APPENDIX F
FILING CATEGORIES

FILING CATEGORIES

A Correspondence

- A1 General In-House Correspondence (memos)/Telephone Record
- A2 All Outgoing Correspondence
- A3 All Incoming Correspondence

B "Blank"

C Originals (IT Submittals)

- C1 Reports
- C2 Proposals
- C3 Regulatory Submittals
- C4 Misc. (Applications, Specifications, Etc.)

D Bids, Contracts, and Specifications **(Copies)**

- D1 Proposals/Bids
- D2 Requisitions/Purchase Orders
- D3 Contracts (Blue)
- D4 Specifications

E Field Data and Checkprints

- E1 Daily Field Logs
- E2 Sampling Collection Forms/Boring Logs
- E3 Copies - Request for Analysis/Chain of Custody Form (including shipping documents with chain of custody)
- E4 Equipment Calibration Records
- E5 Waste Manifests, Handling, and Placement Documents
- E6 Subcontractor Documents
- E7 Tail Gate Safety Meeting
- E8 Well Construction Data
- E9 Ground Water Information (level)
- E10 Misc. Records

F Calculations and Checkprints
Subcategories by Phase (i.e. Phase II - F2)

G All reports from clients or other Consultants
(break down into alpha listing of companies)

H Copies of Reports
Subcategories by Phase

I Photographs
Subcategories by Phase

J Miscellaneous
Subcategories by Phase

K Laboratory Data and Checkprints

- K1 for IT Labs
- K2 for External Labs

L Copies of Regulatory submittals and licensing and all permitting applications

- L1 Regulatory Submittals
- L2 Licensing and Permitting Applications
- L3 Applicable rules and regulations
- L4 Misc.

M Reference Material (except outside reports)

- M1 MSD Sheets
- M2 Standard Operating Procedures (SOPs)
- M3 Historical Documents
- M4 Internal Reference Materials
- M5 MPS (Plans)
- M6 Sections
- M7 Geologic Information
- M8 Hydrologic Information
- M9 Misc. Material

N Site Monitoring Records
Subcategories by Phases

O Drawing and Table Check Prints

- O1 Drawing Check Prints
- O2 Table Check Prints

P Project Cost

- P1 Job and Activity Set Up
- P2 Inter-Company Purchase Order
- P3 Client Invoices
- P4 Inter-Company Invoices
- P5 Subcontractor Purchase Orders/Invoices

Q Quality Assurance Records

- Q1 Audits
- Q2 Variance and Non-Conformances Reports and Responses
- Q3 Internal Review Checklists

ADMIN\A1CATEG.MJ3

SAMPLING AND ANALYSIS PLAN
NAVAL AIR STATION-KEY WEST (UIC N00213)
KEY WEST, FLORIDA

PART I - QUALITY ASSURANCE PROJECT PLAN
PART II - FIELD SAMPLING PLAN

PREPARED FOR

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA
CONTRACT NO. N62467-88-C-0196

PREPARED BY

IT CORPORATION
3012 U.S. HIGHWAY 301 N. SUITE 1000
TAMPA, FLORIDA 33619

FEBRUARY 1990

SAMPLING AND ANALYSIS PLAN
SIGNATURE APPROVAL SHEET

Prepared for: Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
P.O. Box 10068
Charleston, South Carolina 29411

Prepared by: IT Corporation
3012 U.S. Highway 301 N., Suite 1000
Tampa, Florida 33619

Approved: Robert D. Stephens Date: 14 Feb, 1990
Robert D. Stephens, IT Project Manager

Approved: Michael J. Jones Date: 2/12/90
Michael J. Jones, IT QA Officer

Approved: Joe K. Buerhop Date: Feb. 9, 1990
Joe K. Buerhop, Field Operations Manager

Approved: Barry A. Stephenson Date: Feb. 13, 1990
Barry A. Stephenson, IT Analytical Services

TABLE OF CONTENTS

PAGE

LIST OF TABLES/LIST OF FIGURES (combined) iv
ACRONYMS AND SYMBOLS v
1.0 INTRODUCTION AND PROJECT DESCRIPTION 1-1
1.1 PROJECT DESCRIPTION 1-1
1.2 PROJECT OBJECTIVES 1-2
1.3 PROJECT QUALITY ASSURANCE LEVEL 1-3
2.0 PROJECT ORGANIZATION AND RESPONSIBILITY 2-1
2.1 IT PROJECT PERSONNEL 2-1
2.2 IT ANALYTICAL SERVICES 2-2
2.3 SUBCONTRACTOR ACTIVITIES 2-2
2.4 QUALIFICATIONS AND TRAINING OF PERSONNEL 2-2
3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT OF DATA 3-1
3.1 PRECISION AND ACCURACY 3-2
3.2 COMPLETENESS 3-2
3.3 REPRESENTATIVENESS AND COMPARABILITY 3-3
4.0 SAMPLING PROCEDURES 4-1
4.1 PREVENTION OF CROSS CONTAMINATION 4-1
4.2 SAMPLE IDENTIFICATION 4-1
4.3 SAMPLE TURNAROUND TIME 4-1
4.4 FIELD DOCUMENTATION 4-1
4.5 FIELD DATA MANAGEMENT 4-2
4.6 SAMPLE BOTTLE PREPARATION AND SAMPLE PRESERVATION 4-3
5.0 SAMPLE CUSTODY PROCEDURES 5-1
5.1 FIELD SAMPLING 5-1
5.1.1 Sample Identification and Labeling 5-1
5.1.2 Sample Collection Log 5-2
5.1.3 Chain-of-Custody Record 5-3
5.1.4 Request for Analysis 5-3
5.1.5 Container and Custody Seals 5-3
5.1.6 Carrier/Waybill for the Shipping of Samples 5-3
5.2 ANALYTICAL LABORATORY 5-4
6.0 CALIBRATION PROCEDURES AND FREQUENCY 6-1
6.1 FIELD ANALYTICAL EQUIPMENT 6-1
6.1.1 pH Meter 6-1
6.1.2 Temperature Meter 6-2
6.1.3 Specific Conductivity Meter 6-2
6.1.4 Organic Vapor Analyzers 6-3
6.1.4.1 HNU Model 101 Photoionization Analyzer 6-3
6.1.4.2 Photovac Tip I Air Analyzer 6-3
6.1.4.3 Century OVA Equipped with an FID 6-3
6.1.5 Combustible Gas Analyzer (Explosimeter) 6-4
6.1.6 Air Sampling Tubes 6-4
6.1.7 Water Level Indicators 6-5
6.2 LABORATORY ANALYTICAL EQUIPMENT 6-5
7.0 LABORATORY ANALYTICAL PROCEDURES 7-1
7.1 TARGET COMPOUND LIST AND APPENDIX IX LIST - ORGANIC COMPOUNDS 7-1

TABLE OF CONTENTS (Continued)

PAGE

7.2 TARGET COMPOUND LIST AND APPENDIX IX - METALS AND INORGANICS 7-1
7.3 MISCELLANEOUS PARAMETERS 7-2
7.3.1 Lead Analysis 7-2
7.3.2 Halogenated Volatile Organics 7-2
7.3.3 1,2-Dibromoethane 7-3
7.3.4 Polynuclear Aromatic Hydrocarbons 7-3
7.3.5 Pesticides Only Analysis 7-3
7.3.6 EP Toxicity Analysis 7-3
8.0 DATA REDUCTION, VALIDATION, AND REPORTING 8-1
8.1 REDUCTION OF FIELD DATA 8-1
8.1.1 Calculations for Reduction of Field Data 8-1
8.2 DATA VALIDATION 8-1
8.2.1 Field Data 8-1
8.2.2 Analytical Data 8-2
8.2.2.1 Target Compound List (TCL) for VOAs (CLP Methods) 8-2
8.2.2.2 TCL Semivolatile Organics (CLP Methods) 8-3
8.2.2.3 Metals 8-5
8.3 DATA REPORTING 8-6
8.4 REPORT STORAGE 8-6
9.0 ANALYSIS OF QUALITY CONTROL SAMPLES 9-1
9.1 FIELD QUALITY CONTROL PROCEDURES 9-1
9.2 LABORATORY QUALITY CONTROL CHECKS 9-1
10.0 PERFORMANCE AND SYSTEM AUDITS 10-1
10.1 LABORATORY AUDITS 10-1
10.2 FIELD AUDITS 10-1
11.0 PREVENTIVE MAINTENANCE 11-1
11.1 FIELD EQUIPMENT 11-1
11.2 LABORATORY EQUIPMENT 11-2
12.0 DATA ASSESSMENT PROCEDURE 12-1
12.1 FIELD INSTRUMENTS 12-1
12.2 LABORATORY DATA 12-2
13.0 CORRECTIVE ACTION PROCEDURES 13-1
13.1 CORRECTIVE ACTION AT THE DATA COLLECTION LEVEL 13-1
13.2 CORRECTIVE ACTION AFTER INSPECTION OF ANALYTICAL DATA 13-1
13.3 LABORATORY CORRECTIVE ACTION 13-1
14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT 14-1
14.1 QUALITY ASSURANCE REPORTS FROM IT QA OFFICER TO THE IT PROJECT MANAGER 14-1
14.2 QUALITY ASSURANCE REPORTS FROM ITAS LABORATORY TO THE IT PROJECT MANAGER 14-1
14.3 QUALITY ASSURANCE REPORTS FROM IT TO SOUTHDIV 14-1
15.0 PERSONNEL QUALIFICATIONS AND TRAINING 15-1
15.1 PROFESSIONAL PROFILES OF PERTINENT PROJECT PERSONNEL 15-1
TABLES
FIGURES
APPENDIX A - LABORATORY AUDIT COMPLETION EXHIBITS

LIST OF TABLES

TABLE NO.	TITLE
4-1	SUMMARY TABLE, LOCATIONS, AND ANALYTICAL METHODS
4-2	SUMMARY TABLE, ANALYTICAL METHODS, CONTAINER TYPES, PRESERVATION, HOLDING TIMES
7-1	LIST OF TEST PROCEDURES
7-2	TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
7-3	TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
7-4	TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
7-5	INORGANIC TARGET ANALYTE LIST (TAL)
7-6	APPENDIX IX VOLATILE ORGANIC ANALYSIS PURGE & TRAP - WATER QUANTITATION LIMITS
7-7	APPENDIX IX SEMIVOLATILE ANALYSIS WATER QUANTITATION LIMITS
7-8	APPENDIX IX PESTICIDE AND PCB ANALYSIS - WATER QUANTITATION LIMITS
7-9	APPENDIX IX METALS ANALYSIS QUANTITATION LIMITS
7-10	APPENDIX IX CHLOROPHENOXY HERBICIDES QUANTITATION LIMITS
7-11	APPENDIX IS ORGANOPHOSPHORUS PESTICIDES QUANTITATION LIMITS
7-12	APPENDIX IX MISCELLANEOUS QUANTITATION LIMITS
7-13	SURROGATE SPIKE RECOVERY RANGE
7-14	MATRIX SPIKE RECOVERY LIMITS* AND RPD LIMITS*
7-15	MATRIX SPIKE RECOVERY LIMITS* AND RPD LIMITS* APPENDIX IX HERBICIDES AND ORGANOPHOSPHORUS PESTICIDES
7-16	POLYNUCLEAR AROMATIC HYDROCARBONS USEPA METHOD 610
7-17	PART I HALOGENATED VOLATILE ORGANICS USEPA METHOD 8010-MOD PART II AROMATIC VOLATILE ORGANICS USEPA METHOD 8020-MOD
7-18	PESTICIDES/PCBs USEPA METHOD 8080
8-1	DATA SET DELIVERABLES FOR LEVEL C QA

LIST OF FIGURES

FIGURE NO.	TITLE
2-1	PROJECT ORGANIZATION CHART - CONTAMINATION ASSESSMENT
4-1	FIELD ACTIVITY DAILY LOG
4-2	FIELD ACTIVITY DAILY LOG CONTINUATION SHEET
5-1	SAMPLE COLLECTION LOG
5-2	CHAIN-OF-CUSTODY RECORD
5-3	REQUEST FOR ANALYSIS FORM
6-1	FIELD EQUIPMENT CALIBRATION RECORD

ACRONYMS AND SYMBOLS

TITLE	DEFINITION
ACGIH	American Council of Governmental and Industrial Hygienist
ADI	Average Daily Intake
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society of Testing and Materials
BW	Body Weight
CAG	Carcinogenic Assessment Group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGA	Combustible Gas Analyzer (Exposimeter)
CLP	USEPA Contract Laboratory Program
CNO	Chief of Naval Operations
CPR	Cardio Pulmonary Resuscitation
CRPO	Community Relations Plan Outline
CRQL	Contract Required Quantification Limits
C_s	Concentration of Soil
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DDT	Dichloro-Diphenyl-Trichloroethane
DDD	Dichloro-Diphenyl-Dichloroethane
DDE	Dichloro-Diphenyl-Dichloro-Ethylene
DMP	Data Management Plan
DOD	U.S. Department of Defense
DOT	U.S. Department of Transportation
DPDO	Defense Property Disposal Office
DQO	Data Quality Objectives
EFD	Engineering Field Division
EIC	Engineer-in-Charge
EP	Extraction Procedure/Exposure Period
FAC	Florida Administrative Code
FDER	Florida Department of Environmental Regulations
FEV/FVC	Forced Expiratory Volume/Forced Vital Capacity
FGFFC	Florida Game and Fresh Water Fish Commission
FID	Flame Ionization Detector

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
FOC	Field Operations Coordinator
FS	Feasibility Study
FSP	Field Sampling Plan
GAC	Granular Activated Carbon
G&M	Geraghty and Miller
gpm	Gallons per Minute
HRS	Hazard Ranking System
HSC	Health and Safety Coordinator
HSP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments of 1984
IAS	Initial Assessment Study
IBM PC	International Business Machine Corp. Personal Computer
ICRP	International Council on Radiation Protection
IR	Average Soil Ingestion Rate
IRP	Installation Restoration Program
IT	IT Corporation
ITAS	IT Analytical Services
LBG	Leggette, Brashears, and Graham, Inc.
LEL	Lower Explosive Limit
LIMS	Laboratory Information Management Systems
mg/kg	Milligrams/Kilogram
mg/L	Milligrams/Liter
MS DOS	Microsoft Disk Operating System
MSA	Mine Safety Administration
MSL	Mean Sea Level
NACIP	Navy Assessment and Control of Installation Pollutants
NAS	Naval Air Station
NAVENENVSA	Naval Energy and Environmental Support Activity
NAVFACENGCOM	Navy Facilities Engineering Command

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
NCP	National Oil and Hazardous Substances Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NEPPS	Naval Environmental Protection Support Service
NFA	No Further Action
NIOSH	National Institute of Occupational Safety and Health
NPSS	Naval Environmental Protection Support Service
OSHA	Occupational Health and Safety Administration
OVA	Organic Vapor Analyzer
PAO	Public Affairs Officer
PC	Personal Computer
PCB	Polychlorinated Biphenyl
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PMP	Project Management Plan
ppb	Parts per Billion
PPE	Personnel Protection Equipment
ppm	Parts per Million
q	Cancer Potency Factor
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
R	Acceptable Incremental Lifetime Cancer Risk
RA	Risk Assessment or Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RV	Recreational Vehicle
SAP	Sampling and Analysis Plan

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
SARA	Superfund Amendments and Re-authorization Act
SCBA	Self Contained Breathing Apparatus
SI	Site Inspection
SMAC 20	Simultaneous Analysis Complete
SOUTHDIV	Southern Division, Naval Facilities Engineering Command
SOW	Statement of Work
TCL	Target Compound List
TDS	Total Dissolved Solids
TLV	Threshold Limit Value
TRC	Technical Review Committee
ug/L	Micrograms/Liter
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds
WBGT	Wet Globe Bulb Temperature Index

P1ACRONM.LST

SAMPLING AND ANALYSIS PLAN
NAVAL AIR STATION-KEY WEST (UIC N00213)
KEY WEST, FLORIDA

CONTENTS

PART I QUALITY ASSURANCE PROJECT PLAN

PART II FIELD SAMPLING PLAN

SAMPLING AND ANALYSIS PLAN
NAVAL AIR STATION-KEY WEST (UIC N00213)
KEY WEST, FLORIDA

PART I
QUALITY ASSURANCE PROJECT PLAN

1.0 INTRODUCTION AND PROJECT DESCRIPTION

This Quality Assurance Project Plan (QAPP) is Part I of the Sampling and Analysis Plan (SAP) and describes the methods and procedures that will be used by IT Corporation (IT) at the Naval Air Station (NAS) Key West sites to assure the quality, precision, accuracy and completeness of the data generated during the field investigation and interim remedial action (RA) planning activities. Part II of the SAP is the Field Sampling Plan (FSP) which describes the site background, sampling objectives, field sampling techniques and sample handling.

This QAPP has been prepared by IT to insure that the work performed will be of the quality required to satisfy the project objectives and will be responsive to requirements of the Naval Energy and Environmental Support Activity (NEESA); Southern Division, Naval Facilities Engineering Command (SOUTHDIV); the Florida Department of Environmental Regulations (FDER); Analytical Chemistry Department, Martin Marietta Energy Systems, Inc.; and the United States Environmental Protection Agency (USEPA).

This QAPP is based on the NEESA Sampling and Chemical Analysis Quality Assurance (QA) Requirements for the Navy Installation Restoration Program (NEESA 20.2-047B); FDER Guidelines for Preparing QA Plans (DER-QA-001/85); IT Analytical Services (ITAS) QA Manual, Laboratory Specific Attachment and IT's State of Florida Generic QA Plan No. 880566G approved by the FDER.

The QAPP focuses on the acquisition of environmental data of known and acceptable quality. Other aspects of the project, such as engineering analysis, report preparation and records, will be controlled by the internal requirements of IT's QA Program. The IT QA Program is based on the IT Environmental Projects Group Southeast Region QA Procedures Manual, the IT Engineering Operations QA Manual and the ITAS QA Manual. The policies and procedures specified in these manuals define acceptable practices applicable to most environmental related projects, regardless of the specific aim of the project.

These QA Manuals are controlled proprietary documents. Confidential copies can be supplied to regulatory agencies upon written request.

1.1 PROJECT DESCRIPTION

NAS-Key West sites are located in Boca Chica, Truman Annex, Trumbo Point Annex and Fleming Key. The location and type of contamination present at the site(s) are included in the Site Management Plan (SMP).

The 8 sites covered in this QAPP are as follows:

- Site 1 - Truman Annex Refuse Disposal Area
- Site 3 - Truman Annex DDT Mixing Area
- Site 4 - Boca Chica Open Disposal Area
- Site 5 - Boca Chica DDT Mixing Area
- Site 7 - Fleming Key North Landfill
- Site 8 - Fleming Key South Landfill
- Site 9 - Truman Point Annex Fuel Farm and Piers
- Site 10 - Boca Chica Fire Fighting Training Area

These sites are described in detail in Section 1.0 of the FSP. Detailed site specific actions are described in the work plans along with the sampling rationale and methodology for that work.

1.2 PROJECT OBJECTIVES

The objective of the entire remedial investigation (RI) is to characterize and define the extent of contamination at the eight sites to be investigated. The studies being conducted under the initial scope of work will gather data to meet these objectives. Additional data collection may be defined to fully meet the project objectives.

Specific objectives are as follows:

- To conduct an investigation of potential contamination sources at a number of sites at NAS-Key West
- To obtain quantitative data on concentration of contaminants within and in the vicinity of the potential sources
- To confirm the presence or absence of contamination at each of the sites and, if possible, the direction of migration of contaminants based on the properties of the contaminant, the environmental setting and the hydrogeology of the site
- To assess the risk to the environment and to human health that may be represented by contaminant migration at NAS-Key West
- To determine whether RAs are required.

IT's approach for this phase of the Installation Restoration Program (IRP) is to conduct only that field work as required to determine whether a site (A) can be dropped from further consideration (Category I), (B) requires further investigation (Category II), or (C) requires remedial action (RA) (Category III). We believe this approach will prove most economical for the Navy.

While conducting the investigations of individual sites, IT also will integrate the data obtained with that already in existence to develop a more comprehensive basis for further environmental studies, if necessary and RA planning, if required.

If situations requiring prompt RA are found, IT will advise the Navy immediately and recommend actions to be taken.

1.3 PROJECT QUALITY ASSURANCE LEVEL

This project involves the performance of a Remedial Investigation/Feasibility Study (RI/FS) for a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Site Investigation. Level C QA will be followed as stated in the Statement of Work (SOW). The requirements of Level C are stated in NEESA 20.2-047B. Laboratory QA procedures are outlined in the ITAS Knoxville QA Manual, Laboratory Specific Attachment.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

2.1 IT PROJECT PERSONNEL

Figure 2-1 shows the project organization, reporting relationships and line authority as it relates to aspects of QA. The principal contractor personnel assigned to conduct the NAS-Key West investigation are R. Stephens (Project Manager), M. Jones (Quality Assurance Officer), S. Musick (Health and Safety Coordinator), B. Stephenson (Laboratory Coordinator), J. Buerhop (Field Operations Coordinator) and M. Hampton (Project Hydrogeologist). Other personnel will be assigned as deemed necessary.

The Project Manager will be the point of contact with SOUTHDIV and NAS-Key West. He will have primary responsibility for technical, financial and scheduling matters. The Project Manager is also responsible for reviewing and approving all work plans, assigning staff to the project and establishing and maintaining the project budget and schedule.

The Quality Assurance Officer (QAO) implements and monitors IT's QAPP and compliance with IT's QA program. To accomplish this, the QAO will review field and laboratory data including Quality Control (QC) data to determine non-conformancy with the QAPP and/or IT's QA Program. The QAO will follow up on any nonconformances to verify that the proper corrective action is taken in a timely manner. He also maintains copies of IT's QA Manuals and is supervised by the Project Manager, IT Regional and IT's Corporate QAOs.

The Health and Safety Coordinator (HSC) is responsible for making sure the Health and Safety Plan (HSP) is followed. The HSC is responsible for verifying that all necessary health and safety equipment is available on site. In the absence of the HSC, the Field Operations Coordinator (FOC) will assume these responsibilities.

The Laboratory Coordinator is responsible for verifying the lab follows its QA manual and the requirement placed upon it by this document. The Laboratory Coordinator will serve as an interface between the project staff and the laboratory.

The FOC will be responsible for verifying that all field operations are performed in accordance with the SMP, Project Management Plan (PMP), SAP and HSP. The FOC will inform the Project Manager of the status of field activities to coordinate the activities with the Project Manager.

The Project Hydrogeologist will review all project geological, hydrogeological and chemical data. This review includes a review of sampling procedures and analytical results.

2.2 IT ANALYTICAL SERVICES

ITAS provides laboratory support for IT field activities. Laboratory analyses will be the responsibility of ITAS's Knoxville, Tennessee facility. ITAS, Knoxville has been approved by Martin Marietta Energy Systems, Inc., Analytical Chemistry Department, for performing laboratory analysis involved with the Hazardous Waste RA Program (HAZWRAP) and NEESA RI Programs. Submittals from Martin Marietta Energy Systems regarding ITAS approval for HAZWRAP and NEESA work are included as in Appendix A. Exhibit A-1, dated March 8, 1987, notifies ITAS of a upcoming audit and Exhibit A-2 dated 19 of June 1989 indicates successful completion of the audit and approval of ITAS Knoxville to perform HAZWRAP and NEESA related analyses.

2.3 SUBCONTRACTOR ACTIVITIES

The selection of qualified subcontractors will be in accordance with the IT Procurement and QA procedures. Subcontractors, such as drillers, geophysical specialists, surveyors and environmental monitoring specialists, must meet predetermined qualifications developed by the Project Manager which are defined in the procurement bid packages. Each subcontractor bid submittal is reviewed by technical, purchasing and QA personnel to certify that the bidders are qualified and can satisfy bid requirements. Subcontractors involved in environmental measurements will be monitored by the Project Manager and QAO to assure use of calibrated equipment and qualified operators. Leggette, Brashears and Graham, Inc. (LBG) is an integral part of the project team and has already met all qualification established by IT.

2.4 QUALIFICATIONS AND TRAINING OF PERSONNEL

Personnel assigned to the project, including field personnel and subcontractors, will be qualified to perform the tasks to which they are assigned. Individuals will be assigned to tasks based upon their education, experience and specific training. All training will be documented on the appropriate form and placed in the project file as a record.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT OF DATA

The QA objectives for the collection, compilation and evaluation of project data incorporates laboratory and field QA guidelines. The Data Quality Objectives (DQOs) and levels of QC are further discussed in the SMP Section 3.0.

Field QA measures provide for the integrity of the field data. The QA objectives for field sampling include calibration of field instruments such as the pH meter, combustible gas analyzer, organic vapor analyzer (OVA) and specific conductivity meter, which are described in Section 6.0 of this document. Field activities logs, sampling logs and field equipment calibration forms will be completed during field activities to provide a record of these QA procedures. Replicate measurement of ground water elevations will also be conducted per Section 8.1.1.

The overall QA objective for laboratory analysis of ground water, soil and sediment for parameters on the Target Compound List (TCL) and the Appendix IX list is to provide a laboratory Quality Assurance/Quality Control (QA/QC) program that is, at a minimum, equal to the USEPA Contract Laboratory Program (CLP). The accuracy and precision QC limits for laboratory analyses are governed by the methods and equipment used. Laboratory QA/QC requirements defined in the CLP are designed to ensure that acceptable levels of data accuracy and precision are maintained throughout an analytical program. These requirements are detailed in the CLP SOW for Organic Analyses (revised February 1988) and the SOW for Inorganic Analysis (No. 787, July 1987) and will be followed by ITAS, Knoxville during this study. The Appendix IX parameters (herbicides, organophosphorus pesticides, sulfide, dioxin and furans) will be analyzed to SW846 2nd Edition methodology with QA/QC requirements similar to CLP requirements. ITAS Knoxville will use the approved USEPA SW-846 methods for EP Toxicity (Method 1310-extraction, 6010-ICP analysis and 7470-Hg analysis) on the soils for this project.

QA objectives may be attainable only for samples that are homogeneous and "well-behaved". In the event that specific QA objectives cannot be met on specific samples, groups of samples, or types of samples, ITAS will make every reasonable effort to determine the cause of non-attainment of QA objectives. QA objectives that are not attained for samples due to instrument malfunction, operator error, or other identifiable cause within the control of ITAS will result in the sample being reanalyzed, if possible. Should non-attainment of QA objectives be due to sample nonhomogeneity, sample matrix interference or other sample-related causes, reanalyses may not be necessary and if additional sampling and/or analyses are required due to field errors, these will be performed at IT's expense. For many USEPA approved methods, interlaboratory method verification studies have been used to establish QC criteria which may be regarded as an inherent part of the method. In those cases, such criteria will take precedence except for deviations from such criteria that can be reasonably attributed to sample-related cases.

The QA objectives for all measurement data include considerations of precision, accuracy, completeness, representativeness and comparability as described below.

3.1 PRECISION AND ACCURACY

The precision of a measurement is an expression of mutual agreement of multiple measurement values of the same property conducted under prescribed similar conditions and it reflects the repeatability of the measurement. Precision is evaluated most directly by recording and comparing multiple measurements of the same parameter on the same exact sample under the same conditions. It is usually expressed in terms of the standard deviation. The objectives for precision in the target compound list (TCL) parameters on this project were determined from the CLP protocols. Except as otherwise specified by the method, the QA objective for precision will be $\pm$ 20% (relative percent difference) as determined by duplicate analyses. It must be recognized that for analytes at concentrations of less than five to ten times the Contract Required Quantitation Limit (CRQL), this objective is unlikely to be met.

The degree of accuracy of a measurement is based on a comparison of the measured value with an accepted reference or true value or is a measure of system bias. Accuracy of an analytical procedure is best determined based on analysis of a known or "spiked" sample quantity. The degree of accuracy and the recovery of analyte to be expected for the analysis of QA samples and spiked samples is dependent upon the matrix, method of analysis and compound or element being determined. The concentration of the analyte relative to the detection limit is also a major factor in determining the accuracy of the measurement. Except as otherwise specified by a method, the QC objective for accuracy will be 75-125 percent recovery of the spike. Unless the spike concentration is greater than or approximately equal to the native concentration and five to ten times the CRQL, this objective is unlikely to be met. Alternatively, accuracy may be assessed through the analyses of appropriate standard reference materials, certified standards, or samples, as available.

Precision and accuracy determinations, if outside the QA objectives due to sample-related causes, may be regarded as qualifying, rather than invalidating, the associated data.

3.2 COMPLETENESS

Completeness is a measure of the amount of valid data obtained from the measurement system relative to the amount anticipated under ideal conditions. The QC objective for completeness, as determined by the percentage of valid data generated, will be $\geq$ 90%.

4.0 SAMPLING PROCEDURES

Any sample obtained during field sampling should be representative of the sample location and free of contaminants from sources other than the sampling point. The equipment and the techniques that will be employed to obtain representative samples will be in accordance with approved sampling procedures as per IT's QA Program.

The NAS-Key West Field RI work plans describe sampling locations; the numbers and types of samples to be collected; and a sampling schedule. The FSP, Part II of the SAP, describes sampling collection and handling procedures for each type of sample. Analytical tests that will be performed at each site are described in the work plans and summarized in Table 4-1. Table 4-2 presents a summary of analytical methods, container types, preservation and holding times. Total metal analytical procedures are being used instead of dissolved metals, because this represents a worst case condition. The samples for VOA analysis will not be composited. The following paragraphs discuss general sampling procedures that will be in all locations.

4.1 PREVENTION OF CROSS CONTAMINATION

Before entering the site, all the sampling equipment will have been cleaned to remove any foreign material that might contaminate the site. Drilling equipment that will be in contact with the soil will be decontaminated before use and between each borehole. Monitoring well screen and casing in contact with ground water will be decontaminated before use. Sampling equipment will be decontaminated before use and between each sample. Detailed procedures for decontamination of drilling and sampling equipment and disposal of decontamination by-products are provided in the FSP.

4.2 SAMPLE IDENTIFICATION

The sample identification is necessary to ensure that sampling location and time can be tracked. The sample identification will include sample location, type and site sampled. The sampling date and time will be recorded on the sample label and sample date will be indicated on the analytical report. The exact sample identification is included in Section 4.0 of the FSP.

4.3 SAMPLE TURNAROUND TIME

Sample analyses will be scheduled based on site investigation needs and will be consistent with the sample holding times. The ITAS will provide a standard turnaround time of 4 to 6 weeks that will meet the project schedule and objectives.

4.4 FIELD DOCUMENTATION

An integral part of the SAP for the field activities will be maintaining a Field Activity Daily Log (Figure 4-1 and 4-2). Information identified on the Field Activity Daily Log will be obtained from site exploration and sampling activities and will be documented by the FOC. Photos will be taken of the site and activities to further document sampling and exploration. Photos will be identified as per IT's Environmental Project Group QA Manual.

All information pertinent to field activities will be recorded in a daily field log. Entries in the log will be made in water-resistant ink and will include as a minimum:

- The names and affiliations of field personnel
- A general description of the day's field activities
- Documentation of weather conditions during the day
- Documentation of weather conditions for the previous 48 hours, if field work was not performed during that time
- Field measurements such as temperature, pH, conductance and readings from personnel safety instruments.
- Changes to the sampling and work plans (location, type) and the reasons for the changes

Appropriate field generated data forms will be prepared based on the requirements in the FSP. Data to be recorded will include identification of the monitored location (e.g., boring, well, depth, sampling station, elevation and field coordinates), the type of sample and other data obtained during work.

4.5 <u>FIELD DATA MANAGEMENT</u>

Field data is used to assess the site and outline the extent of potential problems which may result from past activities. Field data allows identification, evaluation and support of recommended appropriate actions.

Field data, including instrument readings and recordings, measurements and tests will be documented and reviewed by IT personnel. Field records will be legible and sufficiently complete to permit reconstruction of daily activities by a qualified individual other than the field technician when data are reviewed. The method of data reduction is discussed in the Data Management Plan (DMP), Section 2.0. Field generated data sheets will be collected and reviewed every week for accuracy and completeness by the FOC. The data sheets will be assembled into packages that represent each borehole, monitoring well, etc. These data sheet record packages will be sent to the IT Regional Office in Tampa, Florida, for review, examination, analysis of data and for the technical staff to use in preparing the required studies and reports. Field data approved by the Project Manager and QAO will be included in the RI/FS Report.

4.6 SAMPLE BOTTLE PREPARATION AND SAMPLE PRESERVATION

All sample bottles used by ITAS and shipped to the field will be USEPA certified cleaned or will be cleaned in accordance with Section 6.7 of IT's Florida Approved Generic QA Plan. Tables 4-2 presents the types and volumes of sample bottles that may be used during this project as wells the sample preservation required for each analytical method.

5.0 SAMPLE CUSTODY PROCEDURES

The ability to demonstrate that samples have been obtained from the location stated and that the samples have reached the laboratory without alteration is a primary concern in field data gathering. To address this concern, evidence of collection, shipment, laboratory receipt and laboratory custody until disposal will be documented. Documentation is accomplished through a chain-of-custody record that records each sample and the individuals responsible for sample collection, shipment and receipt. A sample is considered in custody if it is:

- In a person's actual possession
- In view after being in physical possession
- Sealed so that no one can tamper with it after having been in physical custody
- In a secured area, restricted to authorized personnel only

5.1 FIELD SAMPLING

The following will be used in the chain-of-custody process for sample tracking and field activities:

- Sample Identification and Labeling
- Sample Collection Log
- Sample Chain-of-Custody Record
- Request for Analysis Form
- Container and Custody Seals
- Carrier/Waybill for the Shipping of Samples

The following paragraphs describe each of the above documents and processes.

5.1.1 Sample Identification and Labeling

All samples will be adequately marked for identification from the time of collection and packaging through shipping and storage. Marking will generally be on the sample container (jar, bottle, etc.) but may be applied directly to the sample, or on a tag or label attached to the sample or container, depending on the type of sample and its intended use. Sample identification will include, as appropriate:

- Project name and number
- Sample number
- Sample location (e.g., boring, test pit, depth or sampling interval)
- Sampling date and time
- The initials of the individual(s) performing the sampling
- Sample preservative used

A sample numbering system will be established for the purpose of identifying the samples according to location and type as described in the FSP.

5.1.2 Sample Collection Log

A sample collection log is prepared for each sample to record information pertaining to the location, condition and collection of a sample. The following information is required on the sample collection log, as appropriate:

- Project name and number
- Date and time sample collected
- Field engineer(s), scientist(s), or technician(s) responsible for sample collection
- Sample identification number and type (e.g., soil, water, sediment)
- Field testing results such as pH, temperature and specific conductance
- Location sketch of sample collection area
- Weather conditions
- Water level depth of collected sample
- General field observations

Figure 5-1 shows the sampling collection log used by IT.

5.1.3 Chain-of-Custody Record

All samples will be accompanied by chain-of-custody record, an example of which is shown on Figure 5-2. A chain-of-custody record accompanies the container from initial sample container preparation in the field and through its return to the laboratory. If samples are split and sent to different laboratories, a copy of the chain-of-custody record will be sent with each sample.

The "remarks" column is used to record specific considerations associated with sample acquisition such as: sample type, container type, sample preservation methods and analyses to be performed. When transferring samples, the individuals relinquishing and receiving the samples should sign, date and note the time on the record.

The original of this record follow the samples to the laboratory. The laboratory maintains one file copy and the completed original is returned to the Project Manager as a part of the final analytical report. A copy of the record will be retained in the project files until the original record is returned. This record will be used to document sample custody transfer from the sampler, to another sampling team member, to a shipper, or to the laboratory. An Internal chain-of-custody form will be used by ITAS as per ITAS's QA Manual, laboratory specific attachment to document custody of samples in the Lab.

5.1.4 Request for Analysis

All samples will also be accompanied by an IT request for analysis form to document the required testing program. An example is shown in Figure 5.3.

5.1.5 Container and Custody Seals

Shipping containers are to be sealed on the ends with tape prior to shipment, whether shipped by direct transport by field personnel or commercial carrier. The only exception to this is if sufficient holding time exists so that the samples can be held in the field and it is necessary to replace the ice, blue ice or equivalent cooling gel prior to or during transport. Chain-of-custody requirements will still apply. Samples will be shipped within 24 hours of collection via overnight carrier to minimize shipping time. When samples are shipped to the laboratory, they must be placed in containers sealed with custody seals. Clear tape should be placed over the seals to ensure that seals are not accidentally broken during shipment.

5.1.6 Carrier/Waybill for the Shipping of Samples

Shipments will be sent by common carrier and a waybill will be used to document sample custody during shipment. The waybill will be retained as part of the permanent documentation. Samples will be delivered to the designated laboratory and to an alternate retainee (if split) for analysis as soon as practical after the sampling is completed. Samples will be packaged sufficiently for shipment, preferably shipped the same day the sample was taken. The sample will be accompanied by the chain-of-custody record.

6.0 CALIBRATION PROCEDURES AND FREQUENCY

Measuring and test equipment used in the field or laboratory shall be subject to a formal calibration program. The calibration program shall provide equipment of the proper type, to supply data compatible with project requirements and desired results. Calibration of measuring and test equipment may be performed internally in the laboratory by ITAS using reference equipment and standards, or externally by agencies or manufacturers. Calibration of in-house reference equipment is, in general, performed externally.

The responsibility for the calibration of ITAS and associated reference equipment rests with ITAS Laboratory Managers. Calibration of other equipment within the ITAS calibration system is the responsibility of the office or group maintaining that equipment. The IT Project Manager and FOC are responsible for the calibration of project-specific IT field equipment that is not part of the laboratory calibration system and for field equipment provided by subcontractors.

6.1 FIELD ANALYTICAL EQUIPMENT

Field instruments that require periodic calibration include pH meters, temperature meters, conductivity meters, organic vapor meters and water level indicators. Field calibration will be documented on the field equipment calibration record which is shown in Figure 6-1.

Standard solutions and calibration gases necessary for instrument calibrations will be maintained in fresh supply and will be certified by the vendor or laboratory as certified materials traceable to either the National Bureau of Standards (NBS) or the USEPA. All instruments will be properly cleaned before use and between each sample, as required. A calibration log will be maintained for each piece of equipment. Notes regarding instrument performance and maintenance needs will be recorded in this log.

6.1.1 pH Meter

A temperature-compensating pH meter will be used to measure pH of the sample in the field. The meter will be standardized in the field prior to the collection of each sample using a pH 7 buffer solution.

The calibration of the pH meter will be checked before and after each day's sampling. The procedure for instrument calibration is as follows:

1. With meter in "off" position adjust needle to point at 7.0 using meter adjustment screw.

2. Perform battery check.

3. Check temperature of buffer solution and set temperature dial on meter to that temperature.

4. Place clean probe into a fresh sample of buffer solution of pH 7.0. Read pH of solution and set to 7.0.

5. Check calibration with either a buffer solution of pH 4.00 or pH 10.00 by setting meter temperature dial to buffer temperature, placing probe that has been rinsed in distilled water into buffer and recording meter reading.

6. If reading is not within ± .1 pH unit return to laboratory or QAO to be calibrated.

Cole-Parmer brand or equivalent certified buffer solutions of pH 7.00, pH 4.00 and/or pH 10.00 (depending on expected sample pHs) will be used for calibration.

6.1.2 <u>Temperature Meter</u>
Either an electronic temperature meter or a glass thermometer that meets NBS specifications for accuracy will be used to measure the temperature of samples in the field. The calibration of the temperature meter will be checked every day by comparing the reading obtained when the probe is immersed in water to the reading given by the glass thermometer (that meets NBS specifications) when immersed in the same water. When the two readings do not agree, the temperature meter will be calibrated. The procedure for temperature meter calibration will be outlined in the operator's manual for the instrument.

6.1.3 <u>Specific Conductivity Meter</u>
A multirange conductivity meter will be used to measure sample conductivity in the field. The conductivity meter will be standardized in the field prior to the collection of each sample. The procedure for standardization is outlined as follows:

1. With control knob in "off" position adjust meter reading to zero.

2. Perform battery check.

3. Set "temp" knobs to 25°C and range selector at "X100" and switch the control knobs to the "Cal" position. Adjust meter to read 100 mircomhos/cm (if available on instrument).

4. Measure temperature of standard solution (6668 micromhos) and record reading on "X1000" range.

5. Repeat procedure 4 for a solution of 58,640 mircomhos.

6. If meter readings are not within 10% of standard, return to laboratory or QAO for re-calibration.

Calibration will be performed using LaMotte Chemical or equivalent standard solutions: a 0.05 M KCl (conductivity of 6,668 micromhos/cm) and a 0.5 M KCl solution (conductivity of 58,640 micromhos/cm).

6.1.4 <u>Organic Vapor Analyzers</u>
IT may use either HNU photoionization analyzer (PID), or OVA equipped with a Flame Ionization Detector (FID) to measure organic vapor levels in the field.

6.1.4.1 <u>HNU Model 101 Photoionization Analyzer</u>
Calibration of the HNU PID will be checked prior to and after each day's sampling program involving the instrument. Calibration will be determined using calibration gas obtained from HNU Systems. During the initial calibration, if instrument response is not within five percent (± 5 percent) of the known vapor level of the calibration gas, the instrument will be calibrated as the instrument's operation manual. If the final calibration check (at the end of a sampling day) yields a percent error greater than plus or minus 20 percent (± 20 percent), then the validity of the data collected during the day should be reviewed by the FOC, QAO and Project Manager to determine corrections required (i.e. resampling, adjusting data or no action).

6.1.4.2 <u>Photovac Tip I Air Analyzer</u>
Calibration of the Tip I Air Analyzer will be checked prior to and after each day's sampling program involving the instrument. Calibration will be determined using span gas obtained from Photovac. During the initial calibration, if instrument response is not within ten percent (± 10 percent) of the known vapor level of the span gas, the instrument will be calibrated as per the instrument's operation manual. If the final calibration check (at the end of a sampling day) yields a percent error greater than plus or minus 20 percent (± 20 percent), then the validity of the data collected during the day should be reviewed by the FOC, the QAO and the Project Manager to determine corrections required (i.e. resampling, adjusting data, or no action).

6.1.4.3 <u>Century OVA Equipped With a FID</u>
FID OVAs will be calibrated prior to and after use every day. Calibration will be performed using a calibration gas supplied by the OVA manufacturer or distributer that is certified as traceable to NBS or USEPA. This calibration gas will contain methane. If the instrument response is not within five percent(± 5 percent), the instrument will be calibrated as per the Instruments Operations Manual. If the final calibration check reading at the end of the day is not within 20 percent (± 20 percent) of the actual gas concentration, the

data obtained will be reviewed by the FOC, Project Manager and QAO to determine correction required (i.e. resampling, adjusting data, or no action).

6.1.5 <u>Combustible Gas Analyzer (Explosimeter)</u>
Combustible gas measurements will be performed using a Mine Safety Administration (MSA) combustible gas and oxygen alarm model 261. The Model 261 is a hand held, battery operated combustible gas instrument. The instrument analyzes air for oxygen content and combustible gases.

The meter will be calibrated daily prior to use. The meter will be calibrated in an open area which contains no known combustible gases and can be assured of having standard atmospheric oxygen concentration. After the instrument is turned on, the combustible gas concentration will be set to zero. Oxygen concentration will then be set to 20.8 percent which corresponds to actual atmospheric conditions. The alarm reset bottom will then be depressed to silence the alarms.

The sampling system will then be checked for leaks by placing a finger over the sample inlet fitting not allowing air to enter the intake tube. The flow indicator should drop indicating a "no air flow" condition. The battery will then be checked by depressing the "check" button. If battery power is below 80 percent, the instrument will be recharged prior to use.

The instrument will then be calibrated using a known methene gas mixture. The mixture will be placed in a calibration bag. The concentration of gas as percent Lower Explosive Limit (LEL) will be noted on the field equipment calibration log. The alarms will also be checked to see if they sound at the proper levels, greater than 10 percent LEL and less than 20 percent oxygen.

6.1.6 <u>Air Sampling Tubes</u>
Draeger air sampling tubes will be used to determine benzene and vinyl chloride concentration when OVAs indicate the presence of organic vapors.

To ensure analytical accuracy prior to testing, the Draeger air sampling pump will be tested to ensure a proper seal. This will be done by placing an unopened tube in the pump and compressing the pump. The number of strokes of the pump and opening time for each stroke will be recorded on the sample collection log along with the result of the analysis.

Draeger tubes will not be used if they have exceeded their expiration date. If time until opening for a stroke is not within stated values, the analysis will be repeated. Tubes may be reused if stated on the instruction sheet, as long as reuse conditions are satisfied.

6.1.7 Water Level Indicators

The electronic water level indicator will be calibrated by measuring the distance between the zero point (the tip of the electrode on the interface probe) with a metal surveyor's tape calibrated to 0.01 feet traceable to NBS standards. The indicator tape will be measured at 1 foot intervals to 20 feet with the metal tape. A calibration chart will be prepared to correct measurements based upon actual distances between the zero point and each 1 foot mark on the indicator tape.

6.2 LABORATORY ANALYTICAL EQUIPMENT

ITAS's calibration procedures and frequencies for their analytical equipment are addressed in their QA Manual, Section 6.0.

7.0 LABORATORY ANALYTICAL PROCEDURES

USEPA approved methods will be used for all analyses for which such methods exist. Methods specific to the analysis requested on the ground water, sediment and soil samples are incorporated by reference in Table 7.1. For the analysis of ground water and sediment samples for TCL by CLP protocols, ITAS will follow methods detailed in the CLP Statement of Work (SOW) for Organic Analyses (revised February, 1988) and the SOW for Inorganic Analyses (July 1987) or latest revision at the time of analysis. A list of contract required detection limits for the TCL and Appendix IX parameters is included in Tables 7-2 through 7-12.

7.1 TARGET COMPOUND LIST AND APPENDIX IX LIST - ORGANIC COMPOUNDS

The organic compounds contained in the TCL and the Appendix IX parameter list will be determined by procedures from the USEPA Organic CLP SOW 288 or by methods cited in Table 7-1. The TCL and Appendix IX compounds and detection limits for this project are shown in Tables 7-2 through 7-12. The actual detection limits obtainable for a specific sample depend upon potential for matrix interferences. If the contract detection limit is unachievable for a particular sample, an explanation of the problem and supporting evidence will be provided. Analysis for VOA parameter will not be performed on composited samples.

The frequency of analysis of the QC samples (matrix spike/matrix spike duplicate or MS/MSD) will not be less than one set per 20 samples of similar matrix. All samples, field duplicates, blanks, matrix spikes and matrix spike duplicates will be fortified with surrogate spiking compounds as shown in Table 7-13. The recommended guidelines for percentage recovery are shown in this table. The percentage recovery of the matrix spiking compounds and relative percentage difference of duplicate analyses will be calculated to obtain measurements of accuracy and precision. See Tables 7-14 and 7-15 for precision and accuracy criteria. For dioxins and furans, the recommended guidelines for percentage recovery are 60-140% and for relative percentage difference is 50%. These limits are for advisory purposes only and are not to be used to determine if a sample should be reanalyzed.

7.2 TARGET ANALYTE AND APPENDIX IX LIST - METALS AND INORGANICS

All water and soil samples will be prepared for analysis as described by procedures for each respective matrix and method described in the USEPA CLP SOW 787 or latest version at the time of analyses or by methods cited in Table 7-1. Each set of twenty samples is analyzed with a preparation blank, duplicate sample and matrix spike sample. Each group of 20 samples for metals analysis is analyzed with a laboratory control sample of similar matrix.

The metals to be determined and required detections limits are shown in Tables 7-5, 7-9, and 7-12 Analysis Methods other than included in the CLP Inorganic SOW 787 are listed in Table 7-1.

Determination of total cyanide will be made using USEPA Method 335.2, as described in the CLP Inorganic SOW 787. Determination of sulfide will be made using SW-846, 2nd Ed., Method 9030.

The TAL and Appendix IX inorganic compounds and detection limits are shown in Tables 7-2 through 7-12. The actual detection limits obtainable for a specific sample depend upon potential for matrix interferences. If the contract detection limits is unachievable for a particular sample, an explanation of the problem and supporting evidence will be provided.

The recommended guideline for percent recovery for the inorganic parameters is 75% - 125%. The recommended guideline for relative percent duplication (RPD) is ± 20%. These limits are for advisory purposes only and are not to be used to determine if a sample should be reanalyzed.

7.3 MISCELLANEOUS PARAMETERS

For all analyses described in sections 7.3.1 through 7.3.6 the following statements are true. Actual detection limits obtainable for a specific sample depend upon potential for matrix interferences. If the detection limit is unobtainable for a particular sample, an explanation of the problem and supporting evidence will be provided. The acceptability limits for accuracy and precision are for advisory purposes only and are not to be used to determine if a sample should be reanalyzed.

7.3.1 Lead Analysis

The water samples for lead analysis only will be analyzed by USEPA 239.2, the detection limit is listed in Table 7-12. The recommended guidelines for percent recovery for lead is 75 percent to 125 percent. The recommended guideline for relative percent duplication is ± 20 percent. The frequency of analysis of QC samples (MS/MSD) will not be less than one set per 20 samples.

7.3.2 Halogenated Volatile Organics

Halogenated volatile organics will be analyzed by USEPA 8010-modified and aromatic volatile organics will be analyzed by USEPA 8020-modified. The modification is the use of a capillary column. The detection limits and acceptability criteria for precision and accuracy are given in Table 7-17. QC samples will be analyzed as required by the methods.

7.3.3 1,2-Dibromoethane

1,2-Dibromoethane will be analyzed by USEPA Method 504. The detection limits if found in Table 7-12. The accuracy and precision criteria are 74 percent to 122 percent recovery and ± 13 percent relative percent duplication. The frequency of analysis of QC samples will be as required by the method.

7.3.4 Polynuclear Aromatic Hydrocarbons

Polynuclear aromatic hydrocarbons will be analyzed by USEPA Method 610. The parameters, detection limits, and criteria for accuracy and precision are listed in Table 7-16. The frequency of analysis of the QC samples (MS/MSD) will not be less than one set per 20 samples of similar matrix.

7.3.5 Pesticides Only Analysis

The samples for pesticides only analysis will be analyzed by USEPA Method 8080. The detection limits and acceptability criteria for precision and accuracy are found in Table 7-18. The frequency of analysis of QC samples (MS/MSD) will not be less than one set per 20 samples of similar matrix.

7.3.6 EP Toxicity Analysis

The samples for EP Toxicity analysis will be extracted by SW 846 Method 1310. The EP Toxicity extracts will be analyzed by SW 846 Method 6010 for arsenic, barium, cadmium, chromium, manganese, silver and zinc; and by Method 7421 for lead, Method 7740 for selenium and Method 7470 for mercury. Detection limits are listed in Table 7-12. The acceptability criteria for precision and accuracy are 75 percent to 125 percent recovery for accuracy and ± 20 percent RPD for precision. The frequency of analysis of QC samples (MS/MSD) will not be less than one set per 20 samples of similarly matrix.

8.0 DATA REDUCTION, VALIDATION and REPORTING

All data collection will be reduced and reported in accordance with the DMP.

8.1 REDUCTION OF FIELD DATA

Temperature, conductivity, pH, water levels in wells and organic vapor levels will be measured in the field using the equipment listed in Section 6.1.

8.1.1 Calculations for Reduction of Field Data

Calculations for reduction of field data are as follows:

- Temperature - no calculations are required
- Conductivity - no calculations are required as the instrument compensates for temperature
- pH - no calculations are required as the instrument compensates for temperature
- Organic vapor levels - no calculations are required
- Water level elevations - water level elevations are determined by subtracting the "depth to liquid" (as determined using a chalked metal tape or an electronic probe) from the surveyed measuring point elevation at the top of the well casing.
    - When using an electronic probe to measure water levels, at least three measurements of depth to water will be made to ensure accuracy.

8.2 DATA VALIDATION

Collected data need to provide an accurate view of the source of the data. The quality of data will be evaluated by field and laboratory personnel who will check anomalous data and instruments as described below and review and evaluate data in accordance with the ITAS QA Manual.

8.2.1 Field Data

Regardless of the equipment used to obtain field data, the data will always be reviewed in the field for consistency and for reasonable agreement with expected or typical results. Extreme, anomalous, or seemingly unreasonable results will be accepted only after the measuring instrument has been checked and verified to be in proper working order and the anomalous reading has been verified by one or more additional measurements delivering a similar response. Field data will either be accepted or rejected before leaving a sampling site. IT's QAO will review field notes and chain-of-custody forms for that project.

8.2.2 Analytical Data

A record of each sample's history will be available for tracking its progress from time of sample collection to arrival at the laboratory. The analytical laboratory will then document sample progress from the time of sample receipt through analysis to the time of reporting results. Maintaining such documentation will enable data validity to be checked at all points of sample progress. Analytical data received from the laboratory will be reviewed by the FOC to make sure that analytical results are consistent with field observations or previously collected analytical data. Analytical data will also be reviewed by the project QAO. Discrepancies in data will be reported to the project QAO who will determine the validity of the data in accordance with procedures described in IT's QA Program Manuals, i.e. IT Analytical Services QA Manual, IT Engineering Services Manual, etc.

Listed below are the validation criteria which will be utilized in evaluating the analytical data for a Level C QC site.

8.2.2.1 Target Compound List (TCL) for VOAs (CLP Methods)

Holding Times - Samples must be analyzed within the holding times specified or the data should be marked as estimated (J).

GC/MS Tuning - Check that bromofluorobenzene tune is completed each 12-hour shift of operation. Check that it meets the CLP criteria. Assure that each sample is associated with a tune.

Initial Calibration - The maximum relative standard deviation [(RSD) percent RSD] shall not be >30 percent for indicated CLP CCC. The maximum mean relative response factor (RRF) for SPCC shall be >0.300 (0.250 for bromoform). The SPCCs are chloromethane, 1,1-dichloroethane, bromoform, 1,1,2,2-tetrachloroethane, and chlorobenzene. The CCC compounds are vinyl chloride, 1,1-dichloroethene, chloroform, 1,2-dichloropropane, toluene, and ethylbenzene.

Continuing Calibration - The minimum response factor for the SPCC components for VOAs analyses shall not be <0.300 (0.250 bro bromoform). The maximum response factor percent deviation for indicated CLP CCC components from the mean initial calibration response factor shall not exceed 25 percent. If these criteria are exceeded, a new calibration for the compound shall be employed.

Blank/Spike Control Samples - Any control sample which exceeds the internal QC limits set by the laboratory for a given sample matrix shall require all data from the associated batch of samples to be closely inspected. If no analytical problems are found, the data analyzed with the out-of-control point shall be discussed in the QC section of the MPR and final report. If problems are found in the analytical data, the samples associated with the batch shall be reanalyzed and the data from reanalysis reported. If holding times are exceeded in the reanalysis, both sets of data shall be presented.

If the blank/spike results are outside the internal laboratory limits and if the matrix spike results are outside the CLP limits, the laboratory will either reanalyze the samples within the holding times or the data will be flagged with an "R", and the data are not usable.

Surrogates - If surrogates exceed the CLP limits, the data shall be flagged that the surrogates exceeded limits.

Method Blanks - A method blank should be run each day following the Continuing Calibration Standard. Common laboratory solvents should not be found in the blank at levels over five times the detection limits. Other compounds should not be found in the blank at levels exceeding the detection limits. If common contaminant compounds are detected in samples at a concentration of <10 times the concentration found in the blank, or other compounds at <5 times the concentration in the blank, report those compounds as not detected. Adjust the sample quantitation limit to the value reported in the samples and flag the limit as estimated (UJ).

Matrix Spike/Spike Duplicate - Ensure that 1 out of 20 samples has been spiked in duplicate. The recoveries shall meet the CLP criteria. If the recoveries do not meet the criteria, examine the blank spike data. If the blank spike data exceed the limits and the matrix spikes exceed limits, the data shall be flagged as unusable (R). If the blank spike data from the batch are satisfactory, the data is usable, and the low recovery is discussed in the final report QA/QC and in the QC report sent to the EIC.

Field Trip and Equipment Blanks - If contaminant analytes are detected in samples at concentrations of <5 times the concentration found in the highest associated blank, the results are considered suspect and are reported as estimated.

8.2.2.2 TCL Semivolatile Organics (CLP Methods)
Holding Times - Samples must be extracted within 7 days of collection and analyzed within 40 days of extraction. Any samples which do not meet these requirements must be flagged as estimated.

GC/MS Tune - Make certain that a decafluorotriphenylphosphine tune is completed every 12 hours of sample analysis, that each sample is associated with a tune, and that each tune meets CLP requirements. Data are not reported if the instrument does not meet tune.

Initial Calibration - Ensure that a 5-point curve has been completed. The RRF of the BNA compounds shall be a minimum of 0.050 for the SPCC listed in the current revision of the CLP. The maximum RSD for the CCC listed in the CLP procedure is 30.0 percent. The minimum RRF for the SPCC is 0.050, and the maximum percent difference for the CCC is 25 percent. If these limits are exceeded, a new calibration curve shall be generated.

Continuing Calibration - The continuing calibration check will be performed once every 12 hours during operation. The minimum RRF for the SPCC is 0.05, and the maximum percent difference from the initial calibration shall not exceed 25 percent for the CCC. If these limits are exceeded, a new calibration curve shall be generated.

Blank/Spike Control Samples - Any control sample which exceeds the internal QC limits set by the laboratory for a given sample matrix shall require all data from the associated batch of samples to be closely inspected. If no analytical problems are found, the data and the out-of-control point shall be discussed in the QC section of the report. If problems are found in the analytical data, the samples associated with the batch shall be reanalyzed and the data from reanalysis reported. If holding times are exceeded in there analysis, both sets of data shall be presented.

If the blank/spike results are outside the internal laboratory limits and if the matrix spike results are outside the CLP limits, the laboratory will either reanalyze the samples or the data will be flagged with an "R", and the data is not usable.

Surrogates - If surrogates exceed the CLP limits, the data shall be flagged that the surrogates exceeded limits.

Blanks - A method blank should be run each day following the Continuing Calibration Standard. Phthalate should not be found in the blank at levels over five times the detection limits. Other compounds should not be found in the blank at levels exceeding the detection limits. If common contaminant compounds are detected in samples at a concentration of <10 times the concentration found in the blank, or other compounds at <5 times the concentration in the blank, report those compounds as not detected. Adjust the sample quantitation limits to the value reported in the samples and flag the limit as estimated (UJ).

Matrix Spike/Spike Duplicate - Ensure that 1 out of 20 samples has been spiked in duplicate. The recoveries should meet the CLP criteria. If the recoveries do not meet the criteria, examine the blank spike data. If the blank spike data exceed the limits and the matrix spikes exceed limits, the data shall be flagged as unusable (R). If the blanks spike data from the batch is satisfactory, the data are usable, and the low recovery is discussed in the final QC report sent to the Analytical Environmental Support Section.

8.2.2.3 Metals
Holding Times - Samples must be analyzed within six months, except mercury shall be analyzed in 28 days from sample collection.

ICP Initial Calibration - A calibration blank and at least one standard must be analyzed daily. An initial calibration verification standard must be within 90 to 110 percent recovery or the samples should be reanalyzed. If it is not possible to perform reanalysis, the data re rejected and flagged with an "R".

AA Calibration - Calibration blank and at least three standards shall be used in establishing the curve prior to sample analysis. A curve shall be analyzed each day prior to sample analysis.

Calibration Verification - Verification using a standard obtained from a source other than that of the initial calibration shall be used and the result shall be within 90 to 110 percent of the true value for both ICP and AA work. Calibration verification shall be done at a minimum frequency of 10 percent or every 2 hours, whichever is more frequent, and shall be done at the end of the analytical run.

Method Blanks - At least one preparation blank shall be prepared with each batch of samples. The blanks shall contain less than the detection limit for all analytes. If the concentration of the associated blanks is above the detection limit and if the lowest analyte concentration is <10 times the blank, the reanalysis of the sample must occur. If reanalysis is not done, the data shall be reported and flagged as estimated. The blank shall never be subtracted form the sample.

Field and Equipment Blanks - If contaminant analytes are detected in samples at concentration of <5 times the concentration found in the highest associated blank, the results are considered suspect and are reported as estimated.

Blank/Spike Laboratory Control Samples - Any laboratory control sample which exceeds the internal QC limits set by the laboratory for a given sample to be closely inspected. If no analytical problems are found, the data and out-of-control point shall be discussed in the QC section of the report. If problems are found in the analytical data, the samples associated with the batch shall be reanalyzed and the data form reanalysis reported. If holding times are exceeded in the reanalysis, both sets of data shall be presented. A discussion of data reported when the blank/spike laboratory control sample is out of control shall be presented in the QC section of both the final report and the MPR.

If the blank/spike results are outside the internal laboratory limits and if the matrix spike results are outside the CLP limits, the laboratory will either reanalyze the samples or the data will be flagged with an "R", and the data are not usable.

8.3 DATA REPORTING

The data most commonly included in reports are water level data, water quality data, lithologic logs and well construction data. Also all analytical data from the sample analysis including QA sample analysis and laboratory QC parameters will be included in the report.

- Reports of water level data will include the following information:
    - Well number
    - Measuring point elevation (relative to mean sea level (MSL)) in feet
    - Depth to water;
    - Water table elevation.
    - Total depth of well.

- Water level data will be summarized in tabular form for inclusion into reports prepared by IT.

- Lithologic information and well construction data will be reported on lithologic logs.

- Presence of free product.

As a minimum, the Analytical Data Report will contain sample identification, analytical procedures used on samples, analytical results, problems, if any, that occurred during analysis. For Level C QC, the method blanks, blank/spike, surrogates, matrix spikes, matrix spike duplicates, duplicates, and initial and continuing calibration data shall be reported. Table 8-1 lists the required deliverables. The forms referred to in Table 8-1 are from the current CLP for organics and metals/cyanide. The form numbers will be upgraded as new revisions occur in the CLP, which require changes in form content or numbering.

8.4 REPORT STORAGE

Original analytical data, QC data, field data and formal reports will be retained by IT for a minimum of five years. Copies of data and reports will be provided to the Navy as required by contract.

9.0 ANALYSIS OF QUALITY CONTROL SAMPLES

QC samples will be analyzed to provide verification of analytical results. The QC samples will be trip blanks, duplicate samples and laboratory QC check samples and spikes.

9.1 FIELD QUALITY CONTROL PROCEDURES

Field QC checks to be used by IT for this investigation will include the following:

- Trip Blanks: Trip blanks are defined as samples which originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic (VOA) samples. One trip blank should accompany each cooler containing VOAs, should be stored at the laboratory with the samples, and analyzed by the laboratory. Trip blanks are only analyzed for VOAs.

- Sample Duplicate: The sample will be split into two portions and sent to the laboratory as a separate sample for analyses. A minimum of one sample duplicate per sampling day or 1 in 10 samples taken, whichever is greater, will be required. Samples submitted for VOA analysis will not be composited.

- Equipment Rinsates: Equipment rinsates are the final analyte-free water rinse from equipment cleaning collected daily during a sampling event. Initially, samples from every other day should be analyzed. The remaining samples will be extracted and held should analytes pertinent to the project be found in the rinsate. If analytes are detected, the remaining samples must be analyzed. The results from the blanks will be used to flag or assess the levels of analytes in the samples. This comparison is made during data validation. The rinsates are analyzed for the same parameters as the related samples.

- Field Blanks: Field blanks consist of the source water used in decontamination and steam cleaning. At a minimum, one field blank from each source of water must be collected and analyzed for the same parameters as the related samples.

The results of these samples will be reviewed by the Project Manager and QAO to identify and problems and possible corrective actions.

9.2 LABORATORY QUALITY CONTROL CHECKS

Laboratory QC checks will be maintained by ITAS laboratory. These procedures are described in the ITAS QA Manual. ITAS will submit QC reports in accordance with Sections 7 and 8. The reports will be reviewed by the Project Manager and QAO.

10.0 PERFORMANCE AND SYSTEM AUDITS

Field and laboratory audits are used to verify that proper methods were used in sample collection and analysis. Laboratory audits have been performed for HAZWRAP and NEESA certification. The exhibits shown in Appendix A shows that ITAS Knoxville has successfully completed these audit requirements.

10.1 LABORATORY AUDITS

ITAS currently is approved for analysis by Martin Marietta Energy System's Analytical Chemistry Department. Martin Marietta Energy System administers the HAZWRAP for the Department of Defense (DOD) and serves in a similar capacity for NEESA RI Programs. Because of the short duration of the complying event, IT does not plan to do reapproval or internal audits for this statement of work.

10.2 FIELD AUDITS

A formal field audit will not be conducted by IT during this event. IT's QAO will review all field logs for completeness, precision and accuracy during the project.

11.0 PREVENTIVE MAINTENANCE

Periodic preventive maintenance is required for all equipment whose performance can affect results. Instrument manuals are kept on file for reference if equipment needs repair. Troubleshooting sections of manuals are often useful in assisting personnel in performing maintenance tasks.

Any equipment that requires routine maintenance will have a logbook documenting such maintenance. Information pertaining to life histories of equipment maintenance will be kept in individual equipment history logs with each instrument. Equipment logs will be kept in a bound composition book indicating date and type of maintenance performed. Appropriate and sufficient replacement parts of backup equipment will be available so that sampling and monitoring tasks are not substantially impeded or delayed.

11.1 FIELD EQUIPMENT

Depending on the media involved and the intended purpose, a wide variety of equipment is available for sampling and analytical activities. Because of the reliance placed on such equipment to assist in evaluating the appropriate level of protection and because of the use of environmental measurements to support enforcement cases, all sampling and analytical equipment (whether electronic, mechanical, chemical or otherwise) will be maintained at its proper functional status.

All equipment scheduled for field use will be checked prior to leaving for the field to ensure that the equipment is in good working order. This equipment check will generally include some or all of the following items:

- Batteries in battery-powered equipment, to ensure that they are fully charged. For extended periods in the field, the battery charger will also be included
- pH meter and electrode
- Temperature meter and probe
- Specific conductivity meter and probe
- New pH reference solution
- Electronic water level probes
- Photoionization detectors

The following items may be kept on hand in the field whenever samples are being collected:

- Distilled or deionized water
- pH reference solution in case of spilling
- Liquinox[R] or Alconox[R] and
- Isopropyl alcohol

Available for backup will be a pH/conductivity meter or equal in the event of pH or conductivity probe failure and a glass thermometer in case of a temperature probe failure.

11.2 <u>LABORATORY EQUIPMENT</u>

ITAS will maintain all analytical equipment in proper working condition in order to minimize laboratory storage of samples. Laboratory preventive maintenance procedures are described in Section 7.0 of the approved ITAS QA Manual, Laboratory Specific Attachment.

12.0 DATA ASSESSMENT PROCEDURE

The procedures for assessing the validity of data include the analysis of calibration check standards and duplicate analysis. These procedures are outlined in the following sections.

12.1 FIELD INSTRUMENTS

All field test meters will be tested for accuracy and precision on a daily basis. Equipment tested will include temperature, conductivity, pH and organic vapor level meters. Accuracy and precision tests will be conducted after instruments have been calibrated. Instrument accuracy will be tested by comparing readings to those of known standards.

Data completeness will be assessed by dividing the number of data measurements obtained by the number of data measurements expected or proposed for a particular sampling event.

- Temperature accuracy will be determined by comparing the instrument reading to the reading from a thermometer that meets NBS specifications. Temperature precision will be determined by taking duplicative readings and will be expressed as a relative percent difference.

- Conductivity accuracy will be determined by comparing the instrument reading to the conductivity of a certified standard. Duplicate reading will be taken to determine precision, which will be expressed as a relative percent difference.

- The accuracy of pH readings will be checked by comparing meter readings to the pH of certified pH buffer solutions. Certified buffer solutions having pH's of 10.00 and/or 4.00 and 7.00 will be used for accuracy determination. The precision of pH readings will be determined by taking duplicate readings and will be expressed as a relative percent difference.

- The accuracy of vapor level readings will be determined by comparing meter readings to the vapor level of a calibration gas. The precision of vapor level readings will be determined by taking duplicate vapor level measurements and will be expressed as a relative percent difference.

- The water level indicator will be calibrated by comparing the distance from the tip of the interface electrode (zero point) to a metal surveyor's tape calibrated to 0.01 foot and traceable to NBS standards. The accuracy of the indicator is ± 0.015 percent of the mean value.

Precision and accuracy data for each of the instruments discussed above will be recorded in a log book.

12.2 LABORATORY DATA

Standard in-house procedures used by ITAS laboratories to assess the precision and accuracy of their data include, among other things, the use of QC charts.

Further assessment of analytical precision and accuracy is achieved through participation in formal performance evaluations and systems audits.

ITAS procedures for data quality assessment are addressed in the Laboratory Specific QA Manual, Section 10.0.

13.0 CORRECTIVE ACTION PROCEDURES

Nonconformance of sampling procedures and QA sample analyses with the required QA objectives are cause for suspecting the integrity of the generated data. The type of the nonconformance will be noted as previously described. Appropriate corrective action will be taken as needed to develop an accurate and precise set of analytical data.

13.1 CORRECTIVE ACTION AT THE FIELD DATA COLLECTION LEVEL

Field data will be checked daily by field personnel. If problems or inconsistencies are identified, corrective action will be taken. The IT QAO will review each set of field data and descriptions of sampling procedures submitted by the sampling personnel to the FOC. The QAO will check field data for anomalous or suspect values which may include systematic problems. If systematic problems are identified, the FOC and/or sampling personnel will be notified and instructed to correct these errors. If necessary, resampling will be performed.

13.2 CORRECTIVE ACTION AFTER INSPECTION OF ANALYTICAL DATA

The QAO will review each set of analytical data. The QAO will check blank values, blind control sample values and anomalous or suspect values which may indicate systematic problems. If any systematic problems are identified, the manager of the participating laboratory will be notified and will be required to make any necessary systematic changes and then, if possible, reanalyze the samples in question. The limits for acceptability of analytical data will include the laboratory's pre-established objectives for precision and accuracy. If precision and accuracy for a particular sample set is not within these limits, then the data may be deemed unacceptable. The contractor will follow USEPA CLP protocol to determine matrix effect on results. However, the QAO will be contacted prior to reanalysis. Also, if reported detection limits are higher for a particular parameter than the target standard set forth for that parameter, then the data may be unacceptable.

These analytical results will be evaluated jointly by the Project Manager, QAO, FOC,and sampling personnel to determine whether or not the data will be used. If for some reason the samples in question cannot be reanalyzed, then the Project Manager, QAO, FOC and sampling personnel will jointly decide whether or not the suspect data will be used. If resampling is deemed necessary, SOUTHDIV will be notified and approval sought by IT.

13.3 LABORATORY CORRECTIVE ACTION

Corrective action procedures used by ITAS are described in Section 13.0 of the ITAS QA Manual laboratory specific attachment.

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

QA reports for this project may involve three separate levels of reporting. These levels are:

- QA reports (verbal or written) from the IT QAO to IT's Project Manager
- QA reports from ITAS to IT Project Manager
- QA reports from IT to SOUTHDIV if requested

14.1 QUALITY ASSURANCE REPORTS FROM IT QA OFFICER TO THE IT PROJECT MANAGER

The QAO will report all deficiencies in data gathering analyzed reports to the IT Project Manager. The QAO will report any observed nonconformances in the field sample collection and analysis procedures as well as report other nonconformances in data quality, such as equipment out of calibration to the Project Manager.

14.2 QUALITY ASSURANCE REPORTS FROM ITAS LABORATORY TO THE IT PROJECT MANAGER

When requested, ITAS will submit the following items along with their data reports:

- Precision and accuracy QC charts for the analytical period of interest
- A report of missing data, should there be any and if so, and explanation as to why the data are missing
- Results of NEESA performance audits conducted during the course of the project for which the data are being reported.
- A statement accompanying analytical reports stating methods of analysis and that all analyses met established objectives for precision and accuracy. Data is achieved as discussed in Section 7.0.

ITAS will submit a monthly progress report and final QC data report in accordance with NEESA 20.2-047B, Sections 8.1 and 8.2 to the Project Manager for review. The Project Manager will forward the report to the NEESA Contract Representative (Martin Marietta Energy Systems, Inc.)

14.3 QUALITY ASSURANCE REPORTS FROM IT TO SOUTHDIV

QA reports will be submitted to SOUTHDIV only if requested. The final report to SouthDiv will contain a formal QA summary, but a QA report will not be submitted.

15.0 PERSONNEL QUALIFICATIONS AND TRAINING

15.1 PROFESSIONAL PROFILES OF PERTINENT PROJECT PERSONNEL

Appendix A of the PMP contains the professional profiles/resumes listing the qualifications and pertinent experience of key IT personnel who will be involved with various aspects of execution of this project.

TABLE 4-1
SUMMARY TABLE
LOCATIONS AND ANALYTICAL METHODS
NAS - KEY WEST
KEY WEST, FLORIDA

NAS - KEY WEST SITES	ANALYTICAL METHODS		
	WATER SAMPLES	SOIL SAMPLES	SEDIMENT SAMPLES
SITE 1 TRUMAN ANNEX REFUSE DISPOSAL AREA ABBREVIATIONS: VOA = VOLATILE ORGANIC ANALYSIS CLP = EPA CONTRACT LAB PROCEDURES SOW = STATEMENT OF WORK PST/PCBs = PESTICIDES/ POLYCHLORINATED BIPHENYLS	TCL • CLP SOW 288 TAL • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Cu,Fe,Mg,Mn,Ni, K,Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7470 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanide SW-846 METHOD 9010	EP-TOX • EXTRACTION SW-846 METHOD 1310 • METALS (Al,Ba,Cd,Cr,Mn,Ag, Zn) SW-846 METHOD 6010 • Hg SW-846 METHOD 7470 • Pb SW-846 METHOD 7421 • Se SW-846 METHOD 7740	TCL • CLP SOW 288 TAL • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Fe,Mg,Mn,Ni,K, Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Mg SW-846 METHOD 7471 • Se SW-846 METHOD 7240 • Th SW-846 METHOD 7841 • Cyanide SW-846 METHOD 9010

NAS - KEY WEST SITES	ANALYTICAL METHODS		
	WATER SAMPLES	SOIL SAMPLES	SEDIMENT SAMPLES
SITE 3 TRUMAN ANNEX DDT MIXING AREA	PESTICIDES/PCB EPA METHOD 8080 <u>TCL</u> • CLP SOW 288 <u>TAL</u> • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Cu,Fe,Mg,Mn,Ni, K,Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7470 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanides SW-846 METHOD 9010	Composites PESTICIDES/PCB EPA METHOD 8080 Borings <u>TCL</u> • CLP SOW 288 <u>TAL</u> • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Cu,Fe,Mg,Mn,Ni, K,Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Mg SW-846 METHOD 7471 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanides SW-846 METHOD 9010	

NAS - KEY WEST SITES	ANALYTICAL METHODS		
	WATER SAMPLES	SOIL SAMPLES	SEDIMENT SAMPLES
SITE 4 BOCA CHICA OPEN DISPOSAL AREA	<u>TCL</u> • CLP SOW 288 <u>TAL</u> • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Cu,Fe,Mg,Mn,Ni, K,Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7470 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanide SW-846 METHOD 9010 <u>APPENDIX IX</u> • ORGANICS CLP SOW 288 • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Cu,Fe,Mg,Mn,Ni, K,Na,V,Zn) SW-846 METHOD 6010	<u>EP-TOX</u> • EXTRACTION SW-846 METHOD 1310 • METALS (Al,Ba,Cd,Cr, Mn,Ag,Zn) SW-846 METHOD 6010 • Hg SW-846 METHOD 7470 • Pb SW-846 METHOD 7421 • Se SW-846 METHOD 7740	<u>TCL</u> • CLP SOW 288 <u>TAL</u> • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Cu,Fe,Mg,Mn,Ni, K,Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7470 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanide SW-846 METHOD 9010 <u>APPENDIX IX</u> • ORGANICS CLP SOW 288 • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Cu,Fe,Mg,Mn,Ni, K,Na,V,Zn) SW-846 METHOD 6010

TABLE 4-1 (continued)
SUMMARY TABLE
LOCATIONS AND ANALYTICAL METHODS
NAS - KEY WEST
KEY WEST, FLORIDA

NAS - KEY WEST SITES	ANALYTICAL METHODS		
	WATER SAMPLES	SOIL SAMPLES	SEDIMENT SAMPLES
SITE 4 BOCA CHICA OPEN DISPOSAL AREA (Cont.)	APPENDIX IX (Cont.) • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7470 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7741 • PESTICIDES/PCBs EPA METHOD 8080 • Cyanide SW-846 METHOD 9010 • Sulfide SW-846 METHOD 9030 • Pb USEPA 239.2 • Organophosphorous Pesticide SW-846 METHOD 8140 • Dioxins and Furans SW-846 METHOD 8280 (MODIFIED) • 1,2 Dibromoethane USEPA 504.1		APPENDIX IX (Cont.) • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7471 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • PESTICIDES/PCBs EPA METHOD 8080 • Cyanide SW-846 METHOD 9010 • Sulfide SW-846 METHOD 9030 • Pb USEPA 239.2 • Organophosphorous Pesticide SW-846 METHOD 8140 • Dioxins and Furans SW-846 METHOD 8280 (MODIFIED) • 1,2 Dibromoethane USEPA 504.1

NAS - KEY WEST SITES	ANALYTICAL METHODS		
	WATER SAMPLES	SOIL SAMPLES	SEDIMENT SAMPLES
SITE 5 BOCA CHICA DDT MIXING AREA	TCL • CLP SOW 288 TAL • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Fe,Mg,Mn,Ni,K, Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7470 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanide SW-846 METHOD 9010 • PESTICIDES/PCBs USEPA METHOD 8080	Borings will be anaylzed for: TCL • CLP SOW 288 TAL • TOTAL METALS (Al,Sb,Be,Cd,Ca,Cr, Cu,Fe,Mg,Mn,Ni,K,Na, V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7471 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanide SW-846 METHOD 9010 Composite will be analyzed for: • PESTICIDES/PCBs USEPA METHOD 8080	• PESTICIDES/PCBs USEPA METHOD 8080

NAS - KEY WEST SITES	ANALYTICAL METHODS		
	WATER SAMPLES	SOIL SAMPLES	SEDIMENT SAMPLES
SITE 7 FLEMING KEY NORTH LANDFILL	<u>TCL</u> • CLP SOW 288 <u>TAL</u> • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Cu,Fe,Mg,Mn,Ni, K,Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7470 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanide SW-846 METHOD 9010	<u>EP-TOX</u> • EXTRACTION SW-846 METHOD 1310 • METALS (Al,Ba,Cd,Cr, Mn,Ag,Zn) SW-846 METHOD 6010 • Hg SW-846 METHOD 7470 • Pb SW-846 METHOD 7421 • Se SW-846 METHOD 7740	<u>TCL</u> • CLP SOW 288 <u>TAL</u> • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Cu,Fe,Mg,Mn,Ni, K,Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7471 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanide SW-846 METHOD 9010

TABLE 4-1 (continued)
SUMMARY TABLE
LOCATIONS AND ANALYTICAL METHODS
NAS - KEY WEST
KEY WEST, FLORIDA

NAS - KEY WEST SITES	ANALYTICAL METHODS		
	WATER SAMPLES	SOIL SAMPLES	SEDIMENT SAMPLES
SITE 8 FLEMING KEY SOUTH LANDFILL	<u>TCL</u> • CLP SOW 288 <u>TAL</u> • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Cu,Fe,Mg,Mn,Ni, K,Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7470 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanide SW-846 METHOD 9010	<u>EP-TOX</u> • EXTRACTION SW-846 METHOD 1310 • METALS (Al,Ba,Cd,Cr, Mn,Ag,Zn) SW-846 METHOD 6010 • Hg SW-846 METHOD 7470 • Pb SW-846 METHOD 7421 • Se SW-846 METHOD 7740	<u>TCL</u> • CLP SOW 288 <u>TAL</u> • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca, Cr,Co,Cu,Fe,Mg,Mn,Ni, K,Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7471 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanide SW-846 METHOD 9010

NAS - KEY WEST SITES	ANALYTICAL METHODS		
	WATER SAMPLES	SOIL SAMPLES	SEDIMENT SAMPLES
SITE 9 TRUMBO POINT ANNEX FUEL FARM AND PIERS	Gasoline Analytical Group (FAC 17-70.008(9)(a) • 1,2 Dichloroethane EPA METHOD 601 • Benzene EPA METHOD 602 • Toluene EPA METHOD 602 • Total Xylenes EPA METHOD 602 • Ethylbenzene EPA METHOD 602 • Total VOA EPA METHOD 602 • Volatile Organic Halocarbons EPA METHOD 601 • 1,2 Dibromoethane EPA METHOD 504.1 • Methyl Tert-Butyl Ether EPA METHOD 602 • Lead EPA METHOD 239.2	EXCESS SOIL CONTAMINATION FAC 17-770.003(3)	

NAS - KEY WEST SITES	ANALYTICAL METHODS		
	WATER SAMPLES	SOIL SAMPLES	SEDIMENT SAMPLES
SITE 9 TRUMBO POINT ANNEX FUEL FARM AND PIERS (Cont.)	Diesel Analytical Group FAC 17-70.009(9)(b) • Polynuclear Aromatic Hydrocarbons EPA METHOD 625 • Benzene EPA METHOD 602 • Toluene EPA METHOD 602 • Total Xylenes EPA METHOD 602 • Ethylbenzen EPA METHOD 602 • 1,2 Dibromoethane EPA METHOD 504.1 • Methyl Tert-Butyl Ether EPA METHOD 602 • Total VOA EPA METHOD 602 • Volatile Organic Halocarbons EPA METHOD 601 • Lead EPA METHOD 239.2		

TABLE 4-1 (continued)
SUMMARY TABLE
LOCATIONS AND ANALYTICAL METHODS
NAS - KEY WEST
KEY WEST, FLORIDA

NAS - KEY WEST SITES	ANALYTICAL METHODS		
	WATER SAMPLES	SOIL SAMPLES	SEDIMENT SAMPLES
SITE 10 BOCA CHICA FIRE FIGHTING TRAINING AREA	<u>TCL</u> • CLP SOW 288 <u>TAL</u> • TOTAL METALS (Al,Sb,Ba,Be,Cd,Ca,Cr, Co,Cu,Fe,Mn,Mg,Ni,K, Na,V,Zn) SW-846 METHOD 6010 • Ar SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7470 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • Cyanide SW-846 METHOD 9010 <u>APPENDIX IX</u> • Organics CLP SOW 288 • TOTAL METALS (Al,Sb, Ba,Be,Cd,Ca,Cr,Co,Cu, Fe,Mg,Mn,Ni,K,Na,V,Zn) SW-846 METHOD 6010	<u>EP-TOX</u> • EXTRACTION SW-846 METHOD 1310 • METALS (Al,Ba,Cd,Cr, Mn,Ag,Zn) SW-846 METHOD 6010 • Hg SW-846 METHOD 7421 • Pb SW-846 METHOD 7421 • Se SW-846 METHOD 7740 <u>APPENDIX IX</u> • Organics CLP SOW 288 • TOTAL METALS (Al,Sb, Ba,Be,Cd,Ca,Cr,Co,Cu, Fe,Mg,Mn,Ni,K,Na,V,Zn) SW-846 METHOD 6010	

TABLE 4-1 (continued)
SUMMARY TABLE
LOCATIONS AND ANALYTICAL METHODS
NAS - KEY WEST
KEY WEST, FLORIDA

NAS - KEY WEST SITES	ANALYTICAL METHODS		
	WATER SAMPLES	SOIL SAMPLES	SEDIMENT SAMPLES
SITE 10 BOCA CHICA FIRE FIGHTING TRAINING AREA (Cont.)	<u>APPENDIX IX (Cont.)</u> • As SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7470 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • PESTICIDES/PCBs EPA METHOD 8080 • Cyanides SW-846 METHOD 9010 • Sulfide SW-846 METHOD 9030 • Organophosphorous Pesticides SW-846 METHOD 8140 • Dioxins and Furans SW-846 METHOD 8280 (MODIFIED) • 1,2 Dibromoethane EPA METHOD 504.1	<u>APPENDIX IX (Cont.)</u> • As SW-846 METHOD 7060 • Pb SW-846 METHOD 7421 • Hg SW-846 METHOD 7471 • Se SW-846 METHOD 7740 • Th SW-846 METHOD 7841 • PESTICIDES/PCBs EPA METHOD 8080 • Cyanides SW-846 METHOD 9010 • Sulfides SW-846 METHOD 9030 • Pb EPA METHOD 239.2 • Organophosphorous Pesticides SW-846 METHOD 8140 • Dioxins and Furans SW-846 METHOD 8280 (MODIFIED) • 1,2 Dibromoethane EPA METHOD 504.1	

TABLE 4-2
SUMMARY TABLE
ANALYTICAL METHODS, CONTAINER TYPES
PRESERVATION, HOLDING TIMES
NAS - KEY WEST
KEY WEST, FLORIDA

ANALYTICAL METHODS/PARAMETERS	CONTAINER TYPES	VOLUME REQUIRED	PRESERVATION	HOLDING TIMES
VOA; CLP SOW 2/88				
- WATER	40 ML, G, TEFLON LINED SEPTUM	2X40ML 1-125ML FULL	COOL 4°C; HCL TO pH<2	10 DAYS*
- SOILS/SEDIMENTS	40 GM, G, TEFLON-LINED SEPTUM		COOL 4.C	10 DAYS*
SEMI-VOA; CLP SOW 2/88		2L		
- WATER	1L, G, TEFLON-LINED CAP		COOL 4°C	5 DAYS UNTIL EXTRACTION* 40 DAYS AFTER EXTRACTION*
- SOILS/SEDIMENT	500 ML, G, TEFLON-LINED CAP	1-500ML** FULL	COOL 4°C	10 DAYS UNTIL EXTRACTION* 40 DAYS AFTER EXTRACTION*
PESTICIDES/PCBs; CLP SOW 2/88				
- WATER	1L, G, TEFLON-LINED CAP	2L***	COOL 4°C	5 DAYS UNTIL EXTRACTION* 40 DAYS AFTER EXTRACTION*
- SOILS/SEDIMENT	500 ML, G, TEFLON-LINED CAP	1-500ML** FULL	COOL 4°C	10 DAYS UNTIL EXTRACTION* 40 DAYS AFTER EXTRACTION*
METALS; CLP SOW 7/87 EXCEPT MERCURY				
- WATER	200 ML, P	1L***	HN03 TO pH<2	6 MONTHS
- SOILS/SEDIMENT	500 ML, G	1-500ML** FULL	COOL 4°C	6 MONTHS

*FROM DATE OF LABORATORY RECEIPT

SUMMARY TABLE
ANALYTICAL METHODS, CONTAINER TYPES
PRESERVATION, HOLDING TIMES
NAS - KEY WEST
KEY WEST, FLORIDA

ANALYTICAL METHODS/PARAMETERS	CONTAINER TYPES	VOLUME REQUIRED	PRESERVATION	HOLDING TIMES
METALS; CLP SOW7/87 MERCURY				
- WATER	100 ML, P	1L***	HNO3 TO pH<2	28 DAYS
- SOILS/SEDIMENTS	500 ML, P	1 500ML JAR FULL	COOL 4°C	28 DAYS
CN-; CLP SOW 787				
- WATER	1L, G	1L	COOL 4°C; ASCORBIC ACID, NaOH TO pH>12	14 DAYS
- SOILS	500 ML, G	SAME AS METALS P/P, BNA	COOL 4°C	14 DAYS
HERBICIDES; 8150				
- WATER	1L, G	2L	COOL 4°C	7 DAYS UNTIL EXTRACTION* 40 DAYS AFTER EXTRACTION
- SOILS	500 ML, G	1 500ML FULL	COOL 4°C	14 DAYS UNTIL EXTRACTION* 40 DAYS AFTER EXTRACTION
ORGANOPHOSPHOROUS PESTICIDES; 8140				
- WATER (EXT 3510)	2 L, G	2L	COOL 4°C	7 DAYS UNTIL EXTRACTION* 40 DAYS AFTER EXTRACTION
- SOILS (EXT 3550)	500 ML, G	1 500 ML FULL	COOL 4°C	14 DAYS UNTIL EXTRACTION* 40 DAYS AFTER EXTRACTION

* FROM DATE OF COLLECTION

TABLE 4-2 (continued)
SUMMARY TABLE
ANALYTICAL METHODS, CONTAINER TYPES
PRESERVATION, HOLDING TIMES
NAS - KEY WEST
KEY WEST, FLORIDA

ANALYTICAL METHODS/PARAMETERS	CONTAINER TYPES	VOLUME REQUIRED	PRESERVATION	HOLDING TIMES
SULFIDE; 9030				
- WATER	500 ML; G	OUT OF CN BOTTLE	COOL 4°C; NaOH & ZINC ACETATE TO pH>9	7 DAYS
- SOILS	500 ML, G	OUT OF CN BOTTLE** 1 500ML JAR	COOL 4°C	7 DAYS
DIOXINS AND FURANS; MOD 8280				
- WATER	1 L, G	2L	COOL 4°C	30 DAYS
- SOILS	250 GR, AMBER G	500ML FULL	COOL 4°C	30 DAYS
VOLATILE ORGANIC HALOCARBONS, 1,2-DICHLOROETHANE; EPA 8010 MOD				
- WATER	40 ML, G, TEFLON-LINED SEPTA	2X40ML	COOL 4°C, HCL TO pH<2	14 DAYS FROM COLLECTION
VOA: BENZENE, TOLUENE, ETHYLBENZENE METHYL TERT BUTYL ETHER (MTBE); EPA 8020 MOD				
- WATER	40 ML, G, TEFLON-LINED SEPTA	2X40ML	COOL 4°C, HCL TO pH<2	14 DAYS FROM COLLECTION

SUMMARY TABLE
ANALYTICAL METHODS, CONTAINER TYPES
PRESERVATION, HOLDING TIMES
NAS - KEY WEST
KEY WEST, FLORIDA

ANALYTICAL METHODS/PARAMETERS	CONTAINER TYPES	VOLUME REQUIRED	PRESERVATION	HOLDING TIMES
POLYNUCLEAR AROMATIC HYDROCARBONS;EPA 610 - WATER	1 L, G, TEFLON-LINED CAP	2L	COOL 4°C	7 DAYS UNTIL EXTRACTION* 40 DAYS AFTER EXTRACTION
1,2-DIBROMOETHANE (EDB) EPA 504.1 - WATER	40 ML, G, TEFLON-LINED SEPTA	2X40ML	COOL 4°C	14 DAYS FROM COLLECTION
LEAD; EPA 239.2 - WATER	200 ML, P	1L	HNO3 TO pH<2	6 MONTHS

* FROM DATE OF COLLECTION
** ONE 500ML JAR FULL OF SOILS/SEDIMENT IS SUFFICIENT FOR BNA/PEST-PCB/METALS MERCURY/CN- & SULFIDE, NEED SEPARATE JARS OF SOIL/SEDIMENT FOR HERBICIDES, ORGANOPHOSPHOROUS PESTICIDES, DIOXINS AND FURANS.
*** METALS AND MERCURY IN WATER CAN BE ANALYZED FROM SAME 1L BOTTLE.

Abbreviations:

G = Glass Bottle/Jar
P = Plastic Bottle/Jar
HCL = Hydrochloric Acid
VOA = Volatile Organic Analysis
CLP = EPA Contract Lab Procedures
SOW = Statement of Work
MOD EPA 8020 = Addition of MTBE
MOD CLP = Addition of Appendix IX Compounds
PST/PCBs = Pesticides/Polychlorinated Biphenyls
NaOH = Sodium Hydroxide
HNO3 = HNO_3 Nitric Acid
CN- = Cyanide
8010 MOD/8020 MOD - USE OF CAPILLARY COLUMN

TABLE 7.1

LIST OF TEST PROCEDURES OTHER THAN CLP

Parameter	Method	Reference
EP Tox Extraction	1310	1
Total Metals (excluding Hg)	6010	1
Lead	7421	1
Selenium	7740	1
Mercury	7470/7471	1
Herbicides	8150	1
Organophosphorus Pesticides	8140	1
Dioxins & Furans	Mod. 8280	1, 2
Sulfide	9030	1
Lead	239.2	3
Pesticides	8080	4
Halogenated Volatile Organics	8010	4
Aromatic Volatile Organics	Mod. 8020	4, 2
1,2-Dibromoethane	EPA 504.1	5
Polynuclear Aromatic Hydrocarbons	EPA 610	6

1. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 2nd. ed., SW-846, USEPA, 1984.

2. Modified as per the ITAS SOP.

3. EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, March 1983.

4. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 3rd. ed., SW-846, USEPA, 1986.

5. Methods for the Determination of Organic Compounds in Drinking Water, EPA/600/4-88/039, December 1988.

6. Federal Register/Vol. 49, No. 209/Friday, October 26, 1984.

TABLE 7.2

Target Compound List (TCL) and
Contract Required Quantitation Limits (CRQL)*

Volatiles	CAS Number	Quantitation Limits** Water µg/L	Low Soil/Sediment[a] µg/Kg
1. chloromethane	74-87-3	10	10
2. bromomethane	74-83-9	10	10
3. vinyl chloride	75-01-4	10	10
4. chloroethane	75-00-3	10	10
5. methylene chloride	75-09-2	5	5
6. acetone	67-64-1	10	10
7. carbon disulfide	75-15-0	5	5
8. 1,1-dichloroethene	75-35-4	5	5
9. 1,1-dichloroethane	75-34-3	5	5
10. 1,2-dichloroethene (total)	540-59-0	5	5
11. chloroform	67-66-3	5	5
12. 1,2-dichloroethane	107-06-2	5	5
13. 2-butanone	78-93-3	10	10
14. 1,1,1-trichloroethane	71-55-6	5	5
15. carbon tetrachloride	56-23-5	5	5
16. vinyl acetate	108-05-4	10	10
17. bromodichloromethane	75-27-4	5	5
18. 1,2-dichloropropane	78-87-5	5	5
19. cis-1,3-dichloropropene	10061-01-5	5	5
20. trichloroethene	79-01-6	5	5
21. dibromochloromethane	124-48-1	5	5
22. 1,1,2-trichloroethane	79-00-5	5	5
23. benzene	71-43-2	5	5
24. trans-1,3-dichloropropene	10061-02-6	5	5
25. bromoform	75-25-2	5	5
26. 4-methyl-2-pentanone	108-10-1	10	10
27. 2-hexanone	591-78-6	10	10
28. tetrachloroethene	127-18-4	5	5
29. toluene	108-88-3	5	5
30. 1,1,2,2-tetrachloroethane	79-34-5	5	5

(continued)

TABLE 7.2

(continued)

Volatiles	CAS Number	Quantitation Limits** Water µg/L	Low Soil/Sediment[a] µg/Kg
31. chlorobenzene	108-90-7	5	5
32. ethyl benzene	100-41-4	5	5
33. styrene	100-42-5	5	5
34. xylenes (Total)	1330-20-7	5	5

---

[a] Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Volatile TCL Compounds are 125 times the individual Low Soil/Sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

TABLE 7.3

Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL)*

Semivolatiles	CAS Number	Quantitation Limits** Water µg/L	Low Soil/Sedimentb µg/Kg
35. phenol	108-95-2	10	330
36. bis(2-chloroethyl)ether	111-44-4	10	330
37. 2-chlorophenol	95-57-8	10	330
38. 1,3-dichlorobenzene	541-73-1	10	330
39. 1,4-dichlorobenzene	106-46-7	10	330
40. benzyl alcohol	100-51-6	10	330
41. 1,2-dichlorobenzene	95-50-1	10	330
42. 2-methylphenol	95-48-7	10	330
43. bis(2-chloroisopropyl)ether	108-60-1	10	330
44. 4-methylphenol	106-44-5	10	330
45. n-nitroso-di-n-dipropylamine	621-64-7	10	330
46. hexachloroethane	67-72-1	10	330
47. nitrobenzene	98-95-3	10	330
48. isophorone	78-59-1	10	330
49. 2-nitrophenol	88-75-5	10	330
50. 2,4-dimethylphenol	105-67-9	10	330
51. benzoic acid	65-85-0	50	1,600
52. bis(2-chloroethoxy)methane	111-91-1	10	330
53. 2,4-dichlorophenol	120-83-2	10	330
54. 1,2,4-trichlorobenzene	120-82-1	10	330
55. naphthalene	91-20-3	10	330
56 4-chloroaniline	106-47-8	10	330
57. hexachlorobutadiene	87-68-3	10	330
58. 4-chloro-3-methylphenol (para-chloro-meta-cresol)	59-50-7	10	330
59. 2-methylnaphthalene	91-57-6	10	330
60. hexachlorocyclopentadiene	77-47-4	10	330
61. 2,4,6-trichlorophenol	88-06-2	10	330
62. 2,4,5-trichlorophenol	95-95-4	50	1,600
63. 2-chloronaphthalene	91-58-7	10	330
64. 2-nitroaniline	88-74-4	50	1,600
65. dimethyl phthalate	131-11-3	10	330
66. acenaphthylene	208-96-8	10	330
67. 2,6-dinitrotoluene	606-20-2	10	330
68. 3-nitroaniline	99-09-2	50	1,600
69. acenaphthene	83-32-9	10	330

(continued)

TABLE 7.3

(continued)

Semivolatiles		CAS Number	Quantitation Limits** Water µg/L	Low Soil/Sediment[b] µg/Kg
70.	2,4-dinitrophenol	51-28-5	50	1,600
71.	4-nitrophenol	100-02-7	50	1,600
72.	dibenzofuran	132-64-9	10	330
73.	2,4-dinitrotoluene	121-14-2	10	330
74.	diethylphthalate	84-66-2	10	330
75.	4-chlorophenyl-phenylether	7005-72-3	10	330
76.	fluorene	86-73-7	10	330
77.	4-nitroaniline	100-01-6	50	1,600
78.	4,6-dinitro-2-methylphenol	534-52-1	50	1,600
79.	n-nitrosodiphenylamine	86-30-6	10	330
80.	4-bromophenyl-phenylether	101-55-3	10	330
81.	hexachlorobenzene	118-74-1	10	330
82.	pentachlorophenol	87-86-5	50	1,600
83.	phenanthrene	85-01-8	10	330
84.	anthracene	120-12-7	10	330
85.	di-n-butylphthalate	84-74-2	10	330
86.	fluoranthene	206-44-0	10	330
87.	pyrene	129-00-0	10	330
88.	butylbenzylphthalate	85-68-7	10	330
89.	3,3'-dichlorobenzidine	91-94-1	20	660
90.	benzo(a)anthracene	56-55-3	10	330
91.	chrysene	218-01-9	10	330
92.	bis(2-ethylhexyl)phthalate	117-81-7	10	330
93.	di-n-octylphthalate	117-84-0	10	330
94.	benzo(b)fluoranthene	205-99-2	10	330

TABLE 7.3

(continued)

Semivolatiles	CAS Number	Quantitation Limits** Water µg/L	Low Soil/Sediment[b] µg/Kg
95. benzo(k)fluoranthene	207-08-9	10	330
96. benzo(a)pyrene	50-32-8	10	330
97. indeno(1,2,3-cd)pyrene	193-39-5	10	330
98. dibenzo(a,h)anthracene	53-70-3	10	330
99. benzo(g,h,i)perylene	191-24-2	10	330

[b] Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Semivolatile TCL Compounds are 60 times the individual Low Soil/Sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

TABLE 7.4

Target Compound List (TCL) and
Contract Required Quantitation Limits (CRQL)*

Pesticides/PCBs	CAS Number	Quantitation Limits** Water µg/L	Low Soil/Sediment[c] µg/Kg
100. α-BHC	319-84-6	0.05	8.0
101. β-BHC	319-85-7	0.05	8.0
102. δ-BHC	319-86-8	0.05	8.0
103. γ-BHC (lindane)	58-89-9	0.05	8.0
104. heptachlor	76-44-8	0.05	8.0
105. aldrin	309-00-2	0.05	8.0
106. heptachlor epoxide	1024-57-3	0.05	8.0
107. endosulfan I	959-98-8	0.05	8.0
108. dieldrin	60-57-1	0.10	16.0
109. 4,4'-DDE	72-55-9	0.10	16.0
110. endrin	72-20-8	0.10	16.0
111. endosulfan II	33213-65-9	0.10	16.0
112. 4,4'-DDD	72-54-8	0.10	16.0
113. endosulfan sulfate	1031-07-8	0.10	16.0
114. 4,4'-DDT	50-29-3	0.10	16.0
115. methoxychlor	72-43-5	0.5	80.0
116. endrin ketone	53494-70-5	0.10	16.0
117. α-chlordane	5103-71-9	0.5	80.0
118. γ-chlordane	5103-74-2	0.5	80.0
119. toxaphene	8001-35-2	1.0	160.0
120. Aroclor 1016	12674-11-2	0.5	80.0
121. Aroclor 1221	11104-28-2	0.5	80.0
122. Aroclor 1232	11141-16-5	0.5	80.0
123. Aroclor 1242	53469-21-9	0.5	80.0
124. Aroclor 1248	12672-29-6	0.5	80.0
125. Aroclor 1254	11097-69-1	1.0	160.0
126. Aroclor 1260	11096-82-5	1.0	160.0

[c] Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Pesticide/PCB TCL compounds are 15 times the individual Low Soil/Sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

TABLE 7.5

INORGANIC TARGET ANALYTE LIST (TAL)

Analyte	Contract Required (1,2) Detection Limit µg/liter Water	Contract Required (1,2) Detection Limit mg/kg Soil
Aluminum	200	40
Antimony	60	12
Arsenic	10	2
Barium	200	40
Beryllium	5	1
Cadmium	5	1
Calcium	5,000	1,000
Chromium	10	2
Cobalt	50	10
Copper	25	5
Iron	100	20
Lead	5	1
Magnesium	5,000	1,000
Manganese	15	3
Mercury	0.2	0.04
Nickel	40	8
Potassium	5,000	1,000
Selenium	5	1
Silver	10	2
Sodium	5,000	1,000
Thallium	10	2
Vanadium	50	10
Zinc	20	4
Cyanide	10	0.5

(1) Subject to the restrictions specified in the first page of Part G, Section IV of Exhibit D (Alternate Methods - Catastrophic Failure) any analytical method specified in SOW Exhibit D may be utilized as long as the documented instrument or method detection limits meet the Contract Required Detection Limit (CRDL) requirements. Higher detection limits may only be used in the following circumstance:

If the sample concentration exceeds five times the detection limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the Contract Required Detection Limit. This is illustrated in the example below:

For lead:
Method in use - ICP
Instrument Detection Limit (IDL) - 40
Sample concentration - 220
Contract Required Detection Limit (CRDL) - 5

(continued)

TABLE 7.5

(continued)

The value of 220 may be reported even though instrument detection limit is greater than CRDL. The instrument or method detection limit must be documented as described in Exhibit E of the CLP 787 SOW.

(2) The CRDL is the instrument detection limit obtained in pure water that must be met using the procedure in Exhibit E of the CLP 787 SOW. The detection limits for samples may be considerably higher depending on the sample matrix.

TABLE 7.6

APPENDIX IX VOLATILE ORGANIC ANALYSIS

PURGE & TRAP - WATER

AND HEATED PURGE & TRAP - WATER

QUANTITATION LIMITS

Compound	Quantitation* Limit µg/liter (ppb)	Compound	Quantitation* Limit µg/liter (ppb)
Acetone	10	1,2-Dichloropropane	5
Acetonitrile	140	cis-1,3-Dichloropropene	5
Acrolein	20	trans-1,3-Dichloropropene	5
Acrylonitrile	10	1,4-Dioxane	170
Benzene	5	Ethyl benzene	5
Bromodichloromethane	5	Ethyl cyanide	500
Bromoform	5	2-Hexanone	10
Bromomethane	10	Iodomethane	20
2-Butanone	10	Isobutyl alcohol	330
Carbon disulfide	5	Methacrylonitrile	380
Carbon tetrachloride	5	Methyl methacrylate	170
Chlorobenzene	5	4-Methyl-2-pentanone	10
Chloroethane	5	Methylene chloride	5
3-Chloro-1-propene	10	Pyridine	170
Chloroform	5	Styrene	5
Chloromethane	10	1,1,1,2-Tetrachloroethane	5
Chloroprene	5	1,1,2,2-Tetrachloroethane	5
1,2-Dibromo-3-chloropropane	10	Tetrachloroethene	5
Dibromochloromethane	5	Toluene	5
1,2-Dibromoethane	5	1,1,1-Trichloroethane	5
Dibromomethane	10	1,1,2-Trichloroethane	5
trans-1,4-Dichloro-2-butene	30	Trichloroethene	5
Dichlorodifluoromethane	80	Trichlorofluoromethane	10
1,1-Dichloroethane	5	1,2,3-Trichloropropane	10
1,2-Dichloroethane	5	Vinyl acetate	10
1,1-Dichloroethene	5	Vinyl chloride	10
trans-1,2-Dichloroethene	5	Xylenes (total)	5

* Multiply water quantitation limit by one (1) to get soil quantitation limit.

TABLE 7.7

APPENDIX IX SEMIVOLATILE ORGANIC ANALYSIS WATER

QUANTITATION LIMITS

Compound	Quantitation* Limit µg/liter (ppb)	Compound	Quantitation* Limit µg/liter (ppb)
Acenaphthene	10	o-Cresol	10
Acenaphthylene	10	p-Cresol	10
Acetophenone	10	Diallate	10
2-Acetylaminofluorene	10	Dibenz(a,h)anthracene	10
4-Aminobiphenyl	50	Dibenzofuran	10
Aniline	50	Di-n-butyl phthalate	10
Anthracene	10	o-Dichlorobenzene	10
Aramite	10	m-Dichlorobenzene	10
Benzo(a)anthracene	10	p-Dichlorobenzene	10
Benzo(b)fluoranthene	10	3-3'-Dichlorobenzidine	20
Benzo(k)fluoranthene	10	2,4-Dichlorophenol	10
Benzo(g,h,i)perylene	10	2,6-Dichlorophenol	10
Benzo(a)pyrene	10	Diethyl phthalate	10
Benzyl alcohol	10	p-(Dimethylamino)azobenzene	30
bis(2-Chloroethoxy)methane	10	7,12-Dimethylbenz(a)anthracene	20
bis(2-Chloroethyl)ether	10	3-3'-Dimethylbenzidine	80
bis(2-Chloro-1-methylethyl) ether	10	alpha, alpha-Dimethyl-phenethylamine	10
bis(2-Ethylhexyl)phthalate	10	2,4-Dimethylphenol	10
4-Bromophenyl phenyl ether	10	Dimethyl phthalate	10
Butyl benzyl phthalate	10	m-Dinitrobenzene	10
p-Chloroaniline	10	4,6-Dinitro-o-cresol	50
p-Chloro-m-cresol	10	2,4-Dinitrophenol	50
2-Chloronaphthalene	10	2,4-Dinitrotoluene	10
2-Chlorophenol	10	2,6-Dinitrotoluene	10
4-Chlorophenyl phenyl ether	10	Dinoseb	20
Chrysene	10	Di-n-octyl phthalate	10
m-Cresol	10	Diphenylamine	10

* = Multiply water quantitation limit by 33 to get soil quantitation limit.

TABLE 7.7

(continued)

APPENDIX IX SEMIVOLATILE ORGANIC ANALYSIS WATER (page 2)

QUANTITATION LIMITS

Compound	Quantitation* Limit µg/liter (ppb)	Compound	Quantitation* Limit µg/liter (ppb)
Ethyl methacrylate	20	N-Nitrosodiethylamine	10
Ethyl methanesulfonate	10	N-Nitrosodimethylamine	10
Fluoranthene	10	N-Nitrosodiphenylamine[1]	10
Fluorene	10	N-Nitrosodipropylamine	10
Hexachlorobenzene	10	N-Nitrosomethylethylamine	10
Hexachlorobutadiene	10	N-Nitrosomorpholine	10
Hexachlorocyclopentadiene	10	N-Nitrosopiperidine	10
Hexachloroethane	10	N-Nitrosopyrrolidine	10
Hexachlorophene	500	5-Nitro-o-toluidine	20
Hexachloropropene	20	Pentachlorobenzene	20
Indeno(1,2,3-cd)pyrene	10	Pentachloroethane	20
Isophorone	10	Pentachloronitrobenzene	20
Isosafrole	10	Pentachlorophenol	50
Methapyrilene	40	Phenacetin	10
3-Methylcholanthrene	30	Phenanthrene	10
Methyl methanesulfonate	10	Phenol	10
2-Methylnaphthalene	10	p-Phenylenediamine	50
Naphthalene	10	2-Picoline	70
1,4-Naphthoquinone	10	Pronamide	30
1-Naphthylamine	120	Pyrene	10
2-Naphthylamine	170	Safrole	10
o-Nitroaniline	50	1,2,4,5-Tetrachlorobenzene	10
m-Nitroaniline	50	2,3,4,6-Tetrachlorophenol	10
p-Nitroaniline	50	Tetraethyl dithiopyrophosphate	10
Nitrobenzene	10	o-Toluidine	10
o-Nitrophenol	10	1,2,4-Trichlorobenzene	10
p-Nitrophenol	50	2,4,5-Trichlorophenol	50
4-Nitroquinoline 1-oxide	10	2,4,6-Trichlorophenol	10
N-Nitrosodi-n-butylamine	20	0,0,0-Triethyl phosphorothioate	10
		sym-Trinitrobenzene	10

[1] = Cannot be separated from diphenylamine.

* = Multiply water quantitation limit by 33 to get soil quantitation limit.

TABLE 7.8

APPENDIX IX PESTICIDE AND PCB ANALYSIS - WATER

QUANTITATION LIMITS

Compound	Quantitation* Limit µg/liter (ppb)	Compound	Quantitation* Limit µg/liter (ppb)
α-BHC	0.050	endrin ketone	0.10
β-BHC	0.050	α-chlordane	0.50
δ-BHC	0.050	γ-chlordane	0.50
γ-BHC (lindane)	0.050	toxaphene	1.0
heptachlor	0.050	Aroclor 1016	0.50
aldrin	0.050	Aroclor 1221	0.50
heptachlor epoxide	0.050	Aroclor 1232	0.50
endosulfan I	0.050	Aroclor 1242	0.50
dieldrin	0.10	Aroclor 1248	0.50
4,4'-DDE	0.10	Aroclor 1254	1.0
endrin	0.10	Aroclor 1260	1.0
endosulfan II	0.10	isodrin	0.050
4,4'-DDD	0.10	chlorobenzilate	0.50
endosulfan sulfate	0.10	kepone	0.10
4,4'-DDT	0.10	endrin aldehyde	0.10
methoxychlor	0.50	chlordane	0.50

* = Multiply water quantitation limit by 160 to get soil quantitation limits.

TABLE 7.9

APPENDIX IX METALS ANALYSIS

QUANTITATION LIMITS

Compound	Water µg/liter (ppb)	Soil mg/kg (ppm)
Antimony	30	6
Arsenic	30	6
Barium	2	0.4
Beryllium	1	0.2
Cadmium	5	1.0
Chromium	10	2
Cobalt	20	4
Copper	10	2
Lead	30	6
Mercury	0.2	0.04
Nickel	20	4
Selenium	60	12
Silver	5	1.0
Thallium	30	6
Tin	20	4
Vanadium	10	2
Zinc	5	1.0

TABLE 7.10

APPENDIX IX CHLOROPHENOXY HERBICIDES QUANTITATION LIMITS

Compound	Quantitation Limit Water (ppb)	Quantitation Limit Soil (ppm)
2,4-D	0.04	0.02
2,4,5-T	0.01	0.005
2,4,5-TP	0.01	0.005

TABLE 7.11

APPENDIX IX ORGANOPHOSPHORUS PESTICIDES QUANTITATION LIMITS

Compound	Quantitation Limit Water (ppb)	Quantitation Limit Soil (ppm)
Demethoate	0.5	0.2
Disulfoton	0.5	0.2
Famphur	1	1[1]
Parathion, ethyl	0.5	0.2
Parathion, methyl	0.5	0.2
Phorate	0.5	0.2
Sulfotepp	0.5	0.2
Thionazin	0.5	1[1]

[1] = Famphur and thionazin are not routinely analyzed for. Detection limits listed are estimates.

TABLE 7.12

MISCELLANEOUS AND APPENDIX IX QUANTITATION LIMITS

Dioxins and Furans - no set quantitation limits; varies from 1-10 ppt

	Water		Soil
CN- (Appendix IX)	0.01	mg/liter	0.5 mg/kg
Sulfide (Appendix IX)	0.2	mg/liter	2 mg/kg
Lead (USEPA 239.2)	2	μg/liter	---
1,2-Dibromoethane (504.1)	0.05	μg/liter	---
Arsenic (6010)	0.03	mg/liter	---
Barium (6010)	0.002	mg/liter	---
Cadmium (6010)	0.005	mg/liter	---
Chromium (6010)	0.01	mg/liter	---
Lead (7421)	0.002	mg/liter	---
Manganese (6010)	0.002	mg/liter	---
Selenium (7740)	0.002	mg/liter	---
Silver (6010)	0.005	mg/liter	---
Zinc (6010)	0.005	mg/liter	---
Mercury (7470)	0.0002	mg/liter	---

TABLE 7.13

SURROGATE SPIKE RECOVERY RANGE

Fraction	Surrogate Compound	Water % Recovery	Soil/Sediment % Recovery
Volatiles			
	toluene-d_8	88-110	81-117
	4-bromofluorobenzene	86-115	74-121
	1,2-dichloroethane-d_4	76-114	70-121
Semivolatiles	nitrobenzene-d_5	35-114	23-120
	2-fluorobiphenyl	43-116	30-115
	p-terphenyl-d_{14}	33-141	18-137
	phenol-d_5	10-94	24-113
	2-fluorophenol	21-100	25-121
	2,4,6-tribromophenol	10-123	19-122
Pesticides			
	dibutylchlorendate	24-154	24-150

TABLE 7.14

MATRIX SPIKE RECOVERY LIMITS* and RPD LIMITS*

Fraction	Matrix Spike Compound	Recovery Water*	Recovery Soil/ Sediment*	RPD Water*	RPD Soil*
VOA	1,1-dichloroethene	61-145	59-172	14	22
VOA	trichloroethene	71-120	62-137	14	24
VOA	chlorobenzene	76-127	66-142	11	21
VOA	toluene	76-125	59-139	13	21
VOA	benzene	75-130	60-133	13	21
BN	1,2,4-trichlorobenzene	39-98	38-107	28	23
BN	acenaphthene	46-118	31-137	31	19
BN	2,4-dinitrotoluene	24-96	28-89	38	47
BN	pyrene	26-127	35-142	31	36
BN	n-nitrosodi-n-propylamine	41-116	41-126	38	38
BN	1,4-dichlorobenzene	36-97	28-104	28	27
Acid	pentachlorophenol	9-103	17-109	50	47
Acid	phenol	12-89	26-90	42	35
Acid	2-chlorophenol	27-123	25-102	40	50
Acid	4-chloro-3-methylphenol	23-97	26-103	42	33
Acid	4-nitrophenol	10-80	11-114	50	50
Pest.	lindane	56-123	46-127	15	50
Pest.	heptachlor	40-131	35-130	20	31
Pest.	aldrin	40-120	34-132	22	43
Pest.	dieldrin	52-126	31-134	18	38
Pest.	endrin	56-121	42-139	21	45
Pest.	4,4'-DDT	38-127	23-134	27	50
Metals;CN		75-125	75-125	20	20

* = These limits are for advisory purposes only. They are not to be used to determine if a sample should be reanalyzed. When sufficient multi-lab data are available, standard limits will be calculated.

TABLE 7.15

MATRIX SPIKE RECOVERY LIMITS* and RPD LIMITS*

APPENDIX IX HERBICIDES AND ORGANOPHOSPHORUS PESTICIDES

Fraction	Matrix Spike Compound	Water* % R	Water* RPD	Soil* % R	Soil* RPD
Herb.					
	2,4-D	0-173	55	31-154	37
	2,4,5-T	0-173	55	31-154	37
	2,4,5-TP	0-173	55	31-154	37
Organophosphorus Pesticides					
	dimethoate	8-174	44	24-130	16
	disulfoton	8-174	44	24-130	16
	Famphur	8-174	44	24-130	16
	ethyl parathion	8-174	44	24-130	16
	methyl parathion	8-174	44	24-130	16
	phorate	8-174	44	24-130	16
	sulfotepp	8-174	44	24-130	16
	thionazin	8-174	44	24-130	16

* = Limits are method specific, not compound specific.

TABLE 7.16

POLYNUCLEAR AROMATIC HYDROCARBONS

USEPA METHOD 610

Compound	Quantitation Limit (µg/liter or ppb)	Acceptability Range* % Recovery	RPD
Acenaphthene	0.016	D - 124	53
Acenaphthalene	0.016	D - 139	42
Anthracene	0.008	D - 126	41
Benzo(a)anthracene	0.008	12 - 135	34
Benzo(a)pyrene	0.008	D - 128	53
Benzo(b)fluoranthene	0.008	6 - 150	38
Benzo(g,h,i)perylene	0.008	D - 116	58
Benzo(k)fluoranthene	0.008	D - 159	69
Chrysene	0.008	D - 199	66
Dibenzo(a,h)anthracene	0.008	D - 110	45
Fluoranthene	0.008	14 - 123	32
Fluorene	0.008	D - 142	63
Indeno(1,2,3-cd)pyrene	0.008	D - 116	42
Naphthalene	0.016	D - 122	41
Phenanthrene	0.008	D - 155	47
Pyrene	0.008	D - 140	42

D = Detected, result must be greater than zero.
* = Taken from USEPA Method 610.

TABLE 7.17 PART 1

HALOGENATED VOLATILE ORGANICS

USEPA METHOD 8010-MOD

Compound	Detection Limit		Acceptability Criteria	
	Water[1] µg/L	Soil[2] µg/kg	% Recovery	RPD
Bromodichloromethane	0.10	1.0	42 - 172	20
Bromoform	0.20	2.0	13 - 159	21
Bromomethane	1.18	*	D - 144	36
Carbon tetrachloride	0.12	1.2	43 - 143	20
Chlorobenzene	0.25	2.5	38 - 150	18
Chloroethane	0.52	5.2	46 - 137	17
2-Chloroethylvinyl ether	0.13	*	14 - 186	35
Chloroform	0.05	0.5	49 - 133	19
Chloromethane	0.08	1.3	D - 193	52
Dibromochloromethane	0.09	0.8	24 - 191	24
1,2-Dichlorobenzene	0.15	1.5	D - 208	13
1,3-Dichlorobenzene	0.32	3.2	7 - 187	26
1,4-Dichlorobenzene	0.24	2.4	42 - 143	20
Dichlorodifluoromethane	1.81	*	*	*
1,1-Dichloroethane	0.07	0.7	47 - 132	14
1,2-Dichloroethane	0.03	0.3	51 - 137	15
1,1-Dichloroethene	0.13	1.3	28 - 167	29
trans-1,2-Dichloroethene	0.10	1.0	38 - 155	17
1,2-Dichloropropane	0.04	0.4	44 - 156	23
cis-1,3-Dichloropropene	0.34	*	22 - 178	32
trans-1,3-Dichloropropene	0.20	3.4	22 - 178	32
Methylene chloride	0.25	*	25 - 162	21
1,1,2,2-Tetrachloroethane	0.03	0.3	8 - 184	23
Tetrachloroethene	0.03	0.3	26 - 162	18
1,1,1-Trichloroethane	0.03	0.3	41 - 138	20
1,1,2-Trichloroethane	0.02	0.2	39 - 136	19
Trichloroethene	0.12	1.2	35 - 146	23
Trichlorofluoromethane	ND	*	21 - 156	26
Vinyl chloride	0.18	1.8	28 - 163	27

[1]EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, March 1983.

[2]Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 3rd. ed., SW-846, USEPA, 1986.

D - Detected; result must be greater than zero.

* - Method does not list value(s) for this limit/parameter.

TABLE 7.17 PART 2

AROMATIC VOLATILE ORGANICS

USEPA METHOD 8020-MOD

Compound	Detection Limit		Acceptability Criteria	
	Water[1] µg/L	Soil[2] µg/kg	% Recovery	RPD
Benzene	0.2	2.0	39 - 150	21
Chlorobenzene	0.2	2.0	55 - 135	17
1,4-Dichlorobenzene	0.3	3.0	37 - 154	22
1,3-Dichlorobenzene	0.4	4.0	50 - 141	19
1,2-Dichlorobenzene	0.4	4.0	42 - 143	20
Ethylbenzene	0.2	2.0	32 - 160	26
Toluene	0.2	2.0	46 - 148	18
Xylenes	*	*	*	*

[1]EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, March 1983.

[2]Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 3rd. ed., SW-846, USEPA, 1986.

D - Detected; result must be greater than zero.

* - Method does not list value(s) for this limit/parameter.

TABLE 7.18

PESTICIDES/PCPs

USEPA METHOD 8080[1]

Compound	Detection Limit		Acceptability Criteria*	
	Water µg/L	Soil µg/kg	% Recovery	RPD
Aldrin	0.04	2.7	42 - 122	20
α-BHC	0.03	2.0		
β-BHC	0.06	4.0		
δ-BHC	0.09	6.0		
γ-BHC (Lindane)	0.04	2.7	32 - 127	22
Chlordane (Technical)	0.14	9.4		
4,4'-DDD	0.11	7.4		
4,4'-DDE	0.04	2.7		
4,4'-DDT	0.12	8.0	25 - 160	31
Dieldrin	0.02	1.3	36 - 146	16
Endosulfan I	0.14	9.4		
Endosulfan II	0.04	2.7		
Endosulfan sulfate	0.66	44		
Endrin	0.06	4.0	30 - 147	24
Endrin aldehyde	0.23	15		
Heptachlor	0.03	2.0	34 - 111	16
Heptachlor epoxide	0.83	56		
Methoxychlor	1.8	120		
Toxaphene	2.4	160		
PCB 1016	0.65	44		
PCB 1221	0.65	44		
PCB 1232	0.65	44		
PCB 1242	0.65	44		
PCB 1248	0.65	44		
PCB 1254	1.3	87		
PCB 1260	1.3	87		

[1]Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 3rd. ed., SW-846, USEPA, 1986.

* - For matrix spike/matrix spike duplicate.

TABLE 8-1
DATA SET DELIVERABLES FOR LEVEL C QA

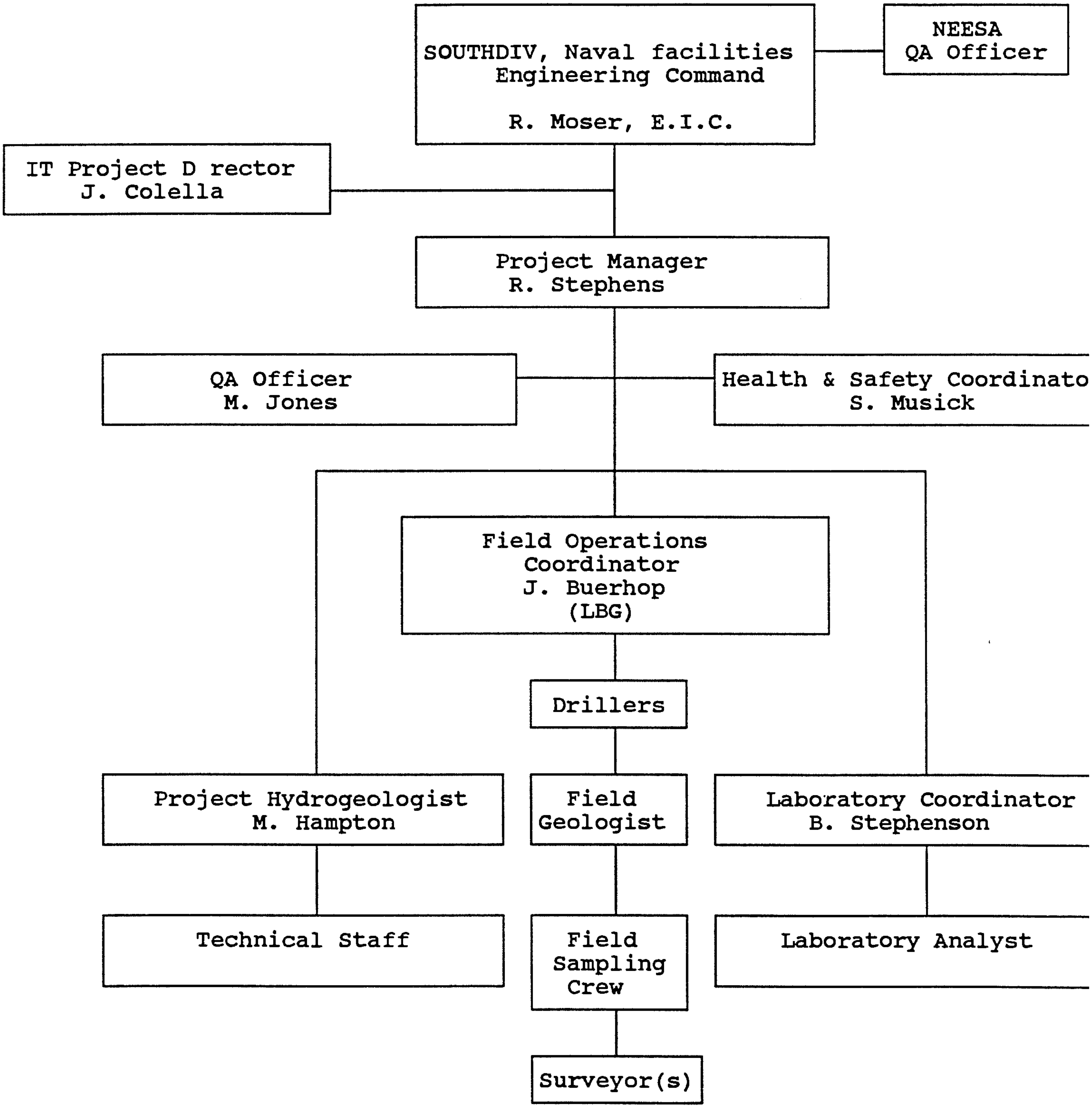
		Method requirements	Deliverables
Organics	-	Method blank spikes with results and control charts. Run with each batch of samples processed.	Control chart
	-	Results to be reported on CLP Form 1 or spreadsheet per Sect. 9. Sample results using CLP data flags.	Form 1 or Sect. 9 1/Sample chromatograms/and mass spectra
	-	Surrogate recovery from samples reported on CLP Form 2. Surrogates to be used in volatiles should be changed to reflect the surrogate used.	Form 2
	-	Matrix spike/spike duplicate 1 spike and spike duplicate per 20 samples of similar matrix reported on Form 3.	Form 3
	-	Method blank reported on CLP Form 4.	Form 4 or Sect. 9
		For volatiles by GC, a similar format will be used as CLP Form 4 for blanks.	
	-	GC/MS tuning for volatiles/semivolatiles. Report results on Form 5.	Form 5
	-	Initial calibration data reported on Form 6.	Form 6
		For volatiles by GC, the initial calibration data with response factors must be reported.	No Form
		For pesticide/PCB data Form 9 must be used for calibration data.	Form 9
	-	Continuing calibration GC/MS data reported on Form 7.	Form 7
		Volatiles, GC data, the response factors and their percent differences from the initial must be reported.	No Form
		Internal Standard Area for Volatiles and Semivolatiles.	Form 8

TABLE 8-1 (Continued)
DATA SET DELIVERABLES FOR LEVEL C QA

		Method requirements	Deliverables
Organics (cont'd)	-	For pesticides/PCB data, the CLP Form and Semivolatiles	Form 9
		No chromatograms or mass spectra are presented for calibration. These data should be filed in the laboratory and available if problems arise in reviewing/ validating the data. The calibration information should be available for checking during on-site audits.	
	-	Internal standard area for GC/MS analyses CLP Form VIII shall be supplied.	
	-	Second column confirmation shall be done for all GC work when compounds are detected above reporting limits. Chromatograms of confirmation must be provided.	Chromatograms
Metals	-	Level C, requirements	Deliverables
	-	Sample results with CLP flagging system.	CLP Form 1 or Sect. 9
	-	Initial and continuing calibration	CLP Form 2, Part 1 only
	-	Blanks 10% frequency	Form 3
	-	Method blank taken through digestion (1/20 samples of same matrix)	Form 3 or Sect. 9
	-	ICP interference check sample	Form 4
	-	Matrix spike recovery (1 per 20 samples of similar matrix)	Form 5, Part 1
	-	Postdigestion spike sample recovery for ICP metals. Only done if predigest spike recovery exceed CLP limits.	Form 5, Part 2 (never used for GFAA work)
	-	Postdigest spike for GFAA	Recovery will be noted on raw data

FIGURE 2-1

PROJECT ORGANIZATION CHART
CONTAMINATION ASSESSMENT
NAS-KEY WEST
KEY WEST, FLORIDA



INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 4-1

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE			
NO.			
SHEET	OF		

PROJECT NAME	PROJECT NO.
FIELD ACTIVITY SUBJECT:	
DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:	
VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE	DATE:

327--7-86

INTERNATIONAL
TECHNOLOGY
CORPORATION

FIGURE 4-2

FIELD ACTIVITY DAILY LOG CONTINUATION SHEET

DAILY LOG			
DATE			
NO.			
SHEET		OF	

PROJECT NAME	PROJECT NO.
FIELD ACTIVITY SUBJECT	
DESCRIPTION ON DAILY ACTIVITIES AND EVENTS	

632-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 5-1

DATE					
TIME					
PAGE ____ OF ____					
PAGE					
PROJECT NO.					

SAMPLE COLLECTION LOG

PROJECT NAME ________________________________

SAMPLE NO. ________________________________

SAMPLE LOCATION ________________________________

SAMPLE TYPE ____________________

COMPOSITE ______ YES ______ NO

COMPOSITE TYPE ____________________

DEPTH OF SAMPLE ____________________

WEATHER ____________________

CONTAINERS USED	AMOUNT COLLECTED

COMMENTS:

PREPARED BY: ____________________

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. ____________

C/C Control No. 130239

PROJECT NAME/NUMBER ____________ LAB DESTINATION ____________

SAMPLE TEAM MEMBERS ____________ CARRIER/WAYBILL NO. ____________

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.

Special Instructions: ____________

Possible Sample Hazards: ____________

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: ____________

   Received By: ____________

2. Relinquished By: ____________

   Received By: ____________

3. Relinquished By: ____________

   Received by: ____________

4. Relinquished By: ____________

   Received By: ____________

WHITE - To accompany samples
YELLOW - Field copy

FIGURE 5-2

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 128680
C/C Control No. ______

PROJECT NAME ______

PROJECT NUMBER ______

PROJECT MANAGER ______

BILL TO ______

______

______

PURCHASE ORDER NO. ______

DATE SAMPLES SHIPPED ______

LAB DESTINATION ______

LABORATORY CONTACT ______

SEND LAB REPORT TO ______

______

______

DATE REPORT REQUIRED ______

PROJECT CONTACT ______

PROJECT CONTACT PHONE NO. ______

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions

TURNAROUND TIME REQUIRED: (Rush must be approved by the Project Manager.)

Normal ______ **Rush** ______ (Subject to rush surcharge)

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances)

Nonhazard ______ **Flammable** ______ **Skin Irritant** ______ **Highly Toxic** ______ **Other** ______ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, and disposal.)

Return to Client ______ **Disposal by Lab** ______

FOR LAB USE ONLY

Received By ______ **Date/Time** ______

WHITE - Original, to accompany samples
YELLOW - Field copy

FIGURE 5-2

FIGURE 6-1

FIELD EQUIPMENT CALIBRATION RECORD[1]

PROJECT NAME ____________________ DATE ____________
PROJECT NUMBER ____________________ PERSONNEL ____________

EQUIPMENT IDENTIFICATION ____________________
EQUIPMENT NAME ____________________
REQUIRED CALIBRATION PERIOD ____________________

CALIBRATION TECHNIQUE[2] ____________________

REMARKS ____________________

NOTES: (1) THIS RECORD SHALL BE COMPLETED FOR ALL EQUIPMENT CALIBRATED IN THE FIELD.

(2) IF APPLICABLE, CITE REFERENCE

APPENDIX A

LABORATORY AUDIT COMPLETION EXHIBITS

EXHIBIT A-1

MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX 2003
OAK RIDGE, TENNESSEE 37831

March 8, 1989

MAR 10 1989

Ms. Alice Moore
IT Corporation
5815 Middlebrook Pike
Knoxville, TN 37921

Dear Ms. Moore:

Laboratory Audit for HAZWRAP and Navy IR Projects

The Analytical Chemistry Department (ACD) of Martin Marietta Energy Systems, Inc., at the ORGDP (K-25) is the organization in charge of the "Analytical Laboratory Approval" as defined in the Hazardous Waste Remedial Action Program (HAZWRAP) document DOE/HWP-65. The ACD also serves in a similar capacity for the Naval Energy and Environmental Support Activity/Remedial Investigation Programs.

This correspondence is to confirm our telephone conversation regarding the upcoming audit of your facility. Our audit team will include Gloria Mencer and myself. We plan to be at your laboratory on Wednesday, March 15, 1989, at approximately 8:30 a.m. It is anticipated the audit will comprise the full working day. Topics to be discussed will include the Laboratory Quality Assurance Plan; the most recent Performance Evaluation Test Sample results; and the actual tour/inspection of your laboratory facility. The inspection will follow the sample route through the lab including discussions with supervisors and analysts responsible for the sample analysis. We hope to achieve this with minimal interruptions to the normal operation of your facility. At the end of the day, we will present a summary of our findings and recommendations at a close-out meeting.

If you have any questions, please do not hesitate to contact me at 615-574-8752.

Sincerely,

Nile A. Luedtke
Nile A. Luedtke
Project Manager

NAL:mpo

cc: A. A. Halouma
G. J. Mencer
M. S. Miller
N. A. Luedtke File (2)

MARTIN MARIETTA

EXHIBIT A-2

MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX 2003
OAK RIDGE, TENNESSEE 37831

June 19, 1989

Ms. Elizabeth Y. Towery
Quality Control Coordinator
IT Analytical Laboratories
5815 Middlebrook Pike
Knoxville, TN 37921

JUN 21 1989

Dear Ms. Towery:

Response to Letter Dated May 24, 1989, in Regard to Laboratory Audit

Item 1: We understand that it is an IT policy to check the pH of preserved samples just prior to analysis. However, it is our policy that the pH be checked immediately upon receipt to identify potential problems with sample preservation. An incorrectly preserved sample would be more difficult to re-collect if the sampling crew had already left the site. Early detection of problems would increase the likelihood of re-collection being possible with the least expense. Please implement this for samples associated with the HAZWRAP program. No response is necessary.

Item 3: Response accepted.

Item 4: Response accepted.

The corrective actions implemented in response to the audit findings are satisfactory. This correspondence closes all open audit findings and completes the approval process. Therefore, as analytical QA/QC representatives for HAZWRAP, approval is hereby granted to the IT Knoxville facility to perform analyses related to HAZWRAP General Order Contract projects.

Sincerely,

Gaye G. Jolly

Gaye G. Jolly
Project Manager

GGJ:mpo

cc: P. J. Franco, HAZWRAP
A. A. Halouma
D. B. Jones, HAZWRAP
M. S. Miller
R. W. Morrow
L. A. Pocratsky, IT-Knoxville
G. G. Jolly File (2)

EXHIBIT A-3

MARTIN MARIETTA

MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX 2003
OAK RIDGE, TENNESSEE 37831

September 12, 1989

Ms. Sis Dreesman
Technical Director
IT Analytical Services
Santa Clara Valley Laboratory
2055 Junction Avenue
San Jose, California 95131

Dear Ms. Dreesman:

Thank you for your letter of September 8, 1989. All corrective responses that were outstanding as outlined in Ms. Jolly's letter of August 8, 1989, have been answered. By receipt of this letter, our evaluation of IT-Santa Clara is complete. Therefore, as analytical QA/QC representatives for HAZWRAP, approval is granted to IT-Santa Clara to perform analysis related to HAZWRAP General Order Projects.

Sincerely,

Max H. Feller
Project Manager

MHF:mpo

cc: P. J. Franco, HAZWRAP
A. A. Halouma
G. G. Jolly
D. B. Jones, HAZWRAP
M. S. Miller
A. L. Porell, HAZWRAP
R. D. Westmoreland
Laboratory File
Letter File
M. H. Feller

SAMPLING AND ANALYSIS PLAN
NAVAL AIR STATION-KEY WEST (UIC N00213)
KEY WEST, FLORIDA

PART II
FIELD SAMPLING PLAN

TABLE OF CONTENTS

PAGE

LIST OF FIGURES iii
ACRONYMS AND SYMBOLS iv
1.0 SITE BACKGROUND 1-1
1.1 LOCATION 1-1
1.2 CLIMATE 1-1
1.3 BIOLOGICAL FACTORS 1-1
1.4 GEOLOGY/HYDROGEOLOGY 1-2
1.5 SURFACE WATER HYDROGEOLOGY 1-2
1.6 MIGRATION POTENTIAL 1-2
1.7 POTENTIAL CONTAMINATION RECEPTORS 1-3
1.8 SITE 1 - TRUMAN ANNEX REFUSE DISPOSAL AREA 1-3
1.9 SITE 3 - TRUMAN ANNEX DDT MIXING AREA 1-3
1.10 SITE 4 - BOCA CHICA OPEN DISPOSAL AREA 1-3
1.11 SITE 5 - BOCA CHICA DDT MIXING AREA 1-4
1.12 SITE 7 - FLEMING KEY NORTH LANDFILL 1-4
1.13 SITE 8 - FLEMING KEY SOUTH LANDFILL 1-5
1.14 SITE 9 - TRUMBO POINT ANNEX FUEL FARM AND PIERS 1-5
1.15 SITE 10 - BOCA CHICA FIRE FIGHTING TRAINING AREA 1-5
2.0 SAMPLING OBJECTIVES 2-1
2.1 LANDFILLS 2-1
2.2 FUEL SITES 2-2
2.3 DDT MIXING AREAS 2-2
3.0 SAMPLING LOCATION AND FREQUENCY 3-1
4.0 SAMPLE DESIGNATION 4-1
5.0 SAMPLING AND EQUIPMENT PROCEDURES 5-1
5.1 SOIL SAMPLING 5-1
5.1.1 Surface Soils 5-1
5.1.2 Sediments 5-1
5.1.3 Trenches 5-1
5.1.4 Soil Borings 5-2
5.1.4.1 Excess Soil Contamination........ 5-3
5.2 GROUND WATER SAMPLING TECHNIQUES 5-3
5.2.1 Monitoring Well Installation 5-3
5.2.2 Monitoring Well Development 5-5
5.2.3 Liquid Level Measurements 5-6
5.2.4 Well Purging (Evacuation) Procedures 5-7
5.2.4.1 Volume Determination 5-7
5.2.4.2 Placement of Intake Hose 5-7
5.2.4.3 Pumping Rate 5-7
5.2.4.4 Volume Purged 5-8
5.2.4.5 Well Stabilization 5-8
5.2.5 Ground Water Sample Collection 5-8
5.3 SURFACE WATER SAMPLING 5-11
5.4 AMBIENT AIR MONITORING 5-11
5.5 PIPE LEAK DETECTION 5-11
5.6 PROCEDURE FOR DECONTAMINATION OF DRILLING AND SAMPLING EQUIPMENT 5-12
6.0 SAMPLE HANDLING AND ANALYSIS 6-1
6.1 FIELD STORAGE AND SHIPMENT OF SAMPLES 6-1
6.2 SAMPLE CUSTODY 6-1
6.3 SAMPLE ANALYSIS 6-1
FIGURES

LIST OF FIGURES

Figure No.	Title
1-1	Locations of Naval Activities and Study Sites
1-2	Investigation and Sampling Locations Truman Annex Refuse Disposal Area, Site 1
1-3	Investigation and Sampling Locations Truman Annex DDT Mixing Area, Site 3
1-4	Investigation and Sampling Locations Boca Chica Open Disposal Area, Site 4
1-5	Investigation and Sampling Locations Boca Chica DDT Mixing Area, Site 5
1-6	Investigation and Sampling Locations Fleming Key North Landfill, Site 7
1-7	Investigation and Sampling Locations Fleming Key South Landfill, Site 8
1-8	Investigation and Sampling Locations Trumbo Point Annex Fuel Farm and Piers, Site 9
1-9	Investigation and Sampling Locations Boca Chica Fire Fighting Training Area, Site 10
4-1	Sample Label
5-1	Visual Classification of Soils
5-2	Monitor Well Installation Sheet
5-3	Sample Collection Log (Front)
5-4	Sample Collection Log (Back)

ACRONYMS AND SYMBOLS

TITLE	DEFINITION
ACGIH	American Council of Governmental and Industrial Hygienist
ADI	Average Daily Intake
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society of Testing and Materials
BW	Body Weight
CAG	Carcinogenic Assessment Group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGA	Combustible Gas Analyzer (Exposimeter)
CLP	USEPA Contract Laboratory Program
CNO	Chief of Naval Operations
CPR	Cardio Pulmonary Resuscitation
CRPO	Community Relations Plan Outline
CRQL	Contract Required Quantification Limits
C_s	Concentration of Soil
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DDT	Dichloro-Diphenyl-Trichloroethane
DDD	Dichloro-Diphenyl-Dichloroethane
DDE	Dichloro-Diphenyl-Dichloro-Ethylene
DMP	Data Management Plan
DOD	U.S. Department of Defense
DOT	U.S. Department of Transportation
DPDO	Defense Property Disposal Office
DQO	Data Quality Objectives
EFD	Engineering Field Division
EIC	Engineer-in-Charge
EP	Extraction Procedure/Exposure Period
FAC	Florida Administrative Code
FDER	Florida Department of Environmental Regulations
FEV/FVC	Forced Expiratory Volume/Forced Vital Capacity
FGFFC	Florida Game and Fresh Water Fish Commission
FID	Flame Ionization Detector

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
FOC	Field Operations Coordinator
FS	Feasibility Study
FSP	Field Sampling Plan
GAC	Granular Activated Carbon
G&M	Geraghty and Miller
gpm	Gallons per Minute
HRS	Hazard Ranking System
HSC	Health and Safety Coordinator
HSP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments of 1984
IAS	Initial Assessment Study
IBM PC	International Business Machine Corp. Personal Computer
ICRP	International Council on Radiation Protection
IR	Average Soil Ingestion Rate
IRP	Installation Restoration Program
IT	IT Corporation
ITAS	IT Analytical Services
LBG	Leggette, Brashears, and Graham, Inc.
LEL	Lower Explosive Limit
LIMS	Laboratory Information Management Systems
mg/kg	Milligrams/Kilogram
mg/L	Milligrams/Liter
MS DOS	Microsoft Disk Operating System
MSA	Mine Safety Administration
MSL	Mean Sea Level
NACIP	Navy Assessment and Control of Installation Pollutants
NAS	Naval Air Station
NAVENENVSA	Naval Energy and Environmental Support Activity
NAVFACENGCOM	Navy Facilities Engineering Command

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
NCP	National Oil and Hazardous Substances Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NEPPS	Naval Environmental Protection Support Service
NFA	No Further Action
NIOSH	National Institute of Occupational Safety and Health
NPSS	Naval Environmental Protection Support Service
OSHA	Occupational Health and Safety Administration
OVA	Organic Vapor Analyzer
PAO	Public Affairs Officer
PC	Personal Computer
PCB	Polychlorinated Biphenyl
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PMP	Project Management Plan
ppb	Parts per Billion
PPE	Personnel Protection Equipment
ppm	Parts per Million
q	Cancer Potency Factor
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
R	Acceptable Incremental Lifetime Cancer Risk
RA	Risk Assessment or Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RV	Recreational Vehicle
SAP	Sampling and Analysis Plan

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
SARA	Superfund Amendments and Re-authorization Act
SCBA	Self Contained Breathing Apparatus
SI	Site Inspection
SMAC 20	Simultaneous Analysis Complete
SOUTHDIV	Southern Division, Naval Facilities Engineering Command
SOW	Statement of Work
TCL	Target Compound List
TDS	Total Dissolved Solids
TLV	Threshold Limit Value
TRC	Technical Review Committee
ug/L	Micrograms/Liter
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds
WBGT	Wet Globe Bulb Temperature Index

1.0 SITE BACKGROUND

The NAS-Key West sites covered by this FSP are site:

- Site 1 - Truman Annex Refuse Disposal Area
- Site 3 - Truman Annex DDT Mixing Area
- Site 4 - Boca Chica Open Disposal Area
- Site 5 - Boca Chica DDT Mixing Area
- Site 7 - Fleming Key North Landfill
- Site 8 - Fleming Key South Landfill
- Site 9 - Trumbo Point Annex Fuel Farm and Piers
- Site 10 - Boca Chica Fire Fighting Training Area

1.1 LOCATION

NAS-Key West is located approximately 150 miles southwest of Miami on the last major island of the Florida Keys. The general location of NAS-Key West is shown on the area map in Figure 1-1. It is connected to the mainland by the Overseas Highway (U.S. Highway No. 1). Tourism is the primary industry in the Key West area. Visitors are attracted by the tropical climate and the beautiful island setting. Fishing is the second most important industry with shrimping accounting for half the total catch.

1.2 CLIMATE

Key West has a mild, tropical-maritime climate with a winter temperature average of only 14°F lower than in summer. The average annual rainfall is 40 inches with numerous, heavy showers and thunderstorms during the wet season months of June through October. The area is typically flat with ground elevations ranging from 0 to 15 feet above mean sea level (MSL).

1.3 BIOLOGICAL FACTORS

The Key West Naval Complex includes areas such as Truman Annex and Trumbo Point Annex that are completely developed. Other areas such as portions of Boca Chica, Saddlebunch, and Demolition Island are mostly cleared land. Around the periphery of these islands are mangrove swamps and salt marshes in intertidal areas, grading into marine grass flats in sub-tidal areas. Areas cleared and left fallow have come back with an Australian Pine monoculture or thick cover of other early successionals.

In Florida there are 68 animal species considered endangered or threatened by either the United States Fish and Wildlife Service (USFWS) or the Florida Game and Freshwater Fish Commission (FGFFC). Eleven of these species have ranges that potentially overlap NAS-Key West. The list includes: the Key Silverside Fish, American Crocodile, Leatherback Turtles, Key Mud Turtles, Green Turtles, Kemp's Ridley Turtles, Hawksbill Turtles, Loggerhead Turtles, Eastern Brown Pelican, Bald Eagle, Least Tern, White-Crowned Pigeons, West Indian Manatee, and the Stock Island Tree Snail.

There are 325 plants listed as either endangered or threatened by the Florida Department of Agriculture. Of these, only seven now occur in the Key West area. The list includes: the Golden Leather Fern, Tree Cactus, Silver Thatch and Coconut Palms, Manchineel Tree, Florida Thatch Palm and the Brittle Thatch Palm. The tree cactus was recently designated an endangered species by the USFWS.

1.4 GEOLOGY/HYDROGEOLOGY

The Florida Keys were created through eustatic elevation of limestone rock units. All of the Lower Keys are composed of Miami Oolite, which consists of calcium carbonate and tiny oolids or spherical calcareous grains. Key Largo Limestone underlies the Miami Oolite on all the Lower Keys. It consists of cemented remains of ancient coral reefs, fossils and shells. The Miami Oolite is approximately 20 feet thick at Key West. It is a porous formation and of little use as a ground water aquifer because of its poor water quality. The underlying Key Largo Limestone is permeable and yields water but the quality is poor, being close to that of seawater. The Key Largo Limestone is approximately 180 feet thick at Key West.

Although the Keys are underlain by highly transmissive limestone aquifers, most ground water is brackish, saline or hypersaline. In the Key West area, freshwater wells of consequence do not exist and potable water is obtained by rainwater catchment or imported by pipeline by the Florida Keys Aqueduct Authority via a 150-mile pipeline from Miami. There are no freshwater public or domestic wells at NAS-Key West.

The areas under investigation in the keys are primarily low lying coastal area. Key West is largely at an elevation of less than 5 feet MSL with sections of the island as high as 10 feet MSL. The elevations of Boca Chica ares less than 5 feet MSL except for filled areas which underlie the Overseas Highway. Due to the low elevation, the keys are subject to tidal effects. However, the proximity of the ocean reduces the likelihood of flood due to effects other than tide such as rainfall.

Soils in Key West are primarily rockland, with some filled areas and mangroves. Boca Chica's soils are also rockland with some filled areas and mangrove swamps, but Boca Chica is used solely as a military base.

1.5 SURFACE WATER HYDROLOGY

The surface water regime in the Florida Keys is dominated by the surrounding saltwater bodies, the Atlantic Ocean and the Gulf of Mexico. The Florida Department of Environmental Regulation (FDER) classifies surface water in the Keys as Class III Waters - Recreational - Propagation and Management of Fish and Wildlife. In the immediate area of NAS-Key West are the Great White Heron National Wildlife Refuge and the Key West National Wildlife Refuge, which are classified by FDER as Outstanding Florida Water and are afforded the highest protection by the State. These waters are considered to be of exceptional recreational and ecological significance.

1.6 MIGRATION POTENTIAL

There is a potential for contamination migration to surface waters in the Key West area due to the porous nature of Miami Oolite and the underlying Key Largo

Limestone. Ground water under tidal influence flows with relative ease in and out of the aquifer, creating a flushing action for contaminant dispersal into the large volume of tidal waters. However, the potential impacts from the sites to the Atlantic Ocean and Gulf of Mexico resulting from the significant tidal flushing is assumed to be minimal.

1.7 POTENTIAL CONTAMINANT RECEPTORS

The major receptor is surface waters and in the Keys are classified as Class III Waters-Recreation-Propagation and Management of Fish and Wildlife. Common activities in the Key West area waters include commercial and recreational fishing and shell fishing, boating and swimming. These waters support the richest coral reefs in the continental United States. All of these are potentially impacted by pollution migrating into the surface water.

1.8 SITE 1 - TRUMAN ANNEX REFUSE DISPOSAL AREA

The Truman Annex Refuse Disposal Area is shown in detail on Figure 1-2. The site is reported to cover an area of approximately seven acres, including the antenna field and the area to the immediate north.

The subsurface at this site consists of landfill material in a shallow fill area with the landfill extending beyond the natural shoreline. Previous investigations reported that ground water in the area is approximately two to three feet below land surface and flow is in a southerly direction towards the Atlantic Ocean.

From 1952 until the mid-1960's, the Truman Annex Refuse Disposal Area was used for general refuse disposal and open burning. No restrictions were placed on the types of wastes disposed of at the site and it is believed that, in addition to general refuse, waste paint, thinners and solvents were also sent here for disposal.

1.9 SITE 3 - TRUMAN ANNEX DDT MIXING AREA

The Truman Annex DDT Mixing Area is shown in detail in Figure 1-3 and is located at the former site of Building 265, which has been demolished. The location of this site is shown on the vicinity map, Figure 1-1. The site covers an area of about 0.25 acres and is located approximately 1,100 feet inland from the coastline in an area subject to vehicular and pedestrian traffic. The site is underlaid by highly permeable soils and no surface water features are present. It is reported that ground water is about two to three feet below land surface and flows south toward the Atlantic Ocean; however, no monitoring wells have been installed at the site to confirm this information.

From the 1940's to the early 1970's, the location was used as a DDT mixing area. Powdered DDT concentrate was mixed with water and temporarily stored in 55-gallon drums both inside and outside the former building. The mixed solution was transferred to trucks for dispersal. Discharge at the site was by spillage.

1.10 SITE 4 - BOCA CHICA OPEN DISPOSAL AREA

The Boca Chica Open Disposal Area is shown in detail in Figure 1-4 and is located in the southeastern part of Boca Chica Key, between the perimeter road and Geiger Creek as shown on the vicinity map in Figure 1-1. The site was operated as an open disposal and burning area from 1942, to the mid-1960's. The site received general refuse and waste associated with the operation and maintenance of aircraft. These wastes might have included waste oils, hydraulic fluids, paint thinners and solvents.

About 2,600 tons of waste from the NAS were disposed of and burned at this site annually. Whenever possible, this burning area was cleared of any remaining debris left over from the burning process and deposited in an area of unknown dimensions to the north of the burning area. Because the burning operation was not a controlled process, all wastes may not have been completely destroyed. There may exist residual wastes within the burn area and/or debris zone.

The burn area is presently clear of any debris with the exception of four abandoned above-ground tanks located in the northwest portion of the site. Around one tank the sides, foundations and ground are covered with an unknown black asphalt like substance. The remaining three tanks are clustered together next to a scrap iron rod pile. Much of the area is subject to tidal inundation.

The debris area, of unknown size, has a predominant thick cover of mangrove trees, spotted with open areas of sea water. Debris can still be seen lying among the mangroves and in these open areas.

The presence of mangrove trees are indicative of a salt water environment and, therefore some connection to the sea must exist. This fact establishes the debris zone as a wetlands which is protected by State/Federal wetland regulations.

1.11 SITE 5 - BOCA CHICA DDT MIXING AREA

The Boca Chica DDT Mixing Area is shown in detail in Figure 1-5 and is located next to a man-made drainage ditch that is connected to a large borrow pit, along the west side of Runway 13. The location of this site is shown in Figure 1-1, on the vicinity map. DDT mixing operations were conducted at the site of Building 915 (demolished in 1982) from the 1940's to the early 1970's. To destroy insect larvae, the pesticides were mixed with waste fuel oil which allowed the pesticide to float on the surface of any standing water. Disposal at the site was not intentional but probably resulted from spillage. Two above-ground tanks on concrete foundations (a 500-gallon mixing tank and a 1,000-gallon storage tank) were located to the west of the building. During the removal of the tanks, some spillage reportedly occurred.

A slight odor of pesticide was detectable at the site during the on-site survey (July, 1989). A man-made drainage ditch is located just south of the site. Drainage from the ditch is to a large borrow pit to the east. The area near the demolished building is partly covered with sparse grass. The ditch has medium size mangroves around its banks. During the on-site survey, numerous fish were observed in the ditch.

1.12 SITE 7 - FLEMING KEY FLEMING KEY NORTH LANDFILL

Fleming Key North Landfill covers approximately 30 acres and is shown in detail in Figure 1-6 on the northern end of Fleming Key as shown in the vicinity map, Figure 1-1. Reportedly, 4,000 to 5,000 tons of unknown wastes were disposed into excavated trenches annually between 1952 and 1962. The trenches were typically cut 25 feet wide, 10 feet deep and 500 to 1,000 feet in length.

In 1977, the U.S. Department of Agriculture Animal Import Center constructed a building over a portion of the landfill. During the construction, wastes were excavated and transferred to an area immediately to the west. Current site plans include construction of a United States Army facility.

Ground water in the area is approximately three to four feet below the surface over much of the site and during trenching it is reported that saline ground water stood in the trenches.

1.13 SITE 8 - FLEMING KEY SOUTH LANDFILL

Fleming Key South Landfill covers approximately 45 acres and is shown in detail in Figure 1-7 on the southern end of Fleming Key as shown in the vicinity map, Figure 1-1. Reportedly, as much as 8000 tons of unknown wastes were disposed of at the landfill annually between 1962 and 1982. Beginning in 1966, the public works disposal activities of the City of Key West were combined with those of the Navy.

The open-trench disposal method was practiced at this site, with the trenches being constructed in a manner similar to that at Fleming Key North Landfill. The trenches were partially full of sea water when the wastes were disposed. Wet garbage was placed directly into one end of the trench and combustible wastes were taken to the western portion of the site and burned. The ashes and unburned wastes then were pushed and piled into an area in the western portion of the site.

1.14 SITE 9 - TRUMBO POINT ANNEX FUEL FARM AND PIERS

The Trumbo Point Annex Fuel Farm and Piers is shown in detail in Figure 1-8 and is located east of the piers at the Trumbo Point Annex, as shown in the vicinity map, Figure 1-1. The Annex was constructed in 1918 as a seaplane base using dredged materials. Fuel is received at this facility from tankers and then distributed by buried transmission lines to either Truman Annex or NAS - Boca Chica. Fuels that have been stored at this site include No. 6 fuel oil, Bunker C oil, diesel, aviation gasoline, JP-4 and JP-5.

1.15 SITE 10 - BOCA CHICA FIRE FIGHTING TRAINING AREA

The Boca Chica Fire Fighting Training Area is shown in detail in Figure 1-9 and is located immediately west of the southern blimp pad as shown in Figure 1-1, on the vicinity map. The fire training facility consists of two unlined circular pits approximately 20 feet in diameter. The pits are surrounded by a gravel apron. The fire pit area is used occasionally during the year. Each time a training session occurs, flammable liquids such as JP-5, waste oils, or hydraulic fluids are poured onto junk vehicles within the pit and ignited. The area surrounding the vehicles shows visible evidence of burning and oil staining.

2.0 SAMPLING OBJECTIVES

The sampling objectives of the site depend upon the type of site investigated. There are three types of sites present at NAS-Key West. These types of sites are landfills, fuel sites and DDT mixing areas. The sites at NAS-Key West are characterized as follows:

- Landfills
  - Site 1 - Truman Annex Refuse Disposal Area
  - Site 4 - Boca Chica Open Disposal Area
  - Site 7 - Fleming Key North Landfill
  - Site 8 - Fleming Key South Landfill
- Fuel Sites
  - Site 9 - Truman Point Annex Fuel Farm and Piers
  - Site 10 - Boca Chica Fire Fighting Training Area
- DDT Mixing Areas
  - Site 3 - Truman Annex DDT Mixing Area
  - Site 5 - Boca Chica DDT Mixing Area

The different nature of the sites require differing sampling objectives for each type of site. However, similar sites, such as landfills, can have similar sampling objectives. The following sections contain sampling objectives for each type of site.

2.1 LANDFILLS

The concerns at landfill sites are due to the nature of wastes disposed of at the site and the potential for ground water contamination which may result from these wastes. Another concern which must be addressed in a landfill investigation is air monitoring to determine if fugitive emissions are being released from the landfill, which has health and safety effects. These concerns are investigated through waste characterization trenches, air monitoring, soil borings and ground water sampling.

Waste characterization will be performed through the digging of trenches within the landfill area. This trenching allows a visual inspection of the types of wastes present within the landfill. Potentially hazardous types of waste can be identified within the landfill and the volume of waste estimated.

Trenching, however, can release gases contained within the landfill. The decomposition of wastes results in the formation of methane and other potentially explosive gasses. For health and safety purposes, a combustible gas analyzer (explosimeter) will be used during trench activities at the landfill sites. If the analyzer indicated combustible gas concentrations exceeding 10 percent of the Lower Explosive Limit (LEL), the area will be evacuated.

Air monitoring with organic vapor analyzers (OVAs) will also be conducted at the sites to determine atmospheric contamination through fugitive emissions. The air quality data from the initial air monitoring survey will be used to determine level of personnel protective equipment initially utilized during the project. These levels of protection are described in the HSP.

Soil borings and monitoring well installation will also be performed at the sties to identify the extent of contamination of areas surrounding the landfills. Soil samples will be analyzed by head space analysis and laboratory analysis to determine the extent of contamination. Ground water sampling will be performed and the samples will be analyzed. Data obtained from these analyses will be utilized to define the extent of contamination and therefore the scope of cleanup work required.

2.2 FUEL SITES

Fuel contaminated areas will be sampled to determine the presence of contamination. This sampling will be performed through soil and ground water sampling. Air monitoring will also be conducted to identify the required levels of protection for the sites.

2.3 DDT MIXING AREAS

To define the presence of contamination at the DDT mixing sites, soil samples, soil borings and ground water sampling will be performed. The soil samples will be composites from the first 0.5 feet of surface soil. These samples will be analyzed for pesticides. Additional soil borings will be conducted to determine the depth of pesticide contamination. Temporary monitoring wells will be installed and ground water samples will be collected. The results of ground water analysis will be used to characterize the presence of pesticide contamination and potential direction of pesticide movement due to ground water flow.

3.0 SAMPLE LOCATION AND FREQUENCY

The location of sampling points for the sites are described in the work plan for each site. The location are based on the objective of the statement of work (SOW) and performance requirements. This Field Sampling Plan (FSP) addresses a one time sampling event that will be used to plan future sampling events that may be required.

4.0 SAMPLE DESIGNATION

Sample designation is important for assuring the analytical results are tied to a physical location. The designation will indicate project name, project number, exact site, sample location/monitor well number, sample type, sample date and time, initials of sampler and sample preservation used. All this information will be contained on the sample label attached to sample container as shown in Figure 4-1.

The project name and number will be placed in their appropriate spaces on the sample label. The sample number will be placed in the sample number space on the sample label. The sample number will be a three part number. These parts are site, sample point and sample types. For example a monitor well sample from Site 2, Well 3 will be indicated as sample 2-3-GW. If deep and shallow wells are present in the same well nest, the deep well will be given the alpha designator "D", and the shallow well will be designated "S". The third part of the sample number will be the sample type. Types of samples sent to the laboratory will be ground water, surface water and soil/sediment which will be designated GW, SW and S, respectively.

5.0 SAMPLING AND EQUIPMENT PROCEDURES

This section of the FSP presents the methodology of soil/sediment sampling, monitor well installation, monitoring well sampling, surface water sampling and air monitoring at the sites. The sampling activities, include collection, preservation, packaging, handling, shipping and storage of samples performed in accordance with procedures described by any or all of: the USEPA, National Institute of Occupational Safety and Health (NIOSH), American Society for Testing Materials (ASTM), Florida Department of Environmental Regulation Supplement A to Standard Operating Procedures and QA Manual dated June of 1981, or contractor-approved protocols.

5.1 SOIL SAMPLING

Four types of soil sampling will be performed. These are sampling of surface soils, sediments, trenches/test pits and soil borings. Soil borings will be conducted at separate boring locations, or in conjunction with monitoring well installation. All field work will be described in the Field Activity Logs. The methods for sampling are discussed in the following sections.

5.1.1 Surface Soils

Samples of surface soils will be obtained from sites using a trowel. A clean, decontaminated stainless steel trowel will be used to obtain the sample. If the surface soils are too hard to sample with the trowel, the soil will be broken up using a pick or hammer. The sample will be placed in an appropriate container for shipment to the lab.

5.1.2 Sediments

Sediment samples will be performed using a hand corer or stainless steel trowel. The corer is a hollow barrel with a handle to facilitate driving the corer into the ground. It also has a check valve to prevent the sediment sample from washing out of the barrel as the sample is retrieved through the water. The corer can also be fitted with a sampling liner made of polyethylene to minimize sample contamination.

The cleaned corer is driven into the sediments to be sampled. Twisting the corer during removal makes recovery of the samples easier. The sample can then be removed from the corer and placed in a stainless steel tray for transfer into the appropriate sample containers for shipment to the laboratory.

The use of a trowel for sediment sampling is similar to the use of a trowel for soil sampling. The primary difference is that care must be taken when samples are removed from under a water depth of more than six inches. The sediment sample can be washed from the trowel during removal through the water. Sediment samples removed with a trowel will not be from water having a depth greater than 18 inches. The sample will be moved slowly through the water to minimize sample loss due to washing from the trowel.

5.1.3 Trenches

Trenching and test pits will be excavated in the former landfill sites as described in the work plans. Excavation locations are described in the work plans for each site. Excavation safety procedures are outlined in the Health and Safety Plan (HSP).

Trenching and test pits will be performed using a backhoe. Trenching and test pits will be performed from ground level to either undisturbed native soils, or to the maximum depth of the backhoe, about eight feet, whichever occurs first. Combustible gas analyzers will be used at trenching sites to monitor for the presence of explosive gases. As indicated in the HSP if the concentration of combustible gases exceed 10 percent of the LEL, the site will be evacuated. This is in accordance with IT Corporate policy regarding Immediately Dangerous to Life and Health (IDLH) situations.

All trenching and test activities will be recorded on the daily field activity log. This log will include location of all trenches and test pits, depth of trenches and summarize materials found. All waste material found will be recorded on these logs.

5.1.4 Soil Borings

Prior to the start of any soil boring or excavation, IT will request a permit from NAS-Key West. Work will not start until permit or permission to start is received from NAS-Key West. Field activity logs will be filled out on a daily basis to indicate drilling activities such as footage drilled and materials used. Well installation will follow commonly accepted professional drilling procedures. The boreholes will be logged by a qualified geologist/hydrogeologist as drilling proceeds. Soil samples will be collected according to ASTM Method D1586-Standard Method for Penetration Test and Split Barrel Sampling of Soils or ASTM D1587 Standard Practice for Thin-walled Tube Sampling of Soils. Boring and test logs will be generated to document subsurface conditions on the Visual Classification of Soils form (Figure 5-1) using IT's Visual Field Classification of subsurface materials classification log legend manual of practice which is based on the ASTM's D2488 Standard Practice for descriptive identification of soils and the Unified Soil Classification System. Wells will be completed as discussed in Section 5.2 of this Field Sampling Plan. Borings will be installed using either a hollow stem auger or a rotary wash method. IT will submit to the Navy the lithologic borehole descriptions as part of the final report including the following:

- Detailed lithologic description of each unit
- Soil sample locations, method of sampling and percent recovery
- Soil classification used
- Depth to first water encounter
- Reason for termination of boring
- Raw data and results of any soils test performed

The drilling contractor will be responsible for securing boring or well drilling permits required by the state and local authorities and for complying with state or local regulations with regard to the submission of well logs, samples, etc. IT will also be responsible for complying with regulations with regard to boring/well drilling safety as described in the HSP.

5.1.4.1 Excess Soil Contamination

Excess soil contamination according to FAC 17-70.003(3) means all soils saturated with petroleum or petroleum producers and those soils that cause a total hydrocarbon reading of greater that 500 ppm on an organic vapor analysis instrument with a flame ionization detector in the survey mode upon sampling the headspace in a half-filled, 16-ounce soil jar. The soil sample shall be brought to a temperature of 20°C with a water bath and sampled five minutes thereafter. Instruments with a photoionization detector may be used after a determination is made of that instrument's equivalent reading to 500 ppm with a flame ionization detector. Analytical instruments shall be calibrated in accordance with the manufacturer's instructions. Other analytical methods may be used subject to Bureau approval upon a demonstration that they provide accurate and verifiable results, and that the results may be calibrated to those achieved with an organic vapor analysis instrument.

5.2 GROUND WATER SAMPLING TECHNIQUES

Standard activities involved with ground water sampling include monitoring well construction and development water-level measurements, removal of standing water in wells (i.e., well evacuation or purging) and retrieval of ground water.

5.2.1 Monitoring Well Installation

To provide proper QC of monitoring well installation, the following standard operating procedures have been set forth, along with the applicable forms, to successfully complete a field drilling investigation oriented towards obtaining hydrogeological and future water quality information. Installation will conform to the specifications outlined below.

Monitoring well installation will be recorded on the Monitor Well Installation Sheet shown in Figure 5-2. Data reporting format and protocol requires that all lines on the forms be filled in. The letter designation "NA" for not applicable or "NK" for not known will be used in all blank spaces. If some steps or procedures were not performed as described, the reason must be stated as completely as is practicable on the appropriate form or submitted as an attachment thereto. Actual materials utilized in the well construction will be documented on the forms.

Each monitoring well will be constructed in the following manner:

- Monitoring well casing will be two inch inside diameter, Schedule 40 polyvinyl chloride (PVC), with flush threaded joints conforming to ASTM F480 and ASTM D1785 standards.

- Commercial 0.01-inch PVC slot screen will be used, flush threaded joints, ASTM F480 and ASTM D1785.

- PTEF "O" rings will be used to seal all joints.

- Screen sand pack material will be a 20/30 silica sand, 98 percent pure, cleaned with potable water. The sand will have a uniformity coefficient of 1-3, and a specific gravity of 2.6-2.7. The filter pack will meet ASTM C775 standards sand specifications.

- Wells will be backfilled with sand pack to a height of two feet above the screen, if possible.

- Approximately two feet of 3/8-inch bentonite pellets consisting of 90 percent montmorillonite clay will be placed above the sand pack and hydrated. The bentonite pellets will be allowed to hydrate per manufacturer's directions before the well is to be grouted.

- Wells will be grouted to the surface with Portland cement conforming to ASTM C150 Type I.

- Sand pack, bentonite plug and grout material will be placed using pumps and tremie line or other appropriate methods.

- A five foot length of 16 gauge aluminum guard pipe will be used for permanent and temporary wells as a security measure. Each guard pipe will be fitted with a hinged cap, hasp and lock.

- The well apron will be 3'x 4'x 6" thick conforming to ASTM C150.

- Wells will be identified with a permanent marker provide by the EIC and protective casings will be spray painted with high visibility epoxy yellow paint AASHTO M220.

- A notch representing the top of casing measuring point will be filed on the inner casing of each well and will be identified on the notes and well sketches.

Each monitoring well will be identified with project name, well number, data installed, completed depth, elevation, well stick-up and location of screened interval.

IT will prepare a well completion report for the installed well. This report will be included with the final report made to the Navy. IT can also submit the report at the Navy's request to regulatory agencies. The well completion report will contain the following:

- Survey of well location map with scale and orientation

- Type of casing material

- Length and diameter of casing material

- Elevation of the notched top of the casing, height of notched casing above ground level and name of surveyor
- Borehole depth and diameter
- Detailed lithologic borehole descriptions
- Size of screen slot and statement that the slot size was manufactured rather than field slotted
- Screened interval
- Materials and methods used to fill annulus
- Size and type of filter pack
- Method of installation and date
- Well development procedures and disposal method of development water, drilling fluids and soils
- Security devices
- Decontamination procedures used on equipment between borings
- Any problems encountered during boring or well installation
- Method of coupling casing sections and screens
- Driller's and well logger's complete name(s)

5.2.2 Monitoring Well Development

The following procedure is presented for the proper development of monitoring wells for ground water sampling purposes.

Monitoring well development will be performed as soon as is practical after well installation, but no sooner than 8 hours after grouting is completed.

Equipment and materials used in development will be properly cleaned and decontaminated prior to use as described in Section 5.5. Development shall be accomplished with a centrifugal pump and/or bottom discharge bailer, possibly supplemented with a surge block, until the well water is clear and sediment within the well is removed to the fullest extent practical. As a minimum:

- Remove five times the standing water volume in the well (well screen and casing and saturated annulus). If recharge is so slow that five volumes could not be removed in one day or the water remains discolored or contains greater than one percent particulates after this five volume removal, the IT's Project Manager will direct an alternative procedure based on the judgement of IT's Field Geologist.

- All water generated during well development will be collected and in 55 gallon drums and left at wells for collection and disposal by NAS Key West.

The following data will be recorded on the well completion log, or an attachment thereof, as part of development:

- Well designation (ID)
- Date(s) of well installation
- Date(s) and time of well development
- Static water level before and after development
- Quantity of water removed and rate of removal
- Physical character of the removed water to include changes during development of clarity, color and particulates
- Type and size/capacity of pump and/or bailer used
- Description of surge techniques, if used
- Field characteristics of water removed

5.2.3 <u>Liquid Level Measurements</u>

All liquid level measurements in each monitoring well will be made from a surveyed measuring point located at the top of well casings. The measuring point will usually be positioned on the north side of the well casing and will be conspicuously marked for ease of measurement. Liquid level measurements will most often be made using either an electronic probe or steel tape. The two methods used to measure liquid levels are discussed below.

- Electronic probe

  Using an electronic water level indicator, lower the probe down the center of the well casing. When the probe enters the liquid, an alarm is sounded. Note the depth to liquid from the measuring point and record the depth to liquid in a field log. Repeat the measurement two more times to ensure the reading is accurate. Subtract the average depth to water from the measuring point elevation to find the elevation of the liquid level in the well to the nearest 0.01 foot.

- Chalked steel tape

  When using the chalked metal tape method, a total of three measurements of depth to water will be made. Each depth measurement will be recorded in a field book. If three consecutive readings are not within 0.01 foot of each other, additional measurements will be made. All water level calculations will be made before leaving the site so that any suspect data can be remeasured.

Liquid level measurements must be obtained at each sampling point every time water samples are collected. After each liquid level measurement, the probe (or the bottom of the steel tape), will be decontaminated using the procedure in Section 5.5. Total depth of each well will be determined by physical measurement (i.e. tape) every time samples are collected to determine whether siltation of any well is a problem.

5.2.4 Well Purging (Evacuation) Procedures

All wells will be purged using a teflon bladder pump or teflon well bailers. The tubing and pump or bailer will be thoroughly cleaned and decontaminated between wells.

5.2.4.1 Volume Determination

Prior to purging a well, it will be necessary to determine the volume of water being held in the well casing. The calculation of the well volume will be conducted as follows:

- Measure inside diameter of well casing;
- Measure the static water level (as described above);
- Determine the total depth of the well from the measuring point;
- Calculate the number of linear feet of static water (total depth of the well minus the static water level);
- Calculate the volume of water in a 2 inch I.D. well casing using the equation:

$$V = 0.1632h$$

V = Volume of water (gallons)
0.1632 = Conversion factor for constant well diameter of two inches
h = height of water in well (feet)

5.2.4.2. Placement of Intake Hose

Monitoring wells will be purged from the top of the water column, even if a monitoring well is likely to go dry. This will force water to move up the well casing to the pump. Otherwise, water standing in the well above the screen may not be evacuated.

5.2.4.3 Pumping Rate

The pumping rate used for monitoring well purging will be kept to a minimum. A monitoring well capable of yielding up to 1 gpm will be purged at the rate they are capable of producing. Wells that yield one to five gpm will be purged at approximately one to two gpm and wells capable of yielding more than five gpm will be purged at approximately two to five gpm. The flow rate of the pump may be measured using a graduated plastic bucket, graduated cylinder, or a totalizing flow meter.

5.2.4.4 Volume Purged

A minimum of three casing volumes will be removed prior to sample collection from the monitoring well. Removal of three casing volumes should result in the collection of a representative ground water sample not influenced by the water originally in the monitoring well casing and yet not result in over pumping of the monitoring well. The latter can result in pulling diluted or more concentrated ground water from another area within the aquifer into the monitoring well. If the monitoring well goes dry during purging, it will be allowed to recover and will then be re-evacuated until at least three volumes have been purged.

5.2.4.5 Well Stabilization

In addition to keeping track of the volume of water pumped from a monitoring well, the pH, conductivity and temperature of discharge water will be monitored. When these parameters stabilize, a monitoring well may be considered to be sufficiently purged, provided that a minimum of three casing volumes have been purged. Temperature will be considered to be stabilized when three consecutive temperature readings are within 0.5 degrees Celsius of one another. When three consecutive pH readings are within 0.5 pH units of one another, pH will be considered stabilized. Conductivity will be considered stabilized when each of three conductivity values are within two percent of the mean of the values. Temperature, pH and conductivity values obtained during well purging will be recorded in field notebooks. High-yielding wells capable of producing large quantities of water will be pumped slowly for a period of time sufficient to record stabilized pH, conductivity and temperature readings.

5.2.5 Ground Water Sample Collection

After a monitoring well has been properly purged, unless the well has a very low recharge rate, the monitoring well will be sampled within three hours with a Teflon bailer. Teflon bailers will be decontaminated between wells to avoid cross contamination. Temperature, pH and conductivity of the water will be measured in the field at the time of sample collection. The sample used to measure these parameters will be collected from the Teflon bailer. These values will be recorded on a sample collection log form. An example of a sample collection log used by IT for recording well purging and sample collection data during ground water sample collection is shown in Figures 5-3 and 5-4.

Water sample collection for volatile organic compounds (VOCs), acid and base-neutral extractable compounds, dissolved metals and general chemistry parameters should be performed in accordance with the following procedures:

Volatile Organic Compounds

- Two screw-cap vials with Teflon-lined silicone rubber septa (USEPA-approved vials) will be filled to overflowing and sealed without any entrapped air bubbles. These vials will be 40 milliliters or larger.

- Each vial is placed in a cooler.

- The samples will not be composited.

- A sample collection log, a chain-of-custody record, a laboratory request for analysis form and a sample label will be filled out in the field. These forms, except for the sample collection log, will accompany the samples to the laboratory.

- The sample bottles will be placed in a cooler with sufficient packing to prevent breakage during shipment.

- The cooler will be packed with blue ice to maintain the samples at 4 degrees Celsius during shipment, sealed and transported to the laboratory.

<u>Acid and Base-Neutral Extractable Compounds</u>

- Appropriate glass sample bottles complete with Teflon-lined caps will be filled to capacity and sealed.

- The sample bottles will be placed in a cooler with sufficient packing to prevent breakage during shipment.

- A sample collection log, a chain-of-custody record, a request for analysis form and a sample label will be filled out in the field. These forms, except for the sample collection log, will accompany the samples to the laboratory.

- The cooler will be packed with blue ice to maintain the samples at 4 degrees Celsius during shipment, sealed and transported to the laboratory.

<u>Total Metals</u>
It should be noted that ground water samples will not be filtered for the analysis of dissolved metals, because total metals represents the worst case situations and these analyses are more readily accepted by the FDER. This procedure is presented for information should dissolved metal analysis be required.

- When it is desired to determine concentrations of dissolved metals in a water system, the sample should be filtered in the field, immediately after collection, through a 0.45-micron filter using Millipore filtration apparatus equipped with a hand or electrical vacuum pump.

- The filtering apparatus or equivalent should be cleaned or rinsed thoroughly with deionized water before filtering each sample.

- It is recommended that the first 100 to 150 milliliters of filtrate from each sample be discarded to rinse the filter and filtration apparatus of any contaminating substances.

- The filtered sample is immediately transferred to a 500-milliliter plastic bottle that contains 1 milliliter of concentrated nitric acid preservative per 100 milliliters of sample or the equivalent nitric acid preservative is added to the sample.

- The sample pH is checked with pH paper to check that the pH is less than 2 and the bottle is sealed with a plastic cap fitted with a polyethylene liner.

- A sample collection log, a chain-of-custody record, a request for analysis form and a sample label will be filled out in the field. These forms, except for the sample collection log, will accompany the sample to the laboratory.

<u>General Chemistry Parameters</u>

- Sample bottles will be either polyethylene or glass and will contain the appropriate chemical preservatives. Sample bottle closures will be plastic with polyethylene liners.

- Sample bottles will be filled to capacity and sealed.

- The sample bottles will be placed in a cooler with sufficient packing to prevent breakage during shipment.

- Collected samples will be stored prior to shipping in an ice chest filled with blue ice and maintained at approximately 4 degrees Celsius.

- A sample collection log, a chain-of-custody record, a request for analysis form and a sample label will be filled out in the field. These forms, except for the sample collection log, will accompany the sample to the laboratory.

- Oxidizing agents, such as chlorine, decompose most cyanides. To determine whether oxidizing agents are present, test a drop of the sample with acidified potassium iodide (KI)-starch test paper as soon as the sample is collected; a blue color indicates the need for treatment. Add ascorbic acid a few crystals at a time until a drop of sample produces no color on the indicator. Then add an additional 0.6 g of ascorbic acid for each liter of water.

Sample integrity can be further enhanced through a few general sampling precautions. These precautions are:

- Samples will be collected in order from least contaminated to most contaminated, when known. Anticipated or known direction of ground water and/or surface water flow will be used to determine sampling order when no chemical data are available. Areas upgradient from a contaminant source areas will be sampled first and sampling will then proceed from areas furthest downgradient, working toward the source areas.

- When sampling monitoring wells, wells will be purged to ensure representative sampling of ground water in the saturated zone.

- Surgical-style or Nitrile gloves will always be worn during sample collection and sample handling will be kept to a minimum.

- All sampling equipment and sample collection vessels will be rinsed at least three times with sample water prior to collection of samples (unless otherwise instructed by the laboratory) to reduce the possibility for contamination and/or dilution of sample by any residual liquids in equipment or sample bottles.

- Samples, preservatives and sample containers will be handled carefully to minimize exposure time and potential for evaporative loss and/or airborne contamination.

- Upon completion of a round of sampling for a site, sampling equipment will be scrubbed with tap water and laboratory grade soap and rinsed thoroughly with tap water and rinsed twice with solvent then with distilled water. The equipment will be allowed to air dry.

- Samples will be delivered to the analyzing laboratory as soon as possible following sample collection.

5.3 SURFACE WATER SAMPLING

Surface water will be sampled below the water surface using a water sampler. The sampler will be submerged to the desired sampling depth. The sample will then be taken and the sampler removed from the water. Sample collection procedure described in Section 5.2.3 will be followed for volatile organic compounds, acid and base neutral extractable compounds, dissolved metals and general chemistry parameters.

5.4 AMBIENT AIR MONITORING

The purpose of air monitoring at work sites is determining the extent of atmospheric contamination through fugitive emissions and document the presence, if any, of airborne contaminates at the site. The monitoring will be performed using an OVA, combustible gas analyzer (explosimeter) and Draeger Tubes. Results of air monitoring will be used as described in the HSP. Specific instruments and calibration techniques are outlined in Section 6.1.4 of the QAPP, Part I of this document.

Ambient air samples will be taken at ground level and approximately 5 feet above ground level using the OVA. The samples taken five feet above ground level corresponds to a "breathing zone" sample. If the OVA indicates the presence of organic vapors, Draeger Tubes will be used as necessary to test specifically for the presence of benzene and vinyl chloride. Results of these analyses will be used to determine the required level of protection for field personnel.

The combustible gas analyzer will be used to monitor organic vapors during field activities. If combustible gases are present, guidelines set out in the HSP will be followed.

5.5 PIPE LEAK DETECTION

The underground piping systems used to receive and distribute fuel and transport wastewater at the Trumbo Point Annex piers may be tested using the helium detection method. Helium, which is the lightest inert gas, will escape a leaking area quickly and permeate to the surface easily. Using this method, all leaks can be located at the same time and repaired quickly. The helium detector utilizes a sensor block that relies upon changes in thermal conductivity. The sensor is programed to be sensitive only to helium and a micro processor helps to control the time over which the sensor will be sensitive. A separation column draws in the sample and the components are separated as they are passed over to the sensor. Since each component has a unique thermal conductivity, the sensor will even pick up traces of helium.

The initial step in testing any part of the piping system is to remove product in the lines. Helium gas will then be injected into the line. After a check is conducted to assure that helium is present throughout the line and isolated from the rest of the system, the system is pressurized to 15 psi. A digital pressure gauge is then monitored while turning off the helium supply. The magnitude of the pressure drop will indicate the size of the leak. If it appears there is no leakage at 15 psi, pressure could be increased to a level of 50 psi to assure there is no leakage. The surface will then be sampled for helium at intervals of 2 feet along the piping system.

Although helium will take longer to permeate concrete surfaces, this will be remedied by either allowing more time for the gas to penetrate this surface material; or by drilling small bore holes in the concrete to allow the gas to escape at a quicker rate.

5.6 PROCEDURE FOR DECONTAMINATION OF DRILLING AND SAMPLING EQUIPMENT

Normally, any portion of the drill rig, backhoe, etc. that is over the borehole (Kelly bar, mast, backhoe buckets, drilling platform, hoist or chain pulldowns and/or cathead, etc.) must be steam cleaned and scrubbed with laboratory grade detergent before being brought on site to remove all rust, soil and other material which may have come from other sites and contaminate the well. The drill rig should then be inspected to ensure that all oil, grease, hydraulic fluid, etc. has been removed from the exterior of the rig, all seals and gaskets are intact and no fluids are leaking. Steam cleaning of the drilling equipment will be performed prior to drilling each borehole. In addition, all downhole drilling, sampling and associated equipment that will come into contact with the downhole equipment and sample medium shall be decontaminated by the following steps:

Step 1 Clean with tap water and laboratory grade detergent, using a brush, if necessary, to remove particulate matter and surface films. Steam cleaning may be necessary to remove matter that is difficult to remove with the brush.

Step 2 Rinse thoroughly with tap water.

Step 3 Rinse with distilled water.

Step 4 Rinse twice with solvent (pesticide-grade or nano-grade isopropanol).

Step 5 Rinse thoroughly with distilled water or hexane if testing for pesticides, PCBs or fuel and allow to air dry. NOTE: All decontamination liquids (distilled water, solvent, etc.) may be applied with a pump sprayer.

Step 6 Wrap with aluminum foil, if appropriate, to prevent contamination if equipment is going to be stored or transported. Clean plastic can be used to wrap augers, drill stems, casings, etc. if they have been air dried.

Sampling equipment used only for inorganic sampling need only follow Steps 1 through 3 and Step 6. Decontamination of all equipment should occur at the decontamination area. This area should be lined with heavy duty plastic film and should be designed to promote runoff of decontamination waste into a central collection point. An above ground decontamination area pit comprised of plastic sheeting bermed with soil, timbers, or other material may be adequate for this project. All cleaning of drill rod, auger flights, well screen and casing, etc. will be conducted above the plastic film using saw horse or other appropriate means.

6.0 SAMPLE HANDLING AND ANALYSIS

Following sample collection, the samples will be sent to the laboratory for analysis. The following procedures for shipping and sample custody will be followed to be able to track samples from the field to the laboratory.

6.1 FIELD STORAGE AND SHIPMENT OF SAMPLES

As soon as samples are collected, filtered (if necessary) and preserved, they will be stored in an ice chest packed with plenty of ice or blue ice. Field personnel should make sure that sample container lids are tight and secure before storing samples in an ice chest. Samples must be shipped with 24 hours to ITAS via overnight delivery to minimize exceeding sample holding times.

The transportation of samples must be accomplished not only in a manner designed to protect the integrity of the sample, but also to prevent any detrimental effects from the potentially hazardous nature of the sample. Regulations for packaging, marking, labeling and shipping of hazardous material, hazardous substances and hazardous wastes are promulgated by the U.S. Department of Transportation (DOT) and described in the Code of Federal Regulations (49 CFR 171 through 177, in particular, 172.402h), Regulation (49 CFR 171 through 177, in particular, 172.402h, Packages Containing Samples). In general, these regulations were not intended to cover the shipment of samples collected at hazardous waste sites. However, the USEPA has deemed it prudent to package, mark, label and ship samples observing these DOT procedures. The information contained in this section is for general guidance and, although factual, should not be misconstrued as identical to DOT regulations for transportation of hazardous materials.

6.2 SAMPLE CUSTODY

Procedure for sample custody will be followed according to Section 5.0 of the QAPP, Part I of this document.

6.3 SAMPLE ANALYSIS

The analytical method for each sample bottle will be identified on the sample label and the request for analysis forms. The analytical methods for each site are identified in the work plans.

453005\P2SMPANL.BB3

148277

DRAWN BY	[illegible] 3/12/84	CHECKED BY	SAM	8/15/84	DRAWING NUMBER	453005-A1
		APPROVED BY	RDS	8/16/84		

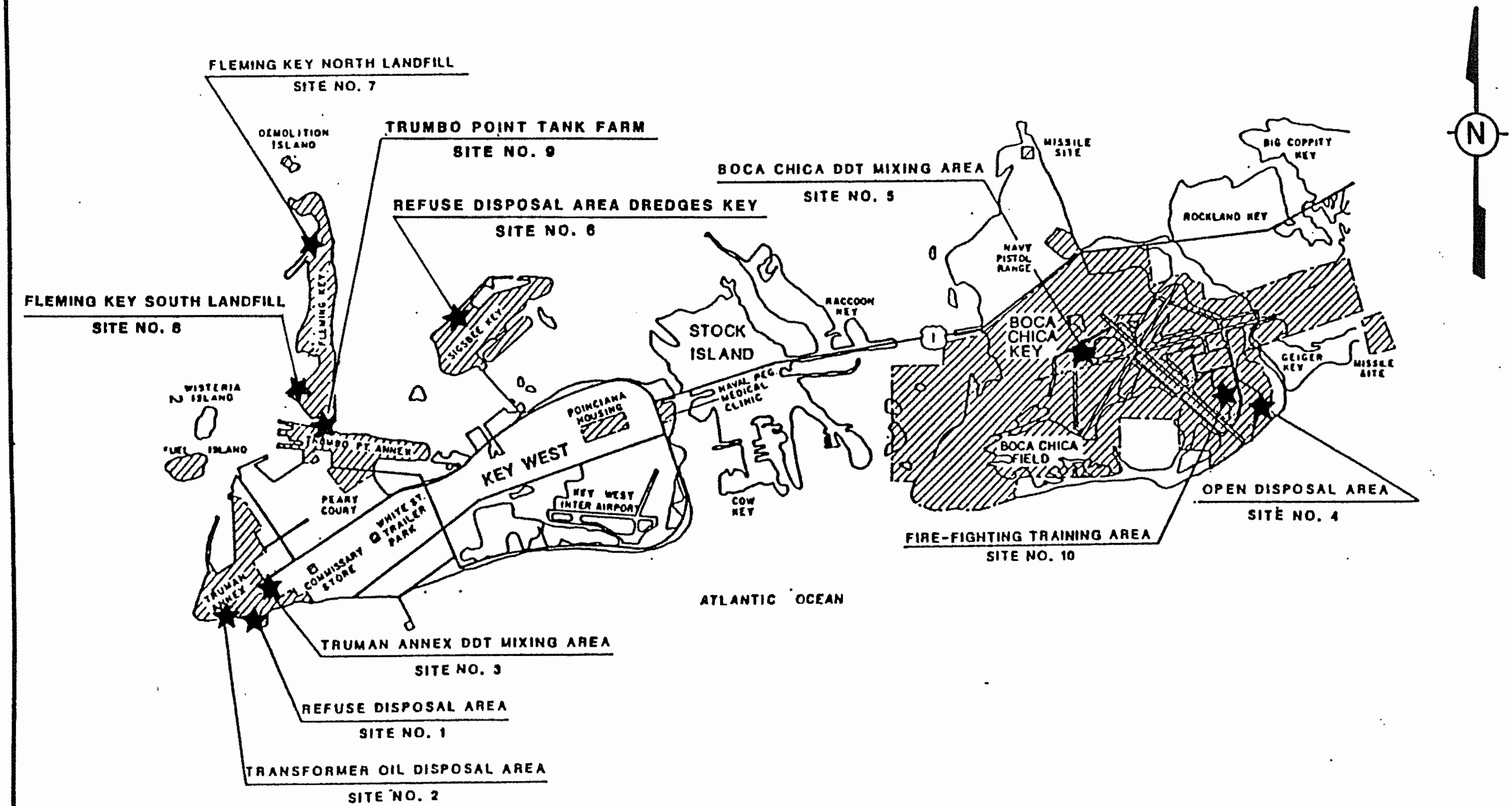


FIGURE 1-1

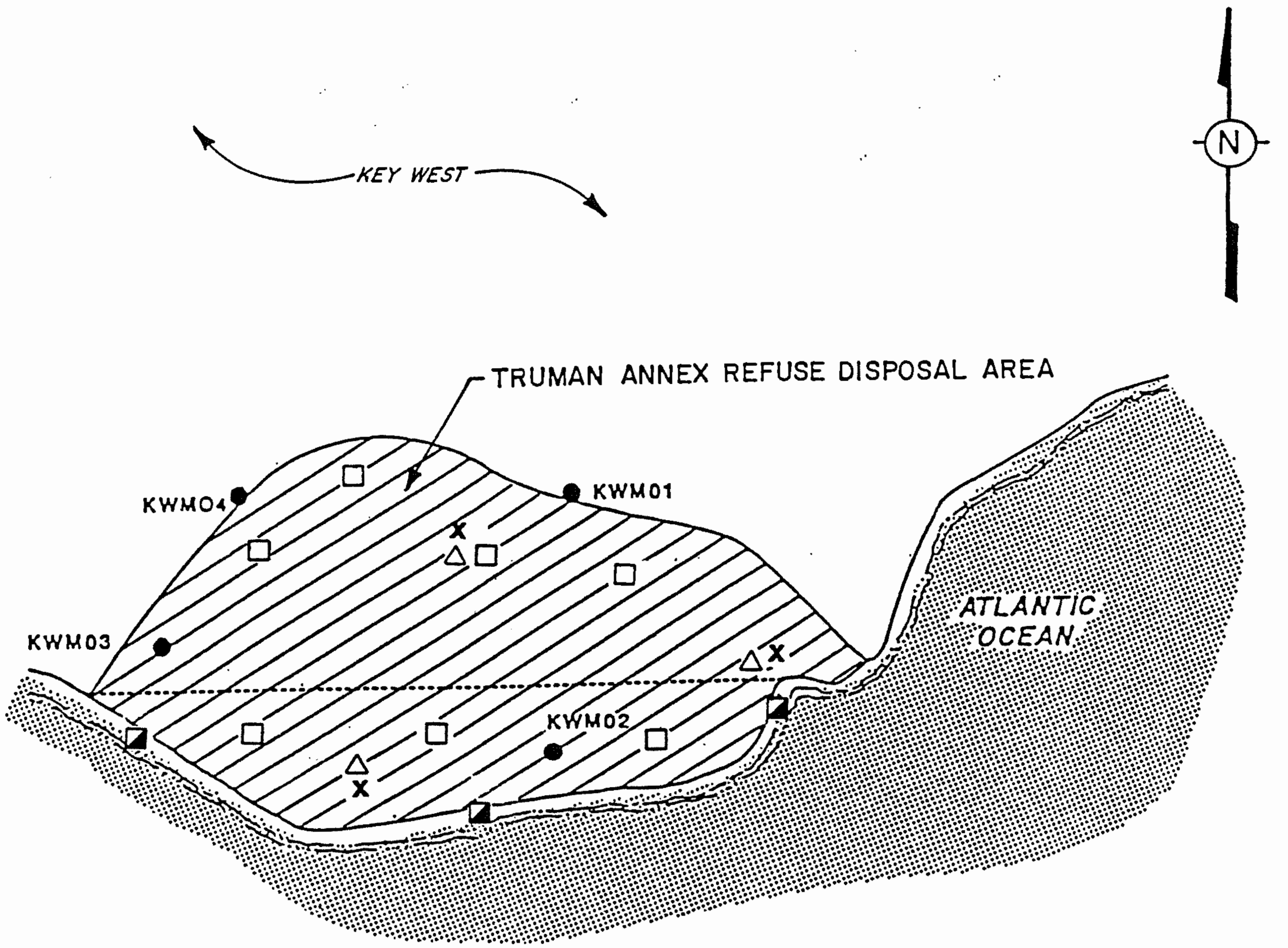
LOCATIONS OF NAVAL ACTIVITIES AND STUDY SITES

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.



LEGEND:

● KWM01	EXISTING MONITORING WELL
X	PROPOSED MONITORING WELL
□	PROPOSED TEST PIT
△	PROPOSED EXPLORATORY BORING LOCATION
--------	PROPOSED AIR QUALITY SURVEY TRANSECT
◪	PROPOSED SEDIMENT SAMPLING LOCATION

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.

FIGURE 1-2

INVESTIGATION & SAMPLING LOCATIONS
TRUMAN ANNEX
REFUSE DISPOSAL AREA
SITE 1

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY | CHECKED BY SAM | APPROVED BY PDS | DRAWING NUMBER 453005-A2

REV.1/2-1-90/C.K.R

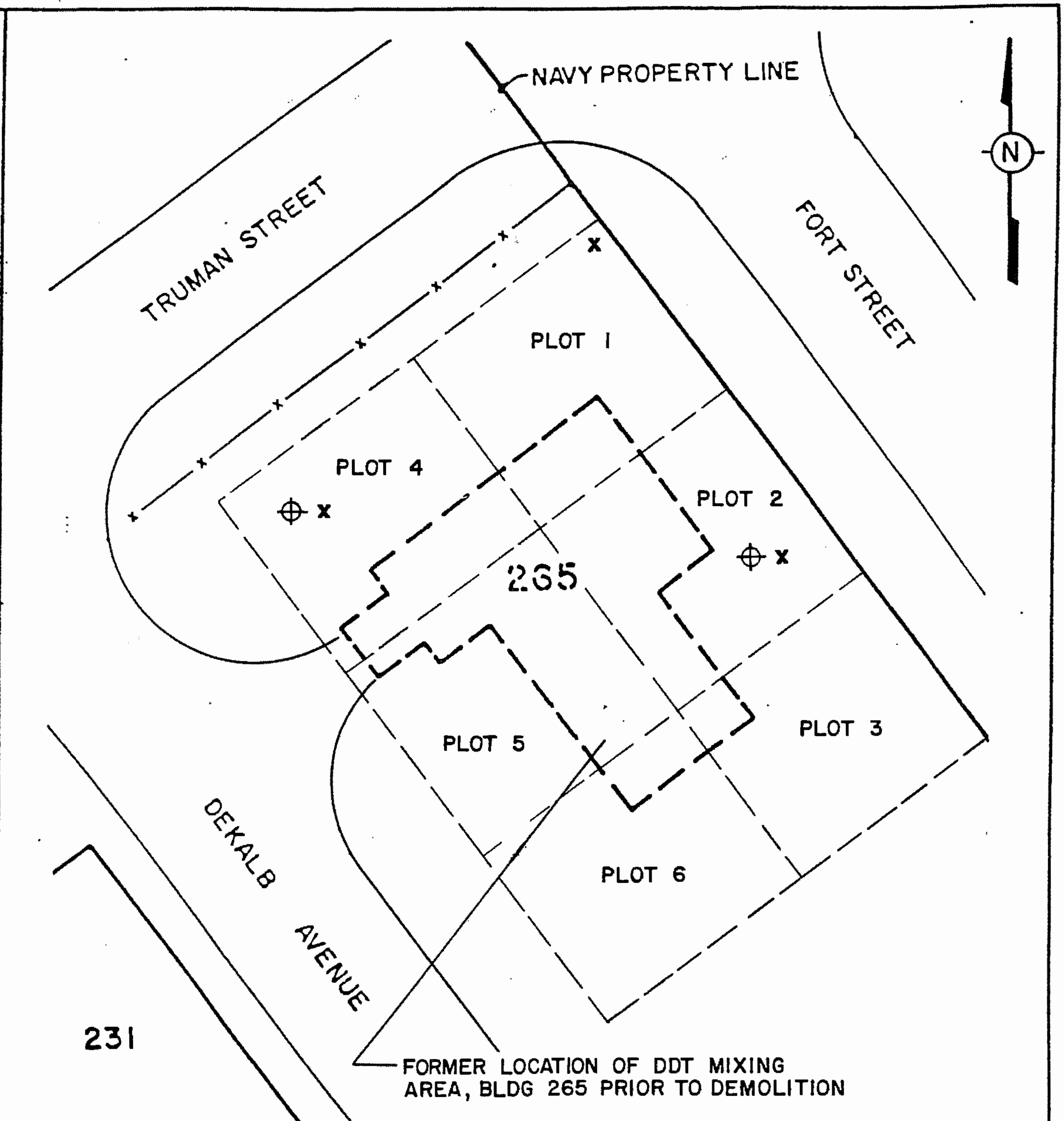
148277

DRAWING NUMBER 453005-A4

CHECKED BY

APPROVED BY

DRAWN BY



LEGEND

- x PROPOSED MONITORING WELL LOCATION
- ⊕ PROPOSED SOIL BORING LOCATION
- --- SOIL SAMPLING PLOT BOUNDARY
- —x— FENCE

NOT TO SCALE

SOURCE: U.S. NAVY

FIGURE 1-3

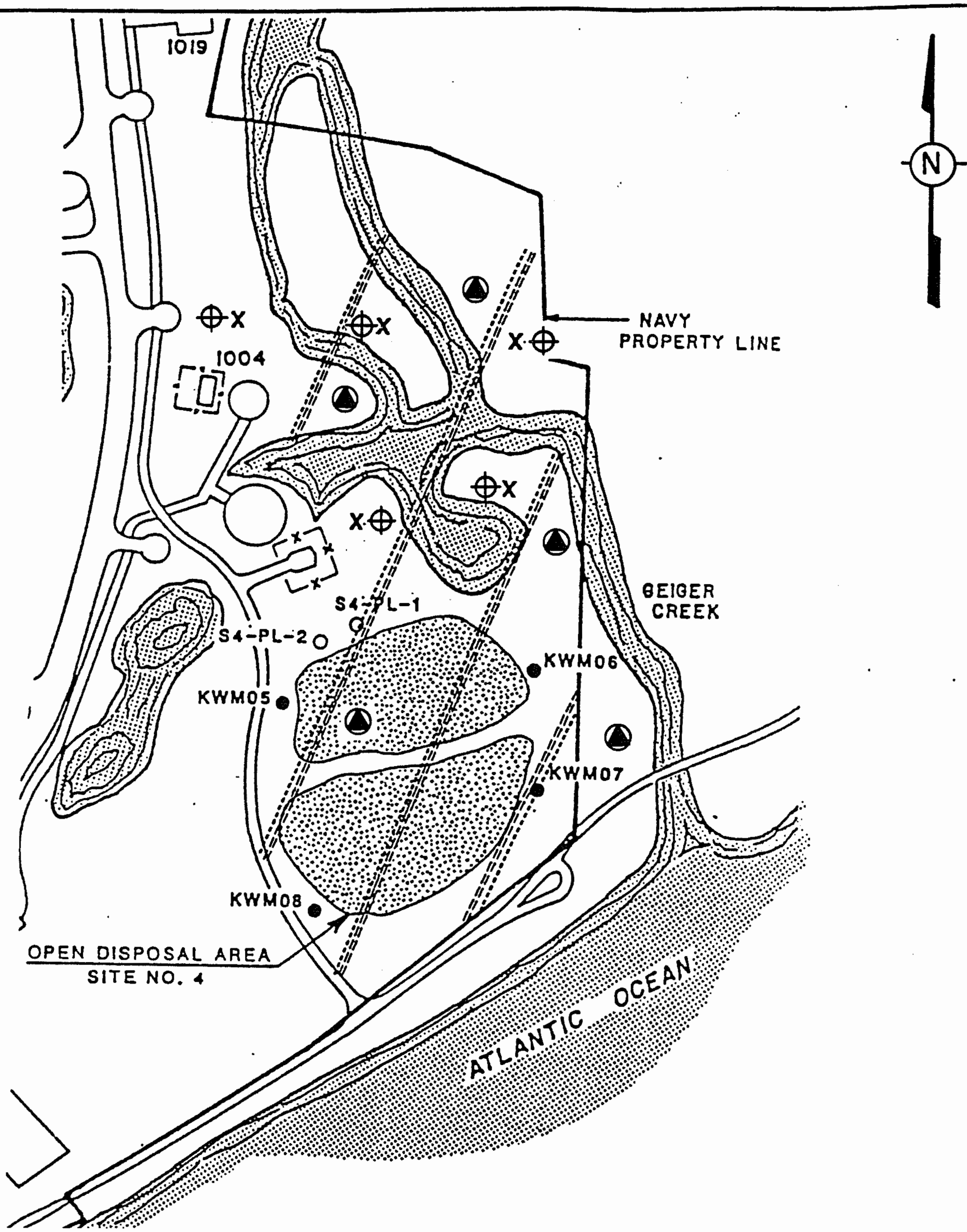
INVESTIGATION & SAMPLING LOCATIONS
TRUMAN ANNEX
DDT MIXING AREA
SITE 3

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

148277

DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER 453005-A5



LEGEND

- ● KWM01 — EXISTING MONITORING WELL
- X — PROPOSED MONITORING WELL
- ======== — PROPOSED WASTE CHARACTERIZATION TRANSECTS
- S4-PL-1 ○ — PREVIOUS SOIL BORING LOCATION
- ----------- — PROPOSED AIR QUALITY SURVEY TRANSECT
- ⊕ — PROPOSED SOIL BORING
- ▲ — PROPOSED SOIL SAMPLING LOCATION

SOURCE: GERAGHTY AND MILLER, INC. NOT TO SCALE

FIGURE 1-4

INVESTIGATION & SAMPLING LOCATION
BOCA CHICA
OPEN DISPOSAL AREA
SITE 4

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

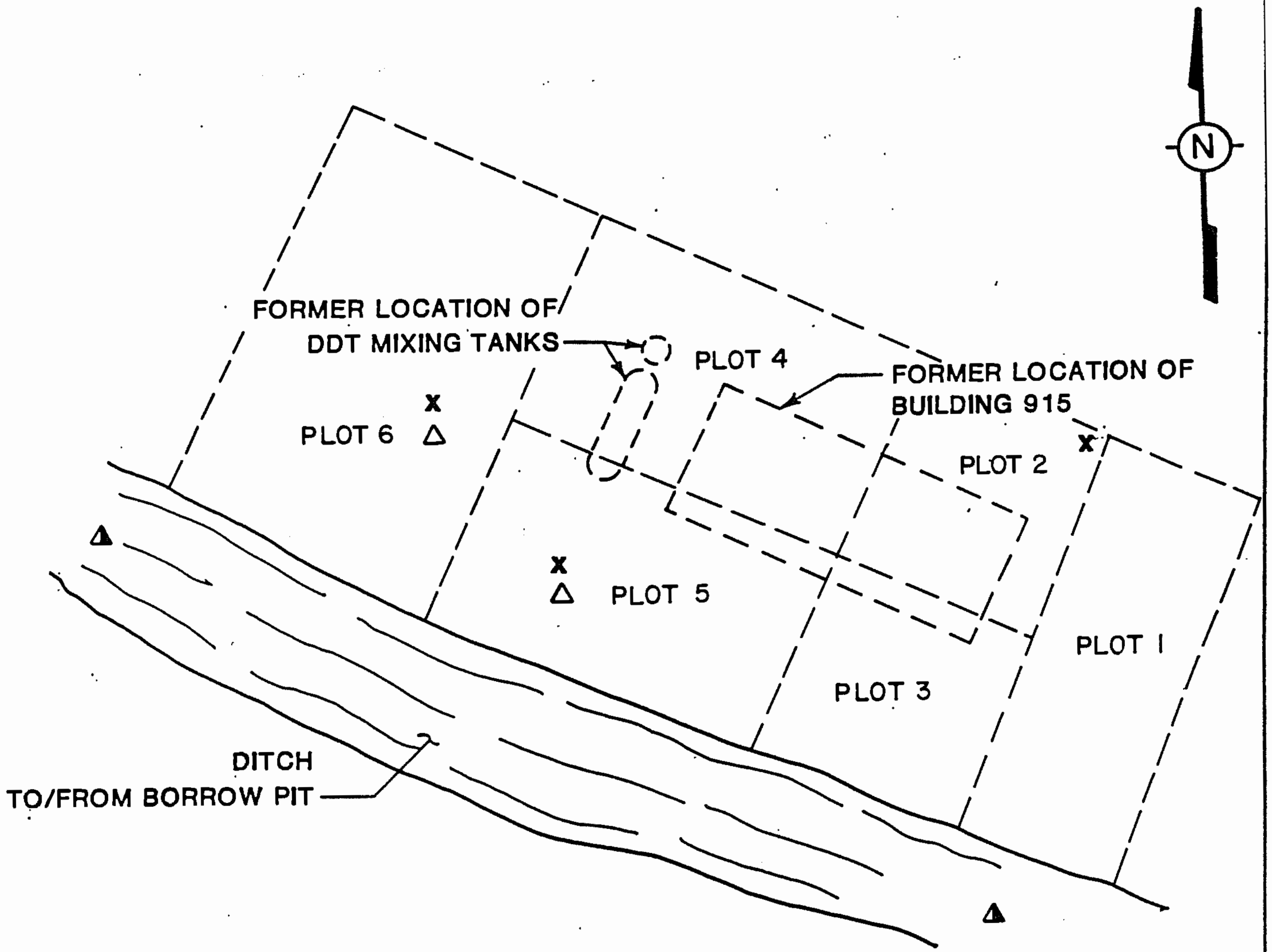
14827

DRAWING NUMBER 453005-A6

CHECKED BY

APPROVED BY

DRAWN BY



LEGEND

- X PROPOSED MONITORING WELL
- △ PROPOSED EXPLORATORY BORING LOCATION
- ▲ PROPOSED SURFACE WATER / SEDIMENT SAMPLING LOCATION
- ---- SOIL SAMPLING PLOT BOUNDARY

NOT TO SCALE

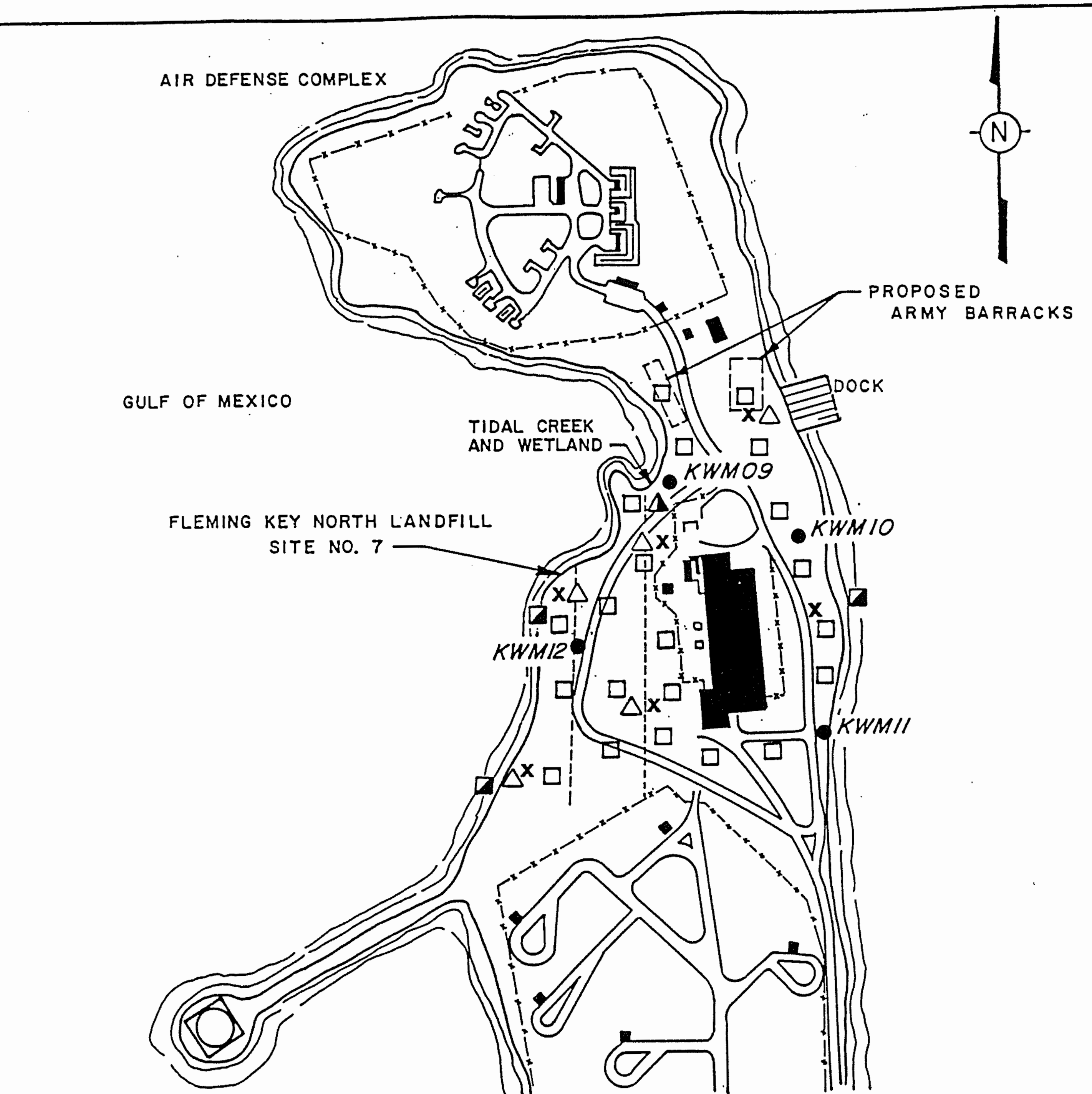
SOURCE: U.S. NAVY

FIGURE 1-5

INVESTIGATION & SAMPLING LOCATION
BOCA CHICA
DDT MIXING AREA
SITE 5

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION



LEGEND

- ● EXISTING MONITORING WELL
- X PROPOSED MONITORING WELL
- □ PROPOSED TEST PIT
- – – – – PROPOSED AIR QUALITY SURVEY TRANSECT
- △ SOIL BORING
- ◭ PROPOSED SURFACE WATER/ SEDIMENT SAMPLING LOCATION
- ◪ PROPOSED SEDIMENT SAMPLING LOCATION
- ■ EXISTING BUILDINGS OR STRUCTURES

SOURCE: GERAGHTY AND MILLER, INC.

NOT TO SCALE

FIGURE 1-6

INVESTIGATION & SAMPLING LOCATIONS
FLEMING KEY
NORTH LANDFILL
SITE 7

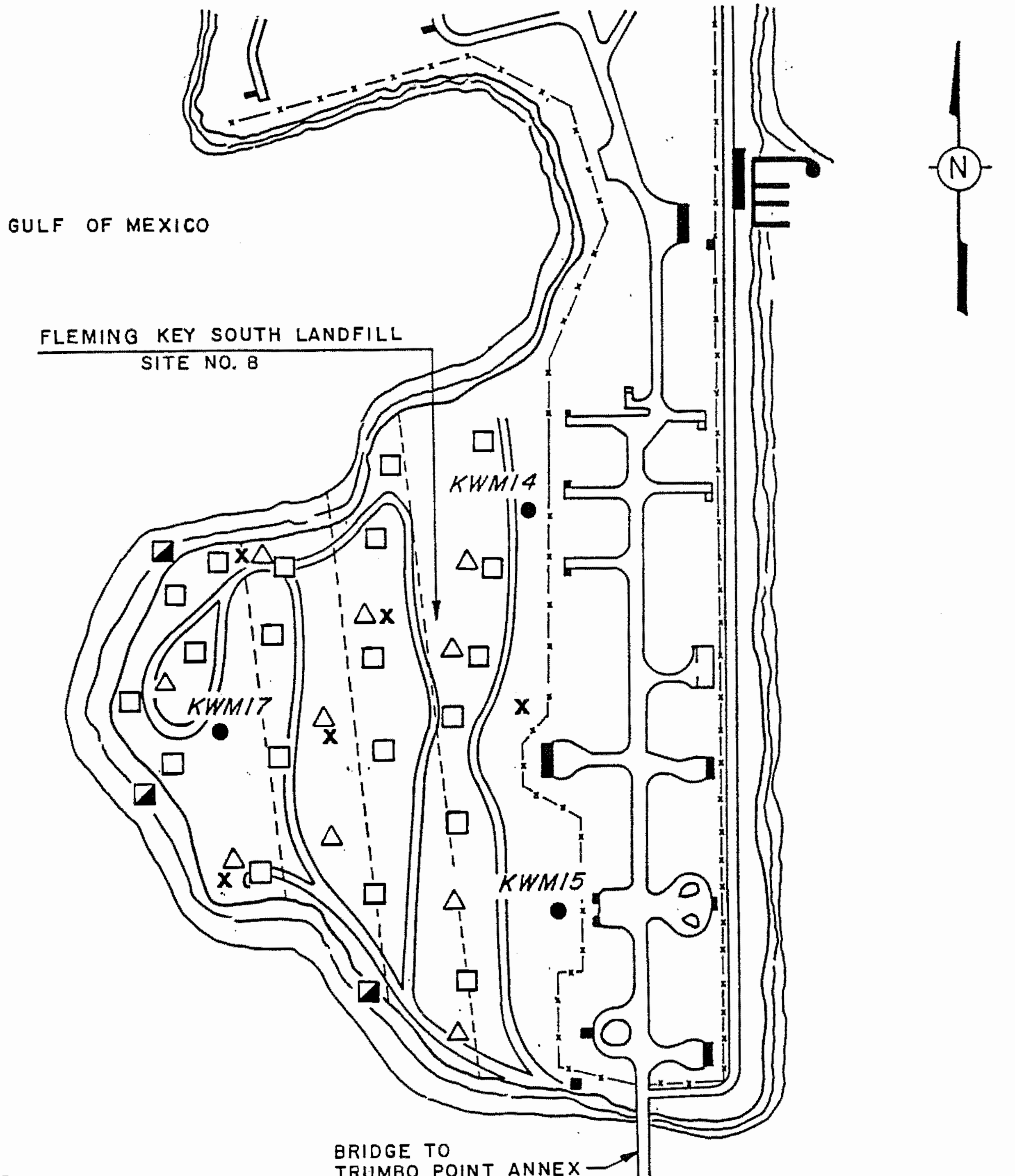
NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER 453005-A8

REV.1/2-1-90/C.K.R

148277



DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER 453005-A9

REV.1/2-1-90/C.K.R

LEGEND

- ● EXISTING MONITORING WELL
- X PROPOSED MONITORING WELL
- □ PROPOSED TEST PIT
- △ PROPOSED EXPLORATORY BORING LOCATION
- - - - - AIR QUALITY TRANSECTS
- ◪ PROPOSED SEDIMENT SAMPLING LOCATION
- ■ EXISTING BUILDINGS OR STRUCTURES

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.

FIGURE 1-7

INVESTIGATION & SAMPLING LOCATIONS
FLEMING KEY
SOUTH LANDFILL
SITE 8

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

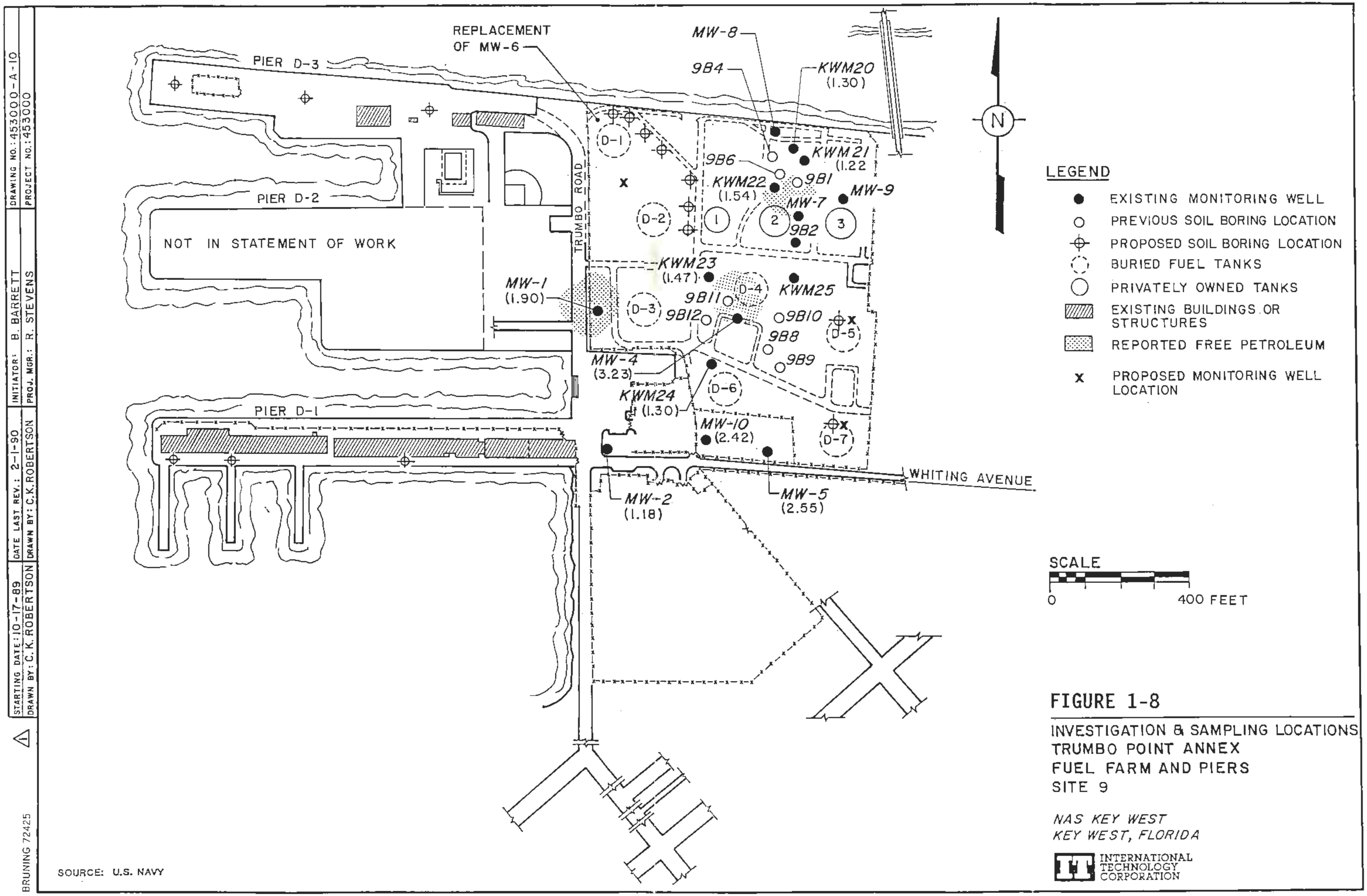


FIGURE 1-8

INVESTIGATION & SAMPLING LOCATIONS
TRUMBO POINT ANNEX
FUEL FARM AND PIERS
SITE 9

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

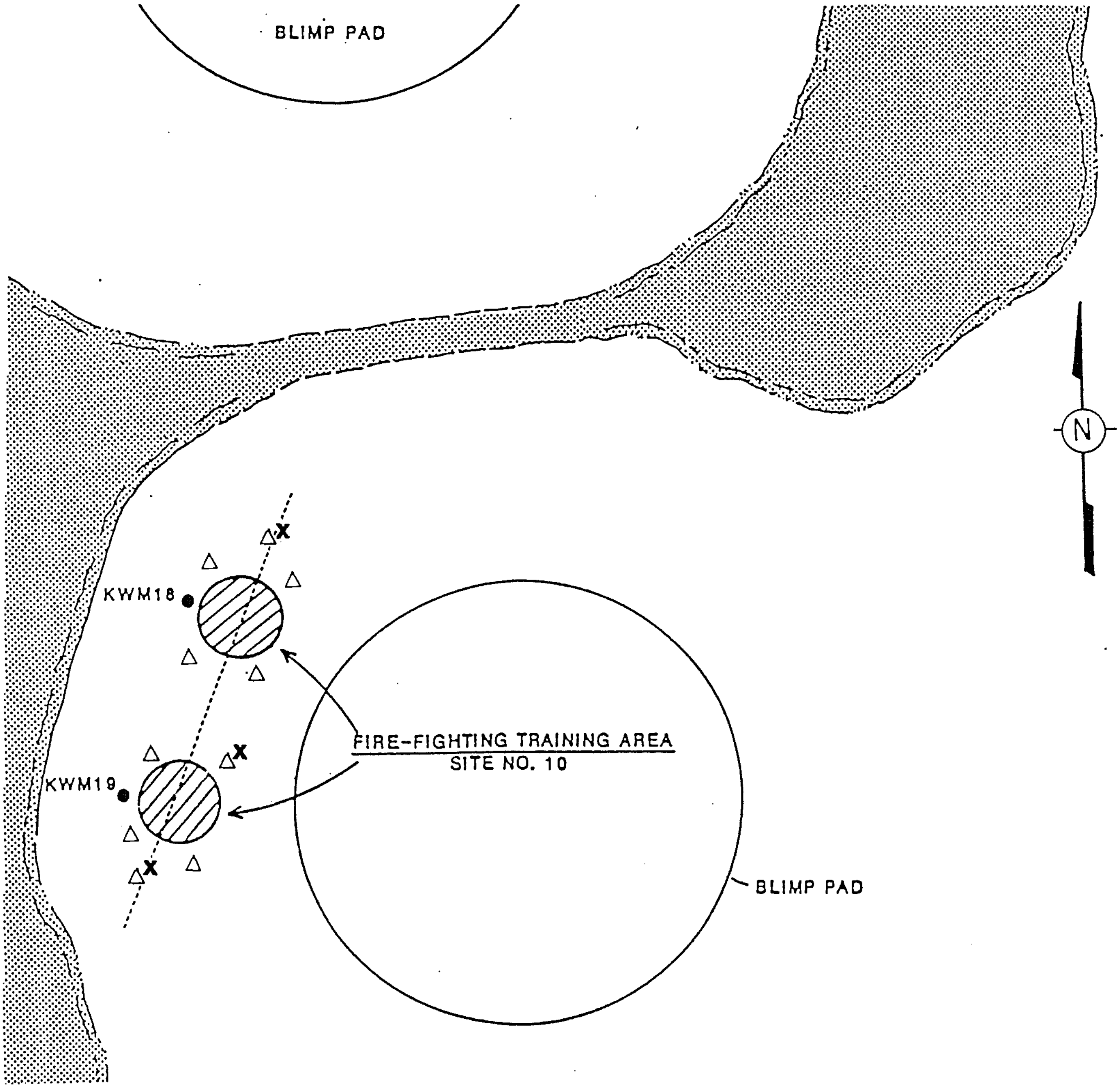
SOURCE: U.S. NAVY

DRAWN BY

CHECKED BY

APPROVED BY

DRAWING NUMBER 453005-A11



LEGEND

- ● KWM01 — EXISTING MONITORING WELL
- x — PROPOSED MONITORING WELL
- △ — PROPOSED EXPLORATORY BORING LOCATION
- ------------ — PROPOSED AIR QUALITY SURVEY TRANSECT

FIGURE 1-9

INVESTIGATIONS & SAMPLING LOCATIONS
BOCA CHICA
FIRE FIGHTING TRAINING AREA
SITE 10

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.

148277

FIGURE 4-1
SAMPLE LABEL

IT CORPORATION

Project Name ______________________________

Project No. ______________________________

Sample No. ______________________________

Collection Date/Time ______________________________

Collector's Name ______________________________

Sample Location ______________________________

Sample Type/Depth/Description ______________________________

______________________________ Preservative ____________

Analyze For ______________________________

Bottle ________ of ____ ____ Filtered ________ Nonfiltered

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 5-1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER:	PROJECT NAME:	
BORING NUMBER:	COORDINATES:	DATE:
ELEVATION:	GWL: Depth Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST:	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS:		PAGE OF

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS

NOTES:

243A-3-86

IT CORPORATION

FIGURE 5-2

MONITOR WELL INSTALLATION SHEET

PROJECT NAME ____________ FIELD ENG./GEO. ____________ DATE ________

PROJECT NO. ____________ CHECKED BY ____________ DATE ________

BORING NO. ____________

DATE OF INSTALLATION ____________

BOREHOLE DRILLING

DRILLING METHOD ____________	TYPE OF BIT ____________
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID ______ FROM ______ TO ______	SIZE ______ FROM ______ TO ______
FLUID ______ FROM ______ TO ______	SIZE ______ FROM ______ TO ______

DESCRIPTION

TYPE ____________	RISER PIPE MATERIAL ____________
DIAMETER OF PERFORATED SECTION ______	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. ______ I. D. ______
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS ______
AVERAGE SIZE OF PERFORATIONS ______	JOINING METHOD ______
TOTAL PERFORATED AREA ______	____________

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH ______	OTHER PROTECTION ______
PROTECTIVE PIPE O.D. ______	____________

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE				
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS:				
GROUT	TOP	BOTTOM	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP				
BOTTOM OF BOREHOLE				
GWL AFTER INSTALLATION				

VAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐

VAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐

REMARKS ____________

INTERNATIONAL TECHNOLOGY CORPORATION

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

FIGURE 5-3

SAMPLE COLLECTION LOG

PROJECT NAME ____________________

SAMPLE NO. ____________________

SAMPLE LOCATION ____________________

SAMPLE TYPE ____________________

COMPOSITE ____ YES ____ NO

COMPOSITE TYPE ____________________

DEPTH OF SAMPLE ____________________

WEATHER ____________________

CONTAINERS USED	AMOUNT COLLECTED

COMMENTS:

PREPARED BY: ____________________

FIGURE 5-4

COMMENTS: (Continued)	

DATE						
TIME						
PAGE ____ OF ____						
PAGE						
PROJECT NO.						

PREPARED BY: ______________________

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK; I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE ______ OF ______ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY, I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS: OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS, WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - IL GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC; 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR).
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

HEALTH AND SAFETY PLAN
NAVAL AIR STATION-KEY WEST (UIC N00213)
KEY WEST, FLORIDA

PREPARED FOR

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA
CONTRACT NO. N-62467-88-C-0196

PREPARED BY

IT CORPORATION
3012 U.S. HIGHWAY 301 N., SUITE 1000
TAMPA, FLORIDA 33619

FEBRUARY 1990

TABLE OF CONTENTS

		Page
LIST OF TABLES/FIGURES (combined)		iv
ACRONYMS AND SYMBOLS		v
1.0	INTRODUCTION	1-1
	1.1 PROJECT DESCRIPTION	1-2
	1.2 CHEMICAL HAZARDS	1-2
	1.3 PHYSICAL HAZARDS	1-3
2.0	ASSIGNMENT OF RESPONSIBILITIES	2-1
	2.1 PROJECT MANAGERS	2-1
	2.2 HEALTH AND SAFETY COORDINATOR	2-1
	2.3 FIELD OPERATIONS COORDINATOR	2-1
	2.4 TECHNICIANS/SUBCONTRACTORS	2-1
3.0	SITE DESCRIPTION	3-1
	3.1 SITE 1 - TRUMAN ANNEX REFUSE DISPOSAL AREA	3-1
	3.2 SITE 3 - TRUMAN ANNEX REFUSE DISPOSAL AREA	3-1
	3.3 SITE 4 - BOCA CHICA OPEN DISPOSAL AREA	3-2
	3.4 SITE 5 - BOCA CHICA DDT MIXING AREA	3-2
	3.5 SITE 7 - FLEMING KEY NORTH LANDFILL	3-3
	3.6 SITE 8 - FLEMING KEY SOUTH LANDFILL	3-3
	3.7 SITE 9 - TRUMBO POINT ANNEX FUEL FARM AND PIERS	3-3
	3.8 SITE 10 - BOCA CHICA FIRE FIGHTING TRAINING AREA	3-3
4.0	MEDICAL PROGRAM	4-1
	4.1 PHYSICAL EXAMINATIONS	4-1
	4.2 MEDICAL RECORDS	4-2
	4.3 INJURY AND ILLNESS TREATMENT	4-2
5.0	TRAINING PROGRAM	5-1
	5.1 PRE-PROJECT TRAINING	5-1
	5.2 TAILGATE SAFETY MEETINGS	5-2
	5.3 TRAINING RECORDS	5-2
6.0	AIR MONITORING	6-1
	6.1 AREA MONITORING	6-1
	6.2 PERSONNEL MONITORING	6-2
7.0	WORK ZONES AND SITE CONTROL	7-1
	7.1 EXCLUSION ZONE	7-1
	7.2 DECONTAMINATION ZONE	7-1
	7.3 SUPPORT ZONE	7-1
	7.4 SITE ACCESS CONTROL	7-1
	7.5 COMMUNICATIONS	7-2
8.0	PERSONAL PROTECTIVE EQUIPMENT AND PROCEDURES	8-1
	8.1 REQUIREMENTS	8-1
	8.2 STANDARD PROCEDURES	8-2
	8.3 HEARING PROTECTION	8-3
9.0	DECONTAMINATION AND SANITATION	9-1
	9.1 PERSONNEL DECONTAMINATION	9-1
	9.2 SANITATION	9-1
	9.3 TOILET FACILITIES	9-1
	9.4 WASHING FACILITIES	9-2
	9.5 EQUIPMENT DECONTAMINATION	9-2
	9.6 BREAKS	9-2

TABLE OF CONTENTS (continued)

		Page
9.7	HOUSEKEEPING	9-2
9.8	FACILITY SAFETY RULES	9-3
10.0	GENERAL WORK PRACTICES	10-1
10.1	SAFETY	10-1
10.2	LEVEL OF PROTECTION	10-2
10.3	WORK ZONES	10-3
10.4	ENTRY PROCEDURES	10-4
10.5	HEAT STRESS	10-4
10.6	CONSTRUCTION SAFETY	10-5
10.7	ILLUMINATION	10-5
10.8	SUBCONTRACTOR SAFETY	10-5
10.9	DRUM HANDLING	10-5
10.10	ACCESS	10-5
10.11	POSTING/BARRICADES	10-6
10.12	LABELING	10-6
10.13	BUDDY SYSTEM	10-6
11.0	EXCAVATION SAFETY	11-1
12.0	EMERGENCY PROCEDURES	12-1
12.1	GENERAL	12-1
12.2	RESPONSES TO SPECIFIC SITUATIONS	12-1
12.2.1	Worker Injury	12-1
12.2.2	Fires	12-2
12.2.3	Spills	12-3
12.3	EMERGENCY NUMBERS AND NOTIFICATION	12-3
12.4	DOCUMENTATION	12-4
12.5	EVACUATION PLAN	12-4

TABLES

FIGURES

APPENDIX A - HEALTH AND SAFETY SIGNATURE PAGE

LIST OF TABLES

TABLE NO.	TITLE
1-1	Suspected Chemical Hazards
10-1	Minimum Illumination Intensities in Foot-Candles
12-1	Florida, Federal, and Private Emergency Contacts

LIST OF FIGURES

FIGURE NO.	TITLE
3-1	Location of Naval Activities and Study Sites
3-2	Investigation and Sampling Locations Truman Annex Refuse Disposal Area, Site 1
3-3	Investigation and Sampling Locations Truman Annex DDT Mixing Area, Site 3
3-4	Investigation and Sampling Locations Boca Chica Open Disposal Area, Site 4
3-5	Investigation and Sampling Locations Boca Chica DDT Mixing Area, Site 5
3-6	Investigation and Sampling Locations Fleming Key North Landfill, Site 7
3-7	Investigation and Sampling Locations Fleming Key South Landfill, Site 8
3-8	Investigation and Sampling Locations Trumbo Point Fuel Farm and Piers, Site 9
3-9	Investigation and Sampling Locations Boca Chica Fire Fighting Training Area, Site 10
12-1	Sites 1, 3, 7, 8, and 9 - Routes to Nearest Hospital
12-2	Sites 4, 5, and 10 - Routes to Nearest Hospital

ACRONYMS AND SYMBOLS

TITLE	DEFINITION
ACGIH	American Council of Governmental and Industrial Hygienist
ADI	Average Daily Intake
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society of Testing and Materials
BW	Body Weight
CAG	Carcinogenic Assessment Group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGA	Combustible Gas Analyzer (Exposimeter)
CLP	USEPA Contract Laboratory Program
CNO	Chief of Naval Operations
CPR	Cardio Pulmonary Resuscitation
CRPO	Community Relations Plan Outline
CRQL	Contract Required Quantification Limits
C_S	Concentration of Soil
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DDT	Dichloro-Diphenyl-Trichloroethane
DDD	Dichloro-Diphenyl-Dichloroethane
DDE	Dichloro-Diphenyl-Dichloro-Ethylene
DMP	Data Management Plan
DOD	U.S. Department of Defense
DOT	U.S. Department of Transportation
DPDO	Defense Property Disposal Office
DQO	Data Quality Objectives
EFD	Engineering Field Division
EIC	Engineer-in-Charge
EP	Extraction Procedure/Exposure Period
FAC	Florida Administrative Code
FDER	Florida Department of Environmental Regulations
FEV/FVC	Forced Expiratory Volume/Forced Vital Capacity
FGFFC	Florida Game and Fresh Water Fish Commission
FID	Flame Ionization Detector

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
FOC	Field Operations Coordinator
FS	Feasibility Study
FSP	Field Sampling Plan
GAC	Granular Activated Carbon
G&M	Geraghty and Miller
gpm	Gallons per Minute
HRS	Hazard Ranking System
HSC	Health and Safety Coordinator
HSP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments of 1984
IAS	Initial Assessment Study
IBM PC	International Business Machine Corp. Personal Computer
ICRP	International Council on Radiation Protection
IR	Average Soil Ingestion Rate
IRP	Installation Restoration Program
IT	IT Corporation
ITAS	IT Analytical Services
LBG	Leggette, Brashears, and Graham, Inc.
LEL	Lower Explosive Limit
LIMS	Laboratory Information Management Systems
mg/kg	Milligrams/Kilogram
mg/L	Milligrams/Liter
MS DOS	Microsoft Disk Operating System
MSA	Mine Safety Administration
MSL	Mean Sea Level
NACIP	Navy Assessment and Control of Installation Pollutants
NAS	Naval Air Station
NAVENENVSA	Naval Energy and Environmental Support Activity
NAVFACENGCOM	Navy Facilities Engineering Command

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
NCP	National Oil and Hazardous Substances Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NEPPS	Naval Environmental Protection Support Service
NFA	No Further Action
NIOSH	National Institute of Occupational Safety and Health
NPSS	Naval Environmental Protection Support Service
OSHA	Occupational Health and Safety Administration
OVA	Organic Vapor Analyzer
PAO	Public Affairs Officer
PC	Personal Computer
PCB	Polychlorinated Biphenyl
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PMP	Project Management Plan
ppb	Parts per Billion
PPE	Personnel Protection Equipment
ppm	Parts per Million
q	Cancer Potency Factor
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
R	Acceptable Incremental Lifetime Cancer Risk
RA	Risk Assessment or Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RV	Recreational Vehicle
SAP	Sampling and Analysis Plan

ACRONYMS AND SYMBOLS (Continued)

TITLE	DEFINITION
SARA	Superfund Amendments and Re-authorization Act
SCBA	Self Contained Breathing Apparatus
SI	Site Inspection
SMAC 20	Simultaneous Analysis Complete
SOUTHDIV	Southern Division, Naval Facilities Engineering Command
SOW	Statement of Work
TCL	Target Compound List
TDS	Total Dissolved Solids
TLV	Threshold Limit Value
TRC	Technical Review Committee
ug/L	Micrograms/Liter
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds
WBGT	Wet Globe Bulb Temperature Index

1.0 INTRODUCTION

This document has been prepared for the Southern Division Naval Facilities Engineering Command (SOUTHDIV) for work on the Naval Air Station (NAS) Key West Florida. It is the policy of IT Corporation (IT) to provide a safe and healthful work environment for all its employees and subcontractors. IT considers no aspect of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency or shortcuts and every attempt is made to reduce the possibility of injury, illness or accident occurrence.

The purpose of this Health and Safety Plan (HSP) is to:

- Assign IT site personnel health and safety responsibilities
- Prescribe mandatory operating procedures
- Establish personal protective equipment requirements for work activities
- Establish emergency response procedures
- Provide information on the health hazards and nature of work safety at each work site to all employees, contractors, subcontractors, and visitors.

The HSP complies with all applicable Federal and Florida Occupational Safety and Health Administration (OSHA) regulations. This plan is in accordance with the following IT Health and Safety Policies and Procedures:

ITC	9000	Safety Policy
ITC	9001	Respiratory Protection Devices - Wearer Fit IT Policy
ITC	9020.1	Accident Prevention Program - Inspection and Analysis
ITC	9020.2	Accident Prevention Program - Safety Inspection
ITC	9021.1	Review of New Jobs, New Project, New Construction and Proposals
ITC	9030.1	Employee and Contractor Training Requirements
ITC	9300.1H	Procedures for Handling Insurance Claims
ITC	9410.1	Pre-employment Medical Examinations
ITC	9410.2	Periodic/Update Medical Examinations
ITC	9532.9	Excavation and Trenching
ITC	9532.10A	Hazardous Waste Operations and Emergency Response
ITC	9533.1	Working in Hot Environments
ITC	9552	Hazards Communication Program
ITC	9561	Respiratory Protective Devices
ITC	9571	Fire Safety
ITC	9572	Electrical Safety
ITC	9591.1	Health and Safety Rules for Contractors
ITC	9650	Hearing Conservation Program.

These policies, and their implementation, are central to IT's accident prevention program.

The provisions of this plan are mandatory for all IT personnel and subcontractors assigned to the project. All authorized visitors to any of the work sites will be required to abide by these procedures. Work conditions can be expected to change as the operation progresses. As appropriate, written addenda to the plan will be provided by the Health and Safety Coordinator (HSC). No changes to the plan will be implemented without prior approval of the HSC and the NAS-Key West Project Manager.

1.1 PROJECT DESCRIPTION

The objectives of the remedial investigative activities at NAS-Key West are to confirm, characterize and define the lateral and vertical extent of environmental contamination and to provide data to support feasibility studies at the following eight sites:

- Site 1 Truman Annex Refuse Disposal Area
- Site 3 Truman Annex DDT Mixing Area
- Site 4 Boca Chica Open Disposal Area
- Site 5 Boca Chica DDT Mixing Area
- Site 7 Fleming Key North Landfill
- Site 8 Fleming Key South Landfill
- Site 9 Trumbo Point Annex Fuel Farm and Piers
- Site 10 Boca Chica Fire Fighting Training Area

Project activities could involve the installation of ground water monitoring wells, soil and surface ground water sampling and/or ambient air monitoring. A brief description of each site and applicable background information is provided in Section 3.0.

1.2 CHEMICAL HAZARDS

The previous investigations at this station involved limited contact with low-level contaminated materials. There exists a potential for chemical exposure at hazardous levels at the sites to be investigated.

Chemical hazards that may be encountered on-site include solvents, pesticides, fuels, oils and PCBs. Existing information indicates very low concentrations of organic contaminants; however, potential for exposure to higher concentrations is present. The effects of these potential exposures will be controlled by the use of protective clothing, as prescribed in Section 8.0 of this plan, and by monitoring airborne contaminant levels, as prescribed in Section 6.0.

Information regarding the hazards and toxicity of the substances present will be disseminated at the initial site safety meeting and will be available on-site. Table 1.1 outlines suspected chemical hazards at NAS-Key West. The threshold limit value (TLV) and permissible exposure limits levels (PEL), listed in Table 1.1, used for assessment of airborne concentrations have been selected on the basis of anticipated concentrations and/or toxicity levels.

The presence of fuel oil and solvent vapors will be monitored for with an Organic Vapor Analyzer (OVA). An action level of 5 parts per million (ppm) sustained for fifteen minutes has been established in lieu of a published TLV or PEL for the specific mixture. A combustible gas indicator, MSA 260/261 or similar device, will be used to monitor for explosive limits of gases/ vapors and oxygen deficiency in the immediate working areas at each drilling or excavation site (see Section 6.0).

Conventional industrial hygiene monitoring will be conducted when, in the judgment of the HSC, an activity may produce airborne concentrations in excess of accepted safe limits. The monitoring data will be compared with American Council of Governmental and Industrial Hygienists (ACGIH) TLVs and OSHA PELs.

1.3 PHYSICAL HAZARDS

The principal risks of this project are the physical hazards associated with trenching and drilling activities. Engineering controls, such as guarding moving parts, shall be used to control such hazards. Protective equipment shall be utilized to minimize these hazards. Heat stress (Section 10.5) and noise (Section 8.3) also present significant physical hazards.

The risk of flammable vapor ignition associated with trenching and drilling at landfill areas will be monitored with a combustible gas indicator (Section 6.0). Pursuant to IT policy, personnel will be evacuated when the concentration of combustible gases exceed 10 percent of the lower explosive limit (LEL).

2.0 ASSIGNMENT OF RESPONSIBILITIES

All personnel involved in operations who treat, excavate, trench, handle, sample, dispose of, or otherwise have a potential for exposure to contaminated materials at the subject NAS-Key West Sites are subject to this HSP.

All personnel are responsible for following the safety procedures while working on the sites. In no case will work be performed in a manner that conflicts with the intent of, or the inherent safety and environmental cautions expressed in, these procedures. Personnel who violate safety procedures may be dismissed from the site and subject to disciplinary action including termination. All field personnel will be properly trained in health and safety regulations associated with handling hazardous materials and the safe operation of equipment. All project field staff and subcontractors will be trained as necessary according to the specifications set forth by 29 CFR 1910.120 and this document.

2.1 PROJECT MANAGERS

The Project Manager, Robert D. Stephens (IT, Tampa, Florida), will be accountable for ensuring field implementation of the health and safety plan. IT Policy and Procedures 9021.1 require that the project manager is responsible for informing the project's HSC of any changes in work plans addressing health and safety and project management issues.

2.2 HEALTH AND SAFETY COORDINATOR

The project HSC will be responsible for development and coordination of the general HSP for each site and of addenda specific to each site. This plan will comply with established site-specific procedures including medical surveillance, training requirements, hazard assessment, personal protective equipment, field implementation and audits. The HSC is the only person who can affect changes to this plan and will update and change the plans, if warranted by on-site or existing conditions. Matters relating to safety and health will be handled by the HSC. Sally Musick is the HSC for this project. Other Health and Safety professionals may provide additional field level support.

2.3 FIELD OPERATIONS COORDINATOR

The Field Operations Coordinator (FOC), Joe Buerhop of Leggette, Brashears, and Graham, Inc. (LBG) will be the first line supervisor responsible for ensuring that all personnel on-site, including subcontractors and visitors, comply with the HSP requirements. His responsibilities will include communication of site requirements to all personnel; field supervision and coordination; and consultation with the HSC regarding appropriate changes to the HSP.

2.4 TECHNICIANS/SUBCONTRACTORS

Technicians, subcontractors and other personnel on-site will be responsible for understanding and complying with all site requirements. Health and safety requirements will be included in all subcontracts. The written requirements will be copied and distributed to personnel working on-site, and will include the health and safety signature page (Appendix A). This form indicates that the recipient has read and understood the HSP. All personnel working on-site will be required to read the HSP and sign this form.

3.0 SITE DESCRIPTION

This section describes the 8 sites to be investigated during the Remedial Investigation (RI) to be conducted at NAS-Key West (Figure 3.1). The sites under investigation are as follows:

- Site 1 Truman Annex Refuse Disposal Area
- Site 3 Truman Annex DDT Mixing Area
- Site 4 Boca Chica Open Disposal Area
- Site 5 Boca Chica DDT Mixing Area
- Site 7 Fleming Key North Landfill
- Site 8 Fleming Key South Landfill
- Site 9 Trumbo Point Annex Fuel Farm and Piers
- Site 10 Boca Chica Fire Fighting Training Area

Some of the sites are discrete, individual locations while other sites are comprised of multiple locations.

NAS-Key West is located approximately 150 miles southwest of Miami on the last major island of the Florida Keys. The general location of NAS Key West is shown on the area map in Figure 3-1. It is connected to the mainland by the Overseas Highway (U.S. Highway No. 1). Tourism is the primary industry in the Key West area. Visitors are attracted by the tropical climate and the beautiful island setting. Fishing is the second most important industry with shrimping accounting for half the total catch.

3.1 SITE 1 - TRUMAN ANNEX REFUSE DISPOSAL AREA

The Truman Annex Refuse Disposal Area is shown in detail on Figure 3-2, located along the southern shore of Truman Annex which is shown on the vicinity map, Figure 3-1. The site is reported to cover an area of approximately seven acres, including the antenna field and the area to the immediate north.

The subsurface at this site consists of landfill material in a shallow fill area with the landfill extending beyond the natural shoreline. Previous investigations reported that groundwater in the area is approximately two to three feet below land surface and flow is in a southerly direction towards the Atlantic Ocean.

From 1952 until the mid-1960's, the Truman Annex Refuse Disposal Area was used for general refuse disposal and open burning. No restrictions were placed on the types of wastes disposed of at the site and it is believed that, in addition to general refuse, waste paint, thinners and solvents were also sent here for disposal.

3.2 SITE 3 - TRUMAN ANNEX DDT MIXING AREA

The Truman Annex DDT Mixing Area is shown in detail in Figure 3-3 and is located at the site of Building 265, which has been demolished. The location of this site is shown on the vicinity map, Figure 3-1. The site covers an area of about 0.25 acres and is located approximately 1,100 feet inland from the coastline in an area subject to vehicular and pedestrian traffic. The site is underlaid by highly permeable soils and no surface water features are present. It is reported that groundwater is about two to three feet below land surface and flows south toward the Atlantic Ocean; however, no monitoring wells have been installed at the site to confirm this information.

From the 1940's to the early 1970's, the location was used as a DDT mixing area. Powdered DDT concentrate was mixed with water and temporarily stored in 55-gallon drums both inside and outside the former building. The mixed solution was transferred to trucks for dispersal. Discharge at the site was by spillage.

3.3 SITE 4 - BOCA CHICA OPEN DISPOSAL AREA

The Boca Chica Open Disposal Area is shown in detail in Figure 3-4 and is located in the southeastern part of Boca Chica Key, between the perimeter road and Geiger Creek as shown on the vicinity map Figure 3-1. The site was operated as an open disposal and burning area from 1942, to the mid-1960's. The site received general refuse and waste associated with the operation and maintenance of aircraft. These wastes might have included waste oils, hydraulic fluids, paint thinners and solvents.

About 2,600 tons of waste from NAS-Key West were disposed of and burned at this site annually. Whenever possible, this burning area was cleared of any remaining debris left over from the burning process and deposited in an area of unknown dimensions to the north of the burning area. Because the burning operation was not a controlled process, all wastes may not have been completely destroyed. There may exist residual wastes within the burn area and/or debris zone.

The burn area is presently clear of any debris with the exception of four abandoned above-ground tanks located in the northwest portion of the site. Around one tank, the sides, foundations, and ground are covered with an unknown black asphalt-like substance. The remaining three tanks are clustered together next to a scrap iron rod pile. Much of the area is subject to tidal inundation.

The debris area, of unknown size, has a predominant thick cover of mangrove trees, spotted with areas of open water. Debris can still be seen lying among the mangroves and in these open areas.

The presence of mangrove trees are indicative of a salt water environment, and, therefore some connection to the sea must exist. This fact establishes the debris zone as a wetlands which is protected by State/Federal wetland regulations.

3.4 SITE 5 - BOCA CHICA DDT MIXING AREA

The Boca Chica DDT Mixing Area is shown in detail in Figure 3-5 and is located next to a man-made drainage ditch that is connected to a large borrow pit, along the west side of Runway 13. The location of this site is shown in Figure 3-1, on the vicinity map. DDT mixing operations were conducted at the site of Building 915 (demolished in 1982) from the 1940's to the early 1970's. To destroy insect larvae, the pesticides were mixed with waste fuel oil to allow the pesticide to float on the surface of any standing water. Disposal at the site was not intentional but probably resulted from spillage. Two above-ground tanks on concrete foundations (a 500-gallon mixing tank and a 1,000-gallon storage tank) were located to the west of the building. During the removal of the tanks, some spillage reportedly occurred.

A slight odor of pesticide was detectable at the site during the on-site survey (July, 1989). A man-made drainage ditch is located just south of the site. Drainage from the ditch is to a large borrow pit to the east. The area near the demolished building is partly covered with sparse grass. The ditch has medium size mangroves around its banks. During the on-site survey, numerous fish were observed in the ditch.

3.5 SITE 7 - FLEMING KEY NORTH LANDFILL

Fleming Key North Landfill covers approximately 30 acres and is shown in detail in Figure 3-6 on the northern end of Fleming Key as shown in the vicinity map, Figure 3-1. Reportedly, 4,000 to 5,000 tons of unknown wastes were disposed into excavated trenches annually between 1952 and 1962. The trenches were typically cut 25 feet wide, 10 feet deep and 500 to 1,000 feet in length.

In 1977, the U.S. Department of Agriculture Animal Import Center was constructed a building over a portion of the landfill. During the construction, wastes were excavated and transferred to an area immediately to the west.

Ground water in the area is approximately three to four feet below the surface over much of the site, and during trenching it is reported that saline ground water stood in the trenches.

3.6 SITE 8 - FLEMING KEY SOUTH LANDFILL

Fleming Key South Landfill covers approximately 45 acres and is shown in detail in Figure 3-7 on the southern end of Fleming Key as shown in the vicinity map, Figure 3-1. Reportedly, as much as 8000 tons of unknown wastes were disposed of at the landfill annually between 1962 and 1982. Beginning in 1966, the public works disposal activities of the City of Key West were combined with those of the Navy.

The open-trench disposal method was practiced at this site, with the trenches being constructed in a manner similar to that at Fleming Key North Landfill. The trenches were partially full of sea water when the wastes were disposed. Wet garbage was placed directly into one end of the trench and combustible wastes were taken to the western portion of the site and burned. The ashes and unburned wastes then were pushed and piled into an area in the western portion of the site.

3.7 SITE 9 - TRUMBO POINT ANNEX FUEL FARM AND PIERS

The Trumbo Point Tank Farm and Piers are shown in detail in Figure 3-8 and located east of the piers at the Trumbo Point Annex, as shown in the vicinity map, Figure 3-1. The Annex was constructed in 1918 as a seaplane base using dredged materials. Fuel is received at this facility from tankers and then distributed by buried transmission lines to either Truman Annex or NAS-Boca Chica. Fuels that have been stored at this site include No. 6 fuel oil, Bunker C oil, diesel, aviation gasoline, JP-4 and JP-5.

3.8 SITE 10 - BOCA CHICA FIRE FIGHTING TRAINING AREA

The Boca Chica Fire Fighting Training Area is shown in detail in Figure 3-9 and is located immediately west of the southern blimp pad as shown in Figure 3-1, on the vicinity map. The fire training facility consists of two unlined circular pits approximately 20 feet in diameter. The pits are surrounded by a gravel apron. The fire pit area is used occasionally during the year. Each time a training session occurs, flammable liquids such as JP-5, waste oils or hydraulic fluids are poured onto junk vehicles within the pit and ignited. The area surrounding the vehicles shows visible evidence of burning and oil staining.

4.0 MEDICAL PROGRAM

IT's medical program is designed to protect the health and safety of each worker who might be exposed to hazardous materials. In order to ensure thorough medical care, periodic examinations and documentation of all injuries and illnesses are required.

4.1 PHYSICAL EXAMINATIONS

As required by IT Policies and Procedures 9410.1 and 9410.2, all IT personnel on-site who may be exposed to hazardous materials will have successfully completed a pre-placement or periodic/update physical examination within the past year. This examination has been designed to comply with appropriate federal and state regulatory requirements for hazardous waste site operations.

The IT medical surveillance program examination consists of:

- Medical and occupational history form (detailed questionnaire for new employees, short questionnaire for periodic exams)
- Physical examination
- Complete blood count with differential
- SMAC 20 or equivalent
- Urinalysis (dipstick and microscopic)
- Chest X-ray
- Pulmonary function test (FEV/FVC)
- Audiogram
- Electrocardiogram for persons older than 45 years of age, or if medically indicated
- Drug and alcohol screening
- Visual activity.

All subcontractor personnel who may be exposed to hazardous materials shall have successfully completed a physical examination similar to IT's pre-placement physical within the past year prior to commencing work. All physicals will be approved by a physician who is Board Certified in Occupational Medicine.

4.2 MEDICAL RECORDS

Medical and personnel exposure monitoring records will be maintained in accordance with the requirements of 29 CFR 1910.20, IT Procedure 9410.1 and the IT Medical Protocol Manual. Employee confidentiality shall be maintained. These records shall be kept for at least 30 years.

4.3 INJURY AND ILLNESS TREATMENT

Emergency procedures for impacts on worker health and safety are provided in Section 12.0.

Any employee of IT or of a subcontractor who is suspected of having an overexposure to the chemicals on-site will be given another complete physical examination within seven calendar days. Any employee or contractor who develops a lost-time illness or sustains a lost-time injury will be reexamined prior to returning to work on the site. The physician will certify that the individual is fit to return to work by completing IT's "Return to Work Authorization Following Medical Absence Form." If necessary, activity restrictions will be specified on IT's "Physical Activity Restriction Report."

5.0 TRAINING PROGRAM

All personnel on-site who have potential for exposure to hazardous materials will attend training sessions where potential Health and Safety hazards on the site will be communicated and individuals will receive instructions on the requirements of the HSP. This training will be designed to address the requirements of OSHA Hazard Communication Standard (29 CFR 1910.1200) and the OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120).

5.1 PRE-PROJECT TRAINING

Employees and contractors who work on-site shall have successfully completed a formal training program which will include:

- Basic Safety Training - This course stresses fundamentals such as the cause and prevention of slip, trip and fall hazards; safe lifting techniques; heat stress illnesses and their prevention.

- Hazard Protection - This course deals with the identification, recognition, and safe work procedures for toxic materials. The use and limitations of applicable protective clothing and decontamination procedures are an important part of this course.

- First Aid and Cardiopulmonary Resuscitation (CPR) - Selected personnel will have completed approved Red Cross First Aid and CPR courses. A minimum of at least one certified employee will be on-site at all times.

- Health Hazard Awareness - Information will be available concerning on-site hazardous materials to which personnel may be exposed. The information will include routes of exposure, toxic effects, appropriate protective equipment, medical surveillance and the specific nature of jobs which could result in exposure to chemicals on-site.

- Work practices and engineering controls

- Hearing Conservation Program

- Respirator Training - The use, limitations and inspection of air purifying respirators and Self Contained Breathing Apparatus (SCBA) will be covered. Respirator fit tests will be given to all personnel. These tests will consist of a qualitative fit using irritant smoke in a plastic containment structure. Personnel will breath normally, heavily, move their heads up and down and from side to side and talk while wearing the respirator in the smoke.

All employees will have received a minimum of 40 hours of initial off-site instruction. On-site supervisors shall have completed at least 8 additional hours of specialized training on managing hazardous waste operations. The additional training for on-site managers shall have been taken within the last

12 months preceding the start of this site work. This training includes familiarization with the locations of nearby medical facilities and safety and emergency procedures. Because the base allows immediate access to emergency vehicles and civilian medical personnel, NAS Medical Facilities will not be utilized.

Prior to commencing trenching or drilling operations at each site, a pre-entry briefing will be held at the site between the FOC, a representative of NAS-Key West's Public Works Department, and all personnel involved in that phase of work. The pre-entry briefing will be to discuss site specific work hazards, to describe the appropriate monitoring, protective clothing and work/decontamination measures, to discuss emergency procedures and location of equipment and facilities.

5.2 TAILGATE SAFETY MEETINGS

Daily tailgate safety meetings will be conducted at the beginning of each shift or whenever new employees or subcontractors arrive at the job site once the job begins. At these meetings Health and Safety considerations and the necessary protective equipment for the day's activities will be discussed. This meeting will be conducted by the Project Manager or his designee and documented on IT's tailgate safety meeting form. Each employee present will sign the tailgate safety meeting form indicating that they attended the meeting, and are aware of general work area hazards. No employee will be allowed to work without having attended the meeting and signed the daily tailgate safety meeting form.

5.3 TRAINING RECORDS

All training that is conducted on-site will be documented on the appropriate forms and forwarded to the Training Department to be placed in the employee's file.

6.0 AIR MONITORING

Monitoring of the ambient air at the work site will be conducted to determine any potential hazards to workers. Should any air contamination be detected, appropriate respiratory protection will be implemented.

6.1 AREA MONITORING

Ambient air monitoring will be conducted with direct reading instruments for explosive vapor concentrations, oxygen concentrations, and volatile organic compound (VOC) concentrations at drill sites and exploratory excavations. Monitoring for explosive vapor concentrations and oxygen concentrations will be conducted using a calibrated MSA 260/261 or similar combustible gas/oxygen meter calibrated using methane. Monitoring for VOCs will be conducted using an HNU PI-101 photoionization detector, a Foxboro OVA-128 flame ionization detector or a similar device. This instrument will be calibrated daily against benzene.

For all of the sites, the first task will be to perform an air monitoring survey. Ground level and breathing zones will be sampled to establish the required level of protection. The level of personal protection used during the NAS-Key West project will either be Level D or Level C. Level A or Level B protection is not planned to be used at these sites. Level D protection will require no protective coveralls and no respirators, and Level C will require protective coveralls and a full face mask. It is noted that half face masks will not be used on this project.

Action levels for area and breathing zone air monitoring are as follows:

1. (Breathing zone) VOCs >1 ppm above background (detected with OVA) if detector tubes indicate presence of benzene or vinyl chloride

2. (Breathing zone) VOCs >5 ppm above background if benzene or vinyl chloride are not present

3. (Area) Oxygen <20 percent or >23 percent

4. (Area) Flammable Atmospheres >20 percent of the LEL (for drilling sites) >10 percent of the LEL (for confined spaces)

If Action Levels 1 and 2 are equaled or exceeded, proper personal protective equipment will be donned. If Action Levels 3 or 4 are equalled or exceeded work will stop immediately and personnel will move upwind at least 50 yards and let the area vent for a minimum of five minutes. At the end of the five minute waiting period, air quality measurements will be taken. If concentrations have not been reduced below action levels, detector tubes will be used to determine if benzene or vinyl chloride are present. If benzene or vinyl chloride is detected, the Project Manager and HSC shall be notified. They shall then determine the type of air purifying respirators to be required before re-entry into the work area. If benzene or vinyl chloride is not detected, work may continue without respirators unless the breathing zone readings exceed 5 ppm for more than 15 minutes.

If the breathing zone exceeds 10 ppm, the level of protection will be reevaluated by the HSC. Air purifying or air-supplied respirators may then be required.

A particular operation may be delayed and restarted under new working Health and Safety guidelines, or may be abandoned totally in extreme cases. The SOUTHDIV Engineer-In-Charge (EIC) will be immediately notified of such conditions and/or resultant work stoppage and abandonment.

6.2 PERSONNEL MONITORING

Personnel monitoring for lead will be conducted during operations. Monitoring will be conducted to ensure compliance with OSHA standards. The HSC shall determine a representative monitoring program based upon the potential for employee exposure.

Conventional industrial hygiene monitoring shall also be conducted when, in the judgment of the HSC, an activity may produce airborne concentrations in excess of acceptable safe limits. Conventional methods would include long-term integrated personal/general area air monitoring.

The monitoring data will be compared with (ACGIH) TLVs and OSHA PELs.

All personnel exposure monitoring records will be maintained for a period of 30 years, in accordance with 29 CFR 1910.20.

7.0 WORK ZONES AND SITE CONTROL

Site conditions and planned activities do not call for the imposition of rigid access control zones. At each site, the FOC will implement a work zone system that is sufficient to limit employee exposure and prevent the dispersion of hazardous components. This will consist of clarifying:

- Where/when protective clothing must be worn
- Where protective clothing will be donned
- Where protective clothing will be removed
- What must be done with contaminated protective clothing.

However, if on-site conditions change so that area(s) are identified as heavily contaminated or hazards and risks are considered significant, work zones around the site(s) shall be more rigidly defined. The work site will be divided into work zones identified as the exclusion, decontamination and support zones which are described below.

7.1 EXCLUSION ZONE

This zone includes areas of potential contamination and poses the highest inhalation and skin exposure potential. The appropriately designated respiratory and skin protection equipment will be required for all persons entering the exclusion zone. Decontamination will be required for all personnel and equipment leaving this zone. Removal of gross contaminants (i.e. soil) from protective clothing should be conducted within this zone.

7.2 DECONTAMINATION ZONE

This zone includes the area immediately surrounding the exclusion zone. This zone shall be at the interface of the exclusion zone and the support zone and shall provide for the decontamination of equipment and personnel before crossing into the support zone. A single decontamination station and exit point will be established between the exclusion and support zones.

7.3 SUPPORT ZONE

This zone covers all areas outside of the decontamination zone. This area is considered to have no significant air, water, or soil contamination. The support zone provides a changing and work staging area for personnel entering the decontamination and exclusion zones.

7.4 SITE ACCESS CONTROL

To minimize congestion, IT will work with the NAS-Key West Public Affairs Officer (PAO) to notify and inform station personnel, via the base information office (or newspaper), of the duration and schedule of site activities. Curiosity and concern regarding IT activities and dress will hopefully be minimized with an explanation of the type of site tasks and employee protection measures.

Plastic sheeting will be placed on the ground surface at the decontamination zone and a duct taped line will delineate the exclusion-decontamination zone boundary.

The support zone will be delineated by the edge of the sheeting signifying the limits of the decontamination zone (see Figure 7.1).

At each site during ongoing work activities, "warning" barricade tape will be suspended approximately two feet above the land surface and to encompass the two inner zones.

Where deemed necessary or prudent, and in coordination with the station traffic and/or security officer(s), barricades with electronic flashers and/or fluorescent traffic cones will be set up to detour or restrict vehicular traffic.

On weekends and during non-working hours, all equipment excluding drilling rig and support equipment, will be removed from the work site and relocated to a secure area, as designated by the base where deemed necessary. To deter curiosity seekers and limit risks to base personnel, IT will erect, as necessary, a warning sign at active work site, or open excavation, and will arrange for increased and periodic patrols with the base security office.

7.5 COMMUNICATIONS

The FOC and/or the designated team leader for a task will be present at all times at each site where activities are ongoing. As such, communications between personnel and employees will be verbal, visual and electronic.

Electronic communications between the FOC and team leader(s) at each concurrently active work site will be available. Emergency response will be available to communicate personnel or employee injury accidents, or to report occurring incidents posing potential hazards and risks.

8.0 PERSONAL PROTECTIVE EQUIPMENT AND PROCEDURES

Based on the current knowledge of the Key West Sites, personal protective equipment (PPE) required are expected to include the donning of Level C or Level D equipment. Before any work begins, a qualified IT professional Health and Safety Representative will perform a site review to assess the hazardous materials present on-site and make informal recommendation of PPE required for the site. Preliminary site characteristics suggest that Level C PPE will be required at sites 3, 5 and 8. The PPE required for sites 1, 4, 6, 7, 9, and 10 is expected to be Level D.

8.1 REQUIREMENTS

At all sites, all personnel will at a minimum wear Level D protection. Level D protection consists of:

- Hard hats with optional face shield
- Safety glasses or goggles
- Safety boots with steel shanks, chemical resistant
- Standard work coveralls
- Gloves, chemical resistant.

If on-site information and conditions demonstrate that the hazards and risks to personnel have increased, the PPE requirement Level C consists of:

- Hard hats with face shield may be changed to Level C (29 CFR 1910.120 Appendix B)
- Safety toed boots with steel shanks (chemical protective)
- Saranex coveralls
- Full-face respirator with the cartridge recommended by the IT Health and Safety Representative
- Gloves, chemical protective

Personnel who have significant potential for exposure to contaminated soils or materials may also be required to use chemically resistant garments which may include:

- PVC boots
- Polyethylene laminated Tyvek suits
- Saranex coveralls
- Nitrile gloves
- Disposable shoe covers

During the ground water sampling phases of the investigation, chemical resistant gloves will be worn while opening and sampling monitoring wells. The area around the monitoring well casing should be checked for the presence of plant and animals which are hazardous including spiders, snakes, etc.

Disposal and decontamination of personal protective equipment will be conducted as described in Section 9.1.

8.2 STANDARD PROCEDURES

Standard procedures will provide the employee with adequate exposure protection and shall consist of the following:

- The respiratory protection utilized on-site will be in compliance with OSHA, 29 CFR 1910.134.
- Selection of respirators, as well as any decisions regarding upgrading or downgrading of respiratory protection, will be made by the HSC designee (see Section 6.0).
- Only properly cleaned, maintained, NIOSH/MSHA-approved respirators (full-face, or positive air pressure units) shall be used on-site.
- Air purifying cartridges shall be replaced at the end of each shift, when load-up or breakthrough occurs, or when the recommended time between replacement as specified by the IT HSC has passed.
- Only employees who have had pre-issue qualitative fit tests and annual fit tests thereafter with the respirator used on-site will be allowed to work in atmospheres where respirators are required.
- Air-supplied respirators will be assembled according to manufacturer's specifications regarding hose length, couplings, valves, regulators, manifolds, etc.
- If an employee has demonstrated difficulty in breathing during the fit testing or during use, he or she shall have a physical examination to determine whether a respirator can be worn while performing the required duty.
- No employee shall be assigned to tasks requiring the use of respirators if, based upon the most recent examination, a physician determines that the employee will be unable to function normally wearing a respirator or that the safety or health of the employee or other employees will be impaired by use of a respirator.

- Excessive facial hair (e.g., beards) prevents proper face fit and reduces the effectiveness of the respirator. Persons required to wear respirators must not have beards, extended sideburns or wide mustaches, etc. All personnel wearing full-face respirators will be required to be clean shaven prior to each day's shift.

- Contact lenses are not to be worn while using any type of respiratory protection.

- Regular eyeglasses cannot be worn with full-face respirators.

- All personnel will wear all required respiratory protection and other protective equipment whenever they are within the Exclusion Zone.

- SCBA may be utilized for emergency procedures.

- Protective clothing will be selected based on site chemical and physical hazards and risks.

- No smoking will be permitted during or in the active vicinity of drilling or excavation sites (i.e. Decontamination and Exclusion Zones).

- All air supplied respirators will be charged with Grade D, or better, breathing air as defined in Compressed Gas - Association Commodity Specification G7.1-1966.

- Other general work practices related to safe working procedures are listed in Section 10.

To the fullest extent possible, the nature and potential hazards of each site has been identified (Section 1.0 and 3.0). Prior to commencing work at each site, an IT HSC will review and analyze current information and site conditions and may determine or require additional PPE.

8.3 HEARING PROTECTION

Hearing protection is required if noise levels exceed 85 decibels on the A-weighted scale. This may occur during trenching, drilling and well installation procedures, as well as near aircraft activity.

Requirements set forth in the OSHA Hearing Conservation Amendment (OSHA 1910.95) will be adhered to during work on-site. Both area noise monitoring and personnel noise dosimetry may be conducted by the safety representative to determine the level of noise and the adequate level of protection. Hearing conservation is of major concern. IT Procedure 9650 will be followed for hearing protection.

9.0 DECONTAMINATION AND SANITATION

Decontamination procedures will be followed to ensure that potential site contaminants are not spread beyond the work site. Employees will also be provided with adequate washing facilities for personal sanitation.

9.1 PERSONNEL DECONTAMINATION

PPE worn on-site will be removed during each egress from the site and decontaminated or disposed of properly. All site personnel shall utilize a step-off decontamination sequence whenever they leave the exclusion and decontamination zones (see Section 7.0). Should site conditions require the level of protection to be upgraded, the decontamination procedures will be modified by the project HSC.

Soft-bristle brushes and/or long-handled brushes will be used to remove loose soil or contaminants before leaving the exclusion zone. Each employee will step into large galvanized (or plastic) wash tubs to rinse boots, and will then wash face and hands with potable (or deionized) water before leaving the decontamination zone. Protective clothing must be removed in this zone. Rinse water will be available in buckets or supplied by garden sprayers. All rinse and wash water will be collected, blended with equipment decontamination waters, and stored pending pre-disposal analysis and determination of proper disposal procedures.

The decontamination zone at all of the sites shall include suitable receptacles for the disposal of used protective clothing, respirator cartridges, plastic sheeting, etc. Polyethylene bags may be used for this purpose. Contaminated protective clothing and equipment will not be removed from the decontamination area until it has been properly decontaminated or bagged. Daily and/or at the end of each shift all used protective equipment will be sealed in the bags provided. Each bag containing used protective clothing and equipment will be placed into new DOT 17-H drums with similar materials from the same, or other, sites. Pre-disposal analysis of the drummed contents is not necessary to determine if contents needs to be disposed of at an appropriate licensed disposal site. Non-hazardous material will be returned to its respective site.

9.2 SANITATION

Potable water will be obtained from the NAS-Key West treated drinking water system and will be available to all personnel. Potable water will be clearly marked and stored in clean, insulated, 5-gallon water coolers. Potable water will be located near and/or in the site Support Zone. Single use paper cups will be available adjacent to the coolers. Cups will be disposed of into plastic garbage bags to be placed into dumpster or refuse container. A refrigeration system, to be used only for the storage of food, may be maintained.

9.3 TOILET FACILITIES

Varied work activities will be in progress concurrently throughout the NAS-Key West. A single portable toilet will be provided for all personnel at each site where work is actively in progress. The holding tanks on each toilet will be emptied on a regular basis and will be discharged at an approved point into the station sanitary sewer system.

9.4 WASHING FACILITIES

Adequate facilities for washing hands will be available at the decontamination station at each work site. Rubberized plastic wash tubs, tubes of hand cream, rinse water and paper towels for drying will be provided at each site. Hands and face will be washed prior to eating or drinking and before leaving the site at the end of each shift. Rinse and wash water will be blended with other used decontamination waters, and stored for disposal.

General work practices for ensuring worker safety (Section 10.0) and personal protective equipment (Section 8.0) are described in separate sections of this plan.

9.5 EQUIPMENT DECONTAMINATION

Prior to entering a new drill site, the drilling rig and support vehicles will be cleaned of soil or mud adhering to or accumulated on the equipment. Augers and other sampling equipment used will be decontaminated by a thorough cleaning with high pressure steam. In addition, the aforementioned equipment including hand tools will be scrubbed with a scrub brush and a low alkaline non-phosphate detergent solution. After scrubbing, the equipment will be rinsed with tap water, then rinsed twice with solvent (pesticide-grade or nano-grade isopropanol) and finally rinsed with distilled water and air dried. If appropriate, the equipment may be wrapped in foil to protect it from the elements.

IT and the SOUTHDIV EIC will designate a suitable site(s) for decontamination of equipment and drill rig which will restrict runoff and permit collection of decontamination water and soil. The soil and water will be collected and separated and a pre-disposal analysis completed to determine proper disposal procedures. Pending results of disposal analyses, decontamination water will be stored on-site. Results of the disposal analysis will be used to determine the disposal techniques for decontamination water. The expected disposal technique is to discharge the waters into the local sanitary sewer. Soil will be collected, drummed and a pre-disposal analysis performed and will be properly disposed.

9.6 BREAKS

All breaks must be taken in a shaded (during the day light hours), clean area. Employees shall wash their hands and faces with soap and water and go to an appropriate break area. Employees are encouraged to drink plenty of fluids during breaks.

9.7 HOUSEKEEPING

IT shall implement a housekeeping program for the field activities to minimize the spread of contaminants beyond the work site (exclusion area). The program shall include at a minimum:

- Daily scheduling to police the work area of debris including paper products, cans and other materials brought on-site.
- Daily changing of wash and rinse water for hands, face and equipment.
- Periodic (daily minimum) removal of all garbage bags and containers

used to dispose of food products, plastic inner gloves and contaminated disposable clothing (Tyvek and Saranx Suits).

9.8 FACILITY SAFETY RULES

The NAS-Key West rules including traffic and security regulations must be adhered to in order to maintain admission to the facility. Violations of facility regulations will be considered grounds for termination.

10.0 GENERAL WORK PRACTICES

The general work practices established by IT will be followed by all employees. Adherence to these standards provides a safe working environment on and around the site.

10.1 SAFETY

The following procedures will be followed to ensure the safety of all employees:

- Each employee shall acknowledge in writing the receipt of and understanding of the HSP. A copy of this document will be maintained at each job work site.

- Removal of contaminated soil from protective clothing or equipment by blowing, shaking or any other means which will disperse contaminants into the air is prohibited.

- Transportation and disposal of contaminated materials must comply with all applicable local, state and federal regulations. These items will be addressed by the transporter and generator.

- Containers shall be moved only with the proper equipment and shall be secured to prevent dropping, tipping or loss of control during transport.

- Emergency equipment shall be located outside, but adjacent to, the decontamination zone in identifiable and readily accessible locations which will remain uncontaminated with materials in case of an emergency.

- All trenching, shoring and excavation work must comply with all federal OSHA rules (Section 11.0).

- No food or beverages shall be present or consumed in the exclusion or decontamination zone(s). No tobacco products shall be present or used, and cosmetics shall not be worn or applied in the work or site control area.

- During the operation, all employees shall be required to wash their hands and faces before eating, drinking, smoking or applying cosmetics.

- All personnel shall avoid contact with potentially contaminated substances. Walking through puddles or mud, kneeling on the ground, etc., should be avoided whenever possible.

- Monitoring equipment will be placed where it is as close as practical to the area monitored while located in an area which minimizes the possibility of equipment damage due to activity on the site.

- Field personnel must watch each other for signs of toxic exposure. Indications of adverse effects include but are not limited to:

  - Changes in complexion and skin discoloration
  - Changes in coordination
  - Changes in demeanor
  - Excessive salivation and pupillary response
  - Changes in speech pattern

- Field personnel shall be cautioned to inform each other of nonvisual effects of toxic exposure such as:

  - Headaches
  - Dizziness
  - Nausea
  - Blurred vision
  - Cramps
  - Irritations of eyes, skin or respiratory tract

- Prompt remedial action, including emergency notification of the FOC, shall be taken whenever any release of a hazardous material occurs.

- Provision will be made for cleaning gross contamination from boots and suits in the exclusion zone (Section 7.0).

10.2 LEVEL OF PROTECTION

Team personnel must wear equipment to protect against potential physical or chemical hazards. The level of protection may be upgraded as deemed necessary by the Project HSC or FOC (Section 8.0).

For all sites, a minimum of Level D protection will be required. The basic PPE will include:

- Hard hat with optional face shield

- Gloves, chemical resistant

- Boots, steel toe and shank, chemical resistant
- Coveralls (may include disposable Saranex suits)

If it is required, additional equipment will be readily available to upgrade to Level C protection. Available equipment on-site will include:

- Full-face, air purifying respirator, with organic vapor and particulate filter (MSHA/NIOSH approved)

- Disposable Saranex chemical-resistant coveralls
- Gloves (outer), chemical-resistant
- Gloves (inner), disposable, chemical-resistant
- Boot cover, chemical-resistant
- Boots, chemical-resistant, steel toe and shank
- Hard hat with full face shield

A professional safety representative will evaluate the data, and determine if the Level D protection being employed at the site is sufficient, or needs to be upgraded. Level C respirator protection will be continued, on the presence of benzene or vinyl chlorides, or when organic vapor concentrations go to a level above 5 ppm for more than 15 minutes.

During the trenching and well drilling phase of the NAS-Key West investigation, the atmosphere directly above the boring will also be monitored at 30 minute intervals for combustible gases using an explosimeter (Section 6.0). All readings will be recorded in the daily field log.

At trenching and drilling sites, if air monitoring readings approach or exceed 9 percent of the LEL, extreme caution shall be exercised in continuing the work activities. If readings approach or exceed 10 percent LEL, or if smoke, mist or vapors are observed at any time near an active trenching or drilling site, work activities will be halted and personnel shall be withdrawn immediately. Before resuming any on-site activities, project personnel in consultation with experts in fire or explosion prevention must develop procedures for continuing operations.

At excavation or confined space work sites, if the monitor readings reach or exceed 10 percent of the LEL, work activities will be halted and personnel withdrawn immediately. Before resuming any on-site activities, project personnel, in consultation with the HSC and experts in fire or explosion prevention, must develop alternate procedures for continuing operations.

10.3 WORK ZONES

For all of the sites, Level D protection is currently deemed appropriate since the potential hazards have been identified, and are considered minimal. No one will be allowed into the exclusion zone unless they are wearing Level D protective equipment. An outer decontamination and support zone will contain the equipment and water necessary for decontamination in the unlikely event that people or equipment become contaminated. The support zone is considered, and should remain, uncontaminated.

As the need for Level C protection arises, the use of work zones will be more important. Additional information on work zones and decontamination at Level C sites is included in sections 7.0 and 9.0.

10.4 ENTRY PROCEDURES

Prior to beginning work at NAS-Key West, the FOC and drilling subcontractor will inspect the drilling equipment. The drilling subcontractor will complete a safety inspection check list, and submit it to the SOUTHDIV representative.

Drilling during this investigation will generally be limited to locations inside or adjacent to contamination source areas, where there may still be the potential for explosive gases. For this reason, an explosimeter will be utilized during drilling. Smoking will be prohibited at all sites.

During the ground water sampling phases of the investigation, heavy gloves will be worn while opening and bailing wells. The area around the well casing will be checked for the presence of harmful animals such as spiders or snakes.

10.5 HEAT STRESS

Heat stress may be of concern depending upon the ambient temperature. Heat stress of employees on-site will be monitored by the Wet Bulb Globe Temperature Index (WBGT) technique. This method requires the use of a heat stress monitoring device, such as the WBGT Heat Stress Monitor (Reuter Stokes).

WBGT values shall be compared to the Threshold Limit Values (TLVs) outlined in the ACGIH TLV Manual, and a work-rest regimen shall be established, as necessary, according to the WBGT obtained. Note that 5°F will be added to the WBGT when wearing chemically resistant protective clothing.

IT Procedure 9533.1 has been developed based on NIOSH/OSHA/USCG/USEPA/ACGIH guidelines and recommendations for heat stress situations. These guidelines will be followed throughout this project to ensure employee safety in high heat environments. In general, the procedures are activated when the ambient temperatures exceeds 78° F (25.5°C).

One or more of the following control measures can be used to help control heat stress:

- Work may be performed from sun-down to sun-up hours.
- Intake of adequate liquids to replace lost body fluids. Employees must replace water and salt lost from sweating. Employees must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.
- Replacement fluids can be a 0.1 percent salt water solution, such as commercial mixes namely Gatorade or Quick Kick or a combination of these, and fresh water.
- Establishment of a work regimen that will provide adequate rest periods for cooling down. This may require additional shifts for workers or earlier/later work schedules.

- Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.

- All breaks are to be taken in a shaded rest area during daylight hours.

- Employees shall remove impermeable protective garments during rest periods.

- All employees shall be informed of the importance of adequate rest, acclimatization, and proper diet in the prevention of heat stress.

10.6 <u>CONSTRUCTION SAFETY</u>
All construction work associated with this project will comply with 29 CFR 1926. In accordance with IT Policy and Procedure 9021.1, all proposed activities will be reviewed with the HSC prior to initiation.

10.7 <u>ILLUMINATION</u>
Work may be schedules during the night, which is cooler than the day, and reduces the possibilities of heat stress. Night time work will require artificial illumination. Work areas shall be lighted while any work is in progress in accordance with Table 10-1.

Lighting for work will follow OSHA Standard 1910.120. This will require a minimum five foot candle power for the general work site and other lighting levels as stipulated.

10.8 <u>SUBCONTRACTOR SAFETY</u>
An subcontractors used during this project will be required to adhere to the applicable requirements of this HSP and its addenda, and to the requirements of IT Policy and Procedure 9591.1. The HSC shall assist project management in ensuring compliance.

10.9 <u>DRUM HANDLING</u>
All drums containing well and decontaminated water, and used protective equipment/site waste will be removed by the Navy from each site weekly as well as at the completion of all site activities. Before pickup, all drums will be labelled as hazardous, include a list of its contents, the site name and number, and the drum number will be included. All drums will be temporarily stored at a location designated by the NAS-Key West project representative pending pre-disposal sampling/analysis and determination of proper disposal procedures.

10.10 <u>ACCESS</u>
Access to contaminated work areas (contaminated and contamination reduction zones) shall be regulated and limited to authorized persons. If requested by the EIC, a daily roster containing the date, the person's name, the person's signature, the time of entry, and the time of exit shall be kept of all persons working in such areas. Any visitors to the area must present proper identification and be authorized to be on-site. Visitors must comply with all aspects of the HSP. All equipment will also be logged in and out of the exclusion zone.

10.11 POSTING/BARRICADES

Warning signs shall be posted and hung, as applicable, in readily visible locations in or near contaminated work areas. Barricades and/or barricade tape shall be utilized to prevent access to various work areas. Barricade tape and signs will be placed on stakes around any open excavation.

Barricade tape with "exclusion zone" printed on it will be placed on stakes around all active work sites where work must be conducted at Level C or greater PPE. A contamination reduction zone will be established and delineated with tape identifying the area as a "contamination reduction zone"

10.12 LABELING

All bags, containers, drums, etc. containing contaminated materials must be labeled according to specifications.

10.13 BUDDY SYSTEM

No single entries will be made into the exclusion area without an established means of communication. Otherwise, a work party of two must be used.

11.0 EXCAVATION SAFETY

All excavation activities shall be conducted in compliance with Federal OSHA regulations set forth in 29 CFR 1926, Subpart P. As a minimum, the following rules shall be strictly observed.

- Excavations into which employees may be required to descend shall be sloped (1-to-1), benched or shored if they are greater than 5 feet in depth.

- Excavation spoils shall be placed no closer to the edge of the excavation than one excavation depth away.

- No employee will work adjacent to any excavation until a reasonable examination of same has been made to determine that no conditions exist exposing them to injury from moving ground.

- Trees, boulders and other surface encumbrances located so as to create a hazard to employees involved in excavation or in the vicinity thereof at any time during operations will be removed or made safe before excavating is begun.

- At any time entry into an excavation is required, there shall be a standby person available. Any person entering the excavation shall wear, as necessary, a lifeline and harness in addition to the PPE (Section 8.0) and air monitoring (Section 6.0) procedures of this plan.

- Excavations shall be inspected by an IT-qualified person after every rainstorm or other hazard-increasing occurrence, and the protection against slides and cave-ins will be increased if necessary.

- Appropriate access methods, such as ladders, shall be used to enter and leave the excavation. Under no circumstances is it permitted to ride backhoe buckets, etc., to enter or exit the excavation.

- As appropriate the Public Works representative or Navy representative will be contacted prior to any excavation activities.

12.0 EMERGENCY PROCEDURES

The HSP has been established to allow site operations to be conducted without adverse impacts on worker health and safety. In addition, supplementary emergency response procedures have been developed to cover extraordinary conditions that might possibly occur at the site(s).

12.1 GENERAL

All incidents will be dealt with in a manner to minimize adverse health risk to site workers. In the event an incident occurs, the following procedures will be followed:

- First aid or other appropriate initial action will be administered by properly trained personnel who are closest to the incident(s). This assistance will be conducted in a manner to ensure that those rendering assistance are not placed in a situation of unacceptable risk.

- All incidents will be reported to the FOC. The FOC is responsible for coordinating the emergency response in an efficient, rapid and safe manner. He will decide if off-site assistance and medical treatment are required and will arrange for assistance.

- All workers on-site are responsible for conducting themselves in a mature, calm manner in the event of an incident event. All personnel must conduct themselves in a manner to avoid endangering themselves and surrounding workers.

The following emergency equipment will be available at each work site while work is being performed:

- First-aid kit

- Fire extinguisher and blanket

- Pressurized eye wash.

12.2 RESPONSES TO SPECIFIC SITUATIONS

Emergency procedures for specific situations are given in the following paragraphs.

12.2.1 Worker Injury

If an employee working in a contaminated area is physically injured, established first-aid procedures will be followed. Depending on the severity of the injury, emergency medical response may be sought. If the employee can be removed, he/she will be removed from the accident site or source of contamination. Decontamination procedures, additional first-aid or preparation for transportation will be conducted at a safe distance from the work site.

If the injury to the worker is chemical in nature (e.g., over exposure), the following first-aid procedures are to be instituted:

- Eye Exposure - If contaminated soils or liquids get into the eyes, wash eyes immediately at the emergency station (decontamination zone) using large amounts of potable water and lifting the lower and upper eye lids occasionally. Wash for at least 15 minutes. Obtain medical attention immediately. Contact lenses will not be worn when working on the site.

- Skin Exposure - If contaminated solids or liquids get on the skin, promptly wash the contaminated skin using soap or mild detergent and water for at least 15 minutes. Obtain medical attention immediately when exposed to concentrated solids or liquids. Wash face and hands prior to eating or leaving the site.

- If an injury/illness is the result of a chemical exposure, the FOC shall promptly initiate the steps necessary to identify the chemical(s). Chemical identification shall be accomplished through use of monitoring equipment (photoionization detectors in conjunction with detector tubes and/or conventional industrial hygiene monitoring) and any sampling results that are available. Such information shall be made available to the treating physician and IT's Health and Safety Staff.

- Any injury or illness requires the completion of IT Form 9300.1.-1,. "Supervisor's Employee Injury Report," in accordance with IT PRO 9300.1.

- Any injury/illness not limited to a first-aid response requires that the IT FOC immediately notify IT's Health and Safety Staff. This notification allows the coordination of internal resources to assist the treating physician in rendering appropriate care.

12.2.2 Fires

As a fire prevention measure, no smoking or fires are permitted wherever there may be dry grass or other flammable material, or wherever NAS-Key West specifically forbids such practices. Vehicles and equipment will not be left idling or parked in or around areas where catalytic converters may cause grass fires.

Hot work such as welding or cutting shall be performed only as absolutely necessary. Hot work shall only be conducted after issuance of a hot work permit, which will require appropriate site inspection for fire hazards. At least two appropriate fire extinguishers shall be readily available during hot work procedures. If hot work is required in areas where NAS-Key West procedures prohibit it, prior clearance shall be obtained in writing from NAS-Key West. A hot work permit shall still be required in such instances.

Multi-purpose chemical (A:B:C) fire extinguishers will be provided. If a localized fire breaks out, dry chemical fire extinguishers will be used to bring the fire under control. If necessary and feasible, a fire blanket, soil or other inert materials may be placed on the burning area to extinguish the flames and minimize the potential for spreading. The NAS-Key West fire squadron will be notified of any and all fires and will be contacted for assistance in the event of a fire.

If an uncontrolled fire develops which may release toxic gases, all persons in the immediate vicinity will be evacuated. Contact with the NAS-Key West fire squadron will be made immediately to notify them of the incident and materials involved.

12.2.3 Spills
Handling procedures have been developed to limit potential problems with material spillage. In the event of a spill at the site, the area will be isolated from traffic by the FOC. Spilled solids will be removed and loaded into appropriate containers for subsequent placement or taken to a temporary destination. Liquid spills will be contained with absorbent material and then the absorbent will be loaded into appropriate containers for disposal. The appropriate NAS-Key West personnel will be notified.

12.3 EMERGENCY NUMBERS AND NOTIFICATION
Maps showing routes to the hospital, clinic, fire department, and police facility will be located in support and personnel vehicles and locations at the site along with the emergency phone numbers. Also, the route to the nearest off-base medical facility (Figures 12-1 and 12-2) will also be located in each support and personnel vehicle.

The primary telephone contact number for any emergency will be '911'. The direct numbers for the following services will be placed in all vehicles and on tailgate safety meeting forms:

- Police Department
- Fire Department

In the event of an on-site emergency, the FOC is responsible for immediately notifying the appropriate NAS-Key West organizations:

- Fire
- Medical
- Safety
- Security
- Officer of the Day

Table 12.1 lists additional emergency contacts.

12.4 DOCUMENTATION
For all incidents the FOC will produce a report describing the following:

- The incident (including date and time) that necessitated the notification and the basis for that decision
- Date, time and names of all persons/agencies notified and their responses
- Resolution of the incident (including duration) and the method/corrective action involved.

This report will be submitted to the HSC and Project Manager within 2 working days of the resolution of the event.

12.5 EVACUATION PLAN
Although very unlikely, it is possible that a site emergency could necessitate evacuating all personnel from the work site. If such a situation arises, the HSC will notify the on-site supervisor or vice versa of this event and the appropriate signal will be give for site evacuation. It is the responsibility of these individuals to evacuate personnel in a calm, controlled fashion.

All available vehicles located outside of the work zone will be used in the evacuation. All personnel will exit the site and be taken to a designated nearby rendezvous point, or an alternate site selected by the HSC depending on wind direction, severity and type of incident, etc. The routes to these locations will be given to all responsible persons and posted at the site. The evacuation routes will depend on which direction affords the most direct route away from the site area.

The on-site supervisor of on-site personnel will be used to ensure that all individuals are accounted for. If someone is missing, the HSC will alert emergency personnel. Control of personnel at the rendezvous point is the responsibility of the on-site supervisor or his designated assistant.

453005\P1HTHSTY.SZ3

TABLE 1-1
SUSPECTED CHEMICAL HAZARDS
NAS-KEY WEST
KEY WEST, FLORIDA

Contaminant	TLV/PEL	Vapor Pressure	Approx. Odor Threshold (ppm)	Health Risks	Exposure Symptoms
Benzene	10/1 ppm	75 mmHg	5	Carcinogen	Irritation, Depression, Convulsions, Headache
Toluene	100/100 ppm	22 mmHg	2	Kidney, liver and nervous system damage	Fatigue, Convulsions Dizziness, Headache
Trichloro-ethylene (TCE)	50/100 ppm	58 mmHg	25	Suspect carcinogen kidney and liver damage, heart and nervous system damage	Irritation, Vomiting, Rapid Heart Beat
Vinyl Chloride	5/1 ppm	2,580 mmHg	3,000	Carcinogen; Liver and nervous system damage	Narcosis, weakness, abdominal pain
Polychlorinated biphenyls (PCBs)	0.5/0.5 mg/m^3	0.001 mmHG	-	Chloracne, liver problems	Skin, rash, irritation, jaundice
DDT	1/1 mg/m^3	$5.5/10^{-6}$ mmHG	-	Nervous system, liver damage	Skin rash, tremors, local irritation

TLV Threshold Limit Values
PEL Permissible Exposure Limit
PPM Parts Per Million

TABLE 10-1
MINIMUM ILLUMINATION INTENSITIES IN FOOT-CANDLES
NAS-KEY WEST
KEY WEST, FLORIDA

Foot-Candles	Area or Operations
5	General site areas
5	Excavation and waste areas, access ways, active storage areas, loading platforms, refueling and field maintenance areas
5	Indoors: warehouses, corridors, hallways and exit ways
5	Tunnels, shafts and general underground work areas: (Exception: minimum of 10 foot-candles is required at tunnel and safe heading during drilling, mucking and scaling. Bureau of Mines approved cap lights shall be acceptable for use in the tunnel heading.
10	General shops (e.g., mechanical and electrical equipment rooms, active storerooms, barracks, or living quarters, locker or dressing rooms, dining areas and indoor toilets and workrooms.
10	First-aid stations, infirmaries and offices

TABLE 12-1
FLORIDA, FEDERAL, AND PRIVATE EMERGENCY CONTACTS
NAS-KEY WEST
KEY WEST, FLORIDA

Contact	Civilian	NAS-Key West[1]
Fire	911	292-2776
Medical	911	292-2337
Safety		292-2878
Security Dispatcher		292-2114
Junior Officer of the Day		292-2268
Duty Officer		292-2943
Trouble Desk		292-2519

[1] When using NAS-Key West telephones, only the last four digits of the number need to be dialed.

148277

DRAWN BY	[illegible] 3/2/89	CHECKED BY	SAM	8/15/89	DRAWING NUMBER	453005-A1
		APPROVED BY	RDS	8/16/89		

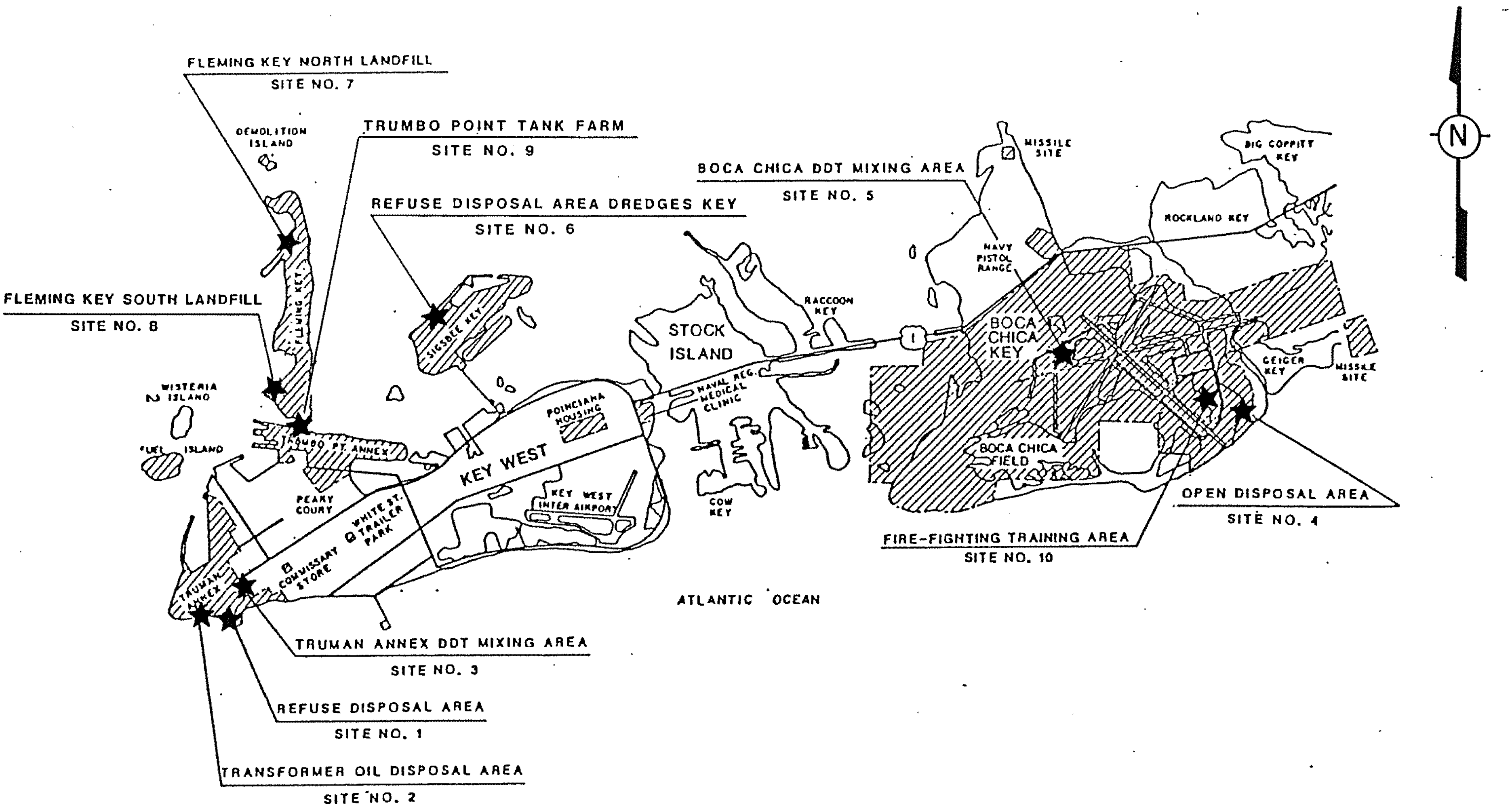


FIGURE 3-1

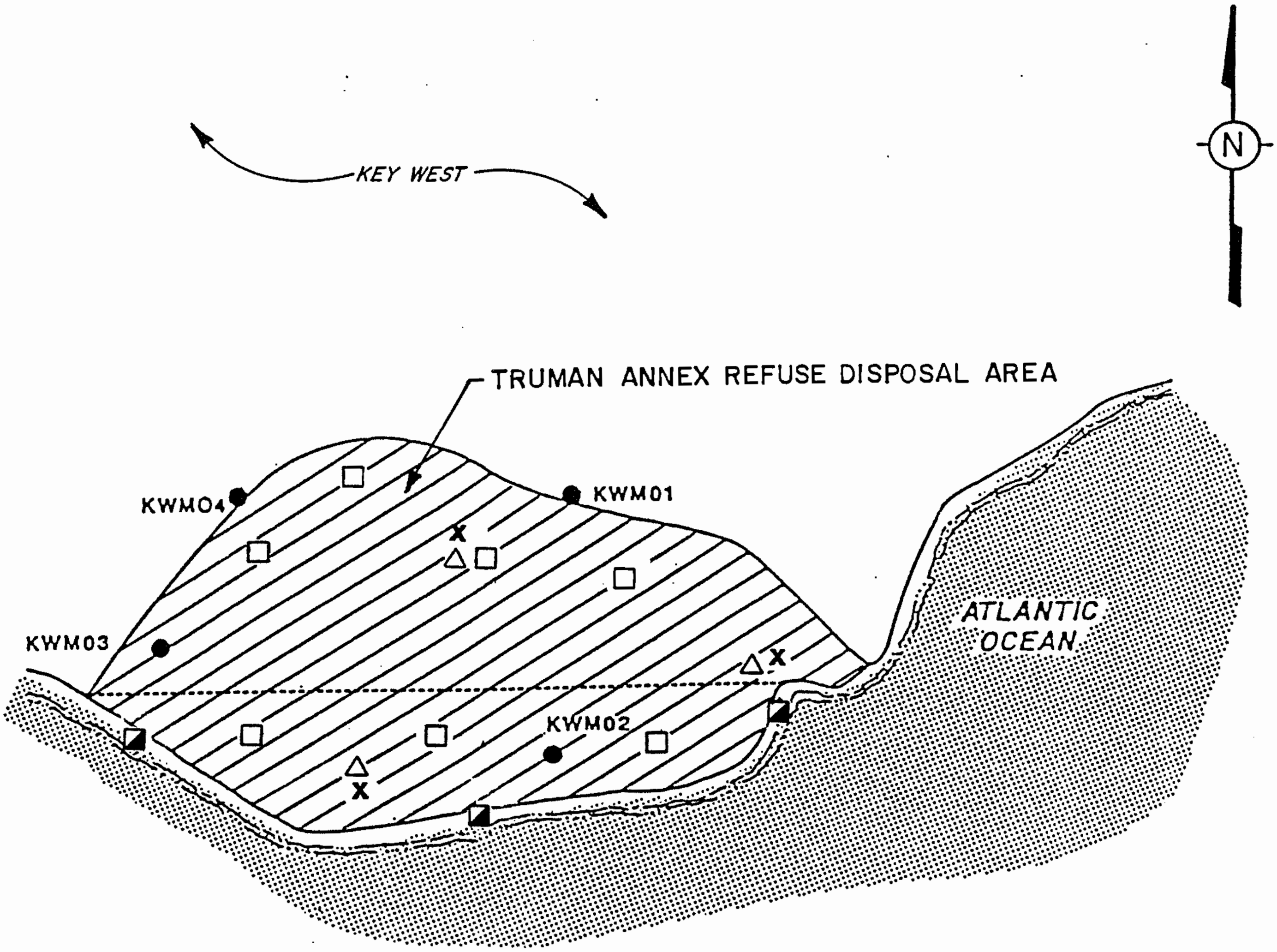
LOCATIONS OF NAVAL ACTIVITIES AND STUDY SITES

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.



LEGEND:

- ● KWM01 — EXISTING MONITORING WELL
- X — PROPOSED MONITORING WELL
- □ — PROPOSED TEST PIT
- △ — PROPOSED EXPLORATORY BORING LOCATION
- --------- — PROPOSED AIR QUALITY SURVEY TRANSECT
- ◪ — PROPOSED SEDIMENT SAMPLING LOCATION

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.

FIGURE 3-2

INVESTIGATION & SAMPLING LOCATIONS
TRUMAN ANNEX
REFUSE DISPOSAL AREA
SITE I

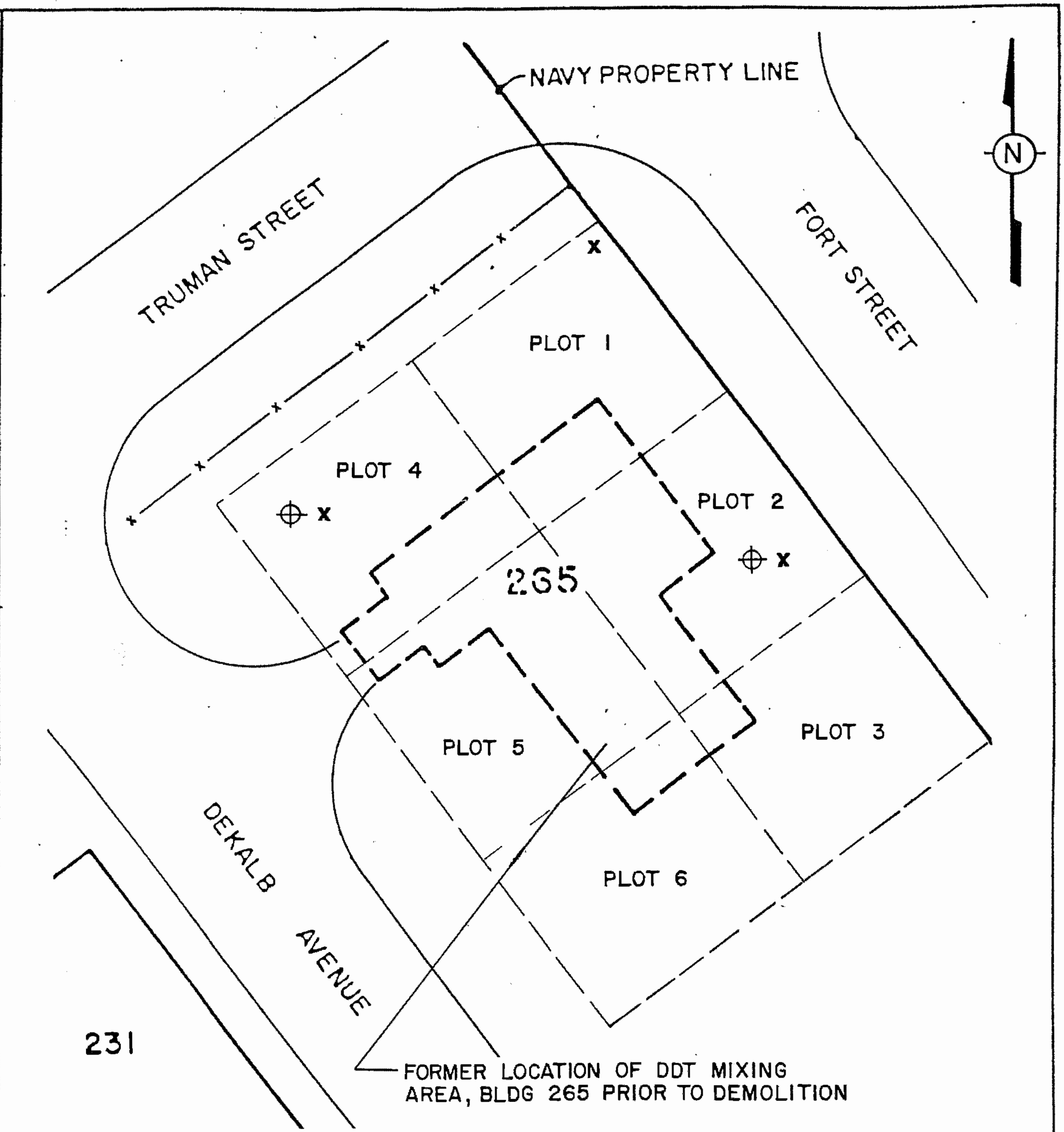
NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY: LWB 8/1/89 | CHECKED BY: SAM | APPROVED BY: RDS | 9/15/89 8/16/89 | DRAWING NUMBER 453005-A2

REV. 1 / 2-1-90 / C.K.R

148277



LEGEND

- x PROPOSED MONITORING WELL LOCATION
- ⊕ PROPOSED SOIL BORING LOCATION
- --- SOIL SAMPLING PLOT BOUNDARY
- —x— FENCE

NOT TO SCALE

SOURCE: U.S. NAVY

FIGURE 3-3

INVESTIGATION & SAMPLING LOCATIONS
TRUMAN ANNEX
DDT MIXING AREA
SITE 3

NAS KEY WEST
KEY WEST, FLORIDA

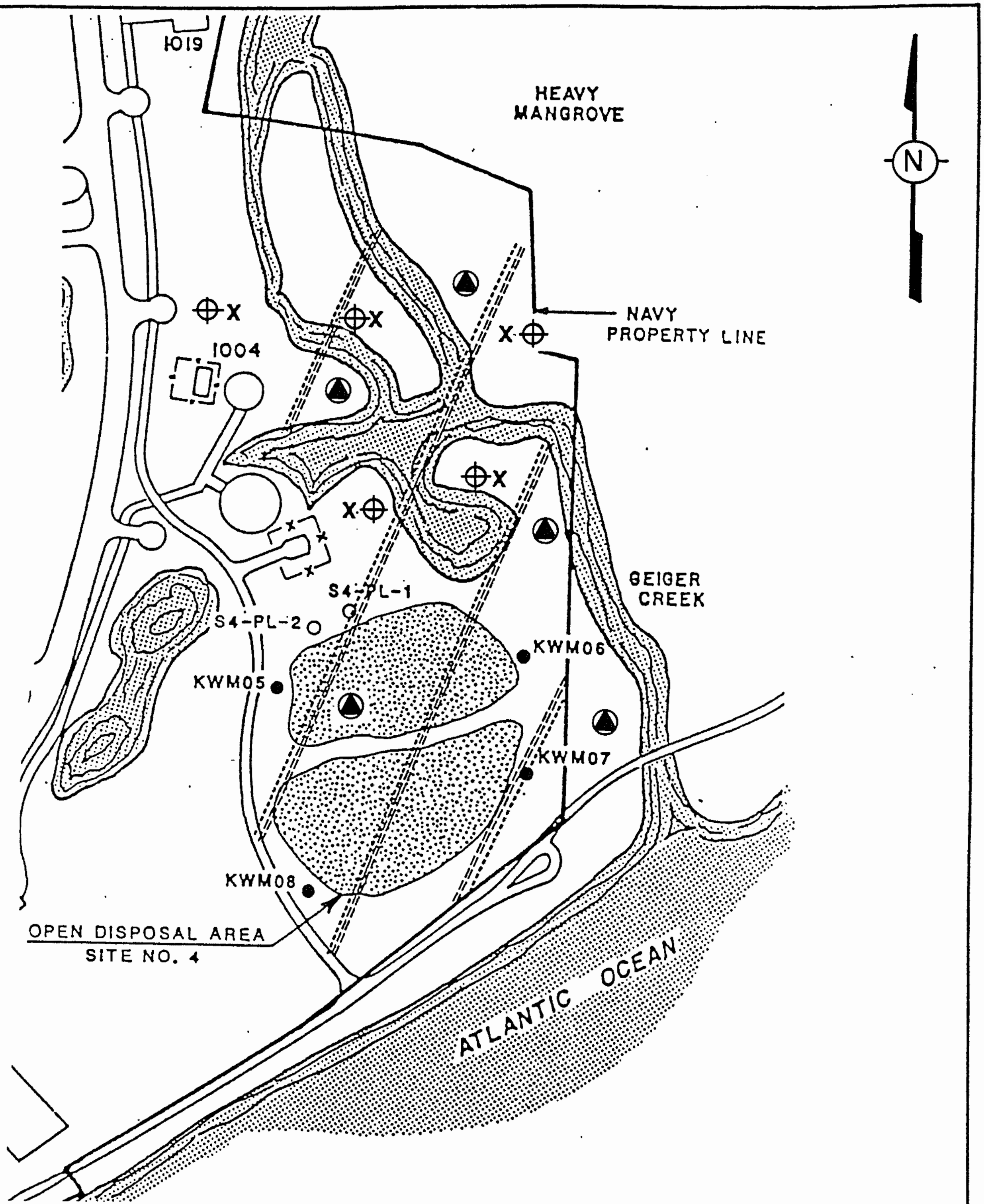
INTERNATIONAL TECHNOLOGY CORPORATION

DRAWING NUMBER 453005-A4

DRAWN BY | CHECKED BY | APPROVED BY

148277

DRAWN BY [handwritten initials] 7/31/89 | CHECKED BY SAM 8/1/89 | APPROVED BY RDS 8/16/89 | DRAWING NUMBER 453005-A5



LEGEND

Symbol	Description
● KWM01	EXISTING MONITORING WELL
X	PROPOSED MONITORING WELL
========	PROPOSED WASTE CHARACTERIZATION TRANSECTS
S4-PL-1 ○	PREVIOUS SOIL BORING LOCATION
-----------	PROPOSED AIR QUALITY SURVEY TRANSECT
⊕	PROPOSED SOIL BORING
▲	PROPOSED SOIL SAMPLING LOCATION

SOURCE: GERAGHTY AND MILLER, INC.

NOT TO SCALE

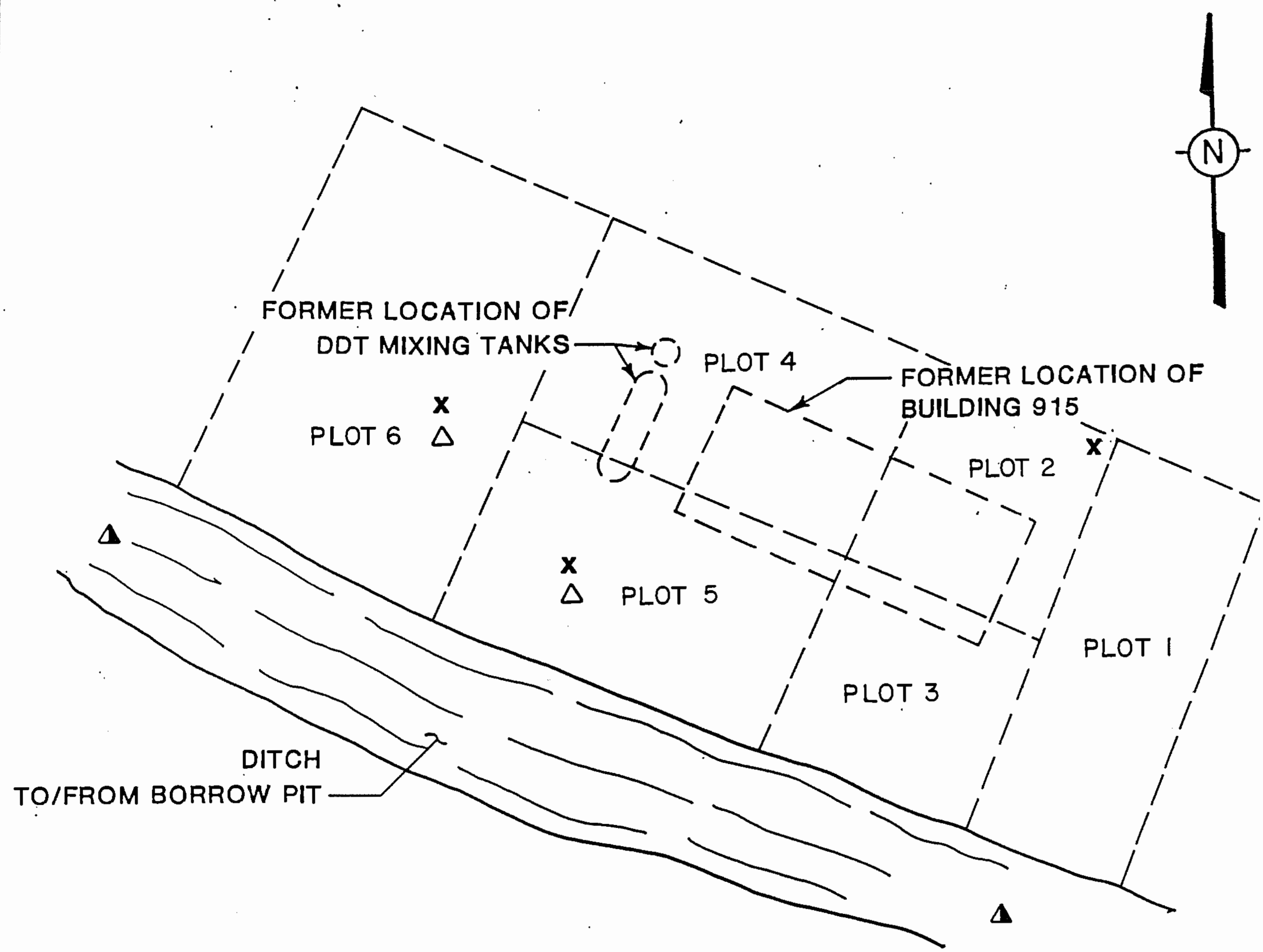
FIGURE 3-4

INVESTIGATION & SAMPLING LOCATION
BOCA CHICA
OPEN DISPOSAL AREA
SITE 4

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

148277



LEGEND

x PROPOSED MONITORING WELL

△ PROPOSED EXPLORATORY BORING LOCATION

▲ PROPOSED SURFACE WATER / SEDIMENT SAMPLING LOCATION

– – – – SOIL SAMPLING PLOT BOUNDARY

NOT TO SCALE

SOURCE: U.S. NAVY

FIGURE 3-5

INVESTIGATION & SAMPLING LOCATION
BOCA CHICA
DDT MIXING AREA
SITE 5

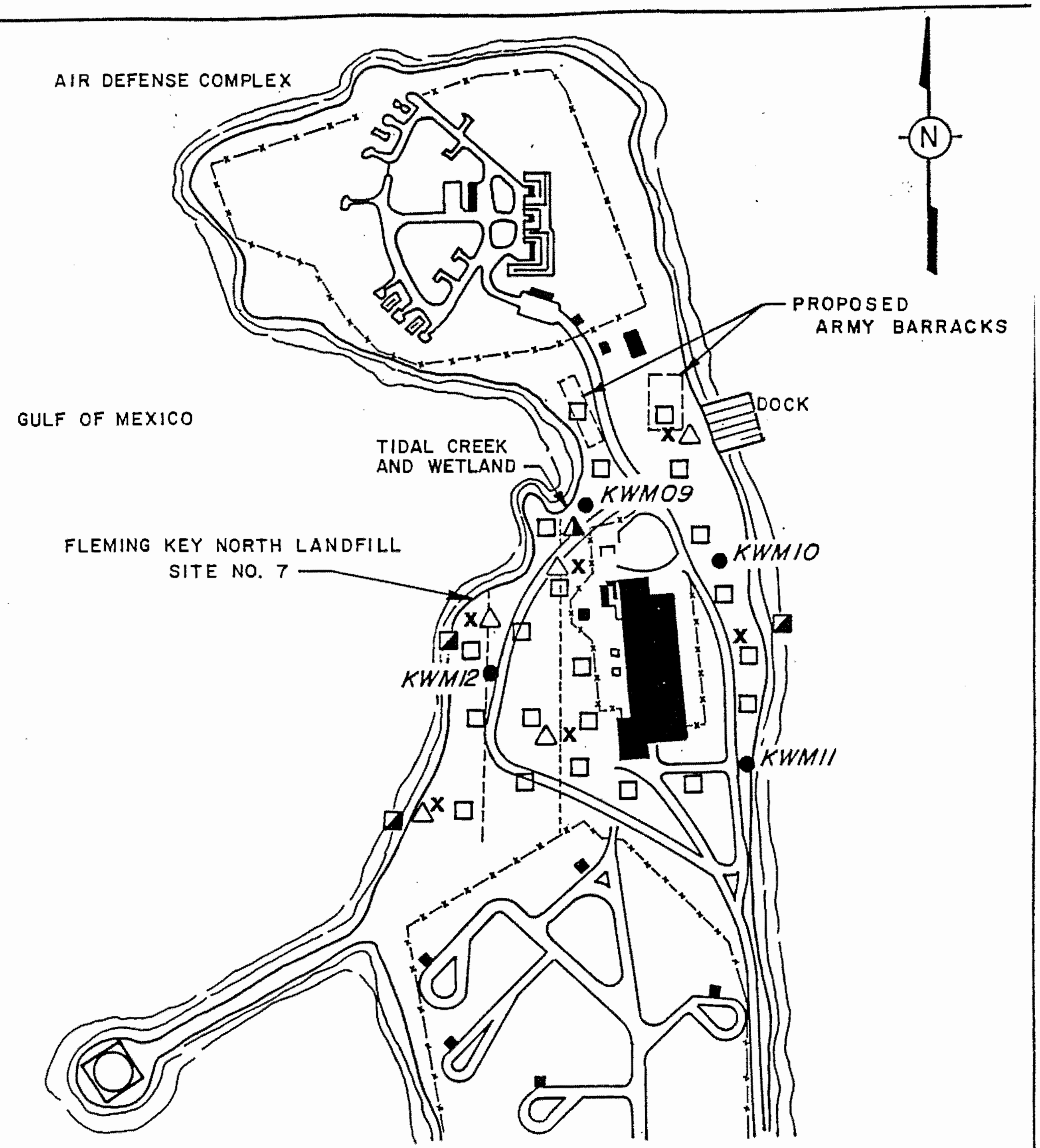
NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWING NUMBER 453005-A6

CHECKED BY / APPROVED BY

DRAWN BY



LEGEND

- ● EXISTING MONITORING WELL
- X PROPOSED MONITORING WELL
- □ PROPOSED TEST PIT
- ---- PROPOSED AIR QUALITY SURVEY TRANSECT
- △ SOIL BORING
- ▲ PROPOSED SURFACE WATER/ SEDIMENT SAMPLING LOCATION
- ◪ PROPOSED SEDIMENT SAMPLING LOCATION
- ■ EXISTING BUILDINGS OR STRUCTURES

SOURCE: GERAGHTY AND MILLER, INC.

NOT TO SCALE

FIGURE 3-6

INVESTIGATION & SAMPLING LOCATIONS
FLEMING KEY
NORTH LANDFILL
SITE 7

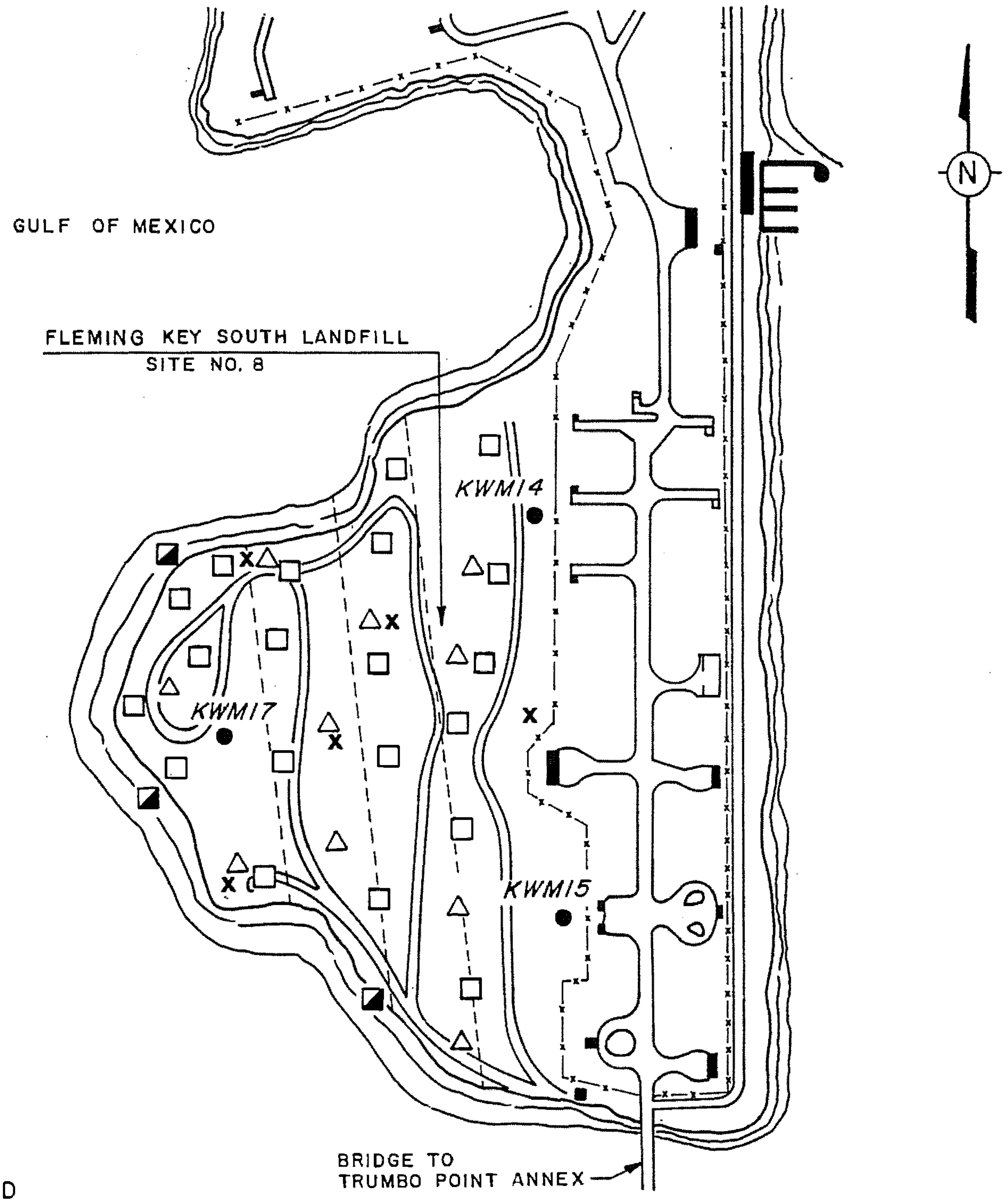
NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER 453005-A8

REV.1/2-1-90/C.K.R

148277



LEGEND

- ● EXISTING MONITORING WELL
- X PROPOSED MONITORING WELL
- □ PROPOSED TEST PIT
- △ PROPOSED EXPLORATORY BORING LOCATION
- ------ AIR QUALITY TRANSECTS
- ◪ PROPOSED SEDIMENT SAMPLING LOCATION
- ■ EXISTING BUILDINGS OR STRUCTURES

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.

FIGURE 3-7

INVESTIGATION & SAMPLING LOCATIONS
FLEMING KEY
SOUTH LANDFILL
SITE 8

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER 453005-A9

REV.1/2-1-90/C.K.R

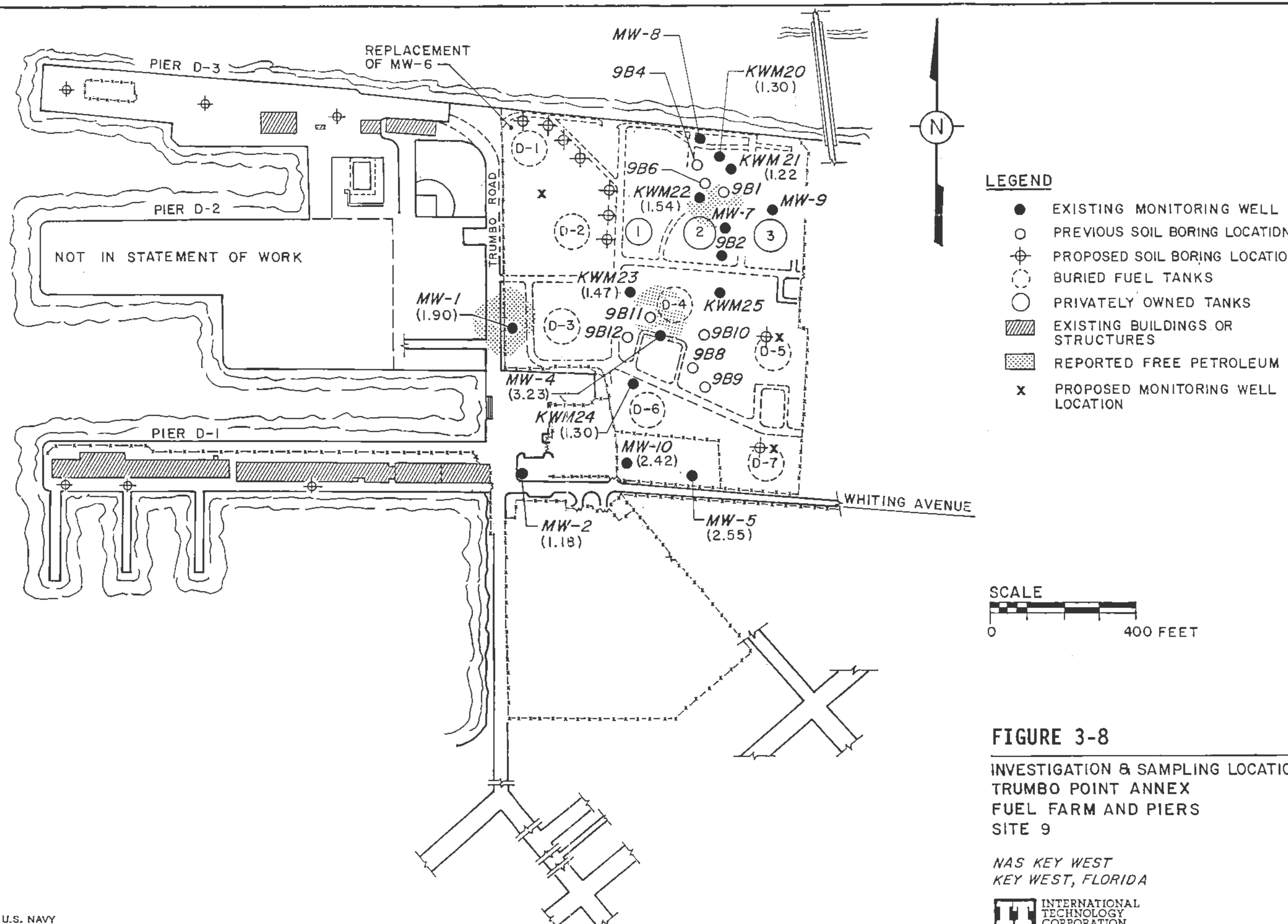


FIGURE 3-8

INVESTIGATION & SAMPLING LOCATIONS
TRUMBO POINT ANNEX
FUEL FARM AND PIERS
SITE 9

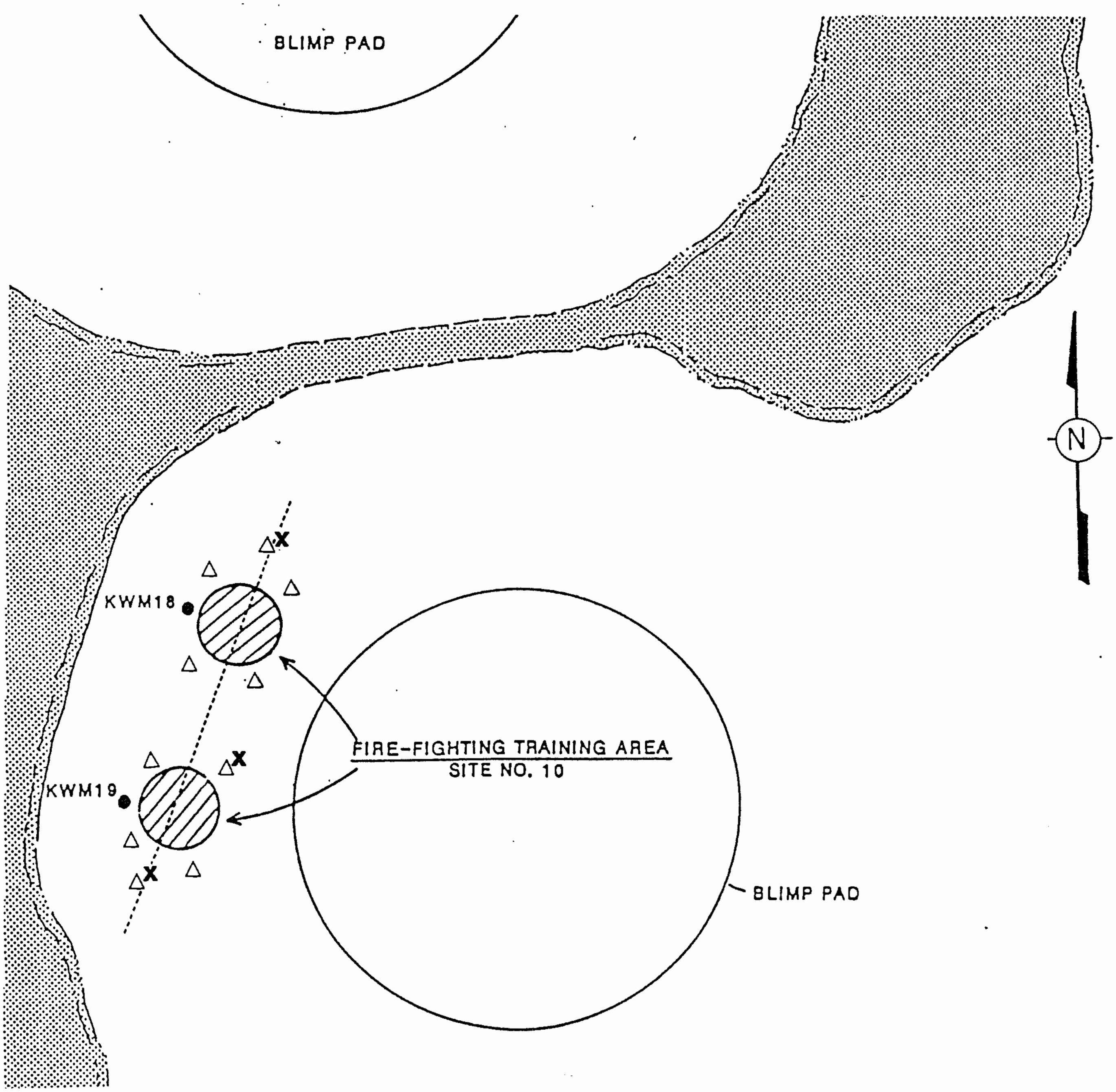
NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWING NO.: 453000-A-10
PROJECT NO.: 453000
INITIATOR: B. BARRETT
PROJ. MGR.: R. STEVENS
DATE LAST REV.: 2-1-90
DRAWN BY: C.K. ROBERTSON
STARTING DATE: 10-17-89
DRAWN BY: C.K. ROBERTSON

BRUNING 72425

DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER 453005-A11



LEGEND

● KWM01	EXISTING MONITORING WELL
X	PROPOSED MONITORING WELL
△	PROPOSED EXPLORATORY BORING LOCATION
------------	PROPOSED AIR QUALITY SURVEY TRANSECT

FIGURE 3-9

INVESTIGATIONS & SAMPLING LOCATIONS
BOCA CHICA
FIRE FIGHTING TRAINING AREA
SITE 10

NAS KEY WEST
KEY WEST, FLORIDA

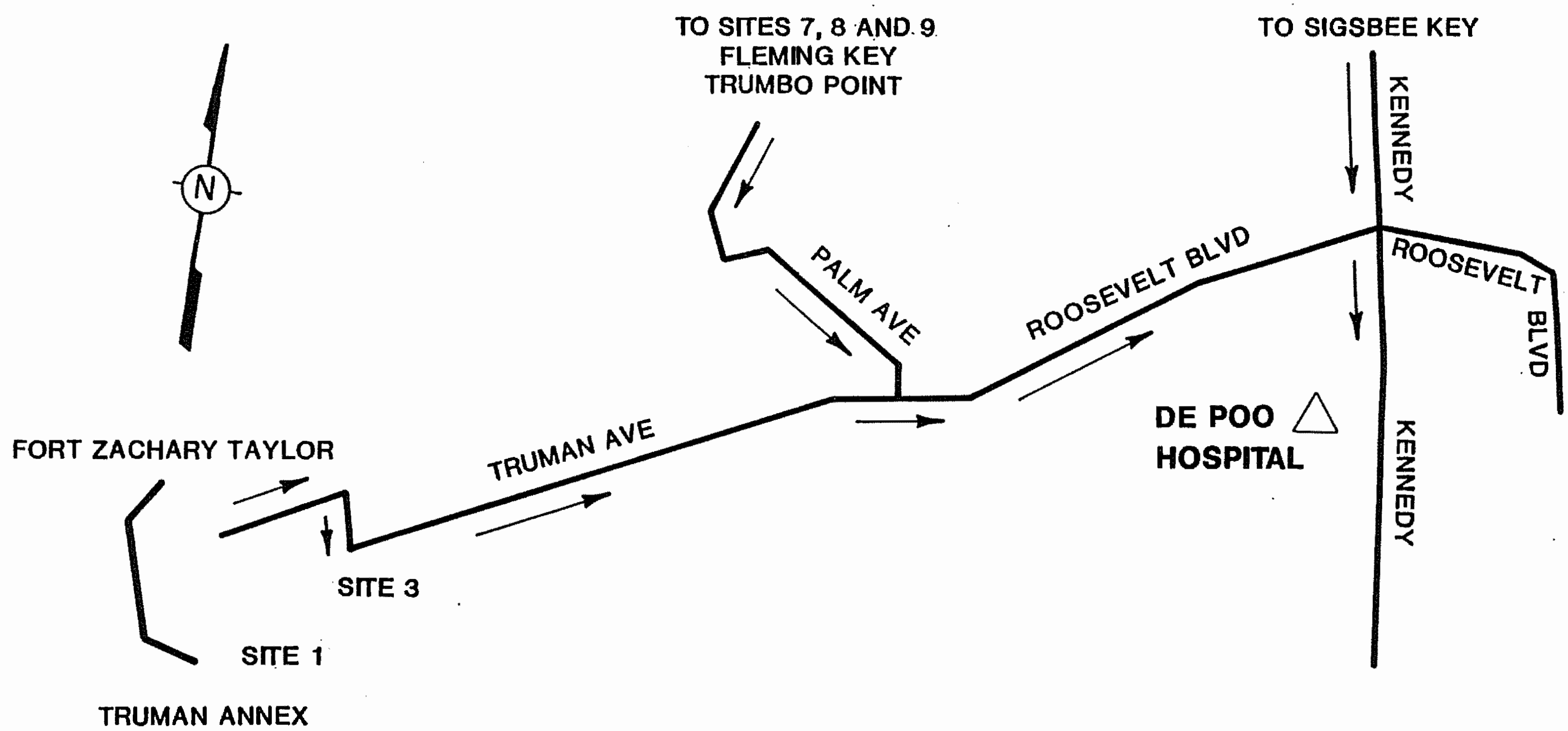
INTERNATIONAL TECHNOLOGY CORPORATION

NOT TO SCALE

SOURCE: GERAGHTY AND MILLER, INC.

148277

DRAWN BY	WMB 8/15/89	CHECKED BY	[illegible]	[illegible]	DRAWING NUMBER 453005-A12
		APPROVED BY			



LEGEND

△ HOSPITAL

→ ROUTE TO HOSPITAL

NOT TO SCALE

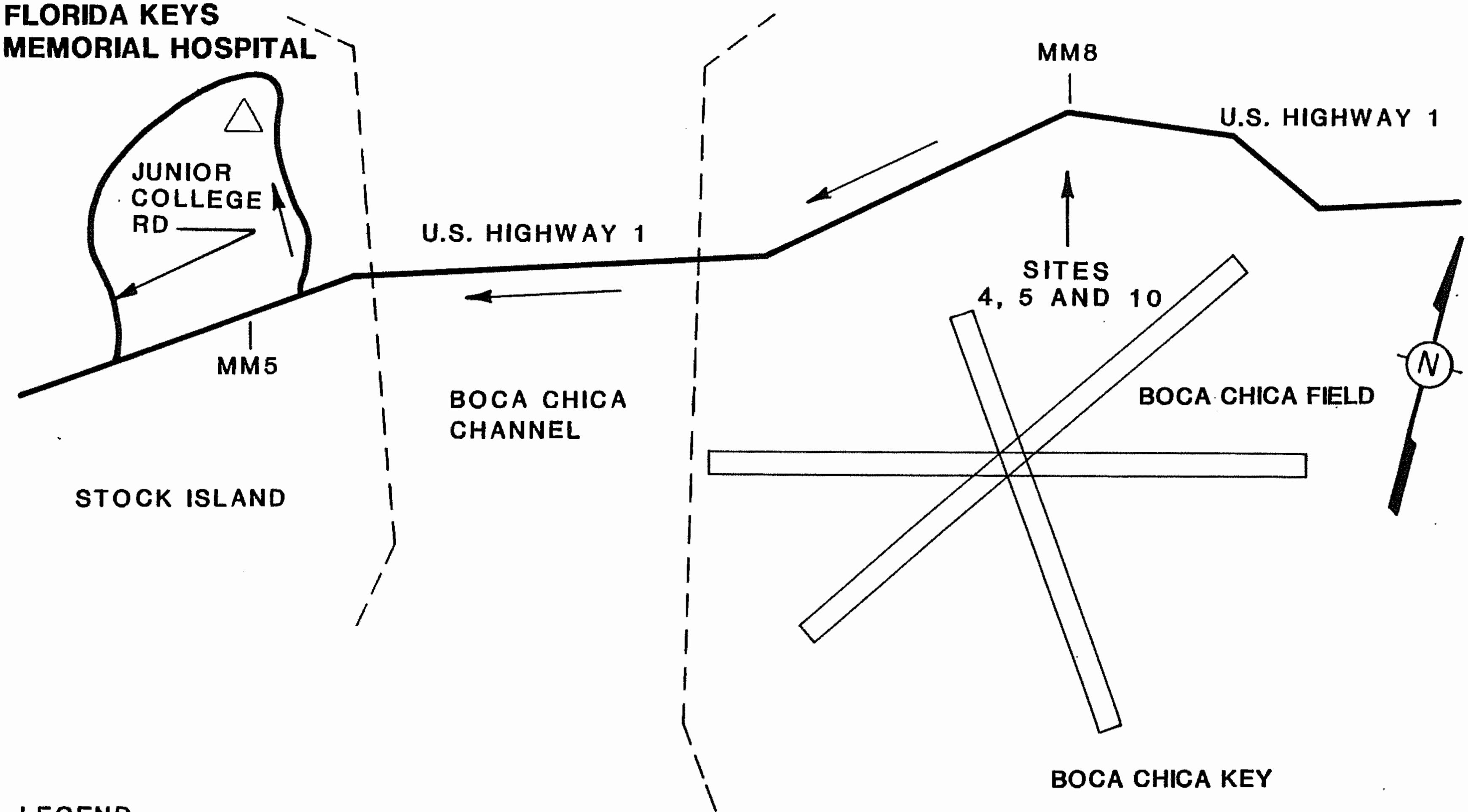
FIGURE 12-1

ROUTES TO NEAREST HOSPITAL
SITES 1,3,7,8 AND 9

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY	WMB 8/15/89	CHECKED BY	Sm	8/16/89	DRAWING NUMBER	453005-A13
		APPROVED BY				



LEGEND

MM5 MILE MARKER LOCATION

△ HOSPITAL

← ROUTE TO HOSPITAL

NOT TO SCALE

FIGURE 12-2

ROUTES TO THE NEAREST HOSPITAL
SITES 4, 5 AND 10

NAS KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

APPENDIX A

HEALTH AND SAFETY SIGNATURE PAGE

IT Corporation

I have reviewed and will comply with the Health and Safety Plan for Naval Air Station, Key West. Document date, August 1989.

Name (Print):____________________________________

Signature:____________________________________

Date:____________________________________