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CNC CHARLESTON
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WORK PLAN FOR CONTAMINATION ASSESSMENT INVESTIGATION AT FLEET MINE
WARFARE TRAINING CENTER CNC CHARLESTON SC
08/01/1991
SIRRINE ENVIRONMENTAL CONSULTANTS



DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P. O. BOX 10068
CHARLESTON, S. C. 29411-0068

PLEASE ADDRESS REPLY TO THE
COMMANDING OFFICER, NOT TO
THE SIGNER OF THIS LETTER.
REFER TO:

5090/13
Code 18231

27 SEP 1991

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. David Baize, Hydrogeologist
South Carolina Department of Health
and Environmental Control
Ground-Water Protection Division
Assessment and Development Section
2600 Bull Street
Columbia, South Carolina 29201

WORK PLAN FOR THE CONTAMINATION ASSESSMENT INVESTIGATIONS AT THE FLEET MINE
WARFARE TRAINING CENTER (FMWTC) AND NAVAL RESERVE TRAINING CENTER (NRTC),
CHARLESTON, SOUTH CAROLINA

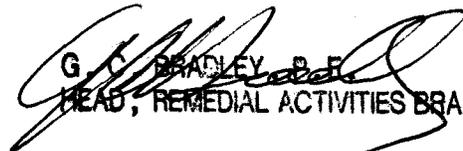
Dear Mr. Baize:

Enclosed for your review and comments are two copies of the Work Plan for the
Contamination Assessment Investigation to be performed at the FMWTC and NRTC
Charleston as requested by SCDHEC.

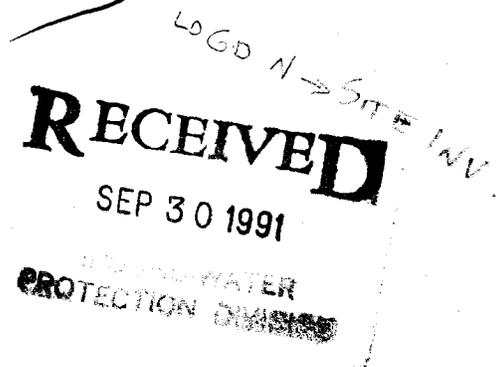
As soon as we receive your review comments on the above mentioned work plan,
field work can commence. We will notify the local SCDHEC District EQC Office
with the exact date work is to start.

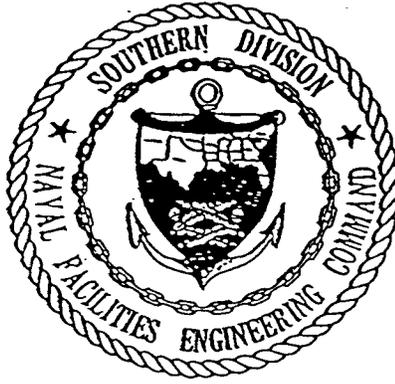
We would appreciate a prompt response from you so that work can start at FMWTC
and NRTC Charleston as soon as possible. If you have any questions, please
contact Mr. Daryle Fontenot, Code 18231, at (803) 743-0607.

Sincerely,


G. C. BRADLEY, P.E.
HEAD, REMEDIAL ACTIVITIES BRANCH

Encl:
(1) Work Plan (2) for FMWTC and NRTC Charleston





CONTRACT N64247-88-D-0655

INDEFINITE QUANTITY CONTRACT

FOR

STORAGE TANK EVALUATIONS

AND

SITE INVESTIGATIONS

AT NAVAL ACTIVITIES IN GA, NC, AND SC

AMENDMENT NO. 14

CONTAMINATION ASSESSMENT PLAN

AND

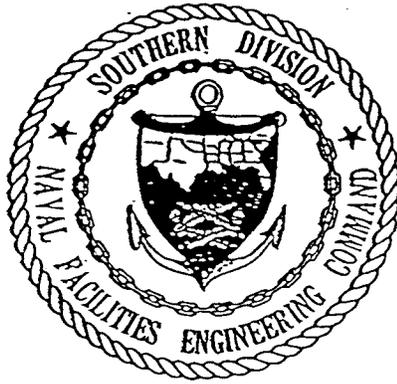
HEALTH AND SAFETY PLAN

FOR

FMWTC AND NRTC CHARLESTON, SC



Charleston, SC 29418



CONTRACT N64247-88-D-0655

INDEFINITE QUANTITY CONTRACT

FOR

STORAGE TANK EVALUATIONS

AND

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AT NAVAL ACTIVITIES IN GA, NC, AND SC

AMENDMENT NO. 14

CONTAMINATION ASSESSMENT PLAN

AND

HEALTH AND SAFETY PLAN

FOR

FMWTC AND NRTC CHARLESTON, SC



Charleston, SC 29418

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SEP 30 1991
GROUND-WATER
PROTECTION DIVISION

CONTRACT N62467-88-D-0655

**Indefinite Delivery Contract for Underground
Storage Tank Evaluations and Site
Investigations at Naval Activities in GA, NC and SC**

Amendment No. 14

**DRAFT
Contamination Assessment Plan
and
Health and Safety Plan**

FMWTC and NRTC, Charleston, SC

**Sirrine Project C1339
August 1991**

**Prepared By
Sirrine Environmental Consultants, Inc.
2694A Lake Park Drive
Charleston, South Carolina 29418
803/572-5600**

SECTION I
CONTAMINATION ASSESSMENT PLAN

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FIGURES

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Figure 5	Proposed Soil/Gas Survey Points, NRTC
Figure 5A	Proposed Soil Borings and Monitor Well Locations, NRTC
Figure 6	Typical Monitor Well Construction

1.0 INTRODUCTION

1.1 Background

Sirrine Environmental Consultants, Inc. (Sirrine) has been contracted by Southern Division, Naval Facilities Engineering Command (NAVFAC) to conduct investigations and evaluations of underground storage tank (UST) systems at Naval Activities throughout Georgia, North Carolina, and South Carolina.

The Fleet and Mine Warfare Training Center (FMWTC) and Naval Reserve Training Center (NRTC) are located on the Naval Base in Charleston, South Carolina (Figure 1). One 4000 gallon diesel fuel UST (~~647A~~) is located at the FMWTC (Figure 2) and was abandoned in place in August, 1980. The abandoned tank is located under concrete and asphalt, immediately east of the training center. During an environmental site assessment, conducted by GEO Services in November, 1990, soil contamination was detected. Analysis of soil samples taken from the tank area indicated total petroleum hydrocarbon (TPH) concentrations as high as 860 ppm. A 550 gallon UST (643C) used to store diesel fuel was also removed at this time by GEO Services. The analytical results for the soil samples from this tank basin did not contain TPH levels in excess of 30 ppm.

Two 1000 gallon out of service diesel USTs at the NRTC, Building RTC-1 (Figure 3), were removed in November, 1990. Tank No. 1 was removed and the analytical results for the soil samples from this basin indicate that TPH concentrations did not exceed 20 ppm. Tank No. 2 was previously located under turf near the south wing of the building. During removal of Tank No. 2 and associated piping, soil contamination was detected. Analysis of soil samples taken from the tank area indicated TPH concentrations as high as 2500 ppm.

1.2 Previous Reports

1.2.1 UST Removal and Closure in Place for FMWTC

GEO Services was contracted to remove one (1) 550 gallon UST (643C) and to assess the

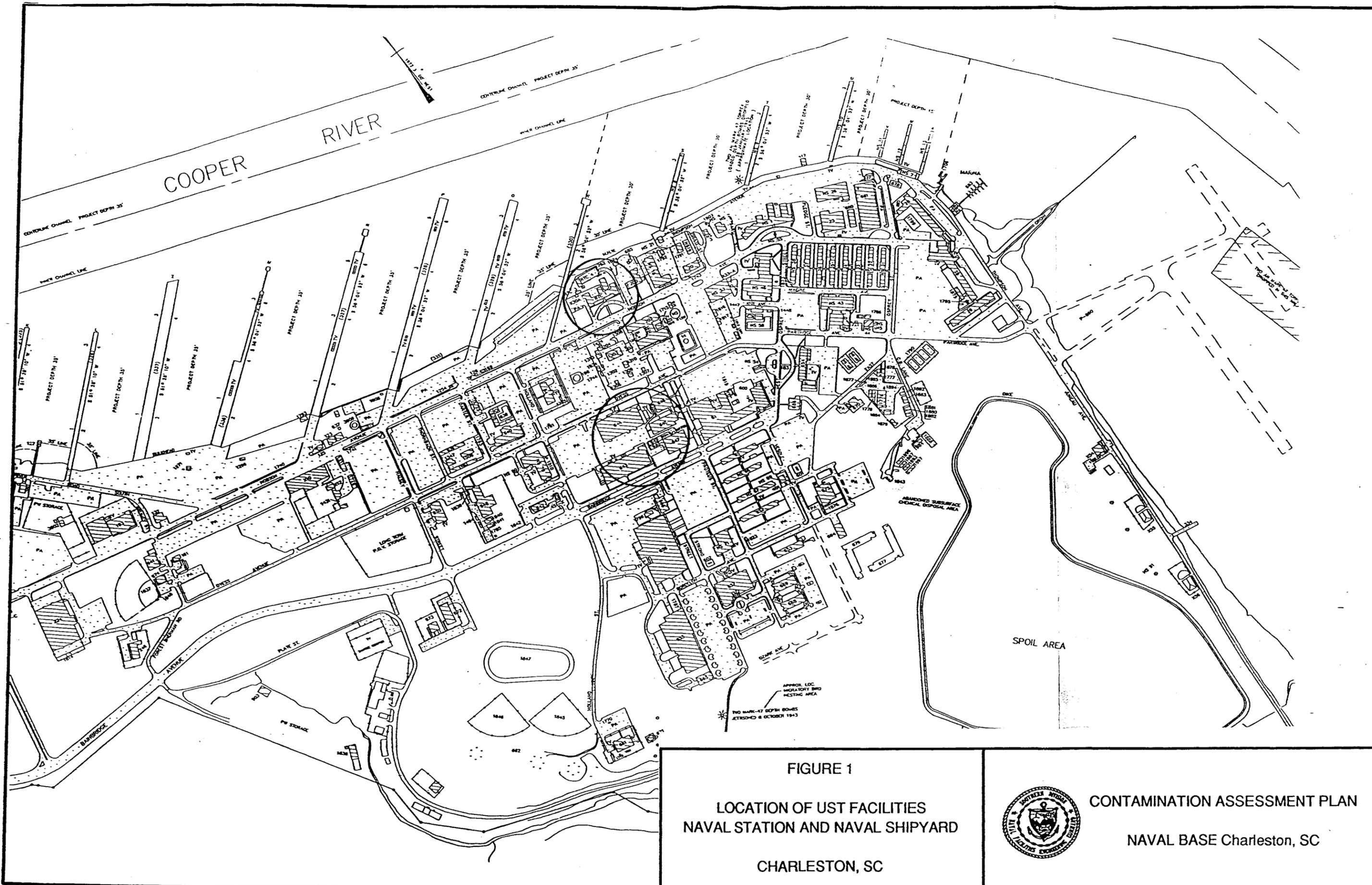


FIGURE 1
 LOCATION OF UST FACILITIES
 NAVAL STATION AND NAVAL SHIPYARD
 CHARLESTON, SC



CONTAMINATION ASSESSMENT PLAN
 NAVAL BASE Charleston, SC

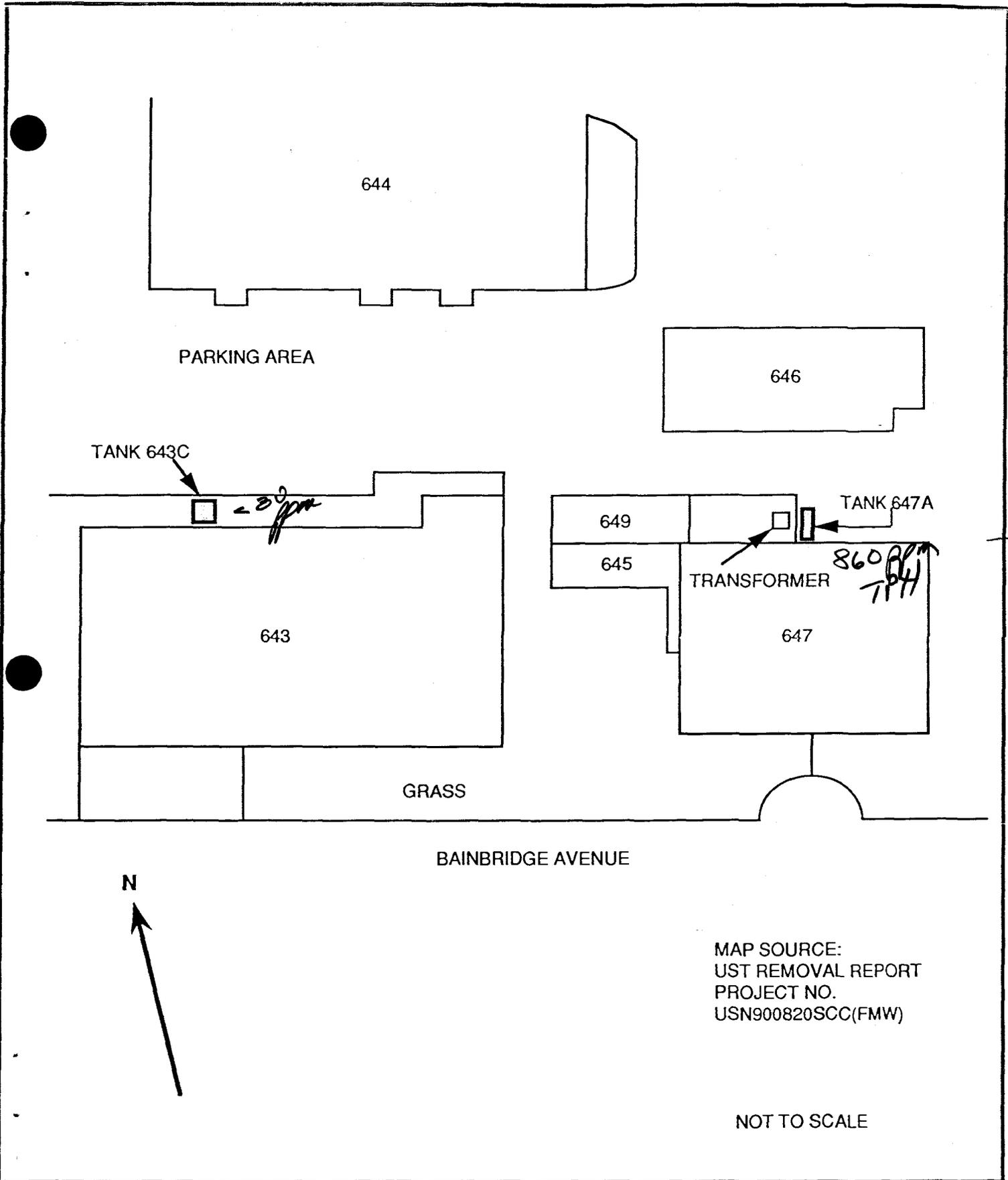


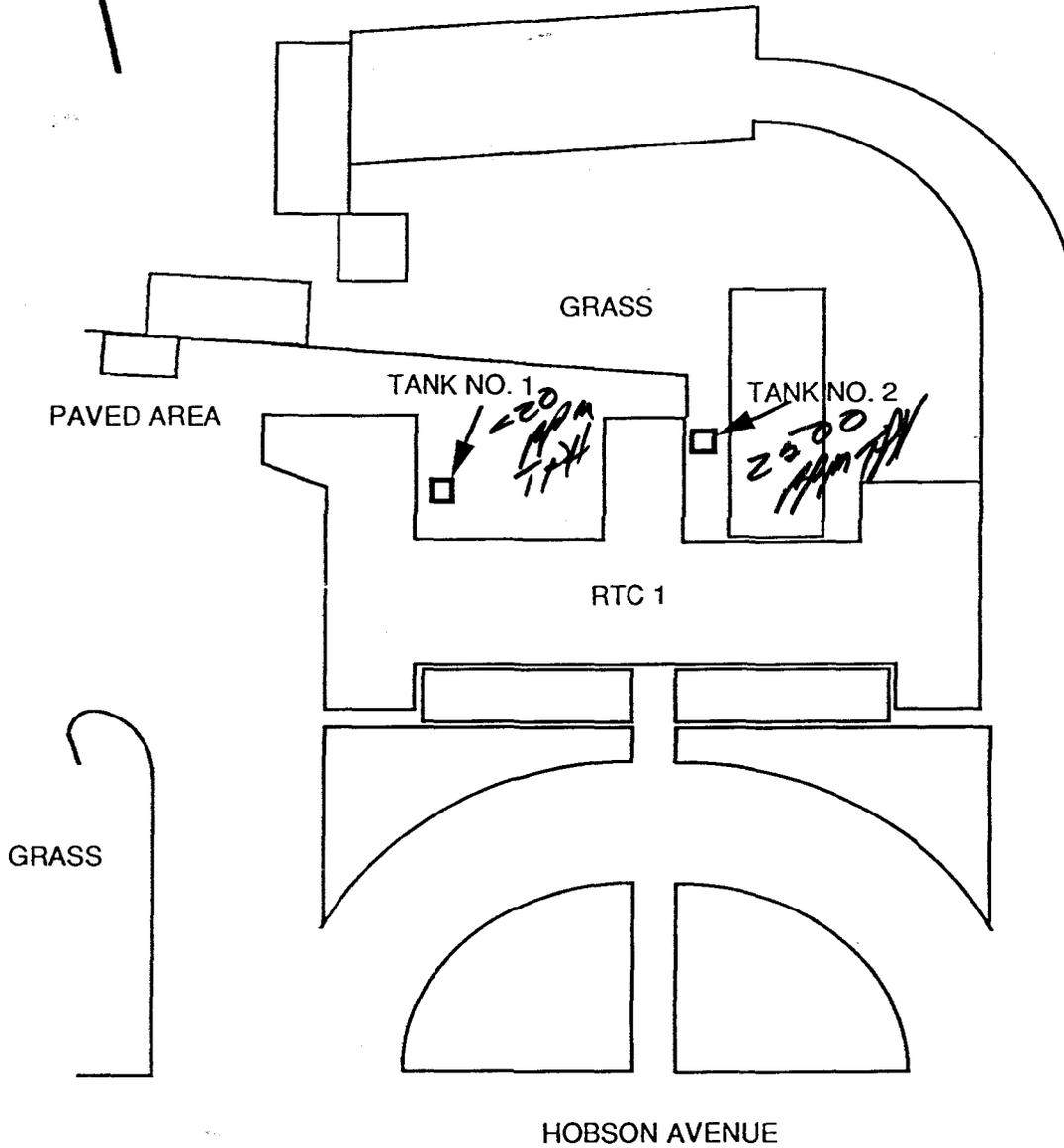
FIGURE 2
UNDERGROUND STORAGE TANK LOCATIONS
 Fleet and Mine Warfare Training Center



CONTAMINATION ASSESSMENT PLAN
 NAVAL BASE Charleston, SC



COOPER RIVER



MAP SOURCE:
UST REMOVAL REPORT
PROJECT NO.
USN900820SCC(RTC)

NOT TO SCALE

FIGURE 3

UNDERGROUND STORAGE TANK LOCATIONS

Naval Reserve Training Center



CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC

environmental impact of one (1) 4000 gallon UST (647A). The 4000 gallon UST (647A) had been previously closed in place and filled with concrete.

According to the Geo Services report, the 550 gallon diesel UST (643C) was removed from the tank basin. The UST showed no signs of deterioration and there was no evidence of corrosion of the associated piping. A soil sample was collected from each end of the tank basin and analyzed for TPH. The analytical results indicated that TPH concentrations in the soil samples did not exceed 30 ppm. As such, it appeared that the UST did not have a significant impact on the environment of the area.

The 4000 gallon diesel UST (647A) was originally installed under concrete and asphalt, immediately east of the building. The UST was out of service and was apparently filled with concrete in August 1980. Soil samples were taken at the four corners of the UST basin and were obtained by hollow-stemmed auger borings. Three (3) samples were collected from each of the four (4) test borings, at the depths 3.5' - 5.0', 8.5 - 10.0', and 13.5 - 25.0', respectively, and submitted to a laboratory for analysis of TPH. The analytical results indicated that TPH was detected. The maximum reading was 860 ppm, and corresponded to the 3.5' - 5.0' interval of boring sample B-3-1 in the northeast corner of the basin. As such, it appeared that contaminants have been released. It is probable that this contamination has emanated from the 4000 gallon UST, and it is probable that this contamination has negatively impacted the ground-water in the area.

1.2.2 UST Removal for NRTC

GEO Services was contracted to remove two (2) 1000 gallon USTs and associated product lines. Both USTs previously contained diesel fuel.

According to the Geo Services report, the No. 1 1000 gallon UST was removed from the tank basin. The UST showed no signs of deterioration and there was no evidence of corrosion on the associated piping. A soil sample was collected from each end of the tank basin and analyzed for TPH. The analytical results indicated that TPH concentrations in the

soil samples did not exceed 20 ppm. As such, it appeared that the No. 1 UST did not have a significant impact on the environment.

The No. 2 1000 gallon UST was removed from the tank basin. The UST showed signs of severe deterioration in the form of rust, although there was no evidence of corrosion on the associated piping. A soil sample was collected from each end of the tank basin and analyzed for TPH. The analytical results indicated that TPH was detected. The maximum reading was 2500 ppm from the east end soil sample. As such, it appeared that contaminants have been released. It is probable that this contamination has emanated from the UST designated as Tank No. 2 and it is probable that this contamination has negatively impacted the ground-water in the area.

1.3 Objective

The objective of the Contamination Assessment Plan (CAP) is to specify the methods which will be used to determine the extent of petroleum hydrocarbon contamination in the soil and ground-water at the FMWTC and the NRTC, Naval Base Charleston, SC. The information collected during Phase I will ultimately be used to develop a Remedial Action Plan (RAP) designed to mitigate and correct contamination impacts.

2.0 PROPOSED CONTAMINATION ASSESSMENT PLAN

2.1 Document Review

The initial step in conducting the Contamination Assessment and subsequent Contamination Assessment Report (CAR) will be a review of previous applicable and relevant documents, studies and investigations.

Specific documents to be reviewed are:

- o U.S. Army Toxic and Hazardous Materials Agency, "Minimum Requirements for Boring Logs, Drilling Procedures and Monitoring Well Installation".
- o "Methods of Chemical Analysis for Water and Wastes", EPA 600/4-79-020.
- o "Procedures for Handling and Chemical Analysis of Sediment and Water Samples", Technical Report EPA CE-81-1.

- o "Groundwater Monitoring Guide", NEESA 20.2-013A.
- o "Standard Method for the Examination of Water and Wastewater", American Public Health Association, Latest Edition.
- o "Flammable and Combustible Liquids Code", NFPA 30-1987, National Fire Codes and Standards, 1990.
- o "Recommended Practice for Handling Underground Leakage of Flammable and Combustible Liquids", NFPA 329-1987, National Fire Codes, 1990.
- o "Specifications for Groundwater Monitoring Well Installation and Sampling", Southern Division, Naval Facilities Engineering Command Guide, 27 March 1989.
- o "Report Format Guidance Manual", Southern Division, Naval Facilities Engineering Command, 14 March 1989.
- o "UST Removal and Closure in Place for FMWTC Charleston, South Carolina", GEO Services.
- o "UST Removal for NRTC Charleston, South Carolina", GEO Services.

2.2 Site Inspection

A site inspection was conducted on 16 July, 1991. During the inspection, facility personnel were interviewed. Additionally, underground utilities and other potential preferential contaminant pathways were approximately located. Prior to drilling activities, underground utilities will be clearly marked on-site. In addition, proposed soil boring and monitoring well locations will also be verified and marked.

3.0 SOIL GAS SURVEY, SOIL BORING AND MONITORING WELL INSTALLATION

In order to better define the horizontal and vertical extent of soil and ground-water contamination, a soil gas survey and drilling program will be conducted as part of Phase I activities.

A total of twenty five (25) soil gas survey points will be evaluated, six (6) soil borings will

be drilled to depths of ± 20 feet and six (6) additional soil borings will be converted into permanently installed monitor wells for both of the sites combined. Proposed locations of the Phase I soil gas survey points, soil borings and monitor wells are shown in Figures 4 and 4A (FMWTC), and Figures 5 and 5A (NRTC), respectively.

3.1 Soil Gas Survey

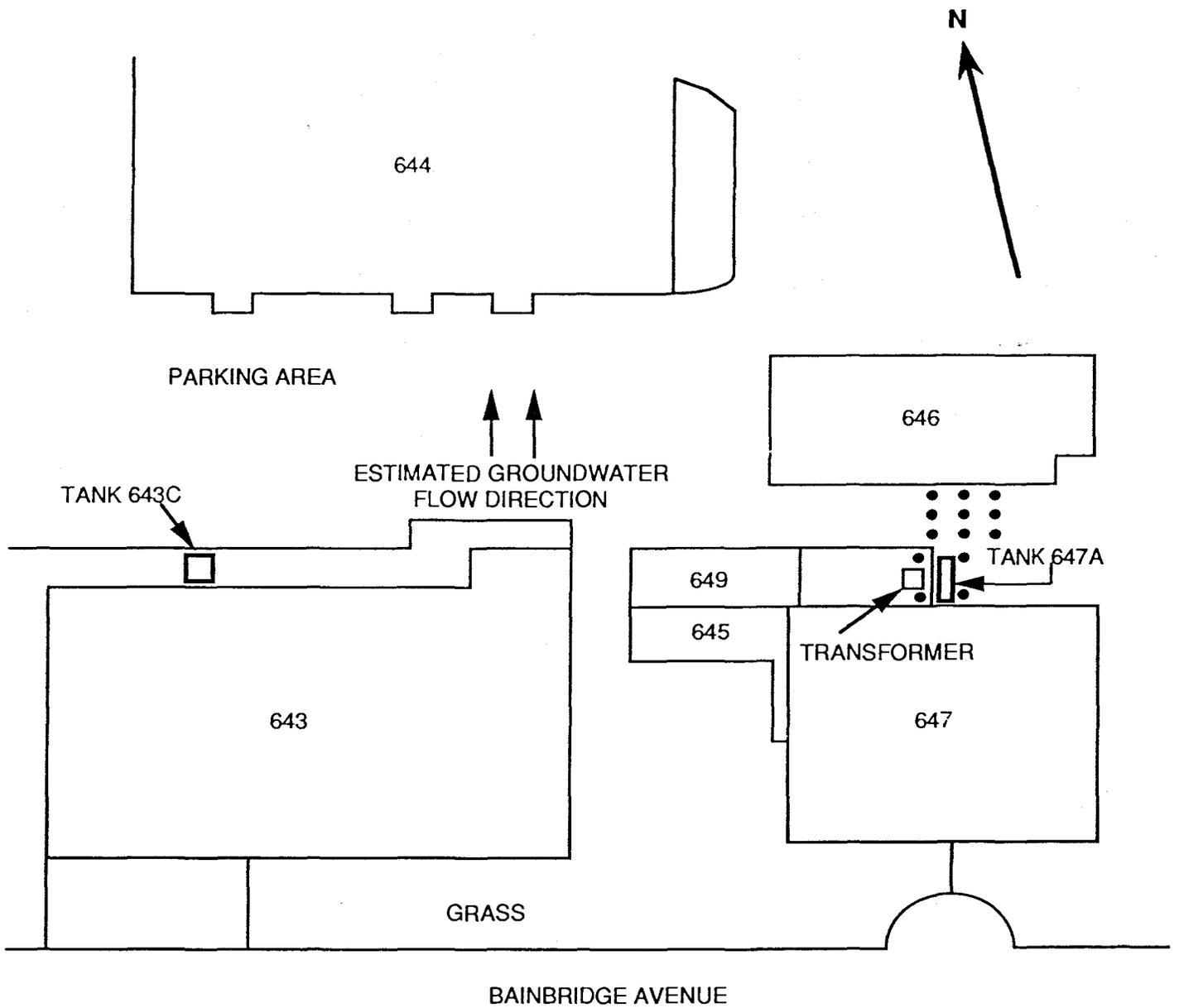
A soil gas survey will be conducted in the vicinity of the abandoned UST at FMWTC and the former No. 2 UST at NRTC (Figures 4 and 5, respectively). The work to be conducted will involve collection of twenty five (25) soil vapor samples from the subsurface at both sites, combined. The soil gas survey points will be distributed as necessary in order to define contamination at each site. The equipment required to conduct this type of sampling will be contained within a standard size four wheel van. A hydraulic ram mounted within the van will be used to push an approximately one inch diameter steel tube into the ground. A vacuum pump will then be used to withdraw an air sample from the soil.

After the air sample has been collected, the steel tube will be withdrawn from the ground. The air sample will be delivered to a certified lab for analysis of benzene, toluene, ethylbenzene and xylene (BTEX) compounds.

3.2 Drilling Specifications

Soil borings and monitor wells will be completed in the vicinity of the abandoned UST at FMWTC and the former No. 2 UST at NRTC (Figures 4A and 5A, respectively). Drilling of boreholes will be completed using hollow-stem auger techniques with continuous split spoon soil sampling per ASTM D 1586; U.S. Army Toxic and Hazardous Materials Agency, "Minimum Requirements for Boring Logs, Drilling Procedures and Monitor Well Installation"; and Southern Division Naval Facilities Engineering Command, "Guidelines for Groundwater Monitoring Well Installation" (Revision 4, 27 March, 1989).

Monitor well installations will be completed by placing schedule 40 PVC threaded well screen (.010" slot) and attached schedule 40 PVC threaded, 2 inch diameter casing through



MAP SOURCE:
 UST REMOVAL REPORT
 PROJECT NO.
 USN900820SCC(FMW)

LEGEND

- PROPOSED SOIL /GAS SURVEY POINTS
- ➔ ESTIMATED GROUNDWATER FLOW DIRECTION

NOT TO SCALE

FIGURE 4

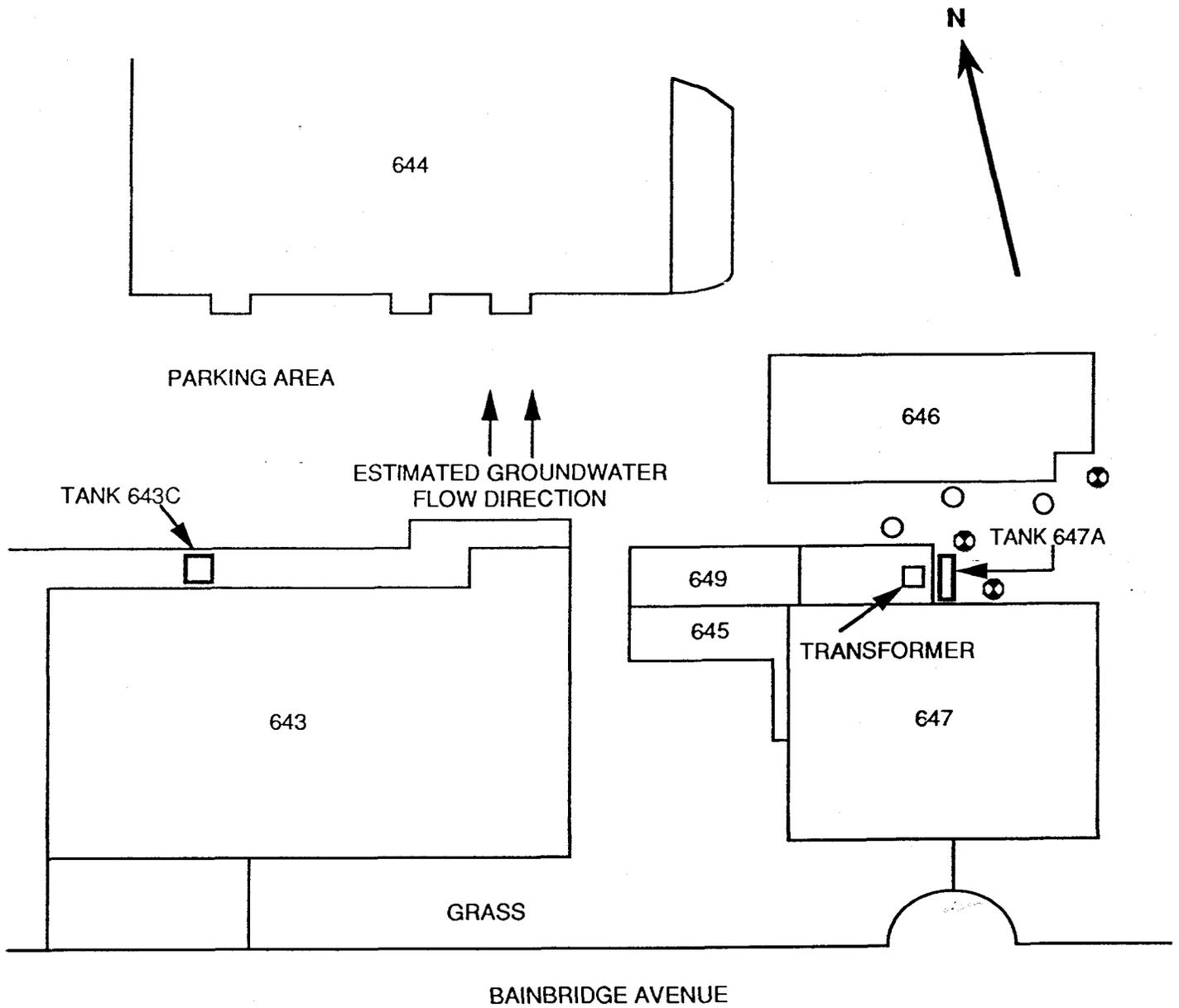
PROPOSED SOIL /GAS SURVEY POINTS

Fleet and Mine Warfare Training Center



CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC



MAP SOURCE:
 UST REMOVAL REPORT
 PROJECT NO.
 USN900820SCC(FMW)

LEGEND

- PROPOSED SOIL BORING LOCATIONS
- ⊗ PROPOSED MONITORING WELL LOCATIONS
- ➔ ESTIMATED GROUNDWATER FLOW DIRECTION

NOT TO SCALE

FIGURE 4A

PROPOSED SOIL BORINGS AND
 MONITORING WELL LOCATIONS

Fleet and Mine Warfare Training Center

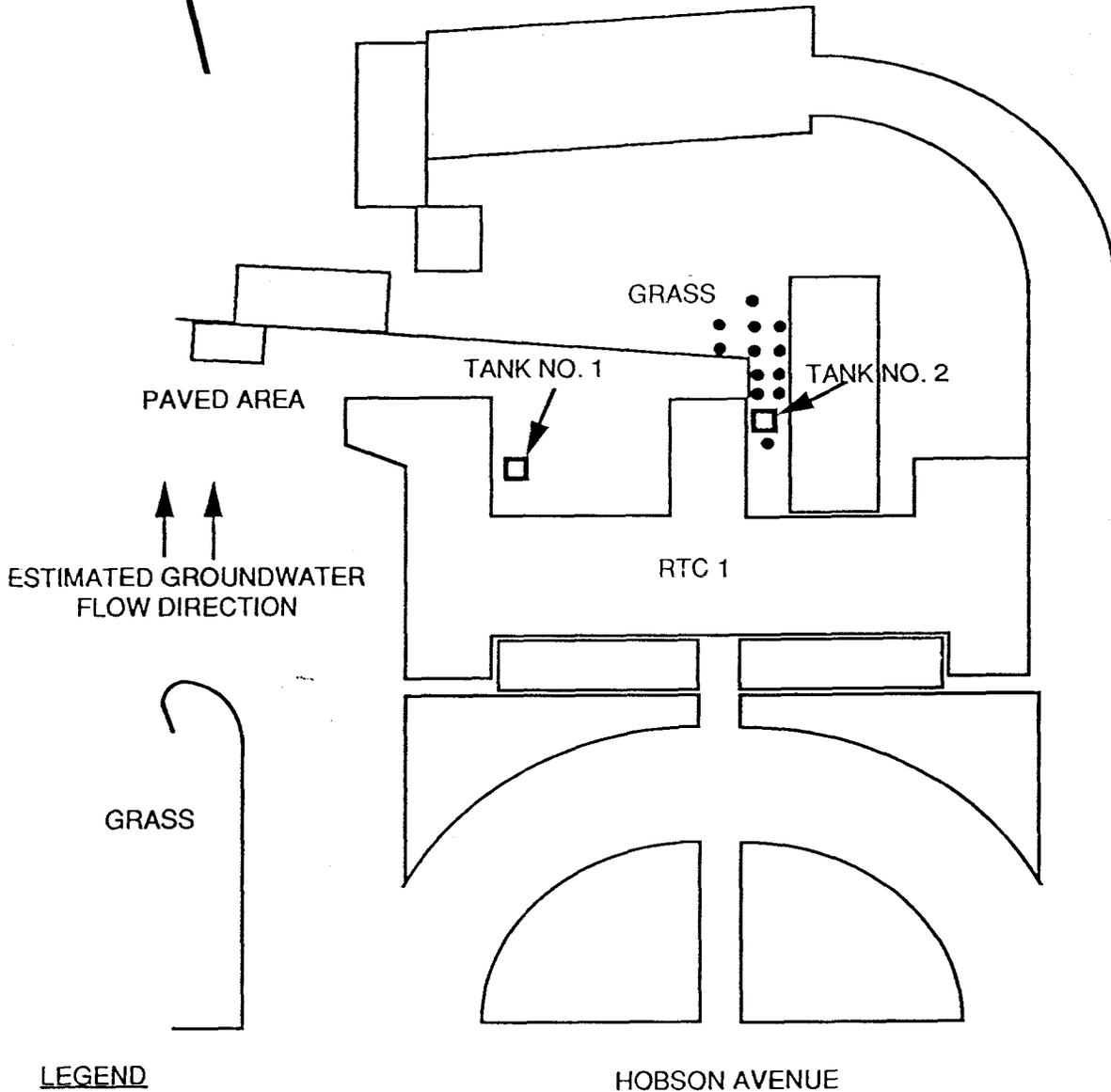


CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC



COOPER RIVER



LEGEND

- PROPOSED SOIL/GAS SURVEY POINTS
- ➔ ESTIMATED GROUNDWATER FLOW DIRECTION

MAP SOURCE:
 UST REMOVAL REPORT
 PROJECT NO.
 USN900820SCC(RTC)

NOT TO SCALE

FIGURE 5

PROPOSED SOIL/GAS SURVEY POINTS

Naval Reserve Training Center

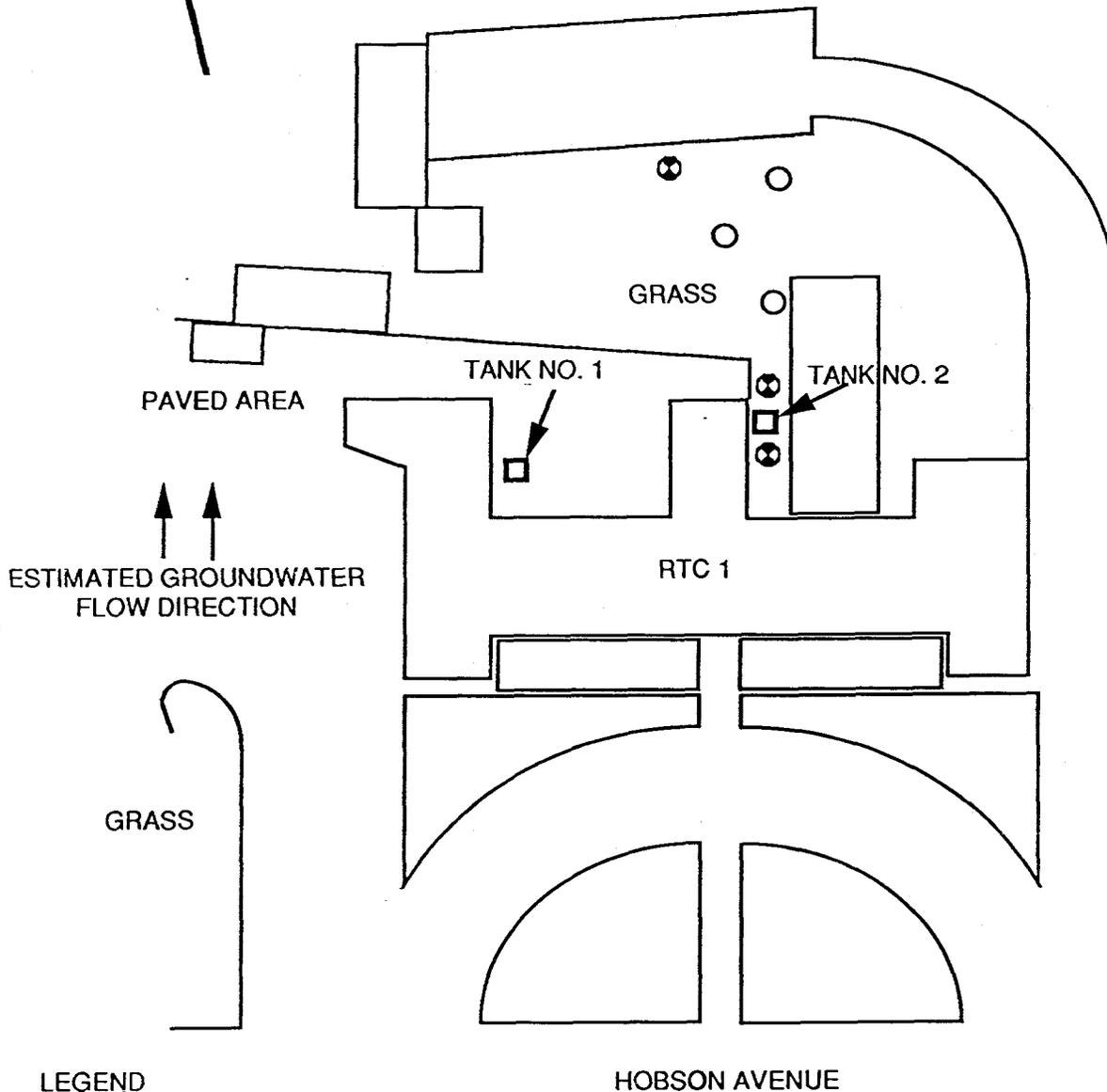


CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC

N

COOPER RIVER



LEGEND

- PROPOSED SOIL BORING LOCATIONS
- ⊗ PROPOSED MONITORING WELL LOCATIONS
- ➔ ESTIMATED GROUNDWATER FLOW DIRECTION

MAP SOURCE:
 UST REMOVAL REPORT
 PROJECT NO.
 USN900820SCC(RTC)

NOT TO SCALE

FIGURE 5A

PROPOSED SOIL BORINGS AND
MONITORING WELL LOCATIONS

Naval Reserve Training Center



CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC

the hollow stem of the auger flytes. Well screens will not exceed ¹⁰~~15~~ feet in length and will be placed so as to intersect the water-table surface.

Following insertion of the screen and casing string, the annular space between the outside of the screen and the inner wall of the auger flytes will be filter packed with clean, well sorted (uniformity coefficient of 1 - 3) silica sand meeting ASTM C775 specifications by gravity or if necessary gravity/wash methods. If it becomes necessary to use water to place the filter pack, only clean potable water from an approved source will be used. The filter pack will extend at least one foot above the top of the screened interval. The filter pack will be installed in lifts not exceeding 2 feet and the auger flytes retracted a corresponding amount to reduce the potential for sand locking the screen and casing within the augers.

A one foot thick granular bentonite seal will then be placed directly above the filter pack material. After allowing sufficient time for hydration the remaining annular space will be sealed with Type I Portland Cement containing 2 - 5% granular bentonite.

The monitor wells will be finished below grade within protective flush mounted 12 inch diameter manholes. Keyed alike locking systems will be provided. A typical well construction diagram is shown in Figure 6. Well identification plates numbered in accordance with NAVFAC protocol will be secured to each well-head.

All drilling cuttings will be containerized in 55 gallon steel drums, and disposed of in an environmentally sound manner.

Well development will be completed by a PVC handpump or by bailing with a PVC or teflon bailer. Development will proceed until non-turbid water is discharged and temperature, pH and specific conductivity have stabilized. Water discharged during development will be containerized and analyzed for TPH and BTEX compounds. The water will be disposed of in a manner appropriate for the analytical results.

MONITORING WELL NO: _____

MANHOLE COVER

CAP

CONCRETE PAD

GROUND SURFACE

GROUT: CEMENT/BENTONITE

8 INCH NOMINAL
DIAMETER BOREHOLE

RISER CASING

MATERIAL: Sch 40 PVC
I.D.: 2.0 inches

BENTONITE PELLET SEAL

WELL SCREEN

MATERIAL: Machine slotted PVC
SLOT WIDTH: 0.010 inches
LENGTH:
I.D.: 2.0 inches

FILTER PACK: WASHED SILICA SAND

BOTTOM CAP

(NO SCALE)

FIGURE 6

TYPICAL MONITORING
WELL CONSTRUCTION



CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC

The drilling rig and all down-hole drilling tools will be decontaminated by steam cleaning prior to mobilization on-site and between borings. Split-spoons will be steam cleaned between runs. All well screens, casings and end plugs will be steam cleaned prior to installation and will contain no stamped, painted or printed material. All work will be conducted within a clearly marked exclusion zone as described in the Health and Safety Plan.

3.3 Technical Oversight

A Serrine hydrogeologist will be on-site during drilling, well installation and well development activities. The Serrine field representative will be responsible for supervision of drilling and well construction activities.

Continuous split-spoon soil samples will be lithologically described and recorded on NAVFAC approved lithologic logs. Upon completion of each monitor well installation, a well construction log will be completed using the appropriate well construction forms.

Additionally, the Serrine field office representative will be responsible for air quality monitoring and record keeping in accordance with the Health and Safety Plan.

4.0 SURVEYING

Upon completion of construction and development, each monitor well will be located with respect to horizontal and vertical datum. The horizontal datum will be either base coordinate grid system or North American Datum '27 at the discretion of the EIC and the activity Public Works Office. The vertical datum will be NVGD '27 or '83 as deemed appropriate by the EIC and the activity Public Works Office. Levelling will be tied into an established measuring point at each wellhead and will be to the nearest 0.01 foot. All surveying work will be certified by a Registered Land Surveyor.

5.0 FLUID-LEVEL MEASUREMENTS

The prevailing hydraulic gradient of the upper-most aquifer will be determined for the site.

Depth to fluid will be measured relative to a known elevation reference established for each well. Accuracy of measurements shall be within 0.01 ft or 1/8 inch. Depth to fluid measurements will be converted to elevations so that a contour map of the ground-water surface may be developed.

Depth to fluid measurements will be made using a hydrocarbon interface probe to determine thicknesses of free product if present within the well bores.

6.0 SAMPLING AND ANALYSES

One soil sample will be collected from each soil boring, one soil sample will be collected from each monitor well, and one aqueous sample will be collected from each monitor well.

6.1 Sampling Protocol

6.1.1 Soil Sampling

Soil samples will be collected from the borehole by continuous split-spooning. Split-spoons will be steam cleaned prior to each run to minimize the potential for cross-contamination of samples. Upon retrieval the soil sample will be visually inspected for obvious petroleum hydrocarbon contamination and lithologically described.

Soil samples will be field screened for volatile organic compounds (VOCs) with a Photovac TIP analyzer. Field screening will be completed by placing a representative portion of each split-spoon sample in a clean glass container sealed with an aluminum foil septum or polyethylene resealable bag. The samples will be allowed to de-gas for 15 minutes and a head-space sample will then be introduced into the Photovac TIP for analysis. Digital readings relative to a known calibration standard (isobutylene) can be obtained immediately and will be recorded for each sample. Results of field screening for VOCs will be used to aid in the selection of soil samples to be submitted for laboratory analyses.

Soil samples which are to be submitted for laboratory analyses will be placed in sterile glass containers provided by the contract laboratory. Each soil sample will be assigned a unique

identification number for tracking purposes.

A total of six (6) soil samples from each site will be collected for laboratory analyses during Phase I activities. Parameters to be analyzed in soil samples will be TPH by modified method 8015 (GC) and lead by EPA method 7421 (furnace).

6.1.2 Ground-Water Sampling

One ground-water sampling round will be conducted upon completion of monitor well construction and development. Parameters to be analyzed in ground-water samples are: EPA 624/8240, EPA 625/8270, TPH (8015), lead (7241), BOD, pH and specific conductance. Standard field parameters (pH, specific conductivity and temperature) will be measured at the time of sample collection.

Prior to sample collection a minimum of three (3) well volumes will be purged from each monitor well or the well will be bailed dry. All water purged prior to sampling will be contained in drums and disposed of in an environmentally sound manner.

A teflon bailer will be used for ground-water sample collection. The bailer will be thoroughly washed and rinsed prior to sampling and between wells to reduce potential cross-contamination. Ground-water samples will be immediately placed in sterile containers, assigned unique identification numbers and preserved in accordance with EPA protocol.

6.1.3 Quality Assurance/Quality Control

All samples submitted for laboratory analyses will be assigned unique identification numbers for tracking purposes. A Chain-of-Custody form will be completed by the sampler and will accompany all samples from the field to the analytical laboratory. All persons handling the samples will be required to sign the Chain-of-Custody.

Trip blanks will accompany containers and samples from issue at the laboratory to the sampling location and back to the laboratory upon delivery of the samples. NEESA Level

C QC guidance will be followed during sampling and data validation.

7.0 HYDRAULIC TESTING

Slug tests will be conducted to calculate an estimate of the hydraulic conductivity of the affected aquifer. These data combined with the observed hydraulic gradient and an estimate of the effective porosity of the formation will be used to calculate the natural flow rate of ground-water across each site. Slug tests are recommended because: 1) small diameter monitor wells can easily be slugged; and 2) there will be no potentially contaminated discharge water to dispose of as would be the case if a pumping test were conducted.

8.0 ADJACENT LAND USE

The area adjacent to the FMWTC and to the NRTC will be surficially examined for other potential contaminant sources. In addition, nearby discharge points, including water wells within 1/4 mile of each site will be identified.

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SEP 30 1991

COMMUNICATIONS

SECTION

SECTION II
HEALTH AND SAFETY PLAN

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GROUND-WATER
PROTECTION DIVISION

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10.0 COORDINATION AND RESPONSIBILITY

The Project Manager must not allow work to begin until this Health and Safety Plan has been provided to all field personnel. Before visiting the work site, all personnel must attend a site specific briefing session, to be conducted by the SIRRINE Health and Safety Director or his designee, on the potential site hazards and specific requirements of this Health and Safety Plan, including training in the proper function and operation of all monitoring and personal protective equipment. The overall responsibility for the health and safety of SIRRINE project personnel lies with the SIRRINE Health and Safety Director. The Site Health and Safety Officer (HSO, the senior SIRRINE representative continually on the site during any site activity) will be responsible for ensuring that the Site-specific Health and Safety Plan is complied with during site operations. If there is any question whether an unplanned occurrence on site may compromise health and safety, the HSO has the authority to interrupt operations and to remove all personnel from the area. If practical, the Project Manager and Health and Safety Director should be consulted before any operation is interrupted. If work is stopped due to any health and safety concern, immediate attention should be given by health and safety personnel, working in cooperation with the Project Manager, to identify and correct the cause of concern as quickly as possible. Any such incident should be fully documented by the Site Health and Safety Officer in a report to the Health and Safety Director and Project Manager. In the event of a work stoppage, the client must be notified as soon as possible, and kept apprised of progress in resolving the incident until normal operations are resumed.

NOTE: Refer to Page 28 for Primary Emergency Contact Numbers.

11.0 SITE DESCRIPTION

The FMWTC and the NRTC are located on the Naval Base in Charleston, South Carolina. During an environmental site assessment in November, 1990, soil contamination was detected in the area of an abandoned in place UST at the FMWTC. In addition, during removal of a UST at the NRTC in November, 1990, soil contamination was also detected.

12.0 PROJECT DESCRIPTION

12.1 Project Description

A. Objective

The objective of this project is to determine the horizontal and vertical extent of petroleum hydrocarbon contamination in the soil and ground-water at the FMWTC and the NRTC, Naval Base Charleston, SC.

B. Assessment Activities

The boreholes for well installation will be drilled using nominal 6 inch ID hollow-stem augers to depths of \pm 20 feet. Continuous split-spoon samples will be collected beginning at 2 feet below land surface to the total depth of the boring. The upper 2 feet of each boring will be hand augered to minimize the risk of accidental breaching of underground utilities and/or product dispensing lines.

Organic vapor monitoring will be conducted at 5 minute intervals using a Photovac TIP II air analyzer. The Photovac TIP II is capable of detecting and quantifying (relative to known calibration standard) organic vapors having an ionization potential of 10.6 eV. Most volatile organic compounds and many semi-volatile organic compounds are detectable with this instrument including; benzene, toluene, ethylbenzene, xylenes, naphthalene, etc.

The drill rig and all downhole tools will be steam cleaned prior to mobilization onto the site, between boreholes, and prior to demobilization off-site. Split spoons will be decontaminated between runs. All well screens, casing and end plugs will be steam cleaned prior to installation. No printed, stamped or painted material will be permitted on the screens, casings or end plugs.

Monitor well development will be completed with a PVC or Teflon bailer. Development will proceed until the discharge is non-turbid and temperature, specific conductivity and pH have stabilized. All drill cuttings and water discharged during development will be containerized in 55 gallon drums.

13.0 HAZARD ASSESSMENT

Data gathered at these locations indicate potential fuel oil contamination in the subsurface.

13.1 Toxicity Summary

13.1.1 Fuel Oil No. 2 - Diesel

Fuel Oil No. 2 is minimally irritating to the eyes, but extremely irritating to the skin, with burns and possible blistering. Middle distillates have caused skin cancer and kidney damage in laboratory animals. Care must be taken to avoid contact with the material. Inhalation of high vapor concentrations may cause nausea, narcosis, and/or drowsiness. Inhalation of extremely high concentrations of vapor may result in the cessation of breathing and death.

TLV:	Stoddard Solvent 100 ppm TWA
PEL:	N/A
IDLH:	N/A
DESCRIPTION:	Brownish colored liquid with a characteristic odor
SOLUBILITY:	Negligible
FLASH POINT:	160°
IONIZATION POTENTIAL:	N/A
VAPOR PRESSURE:	Low at Room Temperature
LEL:	0.52%
VEL:	4.10%
RESPIRATOR CARTRIDGE BREAKTHROUGH TIME:	N/A
H Nu SENSITIVITY:	N/A
OVA SENSITIVITY:	N/A

14.0 QUALITATIVE RISK ANALYSIS

The amount of fuel oil in the soil is currently unknown. During drilling and sampling operations vapor concentrations may become elevated. The flash point of fuel oil No. 2 is

160° F. When temperatures exceed this level sufficient vapors are generated which will support combustion. This presents a significant risk of fire and explosion during site activities. Organic vapor concentrations in the air will be monitored as specified (see Section 6), to warn of any inhalation hazard in the breathing zone. An explosimeter will be used to detect when atmospheric conditions approach the lower explosive limit (LEL). Skin contact with contaminated soil may be irritating and could increase the risk of long term effects such as skin cancer and kidney damage.

Inhalation of vapors may occur during drilling operations if underground vapor pockets are purged. The risk of skin absorption may elevate if personal protective clothing or gloves are torn during sampling and drilling activities. This may result in the ingestion of contaminated particulates if proper personal hygiene practices are not followed.

With proper use of industrial hygiene equipment and personal protective equipment accompanied by good personal hygiene practices as outlined in this Health and Safety Plan, the potential risks at this location are expected to be insignificant. However, failure of equipment or of an individual to adhere to the guidelines outlined in this document will increase the potential risks to a level dependent upon actual exposure and sensitivity of the exposed individual.

15.0 ENVIRONMENTAL MONITORING

Organic vapor monitoring will be conducted at 5 minute intervals using a Photovac TIP II air analyzer. The Photovac TIP II is capable of detecting and quantifying (relative to a known calibration standard) organic vapors having an ionization potential of 10.6 eV. Most volatile organic compounds and many semi-volatile organic compounds are detectable with this instrument including: benzene, toluene, ethylbenzene, xylenes, naphthalene, etc.

15.1. Explosimeter

Combustible gas readings must be taken continuously at all drilling/sampling sites. If the reading results in 20% of the LEL, all work operations must cease and site personnel will evacuate the area. After a reasonable time (10 - 15 minutes) to allow the combustible gas

to dissipate, the site HSO will take additional readings while approaching the drilling/sampling site. If levels are below 20% of the LEL, work may resume at this location. If levels remain at or above 20% of the LEL, the site HSO must direct work activities to a different location.

16.0 PERSONAL PROTECTIVE EQUIPMENT

16.1 Respiratory Protection

Level C or a modified Level D (tyvek suits, boots, gloves) must be maintained throughout the duration of the work in the exclusion zone. Half mask respirators with organic vapor cartridges will be required whenever OVA readings in the breathing zone reach 50 ppm. If OVA readings reach 1000 ppm the work site should be evacuated. Should this happen, the Serrine Health and Safety Director should be consulted for further instructions before work continues at this site.

16.2 Nonrespiratory Personal Protective Equipment

The following items will be required for field operations at this site:

- o Hardhat with liner
- o Steel toe boots or safety shoes (neoprene boots as necessary)
- o Nitrile or neoprene gloves
- o Tyvek suits
- o Safety glasses or goggles for work around drill equipment
- o Eyewash (15 minute)
- o Fire Extinguisher (20 lb. ABC)
- o First Aid Kit
- o Decontamination sprayer and Decon Solution
- o 5 Gallon cooler with water
- o 5 Gallon wash water container (for washing hands and face)

17.0 HEAT STRESS PROTECTIVE MEASURES

When the body temperature rises, the body seeks to dissipate the excess heat. The major

disorders due to heat stress are heat cramps, heat exhaustion, and heat stroke. Heat cramps are painful spasms which occur in the muscles of workers who sweat profusely in the heat and drink large quantities of water, but fail to replace the body's lost salts and electrolytes.

Heat exhaustion is characterized by extreme weakness or fatigue, dizziness, nausea, and headache. In serious cases, a worker may vomit or lose consciousness. The skin is clammy and moist, complexion pale or flushed, and the body temperature can be normal or slightly higher than normal. Treatment consists of rest in a cool place and replacement of body water lost by perspiration. Mild cases may recover spontaneously with this treatment. Severe cases may require care for several days. There are no permanent effects.

Heat stroke is caused by the breakdown of the body's heat regulating mechanism. The skin is very dry and hot with a red or bluish appearance. Unconsciousness, mental confusion, or convulsions may occur. Without quick and adequate treatment, the result can be death or permanent brain damage. Medical assistance should be given quickly. The person should be moved to a cool place. Body heat should be reduced artificially by soaking the person's clothes with water and fanning them. The following steps can be taken to reduce heat stress:

- o Acclimate the body
- o Drink more liquids to replace body water lost during sweating
- o Increase salt consumption (salt tablets are not recommended)
- o Wear personal cooling devices
- o Wear supplied air suits or respirators equipped with a vortex tube that cools the air being supplied.

18.0 ACCIDENT PREVENTION

Preventing accidents is the responsibility of each individual on site. Unsafe or dangerous

working conditions shall be reported immediately to the Health and Safety Officer (HSO). Instructing respective employees in safe work practices and emergency procedures is the responsibility of the Serrine HSO and any subcontractor(s). Serrine shall provide the subcontractor(s) with the Health and Safety Plan, for information only. Adherence to the standard safety operating procedures and practices described below shall be required of Serrine personnel to minimize the risk of accidents resulting in injury or excessive chemical exposure.

19.0 STANDARD OPERATING SAFETY PROCEDURES AND CONTROLS

The following general operating procedures shall be followed by all site personnel. These precautionary measures are designed to reduce the risks of inadvertent or accidental chemical exposure or injury during on-site operations.

19.1 Personal Precautions

- o Be familiar with standard operating safety procedures and adhere to all instructions and requirements in the site safety plan.

- o Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any contaminated or potentially contaminated area. However, a supply of cold water and disposable cups will be located in the decontamination area such that employees will have access to water with only removal of gloves, hat, and respirator where used.

- o Contact lenses shall not be worn in any contaminated area.

- o Hands and face must be thoroughly washed upon leaving the work area. Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

- o No facial hair which interferes with a satisfactory respirator fit of the mask-to-face seal is allowed on personnel required to wear respirators.
- o Avoid contact with contaminated or suspected contaminated surfaces. Whenever possible, avoid walking through puddles, mud, etc. Avoid kneeling or sitting on the ground, equipment or drums.
- o Personal articles shall be prohibited in any contaminated area.
- o Medicine and alcohol can exacerbate the effects from exposure to toxic chemicals. Alcoholic beverage intake should be minimized or avoided on off work hours during field operations. Prescribed drugs should not be taken by personnel on site operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Do not work when ill.
- o Be alert to potential health and safety hazards.

19.2 Operational Requirements

- o All personnel going on site shall be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications.
- o Respiratory protective devices and/or protective clothing appropriate to the designated levels of protection shall be worn by all personnel going into areas designated for wearing protective equipment.
- o Personnel on site shall use the buddy system when wearing respiratory protective equipment.

- o Visual and/or voice contact shall be maintained between pairs on site. Entry team members shall remain close together to assist each other during emergencies.
- o During continual operations, on-site workers shall act as safety backup to each other. Off-site personnel shall provide emergency assistance.
- o Personnel should practice new or unfamiliar operations prior to performing the actual procedure.
- o Entrance and exit locations shall be designated and emergency escape routes delineated. The following warning signals shall be used when necessary:

Hand gripping throat	Can't breathe
Grip partner's wrist or both hands at waist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	OK, I am all right, I understand
Thumbs down	No, negative

- o Communications shall be maintained between field team members at all times. The location of the nearest telephone to site activities will be identified in order to facilitate emergency response communications.
- o Wind indicators visible from the work location should be identified before commencing operations.
- o Personnel and equipment in the contaminated area shall be minimized, consistent with effective site operations.
- o Decontamination procedures for leaving a contaminated area shall be followed.

Hands and face shall be washed prior to work breaks and eating. Work areas and decontamination procedures have been established based on expected site conditions (see Section 11).

- o Report all injuries or work related illnesses to the site HSO or supervisor as soon as possible.

19.3 Drilling Safety

Drilling safety is the responsibility of each member of the drilling crew. Standard operating safety procedures shall comply with guidelines/recommendations specified in the Drilling Safety Guide (National Drilling Federation) or the Manual of Recommended Safe Operating Procedures and Guidelines for Water Well Contractors and Pump Installers (National Water Well Association) or other recognized drilling industry safety guidelines.

Sirrinc personnel shall not assist subcontracted drillers with their assigned tasks. This is required in order to limit the exposure of SIRRINC employees to hazards associated with drilling operations.

Although SIRRINC is not required to provide safety oversight for drillers, the drilling supervisor should be informed of any safety violations, unsafe work practices or imminent danger observed by SIRRINC in the normal performance of our assigned duties.

19.4 Adherence to Buddy System

No field operation is without some degree of risk. For this reason, a minimum of two people must be assigned to all task locations and must stay within voice contact at all times.

20.0 DECONTAMINATION CONTROL MEASURES

Site work zones shall be established by the HSO to reduce the accidental spread of hazardous substances by workers or equipment.

20.1 Site Organization and Control

Three general areas of operation shall be established to reduce the risk of personnel exposure to hazardous substances. The three areas are:

- o Exclusion Zone (Zone A)
- o Contamination Reduction Zone (Zone B)
- o Support Zone (Zone C)

The dimensions of each area and the safe working distances between each area shall be balanced against practical work considerations and existing field conditions.

Exclusion Zone

This area shall be considered contaminated, and all personnel within the area must use the prescribed levels of personal protection. As defined in this Health and Safety Plan, there may be some areas where the use of respiratory protection is not required during normal work activities. Respirators should be immediately available for use, however, should a potential hazard become evident. These areas are identified by the following characteristics:

- o No known airborne hazards are present and there is little or no potential for release of hazardous airborne contaminants,
- o Work operations preclude splashing of hazardous materials.

Because of the nature of field operations, Tyvek suits, disposable gloves, safety glasses, and shoe coverings shall be required in the Exclusion Zone and Contamination Reduction Zone. Hard hats are required in the exclusion zone. Any item taken into the Exclusion Zone shall be considered to be contaminated until carefully inspected by the site HSO and/or decontaminated.

Contamination Reduction Zone

The Contamination Reduction zone (Zone B) shall serve as a buffer between the Exclusion Zone and the Support Zone, and is intended to prevent the spread of contaminants from

work areas. All decontamination procedures shall be conducted within this area.

Personnel entering this area shall be wearing the prescribed personal protective equipment. Exit from the Contamination Reduction Zone requires the removal of any suspected or known contaminants through compliance with established decontamination procedures.

Support Zone

The Support Zone (Zone C) shall be in a non-contaminated area. It shall contain a first aid station and other elements necessary to support site activities. Normal work clothes and safety shoes are worn in this area. Location shall be based upon favorable wind direction, topography and site accessibility, as conditions allow.

Modifications to Site Control

Less stringent site control and decontamination procedures may be utilized based upon field activities and results of monitoring data. Any modification shall be authorized by the Serrine HSD and supervised by the site HSO.

20.2 Decontamination Procedures

Safe personal hygiene practices are discussed in Section 10, Standard Operating Safety Procedures and Controls. Decontamination shall be performed under the supervision of the site HSO. Personnel and portable field equipment decontamination shall be carried out in the contamination reduction zone. When working in the Exclusion Zone, care should be taken to avoid contamination of equipment (particularly instruments) whenever possible.

For all egress from the Exclusion Zone, decontamination stations shall consist of:

1. Equipment drop
2. Boot, glove and respirator wash
3. Boot, glove, and respirator rinse
4. Tyvek disposal (into 55 gallon drum or other suitable container)
5. Respirator wash and rinse

6. Hand and face wash and rinse

NOTE: All persons subject to decontamination should shower daily as soon as practicable after their work shift.

Monitoring instruments and protective equipment shall be decontaminated if the equipment has been in contact with the ground or splashed with contaminated water, mud or other material. Decontamination solution shall consist of detergent and water. Rinse solution shall be potable water. Decontamination and rinse solutions shall be disposed on site under the supervision of the site HSO.

All equipment shall be cleaned before relocation to and use at any other sampling site or work area.

20.3 Medical Emergencies

For physical injuries, first aid treatment shall be given at the site, depending upon the seriousness of the injury. The victim should undergo decontamination, if necessary, unless such procedures interfere with necessary treatment. In life-threatening situations care shall be instituted immediately. Protective clothing shall be removed or cut away if this will not cause delays, interfere with treatment, or aggravate the problem. If contaminated protective clothing cannot be removed, wrap the victim in clean materials to help prevent contamination of medical personnel and ambulances.

For chemical exposure emergencies, decontamination procedures shall be followed unless severe medical problems requiring life sustaining measures are evident.

21.0 EMERGENCY EQUIPMENT

Emergency equipment available on-site shall include:

- o First Aid Kits, (16 unit as specified in National Safety Council Data Sheet No. 202 or equivalent),

- o Portable eyewash (15 minute duration),
- o Respirators - HEPA/Organic Vapor Combination Cartridges (GMA-H or GMC-H),
- o Citizens' Band (CB) Radio (if field conditions warrant),
- o Fire Extinguisher.

First Aid

In the event of injury, the emergency shall be handled according to the procedures described in the Emergency Procedures Section. The first aid kits shall be maintained at the control access point between the decontamination and support zones and in support vehicles.

22.0 EMERGENCY PROCEDURES

Some risk of personal injury or chemical exposure is inherent in hazardous waste site activities. These risks and the effects of unpredictable events such as injury, chemical exposure, fire or explosion shall be minimized by:

- o Adhering to good work practices
- o Using personal protective equipment appropriate for existing field conditions
- o *Performing* adequate monitoring of individuals and ambient field conditions
- o Staying alert both to personal performance and to that of co-workers.

An emergency situation is considered to exist if:

- o Any member of the field crew is injured in an accident
- o Any member of the field crew experiences or exhibits any adverse effects or symptoms of chemical exposure
- o Safety monitoring indicates site conditions more hazardous than anticipated or that an immediate danger to life or health exists.

22.1 General Emergency Procedures

- o In the event that any member of the field crew experiences any adverse effects or symptoms of exposure while on the scene, the entire field crew shall immediately

halt work and act according to the instructions provided by the site HSO.

- o The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated, shall result in the evacuation of the field team and re-evaluation of the hazard and the level of protection required.
- o In the event that an accident occurs, the site HSO is to complete an Accident Report. Follow-up action shall be taken to correct the situation that caused the accident.

22.2 Personal Injury

Site personnel are trained in American Red Cross first aid procedures and shall administer appropriate first aid treatment, including CPR, in emergency situations. The following general emergency procedures shall be carried out in the event of injury:

1. Notify the Health and Safety Officer (HSO) of the incident.
2. If the victim can be moved safely, remove from the contaminated zone to the decontamination zone using established control points.
3. Administer first aid.
4. Transport victim to nearest hospital or emergency medical center or call for ambulance transport, as appropriate.

NOTE: The site HSO shall direct the removal of injured personnel from the contaminated zone and shall approve any necessary deviation from established decontamination procedures. Such deviation shall be based upon the severity or life threatening nature of the injury.

5. Notify the Serrine Health and Safety Director (HSD) of the incident and describe the emergency response actions taken.

22.3 Chemical Exposure

Before entering the contaminated zone, all site personnel shall be thoroughly acquainted with the types of toxic/hazardous chemicals present on site and their potential concentrations. The following general procedures shall be followed for chemical exposure emergencies:

1. Move the victim from the immediate area of exposure or contamination, taking precautions to prevent additional exposure of other individuals.
2. Notify the site Health and Safety Officer (HSO) of the exposure incident.
3. If victim can be moved safely, proceed to the decontamination zone through established control points.
4. Decontaminate clothing or remove if safe to do so.
 - o For skin or eye contact, thoroughly wash affected area with water (eyes should be flushed for at least 15 minutes)
 - o For inhalation exposure, ensure that victim has adequate fresh air
5. Administer additional first aid treatment as appropriate.
6. Transport victim to nearest hospital or emergency medical center or call for ambulance transport as appropriate.

NOTE: The HSO shall direct the removal of injured personnel from the contaminated zone and shall approve any necessary deviation from established decontamination procedures. Such deviation shall be based upon the security or life threatening nature of the injury.

7. Notify the HSD of the incident and describe the emergency actions taken.

22.4 Fire or Explosion

In the event of a fire or explosion:

1. Immediately evacuate injured personnel and leave the area
2. Administer first aid as appropriate
3. Notify emergency services
4. Notify the Serrine Health and Safety Director

22.5 Emergency Contacts

The appropriate primary contact(s) from the following list shall be made for all emergency situations. See the following page for emergency numbers.

EMERGENCY CONTACT NUMBERS

Naval Station Fire Department 803/743-5334

HOSPITALS

Naval Hospital (Emergency) 803/743-6341
Roper Hospital 803/724-2000
Baker Hospital 803/744-2110

City of North Charleston
Emergency 911

Naval Station Chief of Police 803/743-3652

SIRRIE ENVIRONMENTAL CONSULTANTS

Clif Johnson 803/572-5600 (Work)
Division Manager 803/572-0741 (Home)

John Cox 803/572-5600 (Work)
Project Manager 803/884-1371 (Home)

FMWTC

POC: ICC (SW) Patterson 803/743-5066
Chief Mellichamp 803/743-5066

NRTC

POC: Lt. Shawn 803/743-3912

NAVFAC

Mr. Daryle Fontenot 803/743-0607

NOTE: For ambulance, fire or police contacts, give the name of the road and the nearest intersection. In the event no telephone can be reached, Channel 9 can be accessed with a Citizens' Band (CB) Radio for emergency assistance.

Notify the client contact and the Serrine Health and Safety Director after emergency contacts have been made.

The PPE manager should be contacted if unforeseen circumstances require the immediate procurement of additional personal protective or emergency equipment.

Attending emergency physicians should be given the telephone number of the Serrine Medical Director to obtain immediate access to an employee's medical records for consultation purposes.

The telephone number of these secondary contacts are listed below.

<u>Secondary Emergency Contacts</u>	<u>Telephone</u>
Betty Schnee Serrine Health & Safety Director	803/234-3043 (office) 803/244-1391 (home)
Eric Olson Serrine PPE Manager and Emergency Equipment Procurement	803/297-3102 (office)
Peter J. Loper, MD Serrine Medical Director	803/271-9145

22.6 Spill Control Contingency Plan

Solid materials that are spilled will be scooped up, placed in appropriate containers and held for disposal. Wherever possible, samples will be obtained from above the liquid level in all tanks and barrels to limit spill potential. Appropriate temporary spill containment will be erected prior to sampling any liquid containing vessel from below the liquid level. Spilled

liquids will be neutralized or containerized and held for disposal. Prior to spill clean-up, the Serrine Health and Safety Director will be consulted to assure that employees are protected during that work.

23.0 TRAINING OF PERSONNEL

In order to be in compliance with OSHA regulations, all personnel whose duties include participation in job-related activities on these sites, must be able to document "a minimum of 40 hours of initial instruction off the site, and a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor".

Site-specific training shall be carried out by the site HSO entry to the site. This shall consist of a review of the specific hazards of concern, risks, symptoms of exposure and an overview of the Health and Safety Plan to include delineation of work zones, access, decontamination protocols, safety procedures and emergency contacts. Any personnel not initially cleared for site entry will be provided a similar briefing at the site by the HSO before admittance into the Exclusion Zone is permitted.

The OSHA regulations provide that if previous training can be demonstrated equivalent to the OSHA initial training requirements, this shall be considered as meeting those requirements. Equivalent training includes the training that employees might have already received from actual, on-site work experience.

24.0 MEDICAL SURVEILLANCE

Serrine Environmental Consultants, Inc. is providing medical surveillance support for numerous ongoing operations. The Medical Surveillance Program is the core element of the Serrine Health and Safety Plan that provides for maximum assurance for employee as well as liability protection. The intent of this program is to determine if any pre-employment physiological condition exists that could exacerbate effects from exposure to hazardous substances, and to detect deleterious consequences of occupational exposure to hazardous substances and physical stresses associated with the work environment at hazardous waste sites. The Surveillance Program is designed to monitor specific physiological conditions

and mechanisms that may be affected by non-episodic exposure as well as to provide acute or episodic medical care as needed.

All personnel working on these sites will have had a pre-employment physical examination conducted by an occupational health physician and, on the basis of this examination, will have been certified as being fit for duty on potentially hazardous sites. Annual physical examinations are also conducted based upon actual job-specific exposure records.

Unscheduled medical examinations will be conducted in the unlikely event of unusual exposure or accidents.

All medical records are maintained with the Serrine Medical Director and are accessible, within the limits of the Privacy Act, through written requests to the Serrine Health and Safety Director.

25.0 RECORDKEEPING

Daily work logs shall be maintained by the HSO. Copies of daily logs shall be forwarded to the Contracting Officer on request. The daily log shall contain:

- o Date
- o Area(s) or site(s) worked
- o List of employees by area and hours exposed
- o Personal protective equipment utilized by employees
- o Results of monitoring tests
- o Waste materials removed from work area(s)
- o List of equipment decontaminated
- o Description of special or unusual events or incidents; including all first aid treatments not otherwise reportable.

Daily work logs shall be checked and approved by the site HSO. Any incident resulting in a work stoppage shall be fully documented in a report prepared by the site HSO and submitted to the HSD.

25.1 Accident Reporting

In addition to descriptions in the daily log and work stoppage reports, any accident and/or chemical exposure incident shall be investigated, analyzed and documented in an accident investigation report submitted to the Serrine HSD. This process shall be applicable to both Serrine and all subcontractors. These reports, prepared by the site HSO in consultation with the Serrine HSD, shall contain a full description and analysis of the incident, including exposure work-hours and a log of occupational injuries and illnesses (OSHA Form 200 or equivalent as prescribed by 29 CFR 1904).

Formal accident reports shall be prepared for any diagnosed illness or injuries that result in a lost work day or fatality. The accident report shall identify all contributing causes and recommend future hazard control measures to reduce the risk of recurrence.

Persons on site are responsible for reporting all injuries as soon as possible to the site HSO. The HSD should be notified immediately after all appropriate emergency procedures are complied with.

26.0 JOB EXPOSURE REPORT

The HSO shall complete the attached Job Exposure Report Form and deliver it to the Serrine Health and Safety Director at the termination of field activities on this site, in the event of assignment of a new HSO at an intermediate point during site activities, or at the ends of discrete phases of prolonged field activities. The intent of Job Exposure Reports is to provide documentation of actual and suspected job-related exposures for use by the Serrine Medical Director in making decisions on appropriate periodic examination procedures.

Each Job Exposure Report shall be countersigned by the Project Manager who should ensure appropriate compliance with this procedure.

JOB EXPOSURE REPORT

PROJECT NAME _____ PROJECT NUMBER _____

SITE LOCATION _____

EMPLOYEES ON-SITE:

<u>Name</u>	<u>Site Function</u>	<u>Dates of Site Participation</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Were all PPF monitored?

JOB EXPOSURE REPORT

PROJECT NAME _____ PROJECT NUMBER _____

SITE LOCATION _____

EMPLOYEES ON-SITE:

<u>Name</u>	<u>Site Function</u>	<u>Dates of Site Participation</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Were all PPE, monitoring and decontamination procedures carried out in accordance with the provisions of the Site Health and Safety Plan?

Yes _____ No _____

If no, please state how procedures varied from provisions of the Health & Safety Plan, the justification or authority if appropriate, the dates of variance, and if the variance resulted in any known or suspected chemical or radiological exposure. If additional space is needed, please continue on the back of this form.

Please describe any known or suspected exposure that may have occurred during the period of site activities from accidents, unanticipated incidents or failures of personal protective equipment.

HSO Signature

Witness

Project Manager

Date _____

Date _____



Certificate Of Training

This Certifies That

JOHN COX

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script, reading "Betty S. Schnee".

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten signature in cursive script, reading "September 3, 1991".

Date



Certificate Of Training

This Certifies That

JOHN COX

Has Completed An Eight-Hour
Hazardous Waste Site Health And Safety Refresher Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script, appearing to read "Betty S. Schnee", written over a horizontal line.

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten signature in cursive script, appearing to read "September 3, 1991", written over a horizontal line.

Date



Certificate Of Training

This Certifies That

CHUCK BUDINGER

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script, reading "Betty S. Schnee".

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten signature in cursive script, reading "September 3, 1991".

Date



Certificate Of Training

This Certifies That

CHUCK BUDINGER

Has Completed An Eight-Hour
Hazardous Waste Site Health And Safety Refresher Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script, reading "Betty S. Schnee", written over a horizontal line.

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten signature in cursive script, reading "September 3, 1991", written over a horizontal line.

Date



Certificate Of Training

This Certifies That

RON PAULLING

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script, reading "Betty S. Schnee", written over a horizontal line.

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten signature in cursive script, reading "September 3, 1991", written over a horizontal line.

Date



Certificate Of Training

This Certifies That

RON PAULLING

Has Completed An Eight-Hour
Hazardous Waste Site Health And Safety Refresher Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script, appearing to read "Betty S. Schnee".

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten signature in cursive script, appearing to read "September 3, 1991".

Date



Certificate Of Training

This Certifies That

SUSAN BURDICK

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script that reads "Betty S. Schnee".

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten signature in cursive script that reads "September 3, 1991".

Date



Certificate Of Training

This Certifies That

SUSAN BURDICK

Has Completed An Eight-Hour
Hazardous Waste Site Health And Safety Refresher Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script that reads "Betty S. Schnee".

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten signature in cursive script that reads "September 3, 1991".

Date



Certificate Of Training

This Certifies That

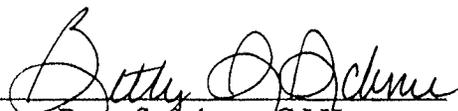
ELLIOTT LOCKLAIR

Has Completed An Eight-Hour
Hazardous Waste Site Health And Safety Refresher Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By Sirriner Environmental Consultants, Inc.
Greenville, South Carolina



Betty S. Schnee, C.I.H.
Health And Safety Director



Date



Certificate Of Training

This Certifies That

ELLIOTT LOCKLAIR

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script that reads "Betty S. Schnee".

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten signature in cursive script that reads "September 3, 1991".

Date



Certificate Of Training

This Certifies That

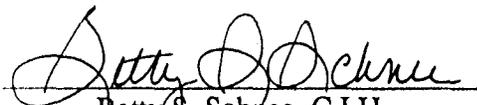
JASON TERRY

Has Completed An Eight-Hour
Hazardous Waste Site Health And Safety Refresher Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina



Betty S. Schree, C.I.H.
Health And Safety Director



Date



Certificate Of Training

This Certifies That

JASON TERRY

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script, appearing to read "Betty S. Schnee", written over a horizontal line.

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten signature in cursive script, appearing to read "September 3, 1991", written over a horizontal line.

Date



Certificate Of Training

This Certifies That

LEE BIENKOWSKI

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script that reads "Betty S. Schnee".

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten date in cursive script that reads "September 3, 1991".

Date



Certificate Of Training

This Certifies That

LEE BIENKOWSKI

Has Completed An Eight-Hour
Hazardous Waste Site Health And Safety Refresher Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script that reads "Betty S. Schnee".

Betty S. Schnee, C.I.H.
Health And Safety Director

September 3, 1991
Date



CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Helen Jervey

has successfully completed a 8 hour course of instruction updating the
HAZARDOUS WASTE OPERATIONS AND EMERGENCY
RESPONSE HEALTH AND SAFETY TRAINING
conducted by

WESTINGHOUSE ENVIRONMENTAL AND
GEOTECHNICAL SERVICES, INC.

in compliance with OSHA 29CFR 1910.120

William D. Foster

Instructor(s)

April 15, 1991
DATE

91-005-10
Certificate Number

October 26, 1993

Daryle L. Fontenot, P.E.
Department of the Navy
Southern Division
Naval Facilities Engineering Company
2155 Eagle Drive, P.O. Box 190010
North Charleston, SC 29419-9010

RE: CNB - FMWTC and NRTC, GWPD Sites #13337 and #13370
Contamination Assessment Report received March 31, 1993
Draft Remedial Action Plan received May 17, 1993
Charleston County

Dear Mr. Fontenot:

The Ground-Water Protection Division (GWPD) of the South Carolina Department of Health and Environmental Control has reviewed the referenced Contamination Assessment Report (CAR) and the Draft Remedial Action Plan (RAP), and has the following comments:

- 1) Review of the well logs and construction details indicates that wells at both the Fleet Mine Warfare Training Center (FMWTC) and the Naval Reserve Training Center (NRTC) do not bracket the water table. Since the types of contaminants of concern are petroleum products which are less dense than water and therefore float, monitoring well screens should bracket the water table.
- 2) Included in the RAP is analytical data (from the CAR) that indicates heavy oil present from 28 ppm to 140 ppm in soil samples during assessment of the FMWTC. These samples also contained measurable levels of lead. The significance of the presence of heavy oil impact was not addressed.
- 3) Ground-water data indicates a potential impact on the groundwater from lead at the FMWTC. The GWPD concurs with the recommendations to quarterly monitor and to further address the lead as outlined in the Draft Remedial Action Plan.
- 4) The GWPD concurs with the proposed no remediation efforts at the NRTC, Building RTC-1 based on the data presented in the Contamination Assessment Report and the Draft Remedial Action Plan.



LI ✓
LO ✓

January 22, 1993

Mr. Tim Mettlen
Ground-Water Protection
SC Department of Health
and Environmental Control
2600 Bull Street
Columbia, SC 29201

RECEIVED
JAN 25 1993
Groundwater Protection
Division

13332

13370

Subject: Fleet and Mine Warfare Training Center
Naval Reserve Training Center; GWPD Site A-10-AA-14068
Request for Extension; SEC Donohue Project C1339

Dear Mr. Mettlen:

Per our telephone conversation earlier today, this letter is in reference to the two sites listed above at the Naval Shipyard in Charleston, South Carolina.

SEC Donohue received the November 9, 1992, Monitoring Well Approval letter from Mr. Scott McInnis on November 20, 1992. At that time a driller was contracted and field activities were initiated the first week in December, 1992. Samples were submitted to the analytical laboratory for NEESA Level C analysis which requires four to five weeks turnaround, during which time many employees had scheduled Christmas holiday leave. Per the Monitoring Well Approval, analytical results must be submitted within 30 days of receipt. However, to date, SEC Donohue is still waiting for the analytical data.

In that the December 22, 1992 deadline for the assessment report has passed and SEC Donohue is still waiting for analytical data, an extension for submittal of the report is requested. Per your approval, the Assessment Report for the Fleet and Mine Warfare Training Center and the Naval Reserve Training Center will be submitted by April 30, 1993.

Thank you for your assistance in this matter. If you have any comments or questions, please do not hesitate to contact me.

Sincerely,

Susan B.C. Burdick
Susan B.C. Burdick, GIT
Hydrogeologist

O.K. -
2/5/93

cc: Daryle Fontenot
John Cox
Lee Bienkowski

rk





LI ✓
LO ✓

RECEIVED
DEC 02 1992
Groundwater Protection
Division

December 1, 1992

Mr. Scott McInnis
Assessment and Development Section
Ground-Water Protection Division
South Carolina Department of Environmental
and Health Control
2600 Bull Street
Columbia, SC 29201

Chas. Naval Shipyard

Subject: FMWTC and NRTC Assessment Report
GWPD Site A-10-AA-14068
SEC Donohue Project C1339

Dear Mr. McInnis:

This letter is to reiterate the points discussed during our telephone conversation of November 30, 1992, regarding the above referenced assessment report.

We anticipate starting the field program sometime during the week of December 6, 1992. Field work will probably continue through the week of December 13, 1992.

Given the anticipated field work schedule and allowing turnaround time for receipt of analytical data, we do not think that the assessment report can be submitted by December 22, 1992 as requested in your correspondence of November 9, 1992. As we discussed and agreed upon the assessment report will be submitted to your office on or before January 31, 1993.

If you have any questions or comments, please contact me at your earliest convenience.

Sincerely,

John Cox, P.G.
Department Manager
Hydrogeology/Regulatory Compliance

lc

cc: Mr. Daryle L. Fontenot, P.E.



file

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Interim Commissioner: Thomas E. Brown, Jr.

Board: John H. Burriss, Chairman
Richard E. Jabbour, DDS, Vice Chairman
Robert J. Stripling, Jr. Secretary

William E. Applegate, III,
Toney Graham, Jr., MD
Sandra J. Molander
John B. Pate, MD

Promoting Health, Protecting the Environment

November 9, 1992

Commanding Officer
Dept. of the Navy
Southern Division
Naval Facilities Engineering Command
2155 Eagle Dr., P.O. Box 1068
Charleston, S.C. 29411-0068

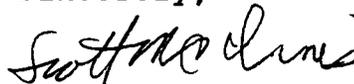
Re: Charleston Naval Base
Fleet Mine Warfare Training Center (FMWTC) and Naval Reserve
Training Center (NRTC), GWPD Site # A-10-AA-14068
Request for Monitoring Well Installation (received September
1, 1992)
Charleston County

Dear Sir:

The Ground-Water Protection Division (GWPD) of the South Carolina Department of Health and Environmental Control (SCDHEC) has reviewed the referenced request for the installation of six monitoring wells. A copy of the monitoring well approval form is enclosed; the original has been sent to your consultant, SEC Donohue. The assessment report should be submitted on or before December 22, 1992.

On all future correspondence concerning this site, please reference the GWPD site number. If you have any questions, please call me at (803)-734-5465.

Sincerely,



Scott McInnis, Hydrogeologist
Assessment and Development Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

sm\fmwtcwel.app

cc: Christine Coker, Trident EQC

SEC Donohue, Susan Burdick, Charleston, SC

Monitor Well Approval

Approval is hereby granted to: SEC Donohue
Attn: Susan Burdick
2694-A Lake Park Drive
Charleston, SC 29418

RE: Charleston Naval Base
FMWTC & NRTC
GWPD Site # A-10-AA-14068
Charleston County

for the construction of monitoring wells designated MW-1 to MW-6 in accordance with the construction plans and specifications submitted on September 1, 1992.

These wells will be constructed to the approximate depth of 30 feet below the surface and screened in the surficial aquifer for the purpose of monitoring ground-water quality.

Conditions: That the latitude and longitude and actual construction details for each well be submitted within 30 days after installation. That the analytical results be submitted within 30 days of receipt of laboratory results. That the District Hydrologist, Christine Coker (740-1590), be notified at least 72 hours prior to installation.

This approval is pursuant to the provisions of Section 44-55-40 and Section 48-1 of the 1976 South Carolina Code of Laws and the Department of Health and Environmental Control Regulations R.61-71.

Date of Issue November 4, 1992



David G. Baize, Manager
Assessment and Development Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

TAM/chb

1104924533/TM

cc: Commanding Officer
Southern Navfac



July 24, 1992

Mr. Scott McInnis, Hydrogeologist
Ground Water Protection Division
South Carolina Department of Health and
Environmental Control
2600 Bull Street
Columbia, SC 29201

RECEIVED
JUL 27 1992
Groundwater Protection
Division

Subject: Soil Gas Survey
Fleet and Mine Warfare Training Center and
Naval Reserves Training Center
Charleston Naval Base
GWPD Site # A-10-AA-14068
SEC Donohue Project C1339

Dear Mr. McInnis:

This letter is in reference to our telephone conversation earlier this morning, regarding the soil gas survey at the Fleet and Mine Warfare Training Center (FMWTC) and Naval Reserve Training Center (NRTC). Your letter dated July 13, 1992 to the Department of the Navy requests that the soil gas survey results and monitoring well locations be submitted to SCDHEC on or before September 7, 1992. In that September 7, 1992, is a national holiday, SEC Donohue would like to request an extension to this date. Per your approval, the soil gas survey results and monitoring well locations will be submitted to SCDHEC on or before September 21, 1992.

Thank you for your cooperation. If you have any questions, please do not hesitate to contact me.

Respectfully,

Susan B.C. Burdick

Susan B.C. Burdick, GIT
Project Hydrogeologist

lc

cc: Daryle Fontenot - NAVFAC
John Cox - SEC Donohue





August 27, 1992

Mr. Scott McInnis
Ground-Water Protection Division
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, SC 29201

Subject: Soil Gas Survey Results and Proposed Monitoring Well Locations
Fleet and Mine Warfare Training Center
Naval Reserve Training Center
Charleston Naval Base
GWPD Site # A-10-AA-14068
SEC Donohue Project C1339

RECEIVED

SEP 01 1992

Dear Mr. McInnis:

Per your request in a letter to the Department of the Navy dated July 13, 1992, please find enclosed the results of the soil gas survey at the referenced sites at the Charleston Naval Base.

Groundwater Protection

The soil gas survey results indicated that the highest levels of total FID volatiles were present in the samples collected near the UST located adjacent to Building number 647 at the FMWTC. Very low levels of total FID volatiles were observed in the surrounding samples. Refer to Table 2 and Figure 2 (attached) of the Soil Gas Survey Report by Target Environmental Services for the analyte concentrations and total FID volatiles at the FMWTC.

No petroleum hydrocarbons were detected in any of the soil gas survey samples collected near the Number 2 UST located at the NRTC. Refer to Table 2 of the Soil Gas Survey Report for the analyte concentrations at the NRTC. In that all analyte concentrations were below the laboratory detection limit, a total FID volatiles Figure was not produced for the report.

The proposed monitoring well locations are based on these results and are illustrated in Figures 1 and 2. The monitoring wells will be installed according to the specifications in the previously submitted Contamination Assessment Plan. Per SCDHEC's recommendation, the wells will be screened with 10 foot screens.



Mr. Scott McInnis
August 27, 1992
SEC Donohue Project C1339
Page Two

If you have any questions, please do not hesitate to contact me.

Sincerely,

Susan B.C. Burdick

Susan B.C. Burdick, GIT
Project Hydrogeologist

cc: Daryle Fontenot - SOUTHDIV
John Cox - SEC Donohue

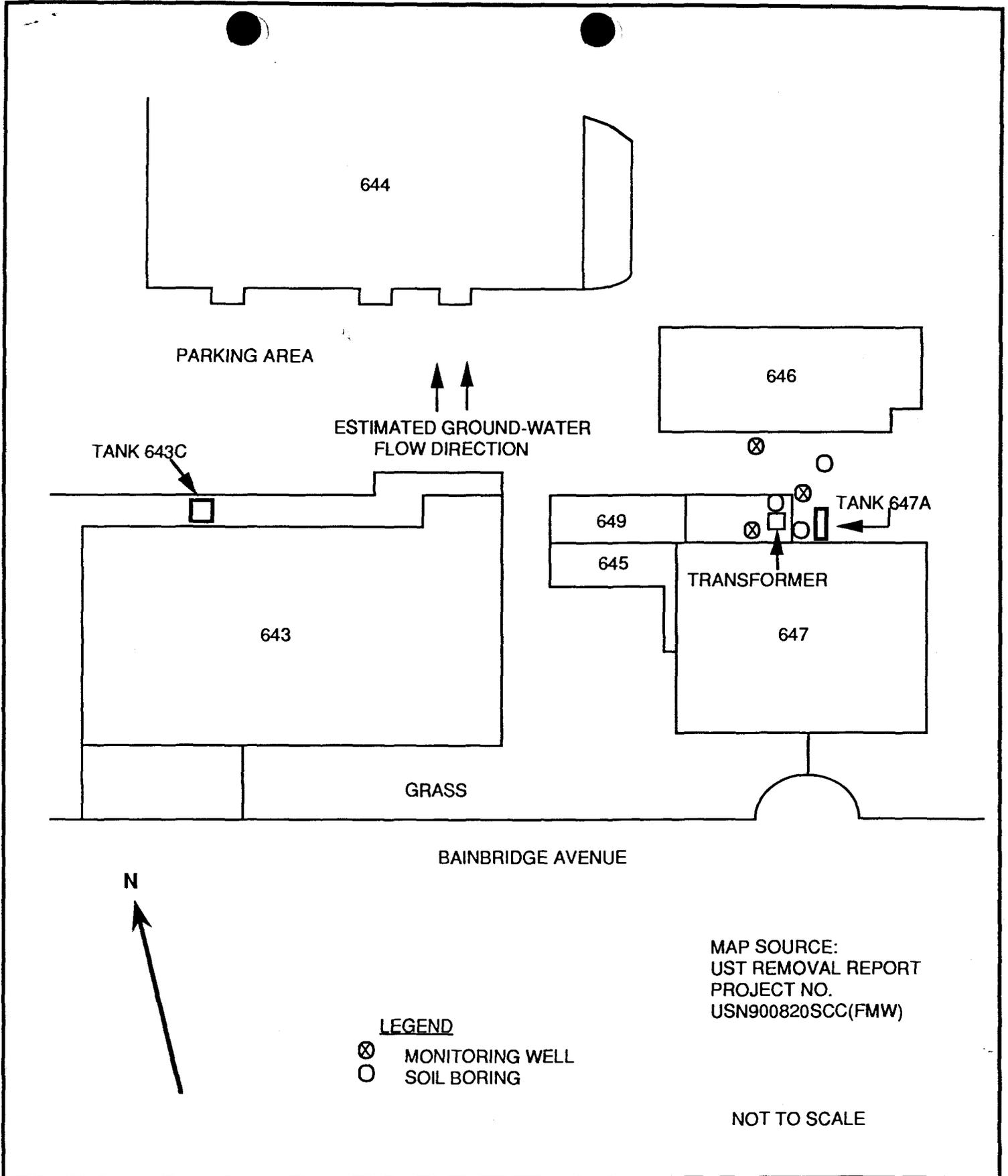


FIGURE 1

PROPOSED MONITORING WELL AND SOIL BORING LOCATIONS

Fleet and Mine Warfare Training Center

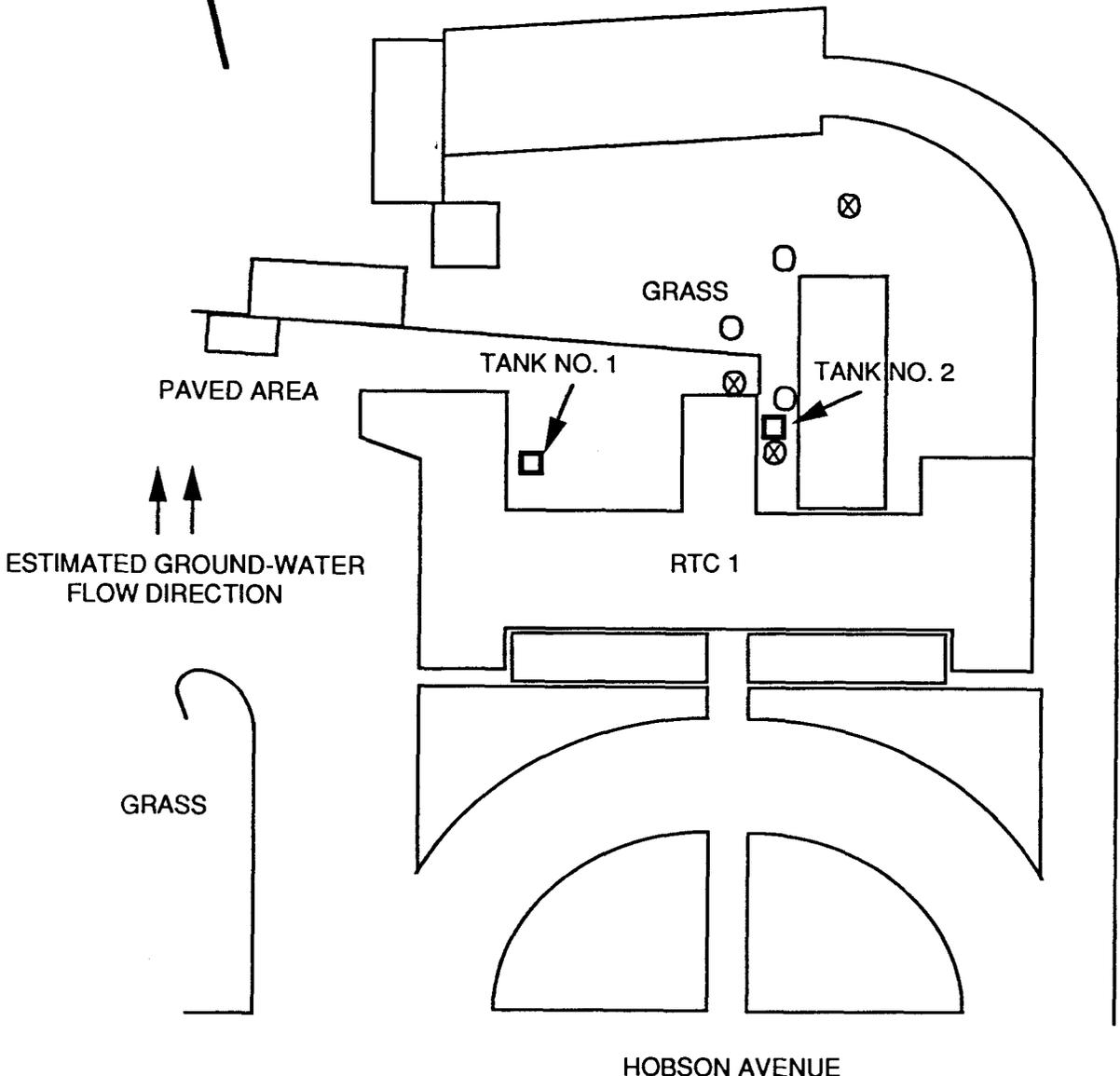


CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC



COOPER RIVER



ESTIMATED GROUND-WATER FLOW DIRECTION

GRASS

HOBSON AVENUE

LEGEND

- ⊗ MONITORING WELL
- SOIL BORING

MAP SOURCE:
 UST REMOVAL REPORT
 PROJECT NO.
 USN900820SCC(RTC)

NOT TO SCALE

FIGURE 2

PROPOSED MONITORING WELL AND SOIL BORING LOCATIONS

Naval Reserve Training Center



CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC

SOIL GAS SURVEY
CHARLESTON NAVAL BASE
CHARLESTON, SOUTH CAROLINA
UST FACILITIES

PREPARED FOR

SEC DONOHUE
26944 LAKE PARK DRIVE
CHARLESTON, SOUTH CAROLINA 29418

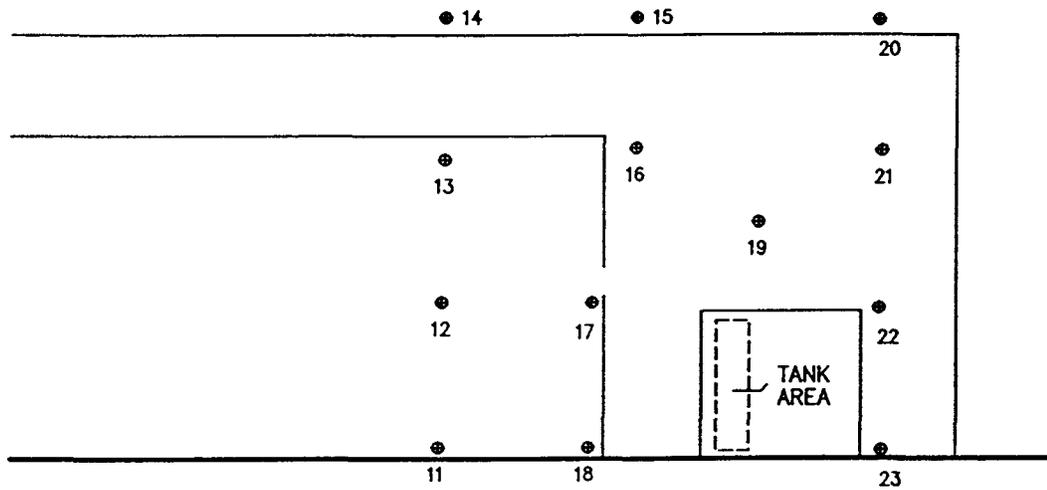
PREPARED BY

TARGET ENVIRONMENTAL SERVICES, INC.
9180 RUMSEY ROAD
COLUMBIA, MARYLAND 21045
(410) 992-6622

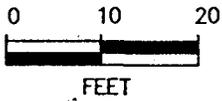
AUGUST 1992



BUILDING



BUILDING #647



● SOIL GAS SAMPLE LOCATION

FIGURE 1A. Sample Locations



TARGET ENVIRONMENTAL SERVICES, INC.

This map is integral to a written report
and should be viewed in that context.

FLEET & MINE WARFARE TRAINING CENTER
CHARLESTON NAVAL BASE
CHARLESTON, SOUTH CAROLINA

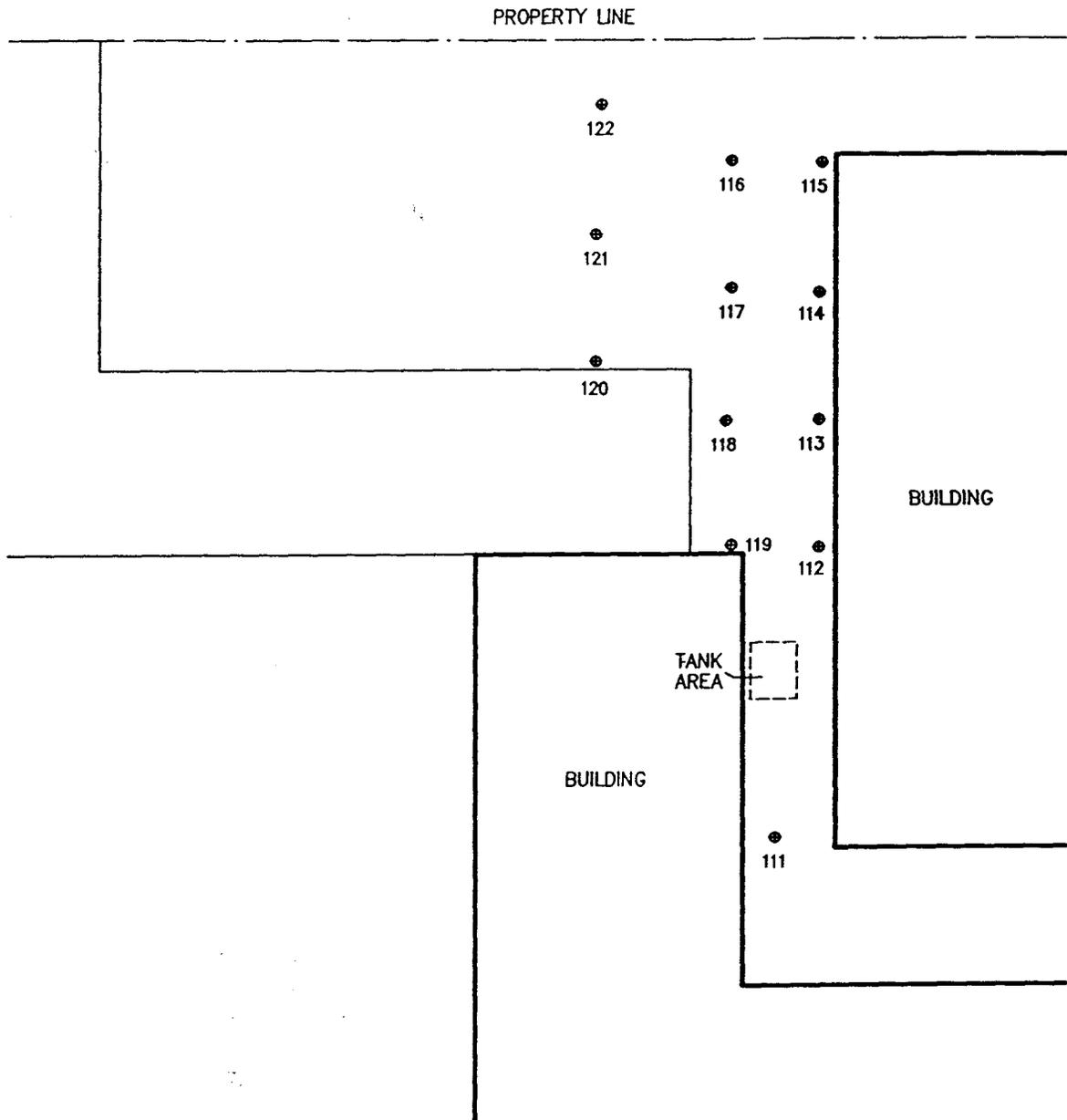


FIGURE 1B. Sample Locations

 TARGET ENVIRONMENTAL SERVICES, INC.

NAVAL RESERVE TRAINING CENTER
CHARLESTON NAVAL BASE
CHARLESTON, SOUTH CAROLINA

This map is integral to a written report
and should be viewed in that context.

TABLE 1
SAMPLING DEPTH

<u>SAMPLE</u>	<u>FEET</u>
11	4
12	3
13	3
14	3
15	3
16	3
17	3
18	3
19	3
20	3
21	2
22	3
23	3
111	2
112	3
113	3
114	3
115	3
116	3
117	3
118	3
119	3
120	3
121	3
122	3

TABLE 2

ANALYTE CONCENTRATIONS VIA GC/FID (µg/L)

SAMPLE	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENES	TOTAL FID VOLATILES ¹
REPORTING LIMIT	1.0	1.0	1.0	1.0	1.0
11	<1.0	<1.0	<1.0	<1.0	<1.0
12	<1.0	<1.0	<1.0	<1.0	<1.0
13	<1.0	<1.0	<1.0	<1.0	<1.0
14	<1.0	<1.0	<1.0	<1.0	<1.0
15	<1.0	<1.0	<1.0	<1.0	<1.0
16	<1.0	<1.0	<1.0	<1.0	47
17	6.8	37	4.1	13	9,236
18	<1.0	<1.0	<1.0	<1.0	11
19	<1.0	63	4.2	18	4,200
20	<1.0	<1.0	<1.0	<1.0	1.0
21	<1.0	<1.0	<1.0	<1.0	9.4
22	<1.0	<1.0	<1.0	<1.0	<1.0
23	<1.0	<1.0	<1.0	<1.0	<1.0
111	<1.0	<1.0	<1.0	<1.0	<1.0
112	<1.0	<1.0	<1.0	<1.0	<1.0
113	<1.0	<1.0	<1.0	<1.0	<1.0
114	<1.0	<1.0	<1.0	<1.0	<1.0
115	<1.0	<1.0	<1.0	<1.0	<1.0
116	<1.0	<1.0	<1.0	<1.0	<1.0
117	<1.0	<1.0	<1.0	<1.0	<1.0
118	<1.0	<1.0	<1.0	<1.0	<1.0
119	<1.0	<1.0	<1.0	<1.0	<1.0
120	<1.0	<1.0	<1.0	<1.0	<1.0
121	<1.0	<1.0	<1.0	<1.0	<1.0
122	<1.0	<1.0	<1.0	<1.0	<1.0
<u>FIELD CONTROL SAMPLES</u>					
1	<1.0	<1.0	<1.0	<1.0	<1.0
2	<1.0	<1.0	<1.0	<1.0	<1.0
101	<1.0	<1.0	<1.0	<1.0	<1.0
102	<1.0	<1.0	<1.0	<1.0	<1.0
<u>LABORATORY DUPLICATE ANALYSIS</u>					
16	<1.0	<1.0	<1.0	<1.0	47
16R	<1.0	<1.0	<1.0	<1.0	46
113	<1.0	<1.0	<1.0	<1.0	<1.0
113R	<1.0	<1.0	<1.0	<1.0	<1.0
122	<1.0	<1.0	<1.0	<1.0	<1.0
122R	<1.0	<1.0	<1.0	<1.0	<1.0
<u>LABORATORY BLANKS</u>					
16B	<1.0	<1.0	<1.0	<1.0	<1.0
113B	<1.0	<1.0	<1.0	<1.0	<1.0
122B	<1.0	<1.0	<1.0	<1.0	<1.0

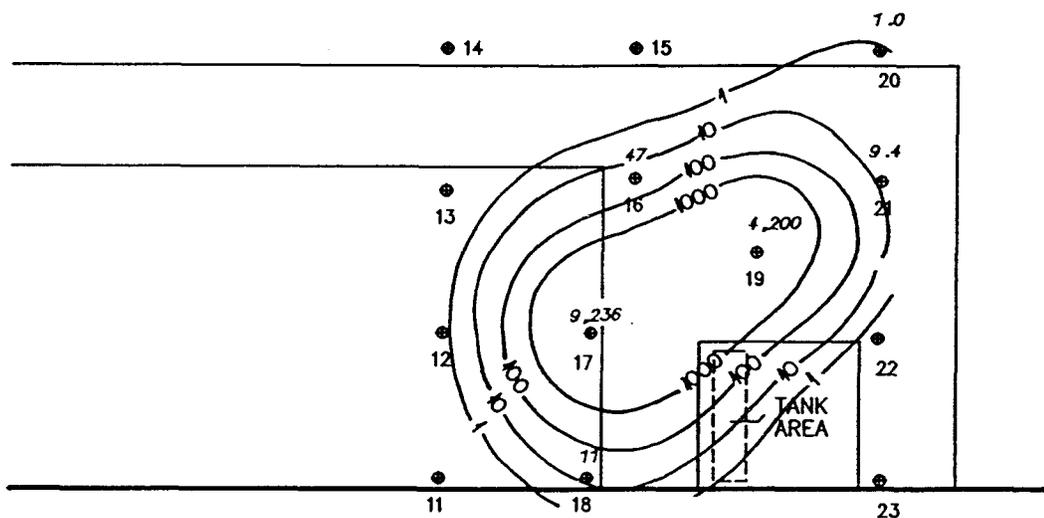
FMWTC {

NRTC {

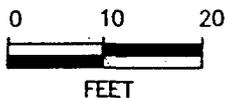
¹ CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAKS AND THE INSTRUMENT RESPONSE FACTOR FOR TOLUENE



BUILDING



BUILDING #647



● SOIL GAS SAMPLE LOCATION

FIGURE 2. Total FID Volatiles
(calc'd $\mu\text{g/l}$)



TARGET ENVIRONMENTAL SERVICES, INC.

This map is integral to a written report
and should be viewed in that context.

FLEET & MINE WARFARE TRAINING CENTER
CHARLESTON NAVAL BASE
CHARLESTON, SOUTH CAROLINA

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Michael D. Jarrett

Board: William E. Applegate, III, Chairman
John H. Burriss, Vice Chairman
Richard E. Jabbour, DDS, Secretary

Promoting Health. Protecting the Environment

7/26
Toney Graham, Jr., MD
Sandra J. Molander
John B. Pate, MD
Robert J. Stripling, Jr.

July 28, 1992

Mrs. Susan Burdick
SEC Donohue
2694-A Lake Park Drive
Charleston SC 29418

Re: Fleet and Mine Warfare Training Center and Naval Reserves
Training Center
Charleston Naval Base
GWPD Site # A-10-AA-14068
Charleston County

Dear Mrs. Burdick:

The Department will grant an extension for submittal of the soil gas survey results and monitoring well locations from September 7, 1992, until September 21, 1992.

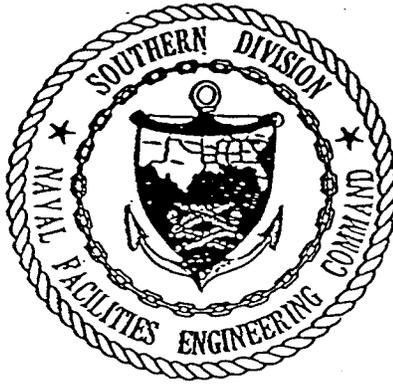
On all future correspondence concerning this site, please reference the GWPD site number. If you have any questions, please call me at (803)-734-5465.

Sincerely,



Scott McInnis, Hydrogeologist
Assessment and Development Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

sm\secfmwtc.ext



CONTRACT N64247-88-D-0655

INDEFINITE QUANTITY CONTRACT

FOR

STORAGE TANK EVALUATIONS

AND

SITE INVESTIGATIONS

AT NAVAL ACTIVITIES IN GA, NC, AND SC

AMENDMENT NO. 14

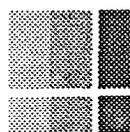
CONTAMINATION ASSESSMENT PLAN

AND

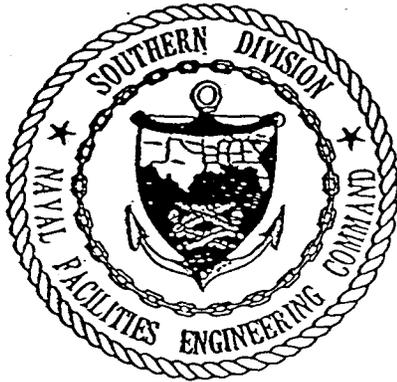
HEALTH AND SAFETY PLAN

FOR

FMWTC AND NRTC CHARLESTON, SC

 **SIRRINE**
ENVIRONMENTAL
CONSULTANTS

Charleston, SC 29418



CONTRACT N64247-88-D-0655

INDEFINITE QUANTITY CONTRACT

FOR

STORAGE TANK EVALUATIONS

AND

SITE INVESTIGATIONS

AT NAVAL ACTIVITIES IN GA, NC, AND SC

AMENDMENT NO. 14

CONTAMINATION ASSESSMENT PLAN

AND

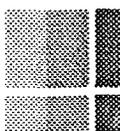
HEALTH AND SAFETY PLAN

FOR

FMWTC AND NRTC CHARLESTON, SC

RECEIVED
SEP 30 1991

GROUNDWATER
PROTECTION DIVISION

 **SIRRINE**
ENVIRONMENTAL
CONSULTANTS

Charleston, SC 29418

CONTRACT N62467-88-D-0655

**Indefinite Delivery Contract for Underground
Storage Tank Evaluations and Site
Investigations at Naval Activities in GA, NC and SC**

Amendment No. 14

**DRAFT
Contamination Assessment Plan
and
Health and Safety Plan**

FMWTC and NRTC, Charleston, SC

**Sirrine Project C1339
August 1991**

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SECTION I
CONTAMINATION ASSESSMENT PLAN

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1.0 INTRODUCTION

1.1 Background

Sirrine Environmental Consultants, Inc. (Sirrine) has been contracted by Southern Division, Naval Facilities Engineering Command (NAVFAC) to conduct investigations and evaluations of underground storage tank (UST) systems at Naval Activities throughout Georgia, North Carolina, and South Carolina.

The Fleet and Mine Warfare Training Center (FMWTC) and Naval Reserve Training Center (NRTC) are located on the Naval Base in Charleston, South Carolina (Figure 1). One 4000 gallon diesel fuel UST (647A) is located at the FMWTC (Figure 2) and was abandoned in place in August, 1980. The abandoned tank is located under concrete and asphalt, immediately east of the training center. During an environmental site assessment, conducted by GEO Services in November, 1990, soil contamination was detected. Analysis of soil samples taken from the tank area indicated total petroleum hydrocarbon (TPH) concentrations as high as 860 ppm. A 550 gallon UST (643C) used to store diesel fuel was also removed at this time by GEO Services. The analytical results for the soil samples from this tank basin did not contain TPH levels in excess of 30 ppm.

Two 1000 gallon out of service diesel USTs at the NRTC, Building RTC-1 (Figure 3), were removed in November, 1990. Tank No. 1 was removed and the analytical results for the soil samples from this basin indicate that TPH concentrations did not exceed 20 ppm. Tank No. 2 was previously located under turf near the south wing of the building. During removal of Tank No. 2 and associated piping, soil contamination was detected. Analysis of soil samples taken from the tank area indicated TPH concentrations as high as 2500 ppm.

1.2 Previous Reports

1.2.1 UST Removal and Closure in Place for FMWTC

GEO Services was contracted to remove one (1) 550 gallon UST (643C) and to assess the

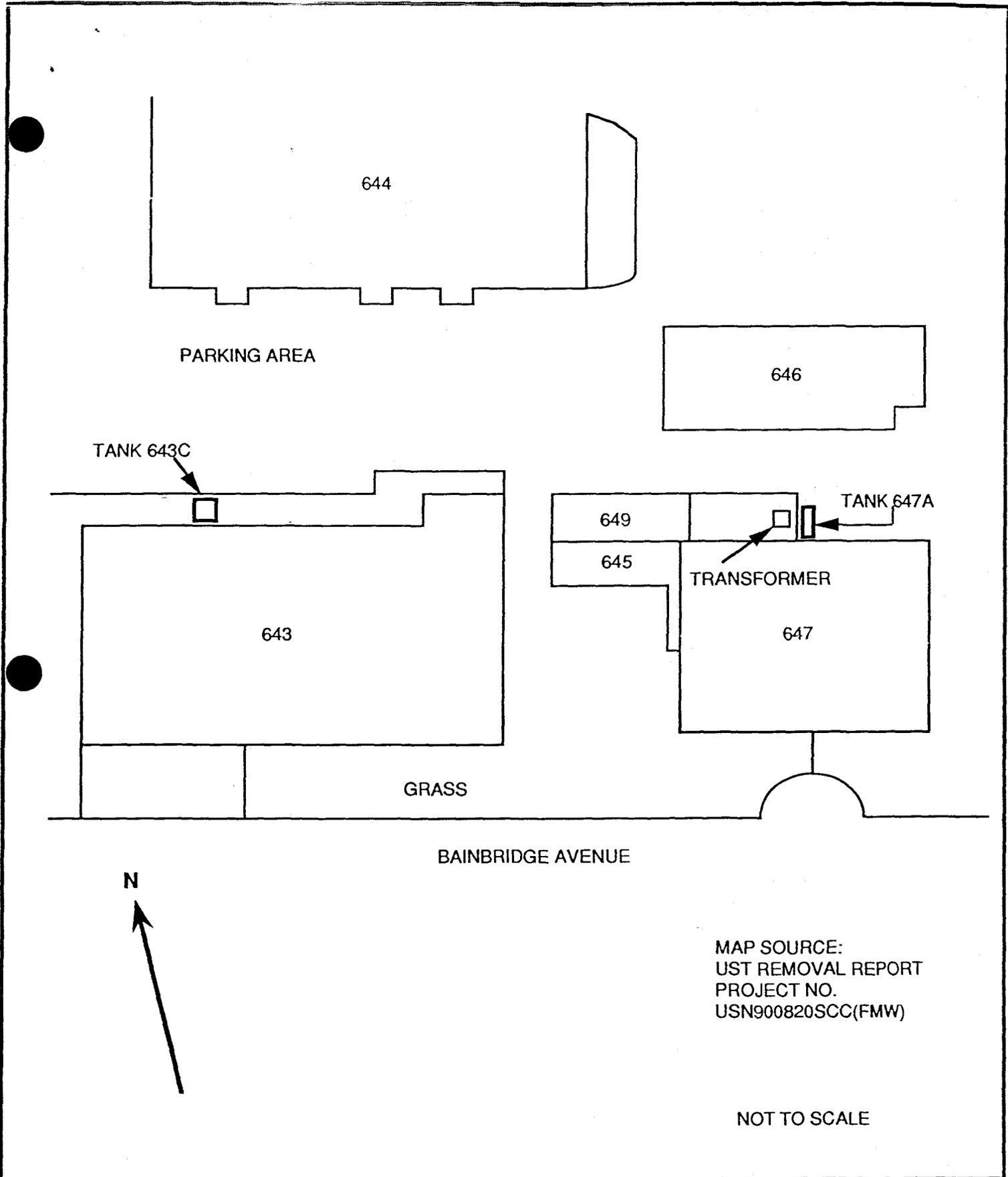
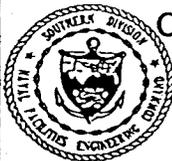


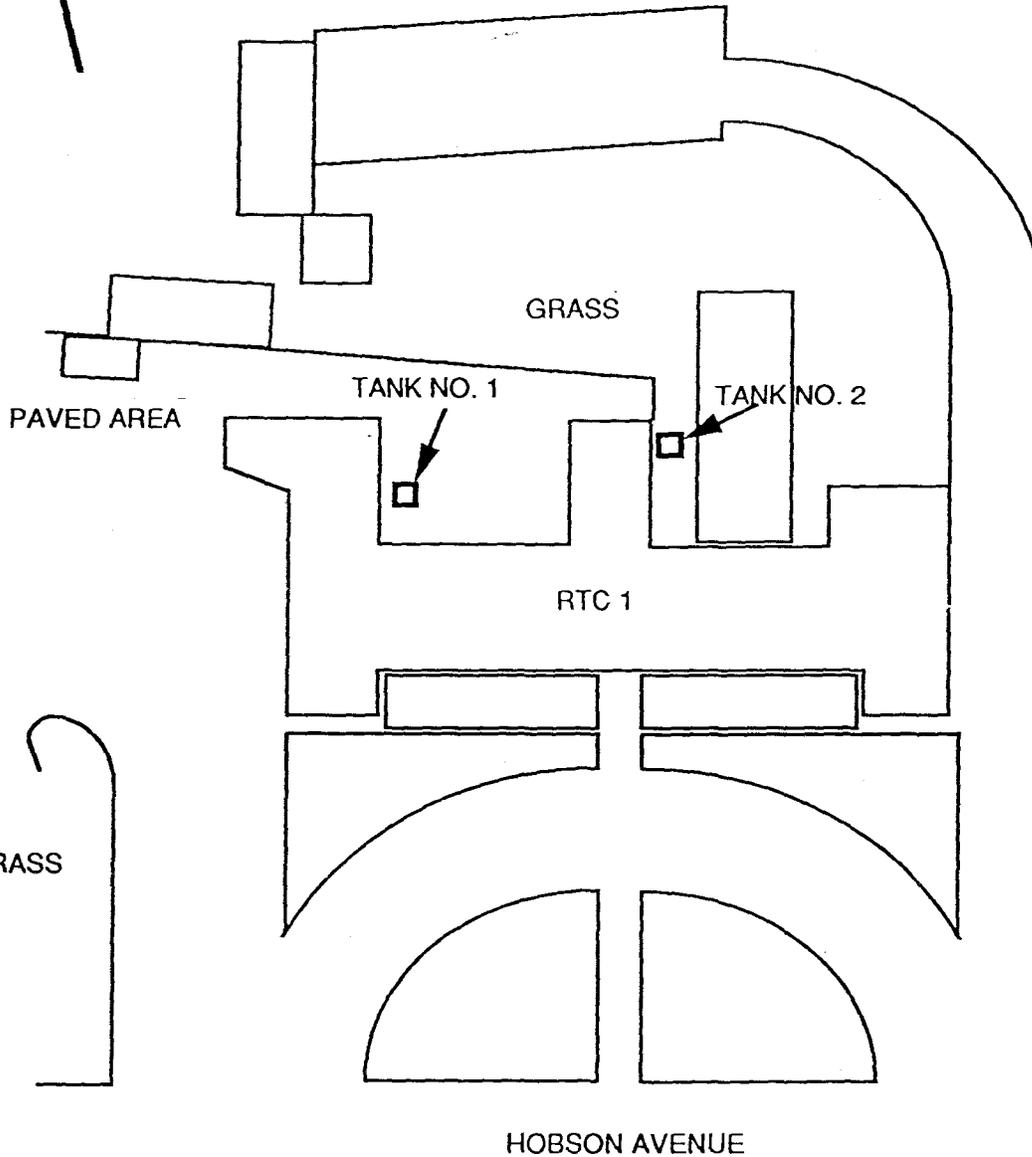
FIGURE 2
UNDERGROUND STORAGE TANK LOCATIONS
Fleet and Mine Warfare Training Center



CONTAMINATION ASSESSMENT PLAN
NAVAL BASE Charleston, SC



COOPER RIVER



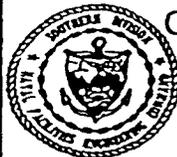
MAP SOURCE:
UST REMOVAL REPORT
PROJECT NO.
USN900820SCC(RTC)

NOT TO SCALE

FIGURE 3

UNDERGROUND STORAGE TANK LOCATIONS

Naval Reserve Training Center



CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC

environmental impact of one (1) 4000 gallon UST (647A). The 4000 gallon UST (647A) had been previously closed in place and filled with concrete.

According to the Geo Services report, the 550 gallon diesel UST (643C) was removed from the tank basin. The UST showed no signs of deterioration and there was no evidence of corrosion of the associated piping. A soil sample was collected from each end of the tank basin and analyzed for TPH. The analytical results indicated that TPH concentrations in the soil samples did not exceed 30 ppm. As such, it appeared that the UST did not have a significant impact on the environment of the area.

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The 4000 gallon diesel UST (647A) was originally installed under concrete and asphalt, immediately east of the building. The UST was out of service and was apparently filled with concrete in August 1980. Soil samples were taken at the four corners of the UST basin and were obtained by hollow-stemmed auger borings. Three (3) samples were collected from each of the four (4) test borings, at the depths 3.5' - 5.0', 8.5 - 10.0', and 13.5 - 25.0', respectively, and submitted to a laboratory for analysis of TPH. The analytical results indicated that TPH was detected. The maximum reading was 860 ppm, and corresponded to the 3.5' - 5.0' interval of boring sample B-3-1 in the northeast corner of the basin. As such, it appeared that contaminants have been released. It is probable that this contamination has emanated from the 4000 gallon UST, and it is probable that this contamination has negatively impacted the ground-water in the area.

1.2.2 UST Removal for NRTC

GEO Services was contracted to remove two (2) 1000 gallon USTs and associated product lines. Both USTs previously contained diesel fuel.

According to the Geo Services report, the No. 1 1000 gallon UST was removed from the tank basin. The UST showed no signs of deterioration and there was no evidence of corrosion on the associated piping. A soil sample was collected from each end of the tank basin and analyzed for TPH. The analytical results indicated that TPH concentrations in the

soil samples did not exceed 20 ppm. As such, it appeared that the No. 1 UST did not have a significant impact on the environment.

The No. 2 1000 gallon UST was removed from the tank basin. The UST showed signs of severe deterioration in the form of rust, although there was no evidence of corrosion on the associated piping. A soil sample was collected from each end of the tank basin and analyzed for TPH. The analytical results indicated that TPH was detected. The maximum reading was 2500 ppm from the east end soil sample. As such, it appeared that contaminants have been released. It is probable that this contamination has emanated from the UST designated as Tank No. 2 and it is probable that this contamination has negatively impacted the ground-water in the area.

1.3 Objective

The objective of the Contamination Assessment Plan (CAP) is to specify the methods which will be used to determine the extent of petroleum hydrocarbon contamination in the soil and ground-water at the FMWTC and the NRTC, Naval Base Charleston, SC. The information collected during Phase I will ultimately be used to develop a Remedial Action Plan (RAP) designed to mitigate and correct contamination impacts.

2.0 PROPOSED CONTAMINATION ASSESSMENT PLAN

2.1 Document Review

The initial step in conducting the Contamination Assessment and subsequent Contamination Assessment Report (CAR) will be a review of previous applicable and relevant documents, studies and investigations.

Specific documents to be reviewed are:

- o U.S. Army Toxic and Hazardous Materials Agency, "Minimum Requirements for Boring Logs, Drilling Procedures and Monitoring Well Installation".
- o "Methods of Chemical Analysis for Water and Wastes", EPA 600/4-79-020.
- o "Procedures for Handling and Chemical Analysis of Sediment and Water Samples", Technical Report EPA CE-81-1.

- o "Groundwater Monitoring Guide", NEESA 20.2-013A.
- o "Standard Method for the Examination of Water and Wastewater", American Public Health Association, Latest Edition.
- o "Flammable and Combustible Liquids Code", NFPA 30-1987, National Fire Codes and Standards, 1990.
- o "Recommended Practice for Handling Underground Leakage of Flammable and Combustible Liquids", NFPA 329-1987, National Fire Codes, 1990.
- o "Specifications for Groundwater Monitoring Well Installation and Sampling", Southern Division, Naval Facilities Engineering Command Guide, 27 March 1989.
- o "Report Format Guidance Manual", Southern Division, Naval Facilities Engineering Command, 14 March 1989.
- o "UST Removal and Closure in Place for FMWTC Charleston, South Carolina", GEO Services.
- o "UST Removal for NRTC Charleston, South Carolina", GEO Services.

2.2 Site Inspection

A site inspection was conducted on 16 July, 1991. During the inspection, facility personnel were interviewed. Additionally, underground utilities and other potential preferential contaminant pathways were approximately located. Prior to drilling activities, underground utilities will be clearly marked on-site. In addition, proposed soil boring and monitoring well locations will also be verified and marked.

3.0 SOIL GAS SURVEY, SOIL BORING AND MONITORING WELL INSTALLATION

In order to better define the horizontal and vertical extent of soil and ground-water contamination, a soil gas survey and drilling program will be conducted as part of Phase I activities.

A total of twenty five (25) soil gas survey points will be evaluated, six (6) soil borings will

be drilled to depths of \pm 20 feet and six (6) additional soil borings will be converted into permanently installed monitor wells for both of the sites combined. Proposed locations of the Phase I soil gas survey points, soil borings and monitor wells are shown in Figures 4 and 4A (FMWTC), and Figures 5 and 5A (NRTC), respectively.

3.1 Soil Gas Survey

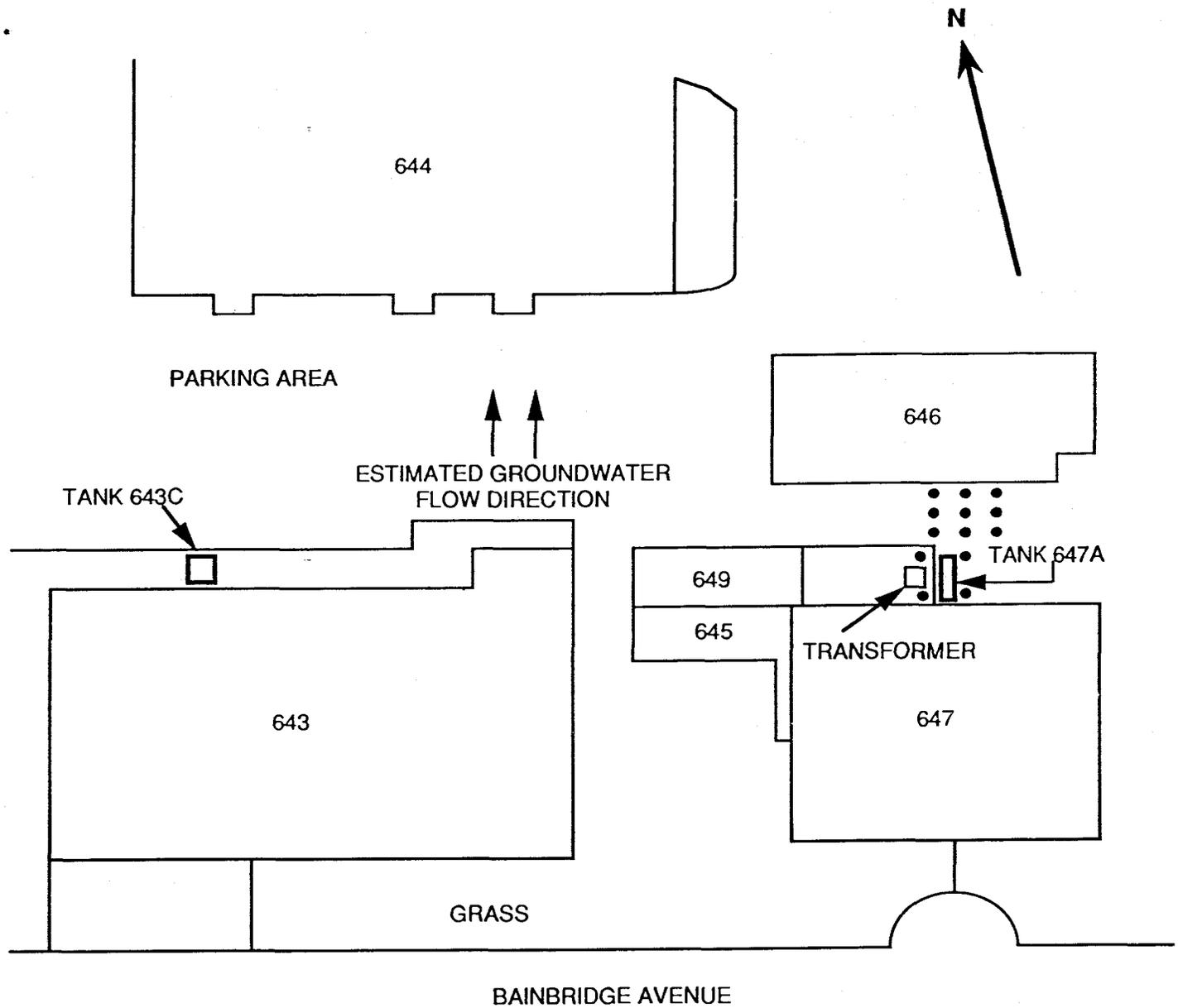
A soil gas survey will be conducted in the vicinity of the abandoned UST at FMWTC and the former No. 2 UST at NRTC (Figures 4 and 5, respectively). The work to be conducted will involve collection of twenty five (25) soil vapor samples from the subsurface at both sites, combined. The soil gas survey points will be distributed as necessary in order to define contamination at each site. The equipment required to conduct this type of sampling will be contained within a standard size four wheel van. A hydraulic ram mounted within the van will be used to push an approximately one inch diameter steel tube into the ground. A vacuum pump will then be used to withdraw an air sample from the soil.

After the air sample has been collected, the steel tube will be withdrawn from the ground. The air sample will be delivered to a certified lab for analysis of benzene, toluene, ethylbenzene and xylene (BTEX) compounds.

3.2 Drilling Specifications

Soil borings and monitor wells will be completed in the vicinity of the abandoned UST at FMWTC and the former No. 2 UST at NRTC (Figures 4A and 5A, respectively). Drilling of boreholes will be completed using hollow-stem auger techniques with continuous split spoon soil sampling per ASTM D 1586; U.S. Army Toxic and Hazardous Materials Agency, "Minimum Requirements for Boring Logs, Drilling Procedures and Monitor Well Installation"; and Southern Division Naval Facilities Engineering Command, "Guidelines for Groundwater Monitoring Well Installation" (Revision 4, 27 March, 1989).

Monitor well installations will be completed by placing schedule 40 PVC threaded well screen (.010" slot) and attached schedule 40 PVC threaded, 2 inch diameter casing through



MAP SOURCE:
 UST REMOVAL REPORT
 PROJECT NO.
 USN900820SCC(FMW)

LEGEND

- PROPOSED SOIL /GAS SURVEY POINTS
- ➔ ESTIMATED GROUNDWATER FLOW DIRECTION

NOT TO SCALE

FIGURE 4

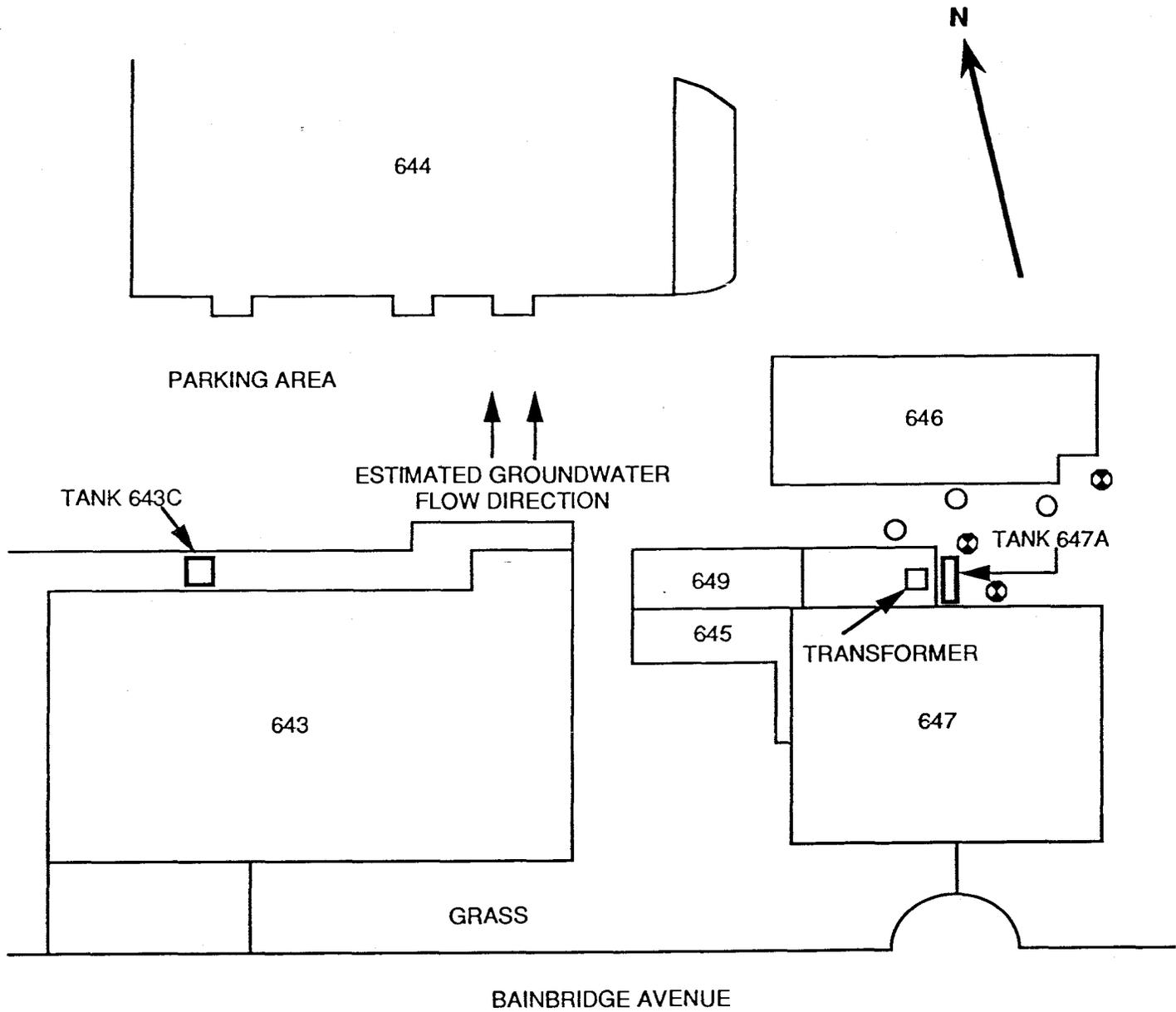
PROPOSED SOIL /GAS SURVEY POINTS

Fleet and Mine Warfare Training Center



CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC



MAP SOURCE:
 UST REMOVAL REPORT
 PROJECT NO.
 USN900820SCC(FMW)

LEGEND

- PROPOSED SOIL BORING LOCATIONS
- ⊗ PROPOSED MONITORING WELL LOCATIONS
- ➔ ESTIMATED GROUNDWATER FLOW DIRECTION

NOT TO SCALE

FIGURE 4A

PROPOSED SOIL BORINGS AND
 MONITORING WELL LOCATIONS

Fleet and Mine Warfare Training Center



CONTAMINATION ASSESSMENT PLAN
 NAVAL BASE Charleston, SC

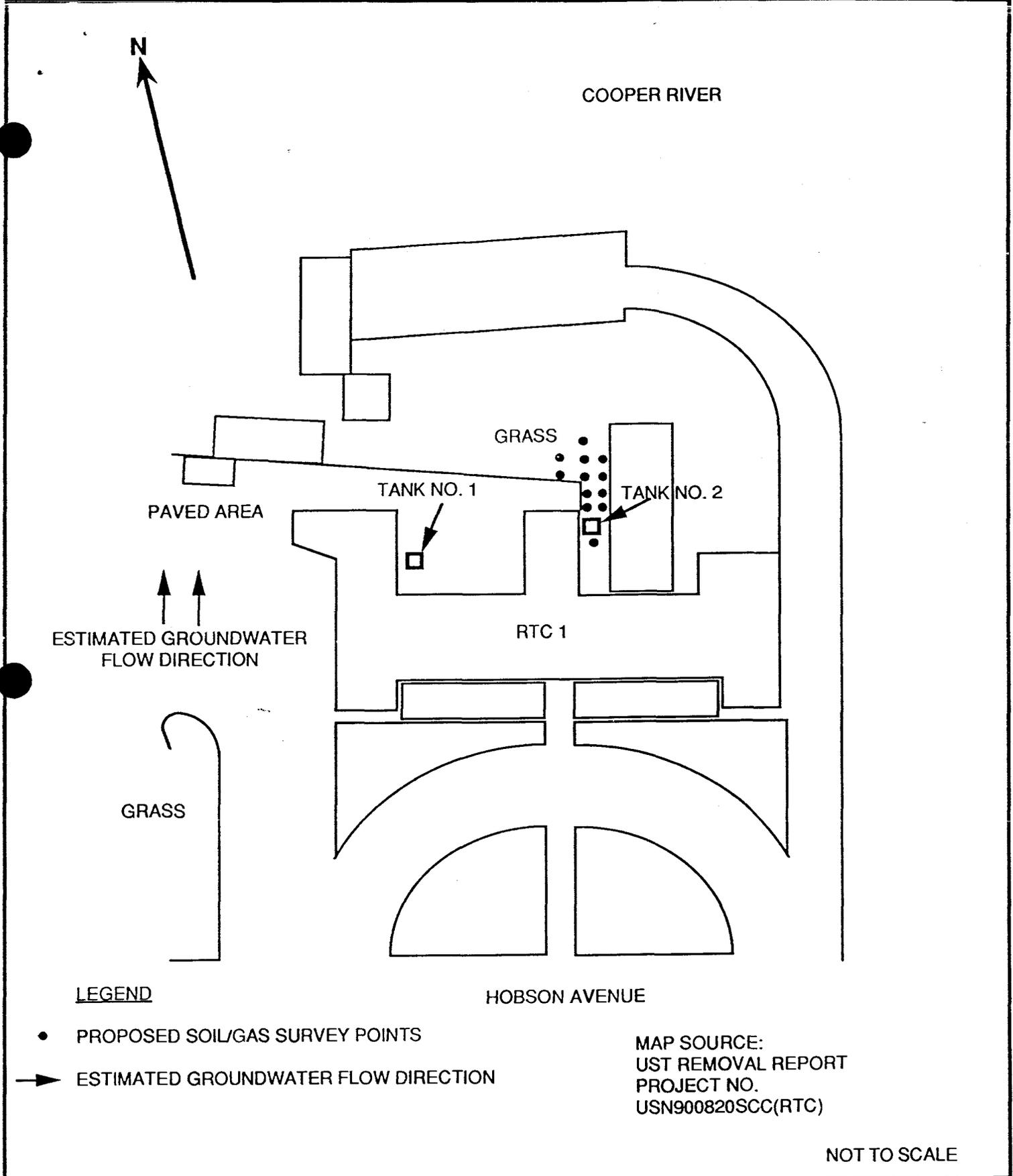


FIGURE 5

PROPOSED SOIL/GAS SURVEY POINTS

Naval Reserve Training Center

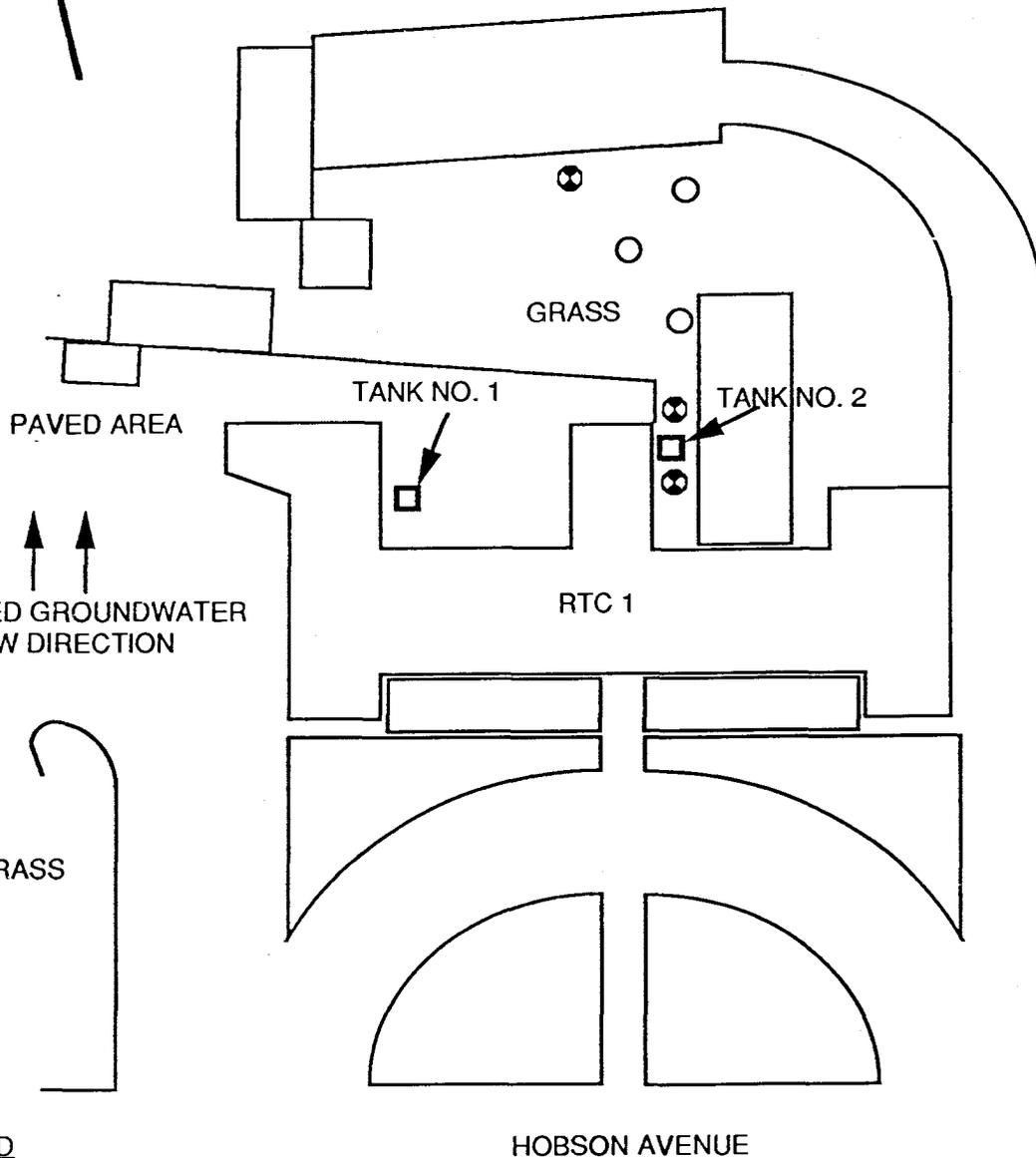


CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC



COOPER RIVER



LEGEND

- PROPOSED SOIL BORING LOCATIONS
- ⊗ PROPOSED MONITORING WELL LOCATIONS
- ➔ ESTIMATED GROUNDWATER FLOW DIRECTION

MAP SOURCE:
 UST REMOVAL REPORT
 PROJECT NO.
 USN900820SCC(RTC)

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FIGURE 5A

PROPOSED SOIL BORINGS AND
MONITORING WELL LOCATIONS

Naval Reserve Training Center



CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC

the hollow stem of the auger flytes. Well screens will not exceed 15 feet in length and will be placed so as to intersect the water-table surface.

Following insertion of the screen and casing string, the annular space between the outside of the screen and the inner wall of the auger flytes will be filter packed with clean, well sorted (uniformity coefficient of 1 - 3) silica sand meeting ASTM C775 specifications by gravity or if necessary gravity/wash methods. If it becomes necessary to use water to place the filter pack, only clean potable water from an approved source will be used. The filter pack will extend at least one foot above the top of the screened interval. The filter pack will be installed in lifts not exceeding 2 feet and the auger flytes retracted a corresponding amount to reduce the potential for sand locking the screen and casing within the augers.

A one foot thick granular bentonite seal will then be placed directly above the filter pack material. After allowing sufficient time for hydration the remaining annular space will be sealed with Type I Portland Cement containing 2 - 5% granular bentonite.

The monitor wells will be finished below grade within protective flush mounted 12 inch diameter manholes. Keyed alike locking systems will be provided. A typical well construction diagram is shown in Figure 6. Well identification plates numbered in accordance with NAVFAC protocol will be secured to each well-head.

All drilling cuttings will be containerized in 55 gallon steel drums, and disposed of in an environmentally sound manner.

Well development will be completed by a PVC handpump or by bailing with a PVC or teflon bailer. Development will proceed until non-turbid water is discharged and temperature, pH and specific conductivity have stabilized. Water discharged during development will be containerized and analyzed for TPH and BTEX compounds. The water will be disposed of in a manner appropriate for the analytical results.

MONITORING WELL NO: _____

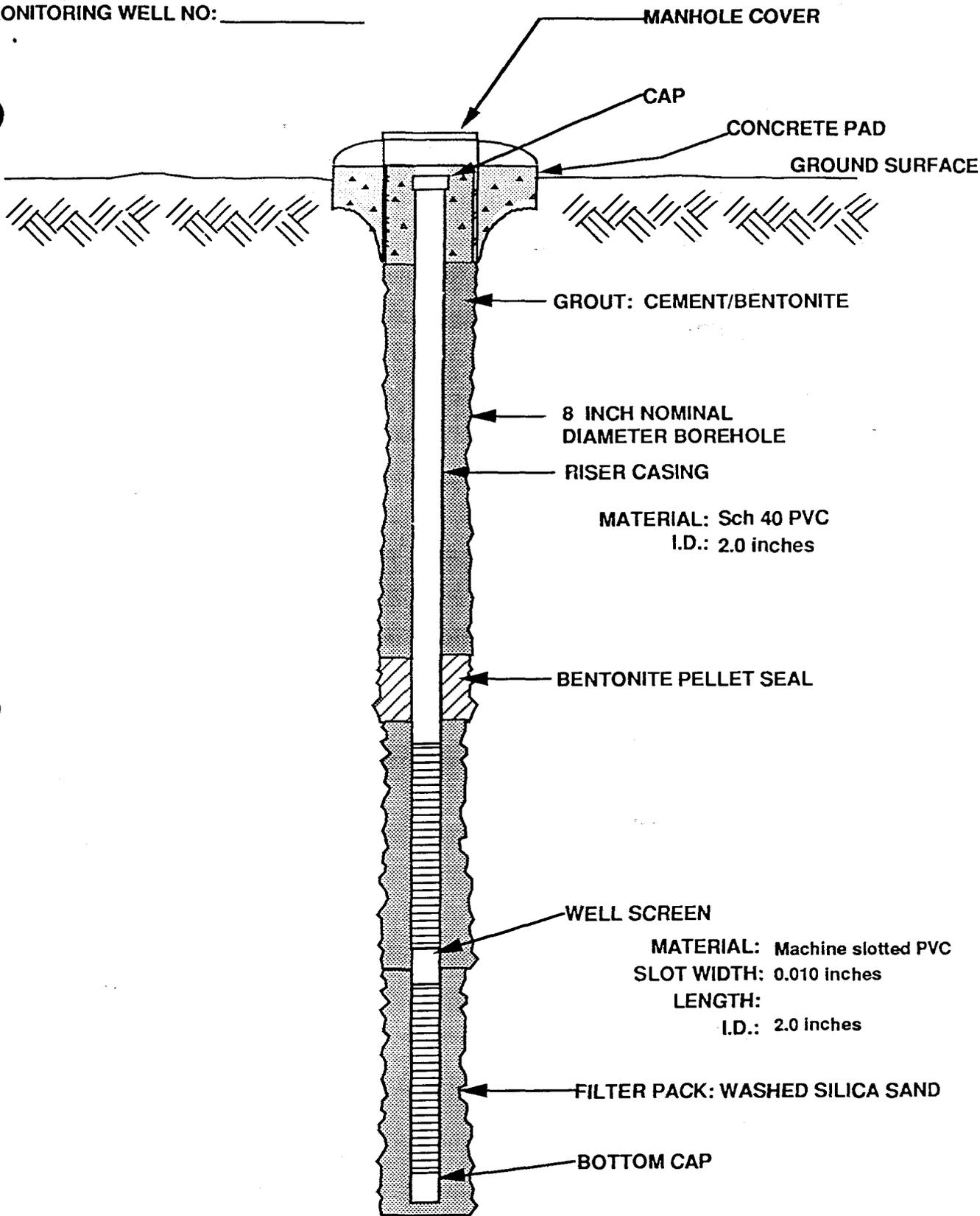


FIGURE 6

TYPICAL MONITORING
WELL CONSTRUCTION



CONTAMINATION ASSESSMENT PLAN

NAVAL BASE Charleston, SC

The drilling rig and all down-hole drilling tools will be decontaminated by steam cleaning prior to mobilization on-site and between borings. Split-spoons will be steam cleaned between runs. All well screens, casings and end plugs will be steam cleaned prior to installation and will contain no stamped, painted or printed material. All work will be conducted within a clearly marked exclusion zone as described in the Health and Safety Plan.

3.3 Technical Oversight

A Serrine hydrogeologist will be on-site during drilling, well installation and well development activities. The Serrine field representative will be responsible for supervision of drilling and well construction activities.

Continuous split-spoon soil samples will be lithologically described and recorded on NAVFAC approved lithologic logs. Upon completion of each monitor well installation, a well construction log will be completed using the appropriate well construction forms.

Additionally, the Serrine field office representative will be responsible for air quality monitoring and record keeping in accordance with the Health and Safety Plan.

4.0 SURVEYING

Upon completion of construction and development, each monitor well will be located with respect to horizontal and vertical datum. The horizontal datum will be either base coordinate grid system or North American Datum '27 at the discretion of the EIC and the activity Public Works Office. The vertical datum will be NVGD '27 or '83 as deemed appropriate by the EIC and the activity Public Works Office. Levelling will be tied into an established measuring point at each wellhead and will be to the nearest 0.01 foot. All surveying work will be certified by a Registered Land Surveyor.

5.0 FLUID-LEVEL MEASUREMENTS

The prevailing hydraulic gradient of the upper-most aquifer will be determined for the site.

Depth to fluid will be measured relative to a known elevation reference established for each well. Accuracy of measurements shall be within 0.01 ft or 1/8 inch. Depth to fluid measurements will be converted to elevations so that a contour map of the ground-water surface may be developed.

Depth to fluid measurements will be made using a hydrocarbon interface probe to determine thicknesses of free product if present within the well bores.

6.0 SAMPLING AND ANALYSES

One soil sample will be collected from each soil boring, one soil sample will be collected from each monitor well, and one aqueous sample will be collected from each monitor well.

6.1 Sampling Protocol

6.1.1 Soil Sampling

Soil samples will be collected from the borehole by continuous split-spooning. Split-spoons will be steam cleaned prior to each run to minimize the potential for cross-contamination of samples. Upon retrieval the soil sample will be visually inspected for obvious petroleum hydrocarbon contamination and lithologically described.

Soil samples will be field screened for volatile organic compounds (VOCs) with a Photovac TIP analyzer. Field screening will be completed by placing a representative portion of each split-spoon sample in a clean glass container sealed with an aluminum foil septum or polyethylene resealable bag. The samples will be allowed to de-gas for 15 minutes and a head-space sample will then be introduced into the Photovac TIP for analysis. Digital readings relative to a known calibration standard (isobutylene) can be obtained immediately and will be recorded for each sample. Results of field screening for VOCs will be used to aid in the selection of soil samples to be submitted for laboratory analyses.

Soil samples which are to be submitted for laboratory analyses will be placed in sterile glass containers provided by the contract laboratory. Each soil sample will be assigned a unique

identification number for tracking purposes.

A total of six (6) soil samples from each site will be collected for laboratory analyses during Phase I activities. Parameters to be analyzed in soil samples will be TPH by modified method 8015 (GC) and lead by EPA method 7421 (furnace).

6.1.2 Ground-Water Sampling

One ground-water sampling round will be conducted upon completion of monitor well construction and development. Parameters to be analyzed in ground-water samples are: EPA 624/8240, EPA 625/8270, TPH (8015), lead (7241), BOD, pH and specific conductance. Standard field parameters (pH, specific conductivity and temperature) will be measured at the time of sample collection.

Prior to sample collection a minimum of three (3) well volumes will be purged from each monitor well or the well will be bailed dry. All water purged prior to sampling will be contained in drums and disposed of in an environmentally sound manner.

A teflon bailer will be used for ground-water sample collection. The bailer will be thoroughly washed and rinsed prior to sampling and between wells to reduce potential cross-contamination. Ground-water samples will be immediately placed in sterile containers, assigned unique identification numbers and preserved in accordance with EPA protocol.

6.1.3 Quality Assurance/Quality Control

All samples submitted for laboratory analyses will be assigned unique identification numbers for tracking purposes. A Chain-of-Custody form will be completed by the sampler and will accompany all samples from the field to the analytical laboratory. All persons handling the samples will be required to sign the Chain-of-Custody.

Trip blanks will accompany containers and samples from issue at the laboratory to the sampling location and back to the laboratory upon delivery of the samples. NEESA Level

C QC guidance will be followed during sampling and data validation.

7.0 HYDRAULIC TESTING

Slug tests will be conducted to calculate an estimate of the hydraulic conductivity of the affected aquifer. These data combined with the observed hydraulic gradient and an estimate of the effective porosity of the formation will be used to calculate the natural flow rate of ground-water across each site. Slug tests are recommended because: 1) small diameter monitor wells can easily be slugged; and 2) there will be no potentially contaminated discharge water to dispose of as would be the case if a pumping test were conducted.

8.0 ADJACENT LAND USE

The area adjacent to the FMWTC and to the NRTC will be surficially examined for other potential contaminant sources. In addition, nearby discharge points, including water wells within 1/4 mile of each site will be identified.

SECTION II
HEALTH AND SAFETY PLAN

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10.0 COORDINATION AND RESPONSIBILITY

The Project Manager must not allow work to begin until this Health and Safety Plan has been provided to all field personnel. Before visiting the work site, all personnel must attend a site specific briefing session, to be conducted by the SIRRINE Health and Safety Director or his designee, on the potential site hazards and specific requirements of this Health and Safety Plan, including training in the proper function and operation of all monitoring and personal protective equipment. The overall responsibility for the health and safety of SIRRINE project personnel lies with the SIRRINE Health and Safety Director. The Site Health and Safety Officer (HSO, the senior SIRRINE representative continually on the site during any site activity) will be responsible for ensuring that the Site-specific Health and Safety Plan is complied with during site operations. If there is any question whether an unplanned occurrence on site may compromise health and safety, the HSO has the authority to interrupt operations and to remove all personnel from the area. If practical, the Project Manager and Health and Safety Director should be consulted before any operation is interrupted. If work is stopped due to any health and safety concern, immediate attention should be given by health and safety personnel, working in cooperation with the Project Manager, to identify and correct the cause of concern as quickly as possible. Any such incident should be fully documented by the Site Health and Safety Officer in a report to the Health and Safety Director and Project Manager. In the event of a work stoppage, the client must be notified as soon as possible, and kept apprised of progress in resolving the incident until normal operations are resumed.

NOTE: Refer to Page 28 for Primary Emergency Contact Numbers.

11.0 SITE DESCRIPTION

The FMWTC and the NRTC are located on the Naval Base in Charleston, South Carolina. During an environmental site assessment in November, 1990, soil contamination was detected in the area of an abandoned in place UST at the FMWTC. In addition, during removal of a UST at the NRTC in November, 1990, soil contamination was also detected.

12.0 PROJECT DESCRIPTION

12.1 Project Description

A. Objective

The objective of this project is to determine the horizontal and vertical extent of petroleum hydrocarbon contamination in the soil and ground-water at the FMWTC and the NRTC, Naval Base Charleston, SC.

B. Assessment Activities

The boreholes for well installation will be drilled using nominal 6 inch ID hollow-stem augers to depths of ± 20 feet. Continuous split-spoon samples will be collected beginning at 2 feet below land surface to the total depth of the boring. The upper 2 feet of each boring will be hand augered to minimize the risk of accidental breaching of underground utilities and/or product dispensing lines.

Organic vapor monitoring will be conducted at 5 minute intervals using a Photovac TIP II air analyzer. The Photovac TIP II is capable of detecting and quantifying (relative to known calibration standard) organic vapors having an ionization potential of 10.6 eV. Most volatile organic compounds and many semi-volatile organic compounds are detectable with this instrument including; benzene, toluene, ethylbenzene, xylenes, naphthalene, etc.

The drill rig and all downhole tools will be steam cleaned prior to mobilization onto the site, between boreholes, and prior to demobilization off-site. Split spoons will be decontaminated between runs. All well screens, casing and end plugs will be steam cleaned prior to installation. No printed, stamped or painted material will be permitted on the screens, casings or end plugs.

Monitor well development will be completed with a PVC or Teflon bailer. Development will proceed until the discharge is non-turbid and temperature, specific conductivity and pH have stabilized. All drill cuttings and water discharged during development will be containerized in 55 gallon drums.

13.0 HAZARD ASSESSMENT

Data gathered at these locations indicate potential fuel oil contamination in the subsurface.

13.1 Toxicity Summary

13.1.1 Fuel Oil No. 2 - Diesel

Fuel Oil No. 2 is minimally irritating to the eyes, but extremely irritating to the skin, with burns and possible blistering. Middle distillates have caused skin cancer and kidney damage in laboratory animals. Care must be taken to avoid contact with the material. Inhalation of high vapor concentrations may cause nausea, narcosis, and/or drowsiness. Inhalation of extremely high concentrations of vapor may result in the cessation of breathing and death.

TLV:	Stoddard Solvent 100 ppm TWA
PEL:	N/A
IDLH:	N/A
DESCRIPTION:	Brownish colored liquid with a characteristic odor
SOLUBILITY:	Negligible
FLASH POINT:	160°
IONIZATION POTENTIAL:	N/A
VAPOR PRESSURE:	Low at Room Temperature
LEL:	0.52%
VEL:	4.10%
RESPIRATOR CARTRIDGE BREAKTHROUGH TIME:	N/A
H Nu SENSITIVITY:	N/A
OVA SENSITIVITY:	N/A

14.0 QUALITATIVE RISK ANALYSIS

The amount of fuel oil in the soil is currently unknown. During drilling and sampling operations vapor concentrations may become elevated. The flash point of fuel oil No. 2 is

160° F. When temperatures exceed this level sufficient vapors are generated which will support combustion. This presents a significant risk of fire and explosion during site activities. Organic vapor concentrations in the air will be monitored as specified (see Section 6), to warn of any inhalation hazard in the breathing zone. An explosimeter will be used to detect when atmospheric conditions approach the lower explosive limit (LEL). Skin contact with contaminated soil may be irritating and could increase the risk of long term effects such as skin cancer and kidney damage.

Inhalation of vapors may occur during drilling operations if underground vapor pockets are purged. The risk of skin absorption may elevate if personal protective clothing or gloves are torn during sampling and drilling activities. This may result in the ingestion of contaminated particulates if proper personal hygiene practices are not followed.

With proper use of industrial hygiene equipment and personal protective equipment accompanied by good personal hygiene practices as outlined in this Health and Safety Plan, the potential risks at this location are expected to be insignificant. However, failure of equipment or of an individual to adhere to the guidelines outlined in this document will increase the potential risks to a level dependent upon actual exposure and sensitivity of the exposed individual.

15.0 ENVIRONMENTAL MONITORING

Organic vapor monitoring will be conducted at 5 minute intervals using a Photovac TIP II air analyzer. The Photovac TIP II is capable of detecting and quantifying (relative to a known calibration standard) organic vapors having an ionization potential of 10.6 eV. Most volatile organic compounds and many semi-volatile organic compounds are detectable with this instrument including: benzene, toluene, ethylbenzene, xylenes, naphthalene, etc.

15.1. Explosimeter

Combustible gas readings must be taken continuously at all drilling/sampling sites. If the reading results in 20% of the LEL, all work operations must cease and site personnel will evacuate the area. After a reasonable time (10 - 15 minutes) to allow the combustible gas

to dissipate, the site HSO will take additional readings while approaching the drilling/sampling site. If levels are below 20% of the LEL, work may resume at this location. If levels remain at or above 20% of the LEL, the site HSO must direct work activities to a different location.

16.0 PERSONAL PROTECTIVE EQUIPMENT

16.1 Respiratory Protection

Level C or a modified Level D (tyvek suits, boots, gloves) must be maintained throughout the duration of the work in the exclusion zone. Half mask respirators with organic vapor cartridges will be required whenever OVA readings in the breathing zone reach 50 ppm. If OVA readings reach 1000 ppm the work site should be evacuated. Should this happen, the Serrine Health and Safety Director should be consulted for further instructions before work continues at this site.

16.2 Nonrespiratory Personal Protective Equipment

The following items will be required for field operations at this site:

- o Hardhat with liner
- o Steel toe boots or safety shoes (neoprene boots as necessary)
- o Nitrile or neoprene gloves
- o Tyvek suits
- o Safety glasses or goggles for work around drill equipment
- o Eyewash (15 minute)
- o Fire Extinguisher (20 lb. ABC)
- o First Aid Kit
- o Decontamination sprayer and Decon Solution
- o 5 Gallon cooler with water
- o 5 Gallon wash water container (for washing hands and face)

17.0 HEAT STRESS PROTECTIVE MEASURES

When the body temperature rises, the body seeks to dissipate the excess heat. The major

disorders due to heat stress are heat cramps, heat exhaustion, and heat stroke. Heat cramps are painful spasms which occur in the muscles of workers who sweat profusely in the heat and drink large quantities of water, but fail to replace the body's lost salts and electrolytes.

Heat exhaustion is characterized by extreme weakness or fatigue, dizziness, nausea, and headache. In serious cases, a worker may vomit or lose consciousness. The skin is clammy and moist, complexion pale or flushed, and the body temperature can be normal or slightly higher than normal. Treatment consists of rest in a cool place and replacement of body water lost by perspiration. Mild cases may recover spontaneously with this treatment. Severe cases may require care for several days. There are no permanent effects.

Heat stroke is caused by the breakdown of the body's heat regulating mechanism. The skin is very dry and hot with a red or bluish appearance. Unconsciousness, mental confusion, or convulsions may occur. Without quick and adequate treatment, the result can be death or permanent brain damage. Medical assistance should be given quickly. The person should be moved to a cool place. Body heat should be reduced artificially by soaking the person's clothes with water and fanning them. The following steps can be taken to reduce heat stress:

- o Acclimate the body
- o Drink more liquids to replace body water lost during sweating
- o Increase salt consumption (salt tablets are not recommended)
- o Wear personal cooling devices
- o Wear supplied air suits or respirators equipped with a vortex tube that cools the air being supplied.

18.0 ACCIDENT PREVENTION

Preventing accidents is the responsibility of each individual on site. Unsafe or dangerous

working conditions shall be reported immediately to the Health and Safety Officer (HSO). Instructing respective employees in safe work practices and emergency procedures is the responsibility of the Serrine HSO and any subcontractor(s). Serrine shall provide the subcontractor(s) with the Health and Safety Plan, for information only. Adherence to the standard safety operating procedures and practices described below shall be required of Serrine personnel to minimize the risk of accidents resulting in injury or excessive chemical exposure.

19.0 STANDARD OPERATING SAFETY PROCEDURES AND CONTROLS

The following general operating procedures shall be followed by all site personnel. These precautionary measures are designed to reduce the risks of inadvertent or accidental chemical exposure or injury during on-site operations.

19.1 Personal Precautions

- o Be familiar with standard operating safety procedures and adhere to all instructions and requirements in the site safety plan.

- o Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any contaminated or potentially contaminated area. However, a supply of cold water and disposable cups will be located in the decontamination area such that employees will have access to water with only removal of gloves, hat, and respirator where used.

- o Contact lenses shall not be worn in any contaminated area.

- o Hands and face must be thoroughly washed upon leaving the work area. Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

- o No facial hair which interferes with a satisfactory respirator fit of the mask-to-face seal is allowed on personnel required to wear respirators.
- o Avoid contact with contaminated or suspected contaminated surfaces. Whenever possible, avoid walking through puddles, mud, etc. Avoid kneeling or sitting on the ground, equipment or drums.
- o Personal articles shall be prohibited in any contaminated area.
- o Medicine and alcohol can exacerbate the effects from exposure to toxic chemicals. Alcoholic beverage intake should be minimized or avoided on off work hours during field operations. Prescribed drugs should not be taken by personnel on site operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Do not work when ill.
- o Be alert to potential health and safety hazards.

19.2 Operational Requirements

- o All personnel going on site shall be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications.
- o Respiratory protective devices and/or protective clothing appropriate to the designated levels of protection shall be worn by all personnel going into areas designated for wearing protective equipment.
- o Personnel on site shall use the buddy system when wearing respiratory protective equipment.

- o Visual and/or voice contact shall be maintained between pairs on site. Entry team members shall remain close together to assist each other during emergencies.
- o During continual operations, on-site workers shall act as safety backup to each other. Off-site personnel shall provide emergency assistance.
- o Personnel should practice new or unfamiliar operations prior to performing the actual procedure.
- o Entrance and exit locations shall be designated and emergency escape routes delineated. The following warning signals shall be used when necessary:

Hand gripping throat	Can't breathe
Grip partner's wrist or both hands at waist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	OK, I am all right, I understand
Thumbs down	No, negative

- o Communications shall be maintained between field team members at all times. The location of the nearest telephone to site activities will be identified in order to facilitate emergency response communications.
- o Wind indicators visible from the work location should be identified before commencing operations.
- o Personnel and equipment in the contaminated area shall be minimized, consistent with effective site operations.
- o Decontamination procedures for leaving a contaminated area shall be followed.

Hands and face shall be washed prior to work breaks and eating. Work areas and decontamination procedures have been established based on expected site conditions (see Section 11).

- o Report all injuries or work related illnesses to the site HSO or supervisor as soon as possible.

19.3 Drilling Safety

Drilling safety is the responsibility of each member of the drilling crew. Standard operating safety procedures shall comply with guidelines/recommendations specified in the Drilling Safety Guide (National Drilling Federation) or the Manual of Recommended Safe Operating Procedures and Guidelines for Water Well Contractors and Pump Installers (National Water Well Association) or other recognized drilling industry safety guidelines.

Sirrine personnel shall not assist subcontracted drillers with their assigned tasks. This is required in order to limit the exposure of Sirrine employees to hazards associated with drilling operations.

Although Sirrine is not required to provide safety oversight for drillers, the drilling supervisor should be informed of any safety violations, unsafe work practices or imminent danger observed by Sirrine in the normal performance of our assigned duties.

19.4 Adherence to Buddy System

No field operation is without some degree of risk. For this reason, a minimum of two people must be assigned to all task locations and must stay within voice contact at all times.

20.0 DECONTAMINATION CONTROL MEASURES

Site work zones shall be established by the HSO to reduce the accidental spread of hazardous substances by workers or equipment.

20.1 Site Organization and Control

Three general areas of operation shall be established to reduce the risk of personnel exposure to hazardous substances. The three areas are:

- o Exclusion Zone (Zone A)
- o Contamination Reduction Zone (Zone B)
- o Support Zone (Zone C)

The dimensions of each area and the safe working distances between each area shall be balanced against practical work considerations and existing field conditions.

Exclusion Zone

This area shall be considered contaminated, and all personnel within the area must use the prescribed levels of personal protection. As defined in this Health and Safety Plan, there may be some areas where the use of respiratory protection is not required during normal work activities. Respirators should be immediately available for use, however, should a potential hazard become evident. These areas are identified by the following characteristics:

- o No known airborne hazards are present and there is little or no potential for release of hazardous airborne contaminants,
- o Work operations preclude splashing of hazardous materials.

Because of the nature of field operations, Tyvek suits, disposable gloves, safety glasses, and shoe coverings shall be required in the Exclusion Zone and Contamination Reduction Zone. Hard hats are required in the exclusion zone. Any item taken into the Exclusion Zone shall be considered to be contaminated until carefully inspected by the site HSO and/or decontaminated.

Contamination Reduction Zone

The Contamination Reduction zone (Zone B) shall serve as a buffer between the Exclusion Zone and the Support Zone, and is intended to prevent the spread of contaminants from

work areas. All decontamination procedures shall be conducted within this area.

Personnel entering this area shall be wearing the prescribed personal protective equipment. Exit from the Contamination Reduction Zone requires the removal of any suspected or known contaminants through compliance with established decontamination procedures.

Support Zone

The Support Zone (Zone C) shall be in a non-contaminated area. It shall contain a first aid station and other elements necessary to support site activities. Normal work clothes and safety shoes are worn in this area. Location shall be based upon favorable wind direction, topography and site accessibility, as conditions allow.

Modifications to Site Control

Less stringent site control and decontamination procedures may be utilized based upon field activities and results of monitoring data. Any modification shall be authorized by the Serrine HSD and supervised by the site HSO.

20.2 Decontamination Procedures

Safe personal hygiene practices are discussed in Section 10, Standard Operating Safety Procedures and Controls. Decontamination shall be performed under the supervision of the site HSO. Personnel and portable field equipment decontamination shall be carried out in the contamination reduction zone. When working in the Exclusion Zone, care should be taken to avoid contamination of equipment (particularly instruments) whenever possible.

For all egress from the Exclusion Zone, decontamination stations shall consist of:

1. Equipment drop
2. Boot, glove and respirator wash
3. Boot, glove, and respirator rinse
4. Tyvek disposal (into 55 gallon drum or other suitable container)
5. Respirator wash and rinse

6. Hand and face wash and rinse

NOTE: All persons subject to decontamination should shower daily as soon as practicable after their work shift.

Monitoring instruments and protective equipment shall be decontaminated if the equipment has been in contact with the ground or splashed with contaminated water, mud or other material. Decontamination solution shall consist of detergent and water. Rinse solution shall be potable water. Decontamination and rinse solutions shall be disposed on site under the supervision of the site HSO.

All equipment shall be cleaned before relocation to and use at any other sampling site or work area.

20.3 Medical Emergencies

For physical injuries, first aid treatment shall be given at the site, depending upon the seriousness of the injury. The victim should undergo decontamination, if necessary, unless such procedures interfere with necessary treatment. In life-threatening situations care shall be instituted immediately. Protective clothing shall be removed or cut away if this will not cause delays, interfere with treatment, or aggravate the problem. If contaminated protective clothing cannot be removed, wrap the victim in clean materials to help prevent contamination of medical personnel and ambulances.

For chemical exposure emergencies, decontamination procedures shall be followed unless severe medical problems requiring life sustaining measures are evident.

21.0 EMERGENCY EQUIPMENT

Emergency equipment available on-site shall include:

- o First Aid Kits, (16 unit as specified in National Safety Council Data Sheet No. 202 or equivalent),

- o Portable eyewash (15 minute duration),
- o Respirators - HEPA/Organic Vapor Combination Cartridges (GMA-H or GMC-H),
- o Citizens' Band (CB) Radio (if field conditions warrant),
- o Fire Extinguisher.

First Aid

In the event of injury, the emergency shall be handled according to the procedures described in the Emergency Procedures Section. The first aid kits shall be maintained at the control access point between the decontamination and support zones and in support vehicles.

22.0 EMERGENCY PROCEDURES

Some risk of personal injury or chemical exposure is inherent in hazardous waste site activities. These risks and the effects of unpredictable events such as injury, chemical exposure, fire or explosion shall be minimized by:

- o Adhering to good work practices
- o Using personal protective equipment appropriate for existing field conditions
- o Performing adequate monitoring of individuals and ambient field conditions
- o Staying alert both to personal performance and to that of co-workers.

An emergency situation is considered to exist if:

- o Any member of the field crew is injured in an accident
- o Any member of the field crew experiences or exhibits any adverse effects or symptoms of chemical exposure
- o Safety monitoring indicates site conditions more hazardous than anticipated or that an immediate danger to life or health exists.

22.1 General Emergency Procedures

- o In the event that any member of the field crew experiences any adverse effects or symptoms of exposure while on the scene, the entire field crew shall immediately

halt work and act according to the instructions provided by the site HSO.

- o The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated, shall result in the evacuation of the field team and re-evaluation of the hazard and the level of protection required.
- o In the event that an accident occurs, the site HSO is to complete an Accident Report. Follow-up action shall be taken to correct the situation that caused the accident.

22.2 Personal Injury

Site personnel are trained in American Red Cross first aid procedures and shall administer appropriate first aid treatment, including CPR, in emergency situations. The following general emergency procedures shall be carried out in the event of injury:

1. Notify the Health and Safety Officer (HSO) of the incident.
2. If the victim can be moved safely, remove from the contaminated zone to the decontamination zone using established control points.
3. Administer first aid.
4. Transport victim to nearest hospital or emergency medical center or call for ambulance transport, as appropriate.

NOTE: The site HSO shall direct the removal of injured personnel from the contaminated zone and shall approve any necessary deviation from established decontamination procedures. Such deviation shall be based upon the severity or life threatening nature of the injury.

5. Notify the Serrine Health and Safety Director (HSD) of the incident and describe the emergency response actions taken.

22.3 Chemical Exposure

Before entering the contaminated zone, all site personnel shall be thoroughly acquainted with the types of toxic/hazardous chemicals present on site and their potential concentrations. The following general procedures shall be followed for chemical exposure emergencies:

1. Move the victim from the immediate area of exposure or contamination, taking precautions to prevent additional exposure of other individuals.
2. Notify the site Health and Safety Officer (HSO) of the exposure incident.
3. If victim can be moved safely, proceed to the decontamination zone through established control points.
4. Decontaminate clothing or remove if safe to do so.
 - o For skin or eye contact, thoroughly wash affected area with water (eyes should be flushed for at least 15 minutes)
 - o For inhalation exposure, ensure that victim has adequate fresh air
5. Administer additional first aid treatment as appropriate.
6. Transport victim to nearest hospital or emergency medical center or call for ambulance transport as appropriate.

NOTE: The HSO shall direct the removal of injured personnel from the contaminated zone and shall approve any necessary deviation from established decontamination procedures. Such deviation shall be based upon the security or life threatening nature of the injury.

7. Notify the HSD of the incident and describe the emergency actions taken.

EMERGENCY CONTACT NUMBERS

Naval Station Fire Department 803/743-5334

HOSPITALS

Naval Hospital (Emergency) 803/743-6341
Roper Hospital 803/724-2000
Baker Hospital 803/744-2110

City of North Charleston
Emergency 911

Naval Station Chief of Police 803/743-3652

SIRRIE ENVIRONMENTAL CONSULTANTS

Clif Johnson 803/572-5600 (Work)
Division Manager 803/572-0741 (Home)

John Cox 803/572-5600 (Work)
Project Manager 803/884-1371 (Home)

FMWTC

POC: ICC (SW) Patterson 803/743-5066
Chief Mellichamp 803/743-5066

NRTC

POC: Lt. Shawn 803/743-3912

NAVFAC

Mr. Daryle Fontenot 803/743-0607

NOTE: For ambulance, fire or police contacts, give the name of the road and the nearest intersection. In the event no telephone can be reached, Channel 9 can be accessed with a Citizens' Band (CB) Radio for emergency assistance.

Notify the client contact and the Serrine Health and Safety Director after emergency contacts have been made.

The PPE manager should be contacted if unforeseen circumstances require the immediate procurement of additional personal protective or emergency equipment.

Attending emergency physicians should be given the telephone number of the Serrine Medical Director to obtain immediate access to an employee's medical records for consultation purposes.

The telephone number of these secondary contacts are listed below.

<u>Secondary Emergency Contacts</u>	<u>Telephone</u>
Betty Schnee	803/234-3043 (office)
Serrine Health & Safety Director	803/244-1391 (home)
Eric Olson	
Serrine PPE Manager and Emergency Equipment Procurement	803/297-3102 (office)
Peter J. Loper, MD	
Serrine Medical Director	803/271-9145

22.6 Spill Control Contingency Plan

Solid materials that are spilled will be scooped up, placed in appropriate containers and held for disposal. Wherever possible, samples will be obtained from above the liquid level in all tanks and barrels to limit spill potential. Appropriate temporary spill containment will be erected prior to sampling any liquid containing vessel from below the liquid level. Spilled

liquids will be neutralized or containerized and held for disposal. Prior to spill clean-up, the SIRRINE Health and Safety Director will be consulted to assure that employees are protected during that work.

23.0 TRAINING OF PERSONNEL

In order to be in compliance with OSHA regulations, all personnel whose duties include participation in job-related activities on these sites, must be able to document "a minimum of 40 hours of initial instruction off the site, and a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor".

Site-specific training shall be carried out by the site HSO entry to the site. This shall consist of a review of the specific hazards of concern, risks, symptoms of exposure and an overview of the Health and Safety Plan to include delineation of work zones, access, decontamination protocols, safety procedures and emergency contacts. Any personnel not initially cleared for site entry will be provided a similar briefing at the site by the HSO before admittance into the Exclusion Zone is permitted.

The OSHA regulations provide that if previous training can be demonstrated equivalent to the OSHA initial training requirements, this shall be considered as meeting those requirements. Equivalent training includes the training that employees might have already received from actual, on-site work experience.

24.0 MEDICAL SURVEILLANCE

SIRRINE Environmental Consultants, Inc. is providing medical surveillance support for numerous ongoing operations. The Medical Surveillance Program is the core element of the SIRRINE Health and Safety Plan that provides for maximum assurance for employee as well as liability protection. The intent of this program is to determine if any pre-employment physiological condition exists that could exacerbate effects from exposure to hazardous substances, and to detect deleterious consequences of occupational exposure to hazardous substances and physical stresses associated with the work environment at hazardous waste sites. The Surveillance Program is designed to monitor specific physiological conditions

and mechanisms that may be affected by non-episodic exposure as well as to provide acute or episodic medical care as needed.

All personnel working on these sites will have had a pre-employment physical examination conducted by an occupational health physician and, on the basis of this examination, will have been certified as being fit for duty on potentially hazardous sites. Annual physical examinations are also conducted based upon actual job-specific exposure records.

Unscheduled medical examinations will be conducted in the unlikely event of unusual exposure or accidents.

All medical records are maintained with the Serrine Medical Director and are accessible, within the limits of the Privacy Act, through written requests to the Serrine Health and Safety Director.

25.0 RECORDKEEPING

Daily work logs shall be maintained by the HSO. Copies of daily logs shall be forwarded to the Contracting Officer on request. The daily log shall contain:

- o Date
- o Area(s) or site(s) worked
- o List of employees by area and hours exposed
- o Personal protective equipment utilized by employees
- o Results of monitoring tests
- o Waste materials removed from work area(s)
- o List of equipment decontaminated
- o Description of special or unusual events or incidents; including all first aid treatments not otherwise reportable.

Daily work logs shall be checked and approved by the site HSO. Any incident resulting in a work stoppage shall be fully documented in a report prepared by the site HSO and submitted to the HSD.

25.1 Accident Reporting

In addition to descriptions in the daily log and work stoppage reports, any accident and/or chemical exposure incident shall be investigated, analyzed and documented in an accident investigation report submitted to the Serrine HSD. This process shall be applicable to both Serrine and all subcontractors. These reports, prepared by the site HSO in consultation with the Serrine HSD, shall contain a full description and analysis of the incident, including exposure work-hours and a log of occupational injuries and illnesses (OSHA Form 200 or equivalent as prescribed by 29 CFR 1904).

Formal accident reports shall be prepared for any diagnosed illness or injuries that result in a lost work day or fatality. The accident report shall identify all contributing causes and recommend future hazard control measures to reduce the risk of recurrence.

Persons on site are responsible for reporting all injuries as soon as possible to the site HSO. The HSD should be notified immediately after all appropriate emergency procedures are complied with.

26.0 JOB EXPOSURE REPORT

The HSO shall complete the attached Job Exposure Report Form and deliver it to the Serrine Health and Safety Director at the termination of field activities on this site, in the event of assignment of a new HSO at an intermediate point during site activities, or at the ends of discrete phases of prolonged field activities. The intent of Job Exposure Reports is to provide documentation of actual and suspected job-related exposures for use by the Serrine Medical Director in making decisions on appropriate periodic examination procedures.

Each Job Exposure Report shall be countersigned by the Project Manager who should ensure appropriate compliance with this procedure.

JOB EXPOSURE REPORT

PROJECT NAME _____ PROJECT NUMBER _____

SITE LOCATION _____

EMPLOYEES ON-SITE:

<u>Name</u>	<u>Site Function</u>	<u>Dates of Site Participation</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Were all PPE, monitoring and decontamination procedures carried out in accordance with the provisions of the Site Health and Safety Plan?

Yes _____ No _____

If no, please state how procedures varied from provisions of the Health & Safety Plan, the justification or authority if appropriate, the dates of variance, and if the variance resulted in any known or suspected chemical or radiological exposure. If additional space is needed, please continue on the back of this form.

Please describe any known or suspected exposure that may have occurred during the period of site activities from accidents, unanticipated incidents or failures of personal protective equipment.

HSO Signature

Witness

Project Manager

Date _____

Date _____



Certificate Of Training

This Certifies That

JOHN COX

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

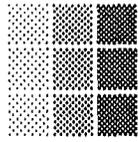
By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script, reading "Betty S. Schnee".

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten signature in cursive script, reading "September 3, 1991".

Date



SIRRINE
ENVIRONMENTAL
CONSULTANTS

Certificate Of Training

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JOHN COX

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AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

Betty S. Schnee, C.I.H.
Health And Safety Director

Date



Certificate Of Training

This Certifies That

CHUCK BUDINGER

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
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Betty S. Schnee, C.I.H.
Health And Safety Director

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Date



Certificate Of Training

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RON PAULLING

Has Completed An Eight-Hour
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Health And Safety Director

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Date



Certificate Of Training

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SUSAN BURDICK

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
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Health And Safety Director

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Betty S. Schnee, C.I.H.
Health And Safety Director

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Date



Certificate Of Training

This Certifies That

ELLIOTT LOCKLAIR

Has Completed An Eight-Hour
Hazardous Waste Site Health And Safety Refresher Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

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Health And Safety Director

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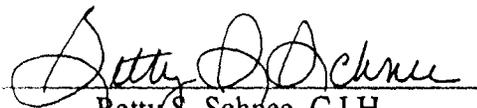
JASON TERRY

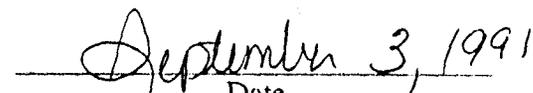
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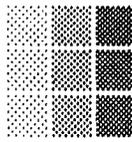
Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina


Betty S. Schnee, C.I.H.
Health And Safety Director


Date



SIRRINE
ENVIRONMENTAL
CONSULTANTS

Certificate Of Training

This Certifies That

JASON TERRY

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

Betty S. Schnee, C.I.H.
Health And Safety Director

Date



Certificate Of Training

This Certifies That

LEE BIENKOWSKI

Has Completed An Eight-Hour
Hazardous Waste Site Supervisor Health And Safety Course
Which Meets The Requirements Of 29 CFR 1910.120 (e)

Presented

AUGUST 29, 1991

By SIRRINE Environmental Consultants, Inc.
Greenville, South Carolina

A handwritten signature in cursive script, reading "Betty S. Schnee".

Betty S. Schnee, C.I.H.
Health And Safety Director

A handwritten date in cursive script, reading "September 3, 1991".

Date



CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Helen Jervey

has successfully completed a 8 hour course of instruction updating the
HAZARDOUS WASTE OPERATIONS AND EMERGENCY
RESPONSE HEALTH AND SAFETY TRAINING
conducted by

WESTINGHOUSE ENVIRONMENTAL AND
GEOTECHNICAL SERVICES, INC.

in compliance with OSHA 29CFR 1910.120

Barbara D. Foster

Instructor(s)

April 15, 1991
DATE

91-005-10
Certificate Number