N61165.AR.005608
CNC CHARLESTON
5090.3a

SAMPLING AND ANALYSIS PLAN (SAP) UNDERGROUND STORAGE TANK 191NW (UST 191NW) CNC CHARLESTON SC

04/27/1998

ENVIRONMENTAL DETACHMENT CHARLESTON

SAMPLING AND ANALYSIS PLAN

UST 191NW
(SCDHEC GWPD SITE ID # 00936)

NAVAL BASE CHARLESTON
CHARLESTON SC

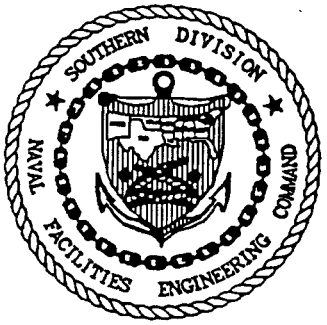
Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, S.C.

Prepared by:

ENVIRONMENTAL DETACHMENT CHARLESTON
1899 NORTH HOBSON AVE.
NORTH CHARLESTON, S.C. 29405-2106

April 27, 1998



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

AST	above-ground storage tank
bgs	below the ground surface
CFR	Code of Federal Regulations
CHASP	Comprehensive Health and Safety Plan
CIA	Controlled Industrial Area
CSAP	Comprehensive Sampling and Analysis Plan
DET	Environmental Detachment Charleston
DL	Detection Level
USEPA	U.S. Environmental Protection Agency
ft/day	feet per day
ft^2/day	square feet per day
gpm	gallons per minute
GWPD	Ground Water Protection Division
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSWA	Hazardous and Solid Waste Amendments
IDW	Investigative Derived Wastes
MSDS	Material Safety Data Sheet
NAVBASE	former Charleston Naval Base
PAH	Polynuclear Aromatic Hydrocarbon
RBSL	Risk Based Screening Level
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAP	Sampling and Assessment Plan
SCDHEC	South Carolina Department of Health and Environmental Control
SOPQAM	*Standard Operating Procedures and Quality Assurance Manual*
SOUTHDIV	Southern Division Naval Facilities Engineering Command
SSHSP	Site-Specific Health and Safety Plan
SWDA	Solid Waste Disposal Act
UST	Underground Storage Tanks

1.0 INTRODUCTION

1.1 GENERAL. A UST and an above-ground storage tank (AST) located beside the former Charleston Naval Base Building 191 were removed by Environmental Detachment Charleston (DET). Soil samples taken during UST removal contained Polynuclear Aromatic Hydrocarbons (PAHs) in excess of South Carolina Department of Health and Environmental Control (SCDHEC) Risk Based Screening Levels (RBSLs). 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 Building 191 UST 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 Building 191 UST location is in Zone A of the RFI. Data taken as part of the RFI, including geological information, hydrogeological information, well drilling logs 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 tanks supplied fuel to Building 191, which is located in the northern section of the NAVBASE at the intersection of Second Street North and Avenue C North. Building 191 was a controlled humidity warehouse is unoccupied as of 4 November 1997. The AST supplied heating oil to the building; the UST supplied diesel fuel to Building 191's diesel powered condenser units. Viewed from Avenue C North, the former UST location is between the steps at the back of the building and the fenced transformer at the northwest corner of the building.

2.2 SITE HISTORY. The two tanks at Building 191 (South Carolina Department of Health and Environmental Control (SCDHEC) Ground Water Protection Division (GWPD) Site Identification Number 00936) were AST 191, a 550 gallon unregulated fuel oil tank whose dates of installation and last use are unknown date, and UST 191NW, a 1500 gallon unregulated diesel oil tank installed in 1961 and used until an unknown date. Both tanks were constructed of steel. All piping for AST 191 was steel and run aboveground. UST 191NW's underground piping consisted of steel vent and fill pipes and copper supply and return lines run to Building 191. Between 24 October 1996 and 31 October 1996, tanks AST 191 and 191NW were emptied and removed, along with their associated piping. The tanks were subsequently cleaned and cut up for recycling as scrap.

There were no recorded releases while either AST 191 or UST 191NW was in service, and no evidence of a release was found during the removal of AST 191. However, when UST 191NW was removed, a loose connection was found where the return line attached to the tank at the east end of the excavation. A soil sample taken at the base of the excavation beneath the loose connection contained PAH contamination in excess of SCDHEC RBSLs. In addition, a soil sample taken at the inlet of the UST fill pipe contained matrix interferences which elevated detection levels (DLs) for PAHs above SCDHEC RBSLs (see Figure 2-4).

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 Oligicene-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 marsh clay is absent from the area of the NAVBASE immediately north of Noisette Creek, including the former UST site at Building 191. The area north of Noisette Creek was originally tidal marsh and its surface contours were extensively changed by fill operations during the NAVBASE's life; the top 7 feet of soil at Building 191 is fill.

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 yields 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 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 feet per day (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, where present, functions as an aquitard separating the upper and lower sand layers. The marsh clay is absent beneath an area of the northern section of the NAVBASE, starting at the north bank of Noisette Creek and extending north past the Building 191 site. At Building 191, rainwater absorbed into the ground will flow downward to the water table and then flow toward discharge points into surface water, splitting whenever the flow encounters the edge of the marsh clay layer.

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 Building 191 UST site is located in the northern portion of the NAVBASE in Zone A. Based on potentiometric maps included in the draft Zone A RFI Report dated September 12, 1996, groundwater beneath the UST location flows south toward the Cooper River. From logs for soil test borings made prior to construction of Building 191 and recorded on NAVBASE Public Works drawing H191-1, the depth to groundwater is 5 to 6 feet bgs.

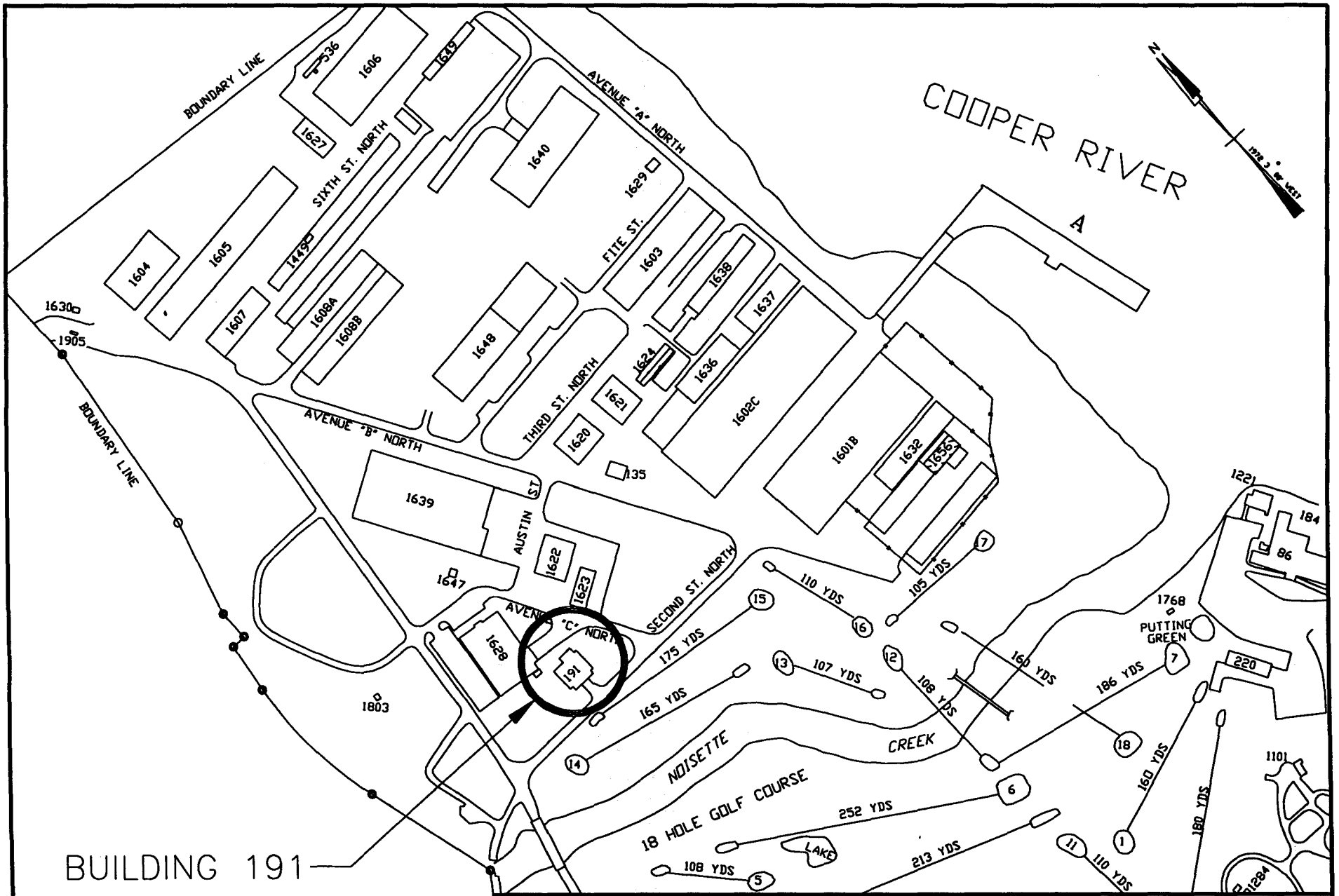


Figure 2-1
Building 191 Location
Charleston Naval Base
Charleston, SC

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

DWG DATE: 6 NOV 97

DWG NAME: 191_21

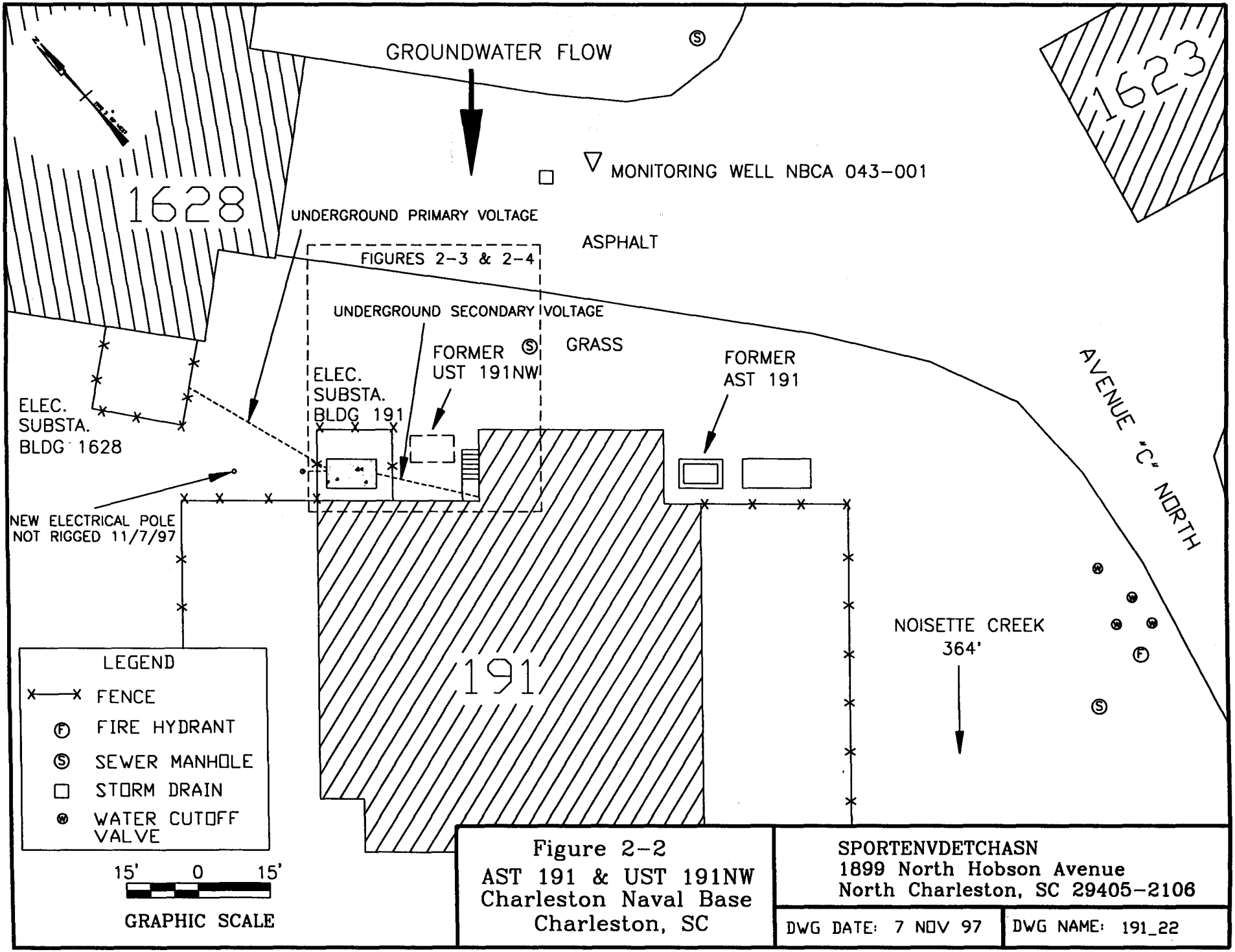


Figure 2-2
AST 191 & UST 191NW
Charleston Naval Base
Charleston, SC

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

DWG DATE: 7 NOV 97 | DWG NAME: 191_22

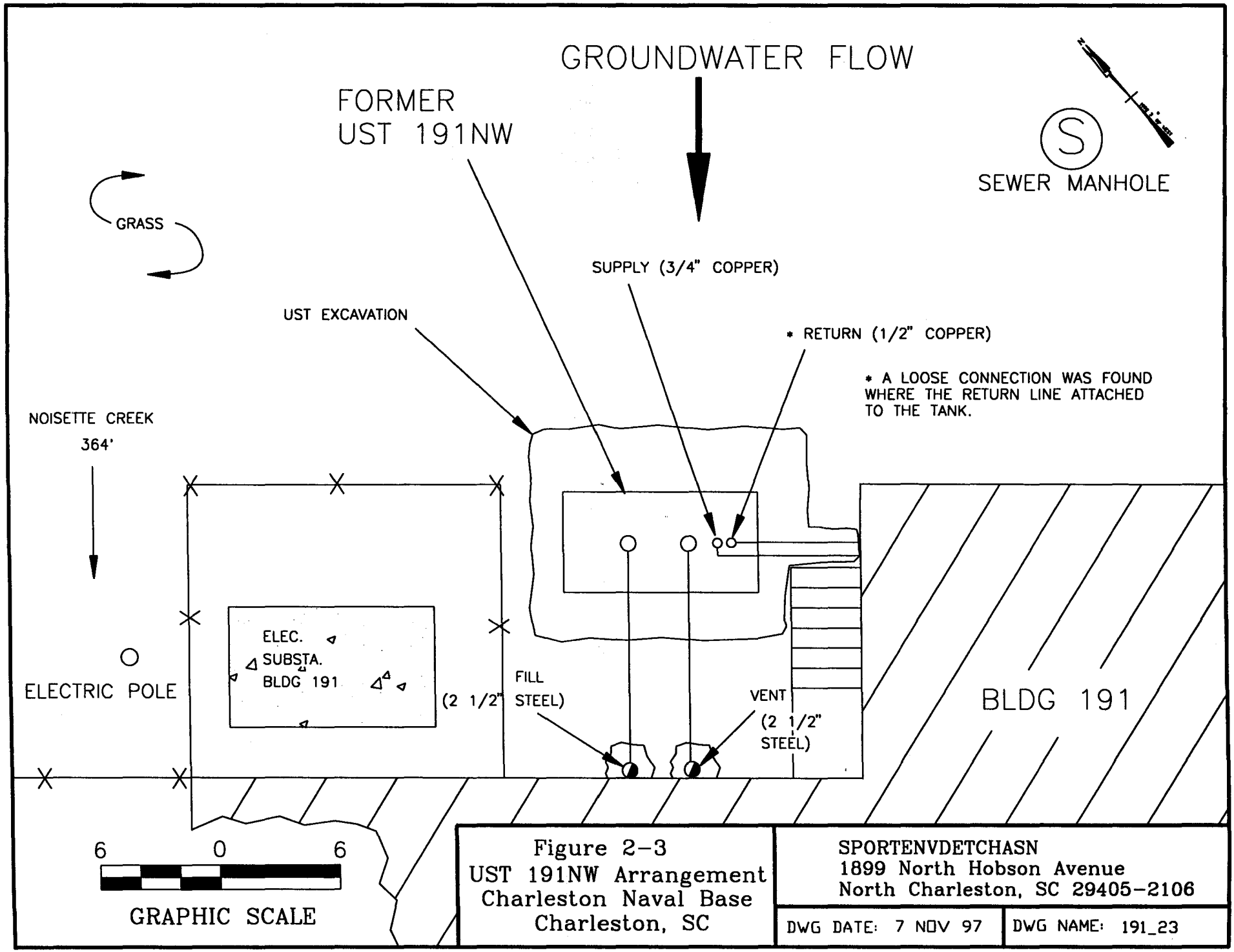


Figure 2-3
UST 191NW Arrangement
Charleston Naval Base
Charleston, SC

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

DWG DATE: 7 NOV 97 | DWG NAME: 191_23

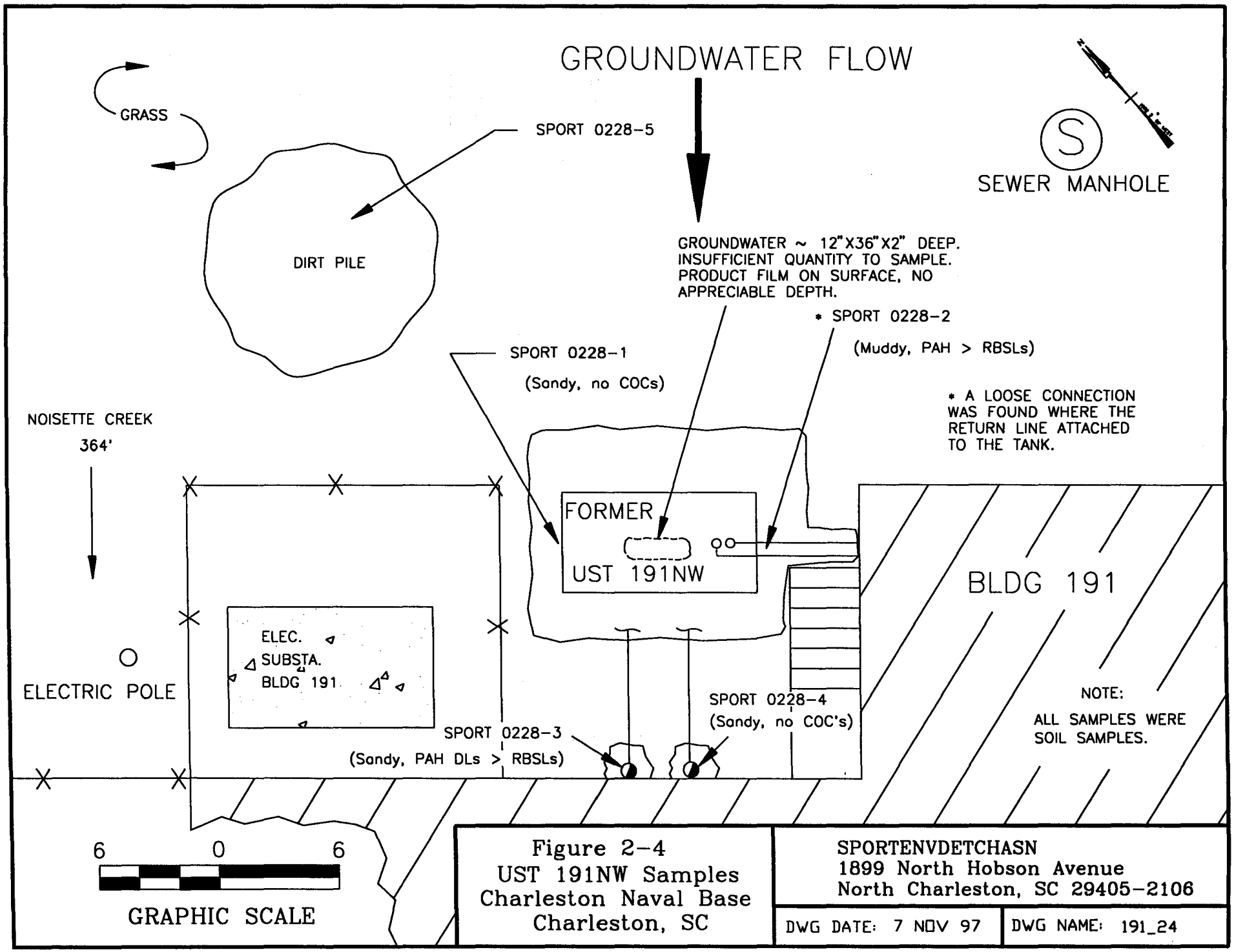


Figure 2-4
UST 191NW Samples
Charleston Naval Base
Charleston, SC

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

DWG DATE: 7 NOV 97 | DWG NAME: 191_24

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 PROPOSED SAMPLING PLAN

4.1 FIELD INVESTIGATION. Prior to the beginning of the field investigation, a 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 (SSHSP). Scheduling, logistics and special precautions will be discussed.

The field investigation has three 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 whether contamination has entered groundwater and determine the areal extent of the petroleum contaminant plume in groundwater if one exists. The third objective is to collect site-specific background information required to prepare the contamination assessment report.

Eleven soil borings will be made, which will be used to determine locations for three temporary monitoring wells. The proposed soil boring locations are shown in Figure 4-1. Actual locations of soil borings and monitoring wells will be determined by the field team as more information is obtained about the contaminant plume during soil sampling. All sampling will be performed in accordance with the NAVBASE Charleston 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*.

Soil borings at the former UST 191NW site will be made at the edge of the tank excavation and around a perimeter outside the suspected extent of contamination to determine the limits of contamination. Soil borings will be advanced with a hand auger. Soil samples will be collected in 2-foot intervals in each boring until the water table is reached. Field screening of soil samples will be performed using an organic vapor analyzer (ova) and the headspace method. Laboratory analysis will be performed on the sample from each boring with the greatest ova headspace analysis. Soil samples will be analyzed for PAHs and Benzene, Toluene, Ethylbenzene and Xylene plus Naphthalene (BTEX + Naphthalene).

Temporary monitoring wells will be advanced using a portable drill rig. After the wells have been developed, groundwater samples will be collected from each well for laboratory analysis. Groundwater samples will be analyzed for PAHs and BTEX + Naphthalene. 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.

Where the initial 11 soil borings are not sufficient to define the extent of soil and groundwater contamination, 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.

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 site at Building 191. 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.

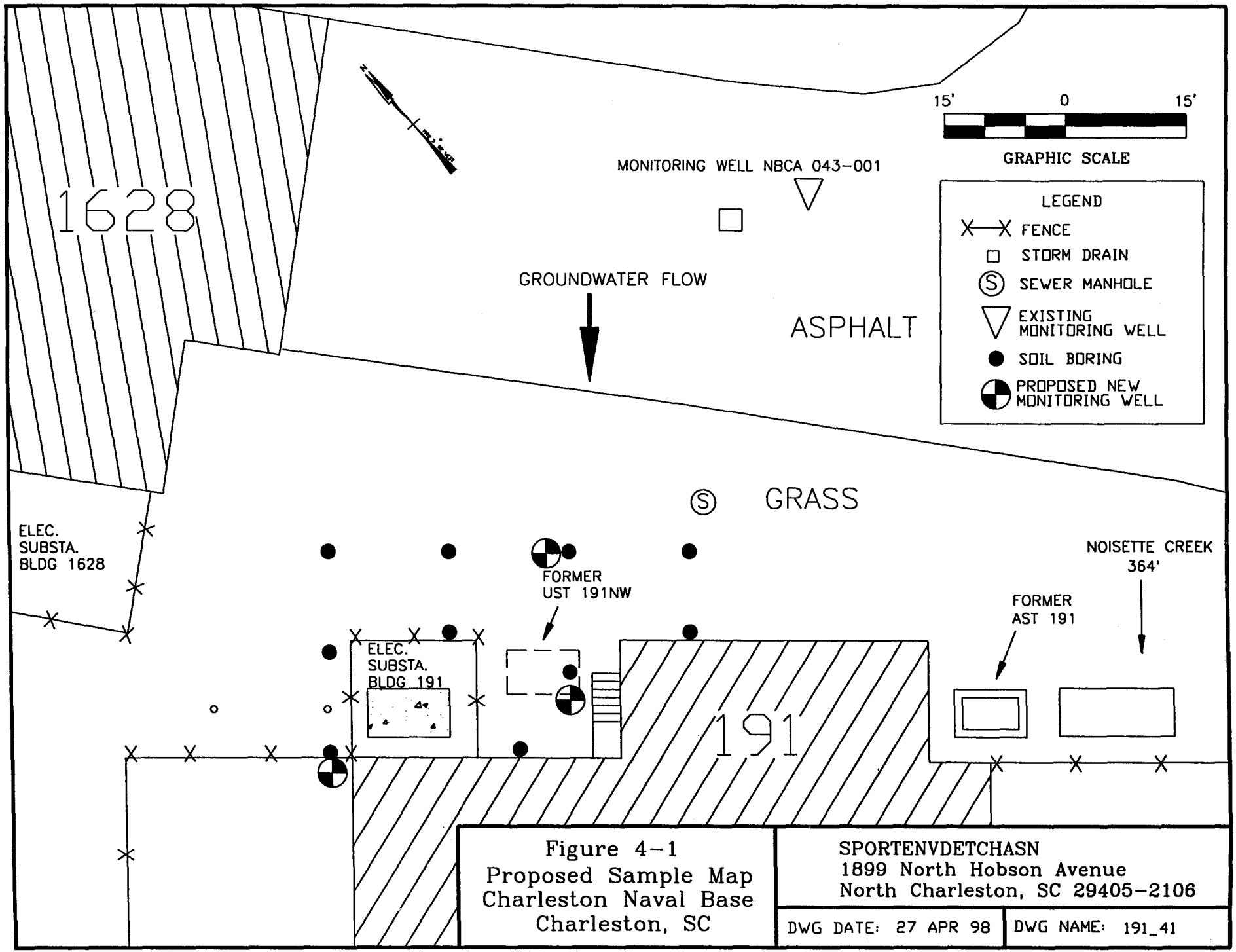


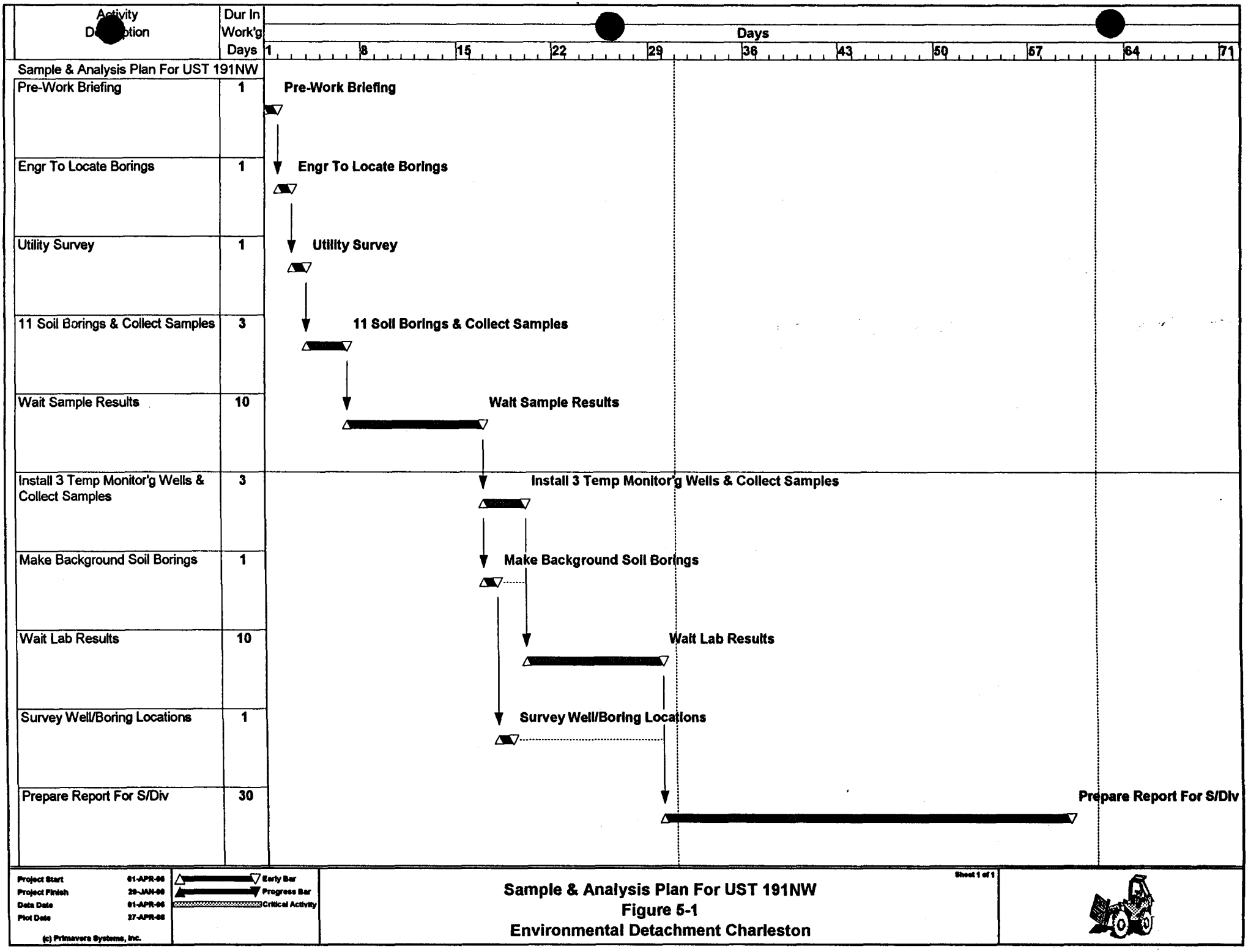
Figure 4-1
Proposed Sample Map
Charleston Naval Base
Charleston, SC

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

DWG DATE: 27 APR 98 | DWG NAME: 191_41

5.0 SCHEDULE

A projected schedule to complete the SAP field investigation at the UST 191NW site is approximately four 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
Days
1
8
15
22
29
36
43
50
57
64
71
Sample & Analysis Plan For UST 191NW
Pre-Work Briefing
1
Pre-Work Briefing
Engr To Locate Borings
1
Engr To Locate Borings
Utility Survey
1
Utility Survey
11 Soil Borings & Collect Samples
3
11 Soil Borings & Collect Samples
Wait Sample Results
10
Wait Sample Results
Install 3 Temp Monitor'g Wells & Collect Samples
3
Install 3 Temp Monitor'g Wells & Collect Samples
Make Background Soil Borings
1
Make Background Soil Borings
Wait Lab Results
10
Wait Lab Results
Survey Well/Boring Locations
1
Survey Well/Boring Locations
Prepare Report For S/Div
30
Prepare Report For S/Div
Project Start 01-APR-96
Project Finish 29-JAN-99
Data Date 01-APR-96
Plot Date 27-APR-96
(c) Primavera Systems, Inc.
Early Bar
Progress Bar
Critical Activity
Sheet 1 of 1
Sample & Analysis Plan For UST 191NW
Figure 5-1
Environmental Detachment Charleston

REFERENCES

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

Ensafe/Allen & Hoshall, Draft - Zone A RCRA Facility Investigation Report NAVBASE Charleston dated September 12, 1996

Ensafe/Allen & Hoshall, Draft Zone I RCRA Facility Investigation Report NAVBASE Charleston dated January 1996

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

NAVBASE Public Works Drawing H191-1 "Precision Instrument Storage Facility - Plot Plan, Plan & Elevations" dated December 1964

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.

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