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SAMPLING AND ANALYSIS PLAN (SAP) UNDERGROUND STORAGE TANK (UST)
QUARTERS C CNC CHARLESTON SC
05/11/1998
ENVIRONMENTAL DETACHMENT CHARLESTON

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MAY 20 1998

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DIVISION OF UNDERGROUND
STORAGE TANK MGMT.

Water Monitoring, Assessment &
Protection Division

SAMPLING AND ANALYSIS PLAN

UST QUARTERS C
(SCDHEC GWPD SITE ID # 00947)
NAVAL BASE CHARLESTON
CHARLESTON SC



Prepared for:

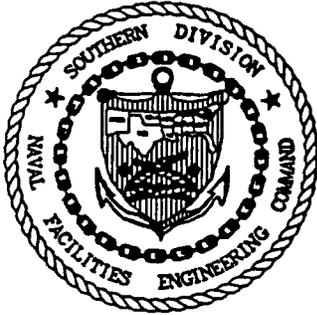
DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, S.C.



Prepared by:

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

May 11, 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.

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ACRONYMS, ABBREVIATIONS AND SYMBOLS

AST	Above-ground Storage Tank
bgs	below the ground surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
BTEX+Naphthalene	Benzene, Toluene, Ethylbenzene and Xylene plus Naphthalene
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
ova	organic vapor analyzer
PAH	Polynuclear Aromatic Hydrocarbon
RBSL	Risk Based Screening Level
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAP	Sampling and Analysis Plan
SCDHEC	South Carolina Department of Health and Environmental Control
SOPQAM	<i>Standard Operating Procedures and Quality Assurance Manual</i>
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. An UST located beside the former Charleston Naval Base Quarters Building C was removed by Environmental Detachment Charleston (DET). Soil samples taken from the final walls of the excavation contained matrix interferences which elevated detection levels (DL) for Polynuclear Aromatic Hydrocarbons (PAHs) above 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 tanks, determine if contamination in fact exceeds RBSLs and evaluate the horizontal and vertical extent of the petroleum contamination detected. The field investigation will also determine if contamination has entered groundwater at the Quarters C 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 Quarters C UST site is in Zone B 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 UST supplied fuel oil to Quarters C, which is located in the northern section of the NAVBASE at 300 Navy Way south of the former NAVBASE golf course. Quarters C is former Navy housing and is unoccupied as of 22 April 1998. Viewed from Navy Way, the former UST location is in the yard on the near side of the driveway leading to garage building 1285.

2.2 SITE HISTORY. The UST at Quarters C (SCDHEC Ground Water Protection Division (GWPD) Site Identification Number 00947) was a 550 gallon unregulated fuel oil tank installed prior to 1976 and used until April 1996. The tanks were constructed of steel and connected to Quarters C by copper supply and return lines. Between 12 November 1996 and 19 November 1996, the UST was removed, drained, cleaned and cut up for recycling as scrap. The copper fuel piping and tank vent piping were removed at the same time.

There were no recorded releases while the UST at Quarters C was in service and no corrosion or damage was observed when the tank was removed. However, soil sample SPORT0242-1 taken from the east end of the excavation contained concentrations of Benzene, Toluene, Ethylbenzene and Xylene (BTEX) and Naphthalene above RBSLs; matrix interferences elevated PAH DLs for this sample above RBSLs. Even after additional soil was excavated, soil sample SPORT0320-1 taken from the base of the excavation still contained Naphthalene above RBSLs and had PAH DLs elevated above RBSLs. PAH DLs were also elevated above RBSLs in soil sample SPORT0242-2 from the west end of the excavation where no additional excavation was performed. Figure 2-3 shows sample locations and results.

A new aboveground storage tank (AST) has been installed at Quarters C in a location away from the former UST site. Two underground electric power cables run close by the former UST Quarters C location (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 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 (ft²/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).

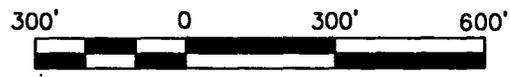
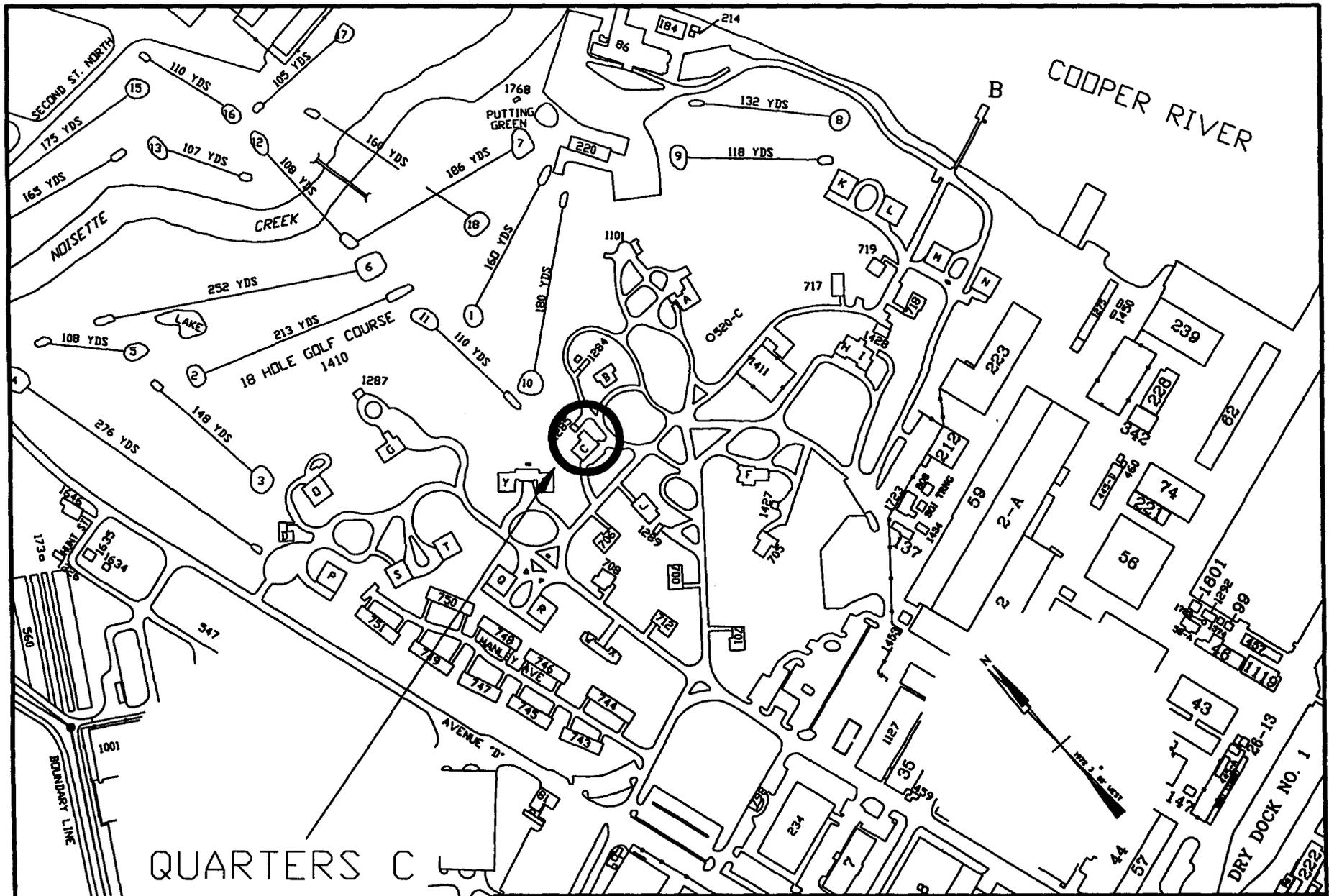
The Cooper Group is hydrogeologically significant mainly because of its low permeability. In most locales, its sandy, finely granular limestones produce little or no water and act as confining material that produces artesian condition in the underlying Santee Limestone.

2.4.2 Site Specific. Typically, above the Ashley Formation at the 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 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 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 Quarters C UST site is located in the northern portion of the NAVBASE in Zone B. Based on potentiometric maps included in the final Zone B RFI Report dated November 21, 1996, groundwater beneath the UST location flows east toward the Cooper River. Because no groundwater was encountered during UST removal, the depth to groundwater is greater than the 6 foot bgs depth of the tank base.

2-4



GRAPHIC SCALE

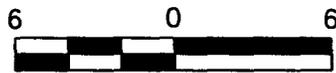
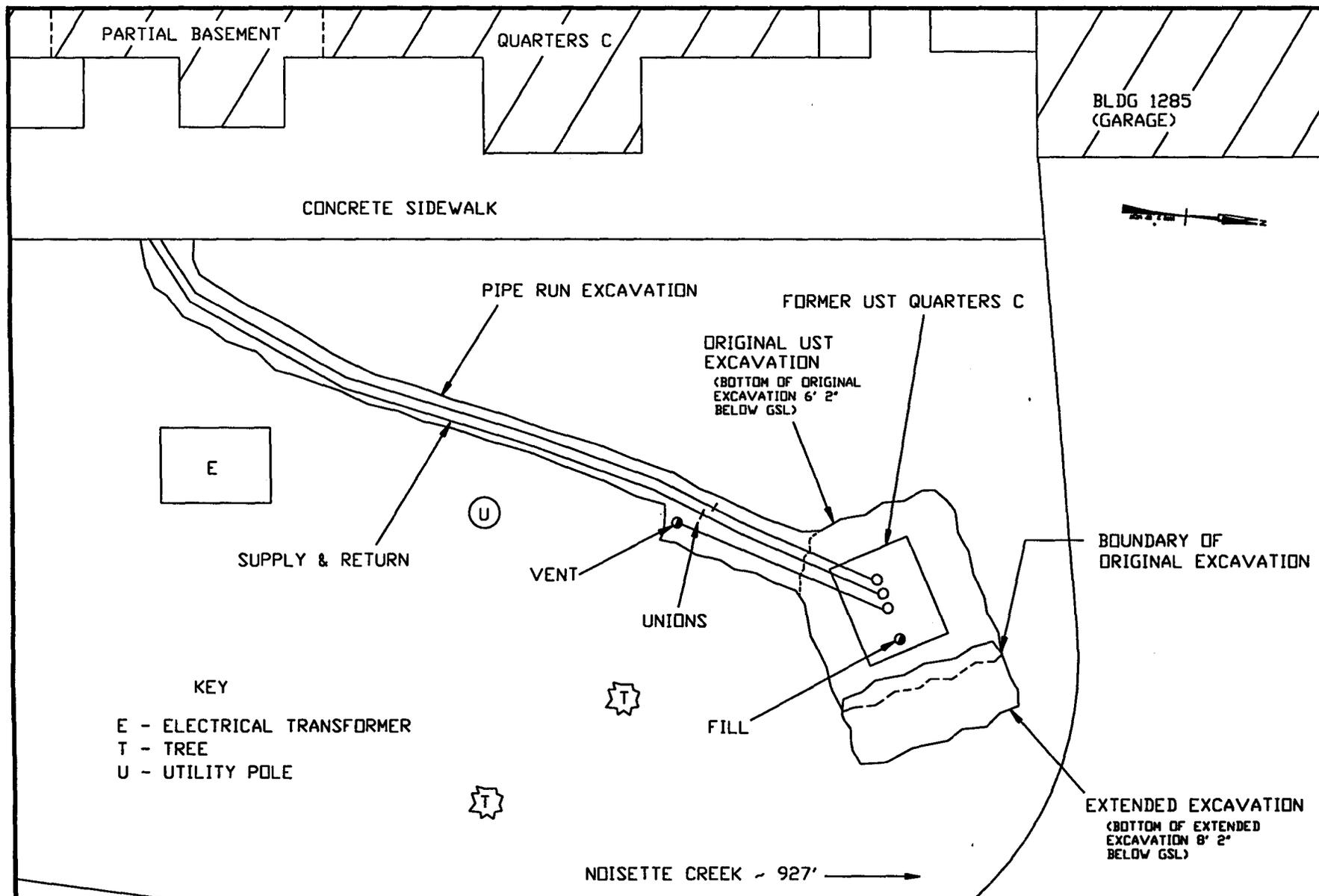
Figure 2-1
 UST QUARTERS C
 Charleston Naval Base
 Charleston, SC

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

DWG DATE: 3 MAR 97

DWG NAME: QTRSC_21

2-5



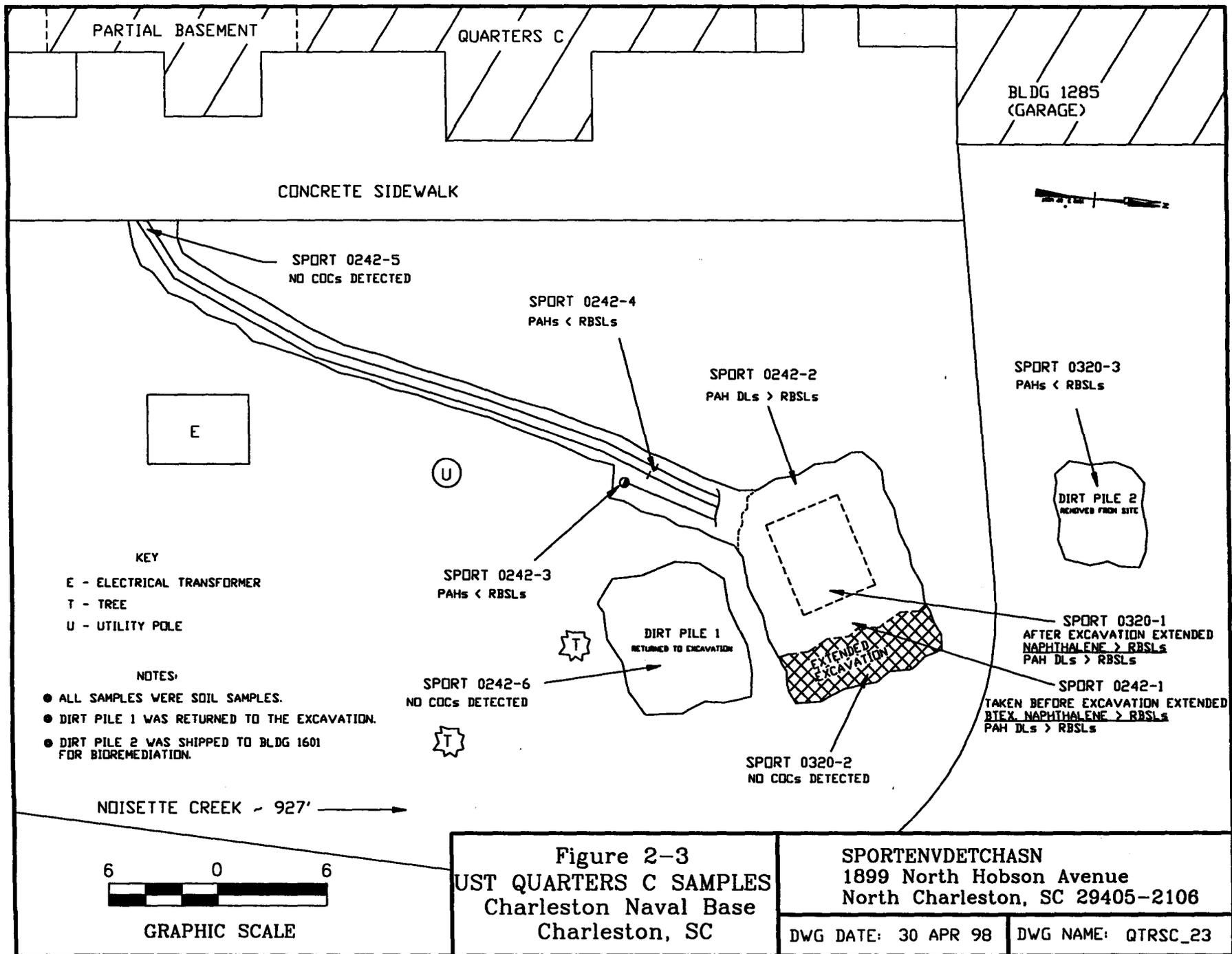
GRAPHIC SCALE

Figure 2-2
 QTRS C UST ARRANGEMENT
 Charleston Naval Base
 Charleston, SC

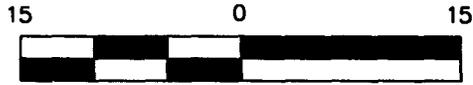
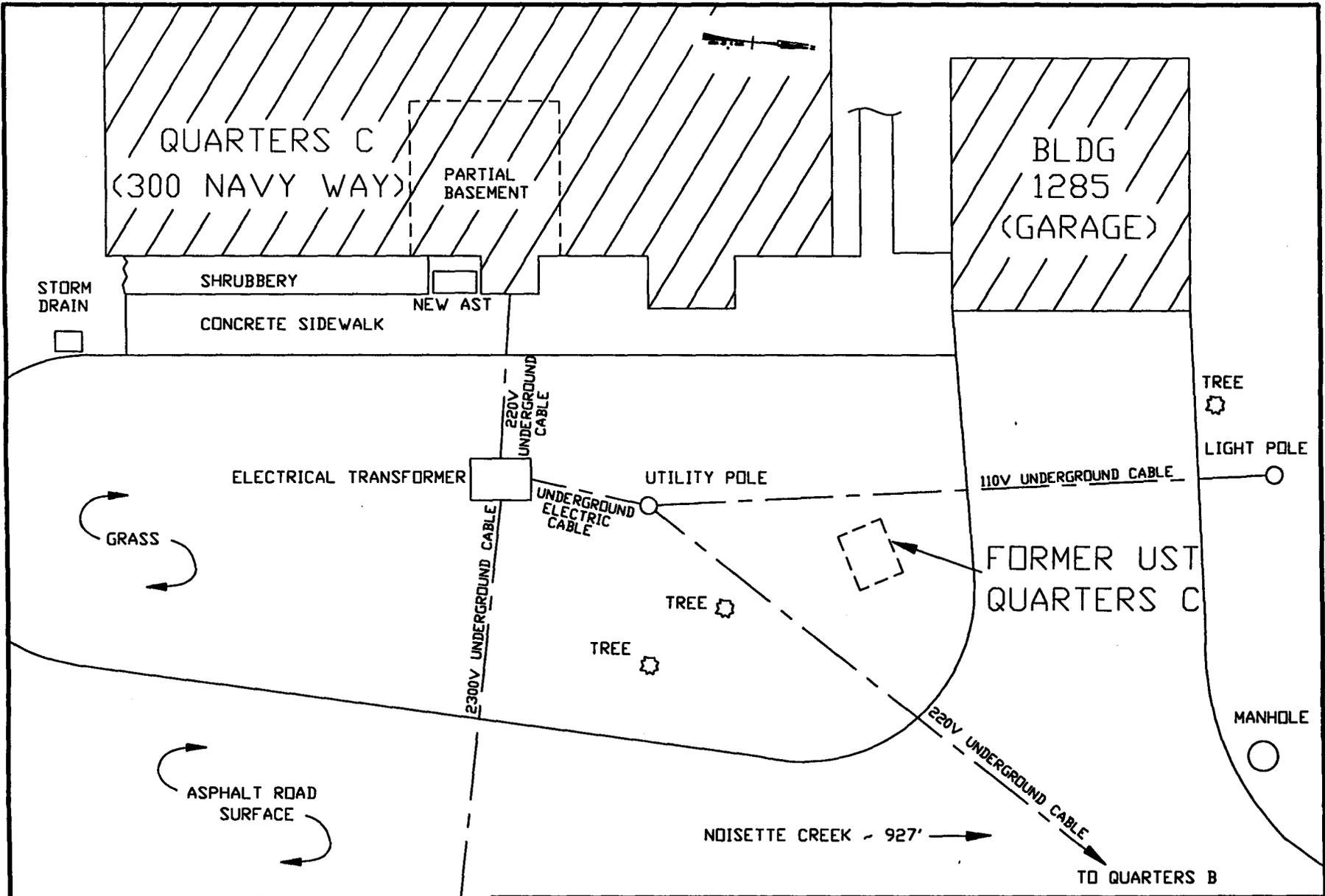
SPORTENVDETHASN
 1899 North Hobson Avenue
 North Charleston, SC 29405-2106

DWG DATE: 5 MAR 97

DWG NAME: QTRSC_22



2-7



GRAPHIC SCALE

Figure 2-4
 FORMER UST QUARTERS C
 Charleston Naval Base
 Charleston, SC

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

DWG DATE: 30 APR 98

DWG NAME: QTRSC_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 final objective is to collect site-specific background information required to prepare the contamination assessment report.

Ten soil borings will be made, which will be used to determine the locations for two 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 Quarters C UST 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).

Because this former UST site is located in a residential area and COCs were detected in the tank excavation (see Figure 2-3), three surficial soil samples will be collected outside the limits of the backfilled tank excavation. Surficial soil samples will be analyzed for PAHs.

The temporary monitoring well 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.

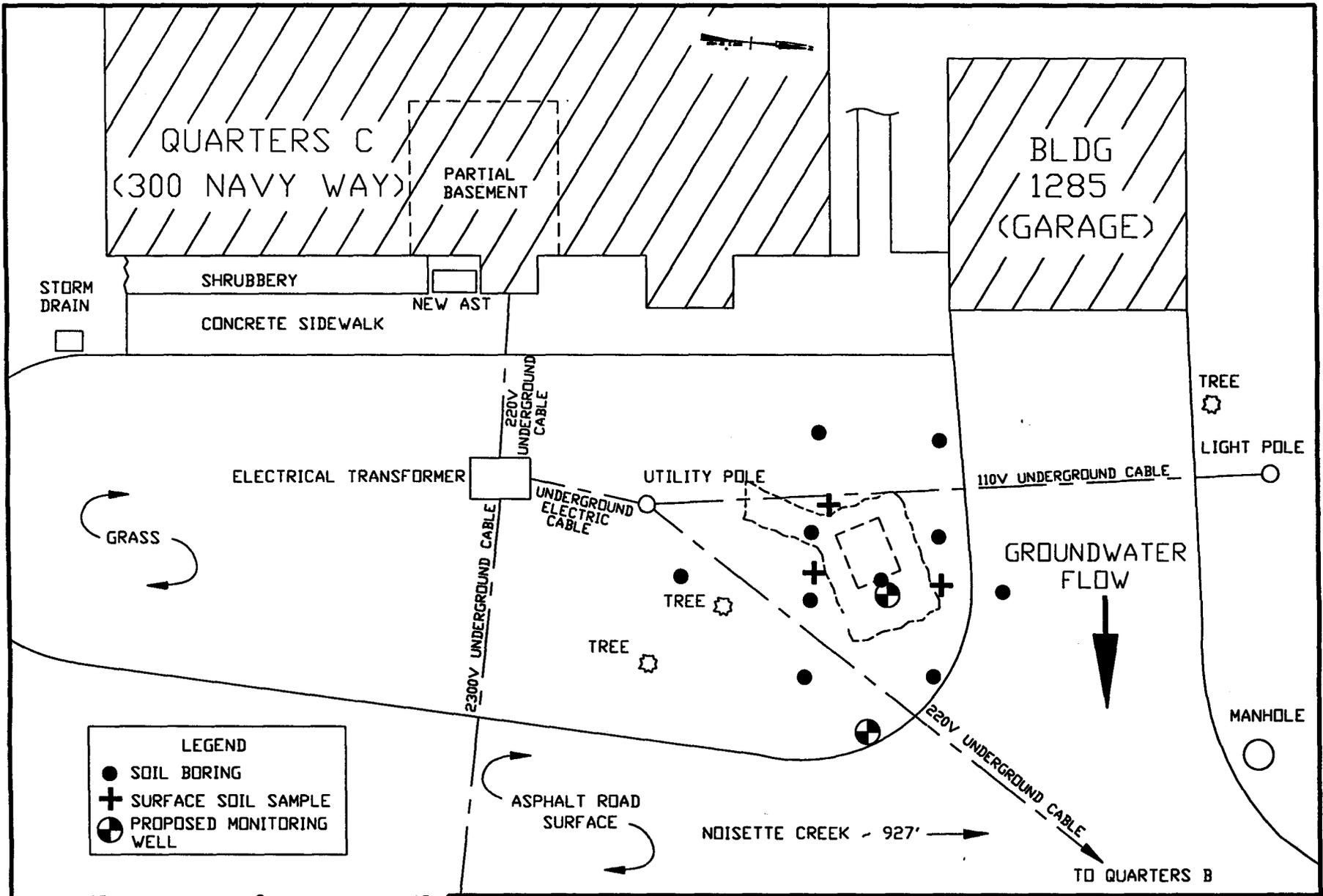
Where the initial ten soil borings are not sufficient to define the extent of soil and groundwater contamination, SCDHEC will be notified that the sampling grid needs to be extended in those directions where the plume is undefined. Any additional soil borings will be advanced using the same methods as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

4-3



LEGEND

- SOIL BORING
- ⊕ SURFACE SOIL SAMPLE
- ⊕ (in circle) PROPOSED MONITORING WELL

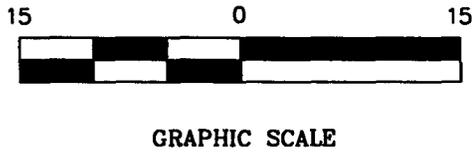


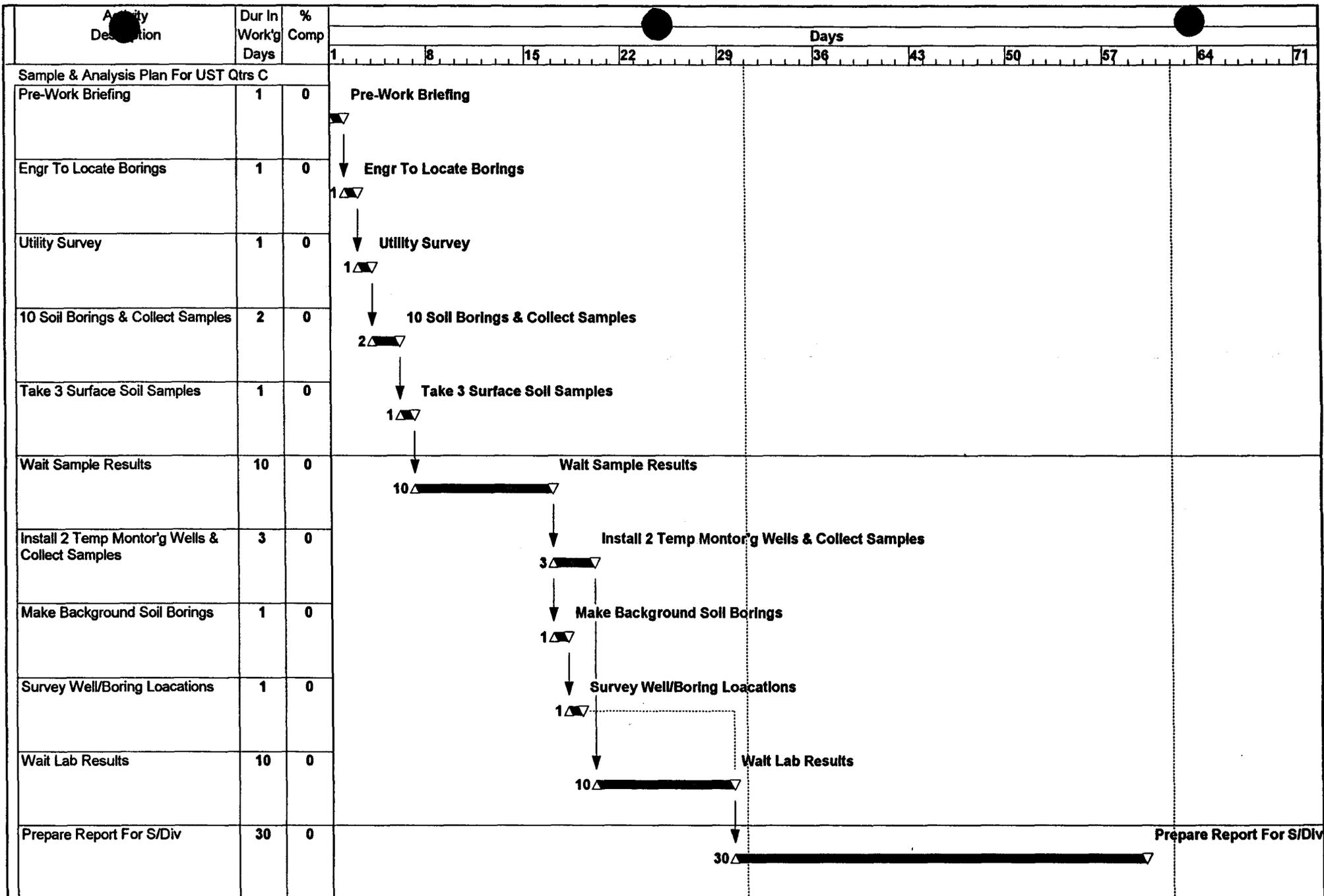
Figure 4-1
QUARTERS C SAMPLING PLAN
 Charleston Naval Base
 Charleston, SC

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

DWG DATE: 30 APR 98 DWG NAME: QTRSC_41

5.0 SCHEDULE

A projected schedule to complete the SAP field investigation at the Quarters C UST site is approximately 4 weeks (see Figure 5-1). This includes mobilization, drilling, sampling, surveying and demobilization. An Assessment Report for the site is scheduled for delivery to SOUTHDIV 30 days after completion of field investigation.



Project Start 01-APR-06
 Project Finish 26-JAN-08
 Data Date 01-APR-06
 Plot Date 13-MAY-06



Sample & Analysis Plan For UST At
 Qtrs C
 Environmental Detachment Charleston



REFERENCES

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

Ensafe/Allen & Hoshall, Final RFI Report CTO-0029, Zone B dated November 21, 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

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 be 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



14 July 1998

2600 Bull Street
Columbia, SC 29201-1708

COMMISSIONER:
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Brian K. Smith

Rodney L. Grandy

Department of the Navy
Southern Division NFEC
P.O. Box 190010
North Charleston, SC 29419-9010
Attn: Mr. Gabriel Magwood

Re: Sampling and Analysis Plan (SAP) dated 19 May 1998
Quarters "C" Housing (Site Identification # 00947)
Charleston Naval Complex/Charleston Naval Base
Charleston, SC
Charleston County

Dear Mr. Magwood:

The author has completed technical review of the referenced document. As submitted, the SAP provides for additional investigative endeavors to determine the extent and severity of soil and groundwater contamination, if any, associated with a suspected release at the subject site. It is recognized that the initial tasks (i.e., soil borings, piezometers/temporary monitoring wells, etc.) are generically designed to allow for field modifications/adjustments, as necessary. Based on the foregoing review, the proposal to perform soil borings, piezometer/temporary monitoring well installation and appropriate sampling is approved for implementation. It is recognized that the Final Comprehensive Sampling and Analysis Plan (30 August 1994) provides detailed technical specifications regarding environmental assessments/investigations to be conducted at the Charleston Naval Complex and will be incorporated into the submitted SAP by reference.

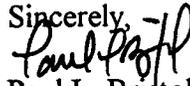
With regard to Section 4.1 (Field Investigation), the facility may use best professional judgement to install additional temporary monitoring points to define the extent and severity of free phase petroleum product and/or significant dissolved phase contamination if identified during initial field activities. Temporary monitoring wells may be converted to permanent wells at the time of installation in the presence of free phase petroleum product, as appropriate.

Please find enclosed monitoring well approval # 0208 for the proposed temporary monitoring wells. Abandonment of all intrusive sampling points will be in accordance with the technical specifications and descriptions provided and/or referenced in the SAP or as approved by the Department.

Charleston Naval Complex/Charleston Naval Base
14 July 1998
page 2

Should you have any questions please contact me at (803) 734-5328.

Sincerely,



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

cc: Trident District EQC



2600 Bull Street
Columbia, SC 29201-1708

Date of Issue: 14 July 1998
Approval No: 0208

Monitoring Well Installation Approval

COMMISSIONER:
Douglas E. Bryant

Approval is hereby granted to: Charelston Naval Complex/Charelston Naval Base
(on behalf of): Quarters "C" Housing
Site ID#: 00947
County: Charleston

BOARD:
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Brian K. Smith

Rodney L. Grandy

This approval is for the construction of two (2) temporary groundwater monitoring point(s) designated (no designation) in accordance with the construction plans and technical specifications submitted to the Department on 20 May 1998. The temporary monitoring point(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 surveyed elevations, boring and/or geologist logs and actual (as built) construction details for each well be submitted to within thirty (30) days of completion (of last well(s) installed). (to be submitted with Assessment Report)
2. 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.
3. A minimum of forty-eight (48) hours prior to initiation of drilling activities, please provide notice to Trident District EQC Office (803-740-1590).
4. Please provide groundwater quality analytical data (chemical analyses and/or water level(s)) and associated measurements (i.e., field measurements) to Paul L. Bristol within thirty (30) days of receipt from laboratory. (to be submitted with Assessment Report)
5. Monitoring wells shall be installed by a well driller certified by the State of South Carolina.
6. 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 number. (for permanent wells, only)

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

cc: Trident District EQC



DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 190010
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NORTH CHARLESTON, S.C. 29419-9010

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MAY 20 1998
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DIVISION OF UNDERGROUND
STORAGE TANK MGMT.
PROTECTION DIVISION

5090 Li 5.28.98
Code 1849 407.9.98
19 May 1998

Mr. Paul Bristol
South Carolina Department of Health
And Environmental Control
Division of Underground Storage Tank
2600 Bull Street
Columbia, SC 29201

**SAMPLING AND ANALYSIS PLAN FOR ADDITIONAL ASSESSMENT
AT UST SITES AT THE FORMER CHARLESTON NAVAL BASE**

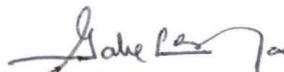
Dear Mr. Bristol:

~~copy~~ → correct

Attached is the Sampling and Analysis Plan (SAP) for additional assessment at UST Quarters C (SCDHEC GWPD SITE ID #00947) located at the former Naval Base, Charleston, SC. The Comprehensive Sampling and Analysis Plan (CSAP) previously submitted would be followed during the additional assessment.

If you have any questions regarding the SAP feel free to contact me at (843) 820-7307.

Sincerely,


GABRIEL L. MAGWOOD
Petroleum/UST Branch

Encl
(1) Sampling and Analysis Plan (SAP)



7 April 1999

2600 Bull Street
Columbia, SC 29201-1708

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Douglas E. Bryant

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Chairman

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Brian K. Smith

Rodney L. Grandy

Department of the Navy
Southern Division NFEC
P.O. Box 190010
North Charleston, SC 29419-9010
Attention: Mr. Gabriel Magwood

Re: Site Assessment Plan dated 26 February 1999
Zone B/Site 13-Quarters C (Site Identification # 00947)
Charleston Naval Complex/Charleston Naval Base
Charleston, SC
Charleston County

Dear Mr. Magwood:

The author has completed technical review of the referenced document. As submitted, the SAP (site assessment plan) provides for additional investigative endeavors to determine the extent and severity of soil and groundwater contamination, if any, associated with a suspected release at the subject site. It is recognized that the initial tasks (i.e., soil borings, piezometers, etc.) are generically designed to allow for field modifications/adjustments, as necessary. Based on the foregoing review, the proposal to perform soil borings, piezometer installation (Phase I) and monitoring well installation (Phase II) and appropriate sampling is approved for implementation. Permanent monitoring well installation (Phase II), with the exception(s) noted below, will be conducted after appropriate consultation with the Department concerning Phase I analytical results.

The facility may use best professional judgement to install additional temporary monitoring points to define the extent and severity of free phase petroleum product and/or significant dissolved phase contamination if identified during Phase I field activities. Temporary monitoring wells may be converted to permanent wells at the time of installation in the presence of free phase petroleum product, as appropriate.

Please find enclosed monitoring well approval # 0430 for the proposed piezometers, soil borings and monitoring wells. Abandonment of all intrusive sampling points will be in accordance with the technical specifications and descriptions provided and/or referenced in the SAP or as approved by the Department.

Please be reminded that the Department retains the authority to request additional assessments and/or remedial endeavors, as appropriate, if future conditions or information warrant and are

Charleston Naval Complex/Charleston Naval Base
7 April 1999
page 2

deemed necessary.

Should you have any questions please contact me at (803) 898-3559.

Sincerely,

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

enc.: Monitoring Well Approval # 0430
cc: Trident District EQC



Date of Issue: 7 April 1999
Approval No: 0430

2600 Bull Street
Columbia, SC 29201-1708

Monitoring Well Installation Approval

COMMISSIONER:
Douglas E. Bryant

Approval is hereby granted to: Charleston Naval Complex/Charleston Naval Base
(on behalf of): Zone B/Site 13-Quarters C
Site ID#: 00941
County: Charleston

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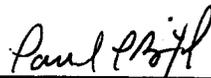
Rodney L. Grandy

This approval is for the construction of DPT (direct push technology) piezometers and monitoring wells (number to be field determined) in accordance with the construction plans and technical specifications submitted to the Department on 10 March 1999. The piezometers and monitoring wells 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 surveyed elevations, boring and/or geologist logs and actual (as built) construction details for each well be submitted to within thirty (30) days of completion (of last well(s) installed).
(to be submitted with Assessment Report)
2. 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.
3. A minimum of forty-eight (48) hours prior to initiation of drilling activities, please provide notice to Trident District EQC Office (843-740-1590).
4. Please provide groundwater quality analytical data (chemical analyses and/or water level(s)) and associated measurements (i.e., field measurements) to Paul L. Bristol within thirty (30) days of receipt from laboratory.
(to be submitted with Assessment Report)
5. Monitoring wells shall be installed by a well driller certified by the State of South Carolina.
6. 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 number.
(for permanent wells, only)

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

cc: Trident District EQC



TETRA TECH NUS, INC.

1311 Executive Center Drive, Ellis Building. ■ Suite 220 ■ Tallahassee, FL 32031
(850) 656-5458 ■ FAX (850) 656-7403 ■ www.tetrattech.com

Li 3.15.99
Lw 4.7.99

TTNUS/TAL-99-017/0141/3.2

26 February, 1999

Project Number 0141

Site #s 00941
00947
~~001~~
01088
01089

Mr. Paul Bristol
South Carolina Department of Health and Environmental Control
Groundwater Quality Section
Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201-1708

Reference: Clean Contract No. N62467-94-D0888
Contract Task Order No. 0092

Subject: Site Assessment Plan for
Charleston Naval Complex - Zone B
Charleston, South Carolina

Dear Mr. Bristol:

On behalf of the Department of the Navy, Southern Division, Naval Facilities Engineering Command, Tetra Tech NUS, Inc. is pleased to submit for your review and approval, the Site Assessment Plan for the referenced zone at the Charleston Naval Complex.

If you have any questions regarding this plan or require further information, please contact me at (850) 656-5458.

Very truly yours,

Paul E. Calligan, P.G.
Task Order Manager

/pc

Enclosures (1)

- c: Ms. D. Evans-Ripley, SOUTHDIV (w/o enclosure)
- Mr. G. Magwood, SOUTHDIV
- Ms. D. Wroblewski, TtNUS (w/o enclosure)
- Ms. R. Baur (w/o enclosure)
- Mr. A. Kendrick, TtNUS
- file

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**Water Monitoring, Assessment &
Protection Division**



3 April 2000

2600 Bull Street
Columbia, SC 29201-1708

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Rodney L. Grandy

Larry R. Chewning, Jr., DMD

Department of the Navy
Southern Division NFEC
P.O. Box 190010
North Charleston, SC 29419-9010
Attention: Mr. Gabriel Magwood

Re: Final Assessment Report dated 08 March 2000
Zone B/Site 13-Quarters C (Site Identification # 00947)
Charleston Naval Complex/Charleston Naval Base
Charleston, SC
Charleston County

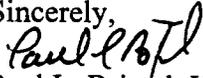
Dear Mr. Magwood:

The author has completed technical review of the referenced document. As submitted, the report provides a narrative describing previous assessment activities and analytical results from additional sampling conducted to determine the environmental fate of suspected contamination at the subject property. The analytical results provided indicate that reportable concentrations of BTEX and PAH compounds were not detected above established method detection limits in soil and/or groundwater samples obtained at the subject site. Based on the analytical results presented and description of site specific geology/hydrogeology, potential releases, if any, from previous activities at the subject site do not appear to present a significant threat to human health and/or the environment at the present time. In this regard, the employed assessment activities and sampling results appear to indicate that no additional endeavors for remedial actions and/or contaminant characterization is warranted for the Zone B/Site 13-Quarters C area at this time.

With consideration to the above comments, the Department has reviewed the referenced environmental data. Based on the information and analytical data submitted, the Department recognizes that the Department of the Navy and Charleston Naval Complex has adequately addressed the known environmental contamination identified on the property to date in accordance with the approved scope of work. Please note, this statement pertains only to the portion of the site addressed in the referenced report and does not apply to other areas of the site and/or any other potential regulatory violations. Further, the Department retains the right to request further investigation if deemed necessary.

Charleston Naval Complex/Charleston Naval Base
3 April 2000
page 2

Should you have any questions please contact me at (803) 898-3559.

Sincerely,

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


Tom Knight, Manager
Groundwater Quality Section
Bureau of Water

cc: Trident District EQC