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SAMPLING AND ANALYSIS PLAN FOR ZONE G BUILDING NS 4 FORMER UNDERGROUND
STORAGE TANK NS 4 CNC CHARLESTON SC
10/1/2002
CH2M HILL

**SAMPLING AND ANALYSIS PLAN
FOR
ZONE G; BUILDING NS 4
Former Underground Storage Tank NS 4
SCDHEC No: 02099**

**Charleston Naval Complex
North Charleston, South Carolina**

**SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND**

Contract Number N62467-99-C-0960

October 2002

**SAMPLING AND ANALYSIS PLAN
FOR
Zone G; Former UST NS 4**

**Charleston Naval Complex
North Charleston, South Carolina**

**Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
Charleston, South Carolina 29406**

**Submitted by:
CH2M-JONES, LLC.
Charleston Naval Complex
1849 Avenue F
North Charleston, South Carolina 29405**



J.A. JONES
ENVIRONMENTAL
SERVICES



CH2MHILL

Contract Number: N62467-99-C-0960

October 2002

ACRONYMS

bls	below land surface
BTEX	benzene, toluene, ethylbenzene and xylenes
BRAC	Defense Base Realignment and Closure Act
CAP	Corrective Action Plan
CNC	Charleston Naval Complex
COC	Chemical of Concern
DPT	Direct Push Technology
EISOPQAM	Environmental Investigations Standard Operating Procedures and Quality Assurance Manual
GEL	General Engineering Laboratories
µg/kg	microgram per kilogram
µg/L	microgram per liter
NAVFAC	Naval Facilities Engineering Command
OVA	Organic Vapor Analyzer
PAH	Polycyclic Aromatic Hydrocarbons
QA	Quality Assurance
QC	Quality Control
RA	Rapid Assessment
RAR	Rapid Assessment Report
RBSL	Risk-Based Screening Level
RCRA	Resource Conservation Recovery Act
RFI	RCRA Facility Investigation
SCDHEC	South Carolina Department of Health and Environmental Control
SOUTHDIV	Southern Division Naval Facilities Engineering Command
SPORTENDETCHASN	Supervisor of Ship Building, Conversion and Repair, United States Navy, Portsmouth Virginia, Environmental Detachment Charleston
SSTL	Site-Specific Target Level
US EPA	United States Environmental Protection Agency
UST	Underground Storage Tank

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1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) has been prepared by CH2M-JONES, LLC. The plan is designed for Underground Storage Tank (UST) NS4; located between to Buildings NS2 and NS3 at the Charleston Naval Complex (CNC), Charleston, South Carolina. This site contained a 25,000 gallon UST installed in 1952.

Originally this site was under the RCRA program as part of AOCs 675, 676, and 677, however a letter dated 5 February 2002, transferred the site to the UST program.

This SAP was developed using the information provided in the Zone I RCRA Facility Investigation Report (IR).

1.1 General Site Description

The CNC is in the city of North Charleston, on the west bank of the Cooper River in Charleston County, South Carolina, as shown on **Figure 1**. This installation consists of two major areas: an undeveloped dredge materials area on the east bank of the Cooper River on Daniel Island in Berkley County, and a developed area on the west bank of the Cooper River. The developed portion of the base is on the peninsula bounded on the west by the Ashley River and on the east by the Cooper River.

The site is located within the developed portion of the base. The area surrounding CNC is "mature urban," having long been developed with commercial, industrial, and residential land use. Commercial areas are primarily west of CNC; industrial areas are primarily to the north of the base along Shipyard Creek.

1.2 Site Background

The CNC began operations in 1901, when the Navy acquired the property. In 1993, the CNC was added to the list of bases schedule for closure under the Defense Base Realignment and Closure Act (BRAC). BRAC regulates the closure of the base and transition of the property back to the community. With the scheduled closure of the base, environmental cleanup has proceeded to make the property available for redevelopment after closure.

UST NS 4 is a former 25,000 gallon UST installed in 1952. A 495 gallon Oily-Water Separator (OWS) is located north of the old UST location. The UST stored fuel oil for a boiler house (Building NS-2). No. 5 fuel oil was used until 1991. From 1991 until its removal in 1996 the tank has stored No. 2 fuel oil. The Area was also used to fuel sea planes, and petroleum contamination may have resulted from this activity. Actual dates of seaplane operations are unknown, but this activity was discontinued in the 1950's.

2.0 PROPOSED SAMPLING PLAN

This SAP provides a method for evaluating the impact of groundwater and soils in the vicinity of the former UST NS-4. During the Zone I CMS Work Plan several groundwater and soil samples were collected around the former tank location. **Figure 2** provides the locations of previous sampling performed in this area. The results from those samples have been used as a guide in selecting the proposed sampling locations.

Based on the historical analytical results CH2M-Jones, LLC recommends that a sampling plan be implemented to confirm that groundwater and or soils in this area have not been impacted by the former operations. If analytical results indicate that levels are below the RBSLs, a No Further Action may be recommended for this site.

2.1 Sampling and Analysis Plan

Groundwater and soil DPTs will be collected in the vicinity of the former UST. If Groundwater analytical from the DPTs indicates that there are COCs above the RBSLs, then permanent monitoring wells will be installed.

DPTs will be analyzed for VOCs and SVOCs, in accordance with the *South Carolina Risk-Based Corrective Action for Petroleum Releases*.

All sampling procedures will be conducted in accordance with EPA EISOPQAM and Ensafe/Allen & Hoshall, Comprehensive Sampling and Analysis Plan, 1996.

2.2 DPT Collection

Groundwater is typically located between 4-5 feet below land surface (bls) in this area so groundwater DPT samples will be collected approximately 12 feet bls (see **Figure 4** for locations).

2.3 Surveying

All new sampling locations will be surveyed after collection.

2.4 Soil Boring Schedule

Twelve soil borings will be collected from six different locations around the site (**Figure 3**). From each soil boring location there will be two intervals sampled (0-1 and 3-5 ft bls). Samples will be collected and analyzed for VOC and SVOCs.

2.5 Reporting

A Groundwater Monitoring Report will be submitted to SCDHEC following the sampling event. The report will summarize and include copies of field and laboratory analytical data and COC distribution.

2.6 Equipment Decontamination

All drilling equipment, augers, well casing and screens, and soil and groundwater sampling equipment involved in field sampling activities will be decontaminated according to the EPA EISOPQAM.

2.7 Sample Handling

Sample handling will be conducted in accordance to the following references: EPA EISOPQAM, Code of Federal Regulations 136, 1990, and EPA Users Guide to Contract Laboratory Program, 1988. The following forms will be completed for packing/shipping process: sample labels, chain-of-custody labels, appropriate labels applied to shipping coolers, and chain-of-custody forms.

2.8 Quality Control

In addition to periodic calibration of field equipment and the completions of the appropriate documentation, quality control (QC) samples will be collected during sampling events. QC samples may include field blanks, field duplicates, and trip blanks. Definitions of each can be found below as described by the EPA EISOPQAM:

- **Field Blank:** A sample collected using organic-free water, which has been run over/through sample collection equipment. These samples are used to determine if contaminants have been introduced by contact of the sample medium with sampling equipment. Equipment field blanks are often associated with collecting rinse blanks of equipment that has been field cleaned.
- **Field Duplicates:** Two or more samples collected from a common source. The purpose of a duplicate sample is to estimate the variability of a given characteristic or contamination associated with a population.
- **Trip Blank:** A sample, which is prepared prior to the sampling event in the actual container and is stored with the investigative samples throughout the sampling event. They are often packaged for shipment with the other samples and submitted for analysis. At no time after their preparation are trip blanks to be opened before they reach the laboratory. Trip blanks are used to determine if samples were contaminated during storage and/or transportation back to the laboratory (a measure of sample handling variability resulting in positive bias in contaminant concentration). If samples

are to be shipped, trip blanks are to be provided with each shipment but not for each cooler.

2.9 Field Quality Assurance / Quality Control (QA/QC)

All sampling procedures will be conducted in accordance with EPA EISOPQAM.

QA/QC specifications for selected field measurements are summarized below.

Analysis	Control Parameter	Control Limit	Corrective Action
Air Monitoring	Check Calibration of OVA daily	Calibrate to manufactures specifications	Recalibrate. If unable to calibrate, replace.
pH of water	Continuing calibration check of pH 7.0 buffer	pH = 7.0	Recalibrate. If unable to calibrate, replace electrode.
Specific Conductance of water	Continuing calibration check of standard solution	> 1% of standard	Recalibrate.

2.10 Record Keeping

In addition to required sampling documentation, standardized forms, log sheets and logbooks will be completed during all field activities.

3.0 SITE MANAGEMENT AND BASE SUPPORT

Throughout the investigation activities, work on the CNC will be coordinated through SOUTHDIV and SCDHEC.

The primary contacts for each are as follows:

1. SOUTHDIV point of contact
Gabe Magwood
Southern Division Engineering Command
2155 Eagle Drive
North Charleston, SC 29406
(843) 820-7307

2. SOUTHDIV point of contact
Tony Hunt
Southern Division Engineering Command
2155 Eagle Drive
North Charleston, SC 29406
(843) 820-5525

3. SCDHEC point of contact
Michael Bishop
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201
(843) 898-4300

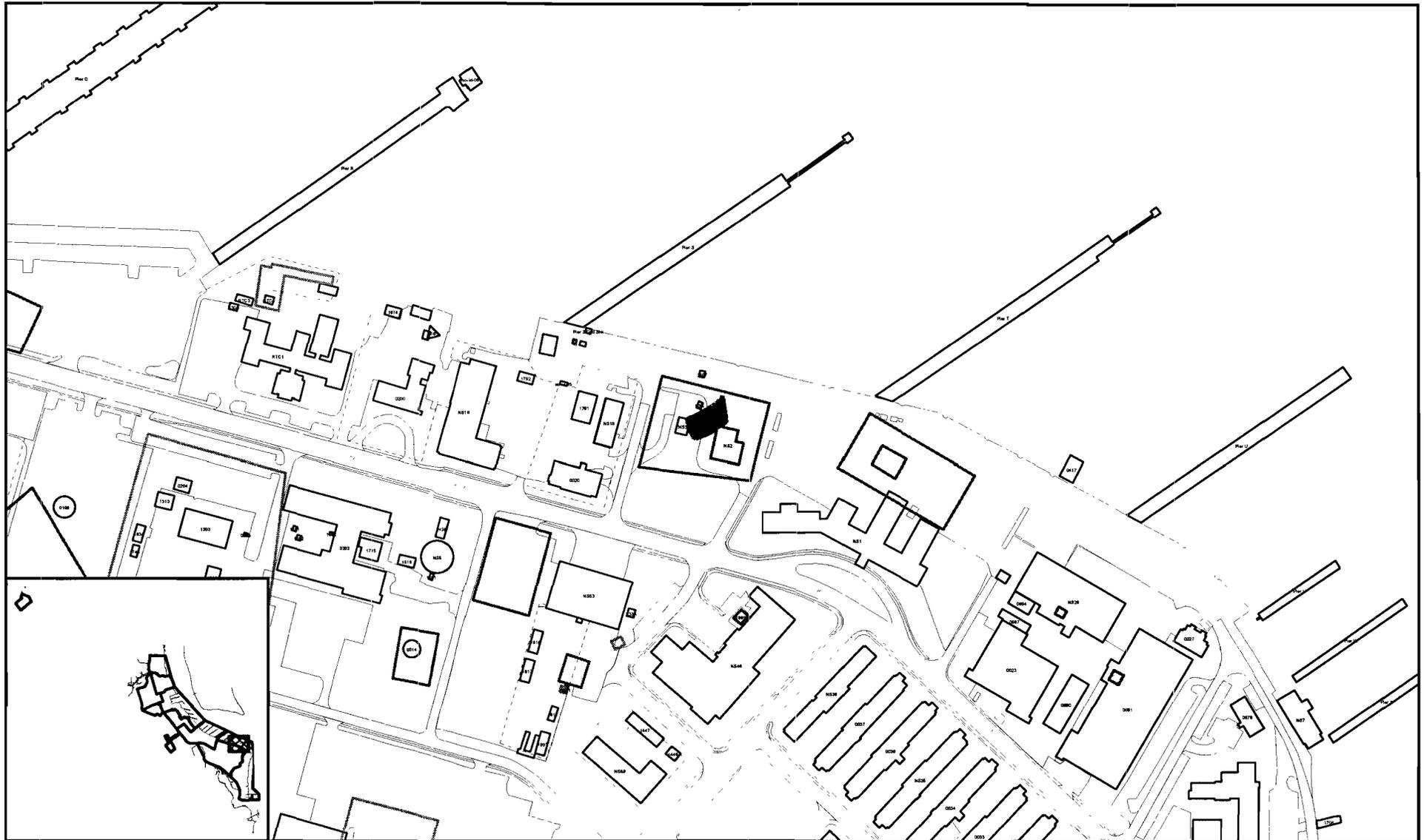
4.0 REFERENCES

South Carolina Department of Health and Environmental Control 2001. Risk-Based Corrective Action.

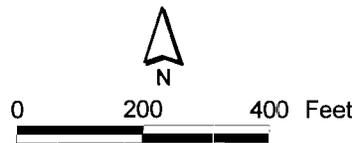
United States Environmental Protection Agency. 1996. EPA Environmental Investigations Standard Operating Procedures for Quality Assurance Manual.

SPORTENVDETHASN. 1996. UST Assessment Report for NS-4.

NOTE: Original figure created in color



-  Pavement
-  Sidewalk
-  AOC Boundary
-  SWMU Boundary
-  Buildings
-  Zone Boundary

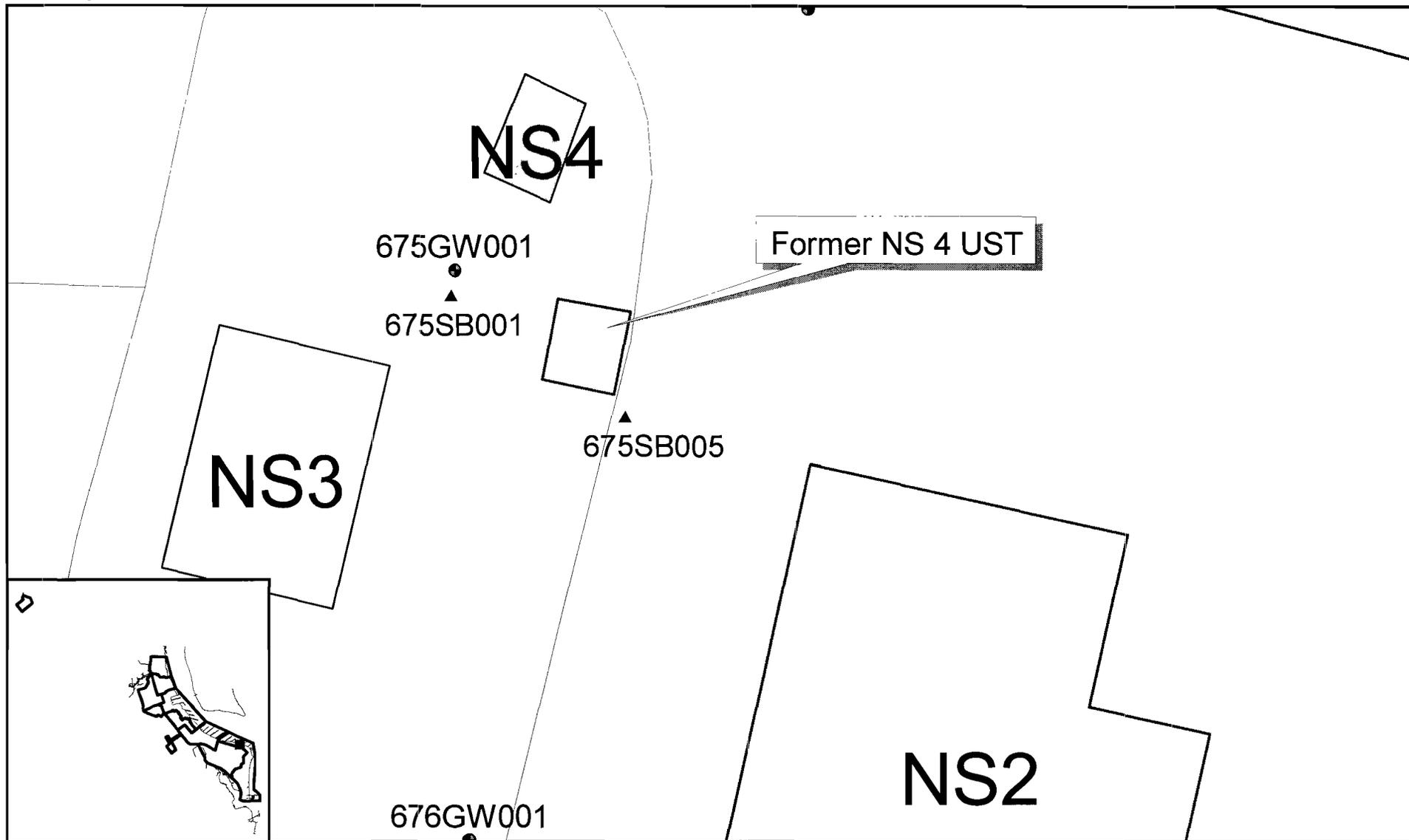


1 inch = 232.422 feet

Figure 1
Site Location Map
NS 4
Charleston Naval Complex

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NOTE: Original figure created in color



- Existing Groundwater Well
- Soil Sample
- Pavement
- Sidewalk
- AOC Boundary
- SWMU Boundary
- Buildings

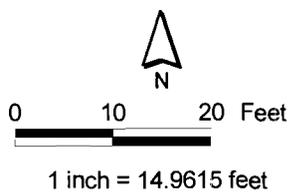
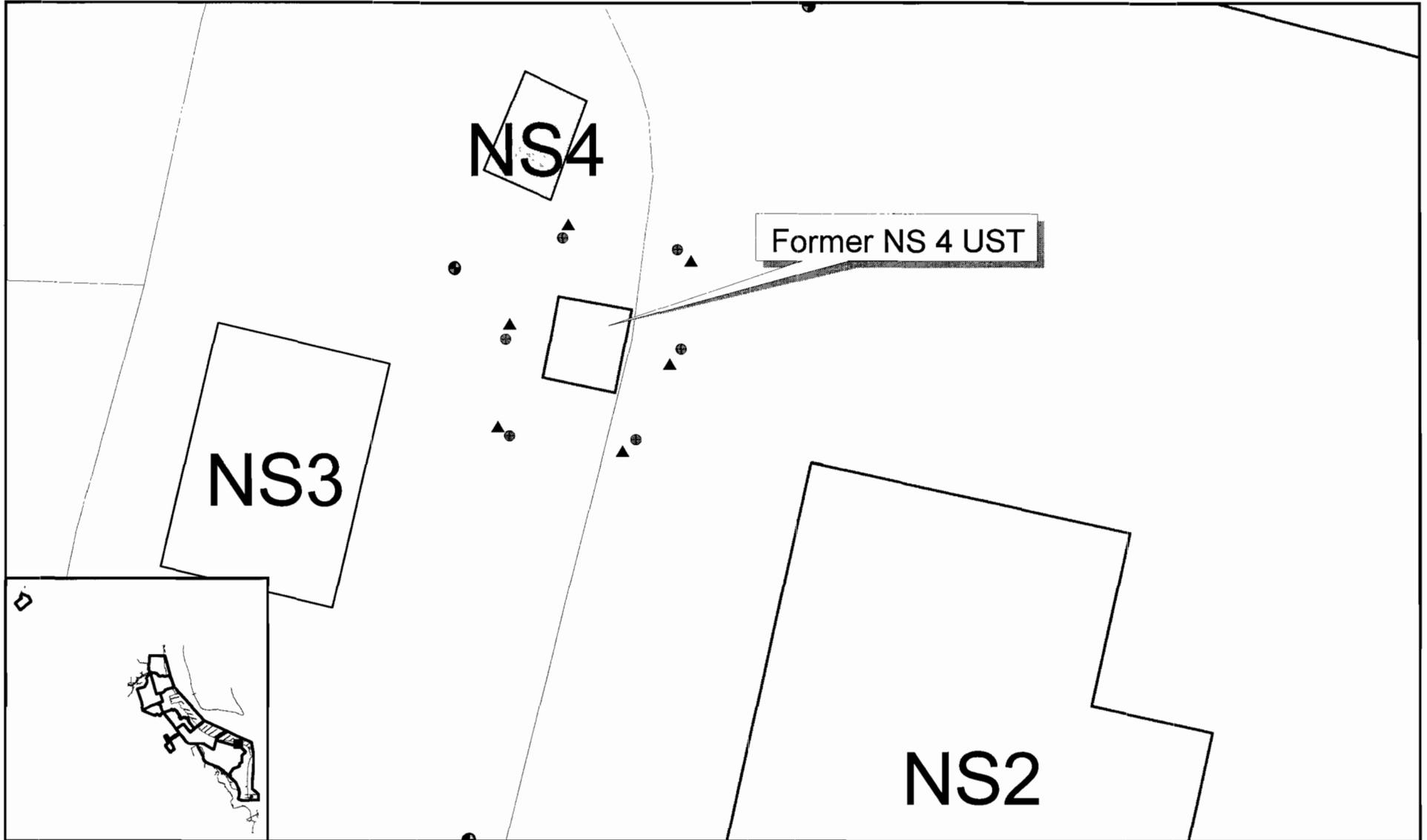


Figure 2
CMS Sample Locations
675 (NS 4)
Charleston Naval Complex

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NOTE: Original figure created in color



Existing Groundwater Well	□ AOC Boundary
Proposed GW DPT	□ SWMU Boundary
▲ Proposed Soil Sample	□ Buildings
--- Roads - Lines	
== Pavement	
- - Sidewalk	

N

0 10 20 Feet

1 inch = 14.9615 feet

Figure 3
Propose Sample Locations
NS 4
Charleston Naval Complex

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APPENDIX I

South Carolina Department of Health and Environmental Control (S.C.D.H.E.C.)
Underground Storage Tank (UST) Assessment Report

Date Received
State Use Only

Submit Completed Form to:
UST Regulatory Section
SCDHEC
2600 Bull Street
Columbia, South Carolina 29201
Telephone (803) 734-5331

I OWNERSHIP OF UST(S)

Agency/Owner: Southern Division, Naval Facilities Engineering Command, Caretaker Site Office			
Mailing Address: P.O. Box 190010			
City: N Charleston	State: SC	Zip Code: 29419-9010	
Area Code: 803	Telephone Number: 743-9985	Contact Person: LCDR Paul Rose	

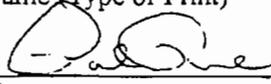
II SITE IDENTIFICATION AND LOCATION

Site ID #:	Unregulated		
Facility Name:	Charleston Naval Base Complex, NS4-TNK-1 (AKA NS4)		
Street Address:	Sarsi Street		
City:	North Charleston, 29405-2413	County:	Charleston

III CLOSURE INFORMATION

Closure Started: 9 July 96	Closure Completed: 13 Sept 96
Number of USTs Closed: 1	
N/A	SPORTENVDETCHASN
Consultant	UST Removal Contractor

IV. CERTIFICATION (Read and Sign after completing entire submittal)

<small>I certify that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate and complete.</small>	
LCDR Paul Rose	
Name (Type or Print)	
	
Signature	

V. UST INFORMATION

- A. Product.....
- B. Capacity.....
- C. Age.....
- D. Construction Material.....
- E. Month/Year of Last Use.....
- F. Depth (ft.) To Base of Tank.....
- G. Spill Prevention Equipment Y/N.....
- H. Overfill Prevention Equipment Y/N.....
- I. Method of Closure Removed/Filled.....
- J. Visible Corrosion or Pitting Y/N.....
- K. Visible Holes Y/N.....

	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5	Tank 6
Fuel oil						
25,000 gal						
1952						
Steel						
1992						
15'						
N						
N						
R						

- L. Method of disposal for any USTs removed from the ground (attach disposal manifests)

UST NS 4 was removed, drained, cut open at both ends, and cleaned with a steam cleaner. It was then cut up for recycling as scrap metal. (See Attachment III.)

- M. Method of disposal for any liquid petroleum, sludges, or waste waters removed from the USTs (attach disposal manifests)

The residual fuel oil and waste water were recycled. The sludge was shipped out as non-regulated sludge waste, too thick to be pumped.

- N. If any corrosion, pitting, or holes were observed, describe the location and extent for each UST

Surface corrosion was found throughout the exterior of the tank.

VI. PIPING INFORMATION

- A. Construction Material.....
- B. Distance from UST to Dispenser.....
- C. Number of Dispensers.....
- D. Type of System P/S.....
- E. Was Piping Removed from the Ground? Y/N....
- F. Visible Corrosion or Pitting Y/N.....
- G. Visible Holes Y/N.....
- H. Age.....

	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5	Tank 6
Steel						
36'						
See Note 1						
1						
See Note 1						
S						
N						
N						
N						
1952						

Note 1: UST NS 4 provided fuel oil to boiler house NS 2.

- I. If any corrosion, pitting, or holes were observed, describe the location and extent for each line.

Minimal surface rust was found on the piping. No corrosion, holes or pitting were found.

The tank piping went from a concrete vault at the top of the tank and ran through a 13.5" pipe under asphalt pavement to another piping vault at building NS2. The piping was cut and capped as indicated on site map 2.

VII. BRIEF SITE DESCRIPTION AND HISTORY

UST NS4 was constructed in 1952 to refuel sea planes. In 1958 usage of the tank was diverted to provide fuel oil to the boilers of NS 2. The tank site is under investigation as Area of Concern (AOC) 675 by the Resource Conservation and Recovery Act (RCRA) Facility Investigation.

VIII. SITE CONDITIONS

Yes No Unk

	Yes	No	Unk
<p>A. Were any petroleum-stained or contaminated soils found in the UST excavation, soil borings, trenches, or monitoring wells? [*various, see site map 4] If yes, indicate depth and location on the site map.</p>	*X		
<p>B. Were any petroleum odors detected in the excavation, soil borings, trenches, or monitoring wells? If yes, indicate location on site map and describe the odor (strong, mild, etc.) [*strong]</p>	*X		
<p>C. Was water present in the UST excavation, soil borings, or trenches? If yes, how far below land surface (indicate location and depth)? X <u>Center of excavation, 13' below GSL</u></p>			
<p>D. Did contaminated soils remain stockpiled on site after closure? If yes, indicate the stockpile location on the site map. Name of DHEC representative authorizing soil removal: _____</p>	**X		
<p>E. Was a petroleum sheen or free product detected on any excavation or boring waters? [*sheen] If yes, indicate location and thickness on the site map.</p>	*X		

** Angular rock was used to fill the area covered by the groundwater. Geofabric was laid over the rock and then all soil from the excavation was returned to the tank pit.

X. SAMPLING METHODOLOGY

Provide a detailed description of the methods used to collect and store (preserve) the samples.

After the removal of UST NS4 soil and ground water samples were taken. Sampling was performed in accordance with SC DHEC R.61-92 Part 280 and SC DHEC UST Assessment Guidelines.

The samples are identified as follows:

	Detachment Charleston		General Engineering Labs
Soil Sample	UST4-1	=	SPORT -0116-1
Soil Sample	UST4-2	=	SPORT -0116-2
Ground Water Sample	UST4-3	=	SPORT -0116-3
Soil Sample	UST4-4	=	SPORT -0116-4
Soil Sample	UST4-5	=	SPORT -0116-5
Soil Sample	UST4-6	=	SPORT -0116-6
Soil Sample	UST4-7	=	SPORT -0116-7
Soil Sample	UST4-8	=	SPORT -0116-8
Soil Sample	UST4-9	=	SPORT -0116-9

Sample jars were prepared by the testing laboratory. The grab method was utilized to fill the sample containers leaving as little head space as possible and immediately capped. Soil samples were extracted at the tank ends just above the ground water level. Ground water samples were taken from beneath the tank at the bottom center of the excavation.

The samples were marked, logged, and immediately placed in sample coolers packed with ice to maintain an approximate temperature of 4° C. Tools were thoroughly cleaned and decontaminated with organic-free soap and water after each sample.

The samples remained in the custody of SPORTENVDETHASN until they were transferred to General Engineering Laboratories for analysis as documented in the attached Chain-of-Custody Record.

XI. RECEPTORS

Yes No

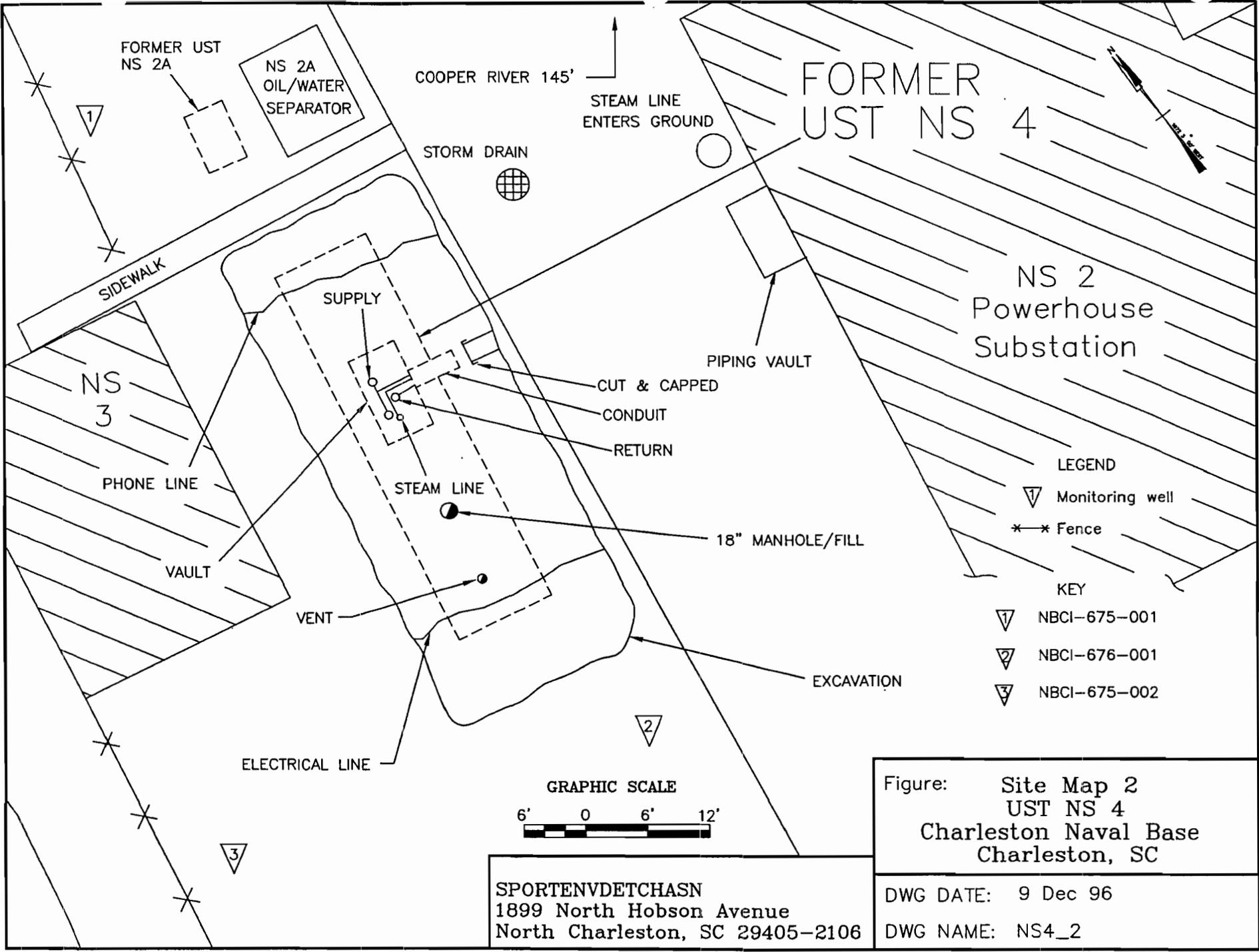
		Yes	No
A.	<p>Are there any lakes, ponds, streams, or wetlands located within 1000 feet of the UST system?</p> <p style="text-align: right;">[*Cooper R. 145'] *X</p> <p>If yes, indicate type of receptor, distance, and direction on site map.</p>		
B.	<p>Are there any public, private, or irrigation water supply wells within 1000 feet of the UST system?</p> <p>If yes, indicate type of well, distance, and direction on site map.</p>		X
C.	<p>Are there any underground structures (e.g., basements) located within 100 feet of the UST system?</p> <p style="text-align: right;">[*Oil/water separator] *X</p> <p>If yes, indicate the type of structure, distance, and direction on site map.</p>	*X	
D.	<p>Are there any underground utilities (e.g., telephone, electricity, gas, water, sewer, storm drain) located within 100 feet of the UST system that could potentially come in contact with the contamination?</p> <p style="text-align: right;">[*Sewer, storm drain] *X</p> <p>If yes, indicate the type of utility, distance, and direction on the site map.</p>	*X	
E.	<p>Has contaminated soil been identified at a depth of less than 3 feet below land surface in an area that is not capped by asphalt or concrete?</p> <p>If yes, indicate the area of contaminated soil on the site map.</p>		X

Attachment I

SITE MAP

You must supply a scaled site map. It should include all buildings, road names, utilities, tank and pump island locations, sample locations, extent of excavation, and any other pertinent information.

Site Maps 1, 2, 3, and 4
Photographs 1, 2, 3, and 4



- LEGEND**
- ▽ Monitoring well
 - *-*- Fence
- KEY**
- ▽ NBCI-675-001
 - ▽ NBCI-676-001
 - ▽ NBCI-675-002

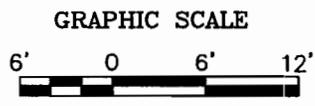
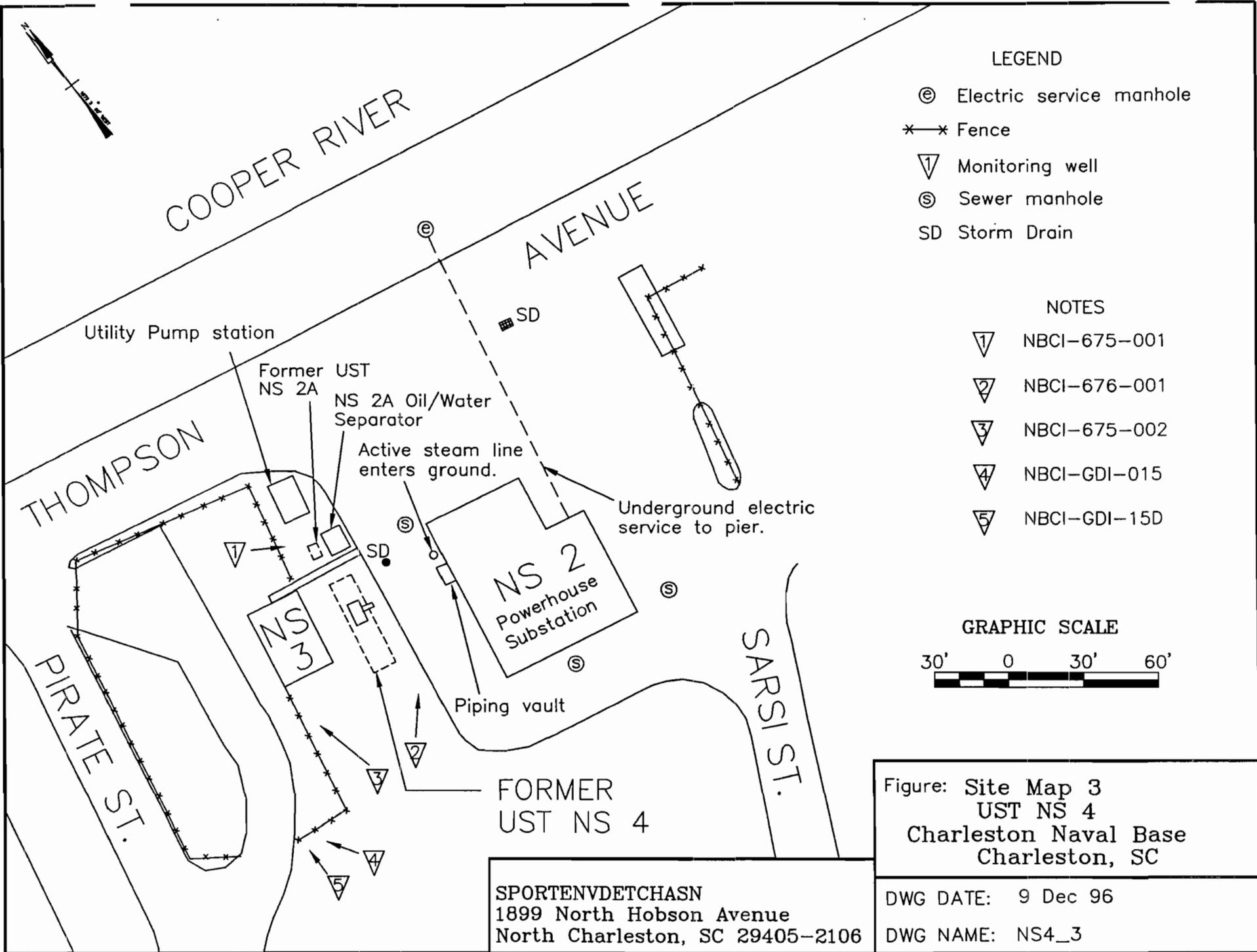


Figure: Site Map 2
 UST NS 4
 Charleston Naval Base
 Charleston, SC

SPORTENVDETHASN
 1899 North Hobson Avenue
 North Charleston, SC 29405-2106

DWG DATE: 9 Dec 96
 DWG NAME: NS4_2



LEGEND

- Ⓧ Electric service manhole
- *—* Fence
- ▽ Monitoring well
- Ⓢ Sewer manhole
- SD Storm Drain

NOTES

- ▽1 NBCI-675-001
- ▽2 NBCI-676-001
- ▽3 NBCI-675-002
- ▽4 NBCI-GDI-015
- ▽5 NBCI-GDI-15D

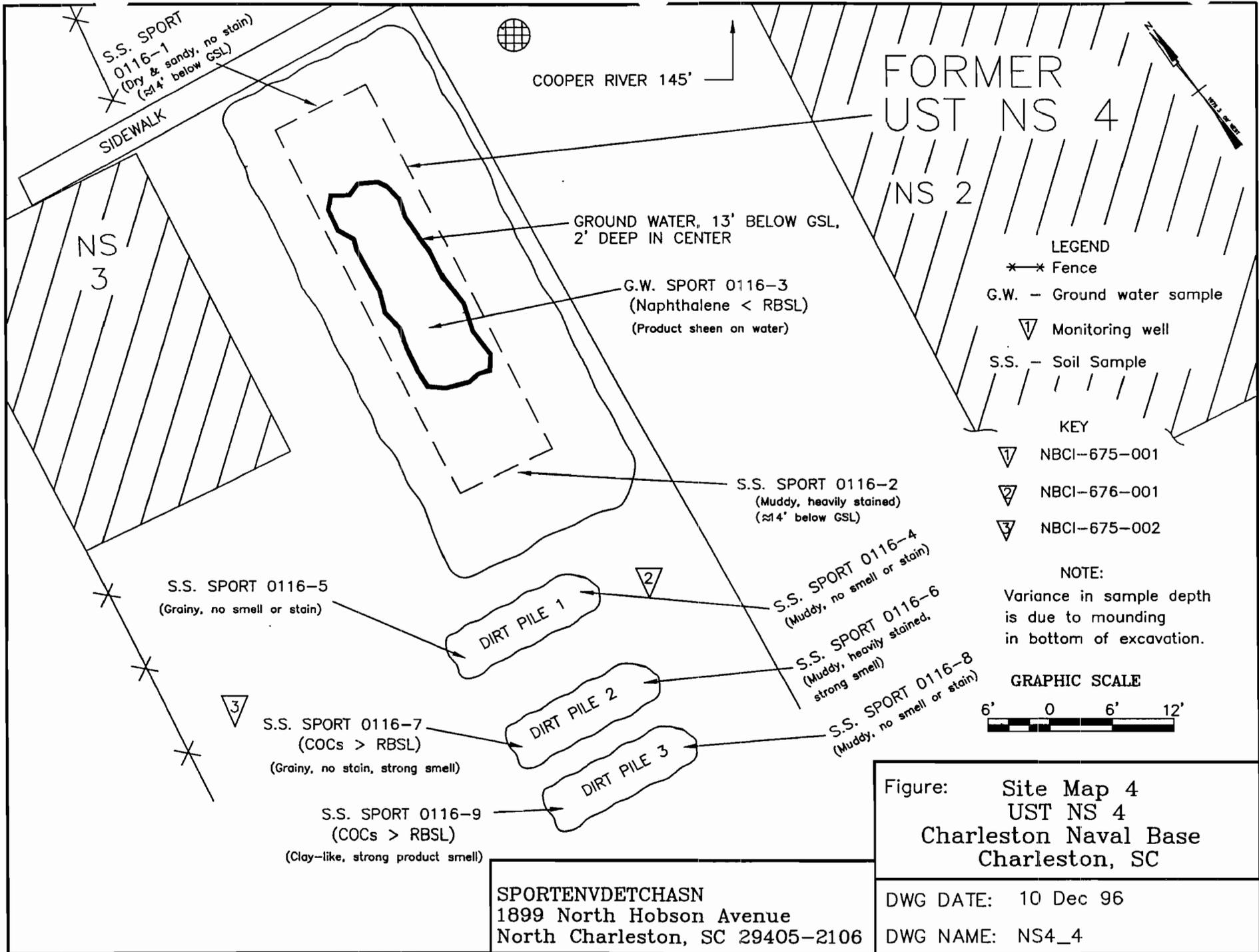
GRAPHIC SCALE



Figure: Site Map 3
 UST NS 4
 Charleston Naval Base
 Charleston, SC

SPORTENVDETHASN
 1899 North Hobson Avenue
 North Charleston, SC 29405-2106

DWG DATE: 9 Dec 96
 DWG NAME: NS4_3



UST NS 4

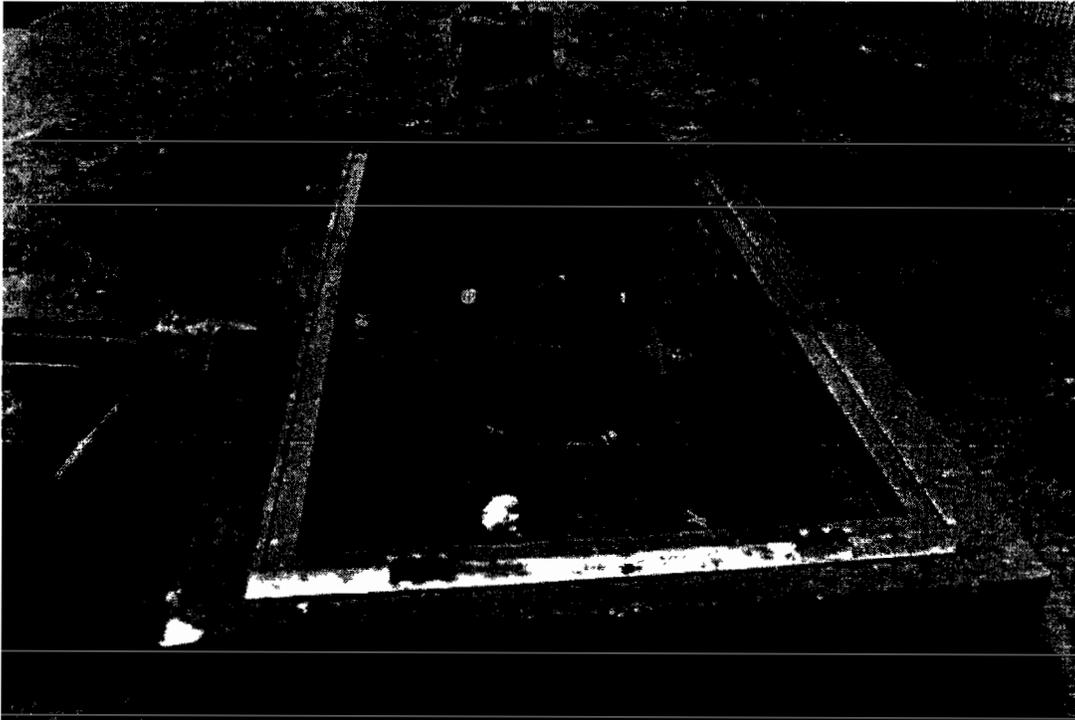


Photo 1: UST NS 4 pipe vault.



Photo 2: UST NS 4 being exposed. Note that the pipe vault has been removed.

UST NS 4



Photo 3: UST NS 4 being raised from the excavation.

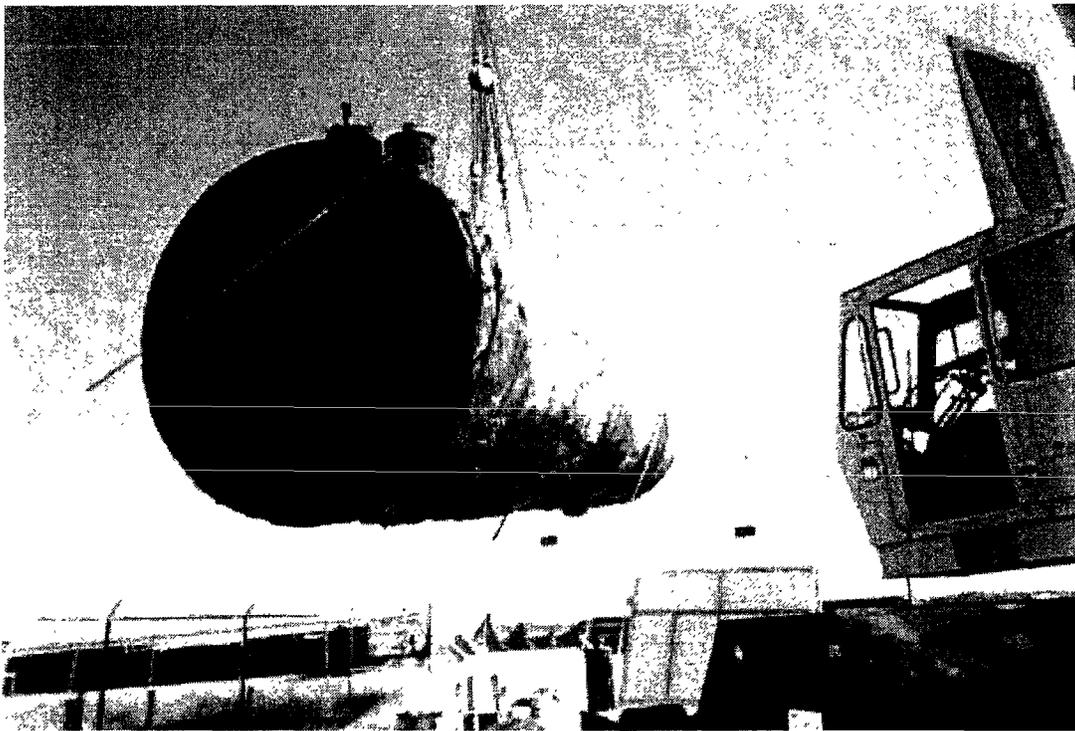


Photo 4: UST NS 4 being lifted clear of the excavation.