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NTC ORLANDO  
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WORK PLAN FOR SOIL SAMPLING WITH TRANSMITTAL LETTER NTC ORLANDO FL  
6/1/2000  
TETRA TECH

# **Work Plan for Soil Sampling**

**Naval Training Center  
Orlando, Florida**



**Southern Division  
Naval Facilities Engineering Command**

**Contract Number N62467-94-D-0888**

**Contract Task Order 0024**

**JUNE 2000**



**TETRA TECH NUS, INC.**

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0600-A090

June 23, 2000

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Reference: CLEAN Contract No. N62467-94-D-0888  
Contract Task Order No. 0024

Subject: Work Plan for Soil Sampling  
Naval Training Center, Orlando, Florida

Dear Ms. Nwokike:

Enclosed is the final Work Plan for Soil Sampling with site-specific addenda for Study Areas 35 and 40. The plan describes the sampling approach for these two sites as discussed in recent e-mail communications with the Orlando Partnering Team. If you have any questions or need further information, please contact me at (865) 220-4730.

Sincerely,

Steven B. McCoy, P.E.  
Task Order Manager

SBM:ckf

Enclosures (2)

c: Mr. Rick Allen, Harding Lawson  
Mr. Michael Campbell, Tetra Tech NUS  
Mr. David Grabka, FDEP (2)  
Mr. Wayne Hansel, SOUTHDIV  
Mr. Allan Jenkins, Tetra Tech NUS  
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Ms. Jacque Van Audenhove, Tetra Tech NUS (2)  
Ms. Debbie Wroblewski, Tetra Tech NUS (cover letter only)  
File/Edb

**WORK PLAN  
FOR SOIL SAMPLING**

**NAVAL TRAINING CENTER  
ORLANDO, FLORIDA**

**COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:**

**Department of the Navy, Southern Division  
Naval Facilities Engineering Command  
2155 Eagle Drive  
North Charleston, South Carolina 29406**

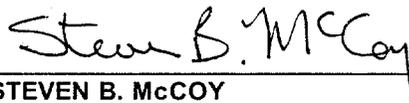
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**CONTRACT NO. N62467-94-D-0888  
CONTRACT TASK ORDER 0024**

**JUNE 2000**

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TETRA TECH NUS, INC.  
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## PROFESSIONAL GEOLOGIST CERTIFICATION

I hereby certify that this document, *Work Plan for Soil Sampling, Naval Training Center, Orlando, Florida* was prepared under my direct supervision in accordance with acceptable standards of geological practice.

*Michael J. Campbell*  
Michael J. Campbell, P.G. / Date *6/23/00*  
License No. *0001281*



The seal is circular with a double-line border. The outer ring contains the text "MICHAEL J. CAMPBELL" at the top and "PROFESSIONAL GEOLOGIST" at the bottom. The inner ring contains "LICENSE" at the top and "STATE OF FLORIDA" at the bottom. In the center, it reads "No. 0001281".

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## ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
B&R Environmental	Brown & Root Environmental
BRAC	Base Realignment and Closure
bgs	below ground surface
CLP	Contract Laboratory Program
DET	Environmental Detachment, Charleston, SC
DPT	Direct Push Technology
DQO	data quality objective
FDEP	Florida Department of Environmental Protection
IDW	Investigation-derived Waste
IRA	Interim Remedial Action
MS/MSD	matrix spike/matrix spike duplicate
NTC	Naval Training Center
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, comparability, and completeness
POP	Project Operations Plan
ppm	parts per million
QA/QC	quality assurance/quality control
SA	Study Area
SCTL	Soil Cleanup Target Level
TRPH	Total Recoverable Petroleum Hydrocarbon
USEPA	U.S. Environmental Protection Agency

## 1.0 INTRODUCTION

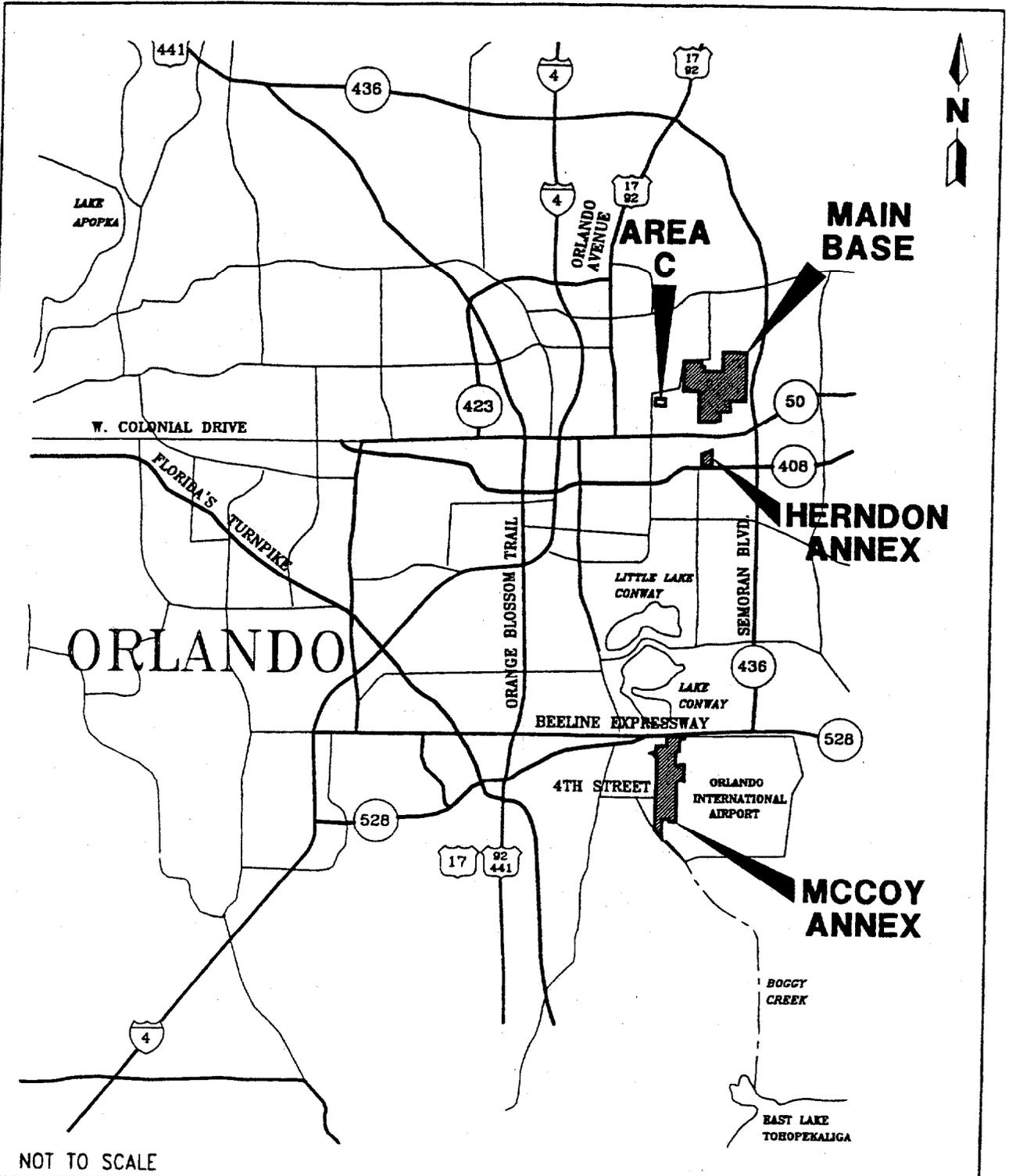
### 1.1 PURPOSE

The Naval Training Center (NTC) located in Orlando, Florida, consists of four areas (the Main Base, Area C, Herndon Annex, and McCoy Annex) as shown in Figure 1-1. The NTC ceased operations in April 1999 as proscribed by the Defense Base Realignment and Closure (BRAC) Act of 1990. As part of the closure process, the Navy initiated a program to identify and remediate environmental contamination at NTC. To ensure that all consultants planned and executed their field activities in a manner consistent with Southern Division, Naval Facilities Engineering Command, and regulatory requirements, the *Project Operations Plan for Site Investigations and Remedial Investigations* [POP] (ABB-ES, 1997) was prepared and implemented.

As part of the NTC environmental program, certain Study Areas (SAs) and Operable Units (OUs) may require soil sampling to delineate the extent of soil contamination or to confirm that contaminated soils above regulatory criteria have been removed or remediated. This document presents the technical approach for performing the sampling with general requirements and procedures specified in the body of the plan. Site-specific information (site background, locations to be sampled, analytical parameters, etc.) is provided in the Appendices.

### 1.2 HEALTH AND SAFETY

Health and safety aspects of Tetra Tech NUS' work at NTC, Orlando are controlled in accordance with the *Health and Safety Plan for Completion of Investigative Work and Data Sampling* (B&R Environmental, 1997) and addenda.



NOT TO SCALE

**FIGURE 1-1**  
**LOCATION OF NAVAL TRAINING**  
**CENTER, ORLANDO**

SOURCE: HLA, 1999



**WORK PLAN FOR**  
**SOIL SAMPLING**  
**NAVAL TRAINING CENTER**  
**ORLANDO, FLORIDA**

## 2.0 SOIL SAMPLING

Unless otherwise specified herein, soil sampling will be performed following guidance detailed in the POP (ABB-ES, 1997).

### 2.1 SCREENING CRITERIA

The soil screening criteria are provided in site-specific appendices to this plan. The screening criteria for organic parameters are the applicable Florida Soil Cleanup Target Levels (SCTLs). For inorganic parameters, the screening criteria are typically either the Residential or Non-Residential SCTLs or background screening values, whichever are greater. However, if the Leachability SCTL is less than both background (inorganic parameters only) and Residential/Non-Residential concentrations, then this value is controlling. For example, the Leachability SCTL for benzo(a)anthracene (3.2 mg/kg) would be the screening criterion at a site with a non-residential reuse scenario. At a site with a residential reuse scenario, the screening criterion would be 1.4 mg/kg. The screening criteria for some contaminants which may be encountered in NTC soils are provided in Table 2-1.

TABLE 2-1  
BACKGROUND VALUES AND SOIL TARGET CLEANUP LEVELS  
NAVAL TRAINING CENTER  
ORLANDO, FLORIDA

Contaminant	Background Screening Values <sup>(a)</sup> (mg/kg)		Soil Cleanup Target Levels <sup>(b)</sup> (mg/kg)		
	Main Base	McCoy Annex	Residential	Non-Residential	Leachability
<b>Inorganic Chemicals</b>					
arsenic	1.0	1.9	0.8	3.7	29
lead	14.5	21.3	400	920	*
<b>Organic Compounds</b>					
benzo(a)anthracene	-	-	1.4	5	3.2
benzo(a)pyrene	-	-	0.1	0.5	8
benzo(b)fluoranthene	-	-	1.4	4.8	10
dibenzo(a,h)anthracene	-	-	0.1	0.5	30
indeno(1,2,3-cd)pyrene	-	-	1.5	5.3	28

<sup>(a)</sup> Background Sampling Report, Naval Training Center, Orlando, Florida (ABB-ES, 1995)

<sup>(b)</sup> Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-777, F.A.C. (FDEP, 1999)

\* Criterion not available.

## 2.2 SAMPLE NUMBERING

The soil samples will be numbered as follows:

NTCXXSNNNDDDD

where: NTC = Naval Training Center  
XX = two-digit SA designation (54) or OU designation (U4)  
S = sample type ("S" for surface soil, "U" for subsurface soil, "D" for duplicate)  
NNN = location number (e.g., 001 or 015)  
DDDD = sample depth (e.g., 0002 or 1015)

For example, a surface soil sample collected at the 5<sup>th</sup> sampling location at a depth of 0 to 2 feet at SA 38 will be designated NTC38S0050002. Samples for field duplicates will be identified with a "blind" number (e.g., NTC38D1000). The "blind" number will replace the location number and sample depth. The corresponding environmental sample will be noted in the field logbook.

Sample numbering may be altered to accommodate special circumstances, if necessary.

## 2.3 QUALITY CONTROL SAMPLES

Quality control samples will be collected at the frequencies listed below.

- One field duplicate per 10 environmental samples.
- One trip blank per cooler containing samples for volatile organic compound analysis.
- One matrix spike/matrix spike duplicate (MS/MSD) per 20 environmental samples.

"MS/MSD" will be added to the sample number on the sample labels and the chain-of-custody form. New sample numbers will not be created for these samples. MS/MSD samples will be collected in the field by the Field Operations Leader and will require 3x sample volume for each set (1x for environmental sample, 1 x for MS sample, and 1x for MSD sample).

If any nondisposable sampling equipment is used and decontaminated, the additional quality control samples listed below will be collected.

- One rinsate blank per 10 environmental samples.
- One field blank for each water source used for decontamination.

## 3.0 DECONTAMINATION

### 3.1 LARGE EQUIPMENT

All downhole drilling equipment, including the rear portions of drill/Direct Push Technology (DPT) rigs, will be steam cleaned on these occasions:

- Prior to arrival on-site.
- Prior to beginning work.
- Between drilling locations.
- Any time the rig leaves and returns to a hole prior to completing a boring.
- Any time the drill rig leaves the site.
- At the conclusion of the drilling/DPT program.

All large equipment decontamination activities will take place at a location designated by base personnel. However, all loose soil material and debris will be removed at the individual site prior to decontamination. Decontamination operations will consist of washing large equipment (drill rig, augers, push probes, down-hole tools, etc.) using a high-pressure potable steam wash.

### 3.2 SAMPLING TOOLS

All sampling tools and miscellaneous sampling equipment coming in contact with contaminated media will be decontaminated prior to each use using the following steps:

1. Wash with potable water and Alconox.
2. Rinse thoroughly with potable water.
3. Rinse with deionized water or analyte-free water.
4. Rinse with isopropanol.
5. Rinse with analyte-free water and air dry.

Clean sampling equipment will be wrapped in aluminum foil to prevent contamination during storage or transport.

## 4.0 DATA QUALITY

### 4.1 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) are qualitative or quantitative statements developed by the data user to specify the quality of data needed from a particular data activity to support specific decisions. The DQOs are the starting point in the design of an investigation. The DQO development process matches sampling and analytical capabilities to the data targeted for specific uses and ensures that the quality of the data satisfies project requirements.

The DQOs for laboratory analyses will be those set by the U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) for Level IV DQOs. Level IV DQOs are characterized by rigorous quality assurance/quality control (QA/QC) protocols and documentation, providing qualitative and quantitative analytical data. Field test kit analyses (Level II DQOs) are sufficiently reliable for field screening activities.

The objective of the analytical data collected will be to evaluate contaminant concentrations to determine if exposure potential exists and to predict if contaminant migration will occur in the future.

### 4.2 DATA VALIDATION

The approach to providing reliable data that meet the DQOs will include QA/QC requirements for each of the analytical data types generated during the field investigation. The QA/QC efforts for laboratory analyses will include collection and submittal of QC samples and the assessment and validation of data from the subcontract laboratory. Analytical data will be subjected to rigorous data validation.

Data quality indicators include the precision, accuracy, representativeness, comparability, and completeness (PARCC) parameters. These parameters will be used within the data validation process to evaluate data quality. The achievable limits for these parameters vary with the DQO level of the data. The limits used for laboratory analytical data in this program will be those set by the CLP for Level IV DQOs. The data will be validated in accordance with the USEPA Contract Laboratory Program: *National Functional Guidelines for Inorganic Data Review* (USEPA, 1994) and USEPA Contract Laboratory Program: *National Functional Guidelines for Organic Data Review* (USEPA, 1999) as amended for use in USEPA Region 4.

## 5.0 INVESTIGATION-DERIVED WASTE (IDW) MANAGEMENT

Soil cuttings and drilling mud from soil borings will be stored in Department of Transportation-approved 55-gallon steel drums or disposed of in a manner approved by the base contact. Decontamination fluids will be temporarily stored in a poly tank or drums. Fluids will be sampled, analyzed, and disposed of by a licensed waste hauler following completion of the fieldwork. Each drum will be clearly marked with the following information or as otherwise directed by the base contact:

- Company name (Tetra Tech NUS)
- Base contact (Wayne Hansel) and phone number (407-895-6714)
- Boring or well identification where the IDW originated
- Material contained in the drum
- Date the IDW was produced

Miscellaneous sampling materials (e.g., gloves and plastic) will be disposed of in approved dumpsters located in Area C near Building 1056 on Seabee Street.

## 6.0 LOGBOOKS AND FORMS

The site logbook is a hard-bound, paginated, controlled-distribution record book in which all major on-site activities are documented. The following activities/events will be recorded in the site logbook in real time on a daily basis:

- Study Area, Operable Unit, or tank site.
- All field personnel present.
- Arrival/departure of site visitors.
- Arrival/departure of major equipment.
- Start/completion of borehole/monitoring well installation or sampling event.
- Weather conditions.
- Health and safety issues, including daily safety meetings.
- Sample number, time of collection, and analytical parameters for all samples collected.
- Problems encountered.
- Deviations from standard operating procedures and documentation explaining rationale.
- Record of pertinent phone calls.
- Documentation of decontamination activities.
- Documentation of sample storage and shipping information, including all sample numbers and the shipper's airbill number used for each shipment.
- IDW information (location where IDW originated, material in drums, date produced, and location where drums were left).
- Signature and date at the completion of daily entries.

Field forms may be used to document sampling activities and to record field data and observations, particularly for repetitive investigation tasks. Field forms may include, but are not limited to, the following types:

- Sample collection form
- Chain-of-Custody
- Boring/Hand Auger log
- Calibration Sheets
- Photographic logs

Field forms will be reviewed by the Field Operations Leader, or other qualified person, for content and completeness and will be signed to indicate that the review was completed. Field forms will become part

of the permanent record and will be incorporated into the project file. At a minimum, field forms must contain the following information:

- Investigation site location
- Sample or station location
- Date and time
- Signature of person completing the form
- Signature of person reviewing the completed form
- Company name
- Unique identifier regarding data collected, such as sample ID number, boring number, serial number of instrument calibrated, chain-of-custody number, photo sequence, etc.

## 7.0 CONTACTS

The following personnel are approved contacts for their respective project areas.

<b>Project Area</b>	<b>Responsible Personnel</b>	<b>Phone Number</b>
Base Contact	Wayne Hansel	407-895-6714
Task Order Management	Steve McCoy	423-220-4730
Technical Issues	Michael Campbell or Allan Jenkins	423-220-4714 or -4724
Health & Safety	Matt Soltis	412-921-8912
Procurement	Sandy D'Alessandris	412-921-8435
Laboratory Services	Dave Heakin, Severn Trent Laboratories	330-497-9396
Analytical Issues	Joe Samchuck	412-921-8510

## REFERENCES

ABB-ES (ABB Environmental Services, Inc.), 1995. *Background Sampling Report, Naval Training Center, Orlando, Florida*, August.

ABB-ES, 1997. *Project Operations Plan for Site Investigations and Remedial Investigations, Volume I*, August.

B&R Environmental (Brown & Root Environmental), 1997. *Health and Safety Plan for Completion of Investigative Work and Data Sampling and addenda*.

FDEP (Florida Department of Environmental Protection), 1999. *Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-777, F.A.C. CEHT/TR-99-01*, Division of Waste Management, Florida Department of Environmental Protection, Gainesville, Florida, May.

USEPA (U.S. Environmental Protection Agency), 1994. *USEPA Contract Laboratory Program; National Functional Guidelines for Inorganic Data Review*. EPA/540/R-94/013, Office of Solid Waste and Emergency Response, Washington, D.C., February.

USEPA, 1999. *USEPA Contract Laboratory Program; National Functional Guidelines for Organic Data Review*. EPA/540/R-99/008, Office of Solid Waste and Emergency Response, Washington, D.C., October.

**APPENDIX A**  
**STUDY AREA 35**  
**MAIN BASE**

## STUDY AREA 35 MAIN BASE

### A.1 INTRODUCTION

#### A.1.1 Site Description

Study Area 35 (SA 35) is located on the Main Base, NTC Orlando (Figure A-1). The study area occupies the southern part of the block formed by Langley and Iwo Jima Streets and Mitscher and Leahy Avenues (Figure A-2). Most of the site is a large paved parking area fringed with grass swales and lawn. Two buildings (2078 and 2079) are included in the study area. Building 2078 is a former aircraft hangar used from 1968 to 1998 for vehicle maintenance. The Environmental Detachment Charleston (DET) performed an Interim Remedial Action (IRA) in April 1999 to remediate surface soils (DET, 1999).

The intended reuse of the site is residential.

#### A.1.2 Background

**October 1997 to April 1999.** Data collected during the site screening investigation at SA 35 from October 1997 to November 1997 (HLA, 1999) indicated that some soil samples had Total Recoverable Petroleum Hydrocarbons (TRPH), lead, and/or arsenic concentrations above screening criteria. An IRA was conducted April 1999 to remediate the surface soils in the vicinity of these sample locations. The results presented in the Completion Report (DET, 1999) indicate the screening criteria for TRPH and arsenic were met at all excavation areas except Area A. For excavation Area A, a confirmatory sample collected adjacent to the north side of Building 2079 had an arsenic concentration that exceeded the screening criterion (Figure A-3). Confirmatory samples were not analyzed for lead at the time of the IRA.

**April 2000.** In April 2000, soil samples were collected to confirm that arsenic and lead concentrations were less than the screening criteria. Prior to sampling, measures were taken (i.e., digging) to identify the limits of the excavation area. The results of the sample analyses are presented in Figure A-4. The concentration of lead (468 mg/kg) in the composite sample from the northern edge of the excavation exceeded the screening criterion (400 mg/kg), indicating the need for further delineation. The concentration of arsenic (1.2 mg/kg) in the composite sample from the southern edge of the excavation exceeded the screening criterion (1 mg/kg), but the FDEP determined that adequate soil had been removed in this area and no further remediation was required.

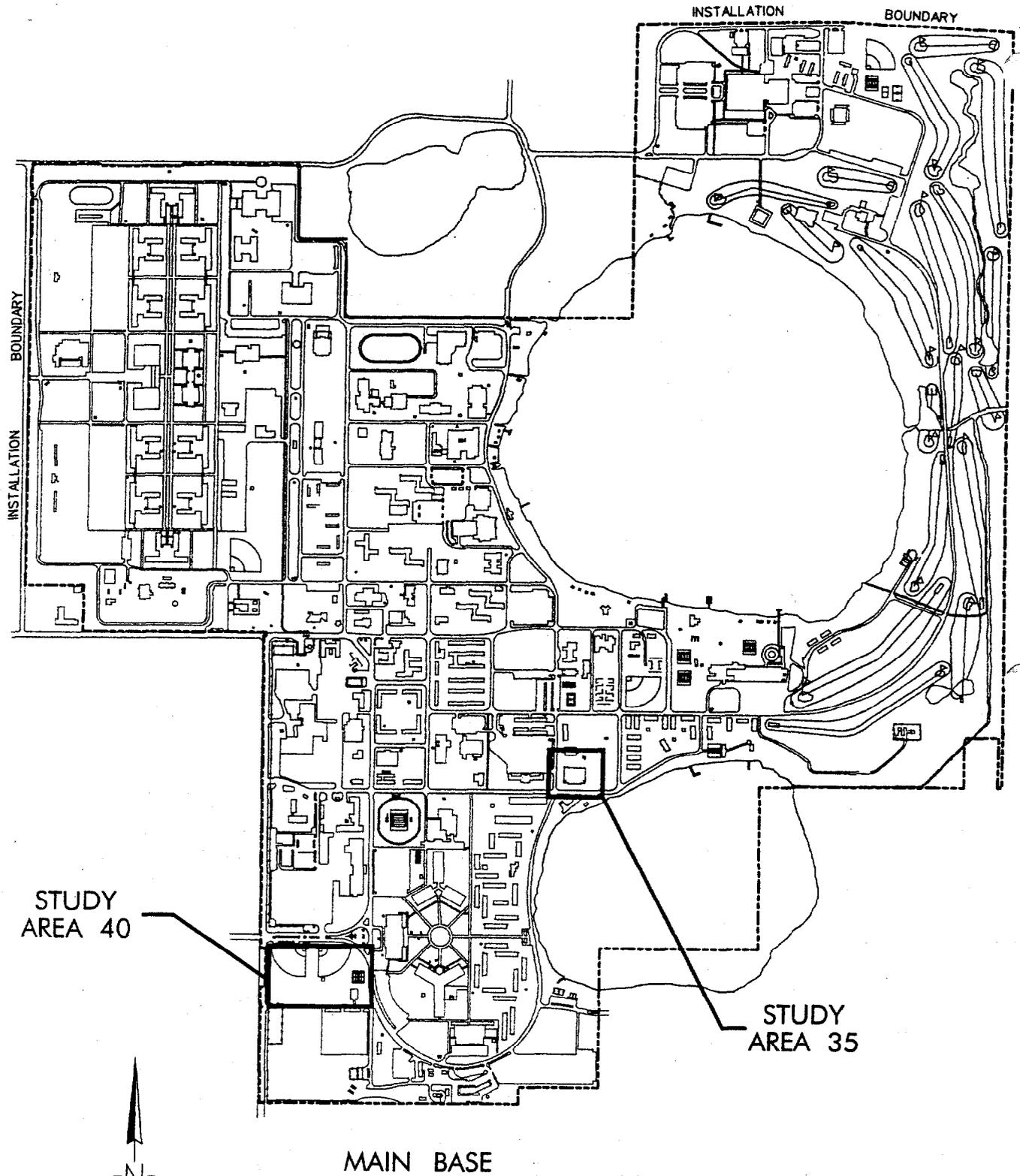
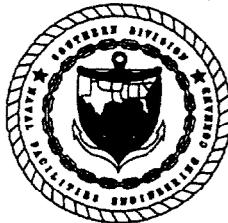
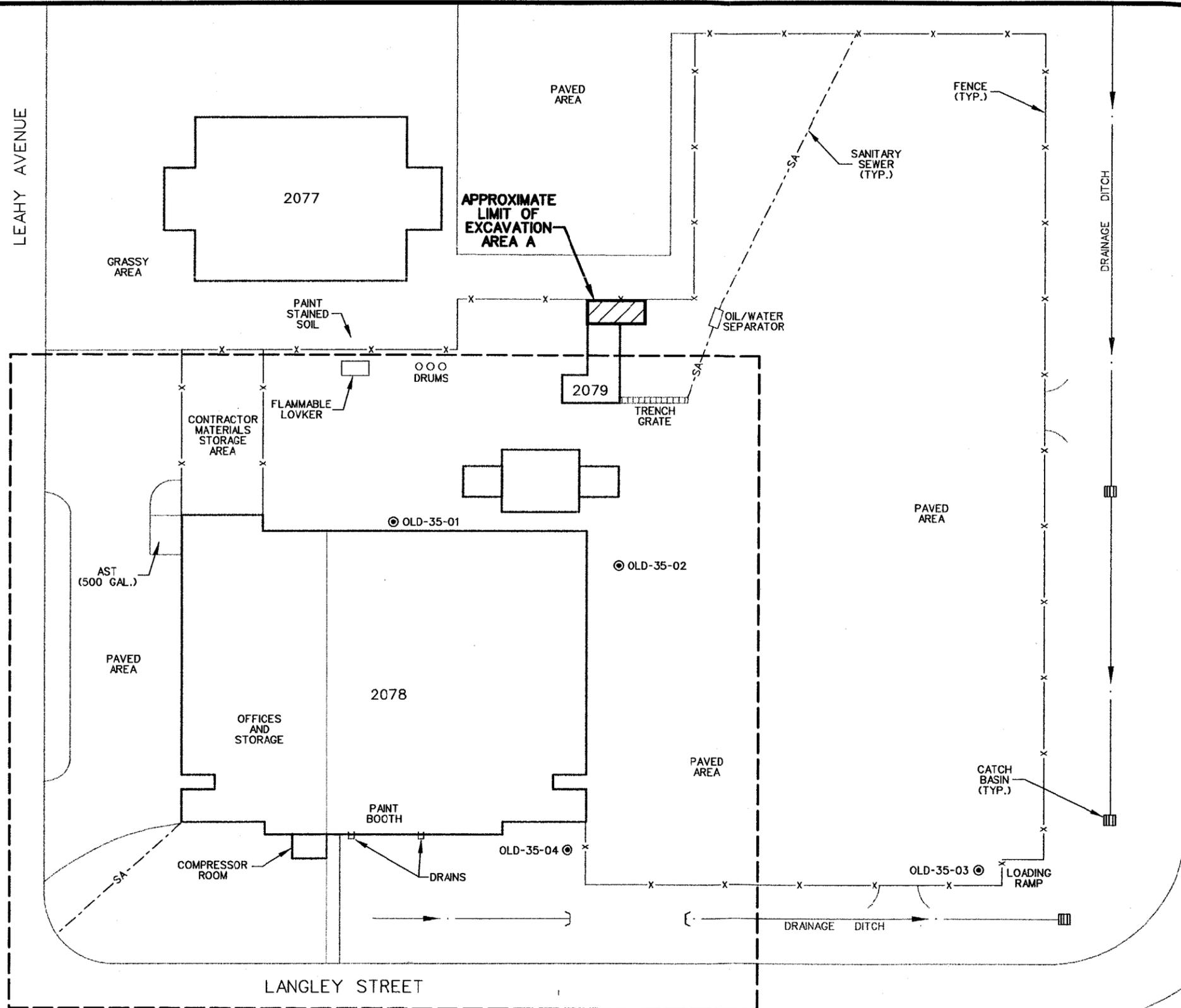


FIGURE A-1

SITE LOCATION MAP  
STUDY AREAS 35 AND 40  
WORK PLAN FOR SOIL SAMPLING

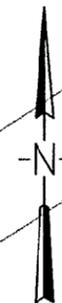
NAVAL TRAINING CENTER  
ORLANDO, FLORIDA





**LEGEND**

MONITORING WELL    ⊙



50 0 50

SCALE IN FEET

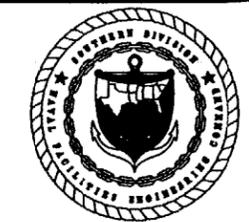
FIGURE A-2

SITE PLAN WITH EXCAVATION AREA A

STUDY AREA 35 - MAIN BASE

NAVAL TRAINING CENTER

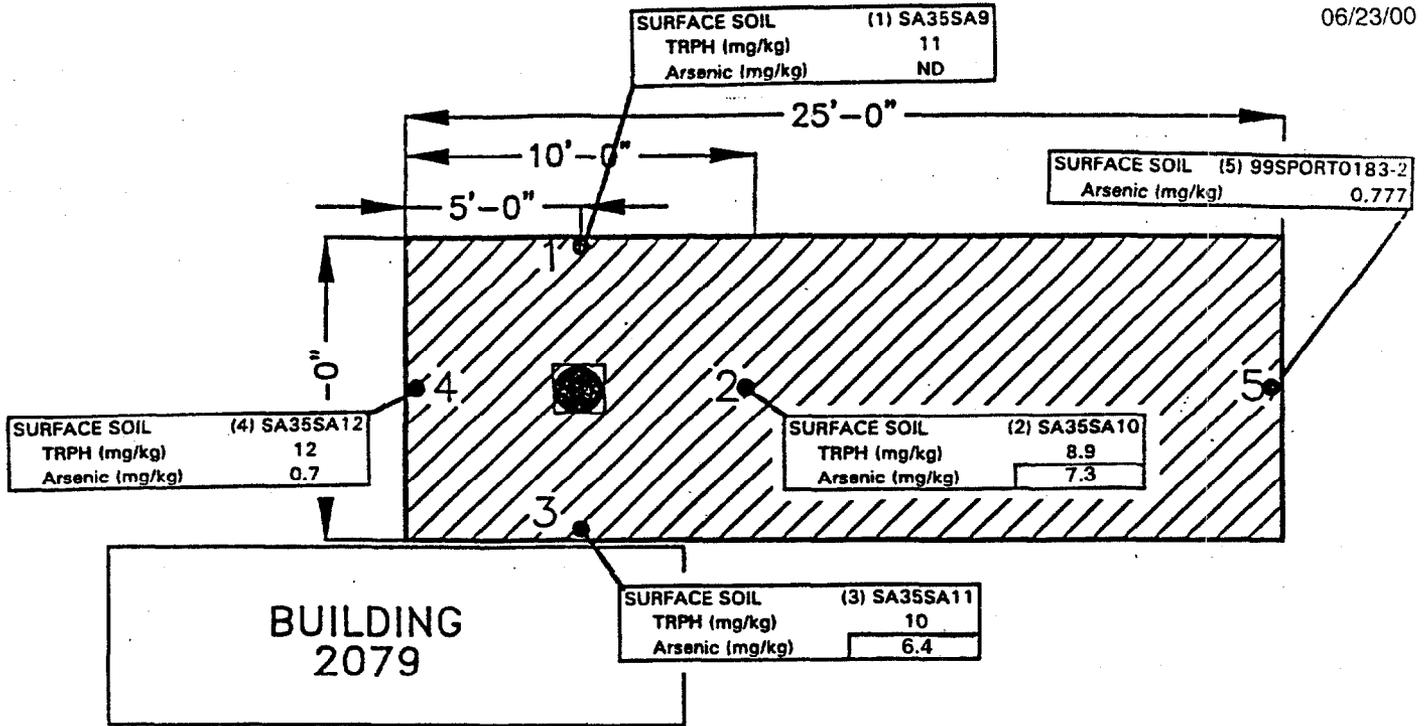
ORLANDO, FLORIDA



SITE BOUNDARY  
(NO ACCESS PERMITTED)

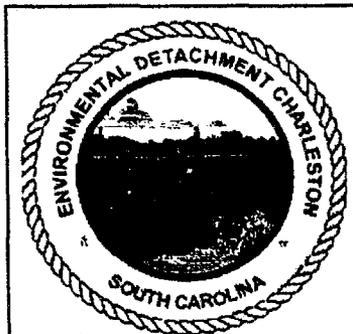
127

n11x17b.dgn



**LEGEND**

- 1 ● CONFIRMATORY SAMPLE ID SA35SA9
- 2 ● CONFIRMATORY SAMPLE ID SA35SA10
- 3 ● CONFIRMATORY SAMPLE ID SA35SA11
- 4 ● CONFIRMATORY SAMPLE ID SA35SA12
- 5 ● CONFIRMATORY SAMPLE ID 99SPORT0183-2
- SAMPLE POINT 35S005
- ▨ EXCAVATED TO 2 FEET DEEP



**ENVIRONMENTAL DETACHMENT CHARLESTON**  
1899 NORTH HOBSON AVENUE - BUILDING 30  
NORTH CHARLESTON, SOUTH CAROLINA 29405-2106

**FIGURE A-3**  
**CONFIRMATORY SAMPLE CONCENTRATIONS**  
**STUDY AREA 35**

DATE: 13 AUGUST 1999	PREPARED BY: A. J. MOYER	REV -
SCALE: NONE	SHEET: -	

**LEGEND**

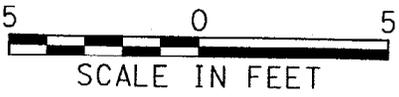
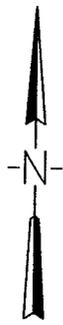
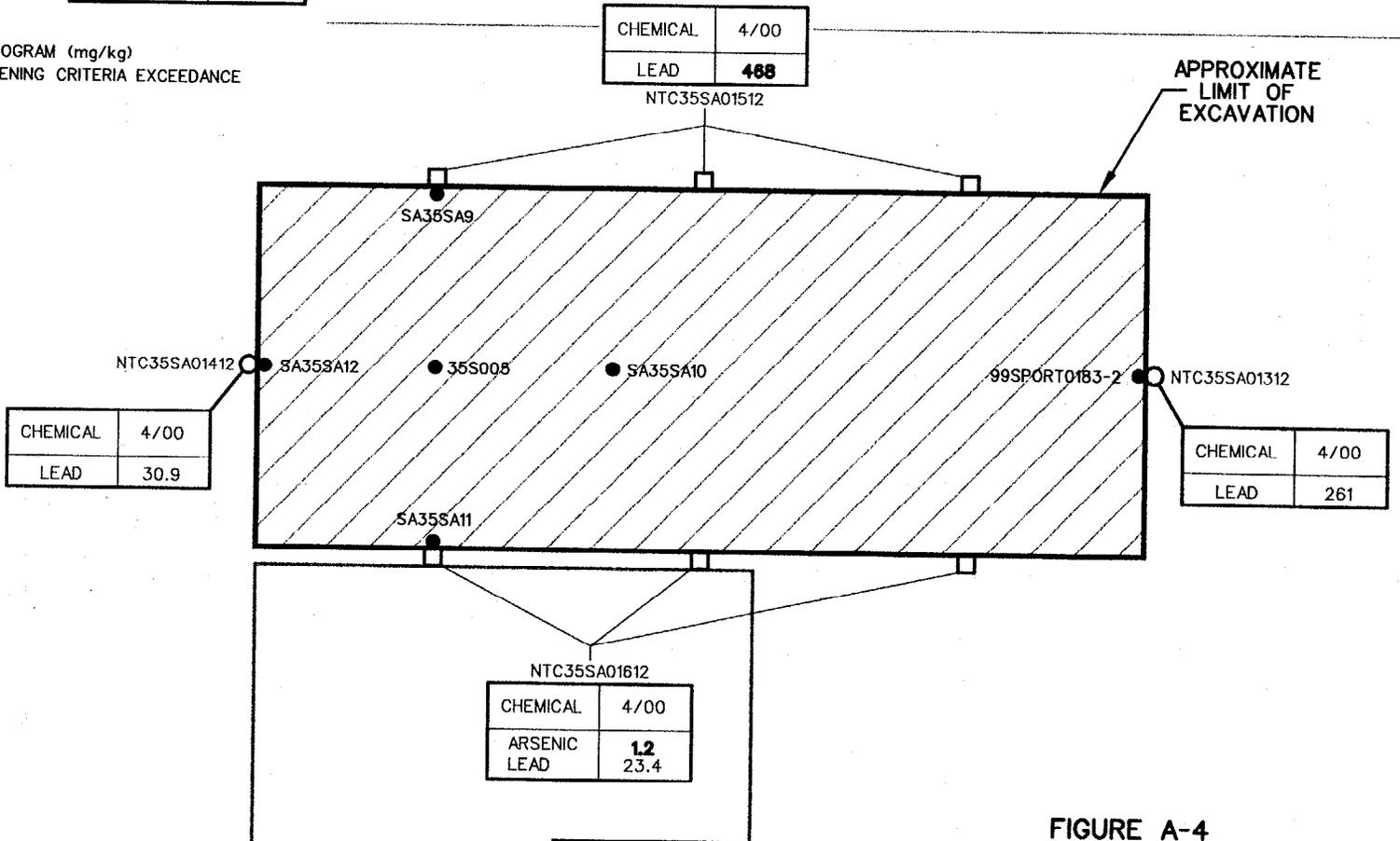
- CONFIRMATION SOIL SAMPLE (APRIL 1999) ●
- SURFACE SOIL SAMPLE 1' BGS (APRIL 2000) ○
- COMPOSITE SOIL SAMPLE 1' BGS (APRIL 2000) □
- EXCAVATED 2' DEPTH (APRIL 1999) ▨

SAMPLE COLLECTION DATE	
CHEMICAL	4/00
ARSENIC	<b>1.2</b>
LEAD	23.4
CHEMICAL CONCENTRATION <sup>1,2</sup>	
SCREENING CRITERION <sup>1</sup>	
ARSENIC	1.0
LEAD	4.00

1-CONCENTRATION IN MILLIGRAMS PER KILOGRAM (mg/kg)  
 2-BOLD CONCENTRATION INDICATES SCREENING CRITERIA EXCEEDANCE

PAVED AREA

APPROXIMATE LIMIT OF EXCAVATION



BUILDING 2079

FIGURE A-4



SOIL SAMPLING RESULTS  
 AT EXCAVATION AREA A - APRIL 2000  
 STUDY AREA 35 - MAIN BASE

NAVAL TRAINING CENTER  
 ORLANDO, FLORIDA

Rev. 1  
 06/23/00

R4704005

A-6

CTO 0024

### **A.1.3 Objectives**

In June 2000, the Orlando Partnering Team determined that additional samples north of the IRA excavation are needed to determine the extent of the lead contamination over the SCTL.

The objectives of this fieldwork are to:

- Collect soil samples at selected locations north of excavation Area A.
- Submit the samples to an off-site fixed-base laboratory for lead analysis.

## **A.2 SOIL CONFIRMATION SAMPLING**

### **A.2.1 Screening Criteria**

Because the intended site reuse is residential, the applicable screening criterion for lead is:

lead: 400 mg/kg

(Refer to Section 2.1 for a discussion of screening criteria.)

### **A.2.2 Sampling**

Figure A-5 shows the planned sampling locations at excavation Area A. Three soil samples will be collected near the paved area north of the excavation. Lead analysis will be performed on the soil samples by Severn Trent Laboratories in North Canton, Ohio, in accordance with USEPA Level IV DQOs.

At each sampling point, a sample will be collected from a depth of 0 to 1 feet in accordance with the procedures specified in the *Project Operations Plan for Site Investigations, Volume I* (ABB-ES, 1997). Health and safety aspects of the work at SA 35 will be controlled in accordance with the *Health and Safety Plan for Completion of Investigative Work and Data Sampling* (B&R Environmental, 1997) and addenda.

**LEGEND**

- CONFIRMATION SOIL SAMPLE (APRIL 1999) ●
- SURFACE SOIL SAMPLE (APRIL 2000) ○
- COMPOSITE SOIL SAMPLE (APRIL 2000) □
- EXCAVATED 2' DEPTH (APRIL 1999) 
- PLANNED SURFACE SOIL SAMPLE (0-1' BGS) ⊕

R4704005

A-8

PAVED AREA

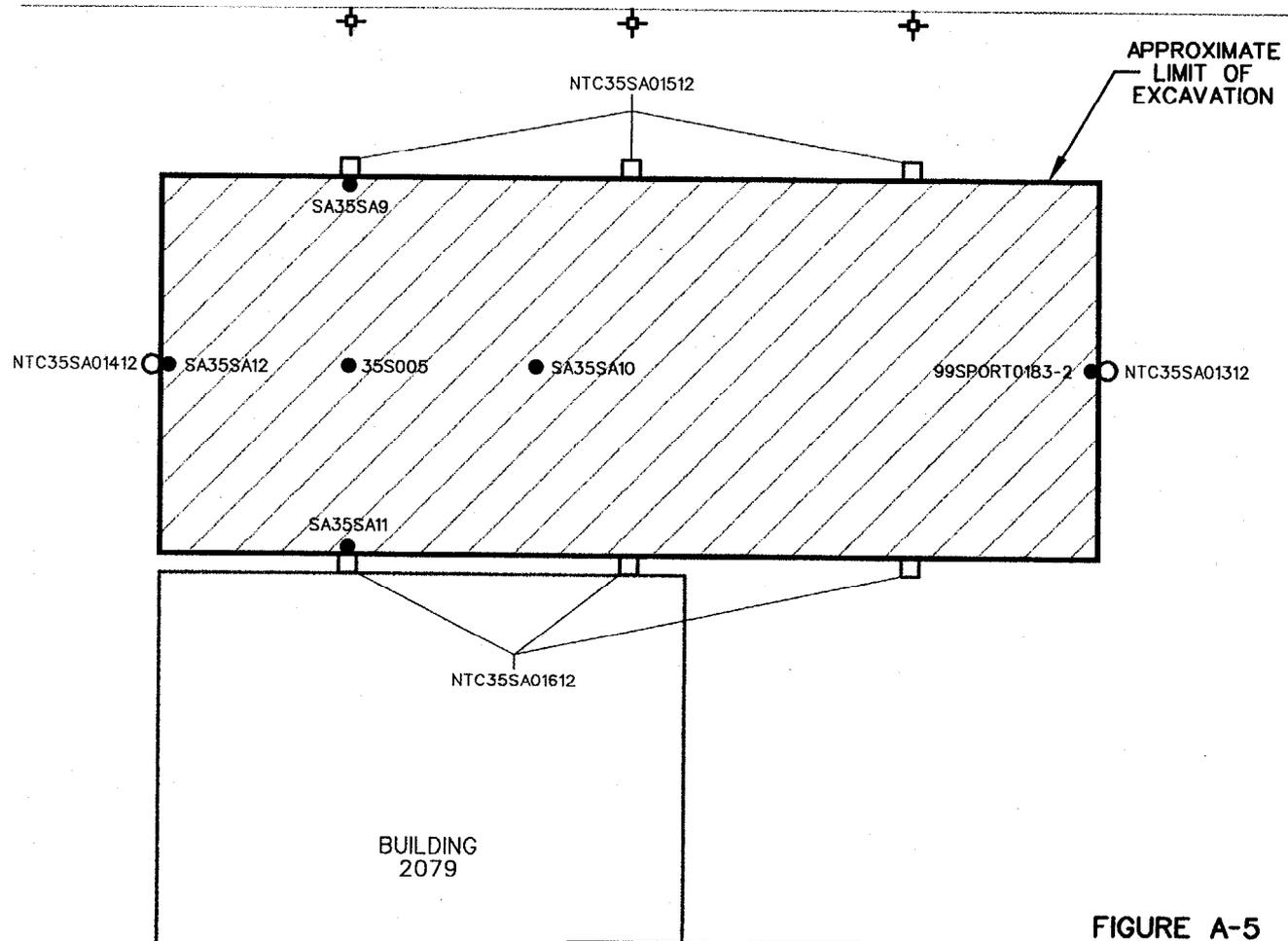
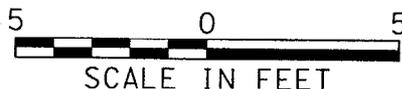


FIGURE A-5



SOIL SAMPLING LOCATIONS  
AT EXCAVATION AREA A  
STUDY AREA 35 - MAIN BASE

NAVAL TRAINING CENTER  
ORLANDO, FLORIDA

Rev. 1  
06/23/00

### A.3 REFERENCES

HLA (Harding Lawson Associates), 1999. *Base Realignment and Closure, Environmental Site Screening Report, Study Area 35 (Final Draft), Naval Training Center, Orlando, Florida, November.*

DET (Environmental Detachment Charleston, S.C.), 1999. *Completion Report, Interim Remedial Action, SA 17, 18, 23, 35, 37, 40, 42 and OU 3 & 4, Naval Training Center and McCoy Annex, Orlando, Florida, August.*

**APPENDIX B**

**STUDY AREA 40  
MAIN BASE**

## STUDY AREA 40 MAIN BASE

### B.1 INTRODUCTION

#### B.1.1 Site Description

Study Area 40 (SA 40) is located in the southwest corner of the Main Base, NTC Orlando (see Figure A-1). The study area encompasses approximately 10 acres of land bounded on the south by Nautilus Street, on the west by the Main Base's western property line, on the north by Maguire Boulevard, and on the east by Grace Hopper Avenue (Figure B-1).

#### B.1.2 Background

**January 1996 to May 1999.** Data collected during the site screening investigation at SA 40 (HLA, 1999) indicated that some surface soils contained polynuclear aromatic hydrocarbons (PAHs), primarily benzo(a)pyrene, and arsenic above screening criteria: the greater of the Florida SCTL or the background screening concentration (arsenic only).

A soil removal IRA was performed by the Navy (DET, 1999) in April/May 1999, removing 7,900 tons of PAH- and arsenic-contaminated soil. The soil was removed from a "large" area in the western portion of the site and a "small" 10-foot x 10-foot area toward the northeast. Confirmation samples were collected to verify that the remaining soil met screening criteria. Arsenic concentrations exceeded the background screening concentration of 1 ppm at six locations at the edges of the excavation areas (Figures B-2 and B-3).

**April 2000.** In April 2000, soil samples were collected to determine the extent of arsenic concentrations exceeding the screening criteria. Prior to sample collection measures were taken (i.e., digging) to identify the limits of the excavated areas. The limits of the excavations were determined by referring to Figures B-2 and B-3 for approximate locations and comparing the color of the fill with that of the undisturbed soil. Six soil samples labeled "A" were collected 5 feet from the undisturbed sidewalls of the two excavation areas, approximately 1 foot bgs at the locations where arsenic concentrations exceeded screening criteria in May 1999. Additional samples were collected at 5-foot horizontal increments (10 feet, 15 feet, and 20 feet) from each of the "A" sample locations also at approximately 1 foot bgs. These samples were labeled "B", "C", and "D", respectively. Arsenic analysis was performed on "A" soil samples. If concentrations exceeded 1 ppm in any of the "A" samples, an analysis was performed on the corresponding "B" soil sample. Similarly, if the concentration in any samples exceeded 1 ppm, an analysis was performed on the next incremented soil sample.

SOURCE: HLA, 1999

DOCUMENT: WORK PLAN FOR SOIL SAMPLING, JUNE 2000

R4704005

B-2

CTO 0024

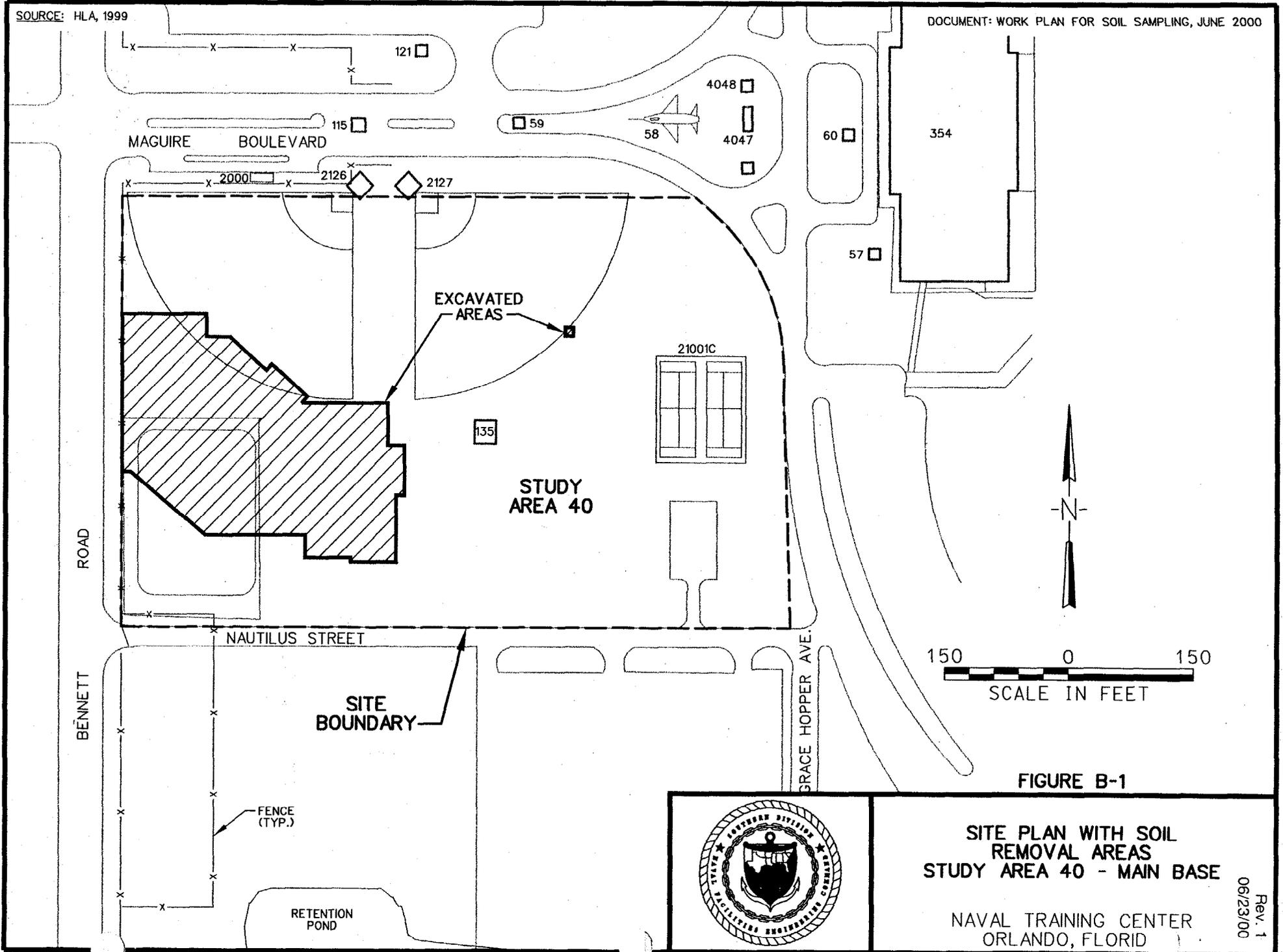


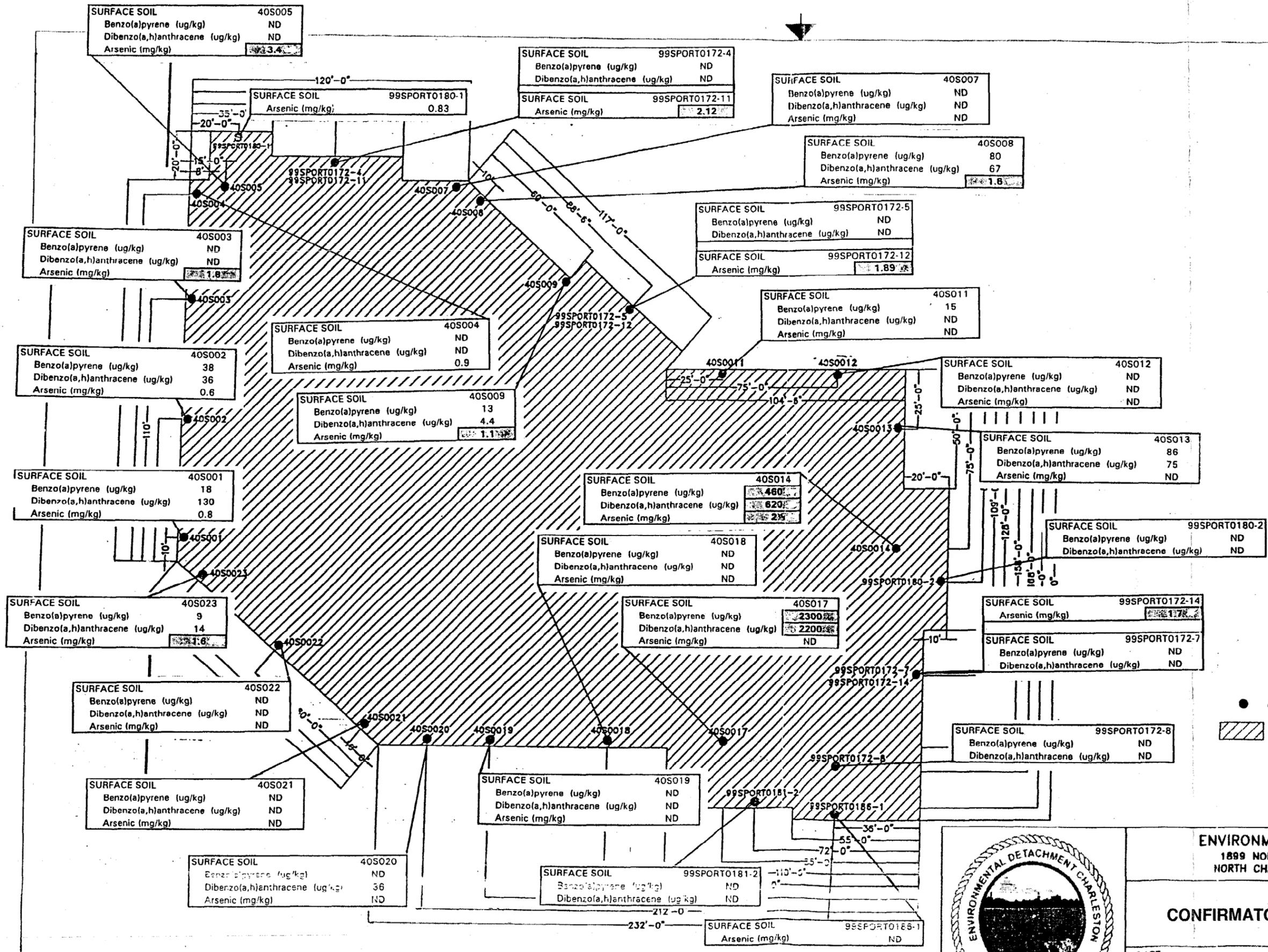
FIGURE B-1



SITE PLAN WITH SOIL  
REMOVAL AREAS  
STUDY AREA 40 - MAIN BASE

NAVAL TRAINING CENTER  
ORLANDO, FLORIDA

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06/23/00



**LEGEND**

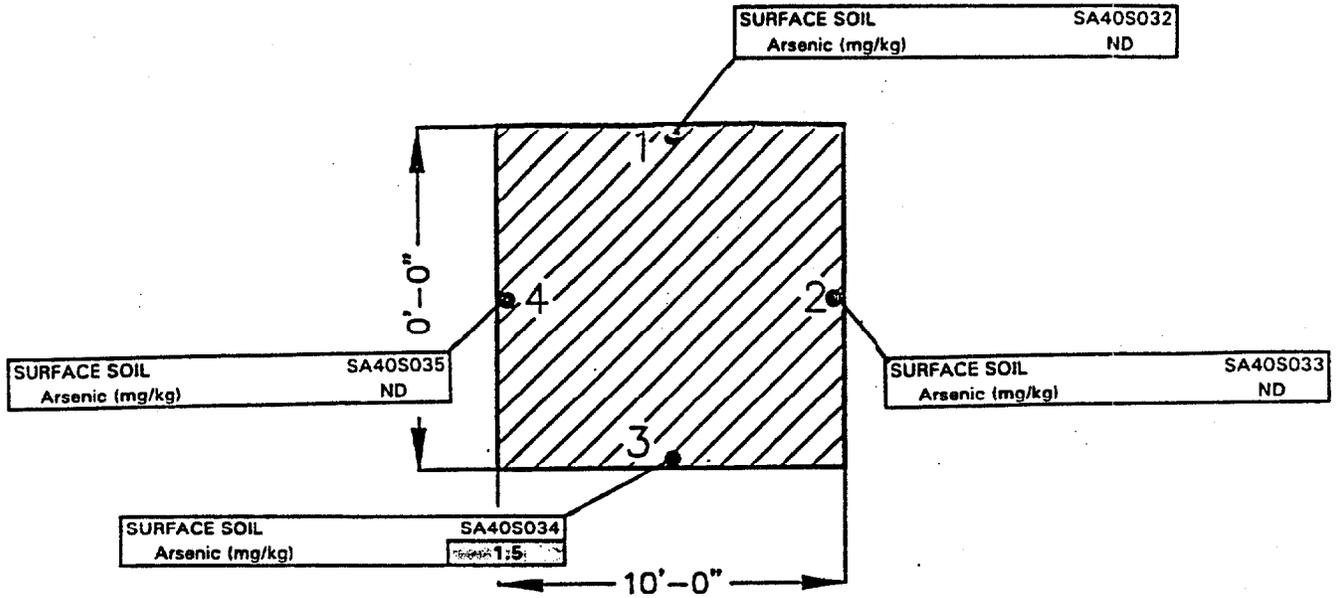
- CONFIRMATORY SAMPLE POINT
- ▨ EXCAVATED TO 2 FEET DEEP



**ENVIRONMENTAL DETACHMENT CHARLESTON**  
1899 NORTH HOBSON AVENUE - BUILDING 30  
NORTH CHARLESTON, SOUTH CAROLINA 29405-2106

**FIGURE B-2**  
**CONFIRMATORY SAMPLE CONCENTRATIONS**  
**STUDY AREA 40**

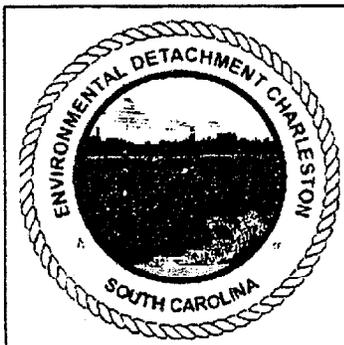
DATE 17 AUGUST 1999	PREPARED BY: A. J. MOYER	REV -
SCALE: NONE	SHEET	



LEGEND

- 1 ● CONFIRMATORY SAMPLE ID SA40S032
- 2 ● CONFIRMATORY SAMPLE ID SA40S033
- 3 ● CONFIRMATORY SAMPLE ID SA40S034
- 4 ● CONFIRMATORY SAMPLE ID SA40S035

EXCAVATED TO 2 FEET DEEP



**ENVIRONMENTAL DETACHMENT CHARLESTON**  
 1899 NORTH HOBSON AVENUE - BUILDING 30  
 NORTH CHARLESTON, SOUTH CAROLINA 29405-2106

**FIGURE B-3**  
 NAVAL TRAINING CENTER CENTER ORLANDO SA 40  
 EXCAVATION BOUNDARIES AND  
 CONFIRMATORY SAMPLE LOCATIONS

DATE: 20 JULY 1999	PREPARED BY: A. J. MOYER	REV -
SCALE: NONE	SHEET: -	

The results of the sample analyses are presented in Figures B-4 and B-5. At the large excavation area in the western portion of the site, only one "A" sample (38A) contained arsenic at a concentration exceeding the screening criterion (Figure B-4). Sample 38B also exceeded the criterion; however, the concentration in 38C (0.70 mg/kg) was below the criterion. At the small excavation area in the northeastern portion of the site, all four samples at location 41 exceeded the criterion (Figure B-5).

### **B.1.3 Objectives**

Additional samples are needed to determine the extent of arsenic-impacted soils exceeding the screening criterion (1 mg/kg) near the small 10-foot x 10-foot excavated area in the northeastern portion of the site.

The objectives of this supplemental investigation are to:

- Delineate arsenic exceedances in surface soil.
- Collect contingency surface soil samples at 10-foot increments.
- Analyze the soil samples at the first 10-foot step-out locations ("A") and, if a sample exceeds 1 mg/kg, analyze the sample at the next step-out until an arsenic concentration of less than 1 mg/kg is obtained. This will bound the impacted soil above the screening criterion.

## **B.2 SOIL SAMPLING**

### **B.2.1 Screening Criteria**

The applicable screening criterion for arsenic at SA 40, which has a residential reuse scenario, is the background concentration of 1 mg/kg.

### **B.2.2 Sampling**

Surface soil samples (0-1 foot bgs) will be collected to determine the extent of arsenic-impacted soils exceeding the screening criterion near the small excavation area in the northeastern portion of the site. Figure B-6 shows the sampling locations. Severn Trent Laboratories in North Canton, Ohio, will perform the arsenic analyses in accordance with USEPA Level IV DQOs.

**LEGEND**

- CONFIRMATION SOIL SAMPLE (APRIL 1999) ●
  - SURFACE SOIL SAMPLE (APRIL 2000 - NOT ANALYZED) ○
  - SURFACE SOIL SAMPLE (APRIL 2000 - ANALYZED) ●
  - DEBRIS AREA EXCAVATED 1' DEPTH (APRIL 1999) [Hatched Box]
  - DEBRIS AREA OF PAH & ARSENIC EXCAVATED 2' DEPTH (APRIL 1999) [Diagonal Hatched Box]
  - NON-DEBRIS AREA OF PAH & ARSENIC EXCAVATED 2' DEPTH (APRIL 1999) [Diagonal Hatched Box]
- QUALIFIER FOR INORGANIC ANALYTES INDICATES A CONCENTRATION BETWEEN THE INSTRUMENT DETECTION LIMIT AND THE REPORTING LIMIT

SAMPLE COLLECTION DATE	
CHEMICAL	4/00
ARSENIC	0.42-B/ <1.1
CHEMICAL CONCENTRATION 1,2	
DUPLICATE SAMPLE	

SCREENING CRITERION 1	
ARSENIC	1.0

1-CONCENTRATION IN MILLIGRAMS PER KILOGRAM (mg/kg)  
2-BOLD CONCENTRATION INDICATES SCREENING CRITERIA EXCEEDANCE

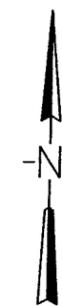
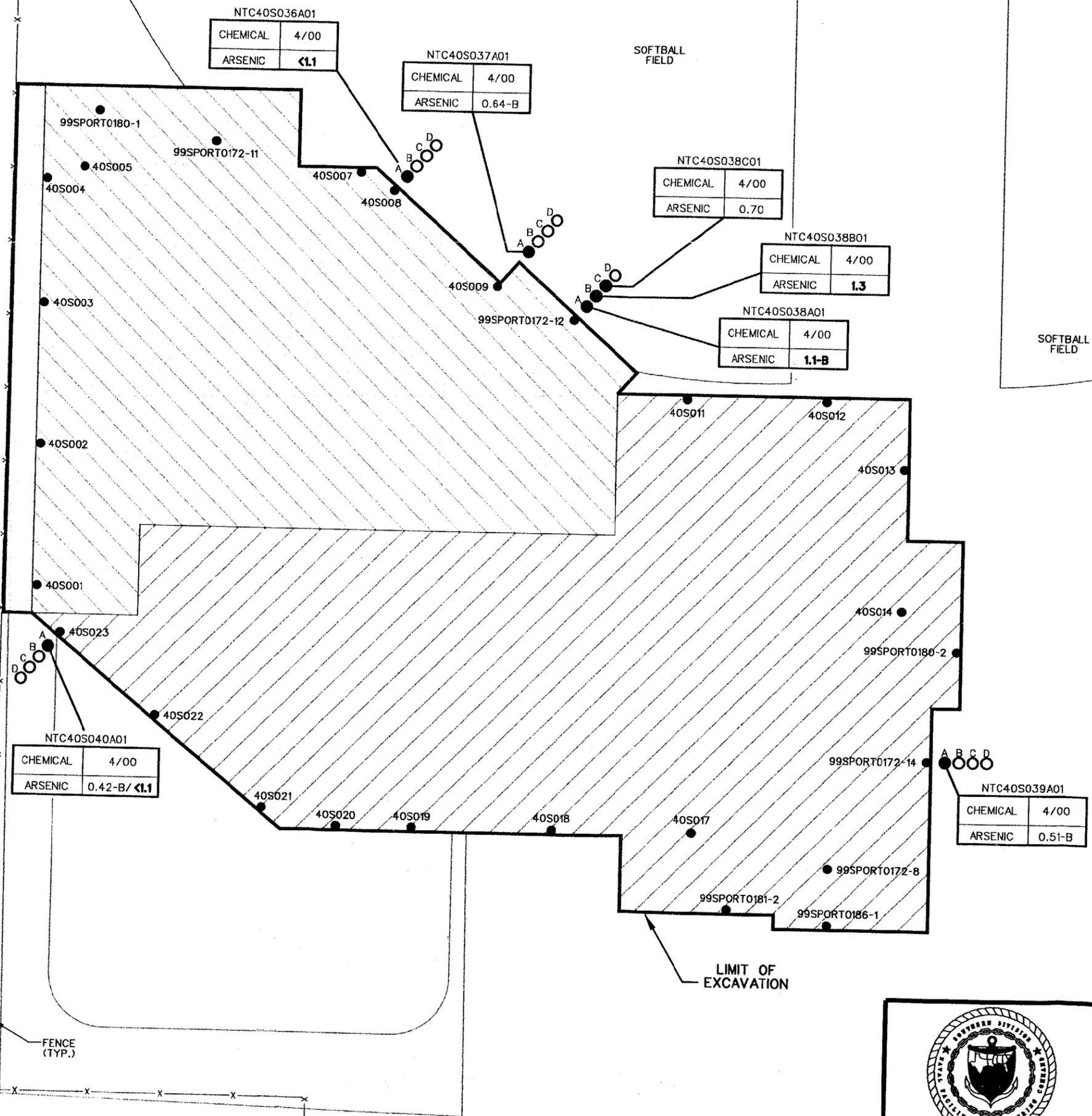


FIGURE B-4

**ARSENIC CONCENTRATIONS IN SOIL AT LARGE EXCAVATED AREA - APRIL 2000 STUDY AREA 40 - MAIN BASE**

NAVAL TRAINING CENTER  
ORLANDO, FLORIDA



BENNETT ROAD

SOFTBALL FIELD

SOFTBALL FIELD

LIMIT OF EXCAVATION

FENCE (TYP.)

**LEGEND**

CONFIRMATION SOIL SAMPLE  
(APRIL 1999)



SURFACE SOIL SAMPLE  
(APRIL 2000)



EXCAVATED 2' DEPTH  
(APRIL 1999)



SAMPLE COLLECTION DATE

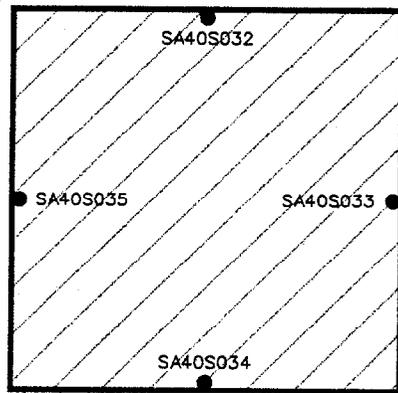
CHEMICAL	4/00
ARSENIC	<b>5.4</b>

CHEMICAL

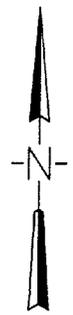
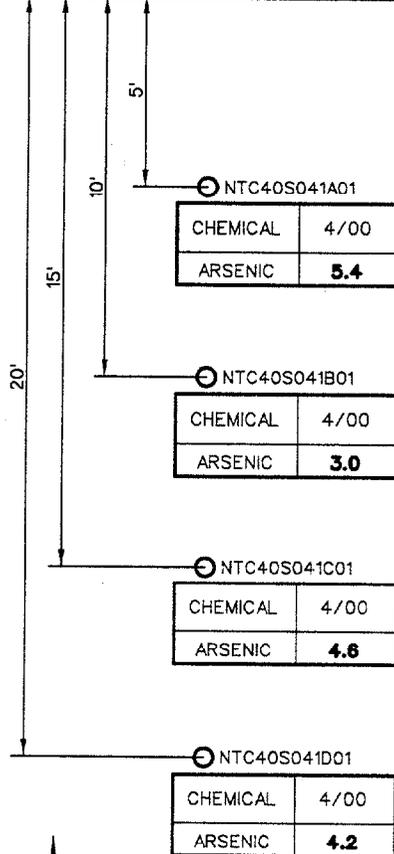
CHEMICAL CONCENTRATION<sup>1,2</sup>

SCREENING CRITERION <sup>1</sup>	
ARSENIC	1.0

1-CONCENTRATION IN MILLIGRAMS PER KILOGRAM (mg/kg)  
2-BOLD CONCENTRATION INDICATES SCREENING CRITERIA EXCEEDANCE



LIMIT OF EXCAVATION



SOURCE: HLA, 1999

**FIGURE B-5**



**ARSENIC CONCENTRATIONS IN SOIL  
AT SMALL EXCAVATED AREA  
APRIL 2000  
STUDY AREA-40 - MAIN BASE**

NAVAL TRAINING CENTER  
ORLANDO, FLORIDA

n8-5x11v.dgn

**LEGEND**

CONFIRMATION SOIL SAMPLE  
(APRIL 1999)



SURFACE SOIL SAMPLE  
(APRIL 2000)



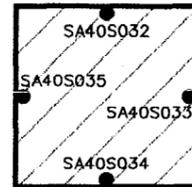
EXCAVATED 2' DEPTH  
(APRIL 1999)



PLANNED  
SURFACE SOIL SAMPLE



LIMIT OF  
EXCAVATION

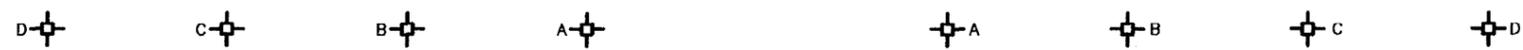


○ NTC40S041A01

○ NTC40S041B01

○ NTC40S041C01

○ NTC40S041D01



⊕ A

⊕ B

⊕ C

⊕ D

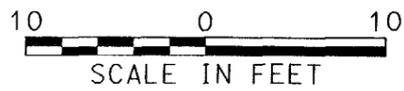
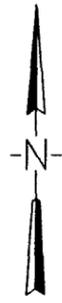


FIGURE B-6



SOIL SAMPLING LOCATIONS  
AT SMALL EXCAVATED AREA  
STUDY AREA 40 - MAIN BASE

NAVAL TRAINING CENTER  
ORLANDO, FLORIDA

### **B.2.3 Sample Numbering**

The soil samples will be numbered as follows:

NTC40SNNXDD

Where: NTC = Naval Training Center  
40 = two-digit SA designation (40)  
S = sample type ("S" for surface soil, "D" for duplicate)  
NNX = location number and increment designation (e.g., 42A or 42B)  
DD = sample depth (e.g., 01)

For example, a sample collected at the 42<sup>th</sup> soil location at the second ("B") increment at a depth of 0-1 foot will be designated NTC40S42B01. Samples for field duplicates will be identified with a "blind" number (e.g., NTC40D1000). The "blind" number will replace the location number and sample depth. The corresponding environmental sample will be noted in the logbook. The soil sample number NNX for this event will start with sample location 42A.

### **B.3 REFERENCES**

HLA (Harding Lawson Associates), 1999. *Base Realignment and Closure Environmental Site Screening Report, Study Area 40, Final Draft, Naval Training Center, Orlando, Florida, November.*

DET (Environmental Detachment, Charleston, S.C.), 1999. *Completion Report, Interim Remedial Action, SA 17, 18, 23, 35, 37, 40, 42 and OU 3 & 4, Naval Training Center and McCoy Annex, Orlando, Florida.*