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CNC CHARLESTON
5090.3a

SAMPLING AND ANALYSIS PLAN DATED 30 JUNE 1997 FOR UNDERGROUND STORAGE TANK NS-44 AND NS-45 (UST NS-44 AND NS-45) WITH SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL REVIEW LETTER CNC CHARLESTON SC
10/14/1997
ENVIRONMENTAL DETACHMENT CHARLESTON

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

Mr. Gabriel L. Magwood
Southern Division NFEC
P.O. Box 190010
2155 Eagle Drive
North Charleston, South Carolina 29419-9010

Re: Sampling and Analysis Plan dated June 30, 1997
UST NS 44A and NS 45 (Site Identification # 17779 and 17787)
Charleston Naval Complex/Charleston Naval Base
Charleston, SC
Charleston County

Date: October 14, 1997

Dear Mr. Magwood:

The author has completed technical review of the referenced document. As submitted, the SAP (Sampling and Analysis Plan) provides for investigative endeavors to determine the extent and severity of contamination associated with a suspected release from the referenced vessel. The author recognizes that the Final CSAP (Comprehensive Sampling and Analysis Plan) dated August 30, 1994 will be utilized at the referenced site during the course of the investigation. With this consideration, the facility must ensure that the site specific sampling program is sufficient to identify and quantify all potential CoC's (contaminant of concern) reasonably expected to be associated with the product stored at the referenced site.

Based on the foregoing review, the proposed assessment activities appear appropriate and reasonable and are approved for implementation. In the presence of significant dissolved/free phase contamination (soils and/or groundwater) the facility may employ best professional judgement to install additional sampling points to define the limits (horizontal and vertical) of contamination. It is anticipated that all activities and reporting requirements will be conducted in accordance with the CSAP and as proposed in the referenced SAP. As previously identified, additional assessments and/or sampling may be required as information and data is developed from the proposed investigative activities.

Please find enclosed monitoring well approval for the installation of six (6) temporary groundwater monitoring points. Conversion of temporary sampling points to permanent wells should be proposed in the Assessment Report with appropriate technical justification, as

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Columbia, SC 29201-1708

Monitoring Well Installation Approval Form

Date of Issue: October 14, 1997
Approval No: 0041

Approval is hereby granted to: Department of the Navy
(on behalf of): Charleston Naval Base
GWPD Site #: 17779/17787
County: Charleston

This approval is for the construction of six (6) temporary monitoring wells designated (to be designated) in accordance with the construction plans and technical specifications submitted to the Department on August 30, 1994 and requested June 30,1997. The well(s) are to be constructed within the surficial aquifer for the intended purpose of monitoring groundwater quality and/or water level(s) at the referenced facility. Approval is provided with the following conditions:

1. The latitude and longitude, surveyed elevations, boring and/or geologist logs and actual (as built) construction details for each well be submitted to Paul L. Bristol within thirty (30) days of completion (of last well(s) installed). (to be submitted with Assessment Report)

2. Each well shall be labeled with an identification plate constructed of a durable material affixed to the casing or surface pad where it is readily visible. The plate shall provide monitoring well I.D.#, date of construction, static water level, and driller name and state certification #. (as necessary)

3. Well construction and sampling derived waste including, but not necessarily limited to, drill cuttings, drilling fluids, development and purge water should be managed properly and in compliance with applicable requirements. If containerized, each vessel should be clearly labeled with regard to contents, source, and date of activity.

4. A minimum of forty-eight (48) hours prior to initiation of drilling activities, please provide notice to Trident District EQC Office (803-740-1590).

5. Please provide ground-water quality analytical data (chemical analysis and/or water level(s)) associated measurements (i.e., in-situ field measurements) to Paul L. Bristol within thirty (30) days of receipt from laboratory. (to be submitted with Assessment Report)

6. Monitoring wells shall be installed by a well driller certified by the State of South Carolina.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and the Department of Health and Environmental Control Regulations R.61-71.

Approved by: Paul Bristol

Paul L. Bristol, Hydrogeologist, P.G.
Groundwater Quality Section
Bureau of Water

cc: Trident District EQC

L 7.31.97
Lo 10.13.97

Letter 10.14

SAMPLING AND ANALYSIS PLAN

USTs NS44A and NS45 (SCDHEC GWPD SITE ID #s 17779 and 17787)

NAVAL BASE CHARLESTON
CHARLESTON SC

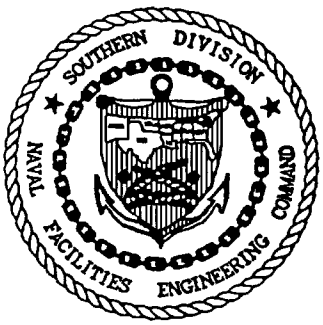
Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON SC

Prepared by:

Supervisor of Shipbuilding, Conversion and Repair, USN, (SUPSHIP) Portsmouth Va.,
Environmental Detachment Charleston, S.C.
1899 North Hobson Ave.
North Charleston, SC 29405-2106

June 13, 1997



FORWARD

Subtitle I of the Hazardous and Solid Waste Amendments (HSWA) of 1984 to the Solid Waste Disposal Act (SWDA) of 1965 established a national regulatory program for managing underground storage tanks (UST) containing hazardous materials, especially petroleum products. Hazardous wastes stored in USTs were already regulated under the Resource Conservation and Recovery Act (RCRA) of 1976, which was also an amendment to SWDA. Subtitle I requires that the U.S. Environmental Protection Agency (USEPA) promulgate UST regulations. The Program was designed to be administered by the individual States, who were allowed to develop more stringent standards, but not less stringent standards. Local governments were permitted to establish regulatory programs and standards that are more stringent, but not less stringent than either State or Federal regulations. The USEPA UST regulations are found in the Code of Federal Regulations, Title 40, Part 280 (40 CFR 280) (*Technical Standards and Corrective Action Requirement for Owners and Operators of Underground Storage Tanks*) and Title 40 CFR 281 (*Approval of State Underground Storage Tank Programs*). Title 40 CFR 281 was revised and published on September 23, 1988, and became effective December 22, 1988.

The Navy's UST program policy is to comply with all Federal, State, and local regulations pertaining to USTs. This plan was prepared to satisfy the requirements of South Carolina R.61-92, Part 280 (*Underground Storage Tank Control Regulations*), Section 280.65 to determine the extent and location of soils contaminated by a release from a UST system.

Contents

Figures

ACRONYMS, ABBREVIATIONS AND SYMBOLS

AOC	Area of Concern
bgs	below the ground surface
BTEX	Benzene, Toluene Ethylbenzene and Xylene
CFR	Code of Federal Regulations
COC	Chemical of Concern
CSAP	Comprehensive Sampling and Analysis Plan
DET	Environmental Detachment Charleston
ft^2/day	square feet per day
gpm	gallons per minute
GWPD	Ground Water Protection Division
HSWA	Hazardous and Solid Waste Amendments
HW/HM	Hazardous Waste/Hazardous Material
IDW	Investigation Derived Wastes
MCL	Maximum Contaminant Limits
MSDS	Material Safety Data Sheet
NAVBASE	former Charleston Naval Base
PAH	Polynuclear Aromatic Hydrocarbon
PPM	Parts Per Million
RBC	Risk Based Concentration
RBSL	Risk Based Screening Level
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAP	Sampling and Assessment Plan
SDWA	Safe Drinking Water Act
SHSO	Site Health and Safety Officer
SOUTHDIV	Southern Division Naval Facilities Engineering Command
SSHSP	Site-Specific Health and Safety Plan
SSL	Soil Screening Level
SWDA	Solid Waste Disposal Act
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
UST	Underground Storage Tanks

1.0 INTRODUCTION

1.1 GENERAL. Two USTs located adjacent to each other beside the former Charleston Naval Base Building NS44 were removed separately by Environmental Detachment Charleston (DET). Samples taken during removal of waste oil UST NS44A revealed low levels of petroleum hydrocarbon contamination in soil and RCRA metal contamination in groundwater, particularly concentrations of Arsenic and Lead exceeding Safe Drinking Water Act (SDWA) maximum contaminant limits (MCLs). Soil samples taken during removal of fuel oil UST NS45 revealed low levels of petroleum hydrocarbon contamination. Groundwater samples taken during UST NS45 removal contained petroleum hydrocarbon contamination, with concentrations of Naphthalene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Chrysene and Pyrene exceeding either SCDHEC Risk Based Screening Levels (RBSLs), RCRA Facility Investigation (RFI) tap water Risk Based Concentrations (RBCs), or both. The Sampling and Analysis Plan (SAP) outlines a field investigation and sampling program that will assess the source(s) of soil contamination at the site of the removed tank and evaluate the horizontal and vertical extent of the petroleum contamination detected. The field investigation will also determine the extent of groundwater contamination at the UST NS44/NS45 site. The following report presents the site location and develops the rationale for the proposed field investigation.

1.2 USE OF RFI DATA. The former Charleston Naval Base is the site of an ongoing RCRA Facility Investigation (RFI); the former UST NS44/NS45 location is in Zone H of the RFI and UST NS45 is designated Area of Concern (AOC) 666 as part of the RFI. Data taken as part of the RFI, including geological information, hydrogeological information, well drilling logs and AOC 666 soil and groundwater sampling data was used in the preparation of this SAP.

2.0 BACKGROUND

2.1 SITE DESCRIPTION. The former Charleston Naval Base (NAVBASE) is in the city of North Charleston, on the west bank of the Cooper River in Charleston County, South Carolina. The developed portion of the NAVBASE occupies the west bank of the Cooper River starting at a boundary 2300 feet upstream of Noisette Creek and ending at Shipyard Creek. The northern section of the NAVBASE (RFI Zones A, B, C and D) contains a mixture of warehouses, offices and former Navy housing areas. The central section of the NAVBASE (RFI Zones E and F) was occupied primarily by the controlled industrial area (CIA) of the former Naval shipyard and its associated offices and warehouses. The southern section of the NAVBASE (RFI Zones G, H and I) along the Cooper River is occupied by piers, barracks, training buildings, offices, storehouses and fuel tanks which formerly supported naval vessels homeported at Charleston. The north bank of Shipyard Creek in the southern part of the base is largely undeveloped and consists of recreational areas and a large dredge spoil area.

The removed USTs served Building NS44, a boiler house located in the southern section of the NAVBASE at the intersection of East Osprey Street and Partridge Street. The former UST locations are approximately 18 feet from the side of Building NS44 facing East Osprey Street.

2.2 SITE HISTORY. The UST NS44A, Ground Water Protection Division (GWPD) Site Identification Number 17779, was a 550 gallon unregulated waste oil tank installed in March 1977 and used until March 1996. The tank was constructed of steel and received waste oil through an underground pipe from an oil/water separator at boiler Building NS44. Between 24 July 1996 and 29 July 1996, the UST and the drain line connecting it to the oil/water separator were removed.

The UST NS45, GWPD Site Identification Number 17787, was a 25,000 gallon unregulated fuel oil tank installed in 1958 and used until an unknown date. The tank was constructed of steel and supplied fuel oil to boiler Building NS44 through an underground pipe inside a protective sleeve shared with a steam heating line run to the UST. Between 6 August 1996 and 15 August 1996, the UST and its associated fill, supply and heating pipes were removed.

There were no recorded releases at the UST NS44A/UST NS45 site while either tank was in service. However, evidence of leakage was observed during the tank removals. A loose mechanical joint was found in the drain line from the oil/water separator to UST NS44A. The loose joint was surrounded by an area of petroleum stained soil, and a groundwater sample collected at the joint location contained petroleum contamination. During UST NS45 removal, petroleum stained soil was noted at the base of the tank excavation and surrounding the base of cofferdam around the piping atop the tank. An oil sheen without depth was observed on groundwater at the bottom of the UST NS45 excavation; when sampled, the groundwater contained petroleum contamination. See Figure 2-4 for location of samples taken during UST removals. In addition, soil and groundwater contamination was found in samples taken during the AOC 666 RFI (see section 2.2.1 below).

2.2.1 Results of AOC 666 RFI During the RFI of AOC 666 (UST NS45), seven surface (0' - 1' depth) and six subsurface (3' to 5' depth) soil samples were taken. Two monitoring wells were installed and four quarterly ground water samples were taken from each well between October 1994 and April 1996. The sample results are shown in Figures 2-5, 2-6 and 2-7. The Figures give Total Petroleum Hydrocarbon (TPH) levels and the name(s) of any Benzene, Toluene, Ethylbenzene and Xylene (BTEX) or Polynuclear Aromatic Hydrocarbon (PAH) Chemicals of Concern (COCs) detected. RCRA metals are only shown in Figures 2-5 or 2-6 when concentrations exceeded a groundwater protection soil Screening level (SSL); no RCRA metal was detected in excess of tapwater RBCs or MCLs during RFI groundwater sampling at AOC 666..

The COCs identified in soil during the RFI investigation can be divided into two categories, heavy PAHs found primarily in surface soil on the East Osprey Street side of UST NS45 and Toluene and lighter PAHs found primarily in subsurface soil on the NS44 side of UST NS45. Groundwater contaminants consisted of Benzene and Acenaphthene in well NBCH66601 downstream of UST NS44A during fourth quarter groundwater monitoring and Acenaphthene in well NBCH666002 during all four quarters of groundwater monitoring. It is worth noting that based on RFI information, well NBCH666002 is not downstream of either UST NS44A or NS45.

2.3 GEOLOGY. Charleston South Carolina is located in the southern Atlantic Coastal Plain. The surficial geology of the region consists of the Quaternary-age sands, silts and clays of the Wando Formation. Below the Wando Formation are the Oligocene-age Ashley Formation and the Eocene-age Parkers Ferry and Harleyville Formations, Known collectively as the Cooper Group. Below the Cooper Group is the Eocene-age Santee Limestone.

At the NAVBASE, the upper surface of the Ashley Formation is an erosional surface ranging from 35 feet to 77 feet below the ground surface (bgs). Overlaying the Ashley Formation is the Wando Formation which at the NAVBASE typically consists of upper and lower sand layers divided by a layer of "marsh clay". The surface contours of the NAVBASE area were extensively changed by fill operations during the base's life, particularly in the lower portion of the NAVBASE, which was originally tidal marsh.

2.4 HYDROGEOLOGY.

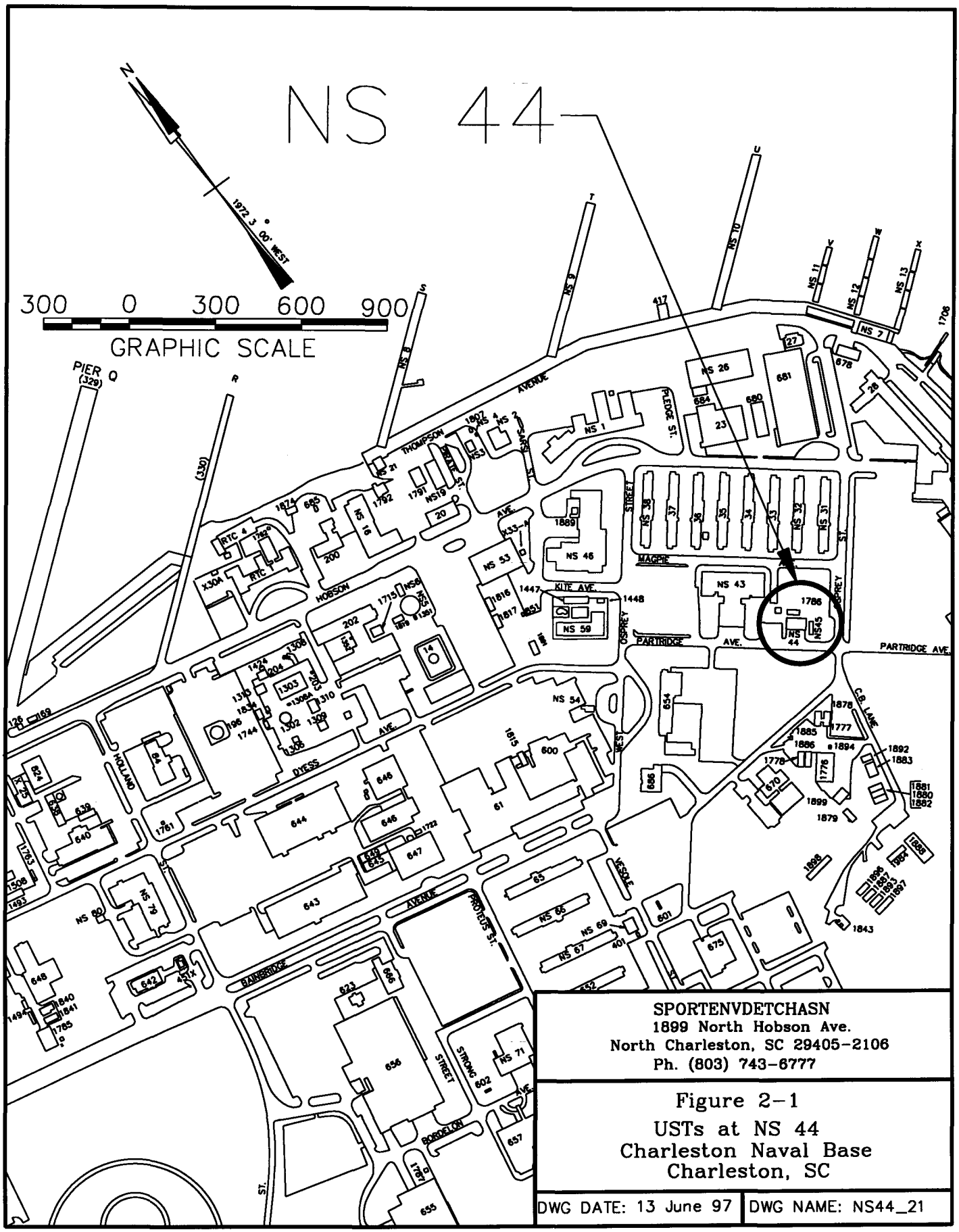
2.4.1 Regional. (Excerpted from Ensafe/Allen & Hoshall, Draft Zone I RCRA Facility Investigation Report NAVBASE Charleston dated January 1996.) Groundwater occurs under water table or poorly confined conditions within the Pleistocene deposits overlying the Ashley Formation. Transmissivities in the Pleistocene aquifer are generally less than 1,000 square feet per day (ft^2/day) and well yield are variable, ranging from 0 to 200 gallons per minute (gpm). This groundwater contains high concentrations of iron and is commonly acidic at shallow depth (Park, 1985).

The Cooper Group is hydrogeologically significant mainly because of its low permeability. In most locales, its sandy, finely granular limestones produce little or no water and act as confining material that produces artesian condition in the underlying Santee Limestone.

2.4.2 Site Specific. Typically, above the Ashley Formation at the entire NAVBASE are two sand layers divided by a clay layer described as "marsh clay" in the RFI Reports. The vertical hydraulic conductivity of the Ashley Formation beneath the NAVBASE is 0.0027 ft/day, based on measurements taken during the Zone H RFI. The vertical hydraulic conductivity of the marsh clay layer is 0.001 ft/day, based on measurements taken during the Zone I RFI. The Ashley Formation acts as a lower confining layer, while the marsh clay functions as an aquitard separating the upper and lower sand layers. At the NAVBASE, rainwater absorbed into the ground will flow downward to the marsh clay and then flow toward a discharge point into a body of surface water.

Parts of the southern portion of NAVBASE are drained by Shipyard Creek while some northern areas are drained by Noisette Creek The drainage basins of both waterways include areas other than NAVBASE. These waterways are tributaries of the Cooper River. Surface Drainage Over the remainder of NAVBASE flows directly into the Cooper River, which discharges into Charleston Harbor.

The former NS44A/NS45 UST site is located in the southern portion of the NAVBASE 1068 feet from the Cooper River in Zone H. Based on potentiometric maps included in the final Zone H RFI Report dated July 5, 1996, groundwater beneath the UST location flows east-southeast toward the Cooper River. From the drilling log for monitoring well NBCH666002 at the site, the depth to groundwater is 4 to 5 feet bgs. However, during UST NS44A and NS45 removals, groundwater was first encountered at greater depths of 9 to 10 feet bgs.


NS 44
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1972 3 00' WEST
300 0 300 600 900
GRAPHIC SCALE
PIER Q (329)
THOMPSON
AVENUE
HOBSON
KITE AVE.
MAGPIE
OSPREY
PARTRIDGE AVE.
DYESS
HOLLAND
BAINBRIDGE
PROTEUS ST.
STRONG STREET
BORDELON
C.B. LANE
NS 44
NS 43
NS 46
NS 59
NS 54
NS 53
NS 45
NS 1
NS 2
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NS 67
NS 69
NS 71
NS 79
NS 80
RTC 4
RTC 7
X30A
SPORTENVDETCHASN
1899 North Hobson Ave.
North Charleston, SC 29405-2106
Ph. (803) 743-6777
Figure 2-1
USTs at NS 44
Charleston Naval Base
Charleston, SC
DWG DATE: 13 June 97
DWG NAME: NS44_21

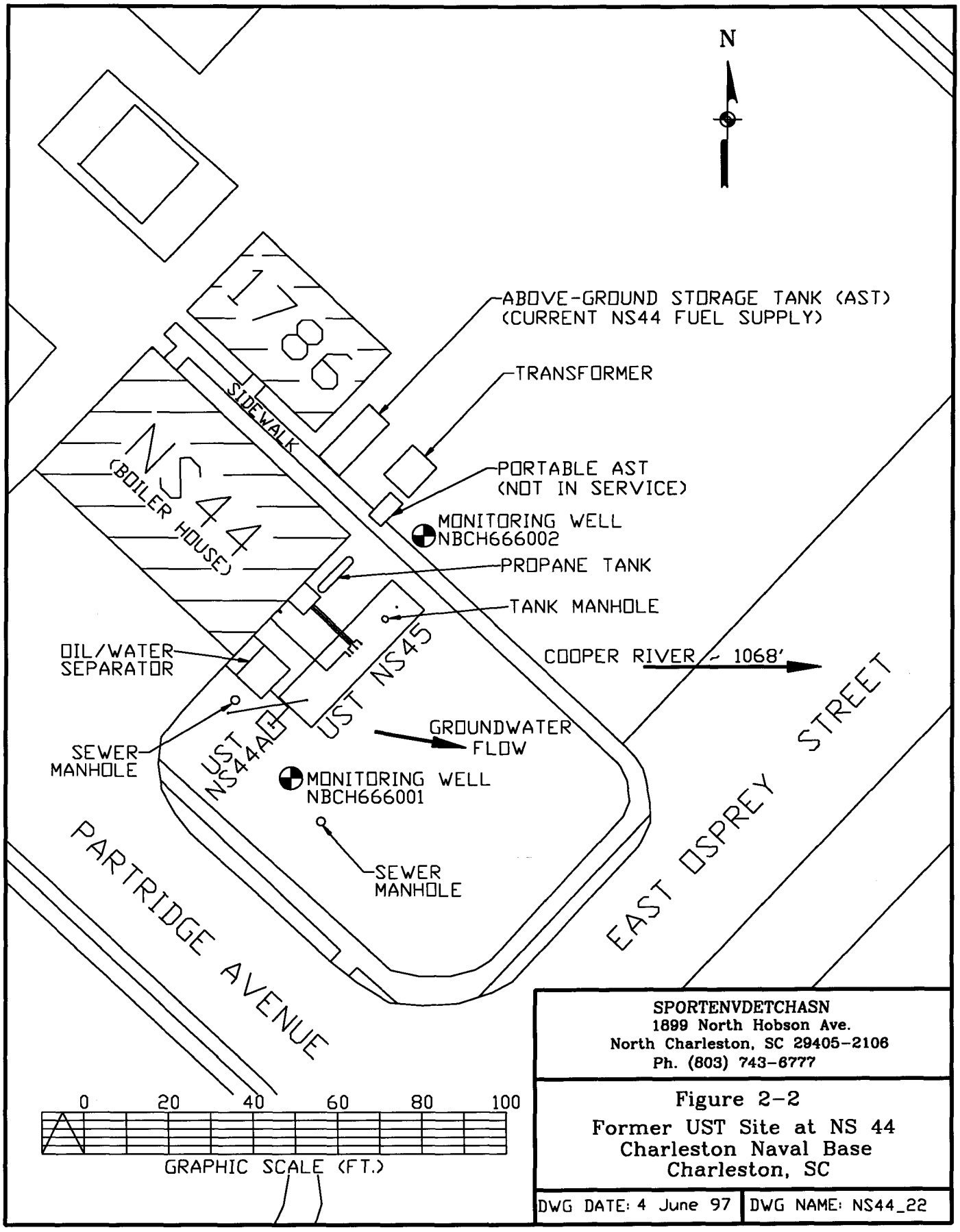

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Figure 2-2
Former UST Site at NS 44
Charleston Naval Base
Charleston, SC

DWG DATE: 4 June 97 | DWG NAME: NS44_22

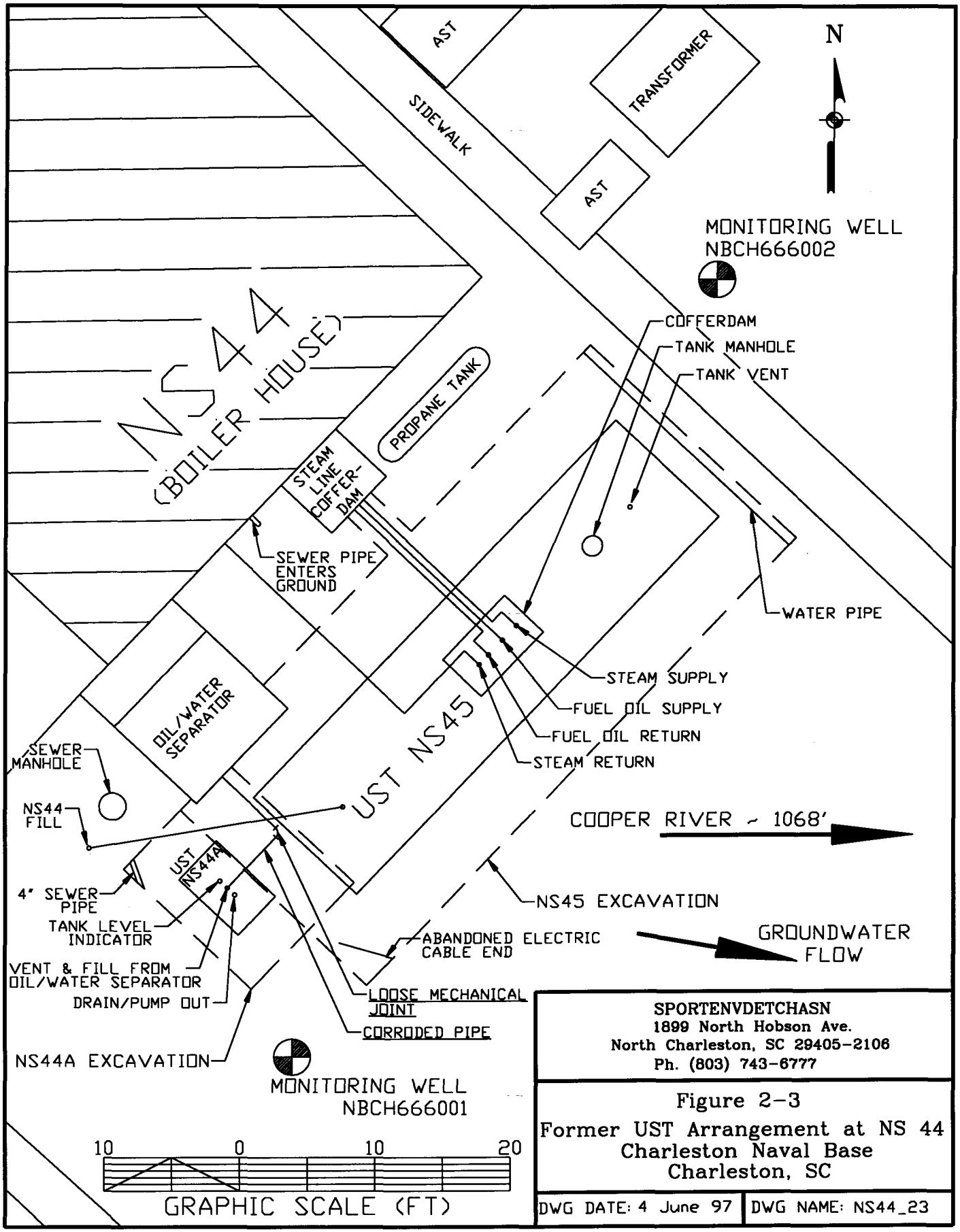

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Figure 2-3
Former UST Arrangement at NS 44
Charleston Naval Base
Charleston, SC

DWG DATE: 4 June 97 | DWG NAME: NS44_23

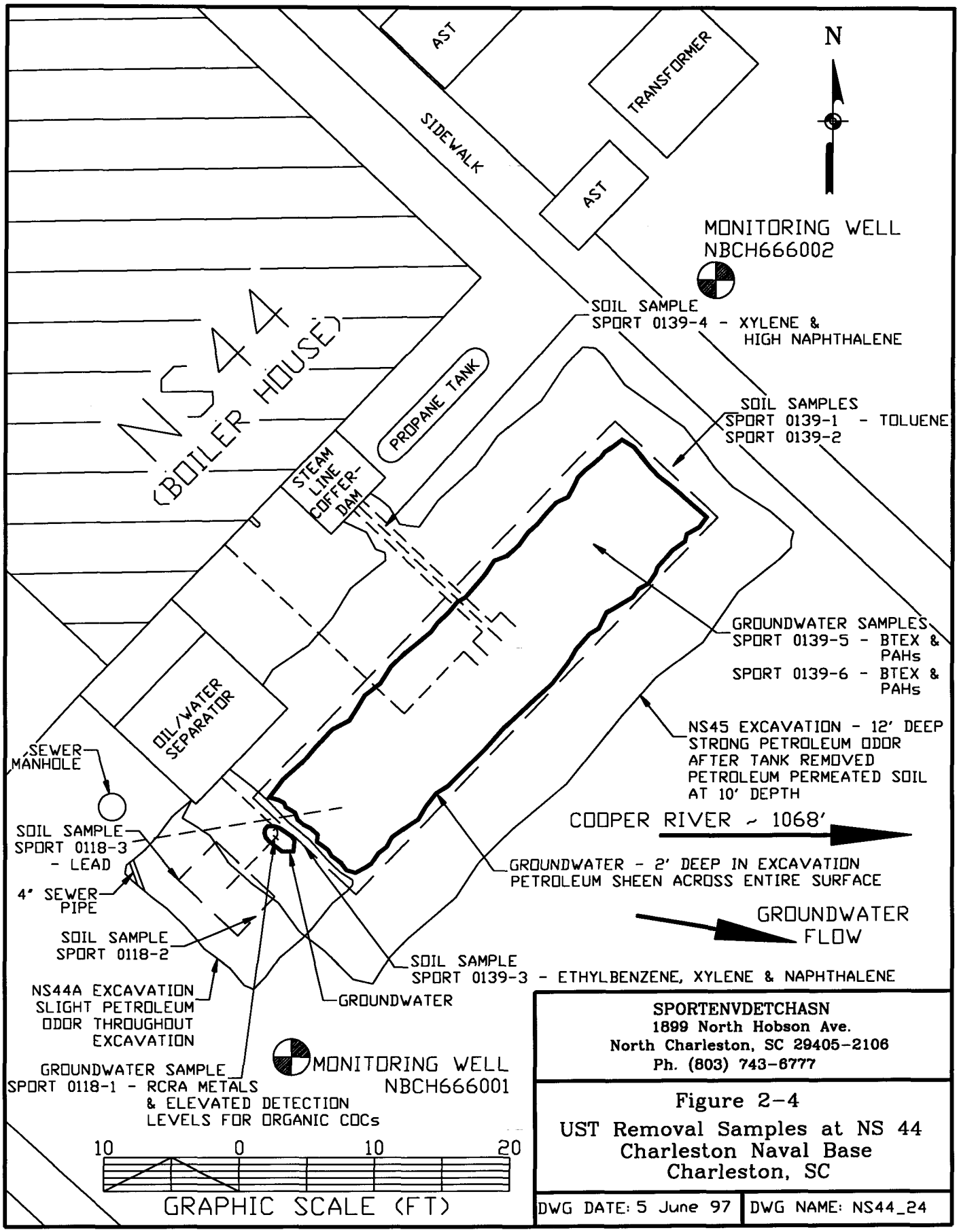

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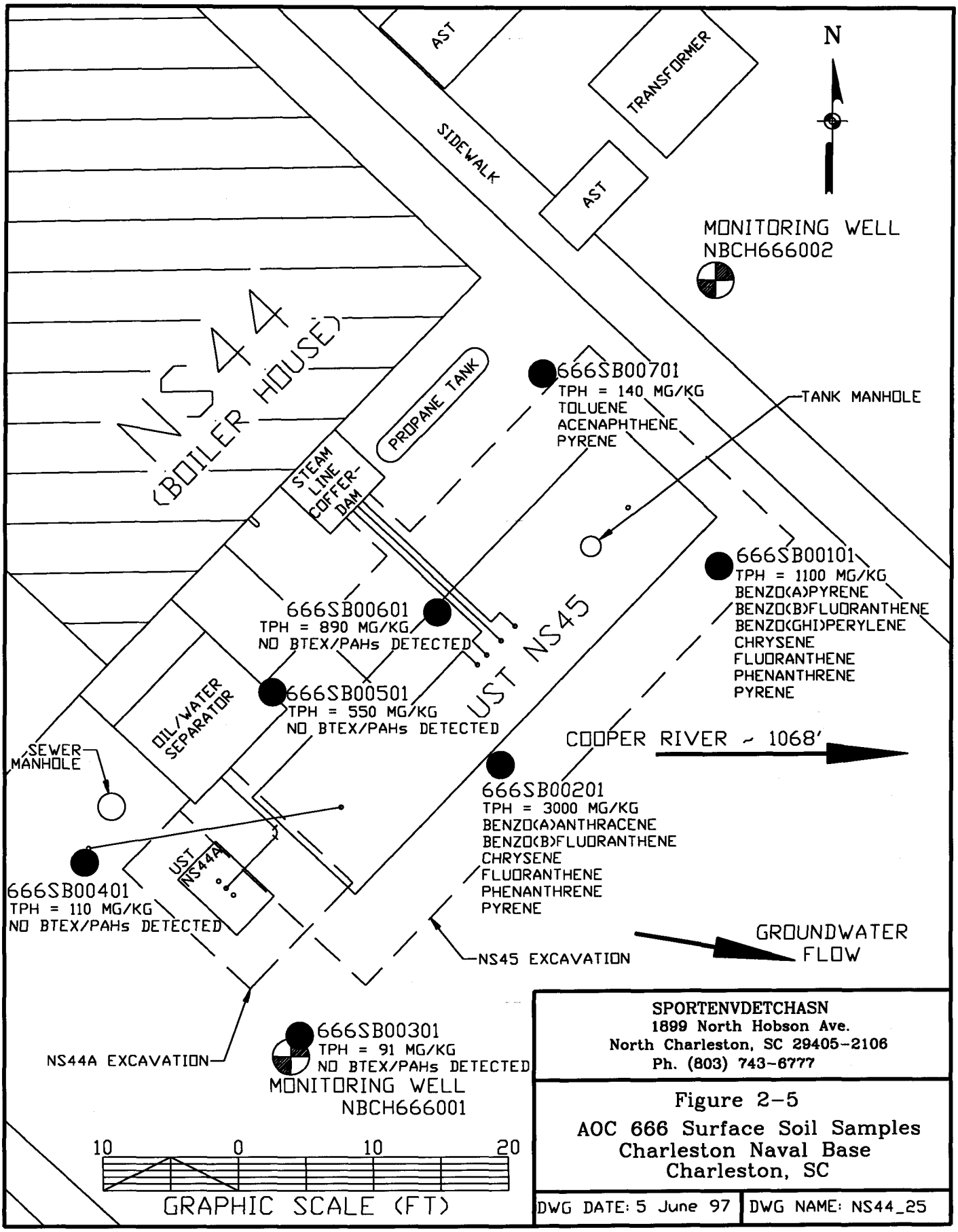
Figure 2-4
UST Removal Samples at NS 44
Charleston Naval Base
Charleston, SC

DWG DATE: 5 June 97 | DWG NAME: NS44_24



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Ph. (803) 743-6777

Figure 2-5
AOC 666 Surface Soil Samples
Charleston Naval Base
Charleston, SC

DWG DATE: 5 June 97 | DWG NAME: NS44_25

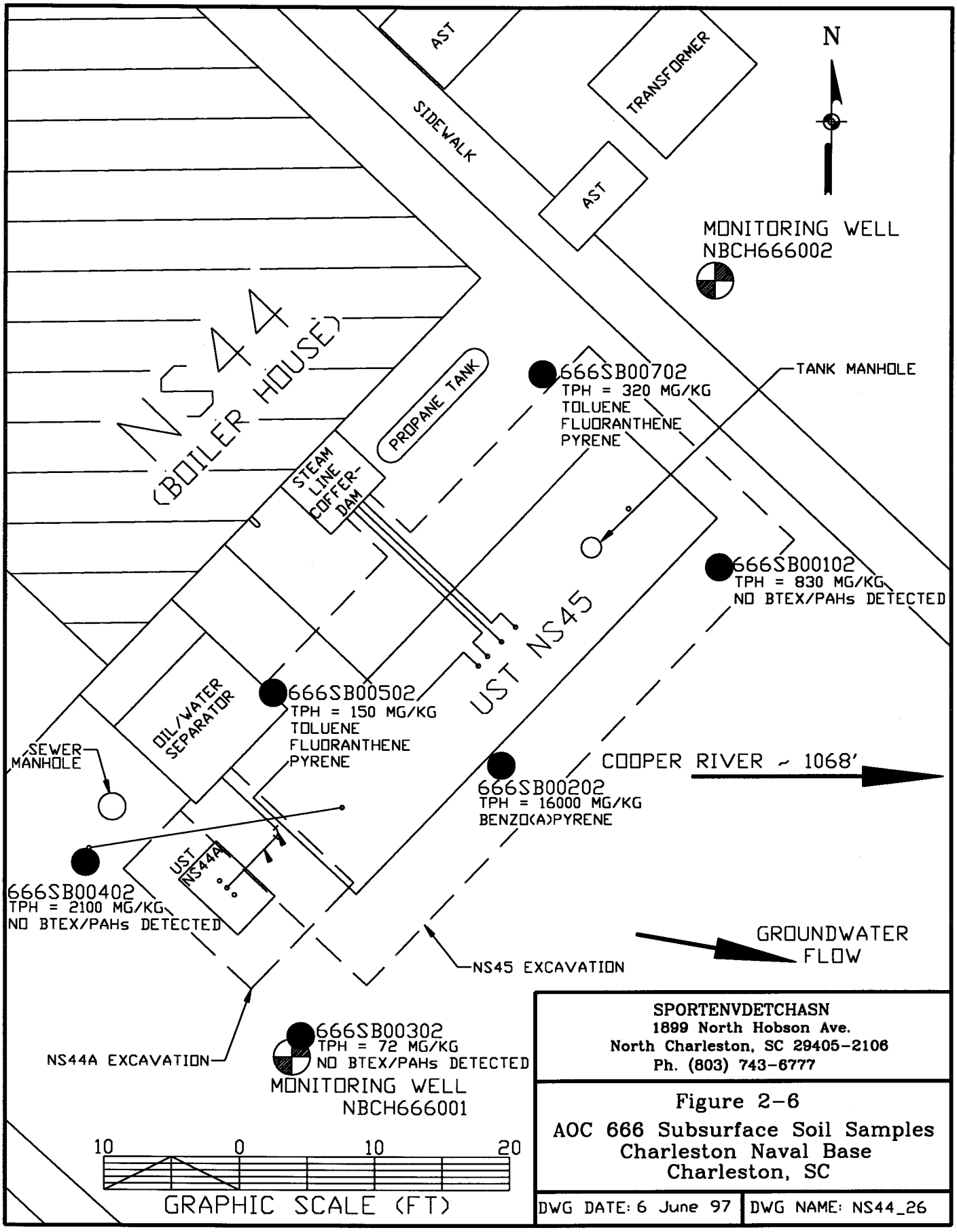

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Figure 2-6
AOC 666 Subsurface Soil Samples
Charleston Naval Base
Charleston, SC

DWG DATE: 6 June 97 | DWG NAME: NS44_26

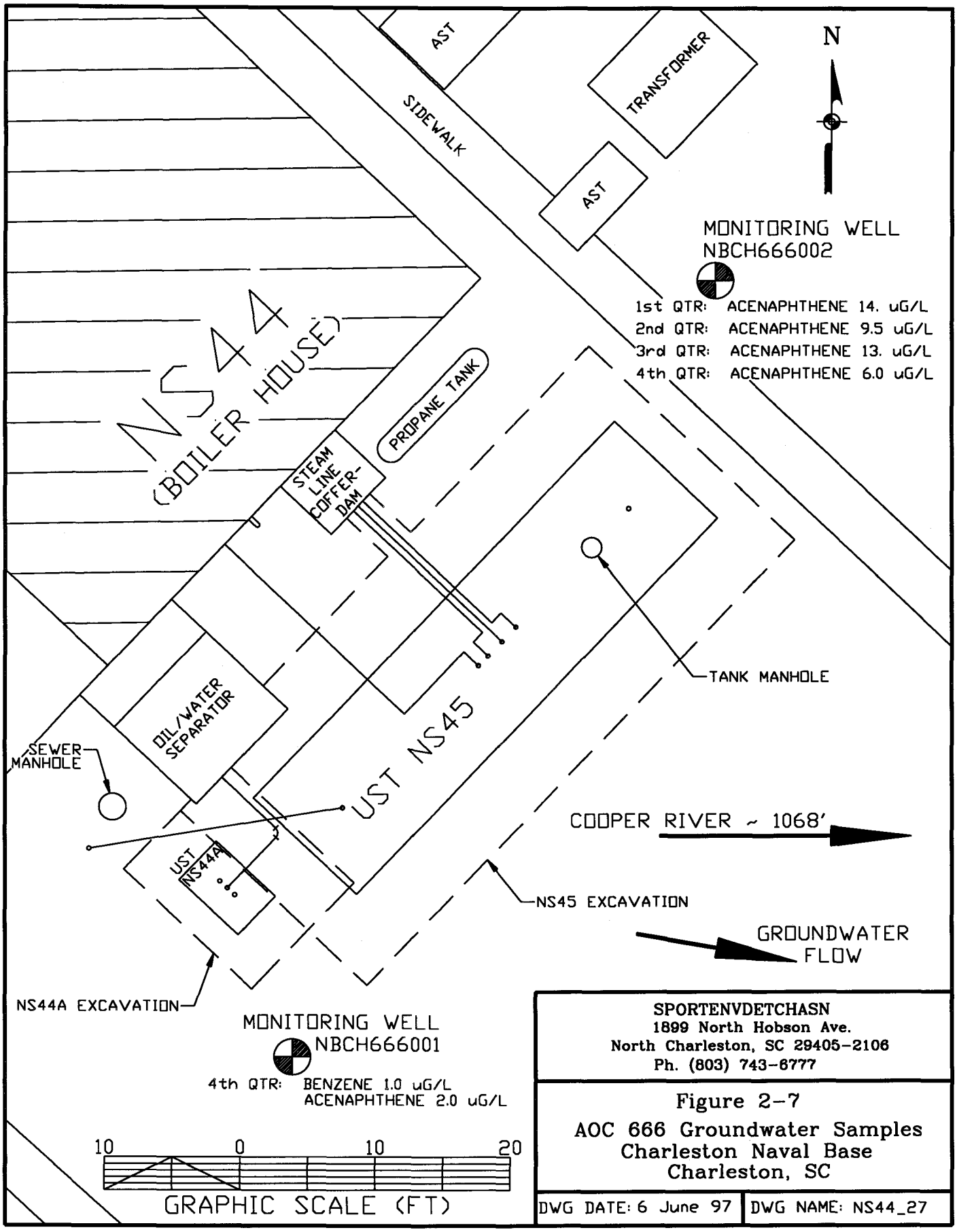

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Figure 2-7
AOC 666 Groundwater Samples
Charleston Naval Base
Charleston, SC

DWG DATE: 6 June 97 | DWG NAME: NS44_27

3.0 INVENTORY OF PROXIMATE POTABLE WATER WELLS

There are no potable water wells on the NAVBASE. Groundwater in the surficial aquifer at the NAVBASE discharges into the Cooper River and its tributaries and so flows away from any potable water wells in residential areas nearby.

4.0 BACKGROUND

4.1 FIELD INVESTIGATION. Prior to the beginning of the field investigation, pre-work briefing will be held. All DET personnel associated with the investigation will review the scope of work in the SAP and the Site Specific Health and Safety Plan (SSHP). Scheduling, logistics and special precautions will be discussed.

The field investigation has four objectives. The first objective is to evaluate the horizontal and vertical extent of the petroleum soil contamination at the overall site. The second objective is to determine the horizontal and vertical extent of the RCRA soil metal contamination detected at the site near the former location of waste oil tank NS44A. The third objective is to determine the areal extent of the petroleum and metal contaminant plumes and install monitoring wells to detect plume movement off the site. The final objective is to collect site-specific background information required to prepare the contamination assessment report.

30 soil borings will be made, of which 6 will be completed as temporary monitoring wells (see Figure 4-1). Borings will be made around a perimeter outside the suspected extent of contamination, in a grid around the existing AOC 666 monitoring wells and in/near hot spots located during the AOC 666 RFI. The borings completed as monitoring wells will be advanced using a portable drill rig and soil samples will be collected using a split-spoon sampling device. Remaining soil borings will be advanced with a hand auger. In all soil borings, samples will be collected in 2-foot intervals until the water table is reached. Water samples will be taken from all temporary monitoring wells. All sampling will be performed in accordance with the RFI Comprehensive Sampling and Analysis Plan (CSAP). All monitoring wells will be installed in accordance with South Carolina R. 61-71, Well Standards and Regulations. The proposed soil boring locations are shown in Figure 4-1. Actual locations of soil borings will be determined by the field team as more information is obtained about the contaminant plume during soil sampling.

Where the initial soil borings are not sufficient to define the extent of the plume, SCDHEC will be notified that the sampling grid needs to be extended in those directions where the plume is undefined. Any additional soil borings will be advanced using the same methods as the initial borings.

Once the extent of soil and groundwater contamination has been determined, a background soil boring will be made in nearby uncontaminated soil. Temporary monitoring wells will be converted as needed to provide permanent upgradient and downgradient monitoring wells.

Detailed information including lithologic descriptions, split-spoon samples, groundwater elevations and other pertinent data for each monitoring well will be presented in the Assessment Report. Soil will be classified in accordance with the unified Soil Classification System.

All wastes shall be disposed of in accordance with the Investigation Derived Waste (IDW) procedures included in Section 16 of the RFI CSAP.

4.2 PREPARATION OF REPORTS. After completion of the field investigation, an assessment report will be prepared and submitted to Southern Division Naval Facilities Engineering Command (SOUTHDIV) for review and approval. The report will discuss site background information, site conditions, findings and recommendations for the former UST NS44A/NS45 site. Recommendations will also be made as to the need for any follow-up investigations. Site location maps, locations of soil borings and soil contamination delineation maps will be included with the report.

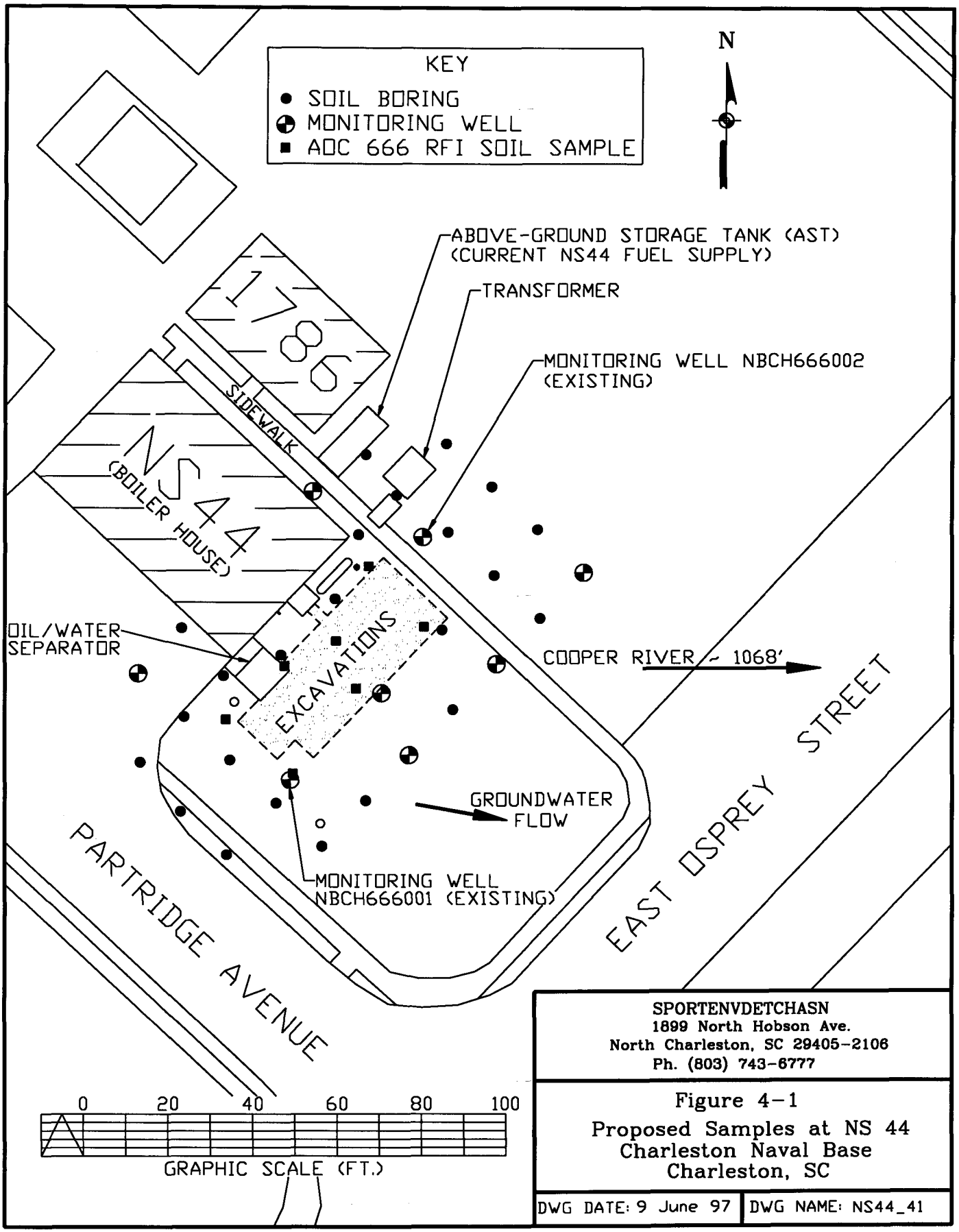

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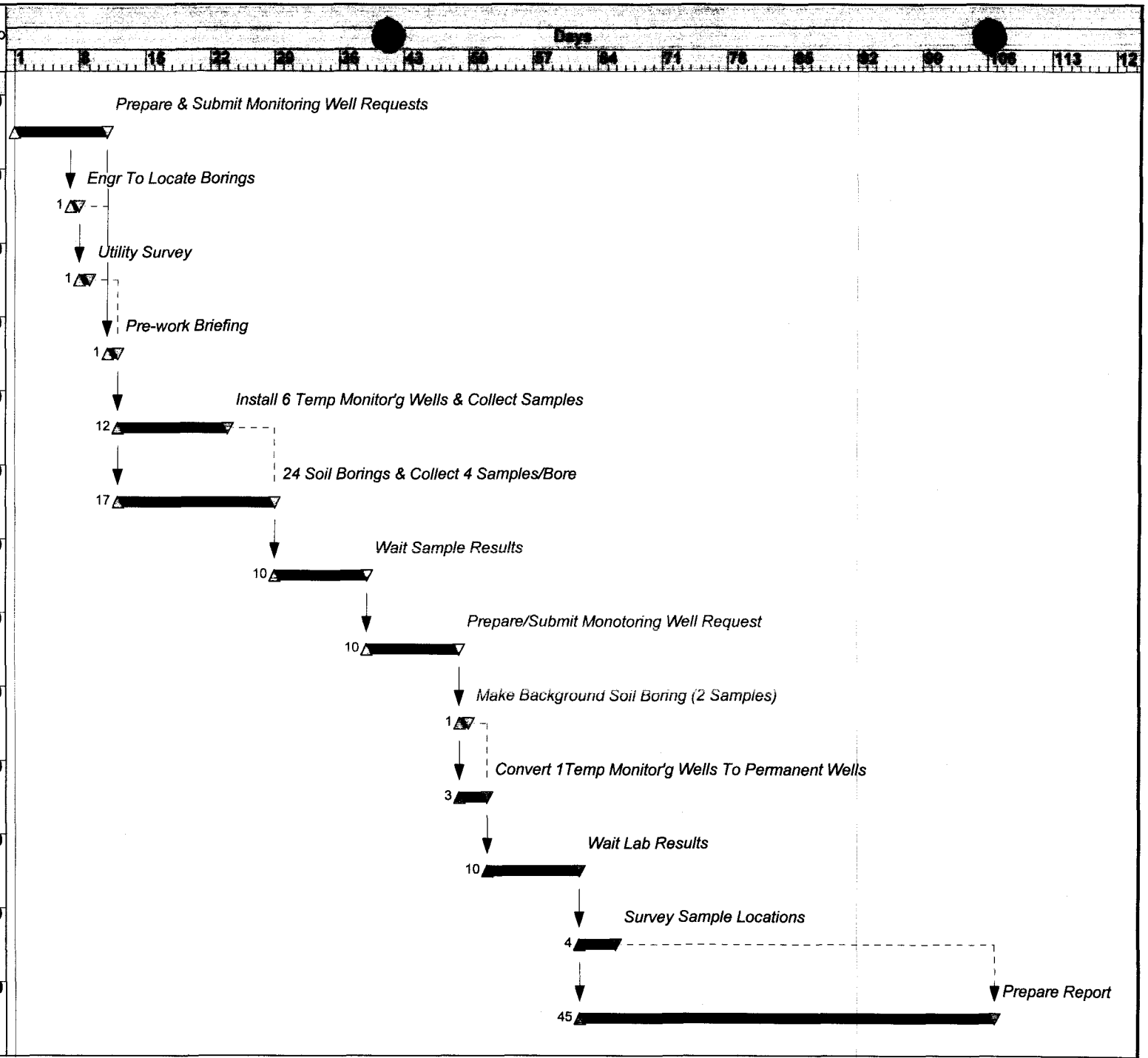
Figure 4-1
Proposed Samples at NS 44
Charleston Naval Base
Charleston, SC

DWG DATE: 9 June 97 | DWG NAME: NS44_41

5.0 SCHEDULE

A projected schedule to complete the SAP field investigation at the NS44A/NS45 site is approximately ten weeks (see Figure 5-1). This includes mobilization, drilling, sampling, surveying and demobilization.. An Assessment Report for the site is scheduled for delivery to 45 days after completion of field investigation.

Activity Description	Dur In Work'g Days	% Comp
Sample & Analysis Plan For NS44A/NS45		
Prepare & Submit Monitoring Well Requests	**10**	**0**
Engr To Locate Borings	**1**	**0**
Utility Survey	**1**	**0**
Pre-work Briefing	**1**	**0**
Install 6 Temp Monitor'g Wells & Collect Samples	**12**	**0**
24 Soil Borings & Collect 4 Samples/Bore	**17**	**0**
Wait Sample Results	**10**	**0**
Prepare/Submit Monotoring Well Request	**10**	**0**
Make Background Soil Boring (2 Samples)	**1**	**0**
Convert 1Temp Monitor'g Wells To Permanent Wells	**3**	**0**
Wait Lab Results	**10**	**0**
Survey Sample Locations	**4**	**0**
Prepare Report	**45**	**0**



Project Start	01-APR-96
Project Finish	23-AUG-96
Data Date	01-APR-96
Plot Date	27-JUN-97

Early Bar
Progress Bar
Critical Activity

Sample & Analysis Plan
UST NS 44A/NS45
Figure 5-1

REFERENCES

Ensafe/Allen & Hoshall, Final Comprehensive Sampling and Analysis Plan (CSAP) RCRA Facility Investigation dated August 30, 1994

Ensafe/Allen & Hoshall, Final RCRA Facility Investigation Report for Zone H Naval Base Charleston dated July 5, 1996

SCDHEC Underground Storage Tank Assessment Guidelines for Permanent Closure, Change-in Owner and Change-in-Service dated June 1995

SCDHEC Risk-Based Corrective Action for Petroleum Releases

South Carolina R. 61-71 South Carolina Well Regulations and Standards

SUPSHIP Portsmouth Va., Environmental Detachment Charleston, Base Realignment and Closure Tank Management Plan

United States Environmental Protection Agency (USEPA) Environmental Services Division *Standard Operating Procedures and Quality Assurance Manual* (SOPQAM)

SITE SPECIFIC HEALTH AND SAFETY PLAN

1.0 Purpose

This plan provides supplemental site specific information and is to be used with the Detachment Comprehensive Health and Safety Plan.

2.0 Work Location

Former petroleum oil underground storage tank locations.

3.0 Work Scope Brief (refer to the work document for full details)

The work scope is to perform a sampling program that will evaluate the horizontal and vertical extent of petroleum contamination in soil and determine the extent of ground water contamination.

4.0 Hazards

The primary health hazard is from petroleum oils which are a primary irritant. Dermatitis, a defatting of the skin, can result from continued skin contact. Some individuals develop hypersensitivity. Quickest entry into the body is by ingestion, therefore do not siphon fuel.

Safety hazards include the personal injury hazards of heavy equipment operation, and the dangers of underground and above ground utility installations.

5.0 Personal Protective Equipment

Gloves and coveralls (either tyvek or cloth). If oil soaked soil is encountered, shoe covers or boots should be worn. At the employee's option an organic vapor respirator may worn, although it is not required.

6.0 Special Personnel Training Qualifications

Hazwoper training.

7.0 Occupational Safety and Health Precautions

Prior to the start of work the area must be checked for the presence of above or below ground utilities, and they must be marked and secured by lockout tagout if they will be endangered. Follow the detachment policy and procedures for location and evaluation of these utilities.

Wash hands before eating or smoking.

If work requires entry into a confined space, contact the project engineer for additional instructions, as a confined space entry permit and gas testing may be required.

Work that involves sewage exposure (e.g. standing sewage liquid or broken sewer pipes), will require the use of workers who are in the NavHospChas C5 medical surveillance program. These workers shall avoid skin exposure by using appropriate protective equipment such as aprons, tyvek suits, boots, and latex or plastic gloves worn under heavier protective gloves. If splashing is a hazard, wear face shields over goggles. Sewage wetted clothing should be removed promptly and the person should then wash with soap and water. Wet clothing should be bagged and then washed separately with hot soap and water and one cup of bleach per wash load. Sewage contaminated equipment should be washed with soap, water, and bleach. Wash hands and face after any contact or sewage work and prior to eating, smoking or going home.

Sewage work also has a risk of fire, explosion, and oxygen deficiency due to the possibility of gases. Cutting of sewer pipes, or the repair of accidentally damaged pipes, should be done only after an assessment of the work by the team leader or project engineer. Typically, gas testing and the use of a confined space entry permit will be required.

8.0 Material safety data sheets

A typical MSDS for fuel oil is included as part of the official folder.

9.0 Medical Surveillance

Hazardous waste worker, (B27,711). This code refers to a NAVHOSPCHASN Medical Surveillance Classification.