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CONTAMINATION ASSESSMENT REPORT FOR FLEET AND MINE WARFARE TRAINING  
CENTER (FMWTC) AND NAVAL RESERVE TRAINING CENTER (NRTC) CNC CHARLESTON  
SC  
02/01/1993  
NAVFAC SOUTHERN

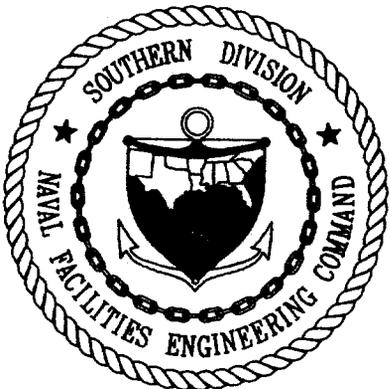


# **CONTAMINATION ASSESSMENT REPORT**

**FMWTC & NRTC**

**CHARLESTON, S.C.**

**FEBRUARY 1993**



**SOUTHERN DIVISION**

**NAVAL FACILITIES ENGINEERING COMMAND**

**CHARLESTON, SOUTH CAROLINA**

**29411-0068**

**CONTAMINATION ASSESSMENT REPORT**  
**FMWTC AND NRTC, CHARLESTON SC**

**CONTRACT N62467-88-D-0655**  
**Amendment 14**

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

**SEC Donohue Project C1339**  
**March 1993**

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

# DISTRIBUTION

Commanding Officer (5)  
Attn: Code 1841  
SOUTHNAVFACENGCOM  
2155 Eagle Drive  
North Charleston, SC 29418  
Attn: Mr. Daryle Fontenot

Commanding Officer (2)  
Fleet & Mine Warfare Training Center  
Naval Base Charleston  
674 Bainbridge Avenue  
Charleston, SC 29411  
Attn: Chief Patterson

Commanding Officer (2)  
Naval Reserve Training Center  
Naval Base Charleston  
Building RTC-1  
Charleston, SC 29408-5900  
Attn: Chief Katte

## EXECUTIVE SUMMARY

Results of an environmental site assessment at the Fleet Mine Warfare Training Center (FMWTC) and the Naval Reserve Training Center (NRTC), Charleston, South Carolina, indicated that petroleum hydrocarbons had possibly contaminated the soil in the vicinity of one underground storage tank (UST) at each site. The site assessment was completed by GEO Services in November, 1990. SEC Donohue was contracted by Southern Division Naval Facilities Engineering Command (Contract No. N62467-88-D-0655, Amendment 14) to conduct a Contamination Assessment and prepare a Remedial Action Plan, if necessary for these sites.

In order to characterize the distribution of contaminants, site-specific hydrogeology and ground-water quality, a soil gas survey was conducted, soil borings were completed and monitoring wells installed.

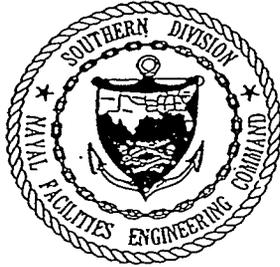
The soil gas survey results indicated that the highest concentrations of total flame ionization detector (FID) volatiles were present in the samples collected near the UST located adjacent to Building 647 at the FMWTC. Low concentrations of total FID volatiles were observed in the surrounding samples. No petroleum hydrocarbons were detected in any of the soil gas samples collected near the No. 2 UST located at the NRTC.

Soil sampling results indicated that moderate concentrations of heavy oils are present in the soils adjacent to the UST locations. The highest concentrations of heavy oils were observed to the north of the UST location at FMWTC. No other petroleum hydrocarbons were present in concentrations in excess of the detection limit.

The results of sample collection from six monitoring wells (three at each site) indicated that there are no hydrocarbons except naphthalene present in detectable concentrations in the ground-water. The concentrations of naphthalene which were quantified were less than the detection limit in the samples which were reported BDL, indicating that naphthalene is not

a contaminant of concern at these sites. The only sampled parameter which was detected in ground-water at concentrations in excess of the USEPA Maximum Contaminant Level (MCL) was lead. Concentrations exceeding the MCL were detected in one well at NRTC and two wells at the FMWTC site. Because the ambient concentration of lead at both sites appears to be approximately 60 percent of the MCL, it is difficult to determine if total lead concentrations which are approximately 20 percent in excess of the MCL are significant. However, one well at the FMWTC site contained lead at a concentration of approximately 4 times the MCL which is significant evidence of contamination.

It is recommended that no further action be taken at the NRTC site because there is no significant evidence of contamination. The evidence of contamination at the FMWTC site is inconclusive. Therefore, a year of quarterly sampling for dissolved and total lead is recommended to determine whether the reported lead contamination is consistently higher than the background lead concentrations.

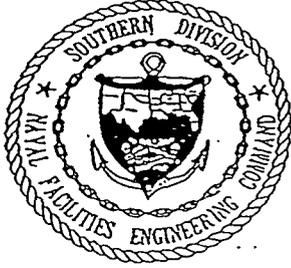


# FOREWORD

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

The Navy's UST Program policy is to comply with all Federal, State and local regulations pertaining to USTs. This report is being generated in response to the required corrective actions stated in the EPA UST Regulations 40 CFR 280 and the South Carolina Department of Health and Environmental Control Underground Storage Tank Regulations, R.61-92 for a release from a UST system. Corrective action phases in response to a release from a UST system are: Phase one - Preliminary Contamination Assessment; Phase two -Contamination Assessment; Phase three - Remedial Action Plan; and Phase four -Remedial Action.

Questions regarding this report should be addressed to SOUTHNAVFACENGCOM, Code 1841, at DSN 563-0607 or 803/743-0607.



# ACKNOWLEDGEMENTS

In the execution of the effort required to generate this report the Underground Storage Tank personnel at SEC Donohue, Inc. commend the unwavering support, assistance and cooperation provided by the personnel at Fleet and Mine Warfare Training Center and Naval Reserve Training Center, Charleston Naval Base, and Southern Division, Naval Facilities Engineering Command. In particular we acknowledge the outstanding effort, dedication and professionalism provided by the following people in the preparation of this report.

Daryle L. Fontenot, P.E., Environmental Engineer, Engineer In Charge,  
SOUTHNAVFACENGCOM.

OS1 Brian M. Patterson, FMWTC.

SKC Katte, Department Manager, Supply, NRTC.

## ACRONYMS, INITIALISMS, AND ABBREVIATIONS

The following list contains many of the acronyms, initialisms, and abbreviations and the units of measure used in this report.

BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene and Xylene Isomers
CAP	Contamination Assessment Plan
CAR	Contamination Assessment Report
CFR	Code of Federal Regulations
CM	Centimeter
DTW	Depth to Water
FID	Flame Ionization Detector
FMWTC	Fleet and Mine Warfare Training Center
Ft	Foot/Feet
HO	Heavy Oils
HSWA	Hazardous and Solid Waste Amendments
MCL	Maximum Contaminant Level
MSL	Mean Sea Level
NEESA	Naval Energy and Environmental Support Activity
NRTC	Naval Reserve Training Center
PAH	Polynuclear Aromatic Hydrocarbons
Pb	Lead
pH	Dissolved Hydrogen

ACRONYMS, INITIALISMS, AND ABBREVIATIONS - Continued

PPB	Parts Per Billion
PPM	Parts Per Million
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
SCDHEC	South Carolina Department of Health and Environmental Control
Sec	Seconds
SOUTHNAVFAC	Southern Division Naval Facilities Engineering Command
SWDA	Solid Waste Disposal Act
TD	Total Depth
TIP	Total Ionizables Present
TOC	Top of Casing
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
USGS	United States Geological Survey
VOC	Volatile Organic Compound
WT	Water Table

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- Appendix F Hydraulic Gradient Calculations
- Appendix G Analytical Results
- Appendix H Chain-of-Custody Documents

**Section I**

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## 1.0 INTRODUCTION

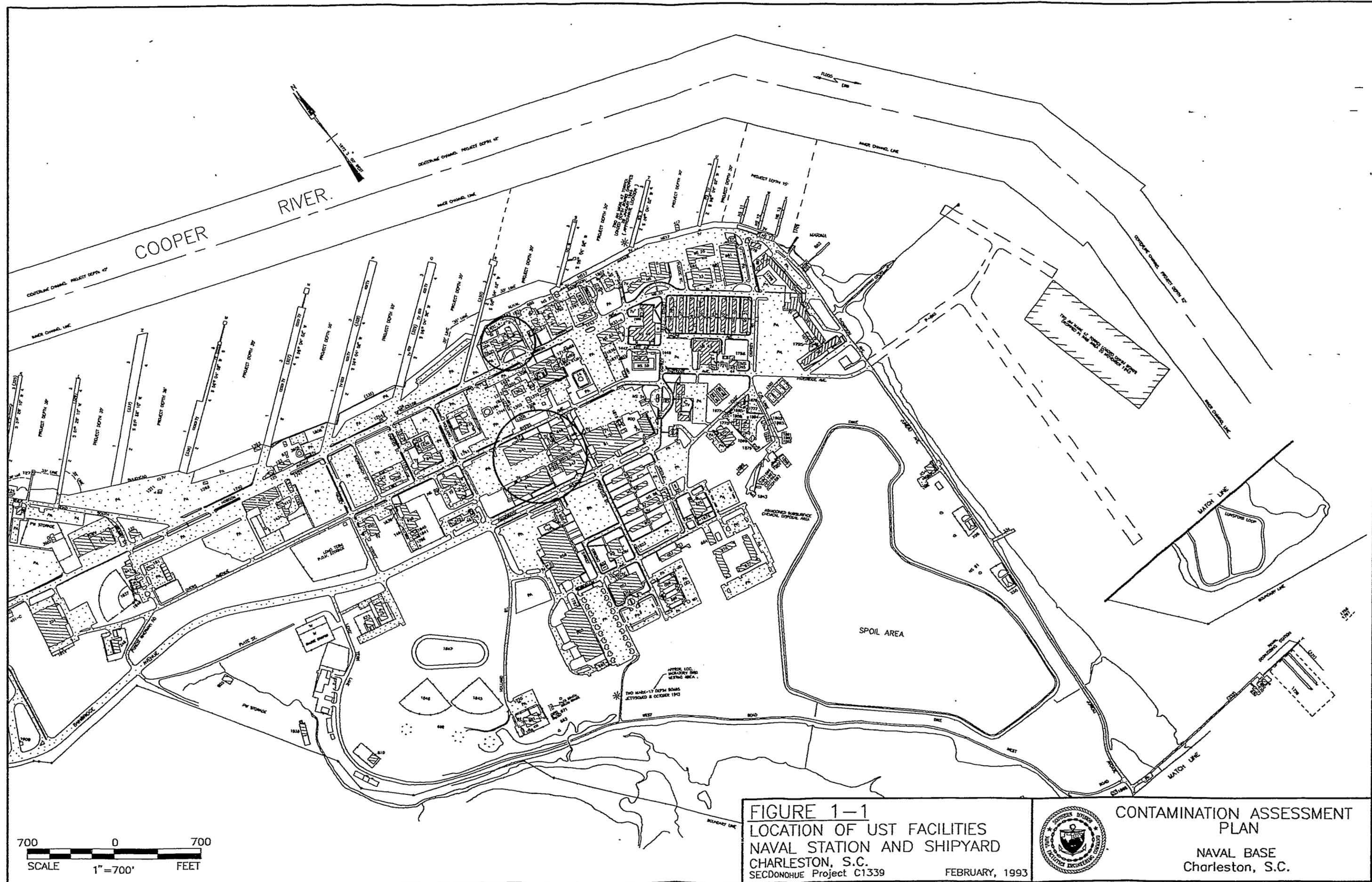
### 1.1 Background

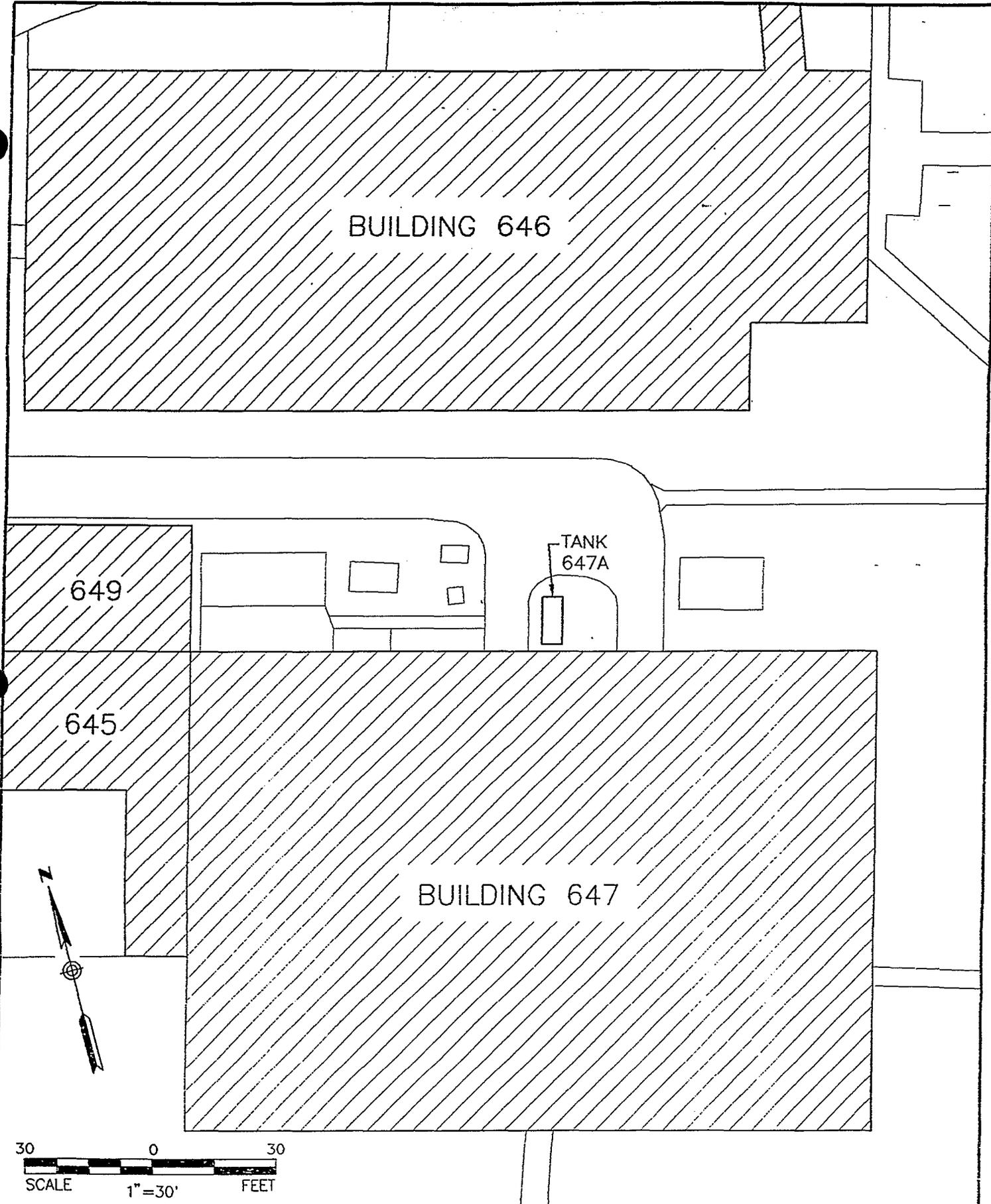
SEC Donohue has been contracted by SOUTHNAVFAC to conduct investigations and evaluations of UST systems at Naval Activities throughout Georgia, South Carolina and North Carolina. As a part of indefinite delivery contract N62467-88-D-0655, a scope of work (Amendment 14) was submitted on June 4, 1991 and a signed delivery order was issued effective June 20, 1991. The field work was completed August, 1992 through February, 1993.

The work performed under Amendment 14 included preparation of the CAP, preparation of a CAR (this document) and preparation of an RAP if necessary, for the FMWTC and the NRTC.

The FMWTC and NRTC are located on the Naval Base in Charleston, South Carolina (Figure 1-1). One 4000 gallon diesel fuel UST (647A) is located at the FMWTC (Figure 1-2) 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 parts per million (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 concentrations in excess of 30 ppm.

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





**FIGURE 1-2**  
**UST LOCATIONS**



**CONTAMINATION ASSESSMENT  
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**FLEET MINE WARFARE TRAINING CENTER  
 CHARLESTON NAVAL STATION  
 CHARLESTON, S.C.**

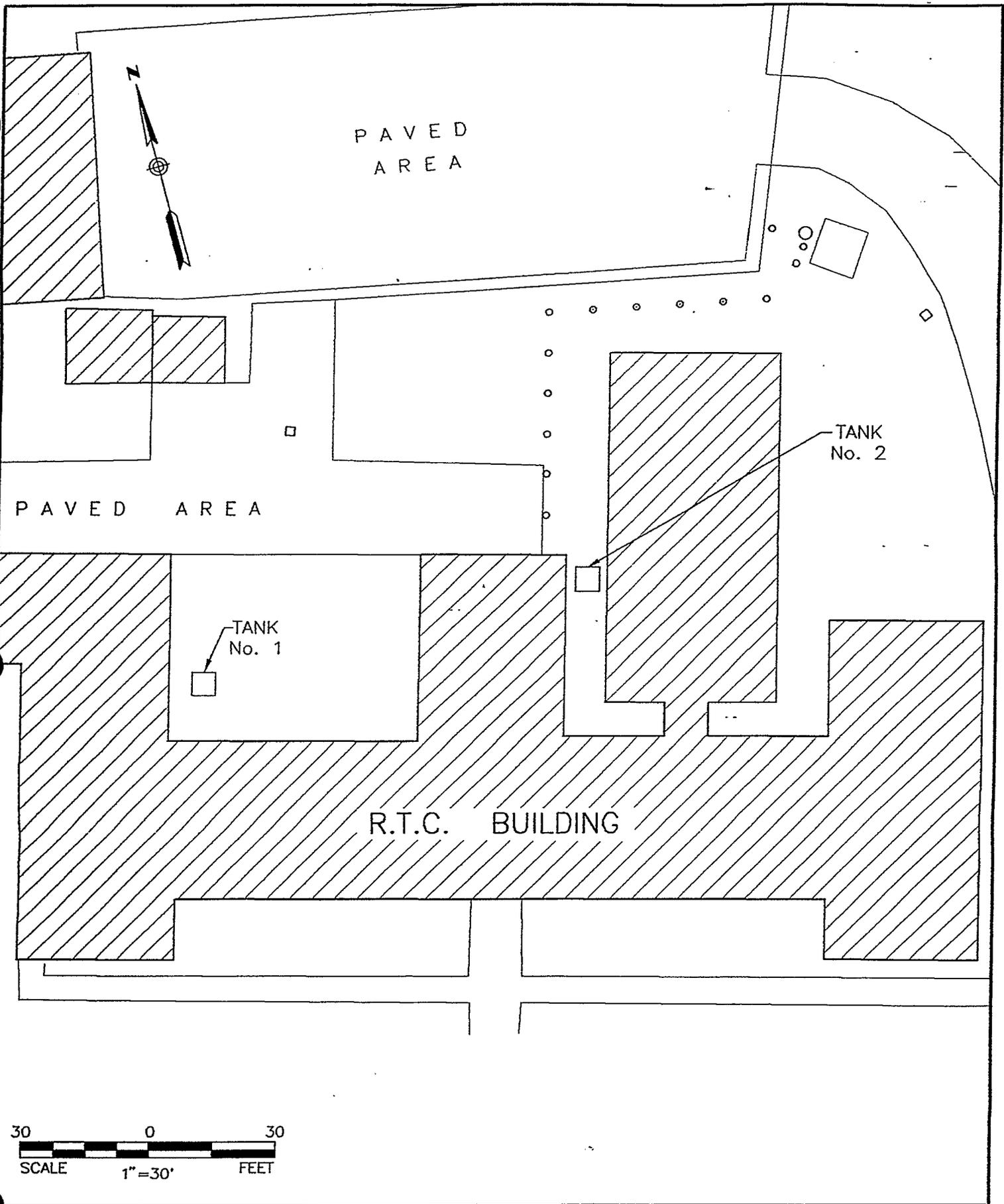


FIGURE 1-3  
UST LOCATIONS



CONTAMINATION ASSESSMENT  
REPORT  
NAVAL RESERVE TRAINING CENTER  
CHARLESTON NAVAL STATION  
CHARLESTON, S.C.

No. 2 and associated piping, soil contamination was detected. Analysis of soil samples collected from the tank area indicated TPH concentrations as high as 2500 ppm.

## **1.2 Objectives**

This CAR has been prepared and submitted to meet, in part, the requirements set forth in the South Carolina Underground Storage Tank Control Regulation R.61-92 (March 23, 1990). The SCDHEC UST regulations are similar to and no less stringent than those contained in 40 CFR 280.

The site-specific data collected during implementation of the previously submitted CAP will be used to characterize the site hydrogeology, chemical nature of the contaminants and identify preferential subsurface flow pathways which may be present at the site.

## **1.3 Previous Reports**

### **1.3.1 UST Removal and Closure in Place for FMWTC**

GEO Services was contracted to remove one (1) 550 gallon UST (643C) and to assess the 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. 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 collected 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 depths of 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 reported concentration 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 had been released. It is probable that the source of the contamination was the 4000 gallon UST, and it is also probable that the contamination has impacted ground-water quality in the vicinity.

### **1.3.2 UST Removal for NRTC**

GEO Services was contracted to remove two (2) 1000 gallon USTs and associated product lines. Both USTs formerly 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 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 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 an elevated TPH concentration. The maximum reported concentration was 2500 ppm from the east end soil sample. As such, it appeared that contaminants have been released. It is probable that the source of this contamination was the UST designated Tank No. 2, and it is probable that the ground-water has been adversely impacted.

## Section II



## 2.0 REGIONAL GEOLOGY AND HYDROGEOLOGY

Ground-water occurrence in the lower Coastal Plain subprovince of South Carolina is primarily restricted to unconsolidated and semi-consolidated clastic and carbonate formations which overlie crystalline basement rocks. Little is known about the water bearing characteristics of the basement rocks but they are not considered likely sources of ground-water.

The lower Coastal Plain accretionary wedge consists of the following formations in ascending order: Middendorf (Tuscaloosa); Black Creek; Peedee; Black Mingo; Santee; Cooper; Edisto; Hawthorne; and undifferentiated terrace deposits. In the study area some of these formations may be absent (Edisto and Hawthorne Formations). Ground-water occurs under artesian conditions in the deeper formations underlying the surficial terrace deposits.

At the FMWTC and the NRTC the Cooper Formation represents the upper confining unit of the Upper Floridan Aquifer (Santee Limestone) and is reported to be approximately 300 feet thick (Park, 1985). Shallow ground-water above the Cooper Formation (<60 ft depth) occurs under water table conditions, hence, recharge is directly affected by local precipitation events. Regional ground-water flow in underlying confined (artesian) aquifers is generally toward the southeast (seaward) except where locally influenced by pumping, recharge, or discharge points. Ground-water flow within the surficial aquifer is more locally affected by recharge/discharge points, especially naturally occurring surface drainages.

Ambient water quality of the artesian aquifers immediately adjacent to the coast is marginal due to their highly mineralized nature (Park, 1985). The City of North Charleston, which serves nearby residential/commercial areas, derives its public water supply from the Edisto River. Therefore, there are no public drinking water supply wells known to be located in proximity to the site.

**Section III**



### 3.0 SITE HYDROGEOLOGY

The FMWTC and NRTC are located within the lower Coastal Plain subprovince as described by Colquhoun (1965). The surficial sediments at the site are assigned to the Princess Anne Formation according to Colquhoun (1965; modified from Cooke, 1936 and Wentworth, 1930). More recently, these sediments were assigned to McCarten, et al's 1984 informal unit designated Q2. The depositional facies was a late Pleistocene beach front, and the predominant sedimentary texture is clean, fine to medium-grained quartzitic sand with disseminated shell fragments (McCarten, et al, 1984).

The Cooper Formation is a regionally extensive confining unit which effectively separates the water table or surficial aquifer from the underlying artesian Upper Floridan aquifer system. The Cooper Formation is reported to be approximately 250 to 270 feet thick in the study area (Park, 1985). Depth to the Cooper Formation is reported to be 45 to 60 feet in the vicinity of the Naval Base.



## **4.0 WORK PERFORMED**

### **4.1 Soil Gas Survey**

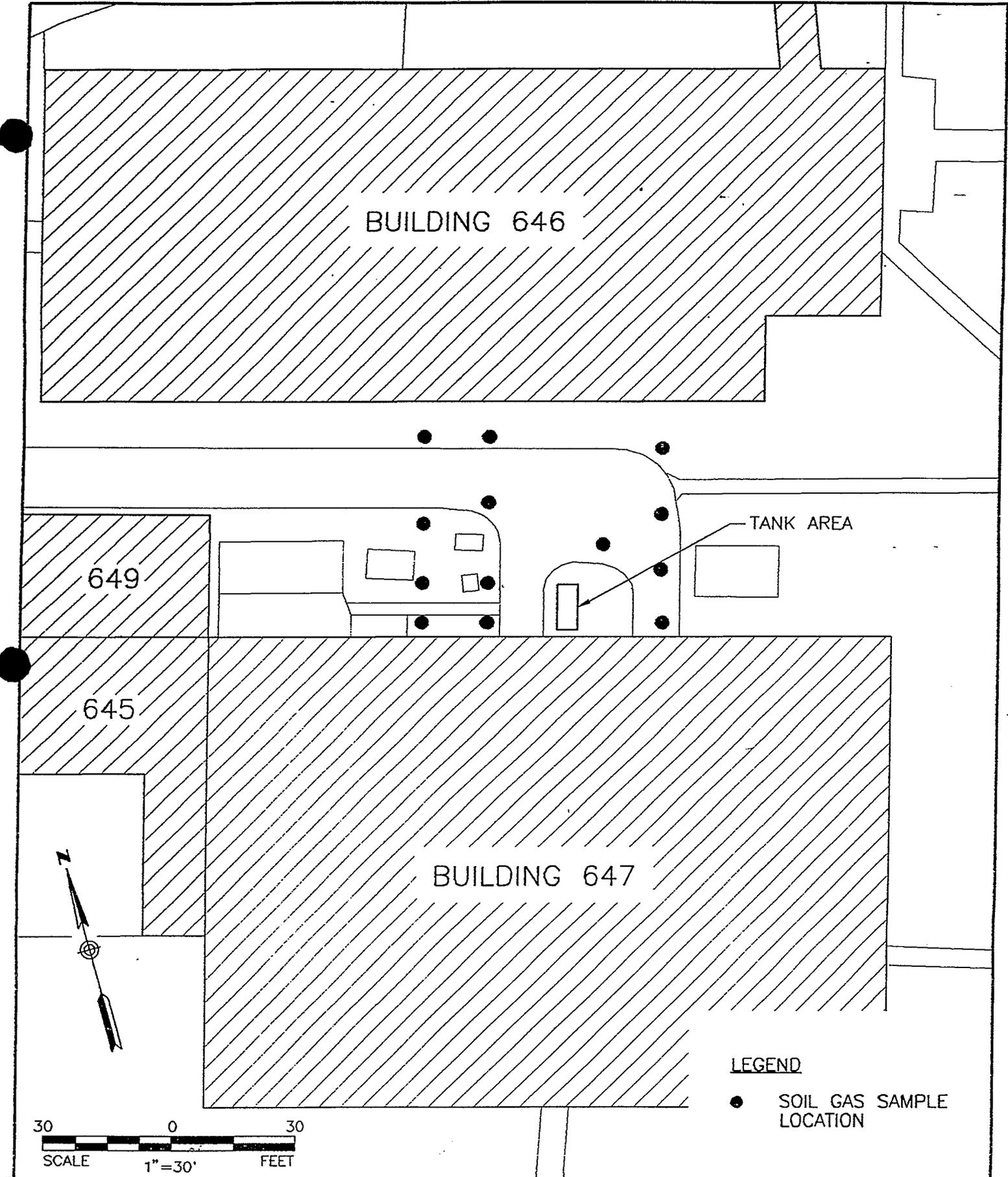
A soil gas survey was conducted on August 6, 1992 by Target Environmental Services, Inc. The work involved the collection of 25 soil vapor samples in addition to field control samples. Thirteen of the soil vapor samples were collected from the FMWTC site (Figure 4-1) and 12 samples were collected from the NRTC site (Figure 4-2). The samples were submitted to a certified laboratory for analysis for benzene, toluene, ethylbenzene and total xylenes (BTEX).

A detailed discussion of the field procedures involved in the collection of the soil vapor samples is included in the Soil Gas Survey Report by Target Environmental Services (Appendix A).

### **4.2 Soil Boring/Monitoring Well Installation**

The following program of soil boring and monitoring well installation was performed at the FMWTC and NRTC sites in order to better define horizontal and vertical extent of soil and ground-water contamination. Drilling was conducted using hollow stem auger methods. A total of twelve (12) soil borings were drilled (6 at each site) of which six were converted into monitoring wells. The locations of these wells are illustrated in Figures 4-3 and 4-4. Logs of each of the 12 borings are included in Appendix B.

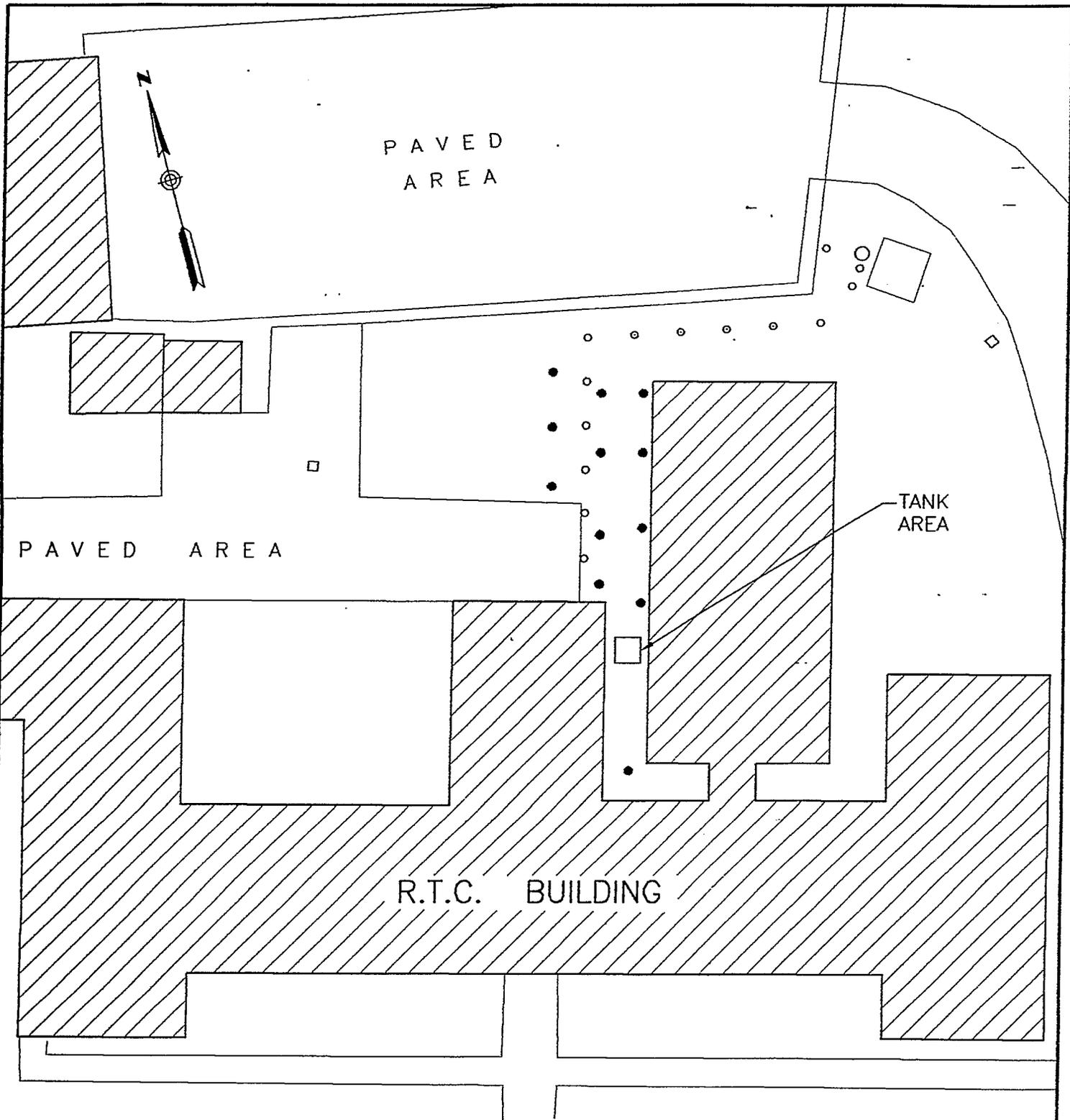
The monitoring wells were installed by placing Schedule 40 PVC threaded well screen (0.010" slot) and attached Schedule 40 PVC threaded, 2-inch diameter casing and end plug through the hollow stem auger flytes. The well screens were placed so as to intersect the water table surface. All wells with a single exception were drilled to a depth of 15 feet. The exception was drilled to 18 feet because information obtained during the soil boring portion of the investigation indicated that the more conductive sediments were deeper at that location.



**FIGURE 4-1**  
**SOIL GAS SAMPLE LOCATIONS**

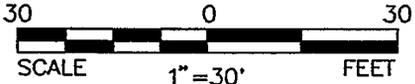


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LEGEND

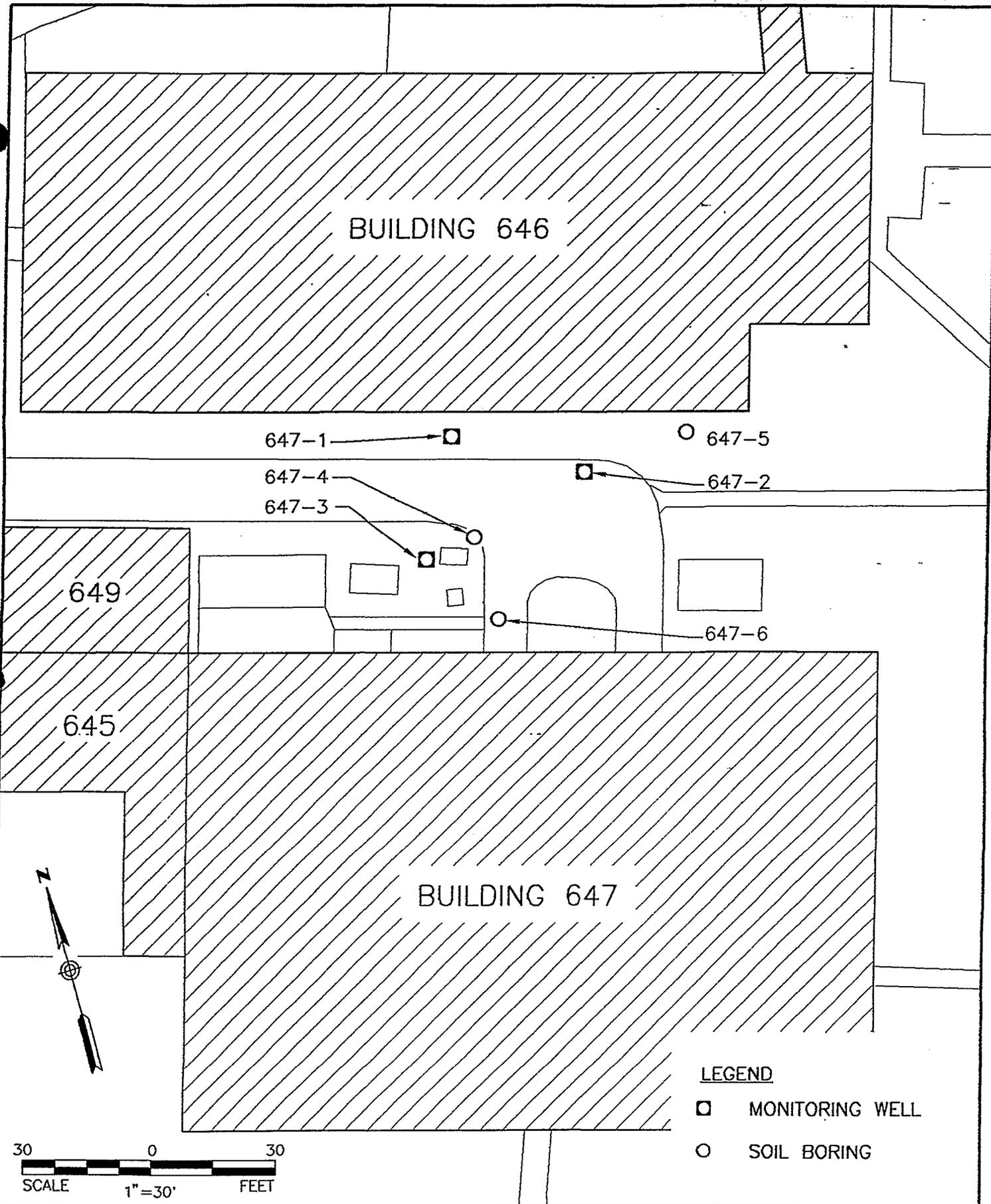
- SOIL GAS SAMPLE LOCATION



**FIGURE 4-2**  
**SOIL GAS SAMPLE LOCATIONS**



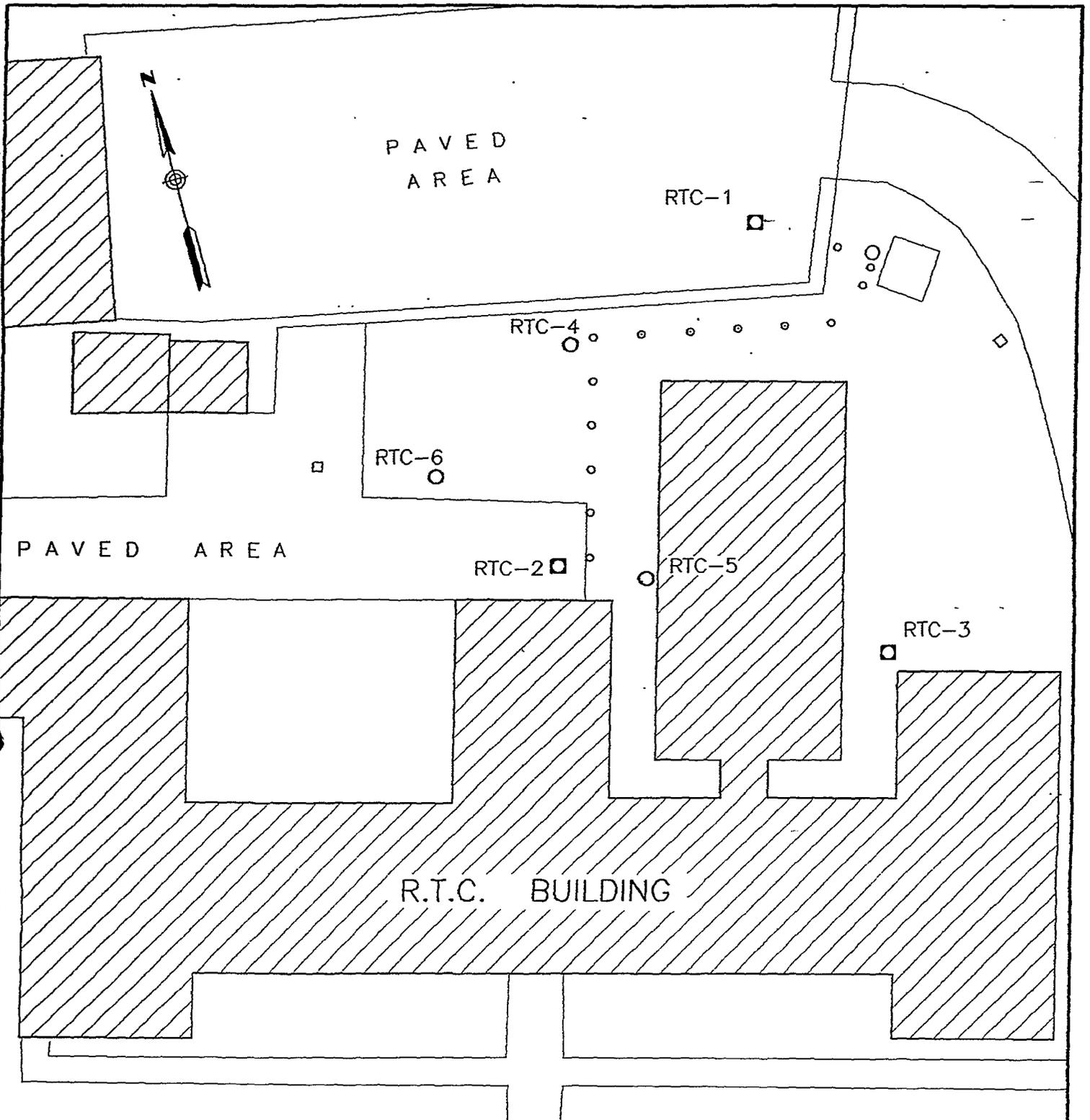
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**FIGURE 4-3**  
**MONITORING WELL AND SOIL BORING**  
**NEAR BUILDING 647**

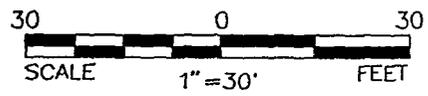


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LEGEND

- RTC-1 □ MONITORING WELL
- RTC-2 ○ SOIL BORING



**FIGURE 4-4**  
**MONITORING WELL AND SOIL BORING**  
**LOCATIONS NEAR THE R.T.C. BUILDING**



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Upon insertion of the well screen and casing string, the annular space between the outside of the well screen and inside wall of the auger flytes was filled by gravity method with clean, washed silica sand. The filter pack extended at least two feet above the top of the screened interval in each monitoring well.

A bentonite seal approximately one foot thick was installed directly above the filter pack. Following hydration, the remaining annular space was sealed with Type I Portland cement containing approximately 2 - 5% bentonite.

All six monitoring wells were finished below grade within protective flush mounted 12-inch diameter manholes. Keyed alike padlocks were provided, and well identification plates numbered in accordance with SOUTHNAVFAC protocol were secured to the wellhead.

Well development was completed with a hand pump until non-turbid water was discharged and temperature, pH and specific conductivity stabilized. All drill cuttings and development waters were containerized in 55-gallon steel drums. The drums were removed by Fenn-Vac, Inc., and disposed of in an environmentally sound manner in January, 1993.

The drilling rig and all downhole drilling tools were decontaminated by steam cleaning prior to mobilization on-site and between borings. Split spoons and continuous samplers were steam cleaned between runs. All well screens, casings, and end plugs were steam cleaned prior to installation and contained no stamped, painted or printed material. Well construction details are provided in Table 4-1 and Appendix C.

### **4.3 Sampling and Analysis**

#### **4.3.1 Soil Sampling**

During the soil boring phase of field work, soil samples were lithologically described by an SEC Donohue project hydrogeologist and inspected for the presence of free phase petroleum hydrocarbons and scanned for petroleum hydrocarbon vapors. Field screening was done by placing a representative portion of each split-spoon sample in a resealable

TABLE 4-1  
WELL CONSTRUCTION DETAILS<sup>(1)</sup>  
 FMWTC AND NRTC, CHARLESTON, S.C.

Well ID	Well Depth	Screen Length	Depth to Pack	Seal Thickness	Screened Interval	Height Above Ground
CSY-647-1	15.0	10.0	2.4	1.0	5.0-15.0	flush
CSY-647-2	15.0	10.0	2.5	1.0	5.0-15.0	flush
CSY-647-3	15.0	10.0	2.8	1.0	5.0-15.0	flush
CSY-RTC-1	15.0	10.0	2.7	1.0	5.0-15.0	flush
CSY-RTC-2	15.0	10.0	2.9	1.3	5.0-15.0	flush
CSY-RTC-3	18.0	10.0	4.8	1.6	8.0-18.0	flush

(1) All measurements in feet

polyethylene bag. The samples were then allowed to de-gas for 15 minutes before a head-space sample was introduced into a Photovac TIP for analysis. Digital readings relative to a known calibration standard (isobutylene) were obtained immediately and recorded for each sample. Those samples which recorded the highest VOC readings were submitted for laboratory analysis.

A total of twelve soil samples were collected for laboratory analysis during assessment activities. The parameters analyzed in soils were lead by USEPA method 7421 and TPH by USEPA method 8015. All sample analyses were conducted following NEESA Level C protocol. Analytical results are discussed in Section 5.0.

#### **4.3.2 Ground-Water Sampling**

A single round of ground-water sampling was conducted at the FMWTC and NRTC sites on December 21, 1992. The analyzed parameters were TPH by USEPA method 8015, lead by USEPA method 7421, polynuclear aromatic hydrocarbons (PAH) by USEPA method 8270, VOC by USEPA method 8240, biochemical oxygen demand (BOD), pH and specific conductance. Standard field parameters (pH, specific conductivity and temperature) were measured at the time of sample collection. All sample analyses were conducted following NEESA Level C protocol.

A minimum of three well volumes were purged from each monitoring well prior to sample collection. Well volumes were calculated by:

- determined TD of each well by sounding to closest 0.01 ft;
- measuring DTW to the closest 0.01 ft;
- subtracting DTW value from TD value to determine length of water column (ft);
- multiplying the length of water column by 0.021 to determine cubic feet of water column; and
- converting cubic ft to gallons by multiplying by 7.48 gallons per cubic ft.

Well purging was completed using a PVC bailer. The contents of each bailer run were emptied into a graduated container in order to measure the volume removed. The PVC bailer was thoroughly decontaminated between monitoring wells. All water purged prior to sampling was contained in 55-gallon steel drums.

Ground-water samples were collected with a Teflon bailer. Care was taken to avoid agitation of water within the well bore during sampling in order to minimize the potential for volatilization of VOCs and other organic compounds. All well sampling equipment was thoroughly decontaminated between monitoring wells.

Ground-water samples were transferred from the Teflon bailer into appropriately sized glass or nalgene containers. Samples to be analyzed for VOCs were placed into glass vials with Teflon septa to allow for maintenance of zero headspace during shipment to the analytical laboratory. In addition to appropriate chemical preservatives the samples were maintained at approximately 4°C during shipment and delivery to the laboratory.

Each sample was assigned a unique identification number for tracking purposes. This information along with the names of sampling personnel, date and time of sampling and analyses requested was entered onto chain-of-custody documents. All persons handling the samples were required to sign the chain-of-custody form. All soil and ground-water samples were analyzed by Savannah Laboratories in Savannah, Georgia.

#### **4.4 Surveying**

Land surface and measuring point (top of casing) elevations for each monitoring well were determined to the nearest 0.01 ft. Latitude and longitude coordinates for the wells were determined to the nearest 10 seconds. Well survey data are provided in Table 4-2.

#### **4.5 Ground-Water Level Elevations**

Ground-water level elevations were determined to the nearest 0.01 ft by subtracting DTW measurements from the measuring point elevations. The measurements were taken with

TABLE 4-2  
WELL SURVEY DATA <sup>(1)</sup>  
 FMWTC AND NRTC, CHARLESTON, S.C.

Well ID	Ground Elevation	TOC Elevation	Longitude	Latitude
CSY-647-1	10.03	9.90	79° 56' 36"	32° 50' 48"
CSY-647-2	9.42	9.14	79° 56' 36"	32° 50' 48"
CSY-647-3	10.58	10.26	79° 56' 36"	32° 50' 48"
CSY-RTC-1	6.63	6.37	79° 56' 33"	32° 51' 00"
CSY-RTC-2	7.55	7.20	79° 56' 33"	32° 51' 00"
CSY-RTC-3	8.68	8.38	79° 56' 33"	32° 51' 00"

(1) All measurements in feet

Solinst water level indicator. Ground-water level elevation data are provided within Section 5.0.

#### 4.6 Hydraulic Conductivity Tests

In-situ aquifer tests (slug tests) were performed for each well to determine site-specific hydraulic conductivity. These tests were conducted on February 5, 1993. Hydraulic conductivities were calculated using a version of the method described by Bouwer and Rice (1979) and modified by Bouwer (1989). Plots of rising head data for each monitoring well are provided in Appendix D, the raw data are provided in Appendix E, and hydraulic conductivities are summarized in Table 4-3.

The equation used to calculate hydraulic conductivities from the slug test results was:

$$K = \frac{rc^2 \ln(Re/rw) 1/t \ln y_o/y_t}{2Le}$$

$$\text{where: } \ln Re/rw = \left( \frac{1.1}{\ln[Lw/rw]} + \frac{A+B \ln([H-Lw]/rw)}{Le/rw} \right)^{-1}$$

where:

K	=	hydraulic conductivity (ft/sec)
rc	=	radius of casing (ft)
Re	=	effective radial distance of drawdown (ft)
rw	=	radial distance of undisturbed aquifer (ft)
Le	=	length of screen (ft)
t	=	time (sec)
y <sub>o</sub>	=	drawdown at time o (ft)
y <sub>t</sub>	=	drawdown at time t (ft)
Lw	=	height of water column in well (ft)
A	=	function of Le/rw (dimensionless)
B	=	function of Le/rw (dimensionless)
H	=	head (ft)

For example, the hydraulic conductivity for well CHAS-RTC-1 was calculated as follows:

$$\begin{aligned} Lw &= 11.47 \text{ ft} \\ rw &= 0.33 \text{ ft} \end{aligned}$$

TABLE 4-3  
FIELD HYDRAULIC CONDUCTIVITIES  
FMWTC AND NRTC, CHARLESTON, S.C.

Well ID	$Y_0^{(1)}$	$Y_t^{(1)}$	$t^{(1)}$	K ft/sec	K ft/day	K cm/sec	T gpd/ft
CSY-647-1	0.90	0.40	240	1.32E-5	1.14	4.04E-4	59
CSY-647-2	0.90	0.20	180	3.35E-5	2.90	1.02E-3	159
CSY-647-3	0.31	0.10	420	1.06E-5	0.91	3.23E-4	50
CSY-RTC-1	0.33	0.90	120	4.20E-5	3.63	1.28E-3	63
CSY-RTC-2	0.70	0.10	240	6.79E-5	5.87	2.07E-3	140
CSY-RTC-3	1.20	0.50	210	1.66E-5	1.43	5.05E-4	33

(1)  $Y_0$  and  $Y_t$  measured in feet, time (t) measured in seconds

Le = 10.0 ft  
H = 2.32 ft  
A = 2.1  
B = 0.4  
y<sub>o</sub> = 0.33 ft  
t = 120 sec  
y<sub>t</sub> = 0.09 ft  
ln(re/rw) = 0.23  
rc = 0.167 ft  
K = 4.20 x 10<sup>-5</sup> ft/sec



## 5.0 DISCUSSION AND RESULTS

### 5.1 Site Specific Hydrogeology

The soils encountered during drilling were principally composed of fine-grained, poorly graded sands and highly plastic gray clays. These clays probably serve as local confining units.

The elevation of the water table at the FMWTC site ranged from 5.10 ft to 7.35 ft msl during the period of December, 1992 through February, 1993 (Table 5-1). The direction of ground-water flow is toward the north with a gradient of 0.037. Hydraulic gradient calculations are included in Appendix F.

At the NRTC site the water table elevation ranged from 1.59 ft to 3.18 ft msl in December, 1992 through February, 1993 (Table 5-1). At the time of ground-water sampling, the direction of ground-water flow was to the east-southeast with a gradient of 0.017. However, due to the close proximity of the Cooper River, the gradient and direction of flow may be tidally influenced.

The ground-water flow rates at both sites were estimated using the Darcy equation:

$$\frac{v}{\phi} = \frac{Ki}{K} \quad \text{where:} \quad \begin{array}{l} v = \text{average velocity} \\ K = \text{hydraulic conductivity} \\ \phi = \text{effective porosity} \\ i = \text{hydraulic gradient} \end{array}$$

The effective porosity was assumed to be 0.20 based on published estimates (USEPA/530-SW-89-026). Site specific average hydraulic conductivity values and observed hydraulic gradient values were used to calculate these ground-water flow estimates. The resulting velocities are approximately 0.3 ft/day at both FMWTC and NRTC.

TABLE 5-1  
WATER TABLE ELEVATIONS <sup>(1)</sup>  
 FMWTC AND NRTC, CHARLESTON, S.C.

Well ID	TOC Elevation <sup>(2)</sup>	Dec 21 '92 WT Elev.	Jan 25 '93 WT Elev.	Feb 5 '93 WT Elev.
CSY-647-1	9.90	5.10	6.87	7.17
CSY-647-2	9.14	5.86	7.33	7.01
CSY-647-3	10.26	6.23	7.35	7.14
CSY-RTC-1	6.37	2.32	----- <sup>(3)</sup>	----- <sup>(3)</sup>
CSY-RTC-2	7.20	2.84	3.18	----- <sup>(3)</sup>
CSY-RTC-3	8.38	1.59	3.12	3.12

(1) Water table elevations in feet msl

(2) Top of casing elevations (TOC Elev.) in feet msl

(3) Data not recorded -- Well not accessed

## **5.2 Analytical Results**

### **5.2.1 Soil Gas Samples**

The complete results of the soil gas survey are provided in the Target Environmental Services report which is included as Appendix A. The highest concentrations of total FID volatiles were present in the samples collected near the UST located adjacent to Building 647 at the FMWTC. Low concentrations of total FID volatiles were reported in the surrounding samples.

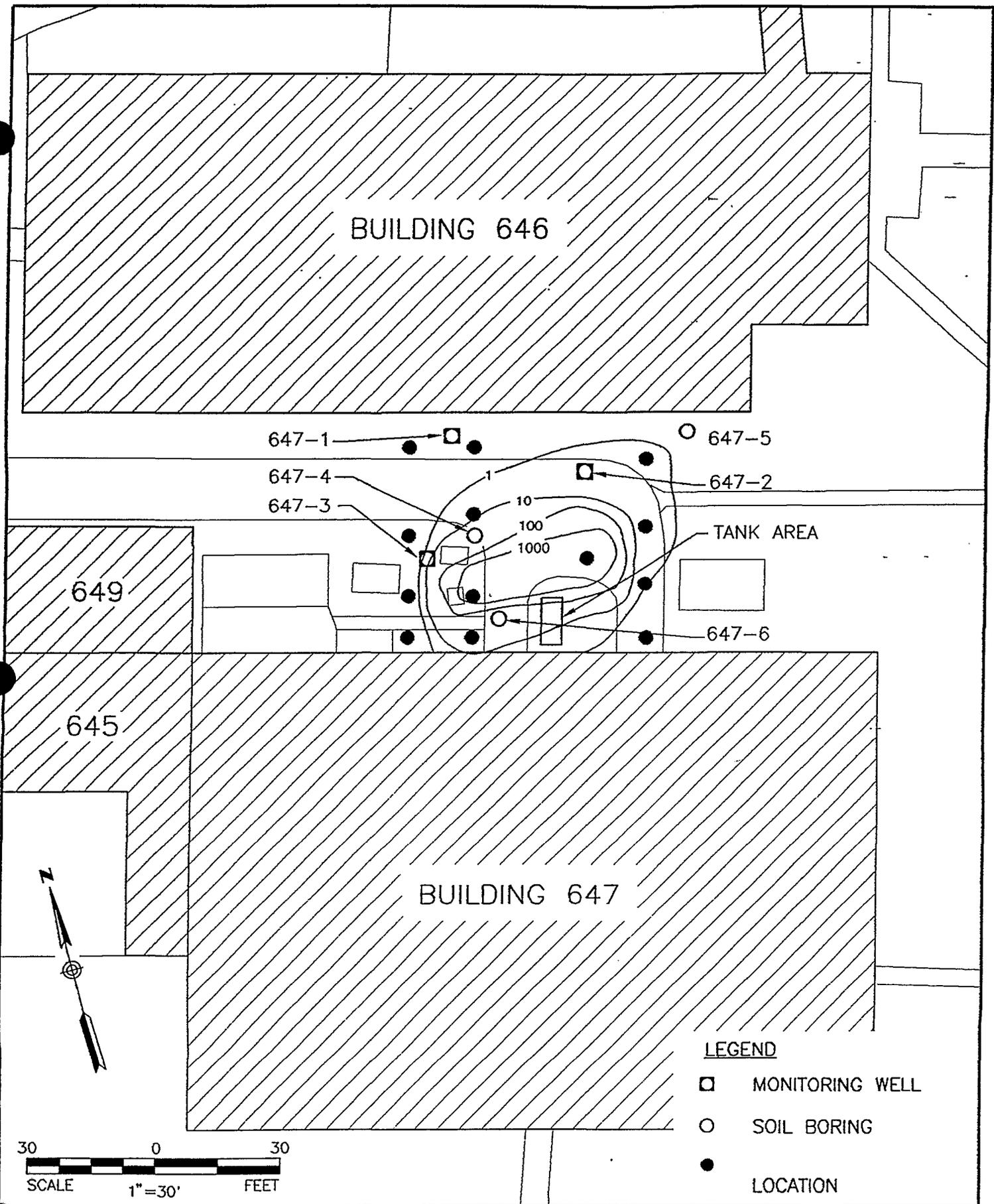
No petroleum hydrocarbons were detected in any of the soil gas survey samples collected near the No. 2 UST located at the NRTC.

The soil boring and monitoring well locations were based on the results of the soil gas survey. Figures 5-1 and 5-2 illustrate the soil boring and monitoring well locations with respect to the FID volatile occurrences.

### **5.2.2 Soil Samples**

Soil samples were collected from all borings and submitted for laboratory analyses based on field TIP readings. Table 5-2 correlates sample number with the boring number. All samples were placed in resealable polyethylene bags for head space screening - a method for head space analysis which is commonplace and well documented (Robbins, 1989). The samples were then allowed to de-gas for 15 minutes before a head space sample was introduced into a Photovac TIP for analysis. Digital readings relative to a known calibration standard (isobutylene) were obtained immediately and recorded for each sample. Those samples which recorded the highest VOC readings were submitted for laboratory analyses. The samples were analyzed for TPH by USEPA method 8015 and lead by USEPA method 7241. Soil sampling results are included in Appendix G and are summarized in Table 5-3.

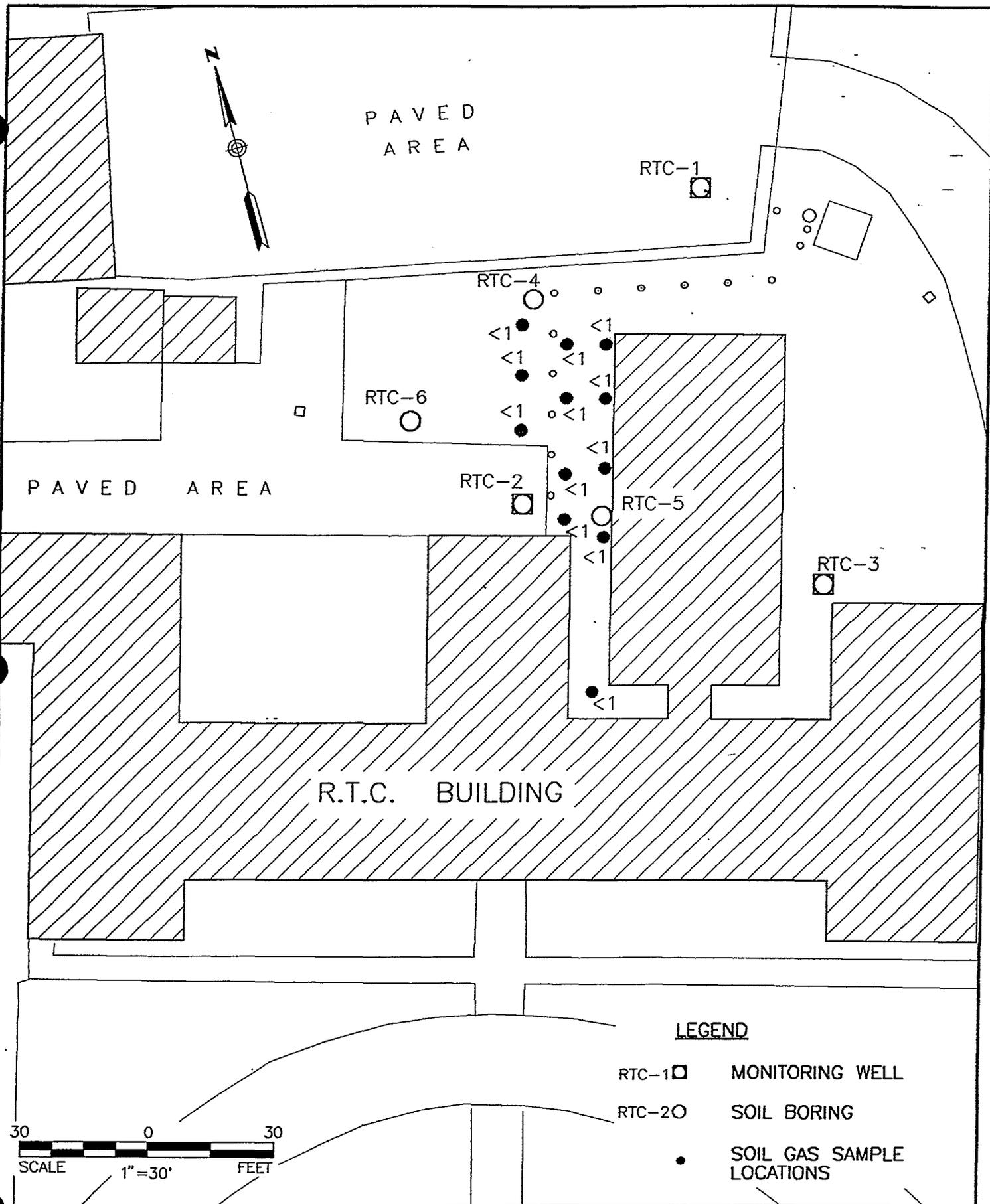
The soil samples collected from the FMWTC site were below the detection limit for all hydrocarbons for which they were analyzed except heavy oils. The concentration of heavy oils in these samples ranged from 28 ppm to 140 ppm. Lead concentrations in the soil



**FIGURE 5-1**  
**TOTAL FID VOLATILES (ppb)**



**CONTAMINATION ASSESSMENT REPORT**  
 FLEET MINE WARFARE TRAINING CENTER  
 CHARLESTON NAVAL STATION  
 CHARLESTON, S.C.



**FIGURE 5-2**

**TOTAL FID VOLATILES (ppb)**



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 NAVAL RESERVE TRAINING CENTER  
 CHARLESTON NAVAL STATION  
 CHARLESTON, S.C.

TABLE 5-2  
SOIL SAMPLE ID NUMBERS  
FMWTC AND NRTC, CHARLESTON, S.C.

Boring ID Number	Sample ID Number
CSY-647-1	SEC-CHAS-1418
CSY-647-2	SEC-CHAS-1420
CSY-647-3	SEC-CHAS-1422
CSY-647-4	SEC-CHAS-1421
CSY-647-5	SEC-CHAS-1419
CSY-647-6	SEC-CHAS-1423
CSY-RTC-1	SEC-CHAS-1424
CSY-RTC-2	SEC-CHAS-1427
CSY-RTC-3	SEC-CHAS-1429
CSY-RTC-4	SEC-CHAS-1425
CSY-RTC-5	SEC-CHAS-1428
CSY-RTC-6	SEC-CHAS-1426

TABLE 5-3  
SOIL SAMPLE ANALYTICAL RESULTS  
FMWTC AND NRTC, CHARLESTON, S.C.

Boring ID	Lead (ppm)	Kerosene (ppm)	Diesel (ppm)	Heavy Oils (ppm)	Varsol (ppm)	Fuel Oil (ppm)
CSY-647-1	3.5	<12	<12	28	<12	<12
CSY-647-2	35.6	<22	<22	100	<22	<22
CSY-647-3	32.0	<22	<22	120	<22	<22
CSY-647-4	21.2	<15	<15	140	<15	<15
CSY-647-5	11.4	<14	<14	45	<14	<14
CSY-647-6	15.4	<19	<19	74	<19	<19
CSY-RTC-1	4.3	<16	<16	<16	<16	<16
CSY-RTC-2	6.6	<17	<17	28	<17	<17
CSY-RTC-3	3.6	<14	<14	<14	<14	<14
CSY-RTC-4	4.6	<15	<15	<15	<15	<15
CSY-RTC-5	7.8	<14	<14	49	<14	<14
CSY-RTC-6	4.0	<13	<13	24	<13	<13

samples ranged from 3.5 ppm to 35.6 ppm. The spatial distribution of these concentrations is illustrated in Figure 5-3.

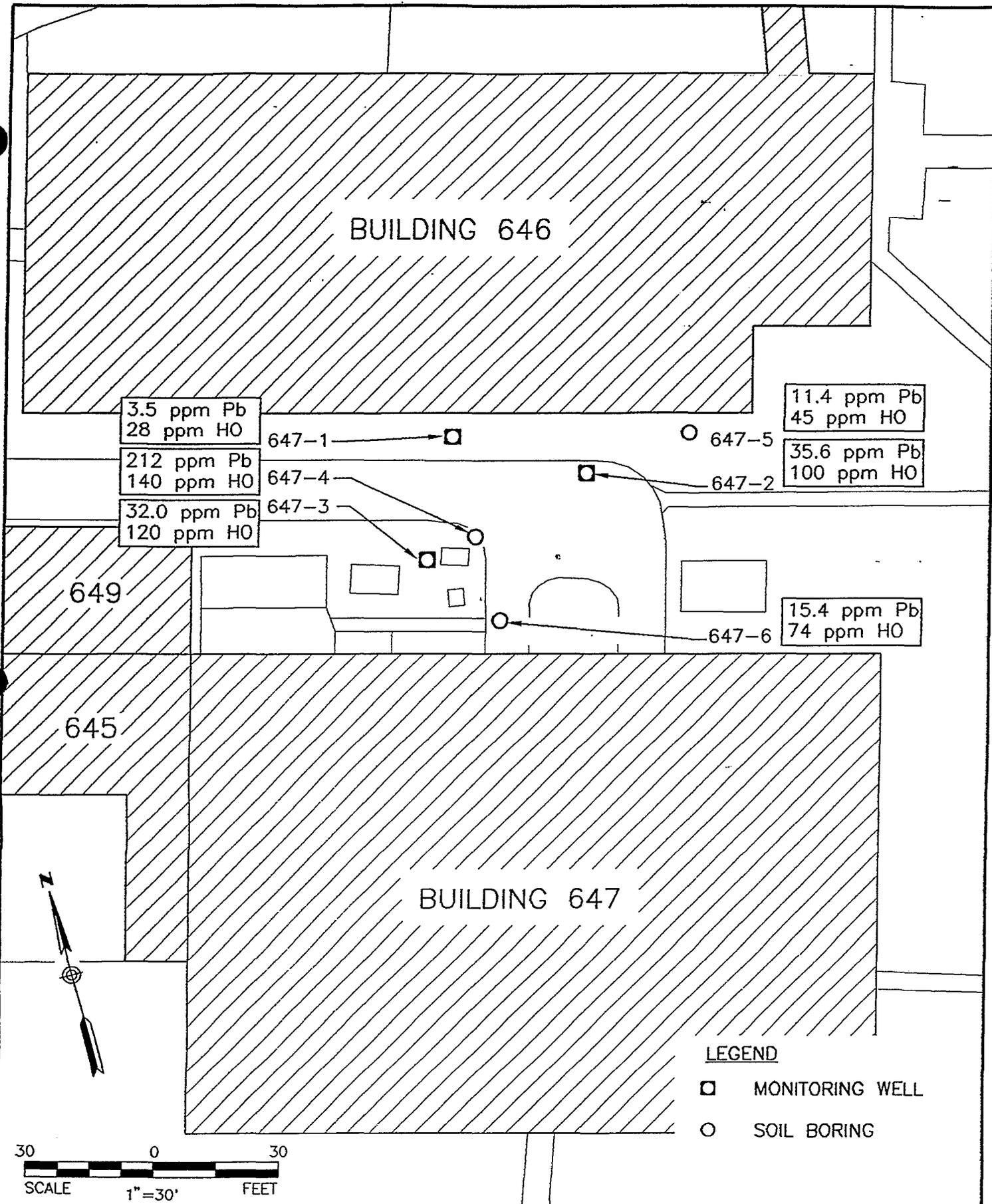
The concentrations of petroleum hydrocarbons in the soil samples collected from the NRTC site were below the detection limit for all hydrocarbons analyzed for except heavy oils which were above the detection limit in three of the samples. The highest reported value from this site was 49 ppm. Lead values from the NRTC site ranged from 3.6 ppm to 7.8 ppm. Figure 5-4 depicts the spatial variation of lead and heavy oil concentrations.

### **5.2.3 Ground-Water Samples**

A single ground-water sample was collected from each monitoring well (Table 5-4). The analyzed parameters were TPH by USEPA method 8015, lead by USEPA method 7241, PAH by USEPA method 8270, VOCs by USEPA method 8240, BOD, pH and specific conductance. Standard field parameters (pH, specific conductivity and temperature) were measured at the time of sample collection. The results of the sample analyses are summarized in Table 5-5. The reports from the laboratory are contained in Appendix G. A minimum of three well volumes were purged from each well before sample collection.

The samples collected from the FMWTC site were below the detection limit for all sampling parameters except lead and naphthalene. The sample collected from monitoring well CSY-647-3 had a reported naphthalene concentration of 0.50 ppb, while the samples from the other two wells at this site were below the detection limit. The reported lead concentrations for CSY-647-1, CSY-647-2 and CSY-647-3 were 202 ppb, 57.8 ppb, and 30.0 ppb, respectively. Two of these values exceed the USEPA MCL of 50 ppb for lead. Figure 5-5 illustrates the relationship between monitoring well location and lead concentration.

All sample parameters were below the detection limit in the samples collected from the NRTC site except naphthalene and lead. The only quantifiable concentration of naphthalene reported from this site was collected from well CSY-RTC-3. This concentration was 0.70 ppb. Lead was detected in wells CSY-RTC-1, CSY-RTC-2 and CSY-

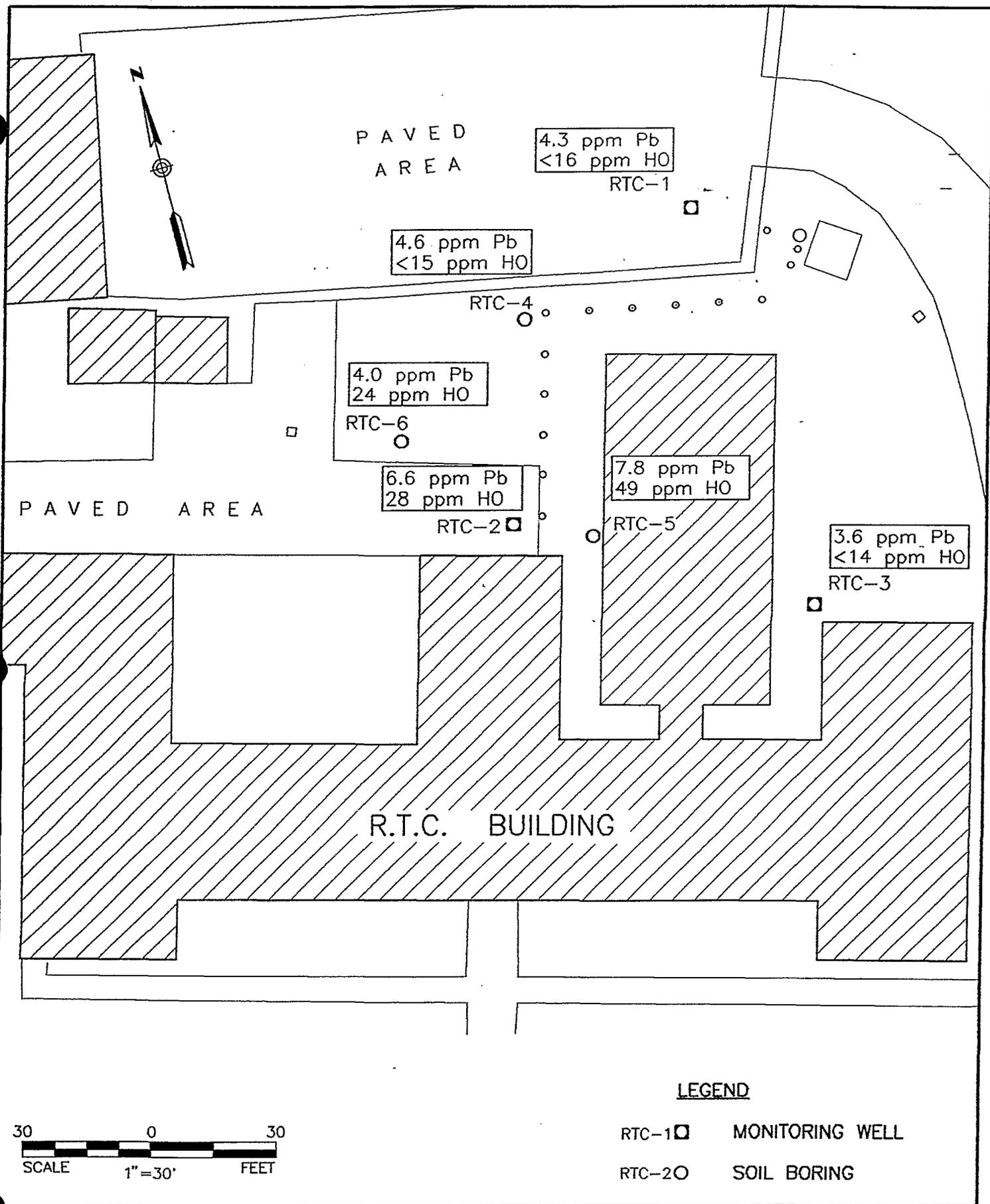


**FIGURE 5-3**  
LEAD AND HEAVY OIL CONCENTRATIONS  
IN SOIL SAMPLES



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**FIGURE 5-4**  
LEAD AND HEAVY OIL CONCENTRATIONS  
IN SOIL SAMPLES



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**TABLE 5-4**  
**GROUND-WATER SAMPLE ID NUMBERS**  
**FMWTC AND NRTC, CHARLESTON, S.C.**

Well ID Number	Sample ID Number
CSY-647-1	SEC-CHAS-1449
CSY-647-2	SEC-CHAS-1450
CSY-647-3	SEC-CHAS-1451
CSY-RTC-1	SEC-CHAS-1446
CSY-RTC-2	SEC-CHAS-1447
CSY-RTC-3	SEC-CHAS-1448

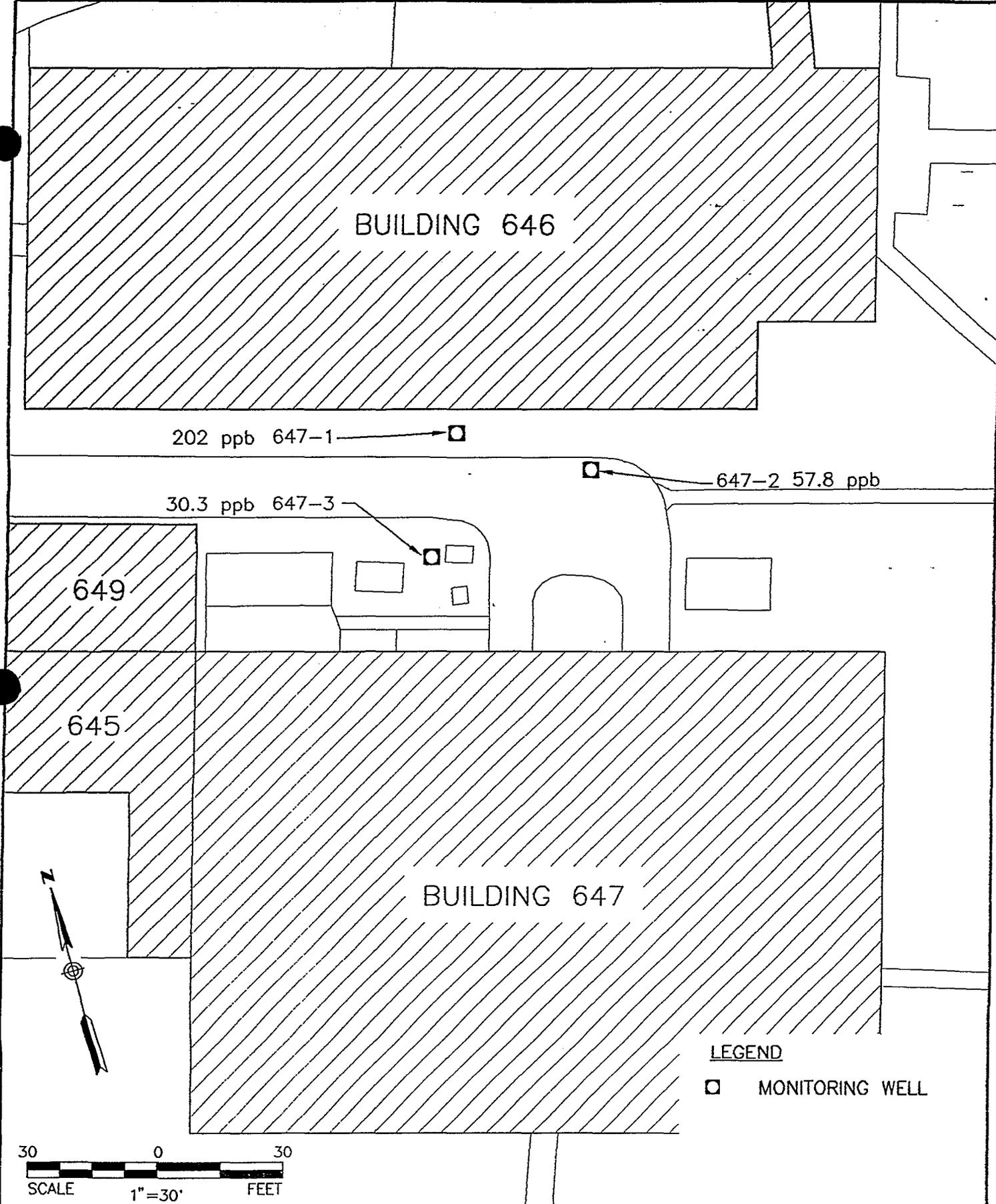




**TABLE 5-5 (CONTINUED)**  
**GROUND-WATER SAMPLE ANALYTICAL RESULTS**  
**FMWTC AND NRTC, CHARLESTON, S.C.**

Parameter	647-1	647-2	647-3	RTC-1	RTC-2	RTC-3
Bromoform (ppb)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Hexanone (ppb)	<50	<50	<50	<50	<50	<50
4-Methyl-2-pentanone (ppb)	<50	<50	<50	<50	<50	<50
Tetrachloroethene (ppb)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene (ppb)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chlorobenzene (ppb)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Ethylbenzene (ppb)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Styrene (ppb)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Xylenes (ppb)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
BOD ppm	8.0	2.7	6.2	9.2	2.5	2.6

USEPA MCLs: Benzene - 5 ppb  
Toluene - 1000 ppb  
Ethylbenzene - 700 ppb  
Xylenes - 10,000 ppb  
Lead - 50 ppb



**FIGURE 5-5**  
**LEAD CONCENTRATION IN**  
**GROUND-WATER SAMPLES**



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RTC-3 at concentrations of 67.0 ppb, 21.7 ppb, and 30.9 ppb, respectively. Of these, one was above the MCL for lead of 50 ppb. The reported lead concentrations for each well are plotted on a map of the site in Figure 5-6.

### **5.3 QA/OC Procedures**

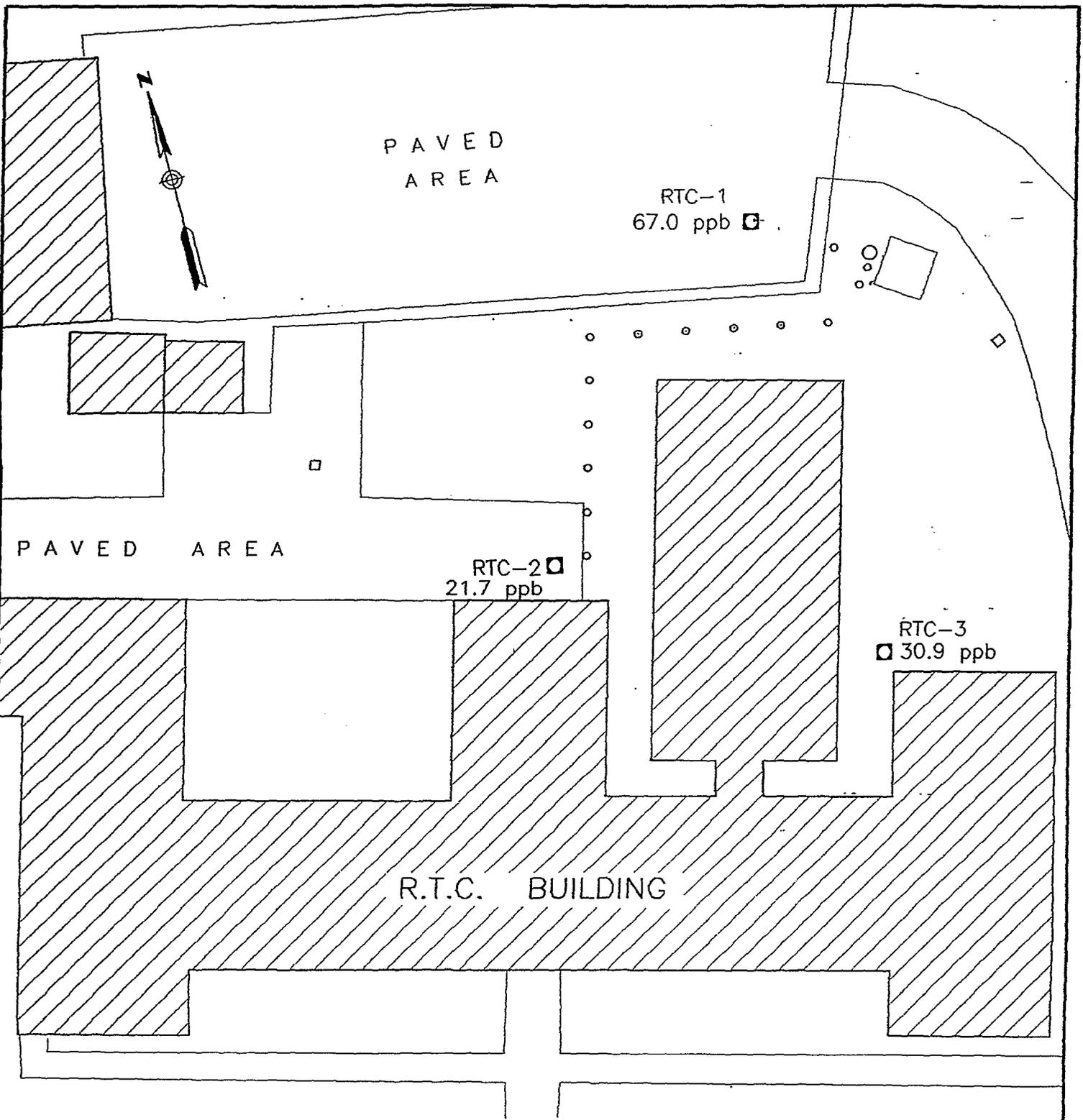
Each soil and ground-water sample was assigned a unique identification number for tracking purposes. A chain-of-custody form was completed listing all sample numbers and accompanied each batch of samples during transit from the field to the laboratory. Each person handling the samples was required to sign and date the chain-of-custody form. Copies of the executed chain-of-custody forms are contained with Appendix H.

Quality control procedures during the sample analyses were conducted according to NEESA Level C specifications. These specifications require that the analytical laboratory successfully analyze a performance sample, undergo an audit and provide monthly quality reports. In addition to reporting the analytical results, the laboratory also provides documentation of in-house quality control; e.g. lab spikes, surrogate recovery, CLP control charts, etc.

A trip blank containing distilled water accompanied the sample bottles to the field and back to the laboratory. Reported VOC concentrations for the trip blank were below the detection limits.

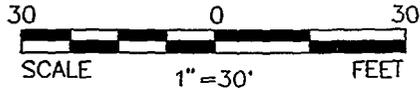
### **5.4 Discussion of Results**

The results of sampling at the FMWTC and NRTC sites indicate that petroleum hydrocarbon releases have had minimal impact on the environment. No significant concentrations of petroleum hydrocarbons were detected in any of the ground-water samples, and only moderate concentrations of TPH as heavy oil were detected in the soil samples. The only parameter of concern at either of these sites is lead which was above the MCL (50 ppb) in the ground-water at both sites. However, the concentrations of lead reported from all ground-water samples collected for this study (both up- and down-



LEGEND

RTC-1 □ MONITORING WELL



**FIGURE 5-6**  
LEAD CONCENTRATIONS  
IN GROUND-WATER SAMPLES



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CHARLESTON, S.C.

gradient) indicate that the ambient lead concentrations at both sites tend to be high (approximately 30 ppb). However, the concentration of 202 ppb in the down-gradient well at the FMWTC site implies that there may have been some negative impact to the groundwater in that location.



## 6.0 RECOMMENDATIONS

As there is no conclusive evidence of negative impact to the environment by the former UST at the NRTC site, no further action is recommended. Although one ground-water sample contained lead concentrations in excess of the USEPA MCL, this concentration was not much greater than the background conditions, thereby indicating little or no impact.

There is more significant evidence of lead contamination at the FMWTC site. A concentration of 202 ppb in the down-gradient well may be the result of a release into the ground-water. However, the sample collected was analyzed for total lead rather than dissolved lead which may be considerably less. For this site it is recommended that a year of quarterly sampling for total and dissolved lead be instituted in order to gain more complete knowledge of the amount of contamination, if any. In addition, sampling for total dissolved solids (TDS) is recommended because ground-water with TDS concentrations exceeding 10,000 ppm is classified as GC and is not subject to drinking water standards (SCDHEC, 1985). Class GC waters are those which are not considered suitable sources of drinking water. The high specific conductance values reported for the ground-water samples indicate high TDS concentrations.

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**APPENDIX A**

**SOIL GAS SURVEY REPORT  
TARGET ENVIRONMENTAL SERVICES**

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

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Sample Collection and Analysis .....	1
Quality Assurance/Quality Control (QA/QC) Evaluation .....	2
Results .....	3
Interpretation .....	3
Conclusions .....	4

## FIGURES

Figure 1A. Sample Locations - Fleet & Mine Warfare Training Center

Figure 1B. Sample locations - Naval Reserve Training Center

Figure 2. Total FID Volatiles - Fleet & Mine Warfare Training Center

Figure 3. Toluene - Fleet & Mine Warfare Training Center

## TABLES

Table 1. Sampling Depth

Table 2. Analyte Concentrations via GC/FID

## APPENDICES

APPENDIX A - Field Procedures

APPENDIX B - Laboratory Procedures

APPENDIX C - Detectability & Terminology

## EXECUTIVE SUMMARY

On August 6, 1992, TARGET Environmental Services, Inc. (TARGET) conducted a soil gas survey at two UST facilities on the Charleston Naval Base, Charleston, South Carolina. A total of 25 soil gas samples were collected from depths of 2 to 4 feet and analyzed by GC/FID for petroleum hydrocarbons. The two UST sites were located at the Fleet and Mine Warfare Training Center and the Naval Reserve Training Center on the base. The objective of the survey was to help determine the presence and extent of subsurface petroleum hydrocarbons at the sites.

Moderate levels of Total FID Volatiles were present in two samples collected near the UST located adjacent to Building #647 at the Fleet and Mine Warfare Training Center. Very low levels were observed in several of the surrounding samples. The chromatogram signatures of the two samples with the highest levels of Total FID Volatiles are dominated by early-eluting peaks representing the more volatile and mobile petroleum hydrocarbons. These signatures are suggestive of gasoline.

Soil gas data indicate that significant levels of gasoline hydrocarbons are present in the subsurface in the vicinity of the UST located adjacent to Building #647 at the Fleet and Mine Warfare Training Center. Map patterns suggest that the occurrence has been defined within the surveyed area.

Petroleum hydrocarbons were not present in any of the samples collected in the UST area located at the Naval Reserve Training Center.

## Introduction

SEC Donohue contracted TARGET Environmental Services, Inc. (TARGET) to perform a soil gas survey at two underground storage tank (UST) facilities on the Charleston Naval Base, Charleston, South Carolina. The two UST sites are located at the Fleet and Mine Warfare Training Center and the Naval Reserve Training Center on the base. The objective of the survey was to help determine the presence and extent of subsurface petroleum hydrocarbons at the sites.

The sites consist of two small areas with USTs that were reported to contain diesel fuel. The survey was designed by SEC Donohue to cover each area of concern with a grid spacing of approximately 10 feet between samples. Since impermeable soil layers were not anticipated, a 4 foot sampling depth was planned. The field phase of the survey was conducted on August 6, 1992.

## Sample Collection and Analysis

Soil gas samples were collected at a total of 25 locations at the sites, as shown in Figures 1A and 1B. Only Sample 11 was collected at the proposed 4 foot depth. After shallow ground water was encountered at the 4 foot depth at several subsequent locations, SEC Donohue's on-site representative requested that the sampling depth be changed to 3 feet. However, Samples 21 and 111 were collected at a depth of 2 feet due to the presence of shallow ground water at the 3 foot depth. The sampling depths are reported in Table 1. A detailed explanation of the sampling procedure is provided in Appendix A.

All of the samples collected during the field phase of the survey were analyzed according to EPA Method 602 (modified) on a gas chromatograph equipped with a flame ionization detector (GC/FID), and using direct injection. Analytes selected for standardization were:

benzene	meta- and para- xylene
toluene	ortho-xylene
ethylbenzene	

These compounds were chosen because of their utility in evaluating the presence of petroleum products such as fuels, lubricating oils, and non-halogenated solvents. An explanation of the laboratory procedures is provided in Appendix B.

The tabulated results of the laboratory analysis of the soil gas samples are reported in micrograms per liter ( $\mu\text{g/l}$ ) in Table 2. Although "micrograms per liter" is equivalent to "parts per billion (v/v)" in water analyses, they are not equivalent in gas analyses, due to the difference in the mass of equal volumes of water and gas matrices. The xylenes concentrations reported in the data table are the sum of the m- and p-xylene and the o-xylene concentrations for each sample.

#### Quality Assurance/Quality Control (QA/QC) Evaluation

##### Field QA/QC Samples

Field control samples were collected at the beginning and end of the day's field activities, as well as after the completion of sampling at the first UST area and prior to the beginning of sampling at the second UST area. These QA/QC samples were obtained by filtering ambient air through a dust and organic vapor filter cartridge and encapsulating as described in the "Field Procedures" in Appendix A. The laboratory results of the analysis of these samples are reported in Table 2. Concentrations of all analytes were below the reporting limit in all field control samples.

##### Laboratory QA/QC Samples

A duplicate analysis was performed on every tenth field sample. Laboratory blanks of nitrogen gas were also analyzed after every tenth field sample. The results of these analyses are reported in Table 2. The duplicate analyses were within acceptable limits. Concentrations of all analytes were below the reporting limit in all laboratory blanks.

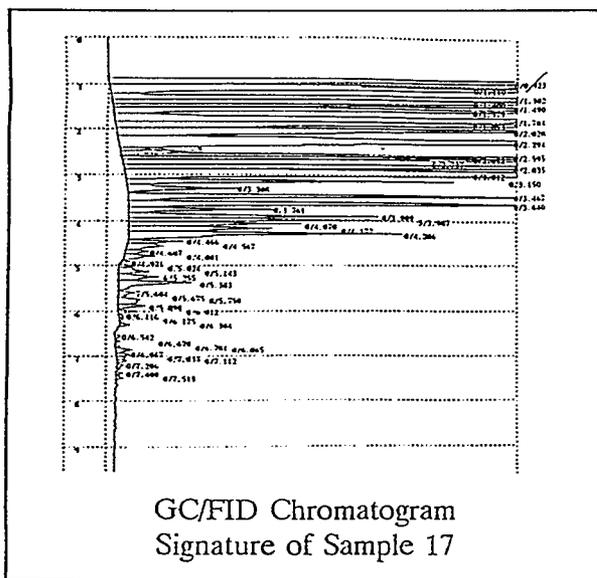
Results

In order to provide graphic presentation of the results, selected individual data sets in Table 2 have been mapped and contoured to produce Figures 2 and 3. Map sample points with no data shown indicate that the analyte concentrations in the sample were below the reporting limit. An explanation of the terminology used in this report is provided in Appendix C.

Moderate levels of Total FID Volatiles (Figure 2) were present in Samples 17 and 19 collected near the UST located adjacent to Building #647 at the Fleet and Mine Warfare Training Center. Very low levels were observed in several of the surrounding samples. Benzene was present only in Sample 17, which had the highest level of Total FID Volatiles. Low levels of toluene, ethylbenzene, and xylenes were observed in Samples 17 and 19, as exemplified by the toluene map (Figure 3).

Petroleum hydrocarbons were not present above the 1 µg/l reporting limit in any of the samples collected in the UST area located at the Naval Reserve Training Center.

Interpretation

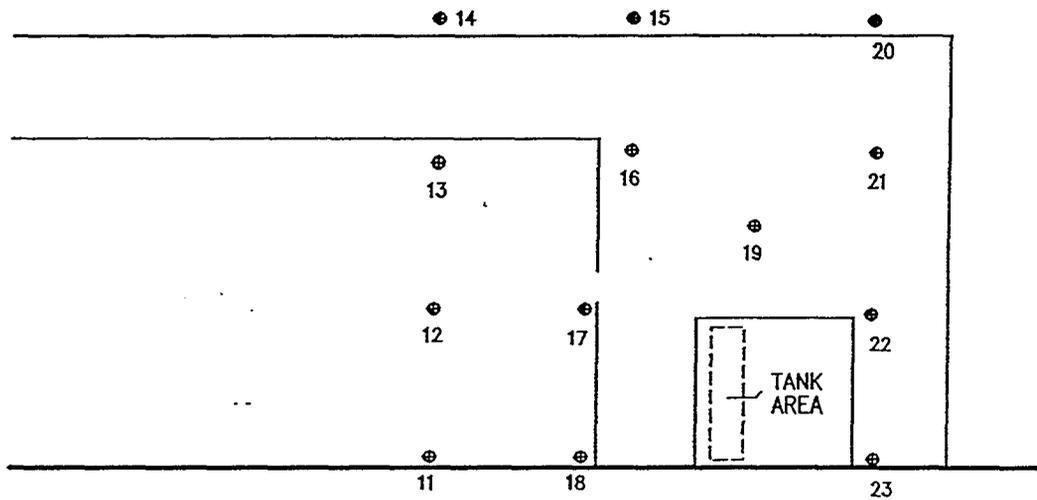


The chromatogram signatures of Samples 17 and 19 are dominated by early-eluting peaks representing the more volatile and mobile petroleum hydrocarbons, as shown by the signature of Sample 17 (left). The signature is suggestive of gasoline. The signature of diesel fuel is not as rich in early-eluting peaks. A typical diesel fuel signature (next page) is shown





BUILDING



BUILDING #647



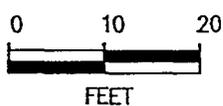
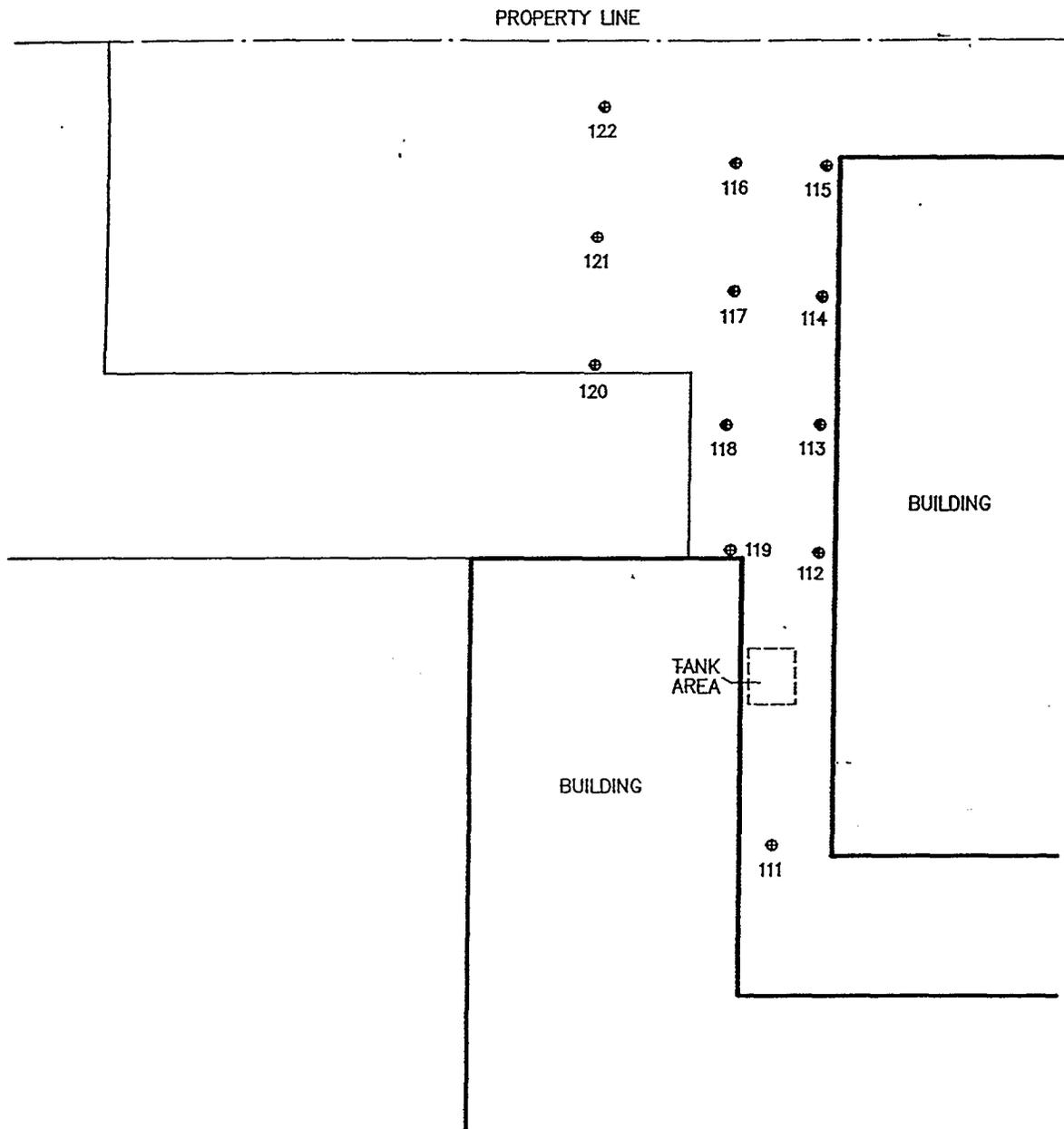
⊕ SOIL GAS SAMPLE LOCATION

FIGURE 1A. Sample Locations

TARGET ENVIRONMENTAL SERVICES, INC.

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

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



⊕ SOIL GAS SAMPLE LOCATION



TARGET ENVIRONMENTAL SERVICES, INC.

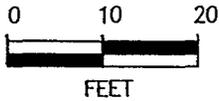
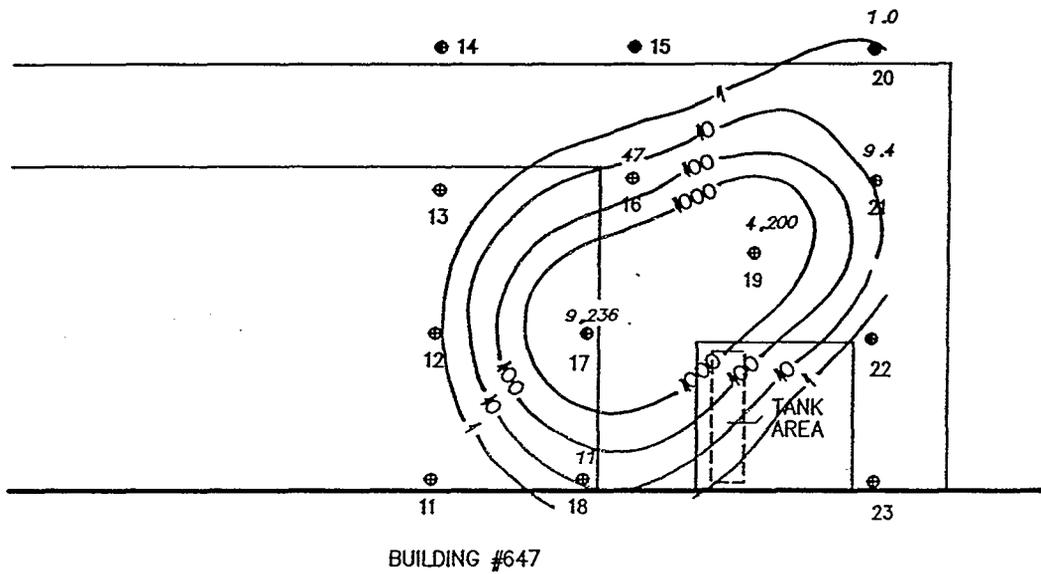
FIGURE 1B. Sample Locations

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.



BUILDING



● SOIL GAS SAMPLE LOCATION

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

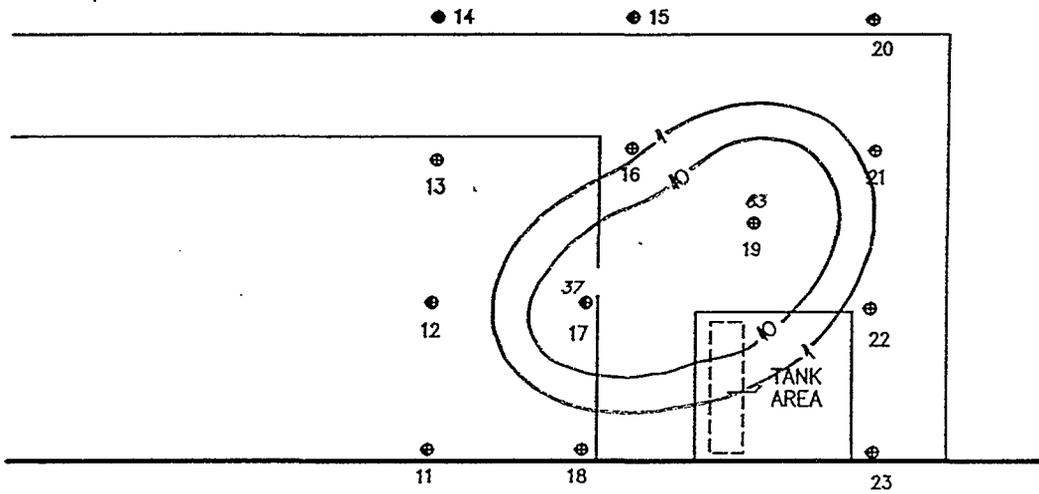


FLEET & MINE WARFARE TRAINING CENTER  
CHARLESTON NAVAL BASE  
CHARLESTON, SOUTH CAROLINA

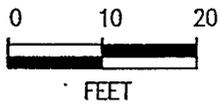
This map is integral to a written report  
and should be viewed in that context.



BUILDING



BUILDING #647



● SOIL GAS SAMPLE LOCATION

FIGURE 3. Toluene ( $\mu\text{g/l}$ )



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

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 ( $\mu\text{g}/\text{l}$ )

SAMPLE	BENZENE	TOLUENE	ETHYL- BENZENE	XYLENES	TOTAL FID VOLATILES <sup>1</sup>
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

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

## FIELD PROCEDURES

To collect the samples a 1/2 inch hole was produced to a depth of approximately 3 feet by using a drive rod. Where pavement was present, a rotary hammer was employed for penetration prior to using the drive rod. The entire sampling system was purged with ambient air drawn through an organic vapor filter cartridge, and a stainless steel probe was inserted to the full depth of the hole and sealed off from the atmosphere. A sample of in-situ soil gas was then withdrawn through the probe and used to purge atmospheric air from the sampling system. A second sample of soil gas was withdrawn through the probe and encapsulated in a pre-evacuated glass vial at two atmospheres of pressure (15 psig). The self-sealing vial was detached from the sampling system, packaged, labeled, and stored for laboratory analysis.

Prior to the day's field activities all sampling equipment, slide hammer rods and probes were decontaminated by washing with soapy water and rinsing thoroughly. Internal surfaces were flushed dry using pre-purified nitrogen or filtered ambient air, and external surfaces were wiped clean using clean paper towels.

## LABORATORY PROCEDURES

The analytical equipment was calibrated using a 3-point instrument-response curve and injection of known concentrations of the target analytes. Retention times of the standards were used to identify the peaks in the chromatograms of the field samples, and their response factors were used to calculate the analyte concentrations.

Total FID Volatiles values were generated by summing the areas of all integrated chromatogram peaks and calculated using the instrument response factor for toluene. Injection peaks, which also contain the light hydrocarbon methane, were excluded to avoid the skewing of Total FID Volatiles values due to injection disturbances and biogenic methane. For samples with low hydrocarbon concentrations, the calculated Total FID Volatiles concentration is occasionally lower than the sum of the individual analytes. This is because the response factor used for the Total FID Volatiles calculation is a constant, whereas the individual analyte response factors are compound specific. It is important to understand that the Total FID Volatiles levels reported are relative, not absolute, values.

## DETECTABILITY & TERMINOLOGY

### Detectability

The soil gas survey data presented in this report are the result of precise sampling and measurement of contaminant concentrations in the vadose zone. Analyte detection at a particular location is representative of vapor, dissolved, and/or liquid phase contamination at that location. The presence of detectable levels of target analytes in the vadose zone is dependent upon several factors, including the presence of vapor-phase hydrocarbons or dissolved or liquid concentrations adequate to facilitate volatilization into the unsaturated zone.

### Terminology

In order to prevent misunderstanding of certain terms used in TARGET's reports, the following clarifications are offered:

**Analyte** refers to any of the hydrocarbons standardized for quantification in the chromatographic analysis.

**Anomaly** refers to an area where hydrocarbons were measured in excess of what would normally be considered "natural" or "background" levels.

**Elevated** and **significant** are used to describe concentrations of analytes which indicate the existence of a potential problem in the soil or ground water.

**Feature** is used in reference to a discernible pattern in the contoured data. It denotes a contour form rather than a definite or separate chemical occurrence.

**Indicates** is used when evidence dictates a unique conclusion. **Suggests** is used when several explanations of certain evidence are possible, but one in particular seems more likely. As a result, "indicates" carries a higher degree of confidence in a conclusion than does "suggests."

Occurrence is used to indicate an area where chemical compounds are present in sufficient concentrations to be detected by the analysis of soil vapors. The term is not indicative of any specific mode of occurrence (vapor, dissolved, etc.), and does not necessarily indicate or suggest the presence of "free product" or "phase-separated hydrocarbons."

**Reporting Limit** refers to the minimum concentration reported for each analyte.

**Vadose zone** represents the unsaturated zone between the ground water table and the ground surface.



**APPENDIX B**

**SOIL BORING LOGS**

# SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION NAVAL RESERVE TRAINING CENTER, CHARLESTON, SC

LOG OF BORING NO. CSY-647-1 LOG OF WELL NO. CSY-647-1

DEPTH (FEET)	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
			Trace: <5%      Little: 15-25% Few: 5-15%      Some: 25-40%	
1	X			
		1	<b>POORLY GRADED SAND (SP)</b> Very loose, yellowish brown, wet, mostly fine sand, trace silt, trace clay.	<p>The diagram shows a well casing with a diameter of 8 inches. The casing is installed to a depth of 17.6 feet. The casing is filled with grout (indicated by a pattern of small triangles) up to a depth of 1.4 feet. Below the grout, there is a layer of sand (indicated by a stippled pattern) extending to a depth of 1.0 foot. The remaining casing is filled with bentonite (indicated by a vertical line pattern). The total depth of the well is 17.6 feet. The ground elevation is 10.03' (MSL) and the top of casing elevation is 9.90' (MSL). The depth to water is 4.80' (TOC).</p>
5		2	<b>POORLY GRADED SAND (SP)</b> Medium dense, grayish yellow, wet, mostly fine sand, trace silt.	
		3	<b>POORLY GRADED SAND (SC)</b> Similar to above except loose and trace clay.	
10		4	<b>CLAYEY SAND (SC)</b> Very loose, yellowish gray, wet, mostly fine sand, some clay.	
		5	<b>FAT CLAY (CH)</b> Soft, greenish gray, wet, mostly clay, few medium sand.	
		6	<b>FAT CLAY (CH)</b> Stiff, greenish gray, wet, mostly clay, trace fine sand, trace plant fragments.	
15		7	<b>FAT CLAY (CH)</b> Similar to above except medium stiff.	
		8	<b>FAT CLAY (CH)</b> Similar to above except no plant fragments.	
20		9	<b>FAT CLAY (CH)</b> Similar to above.	

Grout  
 Sand      Bentonite

**Boring Completion Date:** December 8, 1992  
**Well Completion Date:** December 8, 1992  
**Well Development Date:** December 10, 1992  
**Drilling Method:** Hollow-stem auger  
**Depth to Water:** 4.80' (TOC)

**Boring Diameter:** 8 inches  
**Ground Elevation:** 10.03' (MSL)  
**Top of Casing Elevation:** 9.90' (MSL)  
**Driller:** J. Hallman  
**Logged By:** L. Bienkowski

**SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND  
GROUNDWATER MONITORING WELL INSTALLATION REPORT**

LOCATION NAVAL RESERVE TRAINING CENTER, CHARLESTON, SC

LOG OF BORING NO. CSY-647-2 LOG OF WELL NO. CSY-647-2

DEPTH (FEET)	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
			Trace: <5%      Little: 15-25% Few: 5-15%      Some: 25-40%	
1	X			
1		1	<b>POORLY GRADED SAND (SP)</b> Dense, yellowish brown, moist, mostly fine sand, trace silt.	<p>The well construction diagram shows a casing with a diameter of 8 inches. The casing is installed to a depth of 17.5 feet. The casing is surrounded by grout (indicated by a cross-hatch pattern) from 0 to 1.5 feet depth. Below the grout, there is a 1.0-foot layer of sand (indicated by a dotted pattern). From 1.5 feet to 17.5 feet, the casing is surrounded by bentonite (indicated by a vertical line pattern). The total depth of the well is 17.5 feet. The material description column shows soil layers from 0 to 20 feet depth.</p>
5		2	<b>POORLY GRADED SAND (SP)</b> Same as above except medium dense.	
3		3	<b>FAT CLAY (CH)</b> Very soft, medium gray, wet, mostly clay, few fine sand.	
4		4	<b>FAT CLAY(CH)</b> Similar to above except soft.	
10		5	<b>CLAYEY SAND (SC)</b> Very loose, greenish gray, wet, mostly fine sand, little clay, trace silt.	
6		6	<b>FAT CLAY (CH)</b> Medium stiff, greenish gray, wet, mostly clay, few fine sand.	
15		7	<b>FAT CLAY (CH)</b> Similar to above except trace fine sand.	
8		8	<b>FAT CLAY (CH)</b> Similar to above except soft.	
20		9	<b>FAT CLAY (CH)</b> Similar to above.	

Grout     
 Sand     
 Bentonite

Boring Completion Date: December 8, 1992  
 Well Completion Date: December 8, 1992  
 Well Development Date: December 10, 1992  
 Drilling Method: Hollow-stem auger  
 Depth to Water: 3.28' (TOC)

Boring Diameter: 8 inches  
 Ground Elevation: 9.42' (MSL)  
 Top of Casing Elevation: 9.14' (MSL)  
 Driller: J. Hallman  
 Logged By: L. Bienkowski

**SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND  
GROUNDWATER MONITORING WELL INSTALLATION REPORT**

LOCATION NAVAL RESERVE TRAINING CENTER, CHARLESTON, SC

LOG OF BORING NO. CSY-647-3 LOG OF WELL NO. CSY-647-3

DEPTH (FEET)	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
			Trace: <5%      Little: 15-25% Few: 5-15%      Some: 25-40%	
1	X			
		1	<b>FAT CLAY (CH)</b> Medium stiff, greenish gray, moist, mostly clay, some fine sand.	<p>The diagram shows a well casing with a diameter of 8 inches. The casing is filled with bentonite (vertical lines) and sealed with grout (cross-hatch pattern) at the top. The casing extends to a depth of 20.0 feet. The well is filled with sand (stippled pattern) from 10.26 feet (MSL) to the water table at 4.03 feet (TOC). The total depth of the well is 17.2 feet. The casing is supported by a 5.0-foot section of grout. The well is installed in a borehole that is 5.0 feet deep from the surface to the casing top. The casing is 1.0 foot thick and 1.8 feet in diameter.</p>
5		2	<b>FAT CLAY (CH)</b> Same as above except soft and wet.	
		3	<b>FAT CLAY (CH)</b> Soft, medium dark gray, wet, mostly clay, trace fine sand.	
		4	<b>FAT CLAY (CH)</b> Similar to above except medium stiff and mottled olive green and black.	
10		5	<b>CLAYEY SAND (SC)</b> Loose, greenish gray, wet, mostly fine sand, some clay, little medium sand.	
		6	<b>FAT CLAY (CH)</b> Soft, greenish gray, wet, mostly clay, some fine sand.	
15		7	<b>FAT CLAY (CH)</b> Similar to above except trace fine sand.	
		8	<b>FAT CLAY (CH)</b> Similar to above except medium stiff.	
20		9	<b>FAT CLAY (CH)</b> Similar to above.	

Grout  
 Sand      Bentonite

**Boring Completion Date:** December 8, 1992  
**Well Completion Date:** December 8, 1992  
**Well Development Date:** December 10, 1992  
**Drilling Method:** Hollow-stem auger  
**Depth to Water:** 4.03' (TOC)

**Boring Diameter:** 8 inches  
**Ground Elevation:** 10.58' (MSL)  
**Top of Casing Elevation:** 10.26' (MSL)  
**Driller:** J. Hallman  
**Logged By:** L. Bienkowski

**SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND  
GROUNDWATER MONITORING WELL INSTALLATION REPORT**

LOCATION NAVAL RESERVE TRAINING CENTER, CHARLESTON, SC

LOG OF BORING NO. CSY-647-4 LOG OF WELL NO. \_\_\_\_\_

DEPTH (FEET)	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
			Trace: <5%      Little: 15-25% Few: 5-15%      Some: 25-40%	No well installed at this location
1	X			
	[Dotted Pattern]	1	<b>POORLY GRADED SAND (SP)</b> Medium dense, yellowish brown, moist, mostly fine sand, trace silt.	
5	[Diagonal Lines]	2	<b>FAT CLAY (CH)</b> Medium stiff, medium gray, wet, mostly clay, some fine sand.	
	[Diagonal Lines]	3	<b>FAT CLAY (CH)</b> Soft, greenish gray, wet, mostly clay, trace fine sand.	
	[Diagonal Lines]	4	<b>FAT CLAY (CH)</b> Soft, medium dark gray, wet, mostly clay, some fine sand.	
10	[Diagonal Lines]	5	<b>FAT CLAY (CH)</b> Similar to above except trace shell fragments.	
	[Diagonal Lines]	6	<b>FAT CLAY (CH)</b> Soft, olive green, wet, mostly clay, trace silt, trace plant fragments.	
15	[Diagonal Lines]	7	<b>FAT CLAY (CH)</b> Similar to above except medium stiff and medium dark gray.	
	[Diagonal Lines]	8	<b>FAT CLAY (CH)</b> Similar to above except no plant fragments.	
	[Diagonal Lines]	9	<b>FAT CLAY (CH)</b> Similar to above.	
20				

Boring Completion Date: December 8, 1992

Well Completion Date: \_\_\_\_\_

Well Development Date: \_\_\_\_\_

Drilling Method: Hollow-stem auger

Depth to Water: \_\_\_\_\_

Boring Diameter: 8 inches

Ground Elevation: 10.07' (MSL)

Top of Casing Elevation: \_\_\_\_\_

Driller: J. Hallman

Logged By: L. Bienkowski

**SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND  
GROUNDWATER MONITORING WELL INSTALLATION REPORT**

LOCATION NAVAL RESERVE TRAINING CENTER, CHARLESTON, SC

LOG OF BORING NO. CSY-647-5 LOG OF WELL NO. \_\_\_\_\_

DEPTH (FEET)	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
			Trace: <5%      Little: 15-25% Few: 5-15%      Some: 25-40%	No well installed at this location
1	X			
		1	<b>POORLY GRADED SAND (SP)</b> Very loose, grayish brown, moist, mostly fine sand, trace silt, trace clay.	
5		2	<b>POORLY GRADED SAND (SP)</b> Similar to above except loose and wet.	
		3	No recovery.	
		4	<b>FAT CLAY (CH)</b> Stiff, medium gray, wet, mostly clay, some silt, few fine sand.	
10		5	<b>FAT CLAY (CH)</b> Similar to above except medium stiff and few silt.	
		6	<b>FAT CLAY (CH)</b> Similar to above except trace silt and trace plant fragments.	
15		7	<b>FAT CLAY (CH)</b> Similar to above except stiff.	
		8	<b>FAT CLAY (CH)</b> Similar to above except medium stiff.	
20		9	<b>FAT CLAY (CH)</b> Similar to above.	

Boring Completion Date: December 9, 1992

Well Completion Date: \_\_\_\_\_

Well Development Date: \_\_\_\_\_

Drilling Method: Hollow-stem auger

Depth to Water: \_\_\_\_\_

Boring Diameter: 8 inches

Ground Elevation: 10.51' (MSL)

Top of Casing Elevation: \_\_\_\_\_

Driller: J. Hallman

Logged By: L. Bienkowski

**SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND  
GROUNDWATER MONITORING WELL INSTALLATION REPORT**

LOCATION NAVAL RESERVE TRAINING CENTER, CHARLESTON, SC

LOG OF BORING NO. CSY-647-6 LOG OF WELL NO. \_\_\_\_\_

DEPTH (FEET)	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
			Trace: <5%      Little: 15-25% Few: 5-15%      Some: 25-40%	No well installed at this location
1	X			
		1	<b>POORLY GRADED SAND (SP)</b> Very loose, yellowish brown, moist, mostly fine sand, trace silt.	
5		2	<b>FAT CLAY (CH)</b> Soft, greenish gray, moist, mostly clay, little fine sand.	
		3	<b>FAT CLAY (CH)</b> Soft, medium gray, wet, mostly clay, trace silt.	
		4	<b>FAT CLAY (CH)</b> Soft, olive green, wet, mostly clay, some silt, trace fine sand.	
10		5	<b>FAT CLAY (CH)</b> Soft, medium gray, mostly clay, some medium sand.	
		6	<b>FAT CLAY (CH)</b> Similar to above except few fine sand, no medium sand.	
15		7	<b>FAT CLAY (CH)</b> Similar to above except medium stiff and trace fine sand.	
		8	<b>FAT CLAY (CH)</b> Similar to above.	
		9	<b>FAT CLAY (CH)</b> Similar to above except soft.	
20				

Boring Completion Date: December 8, 1992

Well Completion Date: \_\_\_\_\_

Well Development Date: \_\_\_\_\_

Drilling Method: Hollow-stem auger

Depth to Water: \_\_\_\_\_

Boring Diameter: 8 inches

Ground Elevation: 10.85' (MSL)

Top of Casing Elevation: \_\_\_\_\_

Driller: J. Hallman

Logged By: L. Bienkowski

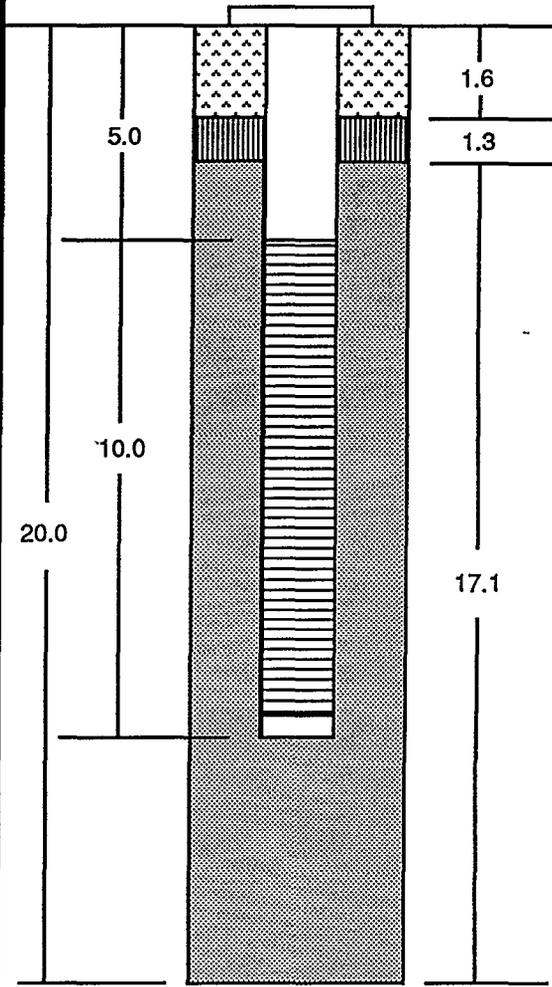


**SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND  
GROUNDWATER MONITORING WELL INSTALLATION REPORT**

LOCATION NAVAL RESERVE TRAINING CENTER, CHARLESTON, SC

LOG OF BORING NO. CSY-RTC-2 LOG OF WELL NO. CSY-RTC-2

DEPTH (FEET)	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
			Trace: <5% Little: 15-25% Few: 5-15% Some: 25-40%	
1	X			
1		1	<b>POORLY GRADED SAND (SP)</b> Medium dense, yellowish gray, dry, mostly fine sand, trace silt.	5.0
5		2	<b>CLAYEY SAND (SC)</b> Very loose, medium dark gray, wet, mostly fine sand, little clay, little silt.	
		3	<b>CLAYEY SAND (SC)</b> Similar to above.	
		4	<b>CLAYEY SAND (SC)</b> Similar to above.	
10		5	<b>POORLY GRADED SAND (SP)</b> Loose, greenish gray, wet, mostly fine sand, few shell fragments, trace silt.	10.0
		6	<b>POORLY GRADED SAND (SP)</b> Similar to above except very loose and trace clay.	
15		7	<b>FAT CLAY (CH)</b> Soft, greenish gray, wet, mostly clay, trace shell fragments.	
		8	<b>FAT CLAY (CH)</b> Similar to above.	
20		9	<b>FAT CLAY (CH)</b> Similar to above.	
				17.1



 Grout  
 Sand  
 Bentonite

Boring Completion Date: December 7, 1992  
 Well Completion Date: December 7, 1992  
 Well Development Date: December 9, 1992  
 Drilling Method: Hollow-stem auger  
 Depth to Water: 4.36' (TOC)

Boring Diameter: 8 inches  
 Ground Elevation: 7.55' (MSL)  
 Top of Casing Elevation: 7.20' (MSL)  
 Driller: J. Hallman  
 Logged By: L. Bienkowski

# SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION NAVAL RESERVE TRAINING CENTER, CHARLESTON, SC

LOG OF BORING NO. CSY-RTC-3 LOG OF WELL NO. CSY-RTC-3

DEPTH (FEET)	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
			Trace: <5%      Little: 15-25% Few: 5-15%      Some: 25-40%	
1	X		<b>POORLY GRADED SAND (SP)</b> Loose, yellowish gray, moist, mostly fine sand, trace silt.	
5		1	<b>LOW PLASTIC SILT (ML)</b> Stiff, brownish yellow, moist, mostly fine silt, some clay, trace fine sand.	
	/	2	<b>CLAYEY SAND (SC)</b> Loose, grayish brown, moist, mostly fine sand, little clay, few silt.	
10		3	<b>POORLY GRADED SAND (SP)</b> Very loose, yellowish brown, moist, mostly fine sand, few silt.	
		4	No recovery.	
		5	<b>POORLY GRADED SAND WITH CLAY (SP-SC)</b> Very loose, greenish gray, wet, mostly fine sand, few clay, few shell fragments.	
15		6	<b>POORLY GRADED SAND WITH CLAY (SP-SC)</b> Similar to above except trace silt.	
		7	<b>POORLY GRADED SAND WITH CLAY (SP-SC)</b> Similar to above.	
20	/	8	<b>FAT CLAY (CH)</b> Clay, olive gray, wet, mostly clay, few silt.	
		9		

**Boring Completion Date:** December 9, 1992  
**Well Completion Date:** December 9, 1992  
**Well Development Date:** December 10, 1992  
**Drilling Method:** Hollow-stem auger  
**Depth to Water:** 6.79' (TOC)

**Boring Diameter:** 8 inches  
**Ground Elevation:** 8.68' (MSL)  
**Top of Casing Elevation:** 8.38' (MSL)  
**Driller:** J. Hallman  
**Logged By:** L. Bienkowski

**SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND  
GROUNDWATER MONITORING WELL INSTALLATION REPORT**

LOCATION NAVAL RESERVE TRAINING CENTER, CHARLESTON, SC

LOG OF BORING NO. CSY-RTC-4 LOG OF WELL NO. \_\_\_\_\_

DEPTH (FEET)	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
			Trace: <5%      Little: 15-25% Few: 5-15%      Some: 25-40%	No well installed at this location
1	X			
		1	<b>POORLY GRADED SAND (SP)</b> Loose, dark yellowish orange, moist, mostly fine sand, trace silt, trace clay.	
5		2	<b>POORLY GRADED SAND (SP)</b> Similar to above except very loose.	
		3	<b>CLAYEY SAND (SC)</b> Loose, greenish gray, wet, mostly fine sand, few clay, few shell fragments.	
		4	<b>CLAYEY SAND (SC)</b> Similar to above.	
10		5	<b>CLAYEY SAND (SC)</b> Similar to above.	
		6	<b>POORLY GRADED SAND (SP)</b> Medium dense, olive gray, wet, mostly fine sand, few shell fragments.	
15		7	<b>POORLY GRADED SAND (SP)</b> Similar to above.	
		8	<b>FAT CLAY (CH)</b> Stiff, medium dark gray, wet, trace shell fragments.	
20		9	<b>FAT CLAY (CH)</b> Similar to above except soft.	

Boring Completion Date: December 7, 1992

Well Completion Date: \_\_\_\_\_

Well Development Date: \_\_\_\_\_

Drilling Method: Hollow-stem auger

Depth to Water: \_\_\_\_\_

Boring Diameter: 8 inches

Ground Elevation: 6.77' (MSL)

Top of Casing Elevation: \_\_\_\_\_

Driller: J. Hallman

Logged By: L. Bienkowski

**SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND  
GROUNDWATER MONITORING WELL INSTALLATION REPORT**

LOCATION NAVAL RESERVE TRAINING CENTER, CHARLESTON, SC

LOG OF BORING NO. CSY-RTC-5 LOG OF WELL NO. \_\_\_\_\_

DEPTH (FEET)	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
			Trace: <5%      Little: 15-25% Few: 5-15%      Some: 25-40%	No well installed at this location
1	X			
		1	<b>POORLY GRADED SAND (SP)</b> Medium dense, mottled brownish yellow and dark yellowish orange, moist, mostly fine sand, trace silt.	
5		2	<b>POORLY GRADED SAND (SP)</b> Similar to above except no dark yellowish orange.	
		3	<b>POORLY GRADED SAND (SP)</b> Similar to above except wet.	
10		4	<b>POORLY GRADED SAND WITH CLAY (SP-SC)</b> Loose, medium gray, wet, mostly fine sand, trace silt, trace clay, trace shell fragments.	
		5		
		6	Drill cuttings indicate similar sediments to bottom of excavation.	
15				
20				

Boring Completion Date: December 9, 1992

Well Completion Date: \_\_\_\_\_

Well Development Date: \_\_\_\_\_

Drilling Method: Hollow-stem auger

Depth to Water: \_\_\_\_\_

Boring Diameter: 8 inches

Ground Elevation: 8.45' (MSL)

Top of Casing Elevation: \_\_\_\_\_

Driller: J. Hallman

Logged By: L. Bienkowski

# SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION NAVAL RESERVE TRAINING CENTER, CHARLESTON, SC

LOG OF BORING NO. CSY-RTC-6 LOG OF WELL NO. \_\_\_\_\_

DEPTH (FEET)	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
			Trace: <5%      Little: 15-25% Few: 5-15%      Some: 25-40%	No well installed at this location
1	X			
	[Dotted]	1	<b>POORLY GRADED SAND (SP)</b> Medium dense, dark yellowish orange, moist, mostly fine sand, trace silt, trace clay.	
5	[Diagonal lines]	2	<b>SANDY FAT CLAY (CH)</b> Very soft, medium gray, wet, mostly clay, some fine sand.	
	[Dotted]	3	<b>CLAYEY SAND (SC)</b> Very loose, greenish gray, wet, mostly fine sand, little clay, trace silt.	
	[Dotted]	4	<b>POORLY GRADED SAND (SC)</b> Very loose, greenish gray, wet, mostly fine sand, little medium sand, few shell fragments, trace clay.	
10	[Diagonal lines]	5	<b>FAT CLAY (CH)</b> Soft, greenish gray, wet, mostly clay, few fine sand.	
	[Diagonal lines]	6	<b>FAT CLAY (CH)</b> Similar to above except very soft and trace shell and plant fragments.	
15	[Diagonal lines]	7	<b>SANDY FAT CLAY (CH)</b> Very soft, greenish gray, wet, mostly clay, some fine sand, trace shell and plant fragments.	
	[Diagonal lines]	8	<b>FAT CLAY (CH)</b> Soft, greenish gray, wet, mostly clay, trace fine sand, trace shell and plant fragments.	
	[Diagonal lines]	9	<b>FAT CLAY (CH)</b> Similar to above except medium stiff.	
20				

Boring Completion Date: December 7, 1992

Well Completion Date: \_\_\_\_\_

Well Development Date: \_\_\_\_\_

Drilling Method: Hollow-stem auger

Depth to Water: \_\_\_\_\_

Boring Diameter: 8 inches

Ground Elevation: 6.78' (MSL)

Top of Casing Elevation: \_\_\_\_\_

Driller: J. Hallman

Logged By: L. Bienkowski

## Appendix C



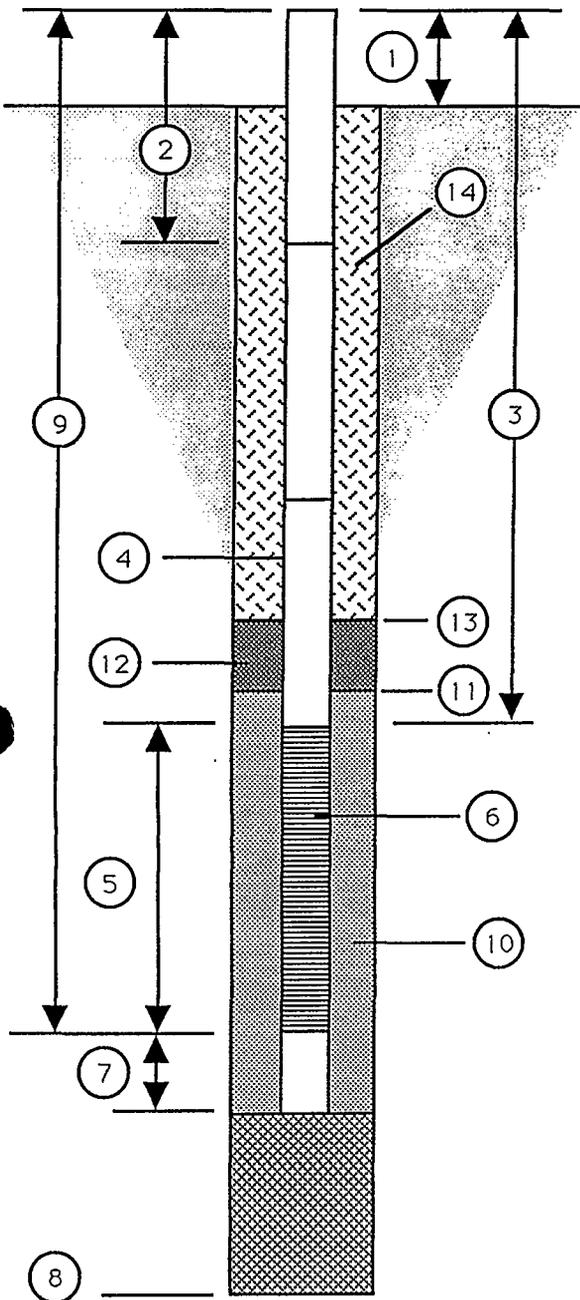
APPENDIX C

**WELL CONSTRUCTION DETAILS**

WELL CONSTRUCTION DETAILS

WELL NUMBER 647-1

DATE OF INSTALLATION December 8, 1992



1. Height of Casing above ground = Flush
2. Depth to first Coupling 4.66  
Coupling Interval Depths 4.66, 14.66
3. Total Length of Blank Pipe 4.66
4. Type of Blank Pipe 2.0 inch dia. Sch. 40 PVC
5. Length of Screen 10.0
6. Type of Screen 0.010 inch machine slotted PVC
7. Length of Sump 0.34
8. Total Depth of Boring 20.0 Hole Diameter 8"
9. Depth to Bottom of Screen 14.66
10. Type of Screen Filter Silica sand  
5 1/2 0.45-  
Quantity Used bags Size 0.55 mm U/C 1-3
11. Depth to Top of Filter 2.4
12. Type of Seal Bentonite pellets  
Quantity Used 1/2 5 gallon bucket
13. Depth to Top of Seal 1.4
14. Type of Grout Portland Type I Cement  
Grout Mixture 2% Bentonite  
Method of Placement Shovelled in place

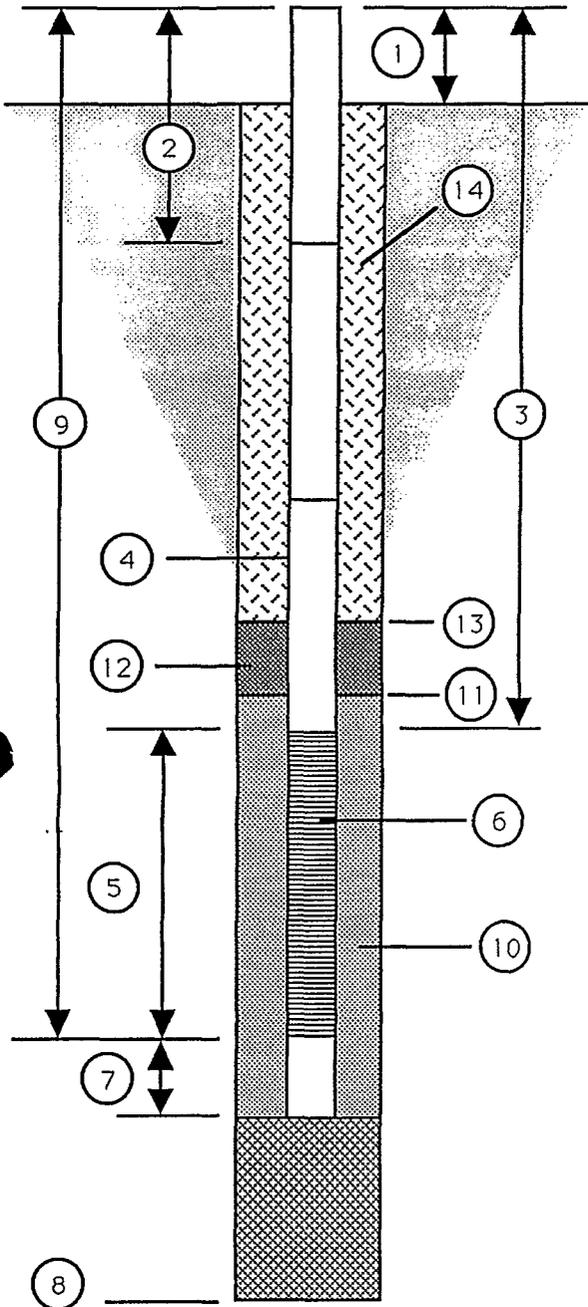
COMMENTS ON INSTALLATION:

All measurements in feet except where noted.

WELL CONSTRUCTION DETAILS

WELL NUMBER 647-2

DATE OF INSTALLATION December 8, 1992



1. Height of Casing above ground Flush
2. Depth to first Coupling 4.66  
Coupling Interval Depths 4.66, 14.66
3. Total Length of Blank Pipe 4.66
4. Type of Blank Pipe 2.0 inch dia. Sch. 40 PVC
5. Length of Screen 10.0
6. Type of Screen 0.010 inch machine slotted PVC
7. Length of Sump 0.34
8. Total Depth of Boring 20.0 Hole Diameter 8"
9. Depth to Bottom of Screen 14.66
10. Type of Screen Filter Silica sand  
Quantity Used 5 bags Size 0.45-0.55 mm U/C 1-3
11. Depth to Top of Filter 2.5
12. Type of Seal Bentonite pellets  
Quantity Used 1/2 5 gallon bucket
13. Depth to Top of Seal 1.5
14. Type of Grout Portland Type I Cement  
Grout Mixture 2% Bentonite  
Method of Placement Shovelled in place

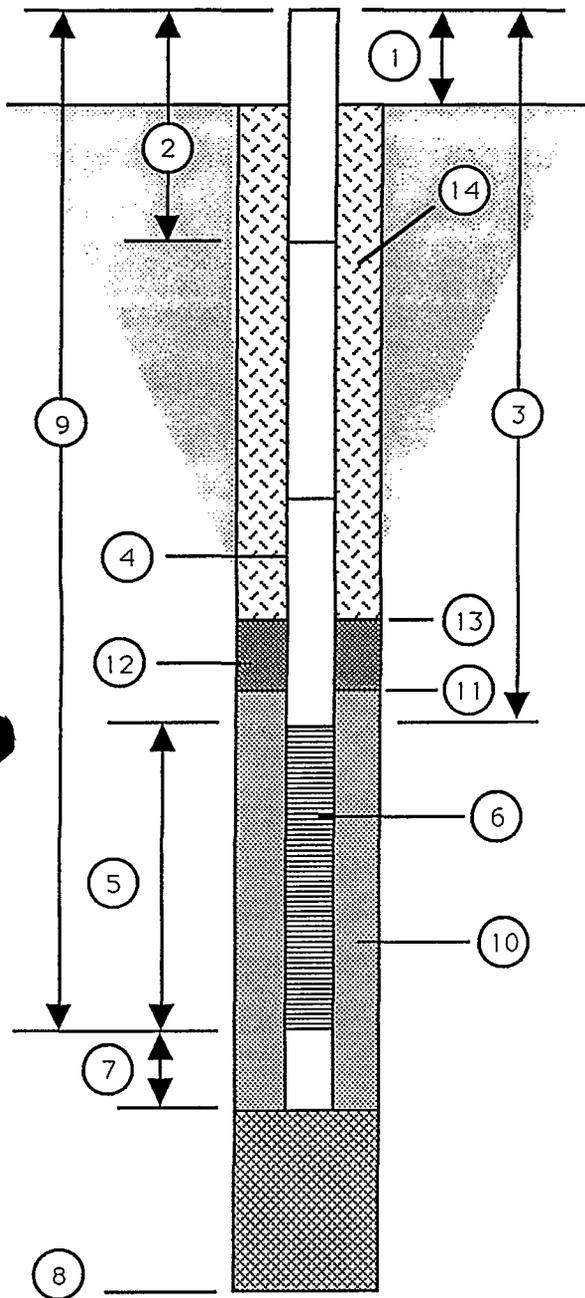
COMMENTS ON INSTALLATION:

All measurements in feet except where noted.

WELL CONSTRUCTION DETAILS

WELL NUMBER 647-3

DATE OF INSTALLATION December 8, 1992



1. Height of Casing above ground Flush
2. Depth to first Coupling 4.66  
Coupling Interval Depths 4.66, 14.66
3. Total Length of Blank Pipe 4.66
4. Type of Blank Pipe 2.0 inch dia. Sch. 40 PVC
5. Length of Screen 10.0
6. Type of Screen 0.010 inch machine slotted PVC
7. Length of Sump 0.34
8. Total Depth of Boring 20.0 Hole Diameter 8"
9. Depth to Bottom of Screen 14.66
10. Type of Screen Filter Silica sand  
5 1/2 0.45-  
Quantity Used bags Size 0.55 mm u/c 1-3
11. Depth to Top of Filter 2.8
12. Type of Seal Bentonite pellets  
Quantity Used 1/2 5 gallon bucket
13. Depth to Top of Seal 1.8
14. Type of Grout Portland Type I Cement  
Grout Mixture 2% Bentonite  
Method of Placement Shovelled in place

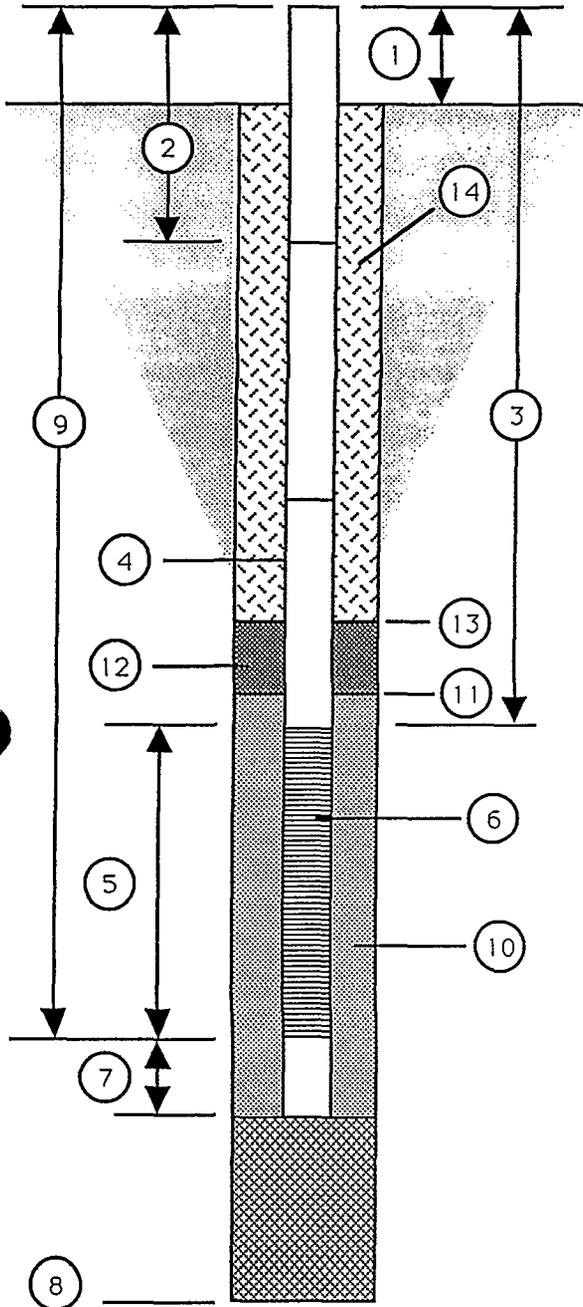
COMMENTS ON INSTALLATION:

All measurements in feet except where noted.

WELL CONSTRUCTION DETAILS

WELL NUMBER RTC-1.

DATE OF INSTALLATION December 7, 1992



1. Height of Casing above ground = Flush
2. Depth to first Coupling 4.66  
Coupling Interval Depths 4.66, 14.66
3. Total Length of Blank Pipe 4.66
4. Type of Blank Pipe 2.0 inch dia. Sch. 40 PVC
5. Length of Screen 10.0
6. Type of Screen 0.010 inch machine slotted PVC
7. Length of Sump 0.34
8. Total Depth of Boring 20.0 Hole Diameter 8"
9. Depth to Bottom of Screen 14.66
10. Type of Screen Filter Silica sand  
Quantity Used 3 bags Size 0.45-0.55 mm U/C 1-3
11. Depth to Top of Filter 2.7
12. Type of Seal Bentonite pellets  
Quantity Used 3/4 5 gallon bucket
13. Depth to Top of Seal 1.7
14. Type of Grout Portland Type I Cement  
Grout Mixture 2% Bentonite  
Method of Placement Shovelled in place

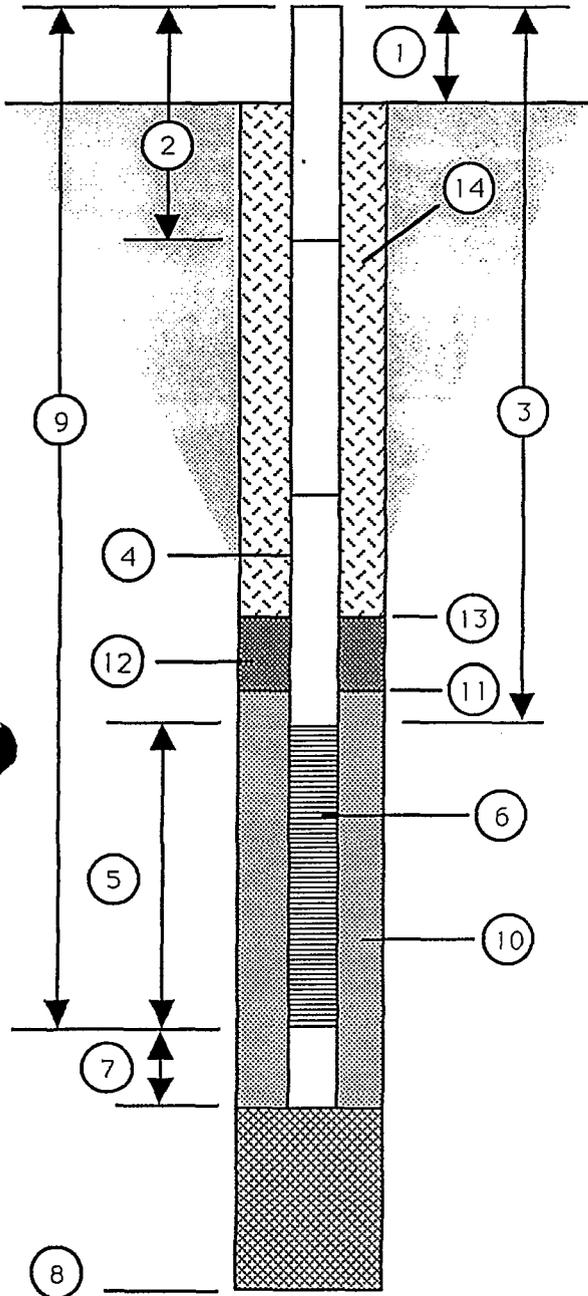
COMMENTS ON INSTALLATION:

All measurements in feet except where noted.

WELL CONSTRUCTION DETAILS

WELL NUMBER RTC-2

DATE OF INSTALLATION December 7, 1992



1. Height of Casing above ground Flush
2. Depth to first Coupling 4.66  
Coupling Interval Depths 4.66, 14.66
3. Total Length of Blank Pipe 4.66
4. Type of Blank Pipe 2.0 inch dia. Sch. 40 PVC
5. Length of Screen 10.0
6. Type of Screen 0.010 inch machine slotted PVC
7. Length of Sump 0.34
8. Total Depth of Boring 20.0 Hole Diameter 8"
9. Depth to Bottom of Screen 14.66
10. Type of Screen Filter Silica sand  
Quantity Used 4 bags Size 0.45-0.55 mm U/C 1-3
11. Depth to Top of Filter 2.9
12. Type of Seal Bentonite pellets  
Quantity Used 1 5 gallon bucket
13. Depth to Top of Seal 1.6
14. Type of Grout Portland Type I Cement  
Grout Mixture 2% Bentonite  
Method of Placement Shovelled in place

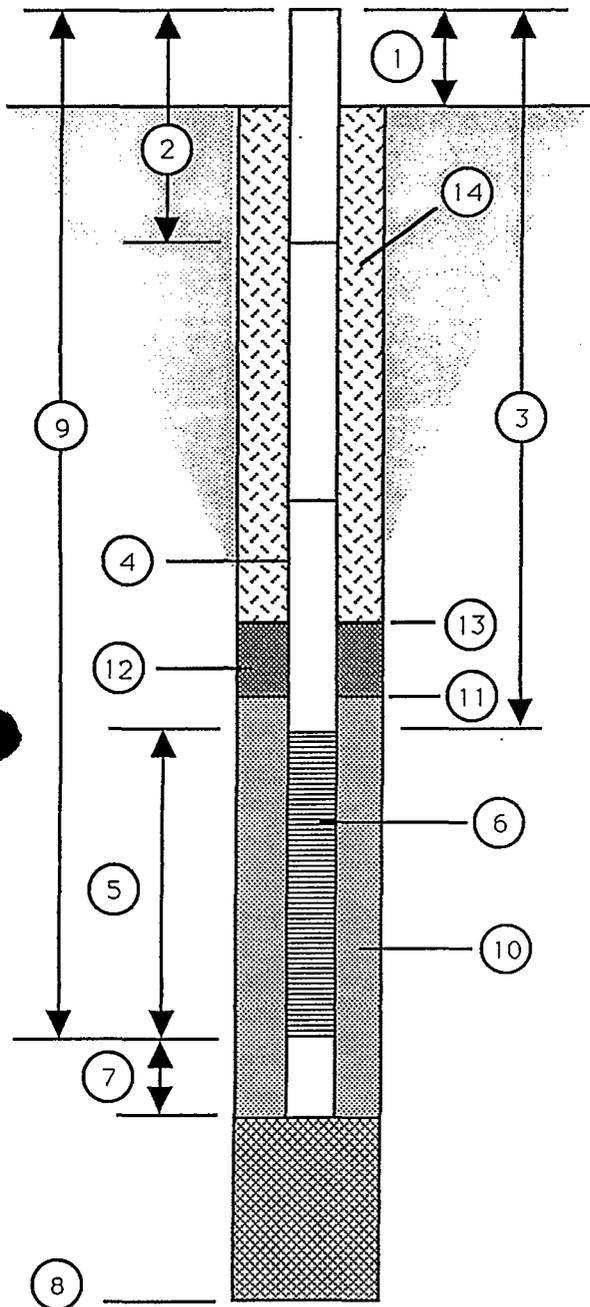
COMMENTS ON INSTALLATION:

All measurements in feet except where noted.

WELL CONSTRUCTION DETAILS

WELL NUMBER RTC-3

DATE OF INSTALLATION December 9, 1992



1. Height of Casing above ground Flush
2. Depth to first Coupling 7.66  
Coupling Interval Depths 7.66, 17.66
3. Total Length of Blank Pipe 7.66
4. Type of Blank Pipe 2.0 inch dia. Sch. 40 PVC
5. Length of Screen 10.0
6. Type of Screen 0.010 inch machine slotted PVC
7. Length of Sump 0.34
8. Total Depth of Boring 20.0 Hole Diameter 8"
9. Depth to Bottom of Screen 17.66
10. Type of Screen Filter Silica sand  
4 1/2 0.45"  
Quantity Used bags Size 0.55 mm U/C 1-3
11. Depth to Top of Filter 4.8
12. Type of Seal Bentonite pellets  
Quantity Used 1 5 gallon bucket
13. Depth to Top of Seal 3.2
14. Type of Grout Portland Type I Cement  
Grout Mixture 2% Bentonite  
Method of Placement Shovelled in place

COMMENTS ON INSTALLATION:

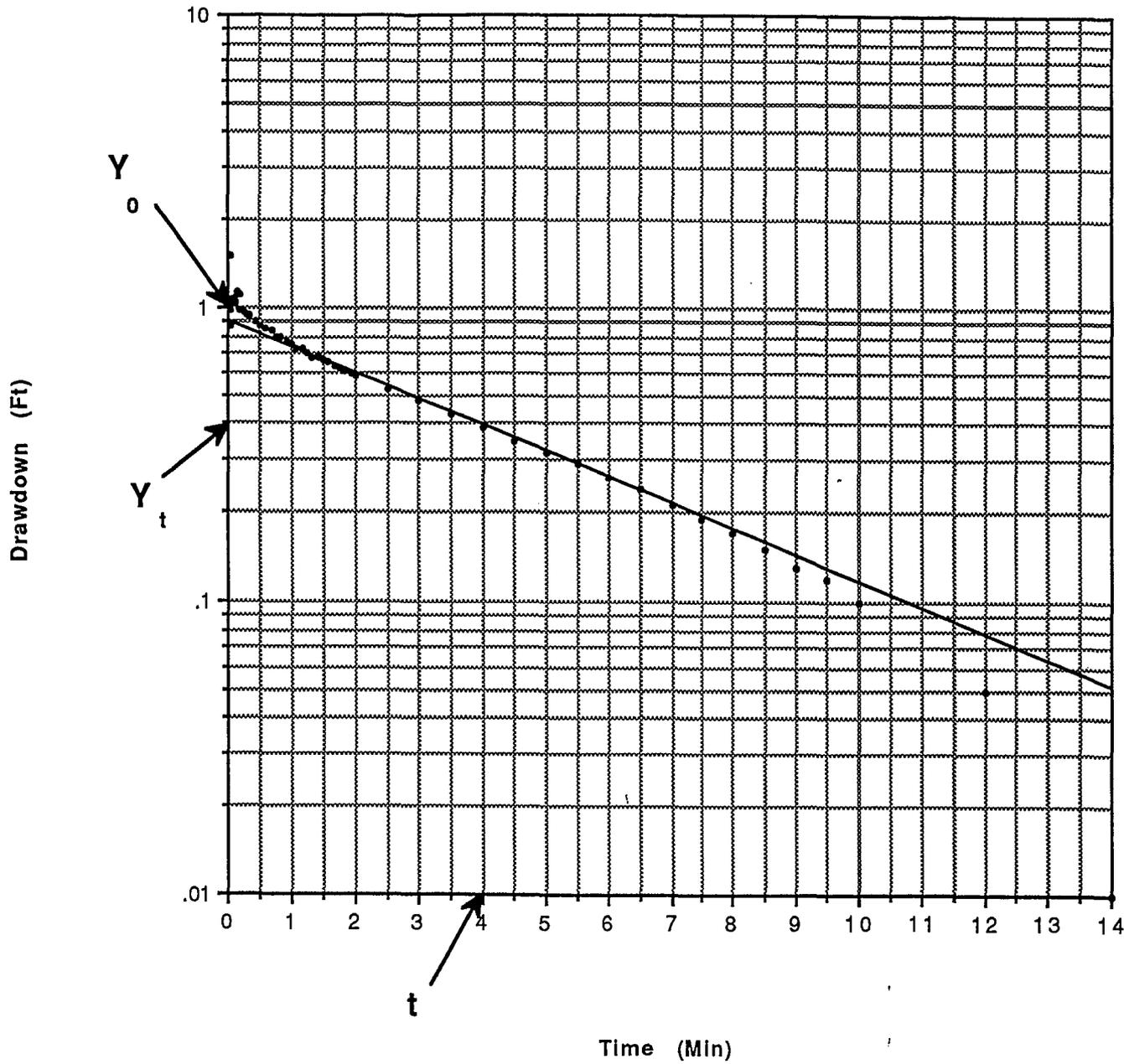
All measurements in feet except where noted.



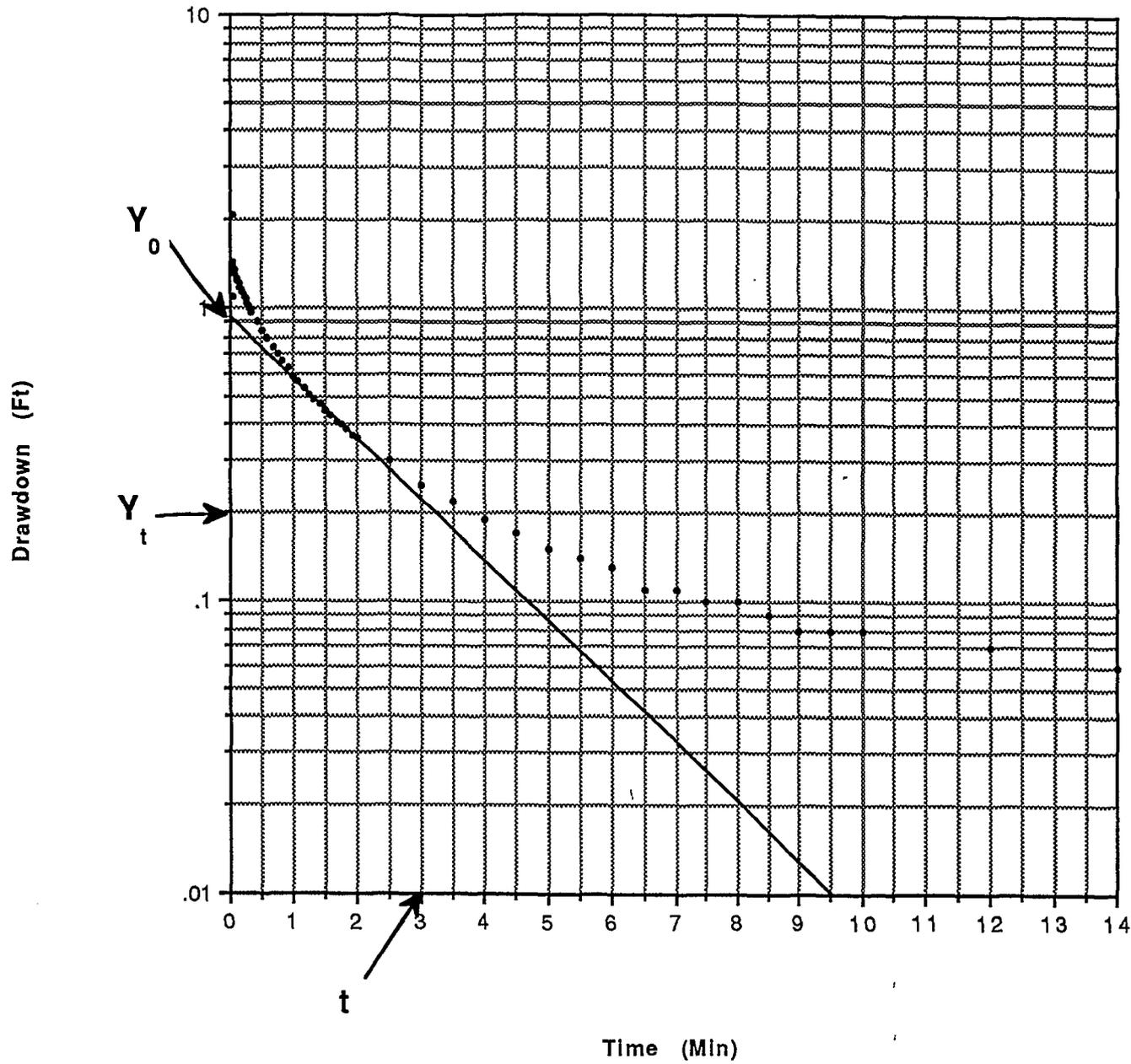
**APPENDIX D**

**RISING HEAD PLOTS**

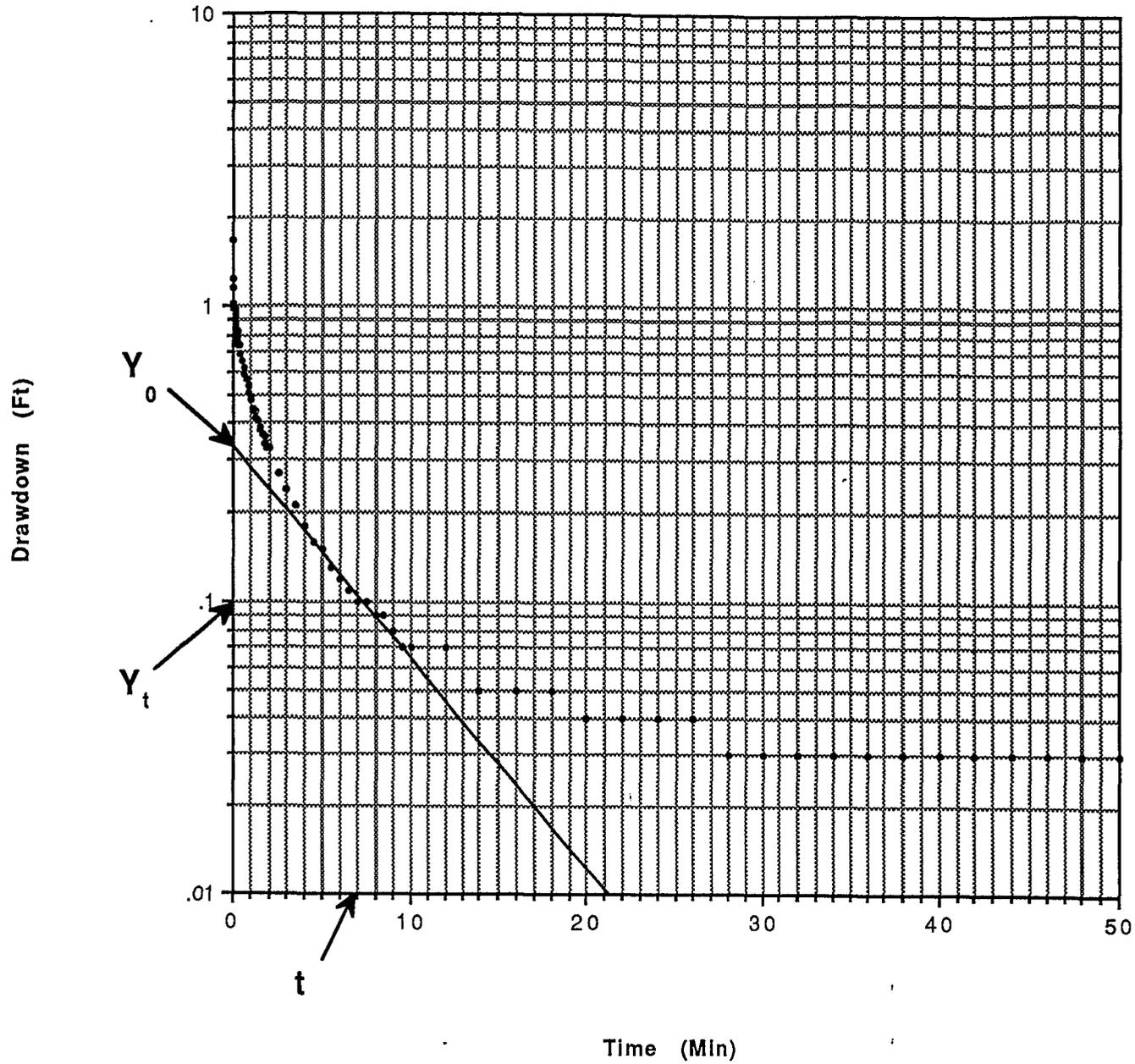
Slug Test Plot -- Well CSY-647-1  
Contamination Assessment Plan  
FMWTC Charleston, S.C.



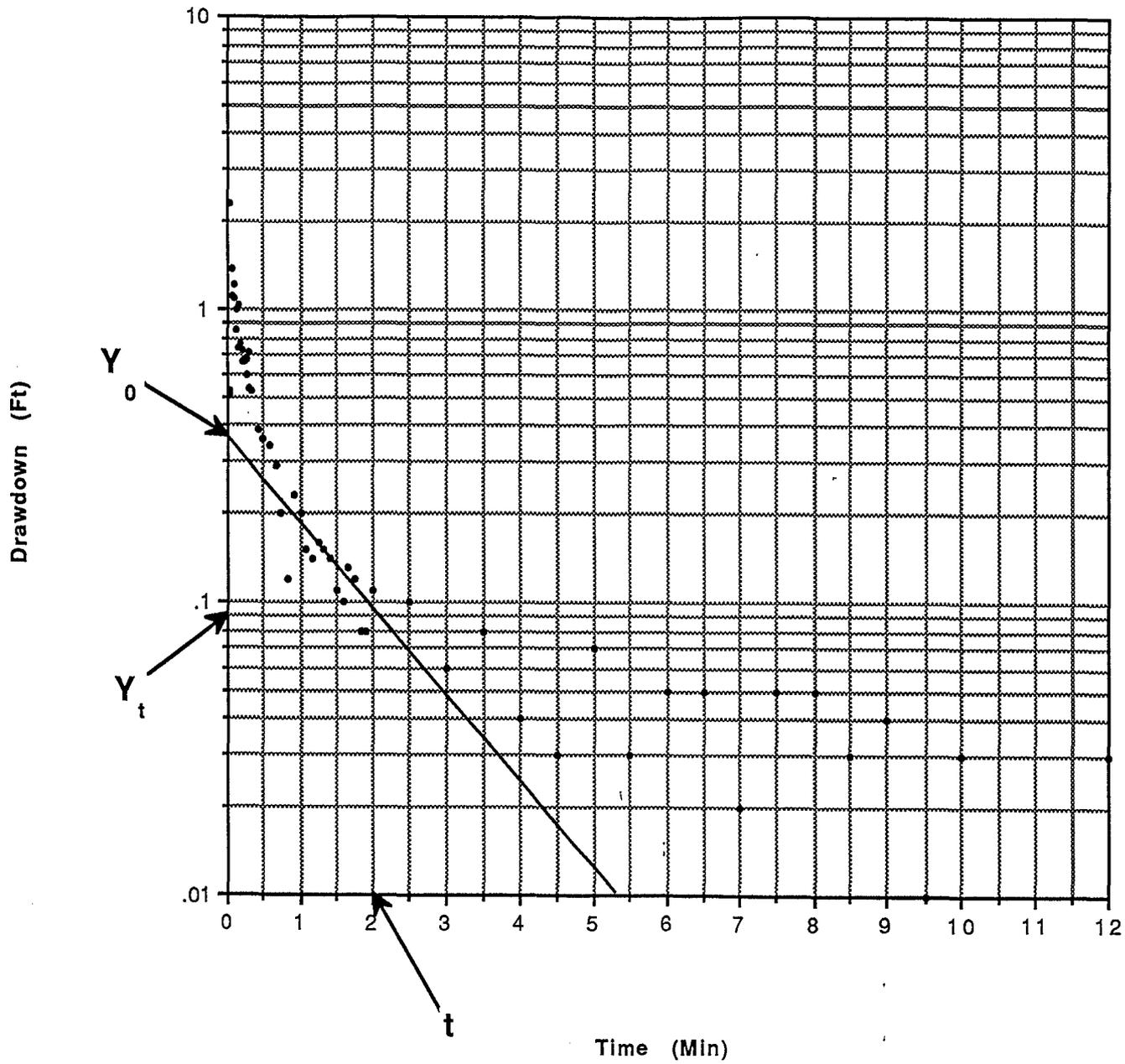
Slug Test Plot -- Well CSY-647-2  
Contamination Assessment Report  
FMWTC Charleston, S.C.



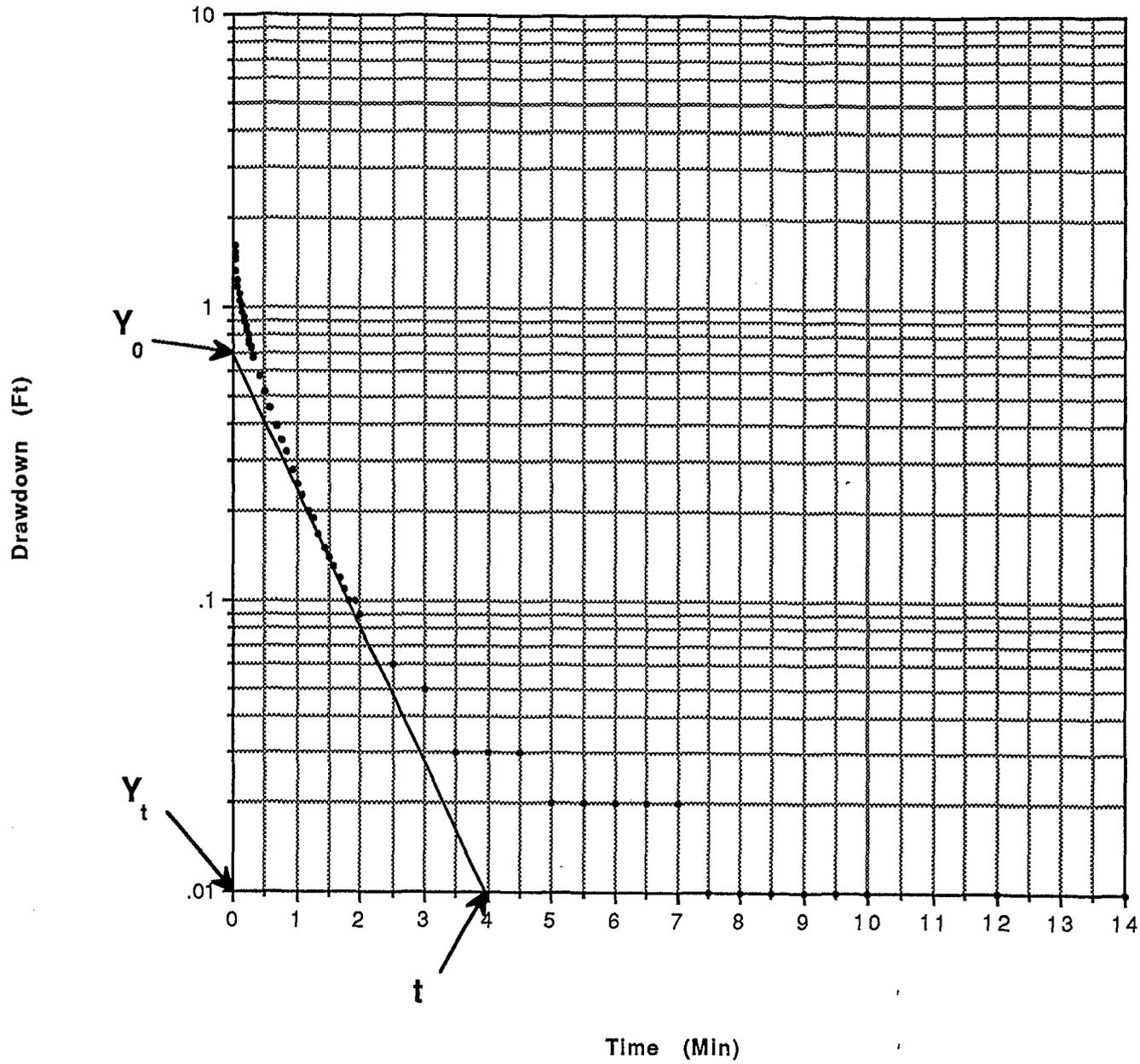
Slug Test Plot -- Well CSY-647-3  
Contamination Assessment Report  
FMWTC Charleston, S.C.



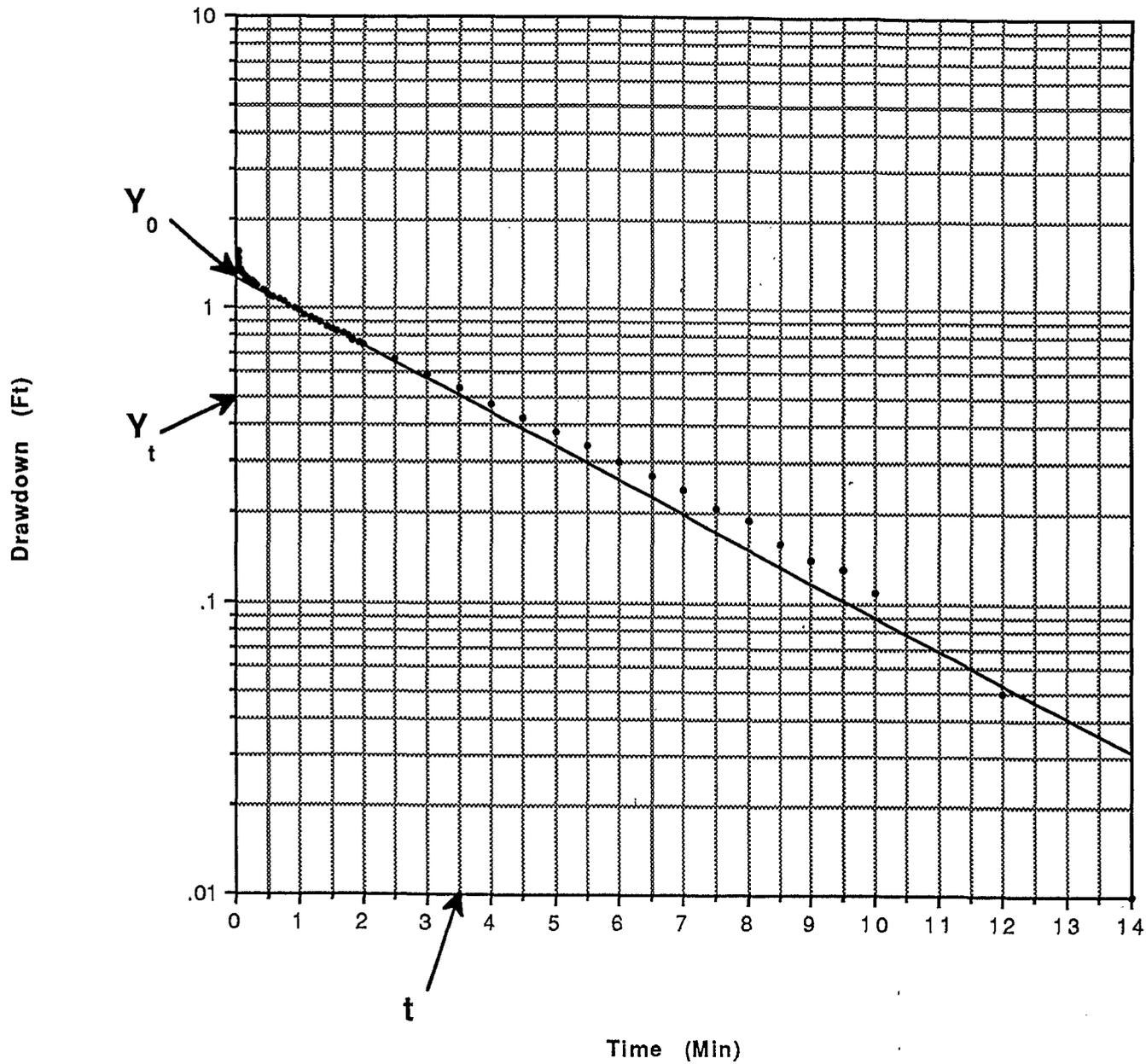
Slug Test Plot -- Well CSY-RTC-1  
Contamination Assessment Report  
NRTC Charleston, S.C.



Slug Test Plot -- Well CSY-RTC-2  
Contamination Assessment Report  
NRTC Charleston, S.C.



Slug Test Plot -- Well CSY-RTC-3  
Contamination Assessment Report  
NRTC Charleston, S.C.





**APPENDIX E**

**HYDRAULIC CONDUCTIVITY TEST DATA**

	Time (Min)	Drawdown (Ft)
1	0.0233	1.50
2	0.0266	1.50
3	0.0300	0.99
4	0.0333	0.87
5	0.0500	1.02
6	0.0666	1.07
7	0.0833	1.07
8	0.1000	1.06
9	0.1166	1.04
10	0.1333	1.13
11	0.1500	1.11
12	0.1666	1.11
13	0.1833	0.99
14	0.2000	0.99
15	0.2166	0.98
16	0.2333	0.97
17	0.2500	0.96
18	0.2666	0.96
19	0.2833	0.95
20	0.3000	0.94
21	0.3166	0.94
22	0.3333	0.93
23	0.4167	0.90
24	0.5000	0.87
25	0.5833	0.85
26	0.6667	0.83
27	0.7500	0.80
28	0.8333	0.79
29	0.9167	0.77
30	1.0000	0.75
31	1.0833	0.73
32	1.1667	0.72
33	1.2500	0.70
34	1.3333	0.68
35	1.4166	0.67
36	1.5000	0.66
37	1.5833	0.65
38	1.6667	0.63
39	1.7500	0.62
40	1.8333	0.61
41	1.9167	0.60
42	2.0000	0.59
43	2.5000	0.53
44	3.0000	0.48
45	3.5000	0.43
46	4.0000	0.39
47	4.5000	0.35
48	5.0000	0.32
49	5.5000	0.29
50	6.0000	0.26
51	6.5000	0.24
52	7.0000	0.21
53	7.5000	0.19
54	8.0000	0.17
55	8.5000	0.15
56	9.0000	0.13

	Time (Min)	Drawdown (Ft)
--	------------	---------------

57	9.5000	0.12
58	10.0000	0.10
59	12.0000	0.05
60	14.0000	0.01

	Time (Min)	Drawdown (Ft)
1	0.0233	2.07
2	0.0266	1.40
3	0.0300	1.09
4	0.0333	1.38
5	0.0500	1.43
6	0.0666	1.35
7	0.0833	1.30
8	0.1000	1.26
9	0.1166	1.23
10	0.1333	1.21
11	0.1500	1.18
12	0.1666	1.16
13	0.1833	1.14
14	0.2000	1.11
15	0.2166	1.09
16	0.2333	1.07
17	0.2500	1.06
18	0.2666	1.04
19	0.2833	1.02
20	0.3000	1.00
21	0.3166	0.99
22	0.3333	0.97
23	0.4167	0.90
24	0.5000	0.84
25	0.5833	0.79
26	0.6667	0.74
27	0.7500	0.70
28	0.8333	0.66
29	0.9167	0.63
30	1.0000	0.59
31	1.0833	0.56
32	1.1667	0.54
33	1.2500	0.51
34	1.3333	0.49
35	1.4166	0.47
36	1.5000	0.45
37	1.5833	0.43
38	1.6667	0.41
39	1.7500	0.40
40	1.8333	0.39
41	1.9167	0.37
42	2.0000	0.36
43	2.5000	0.30
44	3.0000	0.25
45	3.5000	0.22
46	4.0000	0.19
47	4.5000	0.17
48	5.0000	0.15
49	5.5000	0.14
50	6.0000	0.13
51	6.5000	0.11
52	7.0000	0.11
53	7.5000	0.10
54	8.0000	0.10
55	8.5000	0.09
56	9.0000	0.08

Time (Min) Drawdown (Ft)

57	9.5000	0.08
58	10.0000	0.08
59	12.0000	0.07
60	14.0000	0.06

	Time (Min)	Drawdown (Ft)
1	0.0233	1.69
2	0.0266	1.15
3	0.0300	0.99
4	0.0333	1.23
5	0.0500	1.02
6	0.0666	0.99
7	0.0833	0.96
8	0.1000	0.93
9	0.1166	0.91
10	0.1333	0.88
11	0.1500	0.87
12	0.1666	0.85
13	0.1833	0.84
14	0.2000	0.82
15	0.2166	0.81
16	0.2333	0.80
17	0.2500	0.79
18	0.2666	0.77
19	0.2833	0.76
20	0.3000	0.75
21	0.3166	0.74
22	0.3333	0.74
23	0.4167	0.69
24	0.5000	0.65
25	0.5833	0.62
26	0.6667	0.59
27	0.7500	0.56
28	0.8333	0.54
29	0.9167	0.51
30	1.0000	0.49
31	1.0833	0.48
32	1.1667	0.45
33	1.2500	0.44
34	1.3333	0.42
35	1.4166	0.41
36	1.5000	0.39
37	1.5833	0.38
38	1.6667	0.37
39	1.7500	0.36
40	1.8333	0.34
41	1.9167	0.33
42	2.0000	0.33
43	2.5000	0.27
44	3.0000	0.24
45	3.5000	0.21
46	4.0000	0.18
47	4.5000	0.16
48	5.0000	0.15
49	5.5000	0.13
50	6.0000	0.12
51	6.5000	0.11
52	7.0000	0.10
53	7.5000	0.10
54	8.0000	0.09
55	8.5000	0.09
56	9.0000	0.08

Time (Min) Drawdown (Ft)

57	9.5000	0.07
58	10.0000	0.07
59	12.0000	0.07
60	14.0000	0.05
61	16.0000	0.05
62	18.0000	0.05
63	20.0000	0.04
64	22.0000	0.04
65	24.0000	0.04
66	26.0000	0.04
67	28.0000	0.03
68	30.0000	0.03
69	32.0000	0.03
70	34.0000	0.03
71	36.0000	0.03
72	38.0000	0.03
73	40.0000	0.03
74	42.0000	0.03
75	44.0000	0.03
76	46.0000	0.03
77	48.0000	0.03
78	50.0000	0.03
79	52.0000	0.03

Time (Min) Drawdown (Ft)

1	0.0266	2.32
2	0.0300	0.51
3	0.0333	0.53
4	0.0500	1.39
5	0.0666	1.11
6	0.0833	1.21
7	0.1000	1.09
8	0.1166	1.00
9	0.1333	0.85
10	0.1500	1.03
11	0.1666	0.74
12	0.1833	0.76
13	0.2000	0.66
14	0.2166	0.73
15	0.2333	0.66
16	0.2500	0.67
17	0.2666	0.60
18	0.2833	0.67
19	0.3000	0.71
20	0.3166	0.54
21	0.3333	0.53
22	0.4167	0.39
23	0.5000	0.36
24	0.5833	0.34
25	0.6667	0.29
26	0.7500	0.20
27	0.8333	0.12
28	0.9167	0.23
29	1.0000	0.20
30	1.0833	0.15
31	1.1667	0.14
32	1.2500	0.16
33	1.3333	0.15
34	1.4166	0.14
35	1.5000	0.11
36	1.5833	0.10
37	1.6667	0.13
38	1.7500	0.12
39	1.8333	0.08
40	1.9167	0.08
41	2.0000	0.11
42	2.5000	0.10
43	3.0000	0.06
44	3.5000	0.08
45	4.0000	0.04
46	4.5000	0.03
47	5.0000	0.07
48	5.5000	0.03
49	6.0000	0.05
50	6.5000	0.05
51	7.0000	0.02
52	7.5000	0.05
53	8.0000	0.05
54	8.5000	0.03
55	9.0000	0.04
56	9.5000	0.01

Time (Min) Drawdown (Ft)

57	10.0000	0.03
58	12.0000	0.03

	Time (Min)	Drawdown (Ft)
1	0.0200	1.63
2	0.0233	1.54
3	0.0266	1.49
4	0.0300	1.49
5	0.0333	1.45
6	0.0500	1.34
7	0.0666	1.25
8	0.0833	1.18
9	0.1000	1.11
10	0.1166	1.06
11	0.1333	1.01
12	0.1500	0.97
13	0.1666	0.93
14	0.1833	0.90
15	0.2000	0.86
16	0.2166	0.84
17	0.2333	0.81
18	0.2500	0.78
19	0.2666	0.75
20	0.2833	0.73
21	0.3000	0.72
22	0.3166	0.69
23	0.3333	0.67
24	0.4167	0.58
25	0.5000	0.51
26	0.5833	0.45
27	0.6667	0.39
28	0.7500	0.35
29	0.8333	0.32
30	0.9167	0.28
31	1.0000	0.25
32	1.0833	0.23
33	1.1667	0.20
34	1.2500	0.19
35	1.3333	0.17
36	1.4166	0.15
37	1.5000	0.14
38	1.5833	0.13
39	1.6667	0.12
40	1.7500	0.11
41	1.8333	0.10
42	1.9167	0.10
43	2.0000	0.09
44	2.5000	0.06
45	3.0000	0.05
46	3.5000	0.03
47	4.0000	0.03
48	4.5000	0.03
49	5.0000	0.02
50	5.5000	0.02
51	6.0000	0.02
52	6.5000	0.02
53	7.0000	0.02
54	7.5000	0.01
55	8.0000	0.01
56	8.5000	0.01

Time (Min) Drawdown (Ft)

57	9.0000	0.01
58	9.5000	0.01
59	10.0000	0.01
60	12.0000	0.01
61	14.0000	0.01

	Time (Min)	Drawdown (Ft)
1	0.0200	1.56
2	0.0233	1.48
3	0.0266	1.44
4	0.0300	1.43
5	0.0333	1.41
6	0.0500	1.38
7	0.0666	1.35
8	0.0833	1.33
9	0.1000	1.31
10	0.1166	1.30
11	0.1333	1.29
12	0.1500	1.27
13	0.1666	1.27
14	0.1833	1.26
15	0.2000	1.25
16	0.2166	1.24
17	0.2333	1.23
18	0.2500	1.22
19	0.2666	1.22
20	0.2833	1.21
21	0.3000	1.20
22	0.3166	1.20
23	0.3333	1.19
24	0.4167	1.15
25	0.5000	1.12
26	0.5833	1.10
27	0.6667	1.07
28	0.7500	1.05
29	0.8333	1.02
30	0.9167	1.00
31	1.0000	0.98
32	1.0833	0.95
33	1.1667	0.93
34	1.2500	0.91
35	1.3333	0.89
36	1.4166	0.87
37	1.5000	0.85
38	1.5833	0.84
39	1.6667	0.82
40	1.7500	0.80
41	1.8333	0.78
42	1.9167	0.77
43	2.0000	0.75
44	2.5000	0.67
45	3.0000	0.59
46	3.5000	0.53
47	4.0000	0.47
48	4.5000	0.42
49	5.0000	0.38
50	5.5000	0.34
51	6.0000	0.30
52	6.5000	0.27
53	7.0000	0.24
54	7.5000	0.21
55	8.0000	0.19
56	8.5000	0.16

	Time (Min)	Drawdown (Ft)
--	------------	---------------

57	9.0000	0.14
58	9.5000	0.13
59	10.0000	0.11
60	12.0000	0.05
61	14.0000	0.01

TABLE  
 SUMMARY OF FIELD PERMEABILITY TEST RESULTS  
 SLUG TEST ANALYSIS - MODIFIED BOUWER-RICE METHOD

Client: NAVFAC  
 Location: Charleston Naval Base  
 Job Number: C1339  
 Analysis Date: Feb. 9, 1993  
 Assumed porosity of the sand pac: 0.30

Well Number	rc	rc'	Le	rw	Le/rw	Lw	H	A	B	C	yo	yt	t	K	K	K	T	ln(H-Lw) rw
	feet	feet	feet	feet		feet	feet				feet	feet	sec	ft/sec	ft/day	cm/sec	gpd/ft	
647-1	0.167	0.167	10.00	0.330	30.30	11.97	6.87	2.10	0.40	1.50	0.900	0.400	240	1.32E-05	1.14	4.04E-04	59	0.000
647-2	0.167	0.167	10.00	0.330	30.30	13.21	7.33	2.10	0.40	1.50	0.900	0.200	180	3.35E-05	2.90	1.02E-03	159	0.000
647-3	0.167	0.167	10.00	0.330	30.30	12.09	7.35	2.10	0.40	1.50	0.310	0.100	420	1.06E-05	0.91	3.23E-04	50	0.000
RTC-1	0.167	0.167	10.00	0.330	30.30	11.47	2.32	2.10	0.40	1.50	0.330	0.090	120	4.20E-05	3.63	1.28E-03	63	0.000
RTC-2	0.167	0.167	10.00	0.330	30.30	10.98	3.18	2.10	0.40	1.50	0.700	0.010	240	6.79E-05	5.87	2.07E-03	140	0.000
RTC-3	0.167	0.167	10.00	0.330	30.30	12.74	3.12	2.10	0.40	1.50	1.200	0.500	210	1.66E-05	1.43	5.05E-04	33	0.000

NOTES Tests have been analyzed according to Bouwer and Rice (1976), and Bouwer (1989)

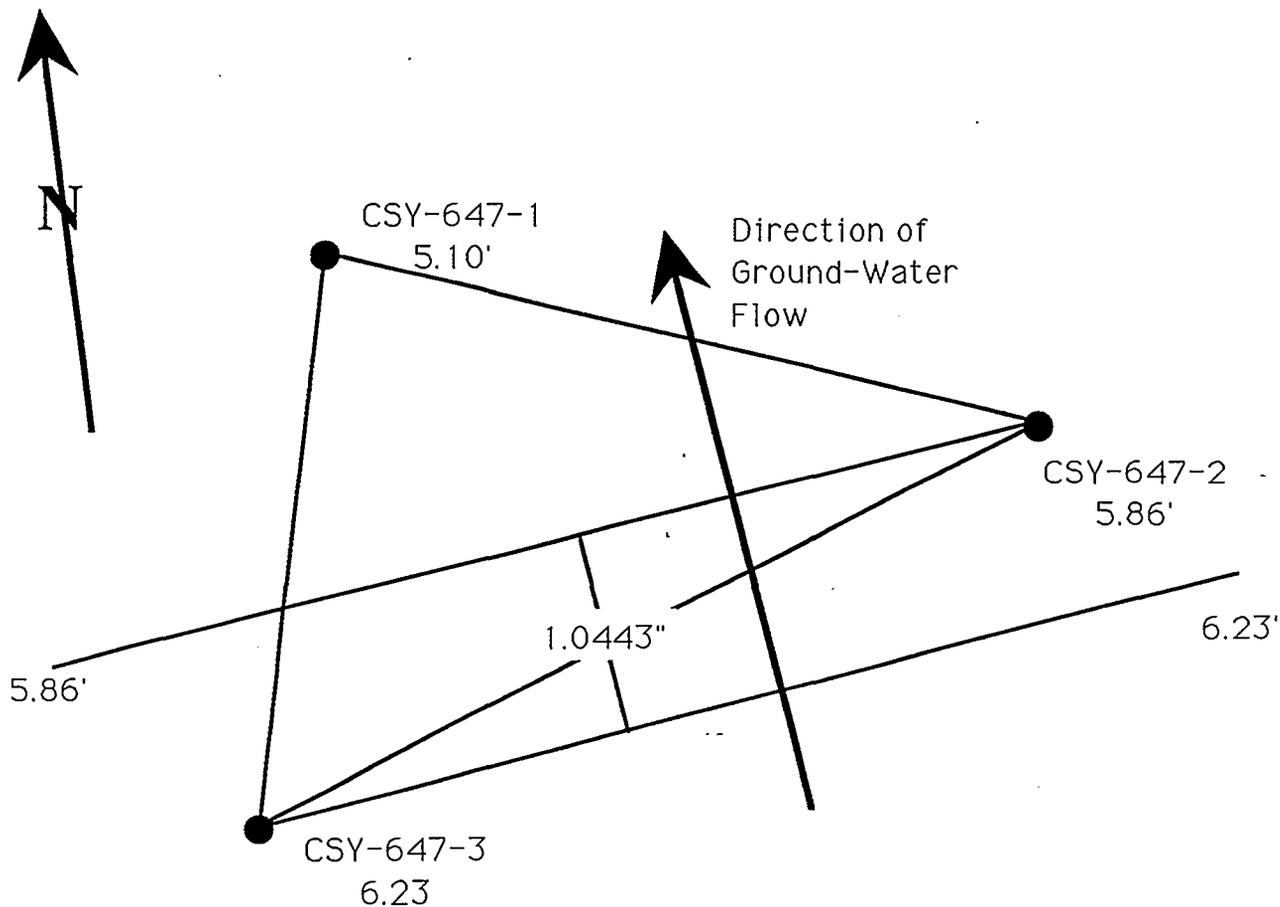


**APPENDIX F**

**HYDRAULIC GRADIENT CALCULATIONS**

# FMWTC Site

## Hydraulic Gradient Calculations



### Calculations:

$$6.23' - 5.10' = 1.13' \text{ in } 30'$$

$$6.23' - 5.86' = 0.37'$$

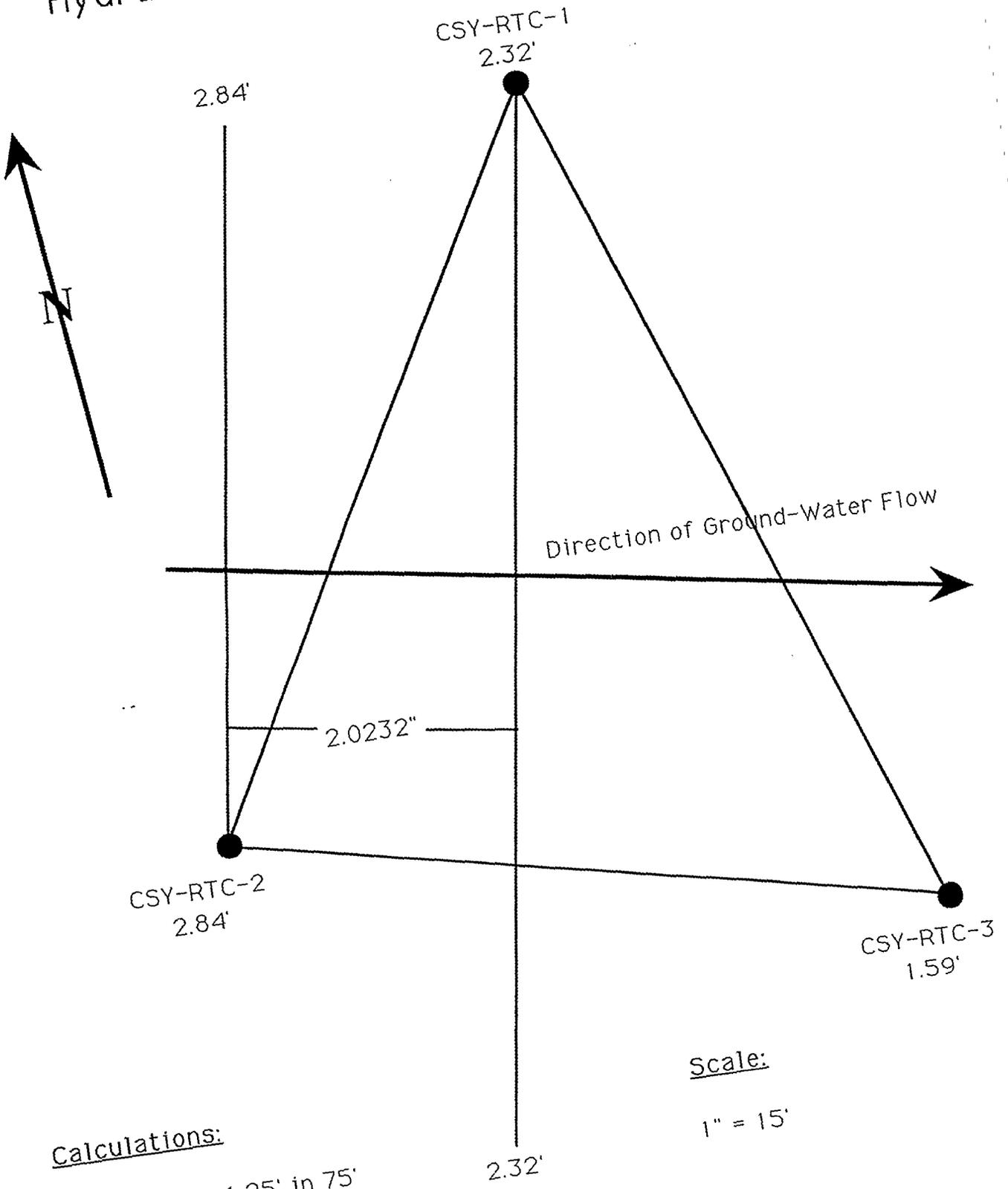
$$\frac{1.13}{30} = \frac{0.37}{10}$$

$$0.37' / 10' = \underline{0.037 \text{ ft/ft}}$$

### Scale:

$$1" = 10'$$

# NRTC Site Hydraulic Gradient Calculations



## Calculations:

$$2.84' - 1.59' = 1.25' \text{ in } 75'$$

$$2.84' - 2.32' = 0.52'$$

$$\frac{1.25}{75} = \frac{0.52}{31}$$

$$0.52' / 30' = 0.017 \text{ ft/ft}$$



**APPENDIX G**

**ANALYTICAL RESULTS**

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S2-46152

Received: 10 DEC 92

Mr. John Cox  
SEC Donohue  
2694A Lake Park Drive  
Charleston, SC 29418

Project: SDG#SEC09 C-1339 CAR AT NAVY BASE  
Sampled By: Client

## REPORT OF RESULTS

Page 1

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED	SDG#
46152-1	SEC-CHAS-1418	12-08-92	SEC09
46152-2	SEC-CHAS-1419	12-09-92	SEC09
46152-3	SEC-CHAS-1420	12-08-92	SEC09
46152-4	SEC-CHAS-1421	12-08-92	SEC09
46152-5	SEC-CHAS-1422	12-08-92	SEC09

PARAMETER	46152-1	46152-2	46152-3	46152-4	46152-5
Lead (7421)					
Lead (7421), mg/kg dw	3.5	11.4	35.6	21.2	32.0
Date Analyzed	12.23.92	12.23.92	12.23.92	12.23.92	12.23.92
Hydrocarbons (Modified 8015 - Ext.)					
Hydrocarbons as Kerosene, mg/kg dw	12U	14U	22U	15U	22U
Hydrocarbons as Diesel Fuel, mg/kg dw	12U	14U	22U	15U	22U
Hydrocarbons as Heavy Oils, mg/kg dw	28	45	100	140	120
Hydrocarbons as Mineral Spirits, mg/kg dw	12U	14U	22U	15U	22U
Hydrocarbons as Varsol, mg/kg dw	12U	14U	22U	15U	22U
Hydrocarbons as Fuel Oil, mg/kg dw	12U	14U	22U	15U	22U
Date Extracted	12.15.92	12.15.92	12.15.92	12.15.92	12.15.92
Date Analyzed	12.17.92	12.17.92	12.17.92	12.17.92	12.17.92
Percent Solids, %	85 %	70 %	46 %	67 %	46 %

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Project: SDG#SEC09 C-1339 CAR AT NAVY BASE  
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## REPORT OF RESULTS

Page 2

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED	SDG#
46152-6	SEC-CHAS-1423	12-08-92	SEC09
46152-7	SEC-CHAS-1424	12-07-92	SEC09
46152-8	SEC-CHAS-1425	12-07-92	SEC09
46152-9	SEC-CHAS-1426	12-07-92	SEC09
46152-10	SEC-CHAS-1427	12-07-92	SEC09

PARAMETER	46152-6	46152-7	46152-8	46152-9	46152-10
Lead (7421)					
Lead (7421), mg/kg dw	15.4	4.3	4.6	4.0	6.6
Date Analyzed	12.23.92	12.23.92	12.23.92	12.23.92	12.23.92
Hydrocarbons (Modified 8015 - Ext.)					
Hydrocarbons as Kerosene, mg/kg dw	19U	16U	.15U	13U	17U
Hydrocarbons as Diesel Fuel, mg/kg dw	19U	16U	15U	13U	17U
Hydrocarbons as Heavy Oils, mg/kg dw	74	16U	15U	24	28
Hydrocarbons as Mineral Spirits, mg/kg dw	19U	16U	15U	13U	17U
Hydrocarbons as Varsol, mg/kg dw	19U	16U	15U	13U	17U
Hydrocarbons as Fuel Oil, mg/kg dw	19U	16U	15U	13U	17U
Date Extracted	12.15.92	12.15.92	12.15.92	12.15.92	12.15.92
Date Analyzed	12.17.92	12.17.92	12.17.92	12.17.92	12.17.92
Percent Solids, %	53 %	64 %	66 %	78 %	58 %

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## REPORT OF RESULTS

Page 3

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED	SDG#
46152-11	SEC-CHAS-1428	12-09-92	SEC09
46152-12	SEC-CHAS-1429	12-09-92	SEC09
PARAMETER		46152-11	46152-12
Lead (7421)			
Lead (7421), mg/kg dw		7.8	3.6
Date Analyzed		12.23.92	12.23.92
Hydrocarbons (Modified 8015 - Ext.)			
Hydrocarbons as Kerosene, mg/kg dw		14U	14U
Hydrocarbons as Diesel Fuel, mg/kg dw		14U	14U
Hydrocarbons as Heavy Oils, mg/kg dw		49	14U
Hydrocarbons as Varsol, mg/kg dw		14U	14U
Hydrocarbons as Fuel Oil, mg/kg dw		14U	14U
Hydrocarbons as Mineral Spirits, mg/kg dw		14U	14U
Date Extracted		12.15.92	12.15.92
Date Analyzed		12.17.92	12.17.92
Percent Solids, %		70 %	72 %

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REPORT OF RESULTS

Page 4

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID					SDG#
46152-13	Detection Limits-Solid					SEC09
46152-14	Method Blank Result					SEC09
46152-15	Lab Control Standard (LCS) Result/Duplicate					SEC09
46152-16	LCS Expected Value					SEC09
46152-17	LCS % Recovery/Duplicate					SEC09
PARAMETER	46152-13	46152-14	46152-15	46152-16	46152-17	
Lead (7421)						
Lead (7421), mg/kg dw	0.50	0.50U	4.81/4.68	4.74	101/99 %	
Date Analyzed	---	12.23.92	12.23.92	---	---	
Hydrocarbons (Modified 8015 - Ext.)						
Hydrocarbons as Kerosene, mg/kg dw	10	10U	---	---	---	
Hydrocarbons as Diesel Fuel, mg/kg dw	10	10U	21.6/22.1	33.3	65/66 %	
Hydrocarbons as Heavy Oils, mg/kg dw	10	10U	---	---	---	
Hydrocarbons as Mineral Spirits, mg/kg dw	10	10U	---	---	---	
Hydrocarbons as Varsol, mg/kg dw	10	10U	---	---	---	
Hydrocarbons as Fuel Oil, mg/kg dw	10	10U	---	---	---	
Date Extracted	---	12.15.92	12.15.92	---	---	
Date Analyzed	---	12.16.92	12.16.92	---	---	

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Project: SDG#SEC09 C-1339 CAR AT NAVY BASE  
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## REPORT OF RESULTS

Page 5

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#		
46152-18	LCS Control Limit	SEC09		
46152-19	LCS % RPD	SEC09		
46152-20	% RPD Control Limits	SEC09		
PARAMETER		46152-18	46152-19	46152-20
Lead (7421)				
Lead (7421), %		70-130 %	2.0 %	<30 %
Hydrocarbons (Modified 8015 - Ext.)				
Hydrocarbons as Diesel Fuel, %		40-140 %	1.5 %	<40 %

**SL SAVANNAH LABORATORIES**  
& ENVIRONMENTAL SERVICES, INC.

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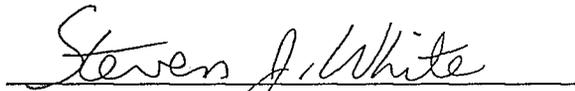
Project: SDG#SEC09 C-1339 CAR AT NAVY BASE  
Sampled By: Client

REPORT OF RESULTS

Page 6

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	DATE SAMPLED	SDG#
46152-21	SEC-CHAS-1418 Matrix Spike % Recovery	12-08-92	SEC09
46152-22	SEC-CHAS-1418 Matrix Spike Dup. % Recovery	12-08-92	SEC09
PARAMETER		46152-21	46152-22
Lead (7421)			
Lead (7421), %		93 %	115 %
Hydrocarbons (Modified 8015 - Ext.)			
Hydrocarbons as Diesel Fuel, %		79 %	91 %

Methods: EPA SW-846

  
Steven J. White

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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LOG NO: S2-46415

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Project: SDG#SEC10 C-1339 Annex 14-NAVFAC  
Sampled By: Client

## REPORT OF RESULTS

Page 1

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED	SDG#		
46415-1	SEC-CHAS-1446	12-21-92	SEC10		
46415-2	SEC-CHAS-1447	12-21-92	SEC10		
46415-3	SEC-CHAS-1448	12-21-92	SEC10		
46415-4	SEC-CHAS-1449	12-21-92	SEC10		
46415-5	SEC-CHAS-1450	12-21-92	SEC10		
PARAMETER	46415-1	46415-2	46415-3	46415-4	46415-5
Hydrocarbons (Modified 8015 - Ext.)					
Hydrocarbons as Kerosene, mg/l	0.30U	0.30U	0.30U	0.30U	0.30U
Hydrocarbons as Diesel Fuel, mg/l	0.30U	0.30U	0.30U	0.30U	0.30U
Hydrocarbons as Heavy Oils, mg/l	0.30U	0.30U	0.30U	0.30U	0.30U
Hydrocarbons as Mineral Spirits, mg/l	0.30U	0.30U	0.30U	0.30U	0.30U
Hydrocarbons as Varsol, mg/l	0.30U	0.30U	0.30U	0.30U	0.30U
Hydrocarbons as Fuel Oil, mg/l	0.30U	0.30U	0.30U	0.30U	0.30U
Date Extracted	12.28.92	12.28.92	12.28.92	12.28.92	12.28.92
Date Analyzed	12.31.92	12.31.92	12.31.92	12.31.92	12.31.92
Hydrocarbons (Modified 8015)					
Hydrocarbons as Gasoline, mg/l	0.50U	0.050U	0.050U	0.050U	0.050U
Date Analyzed	12.31.92	12.31.92	12.31.92	12.31.92	12.31.92
Lead (7421)					
Lead (7421), ug/l	67.0	21.7	30.9	202	57.8
Date Analyzed	01.13.93	01.13.93	01.13.93	01.26.93	01.26.93
pH (150.1)					
pH, units	7.4	6.9	7.3	7.0	6.7
Date Analyzed	12.22.92	12.22.92	12.22.92	12.22.92	12.22.92
Specific Conductance (120.1)					
Specific Conductance, umhos/cm	1800	400	10000	6000	14000
Date Analyzed	12.23.92	12.23.92	12.23.92	12.23.92	12.23.92

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LOG NO: S2-46415

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2694A Lake Park Drive  
Charleston, SC 29418

Project: SDG#SEC10 C-1339 Annex 14-NAVFAC  
Sampled By: Client

## REPORT OF RESULTS

Page 2

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED					SDG#
46415-1	SEC-CHAS-1446	12-21-92					SEC10
46415-2	SEC-CHAS-1447	12-21-92					SEC10
46415-3	SEC-CHAS-1448	12-21-92					SEC10
46415-4	SEC-CHAS-1449	12-21-92					SEC10
46415-5	SEC-CHAS-1450	12-21-92					SEC10
PARAMETER		46415-1	46415-2	46415-3	46415-4	46415-5	
Semivolatile Organics (8270)							
Naphthalene, ug/l		10U	10U	0.7J	10U	0.5J	
2-Chloronaphthalene, ug/l		10U	10U	10U	10U	10U	
Acenaphthylene, ug/l		10U	10U	10U	10U	10U	
Acenaphthene, ug/l		10U	10U	10U	10U	10U	
Fluorene, ug/l		10U	10U	10U	10U	10U	
Phenanthrene, ug/l		10U	10U	10U	10U	10U	
Anthracene, ug/l		10U	10U	10U	10U	10U	
Fluoranthene, ug/l		10U	10U	10U	10U	10U	
Pyrene, ug/l		10U	10U	10U	10U	10U	
Chrysene, ug/l		10U	10U	10U	10U	10U	
Benzo(a)Anthracene, ug/l		10U	10U	10U	10U	10U	
Benzo(b)fluoranthene, ug/l		10U	10U	10U	10U	10U	
Benzo(k)fluoranthene, ug/l		10U	10U	10U	10U	10U	
Benzo(a)pyrene, ug/l		10U	10U	10U	10U	10U	
Indeno(1,2,3-cd)pyrene, ug/l		10U	10U	10U	10U	10U	
Dibenz(a,h)anthracene, ug/l		10U	10U	10U	10U	10U	
Benzo(g,h,i)perylene, ug/l		10U	10U	10U	10U	10U	
2-Methylnaphthalene, ug/l		10U	10U	10U	10U	10U	
Surrogate-NBZ % Rec		52 %	82 %	63 %	75 %	86 %	
Surrogate-2FBP % Rec		51 %	79 %	65 %	73 %	74 %	
Surrogate-TPH % Rec		37 %	56 %	74 %	81 %	35 %	
Date Extracted		12.28.92	12.28.92	12.28.92	12.28.92	12.28.92	
Date Analyzed		01.12.93	01.12.93	01.12.93	01.12.93	01.12.93	

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LOG NO: S2-46415

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SEC Donohue  
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Charleston, SC 29418

Project: SDG#SEC10 C-1339 Annex 14-NAVFAC  
Sampled By: Client

## REPORT OF RESULTS

Page 3

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED					SDG#
46415-1	SEC-CHAS-1446	12-21-92					SEC10
46415-2	SEC-CHAS-1447	12-21-92					SEC10
46415-3	SEC-CHAS-1448	12-21-92					SEC10
46415-4	SEC-CHAS-1449	12-21-92					SEC10
46415-5	SEC-CHAS-1450	12-21-92					SEC10
PARAMETER		46415-1	46415-2	46415-3	46415-4	46415-5	
Volatiles by GC/MS (8240)							
Chloromethane, ug/l		10U	10U	10U	10U	10U	
Bromomethane, ug/l		10U	10U	10U	10U	10U	
Vinyl Chloride, ug/l		10U	10U	10U	10U	10U	
Chloroethane, ug/l		10U	10U	10U	10U	10U	
Methylene Chloride, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Acetone, ug/l		50U	50U	50U	50U	50U	
Carbon Disulfide, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
1,1-Dichloroethene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
1,1-Dichloroethane, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Trans-1,2-Dichloroethene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Cis-1,2-Dichloroethene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Chloroform, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
1,2-Dichloroethane, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
2-Butanone (MEK), ug/l		50U	50U	50U	50U	50U	
1,1,1-Trichloroethane, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Carbon Tetrachloride, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Vinyl Acetate, ug/l		10U	10U	10U	10U	10U	
Bromodichloromethane, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
1,1,2,2-Tetrachloroethane, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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LOG NO: S2-46415

Received: 22 DEC 92

Mr. John Cox  
SEC Donohue  
2694A Lake Park Drive  
Charleston, SC 29418

Project: SDG#SEC10 C-1339 Annex 14-NAVFAC  
Sampled By: Client

REPORT OF RESULTS

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED					SDG#
46415-1	SEC-CHAS-1446	12-21-92					SEC10
46415-2	SEC-CHAS-1447	12-21-92					SEC10
46415-3	SEC-CHAS-1448	12-21-92					SEC10
46415-4	SEC-CHAS-1449	12-21-92					SEC10
46415-5	SEC-CHAS-1450	12-21-92					SEC10
PARAMETER		46415-1	46415-2	46415-3	46415-4	46415-5	
1,2-Dichloropropane, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Trans-1,3-Dichloropropene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Trichloroethene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Dibromochloromethane, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
1,1,2-Trichloroethane, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Benzene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Cis-1,3-Dichloropropene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
2-Chloroethylvinyl Ether, ug/l		50U	50U	50U	50U	50U	
Bromoform, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
2-Hexanone, ug/l		50U	50U	50U	50U	50U	
4-Methyl-2-pentanone, ug/l		50U	50U	50U	50U	50U	
Tetrachloroethene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Toluene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Chlorobenzene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Ethylbenzene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Styrene, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Xylenes, ug/l		5.0U	5.0U	5.0U	5.0U	5.0U	
Surrogate - Toluene-d8 % Rec		101 %	101 %	99 %	100 %	101 %	
Surrogate -		105 %	107 %	102 %	105 %	102 %	
4-Bromofluorobenzene % Rec							
Surrogate -		101 %	99 %	101 %	102 %	97 %	
1,2-Dichloroethane-d4 % Rec							
Date Analyzed		01.04.93	01.04.93	01.04.93	01.04.93	01.04.93	

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED					SDG#
46415-1	SEC-CHAS-1446	12-21-92					SEC10
46415-2	SEC-CHAS-1447	12-21-92					SEC10
46415-3	SEC-CHAS-1448	12-21-92					SEC10
46415-4	SEC-CHAS-1449	12-21-92					SEC10
46415-5	SEC-CHAS-1450	12-21-92					SEC10
PARAMETER		46415-1	46415-2	46415-3	46415-4	46415-5	
Biochemical Oxygen Demand (5-Day) (405.1)							
Biochemical Oxygen Demand (5 Day), mg/l		9.2	2.5	2.6	8.0	2.7	
Date Analyzed		12.22.92	12.22.92	12.22.92	12.22.92	12.22.92	

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED	SDG#
46415-6	SEC-CHAS-1451	12-21-92	SEC10
PARAMETER		46415-6	
Hydrocarbons (Modified 8015 - Ext.)			
	Hydrocarbons as Kerosene, mg/l	0.30U	
	Hydrocarbons as Diesel Fuel, mg/l	0.30U	
	Hydrocarbons as Heavy Oils, mg/l	0.30U	
	Hydrocarbons as Mineral Spirits, mg/l	0.30U	
	Hydrocarbons as Varsol, mg/l	0.30U	
	Hydrocarbons as Fuel Oil, mg/l	0.30U	
	Date Extracted	12.28.92	
	Date Analyzed	12.31.92	
Hydrocarbons (Modified 8015)			
	Hydrocarbons as Gasoline, mg/l	0.050U	
	Date Analyzed	12.31.92	
Lead (7421)			
	Lead (7421), ug/l	30.3	
	Date Analyzed	01.15.93	
pH (150.1)			
	pH, units	6.9	
	Date Analyzed	12.22.92	
Specific Conductance (120.1)			
	Specific Conductance, umhos/cm	1900	
	Date Analyzed	12.23.92	

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED	SDG#
46415-6	SEC-CHAS-1451	12-21-92	SEC10
PARAMETER		46415-6	
Semivolatile Organics (8270)			
Naphthalene, ug/l		10U	
2-Chloronaphthalene, ug/l		10U	
Acenaphthylene, ug/l		10U	
Acenaphthene, ug/l		10U	
Fluorene, ug/l		10U	
Phenanthrene, ug/l		10U	
Anthracene, ug/l		10U	
Fluoranthene, ug/l		10U	
Pyrene, ug/l		10U	
Chrysene, ug/l		10U	
Benzo(a)Anthracene, ug/l		10U	
Benzo(b)fluoranthene, ug/l		10U	
Benzo(k)fluoranthene, ug/l		10U	
Benzo(a)pyrene, ug/l		10U	
Indeno(1,2,3-cd)pyrene, ug/l		10U	
Dibenz(a,h)anthracene, ug/l		10U	
Benzo(g,h,i)perylene, ug/l		10U	
2-Methylnaphthalene, ug/l		10U	
Surrogate-NBZ % Rec		75 %	
Surrogate-2FBP % Rec		72 %	
Surrogate-TPH % Rec		53 %	
Date Extracted		12.28.92	
Date Analyzed		01.12.93	

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED	SDG#
46415-6	SEC-CHAS-1451	12-21-92	SEC10
PARAMETER	46415-6		
Volatiles by GC/MS (8240)			
Chloromethane, ug/l		10U	
Bromomethane, ug/l		10U	
Vinyl Chloride, ug/l		10U	
Chloroethane, ug/l		10U	
Methylene Chloride, ug/l		5.0U	
Acetone, ug/l		50U	
Carbon Disulfide, ug/l		5.0U	
1,1-Dichloroethene, ug/l		5.0U	
1,1-Dichloroethane, ug/l		5.0U	
Trans-1,2-Dichloroethene, ug/l		5.0U	
Cis-1,2-Dichloroethene, ug/l		5.0U	
Chloroform, ug/l		5.0U	
1,2-Dichloroethane, ug/l		5.0U	
2-Butanone (MEK), ug/l		50U	
1,1,1-Trichloroethane, ug/l		5.0U	
Carbon Tetrachloride, ug/l		5.0U	
Vinyl Acetate, ug/l		10U	
Bromodichloromethane, ug/l		5.0U	
1,1,2,2-Tetrachloroethane, ug/l		5.0U	
1,2-Dichloropropane, ug/l		5.0U	
Trans-1,3-Dichloropropene, ug/l		5.0U	
Trichloroethene, ug/l		5.0U	
Dibromochloromethane, ug/l		5.0U	

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 SEC Donohue  
 2694A Lake Park Drive  
 Charleston, SC 29418

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED	SDG#
46415-6	SEC-CHAS-1451	12-21-92	SEC10
PARAMETER		46415-6	
1,1,2-Trichloroethane, ug/l		5.0U	
Benzene, ug/l		5.0U	
Cis-1,3-Dichloropropene, ug/l		5.0U	
2-Chloroethylvinyl Ether, ug/l		50U	
Bromoform, ug/l		5.0U	
2-Hexanone, ug/l		50U	
4-Methyl-2-pentanone , ug/l		50U	
Tetrachloroethene, ug/l		5.0U	
Toluene, ug/l		5.0U	
Chlorobenzene, ug/l		5.0U	
Ethylbenzene, ug/l		5.0U	
Styrene, ug/l		5.0U	
Xylenes, ug/l		5.0U	
Surrogate - Toluene-d8 % Rec		101 %	
Surrogate - 4-Bromofluorobenzene % Rec		105 %	
Surrogate - 1,2-Dichloroethane-d4 % Rec		98 %	
Date Analyzed		01.04.93	
Biochemical Oxygen Demand (5-Day) (405.1)			
Biochemical Oxygen Demand (5 Day), mg/l		6.2	
Date Analyzed		12.22.92	

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SDG#
46415-7	Trip Blank	SEC10
PARAMETER	46415-7	
Volatiles by GC/MS (8240)		
Chloromethane, ug/l		10U
Bromomethane, ug/l		10U
Vinyl Chloride, ug/l		10U
Chloroethane, ug/l		10U
Methylene Chloride, ug/l		5.0U
Acetone, ug/l		50U
Carbon Disulfide, ug/l		5.0U
1,1-Dichloroethene, ug/l		5.0U
1,1-Dichloroethane, ug/l		5.0U
Trans-1,2-Dichloroethene, ug/l		5.0U
Cis-1,2-Dichloroethene, ug/l		5.0U
Chloroform, ug/l		5.0U
1,2-Dichloroethane, ug/l		5.0U
2-Butanone (MEK), ug/l		50U
1,1,1-Trichloroethane, ug/l		5.0U
Carbon Tetrachloride, ug/l		5.0U
Vinyl Acetate, ug/l		10U
Bromodichloromethane, ug/l		5.0U
1,1,2,2-Tetrachloroethane, ug/l		5.0U
1,2-Dichloropropane, ug/l		5.0U
Trans-1,3-Dichloropropene, ug/l		5.0U
Trichloroethene, ug/l		5.0U
Dibromochloromethane, ug/l		5.0U

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SDG#
46415-7	Trip Blank	SEC10
PARAMETER		46415-7
1,1,2-Trichloroethane, ug/l		5.0U
Benzene, ug/l		5.0U
Cis-1,3-Dichloropropene, ug/l		5.0U
2-Chloroethylvinyl Ether, ug/l		50U
Bromoform, ug/l		5.0U
2-Hexanone, ug/l		50U
4-Methyl-2-pentanone , ug/l		50U
Tetrachloroethene, ug/l		5.0U
Toluene, ug/l		5.0U
Chlorobenzene, ug/l		5.0U
Ethylbenzene, ug/l		5.0U
Styrene, ug/l		5.0U
Xylenes, ug/l		5.0U
Surrogate - Toluene-d8 % Rec		102 %
Surrogate - 4-Bromofluorobenzene % Rec		103 %
Surrogate - 1,2-Dichloroethane-d4 % Rec		98 %
Date Analyzed		01.04.93

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LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES					SDG#
46415-8	Detection Limits-Water					SEC10
46415-9	Method Blank Result-Water					SEC10
46415-10	Lab Control Standard (LCS) Result/Duplicate					SEC10
46415-11	LCS Expected Value					SEC10
46415-12	LCS % Recovery/Duplicate					SEC10
PARAMETER	46415-8	46415-9	46415-10	46415-11	46415-12	
Hydrocarbons (Modified 8015 - Ext.)						
Hydrocarbons as Kerosene, mg/l	0.30	0.30U	---	---	---	
Hydrocarbons as Diesel Fuel, mg/l	0.30	0.30U	0.82/0.87	1.0	82/87 %	
Hydrocarbons as Heavy Oils, mg/l	0.30	0.30U	---	---	---	
Hydrocarbons as Mineral Spirits, mg/l	0.30	0.30U	---	---	---	
Hydrocarbons as Varsol, mg/l	0.30	0.30U	---	---	---	
Hydrocarbons as Fuel Oil, mg/l	0.30	0.30U	---	---	---	
Date Extracted	---	12.28.92	12.28.92	---	---	
Date Analyzed	---	12.31.92	12.31.92	---	---	
Hydrocarbons (Modified 8015)						
Hydrocarbons as Gasoline, mg/l	0.050	0.050U	0.160/.152	0.20	80/76 %	
Date Analyzed	---	12.31.92	12.31.92	---	---	
Lead (7421)						
Lead (7421), ug/l	5.0	5.0U	48.4/48.3	49.9	97/97 %	
Date Analyzed	---	01.13.93	01.13.93	---	---	

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LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES					SDG#
46415-8	Detection Limits-Water					SEC10
46415-9	Method Blank Result-Water					SEC10
46415-10	Lab Control Standard (LCS) Result/Duplicate					SEC10
46415-11	LCS Expected Value					SEC10
46415-12	LCS % Recovery/Duplicate					SEC10
PARAMETER	46415-8	46415-9	46415-10	46415-11	46415-12	
Semivolatile Organics (8270)						
Naphthalene, ug/l	10	10U	---	---	---	
2-Chloronaphthalene, ug/l	10	10U	---	---	---	
Acenaphthylene, ug/l	10	10U	---	---	---	
Acenaphthene, ug/l	10	10U	47.9/44	50	96/88 %	
Fluorene, ug/l	10	10U	---	---	---	
Phenanthrene, ug/l	10	10U	---	---	---	
Anthracene, ug/l	10	10U	---	---	---	
Fluoranthene, ug/l	10	10U	---	---	---	
Pyrene, ug/l	10	10U	55.7/56.2	50	111/112 %	
Chrysene, ug/l	10	10U	---	---	---	
Benzo(a)Anthracene, ug/l	10	10U	---	---	---	
Benzo(b)fluoranthene, ug/l	10	10U	---	---	---	
Benzo(k)fluoranthene, ug/l	10	10U	---	---	---	
Benzo(a)pyrene, ug/l	10	10U	---	---	---	
Indeno(1,2,3-cd)pyrene, ug/l	10	10U	---	---	---	
Dibenz(a,h)anthracene, ug/l	10	10U	---	---	---	
Benzo(g,h,i)perylene, ug/l	10	10U	---	---	---	
2-Methylnaphthalene, ug/l	10	10U	---	---	---	
Surrogate-NBZ % Rec	---	76 %	---	---	---	
Surrogate-2FBP % Rec	---	75 %	---	---	---	
Surrogate-TPH % Rec	---	90 %	---	---	---	
Date Extracted	---	12.28.92	12.28.92	---	---	
Date Analyzed	---	01.12.93	01.12.93	---	---	

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LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
46415-8	Detection Limits-Water	SEC10
46415-9	Method Blank Result-Water	SEC10
46415-10	Lab Control Standard (LCS) Result/Duplicate	SEC10
46415-11	LCS Expected Value	SEC10
46415-12	LCS % Recovery/Duplicate	SEC10

PARAMETER	46415-8	46415-9	46415-10	46415-11	46415-12
Volatiles by GC/MS (8240)					
Chloromethane, ug/l	10	10U	---	---	---
Bromomethane, ug/l	10	10U	---	---	---
Vinyl Chloride, ug/l	10	10U	---	---	---
Chloroethane, ug/l	10	10U	---	---	---
Methylene Chloride, ug/l	5.0	5.0U	---	---	---
Acetone, ug/l	50	50U	---	---	---
Carbon Disulfide, ug/l	5.0	5.0U	---	---	---
1,1-Dichloroethene, ug/l	5.0	5.0U	66/61	50	132/122 %
1,1-Dichloroethane, ug/l	5.0	5.0U	---	---	---
Trans-1,2-Dichloroethene, ug/l	5.0	5.0U	---	---	---
Cis-1,2-Dichloroethene, ug/l	5.0	5.0U	---	---	---
Chloroform, ug/l	5.0	5.0U	---	---	---
1,2-Dichloroethane, ug/l	5.0	5.0U	---	---	---
2-Butanone (MEK), ug/l	50	50U	---	---	---
1,1,1-Trichloroethane, ug/l	5.0	5.0U	---	---	---
Carbon Tetrachloride, ug/l	5.0	5.0U	---	---	---
Vinyl Acetate, ug/l	10	10U	---	---	---
Bromodichloromethane, ug/l	5.0	5.0U	---	---	---
1,1,2,2-Tetrachloroethane, ug/l	5.0	5.0U	---	---	---

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LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#				
46415-8	Detection Limits-Water	SEC10				
46415-9	Method Blank Result-Water	SEC10				
46415-10	Lab Control Standard (LCS) Result/Duplicate	SEC10				
46415-11	LCS Expected Value	SEC10				
46415-12	LCS % Recovery/Duplicate	SEC10				
PARAMETER	46415-8	46415-9	46415-10	46415-11	46415-12	
1,2-Dichloropropane, ug/l	5.0	5.0U	---	---	---	
Trans-1,3-Dichloropropene, ug/l	5.0	5.0U	---	---	---	
Trichloroethene, ug/l	5.0	5.0U	54/53	50	108/106 %	
Dibromochloromethane, ug/l	5.0	5.0U	---	---	---	
1,1,2-Trichloroethane, ug/l	5.0	5.0U	---	---	---	
Benzene, ug/l	5.0	5.0U	56/56	50	112/112 %	
Cis-1,3-Dichloropropene, ug/l	5.0	5.0U	---	---	---	
2-Chloroethylvinyl Ether, ug/l	50	50U	---	---	---	
Bromoform, ug/l	5.0	5.0U	---	---	---	
2-Hexanone, ug/l	50	50U	---	---	---	
4-Methyl-2-pentanone , ug/l	50	50U	---	---	---	
Tetrachloroethene, ug/l	5.0	5.0U	---	---	---	
Toluene, ug/l	5.0	5.0U	56/53	50	112/106 %	
Chlorobenzene, ug/l	5.0	5.0U	65/61	50	130/122 %	
Ethylbenzene, ug/l	5.0	5.0U	---	---	---	
Styrene, ug/l	5.0	5.0U	---	---	---	
Xylenes, ug/l	5.0	5.0U	---	---	---	
Surrogate - Toluene-d8 % Rec	---	99 %	---	---	---	
Surrogate -	---	102 %	---	---	---	
4-Bromofluorobenzene % Rec	---	99 %	---	---	---	
Surrogate -	---	99 %	---	---	---	
1,2-Dichloroethane-d4 % Rec	---	---	---	---	---	
Date Analyzed	---	01.04.93	01.04.93	---	---	

**SL SAVANNAH LABORATORIES**  
 & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S2-46415

-Received: 22 DEC 92 -

Mr. John Cox  
 SEC Donohue  
 2694A Lake Park Drive  
 Charleston, SC 29418

Project: SDG#SEC10 C-1339 Annex 14-NAVFAC  
 Sampled By: Client

REPORT OF RESULTS

Page 16

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES					SDG#
46415-8	Detection Limits-Water					SEC10
46415-9	Method Blank Result-Water					SEC10
46415-10	Lab Control Standard (LCS) Result/Duplicate					SEC10
46415-11	LCS Expected Value					SEC10
46415-12	LCS % Recovery/Duplicate					SEC10
PARAMETER	46415-8	46415-9	46415-10	46415-11	46415-12	
Biochemical Oxygen Demand (5-Day) (405.1)						
Biochemical Oxygen Demand (5 Day), mg/l	2.0	2.0U	27.8/26.6	24.0	116/111	%
Date Analyzed	---	12.22.92	12.22.92	---	---	---

Methods: EPA SW-846

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S2-46415

Received: 22 DEC 92

Mr. John Cox  
SEC Donohue  
2694A Lake Park Drive  
Charleston, SC 29418

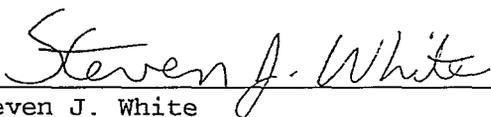
Project: SDG#SEC10 C-1339 Annex 14-NAVFAC  
Sampled By: Client

## REPORT OF RESULTS

Page 17

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#			
46415-13	LCS Control Limit	SEC10			
46415-14	LCS % RPD	SEC10			
46415-15	% RPD Control Limits	SEC10			
46415-16	Control Limit Source	SEC10			
PARAMETER		46415-13	46415-14	46415-15	46415-16
Hydrocarbons (Modified 8015 - Ext.)					
Hydrocarbons as Diesel Fuel, %	40-140 %	5.9 %	<40 %		SL
Hydrocarbons (Modified 8015)					
Hydrocarbons as Gasoline, %	40-140 %	5.1 %	<40 %		SL
Lead (7421)					
Lead (7421), %	80-120 %	0 %	<20 %		SL
Semivolatile Organics (8270)					
Acenaphthene, %	46-118 %	8.7 %	<31 %		SL
Pyrene, %	26-127 %	0.90 %	<31 %		SL
Volatiles by GC/MS (8240)					
1,1-Dichloroethene, % Rec	60-136 %	7.9 %	<19 %		SL
Trichloroethene, % Rec	66-136 %	1.9 %	<20 %		SL
Benzene, % Rec	73-144 %	0 %	<22 %		SL
Toluene, % Rec	68-138 %	5.5 %	<17 %		SL
Chlorobenzene, % Rec	68-138 %	6.3 %	<17 %		SL
Biochemical Oxygen Demand (5-Day) (405.1)					
Biochemical Oxygen Demand (5 Day), %	60-140 %	4.4 %	<30 %		SL

Methods: EPA SW-846

  
Steven J. White



APPENDIX H

CHAIN-OF-CUSTODY DOCUMENTS

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

5102 LaRoche Avenue, Savannah, GA 31404  
 2846 Industrial Plaza Drive, Tallahassee, FL 32301  
 414 Southwest 12th Avenue, Deerfield Beach, FL 33442  
 900 Lakeside Drive, Mobile, AL 36693  
 6712 Benjamin Road, Suite 100, Tampa, FL 33634

Phone: (912) 354-7858  
 Phone: (904) 878-3994  
 Phone: (305) 421-7400  
 Phone: (205) 666-6633  
 Phone: (813) 885-7427

Fax (912) 352-0165  
 Fax (904) 878-9504  
 Fax (305) 421-2584  
 Fax (205) 666-6696  
 Fax (813) 885-7049

O. NUMBER		PROJECT NUMBER		PROJECT NAME		MATRIX TYPE		REQUIRED ANALYSES *NEESA Level C						PAGE		OF			
		C-1339		CAR at Navy Base															
CLIENT NAME				TELEPHONE/FAX NO.				AQUEOUS MATRIX NONAQUEOUS MATRIX OIL MATRIX AIR MATRIX Pb 7421 TPH 6015										<input checked="" type="checkbox"/> STANDARD TAT* <input type="checkbox"/> EXPEDITED TAT*	
CLIENT ADDRESS				CITY, STATE, ZIP CODE															
AMPLER(S) NAME(S)				CLIENT PROJECT MANAGER															
DATE				TIME															
DATE		TIME		SAMPLE IDENTIFICATION						NUMBER OF CONTAINERS SUBMITTED						REPORT DUE DATE _____		* SUBJECT TO RUSH FEES	
2/4/92	12:30	SEC-CHAS-1418						✓	1	1									
2/4/92	8:35	SEC-CHAS-1419						✓	1	1									
2/4/92	10:10	SEC-CHAS-1420						✓	1	1									
2/4/92	10:50	SEC-CHAS-1421						✓	1	1									
2/4/92	9:10	SEC-CHAS-1422						✓	1	1									
2/4/92	14:20	SEC-CHAS-1423						✓	1	1									
2/4/92	16:20	SEC-CHAS-1424						✓	1	1									
2/4/92	14:00	SEC-CHAS-1425						✓	1	1									
2/4/92	14:45	SEC-CHAS-1426						✓	1	1									
2/4/92	11:35	SEC-CHAS-1427						✓	1	1									
2/9/92	13:40	SEC-CHAS-1428						✓	1	1									
2/4/92	11:10	SEC-CHAS-1429						✓	1	1									
RELINQUISHED BY: (SIGNATURE)		DATE		TIME		RECEIVED BY: (SIGNATURE)		DATE		TIME		RELINQUISHED BY: (SIGNATURE)		DATE		TIME			
S. Samuel		2/1/92		9:00		Lee Brankowski		2/2/92		11:00		Lee Brankowski		2/9/92		14:30			
RECEIVED BY: (SIGNATURE)		DATE		TIME		RELINQUISHED BY: (SIGNATURE)		DATE		TIME		RECEIVED BY: (SIGNATURE)		DATE		TIME			
FOR SAVANNAH LABORATORY USE ONLY												LABORATORY REMARKS							
RECEIVED FOR LABORATORY BY: (SIGNATURE)		DATE		TIME		CUSTODY INTACT		CUSTODY SEAL NO.		S.L. LOG NO.									
R. Brankowski		2/10/92		10:30		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO				46152									

ORIGINAL

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue, Savannah, GA 31404  
 2846 Industrial Plaza Drive, Tallahassee, FL 32301  
 414 Southwest 12th Avenue, Deerfield Beach, FL 33442  
 900 Lakeside Drive, Mobile, AL 36693  
 6712 Benjamin Road, Suite 100, Tampa, FL 33634

Phone: (912) 354-7858  
 Phone: (904) 878-3994  
 Phone: (305) 421-7400  
 Phone: (205) 666-6633  
 Phone: (813) 885-7427

(912) 352-0165  
 Fax (904) 878-9504  
 Fax (305) 421-2584  
 Fax (205) 666-6696  
 Fax (813) 885-7049

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

\* All to be done at NEESA Level C

O. NUMBER		PROJECT NUMBER	PROJECT NAME	MATRIX TYPE	REQUIRED ANALYSES*								PAGE	OF
		C-1339	Amc 14 - NAVFAC											
CLIENT NAME			TELEPHONE/FAX NO.	AQUEOUS MATRIX NONAQUEOUS MATRIX OIL MATRIX AIR MATRIX	TPH (8015) Pb (724) BOD/P/H/SC PAH (8270) Voc, (8240)								<input type="checkbox"/> STANDARD TAT <input type="checkbox"/> EXPEDITED TAT *	
CLIENT ADDRESS			CITY, STATE, ZIP CODE										REPORT DUE DATE _____	
SAMPLER(S) NAME(S)			CLIENT PROJECT MANAGER										* SUBJECT TO RUSH FEES	
SAMPLING		SAMPLE IDENTIFICATION			NUMBER OF CONTAINERS SUBMITTED									
DATE	TIME													
12/21/92	11:35	SEC-CHAS-1446			X					1	1	1	1	4
12/21/92	12:10	SEC-CHAS-1447			X					1	1	1	1	4
12/21/92	14:00	SEC-CHAS-1448			X					1	1	1	1	4
12/21/92	14:40	SEC-CHAS-1449			X					1	1	1	1	4
12/21/92	15:15	SEC-CHAS-1450			X					1	1	1	1	4
12/21/92	15:40	SEC-CHAS-1451			X					1	1	1	1	4
		Trip Blank			X					1	1			4

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
<i>S. Samuel</i>	12/1/92	9:50	<i>Lee Binkowski</i>	12/2/92	11:00	<i>Lee Binkowski</i>	12/2/92	16:30
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

FOR SAVANNAH LABORATORY USE ONLY					LABORATORY REMARKS			
RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.			
<i>S. Samuel</i>	12/29/92	10:30	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		46415			

ORIGINAL



Call and ask for  
letter refer to  
in project.  
To mail letter to us

Jay  
NTC  
Orlando

1841

DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 437TH AIRLIFT WING (AMC)



FROM: 437 SPTG/CEV  
100 W. Stewart Street  
Charleston AFB SC 29404-4827

21 December 1992

SUBJ: Air Force Position on Defense Fuel Supply Point Regulatory Compliance

TO: Southern Division Naval Facilities Engineering Command  
Attn Code 185  
2155 Eagle Drive  
North Charleston SC 29405-0068

1. In September 1992 Mr James Malone and Ms Kim Queen of your command contacted us about the Environmental Protection Agency's request for additional information to score the Defense Fuel Supply Point for potential placement on the National Priorities List. At that time the Navy and DLA stance was that the site should be addressed under the Resource Conservation and Recovery Act (RCRA) underground storage tank requirements, not under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), which would negate the need for scoring the site.
2. We requested input from our headquarters and legal counsel on this matter and received the attached letter in response. The letter presents the Air Force's position on this situation, including Headquarters Air Mobility Command Environmental and Legal channels as well as Charleston AFB.
3. If you have any questions, please contact Ms Sue Davis at 566-4978.

GLENN W. EASTERBY, REM  
Chief, Environmental Flight

Atch  
HQ AMC/JAC Ltr, 6 Oct 92

cc: HQ AMC/CEVR  
437 AW/CV  
437 AW/JA  
437 SPTG/CC  
437 SPTG/CE

FROM: 437 SPTG/CEV  
100 W. Stewart Street  
Charleston AFB SC 29404-4827

SUBJ: Air Force Position on Defense Fuel Supply Point Regulatory Compliance

TO: Southern Division Naval Facilities Engineering Command  
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3. If you have any questions, please contact Mr Robert Courtright or Ms Sue Davis at 566-4978.

GLENN W. EASTERBY, REM  
Chief, Environmental Flight

Atch  
HQ AMC/JAC Ltr, 6 Oct 92

cc: HQ AMC/CEVR  
437 AW/CV  
437 AW/JA  
437 SPTG/CC  
437 SPTG/CE

To Kim  
return to  
Daryle



AIR MOBILITY COMMAND

ENVIRONMENTAL RESTORATION DIVISION



FACSIMILE TRANSMITTAL HEADER SHEET

TO: SOE DAVIS  
BOB COURTRIGHT FAX PHONE: (933) 566-4773

OFFICE: 437 SPTG/DEV PHONE DSN 673 4978

FROM: Scott EDWARDS HQ AMC/CEVR

PHONE: (818) 256-8343 DSN 576-8343 FAX EXT 8376

# PAGES (INCL HEADER) 4 DATE 18 Nov 92

COMMENTS: in [unclear] [unclear]



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS AIR MOBILITY COMMAND

FROM: HQ AMC/JAC  
402 Scott Dr, Room 132  
Scott AFB IL 6225-5363

6 October 1992

SUBJ: Charleston AFB Site 01 Remediation

TO: CEVR  
ATTN: Dale Dietzel

1. Pursuant to an Interservice Support Agreement between the Air Force and DLA, DLA manages Air Force property in Hanahan, South Carolina. The land belongs to Charleston AFB; however, DLA and the Navy manage the Defense Fuels Supply Point currently located there. DLA and the Navy have been investigating a 80,000 gallon plus fuel leak under RCRA GST provisions but are concerned the site may be included on the NPL and, thus, become subject to CERCLA cleanup requirements. You have asked our position on the DLA/Navy intent to ask EPA to defer NCP scoring and NPL listing for the site. As discussed below, EPA will not defer NPL inclusion for federal facilities; however, with sufficient EPA oversight and involvement, corrective action taken under RCRA may satisfy our CERCLA/NCP requirements.

2. EPA does have a deferral policy for RCRA facilities under which sites subject to RCRA Subtitle C corrective action requirements are deferred from NPL placement (55 FR 30798, 30853 (1990), Atch 1, and 54 FR 412004-6(1989)). This policy does not, however, apply to federal facilities as it is EPA's position that NPL listing under 42 USC 9620 of CERCLA is mandatory (55 FR 30853 and 30875, Atch 1; 52 FR 17991 (1987)). Accordingly, while DLA and Navy positions and desires are logical, if EPA's HRS scoring exceeds the scoring threshold for this site, it must be listed on the NPL.

3. EPA believes, however, it has substantial authority to "pick and choose" among statutory authorities it can utilize to compel, take, or guide required environmental cleanups (55 FR 30853, Atch 1). This flexible approach also extends to federal facilities, as EPA has stated:

While it is the responsibility of federal facilities to comply with the requirements of both RCRA and CERCLA programs, the Agency plans to continue its efforts to coordinate the activities required under both programs with those under already-established Federal facility remedial programs. For example, the Department of Defense (DOD) has developed the Installation Restoration Program (IRP) to identify and

clean up contamination resulting from postwaste management practices at DOD facilities. IRP-conducted activities will often serve to satisfy RCRA and CERCLA requirements . . . . EPA intends, however, to oversee and, if necessary, direct the scope and substance of investigations and cleanup activities at DOD and other Federal facilities. In addition, EPA anticipates that many states will exercise oversight authority under state laws to review and participate in corrective action decisions at Federal facilities. ;  
(55 FR 30798, 30858, Atch 1)

Accordingly, EPA will afford DOD facilities flexibility and discretion to address under its IRP programs both CERCLA and RCRA requirements, subject to EPA and state oversight.

4. It is likely such flexibility of approach will be extended by EPA to DOD facilities for UST environmental restoration/ corrective action efforts as:

The approach to UST corrective action adopts the same basic steps as the NCP requirements for CERCLA actions and those contained within today's proposed RCRA section 3004 regulation; control the release source, determine the extent of remediation required, and take the necessary cleanup actions.  
(55 FR 30857, Atch 1)

Usually the state or a subdivision thereof will be the implementing agency overseeing UST cleanups. It is our position, then, that UST cleanups conducted in accordance with RCRA Subtitle I, 40 CFR 280 and counterpart state laws can satisfy the requirements of CERCLA and the NCP. However, to ensure later acceptance of EPA of RCRA UST cleanups in lieu of or in satisfaction of CERCLA requirements, EPA should be consulted with initially and provided review and comment opportunities throughout the process.

5. Lastly, note that for purely petroleum contamination, both we and EPA would lack jurisdiction to address the contamination with our CERCLA authorities. The RCRA Subtitle I corrective action requirements for USTs would apply to release of petroleum products, whereas RCRA Subtitle C corrective action requirements would apply to releases of waste petroleum. From the correspondence you have attached from Charleston AFB, it appears possible the petroleum groundwater contamination could be commingled with solvents from a drum storage area on the same site. If so, CERCLA could apply. We have attached our recent opinion on the petroleum exclusion for your use (Atch 2).

6. As the owner of this site when release occurred, we are liable for environmental restoration activities at the site. While our Interservice Support Agreement apparently specifies

that DLA and the Navy will be responsible to conduct and fund required environmental cleanups, we (Charleston AFB) should remain engaged and informed.

*Marc W. Trest*

MARC W. TREST, Major, USAF  
Deputy Director of Civil Law  
Office of the Staff Judge Advocate

2 Atch  
1. Excerpts, 55 FR 30798  
2. HQ AMC/JA Opinion,  
25 Sep 92

cc: 21 AF/JA wo Atch  
437 AW/JA wo Atch

5090/0110  
Code 1841

14 DEC 1992

Mr. Marvin P. Murray, Director  
Division of Drinking Water Quality and Enforcement  
Bureau of Drinking Water Protection  
South Carolina Department of Health  
and Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMIEDIATION PROJECT, PERMIT NUMBER 15707, BERKELEY COUNTY**

Enclosed are the analytical results, daily inspection sheets and the North Charleston Sewer District (NCSD) permit information for the DFSP site for the month of September 1992.

If you have any questions, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

H. J. FRASER  
BY DIRECTION

Enclosures:

- (1) Analytical Results for DFSP
- (2) Daily Inspection Sheets for DFSP
- (3) NCSD Permit Information for DFSP

Copy to:

SCDHEC Trident EQC (Mr. Harvey Wilkins)  
DFSC-FQ (Mr. Wayne Barnum)  
Hanahan Public Library  
USGS (Mr. Don Vrobley) w/o encl

18 File  
18 Circ  
1841  
Daily

184  
1841x



# United States Department of the Interior

## GEOLOGICAL SURVEY

Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
10/28/92



Mr. Daryl Fontenot  
Code 18231  
Southern Division Naval Facilities  
Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina  
29411-0068

Dear Mr. Fontenot,

Enclosed are the daily inspection sheets, analytical results, ground-water elevation data, and NCSD permit information for the DFSP site located in Hanahan, S.C. for the month of September 1992.

If I can be of any further assistance in regards to this submittal, please do not hesitate to contact me (803-750-6129).

Sincerely,

Liesl C. Rhodes  
Hydrologist

Enclosure

DEFENSE LOGISTICS AGENCY  
DEFENSE FUEL SUPPLY CENTER  
CAMERON STATION  
ALEXANDRIA, VIRGINIA 22304-6160

*12/13/92*  
1841  
*Debye, for your  
Info & FILE!*  
*Darrell*



27 NOV 1992

IN REPLY  
REFER TO DFSC-FQ

North Charleston Sewer District  
Attn: Allen T. Ramsay  
Post Office Box 63009  
North Charleston, SC 29419

Dear Mr. Ramsay:

This letter is in response to the Report of Violation for Non Domestic Discharge Permit Program, Permit No. 049, for the Defense Fuel Support Point (DFSP) Charleston, Hanahan, SC. The notification was sent on November 2, 1992.

The Defense Fuel Supply Center (DFSC) obtained the services of the U.S. Geological Survey (USGS) to operate the bioremediation system to cleanup the groundwater and soil contamination under the Hanahan DFSP. The cleanup system became operational during this year and discharge of the groundwater to the North Charleston Sewer District was initiated. As a condition of the permit, the USGS provided the monitoring report data to the DFSP which was originally required to prepare the report for your office. This reporting requirement was never made clear to the DFSP, therefore, it was never done. We have taken steps to correct this situation.

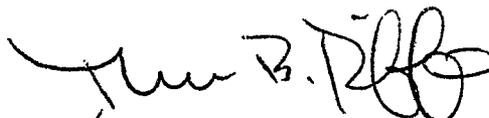
A meeting was held between Mr. Darrell Thornley, Southern Division NAVFAC and Mrs. Tammy Fryar of your office on Friday, November 13, 1992. During this meeting the file for the DFSP was reviewed and a copy of the report format with instructions were provided to be used in future reporting.

All available reports for previous months were delivered to Mrs. Fryar on Thursday, November 19, 1992 for her review.

Per our request (see enclosure), the USGS will directly provide you with all future required reports in the appropriate format and copies to the DFSP.

If you have any questions, contact Wayne Barnum at (703) 274-6579.

Sincerely,



*for* W. E. GOODE

Chief, Environmental Quality Division  
Directorate of Facilities Management

Encl

DEFENSE LOGISTICS AGENCY  
DEFENSE FUEL SUPPLY CENTER  
CAMERON STATION  
ALEXANDRIA, VIRGINIA 22304-6160

27 Nov 1992

IN REPLY  
REFER TO DFSC-FQ

U.S. Geological Survey  
Attn: Don Vroblesky  
Water Resources Division  
Stephen Center - Suite 129  
720 Gracern Rd.  
Columbia, SC 29210-7651

Dear Mr. Vroblesky:

As a condition to the permit to discharge groundwater to the North Charleston Sewer District (NCS), the Defense Fuel Support Point (DFSP) Charleston is required to provide monitoring reports to the NCS. You have provided the DFSP all data needed to prepare the reports, however, due to a misunderstanding the reports were never done.

Because of your direct knowledge as remediation project manager at the Hanahan DFSP, we request that your office prepare and provide the monitoring reports directly to NCS with a copy for the record files at the DFSP. Please provide the reports on a quarterly basis by month and in the format as indicated in the enclosure.

If you have any questions, contact Wayne Barnum at (703) 274-6579.

Sincerely,



W. E. GOODE

Chief, Environmental Quality Division  
Directorate of Facilities Management

Encl

NORTH CHARLESTON SEWER DISTRICT

NON-DOMESTIC WASTEWATER DISCHARGE PERMIT

Discharge Permit No. 049

In accordance with all terms and conditions of the Sewer Use Resolutions of the North Charleston Sewer District and also with any applicable provisions of Federal or State law or regulation:

Permission is hereby granted to Defense Fuel Supply Center  
North Rhett Avenue, Hanahan, South Carolina

Classified by SIC No. 5171

For the discharge of non-domestic wastewater into the District's sewer lines at Naval Weapons Station

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit is granted in accordance with the application filed on September 9, 1988, in the office of the North Charleston Sewer District.

Effective this 31st day of March, 1989

To expire the 31st day of March, 1993

Allen T. Ramsay  
Allen T. Ramsay, District Manager  
North Charleston Sewer District

3 April, 1989  
Date





COMMENTS:

Attach additional sheets if needed

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person/persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment from knowing violations." (40 CFR 403.6 (a) (2) (ii))

SIGNATURE \_\_\_\_\_

TITLE \_\_\_\_\_

DATE \_\_\_\_\_

## INSTRUCTIONS

1. **Company and Address:** Should be mailing address of facility owner.
2. **Permit No:** This can be found on your existing permit.
3. **Reporting Month/Yr:** The month and year samples were taken and analyzed should be used.  
  
Example: 11/91
4. **Reporting Quarter:** The quarter in which the reporting falls.  
Example: Jan., Feb., March - 1st Quarter  
April, May, June - 2nd Quarter  
July, Aug., Sept. - 3rd Quarter  
Oct., Nov., Dec. - 4th Quarter
5. **Sample Location:** Point at which sample is taken.  
Example: Final discharge at Manhole No. 2.
6. **Constituent:** Name of chemical parameter.  
Example: Copper, pH, lead, dichlorethane, etc...
7. **Flow, GPD:** Average daily wastewater discharge to sewer in gallons per day.  
Example: 0.51 MGD = 510,000 GPD or:  
  
 $500 \text{ CF/day} \times 7.48 \text{ Gals/CF} = 3740 \text{ GPD}$   
  
Flow should be determined for each discharge and recorded. The FLOW used to calculate POUNDS values shall be the daily flow on the day the sample was taken. These records should be sent along with the new form and lab analysis.
8. **MG/L, CONC MAX DAILY:** Highest single discharge concentration for any daily sample period.
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parameter indicated.

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Example: DAY 1- FLOW=60,000 GALS; COPPER = 0.351 MG/L  
 DAY 2- FLOW=59,200 GALS; COPPER = 0.423 MG/L

CALC, DAY 1: 60,000 GALS/1,000,000 GAL/MG X  
 0.351 MG/L X 8.34 = 0.176 LBS  
 DAY 2: 59,200 GALS/1,000,000 GAL/MG X  
 0.423 MG/L X 8.34 = 0.209 LBS

AVERAGE POUNDS = (0.176 + 0.209)/2 = 0.192 LBS

AVERAGE POUNDS VALUES SHOULD BE ROUNDED OFF TO TWO(2) DECIMAL PLACES. 0.19 LBS

- 12. **Type of Sampling:** Circle either GRAB OR COMPOSITE as required by your permit.
- 13. **Comments:** Use this section to note any comments such as violations or to reference additional pages.
- 14. **Signature -** Owner or designated Representative of facility must sign the certification statement on the last page of the submittal. Failure to sign the form will be considered a violation of the permit.
- 15. **Title -** Title of the person signing the document.
- 16. **Date of Signature.**
- 17. **Pages:** Insure that each page is numbered at the bottom including any additional pages for parameters or comments.

# North Charleston Sewer District

7225 STALL ROAD / PO BOX 63009

NORTH CHARLESTON, SC 29419

Telephone (803) 764-3072

## REPORT OF VIOLATION FOR NON DOMESTIC DISCHARGE PERMIT PROGRAM

Name and address of Violator: Defense Fuel Supply Point

P. O. Box 60039

N. Charleston, SC 29419-0039

Permit Number: 049

Contact: Donald Matthews

Reporting Quarter: 3/92

Date notification sent: 11/02/92

Please be advised that under the North Charleston Sewer District's guidelines for Pretreatment compliance, you have exceeded the limits set by your Pretreatment permit in the following areas:

Date(s) and type(s) of violation(s):

1. no report - 7/92, 8/92, 9/92

Please provide us within Ten (10) working days with an explanation of these deficiencies and the action you plan to take to correct this matter.

Response should be sent to:

NORTH CHARLESTON SEWER DISTRICT  
 PO Box 63009  
 North Charleston, SC 29419  
 ATTN: Allen T. Ramsay

If you have any questions concerning this violation notice, please contact the Pretreatment Department at (803) 727-7000.

C: Ray Peterson  
 Allen T. Ramsay  
 Pretreatment file

Herb:

12 Nov 92

Darrell Thornley is taking action  
- find out more info.

Please take Note! and follow  
up with him MONDAY when you  
return!

NOV Luis

# North Charleston Sewer District

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c: Ray Peterson  
 Allen T. Ramsay  
 Pretreatment file

Post-It™ brand fax transmittal memo 7671		# of pages ▶ 8	
To	WAYNE BARNUM	From	M. D. THORNLEY
Co.	DFSC	Co.	SOUTH NAUFAC
Dept.		Phone #	(803) 743-0606
Fax #	(703) 274-1644	Fax #	(803) 743-0465

24 November 1992

MEMORANDUM:

FROM: M. DARRELL THORNLEY, SOUTH DIV  
 TO: WAYNE BARNUM, DFSC-FQ

SUBJ: REPORT OF VIOLATION FOR NON DOMESTIC DISCHARGE PERMIT  
 PROGRAM FOR DFSP, HANAHAN, SC

1. Please find enclosed copy of sample letter to NCSO for your information and use in preparing the real letter.
2. Talked with you on this matter on 11/12/92 and took the following actions:
  - a. Met with Mrs. Tammy Fryar, Pre-Treatment Engineer, NCSO on 11/13/92 and told her that they had our attention and requested a time extension. She said that they wanted to make sure that we were taking appropriate action to satisfy the reporting requirements. She provided me with a copy of the permit, report form, its requirements and instructions (enclosed).
  - b. Talked with Don Matthews and Don Vroblesky on 11/16/92 to see if the reports were available so that they could be delivered to NCSO for their information. Matthews looked in his files and on 11/19/92 I delivered all available reports to Mrs. Fryar for her review. Vroblesky said that Liesl Rhodes of his office could, in the future, provide the required reports directly to NCSO with a copy to other parties.
  - c. I talked with Mrs. Fryar on 11/23/92 to see if she had had a chance to review reports which I delivered to her on the 19th. She said that she had not had a chance to review them but would look at them and I should call her back on 11/25/92 to discuss them.
  - d. I plan to talk with Mrs. Fryar on 11/24/92 to see if we need to provide additional data for the past reporting periods. I hope she will except the data as being sufficient.
3. Would suggest that you request USGS (in writing) to provide required reports in the format provided by NCSO on a quarterly basis by month. A copy of this letter should be attached to your letter to NCSO.
4. Don Matthews should retain a copy of the reports (past and future) in a file for review on site if and when NCSO comes to the site for an on-site visit.
5. If you need additional data please contact me at your earliest convenience.



M. Darrell Thornley, PE

24 November 1992

North Charleston Sewer District  
Post Office Box 63009  
North Charleston, SC 29419

ATTN: Mr. Allen T. Ramsay

RE: REPORT OF VIOLATION FOR NON DOMESTIC DISCHARGE PERMIT PROGRAM  
FOR DEFENSE FUEL SUPPLY POINT, HANAHAN, SC

Dear Mr. Ramsay:

A meeting was held between Mr. Darrell Thornley, Southern Division NAVFAC and Mrs. Tammy Fryar of your office on Friday 13 November 1992. During this meeting the file for the Defense Fuel Supply Point (DFSP) was reviewed and a copy of the report format with instructions were provided to be used in future reporting.

All available reports for previous months were delivered to Mrs. Fryar on Thursday 19 November 1992 for her review.

The enclosed letter to USGS request them to provide required reports in the appropriate format directly to your office with a copy to the DFSP, Hanahan, SC.

Should you have any questions or need additional information please contact

---

Sincerely,

NORTH CHARLESTON SEWER DISTRICT

NON-DOMESTIC WASTEWATER DISCHARGE PERMIT

Discharge Permit No. 049

In accordance with all terms and conditions of the Sewer Use Resolutions of the North Charleston Sewer District and also with any applicable provisions of Federal or State law or regulation:

Permission is hereby granted to Defense Fuel Supply Center  
North Rhett Avenue, Hanahan, South Carolina

Classified by SIC No. 5171

For the discharge of non-domestic wastewater into the District's sewer lines at Naval Weapons Station.

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit is granted in accordance with the application filed on September 9, 1988, in the office of the North Charleston Sewer District.

Effective this 31st day of March, 1989

To expire the 31st day of March, 1993

Allen T. Ramsay  
Allen T. Ramsay, District Manager  
North Charleston Sewer District

3 April, 1989  
Date





COMMENTS:

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Attach additional sheets if needed

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"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person/persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment from knowing violations."  
(40 CFR 403.6 (a) (2) (ii))

SIGNATURE \_\_\_\_\_

TITLE \_\_\_\_\_

DATE \_\_\_\_\_

## INSTRUCTIONS

1. Company and Address: Should be mailing address of facility owner.
2. Permit No: This can be found on your existing permit.
3. Reporting Month/Yr: The month and year samples were taken and analyzed should be used.

Example: 11/91

4. Reporting Quarter: The quarter in which the reporting falls.  
Example: Jan., Feb., March - 1st Quarter  
April, May, June - 2nd Quarter  
July, Aug., Sept. - 3rd Quarter  
Oct., Nov., Dec. - 4th Quarter

5. Sample Location: Point at which sample is taken.  
Example: Final discharge at Manhole No. 2.

6. Constituent: Name of chemical parameter.  
Example: Copper, pH, lead, dichlorethane, etc...

7. Flow, GPD: Average daily wastewater discharge to sewer in gallons per day.  
Example: 0.51 MGD = 510,000 GPD or:

$$500 \text{ CF/day} \times 7.48 \text{ Gals/CF} = 3740 \text{ GPD}$$

Flow should be determined for each discharge and recorded. The FLOW used to calculate POUNDS values shall be the daily flow on the day the sample was taken. These records should be sent along with the new form and lab analysis.

8. MG/L, CONC MAX DAILY: Highest single discharge concentration for any daily sample period.
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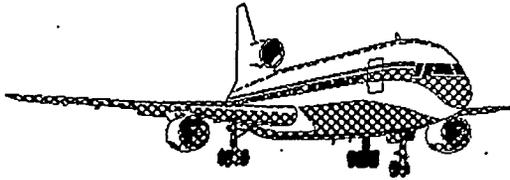
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AVERAGE POUNDS VALUES SHOULD BE ROUNDED OFF TO TWO(2) DECIMAL PLACES. 0.19 LBS

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## Trip Report MEMORANDUM

DATE: October 22, 1992

TO: Distribution

FROM: Jack Pittman

PROJECT: Hanahan Field CTO 010

SUBJECT: Site Investigations and  
Remediation

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**DESCRIPTION OF TRIP:** On October 20, 1992, Allen Stamp and I travelled from the ABB-ES Tallahassee Office to Southern Division, NAVFACENGCOM, in Charleston, SC.

**PURPOSE OF TRIP:** To attend a meeting to review and coordinate ongoing and planned investigation and remediation work at Hanahan Field. We arrived in also visited Hanahan Field and the surrounding area prior to the start of the meeting.

**MEETING PARTICIPANTS:** ABB-ES: Jack Pittman and Allen Stamp  
Southern Division: Daryle Fontenot  
DLA: Richard Kennedy and William Goode  
Hanahan Field: Don Matthews  
USGS: Don Vroblesky and Fred Robertson

(See also the attached attendance sheet.)

**DISCUSSIONS:** USGS representatives began the meeting discussions by summarizing the results of their Hanahan Field investigations and pilot bioremediation efforts. The bioremediation efforts in the vicinity of Tank 1 have been hampered by the appearance of free-product where none had been expected. USGS believes that this results from undegraded petroleum contamination still existing under discontinuous clay layers that underlie the site.

The presence of the clay layers significantly effects both the emergence and recharging of surficial groundwater at the site. This is

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**DISTRIBUTION:** B. Lawrence  
G. Belanger  
P. Redfern  
A. Stamp

K. Busen  
P. Wagner  
S. McDuffie/File

**INFO:** D. Fontenot  
w/o atch.

particularly evident in the behavior of the stream flowing on the southeastern edge of the site.

USGS has found ppm-levels of arsenic in the deep aquifer under the site. The source of the arsenic is not known. Some possibilities are: native soils, paints (the above-ground storage tanks are periodically sandblasted and repainted), or materials dumped on and near the site when it was used by the U.S. Army during World War II (The Gold Cup Springs area, now a private residential development, was constructed over a U.S. Army dump site. During construction of the houses, french drains were installed to convey water away from the housing area). One on-site groundwater sample was found to contain chromium; however, this finding has not been repeated in subsequent USGS analyses.

There was some discussion among all concerned about community relations. Despite a recent out of court settlement between the U.S. and Gold Cup Springs residents, the site continues to attract public and press attention.

Allen Stamp presented an overview of findings from the ABB-ES Phase I Investigation of the site and our concept of the Phase II Investigation. Allen expressed the similarities of ABB-ES' and USGS' views on the presence of clay layers beneath the site potentially trapping contamination. This hypothesis is driving the need for the installation of the drilled monitoring wells in the ABB-ES Phase II Investigation. ABB-ES will continue to coordinate and share information gained about the site with USGS.

There was also some discussions among all concerned about SCDHEC slowness in approving site work plans and monitoring well installations. The ABB-ES Phase II work plan is still waiting SCDHEC approval. Daryle Fontenot is continuing his efforts to secure State approval.

DLA representatives discussed USEPA's interest in Hanahan Field as a potential NPL site. As a first step, USEPA has requested DLA to complete a questionnaire concerning the locations of private wells, fisheries, wetlands, surface water bodies, etc. in 4-mile radius of the site. Southern Division will assist DLA in obtaining information to complete the USEPA questionnaire.

**ACTIONS REQUIRED:** Continue to coordinate and exchange site information with USGS.

Obtain SCDHEC approval of Phase II Investigation prior to initiating work.

Obtain Southern Division approval of the ABB-ES Estimate-to-Complete funding for the Phase II Investigation prior to initiating work.

Daryle -

I tried to get in touch with Wayne Barnum about DFSP Hanahan but he's on travel this week & won't be back until Monday. I'm gonna be in Whiting Field all week next week, so will you give him a call & explain to him that EPA is required to score the site due to a lawsuit & that it was on the original docket list  $\therefore$  it has to be scored under the lawsuit. Tell him that I can get ABB to gather the data gaps that EPA gave them if he still wants me to. DLA just needs to fund it. If there is any sampling required then EPA said DLA can submit them a schedule for when the sampling will be done & the data submitted to EPA. I can't get ABB to do any actual field work, such as sampling. EPA said that if they do sampling, they need to follow CERCLA standards & use a high DQO level for the analysis.

I'll be back the week of Oct. 13<sup>TH</sup>. If he has any more questions for me, he can call me that week.

Thanks!

Kim

PHONE MEMO

DATE CALL MADE: 29 SEP 92

DATE CALL RECEIVED: \_\_\_\_\_

TIME: 1033

TIME: \_\_\_\_\_

PHONE NO.: 803 734 5329

ACTIVITY/FIRM: SC DHEC

PERSON SPOKE WITH: DAVID BAIZE

SUBJECT: DFSP HANAHAN

REFERENCE: EPA PROPOSED HRS II SCORING OF SITE

SUMMARY: David said EPA had called him about scoring DFSP. He is not sure who he talked to at EPA. Said reason for EPA wanting to score the site was due to the disposal of tank bottom sludges at the site. Tank bottom sludges are a listed hazardous waste. David told EPA about the on going remediation and investigation at DFSP by NAVY and that all parties were cooperating with SC DHEC. He does not see what SC DHEC can do to stop EPA from scoring the site.

<sup>CERCLA</sup> Said our petroleum exclusion argument was not valid. May want to push that the majority of the contaminants are petroleum and that we are cooperating with SC DHEC.

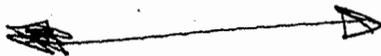
(TANK BOTTOM SLUDGE - LISTED HAZARDOUS WASTE.

Again stated not much he can see SC DHEC doing to prevent the EPA from scoring the site.

NAME: D. L. FONTENOT

CODE: 1841

(David Baize)



734-5329

DFSP  
25 Sep 92

Call back later today Kim Queen not in today.

Talk to Marn Munn David Baize about ARS  
Scoring + DFSP Meeting on 19-23 Oct 92

ep 92 1033 SCDHEC

David Baize DFSP

EPA → No way to stop them  
not much pull on what  
EPA can or can not  
rank.

[ Tank bottom sludges at site ] sludge disposal documental  
at site EPA road in  
are hazardous waste (Listed hazardous waste)

- Earl Boaseman - EPA not sure of EPA contact
- argument not to valid of CERCLA Petroleum exclusion
- Active work going on
- cooperative with SCDHEC
- vast majority of constituents are petroleum

DFSP HANAHAN PHONCON 17 Sep 92 1500

HRSTII

SUE DAVIS

BILL GOODE



Petroleum exclusion for CERCLA

Risk Assment vs HRSTII Propox to EPA

SCDHCC Involved in decision of doing HRSTII scoring

Talk to SCDHCC in response to EPA letter

Talk

Contact DHEC Monday 21 Sep 92  
Marvin Murray



DEFENSE FUEL SUPPLY CENTER  
CAMERON STATION  
ALEXANDRIA, VA 22304-6160

FACSIMILE TRANSMISSION COVER SHEET

DESC-FQ

FACSIMILE TELEPHONE NUMBER (703) 274-1644 OR DSN 284-1644

SECURE FAX PHONE (703) 274-3261 OR DSN 284-3261

TO: CODE 1841

FROM: DFSC-FQ W. BARNUM

ATTENTION: DARYLE FONTENOT

PHONE NUMBER: (703) 274-6579

DESCRIPTION OF DOCUMENTS: EPA LETTER - RE: HRS DATA GAPS FOR DFSP CHARLESTON

TOTAL NUMBER OF PAGES, INCLUDING COVER SHEET: 4

MESSAGE:

Daryle:

Here is a copy of the EPA letter of request for further information not address in the Preliminary Assessment. These are common questions we have been asked at all our facilities.

Thanks for your help:

Wayne Barnum  
DFSC-FQ

Post-It™ brand fax transmittal

To SUE DAVIS  
Co. CHARLESTON AFB  
Dept. ENVIRONMENTAL  
Fax # 566-4993

WILL TRY TO SET UP  
CONFERENCE CALL ON  
THURSDAY OR FRIDAY  
September 17 or 18, 1992.  
If any questions, give  
me a call at 743-0607  
Dan



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

## REGION IV

345 COURTLAND STREET, N.E.  
ATLANTA, GEORGIA 30365

AUG 05 1992

Certified Mail  
Return Receipt Required

4WD-PFB

W. E. Goode, Chief  
Environmental Quality Division  
Defense Logistics Agency  
Defense Fuel Supply Center  
Cameron Station  
Alexandria, VA 22304-6160

Dear Mr. Goode:

The Environmental Protection Agency (EPA) has evaluated the information submitted by your office on November 14, 1991, and other pertinent reports to score the Defense Fuel Support Point - Charleston (DFSP-Charleston) on the Hazard Ranking System (HRS). The EPA appreciates the efforts that DFSP-Charleston has made to comply with our request. However, during the HRS process, significant data gaps have been identified. Without this data, EPA cannot complete an accurate HRS score. Therefore, EPA is requesting that you provide the information needed. Please answer the enclosed questions as fully and accurately as possible. EPA realizes that some of the information will not be available and/or will require further sampling fieldwork. For information in this category, note that it is not available and provide a schedule as to when this information will be submitted.

It is the EPA's understanding that a groundwater remediation project approved by the South Carolina Department of Health and Environmental Control (SCDHEC) is currently underway at DFSP-Charleston. The EPA encourages DFSP-Charleston to continue with this effort, however, it does not affect the HRS scoring process at this point.

DFSP-Charleston must submit answers to these questions within sixty (60) days of receipt of this letter. If you have questions about the information being requested or the HRS process, please contact Ms. Caron Falconer or Mr. Robert H. Pope of this office at (404) 347-3016.

Sincerely yours,

*Jon D. Johnston*

Jon D. Johnston, Chief  
Federal Facilities Branch  
Office of RCRA and Federal Facilities  
Waste Management Division

Enclosure

cc: Mr. Hartsill Truesdale, Chief  
Bureau of Solid and Hazardous Waste  
Management  
South Carolina Department of Health  
and Environmental Control

EPA QUESTIONS ABOUT DFSP-CHARLESTON

1. What is the location and use of all wells within a 4 mile radius of the facility?
2. Has any local fishery been closed? (A fishery is defined as any surface water body where people catch and consume fish.)
3. Are there wetlands areas around the facility, specifically adjacent to Goose Creek? If so, how far are they from the facility and how much area do they encompass?
4. What are the flow rates for the various surface water bodies around the facility?
5. What is the operational history of DFSP-Charleston (i.e., years of operation, exact list of fuels stored there and when, tank cleaning practices historically, etc.)?
6. How many workers are there on the facility?
7. What has been the quantity and frequency of tank water bottom discharges from the facility?
8. What is the exact location and extent of contamination due to tank bottom sludges which were reportedly dumped on site?
9. Have any soil samples been taken to confirm the presence or absence of lead contamination at the facility? If so, what were the analytical results, including quality control/assurance procedures?
10. Have any sediment/surface water samples been taken from any of the surface water pathways (i.e., facility drainage ditches, Gold Cup Stream, Gold Cup Lake, etc.)? If so, what were the results?
11. What is the number and location of slop waste tanks associated with the loading areas at DFSP-Charleston?
12. Is the Fuel System Ice Inhibitor (FSII) used at DFSP-Charleston added to the fuel at the facility, or is it added at the refinery? In addition, is FSII considered a normal jet fuel additive or is it used solely at DFSP-Charleston?

Discuss w/  
Daryl Fontaine  
12-2-82

EPA QUESTIONS ABOUT DFSP-CHARLESTON

maintain  
to do

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ASB Study

to the lead



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

## REGION IV

345 COURTLAND STREET, N.E.  
ATLANTA, GEORGIA 30365

AUG 05 1992

Certified Mail  
Return Receipt Required

4WD-FFB

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Jon D. Johnston, Chief  
Federal Facilities Branch  
Office of RCRA and Federal Facilities  
Waste Management Division

Enclosure

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Bureau of Solid and Hazardous Waste  
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Discuss w/  
Daryl Fontana  
12-2-82

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11. What is the number and location of slop waste tanks associated with the loading areas at DFSP-Charleston?
12. Is the Fuel System Ice Inhibitor (FSII) used at DFSP-Charleston added to the fuel at the facility, or is it added at the refinery? In addition, is FSII considered a normal jet fuel additive or is it used solely at DFSP-Charleston?

ASB  
Study



Meeting  
20 OCT 92

B-1

DLA opening remarks

MSGS - Review what they are doing - remediation systems

Tank 1 - Leak

Tank 3 - Source problem

Goal of Bio - add nitrate to system to improve bio system pilot system in front of Tank 3

Tank 1 system Bio not adequate due to clay layer in area  
contamination under clay layer  
turn wells on product collecting in wells. <sup>extraction</sup>  
Need to recover free product

Tank 2 nitrates into IG at Tank 2  
Deep well was down.

Surface water going into GW

Stream - Contaminated GW leach DFSP into stream and enter GW downstream

GW from stream moving across the site

\* Possible 3 plume from SW going into GW and moving off site  
sediments of stream are contaminated in neighborhood.  
Soil Gas Survey possible action - clean up stream bed.

Tank 3 - contamination on one side low in GW and high in GW  
source of leak - Leaky berm drain tank bottoms  
overflowing oil sep into stream deep contamination  
alot of lead in GW around Tank 3

URS inc in deep water sample at Tank 3 above drinking water standards. (25')

IG 2 ready to go after deep well ready

IG 3 ready to go 2 week after deep well ready

G 1 after pump install + free product removed

Meeting  
20 Oct 92

ABB-ES work -

Train load out area, sgs hot spots + truck loadout stand. investigative area.

Took soil/sediment samples FID

5w samples on GC BTX

Contaminant at Truck stand some offsite

Rail Loadout facility oil separator

contaminator in tank area down to tank area to creek

Need drill rig to handle perch flz + clay layers.

ISSB with

OLD 7/11 in site of investigation and existing fuel facility. possible source of contamination.

Possible offsite contamination from the south.

\*all Rob Devlin) \* ask to proceed v-r badly.

Change the depth of the deep wells to into the Cooper Marler.

Possible continuous split spoon sampling at chosen well to establish a geological cross section of site.

EPA QUESTIONS →

Kim Gwen HRSII Scoring yes

Contact Richard Kennedy

AGENDA FOR THE MEETING ON DFSP

DATE: 20 OCTOBER 1992  
TIME: 1100  
PLACE: SOUTH DIV, CONFERENCE ROOM B1

1. INTRODUCTION OF PEOPLE PRESENT.
2. PURPOSE OF THE MEETING. *To inform DLA on the progress of USGS and ABB's work.  
To possibly share information that will help with the investigation  
& cleanup of DFSP.*
3. REMARKS BY DLA.
4. DISCUSSION OF THE WORK BEING DONE AT DFSP BY THE USGS.
5. DISCUSSION OF THE WORK BEING DONE AT DFSP BY ABB-ES.
6. DISCUSSION OF THE DIRECTION OF THE INVESTIGATION AND THE REMEDIATION  
AT DFSP AND THE POSSIBLE INTERACTION OF ABB-ES AND THE USGS.  
(QUESTIONS AND ANSWERS)
7. WRAP UP OF MEETING
  - STATE IMPORTANT COMMENTS
  - CONFIRM DECISIONS MADE
  - STATE WHO IS RESPONSIBLE FOR ADDITIONAL ACTIONS, IF ANY
  - SCHEDULE OF NEXT MEETING, IF REQUIRED
8. END MEETING



U.S. DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION  
SOUTH CAROLINA DISTRICT  
Stephenson Center - Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651



DATE: 10/14/92

8 Pages, including cover page, transmitted to:

PERSON: Daryl Fontenot

COMPANY: South Div

FAX NUMBER: 803 733 0563

FROM THE DESK OF:

Don Vroblesky

FAX: (803) 750-6181

PHONE: (803) 750-6115

ADDITIONAL COMMENTS: Arsenic data from  
Hanahan DFSP

# CHAIN OF CUSTODY RECORD

General Engineering Laboratories  
2040 Savage Road  
Charleston, South Carolina 29414  
PO Box 30712  
Charleston, South Carolina 29417  
803-556-8171

Page 1 of 1

pollutant

Client Name / Facility Name <b>DFSP Hanahan</b>			SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods															Use F or P in the boxes to indicate whether sample was filtered and/or preserved		
Collected By / Company <b>USGS Vroblesky</b>			# of containers	pH, conductivity	TOC / DOC	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required	METALS - specify	Pesticide	Total Phenol	Acid Extractables	B/N Extractables	PCBs	Cyanide	Coliform - specify type	Metals Prior	Naphthalene	Remarks	
SAMPLE ID	DATE	TIME																		WELL
209 298 -01	MWGS31A	9/15/92	1250	X																
-02	MWGS31B		1300	X																
-03	MWGS31A		1040	X																
-04	MWGS31B		1045	X																
-05	MWGS40A		1530	X																
-06	MWGS40B		1515	X																
-07	MWGS40B		1515	X																
-08	MWGS100B		1120	X																

QA 3984.1

Relinquished by: <i>[Signature]</i>	Date: 9/15/92	Time: 1728	Received by:	Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by lab by: <i>[Signature]</i>	Date:	Time: 9/22/92	Remarks:	

White • sample collector    Yellow • file    Pink • with report



# GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly F. Greene  
President

George C. Greene, P.E., Ph.D.  
Vice President  
SC Registration No. 9103

Laboratory Certifications:	
FL	E87156/87294
NC	233
SC	10120
VA	00151
TN	02934
WI	99988779

## CERTIFICATE OF ANALYSIS

Client: USGS, Stephensen Center  
720 Graceorn Road  
Columbia, South Carolina 29210  
Contact: Mr. Don Vroblesky

Date: 10/06/92

Released by:

  
QA/QC Officer

cc: USGS00191

Project Manager: Pete Ballou

Page No.: 1

Sample ID	: MWGS 31B
Lab ID	: 9209298-02
Matrix	: GroundH2O
Date Collected	: 09/15/92
Date Received	: 09/16/92
Priority	: Routine
Collector	: Client

### Volatile Organics

#### BTEX

Benzene	198 ppb
Ethylbenzene	58.7 ppb
Toluene	1960 ppb
Xylenes (TOTAL)	268 ppb

### Extractable Organics

Naphthalene	114 ppb
-------------	---------

### Metals Analysis

Silver	< 0.0300 ppm
Arsenic	522 ppb
Beryllium	< 0.0100 ppm
Cadmium	< 0.0100 ppm
Chromium	< 0.0300 ppm
Copper	< 0.0300 ppm
Mercury	< 0.500 ppb
Nickel	< 0.0300 ppm
Lead	< 5.00 ppb
Antimony	8.33 ppb
Selenium	< 5.00 ppb
Thallium	< 5.00 ppb
Zinc	< 0.0300 ppm

### The following preparation procedures were performed:

Acid Digestion Prep for Metals  
Ext. & Conc. - E/N Compounds



# GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly F. Greene  
President

W. C. Greene, P.E., Ph.D.  
Vice President  
SC Registration No. 9103

Laboratory Certifications:	
FL	E87156/87294
NC	233
SC	10120
VA	00151
TN	02934
WI	99988779

## CERTIFICATE OF ANALYSIS

Client: USGS, Stephenson Center  
720 Gracern Road  
Columbia, South Carolina 29210  
Contact: Mr. Don Vroblecky

Date: 10/02/92

Released by: *[Signature]*

QA/QC Officer

cc: USGS00191

Project Manager: Pete Ballou

Page No.: 1

Sample ID	: MWGS 34A
Lab ID	: 9209298-03
Matrix	: GroundH2O
Date Collected	: 09/15/92
Date Received	: 09/16/92
Priority	: Routine
Collector	: Client

### Volatile Organics

#### BTEX

Benzene	4.68 ppb
Ethylbenzene	4.80 ppb
Toluene	37.2 ppb
Xylenes (TOTAL)	11.9 ppb

### Extractable Organics

Naphthalene < 10.0 ppb

### Metals Analysis

Silver	< 0.0300 ppm
Arsenic	< 5.00 ppb
Beryllium	< 0.0100 ppm
Cadmium	< 0.0100 ppm
Chromium	< 0.0300 ppm
Copper	< 0.0300 ppm
Mercury	< 0.500 ppb
Nickel	< 0.0300 ppm
Lead	< 5.00 ppb
Antimony	< 5.00 ppb
Selenium	< 5.00 ppb
Thallium	< 5.00 ppb
Zinc	< 0.0300 ppm

### The following preparation procedures were performed:

Acid Digestion Prep for Metals  
Ext. & Conc. - B/N Compounds



# GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly F. Greene  
President

C. Greene, P.E., Ph.D.  
President  
SC Registration No. 9103

Laboratory Certifications:  
FL E87156/87294  
NC 233  
SC 10120  
VA 00151  
TN 02934  
WI 99988779

## CERTIFICATE OF ANALYSIS

Client: USGS, Stephenson Center  
720 Gracern Road  
Columbia, South Carolina 29210

Date: 10/06/92

Contact: Mr. Don Vroblecky

Released by:

  
QA/QC Officer

cc: USGS00191

Project Manager: Pate Ballou

Page No.: 1

Sample ID	:	MWGS 34B
Lab ID	:	9209298-04
Matrix	:	GroundH2O
Date Collected	:	09/15/92
Date Received	:	09/16/92
Priority	:	Routine
Collector	:	Client

### Volatile Organics

#### BTEX

Benzene	231 ppb
Ethylbenzene	58.6 ppb
Toluene	1690 ppb
Xylenes (TOTAL)	270 ppb

### Extractable Organics

Naphthalene	79.9 ppb
-------------	----------

### Metals Analysis

Silver	< 0.0300 ppm
Arsenic	217 ppb
Beryllium	< 0.0100 ppm
Cadmium	< 0.0100 ppm
Chromium	< 0.0300 ppm
Copper	< 0.0300 ppm
Mercury	< 0.500 ppb
Nickel	< 0.0300 ppm
Lead	< 5.00 ppb
Antimony	5.46 ppb
Selenium	< 5.00 ppb
Thallium	< 5.00 ppb
Zinc	< 0.0300 ppm

### The following preparation procedures were performed:

Acid Digestion Prep for Metals  
Ext. & Cong. - B/N Compounds



# GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly F. Greene  
President

C. Greene, P.E., Ph.D.  
Vice President  
SC Registration No. 9103

Laboratory Certifications:	
FL	E87156/87294
NC	233
SC	10120
VA	00151
TN	02934
WI	99988779

## CERTIFICATE OF ANALYSIS

Client: USGS, Stephensen Center  
720 Gracern Road  
Columbia, South Carolina 29210  
Contact: Mr. Don Vroblesky

Date: 10/02/92

Released by:   
QA/QC Officer

cc: USGS00191

Project Manager: Pete Ballou

Page No.: 1

Sample ID	: MWGS 40A
Lab ID	: 9209298-05
Matrix	: GroundH2O
Date Collected	: 09/15/92
Date Received	: 09/16/92
Priority	: Routine
Collector	: Client

### Volatile Organics

#### BTEX

Benzene	4.31 ppb
Ethylbenzene	4.07 ppb
Toluene	53.5 ppb
Xylenes (TOTAL)	10.8 ppb

### Extractable Organics

Naphthalene 11.0 ppb

### Metals Analysis

Silver	< 0.0300 ppm
Arsenic	< 5.00 ppb
Beryllium	< 0.0100 ppm
Cadmium	< 0.0100 ppm
Chromium	< 0.0300 ppm
Copper	< 0.0300 ppm
Mercury	< 0.500 ppb
Nickel	< 0.0300 ppm
Lead	< 5.00 ppb
Antimony	< 5.00 ppb
Selenium	< 5.00 ppb
Thallium	< 5.00 ppb
Zinc	< 0.0300 ppm

### The following preparation procedures were performed:

Acid Digestion Prep for Metals  
Ext. & Conc. - B/N Compounds



# GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly P. Greene  
President

C. Greene, P.E., Ph.D.  
President  
SC Registration No. 9103

Laboratory Certifications:	
FL	887136/87294
NC	233
SC	10120
VA	00151
TN	02934
WI	99988779

## CERTIFICATE OF ANALYSIS

Client: USGS, Stephansen Center  
720 Graceann Road  
Columbia, South Carolina 29210

Date: 10/07/92

Contact: Mr. Don Vroblecky

Released by: 

QA/QC OFFICE

cc: USGS00191

Project Manager: Pete Ballou

Page No.: 1

Sample ID	: MWGS 40B
Lab ID	: 9209298-06
Matrix	: GroundH2O
Date Collected	: 09/15/92
Date Received	: 09/16/92
Priority	: Routine
Collector	: Client

### Volatile Organics

#### BTEX

Benzene	223 ppb
Ethylbenzene	55.4 ppb
Toluene	1310 ppb
Xylenes (TOTAL)	255 ppb

### Extractable Organics

Naphthalene 72.0 ppb

### Metals Analysis

Silver	< 0.0300 ppm
Arsenic	87.4 ppb
Beryllium	< 0.0100 ppm
Cadmium	< 0.0100 ppm
Chromium	< 0.0300 ppm
Copper	< 0.0300 ppm
Mercury	< 0.500 ppb
Nickel	< 0.0300 ppm
Lead	< 5.00 ppb
Antimony	< 5.00 ppb
Selenium	< 5.00 ppb
Thallium	< 5.00 ppb
Zinc	< 0.0300 ppm

The following preparation procedures were performed:

Acid Digestion Prep for Metals  
Ext. & Conc. - B/N Compounds



# GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly F. Greene  
President

C. Greene, P.E., Ph.D.  
President  
SC Registration No. 9103

Laboratory Certifications:	
FL	887156/87294
NC	233
SC	10120
VA	00151
TN	02934
WI	99988779

## CERTIFICATE OF ANALYSIS

Client: USGS, Stephensen Center  
720 Gracern Road  
Columbia, South Carolina 29210  
Contact: Mr. Don Vroblecky

Date: 10/02/92

Released by: 

QA/QC Officer

cc: USGS00191

Project Manager: Pete Ballou

Page No.: 1

Sample ID	: MWGS 40BR
Lab ID	: 9209298-07
Matrix	: GroundH2O
Date Collected	: 09/15/92
Date Received	: 09/16/92
Priority	: Routine
Collector	: Client

### Volatile Organics

#### BTEX

Benzene	251 ppb
Ethylbenzene	56.6 ppb
Toluene	1760 ppb
Xylenes (TOTAL)	255 ppb

### Extractable Organics

Naphthalene	78.0 ppb
-------------	----------

### Metals Analysis

Silver	< 0.0300 ppm
Arsenic	87.2 ppb
Beryllium	< 0.0100 ppm
Cadmium	< 0.0100 ppm
Chromium	< 0.0300 ppm
Copper	< 0.0300 ppm
Mercury	< 0.500 ppb
Nickel	< 0.0300 ppm
Lead	< 5.00 ppb
Antimony	< 5.00 ppb
Selenium	< 5.00 ppb
Thallium	< 5.00 ppb
Zinc	< 0.0300 ppm

The following preparation procedures were performed:

Acid Digestion Prep for Metals  
Ext. & Conc. - B/N Compounds



# GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly F. Greene  
President

C. Greene, P.E., Ph.D.  
President  
SC Registration No. 9103

Laboratory Certifications:	
FL	E87156/87294
NC	233
SC	10120
VA	00151
TN	02934
WI	99988779

## CERTIFICATE OF ANALYSIS

Client: USGS, Stephensen Center  
720 Gracern Road  
Columbia, South Carolina 29210  
Contact: Mr. Don Vroblasky

Date: 10/02/92

Released by:

*[Signature]*  
QA/QC Officer

cc: USGS00191

Project Manager: Pete Ballou

Page No.: 1

Sample ID	:	MGGS100B
Lab ID	:	9209298-08
Matrix	:	GroundH2O
Date Collected	:	09/15/92
Date Received	:	09/16/92
Priority	:	Routine
Collector	:	Client

### Extractable Organics

Naphthalene

< 10.0 ppb

The following preparation procedures were performed:

Ext. & Conc. - B/N Compounds



# GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly F. Greene  
President

W. C. Greene, P.E., Ph.D.  
President  
SC Registration No. 9103

Laboratory Certifications:	
FL	BB7156/87294
NC	233
SC	10120
VA	00151
TN	02934
WI	99988779

## CERTIFICATE OF ANALYSIS

Client: USGS, Stephansen Center  
720 Gracern Road  
Columbia, South Carolina 29210  
Contact: Mr. Don Vroblesky

Date: 10/02/92

Released by:

*[Signature]*  
QA/QC Officer

cc: USGS00191

Project Manager: Pete Ballou

Page No.: 1

Sample ID	: MNGS 5
Lab ID	: 920929t
Matrix	: GroundH <sub>2</sub> O
Date Collected	: 09/15/92
Date Received	: 09/16/92
Priority	: Routine
Collector	: Client

### Volatile Organics

#### BTEX

Benzene	3.88 ppb
Ethylbenzene	3.63 ppb
Toluene	58.8 ppb
Xylenes (TOTAL)	13.4 ppb

### Extractable Organics

Naphthalene < 10.0 ppb

### Metals Analysis

Silver	< 0.0300 ppm
Arsenic	< 5.00 ppb
Beryllium	< 0.0100 ppm
Cadmium	< 0.0100 ppm
Chromium	< 0.0300 ppm
Copper	< 0.0300 ppm
Mercury	< 0.500 ppb
Nickel	< 0.0300 ppm
Lead	< 5.00 ppb
Antimony	< 5.00 ppb
Selenium	< 5.00 ppb
Thallium	< 5.00 ppb
Zinc	< 0.0300 ppm

The following preparation procedures were performed:

Acid Digestion Prep for Metals  
Ext. & Conc. - B/N Compounds

RECEIVED  
USGS-WRD  
OCT 09 1992  
Columbia, S. C.

5090/0110  
Code 1841  
14 OCT 1992

Mr. Marvin P. Murray, Director  
Division of Drinking Water Quality and Enforcement  
Bureau of Drinking Water Protection  
South Carolina Department of Health  
and Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDATION PROJECT, PERMIT NUMBER 15707, BERKELEY COUNTY**

Enclosed is a copy of the United States Geological Survey (USGS) Quarterly Report on the DFSP Charleston Remediation Project. This report outlines the activities of the USGS at DFSP for the last three month (July, August & September 1992). Also enclosed are the analytical results, daily inspection sheets and the North Charleston Sewer District (NCSD) permit information for the DFSP site for the months of June, July and August 1992.

From the minutes of the last meeting held in Charleston, a meeting is to be scheduled to discuss the DFSP project after receipt of a quarterly report. If a meeting is desired by DHEC, please advise us of a time and location that a meeting can be held to discuss the latest quarterly report for the DFSP site.

If you have any questions, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

Enclosures:

- (1) USGS Quarterly Report
- (2) Analytical Results for DFSP
- (3) Daily Inspection Sheets for DFSP
- (4) NCSD Permit Information for DFSP

**H. FRASER, P.E.**  
Head, Petroleum Branch

Copy to:

SCDHEC Trident EQC (Mr. Harvey Wilkins)  
DFSC-FQ (Mr. Wayne Barnum)  
Hanahan Public Library  
USGS (Mr. Don Vroblesky) w/o encl

18 File  
18 Circ  
1841  
Daily

184  
1841x

# PROJECT STATUS REVIEW SHEET, QUARTERLY REPORT

Project Number: SC078

Date: September 1992

Project Name: Remediation of JP-4 contamination using hydraulic containment and in-situ biodegradation at the Defense Fuel Supply Point, Charleston, South Carolina

Project Chief: Don A. Vroblesky Section Chief: Marie Davenport

Report Period: July-Sept 1992 Cooperator: U.S. Dept. of the Navy

Project Completion Date: 1993

## PROJECT OBJECTIVES:

1. Construct and calibrate a digital ground-water flow model of the DFSP site that can be used as a tool in designing the containment-biodegradation system.
2. Monitor the operation of the containment-biodegradation system after start-up to document the hydraulic containment achieved by the system and to assess the efficiency of the system to degrade the contamination. As part of the effort to estimate the length of time required for aquifer remediation, an estimate of the amount of JP-4 sorbed onto aquifer materials will be made prior to startup.
3. Use the results of the monitoring program together with the estimate of JP-4 contained in the aquifer to construct a digital model designed to estimate the time required to decontaminate the aquifer below a given threshold.

## PROGRESS DURING PREVIOUS QUARTER

1. Collected soil-gas samples from stream-bed sediments to determine areas of contaminated ground-water discharge to surface water. Samples were analyzed in house.
2. Developed new wells installed north of tank 3 (wells MWGS-40A, -40B, -41A, -41B).
3. Collected quarterly samples from ground water and surface water during 7/7/92 to 7/16/92.

2. Laboratory experiments have shown that the presence of organic acids in the ground water at DFSP is probably more closely related to the terminal electron accepting process rather than to the presence of lead.

3. Surveying in the stage levels of surrounding streams showed that in some areas east of the facility, contaminated ground water discharges to the stream, however, north of the facility, water in that same stream moves from the stream downward and recharges ground water. Thus, the possibility exists that contaminated ground water from the facility could discharge to the stream, be rapidly carried downstream, and reenter the ground water at an offsite location.

## **PLANS FOR NEXT QUARTER**

1. Reinitiate water delivery and initiate nutrient delivery to infiltration gallery 2.

2. Modernize the free-product recovery system and resume product removal.

3. Collect quarterly samples from ground water and surface water during the first two weeks in November.

4. Continue synoptic water-level measurements at all wells, including the Naval Weapons Station. Continue collection of continuous (15-minute interval) water-level data at wells W-103 and W-108).

5. Continue operation of extraction wells near tanks 1 and 2 and in the Gold Cup Springs subdivision.

6. Continue evaluation and modification of bioremediation system north of tank 1.

7. Continue development of ground-water flow model.

## **STATUS OF REPORTS**

The administrative report on the soil-gas investigation at the site (by Robertson, Aelion, and Vroblesky) is back from Regional review and the recommended changes are being addressed.

4. Found free product in four wells and the free-product-recovery well. Attempted to pump the free-product-recovery well to remove the hydrocarbons, but the removal system is inadequate to remove sufficient amounts of product. The system needs modernization. We have requested modifications.
5. Collected monthly samples from operating extraction wells.
6. Turned off extraction wells EW-3 and EW-4. The reason is that there is a serious Fe-precipitation problem in well EW-4 because the well is at the interface of anoxic, Fe-rich water and oxic water. The mixing produced Fe-precipitates that can quickly clog the system. Well EW-3 contains oxygenated, relatively uncontaminated water. Although there is little Fe in the well EW-3 water, pumping that water into the extraction system where it mixes with Fe-rich, anaerobic water could result in massive Fe precipitation in the discharge plumbing. The only disadvantage of not operating EW-3 is that we are removing its dilution of the rest of the water being treated.
7. Switched daily site-operator contract from Trident to Northcutt Corp. as a result of contracting-renewal bid submittals.
8. Measured water levels monthly.
9. Completed first draft of journal article "Microbial buffering of pH in petroleum-contaminated ground water," by Vroblesky McMahon, Chapelle, and Bradley.
10. Completed first draft of journal article "Influence of Pb concentration and terminal electron acceptor on production of CO<sub>2</sub> and organic acids in petroleum-contaminated sediments," by Bradley, Chapelle, and Vroblesky.
11. Surveyed stage levels and channel bottoms at several points along streams in the vicinity of the facility.

## **SIGNIFICANT FINDINGS**

1. As suspected, once the extraction wells began pumping, petroleum free product began moving from beneath clay layers to the extraction wells, particularly well EW-7. Product was found in wells MWGS-29A (1.14 ft), MWGS-30A (0.63 ft), MWGS-27B (0.8 ft), MWGS-27A (sheen), and the 36-inch recovery well.



# United States Department of the Interior



## GEOLOGICAL SURVEY

Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
9/21/92

Mr. Daryl Fontenot  
Code 18231  
Southern Division Naval Facilities  
Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina  
29411-0068

Dear Mr. Fontenot,

Enclosed are the daily inspection sheets, analytical results, ground-water elevation data, and NCSD permit information for the DFSP site located in Hanahan, S.C. for the month of August 1992.

If I can be of any further assistance in regards to this submittal, please do not hesitate to contact me (803-750-6129).

Sincerely,

*Liesl C. Rhodes*

Liesl C. Rhodes  
Hydrologist

Enclosure



# United States Department of the Interior

## GEOLOGICAL SURVEY



Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
9/09/92

Mr. Daryl Fontenot  
Code 18231  
Southern Division Naval Facilities  
Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina  
29411-0068

Dear Mr. Fontenot,

Enclosed are the daily inspection sheets, analytical results, ground-water elevation data, and NCSD permit information for the DFSP site located in Hanahan, S.C. for the months of June and July 1992. Please note that the negative sign (-) in the analytical data sheets represents the "less than" (<) sign.

If I can be of any further assistance in regards to this submittal, please do not hesitate to contact me (803-750-6129).

Sincerely,

*Liesl C. Rhodes*

Liesl C. Rhodes  
Hydrologist

Enclosure

5090/0110  
Code 1841

12 AUG 1992

Mr. Marvin P. Murray, Director  
Division of Drinking Water Quality and Enforcement  
Bureau of Drinking Water Protection  
South Carolina Department of Health  
and Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMIEDIATION PROJECT, PERMIT NUMBER 15707, BERKELEY COUNTY -  
QUARTERLY REPORT**

Dear Mr. Murray:

Enclosed is a copy of the United States Geological Survey (USGS) Quarterly Report on the DFSP Charleston Remediation Project. This report outlines the activities of the USGS at DFSP for the last three months (April, May & June).

From the minutes of the 20 May <sup>1992</sup> ~~1992~~ meeting held in Charleston, another meeting is to be schedule to discuss the DFSP project after receipt of the subject quarterly report. Please advise us of a time and a location that the meeting can be held. Our current work schedule would allow for a meeting in the first or second week of September.

If you have any questions, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

H. FRASER, P.E.  
Head, Petroleum Branch

Enclosures:

(1) USGS Quarterly Report for DFSP

Copy to:

SCDHEC - Trident EQC (Mr. Harvey Wilkins)  
DFSC-FQ (Mr. Wayne Barnum)  
DFSP (Mr. Don Matthews)  
USGS w/o enclosure (Mr. Don Vroblecky)  
Hanahan Public Library

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# PROJECT STATUS REVIEW SHEET, QUARTERLY REPORT

Project Number: SC078

Date: June 1992

Project Name: Remediation of JP-4 contamination using hydraulic containment and in-situ biodegradation at the Defense Fuel Supply Point, Charleston, South Carolina

Project Chief: Don A. Vroblesky Section Chief: Marie Davenport

Report Period: April-June 1992 Cooperator: U.S. Dept. of the Navy

Project Completion Date: 1993

## PROJECT OBJECTIVES:

1. Construct and calibrate a digital ground-water flow model of the DFSP site that can be used as a tool in designing the containment-biodegradation system.
2. Monitor the operation of the containment-biodegradation system after start-up to document the hydraulic containment achieved by the system and to assess the efficiency of the system to degrade the contamination. As part of the effort to estimate the length of time required for aquifer remediation, an estimate of the amount of JP-4 sorbed onto aquifer materials will be made prior to startup.
3. Use the results of the monitoring program together with the estimate of JP-4 contained in the aquifer to construct a digital solute-transport model designed to estimate the time required to decontaminate the aquifer below a given threshold.

## PROGRESS DURING PREVIOUS QUARTER:

1. Developed new wells near tank 1 installed to locate free product. No product was found in these wells. Either no product is present in that area or the wells missed it. To resolve the uncertainty about the presence of free product and to initiate ground-water remediation, the extraction wells near tank 1 were started (see next item).
2. Started operation of extraction wells EW-1, EW-2, EW-3, EW-4, EW-5, EW-6, EW-7, and EW-8 on 5/15/92. In addition to these wells,

extraction wells EW-9, EW-10, EW-11, and EW-18 are also in operation. Wells EW-4, EW-9, and EW-18 were not operational for a short time during the end of June, but have since been repaired and are back on line.

3. At a meeting (5/20/92) with DFSP, DLA, SouthDiv, DHEC, and USGS, a decision was made to direct water to infiltration galleries 1 and 2. Soon thereafter, nitrate will be introduced into gallery 2. Gallery 1 will be turned off when we begin extracting free product. Gallery 1 will be turned off as well when the below-the-clay injections of nutrients is ready to begin.

4. The pressure tank for the infiltration-gallery-supply well was installed and water was directed to infiltration galleries 1 and 2 (north of tanks 1 and 2, respectively) on 6/12/92. The deadline for this action was 7/15/92. On 6/23/92, however, the supply well for the infiltration galleries malfunctioned and was shut down for repairs. It was not operational at the end of the quarter.

5. On June 11, Mr. Holand (resident of Gold Cup Springs subdivision) visited DFSP with questions regarding progress of the bioremediation system startup. Mr. Holand is a regular visitor to the site to check on progress. Don Vroblesky informed him that all of the extraction wells around tanks 1 and 2 were in operation and that the infiltration galleries at those sites would receive water by the next day. Mr. Holand had concerns about the quality of water from his shallow well, so Vroblesky collected samples from his well for BTEX, TPH, and TOC. Subsequent analysis showed no evidence of contamination from DFSP.

6. Installed wells MWGS-40A, -40B, -41A, and -41B on 6/29-30/92 to provide data points along flowlines to extraction wells EW-13 and EW-14.

7. Completed quarterly sampling of ground-water during 4/1-9/92.

8. Sampled operating extraction wells monthly.

9. Measured water levels monthly.

10. Vroblesky, Chappelle, and McMahon presented the following papers at the 1st International Conference on Ground Water Ecology in Tampa FL on April 26-29, 1992: (1) "Microbial Processes in a Petroleum Hydrocarbon-Contaminated Aquifer: 1. Redox Zonation," (2) "Microbial Processes in a Petroleum Hydrocarbon-Contaminated Aquifer: 2. Evidence for Inhibition of Respiration Relative to

Fermentation," and (3) "Microbial Processes in a Petroleum Hydrocarbon-Contaminated Aquifer: 3. Microbial buffering of pH."

11. Long and Aelion presented the paper "Metabolism of hydrocarbon contaminants by subsurface microbial communities from a jet-fuel contaminated aquifer," at the same meeting as above.

12. Vroblesky, Robertson, Fernandez, and Aelion presented the paper "The permeable-membrane method of soil-gas collection" to the Outdoor Action Conference sponsored by the National Water Well Association on May 11-13, 1992 in Las Vegas.

## **SIGNIFICANT FINDINGS**

1. Free product was not found in the new wells installed in the bermed area of tank 1 to look for the presence of product. However, based on several hydrologic and chemical considerations, free product is probably present in some parts of the northwest corner of the facility. The product present in the 36-inch recovery well will be pumped out, and the extraction wells in that area will create cones of depression that may mobilize some product. We will make measurements in the observation wells to determine if such mobilization occurs.

2. The buildup of organic acids and molecular hydrogen and the anomalously low pH values in the contaminated ground-water immediately north of tank 3 occur because microbial fermentation outpaces microbial respiration in that area.

## **PLANS FOR NEXT QUARTER (these plans are from the Jan-Mar report)**

1. Collect water samples from wells and surface water to comply with quarterly sampling requirements and to reestablish baseline conditions north of tank 3.

2. Reinitiate water delivery to infiltration galleries 1 and 2.

3. Take measures to remove as much free product from near tank 1 as practical.

4. Continue synoptic water-level measurements at all wells, including the Naval Weapons Station. Continue collection of continuous (15-minute interval) water-level data at wells W-103 and

W-108).

5. Continue operation of extraction wells near tanks 1 and 2 and in the Gold Cup Springs subdivision.
6. Continue evaluation and modification of bioremediation system north of tank 1.
7. Continue development of ground-water flow model.

## **STATUS OF REPORTS**

The administrative report on the soil-gas investigation at the site (by Robertson, Aelion, and Vroblesky) is back from Regional review and the recommended changes are being addressed.

DISP Hanken  
Jak Pitnut  
Ku Ban  
Allan Stamp  
Pamala -

Phon Con

4 Aug 93

Letter Report - 5 parts include table of GS FS  
OVA data  
Location of TMWP  
2 maps 1- horz cont upper all  
1- Plan of MW phase II  
additional soil borings

3' thick coal

southern Tank 5+6 contamination below

additional deep soil borings to define what is going on below the clay layer

incorporate additional soil borings into Phase II

\* copy Lab data to Allan Stamp

TOM  
\* scope change for additional monitoring →

\* 40 hours for letter reports

FED → NO.

HERB

8/4/92

GILLES RAGSDALE has a personal  
(Real Estate)  
interest in the Defense Fuel Supply  
Bioremediation project at Hunchon

He has requested someone to call  
him 743-6254

Cliff



# United States Department of the Interior

## GEOLOGICAL SURVEY



Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
July 30, 1992

Mr. Bill Goode  
Defense Fuel Supply Center  
DFSC - FQ  
Cameron Station  
Alexandria, VA 22304-6160

SUBJECT: Report, "Distribution of volatile organic compounds in soil vapor in the vicinity of the Defense Fuel Supply Point, Hanahan, South Carolina," by J.F. Robertson, C.M. Aelion, and D.A. Vroblesky.

Dear Mr. Goode:

Per your telephone conversation with Don Vroblesky on July 1, 1992, permission is requested to change the outlet of subject publication from an Administration Report to a Water-Resources Investigations Report. This change should not affect the content or timeliness of the final publication. Please indicate your concurrence to this change by signature in the space provided below. Your consideration of this matter is greatly appreciated. If you have any questions, please contact me at (803)750-6124 or Don Vroblesky at (803)750-6115.

Sincerely,

Fred Robertson  
Hydrologist

cc: Wayne Barnum, DFSC  
Darryl Fontenot, SOUTHDIV

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Permission is granted to the U.S. Geological Survey to change the subject Administrative Report to a Water-Resources Investigations Report.

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Date

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Signature

---

Title

5090/0110  
Code 1841

01 JUL 1992

Mr. Marvin P. Murray, Director  
Division of Drinking Water Quality and Enforcement  
Bureau of Drinking Water Protection  
South Carolina Department of Health  
and Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDIAION PROJECT, PERMIT NUMBER 15707, BERKELEY COUNTY**

Enclosed are the analytical results, daily inspection sheets and the North Charleston Sewer District (NCSD) permit information for the DFSP site for May 1992.

On 12 June 1992, water from the deep well at DFSP was directed to the infiltration galleries north of Tank 1 and 2. At this point, extraction wells EW-1 through EW-11 and EW-18 are operating and infiltration galleries 1 and 2 are operating with clean water. To date, no nutrients have been added to infiltration gallery 2.

If you have any questions, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

H. FRASER, P.E.  
Head, Petroleum Branch

Enclosures:

- (1) Analytical Results for DFSP
- (2) Daily Inspection Sheets for DFSP
- (3) NCSD Permit Information for DFSP

Copy to:

SCDHEC Trident EQC (Mr. Harvey Wilkins)  
DFSC-FQ (Mr. Wayne Barnum)  
Hanahan Public Library  
USGS (Mr. Don Vrobesky) w/o encl

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# United States Department of the Interior



## GEOLOGICAL SURVEY

Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
6/22/92

Mr. Daryl Fontenot  
Code 18231  
Southern Division Naval Facilities  
Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina  
29411-0068

Dear Mr. Fontenot,

Enclosed are the daily inspection sheets, analytical results, ground-water elevation data, and NCSD permit information for the DFSP site located in Hanahan, S.C. for the month of May 1992. Background conditions were evaluated around the tank 1 area prior to the start-up of extraction wells EW-01 through EW-08 and are being reported in addition to the required monthly sampling results.

If I can be of any further assistance in regards to this submittal, please do not hesitate to contact me (803-750-6129).

Sincerely,

*Liesl C. Rhodes*

Liesl C. Rhodes  
Hydrologist

Enclosure

5090/0110  
Code 1841

17 JUN 1992

Mr. Marvin P. Murray, Director  
Division of Drinking Water Quality and Enforcement  
Bureau of Drinking Water Protection  
South Carolina Department of Health  
and Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDATION PROJECT, PERMIT NUMBER 15707, BERKELEY COUNTY**

Enclosed are the analytical results, daily inspection sheets and the North Charleston Sewer District (NCSD) permit information for the DFSP site for March and April of 1992.

Please note that the total toxic organics (TTO) and lead analyses as required by the NCSD will commence in June 1992. Also note that alkalinity samples were not analyzed on 3/18/92 because of a compromise of sample integrity due to post-collection sample handling error. Ground-water elevation data is also enclosed with the analytical results for the months of February, March and April of 1992.

If you have any questions, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

H. FRASER, P.E.  
Head, Petroleum Branch

Enclosures:

- (1) Analytical Results for DFSP
- (2) Daily Inspection Sheets for DFSP
- (3) NCSD Permit Information for DFSP

Copy to:

SCDHEC Trident EQC (Mr. Harvey Wilkins)  
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# United States Department of the Interior

GEOLOGICAL SURVEY

Water Resources Division  
Stephenson Center-Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651

June 15, 1992

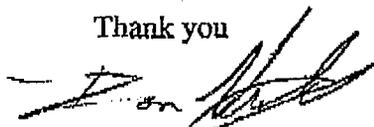


Wayne Barnum  
Defense Fuel Supply Center  
DFSC-FQ  
Cameron Station  
Alexandria, Virginia 22304-6160

Dear Mr. Barnum:

This is just a note to inform you that on Friday, June 12, 1992, we began directing water from the deep well at DFSP, Hanahan SC, to the infiltration galleries north of tanks 1 and 2. At this point, extraction wells EW-1 through EW-11 and EW-18 are operating and galleries 1 and 2 are operating with clean water. Nutrients have not yet been added to gallery 2.

Thank you

  
Don A. Vroblesky  
Hydrologist

cc Daryl Fontenot



# United States Department of the Interior

## GEOLOGICAL SURVEY



Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
6/8/92

Mr. Daryl Fontenot  
Code 18231  
Southern Division Naval Facilities  
Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina  
29411-0068

Dear Mr. Fontenot,

Enclosed are the daily inspection sheets, analytical results, and NCSD permit information for the DFSP site located in Hanahan, S.C. for the months of March and April of 1992. Please note that the TTO and lead analyses as required by the NCSD will commence in June. Please also note that alkalinity samples were not analyzed on 3/18/92 because of a compromise of sample integrity due to post-collection sample handling error. Ground-water elevation data is enclosed for the months of February (2/4/92), March (3/6/92), and April (3/31/92). If I can be of any further assistance in regards to this submittal, please do not hesitate to contact me (803-750-6129).

Sincerely,

Liesl C. Rhodes  
Hydrologist

5090/0110  
Code 1841

04 JUN 1992

Mr. Marvin P. Murray, Director  
Division of Drinking Water Quality and Enforcement  
Bureau of Drinking Water Protection  
South Carolina Department of Health  
and Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDATION PROJECT, PERMIT NUMBER 15707, BERKELEY COUNTY -  
MINUTES OF THE 20 MAY 1992 MEETING.**

Dear Mr. Murray:

Enclosed is a copy of the minutes from the DFSP Remediation Project meeting held in Charleston, South Carolina on 20 May 1992. If you have any questions or comments, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

H. FRASER, P.E.  
Head, Petroleum Branch

Enclosure:  
(1) Minutes from meeting

Copy to with encl:  
SCDHEC - Trident EQC (Mr. Harvey Wilkins)  
DFSC-FQ (Mr. Wayne Barnum)  
DFSP (Mr. Don Matthews)  
USGS (Mr. Don Vrobletsky)  
Hanahan Public Library

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**MINUTES FROM THE QUARTERLY MEETING**  
**DFSP REMEDIATION PROJECT**

DATE: 20 MAY 1992  
TIME: 1300  
PLACE: SOUTHERN DIVISION, NAVAL FACILITIES ENGINEERING COMMAND,  
CHARLESTON, SC

**ATTENDEES**

<u>NAME</u>	<u>ORGANIZATION</u>	<u>PHONE NUMBER</u>
ROBERT DEVLIN	SCDHEC	734-4672
DAVID BAIZE	SCDHEC	734-5329
MARVIN MURRAY	SCDHEC	734-5338
BILL GOODE	DFSC-FQ	703-274-6989
DAN BIGGERSTAFF	TRIDENT LABS	871-4979
M. DARRELL THORNLEY	SOUTHDIV	743-0606
WAYNE BARNUM	DFSC-FQ	703-274-6579
WAYNE FANNING	SCDHEC - TRIDENT	554-5533
NICK PALUMBO	DFR-S	713-750-1883
MARGE DAVENPORT	USGS	750-6109
DON VROBLESKY	USGS	759-6115
HERB FRASER	SOUTHDIV	743-0602
DON MATTHEWS	DFR-S	744-6393
CHANDRA SHETH	SOUTHDIV	743-0553
DARYLE FONTENOT	SOUTHDIV	743-0607

**MINUTES OF THE MEETING**

The meeting was started by the introduction of the persons present at the meeting.

Daryle Fontenot of SOUTHDIV reviewed the November 1991 meeting and outlined the requirements that were accomplished by SOUTHDIV and USGS. The requirements of the remediation project operation permit were reviewed.

Don Vroblesky of the USGS went over the progress of the project since the 27 January 1992 start up. Stated that mechanical problems have been encountered with the extraction wells and they are being resolved as they occur. Extraction wells 1 -11 and 18 are now on. He also highlighted the investigation at Tank 1 for free product. Monitoring wells and samples were taken around Tank 1, but no large quantity of free product was encountered. The existing 36" well will be pumped to recover any free product present around Tank 1. The monitoring of the system was discussed. One thing that the

Enclosure (1)

monitoring has identified is the natural biodegradation that was taking place in the groundwater. It has been noted in several wells that the benzene and toluene levels were decreasing.

USGS stated that due to the clay layer in the area of Tank 1, no nutrients would be making it to the most contaminated part of the groundwater from infiltration gallery No. 1. It was proposed to SCDHEC that injection well be placed in the area of Tank 1 to allow for the injection of nutrients into the groundwater below the clay layer and if the existing permit would cover this installation. SCDHEC said that a addendum to the permit to put injection wells at Tank 1 could be done. The USGS will propose two injection wells to start with.

USGS further stated that containment of the contamination was being accomplished and that there are plans to find out the cone of depression of the extraction wells to determine the radius of influence of each well. This will be used to determine the hydraulic containment of the extraction wells.

USGS discussed the Tank 3 area stating that bioremediation should work in this area.

The USGS will be using field data, injection rates and modeling to fine tune the bioremediation system.

SOUTHDIV informed SCDHEC of future operations for DFSP which are as follows:

Installation of a pressure tank for the deep well to control the amount of water produced and to prevent damage to the deep well pump will be complete by 15 June 1992.

Extraction Well No. 14 will be repaired by 15 June 1992.

Infiltration Gallery 1 and 2 and mini infiltration gallery in front of Tank 3 will be operational by 15 July 1992. Injection of nutrients into infiltration gallery 2 and the mini infiltration gallery in front of Tank 3 will began by 15 July 1992. Clean water will be injected in to infiltration gallery 1. Infiltration gallery 3 will be turned on as the situation dictates.

Asked SCDHEC if they were satisfied with the progress of the project to date. They responded that they were pleased with the progress to date.

Trident EQC asked if information on the DFSP remediation project was available to the public. Information about the DFSP project is located at the Hanahan Public Library. Also asked about the possible affect of the widening of North Rhett would have on the investigations going on at DFSP, specifically if workers would be exposed to contamination. Stated to Trident EQC that the extent of contamination should be identified by the fall with the work ABB-ES is to be starting in June 1992. Trident also wanted to know if the pipeline break on North Rhett would also be investigated. SOUTHDIV to find out if this site is included in the area to be investigation by ABB-ES.

Summary of things to be done that were discussed in the meeting is as follows:

USGS to send letter for the installation of injection wells at Tank 1 for the injection of nutrients. The request will then be submitted to SCDHEC by SOUTHDIV.

SCDHEC wants a schedule of events or activities that are to take place as DFSP. This will be included in the minutes of the meeting.

Quarterly report submitted to SCDHEC should include a schedule of events.

The minutes of the meeting are to be distributed. This is to be done by SOUTHDIV.

New sampling points to be included in future sampling data submitted.

To send updated monitoring well analytical results package to SCDHEC in 2 weeks (USGS).

Dates to remember: 15 June 1992 - Pressure tank installation on deep well complete.

15 July 1992 - Injection into infiltration galleries to start

It was agreed by all present that a quarterly was necessary. The next meeting would involve fewer persons and would be scheduled after the submission of the quarterly reports.

Meeting was adjourn.

## AGENDA FOR THE MEETING ON DFSP REMEDIATION PROJECT

DATE: 20 MAY 1992  
TIME: 1300  
PLACE: SOUTH DIV, CONFERENCE ROOM A1D

- ~~X~~ STATE PURPOSE OF THE MEETING - Outline Requirements of Permit <sup>meeting</sup> ncr  
*Go over Nov 91 Requirements*
- ~~X~~ INTRODUCTION OF THE PERSONS PRESENT AT THE MEETING *ncr*
- ~~X~~ OPENING REMARKS BY SOUTH DIV & DFSC  
*How we are to proceed.*
- ~~X~~ REVIEW OF PROJECT PROGRESS TO DATE BY USGS  
*FUTURE OPERATIONS SOUTH DIV*
5. COMMENTS FROM SCDHEC ON THE PROJECT
6. DISCUSSION OF THE PROJECT (QUESTIONS & ANSWERS)
7. WRAP UP OF MEETING
- STATE IMPORTANT COMMENTS
  - CONFIRM DECISIONS MADE
  - STATE WHO IS RESPONSIBLE FOR ADDITIONAL ACTIONS, IF ANY
  - SCHEDULE OF NEXT MEETING, IF REQUIRED
8. END MEETING

- \* Pressure tank <sup>for deep well</sup> in 1st part of JUNE 92 *(15 JUNE) so we can operate*
- \* IEW-14 *repeal by 15 JUNE*
- ~~15 JUNE~~ IG operations 1+2 + mini gallery Tank 3  
*nutrients*
- \* 15 July <sup>↑</sup> nutrient at IG-3 + mini gallery at Tank 3  
IG-3 turn on as the situation dictates.
- \* Necess. to address zone around Tank 1 below the clay layer  
Injection wells around Tank 1 for zone below clay layer  
is this covered under the permit

DFSP MEETING 1300 20 MAY 92

DFSC - Gommot

USGS → went over what took place at the project

working out mechanical basis of system.

→ stated problem at Tank 1

• state EW 1-11 + 18 was on but NO IG

• went thru investigation at Tank 1 very limited product discovery.

- no free product recovery.

→ pump 36" well.

Talked about monitoring at DFSP.

state bio naturally occur at deep well.

biore + tolerance was decreasing.

AF - addressed to provide to put in input well at Tank 1 at.

Quarterly report has been received.

containment of contamination.

- asked about hydraulic containment

- USGS to find out cause of depression, with EW 1-11 + 18

Free product - Discard Tank 3 area bio will work

Discard Tank 1 area - bio active in zone under clay

injection rates + modeling done by USGS - work along with field data.

\* start with 2 well injection into zone below Tank 1

SOUTH DIV - DAFEC satisfied

TRIDENT → ask about information on DFSP being available to public info w/ at Harahan Library.

N. Rhett road widening.

\* Pete Lina Brock → on N Rhett. A DFSP we take look at  
Talk to ABB

- WSGS to send letter for input w/ of DFSP. to SC/DHEC.
- include time line for activities. SC/DHEC wants a time line
- Quarter report put in a schedule of events.
- publish record of minutes of meeting. SDIV/DHEC.
- > New sampling points
- > To send update monoton package in 2 weeks.

[Quarter meeting good WSGS, SDIV, DHEC thought it necessary.]

DFSP Meeting 20 MAY 92 0900

USGS - Mechanical problems with systems  
Galley 2 infiltration Galley  
FW-10 problem electrical  
problem with FW in front of Tank 3

Tank 1 - free product, put in well not much free product found  
- extraction to get rid of free product pump 36" well thru turret system

All EW good FW-1 - FW-11, FW-18 are on w/d 20 May 92  
12 wells are on -

Tank 3 EW are not on

Infiltration Galley is not on now.

IG-1 clay layer water will not get to zone

IG-2 No problems to operate. Problems High draw downs need to put in less  
water. Pump too big for just IG. Has put in a pressure tank in  
when IG-2 ~~is~~

Inject nutrients into zone by Tank-1 below clay.

EW-14 problem (critical well to turn on mini-galley in front of Tank 1  
Need to fix EW-14, put IG-3 online. (EW-13 involved also)

IG-1 problem if nitrate is not used: could cause problems with contamination  
need nitrate in zone below clay.

Possible use clean water to fix IG-1 until 11 well below clay are put in

Surge tank to be completed - 2 weeks

(2)

- Electric problems most noticeable.

\* TO tell SCDHEC

Recovery water

Concentration not fully at FW-18 - @ 6 PM

FW-11 concentrations are rising + collecting contaminants.

FW-9

Phase approach

1 - pump contaminants

2 - pump IG-1+2

3 - add nutrients to all galleries

4 - add nutrients to zone below ~~IG-1~~ clay.

There was need to clean up unsaturated zone at Tank 1+3

Natural bio is taking place.

Wells in the neighbor -

Possible to let nitrates into neighbor hood to aid bio

\* ABB + more points around Tank 3 \* \* Tank 1

## AGENDA FOR THE MEETING ON DFSP REMEDIATION PROJECT

DATE: 20 MAY 1992  
TIME: 1300  
PLACE: SOUTHDIV, CONFERENCE ROOM A1D

1. INTRODUCTION OF THE PERSONS PRESENT AT THE MEETING
2. STATE PURPOSE OF THE MEETING - Outline Requirements of Permit  
- Review Nov 91 Meeting
3. OPENING REMARKS BY SOUTHDIV & DFSC
4. REVIEW OF PROJECT PROGRESS TO DATE BY USGS  
- Future Operations at DFSP by SOUTHDIV
5. COMMENTS FROM SCDHEC ON THE PROJECT
6. DISCUSSION OF THE PROJECT (QUESTIONS & ANSWERS)
7. WRAP UP OF MEETING
  - STATE IMPORTANT COMMENTS
  - CONFIRM DECISIONS MADE
  - STATE WHO IS RESPONSIBLE FOR ADDITIONAL ACTIONS, IF ANY
  - SCHEDULE OF NEXT MEETING, IF REQUIRED
8. END MEETING



ATTENDANCE SHEET FOR MEETING ON DFSP REMEDIATION PROJECT

DATE: 20 MAY 1992  
TIME: 1300  
PLACE: SOUTH DIV, CONFERENCE ROOM A1D

<u>NAME / TITLE</u>	<u>ORGANIZATION</u>	<u>PHONE NUMBER</u>
Daryle Fontenot / Env Engr	SOUTH DIV	743-0607
Robert Devlin	SCDHEC	734-4672
David Bruce	SCDHEC	734-5329
Marvin P. Murray	SCDHEC	734-5338
Bill Goode	DFSC-FQ	274-6989 (703)
Don Diggerstaff	Trident Lab	871-4979
M. DARRELL THORLEY	SOUTH DIV	743-0606
WAYNE BARNUM	DFSC-FQ	(703) 274-6579
Wayne Fanning	SCDHEC-Trident	(803) 554-5533
Nick Palumbo	DFR-S	713 750-1883
Marge Davenport	U.S. Geological Survey	(803) 750-6109
Don Kroblesky	USGS	(803) 750 6115
H. Paen	South Div	803 743 0602
DON MATTHEWS	DFR-S	803-744-6393
Chandra Shek	South Div	803-743 0553

John Beling DOT

202 501-6853

1115  
4 MAY 92

RE: DFSP Handhan

Left Message.

Quarterly Status Report

Back → TO 1990

USGS ~~XX~~

Called 1550 4 MAY 92

● FEDEX →

DOT 2090M

NO. 15 10 1048-2

~~2090M~~

Sally McCraven

TODD Consett Engs, Inc.

2914 Domingo Ave

Berkeley, CA 94705

510 841 2091

DFSP Meeting 20 MAY 92

USGS - Left message OR  
SCOHFC - Marcu, Murray Left message GR  
TRIDFMT FQC - Left message

$$\frac{11}{3} \times \frac{6}{3} = \frac{18}{33} \quad \left( \frac{55}{18} \right)$$

$$3 \frac{10}{15} + 1 \frac{3}{15} = \frac{30}{15}$$

42

→ Turkey

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Sender's Federal Express Account Number Date 05 MAY 92

SENDER'S COPY

From (Your Name) Please Print DARYLE FONTENOT To (Recipient's Name) Please Print SALLY Mc CRAVEN
Company SOUTH NAV FAC ENG COM Department/Floor No. TODD CONSULTING ENGINEERS, INC.
Street Address 2155 EAGLE DRIVE Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 2914 DOMINGO AVE
City CHARLESTON SC ZIP Required 29418 City BERKELEY CA ZIP Required 94705

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## TERMS AND CONDITIONS

### DEFINITIONS

On this Airbill, we, our and us refer to Federal Express Corporation, its employees and agents. You and your refer to the sender, its employees and agents.

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By giving us your package to deliver, you agree to all the terms on this Airbill and in our current Service Guide, which is available on request. If there is a conflict between the current Service Guide and this Airbill, the Service Guide will control. No one is authorized to alter or modify the terms of our Agreement.

### RESPONSIBILITY FOR PACKAGING AND COMPLETING AIRBILL

You are responsible for adequately packaging your goods and for properly filling out this Airbill. Omission of the number of packages and weight per package from this Airbill will result in a billing based on our best estimate of the number of packages received from you and an estimated "default" weight per package, as determined and periodically adjusted by us.

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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:

5090/0110

Code 1841

13 MAY 1992

Mr. Marvin P. Murray, Director  
Division of Drinking Water Quality and Enforcement  
Bureau of Drinking Water Protection  
South Carolina Department of Health  
and Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDICATION PROJECT, PERMIT NUMBER 15707, BERKELEY COUNTY -  
MONITORING OF THE BIOREMEDIATION SYSTEM**

Dear Mr. Murray:

We are requesting that the requirement for testing the bioremediation system for alkalinity be discontinued. Alkalinity is the equivalent sum of all the species present in solution that are titratable with a strong acid. The original intent of including this parameter was to monitor changes in bicarbonate production as the bioremediation progressed.

The USGS, in their latest round of samples, have seen large amounts of organic acids present in some contaminated areas. The presence of these acids affect the determination of alkalinity by decreasing the slope of the titration curve, making the inflection point difficult to determine. Moreover, increasing the amount of organic acid can actually lower the inflection point, producing inaccuracies in the calculations of bicarbonate concentrations. The absence of the alkalinity parameter will not affect the evaluation of the remediation project.

If you have any questions concerning this request, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

H. FRASER, P.E.  
Head, Petroleum Branch

Copy to:  
SCDHEC Trident EQC (Mr. Harvey Wilkins)  
DFSC - FQ (Mr Wayne Barnum)  
USGS (Mr. Don Vroblecky)

5090/0110  
Code 1841

13 MAY 1992

Mr. Marvin P. Murray, Director  
Division of Drinking Water Quality and Enforcement  
Bureau of Drinking Water Protection  
South Carolina Department of Health  
and Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

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H. FRASER, P.E.  
Head, Petroleum Branch

Copy to:  
SCDHEC Trident EQC (Mr. Harvey Wilkins)  
DFSC - FQ (Mr Wayne Barnum)  
USGS (Mr. Don Vrobesky)

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# United States Department of the Interior



## GEOLOGICAL SURVEY

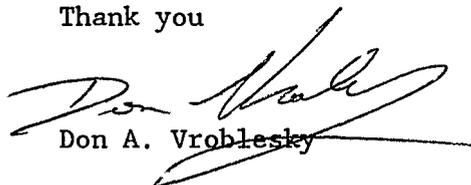
Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
May 5, 1992

Daryl Fontenot  
Southern Division Naval  
Facilities Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

Dear Mr. Fontenot:

The following is a request to delete alkalinity from the required parameters for monitoring the bioremediation system. Alkalinity is the equivalent sum of all the species present in solution that are titratable with a strong acid. The original intent of including this parameter was to monitor changes in bicarbonate production as the bioremediation progressed. Our more recent sampling analyses, however, have shown that large amounts of organic acids are present in some contaminated areas. The presence of these acids affect the determination of alkalinity by decreasing the slope of the titration curve, making the inflection point difficult to determine. Moreover, increasing the amount of organic acid can actually lower the inflection point, producing inaccuracies in the calculation of bicarbonate concentrations. The absence of this parameter will not affect our evaluation of the remediation.

Thank you



Don A. Vroblesky

5090/0110  
Code 1841

6 MAY 1992

From: Southern Division, Naval Facilities Engineering Command (Code 184)  
To: Defense Logistics Agency, DFSC - FQ, Cameron Station, Alexandria, VA  
(Mr. Wayne Barnum)

Subj: **DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMIATION PROJECT**

1. A meeting has been scheduled for 20 May 1992 at our Charleston office so that all interested parties can meet and discuss the progress of the DFSP remediation project. The meeting is scheduled to start at 1:00 pm. Please let us know if you plan to attend. This meeting replaces the previously scheduled meeting of 5 May 1992.
2. If you have any questions, please call Mr. Daryle Fontenot, Code 1841 at A/V 563-0607 or (803) 743-0607.

M. DARRELL THORNLEY  
By direction

Copy to:  
DFSP Charleston (Mr. Don Matthews)

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5090/0110  
Code 1841

6 MAY 1992

Mr. Don A. Vroblesky  
United States Geological Survey  
Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDATION PROJECT**

Dear Mr. Vroblesky:

A meeting has been scheduled for 20 May 1992 at our Charleston office so that all interested parties can meet and discuss the progress of the DFSP remediation project. The meeting is scheduled to start at 1:00 pm. Please let us know if you plan to attend. This meeting replaces the previously scheduled meeting of 5 May 1992.

If you have questions, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

M. DARRELL THORNLEY, P.E.  
Head, Air/solid Waste Branch

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Code 1841

6 MAY 1992

Mr. Marvin P. Murray, Director  
Division of Drinking Water Quality and Enforcement  
Bureau of Drinking Water Protection  
South Carolina Department of Health  
and Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDIAION PROJECT, PERMIT NUMBER 15707, BERKELEY COUNTY**

Dear Mr. Murray:

A meeting has been scheduled for 20 May 1992 at our Charleston office so that all interested parties can meet and discuss the progress of the DFSP remediation project. The meeting is scheduled to start at 1:00 pm. Please let us know if you plan to attend. This meeting replaces the previously scheduled meeting of 5 May 1992.

If you have any questions, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

M. DARRELL THORNLEY, P.E.  
Head, Air/solid Waste Branch

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Code 1841

6 MAY 1992

Mr. Harvey Wilkins  
SCDHEC Trident EQC  
2470 Air Park Road  
North Charleston, South Carolina 29418

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDIAION PROJECT, PERMIT NUMBER 15707, BERKELEY COUNTY**

Dear Mr. Wilkins:

A meeting has been scheduled for 20 May 1992 at our Charleston office so that all interested parties can meet and discuss the progress of the DFSP remediation project. The meeting is scheduled to start at 1:00 pm. Please let us know if you plan to attend. This meeting replaces the previously scheduled meeting of 5 May 1992.

If you have any questions, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

M. DARRELL THORNLEY, P.E.  
Head, Air/solid Waste Branch

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Daily

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5090/0110  
Code 1841  
22 APR 1992

From: Southern Division, Naval Facilities Engineering Command (Code 184)  
To: Defense Logistics Agency, DFSC - FQ, Cameron Station, Alexandria, VA  
(Mr. Wayne Barnum)

Subj: **DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDICATION PROJECT - QUARTERLY REPORT**

Encl: (1) USGS Quarterly Report for DFSP  
(2) Daily Inspection Sheets for DFSP  
(3) Analytical Results for DFSP  
(4) North Charleston Sewer District (NCSD) Permit Information for DFSP

1. Enclosures (1) through (4) are provided for your information concerning the DFSP Charleston Remediation Project.

2. A conference room at our office has been reserved for 5 May 1992 so that all interested parties can meet and discuss the progress of the DFSP remediation project. The meeting is scheduled to start at 1300. Please let us know if you plan to attend.

3. If you have any questions, please call Mr. Daryle Fontenot, Code 1841 at A/V 563-0607 or (803) 743-0607.

H. J. FRASER  
BY DIRECTION

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Code 1841  
22 APR 1992

Mr. Marvin P. Murray, Director  
Division of Drinking Water Quality and Enforcement  
Bureau of Drinking Water Protection  
South Carolina Department of Health  
and Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDICATION PROJECT, PERMIT NUMBER 15707, BERKELEY COUNTY -  
QUARTERLY REPORT**

Dear Mr. Murray:

Enclosed is a copy of the United States Geological Survey (USGS) Quarterly Report on the DFSP Charleston Remediation Project. This report outlines the activities of the USGS at DFSP for the last three months. Also enclosed are the daily inspection sheets, analytical results and North Charleston Sewer District permit information for the DFSP site for January and February of 1992.

A conference room at our office in Charleston has been reserved for 5 May 1992 so that all interested parties can meet and discuss the progress of the DFSP remediation project. The meeting is scheduled to start at 1:00 pm. Please let us know if you plan to attend.

If you have any questions, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

Enclosures:

- (1) USGS Quarterly Report for DFSP
- (2) Daily Inspection Sheets for DFSP
- (3) Analytical Results for DFSP
- (4) NCSD Permit Information for DFSP

H. FRASER, P.E.  
Head, Petroleum Branch

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Code 1841

Mr. Harvey Wilkins  
SCDHEC Trident EQC  
2470 Air Park Road  
North Charleston, South Carolina 29418

22 APR 1992

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDICATION PROJECT, PERMIT NUMBER 15707, BERKELEY COUNTY -  
QUARTERLY REPORT**

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Enclosed is a copy of the United States Geological Survey (USGS) Quarterly Report on the DFSP Charleston Remediation Project. This report outlines the activities of the USGS at DFSP for the last three months. Also enclosed are the daily inspection sheets, analytical results and North Charleston Sewer District permit information for the DFSP site for January and February of 1992.

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If you have any questions, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

H. FRASER, P.E.  
Head, Petroleum Branch

**Enclosures:**

- (1) USGS Quarterly Report for DFSP
- (2) Daily Inspection Sheets for DFSP
- (3) Analytical Results for DFSP
- (4) NCSD Permit Information for DFSP

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Daily

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Code 1841

22 APR 1992

Mr. Don A. Vroblesky  
United States Geological Survey  
Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651

**DEFENSE FUEL SUPPLY POINT (DFSP) CHARLESTON, SOUTH CAROLINA:  
REMEDICATION PROJECT - QUARTERLY REPORT**

Dear Mr. Vroblesky:

The quarterly report you submitted for the DFSP remediation project has been sent to SCDHEC. Also, the daily inspection sheets, analytical results and the NCSD permit information for DFSP were sent to SCDHEC.

A conference room at our office in Charleston has been reserved for 5 May 1992 so that all interested parties can meet and discuss the progress of the DFSP remediation project. The meeting is scheduled to start at 1:00 pm. Please let us know if you plan to attend.

If you have questions, please call Mr. Daryle Fontenot, Code 1841, at (803) 743-0607.

Sincerely,

H. FRASER, P.E.  
Head, Petroleum Branch

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# United States Department of the Interior



GEOLOGICAL SURVEY  
Water Resources Division  
Stephenson Center-Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651

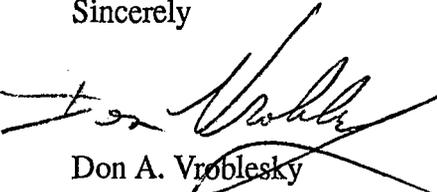
April 6, 1991

Daryl Fontenot  
Southern Division Naval  
Facilities Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

Dear Mr. Fontenot:

Enclosed is a the quarterly progress report for the period from January 1 to March 31, 1992 for the U.S. Geological Survey's involvement in the project involving enhanced bioremediation of petroleum in the ground water at Defense Fuel Supply Point, Hanahan SC.

Sincerely



Don A. Vroblesky

cc. C. Marjorie Aelion  
Stephen Hutchins

Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
3/16/92

Mr. Daryl Fontenot  
Code 18231  
Southern Division Naval Facilities  
Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina  
29411-0068

Dear Mr. Fontenot,

Enclosed are the daily inspection sheets, analytical results, and NCSD permit information for the DFSP site located in Hanahan, SC for the months of January and February of 1992. The sampling results have been submitted in their entirety so that you may update your files accordingly. If I can be of any further assistance in regards to this submittal, please do not hesitate to contact me (803-750-6129).

Sincerely,

*Liesl C. Rhodes*  
Liesl C. Rhodes  
Hydrologist

PHONE MEMO

DATE CALL MADE: \_\_\_\_\_

DATE CALL RECEIVED: 3 APR 92

TIME: \_\_\_\_\_

TIME: 0955

PHONE NO.: \_\_\_\_\_

ACTIVITY/FIRM: USGS

PERSON SPOKE WITH: DON VROBLESKY

SUBJECT: DFSP REMEDIATION PROJECT

REFERENCE: \_\_\_\_\_

SUMMARY: Returning my call of 1 APR 92. Asked him about his thoughts on the situation that happen with the recovery wells. Said this upset the chemistry of the area and may cause him to sample again after his quarterly sampling period he is doing now (maybe in one month). Said the well water level will recover but chemistry may not. Said it was good that the injection of nutrients had not started.

Work in Tank 1 area is ongoing with work next week to sample wells and see what is there.

Also though the idea to have Trident check each well for operation even if it is not supposed to be on was a good idea.

NAME: D.L FONTEROT

CODE: 1841

P H O N E M E M O

DATE CALL MADE: 1 APR 92

DATE CALL RECEIVED: \_\_\_\_\_

TIME: 1040

TIME: \_\_\_\_\_

PHONE NO.: 744-6393

ACTIVITY/FIRM: ~~DFSP~~ DFSP CHARLESTON

PERSON SPOKE WITH: DON MATTHEW

SUBJECT: DFSP CHARLESTON REMEDIATION PROJECT

REFERENCE: \_\_\_\_\_

SUMMARY: Call to talk to him concerning the operation of the remediation project. Thought that the problem with the wells that were on and not supposed to be on was a problem with the contractor TRIDENT and told USGS to straighten out the problem. Trident should check all wells every day.

Are currently installing a 50 gal surk tank for Deepwell so as not to burn at pump.

Don said not satisfied with the speed of things.

NAME: DL FONTENOT

CODE: 1841

# PROJECT STATUS REVIEW SHEET, QUARTERLY REPORT

Project Number: SC078

Date: April 1992

Project Name: Remediation of JP-4 contamination using hydraulic containment and in-situ biodegradation at the Defense Fuel Point, Charleston, South Carolina

Project Chief: Don A. Vroblesky Section Chief: Frank Chapelle

Report Period: Jan.-April 1992 Cooperator: U.S. Dept. of the Navy

Project Completion Date: 1993

## PROJECT OBJECTIVES:

1. Construct and calibrate a digital ground-water flow model of the DFSP site that can be used as a tool in designing the containment-biodegradation system.
2. Monitor the operation of the containment-biodegradation system after start-up to document the hydraulic containment achieved by the system and to assess the efficiency of the system to degrade the contamination. As part of the effort to estimate the length of time required for aquifer remediation, an estimate of the amount of JP-4 sorbed onto aquifer materials will be made prior to startup.
3. Use the results of the monitoring program together with the estimate of JP-4 contained in the aquifer to construct a digital solute-transport model designed to estimate the time required to decontaminate the aquifer below a given threshold.

## PROGRESS DURING PREVIOUS QUARTER:

1. Collected water samples from wells north of tanks 2 and 3, wells in the Gold Cup Springs subdivision, and from 9 surface-water sites.
2. Received final approval from DHEC to operate the bioremediation system.

3. Initiated operation of remediation system on 1/27/92 by starting wells EW-9, EW-10, and EW-11 north of tank 2, and well EW-18 in Gold Cup Springs subdivision. During the following week, clean water from the deep well was directed to the infiltration gallery north of tank 2. Wells EW-13 and EW-14, north of tank 3, were placed into operation on 2/4/92.

4. During the subsequent weeks, parts of the system developed problems and had to be deactivated. Well EW-10 had a switching problem and was out of operation from 2/4/92 to early March. Because this well is in the center of the zone of capture for water from infiltration gallery 2 (north of tank 2), the infiltration gallery was turned off. The infiltration gallery will be turned back on following the quarterly sampling run in the beginning of April 1992.

5. Well EW-14 also ceased operating. By examining the symptoms, we determined that the most probable cause was improper placement of the well-control floats. On 3/9/92, the pump was pulled from well EW-14 and the floats were found to be approximately 25 feet too shallow. Because this was an installation error, Don Matthews is contacting the original contractors to make the required repair. The other pumps near tank 3 were also pulled and checked. Although none of the floats were set according to specifications, only minor adjustments were needed.

6. Installed and developed 3 observation wells inside the berm of tank 1 and one outside the berm of tank 1 to determine whether petroleum free product is still present in appreciable quantities in the facility. The wells were developed and need to stabilize before evaluations regarding free product can be made.

7. Installed one additional well north of tank 2 in an area where insufficient data were available.

8. As of the end of this quarter, the extraction wells in operation are EW-9, EW-10, and EW-11 north of tank 2, and well EW-18 in the Gold Cup Springs subdivision. No infiltration galleries are presently in operation.

9. Ran levels to most of the newly installed wells.

## **SIGNIFICANT FINDINGS**

1. A comparison of the chromatogram (obtained during the USGS soil-gas survey) from the soil zone in the SE corner of the tank 6

area shows a strong resemblance to the chromatogram of JP-5 water bottoms. Thus, the probable source of the subsurface contamination in that area is the discharge of JP-5 tank bottoms.

2. Because of the unexpectedly high drawdowns and the inability to turn on a sufficient number of infiltration galleries to accept the amount of water being pumped from the deep well, a pressure tank must be added to the deep well to prevent the low flow rates from damaging the well pump. The work is in the process of being contracted out.

3. On 3/25/92 we discovered that after wells EW-15, EW-16, and EW-17 had been reinstalled, someone had turned the pumps on full speed. The wells were not supposed to be on and were, therefore, not part of the daily site operator's inspection. By the time we discovered the problem, approximately 261,000 gallons of water had been pumped from the aquifer and discharged to the treatment facility. This constitutes a major disturbance and shifting of contaminants in a section of the aquifer for which we were attempting to establish baseline conditions. We now need to reestablish baseline conditions so that we will be able to determine the effectiveness of the bioremediation. A sampling run is in progress (as part of the required quarterly sampling) and will aid in determining the seriousness of the disturbance. It is possible that the distribution of contamination north of tank 3 is now in a transient condition because of the water removal, and an additional sampling in that area may be required prior to startup of the remediation north of tank 3.

## **PLANS FOR NEXT QUARTER**

1. Collect water samples from wells and surface water to comply with quarterly sampling requirements and to reestablish baseline conditions north of tank 3.

2. Complete the determination of altitudes of water-level measuring points at the new observation wells.

3. Continue synoptic water-level measurements at all wells, including the Naval Weapons Station. Continue collection of continuous (15-minute interval) water-level data at wells W-103 and W-108).

4. Start directing water to the infiltration gallery north of tank

- 2 and to the mini infiltration galleries north of tank 3.
5. Continue operation of extraction well EW-18 in the Gold Cup Springs subdivision.
6. Continue evaluation and modification of bioremediation system north of tank 1.
7. Continue development of ground-water flow model.
8. Vroblesky, Chapelle, and McMahon will present the following papers at the 1st International Conference on Ground Water Ecology in Tampa FL on April 26-29, 1992: (1) "Microbial Processes in a Petroleum Hydrocarbon-Contaminated Aquifer: 1. Redox Zonation," (2) "Microbial Processes in a Petroleum Hydrocarbon-Contaminated Aquifer: 2. Evidence for Inhibition of Respiration Relative to Fermentation," and (3) "Microbial Processes in a Petroleum Hydrocarbon-Contaminated Aquifer: 3. Microbial buffering of pH."
9. Long and Aelion will present the paper "Metabolism of hydrocarbon contaminants by subsurface microbial communities from a jet-fuel contaminated aquifer," at the same meeting as above.
10. Vroblesky, Robertson, Fernandez, and Aelion will present the paper "The permeable-membrane method of soil-gas collection" to the Outdoor Action Conference sponsored by the National Water Well Association on May 11-13, 1992 in Las Vegas.

## **STATUS OF REPORTS**

The administrative report on the soil-gas investigation at the site (by Robertson, Aelion, and Vroblesky) is back from Regional review and the recommended changes are being addressed.



# United States Department of the Interior



## GEOLOGICAL SURVEY

Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
March 26, 1992

Daryl Fontenot  
Southern Division Naval  
Facilities Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

Dear Mr. Fontenot:

This is the eighth informal progress report of the bioremediation system startup at Defense Fuel Supply Point, Hanahan, SC.

1. On 3/25/92, we discovered that whoever reinstalled the wells at sites EW-15, -16, and -17 on or about 3/9/92 turned the wells on full throttle and left them on. When we looked at the wells on 3/25/92, they were cycling on and off, which means that they were pumping very fast and had drawn down water levels about 22 feet. The same thing happened at well EW-13, but the daily site operator discovered the error on 3/10/92 and readjusted the flow down to about 1 gpm. Wells EW-15, -16, and -17 were not supposed to be on, so they were not part of the daily site operator's inspection. About 261,000 gallons of water were pumped from the ground water at wells EW-15, -16, and -17. This constitutes a major disturbance and shifting of contaminants in a section of the aquifer that we had tried very hard to maintain as undisturbed in order to evaluate the effectiveness of the bioremediation. We cannot evaluate the effectiveness of the bioremediation if we do not know the starting conditions. At the very minimum, we now have to collect samples to gain an understanding of the distribution of contamination in the new ground-water system and to determine if our approximate one and a half years of sampling to monitor the seasonal effects can still be used to evaluate the effectiveness of the bioremediation.

Sincerely

  
Don A. Vroblesky

cc. Wayne Barnum  
cc. Don Matthews



United States Department of the Interior  
GEOLOGICAL SURVEY



Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
March 24, 1992

Daryl Fontenot  
Southern Division Naval  
Facilities Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

Dear Mr. Fontenot:

This is the seventh informal progress report of the bioremediation system startup at Defense Fuel Supply Point, Hanahan, SC.

1. Completed monthly water-quality sampling of extraction wells in operation.
2. Developed newly installed wells MWGS-35, -36, -37, -38, and -39.
3. Don Matthews has been in contact with the ROICC office concerning the required repairs to the pump control probes in well EW-14.
4. Don Matthews is awaiting bid submissions for installation of the deep-well pressure tank.
5. Don Matthews supplied us with samples of JP-4, JP-5, FSII, and water bottoms from JP-4 and JP-5 to allow us to compare the chromatograms from those compounds to the chromatograms that we are obtaining from our site investigation. A comparison of the chromatogram (obtained from the soil-gas investigation) from the soil zone in the southeast corner of the tank 6 area, shows a strong resemblance to the chromatogram of JP-5 water bottom.

Sincerely

Don A. Vroblisky

cc. Wayne Barnum  
cc Don Matthews



# United States Department of the Interior

## GEOLOGICAL SURVEY

Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
March 17, 1992



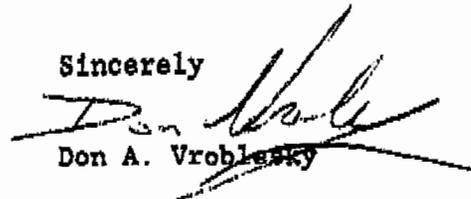
Daryl Fontenot  
Southern Division Naval  
Facilities Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

Dear Mr. Fontenot:

This is the sixth informal progress report of the bioremediation system startup at Defense Fuel Supply Point, Hanahan, SC.

1. Wells EW-9, EW-10, EW-11, and EW-18 are pumping.
2. To determine the cause of the poor performance of well EW-14, the well was disassembled and the pump was pulled out. As suspected, the pump cut-off float was placed at the water table and the cut-on float was above the water table. The well pump was approximately 25 ft below the water table. Thus, the well could be pumped for a few minutes until the water was drawn down to the cut-off float, which would turn off the pump. Because water could never rise to the cut-on float, the well never came back on. This is a pump-installation error, and Don Matthews is contacting Griffin Engineering to come back to the site to correct the problem. We also checked the float levels in wells EW-13, EW-15, EW-16, and EW-17. Although none of the floats were installed according to specifications, the floats in those wells required only minor adjustments. Operation of wells EW-14 and EW-14 and the mini-infiltration galleries cannot be initiated until the well-repair work is complete.

Sincerely

  
Don A. Vroblecky

cc. Wayne Barnum



# United States Department of the Interior



GEOLOGICAL SURVEY  
Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
March 6, 1992

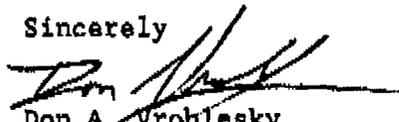
Daryl Fontenot  
Southern Division Naval  
Facilities Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

Dear Mr. Fontenot:

This is the fifth informal (weekly) progress report of the bioremediation system startup at Defense Fuel Supply Point, Hanahan, SC.

1. Well EW-10 (tank 2) is now operational and is on, along with wells EW-9, EW-11, and EW-18.
2. The slow pumping rates of wells EW-13 and EW-14 continue. To address the problem, on Monday (3/9/92) we will be at the site with an electrician and general contractor to pull the pumps and determine the cause. The pumps will be lowered if needed.
3. Paperwork has been initiated (by Don Matthews), to add a pressure tank to the deep well. The tank will allow the well to be pumped at the lower volumes found to be needed without damage to the pump.
4. In an effort to locate a "background" area within the berms, we hand augered two borings in the tank 3 bermed area and one in the tank 2 bermed area. All areas were highly contaminated as evidenced by odor and by vapor and headspace analysis with a field GC.

Sincerely



Don A. Vrobesky

cc. Wayne Barnum



# United States Department of the Interior

## GEOLOGICAL SURVEY

Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
February 28, 1992



FAX

Daryl Fontenot  
Southern Division Naval  
Facilities Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

Dear Mr. Fontenot:

This is the fourth informal (weekly) progress report of the bioremediation system startup at Defense Fuel Supply Point, Hanahan, SC.

1. Well EW-10 (tank 2) is still not operational. Wells EW-9 (tank 2), EW-11 (tank 2), and EW-18 (neighborhood) are still extracting ground water, however. Because well EW-10 is not operational, we cannot use infiltration gallery 2.
2. Well EW-14 (tank 3) is operating, but slowly. It spends more time cycled off than on. I believe that the pump and floats are too shallow. We will initiate efforts to reset the pump and floats in wells EW-13 and EW-14. Until then, we cannot turn on infiltration gallery 3.
3. Installed 3 observation wells inside the berm of tank 1 and one outside the berm of tank 1 to evaluate the possibility that petroleum free product is still present in appreciable quantities in the facility. A check of the cores using a field GC showed high concentrations of organic compounds in all of the wells, but the highest concentrations were found in the well outside of the berm. The wells need to stabilize before evaluations regarding free product can be made.
4. Installed one additional well north of tank 2 in an area where insufficient data were available.
5. Did not install well in tank 3 bermed area, as planned, because the target area was not accessible with the drilling rig.

Sincerely



Don A. Vröblesky

cc. Wayne Barnum



# United States Department of the Interior



## GEOLOGICAL SURVEY

Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
February 21, 1992

Daryl Fontenot  
Southern Division Naval  
Facilities Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

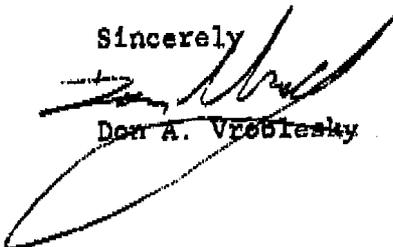
Dear Mr. Fontenot:

This is the third informal progress report of the bioremediation system startup at Defense Fuel Supply Point, Hanahan, SC.

1. As of February 21, 1992, well EW-10 is still not operational. Don Matthews has been informed.
2. Well EW-14 was operational on 2/20/92, but when the pumping rate was increased to 1.2 gpm, the pump cycled off and had still not come back online by 1/21/92. A possible explanation is that the floating cutoff-cuton switches in the well are set too shallow. Only about 2 1/2 ft of drawdown developed before the well cut off. Don Matthews said that an electrician has been called to inspect well EW-10 and that he would have him check EW-14 for electrical problems. If this does not correct the problem, Don said he would contact ROIC and set up a meeting with them for 3/2/92 to discuss the possibility of having Griffin Remediation check the well for probe problems.
3. Because of the unexpectedly high drawdowns and the inability to turn on a sufficient number of infiltration galleries to accept the amount of water being pumped from the deep well, the question arose as to whether limiting the amount of water going to the galleries would endanger the deep-well pump. Fred Robertson contacted Matt Matthews of Layne Atlantic concerning this issue. Matt Matthews stated that pumping the deep well at 2-3 gpm (the amount needed if the mini-infiltration galleries are operating alone) would probably burn up the pump. A minimum of 15 gpm is needed to assure proper cooling of the pump. Possible solutions are (1) pumping part of the required water to the oil-water separator and the rest of the water to the infiltration or mini-infiltration galleries or (2) installing a relatively low-cost pressure tank. Don Matthews stated that 13 gpm to the oil-water separator would be too much water for an extended period of time. Thus, we may need to install a pressure tank or just operate as is and risk destroying the pump.

4. Until the above problems are resolved, we cannot direct water to the infiltration galleries.
5. Well EW-18 in the neighborhood continues to operate without problems.

Sincerely



Don A. Vrebesky

cc. Wayne Barnum



# United States Department of the Interior

## GEOLOGICAL SURVEY

Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
February 18, 1992



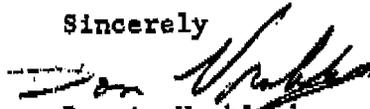
Daryl Fontenot  
Southern Division Naval  
Facilities Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

Dear Mr. Fontenot:

This is the second informal progress report of the bioremediation system startup at Defense Fuel Supply Point, Hanahan, SC.

1. Well EW-10 was repaired on 2/13/92. Clean water will be redirected to gallery 2 during the week of 2/18/92, after it is confirmed operational.
2. Wells EW-13 and EW-14 were operational for a few days, but by 2/12/92, well EW-14 had ceased to operate. The measured drawdown in well EW-14 was approximately 1/2 ft, so it was unlikely that the failure of the well was due to excessive drawdown. An electrician was called, and the well was reported to be repaired on 2/13/92. If the wells continue to operating properly, clean water will be directed to the mini-infiltration galleries at tank 3 during the week of 2/18/92.
3. Drilling for free-product exploration at tank 1 was scheduled to begin on 2/11/92, but the driller requested a delay due to other obligations. Drilling was rescheduled for 2/19/92.

Sincerely

  
Don A. Vroblasky

cc. Wayne Barnum



# United States Department of the Interior

## GEOLOGICAL SURVEY

Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
February 6, 1992



Daryl Fontenot  
Southern Division Naval  
Facilities Engineering Command  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

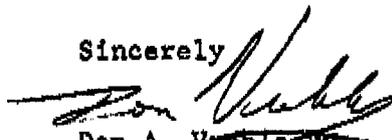
Dear Mr. Fontenot:

This is an informal progress report of the bioremediation system startup at Defense Fuel Supply Point, Hanahan, SC. I will attempt to supply reports on a more or less weekly basis during startup and revert to the normal quarterly reports after system startup.

1. Started up wells EW-9, EW-10, and EW-11 at 3.4 gpm (gallons per minute) at Tank 2 and well EW-18 in the neighborhood at 6.8 gpm on 1/27/92. Started pumping Santee Limestone water to infiltration gallery 2 at a rate of 7 gpm. Began measuring specific conductance at wells EW-9, EW-10, and EW-11. Trident Labs was told to begin their daily site inspections.
2. On 1/29/92, a check of the system showed that initial pumping rates had declined to about 2 gpm in wells EW-9, EW-10, and EW-11 and 3 gpm were being pumped to infiltration gallery 2. The pumping rates were adjusted to the original values.
3. On 2/4/92, a check of the system showed that EW-10 had not been operating for about a day. Don Matthews was informed, and he scheduled an electrical contractor to check out the well switch. Repairs are expected on 2/6/92. Because we are required to capture our recharge water, and because well EW-10 is at the center of gallery 2, I turned off the water flow to gallery 2 until well EW-10 is repaired. Wells EW-9, EW-11, and EW-18 continue to operate.
4. The average pumping rates of wells EW-9 and EW-11, calculated from totalizer readings was about 2 gpm. The measured drawdowns in the wells on 2/4/92 was 8 to 10 ft. The drawdown is excessive, so I decreased the pumping rate.
5. Started wells EW-13 and EW-14 (at tank 3) on 2/4/92. Pumping rates were set at about 1.5 gpm because the drawdowns at wells EW-9 and EW-10 implied that a pumping rate of 3.4 gpm is excessive. Specific conductance (as a tracer of Santee Limestone water) is being measured

electronically every half hour in observation wells near the pumping wells. This week we are collecting background readings. Next week we plan to start pumping Santee Limestone water to the mini-infiltration galleries at tank 3.

Sincerely



Don A. Probaskey



# United States Department of the Interior

GEOLOGICAL SURVEY

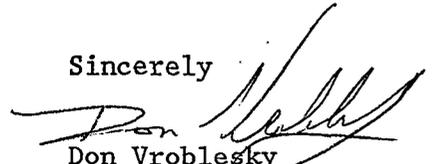
Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
April 11, 1991

Mr. Ted Campbell  
Code 11515  
SOUTHDIVNAVACENGCOM  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

Dear Mr. Campbell:

Enclosed is a copy of the January-March 1991 quarterly progress report for the Hanahan bioremediation investigation.

Sincerely



Don Vroblesky  
Ground-Water Specialist

PROJECT STATUS REVIEW SHEET, QUARTERLY REPORT

Project Number: SC078

Date: April 1991

Project Name: Remediation of JP-4 contamination using hydraulic containment and in-situ biodegradation at the Defense Fuel Point, Charleston, South Carolina

Project Chief: Don A. Vroblesky

Section Chief: Glenn Patterson

Report Period: Jan.-March 1991

Cooperator: U.S. Dept. of the Navy

Project Completion Date: 1991

PROJECT OBJECTIVES:

1. Construct and calibrate a digital ground-water flow model of the DFSP site that can be used as a tool in designing the containment-biodegradation system.
2. Monitor the operation of the containment-biodegradation system after start-up to document the hydraulic containment achieved by the system and to assess the efficiency of the system to degrade the contaminaton. As part of the effort to estimate the length of time required for aquifer remediation, an estimate of the amount of JP-4 sorbed onto aquifer materials will be made prior to startup.
3. Use the results of the monitoring program together with the estimate of JP-4 contained in the aquifer to construct a digital solute-transport model designed to estimate the time required to decontaminate the aquifer below a given threshold.

PROGRESS DURING PREVIOUS QUARTER:

1. Personnel changes: Don Vroblesky became the project chief. Leisl Rhodes was hired to assist in the project.
2. Collected ground-water and surface-water samples from several locations. The results indicated the potential for Fe-precipitation in or near the infiltration gallery. Several options for treatment of the water for iron removal were examined. Remediation is discussed in item 4.
3. Received results of chemical analysis of sediment cores by USEPA. Results indicate that the contamination downgradient from tank 3 is of a different character than downgradient from tank 1. Because operating plans indicate that all of the extraction water will be mixed and sent to the infiltration gallery, concern arose over the possibility of introducing (via the infiltration gallery) specific hazardous constituents into areas of the aquifer where they did not previously exist. Remediation is discussed in item 4.
4. To resolve the issues in items 2 and 3 above, we have decided to install an infiltration-gallery-supply well in the Santee Limestone, well beneath the contaminated shallow aquifer. All water from the extraction wells will be discharged to the sanitary sewer rather than partially recycled to the infiltration gallery.

5. Met with DHEC on 2/14/91 to discuss installation of the Santee Limestone well. All present agreed that the system change should be made.
6. Resolved to install a mini-infiltration gallery upgradient from well EW-6 and another one upgradient from well EW-7. Water going to the new galleries will differ chemically (nitrated vs nonnitrated). This will allow determinations to be made regarding the effects of bioremediation on specific constituents of the JP-4. Such determinations could not be made under the previous operating plan.
7. Reconstructed the ground-water-flow model and determined that complete capture of the contamination by the extraction wells is unlikely.
8. Reorganized the solute-transport modeling so that now the predictive aspects of remediation will be addressed by the use of an areal transport model (USGS), and selected processes accounting for nutrient uptake will be examined in the recharge/recovery zone using a cross-sectional model (Widdowson and Aelion).
9. Site meeting (3/1/91) to perform operational check on the extraction wells.
10. Site meeting (3/19/91) to perform final inspection of entire bioremediation system.
11. Installed continuous (15-min. interval) water-level recorders on wells W103 and W108 in late February.

#### SIGNIFICANT FINDINGS

1. A literature search for information on the quality of water from the Santee Limestone indicates that it has very low concentrations of iron. Thus, the iron-precipitation problem should be adequately addressed using water from the Santee Limestone for the infiltration gallery. The water also is expected to contain moderate amounts of chloride, which should provide us with a natural conservative tracer.
2. Preliminary work by the USEPA on cores from DFSP seemed to indicate that benzene and xylene degradation with nitrate addition was essentially nonexistent, although toluene degradation was noted.
3. The USEPA work showed a similar vertical distribution of organic contamination to that observed by Pete McMahon ("Total Petroleum Hydrocarbons in Sediments at the Defense Fuel Supply Point, Charleston, South Carolina"). The data also showed that the contaminants downgradient of tank #3 do not appear to be derived from JP-4.
4. It was brought to our attention that a disposal area exists at the Naval Weapons Station close to the bioremediation system at DFSP. The site, also known as the South Annex Waste Disposal Area was used from 1940 to 1960 for burying and disposal of liquid and solid industrial waste. About 2,000-5,000 gallons per week of oily wastes were dumped into the open pit during the late 1950s. The site is less than 1,000 ft northeast of tank #3.

#### PLANS FOR NEXT QUARTER

1. Run levels to water-level measuring points at all observation and extraction wells.
2. Conduct synoptic water-level measurement at all wells, including the Naval Weapons Station.
3. Construct water-table map based on synoptic measurements.
4. Collect background water samples for water-quality analysis.
5. Attend systems operation training at DFSP.
6. Install infiltration-gallery supply well in the Santee Limestone. Connect well to bioremediation system.
7. Construct mini-infiltration galleries upgradient from wells EW-6 and EW-7.
8. Evaluate the potential for influences on ground-water chemistry in the study area from possible contamination at the disposal area on the Naval Weapons Station.
9. Consider installing piezometers adjacent to free-product-recovery wells because those wells are already too tightly instrumented to allow water-level measurements.
10. It is uncertain at this time whether actual system startup will be initiated during this quarter. Startup is largely dependent on the length of time necessary to install the Santee Limestone well.

#### STATUS OF REPORTS

1. Marjorie Aelion and Mark Widdowson presented a poster session titled "Application of a numerical model to the performance and analysis of an in-situ bioremediation project" at the conference on "In Situ and On-Site Bioreclamation: an International Symposium" held in San Diego on Mar 19-21, 1991.
2. A manuscript titled "Aerobic biodegradation potential of subsurface microorganisms from a jet fuel contaminated aquifer: was published in the January 1991 issue of Applied and Environmental Microbiology (Aelion and Bradley).
3. A manuscript titled "Rates of denitrification and CO2 production in a JP-4 contaminated sediment" (Bradley and Aelion) was submitted to Environmental Science and Technology for publication.
4. A manuscript "Distribution of volatile organic compounds in soil vapor in the vicinity of the Defense Fuel Supply Point, Hanahan, South Carolina" (Robertson, Aelion, and Vroblesky) was submitted for colleague review for publication as an open-file report.



# United States Department of the Interior

GEOLOGICAL SURVEY

Water Resources Division  
1835 Assembly Street, Suite 677A  
Columbia, SC 29201-2492  
April 12, 1990

Mr. William E. Goode  
Defense Fuel Supply Center  
DFSC-FQ  
Cameron Station  
Alexandria, Virginia 22304-6160

Dear Mr. Goode:

As per our phone conversation of March 20, 1990, I have enclosed a letter for your signature stating that reports in the public domain resulting from work paid for by your organization can be cited by me in USGS reports and journal publications. The reports completed by ICF-Clement Associates, Inc. (1987), Dames and Moore (1982), McClelland Engineers, Inc. (1987) and RMT, Inc. (1987, 1988, 1989, 1990) would fall under this heading.

Also, please find enclosed a draft manuscript for a journal article to be submitted to Applied and Environmental Microbiology concerning laboratory research I have carried out on the Hanahan, South Carolina project. If you have any comments on the manuscript, please send them to me at the above address. If you have any questions or need additional information, do not hesitate to contact me at 803-765-5572.

Thank you very much for your cooperation in this matter.

Sincerely,

Marjorie Aelion, Ph.D.  
Hydrologist

Enclosure

cc: Ted Campbell, SOUDIVNAVFACENCOM

MA/vwf

I authorize the U.S. Geological Survey to cite reports in the public domain resulting from work paid for by the Defense Fuel Supply Center pertaining to the Hanahan, South Carolina site. Several of these reports include:

Dames and Moore, August 1982, Report, Environmental Hydrogeological Study, Defense Fuel Supply Point, Charleston, South Carolina.

ICF-Clement Associates, Inc., October 1987, Technical Report, Risk Assessment for the Defense Fuel Supply Point, Hanahan, South Carolina.

McClelland Engineers, Inc., March 1987, Final Report, Confirmation Study, Characterization Step, Defense Fuel Supply Point, Charleston, South Carolina.

RMT, Inc., July 1987, Final Report, Off-site Air Monitoring and Data Collection, Defense Fuel Supply Point, Charleston, South Carolina.

- January 1988, Final Report, Aquifer Evaluation, Defense Fuel Supply Point, Charleston, South Carolina.

- February 1988, Final Report, Remedial Alternatives Report, Defense Fuel Supply Point, Charleston, South Carolina.

- October 1989, Round 1 Analytical Report, Defense Fuel Supply Point, Charleston, South Carolina.

- January 1990, Round 2 Analytical Report, Defense Fuel Supply Point, Charleston, South Carolina.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Name: William E. Goode  
Chief, Environmental Quality Division  
Directorate of Facilities Management

Address: Defense Fuel Supply Point  
DFSC-FQ  
Cameron Station  
Alexandria, Virginia 22304-6160

## PROJECT STATUS REVIEW SHEET, QUARTERLY REPORT

Project Number: 078                      Date of Review: October 6, 1989  
Project Name: REMEDIATION OF JP-4 CONTAMINATION USING HYDRAULIC  
CONTAINMENT AND IN SITU BIODEGRADATION AT THE DEFENSE FUEL SUPPLY  
CENTER, CHARLESTON, SOUTH CAROLINA  
Project Chief: Marjorie Aelion              Section Chief: Glenn Patterson  
Report Period: 04-09, 1989      Cooperator: U.S. Dept. of the Navy  
Project Completion Date: 1991

### PROJECT OBJECTIVES

The project objectives are threefold:

1. To construct and calibrate a digital ground-water flow model of the DFSP site that can be used as a tool in designing the containment-biodegradation system. The USGS will determine through model simulations, a feasible and cost-effective containment-biodegradation system and recommend to SOUTH DIV specific locations of pumping wells, pumping rates for each well, and locations and recharge rates for each infiltration gallery.
2. To monitor the operation of the containment-biodegradation system after start-up to document the hydraulic containment achieved by the system and to assess the system's efficiency in degrading the contamination. As part of the effort to estimate the length of time required for aquifer remediation, an estimate of the amount of JP-4 sorbed onto aquifer materials prior to start-up will be made.
3. To use the results of the monitoring program together with the estimate of JP-4 contained in the aquifer to construct a digital solute transport model designed to estimate the time required to decontaminate the aquifer below a given threshold.

### PROGRESS DURING PREVIOUS QUARTER

Sediment borings were made at the site from March 6-13, 1989, to ascertain the amount of JP-4 in the sediments. The samples were analyzed by General Engineering Laboratories in Charleston by April 11, 1989. A report was generated summarizing the results entitled "Total Petroleum Hydrocarbons in Sediments at the Defense Fuel Supply Point, Charleston, South Carolina."

The permitting process by the Industrial and Agricultural Wastewater Division of DHEC is underway. After several meetings between DHEC and the USGS in August and September, and a site visit on September 8, 1989 by DHEC, processing of the permit to allow reintroduction of water at the site for remediation purposes has begun.

Laboratory work at the University of South Carolina to date includes <sup>14</sup>C-radioisotope experiments to look at the breakdown of specific compounds (glucose, benzene and toluene) and the production of CO<sub>2</sub>; gas chromatographic analyses of contaminated sediment monitoring specific organic compounds (n-paraffins, substituted alkanes and volatile aromatic hydrocarbons), oxygen

and CO2 concentrations over time; and monitoring of nitrous oxide production and nitrate disappearance to quantify denitrification.

#### SIGNIFICANT FINDINGS

The sediments at Hanahan have concentrations of petroleum hydrocarbons ranging from 11 to 4,487 mg/kg sediment (dry wt), with the majority of samples in the 10-100 mg/kg range.

Laboratory results show that the microorganisms at the site are actively respiring in sediment contaminated with JP-4. Aerobic respiration and denitrification are occurring. Gas chromatographic analyses suggest that the addition of nitrate significantly increases aerobic respiration and the production of CO2 (0.078 umol CO2/gm dry wt/day). There was no lag period before the production of CO2 was measured. CO2 production for the first two months of incubation was a linear function of time. Of the specific volatile compounds examined, the n-paraffins appear to be decreasing more rapidly than the aromatic compounds or the substituted alkanes. Similarly, little <sup>14</sup>C<sub>2</sub>O was measured in incubations using <sup>14</sup>C-benzene and <sup>14</sup>C-toluene.

Denitrification rates are slower than aerobic respiration rates. Nitrate consumption rates were approximately 0.02 umol NO<sub>3</sub>-N/gm dry wt/day, and nitrous oxide production rates were 0.017 umol N<sub>2</sub>O-N/gm/day. Approximately 80% of the nitrate-N was recovered as nitrous oxide-N. Nitrate concentrations above 1 mM did not increase rates of denitrification when nitrate concentrations between 0 and 40 mM were tested.

#### PLANS FOR NEXT QUARTER

In the next quarter, permitting for the project by DHEC should be completed. Monitoring of surface water and wells will begin prior to the construction of the project. This will include monitoring of: water levels in monitoring and pumping wells; quantity and quality of ground water recovered from pumping wells; quality of ground water in selected monitoring wells; and organic constituents in five surface water sites if required by DHEC in the permit.

Laboratory work will continue with the identification and quantification of specific volatile organic compounds degraded by the in situ microbial community using the GC flame ionization detector. A second round of <sup>14</sup>C experiments will be carried out using higher concentrations of benzene and toluene. Also, a <sup>14</sup>C-n-paraffin may be purchased to support results obtained from the GC analyses, and compare <sup>14</sup>C<sub>2</sub>O production rates of <sup>14</sup>C-aromatic compound and <sup>14</sup>C-alkanes.

## STATUS OF REPORTS

The sediment report entitled "Total Petroleum Hydrocarbons in Sediments at the Defense Fuel Supply Point, Charleston, South Carolina" was rewritten by Peter McMahon and is currently at Region for review. An abstract was submitted by Marjorie Aelion for the annual meeting of the American Association for the Advancement of Science to be presented in February, 1990.

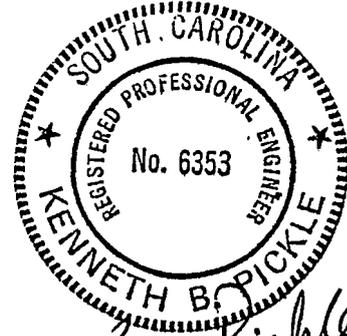
Final: File Copy

SOUTHERN DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
2155 EAGLE DRIVE  
CHARLESTON, SOUTH CAROLINA

NAVFAC  
SPECIFICATION

SPECIFICATION FOR:

JP-4 Remediation  
Defense Fuel Support Point (DFSP)  
North Rhett Avenue Extension  
Hanahan, South Carolina



*Kenn Pickle*

J.O.:9R9488\_ SEIC:Code 406RWB EIC:CODE 405LSB

1. GENERAL DESCRIPTION:

The work includes drilling and installing one approximately 340' deep ground water production well capable of producing a minimum of 40 gallons per minute continuous flow. Well development, providing a submersible pump, and providing electrical power and pump controls are also required.

1.1 Minor Materials and Work

Minor materials and work not specifically mentioned herein but necessary for the proper completion of the specified work shall be furnished without additional cost to the Government.

1.2 Omitted

1.3 Quantities

Where the quantities for quoting purposes are specified, quotes shall be based on the stated quantity; should more or less than the specified quantities be required, the Purchase Order price will be adjusted in accordance with the terms of the Purchase Order.

1.4 Existing Work

Where existing work is changed or removed, or where new work adjoins, connects to or abuts existing work, the existing work shall be altered as necessary and connected in a substantial and workmanlike manner. All new work shall match, as nearly as practicable the existing adjoining and/or adjacent similar work. Operations affecting existing work shall be conducted with care not to damage work in place; and all existing work damaged by such operations shall be rectified or replaced without additional expense to the Government.

1.5 Disposition of Removed Material

1.5.1 Salvable Materials

Except where specifically specified otherwise herein, all salvable materials and equipment disconnected or removed during the course of the work and not indicated or specified for reuse in the new work shall become the property of the Contractor and shall be removed from the Government property.

1.5.2 Debris and Unusable Materials

All flammable scrap materials and debris shall be disposed of by removing completely from the Government property.

1.6 Schedule and Sequence of Work

The work shall be prosecuted in such a manner as to cause the least interference with the normal functions of the Government activity. Prior to beginning any work, the Contractor shall meet with the Contracting Officer in order that an approved schedule and sequence of work may be arranged.

1.7 Interruption of Utilities Services

Interruptions shall be kept to a minimum and shall be at such times and durations as approved. No interruption shall occur, unless scheduled with the Contracting Officer and approved by him in advance as to time and duration of such interruption.

2. SKETCHES ACCOMPANYING SPECIFICATION

The following sketches accompany this specification and are a part thereof. Sketches are the property of the Government, and shall not be used for any purpose other than that contemplated by this specification.

SKETCH NO.	TITLE
C-1	Site Plan
C-2	Well Head Piping & Vault
C-3	Well Head Piping & Vault
C-4	Existing Valve Box
C-5	Well Schematic
C-6	Well Construction Diagram
E-1	Single Line Diagram

### 3. SITE VISITATION

Prior to submitting quotations, prospective quoters are invited to visit the site, inspect the work in place, and satisfy themselves as to the character and amount of work to be accomplished. Site visitation, if desired, may be arranged with Don Matthews. A minimum of 48 hours notice is required prior to time of visit, telephone Area Code 803, number 744-6393.

### 4. TIME FOR COMPLETION

All work shall be completed within 19 calendar days after date of Purchase Order. This completion time includes 5 days for mailing of Purchase Order.

### 5. QUOTATIONS

Submit quotations on Standard Form 18.

### 6. DETAILED REQUIREMENTS

#### 6.1 Geologic Setting

The site is located in the Lower Coastal Plain Physiographic Province. The surficial aquifer is composed of unconsolidated sand with varying amounts of silt and clay. This unit extends from land surface to a depth of approximately 30 feet. The surficial aquifer is underlain by the Cooper Marl. The Marl extends from the base of the surficial aquifer to a depth of approximately 250 feet. The Marl is underlain by the Santee Limestone.

#### 6.2 Drilling Methods and Procedures

The drilling method will be mud rotary.

##### 6.2.1 General Information

6.2.1.1 Well construction will be as presented in Sketch C-5, Well Schematic. For the purpose of bidding, contractor will quote the outside casing as 40' in length (30' to the Cooper Marl plus 10' into it); the inside casing as 250' in length; and pump depth as 120' below land surface.

6.2.1.2 Driller and other drill crew personnel must be familiar with the project drilling specifications and the drilling subcontractor's plan for health and safety, prior to their arrival on-site.

6.2.1.3 Work will be done by experienced personnel, using state-of-the-art equipment in good operating condition and free of leaks (fuel, hydraulic fluid, lubricants, and similar compounds).

6.2.1.4 Drilling and well installation will be completed by a well driller certified by the State of South Carolina. The driller will be responsible for all subcontractor activity on-site, assuring compliance with the specifications and timely completion of the work. The well driller will be responsible for notifying the State of South Carolina of the well installation, upon completion, as required by South Carolina law. Copies of the notification forms will be sent to the Contracting Officer, Southern Division, Naval Facilities Engineering Command, Code 18214.

6.2.1.5 The driller will assist the Contracting Officer's on-site representative in completing a daily field progress report of drilling operations. This report will include: project name, date, drill crew personnel, manufacturer's designation of drill rig, a general description of work completed, and other significant activities. The driller and the Contracting Officer's on-site representative will each sign the daily report upon completion. Driller will also submit to the Contracting Officer the completed Well Construction Diagram, Sketch C-6 upon completion.

6.2.1.6 Unless approved in writing by the Contracting Officer, no lubricants or glue shall be used in any manner that might possibly contaminate the samples, borehole, or well.

6.2.1.7 The driller shall be responsible for cleaning up and restoring the drill site. This will be accomplished by containing drill cuttings and drill fluids generated while drilling through the surficial aquifer (land surface to the top of the Cooper Marl). The driller shall supply the 55 gallon drums required. Disposal by others. Drill cuttings and fluids generated while drilling through the Cooper Marl and the Santee Limestone will be discarded by the driller at an on-site location designated by the Contracting Officer's on-site representative.

6.2.1.8 The driller will maintain a written log of drilling operations, completed at the time of drilling. This log will include: project name, date, drill crew personnel, borehole number, manufacturer's designation of drill rig, drilling methods, borehole size, a description of the general lithology of each major stratum encountered, sampling methods and intervals sampled, blow counts and any other significant drilling characteristics. The reproducible copy of this log will be turned over to the Contracting Officer when drilling is completed.

## 6.2.2 Mud Rotary

6.2.2.1 Drilling will be done using mud rotary techniques. Drilling fluid will be made up of potable water and bentonite powder. Borehole diameter when drilling through the surficial aquifer will be 12 inches. The borehole diameter when drilling through the Cooper Marl will be 10 inches and the borehole diameter when drilling in the Santee Limestone will be 6 inches.

6.2.2.2 The settling pit (i.e. "mud tub", "sump", etc.) will be covered during drilling operations to reduce the possibility of contaminating the drilling fluid. Equipment, such as hoses or tools, will not be placed in the settling pit if it may introduce contaminants into the drilling fluid.

## 6.2.3 Installation of Surface Casing

When drilling through the surficial aquifer the driller will be responsible for installing surface casing. A second string of casing will be set within the Cooper Marl.

6.2.3.1 When drilling through the surficial aquifer, the borehole will be advanced approximately ten feet into the Cooper Marl by the previously specified drilling method. This depth will be determined by the Contracting Officer's personnel in the field and is estimated at 30 feet below land surface. The second string of casing will extend to the base of the Cooper Marl, approximately 250 feet below land surface.

6.2.3.2 When the borehole has been advanced to the desired depth the casing will be placed in the borehole. The borehole must be clean and open to the desired depth. Surface casing will be 10 inch I.D. threaded PVC. The second string of casing will be 6 inch I.D. threaded PVC.

6.2.3.3 After being placed into the top of the Cooper Marl, the surface casing will be grouted in place by filling the entire annular space with grout. Grout will be placed using a rigid tremie from the bottom of the annular space upward or by pressure grouting through the inside of the surface casing, forcing the grout upward through the annular space.

6.2.3.4 After the grout has hardened sufficiently, as determined by the Contracting Officer's personnel in the field, the borehole will be flushed with potable water prior to continuing by the specified method. The second string of casing will be grouted in place according to the methods specified in section 6.2.3.3 above. As with the surface casing, the grout will be allowed to harden sufficiently before advancing the borehole into the Santee limestone.

#### 6.2.4 Grouting

The driller will be responsible for grouting with a Portland cement slurry containing approximately five percent (5%) powdered bentonite. The grout slurry will be mixed by pump recirculation or other methods acceptable to the Contracting Officer. When thoroughly mixed, the slurry will be pumped into the borehole or annulus via a rigid tremie.

#### 6.3 Well Development

6.3.1 The driller will be responsible for well development by pumping with a submersible pump until discharge is relatively clear and free of sediment. A surge block or swab may be necessary for proper development and must be available on-site.

6.3.2 The driller will be responsible for providing to the contracting officer a record of measurements that establishes that the installed pump can deliver a minimum of 40 gpm. Measurements shall be taken over a length of time sufficient to attain steady state conditions and shall include time from beginning of pumping, pump rate, and water level in the well. The contracting officer's on-site representative will determine when the pumping and measurements are sufficient to meet this requirement. For the purpose of bidding assume 5 hours will be required.

6.3.3 The driller will be responsible for documenting well development on forms provided by the Contracting Officer. Forms will be completed at the time of development and delivered to the Contracting Officer upon completion.

6.3.4 Well development water will be discharged on-site at a location specified by the Contracting Officer's on-site representative.

#### 6.4 Decontamination

The driller will be responsible for decontamination of the drill rig, downhole tools, sampling equipment, well materials and vehicles .

6.4.1 Decontamination will be accomplished by steam cleaning before drilling and after setting the surface casing. Brushing may be required to remove hard or caked on material. Clean tools and equipment will be placed on and covered by clean plastic sheeting (or wrapped in aluminum foil) during transportation and storage. Downhole tools or equipment that contact possibly contaminated surfaces must be decontaminated before further use.

6.4.2 Well development equipment will be decontaminated and transported in the same manner as downhole drilling tools prior to use.

## 6.5 Health and Safety

The drilling subcontractor shall, as a minimum, satisfy all applicable federal, state, and local statutes, regulations, and ordinances regarding health and safety, including, but not limited to, the standards contained in 29 CFR 1926 Construction and Industry and CFR 1910 General Industry, with special attention to 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response, Interim Final Rule, U.S. Department of Labor, Occupational Safety and Health Administration.

## 6.6 Miscellaneous Information

6.6.1 Drilling, well installation and associated tasks will be observed by the Contracting Officer's personnel on-site; drilling subcontractor personnel shall not be on-site without a Contracting Officer's representative being present unless specific prior approval is given by the Contracting Officer.

6.6.2 Strict project confidentiality will be maintained. Nonessential personnel should not be on-site. Inquiries from the news media or from the public will be referred to the Contracting Officer immediately.

## 6.7 Submersible Pump and Piping

6.7.1 Provide a four-inch stainless steel submersible pump delivering a minimum of 40 gpm at 140' TDH. Integral check valve and safety hook are required. An acceptable product meeting the requirements of this specification is the Grundfos Model 60S30-5 with 3 hp motor. Anticipated depth of pump is 120' below land surface.

6.7.2 Provide a well head vault and well head piping as shown on sketches C-2 and C-3. Metal pipe and fittings shall be galvanized steel conforming to ASTM-A120.

6.7.3 Provide additional piping modifications as shown on sketch C-4. Plastic pipe and fittings shall be schedule 80 PVC and shall conform to ASTM F402, ASTM D1784, ASTM D1785, ASTM D2476, ASTM D2564, and ASTM D2855.

6.7.4 The backflow preventer shall be tested and certified in accordance with the standards set forth in FCCCHR of USC Manual Section 10.

6.7.5 Provide pump electrical power and controls as shown on sketch E-1. Installation shall be per the latest edition of the National Electrical Code and all applicable state and local codes. All materials shall be approved by Underwriters Laboratory. Conduit to be rigid galvanized steel. Cable shall be copper conductor with THHN-THWN insulation.

6.7.6 The pump shall be 230 volts, single phase and supplied with the following power and controls items.

- Overcurrent protection
- Overload protection, manual reset
- Run light, power light
- "Hand-off-Auto" selector switch
- Low voltage power supply from 230 volt, single phase, if required
- Above items in single (NEMA 4) enclosure suitable for strut mounting outdoors
- Level system to stop the pump motor before it is unsubmerged

- Minimum 150' of cable between the pump and controller (power wiring)
- Minimum 150' of cable between the level system and controller (control wiring)

6.8 Submittals

Submit the following to the Contracting Officer for approval.

6.8.1 Manufacturer's Data

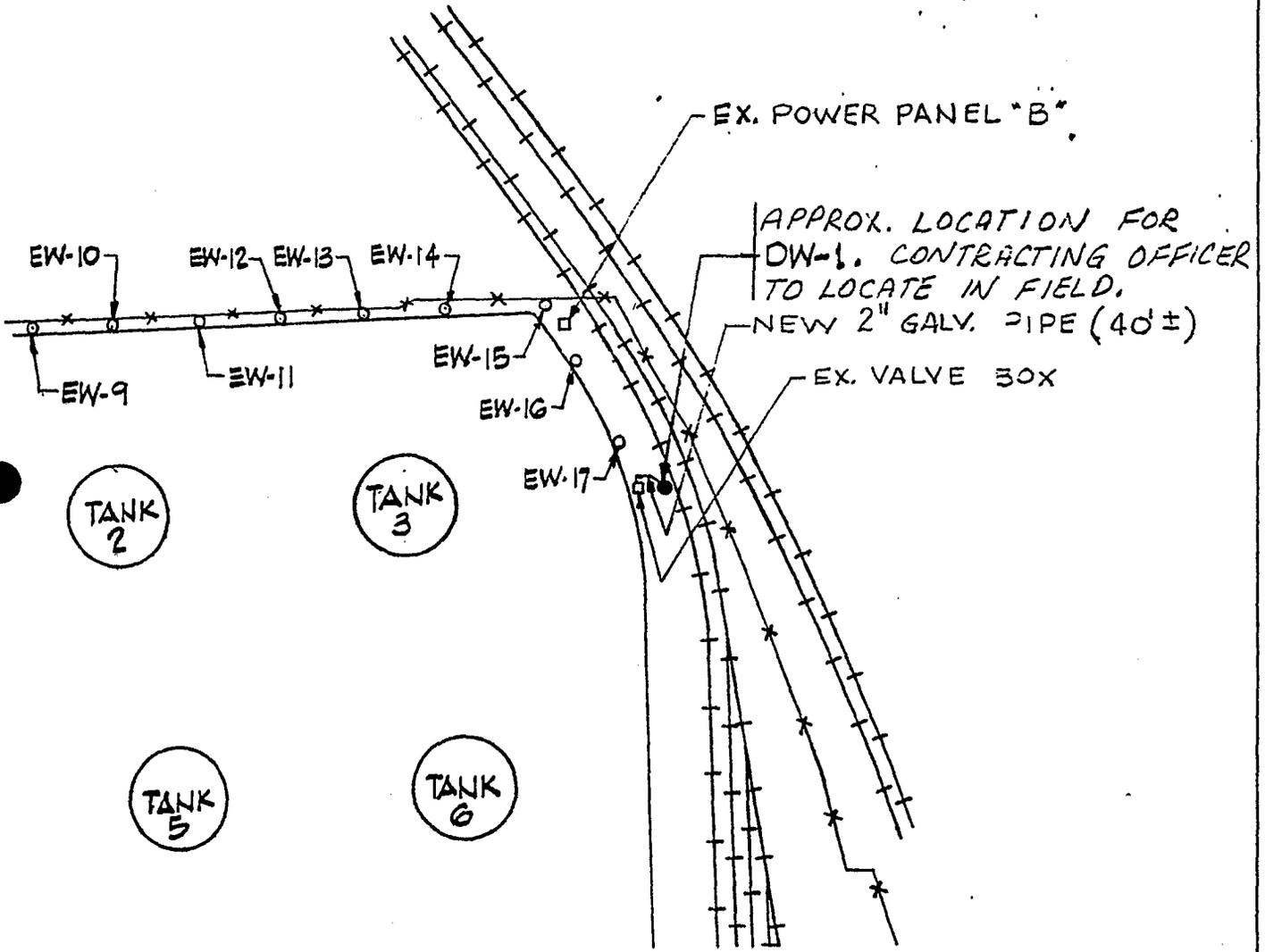
Manufacturer's data for well casing, submersible pump, backflow preventer, and pump controls. Manufacturer's printed installation instructions shall accompany or be contained with the data. Submit prior to beginning work.

6.8.2 At the completion of work, submit certification by a professional engineer registered in South Carolina that the work has been completed in accordance with the plans and specs contained herein.

-- End of Section

# LEGEND

- EW-15 EXISTING WELL
- \* \* \* \* \* EXISTING FENCE
- + + + + + EXISTING RAILROAD
- TANK 5 EXISTING TANK
- DW-1 NEW DEEP WELL



# SITE PLAN

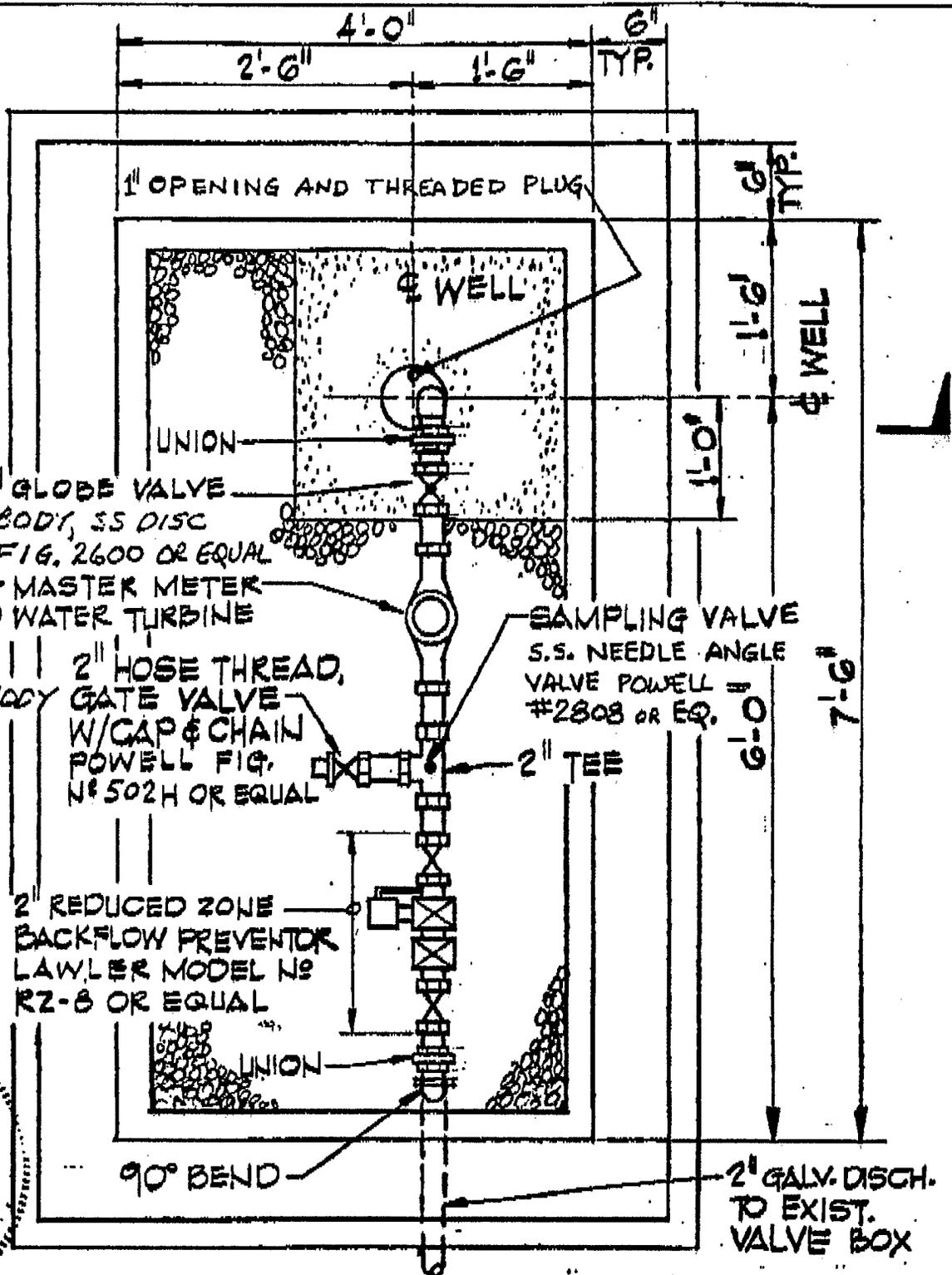
1" = 200'

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

Prepared by: **D. CROCKER**  
 Approved by: *Ken Puckett*  
 Date: 5/1/91  
 Scale: AS NOTED

**DFSP - JP-4**  
**SITE PLAN**

Amendment No. \_\_\_\_\_ Sketch No. C-1  
 Spec. No. \_\_\_\_\_ Contract No. \_\_\_\_\_



2" GLOBE VALVE  
BRONZE BODY, SS DISC  
POWELL FIG. 2600 OR EQUAL  
2" METER-MASTER METER  
MMT COLD WATER TURBINE  
OR EQUAL

2" HOSE THREAD,  
BRONZE BODY GATE VALVE  
W/CAP & CHAIN  
POWELL FIG. #502H OR EQUAL

2" REDUCED ZONE  
BACKFLOW PREVENTOR  
LAWLER MODEL NO  
RZ-8 OR EQUAL

SAMPLING VALVE  
S.S. NEEDLE ANGLE  
VALVE POWELL #2808 OR EQ.

PLAN-WELL HEAD PIPING & VAULT

3/4" = 1'-0"

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

Prepared by D. CROCKER

Approved by Paul Pickle

Date 5/1/91

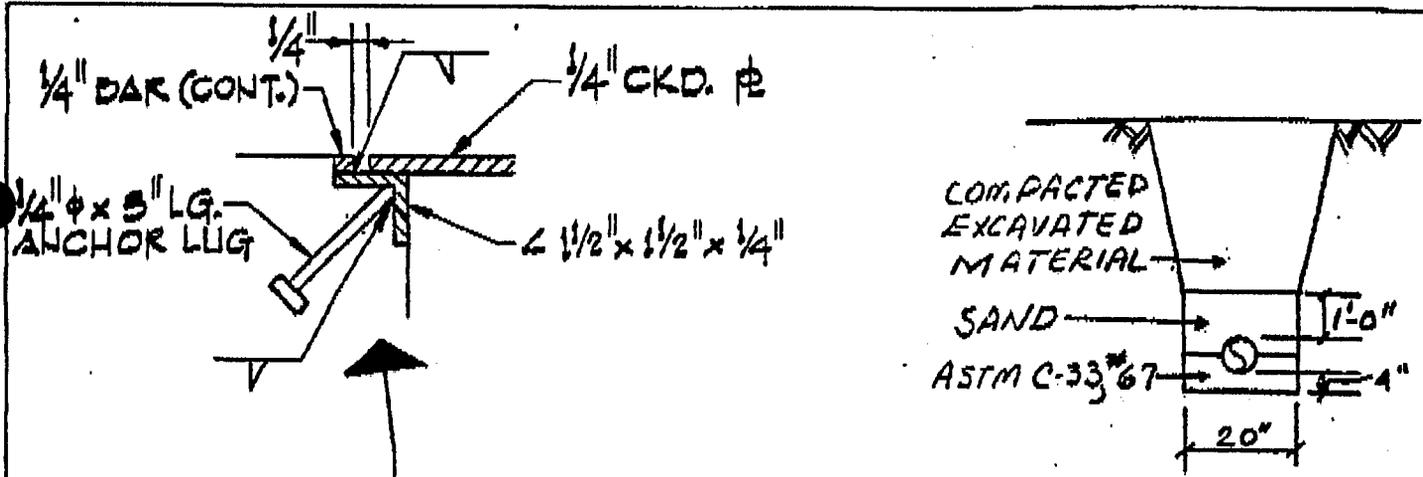
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Amendment No. \_\_\_\_\_

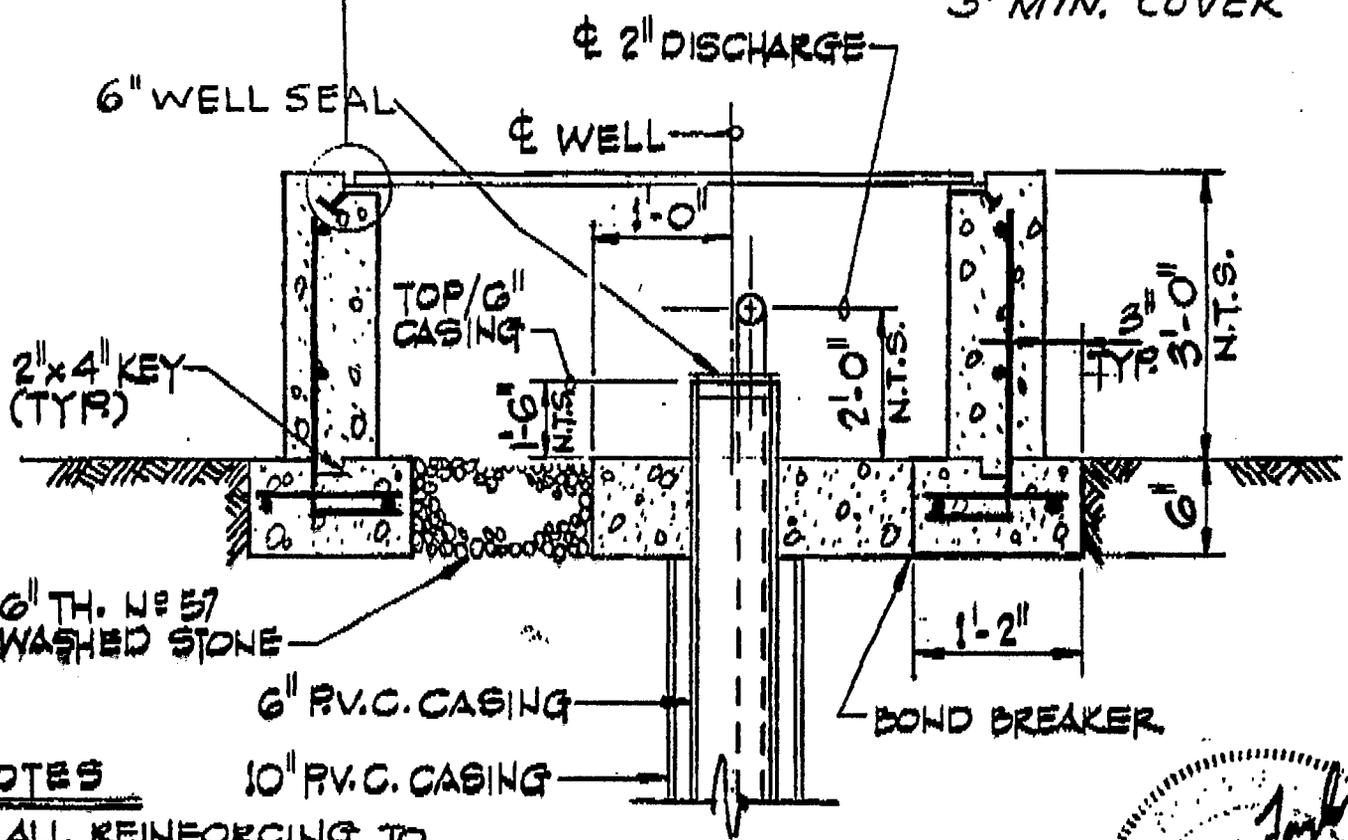
Sketch No. C-2

Contract No. \_\_\_\_\_

DFSP - JP-4  
WELL HEAD PIPING & VAULT



TRENCH DETAIL  
 NTS  
 3' MIN. COVER



NOTES

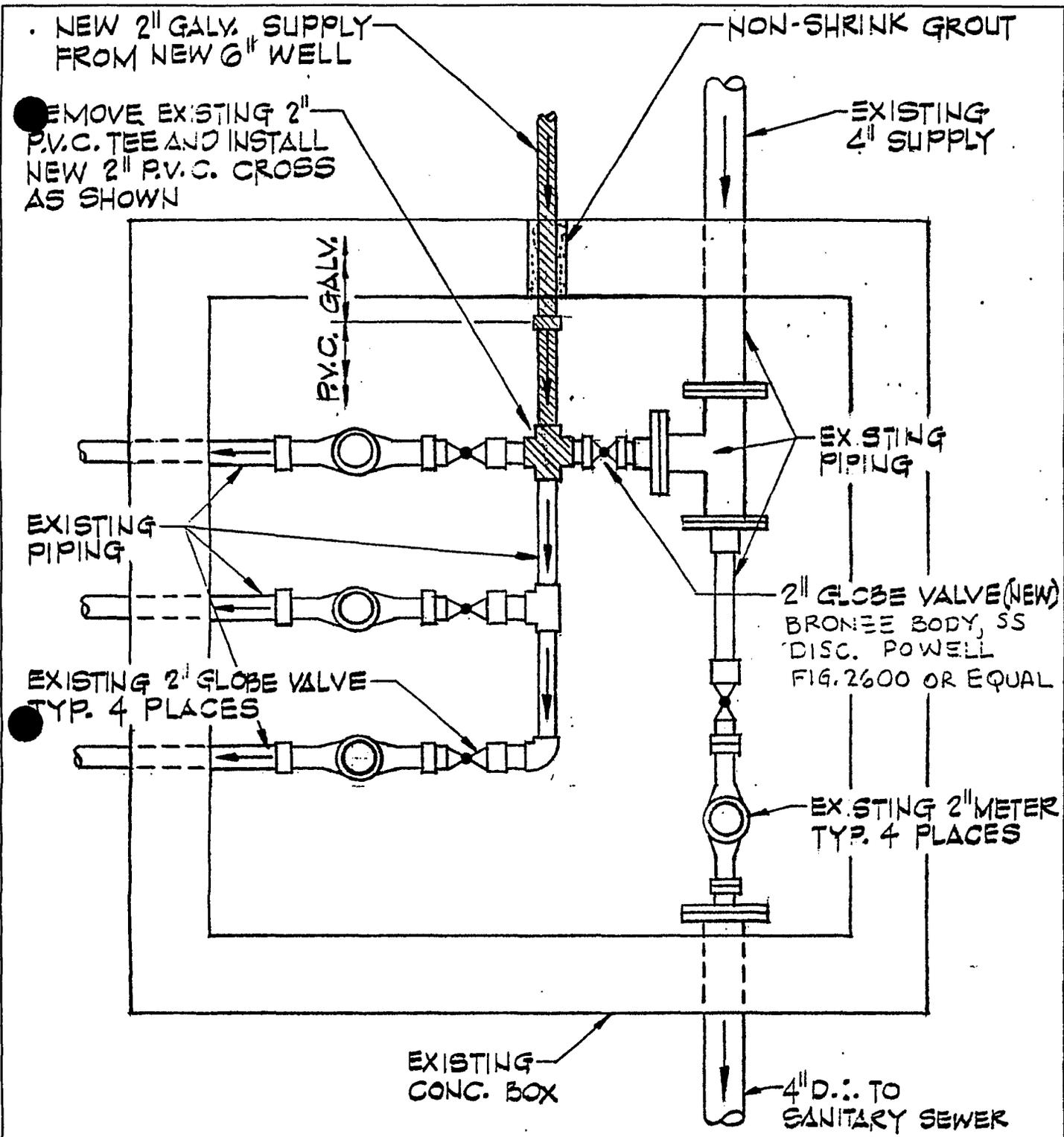
1. ALL REINFORCING TO BE #4 @ 12".
2. CONCRETE SHALL BE 3,000 P.S.I. @ 28 DAYS.
3. PROVIDE OKD. # TOP IN 2 SECTIONS WITH 2 LIFTING HANDLES PER SECTION.



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

Prepared by D. CROCKER  
 Approved by Paul K. K. K.  
 Date 5/1/91  
 Scale AS NOTED

DFSP - JP. 4  
WELL HEAD PIPING & VAULT  
 Amendment No. \_\_\_\_\_ Sketch No. C-3  
 Spec. No. \_\_\_\_\_ Contract No. \_\_\_\_\_



PLAN - EXISTING VALVE BOX

3/4" = 1'-0"

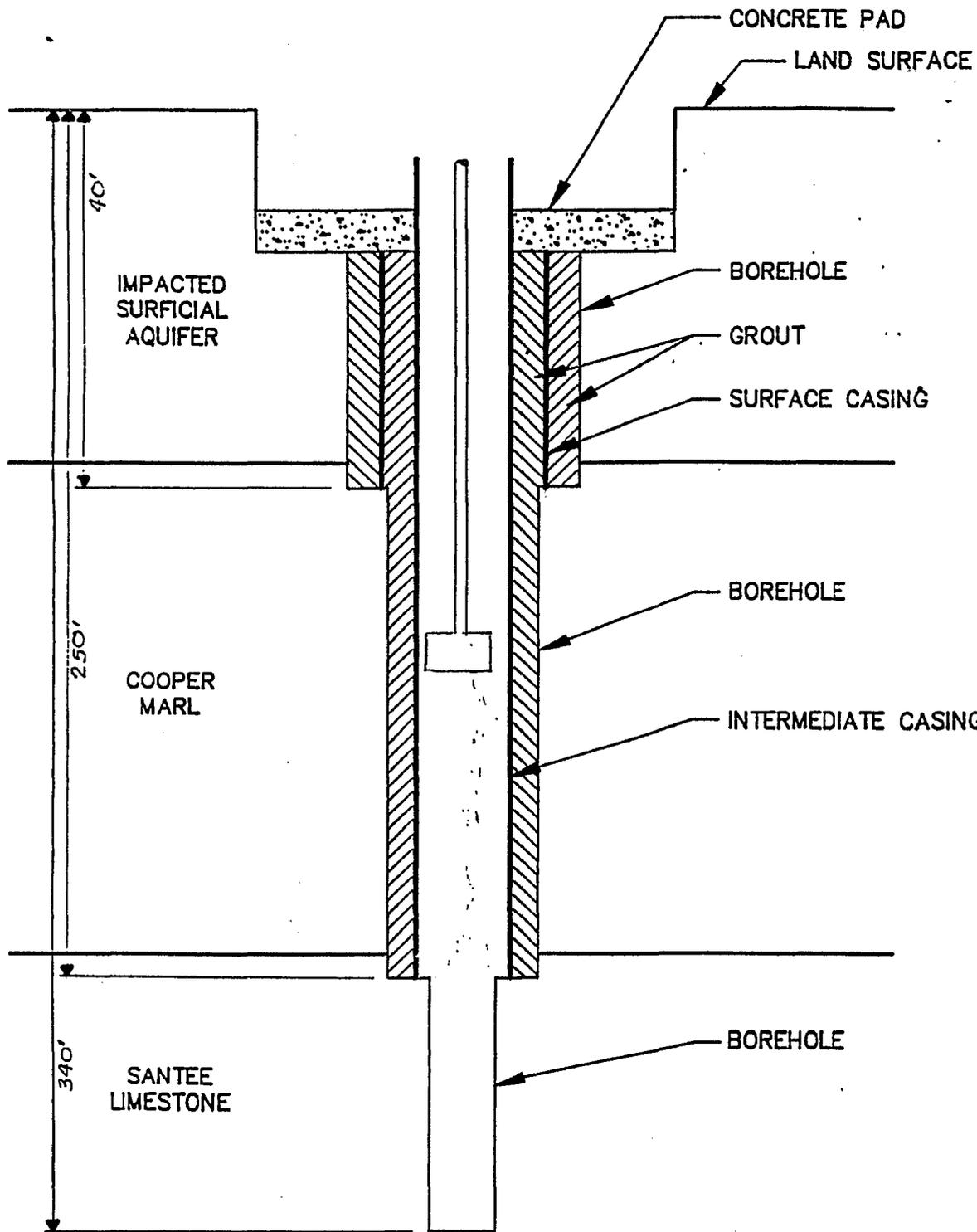
DEPARTMENT OF THE NAVY

NAVAL FACILITIES ENGINEERING COMMAND

SOUTHERN DIVISION - Charleston, S.C.

Prepared by D. CROCKER  
 Approved by Genl Pickle  
 Date 5/1/31  
 Scale AS NOTED

DFSP - JP.4  
 EXISTING VALVE BOX  
 Amendment No. \_\_\_\_\_ Sketch No. C-4  
 Spec. No. \_\_\_\_\_ Contract No. \_\_\_\_\_



DEPARTMENT OF THE NAVY

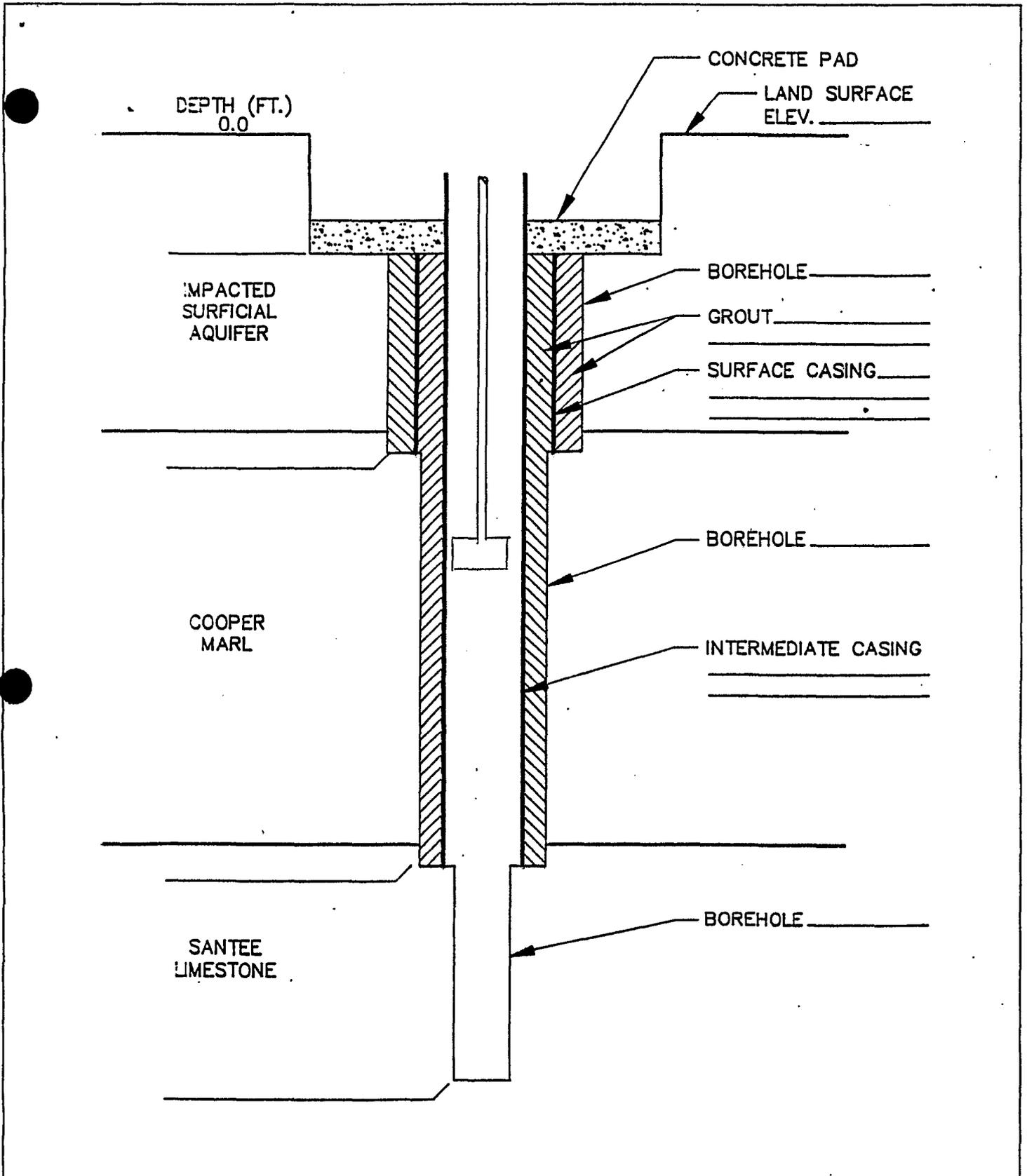
NAVAL FACILITIES ENGINEERING COMMAND

SOUTHERN DIVISION - Charleston, S.C.

Prepared by JS. BECHTOLD  
 Approved by *M. S. Whitfield*  
 Date 5/1/91  
 Scale NOT TO SCALE

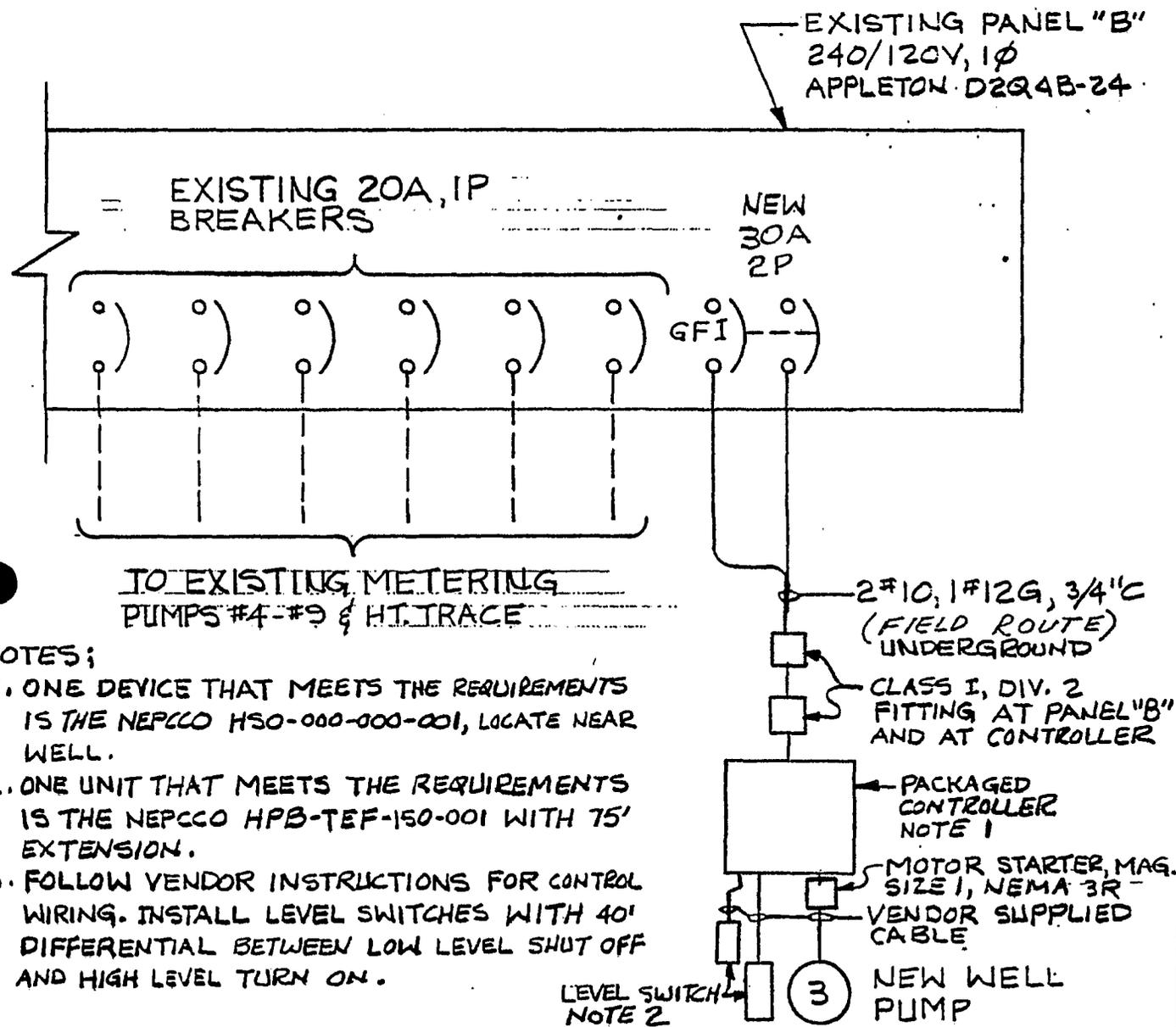
DFSP - JP-4  
 WELL SCHEMATIC

Amendment No. \_\_\_\_\_ Sketch No. C-5  
 Spec. No. \_\_\_\_\_ Contract No. \_\_\_\_\_



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

Prepared by <u>JS. BECHTOLD</u>	DFSP - JP-4
Approved by <u><i>[Signature]</i></u>	WELL CONSTRUCTION DIAGRAM
Date <u>5/1/91</u>	Amendment No. _____ Sketch No. <u>C-6</u>
Scale <u>NOT TO SCALE</u>	Spec. No. _____ Contract No. _____



NOTES;

1. ONE DEVICE THAT MEETS THE REQUIREMENTS IS THE NEPCCO HSO-000-000-001, LOCATE NEAR WELL.
2. ONE UNIT THAT MEETS THE REQUIREMENTS IS THE NEPCCO HPB-TEF-150-001 WITH 75' EXTENSION.
3. FOLLOW VENDOR INSTRUCTIONS FOR CONTROL WIRING. INSTALL LEVEL SWITCHES WITH 40' DIFFERENTIAL BETWEEN LOW LEVEL SHUT OFF AND HIGH LEVEL TURN ON.

DEPARTMENT OF THE NAVY

NAVAL FACILITIES ENGINEERING COMMAND

SOUTHERN DIVISION - Charleston, S.C.

Prepared by JOHN MIDDLETON

DEFENSE FUEL SUPPORT POINT CHARLESTON, S.C.

Approved by *Nick Pasquale*

JP-4 REMEDIATION  
SINGLE LINE DIAGRAM

Date 30 APRIL 1991

Amendment No. \_\_\_\_\_

Sketch No. E-1

Scale NONE

Spec. No. \_\_\_\_\_

Contract No. \_\_\_\_\_

**GROUND-WATER PROTECTION DIVISION**

**Injection Well Construction Permit  
for**

**Class II, III, and V.A. Injection Well(s)**

Permit #112

Date Issued: June 14, 1991

For (Operator): Department of the Navy  
Southern Division  
2155 Eagle Drive, P. O. Box 10068  
Charleston, SC 29411-0068

In accordance with provisions of Title 48, Chapter 1, South Carolina Code of Laws, 1976, as amended, permission is granted for construction of one (1) Class V.A.-G injection well a total depth ranging from 4' to 6' located at the Defence Fuel Supply Point, Hanahan, Berkely county, with the following provisions:

- 1) The operator shall submit completed construction details of the infiltration trench to the Department's Ground-Water Protection Division after the completion.
- 2) Upon completion of construction, injection activities shall not commence prior to receiving approval from the Department to operate these injection wells.



---

David Baize, Manager  
Assessment & Development Section  
Ground-Water Protection Division  
Bureau of Drinking Water Protection

June 14, 1991  
Date

DHEC 2104 (6/88)

Commissioner: Michael D. Jarrett

Board: John B. Pate, MD, Chairman  
William E. Applegate, III, Vice Chairman  
John H. Burriss, Secretary

Toney Graham, Jr., MD  
Richard E. Jabbour, DDS  
Henry S. Jordan, MD  
Robert J. Stripling, Jr.

*Promoting Health, Protecting the Environment*

## STATEMENT OF BASIS

In accordance with the South Carolina Underground Injection Control Regulations, Section R61-87.12, J., this "Statement of Basis" has been prepared for the Department of the Navy Underground Injection Control permit application dated May 2, 1991.

Ownership of the proposed injection well is Department of the Navy. The draft permit (permit #112) is for the construction of one injection well for corrective action at Defence Fuel Supply point. The intent of the injection well is to inject water extracted from one extraction well that has been enriched with nitrogen and phosphorous for the purpose of creating a hydraulic barrier and enhancing bioremediation of the soils and surficial aquifer. The draft permit for the underground injection proposal has been prepared based on staff review and the application of the Pollution Control Act of South Carolina and the Underground Injection Control Regulations of South Carolina.

The permit is being granted in accordance with section R61-87.13 of the Underground Injection Control Regulations. The decision is based on the proposed average daily concentrations of the water to be injected pose no violation of the Primary and Secondary Drinking Water Standards.

Conditions of the permit requires inspection of well construction by the Department prior to injection.

FM - CLAUDE ROBERTSON

TO - JIMMY ELLIOTT

SUBJ - JP 4 REM -

I FOUND 2 REPORTS  
(DRI & CRT) DATED 8/24/90  
WHICH MENTION THE LEAK TEST.

Claude 10/3/91

10/3/91

Darrell,

For your  
Info, Is this  
Sufficient?

Jimmy  
Blum  
(665)



12. JOB SAFETY (Unrectified hazards- lost time accidents)

*None*

13. INSTRUCTIONS GIVEN CQC REPRESENTATIVE/SUPERINTENDENT (Follow up in writing)

*NA*

14. DEFICIENCIES NOTFD (Attach Contract Construction Compliance Notice, NAVFAC 4330/36)

*None*

15. REMARKS (Pitfalls, delays, problem areas, job progress, fires, field changes, change orders, adherence to CQC plan, CQC Records)

*None*

16. SIGNATURE OF CONSTRUCTION REPRESENTATIVE

*James F. Jones*



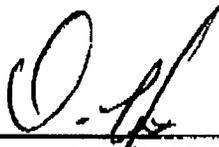
SPEC. PARA. AND/OR DRAWING NO.	LOCATION AND DESCRIPTION OF DEFICIENCIES (Materials, Equipment, Safety, and/or Workmanship) ACTION TAKEN OR TO BE TAKEN

DEFICIENCIES CORRECTED THIS DATE	REFERENCE	
	REPORT NO.	COMPLIANCE NOTICE NO.

INSPECTION AND/OR TESTING PERFORMED TODAY-FOLLOW WITH REPORT	LOCATION AND/OR ELEMENT OF WORK	REMARKS RESULTS OF INSPECTION/TESTING

SPEC. PARA. AND/OR DRAWING NO.	EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (Description, Sizes, Quantity)	SUBMITTAL NO. OR CERTIFICATION	DATE APPROVED

REMARKS (Include directions received from ROICC/AROICC, visitors, compliance notices received, errors and/or omission in P/S; pertinent information)

  
 \_\_\_\_\_  
 CONTRACTOR/SUPERINTENDENT                      8-29                      DATE

CONSTRUCTION REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THIS REPORT

\_\_\_\_\_  
 CONSTRUCTION REPRESENTATIVE                      DATE

5090/11  
Code 18214

Mr. Bill Botts  
Industrial Wastewater Division  
SC Department of Health and Environmental Control  
2600 Bull Street  
Columbia, SC 29201

27 MAR 1991

Subj: REQUEST FOR MODIFICATION TO CONSTRUCTION PERMIT #15,707 AT DEFENSE FUEL  
SUPPLY POINT (DFSP), HANAHAN, SC

Dear Mr. Botts:

This letter is a follow up to the 14 February 91 meeting between Mr. Ted Campbell of this command and representatives from both United States Geologic Survey and SCDHEC's Groundwater, Industrial Wastewater, and Enforcement Sections. This letter serves as a formal request for modification to the subject permit.

As discussed in the meeting, the bioremediation system needs to be modified based on the potential for iron precipitation to occur in the infiltration galleries. Enclosure (1) provides a description and schematic of the proposed modification. Enclosure (2) provides the construction detail for the proposed deep well.

We are currently requesting approval from North Charleston Sewer District (NCSD) to increase our discharge flow rates. The modified NCSD permit will be forwarded to you as soon as we receive it. In addition, an Underground Injection Control Permit is being requested from the Groundwater protection Section at SCDHEC.

If this Construction Permit modification meets SCDHEC approval please forward written notification of the permit change. We appreciate your help in this matter. If you have any questions regarding this or other permit concerns, please call Mr. Ted Campbell, Code 18214, at 743-0576.

09B  
182  
18214  
Daily  
WANG 1477L p28

Sincerely,

H. J. FRASER, P.E.  
ACTING HEAD, REMEDIAL  
ACTIVITIES BRANCH

182  
1821  
18214x  
CLH  
3/7/91

Encl:

- (1) Memorandum on Proposed Modification to  
Bioremediation System, DFSP, Hanahan, SC  
of 1 Mar 91
- (2) Construction Detail for Proposed Deep Well

Copy to:

NCSD (Mr. David Thompson)  
SCDHEC (Mr. Marvin Murray)  
(Mr. David Balze)  
DLA (Mr. Wayne Barnum)

5090/11  
Code 18214

27 MAR 1991

Mr. Rob Devlin  
Groundwater Protection  
SC Department of Health and Environmental Control  
2600 Bull Street  
Columbia, SC 29201

Subj: REQUEST FOR UNDERGROUND INJECTION CONTROL (UIC) PERMIT FOR  
BIOREMEDIATION PROJECT AT DEFENSE FUEL SUPPLY POINT (DFSP),  
HANAHAN, SC (CONSTRUCTION PERMIT #15,707)

Dear Mr. Devlin:

This letter is a follow up to the 14 February 91 meeting between Mr. Ted Campbell of this command and representatives from both United States Geologic Survey and SCDHEC's Groundwater, Industrial Wastewater, and Enforcement Sections. This letter serves as a formal request for a UIC Permit for the subject site.

As discussed in the meeting, the bioremediation system needs to be modified based on the potential for iron precipitation to occur in the infiltration galleries. Enclosure (1) is the completed UIC permit application and corresponding attachments. Enclosure (2) provides the construction detail for the proposed deep well.

If this request meets SCDHEC approval please forward your written notification. We appreciate your help in this matter. If you have any questions regarding this or other permit concerns please call Mr. Ted Campbell, Code 18214, at (803) 743-0576.

09B  
182  
18214  
Dally  
WANG 1477L p24

Sincerely,  
  
H. J. FRASER, P.E.  
ACTING HEAD, REMEDIAL  
ACTIVITIES BRANCH

182  
1821  
18214x  
CLH  
3/7/91

Encl:

- (1) Completed UIC Permit Application and Corresponding Attachments
- (2) Construction Detail for Proposed Deep Well

Copy to:  
(w/o encl)  
SCDHEC (Mr. Marvin Murray)  
(Mr. Balze)  
(Mr. Bill Botts)  
DLA (Mr. Wayne Barnum) (w/encl)

5090/11  
Code 18214

27 MAR 1991

Mr. David Baize  
Groundwater Protection  
SC Department of Health and Environmental Control  
2600 Bull Street  
Columbia, SC 29201

Subj: PROPOSED MODIFICATION OF BIOREMEDIATION SYSTEM AT DEFENSE FUEL SUPPLY  
POINT (DFSP), HANAHAN, SC (CONSTRUCTION PERMIT #15,707)

Dear Mr. Baize:

This letter is a follow up to the 14 February 91 meeting between Mr. Ted Campbell of this command and representatives from both United States Geologic Survey and SCDHEC's Groundwater, Industrial Wastewater, and Enforcement Sections. This letter serves to formally propose to SCDHEC's Groundwater section a modification to the subject project. In addition, this letter formally requests approval to install one deep extraction well as part of the system modification.

As discussed in the meeting, the bioremediation system needs to be modified based on the potential for iron precipitation in the infiltration galleries. Enclosure (1) provides a description and schematic of the system modification. Enclosure (2) provides a construction detail of the deep well to be drilled as part of the system modification.

If this proposal and well detail meet SCDHEC approval please forward your written concurrence. We appreciate your help in this matter. If you have any questions regarding this or other permit concerns please call Mr. Ted Campbell, Code 18214, at 743-0576.

09B  
182  
18214  
Daily  
WANG 1477L p25

Sincerely,

H. J. FRASER, P.E.  
ACTING HEAD, REMEDIAL  
ACTIVITIES BRANCH

182  
1821  
18214x  
CLH  
3/7/91

Encl:

- (1) Memorandum of 1 Mar 91 on Proposed Modification to Bioremediation System, DFSP, Hanahan, SC
- (2) Construction detail for Proposed Deep Well

Copy to:  
(w/o encl)  
SCDHEC (Mr. Marvin Murray)  
(Mr. Bill Botts)  
DLA (Mr. Wayne Barnum)

5090/11  
Code 18214

27 MAR 1991

Mr. Ed Lohr  
Officer-in-Charge of Construction  
Building 5, 09AZ  
Naval Weapons Station  
Charleston, SC 29408-7000

Subj: COORDINATION FOR INCREASED DISCHARGE INTO MANHOLE #102 FOR THE DEFENSE  
FUEL SUPPLY POINT (DFSP) BIOREMEDIATION PROJECT, HANAHAN, SC

Dear Mr. Lohr:

This letter is a follow up to your telephone conversation with Mr. John Collins of Southern Division Navy (SOUTHDIV) concerning increased discharge rates into manhole #102 for the subject project. An increased discharge rate to North Charleston Sewer District (NCSO) is necessary due to a change in the bioremediation system.

To briefly describe the bioremediation situation at DFSP, approximately 70 gpm must be extracted from the surficial aquifer to maintain hydraulic control at the site boundary. As you know, approximately 40 gpm of this was originally scheduled to be infiltrated back into the bioremediation system, with the remaining 30 gpm to be sent to NCSO via manhole #102 on the Naval Weapons Station (WPNSTA) South Annex. However, it has been discovered that iron precipitation problems are likely to occur in the infiltration galleries due to elevated iron levels in the extracted groundwater. As a result, it is necessary to use an iron-free source of water for the infiltration galleries. Thus, the additional 40 gpm will need to be sent to NCSO instead of injecting it into the galleries. Given the conditions, this appears to be the only cost-effective and technically sound alternative available.

As per the Memorandum of Agreement (MOA) between WPNSTA and DFSP Alexandria, VA, of 18 July 89, this letter is being submitted to fully coordinate the system modifications with WPNSTA. This letter serves to notify WPNSTA that an increase in discharge flow rate to 70 gpm (100, 800 gpd) into manhole #102 is necessary.

A formal request has been made to NCSO to allow for the increased flow. Initial discussions with NCSO indicate that the higher flow rates should not pose a problem. Effluent concentrations are not expected to exceed current permit limits. All monitoring, reporting, and special condition requirements

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18214x  
CLH  
3/7/91

Subj: COORDINATION FOR INCREASED DISCHARGE INTO MANHOLE #102 FOR THE DEFENSE  
FUEL SUPPLY POINT (DFSP) BIOREMEDIATION PROJECT, MANAHAN, SC

will be followed as outlined in the current permit and in the MOA. Billing  
for the increased flow rate will follow current practice.

SOUTHDIIV appreciates WPNSTA's assistance in this project and in this  
modification. If WPNSTA has any questions or concerns regarding the  
modification, please call Mr. Ted Campbell, Code 18214, Remedial Project  
Manager, (SOUTHDIIV) at 743-0576.

Sincerely,

H. J. FRASER, P.E.  
ACTING HEAD, REMEDIAL  
ACTIVITIES BRANCH

Copy to:  
DLA (Mr. Wayne Barnum)  
DFSP (Mr. Don Matthews)  
SOUTHDIIV (Mr. John Collins)

WELL CLASS AND TYPE CODES

Class I Industrial, municipal, and other injection wells for the subsurface disposal of fluids. (Prohibited)

Class II Oil and gas production and storage related injection wells.

- Type "D" Produced fluid disposal well
- "R" Enhanced recovery well
- "H" Hydrocarbon storage well (excluding natural gas)
- "X" Other Class II wells

Class III Special process injection wells.

- Type "G" Solution mining well.
- "S" Sulfur mining well by Frasch process
- "U" Uranium mining well (excluding solution mining of conventional mines)
- "X" Other Class III wells

Class IV Hazardous or radioactive waste disposal injection wells. (Prohibited)

Class V.A. Injection wells not included in Class I, II, III, IV, or V.B..

- Type "A" Storm runoff drainage wells
- "B" Aquifer recharge wells
- "C" Salt-water intrusion barrier wells
- "D" Subsidence control wells
- "E" Backfill wells associated with subsurface mining
- "F" Geothermal energy recovery wells
- "G" Experimental technologies wells
- "H" Natural gas storage wells
- "I" Corrective Action Wells

Class V.B. Non-contact return flow system wells.

- Type "A" Heat pump return flow wells
- "B" Cooling water return flow wells

C. 3180000

Form 1 UIC	South Carolina Department of Health and Environmental Control Ground-Water Protection Division UNDERGROUND INJECTION CONTROL PERMIT APPLICATION (Collected under the authority of Title 48 Chapter 1 of the 1976 South Carolina Code of Laws)	I. EPA ID NUMBER		
		U	SC7570024332	T/A C

READ ATTACHED INSTRUCTIONS BEFORE STARTING FOR OFFICIAL USE ONLY

Application approved mo day year	Date Received mo day year	Permit/Well Number

Comments

II. FACILITY NAME AND ADDRESS			III. OWNER/OPERATOR AND ADDRESS		
Facility Name DEFENSE FUEL SUPPORT POINT (DFSP, HANAHAN, SC)			Owner/Operator Name DEFENSE LOGISTICS AGENCY (DLA)		
Street Address 5862 N. Rhett Blvd.			Street Address DFSC-FQ Cameron Station		
City Hanahan	State SC	Zip Code 29406	City Alexandria	State VA	Zip Code 22304-6106

IV. OWNERSHIP STATUS (Mark 'x')	V. SIC CODES
<input checked="" type="checkbox"/> A. Federal <input type="checkbox"/> B. State <input type="checkbox"/> C. Private <input type="checkbox"/> D. Public <input type="checkbox"/> E. Other (Explain)	Storage Facility for DOD Fuels

VI. WELL STATUS (Mark 'x')		
<input type="checkbox"/> A. Operating	Date Started mo day year	<input type="checkbox"/> B. Modification/Conversion <input checked="" type="checkbox"/> C. Proposed

VII. TYPE OF PERMIT REQUESTED - CLASS AND TYPE OF WELL (see reverse)			
A. Class(es) (enter code(s)) V.A.	B. Type(s) (enter code(s)) G.I.	C. If class is "other" or type is code 'x', explain	D. Number of wells per type (if area permit) 1 gallery

VIII. LOCATION OF WELL(S) OR APPROXIMATE CENTER OF FIELD OR PROJECT								
C	A. Latitude			B. Longitude				
I	Deg 32	Min 54	Sec 22	N	Deg 79	Min 57	Sec 15	W

IX. ATTACHMENTS

(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)  
 FOR CLASSES II, III (and VA) complete and submit on separate sheet(s) Attachments A-U (pp ) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application.

X. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. Name and Title (Type or Print) W. E. GOODE - DEFENSE FUEL SUPPLY CENTER CHIEF, ENVIRONMENTAL QUALITY DIVISION	B. Phone No. (Area Code and No.) (703) 274-6989
C. Signature 	D. Date Signed 03-19-91

ATTACHMENT TO FORM 1 UIC  
Corrective Action Wells

Defense Fuel Supply Point (DFSP), Hanahan, SC

---

Section I.

A. Specific activities to be conducted on site entail the infiltration (percolation) of clean groundwater extracted from the Santee Limestone aquifer (approximately 275'). These waters will be enriched with nutrients (nitrogen and phosphorous) and infiltrated at a 2.5' depth to enhance bioremediation of the soils and surficial aquifer.

See attached memorandum dated 1 March 91 for a brief history and overview of the DFSP bioremediation system and the proposed modification.

B. Construction details may be found in Sheet C-9, Final Plans, Remediation Project, Hanahan, SC prepared by RMT, Inc., May 89.

C. 1. Maximum rates for infiltration will be approximately 40 gpm. (57,600 gpd). Average rates will be somewhat less, depending on seasonal rainfall and ongoing bioremediation results. If the soil becomes saturated and the water table rises, infiltration rates will be reduced accordingly.

The source of the infiltrate is from the Santee Limestone aquifer at a depth of about 275'. This aquifer is not hydraulically connected to the surficial aquifer, and, as such, will not pose a production concern.

Seepage tests have been performed, and the results are presented in the Schematic Submission, DFSP, September 1988, RMT, Inc. and in the Final Confirmation Study Report, DFSP, March 1987, McClelland Engineers. These reports are on file at SCDHEC.

2. Injection is via infiltration (i.e. percolation), and is not under pressure.
3. The pumping schedule is continuous and is dependent on seasonal water table elevations and on-going bioremediation results.

ENCLOSURE 1

4. The infiltrate will be clean groundwater from the Santee Limestone aquifer (approximately 275').
  5. The length of time necessary to complete remediation is unknown. United States Geologic Survey will be preparing a solute transport model to assist in predicting the time that will be required to achieve remediation. For permitting considerations, it should be assumed that the system will need to be in operation for approximately 5 years.
- D.
1. The complete monitoring program is outlined in the Construction Permit #15,707 issued by the Industrial Wastewater Division of SCDHEC dated 3 October 89. The techniques and procedures for sampling may be found in the Quality Assurance / Quality Control Plan prepared by USGS, dated July 1988. This plan is on file at SCDHEC.
  2. See D. 1. above.
  3. See D. 1. above.
- E.
- NPDES # SC 0021997, originally dated 1 December 81.
  - Construction Permit # 15,707, dated 3 October 89 issued by Industrial Wastewater, SCDHEC.
- F. The Defense Fuel Supply Point, Hanahan, SC is a government-owned, contractor operated fuel tank terminal managed by the Defense Logistics Agency (DLA). DFSP serves to store and supply fuel for Department of Defense usage.

## Section II.

N/A. The injectate will be clean groundwater.

MEMORANDUM

From: Ted Campbell, Remedial Project Manager (SDiv)  
To: Project Parties  
Date: 1 March 91

PROPOSED MODIFICATION TO BIOREMEDIATION SYSTEM, DFSP, HANAHAN, SC

Project: JP-4 Bioremediation Project, DFSP, Hanahan, SC  
Site Responsibility: Defense Logistics Agency (DLA), Alexandria, Va  
Investigations / Remediations: Southern Division Navy  
Bioremediation Design: RMT, Inc and U.S. Geologic Survey (USGS)  
Bioremediation Operation: USGS

Background

An 83,000 gallon JP-4 jet fuel spill in 1975 has created the need for aquifer and soil remediation at the Defense Fuel Supply Point (DFSP), Hanahan, SC. Bioremediation was the selected remedy. The bioremediation design called for contaminated groundwater to be extracted from the surficial aquifer. Forty percent (27 gpm) of this groundwater would be sent to North Charleston Sewer District for disposal. The remaining 60% (38 gpm) would be enriched with nutrients (nitrogen and phosphorous) and reintroduced, via infiltration galleries, into the soils overlying the contaminated groundwater. The added nutrients enhance biodegradation.

USGS has recently noted a potential problem in the bioremediation system operation. Based on their on-going review, USGS has indicated the potential for iron-precipitation to occur in the infiltration galleries due to the elevated iron levels in the infiltrate. As such, soil plugging is a major concern. It is thus necessary to modify the bioremediation system.

Several solutions have been considered and are discussed in the USGS memo dated 11 February 91. However, given the conditions there appears to be only one cost-effective and technically sound alternative. The optimum solution entails extracting clean, low-iron groundwater from the Santee Limestone aquifer at a depth of about 275'. This water would be used as the infiltrate. As before, nutrients would be added to enhance biodegradation. By using clean water from the deep aquifer, iron precipitation and soil plugging problems will be minimized.

The proposed modification entails the following:

1. All groundwater (100%) extracted from the contaminated surficial aquifer will be disposed to NCSD (see Sketches 2 and 3). A formal request has been presented to NCSD to increase the current permit flow limits to 70 gpm. Initial discussions indicate that this increase should be acceptable to NCSD.
2. A new 4" extraction well will be installed to approximately 275'. This well will be located as close as possible to the valve box shown on Sketch 3. This well will be equipped with a submersible pump to supply up to 50 gpm of clean groundwater which is low in iron. This well will provide the infiltration water source, and nutrients will be added accordingly.
3. The new well will be plumbed into the existing valve box (Sketch 3) and fitted with a totalizing flow meter and an adjustable valve.
4. A modification to the existing Construction Permit (#15,707) is currently being requested from the Industrial Wastewater Section of SCDHEC. Based on initial discussions, it appears that the changes outlined above are acceptable to SCDHEC if the modified NCSD permit is obtained.

To summarize, the proposed modification is a relatively simple field change and will result in a significantly more effective and efficient cleanup operation. Further, this change will minimize iron-precipitation and soil plugging problems in and around the infiltration galleries of the site.

Questions regarding this modification may be addressed to Mr. Ted Campbell, Remedial Project Manager, Southern Division Navy at 743-0576.



# United States Department of the Interior

## GEOLOGICAL SURVEY

Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7651  
March 7, 1991

Mr. Ted Campbell  
Code 11515  
SOUTHDIVNAVACENCOM  
2155 Eagle Drive  
P.O. Box 10068  
Charleston, South Carolina 29411-0068

Dear Mr. Campbell:

The purpose of this letter is to request a change in the proposed operation of the bioremediation system at Defense Fuel Supply Point in Hanahan, S.C. The change involves constructing a water well to the Santee Limestone and using water from the limestone aquifer, rather than water from the extraction wells, to supply the infiltration gallery. The water from the extraction wells could then be disposed entirely in the sewer system. Although we cannot be entirely sure of the water quality until the well is installed, initial evaluations indicate that the water is suitable for our purposes. According to a publication by A.D. Park (1985, The Ground-Water Resources of Charleston, Berkely, and Dorchester Counties, South Carolina: Water Resources Commission Report 139), water from wells open to the Santee Limestone - Black Mingo Formation within 4 miles of the Defense Fuel Supply Depot contain low concentrations of dissolved iron (<0.2 mg/L) and chloride at or near USEPA Secondary Maximum Contaminant Levels (250 mg/L). These data agree with the experiences of local well drillers who say that the aquifer is low in iron and somewhat salty.

This alteration provides a solution to several potential problems. One such potential problem is that of iron precipitation in the infiltration gallery. The results of our ground-water sampling in December 1990 indicate that large amounts of dissolved iron (15 mg/L) are present in the ground water near the extraction wells. Oxidation of this amount of iron can precipitate large amounts of ferric iron. The potential for such precipitation to occur at the site is evidenced by the red color of the stream sediments in areas where the contaminated ground water discharges. Because the extracted ground water is supposed to be pumped into an infiltration gallery in an unsaturated zone (i.e., in an area where it will contact a vapor phase), there is a potential for similar precipitation to occur in or near the infiltration gallery. Such precipitation could substantially impair the effectiveness of the infiltration gallery. Several remedial alternatives were examined to address the question of iron precipitation. The alternatives and relevant information are listed as an attachment to this letter. Of the alternatives examined, installation of an infiltration-gallery-supply well in the Santee Limestone not only provided the most cost-effective solution, but also provided the greatest efficiency of operation.

ENCLOSURE 2

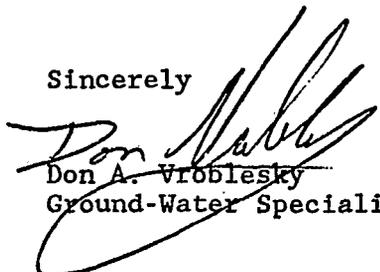
Campbell  
3/7/91  
Page 2

A second problem that installation of the supply well addresses is the potential for undesirable redistribution of ground-water contamination. The results of our preliminary sampling and sampling by the USEPA imply that the contamination downgradient from tank 1 and downgradient from tank 3 are inherently different in character. The contamination downgradient from tank 3 appears to contain components that are denser than water, as evidenced by their location at the base of the aquifer. These constituents did not appear to be present in the contamination near tank 1. Thus, reinjecting water from the extraction wells into the infiltration gallery could introduce constituents of the contamination into areas where they previously did not exist. This problem can be partly addressed by operating only specific sections of the infiltration gallery and the corresponding extraction wells for a certain amount of time and then turning off that section and operating the next section. The primary weaknesses of this approach are that it is extremely complicated and will substantially slow down remediation, because sections of the remediation zone will be turned off for long periods of time. If, however, water is supplied from a well in the Santee Limestone, there will be no need to alternate infiltration galleries because the input water is uncontaminated. Moreover, there will be no risk of undesirable redistribution of contamination.

A third reason for installing such a well has to do with the total remediation time necessary to produce the desired results. When using water from the extraction wells to supply the infiltration gallery, the system must bioremediate both the existing contamination and the contamination that is reintroduced in the infiltration gallery. By supplying water that is free of organic contamination, the total amount of contamination to be remediated is reduced, which should substantially decrease the remediation time.

In conclusion, installation of this well is a relatively inexpensive action that provides substantial returns in solving a variety of problems. Please consider this request.

Sincerely



Don A. Vroblesky  
Ground-Water Specialist

Attachments  
/DV

ATTACHMENT A - SCHEDULE OF ARTICLES

Installation of Production Well for  
U.S. Geological Survey (USGS) In Situ Bioremediation Study  
(SC - 078)

INTRODUCTION: Services are required to install a well to be used as a water source as part of a USGS, Water Resources Division study involving the remediation of JP-4 contamination in the water-table aquifer. The well shall be installed within the confines of the Defense Fuel Supply Point, located approximately 0.75 mile north of the intersection of Remount Road and North Rhett Avenue, near Hanahan, South Carolina. The well will be used to provide relatively clean water to be introduced into the bioremediation system. The exact location will be provided to the contractor by USGS personnel prior to mobilization.

SCOPE: The purpose of this contract is to retain the services of a private well drilling company to install one production well at the Defense Fuel Supply Point as a component of an in situ bioremediation system.

REQUIREMENTS: The contractor is responsible for obtaining, at his own cost, any required State and local permits, licenses and fees necessary to lawfully perform the work addressed in this document. The contractor must be capable of working at a hazardous waste site. The driller must comply to "R.61-71: Well Standards and Regulations" as required by the South Carolina Department of Health and Environmental Control (DHEC). In addition, the driller must perform in accordance with Southern Division Naval Facilities Specifications for Well Installation.

The contractor shall provide all equipment, labor, and materials necessary to install one production well, using hydraulic rotary method, finished off in the Santee Limestone and capable of producing a minimum of 40 gallons per minute.

According to DHEC regulations, the well must be drilled in two phases. Phase one will involve drilling through the potentially contaminated surficial aquifer and into the Cooper Formation. At the completion of the hole to a desired depth into the Cooper Formation, the well must be cased and grouted (from total depth to surface) to prevent potentially contaminated water from the surficial aquifer from entering lower units. All downhole equipment must then be decontaminated by steam cleaning and brushing prior to reentering the hole. Phase two, which will be initiated after the grout has been allowed to set, will involve the completion of the hole through the Cooper Formation and into the Santee Limestone to a sufficient depth to provide a minimum of 40 gpm.

The well will be completed at a depth of approximately 340 feet (bottom of Santee Limestone). The upper, cased portion should be finished in the Cooper Formation at a depth sufficient to provide an adequate seal, as mentioned above (approximately 60 feet into the formation). This upper portion shall be cased with new, 4 inch ID, schedule 40, flush joint PVC. The upper portion of the hole should be about 8 inches in diameter to provide 2 inches of annular space to be grouted. The lower portion of the hole will be left open to provide the maximum water quantity available and should be of a diameter slightly smaller than 4 inches (~3 7/8"). All depths are approximate due to the variability of formation depths and thicknesses at particular locations, therefore specific depths will be determined in the field.

The driller shall provide a submersible pump, capable of pumping at a rate that exceeds 40 gpm, and a pressure tank. The pump and tank combination must be capable of providing a continuous rate of 40 gallons per minute.

The driller will also be responsible for the development of the well. The well shall be developed by pumping at a rate and period of time necessary to remove all drilling fluid, sand, cuttings, and foreign material. USGS personnel will determine the completeness of development.

DELIVERABLE: The contractor must provide a driller's log and exact well installation specifications within 30 days of well completion.

DEFENSE FUEL SUPPLY POINT

U S NAVAL

U S ARMY RESERVATION

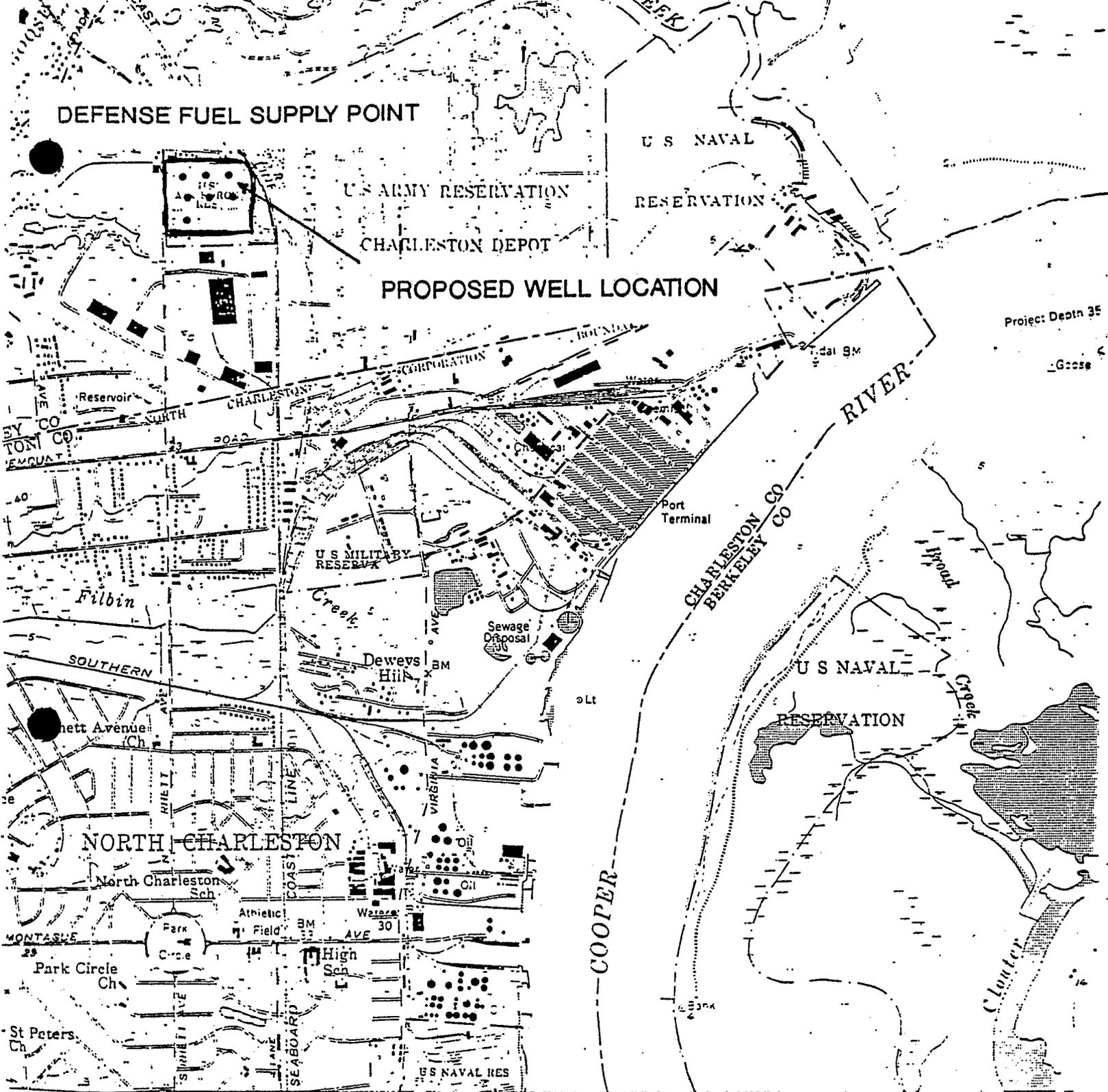
RESERVATION

CHARLESTON DEPOT

PROPOSED WELL LOCATION

Project Depth 35

Goose



2310000 FEET 995 996 997 57'30" 998 999

and published by the Geological Survey

USGS and South Carolina Geodetic Survey

in part compiled from aerial photographs graphically by planimetric surveys 1955

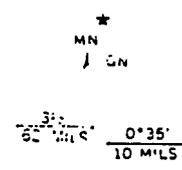
red from USGS charts 470 (1957) and

1927 North American datum

used South Carolina coordinate system.

Universal Transverse Mercator grid ticks, blue

United North American Datum 1983



UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Fine red dashed lines indicate selected fence and field lines where

DEPTH CURVES AND SOUNDINGS SHOW THE RELATIONSHIP SHORELINE SHOWN REPRESENTS THE AVERAGE POSITION

THIS MAP IS UNCLASSIFIED

June 3, 1991

Mr. Ted Campbell  
Southern Division  
Naval Facilities Engineering Cmd.  
P. O. Box 10068  
7155 Eagle Drive  
Charleston, SC 29411-0068

Re: Defence Fuel Supply Point  
Extraction Well Construction Plans received May 6, 1991  
Charleston County

Dear Mr. Campbell:

The Ground-Water Protection Division of the South Carolina Department of Health and Environmental Control (SCDHEC) has reviewed the referenced construction plans for a deep non-potable extraction well. The following comments and concerns are provided.

- 1) The referenced construction plans indicate the well head will be placed in a below grade vault. The South Carolina Well Standards and Regulations R.61-71.5(C)(1) states that all water wells shall be located such that they are accessible for cleaning, treatment, repair, test inspection, and other attention as needed. Please submit justification for the use of the below grade vault, and clarification that this type of vault will not cause a violation of the Well Standards and Regulations.
- 2) The Department is requesting further information regarding the construction plans for the below grade vault. Please clarify the following:
  - o The construction plans do not clearly indicate if the vault will be constructed with a water tight seal to prevent the infiltration of surface water.
  - o The Department is concerned with the depth of the proposed vault in relation to the depth of the water table. What assurances are there that the vault will not become flooded by the ground water?
  - o What is the purpose of the six inch thick gravel area proposed to be placed at the bottom of the vault?

Mr. Campbell  
June 3, 1991  
Page 2

If you have any questions, please feel free to call me at  
(803) 734-4672.

Sincerely,



Robert Devlin, Hydrogeologist  
Assessment and Development Section  
Ground Water Protection Division  
Bureau of Drinking Water Protection

cc: Sue Schweikart, Trident District EQC  
Christine Sanford-Coker, Trident District EQC  
Bill Botts, IAWD

5090/11  
Code 18214  
19 JUN 1991

Mr. Rob Devlin  
Groundwater Protection  
SC Department of Health and Environmental Control  
2600 Bull Street  
Columbia, SC 29201

Subj: REVISED EXTRACTION WELL CONSTRUCTION PLANS (SHEETS C-2 AND C-3),  
DEFENSE FUEL SUPPLY POINT (DFSP), HANAHAN, SC

Dear Mr. Devlin:

Based on your 3 Jun 91 letter outlining your comments and concerns regarding the proposed extraction well at DFSP, enclosed are the subject revisions. If these changes meet your approval, please forward formal well approval.

Thank you for your assistance on this project. If you have any questions regarding this submittal please call Mr. Ted Campbell, Code 18214, at (803) 743-0576.

Sincerely,

J. B. MALONE, Jr., P.E.  
MANAGER, INSTALLATION  
RESTORATION EAST SECTION

Encl:  
(1) Revised Construction Plans (Sheets C-2 and C-3)  
for Extraction Well at DFSP, Hanahan, SC

Copy to:  
DHEC (Mr. David Baize)  
DHEC Trident District (Ms. Sue Schweikart)  
DHEC (Mr. Bill Botts, Industrial WW)

09B  
182  
18214  
Daily  
WANG 1477L p44

1821  
18214x  
CLH  
6/19/91

5090/11  
Code 18214

19 JUN 1991

Mr. Bill Botts  
Industrial Wastewater Division  
SC Department of Health and Environmental Control  
2600 Bull Street  
Columbia, SC 29201

Subj: EXTRACTION WELL CONSTRUCTION PLANS FOR JP-4 REMEDIATION, DEFENSE  
FUEL SUPPLY POINT (DFSP), HANAHAN, SC

Dear Mr. Botts:

As requested for your information and files, enclosed is the subject plans for the deep extraction well at DFSP, Hanahan, SC. The Groundwater Section will review these plans as part of the well approval process.

Thank you for your assistance on this project. Please call Mr. Ted Campbell, Code 18214, at (803) 743-0571 if you have any questions.

Sincerely,

J. B. MALONE, Jr., P.E.  
MANAGER, INSTALLATION  
RESTORATION EAST SECTION

Encl:  
(1) Plans and Specifications for Deep  
Extraction Well at DFSP, Hanahan, SC

Copy to:  
DHEC (Mr. David Baize, Groundwater Section)

09B  
182  
18214  
Daily  
WANG 1477L p43

1821  
18214x

CLH  
6/19/91

MEMORANDUM

From: Ted Campbell, Code 18214  
To: FILE  
Via: James Malone, Code 1821

Date: 23 May 91

Subj: PE Certification Letter-Wording Requirements, JP-4 Bioremediation Project, Contract 88-0426

1. As per my 22 May 91 phone conversation with Harvey Wilkins of SCDHEC Trident and followup phone conversation of 23 May 91 with Sue Schweikart (SCDHEC Trident), the following exact wording has been agreed upon as acceptable by SCDHEC for proper and adequate PE certification:

"I have reviewed all field notes, as-builts, and associated site drawings and system tests and have performed a site inspection for design compliance of the JP-4 Bioremediation Project, DFSP, Hanahan, S.C. (Construction Permit # 15,707). Based on my after-construction review and inspection, I hereby certify that the construction is complete and in accordance with approved plans and specifications, to the best of my knowledge, information, and belief."

2. This wording will be provided as part of the request for the JP-4 Bioremediation Operation Permit.

Copy to: Sue Schweikart, SCDHEC Trident  
Code 1813, Darrel Thornley  
Code 1821, James Malone  
Claude Robertson, ROICC  
Code 09A23, Owen Welling  
Code 0522, Jimmy Elmore

May 17, 1991

Mr. Ted Campbell  
Code 18214  
SOUTHDIVNAVACENGCOM  
2155 Eagle Drive  
P. O. Box 10068  
Charleston, SC 29411-0068

RE: Modification to Construction Permit #15,707  
Defense Fuel Supply Point  
Charleston County

Dear Mr. Campbell:

This Office has reviewed your request to modify the above-referenced Construction Permit. Under the original permit, a portion of the contaminated groundwater would be discharged to an infiltration gallery and the rest would go to the North Charleston Sewer District. It is our understanding that the present intent is to discharge all the contaminated groundwater to the NCSW. Therefore, the permit will be modified to read "Effluent to be discharged to North Charleston Sewer System in the Santee-Cooper River basin at a daily rate not to exceed 110,000 gallons per day."

Should you have any questions, please contact William Botts of my staff at 734-5239.

Sincerely,

*Andrew Yasinsac, Jr., P.E.*

Andrew Yasinsac, Jr., P.E., Acting Director  
Industrial and Agricultural  
Wastewater Division  
Bureau of Water Pollution Control

AY/WCB/vr

cc: Foster Coleman, Trident EQC

Commissioner: Michael D. Jarrett

Board: John B. Pate, MD, Chairman  
William E. Applegate, III, Vice Chairman  
John H. Burriss, Secretary

Toney Graham, Jr., MD  
Richard E. Jabbour, DDS  
Henry S. Jordan, MD  
Robert J. Stripling, Jr.

*Promoting Health, Protecting the Environment*

### Extraction Well Approval

Approval is hereby granted to: Southern Division  
Naval Facilities Engineering Cmd.  
P.O. Box 10068 (7155 Eagle Dr)  
Charleston, SC 29411-0068

RE: DFSP  
Charleston County

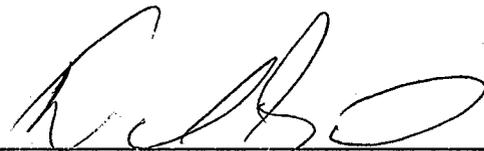
for the construction of one extraction well designated DW-1 in accordance with the construction plans and specifications submitted on June 13, 1991.

This well will be constructed to the approximate depth of 335 feet below the surface and screened in the tertiary aquifer for the purpose of aquifer remediation.

Conditions: That the latitude and longitude and actual construction details for each well be submitted within 30 days after installation. That the District Hydrologist, Christine Sanford-Coker, Trident EQC District Office, (803) 554-5533, 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 May 28, 1991.



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

RD/sa

0528912322/RD

cc: Christine Sanford-Coker, Trident EQC District  
Bill Botts, IAWD, SCDHEC  
Sue Schweikart, Trident EQC District

5090/11  
Code 18214  
10 JUN 1991

Ms. Sue Schweikart  
Trident District EQC  
2470 Air Park Rd.  
N. Charleston, SC 29418

Subj: CONSTRUCTION CONTRACT NO. W62467-88-C-0426, JP-4 BIOREMEDIATION PROJECT,  
HANAHAN, SC

Dear Ms. Schweikart:

As discussed in the meeting at SOUTHDIY on 3 May 1991, we are formally notifying you of our intention to change the Professional Engineer (PE) certifying the DFSP project Construction Permit #15,707, JP-4 Remediation, DFSP, Hanahan, S.C. from Robert F Martin (PE#5928) to W. D. Knight, Jr. (PE #13255). W.D. Knight will be responsible for inspecting and certifying the construction records and drawings to make sure that the system has been built according to approved plans, specifications, and permits. Mr. Knight will make the final inspection and prepare a certification letter to be submitted to SCDHEC, Trident District.

As we discussed, we wish to obtain the Operator's Permit at the end of June, upon completion of the new well construction modification. Please notify us of a convenient date at the end of June to plan a system inspection and arrange for an operation permit.

Please note that Trident labs will provide operation (Biological D Licence) and oversight for the bioremediation system.

Should you have any questions, please contact Mr. Ted Campbell, Code 18214, at telephone number (803) 743-0576. We appreciate your input into this project.

Sincerely,

M. DARRELL THORNLEY, P.E.  
Manager, Environmental  
Programs Section

095  
152  
1813  
18132  
18214  
Daily  
WANG 1477L p35

1813  
1821  
18214x

CLH  
6/7/91

DATE: May 31, 1991

FROM: ROICC CHARLESTON, CODE 30CR

TO: SOUTH DIV CODE 18214 T 6/6 VIA CODE 0522 E 6/6

SUBJ: CONTRACT N62467-88-C-0426, JP-4 REMEDIATION, DFSP CHARLESTON

THE SKIMMER PUMPS ARE INSTALLED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS, THE SKIMMER PUMP SUBMITTAL, AND THE OMSI SUBMITTAL. SETTINGS FOR SAME ARE IN ACCORDANCE WITH THE DESCRIPTION ON THE CONTRACT DRAWINGS.

IT IS RECOGNIZED THAT AN OPERATIONAL TEST TO DETERMINE ACTUAL PERFORMANCE CANNOT BE DONE UNTIL THE SYSTEM HAS BEEN PUT INTO SERVICE AND THE GROUNDWATER EXTRACTION PUMPS HAVE STABILIZED; HOWEVER, THE CONTRACTOR IS NOT RESPONSIBLE FOR ACTUAL PERFORMANCE. HE IS RESPONSIBLE FOR INSTALLATION IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

DISCUSSION WITH THE CONTRACTOR INDICATE WHAT WAS SUBMITTED IS WHAT IS INSTALLED. A VISIT TO THE SITE AND AN INSPECTION OF THE INSIDE OF A CONTROL PANEL CONFIRMS THE PRESENCE OF LED'S AND CONTROL WIRING IN ACCORDANCE WITH DIAGRAMS 2 & 3 AND THE WIRE CODE DIAGRAM OF THE OMSI SUBMITTAL.

I HAVE NO COMMENTS ON THE DRAFT OPERATION AND MAINTENANCE MANUAL PREPARED BY RMT.

AS BUILT DRAWINGS HAVE BEEN RECEIVED FROM THE CONTRACTOR AND ARE BEING FORWARDED TO CODE 05 BY SEPERATE CORRESPONDENCE.

EVERY EFFORT WILL BE MADE TO OBTAIN THE REQUIRED CERTIFICATION FROM A REGISTERED ENGINEER BY YOUR DEADLINE OF 24 JUNE 1991. THE CONTRACTOR HAS THE CERTIFICATION WORDING AND IS IN THE PROCESS OF GIVING ME A PRICE PROPOSAL FOR SAME.

IF YOU HAVE ANY QUESTIONS OR COMMENTS REGARDING THE ABOVE, PLEASE GIVE ME A CALL.



CLAUDE ROBERTSON JR.

### Monitor Well Approval

Approval is hereby granted to: USGS, Water Resources Division  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210-7657

RE: DFSP - Hannahan  
Berkeley County

for the construction of four monitoring well clusters of four wells each designated MW-GS-27 thru 30 in accordance with the construction plans and specifications submitted on July 8, 1991.

These wells will be constructed to the approximate depth of 12 to 24 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 to the Department within 30 days of receipt. That the District Hydrologist, Christine Sanford-Coker, Trident EQC District, 554-5533 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 July 11, 1991.



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

DB/sa

0711912405/DB

cc: Marvin Murray, BDWP  
Ted Campbell, Southern Division  
Christine Sanford-Coker, Trident EQC District

MEMORANDUM

From: Ted Campbell, Code 18214  
To: Jimmy Elmore, Code 0522  
Via: James Malone, Code 1821

Date: 23 May 91

Subj: PE Certification Letter-Wording Requirements, JP-4 Bioremediation  
Project, Contract 88-0426

1. As per your 22 May 91 phone call and request for exact wording for the PE certification letter, the following memo is provided.
2. I have confirmed the wording requirements with SCDHEC Trident (see attached memo to file of 23 May 91). The following words are required by the certifying PE:

"I have reviewed all field notes, as-builts, and associated site drawings and system tests and have performed a site inspection for design compliance of the JP-4 Bioremediation Project, DFSP, Hanahan, S.C. (Construction Permit # 15,707). Based on my after-construction review and inspection, I hereby certify that the construction is complete and in accordance with approved plans and specifications, to the best of my knowledge, information, and belief."

2. The certification containing this wording will be provided as part of the request for the JP-4 Bioremediation Operation Permit.
3. Thank you for your assistance on this project. Please call me if you need additional information or have any questions.

Very Respectfully,

Copy to: Code 1821, James Malone  
Code 1813, Darrel Thornley  
Claude Robertson, ROICC  
Code 09A23, Owen Welling

11000  
Code 405(LSB)  
87-C-0027  
FY-93  
16 Jul 91

RIT, Inc.  
11 Regency Hills Drive  
P.O. Box 16778  
Greenville, SC 29605

Subj: A/E CONTRACT N62467-87-C-0027, OPERATIONS AND MAINTENANCE MANUAL,  
JP-4 REMEDIATION, DFSP, CHARLESTON, SC

Gentlemen:

Your draft submission of the O&M Manual for the subject project is returned with our review comments. Please incorporate these comments and the changes described in Amendment 12 to your contract.

Please take all review comments into consideration and proceed to the final submission. Return a copy of the comments along with your responses with the completed manual. If there are any comments which you modify or don't incorporate, provide a brief explanation in the cover letter.

In our opinion, these comments are all within the scope of your contract and should be incorporated at no increase in contract price. If you do not agree, please contact us before incorporating any comment that you believe to be beyond the terms of your contract. This letter is not authority to proceed with work beyond the scope of your contract.

The final submission is due 9 August 1991. The final manual must be signed and sealed by a corporate member of your firm.

Sincerely,

L. S. BURKE, P. E.  
Engineer-in-Charge

Encl:  
(1) Review Comments

CONT  
02A234  
118214  
405/Daily  
4052  
405(LSB)

405(LSB)X

Writer: L. S. Burke  
Typist: N. Singleton, 15 Jul 91  
Wang: 0171N



LETTER OF TRANSMITTAL

Griffin Remediation Services, Inc.

An affiliated company of Griffin Dewatering Corporation.

3200 West 45th Street
West Palm Beach, Florida 33407
(407) 683-4730
FAX (407) 683-1944

TO:

Department Of The Navy
Southern Division Naval Facilities
P.O.Box 10068
Charleston, South Carolina 29451

DATE February 12, 1991
PROJECT JP-4 Remediation
LOCATION Defense Fuel Support Point
ATTENTION Ted Campbell
RE: N62467-88-C-0426

GENTLEMEN:

WE ARE SENDING YOU [X] HEREWITH [ ] DELIVERED BY HAND [ ] UNDER SEPARATE COVER

VIA U.S. Mail THE FOLLOWING ITEMS:

- [ ] PLANS [ ] PRINTS [ ] SHOP DRAWINGS [ ] SAMPLES [ ] SPECIFICATIONS
[ ] ESTIMATES [ ] COPY OF LETTER [X] Drilling Logs

Table with 3 columns: COPIES, DATE OR NO., DESCRIPTION. Row 1: 1, 6/8/90 Through 7/3/90, Law Engineering-Test Boring Field Records

THESE ARE TRANSMITTED AS INDICATED BELOW

- [X] FOR YOUR USE [ ] APPROVED AS NOTED [ ] RETURN CORRECTED PRINTS
[ ] FOR APPROVAL [ ] APPROVED FOR CONSTRUCTION [ ] SUBMIT COPIES FOR
[ ] AS REQUESTED [ ] RETURNED FOR CORRECTIONS [ ] RESUBMIT COPIES FOR
[ ] FOR REVIEW AND COMMENT [ ] RETURNED AFTER LOAN TO US [ ] FOR BIDS DUE

REMARKS:

IF ENCLOSURES ARE NOT AS INDICATED, PLEASE NOTIFY US AT ONCE.

SIGNED: Vincent Cummings
Vincent Cummings



LETTER OF TRANSMITTAL

Griffin Remediation Services, Inc.

An affiliated company of Griffin Dewatering Corporation.

3200 West 45th Street
West Palm Beach, Florida 33407
(407) 683-4730
FAX (407) 683-1944

TO:

Department Of The Navy
Southern Division Naval Facilities
P.O.Box 10068
Charleston, South Carolina 29451

DATE February 12, 1991
PROJECT JP-4 Remediation
LOCATION Defense Fuel Support Point
ATTENTION Ted Campbell
RE: N62467-88-C-0426

GENTLEMEN:

WE ARE SENDING YOU [X] HEREWITH [ ] DELIVERED BY HAND [ ] UNDER SEPARATE COVER

VIA U.S. Mail

THE FOLLOWING ITEMS:

- [ ] PLANS [ ] PRINTS [ ] SHOP DRAWINGS [ ] SAMPLES [ ] SPECIFICATIONS
[ ] ESTIMATES [ ] COPY OF LETTER [X] Drilling Logs

Table with 3 columns: COPIES, DATE OR NO., DESCRIPTION. Row 1: 1, 6/8/90 Through 7/3/90, Law Engineering-Test Boring Field Records

THESE ARE TRANSMITTED AS INDICATED BELOW

- [X] FOR YOUR USE [ ] APPROVED AS NOTED [ ] RETURN CORRECTED PRINTS
[ ] FOR APPROVAL [ ] APPROVED FOR CONSTRUCTION [ ] SUBMIT COPIES FOR
[ ] AS REQUESTED [ ] RETURNED FOR CORRECTIONS [ ] RESUBMIT COPIES FOR
[ ] FOR REVIEW AND COMMENT [ ] RETURNED AFTER LOAN TO US [ ] FOR BIDS DUE

REMARKS:

IF ENCLOSURES ARE NOT AS INDICATED, PLEASE NOTIFY US AT ONCE.

SIGNED: Vincent Cummings
Vincent Cummings

PROJECT: JP-4

PROJECT NO. J-5266

BORING: EW-4

DATE: 6-8-90

DRILLER: N. Boyette / K. Landry CREW: G. Fischer

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
		<b>TOP SOIL:</b>							
		Drilled to 33.0 w. 8 1/4" I.D. HSA.							
		Set 6" PVC well @ 33.0							
		(30.0) Screen: 3.0 to 33.0							
		Sand: 2.0 to 33.0							
		Bentonite 1.0 to 2.0							
		Grout to Surface							
		(33 bags Sand)							

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" I.D.

b. WASH  WATER  MUD

BORING SIZE 13" BIT USED -

ANG: SIZE - LENGTH -

UNDISTURBED SAMPLES: NO. - SIZE -

BAG SAMPLES: NO. -

WATER LOSSES, % - DEPTH -

SPECIAL TESTS (Hrs. & Explain) -

WEATHER 95° Sunny

NON-DRILLING TIME (Hrs.) -

BORING LAYOUT .5 MOVING 20 min.

HAULING WATER 1.0 STANDBY -

WATER @ - DATE - TIME -

LEVELS @ - DATE - TIME -

CAVE-IN-DEPTH: @ - DATE - TIME -

REMARKS: (All remarks should be explained on the back of white copy)

PROJECT: JP-4

PROJECT NO. J-5266

BORING: EW-5

DATE: 6-12-70

DRILLER: M. Boyce / K. Long CREW: G. Fischer

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH		FIRST 6"	2ND 6"	3RD 6"	REC.
FROM	TO					FROM	TO				
		<b>TOP SOIL:</b>									
		Drilled to 36.5 w. 8 1/4" I.D. H&A									
		Set 6" PVC well @ 36.5									
		(30.6) Screen: 6.5 to 36.5									
		Sand: 4.0 to 36.5									
		Bentonite: 2.7 to 4.0									
		Grout to surface									
		<del>(23 bags Sand)</del>									
		(29 bags Sand)									

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" I.P.

b. WASH  WATER  MUD

BORING SIZE 13" BIT USED

ING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER 70° Sunny

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT .5 MOVING .5

HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_

WATER @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)

PROJECT: JP-4

PROJECT NO. T-5266

BORING: EW-6

DATE: 6-13-90

DRILLER: M. Boyette & K. Pendley CREW: G. Fischer

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			FIR 6"	2ND 6"	3RD 6"	REC.
FROM	TO					FROM	TO					
		<b>TOP SOIL:</b>										
		Drilled to 38.0 w. 8 1/4" F.O. HSA.										
		Set 6" PVC E.W. well @ 38.0										
		(30.0) Screen: 8.0 to 38.0										
		Sand: 6.0 to 38.0										
		Bentonite: 5.0 to 6.0										
		6' out to surface										
		(39 bags Sand)										

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" J.P.

b. WASH  WATER  MUD

BORING SIZE 13" BIT USED \_\_\_\_\_

DRILLING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER 60° Sunny

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT \_\_\_\_\_ MOVING Zoaria

HAULING WATER .5 STANDBY \_\_\_\_\_

WATER LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)

PROJECT: JP-4

PROJECT NO. T-5266

BORING: EW-6

DATE: 6-13-90

DRILLER: M. Boyette & R. Pendley

CREW: G. Fischer

SURFACE ELEV.

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
		TOP SOIL:							
		Drilled to 38.0 w. 8 1/4" F.O. HSA.							
		Set 6" PVC L.W. well @ 38.0							
		(30.0) Screen: 8.0 to 38.0							
		Sand: 6.0 to 38.0							
		Bentonite: 5.0 to 6.0							
		6' out to surface							
		(39 bags Sand)							

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" J.P.

b. WASH  WATER  MUD

BORING SIZE 13" BIT USED

SPACING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER

60° Sunny

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT \_\_\_\_\_ MOVING 20 min.

HAULING WATER 0.5 STANDBY \_\_\_\_\_

WATER LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)



PROJECT: JP-4

PROJECT NO. J-5266

BORING: EW-7

DATE: 6-13-90

DRILLER: N. Boyette, G. Hendley CREW: G. Fischer

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
		TOP SOIL:							
		Drilled to 35.0 w. 8 1/4" I.P. HSA							
		Set 6" PVC E.W. well @ 35.0							
		(30.0) Screen: 5.0 to 35.0							
		Sand: 3.0 to 35.0							
		Bentonite 2.0 to 3.0							
		Grout to Surface							
		(34 bags sand)							

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" I.D.

b. WASH  WATER  MUD

BORING SIZE 13" BIT USED \_\_\_\_\_

PIPE: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER 90° Sunny

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT .5 MOVING 15 min.

HAULING WATER .5 STANDBY \_\_\_\_\_

WATER @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)

PROJECT: JP-4

PROJECT NO. J-5266

BORING: EW-8

DATE: 6-17-90

DRILLER: W. Byr Heip. Pondrew CREW: C. Fischer

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
		TOP SOIL:							
		Drilled to 37.0 w. 8 1/4" I.D. HSA							
		Set 6" PVC EW. well @ 37.0							
		(30.0) Screen: 7.0 to 37.0							
		Sand: 4.5 to 37.0							
		Bentonite: 3.5 to 4.5							
		Grout to surface							
		(40 bags Sand)							

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" I.D.

b. WASH  WATER  MUD

BORING SIZE 13" BIT USED

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER 75° Sunny

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT .5 MOVING 20 min.

HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_

WATER @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)

LAW ENGINEERING

TEST BORING FIELD RECORD

PROJECT: JP-4

PROJECT NO. J-5266

BORING: EW-9

DATE: 6-14-90

DRILLER: N. Boyce, K. Pandley, CREW: G. Fischer

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
		TOP SOIL:							
		Drilled to 37.0 w. 8 1/4" I.P. HSA							
		Set 6" PVC E.W. well @ 37.0							
		(30.0) Screen: 7.0 to 37.0							
		Sand: 5.0 to 7.0							
		Bentonite: 4.0 to 5.0							
		Gravel to surface							
		(38 bags Sand)							

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" I.P.

b. WASH  WATER  MUD

BORING SIZE 13" BIT USED \_\_\_\_\_

CASING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs & Explain) \_\_\_\_\_

WEATHER 90° Sunny

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT 15 MOVING 20 min.

HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_

WATER LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)

PROJECT: JP-4

PROJECT NO. J-5266

BORING: EW-10

DATE: 6-15-90

DRILLER: N. Boyette; H. Landrew; G. Fischer

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
		<b>TOP SOIL:</b>							
		Drilled to 37.0 w. 8 1/4" F.P. HSA							
		Set 6" PVC E.W. well @ 36.0							
		(30.0) Screen: 6.0 to 36.0							
		Sand: 4.0 to 6.0							
		Bentonite 3.0 to 4.0							
		(32 bags Sand)							

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" F.P.

b. WASH  WATER  MUD

BORING SIZE 13" BIT USED -

CHANGING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER 75° Cloudy

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT .5 MOVING 20 min.

HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_

WATER @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)

<b>DAILY REPORT TO INSPECTOR</b>				DATE <b>6-14-90</b>
CONTRACT NO.		TITLE AND LOCATION		REPORT NO.
CONTRACTOR (Prime or Subcontractor) <b>Law Engineering</b>			NAME OF SUPERINTENDENT OR FOREMAN <b>Norwood Boyelle</b>	
WEATHER <b>Sunny, Hot</b>			TEMPERATURE	<b>90°</b>
WEATHER EFFECTS				
PRIME CONTRACTOR/SUBCONTRACTOR WORKFORCE <i>(If space provide below is inadequate, use additional sheets)</i>				LOCATION AND DESCRIPTION OF WORK PERFORMED
NUMBER	TRADE	HOURS	EMPLOYER	
	<b>Driller</b>	<b>9.5</b>	<b>Law Eng.</b>	<b>Drilling, Installing 6" Wells</b>
	<b>Asst. Driller</b>	<b>9.5</b>	<b>" "</b>	
	<b>Driller Helper</b>	<b>9.5</b>	<b>" "</b>	
TOTAL WORK HOURS ON JOB SITE THIS DATE		<b>28.5</b>	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE?  <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO  IF "YES", A COPY OF THE COMPLETED OSHA REPORT IS REQUIRED	
CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT				
TOTAL WORK HOURS FROM START OF CONSTRUCTION				
CONSTRUCTION AND PLANT EQUIPMENT LEFT ON JOB SITE UNTIL USE IS COMPLETED				
DESCRIPTION	DATE FIRST ON JOB <i>(First time only)</i>	HOURS WORKED THIS DATE	HOURS IDLED	DATE OF FINAL REMOVAL FROM JOB SITE
CONSTRUCTION AND PLANT EQUIPMENT NOT LEFT ON JOB SITE PERMANENTLY <i>(This will include pickup trucks and mobile mounted items, such as compressor, that are also used for transportation to and from the job)</i>				
DESCRIPTION		HOURS WORKED	HOURS IDLED	
<b>1988 Chevrolet Pickup Truck</b>		<b>7.0</b>	<b>2.5</b>	

LAW ENGINEERING

TEST BORING FIELD RECORD

PROJECT: JP-4

PROJECT NO. J-5266

BORING: EW-11

DATE: 6-15-90

DRILLER: M. Boyette, Jr. Leasing CREW: G. Fischer

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
		<b>TOP SOIL:</b>							
		Drilled to 37.0 w. 8 1/4" I.D. H&H							
		Set 6" PVC E.W. well @ 37.0							
		(30.0) Screen: 7.0 to 37.0							
		Sand: 5.0 to 37.0							
		Bitumite: 4.0 to 5.0							
		(24 bags Sand)							

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" I.D.

b. WASH  WATER  MUD

BORING SIZE 13 1/2" BIT USED

NG: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER 95° Sunny

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT .5 MOVING 20min.

HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_

WATER @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)

<b>DAILY REPORT TO INSPECTOR</b>				DATE <b>6-15-90</b>	
CONTRACT NO.		TITLE AND LOCATION			REPORT NO.
CONTRACTOR (Prime or Subcontractor) <b>Law Engineering</b>				NAME OF SUPERINTENDENT OR FOREMAN <b>Norwood Boyette</b>	
WEATHER <b>Pt. Cloudy</b>				TEMPERATURE <b>92°</b> °F	
WEATHER EFFECTS					
PRIME CONTRACTOR/SUBCONTRACTOR WORKFORCE <i>(If space provide below is inadequate, use additional sheets)</i>				LOCATION AND DESCRIPTION OF WORK PERFORMED	
NUMBER	TRADE	HOURS	EMPLOYER		
	<b>Driller</b>	<b>6.0</b>	<b>Law Eng</b>	<b>Drilling, Installing 6" Wells</b>	
	<b>Asst. Driller</b>	<b>6.0</b>	<b>" "</b>	<b>" " " "</b>	
	<b>Driller Helper</b>	<b>6.0</b>	<b>" "</b>	<b>" " " "</b>	
TOTAL WORK HOURS ON JOB SITE THIS DATE		<b>18.0</b>		WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO  IF "YES", A COPY OF THE COMPLETED OSHA REPORT IS REQUIRED	
CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT					
TOTAL WORK HOURS FROM START OF CONSTRUCTION					
<b>CONSTRUCTION AND PLANT EQUIPMENT LEFT ON JOB SITE UNTIL USE IS COMPLETED</b>					
DESCRIPTION	DATE FIRST ON JOB <i>(First time only)</i>	HOURS WORKED THIS DATE	HOURS IDLED	DATE OF FINAL REMOVAL FROM JOB SITE	
CONSTRUCTION AND PLANT EQUIPMENT NOT LEFT ON JOB SITE PERMANENTLY <i>(This will include pickup trucks and mobile mounted items, such as compressor, that are also used for transportation to and from the job)</i>					
DESCRIPTION			HOURS WORKED	HOURS IDLED	
<b>1988 Chevrolet Pickup Truck</b>			<b>4.0</b>	<b>2.0</b>	

PROJECT: J.P.-4 PROJECT NO. J-5266 BORING: EW-12

DATE: 6-18-90 DRILLER: N. Boyette / K. Hendley CREW: G. Fischer SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH		FIRST 6"	2ND 6"	3RD 6"	REC.
FROM	TO					FROM	TO				
		<b>TOP SOIL:</b>									
		Drilled to 37.0 w. 8 1/4" I.D. HSA									
		Set 6" PVC E.W. well @ 37.0									
		(30.0) Screen: 7.0 to 37.0									
		Sand: 4.5 to 37.0									
		Bentonite: 3.5 to 4.5									
		(37 bags Sand)									

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" F.P.

b. WASH \_\_\_\_\_ WATER \_\_\_\_\_ MUD \_\_\_\_\_

BORING SIZE 13" BIT USED \_\_\_\_\_

\_\_\_\_\_ NG: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER 90° Sunny

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT 15 min. MOVING 15 min.

HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_

WATER @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)

<b>DAILY REPORT TO INSPECTOR</b>				DATE <b>6-18-90</b>
CONTRACT NO.		TITLE AND LOCATION		REPORT NO.
CONTRACTOR (Prime or Subcontractor) <b>Ldw Engineering</b>			NAME OF SUPERINTENDENT OR FOREMAN <b>Norwood Boyelle</b>	
WEATHER <b>Sunny, Hot</b>			TEMPERATURE <b>85°</b> °F	
WEATHER EFFECTS				
PRIME CONTRACTOR/SUBCONTRACTOR WORKFORCE (If space provide below is inadequate, use additional sheets)				LOCATION AND DESCRIPTION OF WORK PERFORMED
NUMBER	TRADE	HOURS	EMPLOYER	
	<b>Driller</b>	<b>4.5</b>	<b>Ldw Eng.</b>	<b>Drilling, Installing 6" Wells</b>
	<b>Asst. Driller</b>	<b>4.5</b>	<b>" "</b>	<b>" " " "</b>
	<b>Driller Helper</b>	<b>4.5</b>	<b>" "</b>	<b>" " " "</b>
TOTAL WORK HOURS ON JOB SITE THIS DATE		<b>13.5</b>	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO  IF "YES", A COPY OF THE COMPLETED OSHA REPORT IS REQUIRED	
CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT				
TOTAL WORK HOURS FROM START OF CONSTRUCTION				
CONSTRUCTION AND PLANT EQUIPMENT LEFT ON JOB SITE UNTIL USE IS COMPLETED				
DESCRIPTION	DATE FIRST ON JOB (First time only)	HOURS WORKED THIS DATE	HOURS IDLED	DATE OF FINAL REMOVAL FROM JOB SITE
CONSTRUCTION AND PLANT EQUIPMENT NOT LEFT ON JOB SITE PERMANENTLY (This will include pickup trucks and mobile mounted items, such as compressor, that are also used for transportation to and from the job)				
DESCRIPTION			HOURS WORKED	HOURS IDLED
<b>1988 Chevrolet Pickup</b>			<b>4.0</b>	<b>0.5</b>



DAILY REPORT TO INSPECTOR				DATE 6-19-90
CONTRACT NO.		TITLE AND LOCATION		REPORT NO.
CONTRACTOR (Prime or Subcontractor) Law Engineering			NAME OF SUPERINTENDENT OR FOREMAN Norwood Boyette	
WEATHER Sunny, Hot			TEMPERATURE 90°	°F
WEATHER EFFECTS				
PRIME CONTRACTOR/SUBCONTRACTOR WORKFORCE (If space provide below is inadequate, use additional sheets)				LOCATION AND DESCRIPTION OF WORK PERFORMED
NUMBER	TRADE	HOURS	EMPLOYER	
	Driller	9.5	Law Eng.	Drilling, Installing 6" Wells
	Asst. Driller	9.5	" "	
	Driller Helper	9.5	" "	
TOTAL WORK HOURS ON JOB SITE THIS DATE		28.5	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO  IF "YES", A COPY OF THE COMPLETED OSHA REPORT IS REQUIRED	
CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT				
TOTAL WORK HOURS FROM START OF CONSTRUCTION				
CONSTRUCTION AND PLANT EQUIPMENT LEFT ON JOB SITE UNTIL USE IS COMPLETED				
DESCRIPTION	DATE FIRST ON JOB (First time only)	HOURS WORKED THIS DATE	HOURS IDLED	DATE OF FINAL REMOVAL FROM JOB SITE
CONSTRUCTION AND PLANT EQUIPMENT NOT LEFT ON JOB SITE PERMANENTLY (This will include pickup trucks and mobile mounted items, such as compressor, that are also used for transportation to and from the job)				
DESCRIPTION		HOURS WORKED	HOURS IDLED	
1988 Chevrolet Pickup Truck		8.5	1.0	

PROJECT: J.P.-4

PROJECT NO. T-5266

BORING: EW-14

DATE: 6-19-90

DRILLER: W. Boyette, J. K. Kelly

CREW: G. Fischer

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					SOIL DESCRIPTION AND REMARKS	FROM	TO	
		<b>TOP SOIL:</b>							
		Drilled to 36.0 w. 8 1/4" I.D. HSA							
		Set 6" PVC E.W. well @ 36.0							
		(30.0) Screws 6.0 to 36.0							
		Sand: 4.0 to 6.0							
		Bentonite: 3.0 to 4.0							
		(41 Sand Sand)							

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" I.D.

b. WASH  WATER  MUD

BORING SIZE 13" BIT USED

PIPE: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER 9.50 Sunny

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT 15 min. MOVING 15 min.

HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_

WATER @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)

PROJECT: TP-4

PROJECT NO. T-5266

BORING: EW-15

DATE: 6-20-90

DRILLER: Mr. Boyette's to Pend SCREW: G. Fischer

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH		FIRST 6"	2ND 6"	3RD 6"	REC.
FROM	TO					FROM	TO				
		<b>TOP SOIL:</b>									
		Drilled to 35.0 w. 8 1/4" I.D. Hst									
		Set 6" PVC E.W. well @ 35.0									
		(30.0) Screen: 5.0 to 35.0									
		Sand: 3.5 to 35.0									
		Bentonite: 2.5 to 3.5									
		(31 bags sand)									

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" I.D.

b. WASH  WATER  MUD

BORING SIZE 13" BIT USED

ING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER 85° Sunny

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT 15 min. MOVING 15 min.

HAULING WATER 1.5 STANDBY \_\_\_\_\_

WATER @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)



PROJECT: TP-4

PROJECT NO. J-5266

BORING: EW-16

DATE: 6-21-90

DRILLER: N. Boyette & R. Parley CREW: G. Fisher

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
		<b>TOP SOIL:</b>							
		Drilled to 35.0 w. 8 1/4" T.D. H&A							
		Set 6" PVC E.W. Well @ 35.0							
		(30.0) Screen: 5.0 to 35.0							
		Sand: 3.0 to 5.0							
		Beaunite: 2.0 to 3.0							
		(30.0) Sand							

METHOD OF DRILLING (Check One)

a. AUGER  SIZE 8 1/4" T.D.

b. WASH  WATER  MUD

BORING SIZE 13" BIT USED \_\_\_\_\_

ING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_

UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_

BAG SAMPLES: NO. \_\_\_\_\_

WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_

SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER 95° Sunny

NON-DRILLING TIME (Hrs.) \_\_\_\_\_

BORING LAYOUT .5 MOVING 45 min.

HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_

WATER @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)

PROJECT: JP-4 PROJECT NO. J-5266 BORING: EW-18  
DATE: 6-21-90 DRILLER: V. Boyette & H. Penley CREW: G. Fischer SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
		<b>TOP SOIL:</b>							
		Drilled to 30.0 w. 8 1/4" F. P. HSA							
		Set 6" PVC E. W. well @ 30.0							
		(25.0) Screen: 15.0 to 30.0							
		Sand: 2.5 to 30.0							
		Bentonite: 2.5 to 3.5							
		( <del>28</del> layers Sand)							
		(28 layers Sand)							

METHOD OF DRILLING (Check One)  
 a. AUGER  SIZE 8 1/4" F.D.  
 b. WASH  WATER  MUD   
 BORING SIZE 13" BIT USED   
 DRILLING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_  
 UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_  
 BAG SAMPLES: NO. \_\_\_\_\_  
 WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_  
 SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER 75° Sunny  
 NON-DRILLING TIME (Hrs.) \_\_\_\_\_  
 BORING LAYOUT 15 min. MOVING 30 min.  
 HAULING WATER  STANDBY   
 WATER @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_  
 LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_  
 CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)  
 FORM 126 6/89

DAILY REPORT TO INSPECTOR				DATE 6-21-90
CONTRACT NO.		TITLE AND LOCATION		REPORT NO.
CONTRACTOR (Prime or Subcontractor) Law Engineering			NAME OF SUPERINTENDENT OR FOREMAN Norwood Boyette	
WEATHER Sunny, Hot			TEMPERATURE 100° °F	
WEATHER EFFECTS				
PRIME CONTRACTOR/SUBCONTRACTOR WORKFORCE <i>(If space provide below is inadequate, use additional sheets)</i>				LOCATION AND DESCRIPTION OF WORK PERFORMED
NUMBER	TRADE	HOURS	EMPLOYER	
	Driller	10.5	Law Eng.	Drilling, Installing 6" Wells
	Asst. Driller	10.5	" "	" " " "
	Driller Helper	10.5	" "	" " " "
TOTAL WORK HOURS ON JOB SITE THIS DATE		31.5		WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO  IF "YES", A COPY OF THE COMPLETED OSHA REPORT IS REQUIRED
CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT				
TOTAL WORK HOURS FROM START OF CONSTRUCTION				
CONSTRUCTION AND PLANT EQUIPMENT LEFT ON JOB SITE UNTIL USE IS COMPLETED				
DESCRIPTION	DATE FIRST ON JOB <i>(First time only)</i>	HOURS WORKED THIS DATE	HOURS IDLED	DATE OF FINAL REMOVAL FROM JOB SITE
CONSTRUCTION AND PLANT EQUIPMENT NOT LEFT ON JOB SITE PERMANENTLY <i>(This will include pickup trucks and mobile mounted items, such as compressor, that are also used for transportation to and from the job)</i>				
DESCRIPTION			HOURS WORKED	HOURS IDLED
1988 Chevrolet Pickup Truck			8.0	2.5



<b>DAILY REPORT TO INSPECTOR</b>				DATE <i>6-22-90</i>
CONTRACT NO.		TITLE AND LOCATION		REPORT NO.
CONTRACTOR (Prime or Subcontractor) <i>Law Engineering</i>			NAME OF SUPERINTENDENT OR FOREMAN <i>No wood Boyette</i>	
WEATHER <i>Sunny, Hot</i>			TEMPERATURE <i>95°</i> °F	
WEATHER EFFECTS				
PRIME CONTRACTOR/SUBCONTRACTOR WORKFORCE <small>(If space provide below is inadequate, use additional sheets)</small>				LOCATION AND DESCRIPTION OF WORK PERFORMED
NUMBER	TRADE	HOURS	EMPLOYER	
	<i>Driller</i>	<i>6.0</i>	<i>Law Eng</i>	<i>Drilling, Well Installation, Clean Up</i>
	<i>Asst. Driller</i>	<i>6.0</i>	<i>" "</i>	<i>" " " "</i>
	<i>Driller Helper</i>	<i>6.0</i>	<i>" "</i>	<i>" " " "</i>
TOTAL WORK HOURS ON JOB SITE THIS DATE		<i>18.0</i>		WERE THERE ANY LOST TIME ACCIDENTS THIS DATE?  <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO  IF "YES", A COPY OF THE COMPLETED OSHA REPORT IS REQUIRED
CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT				
TOTAL WORK HOURS FROM START OF CONSTRUCTION				
CONSTRUCTION AND PLANT EQUIPMENT LEFT ON JOB SITE UNTIL USE IS COMPLETED				
DESCRIPTION	DATE FIRST ON JOB <small>(First time only)</small>	HOURS WORKED THIS DATE	HOURS IDLED	DATE OF FINAL REMOVAL FROM JOB SITE
CONSTRUCTION AND PLANT EQUIPMENT NOT LEFT ON JOB SITE PERMANENTLY <small>(This will include pickup trucks and mobile mounted items, such as compressor, that are also used for transportation to and from the job)</small>				
DESCRIPTION	HOURS WORKED	HOURS IDLED		
<i>1988 Chevrolet Pickup</i>	<i>5.0</i>	<i>1.0</i>		

PROJECT: NAVY Fuel Depo Charleston S.C. PROJECT NO. J-5266

BORING: \_\_\_\_\_

DATE: 6-26-90 DRILLER: K. Pendley CREW: \_\_\_\_\_

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
		<b>TOP SOIL: Well Development</b>							
		<b>EW-1 2 hr.</b>							
		water level start 10.1' stop 10.6'							
		bottom 33.5'							
		pumped @ 5.3 gal. min.							
		Total 200 gal. (stained)							
		<b>EW-2 2 hr.</b>							
		water level start 11.8' stop 13.2'							
		bottom 30.6'							
		pumped @ 3.9 g.p.m.							
		Total 200 gal. (stained)							
		<b>EW-3 2 hr.</b>							
		water level start 11.2' stop 12.2'							
		bottom 34.5'							
		pumped @ 6 g.p.m.							
		Total 190 gal. (clear)							
		<b>EW-4 2 hr</b>							
		water level start 12.4' stop 13.6'							
		bottom 31.8'							
		pumped @ 9.5 g.p.m.							
		Total 200 gal. (clear)							

METHOD OF DRILLING (Check One)

- a. AUGER \_\_\_\_\_ SIZE \_\_\_\_\_
- b. WASH \_\_\_\_\_ WATER \_\_\_\_\_ MUD \_\_\_\_\_
- BORING SIZE \_\_\_\_\_ BIT USED \_\_\_\_\_
- CASING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_
- UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_
- BAG SAMPLES: NO. \_\_\_\_\_
- WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_
- SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

- WEATHER \_\_\_\_\_
- NON-DRILLING TIME (Hrs.) \_\_\_\_\_
- BORING LAYOUT \_\_\_\_\_ MOVING \_\_\_\_\_
- HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_
- WATER LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_
- @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_
- CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_

REMARKS: (All remarks should be explained on the back of white copy)

LAW-ENGINEERING

TEST BORING FIELD RECORD

PROJECT: NAVY Fuel Depo Charleston S.C. PROJECT NO. J-5266

BORING: \_\_\_\_\_

DATE: 6-27-90 DRILLER: Pendley

CREW: \_\_\_\_\_

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
6-27-90		TOP SOIL: Well Development EW-5 2 hr. water level start 14.9' stop 15.8' bottom 33.9' Pumped 5.6 g.p.m. Total 190 gal. (clear)							
		EW-6 1.5 hr. water level start 15' stop 15.6' bottom 37.5' Pumped 5 g.p.m. Total 150 gal. (clear)							
		EW-7 1 hr. 45 min. water level start 14.9' stop 16.3' Bottom 33.2' Pumped 5 g.p.m. Total 180 gal. (clear)							
		EW-8 1 hr. 30 min. water level start 14.8 stop 17.0 bottom 36.7' Pumped 2.6 G.P.M. (very clear) Total 120 gal.							
		EW-9 2 hr. water level start 15.3' stop 26' bottom 36' Pumped 5.45 g.p.m. (Stained) Total 180 gal.							

METHOD OF DRILLING (Check One)

~~a. AUGER \_\_\_\_\_ SIZE \_\_\_\_\_~~  
~~b. WASH \_\_\_\_\_ WATER \_\_\_\_\_ MUD \_\_\_\_\_~~  
~~BORING SIZE \_\_\_\_\_ BIT USED \_\_\_\_\_~~  
~~DRILLING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_~~  
~~UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_~~  
~~BAG SAMPLES NO. \_\_\_\_\_~~  
~~WATER LOSSES: % \_\_\_\_\_ DEPTH \_\_\_\_\_~~  
~~SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_~~

WEATHER \_\_\_\_\_

~~NON-DRILLING TIME (Hrs.) \_\_\_\_\_~~  
~~BORING LAYOUT \_\_\_\_\_ MOVING \_\_\_\_\_~~  
~~HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_~~  
~~WATER LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_~~  
~~CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_~~  
~~REMARKS: (All remarks should be explained on the back of white copy)~~



PROJECT: Navy Fuel Depo Charleston S.C. PROJECT NO. J-5266

BORING: \_\_\_\_\_

DATE: 7-2-90

DRILLER: K. Pendley

CREW: \_\_\_\_\_

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH			REC.
FROM	TO					FROM	TO	FIRST 6"	
		<b>TOP SOIL: Well Development</b>							
7-2-90		EW-12 2 hr water level start 9.8' stop 12.2' bottom 36.2' Pumped 8.6 g.p.m. Total 200 gal. (stained)							
		EW-13 1 hr 45 min. water level start 8.9' stop 16.2' bottom 34.8' Pumped 8.5 g.p.m. Total 190 gal. (stained)							
		EW-14 2 hr. 15 min. water level start 8' stop 24' bottom 34.8' Pumped 6 g.p.m. - Pumped down after 80 gal. let set 10 min + pumped down after 30 gal. let set 20 min + pumped down after 40 gal. let set 20 min. + pumped down after 40 gal. Total Pumped 210 gal. (slightly <del>stained</del> stained)							

METHOD OF DRILLING (Check One)

a. AUGER \_\_\_\_\_ SIZE \_\_\_\_\_  
 b. WASH \_\_\_\_\_ WATER \_\_\_\_\_ MUD \_\_\_\_\_  
 BORING SIZE \_\_\_\_\_ BIT USED \_\_\_\_\_  
 BORING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_  
 UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_  
 BAG SAMPLES: NO. \_\_\_\_\_  
 WATER LOSSES, % \_\_\_\_\_ DEPTH \_\_\_\_\_  
 SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_

WEATHER \_\_\_\_\_

NON-DRILLING TIME (Hrs.) \_\_\_\_\_  
 BORING LAYOUT \_\_\_\_\_ MOVING \_\_\_\_\_  
 HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_  
 WATER LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_  
 @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_  
 CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_  
 REMARKS: (All remarks should be explained on the back of white copy)

PROJECT: Navy Fuel Depo Charleston S.C. PROJECT NO. J-5266

BORING: \_\_\_\_\_

DATE: 7-3-90 DRILLER: K. Pendley CREW: \_\_\_\_\_

SURFACE ELEV. \_\_\_\_\_

DEPTH		SOIL STRATA SOIL DESCRIPTION AND REMARKS	TIME	TYPE	NO.	DEPTH		FIRST 6"	2ND 6"	3RD 6"	REC.
FROM	TO					FROM	TO				
		<b>TOP SOIL: Well Development</b>									
7-3-90		<b>EW-15 2 hr.</b>									
		water level start 8.1' stop 19.3'									
		bottom 31.5'									
		Pumped 5 g.p.m.									
		Pumped down with 50 gal. Waited 30 min.									
		" " " 30 " " 20 "									
		" 40 more gal.									
		Total 120 gal. (stained)									
		<b>EW-16 2 hr.</b>									
		water level start 8' stop 18.3'									
		Bottom 32.8'									
		Pumped 9.2 g.p.m.									
		Pumped down after 130 gal. Waited 30 min.									
		Total 210 gal. (clear)									
		<b>EW-17 2 hr.</b>									
		water level start 8.3' stop 11.4'									
		bottom 32.9' Pumped 7.5 g.p.m.									
		Pumped down with 90 gal. waited 30 min.									
		" " " " Total 180 gal. (slightly stained)									
		<b>EW-18 2 hr.</b>									
		water level start 6.8' stop 20.5'									
		bottom 29.1' Pumped 9.2 g.p.m.									
		Pumped down with 70 gal. Waited 30 min.									
		" " " 50 " " " "									
		" " " 55 " Total 175 gal. (clear)									

METHOD OF DRILLING (Check One)

~~a. AUGER \_\_\_\_\_ SIZE \_\_\_\_\_~~  
~~b. WASH \_\_\_\_\_ WATER \_\_\_\_\_ MUD \_\_\_\_\_~~  
~~BORING SIZE \_\_\_\_\_ BIT USED \_\_\_\_\_~~  
~~CASING: SIZE \_\_\_\_\_ LENGTH \_\_\_\_\_~~  
~~UNDISTURBED SAMPLES: NO. \_\_\_\_\_ SIZE \_\_\_\_\_~~  
~~BAG SAMPLES: NO. \_\_\_\_\_~~  
~~WATER LOSSES: % \_\_\_\_\_ DEPTH \_\_\_\_\_~~  
~~SPECIAL TESTS (Hrs. & Explain) \_\_\_\_\_~~

~~WEATHER \_\_\_\_\_~~  
~~NON-DRILLING TIME (Hrs.) \_\_\_\_\_~~  
~~BORING LAYOUT \_\_\_\_\_ MOVING \_\_\_\_\_~~  
~~HAULING WATER \_\_\_\_\_ STANDBY \_\_\_\_\_~~  
~~WATER LEVELS @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_~~  
~~CAVE-IN-DEPTH: @ \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_~~  
~~REMARKS: (All remarks should be explained on the back of white copy)~~

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>				1. CONTRACT ID CODE	PAGE OF PAGES 1   6
2. AMENDMENT/MODIFICATION NO. 0001	3. EFFECTIVE DATE 89JUN30	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (If applicable) N/A		
6. ISSUED BY SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND 2155 EAGLE DR., P.O. BOX 10068 CHARLESTON, SC 29411-0068		7. ADMINISTERED BY (If other than Item 6) 0213KH	CODE		
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)				9A. AMENDMENT OF SOLICITATION NO. N62467-88-B-0426	9B. DATED (SEE ITEM 11) 89JUN14
				10A. MODIFICATION OF CONTRACT/ORDER NO.	
				10B. DATED (SEE ITEM 11)	
CODE	FACILITY CODE				

**11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS**

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers  is extended,  is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:  
 (a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

**12. ACCOUNTING AND APPROPRIATION DATA (If required)**

**13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.**

A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

D. OTHER (Specify type of modification and authority)

**E. IMPORTANT:** Contractor  is not,  is required to sign this document and return \_\_\_\_\_ copies to the issuing office.

**14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)**

JP-4 REMEDIATION AT THE DEFENSE FUEL SUPPORT POINT, CHARLESTON, SC  
 Specification 06-88-0426 is amended as follows: (Continued on Page 2)

**EACH BIDDER MUST ACKNOWLEDGE RECEIPT OF THIS AMENDMENT ON THE BID FORM. FAILURE TO DO SO MAY CONSTITUTE REJECTION OF THE BID.**

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)		16B. UNITED STATES OF AMERICA  BY (Signature of Contracting Officer)	
15C. DATE SIGNED	16C. DATE SIGNED		

In the "Table Of Contents" under "Division 1. General Requirements" add:

"01600 Health and Safety Requirements"

This section is attached to this amendment.

SECTION 02050 DEMOLITION, REMOVAL AND DISPOSAL

2.3.2 Regulations: Delete this subparagraph in its entirety and substitute the following:

"2.3.2 Regulations: Comply with all applicable federal, state, and local storage, handling, and disposal regulations, as well as all DFSP facility operating, storage, handling, and disposal practices and procedures."

SECTION 01600

HEALTH AND SAFETY REQUIREMENTS

1.1 APPLICABLE PUBLICATIONS: The publications listed below are applicable to this specification. The publications are referred to in the text by the basic designation only. In addition to the requirements set forth in these publications, all additional local, state, and federal requirements relating to this project must be followed, including SC Department of Health and Environmental Control (SCDHEC), the Environmental Protection Agency (EPA), and Occupational Safety and Health Administration (OSHA) regulations and guidelines.

1.1.1 American Conference of Governmental Industrial Hygienists: Threshold Limit Values and Biological Exposure Indices for 1988-1989.

1.1.2 Environmental Protection Agency (EPA): 40 CFR 261 Identification and Listing of Hazardous Waste.

1.1.3 National Industrial Occupational Safety and Health Administration (NIOSH): Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985.

1.1.4 Occupational Safety and Health Administration (OSHA): 29 CFR 1910.120 Hazardous Waste Site Operations and Emergency Response

1.2 BACKGROUND: DFSP is a JP-4 jet fuel storage facility used primarily by the Air Force. In 1975, a leak was discovered in one of the seven tanks (tank 1) that resulted in a release of an estimated 83,000 gallons of JP-4 fuel. The fuel constituents contaminated a portion of the local groundwater as well as the unsaturated soils in the area. Following the release of the fuel, several remedial actions were undertaken to recover lost product. Benzene, toluene, ethylbenzene, and xylene, specific compounds of JP-4 fuel, have been identified in some of the monitoring wells both on and off site.

Data obtained during subsequent investigations indicate a potential presence of contaminants that may present health or environmental hazards during site construction.

1.3 SUBMITTALS: The Contractor shall submit a Health and Safety Plan as described below within 45 days of notice to proceed.

1.3.1 HEALTH AND SAFETY PLAN (HASP): In order to perform the drilling, excavation, and materials handling and disposal associated with this project, a health and safety plan will be designed and

implemented according to NIOSH guidance, October 1985 and OSHA regulations, 29 CFR 1910.120, July 1988. This program plan, as a minimum, shall incorporate the requirements listed and/or referenced and shall be provided, as appropriate, to any subcontractor or its representative who will be involved with the project. The HASP shall be designed to identify, evaluate, and control safety and health hazards and provide for emergency response for hazardous waste operations. The HASP shall follow all applicable federal (EPA, OSHA, NIOSH, etc), state (SCDHEC, etc), and local requirements. Following the requirements set forth above, the HASP shall include the following sections, as a minimum:

1.3.1.1 Work Plan: The Contractor shall provide a work plan that consists of a site description and background as well as a task-by-task description of the events necessary to complete the project and the associated engineering controls to be utilized.

1.3.1.2 Pre-site Characterization: Site characterization shall be performed to assess potential hazards of the work area.

1.3.1.3 Work Zones: The Contractor shall clearly lay out and identify work zones in the field to distinguish those areas where the potential for exposure to hazardous materials exists. The contractor shall plan for, and exercise appropriate measures to control the operations of personnel and equipment in these areas.

1.3.1.4 Air Monitoring: The Contractor shall describe the program for air monitoring. The program should include provisions for continuous air monitoring as appropriate. In addition, the program should specify the type of equipment used during the air monitoring.

The documentation method should be specified as well as the frequency of monitoring.

1.3.1.5 Site Safety Plan: The Contractor shall outline procedures to be used during activities at the work area to minimize risk of injury or illness resulting from on-site activities. The specific health and safety concerns in this plan will deal with chemical and physical hazard exposure during the various activities associated with this project. Thus, all physical and all chemical hazards shall be characterized and addressed in this plan. The intent is that the Contractor will carry out these duties to the degree that injuries, occupational illnesses/unwarranted property losses are prevented, while at the same time, ensuring compliance with applicable laws and regulations. The Contractor shall place emphasis on individual awareness/personal protective equipment and emergency responses. The Contractor will design the Site Safety Plan to include, as a minimum, the sections listed below.

1.3.1.5.1 Personal Protective Equipment and Clothing (PPE): Describe the protective clothing and equipment to be worn by personnel during the various site operations. Levels of protection will be dictated by site constituents and air monitoring results. The Contractor shall develop and implement levels of protection required for the specific contaminants and contaminant levels associated with this site. The Contractor shall develop this plan to address upgrading or downgrading the levels of protection, as necessary, to meet site conditions.

1.3.1.5.2 Medical Surveillance Program: A medical surveillance program shall be instituted, meeting as a minimum, the requirements of 29 CFR 1919.120. A description of the medical surveillance program shall be submitted as part of the HASP.

1.3.1.5.3 Site Control/Site Entry Procedures: Define site control and management measures and include site map.

1.3.1.5.4 Decontamination Procedures: Establish decontamination procedures for personnel and equipment. All contaminated materials, including solvents, cloth, soil, and wood that cannot be decontaminated, must be properly containerized, labeled, and properly disposed of in accordance with all applicable federal regulations as well as SCDHEC regulations and DFSP facility guidelines.

1.3.1.5.5 Material Handling and Disposal: All drilled or excavated material generated during this project shall be handled and disposed of in accordance with all applicable federal, state, and local statutes, regulations, and guidelines, including those of SCDHEC and the DFSP facility. The plan for material handling and disposal procedures should be developed under close supervision and guidance by SCDHEC and the DFSP facility.

1.3.1.6 Contingency Plan: Set forth a Contingency Plan according to requirements set forth by 29 CFR 1910 for emergency response plans for safe and effective response to emergencies. The plan will comprise two major sections: emergency communications and medical support and first aid.

1.3.1.7 Project Responsibility and Organization: The purpose of the HASP is to protect all personnel and the surrounding environment during site activities and to satisfy OSHA requirements. It will be the responsibility of the Contractor to conform to and comply with all aspects of the safety program. All personnel will adhere to the Contractor's site Safety Plan. The Contractor will utilize a qualified Industrial Hygienist (IH)/Site Safety Officer (SSO) who will be responsible for enforcing strict adherence to the HASP.

1.3.1.7.1 The Contractor shall provide a IH/SSO to monitor site activities. The IH/SSO shall have the authority and knowledge necessary to implement the HASP and verify compliance with applicable safety and health requirements. The Contractor shall select an IH/SSO and submit a statement of his/her qualifications for approval to work on this project.

The IH/SSO shall have the following qualifications:

1. A sound working knowledge of federal and state occupational safety and health regulations;

2. And shall also have formal educational training in occupational safety and health adequate to comply with current OSHA requirements and will submit evidence of training. If necessary, the Contractor shall subcontract an independent IH/SSO, subject to review and approval by the Navy.

The IH/SSO has full authority for determining levels of PPE during construction (based on air monitoring results and the HASP). Additional responsibilities include:

a. Preparing an effective site safety plan for the project;

b. Categorizing and identifying to the project staff the levels of potential exposure to dangerous levels of hazardous materials;

c. Assuring that adequate and appropriate safety training and equipment are available for project personnel;

d. Arranging for medical examinations for specified project personnel.

1.3.1.8 Standard Operating Procedures (SOP): SOP are those activities that can be standardized (such as site entry, excavation, drilling, decontamination, respirator fit testing, etc.).

1.3.1.9 Training: The contractor shall provide evidence that all persons working at the site have received health and safety training as required by 29 CFR 1910.120.

The above list of HASP sections shall not be construed as complete, but rather provides a framework for the Contractor. The HASP shall be reviewed and approved according to requirements outlined herein.

\*\*\* END OF SECTION \*\*\*

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>				1. CONTRACT ID CODE	PAGE OF PAGES 1   1
2. AMENDMENT/MODIFICATION NO. 0002	3. EFFECTIVE DATE 89 JULY 13	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (If applicable) N/A		
ISSUED BY SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND 2155 EAGLE DR., P.O. BOX 10068 CHARLESTON, SC 29411-0068	CODE N62467 0213KH:kh'	7. ADMINISTERED BY (If other than Item 6) CODE			

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)	(/)	9A. AMENDMENT OF SOLICITATION NO. N62467-88-B-0426
	X	9B. DATED (SEE ITEM 11) 89 June 14
		10A. MODIFICATION OF CONTRACT/ORDER NO.
		10B. DATED (SEE ITEM 13)
CODE	FACILITY CODE	

11 THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers  is extended,  is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:  
 (a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(/)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor  is not,  is required to sign this document and return \_\_\_\_\_ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by DCF section headings, including solicitation/contract subject matter where feasible.)

JP-4 REMEDIATION AT THE DEFENSE FUEL SUPPORT POINT, CHARLESTON, SC

NOTICE: THE OPENING OF BIDS ON TUESDAY 18 JULY 1989 AT 2:30 PM IS HEREBY POSTPONED INDEFINITELY PENDING THE ISSUANCE OF A TECHNICAL AMENDMENT.

**EACH BIDDER MUST ACKNOWLEDGE RECEIPT OF THIS AMENDMENT ON THE BID FORM. FAILURE TO DO SO MAY CONSTITUTE REJECTION OF THE BID.**

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

14A. NAME AND TITLE OF SIGNER (Type or print)	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
15B. CONTRACTOR/OFFEROR	16B. UNITED STATES OF AMERICA
15C. DATE SIGNED	16C. DATE SIGNED
(Signature of person authorized to sign)	BY (Signature of Contracting Officer)

1011515 Code 11517

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE PAGE OF PAGES 1 1
2. AMENDMENT/MODIFICATION NO. 0004
3. EFFECTIVE DATE 89OCT16
4. REQUISITION/PURCHASE REQ. NO. N/A
5. PROJECT NO. (If applicable) N/A
6. ISSUED BY SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND 2155 EAGLE DR., P.O. BOX 10068 CHARLESTON, SC 29411-0068
7. ADMINISTERED BY (If other than Item 6)
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)

9A. AMENDMENT OF SOLICITATION NO. N62467-88-B-0426
9B. DATED (SEE ITEM 11) 89JUN14
10A. MODIFICATION OF CONTRACT/ORDER NO.
10B. DATED (SEE ITEM 13)
CODE FACILITY CODE

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

[X] The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers [XX] is extended, [ ] is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted, or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

[V] A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor [XX] is not, [ ] is required to sign this document and return \_\_\_\_\_ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

JP-4 REMEDIATION AT THE DEFENSE FUEL SUPPORT POINT, CHARLESTON, SC

NOTICE: THE OPENING OF BIDS IS HEREBY RE-ESTABLISHED FOR 2:30 PM, TUESDAY, 14 NOVEMBER 1989.

EACH BIDDER MUST ACKNOWLEDGE RECEIPT OF THIS AMENDMENT ON THE BID FORM. FAILURE TO DO SO MAY CONSTITUTE REJECTION OF THE BID.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
15B. CONTRACTOR/OFFEROR
15C. DATE SIGNED
16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
16B. UNITED STATES OF AMERICA
16C. DATE SIGNED
BY (Signature of Contracting Officer)

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>				1. CONTRACT ID CODE	PAGE OF PAGES 1   4
2. AMENDMENT/MODIFICATION NO. 0003	3. EFFECTIVE DATE 89 SEP 15	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (If applicable) N/A		
ISSUED BY SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND 2155 EAGLE DR., P.O. BOX 10068 CHARLESTON, SC 29411-0068	CODE N62467 0213KH	7. ADMINISTERED BY (If other than Item 6) CODE			

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)	<input checked="" type="checkbox"/> 9A. AMENDMENT OF SOLICITATION NO. N62467-88-B-0426
	<input checked="" type="checkbox"/> 9B. DATED (SEE ITEM 11) 89 JUNE 14
	10A. MODIFICATION OF CONTRACT/ORDER NO.
	10B. DATED (SEE ITEM 13)
CODE	FACILITY CODE

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers  is extended,  is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:  
 (a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

<input checked="" type="checkbox"/> A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
<input type="checkbox"/> B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
<input type="checkbox"/> C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
<input type="checkbox"/> D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor  is not,  is required to sign this document and return \_\_\_\_\_ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

JP-4 REMEDIATION AT THE DEFENSE FUEL SUPPORT POINT, CHARLESTON, SC

NOTICE: THE OPENING OF BIDS IS HEREBY SET AT 2:30 PM, TUESDAY, 26 SEPTEMBER 1989.

SPECIFICATION 06-88-0426 IS AMENDED AS FOLLOWS: (CONTINUED ON PAGE 2)

**EACH BIDDER MUST ACKNOWLEDGE RECEIPT OF THIS AMENDMENT ON THE BID FORM. FAILURE TO DO SO MAY CONSTITUTE REJECTION OF THE BID.**

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
_____ (Signature of person authorized to sign)		BY _____ (Signature of Contracting Officer)	

## SECTION 01011 GENERAL PARAGRAPHS

9. GOVERNMENT REPRESENTATIVES: At the end of the paragraph, add:  
"The Government reserves the right to perform environmental sampling and/or well sampling during the construction process."

## SECTION 02225 EXCAVATION, BACKFILLING, AND COMPACTING FOR UTILITIES

## 1.4.4 Reports of Field Testing: Insert:

"d. Surplus Soils Tests: Submit to Contracting Officer the total Petroleum Hydrocarbon and EP toxicity metals test results for composite sampling of well cuttings. Two composite samples each are required for excess soils and for well cuttings. Composite sampling and analysis shall be performed as outlined herein. These test results shall be reviewed by the Contracting Officer for proper disposal classification and disposal approval."

## 1.6 CRITERIA FOR BIDDING: Add:

"d. Assume excavated soil and well cuttings are non-hazardous; thus excess excavated soils (not used as backfill) and well cuttings should be assumed to require non-hazardous solid waste disposal."

## 1.7.4.1 Delete this subparagraph in its entirety and substitute:

"1.7.4.1 Dispose of excavated material as indicated herein. This material shall not obstruct the flow of streams, endanger a partly finished structure, impair the efficiency or appearance of any facilities, or be detrimental to the completed work."

## 3.2 GENERAL EXCAVATIONS: Add the following subparagraph:

"3.2.2 Excess Soil from Excavations: Excess soil from excavations shall be stockpiled, composite-sampled, and covered on the DFSP facility. Well cuttings shall be containerized on-site and composite-sampled. Composite samples shall be collected according to methodology outlined in EPA SW-846, 2nd edition. Six random grab samples shall constitute one composite sample. Two composites are required for the stockpiled excess soils and two composites are required for the containerized well cuttings. Composite samples shall be analyzed for Total Petroleum Hydrocarbons (EPA Method 418.1) and EP toxicity metals by a SCDHEC-approved laboratory. These test results shall be reviewed by the Contracting Officer for disposal approval in accordance with SCDHEC disposal requirements. The Contractor shall obtain all necessary permits and approvals required for this disposal.

If waste designation indicates a scenario other than suitable and non-hazardous, these waste materials and soils shall be removed from the limits of Government property in accordance with all federal, state, and local disposal requirements, and shall be approved by the Contracting Officer. All applicable permits and approvals must be obtained. The hazardous scenario would constitute a change in contract and the contract price would be adjusted in accordance with the clause "Changes" of the contract clauses."

3.9.3 Disposition of Surplus Material: Delete this subparagraph in its entirety and substitute:

"3.9.3 Disposition of Surplus Material: Surplus excavated soils not required or suitable for filling, backfilling, or grading shall be stockpiled, covered, and composite-sampled using EPA Method SW-846, 2nd edition. Well cuttings shall be containerized and composite-sampled by the same method. Six random grab samples shall constitute one composite sample. Two composites are required for the stockpiled excess soils and two composites are required for the containerized well cuttings. Composite samples shall be analyzed for Total Petroleum Hydrocarbons (EPA Method 418.1) and EP toxicity metals by a SCDHEC-approved laboratory. These test results shall be reviewed by the Contracting Officer for proper disposal classification and disposal approval. Upon approval by the Contracting Officer soils shall be removed from Government property in accordance with SCDHEC disposal requirements. Comply with the requirements of Section 01560, "Environmental Protection," Section 02225, "Excavating, Backfilling, and Compacting for Utilities," and Section 02670, "Rotary-Drilled Extraction Well." All surplus soil materials shall be removed from the Government property within 30 days or as approved by the Contracting Officer."

3.10 FIELD SAMPLING AND TESTING: Insert the following as the first sentence of the paragraph: "Perform composite-sampling for excess soils and well cuttings as described herein."

#### SECTION 02670 ROTARY-DRILLED EXTRACTION WELL

2.1.6 Auxiliary Equipment: Delete this subparagraph in its entirety and substitute:

"2.1.6 Auxiliary Equipment: Provide a large loosely covered holding container for temporary storage of well cuttings. Provide containers and/or equipment necessary to transfer well development waters to existing 10,000 gallon holding tank on DFSP facility."

3.1.1 Drilling: Add the following subparagraphs:

"3.1.1.1 Cleaning of Drill Equipment: Contractor shall steam clean drill rig and equipment before beginning and after completion of project work.

For extraction wells 1 - 17 Contractor shall thoroughly rinse (potable water) and remove all soil material and residue from drill rig and drilling equipment before proceeding to each subsequent hole on the DFSP facility. Dispose of the rinse water as specified for well development water. Dispose of the residue as excess excavated material.

For extraction well 18 (EW-18) located on Valley St. Contractor shall ensure that ALL cuttings, fluids, and development waters are contained and collected; also, ensure that soil and muds do not spill from the drilling equipment and rig during relocation to the DFSP facility.

3.1.1.2 Order of Drilling: Contractor shall begin drilling at extraction well 18 (EW-18)."

3.1.5 Well Development: Add the following subparagraph:

"3.1.5.1 Well Purge/Development Water: The well purge/development water shall be placed into an existing 10,000 gallon holding tank located on the DFSP facility. The method of placing these waters shall be in accordance with all regulations and guidelines set forth by SCDHEC and EPA. DFSP personnel will be responsible for the testing and disposal of these waters."

3.2 WASTE DISPOSAL: Delete this paragraph in its entirety and substitute:

"3.2 WASTE DISPOSAL: Dispose of waste, materials, excess excavated soil, and well cuttings according to appropriate waste designation. Excess soil from excavations shall be stockpiled and loosely covered on the DFSP facility, and well cuttings shall be placed in a large loosely covered holding container. Soil composites for the stockpile and for the containerized well cuttings shall be collected according to EPA Method SW 846, 2nd edition. Six random grab samples collected from upper and lower portions of the load shall constitute one composite sample. Two composites are required for the stockpiled excess soils and two composites are required for the containerized well cuttings. The composites shall be analyzed for Total Petroleum Hydrocarbons (EPS Method 418.1) and EP toxicity metals by a SCDHEC-approved laboratory. Based upon these results, the Contracting Officer shall approve disposal in accordance with regulatory designation. For purposes of bidding, Contractor shall assume that non-hazardous solid waste disposal will be required; all requirements of Section 01560 "Environmental Protection" hold. If waste designation indicates a scenario other than suitable and non-hazardous, these waste materials and soils shall be removed from the limits of Government property in accordance with all federal, state, and local disposal requirements, and shall be approved by the Contracting Officer. All applicable permits and approvals must be obtained. The hazardous scenario would constitute a change in contract and the contract price would be adjusted in accordance with the clause "Changes" of the contract clauses."

N62467-88-0426  
SPEC. 06-88-0426  
BID OPENING DATE:  
18 JULY 1989

NOTICE TO BIDDERS

ALL INQUIRIES CONCERNING THE TECHNICAL ASPECTS OF THE ATTACHED SPECIFICATIONS, OR THE DRAWINGS ACCOMPANYING THESE SPECIFICATIONS, MUST BE SUBMITTED IN WRITING, EITHER BY CORRESPONDENCE OR BY TELEGRAM, AND MUST BE RECEIVED AT LEAST FIFTEEN (15) DAYS IN ADVANCE OF THE BID OPENING DATE IN ORDER TO PERMIT ADEQUATE TIME TO REPLY TO THE INQUIRY.

IT MUST BE EMPHASIZED THAT TELEPHONE INQUIRIES CONCERNING TECHNICAL ASPECTS OF THE PLANS AND SPECIFICATIONS CANNOT BE ACCEPTED.

CORRESPONDENCE REQUESTING INTERPRETATION AND/OR CLARIFICATION OF TECHNICAL DATA SHOULD BE ADDRESSED TO:

COMMANDING OFFICER  
SOUTHERN DIVISION (ATTN: CODE 02)  
NAVAL FACILITIES ENGINEERING COMMAND  
2155 EAGLE DRIVE, P.O. BOX 10068  
CHARLESTON, SOUTH CAROLINA 29411-0068

\*\*\*\*\*  
BIDS OVER \$25,000 MUST BE ACCOMPANIED  
BY BID BOND OR CERTIFIED CHECK FOR  
20 PERCENT OF THE AMOUNT BID.  
\*\*\*\*\*

SECTION 00101

INSTRUCTIONS TO BIDDERS

CONSTRUCTION CONTRACT  
(SEALED BIDDING PROCEDURES)

CONTENTS

This solicitation for bids, IFB No. N62467-88-B-0426, JP-4 Remediation, Defense Fuel Support Point, Charleston, SC, consists of the following documents:

- (1) Instructions to Bidders-Construction Contract (Sealed Bidding Procedures)
- (2) Bid Submittal Documents
  - (a) Solicitation, Offer and Award (Standard Form 1442 (Rev. 4-85)) (3 copies)
  - (b) Representations and Certifications-Construction Contract (Sealed Bidding Procedures) APR 1989 (1 set)
  - (c) Bid Bond (Standard Form 24 (Rev. 4-85)) (1 copy)
- (3) Contract Documents
  - (a) Contract Clauses-Construction Contract (Sealed Bidding Procedures) APRIL 1989
  - (b) NAVFAC Specification No. 06-88-0426.
  - (c) Wage Determination, Secretary of Labor Decision No. SC89-10
  
- (d) Drawings identified in Section 01011 of the Specification

SECTION 00101

INSTRUCTIONS TO BIDDERS

CONSTRUCTION CONTRACT  
(SEALED BIDDING PROCEDURES)

1. BIDS: Instructions to Bidders and Standard Form 1442 (Solicitation, Offer, and Award), shall be observed in the preparation of bids. Bidders shall affix their names and return addresses in the upper left corner of bid envelope. Envelopes containing bids must be sealed.

1.1 Submission of Bids: Bids shall be submitted in triplicate on Standard Form 1442 and, bids exceeding \$25,000, shall be accompanied by Representations and Certifications-Construction Contract (Sealed Bidding Procedures) and a bid guarantee as stipulated in the paragraph entitled "Bid Guarantee" of the Instructions to Bidders.

1.2 Basis of Bid: The basis of bid shall be lump sum price for the entire work, complete.

1.3 Hand Delivered Bids: All hand delivered bids must be deposited in the bid box of the Office of Commanding Officer, Southern Division Naval Facilities Command, 2155 Eagle Drive, N. Charleston, SC 29418 prior to the time and date set for bid opening. Any bids submitted by hand after the time set for receipt will not be accepted. Telegraphic bids will not be considered in accordance with the solicitation provision entitled "Submission of Bids".

2. PRE-BID SITE VISITATION: To inspect the site of the work prior to bid opening, an appointment must be made with Resident Officer in Charge of Construction Bldg NH-52, Naval Base, Charleston, SC 29408 Telephone No. (803) 743-3630. A minimum of 48 hours notice is required prior to the time of the visit.

3. CONDITIONS AFFECTING THE WORK: Bidders should visit the site and take such other steps as may be reasonably necessary to ascertain the nature and location of the work, and the general and local conditions which can affect the work or the cost thereof. Failure to do so will not relieve bidders from responsibility for estimating properly the difficulty or cost of successfully performing the work. The Government will assume no responsibility for any understanding or representations concerning conditions made by any of its officers or agents prior to the execution of the contract, unless included in the invitation for bids, the specifications or related documents.

4. NOTICE OF PRIORITY RATING FOR NATIONAL DEFENSE USE (MAY 1986): Any contract awarded as a result of this solicitation will be a D0-C2 rated order certified for national defense use under the Defense Priorities and Allocations System (DPAS) (15 CFR 350). The contractor will be required to follow all of the requirements of DPAS. (FAR 52.212-7)

5. AVAILABILITY OF SPECIFICATIONS LISTED IN THE DOD INDEX OF SPECIFICATIONS AND STANDARDS (DODISS) (APR 1984): Single copies of specifications cited in this solicitation may be obtained by submitting a written request to the supply point listed below. The request must contain the title of the specification, its number, date, applicable amendment(s), and the solicitation or contract number. In case of urgency, telephone or telegraphic requests are acceptable. Voluntary standards, which are not available to Offerors and Contractors from Government sources, may be obtained from the organization responsible for their preparation, maintenance, or publication.

Commanding Officer  
 U.S. Naval Publication and Forms Center  
 5801 Tabor Avenue  
 Philadelphia, PA 19120

Telex Number.....834295  
 Western Union Number.....710-670-1685  
 Telephone Number.....(215)697-3321

(FAR 52.210-2)

6. AVAILABILITY OF DESCRIPTIONS LISTED IN DOD DIRECTIVE 5000.19-L, VOLUME II (APR 1984): Copies of the Acquisition Management Systems and Data Requirements Control List, DoD Directive 5000.19-L, Volume II, may also be ordered from the supply point listed herein. When requesting a data item description, the request shall cite the applicable data item number set forth in the solicitation. (DFARS 52.210-7001)

7. AVAILABILITY OF SPECIFICATIONS AND STANDARDS NOT LISTED IN DODISS, DATA ITEM DESCRIPTIONS NOT LISTED IN DOD DIRECTIVE 5000.19-L, VOLUME II, AND PLANS, DRAWINGS, AND OTHER PERTINENT DOCUMENTS (JUNE 1977): The specifications, standards, plans, drawings, descriptions, and other pertinent documents cited in this solicitation may be obtained by submitting request to the office issuing this solicitation. Requests should give the number of the solicitation and the title and number of the specification, standard, plan, drawing or other pertinent document requested, exactly as cited in this solicitation. (DFARS 52.210-7002)

8. AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS, STANDARDS, PLANS, DRAWINGS, DATA ITEM DESCRIPTIONS, AND OTHER PERTINENT DOCUMENTS (JUNE 1977): The specifications, standards, plans, drawings, descriptions, and other pertinent documents cited in this solicitation may be examined at the Office of the Commanding Officer, Southern Division, Naval Facilities Engineering Command, Charleston, SC. (DFARS 52.210-7003)

9. THE SMALL BUSINESS SIZE STANDARD APPLICABLE TO THIS CONTRACT IS AS FOLLOWS: \*\*

SIC CODE	INDUSTRY, SUBINDUSTRY OR CLASS OF PRODUCTS	ANNUAL SIZE* STANDARD (MAXIMUM IN MILLIONS)
1623	<u>Water, Sewer Pipe Line, Communication and Power Line Construction</u>	\$17,000,000.00

\* Average annual receipts for the preceding three fiscal years.

\*\* This procurement is not a total Small Business Set-Aside. The above small business size standard is solely for use in determination of size of firm.

10. BIDDER'S QUALIFICATIONS: Before bid is considered for award, the bidder may be requested by the government to submit a statement regarding his previous experience in performing comparable work, his business and technical organization, financial resources, and plant available to be used in performing the work.

11. BID GUARANTEE: (Applicable only to bids exceeding \$25,000.) To assure the execution of the contract and the performance and payment bonds, each bidder shall submit with its bid a guarantee bond (Standard Form 24) executed by a surety company holding a certificate of authority from the Secretary of the Treasury as an acceptable surety, or other security as provided in Contract Clause "Bid Guarantee". Security shall be in the sum of 20 percent of the largest amount for which award can be made under the bid submitted, but in no case to exceed \$3,000,000. The bid guarantee bond shall be accompanied by a verifax or other facsimile copy of the agent's authority to sign bonds for the surety company.

12. PUBLIC OPENING OF BIDS: Bids will be publicly opened at the time set forth in this solicitation. Their consent will be made public for the information of bidders and others interested, who may be present either in person or by representative.

13. CONTRACT AND BONDS: (Applicable only to bids exceeding \$25,000.) Within 10 days after receipt of award the bidder to whom award is made shall furnish two bonds, each with satisfactory security; namely, a performance bond (Standard Form 25) and a payment bond (Standard Form 25A). The performance bond shall be in a penal sum equal to 100 percent of the contract price. The payment bond shall be equal to 50 percent of the contract price, except that it shall be 40 percent of the contract price if that price is more than \$1,000,000 and not more than \$5,000,000, and in the fixed sum of \$2,500,000 if the contract price is more than \$5,000,000. The bond of any surety company holding a certificate of authority from the Secretary of the Treasury as an acceptable surety on Federal bonds will be accepted. Individual sureties will be acceptable. At least two individual sureties must execute the bond and the net worth of each individual must equal or exceed penal amount of the bond. As an option and in lieu of sureties, the bidder may deposit with the Contracting Officer cash, bonds, or notes of the United States, or certified check drawn to the order of the Treasurer of the United States, or such other security as the Contracting Officer may deem necessary for the required amount of the guaranty, under the agreement that the collateral so deposited shall remain in the possession and control of the Treasurer of the United States for at least one year after the completion of the contract. The contract time for purposes of fixing the completion date, default, and liquidated damages shall begin to run 15 days from the date of award, regardless of when performance and payment bonds are executed.

13.1. INDIVIDUAL SURETY: As prescribed in FAR 28.202-2, individual sureties are acceptable for all types of bonds except position schedule bonds. In order for the Contracting Officer to determine the acceptability of individuals proposed as sureties, all bidders/offerors who submit bonds which are executed by individual sureties are required to furnish the following information in support of SF-28, Affidavit of Individual Surety, with the bond(s):

(1) A complete description of real property offered, supported by proof of title, such as by title opinion or abstract of title, and a certified appraisal for tax assessment;

(2) C.P.A. certified balance sheet(s) and income statement(s) with a signed opinion for each individual surety;

(3) Independent certified appraisal of net value of property offered;

(4) Independent Certification by licensed attorney or title company of liens or other encumbrances which exist against all property listed;

(5) A current list of all other bonds on which the individual is a surety and bonds for which the individual is requesting to be a surety, together with a statement as to the percent completion of these bonded jobs.

This information is necessary to enable the Government to evaluate the sufficiency of the surety. Failure to furnish this information may result in non-approval of the surety and a determination of nonresponsibility.

14. SUBCONTRACTING PLAN (applicable in unrestricted solicitations only): The successful offeror will be required, if it is a large business concern, to submit his "Subcontracting Plans for Small Business and Small Disadvantaged Business Concerns" to the issuing office pursuant to Contract Clause entitled "Small Business and Small Disadvantaged Business Subcontracting Plan" prior to award upon request from the Contracting Officer within the time specified.

15. NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (APR 1984): The offeror's attention is called to the Equal Opportunity Clause and the Affirmative Action Compliance Requirements for Construction Clause of this solicitation. The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for Minority Participation  
for each Trade

Goals for Female Participation  
for each Trade

30%

6.9%

a. These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the Federal Register in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

b. The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on (1) its implementation of the Equal Opportunity clause, (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction", and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

c. The Contractor shall provide written notification to the Director, Office of Federal Contract Compliance Programs, within 10 working days following award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the:

- (1) Name, address, and telephone number of the subcontractor;
  - (i) Employer identification number of the subcontractor;
- (2) Estimated dollar amount of the subcontract;
- (3) Estimated starting and completion dates of the subcontract; and
- (4) Geographical area in which the subcontract is to be performed.

d. As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is: SC-Berkeley, Charleston, North Charleston, Dorchester.

(FAR 52.222-23)

16. LIST OF OFFICE OF FEDERAL CONTRACT COMPLIANCE OFFICES APPLICABLE TO CONSTRUCTION PROJECTS SPONSORED BY THE SOUTHERN DIVISION, NAVAL FACILITIES ENGINEERING COMMAND:

<u>REGION</u>	<u>STATES</u>	<u>ADDRESS</u>	<u>TELEPHONE</u>
IV	North Carolina	OFCCP/ESA - Atlanta	Commercial: (404) 347-3200
	South Carolina	U.S. Department of Labor	
	Kentucky	1371 Peachtree Street, N.E.	
	Tennessee	Room 111	
	Mississippi	Atlanta, GA 30367	
	Alabama		
	Georgia		
VI	Florida		
	Louisiana	OFCCP/ESA - Dallas	Commercial: (214)-767-2004
	Arkansas	U.S. Department of Labor	
	Oklahoma	525 Griffin Street Bldg.	
	Texas	Room 505	
New Mexico	Dallas, Texas 75202		

17. SERVICE OF PROTEST (JAN 1986): Protests, as defined in section 33.101 of the Federal Acquisition Regulation, shall be served on the Contracting Officer by submitting written and dated acknowledgement of receipt from Commanding Officer, Southern Division, Naval Facilities Engineering Command, 2155 Eagle Drive, Charleston, SC 29411-4008. (FAR 52.233-2)

18. LIMITATIONS ON SUBCONTRACTING (OCT 1987) (Applicable in Total or Partial Small Business Set-Aside Solicitations Only): By submission of an offer and execution of a contract, the Offeror/Contractor agrees that in performance of the contract in the case of a contract for:

(a) Services (except construction). At least 50 percent of the cost of contract performance incurred for personnel shall be expended for employees of the concern.

(b) Supplies (other than procurement from a regular dealer in such supplies). The concern shall perform work for at least 50 percent of the costs of manufacturing the supplies, not including the cost of materials.

(c) General construction. The concern will perform at least 15 percent of the cost of the contract, not including the cost of materials, with its own employees.

(d) Construction by special trade contractors. The concern will perform at least 25 percent of the cost of the contract, not including the cost of materials, with its own employees.

(FAR 52.219-14)

18.1 DESIGNATION OF WORK: The work described herein is designated "General Construction" for purposes described in paragraph "LIMITATIONS ON SUBCONTRACTING (OCT 1987)".

19. PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984) (Applicable to unrestricted solicitations only): The Contractor shall perform on the site, and with its own organization, work equivalent to at least 20 percent of the total amount of the work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the government. (FAR 52.236-1)

20. DISPLAY OF DOD HOTLINE POSTER (OCT 1987) (Applicable for solicitations that exceed \$5,000,000):

(a) Except as provided in paragraph (c) below, the Contractor shall display prominently in common work areas within business segments performing work under DoD contracts, DoD Hotline Posters prepared by the Office of the Inspector General, DoD.

(b) DoD Hotline Posters may be obtained from the DoD Inspector General, ATTN: Defense Hotline, 400 Army Navy Drive, Washington, DC 22202-2884.

(c) The Contractor need not comply with paragraph (a) above, if the Contractor has established a mechanism, such as a hotline, by which employees may report suspected instances of improper conduct, and instructions that encourage employees to make such reports.

21. SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (JAN 1989): This solicitation incorporates the following solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. (FAR 52.252-1)

- 52.214-1 Solicitation Definitions-Sealed Bidding (JULY 1987)
- 52.214-3 Amendments to Invitations for Bids (NOV 1988)
- 52.214-4 False Statements in Bids (APR 1984)
- 52.214-5 Submission of Bids (APR 1984)
- 52.214-6 Explanation to Prospective Bidders (APR 1984)
- 52.214-7 Late Submissions, Modifications, and Withdrawal of Bids (APR 1984)
- 52.214-18 Preparation of Bids-Construction (APR 1984)
- 52.214-19 Contract Award-Sealed Bidding-Construction (FEB 1986) (Applicable if award exceeds \$10,000)
- 52.233-2 Service of Protest (NOV 1988)
- 252-204-7007 Commercial and Government Entity (CAGE) Code Reporting (OCT 1987)

22 SMALL BUSINESS SET-ASIDE: (FAR 52.219-6) In the Contract Clause "Notice to Total Small Business Set-Aside" is hereby DELETED.

\*\*\*END OF SECTION\*\*\*

BID SUBMITTAL DOCUMENTS

REMOVE THE FOLLOWING BID  
SUBMITTAL DOCUMENTS AND  
SUBMIT 3 ORIGINALLY SIGNED  
SF1442'S, & 1 ORIGINAL SET  
OF BID BONDS & REPRESENTATIONS  
& CERTIFICATIONS

TO OBTAIN BID RESULTS, CALL 803/743-0922 AFTER 9AM ON THE  
BUSINESS DAY FOLLOWING BID OPENING.

<b>SOLICITATION, OFFER, AND AWARD</b> (Construction, Alteration, or Repair)	1. SOLICITATION NO.	2. TYPE OF SOLICITATION	3. DATE ISSUED	PAGE OF PAGES
	N62467-88-B-0426	<input checked="" type="checkbox"/> SEALED BID (IFB) <input type="checkbox"/> NEGOTIATED (RFI)	89JUN14	
NOTE: The "offer" section on the reverse must be fully completed by offeror.				
4. PROJECT INFO.	5. REQUISITION/PURCHASE REQUEST NO.	6. PROJECT NO.		
N62467-88-G-0426				
7. ISSUED BY	8. ADDRESS OFFER TO			
COMMANDING OFFICER, SOUTHERN DIVISION ARMY FACILITIES ENGINEERING COMMAND 2155 EAGLE DRIVE, PO BOX 10068 CHARLESTON, SC 29411-0068	SAME AS BLOCK 7			
9. FOP INFORMATION CALL	10. TELEPHONE NO. (include area code) (NO COLLECT CALLS)			
MA. NAME Karen Harshman (803) 743-0927	TO OBTAIN BID RESULTS: CALL 743-0922			

**SOLICITATION**

NOTE: The words "offer" and "offeror" mean "bid" and "bidder".  
 TO THE GOVERNMENT REPRESENTATIVE OF THE WORK DESCRIBED IN THE SPECIFICATIONS (Title, identifying no., date).

**TITLE** SOLICITATION NO. N62467-88-B-0426

JP-4 REMEDIATION DATED: 89JUN14

DEFENSE TROOP SUPPORT POINT  
 CHARLESTON, SC

**IF APPLICABLE, THE SUCCESSFUL CONTRACTOR WILL FURNISH A CONTRACTOR QUALITY CONTROL PLAN IN ACCORDANCE WITH THE SOLICITATION, WITHIN 15 CALENDAR DAYS AFTER AWARD.**

**ESTIMATE COST:** BETWEEN \$250,000 and \$500,000

**NOTICE: THIS PROCUREMENT IS ISSUED PURSUANT TO PUBLIC LAW 100-656, SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM.**

11 The Contractor shall begin performance within 10 calendar days and complete it within 180 calendar days after receiving  award,  notice to proceed. This performance period is  mandatory,  negotiable. (See \_\_\_\_\_)

12A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS?  
 (If "YES," indicate within how many calendar days after award in Item 12B.)

YES  NO

12B. CALENDAR DAYS 15

- 13. ADDITIONAL SOLICITATION REQUIREMENTS:**
- A. Sealed offers in original and 2 copies to perform the work required are due at the place specified in Item 8 by 2:30 pm (hour) local time 18 July 1989 (date). If this is a sealed-bid solicitation, offers will be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.
- B. An offer guarantee  is,  is not required.
- C. Offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.
- D. Offers arriving less than 60 calendar days before Government acceptance after the date offers are due will not be considered and will be rejected.

**OFFER (Must be fully completed by offeror)**

14. NAME AND ADDRESS OF OFFEROR (Include ZIP Code)

15. TELEPHONE NO. (Include area code)

DUNS NO.

16. REMITTANCE ADDRESS (Include only if different than Item 14)

CODE FACILITY CODE

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within 60 calendar days after the date offers are due. (Insert any number equal to or greater than the minimum requirement stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D).

AMOUNTS ▶

\$ \_\_\_\_\_

Solicitation #N62467-88-B-0426  
 Title: JP-4 Remediation  
 Defense Fuel Support Point  
 Charleston, SC

18. The offeror agrees to furnish any required performance and payment bonds.

**19 ACKNOWLEDGMENT OF AMENDMENTS**

*(The offeror acknowledges receipt of amendments to the solicitation - give number and date of each)*

AMENDMENT NO	DATE								

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)

20B. SIGNATURE

20C. OFFER DATE

**AWARD (To be completed by Government)**

21. ITEMS ACCEPTED:

22. AMOUNT

23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified)

ITEM

25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO

10 U.S.C. 2304(c) ( )

41 U.S.C. 253(c) ( )

26. ADMINISTERED BY CODE

27. PAYMENT WILL BE MADE BY

**CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE**

28. NEGOTIATED AGREEMENT (Contractor is required to sign this document and return \_\_\_\_\_ copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all work requirements identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, negotiations, certifications and specifications incorporated by reference to be attached to this contract.

29. AWARD (Contractor is not required to sign this document.) Your offer on this solicitation is hereby accepted as to the items listed. This award constitutes the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN (Type or print)

31A. NAME OF CONTRACTING OFFICER (Type or print)

30B. SIGNATURE

30C. DATE

31B. UNITED STATES OF AMERICA

31C. AWARD DATE

BY



**OFFER (Must be fully completed by offeror)**

14. NAME AND ADDRESS OF OFFEROR (Include ZIP Code)

15. TELEPHONE NO. (Include area code)

DUNS NO.

16. REMITTANCE ADDRESS (Include only if different than Item 11)

CODE FACILITY CODE

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within 60 calendar days after the date offers are due. (Insert any number equal to or greater than the minimum requirement stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D).

AMOUNTS ▶

\$ \_\_\_\_\_

Solicitation #N62467-88-B-0426  
 Title: JP-4 Remediation  
 Defense Fuel Support Point  
 Charleston, SC

18. The offeror agrees to furnish any required performance and payment bonds.

**19. ACKNOWLEDGMENT OF AMENDMENTS**

*(The offeror acknowledges receipt of amendments to the solicitation - give number and date of each)*

AMENDMENT NO

DATE

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER  
*(Type or print)*

20B. SIGNATURE

20C. OFFER DATE

**AWARD (To be completed by Government)**

21. ITEMS ACCEPTED:

22. AMOUNT

23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN  
*(4 copies unless otherwise specified)*

▶ ITEM

25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO

10 U.S.C. 2304(c) ( )

41 U.S.C. 253(c) ( )

26. ADMINISTERED BY CODE

27. PAYMENT WILL BE MADE BY

**CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE**

28. NEGOTIATED AGREEMENT (Contractor is required to sign this document and return \_\_\_\_\_ copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all work requirements identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, negotiations, certifications, and specifications incorporated by reference or attached to this contract.

29. AWARD (Contractor is not required to sign this document.) Your offer on this solicitation is hereby accepted as to the items listed. This award constitutes the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN (Type or print)

31A. NAME OF CONTRACTING OFFICER (Type or print)

30B. SIGNATURE

30C. DATE

31B. UNITED STATES OF AMERICA

31C. AWARD DATE

BY

<b>SOLICITATION, OFFER, AND AWARD</b> (Construction, Alteration, or Repair)	1. SOLICITATION NO.	2. TYPE OF SOLICITATION	3. DATE ISSUED
	N62467-88-B-0426	<input checked="" type="checkbox"/> SEALED BID (IFB) <input type="checkbox"/> NEGOTIATED (RFI)	89JUN14

MEMORANDUM - The "offer" section on the reverse must be fully completed by offeror.

4. PROJECT NO.	5. REQUISITION/PURCHASE REQUEST NO.	6. PROJECT NO.
2467-88-G-0426		

7. ISSUANCE CODE	8. ADDRESS OFFER TO
N62467	SAME AS BLOCK 7
COMMANDING OFFICER, SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND 1155 BACKE DRIVE, PO BOX 10068 CHARLESTON, SC 29411-0068	

9. FOR INFORMATION CALL	A. NAME	B. TELEPHONE NO. (Include area code) (NO COLLECT CALLS)
	Karam Hashbani (803) 743-0927	TO OBTAIN BID RESULTS: CALL 743-0922

**SOLICITATION**

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".  
 10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THIS DOCUMENTS (Title, identifying no., date)

**TITLE** SOLICITATION NO. N62467-88-B-0426  
 JP-4 REMEDIATION  
 DEFENSE FUEL SUPPORT POINT  
 CHARLESTON, SC  
**DATED:** 89JUN14

IF APPLICABLE, THE SUCCESSFUL CONTRACTOR WILL FURNISH A CONTRACTOR QUALITY CONTROL PLAN IN ACCORDANCE WITH THE SOLICITATION, WITHIN 15 CALENDAR DAYS AFTER AWARD.

ESTIMATE COST: BETWEEN \$250,000 and \$500,000

NOTICE: THIS PROCUREMENT IS ISSUED PURSUANT TO PUBLIC LAW 100-656, SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM.

11. The Contractor shall begin performance within <u>10</u> calendar days and complete it within <u>180</u> calendar days after receiving <input checked="" type="checkbox"/> award, <input type="checkbox"/> notice to proceed. This performance period is <input checked="" type="checkbox"/> mandatory, <input type="checkbox"/> negotiable. (See _____.)	12B. CALENDAR DAYS
12A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? (If "YES" indicate within how many calendar days after award in Item 12B.)	15
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	

13. ADDITIONAL SOLICITATION REQUIREMENTS:
- A. Sealed offers in original and 2 copies to perform the work required are due at the place specified in Item 8 by 2:30 pm (hour) local time 18 July 1989 (date). If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.
  - B. An offer guarantee  is  is not required.
  - C. Offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.
  - D. Offers providing less than 60 calendar days for government acceptance after the date offers are due will not be considered and will be rejected.

**OFFER (Must be fully completed by offeror)**

14. NAME AND ADDRESS OF OFFEROR (Include ZIP Code)

15. TELEPHONE NO. (Include area code)

DUNS NO.

16. REMITTANCE ADDRESS (Include only if different than Item 14)

CODE FACILITY CODE

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within 60 calendar days after the date offers are due. (Insert any number equal to or greater than the minimum requirement stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D).

AMOUNTS

\$ \_\_\_\_\_

Solicitation #N62467-88-B-0426  
 Title: JP-4 Remediation  
 Defense Fuel Support Point  
 Charleston, SC

18. The offeror agrees to furnish any required performance and payment bonds.

**19. ACKNOWLEDGMENT OF AMENDMENTS**

*(The offeror acknowledges receipt of amendments to the solicitation - give number and date of each)*

AMENDMENT NO

DATE

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER  
*(Type or print)*

20B. SIGNATURE

20C. OFFER DATE

**AWARD (To be completed by Government)**

21. ITEMS ACCEPTED:

22. AMOUNT

23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN  
*(4 copies unless otherwise specified)*

ITEM

25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO

10 USC 2304(c) ( )

41 USC 253(c) ( )

26. ADMINISTERED BY CODE

27. PAYMENT WILL BE MADE BY

**CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE**

28. NEGOTIATED AGREEMENT Contractor is required to sign this document and return \_\_\_\_\_ copies to issuing office. Contractor agrees to furnish and deliver all items or perform all work requirements identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, interpretations, certifications, and specifications incorporated by reference to this contract.

29. AWARD (Contractor is not required to sign this document) Your offer on this solicitation is hereby accepted as to the items listed. This award constitutes the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

29A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN (Type or print)

31A. NAME OF CONTRACTING OFFICER (Type or print)

30B. SIGNATURE

30C. DATE

31B. UNITED STATES OF AMERICA

31C. AWARD DATE

BY

<b>SOLICITATION, OFFER, AND AWARD</b> (Construction, Alteration, or Repair)		SOLICITATION NO. N62467-88-B-0426	<input checked="" type="checkbox"/> SEALED BID (RFB) <input type="checkbox"/> NEGOTIATED (RFP)	DATE ISSUED 89JUN14
IMPORTANT - The "offer" section on the reverse must be fully completed by offeror.				
CONTRACT NO. N62467-88-C-0426		5. REQUISITION/PURCHASE REQUEST NO.	6. PROJECT NO.	
ISSUED BY COMMANDING OFFICER, SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND 2155 EAGLE DRIVE, PO BOX 10068 CHARLESTON, SC 29411-0068		CODE N62467	8. ADDRESS OFFER TO SAME AS BLOCK 7	
FOR INFORMATION CALL		A. NAME Nathan Harbin (803) 743-0927	B. TELEPHONE NO. (Include area code) (NO COLLECT CALLS) TO OBTAIN BID RESULTS: CALL 743-0922	

**SOLICITATION**

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".  
 3. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THIS DOCUMENTS (Title, identifying no., date).

**TITLE** SOLICITATION NO. N62467-88-B-0426  
 JP-4 REMEDIATION DATED: 89JUN14  
 DEFENSE FULL SUPPORT POINT  
 CHARLESTON, SC

IF APPLICABLE, THE SUCCESSFUL CONTRACTOR WILL FURNISH A CONTRACTOR QUALITY CONTROL PLAN IN ACCORDANCE WITH THE SOLICITATION, WITHIN 15 CALENDAR DAYS AFTER AWARD.

**ESTIMATE COST:** BETWEEN \$250,000 and \$500,000

**NOTICE:** THIS PROCUREMENT IS ISSUED PURSUANT TO PUBLIC LAW 100-656, SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM.

1. The Contractor shall begin performance within <u>10</u> calendar days and complete it within <u>180</u> calendar days after receiving <input checked="" type="checkbox"/> award, <input type="checkbox"/> notice to proceed. This performance period is <input checked="" type="checkbox"/> mandatory, <input type="checkbox"/> negotiable. (See _____.)	
2A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? (If "YES," indicate within how many calendar days after award in Item 12B.) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	12B. CALENDAR DAYS  15

3. ADDITIONAL SOLICITATION REQUIREMENTS:  
 A. Sealed offers in original and 2 copies to perform the work required are due at the place specified in Item 8 by 2:30 pm (hour) local time 18 July 1989 (date). If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.  
 B. An offer guaranteed  is not required.

Offers are subject to the (1) work requirements and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

D. Offers providing less than 60 calendar days for government acceptance after the date offers are due will not be considered and will be rejected.

**OFFER (Must be fully completed by offeror)**

14. NAME AND ADDRESS OF OFFEROR (Include ZIP Code)

15. TELEPHONE NO. (Include area code)

DUNS NO.

16. REMITTANCE ADDRESS (Include only if different than Item 14)

CODE FACILITY CODE

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within **60** calendar days after the date offers are due. (Insert any number equal to or greater than the minimum requirement stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D).

AMOUNTS ▶

\$ \_\_\_\_\_

Solicitation #N62467-88-B-0426  
 Title: JP-4 Remediation  
 Defense Fuel Support Point  
 Charleston, SC

18. The offeror agrees to furnish any required performance and payment bonds.

**19. ACKNOWLEDGMENT OF AMENDMENTS**

*(The offeror acknowledges receipt of amendments to the solicitation - give number and date of each)*

AMENDMENT NO

DATE

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER  
*(Type or print)*

20B. SIGNATURE

20C. OFFER DATE

**AWARD (To be completed by Government)**

21. ITEMS ACCEPTED.

22. AMOUNT

23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN  
*(4 copies unless otherwise specified)*

ITEM

25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO

10 U.S.C. 2304(c) ( )

41 U.S.C. 253(c) ( )

26. ADMINISTERED BY CODE

27. PAYMENT WILL BE MADE BY

**CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE**

28. NEGOTIATED AGREEMENT *Contractor is required to sign this document and return \_\_\_\_\_ copies to issuing office.* Contractor agrees to furnish and deliver all items or perform all work requirements identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be defined by (a) this contract award, (b) the solicitation, and (c) the clauses, specifications, certifications, and specifications incorporated by reference to this contract.

29. AWARD *(Contractor is not required to sign this document.) Your offer on this solicitation is hereby accepted as to the items listed. This award constitutes the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.*

28A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN *(Type or print)*

31A. NAME OF CONTRACTING OFFICER *(Type or print)*

30B. SIGNATURE

30C. DATE

31B. UNITED STATES OF AMERICA

31C. AWARD DATE

BY

REPRESENTATIONS AND CERTIFICATIONS

APRIL 1989

Construction Contract  
(Sealed-Bidding Procedures)

Solicitation No: M62467-88-B-0426

Name and Address of Bidder:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DUNS Number: \_\_\_\_\_  
CIS Number: \_\_\_\_\_

The bidder makes the following representations and certifications, by completing the following paragraphs, as part of the bid identified above. A completed REPRESENTATIONS AND CERTIFICATIONS is to be returned with the bid.

1. FAR 52.203-2 CERTIFICATE OF INDEPENDENT PRICE DETERMINATION  
(APR 1985)

(a) The offeror certifies that-

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to (i) those prices, (ii) the intention to submit an offer, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory-

(1) Is the person in the offeror's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those

principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above

---

(insert full name of person(s) in the offeror's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the offeror's organization);

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the offeror deletes or modifies subparagraph (a)(2) above, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

2. FAR 52.203-4 CONTINGENT FEE REPRESENTATION AND AGREEMENT (APR 1984)

(a) Representation. The offeror represents that, except for full-time bona fide employees working solely for the offeror, the offeror-

[Note: The offeror must check the appropriate boxes. For interpretation of the representation, including the term "bona fide employee," see Subpart 3.4 of the Federal Acquisition Regulation.]

(1) [ ] has, [ ] has not employed or retained any person or company to solicit or obtain this contract; and

(2) [ ] has, [ ] has not paid or agreed to pay to any person or company employed or retained to solicit or obtain this contract any commission, percentage, brokerage, or other fee contingent upon or resulting from the award of this contract.

(b) Agreement. The offeror agrees to provide information relating to the above Representation as requested by the Contracting Officer and, when subparagraph (a)(1) or (a)(2) is answered affirmatively, to promptly submit to the Contracting Officer-

(1) A completed Standard Form 119, Statement of Contingent or Other Fees, (SF 119); or

(2) A signed statement indicating that the SF 119 was previously submitted to the same contracting office, including the date and applicable solicitation of contract number, and

representing that the prior FAR 119 applies to this offer or quotation.

### 3. FAR 52.204-3 TAXPAYER IDENTIFICATION (NOV 1988)

#### (a) Definitions.

"Common parent," as used in the solicitation provision, means an offeror that is a member of an affiliated group of corporations that files its Federal income tax returns on a consolidated basis.

"Corporate status," as used in this solicitation provision, means a designation as to whether the offeror is a corporate entity, an unincorporated entity (e.g., sole proprietorship or partnership), or a corporation providing medical and health care services.

"Taxpayer Identification Number (TIN)," as used in this solicitation provision, means the number required by the IRS to be used by the offeror in reporting income tax and other returns.

(b) The offeror is required to submit the information required in paragraphs (c) through (e) of this solicitation provision in order to comply with reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M and implementing regulation issued by the Internal Revenue Service (IRS). If the resulting contract is subject to reporting requirements described in 4.902(a), the failure or refusal by the offeror to furnish the information may result in a 20 percent reduction of payments otherwise due under the contract.

#### (c) Taxpayer Identification Number (TIN).

TIN:

TIN has been applied for.

TIN is not required because:

Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the U.S. and does not have an office or place of business or a fiscal paying agent in the U.S.;

Offeror is an agency or instrumentality of a foreign government;

Offeror is an agency or instrumentality of a state or local government;

Other. State basis.

#### (d) Corporate Status.

Corporation providing medical and health care services, or engaged in the billing and collecting of payments for such services

Other corporate entity;

Not a corporate entity;

Sole proprietorship;

( ) Partnership;  
( ) Hospital or extended care facility described in 26 CFR 501(c)(3) that is exempt from taxation under 26 CFR 501(a).

(e) Common Parent.

( ) Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this clause.

( ) Name and TIN of common parent:

Name \_\_\_\_\_

TIN \_\_\_\_\_

4. DFARS 252.204-7004 DATA UNIVERSAL NUMBERING SYSTEM (DUNS) NUMBER REPORTING (DEC 1980)

In the block with its name and address, the offeror should supply the Data Universal Numbering System (DUNS) Number applicable to that name and address. The DUNS Number should be preceded by "DUNS:". If the offeror does not have a DUNS Number, it may obtain one from any DUN and Bradstreet branch office. No offeror should delay the submission of its offer pending receipt of its DUNS Number.

5. DFARS 252.209-7000 CERTIFICATION OR DISCLOSURE OF OWNERSHIP OR CONTROL BY A FOREIGN GOVERNMENT THAT SUPPORTS TERRORISM (NOV 1987) (Applicable to solicitation greater than \$100,000).

a. "Significant interest" as used in this provision means--

(1) Ownership of or beneficial interest in five percent (5%) or more of the firm's or subsidiary's securities. Beneficial interest includes holding five percent (5%) or more of any class of the firm's securities in "nominee shares", "street names", or some other method of holding securities that does not disclose the beneficial owner;

(2) Holding a management position in the firm such as director or officer;

(3) Ability to control or influence the election, appointment, or tenure of directors or officers of the firm;

(4) Ownership of ten percent (10%) or more of the assets of a firm such as equipment, buildings, real estate, or other tangible assets of the firm; or

(5) Holding fifty percent (50%) or more of the indebtedness of a firm.

b. Unless paragraph (c) below has been completed, the Offeror, by submission of its offer, certifies, to the best of its knowledge and belief, that no government of a foreign country, or agent or instrumentality of a foreign country, listed below,

has, directly or indirectly, a significant interest in the Offeror or, if the Offeror is a subsidiary, in the firm that owns or controls, directly or indirectly, the Offeror. Such countries currently include:

- (1) Cuba;
- (2) Iran;
- (3) Libya;
- (4) Syria; and
- (5) South Yemen.

c. If the Offeror is unable to certify in accordance with (b) above, the Offeror represents that the following country or countries (listed in (b) above) or an agent or instrumentality of such country or countries, have a significant interest in the Offeror's firm:

Country \_\_\_\_\_  
Significant Interest \_\_\_\_\_

6. FAR 52.215-6 TYPE OF BUSINESS ORGANIZATION (JUL 1987)

The bidder, by checking the applicable box, represents that-

(a) It operates as  a corporation incorporated under the laws of the State of \_\_\_\_\_,  an individual,  a partnership,  a nonprofit organization, or  a joint venture; or

(b) If the offeror or quoter is a foreign entity, it operates as  an individual,  a partnership,  a nonprofit organization,  a joint venture, or  a corporation, registered for business in \_\_\_\_\_

country

7. FAR 52.214-8 PARENT COMPANY AND IDENTIFYING DATA (APR 1984)

(a) A "parent" company, for the purpose of this provision, is one that owns or controls the activities and basic business policies of the bidder. To own the bidding company means that the parent company must own more than 50 percent of the voting rights in that company. A company may control a bidder as a parent even though not meeting the requirement for such ownership if the parent company is able to formulate, determine, or veto basic policy decisions of the offeror through the use of dominant minority voting rights, use of proxy voting, or otherwise

(b) The bidder ( ) is, ( ) is not (check applicable box) owned or controlled by a parent company.

(c) If the bidder checked "is" in paragraph (b) above, it shall provide the following information:

Name and Main Office Address of

Parent Company's

Parent Company (include zip Code)

Employer's  
Identification  
Number

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(d) If the bidder checked "is not" in paragraph (b) above, it shall insert its own Employer's Identification Number on the following line

**8. EMPLOYER'S IDENTIFICATION NUMBER**

The employer's identification Number requested in paragraph 5(d) above is the Federal Social Security Number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department form 941

**9. FAR 52.219-1 SMALL BUSINESS CONCERN REPRESENTATION (MAY 1986)**

The offeror represents and certifies as part of its offer that it  is,  is not a small business concern and that  all,  not all end items to be furnished will be manufactured or produced by a small business concern in the United States, its territories or possessions, Puerto Rico, or the Trust Territory of the Pacific Islands. "Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operating in which it is bidding on Government contracts, and qualified as a small business under the size standards in this solicitation.

**10. FAR 52.219-3 WOMEN-OWNED SMALL BUSINESS REPRESENTATION (APR 1984)**

(a) Representation. The offeror represents that it  is,  is not a women-owned small business concern.

(b) Definitions.

"Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominate in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria and size standards in 13 CFR 121.

"Women owned," as used in this provision, means a small business that is at least 51 percent owned by a woman or women who are U.S. citizens and who also control and operate the business.

11. DFARS 252.219-7005 SMALL DISADVANTAGED BUSINESS CONCERN REPRESENTATION (DOD FAR SUPPLEMENT DEVIATION) (JUN 1988).

a. Definition. "Small disadvantaged business concern", as used in this provision, means a small business concern, including mass media, owned and controlled by individuals who are both socially and economically disadvantaged, as defined in regulations prescribed by the U.S. Small Business Administration at 13 CFR Part 124, the majority of earnings of which directly accrue to such individuals. (13 CFR Part 124 generally provides that a small disadvantaged business concern is a small business concern (1) which is at least 51 percent owned by one or more socially and economically disadvantaged individuals or in the case of any publicly owned business, at least 51 percent of the voting stock of which is owned by one or more socially and economically disadvantaged individuals, and (2) whose management and daily business operations are controlled by one or more such individuals.) (See 13 CFR 124.101 through 124.110)

b. Representation. The Offeror represents that its qualifying ownership falls within at least one of the following categories, as defined in 13 CFR 124 (check the applicable categories):

- Subcontinent Asian (Asian-Indian) American (US Citizen)
- Asian-Pacific American (US Citizen)
- Black American (US Citizen)
- Hispanic American (US Citizen)
- Native American
- Individual/concern certified for participation in the Minority Small Business and Capital Ownership Development Program under section 8(a) of the Small Business Act (15 U.S.C. 637 (a))
- Other minority found to be socially disadvantaged by the Small Business Administration (US Citizen)

c. Certification. The Offeror represents and certifies, as part of its offer, that it is , is not  a small disadvantaged business concern.

d. Notification. The Offeror agrees to notify the Contracting Officer before award of any change in its status as a small disadvantaged business concern occurring between the submission of its offer and contract award.

e. Penalty. The Offeror represents and certifies that the above information is true and understands that whoever for the purpose of securing a contract or subcontract under subsection (a) of Section 1207 of Public Law 99-661 misrepresents the status of any concern or person as a small business concern owned and controlled by a minority (as described in subsection (a)) shall be punished by a fine of not less than \$10,000 or by imprisonment for not more than a year, or both.

12. DFARS 252.219-7012, SMALL BUSINESS CONCERN REPRESENTATION FOR THE SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM (JAN 1989)

(a) Definition.

"Emerging small business", as used in this solicitation, means a small business concern whose size is no greater than 50 percent of the numerical size standard applicable to the standard industrial classification code assigned to a contracting opportunity.

(b) Complete only if Offeror has certified itself under the clause at FAR 52.219-1 as a small business concern under the size standards of this solicitation.

The Offeror represents and certifies as part of its offer that it \_\_\_\_\_ is, \_\_\_\_\_ not an emerging small business.

(c) Complete only if the Offeror is a small business or an emerging small business, indicating its size range.

Offeror's number of employees for the past twelve months or Offeror's average annual gross revenue for the last three fiscal years. (Check one of the following.)

NO. OF EMPLOYEES	AVERAGE ANNUAL GROSS REVENUES
------------------	-------------------------------

_____	50 or fewer	\$1 million or less.
_____	51-100	\$1,000,001-\$2 million.
_____	101-250	\$2,000,001-\$3.5 million.
_____	251-500	\$3,500,001-\$5 million.
_____	501-750	\$5,000,001-\$10 million.
_____	751-1,000	\$10,000,001-\$17 million.
_____	Over 1,000	\$Over \$17 million.

13. FAR 52.220-1 PREFERENCE FOR LABOR SURPLUS AREA CONCERNS (APR 1984)

a. This acquisition is not a set aside for labor surplus area (LSA) concerns. However, the Offeror's status as such a concern may affect (1) entitlement to award in case of tie offers or (2) offer evaluation in accordance with the Buy American Act clause of this solicitation. In order to determine whether the

offeror is entitled to a preference under (1) or (2) above, the offeror must identify, below, the ISA in which the costs to be incurred on account of manufacturing or production (by the offeror or the first-tier subcontractors) amount to more than 50 percent of the contract price.

b. Failure to identify the locations as specified above will preclude consideration if the offeror as an ISA concern. If the offeror is awarded a contract as an ISA concern and would not have otherwise qualified for award, the offeror shall perform the contract or cause the contract to be performed in accordance with the obligations of an ISA concern (IAW FAR 20.103(b)). (Applicable to all solicitations that are not set-aside for labor surplus area concerns when contract performance is in the U.S., its territories and possessions, the Commonwealth of Puerto Rico, or the Trust Territory of the Pacific Islands except those issued under small purchase procedures).

14. FAR 52.222-15 CERTIFICATION OF ELIGIBILITY STATUS (FEB 1988)

(a) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

15. CERTIFICATION OF DEBARMENT/SUSPENSION STATUS

(a) The Offeror certifies with its submission of this offer that it is, is not (check one) suspended, debarred or ineligible from entering into contracts with the Executive Branch of the Federal Government, or in receipt of a notice of proposed debarment from another DOD Agency.

(b) The Offeror shall provide immediate notice to the Contracting Officer in the event of being suspended, debarred or declared ineligible by any Department or other Federal Agency, or upon receipt of a notice of proposed debarment from another DOD Agency, prior to award of this contract.

(c) The offeror further certifies he will not employ any subcontractor who is suspended, debarred, or ineligible from entering contracts, or has received a notice of such as stated in paragraph a. above.

16. FAR 52.222-21 CERTIFICATION OF NONSEGREGATED FACILITIES (APR 1984)

(a) "Segregated facilities," as used in this provision, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking

fountains, recreation or entertainment areas, Transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin because of habit, local custom, or otherwise.

(b) By the submission of this offer, the offeror certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The offeror agrees that a breach of this certification is a violation of the Equal Opportunity clause in the contract.

(c) The offeror further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) it will-

(1) Obtain identical certifications from proposed subcontractors before the award of subcontracts under which the subcontractor will be subject to the Equal Opportunity clause;

(2) Retain the certifications in the files; and

(3) Forward the following notice to the proposed subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

**NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES.**

A certification of Nonsegregated Facilities must be submitted before the award of a subcontract under which the subcontractor will be subject to the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

**17. FAR 52.222-22 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (APR 1984)**

The offeror represents that-

(a) It [ ] has, [ ] has not participated in a previous contract or subcontract subject either to the Equal Opportunity clause of this solicitation, the clause originally contained in Section 310 of Executive Order No. 10925, or the clause contained in Section 201 of Executive Order No. 11114;

(b) It [ ] has, [ ] has not filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

18. FAR 52.223-1 CLEAN AIR AND WATER CERTIFICATION (APR 1984)

The Offeror certifies that-

(a) Any facility to be used in the performance of this proposed contract is  is not  listed on the Environmental Protection Agency List of Violating Facilities;

(b) The Offeror will immediately notify the Contracting Officer, before award, of the receipt of any communication from the Administrator, or a designee, of the Environmental Protection Agency, indicating that any facility that the Offeror proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and

(c) The Offeror will include a certification substantially the same as this certification, including this paragraph (c), in every non-exempt subcontract.

19. FAR 52.223-5 CERTIFICATION REGARDING A DRUG-FREE WORKPLACE (MAR 1989)

(a) Definitions. As used in this provision,

"Controlled substance" means a controlled substance in schedules I through V of section 202 of the Controlled Substances Act (21 U.S.C. 812) and as further defines in regulation at 21 CFR 1308.11 -- 1308.15.

"Conviction" means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes.

"Criminal drug statute" means a Federal or non-Federal criminal statute involving the manufacture, distribution, dispensing, possession or use of any controlled substance.

"Drug-free workplace" means a site for the performance of work done in connection with a specific contract at which employees of the Contractor are prohibited from engaging in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance.

"Employee" means an employee of a Contractor directly engaged in the performance of work under a Government contract.

"Individual" means an offeror/contractor that has no more than one employee including the offeror/contractor.

(b) By submission of its offer, the offeror, if other than an individual, who is making an offer that equals or exceeds \$25,000, certified and agrees, that with respect to all employees of the offeror to be employed under a contract resulting from this solicitation, it will ---

(1) Publish a statement notifying such employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the Contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition;

(2) Establish a drug-free awareness program to inform such employees about--

(i) The dangers of drug abuse in the workplace;

(ii) The Contractor's policy of maintaining a drug-free workplace;

(iii) Any available drug counseling, rehabilitation, and employee assistance programs; and

(iv) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(3) Provide all employees engaged in performance of the contract with a copy of the statement required by subparagraph (b)(1) of the provision;

(4) Notify such employees in the statement required by subparagraph (b)(1) of this provision, that as a condition of continued employment on the contract resulting from this solicitation, the employee will --

(i) Abide by the terms of the statement; and

(ii) Notify the employer of any criminal drug statute conviction for a violation occurring in the workplace no later than five (5) days after such conviction;

(5) Notify the contracting officer within ten (10) days after receiving notice under subdivision (b)(4)(ii) of this provision, from an employee or otherwise receiving actual notice of such conviction; and

(6) Within 30 days after receiving notice under subparagraph (a)(4) of this provision of a conviction, impose the following sanctions or remedial measures on any employee who is convicted of drug abuse violations occurring in the workplace:

(i) Take appropriate personnel action against such employee, up to and including termination; or

(ii) Require such employee to satisfactorily

participate in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

(7) Make a good faith effort to maintain a drug-free workplace through implementation of subparagraphs (b)(1) through (b)(6) of this provision.

(c) By submission of its offer, the offeror, if an individual who is making an offer of any dollar value, certified and agrees that the offeror will not engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance in the performance of the contract resulting from this solicitation.

(d) Failure of the offeror to provide the certification required by paragraphs (b) or (c) of this provision, renders the offeror unqualified and ineligible for award. (See FAR 9.104-1(g) and 19.502-1.(a)(2)(i).)

(e) In addition to other remedies available to the Government, the certification in paragraphs (b) and (c) of this provision concerns a matter within the jurisdiction of an agency of the United States and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code, Section 1001.

20. DAR 7-2003.81 PERCENT FOREIGN CONTENT (SEP 1978)

Approximately \_\_\_\_\_ percent of the proposed contract price represents foreign content or effort. (DAR 7-2003.81)

COMPLETED REPRESENTATIONS AND CERTIFICATIONS IS TO BE RETURNED WITH THE BID.

**INSTRUCTIONS TO OFFERORS: REFERENCE STANDARD FORM 24 "BID BOND"**

1. The name and address of the Principal as well as the signature of the Principal should be identical to those on the Standard Form 1442, "Solicitation Offer & Award" (SF 1442).
2. The date the Bond is executed must be on or before bid opening date. You must indicate your type of organization and State of incorporation, if applicable.
3. The Surety block should show the same address as is published in the Department of Treasury Circular. Also, include a telephone number.
4. The penal sum of the Bid Bond must be either 20% or an amount greater than or equal to 20%.
5. The Principal's signature should be identical to that on the SF 1442, with the typed or printed name entered below. If applicable, imprint with the Corporate Seal.
6. If using individual Sureties, you must have 2 or more with independent assets greater than or equal to the penal sum of the Bond. Attach executed Standard Form 28 "Affidavit of Individual Surety" for each Surety.
7. If using corporate Surety, enter the Branch address, the State of incorporation and liability amount. Enter the typed or printed name and title below; imprint with the Corporate Seal. Attach a Power of Attorney to the Payment Bond.

**BID BOND**  
(See Instructions on reverse)

DATE BOND EXECUTED (Must not be later than bid opening date)

PRINCIPAL (Legal name and business address)

TYPE OF ORGANIZATION (Check one)  
 INDIVIDUAL     PARTNERSHIP  
 JOINT VENTURE     CORPORATION

STATE OF INCORPORATION

SURETY (IES) (Legal name and business address)

PERCENT OF BID PRICE	PENAL SUM OF BOND				BID DATE	INVITATION NO.
	AMOUNT NOT TO EXCEED					
	MILLION(S)	THOUSAND(S)	HUNDRED(S)	CENTS	FOR (Construction, Supplies or Services)	

**OBLIGATION:**

We, the Principal and Surety(ies) are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally. However, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally," only for the purpose of allowing a joint action or actions against any or all of us. For all other purposes, each Surety binds itself, jointly and severally with the Principal, for the payment of the sum shown opposite the name of the Surety. If no limit of liability is indicated, the limit of liability is the full amount of the penal sum.

**CONDITIONS:**

The Principal has submitted the bid identified above.

**HEREFORE:**

the above obligation is void if the Principal - (a) upon acceptance by the Government of the bid identified above, within the period specified therein for acceptance (sixty (60) days if no period is specified), executes the further contractual documents and gives the bond(s) required by the terms of the bid as accepted within the time specified (ten (10) days if no period is specified) after receipt of the forms by the principal or (b) in the event of failure so to execute such further contractual documents and give such bonds, pays the Government for any cost of preparing the work which exceeds the amount of the bid.

Each Surety executing this instrument agrees that its obligation is not impaired by any extension(s) of the time for acceptance of the bid that the Principal may grant to the Government. Notice to the surety(ies) of extension(s) are waived. However, waiver of the notice applies only to extensions aggregating not more than sixty (60) calendar days in addition to the period originally allowed for acceptance of the bid.

**WITNESS:**

The Principal and Surety(ies) executed this bid bond and affixed their seals on the above date:

PRINCIPAL					
Signature(s)	1.			2.	
		(Seal)		(Seal)	
Name(s) & Title(s) (Typed)	1.			2.	
		(Seal)		(Seal)	
INDIVIDUAL SURETIES					
Signature(s)	1.			2.	
		(Seal)		(Seal)	
Name(s) (Typed)	1.			2.	
		(Seal)		(Seal)	
CORPORATE SURETY(IES)					
Name & Address				STATE OF INC.	LIABILITY LIMIT
					\$
Signature(s)	1.			2.	
		(Seal)		(Seal)	
Name(s) & Title(s) (Typed)	1.			2.	
		(Seal)		(Seal)	

**CORPORATE SURETY (IES) (Continued)**

SURETY B	Name & Address	STATE OF INC.		LIABILITY LIMIT	Corporate Seal	
	Signature(s)	1.	2.			\$
	Name(s) & Title(s) (Typed)	1.	2.			
SURETY C	Name & Address	STATE OF INC.		LIABILITY LIMIT	Corporate Seal	
	Signature(s)	1.	2.			\$
	Name(s) & Title(s) (Typed)	1.	2.			
SURETY D	Name & Address	STATE OF INC.		LIABILITY LIMIT	Corporate Seal	
	Signature(s)	1.	2.			\$
	Name(s) & Title(s) (Typed)	1.	2.			
SURETY E	Name & Address	STATE OF INC.		LIABILITY LIMIT	Corporate Seal	
	Signature(s)	1.	2.			\$
	Name(s) & Title(s) (Typed)	1.	2.			
SURETY F	Name & Address	STATE OF INC.		LIABILITY LIMIT	Corporate Seal	
	Signature(s)	1.	2.			\$
	Name(s) & Title(s) (Typed)	1.	2.			
SURETY G	Name & Address	STATE OF INC.		LIABILITY LIMIT	Corporate Seal	
	Signature(s)	1.	2.			\$
	Name(s) & Title(s) (Typed)	1.	2.			

**INSTRUCTIONS**

1. This form is authorized for use when a bid guaranty is required. Any deviation from this form will require the written approval of the Administrator of General Services.

2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.

3. The bond may express penal sum as a percentage of the bid price. In these cases, the bond may state a maximum dollar limitation (e.g., 20% of the bid price but the amount not to exceed \_\_\_\_\_ dollars).

4. (a) Corporations executing the bond as sureties must appear on the Department of the Treasury's list of approved sureties and must act within the limitation listed herein. Where more than one corporate surety is involved, their names and addresses shall appear

in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)". In the space designated "SURETY(IES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, two or more responsible persons shall execute the bond. A completed Affidavit of Individual Surety (Standard Form 28), for each individual surety, shall accompany the bond. The Government may require these sureties to furnish additional substantiating information concerning their financial capability.

5. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Corporate Seal"; and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.

6. Type the name and title of each person signing this bond in the space provided.

7. In its application to negotiated contracts, the terms "bid" and "bidder" shall include "proposal" and "offeror".

## **CONTRACT DOCUMENTS**

**NOTE: THE STANDARD FORM 1442  
SOLICITATION, OFFER AND AWARD  
WILL BECOME A PART OF THE  
CONTRACT DOCUMENTS UPON  
EXECUTION BY THE GOVERNMENT.**

CONTRACT CLAUSES  
CONSTRUCTION CONTRACT  
(SEALED BIDDING PROCEDURES)

CLAUSES INCORPORATED BY REFERENCE (APRIL 1989). This contract incorporates the following clauses by reference, with the same force and effect as if they were given full text. Upon request, the Contracting Officer will make their full text available.

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES  
(FAR) 52.252-2)

(End of Clause)

1. FAR 52.202-1, Definitions (APR 1984) - Alternate I (APR 1984)
2. FAR 52.203-1, Officials Not to Benefit (APR 1984)
3. FAR 52.203-3, Gratuities (APR 1984)
4. FAR 52.203-5, Covenant Against Contingent Fees (APR 1984)
5. FAR 52.203-7, Anti-Kickback Procedures (OCT 1988)
6. FAR 52.204-2, Security Requirements Alternate II (APR 1984)
7. FAR 52.212-5, Liquidated Damages - Construction (APR 1984)
8. FAR 52.212-6, Time Extensions (APR 1984)
9. FAR 52.212-8, Defense Priority and Allocation Requirements (MAY 1986)
10. FAR 52.212-11, Variation in Estimated Quantity (APR 1984)
11. FAR 52.212-12, Suspension of Work (APR 1984)
12. FAR 52.214-26, Audit-Sealed Bidding (APR 1985) (Applicable if award exceeds \$100,000)
13. FAR 52.214-27, Price Reduction for Defective Cost or Pricing Data-Modifications-Sealed Bidding (APR 1988) (Applicable if award exceeds \$100,000)
14. FAR 52.214-28, Subcontractor Cost or Pricing Data-Modifications-Sealed Bidding (APR 1985) (Applicable if award exceeds \$100,000)
15. FAR 52.219-6, Notice of Total Small Business Set-Aside (APR 1984) (Applicable if contract is Small Business Set-Aside)
16. FAR 52.219-8, Utilization of Small Business Concerns and Small Disadvantaged Business Concerns (JUN 1985) (Applicable if award exceeds \$10,000)

17. FAR 52.219-9, Small Business and Small Disadvantaged Business Sub-Contracting Plan Alternate I (APR 1984) (Applicable if award exceeds \$1,000,000)
18. FAR 52.219-13, Utilization of Women-Owned Small Business (AUG 1986) (Applicable if award exceeds \$25,000)
19. FAR 52.220-3, Utilization of Labor Surplus Area Concerns (APR 1984)
20. FAR 52.220-4, Labor Surplus Area Subcontracting Program (APR 1984) (Applicable if award exceeds \$500,000)
21. FAR 52.222-1, Notice to the Government of Labor Disputes (APR 1984)
22. FAR 52.222-3, Convict Labor (APR 1984)
23. FAR 52.222-4, Contract Work Hours and Safety Standards Act - Overtime Compensation (MAR 1986)
24. FAR 52.222-6, Davis-Bacon Act (FEB 1988)
25. FAR 52.222-7, Withholding of Funds (FEB 1988)
26. FAR 52.222-8, Payrolls and Basic Records (FEB 1988)
27. FAR 52.222-9, Apprentices and Trainees (FEB 1988)
28. FAR 52.222-10, Compliance with Copeland Act Requirements (FEB 1988)
29. FAR 52.222-11, Subcontracts (Labor Standards) (FEB 1988)
30. FAR 52.222-12, Contract Termination-Debarment (FEB 1988)
31. FAR 52.222-13, Compliance with Davis-Bacon and Related Act Regulation (FEB 1988)
32. FAR 52.222-14, Disputes Concerning Labor Standards (FEB 1988)
33. FAR 52.222-15, Certification of Eligibility (FEB 1988)
34. FAR 52.222-26, Equal Opportunity (APR 1984)
35. FAR 52.222-27, Affirmative Action Compliance Requirements for Construction (APR 1984) (Applicable if award exceeds \$10,000)
36. FAR 52.222-35, Affirmative Action for Special Disabled and Vietnam Era Veterans (APR 1984) (Applicable if award exceeds \$10,000)

37. FAR 52.222-36, Affirmative Action for Handicapped Workers (APR 1984) (Applicable if award exceeds \$2,500)
38. FAR 52.222-37, Employment Reports on Special Disabled Veterans and Veterans of the Vietnam Era (JAN 1988)
39. FAR 52.223-2, Clean Air and Water (APR 1984) (Applicable if award exceeds \$100,000)
40. FAR 52.223-3, Hazardous Material Identification and Material Safety Data (APR 1984)
41. FAR 52.223-6, Drug-Free Workplace (MAR 1989)
42. FAR 52.225-5, Buy American Act - Construction Materials (APR 1984)
43. FAR 52.227-1, Authorization and Consent (APR 1984)
44. FAR 52.227-2, Notices and Assistance Regarding Patent & Copyright Infringement (APR 1984) (Applicable if award exceeds \$25,000)
45. FAR 52.227-4, Patent Indemnity - Construction Contracts (APR 1984)
46. FAR 52.228-1, Bid Guarantee (APR 1984) (Applicable if award exceeds \$25,000)
47. FAR 52.228-2, Additional Bond Security (APR 1984)
48. FAR 52.228-5, Insurance-Work on a Government Installation (APR 1984) (Applicable if award exceeds \$25,000)
49. FAR 52.229-3, Federal, State, and Local Taxes (APR 1984) (Applicable if award exceeds \$25,000)
50. FAR 52.232-5, Payments Under Fixed-Price Construction Contracts (APR 1989)
51. FAR 52.232-17, Interest (APR 1984)
52. FAR 52.232-23, Assignment of Claims (JAN 1986) (Applicable if award exceeds \$1,000)
53. FAR 52.232-27, Prompt Payment for Construction Contracts (APR 1989)
54. FAR 52.233-1, Disputes (APR 1984)
55. FAR 52.233-3, Protest After Award (JUN 1985)
56. FAR 52.233-2, Differing Site Conditions (APR 1984)

57. FAR 52.236-3, Site Investigation and Conditions Affecting the Work (APR 1984)
58. FAR 52.236-5, Material and Workmanship (APR 1984)
59. FAR 52.236-6, Superintendence by the Contractor (APR 1984)
60. FAR 52.236-7, Permits and Responsibilities (APR 1984)
61. FAR 52.236-8, Other Contracts (APR 1984)
62. FAR 52.236-9, Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements (APR 1984)
63. FAR 52.236-10, Operations and Storage Areas (APR 1984)
64. FAR 52.235-11, Use and Possession Prior to Completion (APR 1984)
65. FAR 52.236-12, Cleaning Up (APR 1984)
66. FAR 52.236-13, Accident Prevention (APR 1984) - Alternate I (APR 1984)
67. FAR 52.236-14, Availability and Use of Utility Services (APR 1984)
68. FAR 52.236-15, Schedules for Construction Contracts (APR 1984) (Applicable if award exceeds \$25,000)
69. FAR 52.236-17, Layout of Work (APR 1984)
70. FAR 52.236-21, Specification and Drawings for Construction (APR 1984)
71. FAR 52.243-4, Changes (AUG 1987) (Applicable if award exceeds \$25,000)
72. FAR 52.244-1, Subcontracts (Fixed-Price Contracts) (JAN 1986) (Applicable if award exceeds \$500,000)
73. FAR 52.245-1, Property Records (APR 1984)
74. FAR 52.245-2, Government Property (Fixed-Price Contract) (APR 1984) (Applicable if Government Furnished Property Exceeds \$50,000 in value)
75. FAR 52.245-3, Identification of Government Furnished Property (APR 1984)
76. FAR 52.245-4, Government-Furnished Property (Short Form) (APR 1984) (Applicable if Government Furnished Property is less than \$50,000 in value)

- 77. FAR 52.246-12, Inspection of Construction (JUL 1986)
- 78. FAR 52.246-21, Warranty of Construction (APR 1984) -  
Alternate I (APR 1984)
- 79. FAR 52.247-64, Preference of Privately Owned U.S.-Flag  
Commercial Vessels (Alternate II) (APR 1984)
- 80. FAR 52.248-3, Value Engineering-Construction (APR 1984)  
(Applicable if award exceeds \$100,000)
- 81. FAR 52.249-1, Termination for Convenience of the Government  
(Fixed Price) (Short Form) (APR 1984) (Applicable if award  
is less than \$100,000)
- 82. FAR 52.249-2, Termination for Convenience of the Government  
(Fixed Price) Alternate I (APR 1984) (Applicable if award  
exceeds \$100,000)
- 83. FAR 52.249-10, Default (Fixed Price Construction) (APR 1984)

III. DEPARTMENT OF DEFENSE FEDERAL ACQUISITION REGULATION  
SUPPLEMENT (DFARS) CLAUSES INCORPORATED BY REFERENCE

- 84. DFARS 252.209-7001, Acquisitions from Defense Contractors  
Subject to On-Site Inspection Under the Intermediate-Range  
Nuclear Forces (INF) Treaty (JUN 1988)
- 85. DFARS 252.219-7000, Small Business and Small Disadvantaged  
Business Subcontracting Plan (Applicable if award exceeds  
\$1,000,000 and unrestricted (Master Plans) (FEB 1988)
- 86. DFARS 252.225-7012, Preference for Domestic Specialty Metals  
(OCT 1980)
- 87. DFARS 252.225-7024, Restriction on Contracting with Toshiba  
Corporation or Kongsberg Vapenfabrikk (MAR 1988)
- 88. DFARS 252.231-7000, Supplemental Cost Principles (APR 1984)  
(Applicable if award exceeds \$25,000)
- 89. DFARS 252.233-7000, Certification of Requests for Adjustment  
or Relief Exceeding \$100,000 (FEB 1980) (Applicable if award  
exceeds \$100,000)
- 90. DFARS 252.236-7000, Composition of Contractor (JAN 1965)
- 91. DFARS 252.236-7001, Modification Proposals - Price Breakdown  
(APR 1968)
- 92. DFARS 252.236-7002, Contract Drawings, Maps and

Specification (SEP 1987)

93. DFARS 252.236-7005, Salvage Materials and Equipment (JAN 1965)
94. DFARS 252.236-7006, Misplaced Material (JAN 1965)
95. DFARS 252.242.7003, Certification of Indirect Cost (APR 1986)
96. DFARS 252.243-7001, Pricing of Adjustments (APR 1984)

DEPARTMENT OF THE NAVY  
SOUTHERN DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
CHARLESTON, SOUTH CAROLINA

SPECIFICATION  
NO. 06-88-0426

N62467-88-C-0426

APPROPRIATION:

JP-4 REMEDIATION

at the

DEFENSE FUEL SUPPORT POINT  
CHARLESTON, SC

DESIGN BY

RMT, Inc.  
11 Regency Hills Drive  
Greenville, SC 29606

SUBMITTED BY

Robert F. Martin  
*Robert F. Martin* 3/3/89

SPECIFICATION PREPARED BY

\_\_\_\_\_

J. McGraner

V. Micellota

Architectural

Civil

Structural

\_\_\_\_\_

L. Forrester

Electrical

APPROVED BY

EFD Specification  
Branch Head: *J.R. Vandell*

Design Director: \_\_\_\_\_

For Commander, NAVFAC: *J.R. Vandell*

Date: 5/15/89

J.O. No. 14D437 W/R: \_\_\_\_\_ SEIC: RWB

EIC: 405 (LSB)

06-88-0426

3.3.3 End Item Manufacturer's Part Numbers: Include parts for which the end item manufacturer has proprietary rights or has exercised design control, and for which the end item manufacturer is the logical supplier. The end item manufacturer shall also assign numbers to purchased production parts, if such parts are altered to meet the prime manufacturer's design configuration. (Repainting, marking, or other nonsignificant operations are not adequate cause for use of exclusively assigned numbers.)

3.3.4 Components Assemblies/Parts: Include those components assemblies/parts purchased by the end item manufacturer for which the end item manufacturer does not have control, and shall be identified by the actual manufacturer's name and part numbers. Detail parts in the manufacturer's assembly, as well as attaching parts, for which the manufacturer does not have design control shall also be identified by the applicable actual manufacturer's parts numbers. This paragraph does not restrict the end item manufacturer from assigning part numbers as long as the actual manufacturer's part number and the Federal Supply Code for Manufacturer H4-1 (FSCM) or manufacturer is shown.

3.3.5 Appendices: End item manufacturer may add an appendix for cross-reference to implement Components Assemblies/Parts requirements when implementation in manual form varies drastically with the style, format, and method of Contractor's standard commercial practice. Subject cross-reference in an appendix will appear in the following format:

End Item Manufacturer's Alpha Numeric Seq.	Actual Manufacturer's Name and/or FSCM* From H4.1**	Actual Manufacturer Part No.
100001	John Doe & Co. 000000	2000002

\* Federal Supply Code for Manufacturers

\*\* Cataloging Handbook, Name to Code

3.4 VALIDATION: Each submittal shall be validated by the Contractor or manufacturer as being accurate and applicable to the systems and equipment provided.

3.5 SPECIFIC EQUIPMENT SUBMITTALS: The technical sections of this specification identify the specific equipment or systems for which OMSI submittals are required. This paragraph and its subparagraphs contain a general list of various types of equipment and systems together with the OMSI information required for each type. The applicable OMSI information contained in this paragraph shall be submitted for each specific piece of equipment or system listed under the "OMSI Submittals" paragraph in the technical sections. Operating instructions; maintenance, service, and repair instructions; and parts manuals shall conform to the requirements of their respective paragraphs herein. Provide validation in accordance with Paragraph 3.4 for all submittals.

3.2.3 Preventive Maintenance Inspection: Points and checklist should be clearly spelled out as part of operator-type inspection in this section. Include chart with schematic diagram and/or a separate inspection checklist indicating what should be examined for wear or possible malfunction and what should be reported for repair, including a priority system.

3.2.4 Troubleshooting Guides and Diagnostic Techniques: Provide step-by-step procedures to enable prompt isolation of the cause of a malfunction with corrective maintenance instructions. Instructions shall clearly indicate why the checkout is performed and what conditions are to be sought.

3.2.5 Removal and Replacement Instructions: Provide step-by-step procedures for removal, replacement, disassembly, and assembly of all components, assemblies, sub-assemblies, accessories, and attachments normally subjected to wear, damage, malfunction, and frequent replacement. These instructions should provide for judicious combination of text and illustrations.

3.2.6 Maintenance and Repair Procedures: Provide instructions for tolerances, dimensions, settings, and adjustments normally required for performing routine maintenance servicing. Instructions shall provide the necessary information to bring the equipment up to the required serviceable standard when it becomes unserviceable. Include instructions for examining equipment for needed repairs and adjustment, and any tests or inspections required to determine whether or not parts must be replaced.

### 3.3 PARTS MANUAL:

3.3.1 Contents: The parts manual shall provide positive identification and coverage for all of the parts of components, assemblies, sub-assemblies, and accessories of the end item normally subjected to wear, malfunctioning, damage, or loss. Include any special hardware requirements (e.g., high-strength bolts and nuts). The parts manual may cover more than one model or series of equipments, components, assemblies, subassemblies, attachments, or accessories, such as a master parts catalog, in accordance with the manufacturer's standard commercial practice. Identification of the parts shall be such that all parts may be ordered and centrally stocked by the Government without further identification to the make, model, and serial number of the equipment being provided.

3.3.2 Illustrations, Drawings, and/or Exploded Views: Provide clear and legible illustrations, drawings, and/or exploded views to enable easy identification of all individual parts, components, assemblies, sub-assemblies, and accessories of the end item. Show part numbers and description on illustrations or list separately. When the illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to listed part. Parts shown in the listings shall be grouped by components, assemblies, and sub-assemblies with individual parts identified to the assembly.

3.1.4 Normal Operating Instructions: Shall be sufficient to enable the mechanic to adjust, stop and start, and operate the equipment properly. Special startup precautions shall be noted, as well as other items requiring action before the equipment may be put into service.

3.1.5 Emergency Operating Procedures: Include action to be taken in the event of a malfunction of the unit, either to permit a short period of continued operation or to prevent further damage to the unit and to the system in which it is installed.

3.1.6 Operator Service Requirements: Include instructions for operator service requirements during operation of the equipment.

3.1.7 Instruction to Government Personnel: The Contractor shall furnish the services of competent instructors who will give full instruction to the designated personnel in the adjustment, operation and maintenance, including pertinent safety requirements, of the equipment or system specified. Each instructor shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. A minimum of 1 man-day (8 hours) of instruction shall be furnished for each system specified in other sections. When more than 4 man-days of instruction are specified, approximately half of the time shall be used for classroom instruction. All other time shall be used for instruction with the equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the contract, additional instruction shall be provided to acquaint the operating personnel with the changes or modifications.

3.2 MAINTENANCE, SERVICE, AND REPAIR INSTRUCTIONS: The shop or maintenance manual shall include manufacturer's instructions to maintain the equipment in a safe and serviceable condition. The maintenance or shop manual shall contain all necessary instructions, illustrations, charts, and diagrams covering, as a minimum, the items listed below.

3.2.1 Lubrication Instructions:

- a. Include a table showing recommended lubricants for specific temperature ranges and applications.
- b. Include chart(s) with schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities. Provide a lubrication schedule showing service interval frequency.

3.2.2 Table of Preventive Maintenance Instructions: Include frequency in time, miles, or hours covering routine servicing, lubrication, and adjustments.

2.1.2 Identification: On each folder identify and mark as follows:

- a. Inscribe on the cover, the words "OPERATION AND MAINTENANCE MANUAL," the name and location of the building, and the contract number.
- b. Equipment manufacturer and/or Contractor's address and telephone number; names, addresses, and telephone numbers of each subcontractor installing equipment; and local representative for each item of equipment.
- c. Equipment identification, make, model, serial number, USN number of equipment, and stock number provided by the Government.
- d. Volume number and title of the folder.
- e. The manual shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject. Sub-divide manuals or provide separate manuals for each of the following categories:
  1. Operating Instructions
  2. Maintenance, Service, and Repair Instructions
  3. Parts Manual

### PART 3 - EXECUTION

3.1 OPERATING INSTRUCTIONS: The operator's instructions shall include specific instructions and illustrations of the equipment operation required or recommended by the manufacturer as follows:

3.1.1 Safety: Include manufacturer's safety precautions to be observed while operating under all conditions for which the equipment was designed. Clearly list all major hazards to personnel and equipment safety that are peculiar to systems and equipment described in the manual.

3.1.2 Operator Prestart: Include instructions for prestart checks, lubrication, and service requirements necessary for setting up or preparing each system for use; warmup procedures, and verification of normal operation. Include control diagrams with data to explain detailed operation and control of each item of the equipment.

3.1.3 Starting and Shutdown Procedures and Controls: Include a control sequence describing startup operation and provide shutdown procedures and post-shutdown requirements.

SECTION 01730

OPERATION AND MAINTENANCE SUPPORT INFORMATION

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 Defense Logistics Agency Handbook:

H4-I (June 82) Federal Supply Code for Manufacturers;  
United States and Canada-Name to Code

1.2 CONTRACTOR RESPONSIBILITY: The Contractor is responsible for providing the technical publications specified herein for all of the components, assemblies, sub-assemblies, attachments, and accessories, required to be supplied in accordance with submittal requirements of each specification section, regardless of whether the item was manufactured and assembled in-house or obtained from other sources.

1.2.1 General OMSI Submittal Requirements: OMSI submittals are required in order that complete documentation can be assembled to provide the Government "Activity" with the necessary information and orientation to adequately operate and maintain the new structures/facilities of this project. The Contractor shall submit the OMSI documents and information specified for the equipment listed under the OMSI submittal paragraphs in each technical section and as indicated on the drawings. Five (5) copies of each OMSI submittal shall be forwarded to the Contracting Officer 90 days prior to contract completion. OMSI submittals are to be submitted separate from and in addition to Contractor's product approval submittals.

PART 2 - PRODUCTS

2.1 DEVELOPMENT OF SUBMITTALS:

2.1.1 Structure: Provide submittals in separate folders consistent with the Contractor's standard practice. Manufacturer's manuals or data for the components, assemblies, sub-assemblies, and other operating parts which are provided shall be assembled into a loose-leaf notebook-type folder, indexed by major assembly and component in sequential order. Manuals shall be complete in all respects for all equipment, controls, and accessories provided.

power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not shake bags of cement, concrete mortar, or plaster.

2.8 NOISE: Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives will not be permitted without written permission from the Contracting Office, and then only during the designated times. Confine pile-driving operations to the period between 8 a.m. and 4 p.m., Monday through Friday, exclusive of holidays, unless otherwise specified.

2.9 FOOD: Preparation, cooking and dispensing of food products will not be permitted.

2.10 TEMPORARY CONSTRUCTION: Remove temporary construction facilities including haul roads, work areas, structures, foundations of temporary structures, and stockpiles of excess or waste materials. Grade temporary roads, parking areas, and temporarily used areas to conform with surrounding contours. Remove temporary culverts or bridges upon completion of work, and repair the area as indicated.

\*\*\*END OF SECTION\*\*\*

2.4.1.1 Removal From Government Property: Remove solid wastes from Government property.

2.4.2 Garbage Disposal: Place garbage in approved containers, and move to a pickup point or disposal area, where directed.

2.4.3 Sewage, Odor, and Pest Control: Dispose of sewage through connection to a municipal, district, or station sanitary sewage system, where such a system is not available, use chemical toilets. Empty wastes into a municipal, district, or station sanitary sewage system, or construct and maintain an approved type of sanitary convenience for the use of persons employed on the work in accordance with the General Paragraphs titled, "SANITATION." Provide pest control and elimination of odors. No substances shall be disposed of which will interfere with treatment plant operations in accordance with 40 CFR 403.

## 2.5 HAZARDOUS WASTES:

2.5.1 General: Handle generated hazardous wastes in accordance with 40 CFR 262. Store hazardous wastes in approved containers in accordance with 49 CFR 178. Label to identify the type of waste and the date the container was filled. Remove the containers from the project site, and store and dispose of hazardous wastes in accordance with 40 CFR 263 and 264. For hazardous wastes spills, verbally notify the Contracting Officer immediately.

2.5.2 Petroleum Products: Conduct the fueling and lubricating of equipment and motor vehicles to protect against spills and evaporation. Dispose of lubricants and excess oils.

2.5.3 Lead-Acid Battery Electrolyte: Dispose of electrolyte solution from lead-acid batteries. Do not dump electrolyte onto the ground or into storm drains or sanitary sewers without first neutralizing the electrolyte. Use one of the following alternatives for disposal of waste electrolyte:

- a. An industrial waste treatment plant, if available and approved by the Contracting Officer for neutralizing and disposing of battery acid electrolyte.
- b. Transport the electrolyte to a state-approved hazardous waste disposal site. The method of transportation and equipment shall comply with applicable Federal and state regulations.
- c. Use an EPA-approved existing tank located on station or construct a neutralization tank. The neutralization process shall be in accordance with NEPSS PS-015.

2.6 DUST: Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet

2.2 HISTORICAL AND ARCHEOLOGICAL RESOURCES: Preserve, and verbally report immediately to the Contracting Officer, items having possible historical or archeological interest which are discovered in the course of work. Protect monuments, markers, and works of art.

2.3 EROSION AND SEDIMENT CONTROL:

2.3.1 Runoff: Runoff of the ground cover will not be permitted.

2.3.2 Protection of Erodible Soils: Immediately finish the earthwork brought to a final grade, as indicated or specified. Immediately protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

2.3.3 Temporary Protection of Erodible Soils: Provide the following methods to prevent erosion and control sedimentation.

2.3.3.1 Mechanical Retardation and Control of Runoff: Mechanically retard and control the rate of runoff from the construction site. This includes construction of diversion ditches, benches, and berms to retard and divert runoff to protected drainage courses.

2.3.3.2 Sediment Basins: Trap sediment in temporary sediment basins. Select a basin size to accommodate the runoff of a local 10-year storm. Pump dry and remove the accumulated sediment, after each storm. Use a paved weir or vertical overflow pipe for overflow. Remove collected sediment from the site. Institute effluent quality monitoring programs.

2.3.3.3 Borrow: Permitted only in areas where suitable environmental controls are possible.

2.3.3.4 Vegetation and Mulch: Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydroseeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control.

2.3.3.5 Seeding: Provide seeding where ground is disturbed. Include topsoil or nutriment during the seeding operation necessary to establish or re-establish a suitable stand of grass.

2.4 SOLID AND SANITARY WASTES: Pick up solid wastes, and place in containers which are regularly emptied. Prevent contamination of the site and other areas when handling and disposing wastes. On completion, leave the areas clean. Control and dispose of wastes.

2.4.1 Disposal of Solid Wastes: Dispose of solid wastes in accordance with the requirements specified.

during the construction of permanent or temporary environmental features associated with the project. Comply with federal, state, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances and noise pollution.

1.6.1.1 Commencement of the Work: As directed by the Contracting Officer, following approval.

## PART 2 - EXECUTION

2.1 NATURAL RESOURCES: Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified. Remove displaced rocks from uncleared areas.

2.1.1 Landscape Features: Except in areas to be cleared, do not remove, cut deface, injure, or destroy existing landscape features without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages, unless authorized by the Contracting Officer. Where such use of attach ropes, cables, or guys is authorized, the Contractor shall be responsible for any resultant damage.

2.1.1.1 Protection: Protect existing landscape features which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. By approved excavation, remove trees with 30 percent or more of their root systems destroyed.

2.1.1.2 Replacement: Remove existing landscape features scarred or damaged by equipment operations, and replace with equivalent, undamaged features. Obtain the Contracting Officer's approval before replacement.

### 2.1.2 Water Resources:

2.1.2.1 Stream Crossings: The Contracting Officer's approval is required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges.

2.1.2.2 Oily Wastes: Prevent oily wastes from entering the ground, drainage areas, or local bodies of water. Surround temporary fuel oil or petroleum storage tanks with a temporary earth berm of sufficient size and strength to contain the contents of the tanks in the event of leakage or spillage.

2.1.3 Fish and Wildlife Resources: Do not disturb fish and wildlife. Do not alter water flows or otherwise disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as indicated or specified.

1.4 DEFINITIONS:

1.4.1 Sediment: Soil and other debris that have eroded and have been transported by runoff water or wind.

1.4.2 Solid Wastes: Rubbish, debris, and other discarded solid materials, except hazardous waste as defined in paragraph entitled, "Hazardous Waste," resulting from industrial, commercial, and agricultural operations and from community activities.

1.4.3 Rubbish: Combustible and noncombustible wastes including paper, boxes, glass, crockery, metal, lumber, cans, and bones.

1.4.4 Debris: Combustible and noncombustible wastes such as ashes and waste materials resulting from construction or maintenance and repair work, leaves, and tree trimmings.

1.4.5 Chemical Wastes: This includes salts, acids, alkalis, herbicides, pesticides, and organic chemicals.

1.4.6 Sanitary Wastes:

1.4.6.1 Sewage: Waste characterized as domestic sanitary sewage.

1.4.6.2 Garbage: Refuse and scraps resulting from consumption of food.

1.4.7 Hazardous Wastes: Hazardous substances as defined in 40 CFR 261 or as defined by applicable state and local regulations or SCDHEC Regulation NO. 61-79-261.

1.4.8 Oily Wastes: Petroleum products and bituminous materials.

1.4.9 Landscape Features: Trees, plants, shrubs and ground covers.

1.4.10 Hazardous Substances: As defined in EPA Pl 96-510.

1.4.11 Hazardous Materials: As defined in DOT Regulation 49 CFR 171 and listed in 49 CFR 172.

1.5 SUBMITTALS: Submit to the Contracting Officer:

1.5.1 Solid Wastes Disposal Permit: Submit one copy of a state or local permit or license showing such agency's approval of the disposal plan before transporting wastes off Government property.

1.6 ENVIRONMENTAL PROTECTION REQUIREMENTS: Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop

SECTION 01560  
ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

- 1.1.1 Environmental Protection Agency (EPA) Regulations:
- 40 CFR 261 Regulations Identifying Hazardous Wastes
  - 40 CFR 262 Regulations for Hazardous Waste Generators
  - 40 CFR 263 Regulations for Hazardous Waste Transporters
  - 40 CFR 264 Regulations for Owners and Operators of Permitted Hazardous Waste Facilities
  - 40 CFR 403 General Pretreatment Standards
  - PL 96 510 Comprehensive Environmental Response Compensation and Liability Act of 1980
- 1.1.3 U.S. Army Corps of Engineer's (COE) Engineering Pamphlet:
- EP 1165-2 Flood Plain Regulations for Flood Plain Management, June 1976
- 1.1.4 Naval Environmental Protection Support Service (NEPSS) Publication:
- PS-015 Disposal of Lead-Acid Battery Electrolyte, April 19, 1980
- 1.1.5 Department of Transportation (DOT):
- 49 CFR 171 Standards for Transportation of Hazardous Materials
  - 49 CFR 172 Hazardous Materials Tables and Regulations
  - 49 CFR 178 Regulations for Shipping Container Specifications
- 1.1.6 South Carolina Department of Health and Environmental Control (SCDHEC) Regulation:
- 61-79.261 Identification and Listing of Hazardous Waste

06-88-0426  
01560-1



NON-COMPLIANCE CHECK-OFF LIST

Contract No. and Title: \_\_\_\_\_

Contractor: \_\_\_\_\_

DATE NON-COMPLIANCE IDENTIFIED	ITEM	CONTRACT REQUIREMENT (Spec. Section and Para. No., Draw. No. and Detail No., etc.)	ACTION TAKEN BY COC REP.	RESOLUTION	DATE RESOLVED

06-88-0426  
01481-15

SPEC PARA  
AND/OR DRAWING NO

(Materials, Equipment, Safety, and/or Workmanship) ACTION TAKEN OR TO BE TAKEN


DEFICIENCIES CORRECTED THIS DATE

REFERENCE

REPORT NO

COMPLIANCE  
NOTICE NO


CONSTRUCTION AND PLANT EQUIPMENT LEFT ON JOB SITE UNTIL USE IS COMPLETED

DESCRIPTION

DATE FIRST ON JOB  
(First time only)

HOURS WORKED  
THIS DATE

HOURS IDLED

DATE OF FINAL  
REMOVAL FROM JOB SITE


CONSTRUCTION AND PLANT EQUIPMENT NOT LEFT ON JOB SITE PERMANENTLY

DESCRIPTION

HOURS WORKED

HOURS IDLED


REMARKS (Include directions received from ROICC, AROICC, visitors, compliance notices received, errors and/or omission in P.S. pertinent information)

I certify that this report is complete and correct and all equipment and material used and work performed during this reporting period are in compliance with the contract plans and specifications to the best of my knowledge except as noted above.

CONTRACTOR/SUPERINTENDENT

DATE

CONSTRUCTION REPRESENTATIVE'S REMARKS AND OR EXCEPTIONS TO THIS REPORT


CONSTRUCTION REPRESENTATIVE

DATE

BACK

06-88-0426  
01401-14

SHEET OF



## INSTRUCTIONS FOR SUBMITTAL STATUS LOG

1. This form, or a similar one containing the same data, shall be used for listing all material submittals that require action by either the Contractor or the Government. Indicate by an "X" in the space provided to denote status, unless otherwise indicated.
  - a. Columns (a) through (e) should be completed and must include all submissions that are required by the specifications. This partially completed form then becomes the submittal log portion of the QC Plan.
  - b. Columns (a) through (d) are self-explanatory for the information required.
  - c. In column (e), indicate with an "X" in the space provided to show Government approval is required. The space designating "Contractor Approved" is not applicable since all items require Government Approval.
  - d. As submittals are received and processed, the remaining columns are to be completed.
  - e. In column (f), use the following Action Codes:
    - G - Certified by Contractor; forwarded for final review and approval.
    - R - Certified by Contractor; forwarded for record purposes.
    - V - Variance; forwarded for review and approval - Review charges to be as determined by the Contracting Officer.
    - W - Resubmittal, Certified by Contractor; forwarded for final review and approval.
  - f. Column (g) is self-explanatory for the information required.
  - g. Columns (h) and (i) are applicable for all submittals. Column (i) is self-explanatory. Column (h) information shall be obtained from written ROICC response for the applicable item. Action codes used by the ROICC are as follows:
    - A - Approved as submitted.
    - B - Approved, except as noted on drawings. Resubmission not required.
    - C - Approved, except as noted on drawings. Refer to attached sheet. Resubmission required.
    - D - Will be returned by separate correspondence.
    - E - Disapproved. See attached sheet.
  - h. Column (j), is completed when material or equipment is delivered to the project. Column (k) is not applicable. Use remarks in column (l) to indicate verification that the delivered item is that represented by the approved submittal.
  - i. Column (l) is self-explanatory.



<u>Copies:</u>	<u>Category:</u>	<u>Number of</u>
a.	Shop drawings, catalog cuts, certificates of conformance, O&M manuals, request for variances, and other types of submittals, except samples.	6 copies; 2 copies will be returned to Contractor
b.	Samples for Government selection of color, texture, etc., except on-site sample panels.	4 copies; 2 copies will be returned to Contractor.
c.	On-site sample panels.	One panel
d.	QC Daily Reports and Documentation Forms.	Original plus 3 copies
e.	QC Plan.	4 copies
f.	QC Meeting minutes.	2 copies

7.3 IDENTIFICATION OF CONSTRUCTION INSPECTED: If a Contractor Prepared Network Analysis System is used, the reporting of work inspected shall identify construction activities from the Contractor Prepared Network Analysis System by use of I-J numbers for each item of work inspected. A column is included on The Testing Plan Form for I-J node reference.

7.4 SPECIAL INSPECTION AND DOCUMENTATION: Certain Special Inspection and Documentation requirements may be contained in the specification sections. A record of these requirements is to be independent of, but attached to the "Quality Control Daily Report" and shall be submitted for record purposes on an "as occurred" basis, unless otherwise indicated. Each documentation report shall be signed by the Contractor's authorized representative who witnessed the test or inspection, certifying compliance with the specific contract requirement. The format for each special documentation requirements shall be developed and submitted for approval as sample forms in the QC Plan.

7.5 AS-BUILT RECORD DRAWINGS: Maintain at the job site two sets of full-size prints of the contract drawings, marked in red with dimensions, to show variations between the construction provided and that indicated or specified in the contract documents, including buried or concealed construction. Special attention shall be given to recording the horizontal and vertical location of buried utilities that differ from the contract drawings. Existing utility lines and features revealed during the course of construction, shall also be recorded. Variations in the interior utility systems shall be defined and dimensioned; and coordinated with exterior utility connections at the building five-foot line, where applicable. Existing topographical features which differ from those shown on the contract drawings shall also be located and recorded. Where a choice of materials or methods is permitted herein, or where variations in scope or character of work from that of the original contract are authorized, the drawings shall be marked to define the construction provided. The representations of such changes shall conform to standard drafting practice and shall include such supplementary notes, legends, and details as necessary to portray the as-built construction. These drawings shall be available for review at all times. Initial each variation or revision, and upon completion of construction, certify the accuracy of the Record Drawings and submit for approval. Requests for partial payments will not be approved if the marked prints are not kept current, and request for final payment will not be considered until the marked prints are approved.

8. NUMBER OF COPIES: Notwithstanding any other reference to the number of copies of shop drawings, catalog cuts, certificates of conformance, samples, O&M manuals, QC daily reports, documentation forms, QC Plan, QC Meeting minutes, or other submittals, the following is a list of copies required:

5.3.3 Follow-Up Inspections: Perform daily and more frequently as necessary, and include continued testing and examinations to ensure continued compliance with the requirements.

5.3.4 Special Inspection and Documentation: Perform as required, record results, and submit for approval on an "as occurred" basis unless otherwise indicated.

5.5 NON-COMPLIANCE CHECK-OFF LIST: Maintain a check-off list of work that does not comply with the contract, stating specifically what is non-complying, the date the faulty work was originally discovered, and the date the work was corrected. There is no requirement to report a deficiency which was corrected the same day it was discovered. Do not add to or build upon non-conforming work unless, in the opinion of the Contracting Officer, correction can be made without disturbing the continuing work. Submit a copy of the non-compliance check-off list on a monthly basis, unless otherwise directed.

5.6 COMPLETION AND INSPECTION OF WORK: Prior to final Government inspection and acceptance, submit a certification that all work has been inspected and that all work, except as specifically noted, is complete and in compliance with the contract requirements.

6. REPEATED TESTS AND INSPECTIONS: Repeat tests and inspections after each correction made to nonconforming materials and workmanship until tests and inspections indicate the materials, equipment, and workmanship conform to the contract requirements.

7. FORMS, REPORTS, AND AS-BUILTS:

7.1 FORMS: Sample forms are attached at the end of this section for the Quality Control Daily Report, Submittal Status Log, Non-Compliance Check-Off List, and Testing Plan. Other similar forms may be used, but require approval and must contain the same information as required by the sample forms.

7.2 QUALITY CONTROL DAILY REPORT: Submit reports identifying prime and subcontractor personnel and equipment on the site, idle equipment and personnel, material deliveries, weather conditions, work accomplished, inspections and tests conducted, results of inspection and tests, nature of defects found, causes for rejection, proposed remedial action, and corrective actions taken. The reports shall be delivered to the Contracting Officer by 10:00 A.M. on the working day following the day the work was performed. The reports shall include the following certification: "I certify that this report is complete and correct and all equipment and material used and work performed during this reporting period are in compliance with the contract plans and specifications to the best of my knowledge except as noted above." This certification shall be signed by the Contractor or his designated Representative.

- e. A list of test and inspection equipment for each of the proposed test procedures and certification that the equipment is calibrated at prescribed intervals to ensure the validity of the test and inspection data.
- f. A copy of the latest Laboratory Inspection Report by a separate nationally recognized agency with laboratory certification that deficiencies (if any) have been corrected.
- g. Names and qualifications of individuals who will perform the testing and sampling. (Changes in personnel require approval prior to performance of work under this contract.)

4.4 FACTORY TESTS: Arrange for and provide services for factory tests when required. Notify the Contracting Officer 15 days prior to each test.

4.5 TEST RESULTS: Test results shall cite the contract requirements, the test or analytical procedures used, the actual results, and include a statement that the item tested or analyzed conforms or fails to conform to the specification requirements. The cover sheet for each report shall be conspicuously stamped in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, as the case may be. Test reports shall be certified by the approved testing laboratory. Arrange for immediate and direct submittal of the signed reports, certifications, and other documentation.

## 5. INSPECTION:

5.1 GENERAL: Inspect all work. Keep the Contracting Officer informed of the status of work to allow for Government inspections of work in progress. Inspections performed shall be reported on the Quality Control Daily Report.

5.2 FACTORY INSPECTION: Arrange for and perform any required factory inspections.

5.3 FIELD INSPECTION: Arrange for and perform field inspections.

5.3.1 Preparatory Inspection: Perform before beginning work and, in addition, before beginning each segment of work, and include a review of the contract requirements, the review of submittal data, a check to ensure that required control testing will be performed, an examination to ensure that materials and equipment conform to approved submittals, and a check to ensure preliminary work has been completed.

5.3.2 Initial Inspection: Perform as soon as a representative segment of the particular item of work has been accomplished, and include performance of scheduled tests, examination of the quality of workmanship, review for omissions or dimensional errors, and approval status of the initial segment of the work.

3.10: CERTIFIED INSPECTION/TEST REPORTS: Inspections and tests shall have been performed within 60 days of submittal of the reports for approval. TWO COPIES OF REPORTS SHALL BE MAILED TO THE CONTRACTING OFFICER DIRECTLY FROM THE LABORATORY, in addition to the specified submittal requirements.

4. TESTING.

4.1: GENERAL: Except as expressly stated otherwise in the technical specifications sections, perform all field sampling and testing. Tests performed shall be reported on the Quality Control Daily Report.

4.2: TESTING PLAN: Maintain a Testing Plan to indicate tests to be performed along with other required information on testing. The initial submittal of the Testing Plan shall be included with the QC Plan.

4.3: TESTING LABORATORY: Employ the services of a commercial testing laboratory, acceptable to the Contracting Officer, to perform all laboratory work required, excluding factory tests.

4.3.1: Government Acceptance of Laboratories: The basis of acceptance includes the following:

4.3.1.1: Laboratories performing work in connection with concrete, steel, and bituminous materials must conform to ASTM E 329 and ASTM D 3666, respectively.

4.3.1.2: Laboratories performing work in connection with sampling and testing or inspection of soil and rock as used in engineering design and construction (including compaction tests), must be commercial materials inspection and testing laboratories (agencies) which conform to ASTM D 3740. Laboratories performing nondestructive testing must conform to ASTM E 543.

4.3.1.3: Laboratories performing work not in connection with concrete, steel, bituminous materials, soils and nondestructive testing shall conform to ASTM E 548.

4.3.1.4: Submittals: Prior to consideration for acceptance, the laboratory shall submit in writing the following:

- a. Functional description of the laboratory's organization structure, operational departments, and support departments and services.
- b. Evidence of license to operate as a commercial testing laboratory.
- c. Name, registration number, and engineering discipline of the Registered Professional Engineer in charge of the laboratory.
- d. Affidavit of compliance with the applicable ASTM publication and certification that the laboratory performs work in accordance with Technical requirements as stated in this contract.

- b. Provide an index of included items with each volume. Title the index with applicable specification section name and number.
- c. Mark each item in the volume with the specification section number and paragraph number to which it pertains.
- d. Assemble each volume in the same numerical sequence as specification section paragraphs.

3.4 SUBMITTALS STATUS: Include with the QC Plan 4 copies of an initial submittal status log, listing submittals required in this contract. Maintain at the job site an up-to-date submittal status log showing the status of submittals throughout the contract.

3.5 VARIATIONS: Variations from contract requirements require approval and will be considered where advantageous to the Government. Where variations are proposed for consideration, submit a written request, with documentation of why the variation is desirable and beneficial to the Government. The proposed variation shall be separately identified and included along with the required submittal for the item.

3.5.1 Warrants for Variations: If a variation is submitted and approved, the Contractor shall warrant:

3.5.1.1 The contract has been reviewed to establish that the variation, when incorporated, will be compatible with all other elements of construction.

3.5.1.2 The taking of all actions and bearing all additional expenses, including review costs by the Government, which may arise by reason of incorporating the proposed variation.

3.6 SHOP DRAWINGS: shall be as defined and described in Contract Clause "SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION."

3.7 MANUFACTURER'S DATA OR CATALOG DATA: Shall be printed pages or permanent copies of pages from manufacturer's catalogs.

3.8 SAMPLES: Shall be marked showing the name of the material, supplier, and contract number and identified as to intended use and accompanied by a letter of certification that the samples comply with the contract requirements. Where practicable, the samples shall be stamped with the Contractor's certification stamp, properly applied and signed.

3.9 MANUFACTURER'S CERTIFICATES OF CONFORMANCE OR COMPLIANCE: Pre-printed certifications will not be acceptable. Certifications shall include one original along with the required copies. Manufacturer's certifications shall name the appropriate item of equipment and material, specification, standard, or other document specified as controlling the quality of that item, and shall have attached thereto copies of certified test reports upon which the certifications are based.

lay down areas and temporary utilities, plus demolition work and installation of temporary utilities, but does not include surveying for permanent construction or performing any permanent work.

### 3. SUBMITTALS:

3.1 GENERAL: Each technical section of these specifications describes the submittals required for items included in that section. Additionally, TESTING PROCEDURES shall be included as submittals. Approval of submittals shall be obtained prior to custom fabrication and before delivery of materials and equipment to the project site.

3.2 SUBMITTALS CERTIFICATION AND DELIVERY: Submittals shall be certified by the Contractor as conforming to the drawings and specifications and shall be accompanied with a cover letter. SUBMITTALS SHALL BE FURNISHED WITHIN 60 CALENDAR DAYS AFTER THE DATE OF RECEIPT OF THE NOTICE OF AWARD. Each sheet of submittals shall be stamped with the Contractor's certification stamp, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only. The stamp shall be worded as follows:

"It is hereby certified that the material/equipment/article shown and marked in this submittal is that proposed to be incorporated into Contract Number \_\_\_\_\_, is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for approval.

Certified by: \_\_\_\_\_ Date \_\_\_\_\_."

The person signing the certification shall be the one designated in writing as having this authority. Signatures shall be in original ink. Stamp signatures will not be acceptable.

3.2.1 Resubmittal Costs: Initial submittals will be reviewed at no cost to the Contractor. The cost of reviewing resubmittals, for reason of failure of the initial submittal to meet contract requirements, shall be the responsibility of the contractor. The Contracting Officer will issue a deductive contract modification to reduce the contract price by \$100.00 for each resubmittal of items requiring Government review and approval. The contract completion date will not be extended due to non-compliance with submittal requirements.

3.3 SUBMITTALS ORGANIZATION AND ASSEMBLY: Organize and assemble submittals as follows:

- a. Present all submittals for each specification section as a separate and complete bound volume, titled with project title and contract number. However, if the amount of submittals for certain sections is too large to include in one volume, more than one volume (maximum of three) may be used for those sections.

- a. The quality control organization in chart form showing the relationship to other elements of the firm and subcontractors.
- b. Names and qualifications of personnel in the quality control organization.
- c. Area of responsibility and authority of each individual in the quality control organization.
- d. A listing of outside organizations such as testing laboratories, architects, or consulting engineers that will be employed and a description of the services they will provide. Additionally, include the Laboratory Acceptance submittal data as required elsewhere in this specification section.
- e. Procedures for reviewing submittals for contract compliance.
- f. A matrix showing, for each specification section, who is the authorized submittal reviewer and who will inspect the work.
- g. An inspection schedule, keyed to the construction schedule and following the order of the specification sections, indicating what inspections and tests will be performed and the time schedule for each inspection and test. Include preparatory, initial, follow-up and other inspection phases in the schedule.
- h. The procedures for maintaining records for As-Built Drawings and As-Built Materials used.
- i. The procedures for documenting quality control operation, inspection, and testing, with a copy of all forms and reports to be used for this purpose. Additionally, include a copy of the initial submittal of the submittal status log and the testing plan.

2.2 QC MEETING: At least 5 days after the QC plan is submitted, but before construction operations begin, meet with the Contracting Officer to discuss quality control requirements. The purpose of the meeting shall be to develop a mutual understanding relative to details of the system, including forms to be used for recording the quality control operations, inspections, tests, approvals, certifications, administration of the system, and Government surveillance. The meeting shall also develop a schedule for future QC meetings and shall establish procedures for submission of daily reports and other records and documents. Document all QC meetings by providing copies of the minutes with 3 calendar days after the meeting.

2.3 PREPARATORY WORK PRIOR TO APPROVAL OF QC PLAN: The only construction authorized to proceed prior to the QC Plan being approved is mobilization which includes surveying for location of Contractor's offices.

1.3.3 Submittal: Information, concerning the performance, capacity, nature, rating, configuration, details, or other descriptions related to a "product," presented for approval.

1.3.4 Inspection: Examining and testing products or workmanship, including, when appropriate, raw materials, components, and intermediate assemblies, to determine conformance to stated requirements.

1.3.5 Testing: That element of inspection which determines properties or functional operation of a product.

1.3.6 Product: Types or categories of manufactured goods, constructions, installations, and natural and processed materials or those associated services whose characterization, classification, or functional performance determination is specified by standards.

1.3.7 Factory Inspection: Examining and testing of a product prior to shipment to the jobsite.

1.3.8 Field Inspection: Examining, testing, analysis, or sampling performed at or in the vicinity of the job site in connection with the actual construction.

1.3.9 Person: Associations, companies, corporations, educational institutions, firms, government agencies at the Federal, State and local level, partnerships and societies, as well as divisions thereof and individuals.

1.3.10 Testing Laboratory: Any "person" whose functions include testing, analyzing, or inspecting of a "product" or evaluating the designs or specifications of such "products" according to the requirements of applicable standards.

1.3.11 Certified Inspection/Test Reports: Signed reports by an approved Testing Laboratory attesting that inspections or tests were performed in accordance with the specified requirements, that the results reported are accurate, and that items inspected or tested either meet or fail to meet the specified requirements.

1.3.12 Manufacturer's Certificates of Conformance or Compliance: Signed documents by the manufacturer attesting that the material or equipment delivered meets the specified requirements.

## 2. QUALITY CONTROL (QC) PLAN:

2.1 QC PLAN REQUIREMENTS: Submit a QC plan for approval within 15 calendar days after receipt of the Notice of Award. The QC plan shall detail the procedures, instructions, and reports to be used to ensure compliance with the contract. The plan shall include, as a minimum:

SECTION 01401

QUALITY CONTROL

1. GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 American Society for Testing and Materials (ASTM) Publications:

D 3666-83	Evaluation of Inspection and Testing Agencies for Bituminous Paving Materials, Practice for
D 3740-80	Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction, Practice for
E 329-77	Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction
E 543-87	Standard Practice for Determining the Qualification of Nondestructive Testing Agencies
E 548-84	Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies

1.2 QUALITY CONTROL REQUIREMENTS: This contract shall be accomplished under the "QUALITY CONTROL SYSTEM" as defined herein.

1.2.1 Basic Requirement: Provide a Quality Control System for all construction operations, including on-site and off-site work.

1.3 DEFINITIONS:

1.3.1 Quality Control System: The system provided by the Contractor to ensure compliance with the contract requirements.

1.3.2 Approval: the words "approval" and "approved," or words of similar meaning or import, mean approval by the Contracting Officer.

- c. The Government will be responsible for obtaining those environmental and other construction permits whose issuance is directly dependent upon the design and function of the proposed facility, or action, i.e., Army Corps of Engineers and state permit for dredge or fill and construction in navigable waters and wetlands; state environmental regulatory agency permit for installation of an air emission source, wastewater, solid waste and similar facilities; and Coast Guard and Federal Aviation Administration Permits. In such cases, the Contractor shall be relieved of the responsibility under Clause entitled "Permits and Responsibilities" and a. above for obtaining these specific licenses or permits.

\*\*\* END OF SECTION \*\*\*

location and depth by hand digging, cable/pipe locators or other approved methods before any excavation. After location has been established, the Contractor shall mark each line clearly and establish its depth below the surface. Southern Bell Telephone Company (Telephone 611) will establish the location of buried telephone cables on request. There is no charge for this service. After the locations of telephone cables have been established by the Telephone Company, the Contractor shall ascertain the depth by hand digging or other approved methods. Care shall be exercised to prevent damage to any buried utility. Should damage occur to any utility during excavation or construction, the Contractor shall take immediate steps, as soon as possible, to make necessary repairs and shall prosecute repairs diligently to the satisfaction of the Contracting Officer. If the Contractor fails to respond in an acceptable and timely manner, the Government may exercise the option to complete the repairs by other means, and the Contractor will be charged for the complete cost therefor. Repairs shall be inspected by the Contracting officer before backfilling. All damages, regardless of severity shall be reported immediately to the Contracting Officer, Telephone 743-7675. If damage is to a direct burial power or communication cable in duct, the cable shall be replaced between junction boxes or manholes/handholes on each side of the break or damage point, whichever is less. All repairs to damaged utilities which are indicated on the drawings an/or as described/verified by the permit clearance review shall be made without any additional cost to the Government.

10. LICENSES AND PERMITS FOR CONSTRUCTION WORK, STRUCTURES AND DISCHARGES:

- a. Attention is invited to clause entitled "Permits and Responsibilities" of the Contract Clauses which requires the Contractor to comply with all applicable Federal, State and Municipal laws, codes and regulations in connection with prosecution of work under this contract. Except as provided in c. below, the requirement of the above-referenced Clause shall specifically include the responsibility of the Contractor to obtain those licenses and permits required for actions associated with construction work, including but not limited to, the placement of temporary structures, transport and handling of hazardous materials and wastes, the direct or indirect discharge of gaseous or liquid emissions into the environment, and temporary or permanent placements of solid waste materials. Also, without limiting the generality of said Clause, the requirements therein contained for compliance with all Federal, State and Municipal laws, codes and regulations shall specifically include such laws, codes and regulations governing work and structures that may affect existing environmental conditions.
- b. During the performance of work under this contract, the Contractor shall notify the contracting Officer not less than sixty (60) calendar days in advance of any and all work in wetlands and/or navigable waters that may have discharges or deposits that may reasonably be expected to enter wetlands or navigable waters.

7.2 Scope: The Contractor represents that the Contract price does not include the cost of insurance, nor any provision for a reserve covering the risk assumed by the Government under this paragraph. The Government assumes the risk of loss or damage to such Government-owned property, including expenses incidental to such loss or damage resulting directly or indirectly from the explosion of Government-owned or controlled munitions, including, without limitations, ammunition, bombs, powder, dynamite, and other explosives, whether or not caused by negligence. However, the Government does not assume at any time the risk of and the Contractor shall be responsible for, such loss or damage which is in fact covered by insurance or for which the Contractor is otherwise reimbursed, or which is caused by willful misconduct or lack of good faith or willful disregard of proper instructions of the Contracting Officer, on the part of any of the Contractor's directors, officers, or any of his other representatives having supervision or direction of all or substantially all the Contractor's operations under this Contract.

7.3 Recourse: In the event of loss or damage to Government-owned property resulting from the risk assumed by the Government hereunder, the Contracting Officer shall determine whether, and to what extent, such property shall be rebuilt, repaired, or replaced by the Contractor or otherwise. Should his determination cause an increase or decrease in the cost of doing the work under this contract or time required for its performance, an equitable adjustment in the pertinent contract terms will be made in the manner and upon notice as provided in the Contract Clause entitled "Changes."

7.4 Modification: The provisions of the Contract Clause entitled "Permits and Responsibilities" are to be deemed modified by this paragraph only to the extent required to give effect to the limited assumption of risk stated herein.

8. LOCATION OF UNDERGROUND FACILITIES: Where existing piping, utilities, and underground obstructions of any type are indicated in locations to be traversed by new piping, ducts, and other work provided herein, and are not indicated or specified to be removed, the elevations of the existing utilities and obstructions shall be determined before the new work is laid closer than the nearest manhole or other structure at which an adjustment in grade could be made. For any additional work required by reason of conflict between the new and existing work, an adjustment in contract price will be made in accordance with clause entitled "Differing Site Conditions" of the Contract Clauses.

8.1 Existing Telephone Lines and TV Cables: Upon proper notification, local telephone and television cable companies will identify and, if necessary, relocate these services to prevent their damage. Prior to beginning excavation, the Contractor shall properly notify these companies and make all such arrangements.

9. DAMAGE TO EXISTING UNDERGROUND UTILITIES AND CABLES (UNDERGROUND SERVICES): The approximate locations of all known underground utilities and cables are indicated on the contract drawings and/or are described/verified by the permit clearance review. The Contractor shall determine the exact

4. SECUREMENT OF TRAILERS AND PORTABLE BUILDINGS: All Contractor's onsite trailers and portable buildings shall be secured by tiedowns in a suitable manner as approved by the Contracting Officer, to ensure their stability in storms and high winds prevalent in the particular geographical area, until removed from the worksite.

5. EXECUTING WORK WITHIN 15 FEET OF THE NEAREST RAIL OF TRAIN AND CRANE TRACKS: In executing work within 15 feet of trackage, special precautions shall be taken to ensure that trackage capacity is not affected. Excavation and other work in this area will require prior written approval by the Contracting Officer. Contractor shall submit drawings showing his proposed method of shoring and sheeting any excavations as part of his request for approval. This shoring and sheeting shall be capable of supporting the surcharge from Cooper E-80 loading as defined in the A.R.E.A. manual. Prior to excavation, and after backfilling and compacting excavated areas, soil tests will be required to ensure that the soil is restored to original or better condition. See Section titled "Earthwork" for backfilling, compacting, and testing requirements. The Contractor shall bear the full cost of rebuilding track and track beds and testing them as directed by the Contracting Officer to Cooper E-80 loading as defined in the A.R.E.A. manual should any of them fail during the contract period. The Contractor will not be allowed to bring a test car onto the Station. He will be required to obtain the services of the Government's personnel and test car.

6. LAYDOWN/STORAGE AREAS: To clause entitled "CLEANING UP" of the Contract Clauses add the following: "The jobsite and laydown, storage and work areas shall be maintained in a neat, orderly condition on a continuing basis and shall comply with the standards of cleanliness and appearance regulating the Station. The continued availability of all laydown, storage and work areas to be Contractor will be at the convenience of the Government and subject to strict compliance with Station cleanliness and appearance standards."

7. LIMITED ASSUMPTION OF RISK BY THE GOVERNMENT:

7.1 Action: The work is in a hazardous location. Title to all work in place shall be in the Government, and title to all property intended for incorporation in the work shall vest in the Government upon delivery to the worksite. The term "Government-owned property" as used in these paragraphs refers to such work in place and to such other property for which titles have vested in the Government pursuant to the provisions of the preceding sentence, and likewise includes any property furnished or rented to the Contractor by the government. Upon completion of the work, any such Government-owned property not a part of the work, except property rented to or furnished without charge to the Contractor by the Government, shall become the property of the Contractor. The vesting of title in the Government as provided in this paragraph shall in no way relieve the Contractor of any obligations otherwise provided in this Contract in respect to such Government-owned property, except as expressly stated below.

SECTION 01012.

ADDITIONAL GENERAL PARAGRAPHS

1. ~~SUBCONTRACTORS AND PERSONNEL:~~ Promptly after award of the contract, the Contractor shall submit to the Contracting Officer, in triplicate, a list of his subcontractors and the work each is to perform. The list shall include the names of the key personnel of the Contractor and subcontractors, together with their home addresses and telephone numbers, for use in event of any emergency. As changes occur and additional information becomes available, the Contractor shall amplify, correct, and change the information contained in previous lists.

2. ~~DRUG ABUSE BY CONTRACT EMPLOYEES:~~ It has been determined that the illegal possession and use of drugs and paraphernalia by civilian and contract employees in the military setting contributes directly to widespread military drug abuse and undermines command efforts to eliminate drug abuse among military personnel. Every effort will be made to deter and detect drug offenses by civilian and contract employees on military installations. Measures to be taken to identify drug offenses on military installations, and to prevent introduction of illegal drugs and paraphernalia include routine, random inspections of vehicles on entry or exit, with drug detection dog teams, when available; and random inspection of personal possessions on entry or exit. Where there is probable cause to believe that a civilian or contract employee on a military installation has been engaged in use, possession or trafficking of drugs, that employee may be restricted or detained for the period necessary until the employee can be removed from the installation or can be turned over to local law enforcement authorities having jurisdiction, when appropriate. In any event, civilians or contract employees suspected of committing a drug offense on a military installation may be removed therefrom at the earliest opportunity. When illegal drugs are discovered in the course of an inspection or search of a vehicle operated by a civilian or contract employee, the employee and vehicle may be detained for a reasonable period of time necessary to turn the employee and the vehicle over to appropriate civil law enforcement officials, and action may be taken to suspend, revoke or deny installation driving privileges. Implicit with the acceptance of this contract is the Contractor's agreement to comply with all federal statutes, laws and regulations, including those regulations issued by the Commander of the military installation. Refer to clause entitled "MATERIAL AND WORKMANSHIP" of the Contract Clauses and paragraph entitled "STATION REGULATIONS" of Section "General Paragraphs."

3. ~~STORM PROTECTION:~~ Should warnings of wind of gale force or stronger be issued, the Contractor shall take every practicable precaution to minimize danger to persons, to the work, and to adjacent property. These precautions shall include closing all openings, removing all loose materials, tools and equipment from exposed locations, and removing or securing scaffolding and other temporary work.

30. DAMAGES FOR DELAY - DEFENSE PRIORITIES AND ALLOCATIONS SYSTEM: The Government will take no action pursuant to the clause entitled "DEFAULT (FIXED-PRICE CONSTRUCTION)" of the Contract Clauses to terminate the right of the Contractor to proceed or to assess liquidated or actual damages where failure of the Contractor to complete the work within the time specified is due solely to the operation of the Defense Priorities and Allocations System (15 CFR 350) regulation, provided the Contractor and his subcontractors comply with the provisions of this System and the Contractor's lateness in completion of the work is not otherwise caused by the fault or negligence of the Contractor. Such delays will be excusable within the meaning of the above referenced clause and the Contractor will be entitled to a time extension by reason thereof.

31. PRIORITIES, ALLOCATIONS AND ALLOTMENTS: The Contractor shall follow the provision of the Defense Priorities and Allocations System (DPAS) regulation (15 CFR 350) and all other applicable regulations and orders of the Office of Industrial Resource Administration, Department of Commerce, in obtaining controlled materials and other products and materials needed to complete this contract.

32. SUBCONTRACTORS: Within seven days after the award of any subcontract either by himself or a subcontractor, the Contractor shall deliver to the Contracting Officer a completed Standard Form 1413. The form shall include the subcontractor's acknowledgement of the inclusion in his subcontract of the Contract Clauses of this contract entitled "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act - Overtime Compensation," "Apprentices and Trainees," "Payrolls and Basic Records," "Compliance with Copeland Act Regulations," "Withholding," "Subcontracts," "Compliance with Davis-Bacon and Related Acts Requirements," and "Certification of Eligibility." Nothing contained in this contract shall create any contractual relation between the subcontractor and the Government.

\*\*\* END OF SECTION \*\*\*

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e. Other as required by state law.

27.1 ~~Statement of Insurance: Prior to commencement of work, the Contractor shall furnish to the Contracting Officer a certificate or written statement of the above required insurance. The policies evidencing required insurance shall contain an endorsement to the effect that cancellation or any material change in the policies adversely affecting the interests of the Government in such insurance shall not be effective for such period as may be prescribed by the laws of the State in which this contract is to be performed and in no event less than 30 days after written notice thereof to the Contracting Officer.~~

27.2 ~~Subcontracts: The Contractor agrees to insert the substance of this clause, including this subparagraph, in all subcontracts hereunder.~~

28. ~~EQUITABLE ADJUSTMENTS - WAIVER AND RELEASE OF CLAIMS: Whenever the Contractor submits a claim for equitable adjustment under any clause of this contract which provides for equitable adjustment of the contract, such claim shall include all types of adjustments in the total amounts to which the clause entitles the Contractor, including, but not limited to, adjustments arising out of delays or disruptions or both caused by such change. Except as the parties may otherwise expressly agree, the Contractor shall have waived (1) any adjustments otherwise entitled under the clause where such claim fails to request such adjustments, and (2) any increase in the amount of equitable adjustments additional to those requested in the claim.~~

28.1 ~~Contractor's Release: The Contractor agrees that, if required by the Contracting Officer, he will execute a release, in form and substance satisfactory to the Contracting Officer, as part of the modification setting forth the aforesaid equitable adjustment. The Contractor further agrees that such release shall discharge the Government, its officers, agents and employees, from any further claims, including, but not limited to, further claims arising out of delays or disruptions or both caused by the aforesaid change.~~

29. ~~CHANGES BOARD AND ESTIMATES: In determining any equitable adjustment under the Changes Clause of the Contract Clauses, the Contracting Officer shall, in those instances where the adjustment is estimated by the Contracting Officer to be \$50,000 or more, convene and give full consideration to the report of an advisory board of three members, consisting of two Government representatives appointed by the Contracting Officer and one representative appointed by the Contractor. This board shall report to the Contracting Officer the amount of the change in cost, time, or both, resulting from the ordered change. In making all equitable adjustments under the clause entitled "Changes" of the Contract Clauses, compensation for additions will be based upon estimated costs at the time the work is performed and credit for deductions will be based upon estimated costs at the time the contract was made. In arriving at the amount of the change in price, if any, allowance may be made for profit, overhead and general expenses, plant rental, and other similar items.~~

06-88-0426

01011-10

- a. Posted Warranty Information: Provide all warranty data concerning the standard one-year warranty, including the warranty period (dates), and warranty contacts with names, addresses and telephone numbers. This data shall be posted, under glass, at a location as directed by the Contracting Officer.
- b. Warranty Notebook: Provide a notebook (indexed and bound) containing manufacturer/supplier warranty documents for all equipment/products that have extended warranties (warranty periods exceeding the standard one-year warranty).
- c. Warranty Tags: Provide tags on all equipment/products that have extended warranties (those items included in notebook described above). Tags shall include the following information:

EQUIPMENT/PRODUCT EXTENDED WARRANTY TAG

Type of Equipment/Product \_\_\_\_\_  
 Warranty Period \_\_\_\_\_ From \_\_\_\_\_ To \_\_\_\_\_  
 Contract No. N62467-88-C-0426

Construction Contractor:

Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 Telephone \_\_\_\_\_

Warranty Contact:

Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 Telephone \_\_\_\_\_

27. REQUIRED INSURANCE: The Contractor shall procure and maintain during the entire period of performance under this contract the following minimum insurance coverage.

- a. Comprehensive General Liability: \$500,000 per occurrence.
- b. Automobile Liability: \$200,000 per person, \$500,000 per occurrence, \$20,000 per occurrence for property damage.
- c. Workmen's Compensation: As required by Federal and State workers' compensation and occupational disease statutes.
- d. Employer's liability coverage: \$100,000, except in states where workers' compensation may not be written by private carriers.

Government. The Government will remove and relocate all such equipment and furnishings as necessary for the Contractor to perform his work. The Contractor shall coordinate his work, and cooperate with the Contracting Officer, in the disposition of these items.

21. SECURITY REQUIREMENTS: Shall be in accordance with clause entitled "Security Requirements" of the Contract Clauses. No employee or representative of the Contractor will be admitted to the site of the work unless he furnishes satisfactory proof that he is a citizen of the United States or is specifically authorized admittance to the site of the work by the Contracting Officer.

22. DEFENSE FUEL SUPPORT POINT STATION REGULATIONS: The Contractor and his employees and his subcontractor(s) shall become familiar with and obey all Defense Fuel Support Point Station Regulations, including fire, traffic, and security regulations. All personnel employed on the Defense Fuel Support Point Station shall keep within the limits of the work (and avenues of ingress and egress), and shall not enter any restricted areas unless required to do so and are cleared for such entry. The Contractor's and his subcontractor's equipment shall be conspicuously marked for identification.

23. SAFETY REQUIREMENTS: A copy of the Department of the Army Corps of Engineers, "Safety and Health Requirements Manual", referenced in clause entitled "Accident Prevention" of the Contract Clauses, may be examined at the office where bids are received. (Copies of this publication may be obtained upon application, accompanied by money order, coupon, or cash to the Superintendent of Documents, Government Printing Office, Washington, DC 20401). Prior to commencement of the work, the Contractor shall meet in conference with representatives of the Contracting Officer to discuss and develop mutual understandings relative to administration of the safety program.

24. WORK OUTSIDE REGULAR HOURS: If the Contractor desires to carry on work outside regular hours or on Saturdays, Sunday, or holidays, he shall submit an application to the Contracting Officer. The Contractor shall allow ample time to enable satisfactory arrangements to be made by the Government for inspecting the work in progress. At night, he shall light the different parts of the work in an approved manner. All utility cutovers shall be made after normal working hours or on weekends. Anticipated costs shall be included in the bid.

25. OPTIONAL REQUIREMENTS: Where a choice of materials and/or methods is permitted herein, the Contractor will be given the right to exercise the option unless stated specifically otherwise.

26. WARRANTIES: The Contractor shall provide the following prior to completion of the contract:

- f. Date material or equipment is required according to current progress schedule or network.

The Contractor shall update the progress chart and equipment delivery schedule at monthly intervals or at intervals directed by the Contracting Officer. The revised documents shall reflect any changes occurring since the last updating. The Contractor shall also submit copies of purchase orders and confirmation of delivery dates as directed by the Contracting Officer. Updated progress charts and equipment schedules shall be submitted with each invoice for progress payment (See clause entitled "Schedules for Construction Contracts" of the Contract Clauses).

17.3 Network System: Optionally, the Contractor may use the "CPM" (Critical Path Method), the "PERT" (Program Evaluation and Reporting Technique), or, subject to approval of the Contracting Officer, some other system which will give similar and equal information and control to that provided by the named systems, in lieu of the progress charts specified above. The use of one of these methods shall be subject to the terms of clause entitled "Schedules for Construction Contracts" of the Contract Clauses.

18. SANITATION: Adequate sanitary conveniences of a type approved for the use of persons employed on the work, shall be constructed, properly secluded from public observation, and maintained by the Contractor in such a manner as required or approved by the Contracting Officer. These conveniences shall be maintained at all times without nuisance. Upon completion of the work they shall be removed from the premises, leaving the premises clean and free from nuisance. Refer to section "ENVIRONMENTAL PROTECTION" for additional requirements.

19. EXISTING WORK: The disassembling, disconnecting, cutting, removal or altering in any way of existing work shall be carried on in such a manner as to prevent injury or damage to all portions of existing work, whether they are to remain in place, to be re-used in the new work, or to be salvaged and stored. Where existing work is changed or removed, or where new work adjoins, connects to or abuts existing work, the existing work shall be altered as necessary and connected in a substantial and workmanlike manner. All new work shall match, as nearly as practicable the existing adjoining and/or adjacent similar work. Operations affecting existing work shall be conducted with care not to damage work in place; and all existing work damaged by such operations shall be restored to its original condition or replaced with new without additional expense to the Government.

20. MATERIALS AND EQUIPMENT TO BE SALVAGED: All existing materials and equipment which are required to be removed or disconnected to perform the work, but are not indicated or specified for use in the new work, shall become the property of the Contractor and shall be removed from Government property.

20.1 Collateral Equipment and Furnishings: Except where indicated or specified otherwise, all existing collateral equipment (including desks, chairs, file cabinets and other furniture and furnishings) in the buildings and elsewhere on the site of work, shall remain the property of the

- d. The materials for which progress payments are requested are not susceptible to deterioration or physical damage in storage or in transit to the job site (e.g., items such as steel, machinery, pipe, and fittings, electrical cable, and the like, would be acceptable for progress payments; items such as sheetrock, glass, insulation, wall coverings, and the like, would not).
- e. Payments will not be made for materials in transit.

17. ~~PROGRESS CHARTS AND EQUIPMENT DELIVERY SCHEDULE:~~

17.1 ~~Progress Charts:~~ The Contractor shall, within 15 days after receipt of Award, prepare and submit to the Contracting Officer for approval a practicable construction schedule in accordance with clause entitled "Schedules for Construction Contracts" of the Contract Clauses except as modified herein. The schedule shall be in the form of a progress chart on Form GND-SOUTH/DIV-4855-1. The Contractor shall maintain current with each submittal, at least the following information:

- a. The various classes and areas of work, broken down into:
- (1) Times projected for submittals, approvals, and procurement;
  - (2) Times for installation and erection;
  - (3) Times for testing and inspection.
- b. The work completed and the work remaining to be done to complete the project.
- c. Any items of work which will delay the start or completion of other major items of work so as to delay completion of the whole project.

17.2 ~~Equipment Delivery Schedule:~~ The Contractor shall, within 45 days after date of award, submit to the Contracting Officer for approval, a schedule showing the procurement plans for materials, plant and equipment. The data shall be submitted in the format prescribed by the Contracting Officer and shall include but not be limited to the following information:

- a. Description.
- b. Date of purchase order.
- c. Promised shipping date.
- d. Name of manufacturer or supplier.
- e. Date delivery is expected.

- b. Payment Breakdown on an acceptable form, which shall show, in detail, the estimated cost percentage of completion and value of completed construction. The format, content, and number of copies required will be prescribed by the Contracting Officer and subject to his approval. The submission of the required data shall not otherwise affect the contract terms.

16. PAYMENTS TO CONTRACTOR:

- a. Payments made in accordance with the clause entitled "Payments Under Fixed-Price Construction Contract" of the Contract Clauses will be made on submission of itemized requests by the Contractor and shall be subject to reduction for overpayments or increase for underpayments on preceding payments to the Contractor.
- b. The obligation of the Government to make any of the payments required under any of the provisions of this contract shall, in the discretion of the Contracting Officer, be subject to (1) reasonable deductions on account of defects in material or workmanship, and (2) any claims which the Government may have against the Contractor under or in connection with this contract. Any overpayments to the Contractor shall, unless otherwise adjusted, be repaid to the Government upon demand.

16.1 Payment for Offsite Material: The Government will make every effort to review and process Contractor payment requests in an expeditious nature, thereby assuring earliest possible payment under the contract terms and provisions. The Government will make progress payments for this work on a monthly basis, subject to suitable arrangements for the submission of payment requests being agreed to between the Contractor and the Government. Payment will be made for material delivered on the site subject to the conditions set forth in subparagraph (b) of clause entitled "Payments Under Fixed-Price Construction Contracts" of the Contract Clauses. Payments may also be made for materials stored off construction sites, upon specific request from the Contractor. As a condition precedent to such payments, the Contracting Officer must be satisfied that:

- a. The materials are stored in reasonable proximity to the construction site, so that transportation and attendant hazards are minimized.
- b. The Contractor demonstrates clear title (Paid invoices) to such material.
- c. The materials for which progress payments are requested are adequately insured and protected from theft and the elements through appropriate security measures.

action taken pursuant thereto, or not intended to, and shall not relieve the Contractor of responsibility for the accomplishment of the work either as regards sufficiency or the time of performance, except as expressly otherwise provided herein.

10. **ORAL MODIFICATION:** No oral statement of any person other than the Contracting Officer or his representative, as provided in the clause entitled "Changes" of the Contract Clauses, shall in any manner or degree modify or otherwise affect the terms of this contract.

11. **NO WAIVER BY GOVERNMENT:** The failure of the Government to insist upon the strict performance of any one or more of the terms of this contract or to exercise any options contained herein, shall not be construed as a waiver or relinquishment of the right to assert or rely upon such strict performance or option on any future occasion.

12. **PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984):** The Contractor shall perform on the site, and with its own organization, work equivalent to at least 20 percent of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government. (FAR 52.236-1)

13. **UTILITIES FOR CONSTRUCTION AND TESTING:** The Contractor shall be responsible for obtaining, either from available Government sources or local utility companies, all utilities required for construction and testing. The Contractor shall provide these utilities at his expense, paid for at the current utility rate delivered to the job site. The Contractor shall provide and maintain all temporary utility connections and distribution lines, and all meters required to measure the amount of each utility used.

14. **SCHEDULE OF PRICES:** Within 5 days of receipt of the proper forms, the Contractor shall prepare and submit to the Contracting Officer a Schedule of Prices. The Schedule of Prices shall consist of a detailed breakdown of the contract price, giving the quantities for each of the various kinds of work, the unit prices, and the total prices therefor. The format, content, and number of copies required will be prescribed by the Contracting Officer and subject to his approval. The submission of the required data shall not otherwise affect the contract terms.

15. **INVOICING INSTRUCTIONS:** Requests for payment in accordance with the terms of the contract shall consist of:

- a. Contractor's Invoice on the form furnished for this purpose, which shall show, in summary form, the basis for arriving at the amount of the invoice; and

## NAVFAC DRAWING NO.

## TITLE

5199480	Title Sheet
5199481	Key Plan
5199482	Existing Site & Demolition Plan Area A
5199483	Existing Site Plane Area B
5199484	Existing Site & Demolition Plan Area C
5199485	Site Plan Area A
5199486	Site Plan Area B
5199487	Site Plan Area C
5199488	Details (Nutrient Facility, Valve Pit, etc.)
5199489	Details (Ground Water Extraction Well, etc.)
5199490	Details (Vault for EW18)
5199491	Single Line Diagram
5199492	Electrical Site Plan
5199493	Electrical Details
5201005	Electrical Details

8.1 Omissions: Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work, but they shall be performed as if fully and correctly set forth and described in the drawings and specifications.

8.2 Notification of Discrepancies: The Contractor shall check all drawings furnished him immediately upon their receipt and shall promptly notify the Contracting Officer of any discrepancies. Figures marked on drawings shall in general be followed in preference to scale measurements. Large scale drawings shall in general govern over small scale drawings. The Contractor shall compare all drawings and verify the figures before laying out the work and will be responsible for any errors which might have been avoided thereby.

9. GOVERNMENT REPRESENTATIVES: The work will be under the general direction of an officer of the Civil Engineer Corps, United States Navy, or other officer or representative of the Government, as Officer in Charge of Construction, referred to as the "OICC" or "Contracting Officer" and designated in block 26 of Standard Form 1442. Except in connection with the "Disputes" clause of the Contract Clauses, the Officer in Charge of Construction shall be the authorized representative of the Contracting Officer, and have complete charge of the work and exercise full supervision of the work, so far as it affects the interest of the Government. For the purposes of the "Disputes" clause, "Contracting Officer" shall mean the Commander, Naval Facilities Engineering Command, the Acting Commander, their successors, or their representatives specially designated for this purpose. The provisions of this paragraph or elsewhere in this contract regarding supervision, approval or direction by the Contracting Officer or the OICC, or

5. LIQUIDATED DAMAGES CONSTRUCTION (APR 1984): If the Contractor fails to complete the work within the time specified in the contract, or any extension, the Contractor shall pay to the Government as liquidated damages, the sum of \$200 for each calendar day of delay.

5.1. Termination. If the Government terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Government in completing the work.

5.2. Non-Termination. If the Government does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the work is completed or accepted. (FAR 52.212-5)

6. ORDER OF WORK. The work shall be executed in a manner and at such times that will cause the least interference with the normal functions of the Government facility. Before starting any work, the sequence of operations and the methods of conducting the work shall have been approved by the Contracting Officer.

7. INTERFERENCE WITH STATION OPERATIONS. The Contractor shall schedule his work as to cause the least amount of interference with Station operations. Work schedules shall be subject to the approval of the Contracting Officer. Permission to interrupt any station utility, communication, operational or traffic service or pattern shall be requested in writing at least 10 working days prior to the desired date of interruption. The Contractor shall receive approval in writing from the Contracting Officer before the requested interruption may be put into effect.

8. DRAWINGS ACCOMPANYING SPECIFICATIONS. The following drawings accompany this specification and are a part thereof. Drawings are the property of the Government, and shall not be used for any purpose other than that contemplated by the specification. The drawings included with this specification are half scale. Full-size drawings may be acquired at the Bidder's or Contractor's expense. Information on obtaining full-size drawings is available at the office of the Contracting Officer. Full-size drawings may be inspected during regular working hours at the issuing office. After Award, five copies of the contract specification, five sets of drawings and one set of full-size reproducible drawings will be furnished to the Contractor without charge.

SECTION 01011

GENERAL PARAGRAPHS

1. GENERAL INTENTION: It is the declared and acknowledged intention and meaning to provide and secure JP-4 Remediation, complete and ready for use.

2. GENERAL DESCRIPTION: The work includes construction of a system to remediate JP-4 contamination by extracting ground water. A portion shall have nutrients added and be reintroduced into the ground and the remainder shall be disposed of by routing it to the sanitary sewer.

2.1 Minor Materials and Work: Minor materials and work not specifically mentioned herein but necessary for the proper completion of the work shall be furnished without additional cost to the Government.

2.2 Unforeseen Major Repairs: Should deteriorated material of a major nature be uncovered in the course of the work, it shall be brought to the attention of the Contracting Officer. Repairs shall be made as directed, and an adjustment will be made in the contract price in accordance with the terms of the contract.

2.3 Quantities: Where the quantities for bidding purposes are specified or indicated, bids shall be based on the stated quantity; should more or less than the stated quantities be required, the contract price will be adjusted in accordance with the clause "Changes" of the Contract Clauses. Replacement of deteriorated materials shall be at such location and of such extent as directed.

3. LOCATION: The work shall be located at the Defense Fuel Support Point (DFSP), North Charleston, SC, approximately as shown. The exact location will be indicated by the Contracting Officer.

4. COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK: The Contractor will be required to commence work under the contract within 10 calendar days after the date of receipt of Award, to prosecute the work diligently, and to complete the entire work ready for use within 180 calendar days. The time stated for completion shall include final cleanup of the premises. The contract completion date will be computed starting 15 calendar days after the date of Award. This 15-day period is to allow for mailing of the Award and the Contractor's submission of required Bonds. The Contractor will not be allowed to commence work at the site until acceptable Payment and Performance Bonds are received and a Notice to Proceed has been issued. The contract time for purposes of fixing the completion date, default and liquidated damages shall be assessed beginning 15 days from the date of Award, regardless of when the Payment and Performance Bonds have been executed, received and accepted. Any delay in issuance of the Notice to Proceed as a result of the Contractor's failure to submit the required Payment and Performance Bonds within the time specified will not be a cause for extension of the contract completion date.

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## 2. GENERAL REQUIREMENTS

2.1 Ground Water Collection Mains (indicated as 2 or 4-inch lines): Provide ground water collection mains of ductile-iron pipe or steel water main pipe at the Contractor's option. Provide gate valves, globe valves, and check valves where indicated.

2.2 Well Service Lines (indicated as 1-inch lines): Provide well service lines from ground water collection main to extraction wells. Well service lines shall be steel pipe. Where size permits, ductile-iron pipe and gate valves as specified for ground water mains may also be used for service lines. Provide well service line appurtenances where specified and where indicated.

2.3 Layout Drawings: Submit drawings for layout of piping system. Indicate locations of all fittings, valves, and other accessories on layout drawings. Do not have pipe, fittings, and accessories delivered to the site until layout drawings have been approved.

2.4 Manufacturer's Data: Submit manufacturer's standard drawings or catalog cuts of the following items, except where both are specified:

- a. Pipe and Fittings
- b. Joints and Couplings, including gaskets for joints (submit both drawings and cuts).

2.5 Standards Compliance: Submit manufacturer's certificates of conformance or compliance for each of the following materials which are specified to conform to publications referenced under paragraph, "Materials" in this section:

- a. Pipe and Fittings, including shop-applied linings and coatings
- b. Pipe Joint Materials
- c. Valves

2.6 OMSI Submittals: OMSI information shall be submitted for the equipment items or systems listed below. Refer to Section 01730, Operation and Maintenance Support Information (OMSI), for the information to be submitted for various equipment and systems.

- a. Valves
- b. Flow meter

All tests required by the applicable referenced publication shall have been performed, whether specified in that publication to be mandatory or otherwise. For tests which are not specified in the referenced publication to be performed at definite intervals during manufacture, the tests shall have been

B 62-81                      Composition Bronze or Ounce Metal Castings

1.6 American Water Works Association (AWWA) Publications:

- C104/A21.4-80              Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water (ANSI/AWWA C104/A21.4)
- C110-77                      Gray-Iron and Ductile-Iron Fittings, 3 in. Through 48 in., for Water and Other Liquids (ANSI A21.10)
- C111/A21.11-80              Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings (ANSI/AWWA C111/A21.11)
- C115-75                      Flanged Cast-Iron and Ductile-Iron Pipe with Threaded Flanges (ANSI A21.15)
- C151/21.51-81              Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-lined Molds, for Water or Other Liquids (ANSI/AWWA C151/A21.51)
- C200-80                      Steel Water Pipe 6 Inches and larger (ANSI/AWWA C200)
- C203-78                      Coal-Tar Protective Coatings and Linings for Steel Water Pipelines -- Enamel and Tape -- Hot-Applied (ANSI/AWWA C203)
- C207-78                      Steel Pipe Flanges for Waterworks Service, Sizes 4 in. through 144 in. (ANSI/AWWA C207)
- C208-59                      Dimensions for Steel Water Pipe Fittings
- C209-76                      Cold-Applied Tape Coatings for Special Sections, Connections, and Fittings for Steel Water Pipelines
- C600-82                      Installation of Ductile-Iron Water Mains and Their Appurtenances (ANSI/AWWA C600)
- C701-78                      Cold-Water Meters - Turbine Type for Customer Service
- M11                              Steel Pipe Design and Installation, 1964 Edition

1.7 Underwriter's Laboratories, Inc. (UL) Publications:

- UL 262-80                      Gate Valves for Fire Protection Service

SECTION 02713

GROUND WATER COLLECTION SYSTEM

1. APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1 Federal Specifications (Fed. Spec.):

- WW-P-501E Pipe Fittings, Cast Iron, Screwed, 125 and 250 Pound
- WW-P-521G Pipe Fittings, Flange Fittings, and Flanges: Steel and Malleable Iron (Threaded and Butt-welding), Class 150
- WW-V-58B Valves, Gate, Cast Iron; Threaded and Flanged (for Land Use)

1.2 Military Specification (Mil. Spec.):

- MIL-V-18436D Valves, Check: Bronze-, Cast Iron-, and Steel Body

1.3 American National Standards Institute (ANSI) Publications:

- B18.2.2-1972 Square and Hex Nuts
- B18.5-1978 Round Head Bolts (Inch Series)

1.4 American Railway Engineering Association (AREA) Publication:

Manual for Railway Engineering, Fixed Properties: Chapter 1, Part 5, Pipelines (1972)

1.5 American Society for Testing and Material (ASTM) Publications:

- A 47-77 Malleable Iron Castings (ANSI/ASTM A47)
- A 105 Specifications for Forgings, Carbon Steel, for Piping Components
- A 120--81 Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses
- A 126-84 Specifications for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
- A 563-80 Carbon and Alloy Steel Nuts

performed within three years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

1.3 Requirements: Provide well pump package and skimmer pump package as specified on the drawings.

1.4 Delivery, Storage, and Protection: Deliver materials in an undamaged condition. Store materials off the ground. Replace defective or damaged materials with new materials.

## PART 2 - PRODUCTS

2.1 Materials: Shall conform to those specified on the drawings.

## PART 3 - EXECUTION

3.1 Pump Installation: Install pumps in conformance with manufacturer's instructions.

3.2 Inspections: Prior to initial operation, inspect equipment and piping systems for compliance with drawings, specifications, and manufacturer's submittals.

3.3 Tests: Perform tests on pumps, drivers, and equipment, including visual equipment checks to ensure compliance with approved shop drawings; pump start-run to ensure proper operation and to detect leakage of piping, valves, and fittings; sequence of operation check; verification that required pump accessories have been provided; test of pump level control devices; and additional inspections and tests necessary to ensure that the entire pump installation is correct, complete, and ready for operation. When tests have been completed and corrections made, submit a signed and dated certificate.

\*\*\*END OF SECTION\*\*\*

SECTION 02671

PUMP PACKAGES

PART 1 - GENERAL

1.1 Submittals:

1.1.1 Manufacturer's Data:

- a. Pumps and controllers including manufacturer's certified shop test characteristic curves for each pump.
- b. Level sensors.

1.1.2 Shop Drawings:

- a. Pumps, controllers, and pump discharge curves.
- b. Complete circuit diagrams.
- c. Interior wiring diagrams of each controller.

1.1.3 Certificates of Conformance:

- a. Pumps and controllers.
- b. Pipe and fittings.

1.1.4 Operation and Maintenance Manuals

- a. Pumps
- b. Controllers
- c. Level sensors

1.1.5 Posted Operating Instructions:

- a. Pumps
- b. Controllers

1.2 OMSI Submittals: OMSI information shall be submitted for the equipment items or systems listed below. Refer to Section 01730, Operation and Maintenance Support Information (OMSI), for the information to be submitted for various equipment and systems.

- a. Well Systems
- b. Electric and Electronic Hardware Items
- c. Electrical Switches

All tests required by the applicable referenced publication shall have been performed, whether specified in that publication to be mandatory or otherwise. For tests which are not specified in the referenced publication to be performed at definite intervals during manufacture, the tests shall have been

limit sand intrusion during the life of the well. Pump the well free of sand, mud, drillings, and other foreign matter. Maximum sand concentration at the completion of well development shall be 2.0 ppm.

3.1.6 Sanitary Seal: Provide a sanitary surface seal for the well to prevent contamination until the pump foundation and pump are installed on the well.

3.1.7 Pump Foundation: A concrete pad and pit shall be framed and poured around the well as indicated. Concrete and reinforcement shall conform to Section 03302 "Cast-In-Place Concrete".

3.2 WASTE DISPOSAL: Dispose of waste materials and soil removed from the drilled holes by removal from the limits of Government property. For purposes of bidding, Contractor shall assume that this waste material is hazardous and shall comply with the requirements of Section 01560 "Environmental Protection".

\*\*\*END OF SECTION\*\*\*

2.1.5 Drilling Mud: Provide a fluid composed of potable water and bentonite clay, readily thinned with commercial mud thinners which will break down naturally. The specific gravity and the character of the mud-laden fluid shall be such that the production of the aquifers will not be impaired.

2.1.6 Auxiliary Equipment: Provide containers to dispose of drill fluid, cuttings, and pumped water during developing and testing of well.

### PART 3 - EXECUTION

3.1 WELL CONSTRUCTION: The depth of the well and screen length provided shall be as indicated on plans. Methods of construction include using drilling mud for conventional fluid rotary drilling or reverse circulation drilling.

3.1.1 Drilling: Drill a hole 10 inches in diameter to a minimum depth of 35 feet and to additional depths as required to reach the Cooper Marl.

3.1.2 Casing and Well Screen: Install the casing and well screen concentrically in the drilled hole and extend down to an approximate depth of 35 feet to the Cooper Marl. Provide threaded joints as specified in Part 2 of this section. Provide centralizers at the bottom of the screen and at ten-foot intervals to the top of the well screen. Seal the bottom of the screen with a threaded plug, consisting of the same material and thickness as the screen body, or a welded plate, consisting of the same material and thickness as the screen body.

3.1.3 Sand Envelope: Following placement of casing and well screen to the desired depth, fill the entire annular space between the screen and the outside wall of the borehole with filter sand as specified in paragraph 2.1.3. The sand envelope shall extend to a point two feet above the top of the screen. Place the sand with a tremie pipe in accordance with Articles 54 and 50 of the EPA Manual of Water Well Construction Practices. Control speed of sand placement to prevent bridging and to allow for settlement of the sand. Equipment and methods required to place the sand shall be approved by the Contracting Officer prior to commencement of work.

3.1.4 Bentonite Seal and Grouting: The upper surface of the sand pack will be sealed with bentonite pellets. Minimum thickness of the bentonite seal will be two feet. The bentonite pellets will be allowed to hydrate for at least 30 minutes before introducing grout into the borehole. The annular space above the bentonite seal will be grouted from the bottom up to the land surface using a tremie pipe.

3.1.5 Well Development: Set the casing and allow the neat cement grout to harden a minimum of 72 hours prior to well development. Provide well development in accordance with Article 52 of the EPA Manual of Water Well Construction Practices, except explosive will not be permitted. Furnish pumps, compressors, plungers, bailers, and other equipment required to fully develop the well for the maximum yield of water per foot of drawdown and to

1.4 GENERAL REQUIREMENTS: Provide each system complete and ready for operation. All drilling and well installation shall be performed by a well driller certified by the State of South Carolina. Each system, including equipment, materials, installation, and workmanship shall be in accordance with the EPA Manual of Water Well Construction Practices, except as modified herein. In the manual referred to herein, the advisory provisions shall be considered mandatory, as though the word "shall" has been substituted for the word "should" wherever it appears. Reference to the "Project Representative" and the "Owner" shall be interpreted to mean the Contracting Officer.

PART 2 - PRODUCTS

2.1 MATERIALS: Shall conform to the respective specifications and other requirements as specified herein.

2.1.1 Casings: Schedule 40 polyvinylchloride (PVC) casing, 6-inch inside diameter. Provide casings with threaded, flush joints.

2.1.2 Well Screens: Schedule 40 PVC 6-inch inside diameter, machine slotted (slot size 0.010 in.). Provide screens with adequate strength to resist external forces, both during and after installation. Length shall be as indicated on drawings. Provide screen with threaded, flush joints.

2.1.3 Filter Sand: Provide clean sand with less than 5 percent feldspar, no fossils, carbonate, or organics to allow free flow of water in the well and prevent the infiltration of sand. The size and gradation shall conform to the following requirements:

<u>Sieve Designation</u>	<u>Percent Passing by Weight</u>
No. 14	100
No. 16	98 - 100
No. 18	91 - 95
No. 20	75 - 77
No. 25	50 - 53
No. 30	20 - 25
No. 35	4 - 6
No. 40	1 - 2
No. 45	0 - 1
No. 50	0 - 1
No. 70	0 - 1
PAN	0
Effective Size: .5 mm	Uniformity Coefficient: 1.5

2.1.4 Grout: Provide neat cement grout, Type I or II portland cement conforming to ASTM C 150, and water. The mixed grout shall contain no more than 7 gallons of water and 6-8% bentonite per bag (1.0 cubic foot or 94 pounds) of cement.

SECTION 02670

ROTARY-DRILLED EXTRACTION WELL

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 American National Standards Institute (ANSI) Publication:

ANSI/ASME                      Pipe Threads, General Purpose (Inch)  
B1.20.10-83

1.1.2 American Society for Testing and Materials (ASTM) Publication:

C 150-86                      Portland Cement

1.1.3 South Carolina Department of Health and Environmental Control  
(SC DHEC)

South Carolina Well Standards and Regulations

1.1.4 U. S. Environmental Protection Agency (EPA) Publication:

570/9-75-001                  Manual of Water Well Construction Practices

1.2 SUBMITTALS:

1.2.1 Shop Drawings: Shop drawings or catalog cuts showing well components and details of well casings and well screens. Shop drawings or catalog cuts shall be accompanied by a cross section showing the relative size, location, and spacing of the well components such as the hole size, well casing and screen, sand filter, and grout.

1.2.2 Certificates of Conformance:

- a. Casings
- b. Cement
- c. Drilling mud
- d. Screens
- e. Sand
- f. Well Development Procedures

1.3 DELIVERY, STORAGE, AND PROTECTION: Deliver materials in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact. Replace defective or damaged materials with new materials.

- a. Bedding and Backfill in Trenches: One test per 50 linear feet in each lift.
- b. Appurtenance Structures: One test in each lift.

\*\*\* END OF SECTION \*\*\*

3.8 SPECIAL EARTHWORK REQUIREMENTS FOR INFILTRATION TRENCH: Provide infiltration trench as indicated. Grade trenches uniformly downward to ends of laterals. Place porous fill around and over pipe as indicated. Take special care to prevent displacement of or damage to pipe. Cover porous fill with a 2-inch-thick layer of straw as indicated before continuing with backfill for adjacent or overlying work.

3.9 FINISH OPERATIONS:

3.9.1 Grading: Finish to grades indicated within one-tenth of a foot. Provide topsoil in areas to be seeded as indicated. Grade areas to drain water away from structures and to provide suitable surfaces for mowing machines. Grade existing grades that are to remain but have been disturbed by the Contractor's operations.

3.9.2 Spreading Topsoil: Clear areas to receive topsoil for the finished surface of materials that would interfere with planting and maintenance operations. Scarify subgrade to a depth of 2 inches. Do not place topsoil when the subgrade is frozen, extremely wet or dry, or in other conditions detrimental to seeding, planting, or grading. Spread topsoil to a uniform depth of 4 inches over the designated areas.

3.9.3 Disposition of Surplus Material: Surplus or other soil material not required or suitable for filling, backfilling, or grading shall be removed from Government property. Comply with the requirements of Section 01560, "Environmental Protection."

3.9.4 Protection of Surfaces: Protect newly graded areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.9.5 Pavement Repair: Repair pavement as indicated on the drawings. Do not repair pavement until trench or pit has been backfilled and compacted as herein specified. Provide a temporary road surface of gravel or crushed stone over the backfilled portion until permanent pavement is repaired. Remove and dispose of temporary road surface material when permanent pavement is placed. As a minimum, maintain one-way traffic on roads and streets crossed by trenches; roads and streets shall be fully opened to traffic at all times.

3.10 FIELD SAMPLING AND TESTING: Test bedding, backfill and topsoil for conformance to specified requirements. Test backfill to be used under roads and paved areas for conformance to special requirements. Test bedding and backfill for moisture-density relations in accordance with ASTM D1557 and as specified herein. Perform at least one of each of the required tests for each material used sufficiently in advance of construction so as not to delay work. Provide additional tests as specified above for each change of source. Perform final tests on topsoil to assure adjustment of parameters into the ranges specified. Perform density and moisture tests in randomly selected locations and in accordance with ASTM D 1556 as follows:

TABLE 4

<u>PIPE MATERIAL</u>	<u>SYSTEM SPECIFICATION SECTION</u>	<u>INSTALLATION REFERENCE</u>
a. Steel Pipe	02713	AWWA M11
b. Ductile Iron Pressure Pipe	02713	AWWA C600

3.7.2 Manholes and Other Appurtenances: Provide at least 12 inches clear from outer surfaces to the embankment or shoring. Remove rock as specified herein. Remove unstable soil that is incapable of supporting the structure to an overdepth of one foot and refill with gravel to the proper elevation. Refill overdepths with gravel to the required grade and compact as specified.

3.7.3 Steel Cased Pipelines: Install pipeline casing by dry boring and jacking method in accordance with AREA and as follows:

3.7.3.1 Hole for Pipeline Casing: Mechanically bore holes and case through the soil with a cutting head on a continuous auger mounted inside the casing pipe. Weld lengths of pipe together in accordance with AWS D1.1. Do not use water or other fluids in connection with the boring operation.

3.7.3.2 Cleaning: Clean the inside of the pipeline casing of dirt, weld splatters, and other foreign matter which would interfere with insertion of the piped utilities by attaching a pipe cleaning plug to the boring rig and passing it through the pipe.

3.7.3.3 Piped Utilities: Provide the piped utilities in the casing using wood supports.

3.7.3.4 End Seals: After installation of piped utilities in the pipeline casing, provide watertight end seals at each end of the pipeline casing between the pipeline casing and the piping utilities. Provide watertight segmented elastomeric end seals.

3.7.4 Roads, Streets, Building Slabs, and Other Areas to be Paved: Place final backfill in 6-inch-maximum loose lifts. If a vibratory roller is used for compaction of final backfill, the lift thickness can be increased to 9 inches. Compact all backfill surrounding pipes, ducts, conduits, and other structures to 90 percent of ASTM D 1557 maximum density except compact the top 12 inches of subgrade to 95 percent of ASTM D 1557 maximum density. Backfill to permit the rolling and compacting of the completed excavation with the adjoining material, providing the specified density necessary to enable paving of the area immediately after backfilling has been completed.

coatings. Place the remainder of the backfill in 8-inch-maximum loose lifts unless otherwise specified. Compact each loose lift as specified in paragraph "General Compaction" before placing the next lift. Do not backfill in freezing weather or where the material in the trench is already frozen or is muddy, except as authorized. Provide a minimum cover from final grade of 2 feet. Where settlements greater than the tolerance allowed herein for grading occur in trenches and pits due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation. Coordinate backfilling with testing of utilities. Testing for the ground water collection system shall be complete before final backfilling. Provide buried warning and identification tape installed in accordance with the manufacturer's recommendation.

3.6 GENERAL COMPACTION: Use hand-operated, plate-type, vibratory, or other suitable hand tampers in areas not accessible to larger rollers or compactors. Avoid damaging pipes and protective pipe coatings. Compact material in accordance with the following unless otherwise specified. If necessary, alter, change, or modify selected equipment or compaction methods to meet specified compaction requirements.

3.6.1 Compaction of Material for Subcuts or Overexcavations: In rock, compact to 95 percent of ASTM D 1557 maximum. In stable soils, compact to 90 percent of ASTM D 1557 maximum.

3.6.2 Compaction of Pipe and Conduit Bedding: In rock, compact to 95 percent and in soil, compact to 90 percent of ASTM D 1557 maximum density.

3.6.3 Compaction of Backfill: Compact initial backfill material surrounding pipes, cables, conduits or ducts to 90 percent of ASTM D 1557 maximum density. Under areas to be seeded or sodded, compact succeeding layers of final backfill to 85 percent of ASTM D 1557 maximum density. For utilities under railroad or highway right-of-way; roads, streets, building slabs or other areas to be paved; compact succeeding layers of final backfill as specified under paragraph entitled "Special Earthwork Installation Requirements."

### 3.7 SPECIAL EARTHWORK INSTALLATION REQUIREMENTS:

3.7.1 Standard Specification References: In addition to bedding and backfill construction requirements stated above, place material in overcuts, bed material, and provide special backfill construction in accordance with the installation references identified in Table 4 for the pipe materials listed.

3.1.2 Cutting Pavement, Curbs, and Gutters: Make cuts with neat, parallel, straight lines one foot wider than trench width on each side of trenches and one foot beyond each edge of pits.

3.2 GENERAL EXCAVATION: Keep excavations free from water while construction is in progress. Notify the Contracting Officer immediately in writing if it becomes necessary to remove rock or hard, unstable, or otherwise unsatisfactory material to a depth greater than indicated. Make trench sides as nearly vertical as practicable except where sloping of sides is allowed. Sides of trenches shall not be sloped from the bottom of the trench up to the elevation of the top of the pipe or conduit. Excavate ledge rock, boulders, and other unyielding material to an overdepth at least 6 inches below the bottom of the pipe or conduit and appurtenances unless otherwise indicated or specified. Blasting will not be permitted. Overexcavate soft, weak, or wet excavations as indicated. Use bedding material placed in 6-inch-maximum layers to refill overdepths to the proper grade. At the option of the Contractor, the excavations may be cut to an overdepth of not less than 4 inches and refilled to required grade as specified. Grade bottom of trenches accurately to provide uniform bearing and support for each section of pipe, conduit or structure on undisturbed soil, or bedding material as indicated or specified at every point along its entire length except for portions where it is necessary to excavate for making proper joints. Dig depressions for joints after trench has been graded. Trench dimensions shall be as indicated.

3.2.1 Shoring and Sheet piling: Shore and sheet excavations as described in the plan submitted with various member sizes arranged to prevent injury to persons and damage to structures. Also arrange shoring and sheet piling to preclude injurious caving during removal. Obtain approval from the Contracting Officer prior to removing any shoring, sheet piling, or bracing in excavations adjacent to on-grade slabs, foundations, or other structural elements.

3.3 GENERAL BEDDING: Shall be of the materials and depths as indicated for utility lines and utility line structures. Place bedding in 6-inch-maximum loose lifts. Provide uniform and continuous support for each section of structure except at depressions necessary for making proper joints.

3.3.1 Refill: Defined as material placed in excavation to correct overcut in depth.

3.4 BURIED WARNING AND IDENTIFICATION TAPE: Install tape in accordance with manufacturer's recommendations except as modified herein. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.5 GENERAL BACKFILLING: Construct backfill in two operations (initial and final) as indicated and specified in this section. Place initial backfill in 6-in-maximum loose lifts to one foot above pipe or conduit unless otherwise specified. Ensure that initially placed material is tamped firmly under pipe haunches. Bring up evenly on each side and along the full length of the structure. Ensure that no damage is done to structures or their protective

2.2 BURIED WARNING AND IDENTIFICATION TAPE: Polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3-inch-minimum width, color coded as stated below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing is to be permanent, unaffected by moisture or soil.

Warning Tape Color Codes

Red:	Electric
Yellow:	Gas, Oil, Dangerous Materials
Green:	Sewer Systems

2.2.1 Warning Tape for Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements indicated above. Minimum thickness of the tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise with a maximum 350 percent elongation.

2.3 COVER FOR POROUS FILL-IN INFILTRATION TRENCH: A layer of straw at least 2 inches thick as indicated.

2.4 MATERIAL FOR PIPE CASING:

2.4.1 Casing Pipe: Steel conforming to ASTM A 139, Grade B, or ASTM A 252, Grade 2, smooth wall pipe. Casing size shall be of the outside diameter and wall thickness as indicated. Protective coating is not required on casing pipe.

2.4.2 Wood Supports: Treated Yellow Pine or Douglas Fir, rough, structural grade. Provide wood with nonleaching water-borne pressure preservation (ACA or CCA) and treatment conforming to AWPA P5 and C2, respectively. Secure wood supports to carrier pipe with stainless steel or zinc-coated steel bands.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

3.1.1 Stockpiling Topsoil: Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be stockpiled and used for backfilling. Locate topsoil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil. Protect topsoil and keep in segregated piles until needed.

1.7.4 Structures and Surfaces: Protect newly backfilled areas and adjacent structures, slopes, or grades from traffic, erosion settlement, or any other damage. Repair and reestablish damaged or eroded grades and slopes and restore surface construction prior to acceptance.

1.7.4.1 Dispose of excavated material so that it will not obstruct the flow of streams, endanger a partly finished structure, impair the efficiency or appearance of any facilities, or be detrimental to the completed work.

1.8 PIPELINE CASING UNDER RAILROAD: Provide new smooth wall steel pipeline casing under existing railroad by the boring and jacking method of installation. Provide each new pipeline casing, where indicated and to the lengths and dimensions shown, complete and suitable for use with the new piped utility as indicated.

1.8.1 Earthwork for Pipeline Casings: Provide excavation, sheet piling, shoring, dewatering, and backfilling for pipeline casings under this section.

## PART 2 - PRODUCTS

2.1 SOIL MATERIALS: Provide soil materials as described below free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, ice, or other deleterious and objectionable materials.

2.1.1 Backfill: Bring trenches to grade indicated on the drawing using material excavated on the site of this project. This material will be considered unclassified and no testing other than for compaction will be required before use as backfill.

2.1.2 Sand: Clean, coarse-grained sand classified as gradation FA-12 of the SCSHD Standard.

2.1.3 Gravel: Clean, coarsely graded natural gravel, crushed stone or a combination thereof identified as gradation 789 of the SCSHD Standard.

2.1.4 Porous Fill for Infiltration Trench: Backfill material consisting of clean crushed rock or gravel having a gradation conforming to the requirements of gradation No. 4 for coarse aggregate in ASTM C 133.

2.1.5 Topsoil: Provide topsoil conforming to Section 02930, Turf.

2.1.6 Borrow: Meeting requirement for backfill. Obtain borrow materials in excess of those furnished from excavations described herein from sources off Government property.

2.1.7 Pipe Bedding: Provide material for pipe bedding as indicated.

## 1.7 PROTECTION:

1.7.1 Shoring and Sheeting: Provide shoring, bracing, and sheeting where indicated. In addition to Section XXIII A and B of COE Manual EM-385-1-1, include provisions in the shoring and sheeting plan that will accomplish the following:

- a. Prevent undermining of pavements and slabs.
- b. Prevent slippage or movement in banks or slopes adjacent to the excavation.
- c. Allow for the abandonment of shoring and sheeting materials in place in critical areas as the work is completed. In these areas, backfill the excavation to within 3 feet of the finished grade and remove the remaining exposed portion of the shoring before completing the backfill.

1.7.2 Dewatering: Plan for and provide the structures, equipment, and construction for the collection and disposal of surface and subsurface water encountered in the course of construction.

1.7.2.1 Dewatering Plan: Base on site surface and subsurface conditions, available soil, and hydrological data. Remove water by pumping or other methods to prevent the softening of surfaces exposed by excavation, prevent hydrostatic uplift, and provide a stable trench condition for installation of the utility. Use screens and gravel packs or other filtering systems on the dewatering devices to prevent the removal of fines from the soil.

1.7.2.2 Operation and Performance: Operate the dewatering system continuously until construction work below existing water levels is complete. Measure and record the performance of the dewatering system. After placement of the pipe or conduit and the initial backfill, the water level may be allowed to rise but at no time allow it to rise higher than one foot below the prevailing level of excavation or backfill.

1.7.3 Utilities: Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. Perform all work adjacent to non-government utilities as indicated in accordance with procedures outlined by utility company. Excavation made with power-driven equipment is not permitted within two feet of any known government-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, use hand or light equipment excavation. Start hand or light equipment excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

1.4.3 Contractor Furnished Plans, Shop Drawings; and Certifications:

- a. Shoring and sheeting plan: Describe materials of shoring system to be used. Indicate whether or not components will remain after filling or backfilling. Provide plans, sketches, or details along with calculations by a professional engineer registered in any jurisdiction. Indicate sequence and method of installation and removal.
- b. Dewatering plan: Describe methods for removing collected water from open trenches and diverting surface water or piped flow away from work area. Record performance and effectiveness of method or system in use and submit weekly.
- c. Pipeline casing fabrication drawings.
- d. Proposed method of boring and jacking.
- e. Certifications of each welder's qualifications prior to on-site welding.

1.4.4 Reports of Field Testing:

- a. Test for Moisture-Density Relation: Submit 7 days prior to commencing utility excavation.
- b. Topsoil Tests: Submit topsoil tests verifying conformance to required parameters prior to commencing seeding.
- c. Density and Moisture Tests: Submit within 10 days of test date.

Submit any field test data not listed above sufficiently in advance of construction so as not to delay work.

1.5 DELIVERY AND STORAGE: Deliver and store materials in a manner to prevent contamination, segregation, freezing, and other damage.

1.6 CRITERIA FOR BIDDING: Base bids on the following criteria:

- a. Surface elevations are as indicated.
- b. No pipes or other manmade obstructions, except those indicated, will be encountered.
- c. The character of the material to be excavated or found in the trench is as indicated. Rock or hard material as defined in paragraph entitled "Definitions," will not be encountered.

1.3.8 Rock: Solid homogenous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding cubic yard in volume. Removal of "hard material" will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.3.9 Topsoil: In natural or undisturbed soil formations, the fine-grained, weathered material on the surface or directly below any loose or partially decomposed organic matter. Topsoil may be a dark-colored, fine, silty, or sandy material with a high content of well decomposed organic matter, often containing traces of the parent rock material. Gradation and material requirements specified herein apply to all topsoil references in this contract. The material shall be representative of productive soils in the vicinity.

1.3.10 Unyielding Material: Rock or soil with cobbles in the trench bottom requiring a covering of finer grain material or special bedding to avoid bridging in the pipe or conduit.

1.3.11 Unsatisfactory Material: Soil or other material identified as having insufficient strength or stability to carry intended loads on trench backfills without excessive consolidation or loss of stability. Also backfill material which contains refuse, frozen material, large rocks, debris, and other material which could damage the pipe or cause the backfill not to compact. Materials classified as PT, OH, or OL by ASTM D 2487 are unsatisfactory.

1.3.12 Unstable Material: Material in the trench bottom which lacks firmness to maintain alignment and prevent joints from separating in the pipe, conduit, or appurtenance structure during backfilling. This may be material otherwise identified as satisfactory which has been disturbed or saturated.

#### 1.4 SUBMITTALS:

##### 1.4.1 Certified Test Reports:

- a. Trench Backfill Material
- b. Pipe Bedding Material
- c. Topsoil

##### 1.4.2 Manufacturers Certificates of Compliance:

- a. Warning and identification tape
- b. Pipeline casing
- c. Casing end seals

1.1.6 South Carolina State Highway Department (SCSHD) Standard Specification for Highway Construction

1.2 DESCRIPTION: This section includes requirements for excavating, preparation of pipe-laying surface, pipe bedding, backfilling and compaction and providing steel pipeline casing under existing railroad by boring and jacking for the piping systems furnished and installed under Section 2713, "Ground Water Collection System." This section also includes requirements for excavating, backfilling, and compaction for specially installed, underground conduit furnished and installed in accordance with Section 16301, "Underground Electric Work."

1.2.1 Referenced Standard Specifications: Materials and workmanship specified herein with reference to SCSHD Standard shall be in accordance with the referenced articles, sections, and paragraphs of the standard except that contractual and payment provisions do not apply. Where the term "Engineer" is used, it shall mean the Contracting Officer. Where the term "state" is used, it shall mean "Federal Government."

1.3 DEFINITIONS:

1.3.1 Backfill: Material used in refilling a trench or other excavation.

1.3.2 Cohesive Materials: Soils classified by ASTM D 2487 as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesive only when fines have a plasticity index greater than zero.

1.3.3 Cohesionless Materials: Soils classified by ASTM D 2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero.

1.3.4 Compaction: Any method of mechanically stabilizing a material by increasing its density at a controlled moisture condition. "Degree of Compaction" is expressed as a percentage of the maximum density obtained by the test procedure described in ASTM D 698 or D 1557 for general soil types abbreviated in this specification as "95 percent ASTM D 1557 maximum density."

1.3.5 Granular Pipe Bedding: A dense, well-graded aggregate mixture of sand, gravel, or crushed stone placed on a subgrade to provide a suitable foundation for pipe.

1.3.6 Hard Material: Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" but which usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.3.7 Lift: A layer or course of soil placed on top of unprepared subgrade or a previously prepared or placed soil in a fill or backfill.

SECTION 02225

EXCAVATION, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 American Railway Engineering Association (AREA) Publication:

Manual for Railway Engineering, Fixed  
Properties: Chapter 1, Part 5, Pipelines (1972)

1.1.2 American Society for Testing and Materials (ASTM) Publications:

- |                      |  |
|----------------------|--|
| A 139-74<br>(R 1980) | Electric-Fusion (Arc)-Welded Steel Pipe  |
| A 252-82             | Welded and Seamless Steel Pipe Piles   |
| C 33-82              | Concrete Aggregates  |
| D 698-78             | Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm) Drop |
| D 1557-78            | Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop  |
| D 2487-83            | Classification of Soils for Engineering Purposes   |

1.1.3 American Wood Preserver's Association (AWPA) Publications:

- |       |   |
|-------|---|
| C2-77 | Lumber, Timbers, Bridge Ties and Mine Ties-Preservative Treatment by Pressure Process |
| P5-78 | Water-Borne Preservatives   |

1.1.4 American Welding Society (AWS) Publication:

- |         |                                |
|---------|--------------------------------|
| D1.1-84 | Structural Welding Code, Steel |
|---------|--------------------------------|

1.1.5 United States Army Corps of Engineers (COE) Publications:

- |            |                                       |
|------------|---------------------------------------|
| EM-385-1-1 | Safety and Health Requirements Manual |
|------------|---------------------------------------|

Contractor and shall be removed from Government property. Title to all materials resulting from demolition, and all materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition and removal procedures, and authorization by the Contracting Officer to begin demolition. The Government will not be responsible for the condition or loss of, or damage to, such property after notice to proceed. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

2.3 CLEANUP

2.3.1 Debris and Rubbish: Remove and transport debris and rubbish in a manner that will prevent spillage on streets or adjacent areas. Clean up spillage from streets and adjacent areas.

2.3.2 Regulations: Comply with federal, state, and local hauling and disposal regulations.

\*\*\* END OF SECTION \*\*\*

SECTION 02050

**DEMOLITION, REMOVAL AND DISPOSAL**

PART 1 - GENERAL

1.1 SUBMITTALS: Submit proposed demolition, removal, and disposal procedures to the Contracting Officer for approval before work is started. Procedures shall provide for coordination with other work in progress, a detailed description of methods and equipment to be used for each operation and of the sequence of operations.

1.2 REQUIREMENTS: The work includes demolition or removal of all construction indicated or specified. Do not begin demolition until authorization is received from the Contracting Officer; refer to paragraph "Title to Materials," hereinafter. Remove rubbish and debris accumulations. Store materials that cannot be removed daily in areas specified by the Contracting Officer.

1.3 DUST CONTROL: Take appropriate action to check the spread of dust to occupied portions of the building and to avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions, such as ice, flooding, or pollution. Comply with all dust regulations imposed by local air pollution agencies.

1.4 PROTECTION:

1.4.1 Warning Signs: Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Contracting Officer prior to beginning any such work.

1.4.2 Facilities: Protect all electrical and mechanical services and utilities. Where removal of existing pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.

1.5 EXPLOSIVES: Use of explosives will not be permitted.

1.6 BURNING: Burning will not be permitted.

PART 2 - EXECUTION

2.1 EXISTING FACILITIES TO BE REMOVED

2.2 DISPOSITION OF MATERIAL:

2.2.1 Title to Materials: Except where indicated otherwise or specifically specified otherwise in other sections, all materials and equipment removed, and not reused, shall become the property of the

Interfaces, and requirements shall be provided for all system operating modes.

3.5.4 Electric and Electronic Hardware Items:

- a. Manufacturer's descriptive literature, general.
- b. Parts manual.
- c. Maintenance, service and repair instructions.
- d. Operating instructions.
- e. Manufacturer's name, model number, serial number, Federal Stock number (if any), and equipment designation assigned on drawings, if any.
- f. Control wiring diagrams showing all terminations of conductors (and all control devices) labeled to permit identification in the field; part numbers of all control devices; normally open or normally closed; voltage of all control components.
- g. Name, address and telephone number of the nearest manufacturer's representative.

3.5.5 Electrical Switches:

- a. Manufacturer's descriptive literature, general.
- b. Parts manual.
- c. Maintenance, service and repair instructions.
- d. Manufacturer's name, model number, serial number, Federal Stock number (if any).

\*\*\* END OF SECTION \*\*\*

- f. Control wiring diagrams showing: All terminations of conductors (and all control devices) labeled to permit identification in the field; part numbers of all control devices; normally open or normally closed; voltage of all control components.
- g. Plan and elevation views of equipment showing clearance required for maintenance and/or replacement.
- h. Name, address and telephone number of the nearest manufacturer's representative.
- i. Shipping and operating weights.
- j. Operating instructions.
- k. Factory run test curves indicating flow, head, rpm, vibration amplitude and BHP.

3.5.3 Controls and Control Systems:

- a. Manufacturer's descriptive literature, general.
- b. Parts manual.
- c. Maintenance, service and repair instructions.
- d. Operating Instructions.
- e. Manufacturer's name, model number, serial number, Federal Stock number (if any), and equipment designation assigned on drawings, if any.
- f. Performance data at specified conditions.
- g. Control wiring diagrams showing all terminations of conductors (and all control devices) labeled to permit identification in the field; part numbers of all control devices; normally open or normally closed; voltage of all control components.
- h. Name, address and telephone number of the nearest manufacturer's representative.
- i. Plan and elevation views of panels/equipment showing clearances required for maintenance and/or replacement.
- j. For Control Systems, provide a Functional Design Manual identifying the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions. Hardware and software functions,

3.5.1 Valves (including Electric Valves and Control Valves):

- a. Manufacturer's descriptive literature, general.
- b. Parts manual.
- c. Maintenance, service and repair instructions.
- d. Operating Instructions.
- e. Manufacturer's name, model number, serial number, Federal Stock number (if any), and equipment designation assigned on drawings, if any.
- f. Performance data at specified conditions. Performance data shall include pressure drop at rated flow pressure.
- g. Control wiring diagrams (for electric-operated valves) showing: All terminations of conductors (and all control devices) labeled to permit identification in the field; part numbers of all control devices; normally open or normally closed; voltage of all control components.
- h. Side and elevation views of equipment showing clearances required for maintenance and/or replacement.
- i. Name, address and telephone number of the nearest manufacturer's representative.

3.5.2 Well System (including Pump):

- a. Manufacturer's descriptive literature, general.
- b. Parts manuals.
- c. Maintenance, service and repair instructions.
- d. Manufacturer's name, model number, serial number, Federal Stock Number (if any), and equipment designation assigned on drawings, if any.
- e. Performance data at specified flow rates. Performance shall include:
  1. Head developed, horsepower required and efficiency.
  2. Pump curves, flow and power requirements, efficiency, head and operating speed. Curves to show operating points at full range of operating conditions.

SECTION 05120

**STRUCTURAL STEEL**

PART I - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 Federal Specifications (Fed. Spec.):

TT-C-490B      Cleaning Method and Pretreatment of Ferrous Surfaces  
for Organic Coatings

TT-P-645A      Primer, Paint, Zinc Chromate, Alkyd Type

1.1.2 Military Specifications (Mil. Spec.):

DOD-P-15328D   Primer (Wash), Pretreatment (Formula No. 117 for  
& Am 1           Metals) (Metric)

DOD-P-21035A   Paint, High Zinc Dust Content, Galvanizing Repair  
(Metric)

1.1.3 U. S. Army Corps of Engineers (COE) Waterways Experiment Station  
Publication:

CRD-C-621-83   Handbook for Concrete and Cement, Specification for  
Nonshrink Grout, Volume II (1949 Ed.)

1.1.4 American Association of State Highway and Transportation  
Officials (AASHTO) Publication:

1983            Standard Specifications for Highway Bridges  
(Thirteenth Edition)

1.1.5 American National Standards Institute (ANSI) Publication:

B18.22.1-65    Plain Washers  
(R81)

1.1.6 American Institute of Steel Construction (AISC) Publications:

1980            Manual of Steel Construction (Eighth Edition)  
(Includes "Specification for the Design, Fabrication  
and Erection of Structural Steel for Buildings,"  
"Code of Standard Practice for Steel Buildings and  
Bridges," and "Structural Joints Using ASTM A 325 or  
A 490 Bolts")

sufficient water to be of pouring consistency and sufficiently fluid to flow into joints and around reinforcing without leaving voids. Grout shall be well stirred before placing to avoid segregation of the aggregate and shall be stirred before placing to avoid segregation of the aggregate and shall be placed by pumping; or pouring from chutes, buckets with spouts, or other spouted containers. For brick masonry: the maximum height of grout pour shall be 12 inches for spaces less than 2 inches in horizontal dimension; for spaces 2 inches and more, pour shall not exceed 48 times such clear dimension for course grout and 64 times such clear dimension for fine grout, but never exceeding 12 feet. The maximum height of grout pour for concrete masonry shall be 4 feet. Grout shall be rodded or agitated thoroughly to eliminate voids, but with caution not to displace masonry from its original position nor to stain exposed surfaces. Masonry displaced by grouting shall be removed and laid in realignment with fresh mortar. Pours shall be kept at 1-1/2 inches below the top of masonry units in the top course, except for the finish course. Each pouring of grout shall be re-rodded or otherwise re-agitated one to one and one-half hours after placing. Where bricks are used as fillers, they shall be floated into position, with not less than 1/2-inch nor more than 2 inches of grout surrounding bricks.

3.3 CLEANING: During construction, care shall be taken continuously to keep the exposed faces clean of mortar and other stains. When mortar joints reach thumbprint hardness and are tooled, the exposed work shall be brushed with a soft fiber brush to remove adhering mortar, and a wood paddle shall be used to remove more tenacious material. Bases of walls shall be protected from splash stains by covering the adjacent ground with sand, sawdust, or polyethylene. At the completion of the masonry work, holes in exposed masonry shall be pointed, and defective joints shall be cutout and tuck pointed solidly with mortar which has been re-tempered one to two hours after original mixing.

\*\*\*END OF SECTION\*\*\*

3.2.3.1 Concrete Masonry Unit Work: The first course of concrete masonry units shall be laid in a full bed of mortar for the full width of the unit; the succeeding courses shall be laid with broken joints. The bed joints of concrete masonry unit shall be formed by applying the mortar to the entire top surfaces of the inner and outer face shells, and the head joints shall be formed by applying the mortar for a width of about one inch to the ends of the adjoining units laid previously. The mortar for joints shall be smooth, not furrowed, and shall be of such thickness that it will be forced out of the joints as the units are being placed in position. Where anchors, bolts and ties occur within the cells of the units, such cells shall be filled with mortar or grout as the work progresses. Metal lath shall be placed under cells before they are filled. Concrete brick shall be used for bonding walls, working out the coursing, topping out walls under sloping slabs, distributing concentrated loads, backing brick headers, and elsewhere as required. Concrete masonry units shall not be dampened before or during laying.

3.2.3.2 Exposed Concrete Units: Concrete masonry units for exposed walls and partitions shall be selected for undamaged edges and ends of the exposed surface. It is not intended that all units within any one wall or partition be perfect without slight cracks and small chips, but rather that discretion be used in selecting the units with closer matching faces and least imperfections for exposure to view. Special attention shall be given to placing the units plumb, parallel and with a properly tooled joint. Exposed surfaces shall be kept clean and free of blemishes. Bond pattern shall be as indicated and specified. Upon completion, and after grouting and pointing, exposed surfaces shall present a reasonably uniform appearance not unpleasing to the eye and suitable to receive decorative finish. Masonry units which exceed imperfections allowed by ASTM C 90 shall not be used in walls and partitions exposed to view.

3.2.4 Concrete Masonry Bond Beams: Bond beams shall be formed of units having the cells filled solidly with grout or concrete, or precast concrete, and provided with not less than two No. 5 reinforcing bars, unless indicated otherwise. Reinforcing shall overlap a minimum of 24-bar diameters at splices, and bond beams and reinforcing shall be broken at expansion joints and control joints. Concrete masonry units used for bond beams shall be of special shapes, and exposed work shall be of the same material and texture as the adjoining masonry units. Concrete and grout for bond beams shall have manufacturer's recommended quantity of water-repellant admixture added during mixing.

3.2.5 Bonding and Anchoring: Unless otherwise shown, corners and intersections of load-bearing masonry walls shall be bonded in each course with a true masonry bond, except that when necessarily erected separately, they shall be anchored with rigid steel anchors spaced not more than two feet apart vertically.

3.2.6 Grout Placement: Grouting shall be performed from the interior side of walls, except as approved otherwise. Sills, ledges, offsets and other surfaces to be left exposed shall be protected from grout droppings. Grout falling on such surfaces shall be removed immediately. Grout shall contain

3.2.1.2 Grout: Shall consist of a mixture of cementitious materials and aggregate as specified hereinbelow; water shall be added insufficient quantity to produce a fluid mixture with a slump of 8 to 10 inches. Slump shall be verified by at least one slump test for each truckload of grout delivered by truck mixer; and by at least one test each day for all grout placed that day, if mixed at the project site. Fine grout shall be provided in grout spaces less than 2 inches in any horizontal dimension or in which clearance between reinforcing and masonry is less than 3/4-inch. Coarse grout shall be provided in grout spaces 2 inches or greater in all horizontal dimensions and in which clearance between reinforcing and masonry is at least 3/4-inch.

3.2.1.2.1 Fine Grout: Shall be mixed in proportions of one part cement, 1/4 part hydrated lime or lime paste and 3 parts sand.

3.2.1.2 Coarse Grout: Shall be mixed in proportions in one part cement, 1/4 part hydrated lime or lime paste, 3 parts sand, and 3 parts pea gravel passing a 3/8-inch sieve.

3.2.2 Mortar Joints: Joints shall be uniform in thickness and the average thickness of any three consecutive joints shall be 3/8 - 1/2-inch, to be adjusted and approved as initial placement of brick commences. Story poles or gage rods shall be made and approved prior to starting the work and shall be used throughout the work. Changes in coursing or bonding after the work is started will not be permitted. Exposed joints shall be tooled slightly concave with a round or other approved jointer, when the mortar is thumbprint hard. The jointer shall be slightly larger than the width of the joint, so that complete contact is made along the edges of the units, compressing and sealing the surface of the joint. Tools which cause discoloration shall not be used. Joints in masonry which will not be exposed shall be struck flush. Horizontal joints shall be tooled first. Joints shall be brushed to remove all loose and excess mortar. All horizontal joints shall be level. Vertical joints shall be plumb and in alignment from top to bottom of wall within a tolerance of plus or minus 1/2-inch. Weep holes shall be provided at base of walls and other locations indicated. Unless indicated otherwise, weep holes shall be constructed of open masonry head joints spaced 24 to 32 inches apart.

3.2.3 Cavity Walls: The open spaces between wythes of cavity walls shall be kept free of mortar, mortar droppings and debris, with special caution to keep flashing and weep holes free of material detrimental to their proper performance. Mortar droppings shall be minimized by beveling mortar joints away from cavities so that mortar does not protrude into cavities when units are laid. Any protruding mortar fins shall be left protruding without striking off. The cavity space shall be kept clear and clean of mortar droppings; horizontal strips of wood slightly narrower than the cavity width shall be placed in cavities below masonry work in progress, raised periodically and cleaned of mortar and debris.

3.1.2.2 Openings and Accessories: Door and window frames, louvered openings, anchors, pipes, ducts and conduits shall be built in carefully and neatly as the masonry work progresses. Ties and anchors shall be placed accurately as shown or herein specified, as the work progresses. Grouting of ties or anchors into hardened mortar or grout will not be permitted. Spaces around metal door frames shall be filled solidly with mortar. Structural steelwork, bolts, anchors, inserts, plugs, ties, lintels and miscellaneous metalwork specified elsewhere shall be placed in position as the work progresses.

### 3.2 ERECTION

3.2.1 Mortar and Grout Mixing: Materials shall be measured in approved containers, which will insure that the specified proportions of materials will be controlled and accurately maintained during the progress of the work. Measuring materials with shovels will not be permitted. Unless specified otherwise, mortar and grout shall be mixed in proportions by volume. The aggregates shall be introduced and mixed in such a manner that the materials will be distributed uniformly throughout the mass. A sufficient amount of water shall be added gradually and the mass further mixed, not less than 3 minutes nor more than 5 minutes, until a mix of the plasticity necessary for the purposes intended, is obtained. The materials shall be machine-mixed in approved mixers, of the type in which the quantity of water can be controlled accurately and uniformly. Hand mixing may be used, only when specifically approved. Mortar boxes, pans, and/or mixer drums shall be kept clean and free of debris or dried mortar. The mix shall be used before the initial setting of the cement has taken place: the mortar and grout may be retempered as frequently as needed, up to 2-1/2 hours after mixing. Anti-freeze compounds, salts, or any other substance used to lower the freezing point of the mix, will not be permitted.

3.2.1.1 Mortar: The color of cement and sand used in mortar for a exposed work shall produce, without the admixture of any coloring matter, a mortar of uniform shade. Mortar for exterior masonry unit construction shall have manufacturer's recommended quantity of water-repellant admixture added during mixing.

3.2.1.1.1 Mortar for Foundation Walls, Basement Walls and Isolated Piers: ASTM C 270, Type M, consisting of one part cement, 1/4 part hydrated lime or lime paste and 3 to 3/4 parts sand.

3.2.1.1.2 Mortar for Other Work: ASTM C 270, Type S, consisting of one part cement, 1/4 to 1/2 part hydrated lime or lime paste, and 3 3/4 to 4 1/2 parts sand. Prepackaged mortar mix may be used provided the mix has the same cement-to-lime proportion as that specified herein for ASTM C 270 Type S mortar. Air content of the prepackaged mix shall not exceed 16 percent when tested in accordance with ASTM C 91, and the mix shall not contain any noncementitious fillers. Mortar made with a prepackaged mix shall consist of one part mix to not more than three parts sand.

above 32 degrees F on both sides of walls under construction. Ascertain that temperatures of masonry units are not less than 20 degrees F when units are laid.

3.1.1.2 Cold Weather Protection: Protect newly laid masonry as specified below for the respective mean daily air temperature (MDAT), that is, the average of the daytime high temperature and the forecasted nighttime low temperature.

- a. MDAT 40 to 32 degrees F: Protect top of masonry from rain or snow for 24 hours by covering with canvas, plastic or other acceptable waterproof membrane, extended a minimum of 2 feet down on both sides of walls, and well secured in place.
- b. MDAT 32 to 25 degrees F: Completely cover masonry with weather-resistive membrane for 24 hours.
- c. MDAT 25 to 20 degrees F: Completely cover masonry with insulating blankets and weather-resistive membrane for 24 hours.
- d. MDAT 20 degrees F and below: Maintain temperature of masonry above 32 degrees F for 24 hours by providing enclosures and supplementary heat, or by other approved means.

3.1.1.3 Normal Masonry Procedure: When work is not in progress, cover tops of exposed walls and partitions with canvas, plastic or other acceptable waterproof membrane, extended a minimum of 2 feet down on both sides of structure, and well secured in place.

3.1.2 Workmanship: Masonry walls shall be carried up level and plumb all around. One section of the walls (other than reinforced walls) shall not be carried up in advance of the others, unless specifically approved. Unfinished work shall be stepped back for joining with new work. Tothing will not be permitted, except where specified or specifically approved. Heights of masonry shall be flecked with an instrument at each floor, and at sills and heads of openings, to maintain the level of the walls. Masonry units shall be handled with care to avoid chipping, cracking and spalling of faces and edges. Drilling, cutting, fitting and patching to accommodate the work of others, shall be performed by masonry mechanics. Masonry shall be cut with masonry saws in exposed work, where directed. Chases of approved dimensions for pipes and other purposes shall be provided where indicated or necessary.

3.1.2.1 Wall and Partition Intersections: Unless indicated otherwise, partitions shall extend from the floor to the bottom of the floor or roof construction above. Walls and partitions shall be structurally bonded or anchored to each other and to concrete walls, beams and columns; partitions and interior walls shall be securely anchored or wedged to the construction above. Wedging shall be done with slate, metal, or clay tile shims, at least two days after the erection of the wall or partitions, and the top joint shall be filled solidly with mortar.

- b. Five-ounce copper or 38 U.S. Standard gage stainless steel factory bonded between two layers of waterproof, rot and mold-resistant, and reinforced kraft covering.
- c. A dual metal core of copper bonded with asphalt to a ply of lead, factory bonded between two layers of waterproof, rot and mold-resistant, and reinforced kraft covering. Total metal core weight shall be 5 ounces.

2.1.10 Water-Repellant Admixture: Polymeric type formulated to reduce porosity and water transmission. Masonry panels, constructed of normal weight concrete masonry units and mortar containing water-repellant admixture, shall be tested in accordance with ASTM E 72 and E 514. Panels tested in accordance with ASTM E 72 when compared to test panels constructed without admixture, shall have an increase in flexural strength of not less than 20 percent and an increase in compressive strength of not less than 3 percent. Panels tested in accordance with ASTM E 514 shall exhibit no water visible on back of test wall and no leaks through the wall at the end of one day and nor more than 25 percent of wall area shall be damp at the end of three days.

### PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS: Masonry work shall be coordinated with the work of other trades.

#### 3.1.1 Erection Conditions:

3.1.1.1 Cold Weather Construction: Masonry work may be started at 34 degrees F on a rising thermometer. Do not lay masonry when the air temperature is below 40 degrees F and falling, or when it appears that air temperature will drop to 40 degrees F or below with 2 1/2 hours after the masonry has been laid, unless the work is protected from freezing as specified below. Work will not be permitted with or on frozen materials. Comply with the requirements specified below for the respective air temperatures:

- a. Air temperature 40 to 32 degrees F: Heat sand or mixing water to produce mortar temperature between 40 and 120 degrees F.
- b. Air temperature 32 to 25 degrees F: Heat sand and mixing water to produce mortar temperature between 40 and 120 degrees F.
- c. Air temperature 25 to 20 degrees F: Heat sand and mixing water to produce mortar temperature between 40 and 120 degrees F. Use salamanders or other heat sources on both sides of walls under construction. Use windbreaks when wind is in excess of 15 mph.
- d. Air temperature 20 degrees F and below: Heat sand and mixing water to produce mortar temperature between 40 and 120 degrees F. Provide enclosures and auxiliary heat to maintain air temperature

2.1.4 Water: Clean, potable, and free from substances which could adversely affect the mortar.

2.1.5 Reinforcing Steel Rods: ASTM A 615, Grade 60.

2.1.6 Horizontal Joint Reinforcement: ASTM A 82, fabricated from cold-drawn steel wire. The wire shall be zinc coated after fabrication by the hot-dip process in accordance with ASTM A 153. Reinforcement shall consist of two or more parallel longitudinal wires, not less than 0.1875-inch in diameter, weld connected with cross wires, not less than 0.1483-inch diameter at minimum 16 inches o.c. The out-to-out spacing of the longitudinal wires shall be 1-1/2 to 1-3/4 inches less than the actual width of the masonry. The distance between welded contacts of cross wires with each longitudinal wire shall not exceed 6 inches for smooth wire and 16 inches for deformed wire. Joint reinforcement shall be provided in flat sections, not less than 10 feet in length, except that corner reinforcements and other special shapes may be less in length. Cross wires shall be crimped to provide an effective moisture drip in cavity wall construction.

2.1.7 Anchors and Ties: Items shall be of approved designs, and shall be of copper-clad steel, zinc-coated steel, or of non-corrosive metal having the equivalent total strength of steel types. Zinc-coated items shall be coated by the hot-dip process after fabrication to provide a minimum of 1.25 ounces of zinc per square foot of surface when tested in accordance with ASTM A 90. Ties for cavity wall construction shall be not less than 3/16-inch diameter and of such lengths as to extend to within not more than 2 inches or less than one inch from both exterior faces of the wall.

2.1.7.1 Wire Mesh Ties: Tie wire, not lighter than 20 gage, galvanized, in 1/2-inch mesh, and of suitable width and length.

2.1.7.2 Corrugated Metal Ties: Not less than 7/8-inch wide by approximately 6 inches long, and not lighter than 22 gage.

2.1.7.3 Rigid Steel Anchors: Not less than one-inch wide, 1/4 inch thick, and 18 inches long between bent ends. Each end shall be bent down not less than 3 inches into mortar filled cells.

2.1.8 Fastenings: Suitable bolts, metal wall plugs, or other approved metal fastenings for securing furring to masonry, and elsewhere as necessary.

2.1.9 Miscellaneous Flashing: Miscellaneous flashings, including thru-wall, lintel, sill, and flashing at heads of openings, shall be one of the following

- a. 30 U.S. Standard gage stainless steel with ribs or deformations designed to provide an interlocking mechanically keyed bond in the mortar bed to prevent movement in all lateral directions.

weathertight sheds or inclusion of foreign materials and damage by water or dampness. Masonry units shall be handled with care to avoid chipping and breakage. Materials stored on newly constructed floors shall be stacked in such manner that the uniformly distributed loading does not exceed 50 psf. Masonry material shall be properly protected from contact with the earth and exposure to the weather, and shall be kept dry until used. Materials containing frost or ice, and cement and lime which have been wetted by rain or other water prior to incorporation in mortar, shall not be used.

## PART 2 - PRODUCTS

2.1 MATERIALS: Masonry work of the types indicated shall be provided. The source of supply for materials which will affect the appearance of the finished work shall not be changed after the work has started.

2.1.1 Concrete Masonry Units: Units shall be of modular dimensions, and shall be either air, water or steam cured. Units shall be stored before use a minimum of 28 days for air cured units; 10 days for steam or water cured units; and 3 days for units cured with steam at a pressure of 120 to 150 psi and at a temperature of 350 to 365 degrees F. for at least 5 hours. Surfaces of units which are to be left exposed in the finished work, or which are to be painted, shall be relatively smooth with a uniform texture. Surfaces of units to receive plaster or stucco shall be sufficiently rough to provide a suitable bond. Exterior concrete masonry units shall have water repellent admixture added during manufacture.

2.1.1.1 Hollow Load-Bearing Units: ASTM C 90, made with lightweight or normal weight aggregates. Grade N-I units shall be provided for exterior and foundation walls; Grade N-I units shall be provided for other load-bearing walls and partitions.

2.1.1.2 Concrete Building Brick: ASTM C 55, made with normal weight aggregates, Grade N-1 or S-I, except that brick exposed to weather shall be Grade N-1. Concrete brick shall match the concrete masonry units with which they are used as closely as practicable in color and surface characteristics.

2.1.1.3 Solid Load-Bearing Units: ASTM C 145, made with normal weight aggregates. Grade N-I or S-I, except that units exposed to weather shall be Grade N-I. Solid units shall be provided for masonry bearing under structural framing members and elsewhere as indicated.

2.1.1.4 Special Shapes: Closures, header units, jamb units, and the like shall be provided as necessary to complete the work, and shall conform to the applicable portions of the specifications for the units with which they are used.

2.1.2 Cement: Type I Portland cement conforming to ASTM C 150, or Type IP blended hydraulic cement, conforming to ASTM C 595.

2.1.3 Sand: ASTM C 144. The sand, in combination with the cementitious materials, shall produce a mortar of the specified color.

1.2.1.1 Efflorescence Tests: Shall be made on the clay brick and mortar materials which will be exposed to weathering. Tests shall be scheduled far enough in advance of starting masonry work to permit retesting if necessary. Efflorescence tests will not be required for concrete masonry units.

1.2.1.1.1 Masonry Units: Ten unbroken specimens of each type of masonry unit shall be selected in 5 pairs, each pair of similar appearance. One unit of each pair shall be tested by placing it on end in a glass or glazed receptacle in which a 1-inch depth of distilled water is maintained. After being indoors at normal temperatures for 7 days, the masonry unit shall be removed from the water and air dried for 24 hours. Each pair of units shall be compared, and if the difference due to efflorescence is noticeable on any of the five samples, when viewed at a distance of 10 feet, the units represented by the samples will be rejected.

1.2.1.1.2 Mortar: A 3-ounce mortar specimen shall be prepared of each proposed mix, using as little water as possible. While still in a plastic condition and prior to its initial set, each mortar specimen shall be placed in a glass or glazed receptacle, and four ounces of distilled water shall be mixed with the mortar and stirred thoroughly for 5 minutes. The receptacle shall be of such a size that when the mortar specimen and water are combined in solution, and a masonry unit is placed in it, the solution will have a depth of 1/2-to 1-inch. A masonry unit, which has been tested and found free of efflorescence, shall be placed on end in the solution and the water level maintained at 1/2- to 1- inch with distilled water. After being indoors at normal temperature for 7 days, the masonry unit shall be removed from the solution and air dried for 24 hours. The masonry unit shall be compared with an untreated unit, and if the difference due to efflorescence is noticeable when viewed at a distance of 10 feet, the mortar components shall be tested in separate receptacles, each containing a masonry unit which has been tested and found free of efflorescence. Each mortar component shall be thoroughly mixed with 4 ounces of distilled water, using one ounce of each cementitious material and 3 ounces of each aggregate, and the water level shall be maintained at a depth of 1/2- to 1-inch with distilled water. After 7 days indoors at normal temperatures, the masonry units shall be removed from the solution and observed for efflorescence, as specified hereinbefore, and the component causing efflorescence will be rejected.

1.2.2 Manufacturers Catalog Data: Complete descriptive literature of preformed sealing strip for control joints, water-repellant admixture, and flashing material.

1.2.3 Mill Certificates: Certificate for cement, quicklime, and hydrated lime.

1.3 DELIVERY AND STORAGE: Cement, lime and other cementitious materials shall be delivered to the site and stored in unbroken bags, barrels, or other approved containers, plainly marked and labeled with the manufacturer's names and brands. Mortar materials shall be stored in dry,

SECTION 04200

UNIT MASONRY

PART 1 GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 American Society for Testing and Materials (ASTM) Publications:

A 82-85	Steel Wire, Plain, for Concrete Reinforcement
A 90-81 (R 1987)	Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel ARTicles
A 153-82 (R 1987)	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A 615-87	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C 55-85	Concrete Building Brick
C 90-95	Hollow Load-Bearing Concrete Masonry Units
C 91-87A	Masonry Cement
C 144-87	Aggregate for Masonry Mortar
C 145-85	Solid Load-Bearing Concrete Masonry Units
C 150-86	Portland Cement
C 270-86	Mortar for Unit Masonry
C 595-86	Blended Hydraulic Cements
E 72-80	Conducting Strength Tests of Panels for Building Construction
E 514-86	Water Penetration and Leakage Through Masonry

1.2 SUBMITTALS:

1.2.1 Certified Test Reports: Submit certified copies of the reports of all tests specified herein. Test reports shall be accompanied by notarized certificates from the manufacturer certifying that the tested material and equipment is of the same type, quality, manufacture and make as that proposed to be supplied.

3.5.3 Liquid Membrane-Forming Compound Curing: Seal or cover joint openings prior to application of curing compound. Prevent curing compound from entering the joint. Provide and maintain compound on the concrete surface throughout the curing period. Provide a continuously wetted, permeable cover as specified in paragraph entitled "Hot Weather."

3.5.3.1 Application: Unless the manufacturer recommends otherwise, apply compound immediately after the surface loses its water sheen and has a dull appearance, and before joints are sawed. Mechanically agitate curing compound thoroughly during use. Use approved power-spraying equipment to uniformly apply two coats of compound in a continuous operation. The total coverage for the two coats shall be 200 square feet maximum per gallon of undiluted compound, unless otherwise recommended by the manufacturer's written instructions. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel. Immediately apply an additional coat of compound to areas where the film is defective. Respray concrete surfaces subjected to rainfall within 3 hours after the curing compound application.

3.5.3.2 Protection of Treated Surfaces: Prohibit foot and vehicular traffic and other sources of abrasion for not less than 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

3.5.4 Liquid Chemical Sealer-Hardener Curing: Provide for floor of nutrient facility. Apply sealer-hardener in accordance with manufacturer's recommendations. Seal or cover joints and openings in which joint sealant is to be applied, as required by the joint sealant manufacturer.

3.5.5 Curing Periods: Allow 7 days.

### 3.6 SAMPLING AND TESTING:

3.6.1 Sampling: ASTM C 172. Collect samples of fresh concrete to perform tests specified.

#### 3.6.2 Testing:

3.6.2.1 Slump Tests: ASTM C 143. Take samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at commencement of concrete placement and for each batch (minimum) or every 10 cubic yards (maximum) of concrete.

3.6.2.2 Air Content: ASTM C 173 or ASTM C 231. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

\*\*\* END OF SECTION \*\*\*

prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater. Surface shall be level to within 1/4 inch in 10 feet where floor drains are not provided.

3.4.3 Steel Troweled Finish: First, provide a floated finish. When slab has attained a proper set, trowel to a smooth, hard, dense finish. Finished surfaces shall be free of trowel marks, uniform in texture, flat within 0.01 foot (approximately 1/8 inch) in 10 feet. Hand-finish portions of the slab not accessible to power finishing equipment (e.g., edges, corners) to match the remainder of the slab. Power trowel once and finally hand trowel where a finished floor covering (e.g., tile, carpet ) is specified. Power trowel twice and finally hand trowel for exposed concrete floors.

3.4.4 Broomed Finish: Provide for exterior slab unless otherwise indicated. Provide a floated finish, then finish with a flexible bristle broom. Permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.

3.5 CURING AND PROTECTION: ACI 301. Protect concrete from injurious action by sun, rain, wind, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the curing period. Forms may be removed 48 hours after concrete placement.

3.5.1 Moist Curing: Provide for the removal of water without erosion or damage to the structure.

3.5.1.1 Ponding or Immersion: Continually immerse the concrete throughout the curing period. Water temperature shall not be more than 20 degrees F less than the temperature of the concrete. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.5.1.2 Fog Spraying or Sprinkling: Provide uniform and continuous application of water throughout the curing period. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.5.1.3 Pervious Sheeting: Cover the entire surface of the concrete with two thicknesses of wet sheeting. Mats shall be at least as long as the width of the surface to be cured. During application, do not drag the mats over the finished concrete nor over mats already placed. Completely cover surface and edges of the concrete, with a 6-inch overlap over adjacent mats. Wet mats thoroughly and keep continuously wet throughout the curing period.

3.5.2 Impervious-Sheeting Curing: Wet the entire exposed surface thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting.

Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 85 degrees F. Reduce mixing time to 60 minutes if the air temperature is greater than 85 degrees F. Additional water may be added, provided that both the specified maximum slump and water-cement ration are not exceeded. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture to bring the entrained air content within the specified limits. Do not place concrete when weather conditions prevent proper placement and consolidation; in uncovered areas during periods of precipitation; or in standing water. Prior to placing concrete, remove dirt, construction debris, water, snow, and ice from within the forms. Consolidate concrete slabs greater than 4 inches in depth with high frequency, internal, mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 4 inches or less in depth by tamping, spading, and settling with a heavy leveling straight edge.

3.3.1 Cold Weather: ACI 306R. Provide and maintain 50 degrees F minimum concrete temperature. Do not place concrete when the ambient temperature is below 40 degrees F. Cover concrete and provide with a source of heat sufficient to maintain 50 degrees F minimum while curing.

3.3.2 Hot Weather: ACI 305R. Concrete temperature from initial mixing through final cure shall not exceed 90 degrees F. Cool ingredients before mixing, or substitute chip ice for part of required mixing water or use other suitable means to control concrete temperature to prevent rapid drying of newly placed concrete. Shade the fresh concrete and start curing as soon as the surface of the fresh concrete is sufficiently hard to permit curing without damage.

3.4 SURFACE FINISHES: ACI 301 for repair and finish, unless otherwise specified. Slope floors uniformly to drains where drains are provided. After troweling is completed, apply a liquid chemical sealer-hardener to interior slabs that do not receive floor covering.

3.4.1 Defects: Repair formed surfaces by removing minor honeycombs, pits greater than 1 square inch surface area or 0.25 inch maximum depth, or otherwise defective areas. Provide edges perpendicular to the surface and patch with nonshrink grout. Patch tie holes and defects when the forms are removed. Concrete with extensive honeycomb (including exposed steel reinforcement, cold joints, entrapped debris, separated aggregates, or other defects) which affect the serviceability or structural strength will be rejected, unless correction of defects is approved. Obtain approval of corrective action prior to repair. The surface of the concrete shall not vary more than the allowable tolerances of ACI 301. Exposed surfaces shall be uniform in appearance and finished to a smooth form finish, unless otherwise specified.

3.4.2 Floated Finish: Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present

## PART 3 - EXECUTION

3.1 FORMS: ACI 301. Set forms true to line and grade and make mortar-tight. Chamfer above grade exposed joints, edges, and external corners of concrete 3/4 inch, unless otherwise indicated. Before concrete placement, coat the contact surfaces of forms with a nonstaining form coating compound. Do not use mineral oil on formed surfaces to be painted. Prevent concrete damage during form removal. Concrete for footings may be placed in excavations without forms upon inspection and approval by the Contracting Officer. Excavation width shall be a minimum of 4 inches greater than finished dimensions indicated.

3.2 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS: ACI 301. Provide bars, wire fabric, and other reinforcing materials, including wire ties, supports, and other devices necessary to install and secure the reinforcement.

3.2.1 Cover and Splicing: ACI 301, unless otherwise indicated.

3.2.2 Setting Miscellaneous Material: Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.2.3 Vapor Barrier: Provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. Lap 12 inches minimum. Remove torn, punctured, or damaged vapor barrier material and provide with new material prior to placing concrete. Place concrete to prevent damage to the vapor barrier material.

3.2.4 Construction Joints: ACI 301. Continue reinforcement across joints, unless otherwise indicated. Fusion weld waterstop splices.

3.2.5 Expansion Joints and Contraction Joints: ACI 301. For slabs on grade, provide at edges of interior floor slabs, adjacent to walls, and as indicated. Make expansion joints 0.5 inch wide, except as indicated otherwise. Fill expansion joints not exposed to weather with preformed joint material. Seal joints exposed to weather with joint sealant. Do not extend reinforcement or other embedded metal items bonded to the concrete through any expansion joint, unless an expansion sleeve is used. Provide contraction joints, either formed or saw cut or cut with a jointing tool to the indicated depth after the surface has been finished. Sawed joints shall be completed within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.3 MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE: ACI 304, except as modified herein. ASTM C 94; machine mix concrete and provide mandatory batch ticket information for each load of ready mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates.

2.2.3 Aggregates: ASTM C 33. Obtain aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalis in the cement.

2.2.4 Admixtures: ASTM C 260 for air-entrained concrete. ASTM C 494 for water reducing (Type A, D, or E), accelerating (Type C), and retarding (Type B or D), to be used only when approved.

2.2.5 Reinforcement:

2.2.5.1 Reinforcing Bars: ASTM A 615, Grade 60.

2.2.5.2 Welded Wire Fabric: ASTM A 497 or ASTM A 185, 6 by 6, W2.9 by W2.9, unless otherwise indicated. Provide flat sheets or welded wire fabric for slabs and toppings.

2.2.6 Materials for Curing Concrete:

2.2.6.1 Impervious Sheeting: ASTM C 171; waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

2.2.6.2 Liquid Membrane-Forming Compound: ASTM C 309, white-pigmented, Type 2, free of paraffin or petroleum. Do not use where finished appearance is important. Use where approved only.

2.2.6.3 Liquid Chemical Sealer-Hardener Compound: Compound shall be magnesium fluosilicate which when mixed with water seals and hardens the surface of the concrete. Compound shall not reduce the adhesion of resilient flooring, tile, paint, roofing, waterproofing, or other material to be applied to the concrete.

2.2.7 Expansion-Join Filler: ASTM D 1751 or ASTM D 1752, 1/2-inch thick, unless otherwise indicated.

2.2.8 Joint Sealants:

2.2.8.1 Horizontal Surfaces (3 percent slope, maximum):

- A. Outside Building: ASTM D 1190.
- B. Inside Buildings: ASTM D 1190 or ASTM D 1850.

2.2.8.2 Vertical Surfaces (greater than 3 percent slope): ASTM C 920, Type M, Grade NS, Class 25, Use T.

2.2.9 Vapor Barrier: ASTM D 4397, polyethylene sheeting, minimum 6 mil thickness.

2.2.10 Polyvinylchloride Waterstops: COE CRD-C-572.

2.2.11 Nonshrink Grout: COE CRD-C-621.

1.3 SUBMITTALS: Manufacturer's Certificate of Compliance:

- a. Cement
- b. Aggregates
- c. Admixtures
- d. Reinforcement
- e. Joint filler
- f. Joint sealant

1.4 DELIVERY: Do not deliver concrete until ready for concrete placement.

1.5 STORAGE: Store concrete aggregates to prevent contamination or segregation. Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Provide for accurate identification after bundles are broken and tags removed.

PART 2 - PRODUCTS

2.1 CONCRETE:

2.1.1 Concrete Mix Design: ACI 301, except as modified herein. Concrete shall have a 28-day compressive strength of 4000 psi. Slump shall be between 2 and 4 inches in accordance with ASTM C 143. The slump may be increased to 5 inches for concrete utilizing either fly ash, pozzolan, or ground slag. Provide ASTM C 33 aggregate Size No. 67 and 4 to 6 percent air entrainment for concrete exposed to freeze-thaw conditions. Accomplish air-entrainment using an air-entraining admixture.

2.1.2 Ready-Mixed Concrete: ASTM C 94, except as modified herein. Ready-mixed concrete is defined in this specification as concrete produced regularly by a commercial establishment and delivered to the purchaser in the plastic state.

2.2 MATERIALS:

2.2.1 Cement: ASTM C 150, Type I or ASTM C 595, Type IP(MS) blended cement, except as modified herein. The blended cement shall consist of a mixture of ASTM C 150 cement and one of the following materials: ASTM C 618 pozzolan or fly ash. The pozzolan/fly ash content shall not exceed 25 percent. For exposed concrete, use one manufacturer for each type of cement, fly ash, and pozzolan.

2.2.1.1 Fly Ash and Pozzolan: ASTM C 618, Type N, F, or C, except that the maximum allowable loss on ignition shall be 6 percent for Type N and F. Add with cement.

2.2.2 Water: Water shall be potable.

C 171-69  
 (R80) Sheet Materials for Curing Concrete

C 172-82 Sampling Freshly Mixed Concrete

C 173-78 Air Content of Freshly Mixed Concrete by the  
 Volumetric Method

C 231-82 Air Content of Freshly Mixed Concrete by the  
 Pressure Method

C 260-77 Air-Entraining Admixtures for Concrete

CC 309-81 Liquid Membrane-Forming Compounds for Curing  
 Concrete

CC 494-82 Chemical Admixtures for Concrete

C 595-85 Blended Hydraulic Cements

C 618-85 Fly Ash and Raw or Calcined Natural Pozzolan for  
 Use as a Mineral Admixture in Portland Cement  
 Concrete

C 920-79 Elastomeric Joint Sealants

D 1190-74  
 (R80) Concrete Joint Sealer, Hot-Poured Elastic Type

D 1751-83 Preformed Expansion Joint Filler for Concrete  
 Paving and Structural Construction (Nonextruding  
 and Resilient Bituminous Types)

D 1752-84 Preformed Sponge Rubber and Cork Expansion Joint  
 Fillers for Concrete Paving and Structural  
 Construction

D 1850-74  
 (R79) Concrete Joint Sealer, Cold Application Type

D 4397-84 Polyethylene Sheeting for Construction,  
 Industrial and Agricultural Application

1.2 GENERAL REQUIREMENTS; In the ACI publications referred to herein,  
 the advisory provisions shall be considered to be mandatory; as though the  
 word "shall" has been substituted for "should" wherever it appears; references  
 to the "Building Official," the "Structural Engineer," and the  
 "Architect/Engineer" shall be interpreted to mean the Contracting Officer.

SECTION 03302

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 U. S. Army Corps of Engineers (COE) Waterways Experiment Station Publications:

CRD-C-572-74	Specification for Polyvinylchloride Waterstop
CRD-C-621-83	Handbook for Concrete and Cement, Specification for Nonshrink Grout, Volume II (1949 Ed.)

1.1.2 American Concrete Institute (ACI) Publications:

Buildings	301-84	Specifications for Structural Concrete for
	304-73 (R83)	Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
	305R-77 (R82)	Hot Weather Concreting
	306R-78 (R83)	Cold Weather Concreting

1.1.3 American Society for Testing and Materials (ASTM) Publications:

A 185-85	Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
A 497-79	Welded Deformed Steel Wire Fabric for Concrete Reinforcement
A 615-85	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C 33-85	Concrete Aggregates
C 94-84	Ready-Mixed Concrete
C 143-78	Slump of Portland Cement Concrete
C 150-85	Portland Cement

3.7 FINAL ACCEPTANCE:

3.7.1 Final Inspection and Acceptance: Final inspection will be made upon written request from the Contractor at least 10 days prior to the last day of the turf establishment period. Final acceptance will be based upon a satisfactory stand of turf as defined in the paragraph entitled, "Turf Establishment Period."

3.7.2 Replanting: Replant, within specified planting dates, areas which do not have a satisfactory stand of turf.

~~\*\*\*END OF SECTION\*\*\*~~

3.3.3 Mulch: Spread evenly at the rate of 10 tons per acre. Anchor by crimping mulch with serrated disc, or by spraying asphalt emulsion on mulched surface at a rate of 0.02 gallons per square yard. Take precautionary measures to prevent asphalt materials from marking or defacing structures, pavements, utilities, or plantings.

3.3.4 Rolling: Immediately after seeding, firm entire area except for slopes in excess of 3 to 1 with a roller not exceeding 90 pounds for each foot of roller width. If seeding is performed with cultipacker-type seeder or by hydroseeding, rolling may be eliminated.

3.3.5 Erosion Control Material: Install in accordance with manufacturer's instructions.

3.4 PROTECTION OF TURF AREAS: Immediately after turfing, protect the area against traffic or other use.

3.5 RESTORATION: Restore to original condition existing turf areas which have been damaged during turfing operations. Clean paving when work in adjacent areas is complete.

3.6 TURF ESTABLISHMENT PERIOD:

3.6.1 Definitions:

3.6.1.1 Turf establishment period will be in effect until the turf has been mowed three times.

3.6.1.2 A stand of turf is 95 percent ground cover of the established species.

3.6.2 Maintenance During Turf Establishment Period:

3.6.2.1 Mow turfed area to an average height of 3 inches whenever average height of grass becomes 4 inches.

3.6.2.2 Mow, remove excess clippings, eradicate weeds, water, fertilize, overseed, and perform other operations necessary to promote turf growth.

3.6.2.3 Post-fertilize the turfed areas with commercial grade controlled release fertilizer approximately 14 days after planting and at intervals of 3 weeks thereafter until accepted. Apply fertilizer uniformly at the rate of 25 pounds per 1000 square feet.

3.2.4.2 Apply all herbicides and other chemicals in accordance with EPA label restrictions and recommendations and Federal and state laws. Make daily reports to the Contracting Officer stating areas treated with each chemical, the quantity applied, and spray mixture or formulation used. Application at each site shall be under the supervision of a certified applicator.

3.2.4.3 Apply in well ventilated areas. Avoid inhalation, injection; or spilling on clothing or skin. Wear protective clothing in accordance with manufacturer's material safety data sheet recommendations. Personnel shall not be exposed to pesticides exceeding the exposure levels recommended in the most stringent of the following: OSHA, 29 CFR 1910.1000, or the manufacturer's material safety data sheet. If excessive exposures are unavoidable, use respirators approved by the National Institute for Occupational Safety and Health for protection from pesticides, fumigants, herbicides and fungicides. Conform to the selection and usage guidance in ANST Z88-2.

3.2.4.4 Apply so damage will not result to personnel or property from either direct spray or drifting of chemicals both on and off Government property.

3.2.4.5 Dispose of excess chemicals and containers in accordance with section 01560, "Environmental Protection".

### 3.3 SEEDING:

3.3.1 Approved Equipment: Sow seed by approved sowing equipment. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing. Cover seed to average depth of 1/2 inch by means of spike-tooth harrow, cultipacker, or other approved device.

SEED SHALL BE APPLIED AT THE FOLLOWING RATE:

<u>Seed</u>	<u>Rate of Application</u> <u>Pounds Per 1,000 Sq. Feet</u>
Common Bermuda	0.5
Rye	0.2

3.3.2 Hydroseeding: Mix seed, fertilizer, and wood cellulose fiber in required amount of water to produce a homogeneous slurry. Add wood cellulose fiber after seed, water, and fertilizer have been thoroughly mixed and apply at the rate of 200 pounds per acre dry weight. When hydraulically sprayed on the ground, material shall form a blotterlike cover impregnated uniformly with grass seed. Immediately following the application of the slurry mix, make separate application of wood cellulose mulch at the rate of 1,000 pounds, dry weight, per acre. Cover shall allow rainfall or applied water to percolate to underlying soil.

2.12 EROSION CONTROL MATERIALS:

2.12.1 Blanket: Excelsior.

PART 3 - EXECUTION

3.1 TIME RESTRICTIONS AND PLANTING CONDITIONS

3.1.1 Planting Dates:

3.1.1.1 Sow seed from February 15 to April 15 for spring planting and from September to November for fall planting. Seed shall be hulled for spring planting and unhulled for fall planting.

3.1.2 Restrictions: Do not plant when the ground is frozen, snow covered, or muddy.

3.2 PREPARATION

3.2.1 Subgrade: After areas required to be turfed have been brought to the required subgrade, thoroughly till to minimum depth of 6 inches by scarifying, disking, harrowing, or other approved methods. Remove debris and stones larger than one inch in any dimension remaining on surface after tillage.

3.2.2 Topsoiling: Immediately prior to placing topsoil, scarify subgrade to a 2-inch depth for bonding of topsoil with subsoil. Spread topsoil evenly to a minimum depth of 4 inches. Do not spread topsoil when frozen or excessively wet or dry. Correct irregularities in finished surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

3.2.3 Fertilizer, pH Adjusters, and Soil Conditioners:

3.2.3.1 Apply fertilizer pH adjuster and soil conditioner at rates and analysis as determined by laboratory soil tests of the soils at the job site.

3.2.3.2 Incorporate fertilizer, pH adjusters, and soil conditions into soil to minimum depth of 6 inches. This may be done as part of the subgrade tillage operation specified herein.

3.2.4 Application of Pesticides:

3.2.4.1 Hydraulic equipment for liquid application of chemicals shall have leakproof tanks and positive agitation method, plus gauges and valves capable of maintaining constant application pressures. Calibrate and meter equipment so that application of chemicals in specified amounts can be determined.

2.6.6.2 Nitrogen Content: Minimum percent based on dry weight:

Redwood Sawdust	0.5
Fir Sawdust	0.7
Fir or Pine Bark	1.0

2.6.7 Calcined Clay: Granular particles produced from montmorillonite clay calcined to minimum temperature of 1200 degrees to the following gradation: minimum 90 percent passing 8-mesh screen, 99 percent retained on 60-mesh screen and, maximum 2 percent passing 100-mesh screen. Bulk density: 40 pounds maximum per cubic foot.

## 2.7 FERTILIZER:

2.7.1 Commercial Grade Fertilizer: Fed. Spec. O-F-241, Type I, Class 2, free flowing, and uniform in composition with nitrogen-phosphorus potash ratio of 10 percent nitrogen, 10 percent phosphorus, and 10 percent potash.

2.7.2 Controlled Release Fertilizer with Hydroseeding: Nitrogen-phosphorus-potassium ratio of 16-7-12 plus 2 percent iron, composed of pills coated with plastic resin to provide continuous release of fertilizer for at least six months.

2.8 MULCHES: Free from, noxious weeds, mold, and other deleterious materials.

2.8.1 Wood Chips: Ground redwood or fir tree bark, 3/16-inch maximum particle size.

2.8.2 Straw: Stalks from oats, wheat, rye, barley, or rice. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment.

2.8.3 Hay: Air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Use only marsh hay for lawn areas.

2.8.4 Wood Cellulose Fiber: Processed to contain no growth or germination-inhibiting factors and dyed an appropriate color to facilitate visual metering of materials application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 3.5 to 5.0. Use with hydraulic application of grass seed and fertilizer.

2.9 ASPHALT ADHESIVE: ASTM D 977, Grade RS-1. Use with straw or hay mulch.

2.10 WATER: Suitable quality for irrigation.

2.11 PESTICIDES: Soil Fumigant, Herbicide, Insecticide and Fungicide: EPA registered and approved. Furnish for preemergence and postemergence application for crabgrass control and broadleaf weed control.

with maximum 3 percent retained on 1/4-inch screen. Other components shall be within the following percentages:

Silt	25-50
Clay	10-30
Sand	20-35
pH	5 to 7.6
Soluble Salts	600 ppm maximum

2.5 pH ADJUSTERS:

2.5.1 Lime: Commercial grade hydrated limestone containing not less than 50 percent of total oxides, 25 percent calcium and 25 percent magnesium oxide, gradation, as follows: minimum 75 percent passing 100-mesh sieve and 100 percent passing 20-mesh sieve.

2.5.2 Aluminum Sulfate: Commercial grade.

2.6 Aluminum Sulfate: Commercial grade.

2.6 SOIL CONDITIONERS: Use singly or in combination as required to meet specified requirements for topsoil. Soil conditioners shall be nontoxic to plants.

2.6.1 Peat: Peat moss derived from a freshwater site and conforming to ASTM D 2607 as modified herein. Shred and granulate peat to pass 1/2 inch mesh screen and condition in storage pile for minimum six months after excavation.

2.6.2 Sand: Clean and free of materials harmful to plants.

2.6.3 Perlite: Horticultural grade.

2.6.4 Vermiculite: Horticultural grade.

2.6.5 Rotted Manure: Well rotted, horse or cattle manure containing maximum 25 percent by volume of straw, sawdust, or other bedding materials. It shall be free of stones, sticks, and soil.

2.6.6 Composted Wood Derivatives: Ground bark, sawdust, or other wood waste material free of stones, sticks, and soil stabilized with nitrogen and having the following properties:

2.6.6.1 Particle Size: Minimum percent by weight passing:

No. 4 mesh screen	95
No. 8 mesh screen	80

1.4.2.2 Do not store pesticides with other landscape materials.

1.4.2.3 Prior to stockpiling topsoil, treat growing vegetation with application of appropriate specified non-selective herbicide. Treat when foliage is 6 to 10 inches high and approximately 4 to 6 weeks prior to stockpiling.

1.4.3 Handling: Do not drop or dump materials from vehicles.

## PART 2 - PRODUCTS

### 2.1 SEED:

2.1.1 Classification: State-approved of the latest season's crop delivered in original sealed packages bearing the producer's guaranteed analysis for percentages of mixtures, purity, germination, weed seed content, and inert material. Label in conformance with USDA Federal Seed Act 53 Stat., Rules and Regulations and applicable state seed laws. Wet, moldy, or otherwise damaged seed will be rejected. Field mixes will be acceptable when mix is performed on site in the presence of the Contracting Officer.

2.1.2 Composition: Proportion seed mixtures by weight as follows:

Name of Grass or Legume	Min. Percent Pure Seed	Min. Percent Germination and Hard Seed	Max. Percent Weed Seed
Common Bermuda	97	85	1
*Rye	98	90	0.5

\*If planting is between 1 October and 1 February add Rye seed.

### 2.3 TOPSOIL

2.3.1 Existing Soil: Modify existing soil to conform to the requirements specified in the paragraph entitled, "Composition."

2.3.2 On-Site Topsoil: Reusable surface soil stripped and stockpiled on the site if requirements specified for topsoil in the paragraph entitled, "Composition" are met.

2.3.3 Off-Site Topsoil: Conform to requirements specified in the paragraph entitled, "Composition". Additional topsoil shall be furnished by the Contractor.

2.3.4 Composition: Containing from 5 to 20 percent organic matter as determined by the Organic Carbon, 6A, Chemical Analysis Method described in USDA Soil Survey Investigation Report No. 1. Maximum particle size, 3/4 inch,

1.3.2 Certificates of Conformance:

- a. Seed
- b. Fertilizer
- c. Topsoil
- d. Peat
- e. Lime
- f. Aluminum Sulfate
- g. Gypsum
- h. Perlite
- i. Vermiculite

1.3.3 Laboratory Test Reports: Tests for Topsoil Composition specified in USDA Soil Survey Investigation Report No. 1.

1.3.4 Manufacturer's Data: Including physical characteristics, application and installation instructions, and recommendations:

- a. Erosion Control Materials
- b. Pesticides

1.3.5 Delivery Schedule: Submit at least 10 days before delivery.

1.3.6 Pesticide Control Plan: Submit proposed sequence of pesticide work. Include common name, chemical composition, formulation, concentration, rate and method of application, for all materials furnished; and names of state certified applicator(s), in the appropriate category.

1.4 DELIVERY, STORAGE, AND HANDLING:

1.4.1 Delivery:

1.4.1.1 Protect seed from drying out and from contamination during delivery, on-site storage, and handling.

1.4.1.2 Deliver fertilizer and lime to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to state and Federal laws. Instead of containers, fertilizer and lime may be furnished in bulk with certificate indicating the above information.

1.4.1.3 Deliver pesticide materials to the site in the original unopened contains with legible label indicating Environmental Protection Agency (EPA) registration number and manufacturer's registered uses.

1.4.2 Storage:

1.4.2.1 Store seed, lime, and fertilizer in cool, dry locations away from contaminants.

SECTION 02930

TURF

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 Federal Specifications (Fed. Spec.):

O-E-241D Fertilizers, Mixed, Commercial.  
Q-E-166E Peat, Moss, Peat, Humus, and Peat, Reed-Sedge

1.1.2 U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) Occupational Safety and Health Standards:

29 CFR Air Contaminants  
1910.1000

1.1.3 U.S. Department of Agriculture (USDA) Publications:

Federal Seed Act (January 1, 1985 Edition) Rules and Regulations of the Secretary of Agriculture

Soil Survey Investigation Report No. 11, Soil Survey Laboratory Methods and Procedures for Collecting Soil Samples. Soil Conservation Service, April 1972

1.1.4 American National Standards Institute (ANSI) Publication:

ANSI Z88.2-80 Practices for Respiratory Protection

1.1.5 American Society for Testing Materials (ASTM) Publications:

D 977-84 Specification for Emulsified Asphalt  
D 2607-69 Classification of Peats, Mosses, Humus and Related Products

1.2 DEFINITION: Pesticide means soil fumigants, herbicides, insecticides and fungicides.

1.3 SUBMITTALS:

1.3.1 Samples: Two-8 by 10-inch swatches of erosion control material.

of AWWA C600 for hydrostatic testing. The amount of leakage on steel pipelines with mechanical joints shall not exceed 20 gallons per 24 hours per inch of pipe diameter per mile of pipeline; no leakage will be allowed at joints made by any other method. Test water service lines in accordance with the applicable requirements of AWWA C600 for hydrostatic testing. No leakage will be allowed at flanged joints and screwed joints.

6.3 Special Testing Requirements: For pressure test, use a hydrostatic pressure 50 psi greater than the maximum working pressure of the system, but not less than 200 psi. Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

\*\*\*END OF SECTION\*\*\*

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## 5.5.2 Metallic Piping:

5.5.2.1 Metallic Piping Installation, General: Install pipe and fittings in accordance with the general requirements for installation of pipelines and with the applicable requirements of AWWA C600 for pipe installation, except as otherwise specified in the other subparagraphs hereunder.

### 5.5.2.2 Jointing:

5.5.2.2.1 Screwed Joints: Make screwed joints up tight with a stiff mixture of graphite and oil, inert filler and oil, or an approved graphite compound; apply to male threads only. Threads shall be full cut; do not leave more than three threads on the pipe exposed after assembling the joint.

5.5.2.2.2 Flanged Joints: Make flanged joints up tight, taking care to avoid undue strain on flanges, valves, fittings, and accessories.

5.5.3 Connections to Ground Water Mains: Connect service lines 1-inch size to the main with a rigid connection and install a gate valve and flow meter on service line in well valve pit as indicated.

5.5.4 Protection of Buried Steel Service Line Piping: Except as otherwise specified in this paragraph, prepare, prime, and coat exterior surface of zinc-coated steel pipe and associated fittings to be buried with hot-applied coal-tar enamel with a bonded single layer of felt wrap in accordance with AWWA C203. For the felt wrap material, use fibrous-glass mat as specified in Appendix Sec. A2.1 of AWWA C203; use of asbestos felt will not be permitted. Use solvent wash only to remove oil, grease, and other extraneous matter from zinc-coated pipe and fittings.

5.6 Disinfection: Flush and disinfect new potable water lines and affected portions of existing potable water lines in accordance with AWWA C601. Apply chlorine by the continuous feed method.

## 6. FIELD TESTS AND INSPECTIONS:

6.1 Field Tests and Inspections, General: The Contracting Officer will conduct field inspections and witness all field tests specified in this section. The Contractor shall perform all field tests, and provide all labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when required, that any item of work has been constructed properly in accordance with the drawings and specifications.

6.2 Testing Procedure: Test water mains and water service lines in accordance with the applicable standard specified in this paragraph, except for the special testing requirements given in the following paragraph. Test ductile-iron water mains and water service lines in accordance with the requirements of AWWA C600 for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints shall not exceed the amounts given in AWWA C600; no leakage will be allowed at joints made by any other method. Test steel water mains in accordance with the applicable requirements

flanges, fittings, valves, and other equipment and accessories. Align bolt holes for each flanged joint. Use full size bolts for the bolt holes; use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted. Do not allow adjoining flange faces to be out of parallel to such degree that the flanged joint cannot be made watertight without over straining the flange. When any flanged pipe or fitting has dimensions that do not allow the making of a proper flanged joint as specified in this paragraph, replace it by one of proper dimensions.

### 5.3 Special Requirements for Installation of Steel Piping:

5.3.1 Installation, General: Install pipe and fittings in accordance with the general requirements for installation of pipelines and with the recommendations given for installation of pipe (pipe laying), and joint harness in AWWA Manual M11, except as otherwise specified in the other subparagraphs hereunder.

5.3.2 Jointing: Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations given for installation of pipe in AWWA Manual M11 and with the recommendations of the coupling manufacturer, as approved. Make flanged joints with the gaskets, bolts, and nuts previously specified for this type joint. Make flanged joints up tight, taking care to avoid undue strain on flanges, fittings, valves, and other equipment and accessories. Align bolt holes for each flanged joint. Use full size bolts for the bolt holes; use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted. Do not allow adjoining flange faces to be out of parallel to such degree that the flanged joint cannot be made watertight without over straining the flange. When any flanged pipe or fitting has dimensions that do not allow the making of a proper flanged joint as specified in this paragraph, replace it by one of proper dimensions. Finish joints on piping with coal-tar enamel coating by cleaning, priming, coating, and wrapping with a cold-applied tape coating conforming to and applied in accordance with AWWA C209.

### 5.4 Installation of Valves for Ground Water Mains:

5.4.1 Installation of Valves: Install globe and gate valves in accordance with the requirements of AWWA C600 for valve-and-fitting installation. Install check valves in accordance with the applicable requirements of AWWA C600 for valve-and-fitting installation. Make and assemble joints to gate valves and check valves as previously specified for making and assembling the same type joints between pipe and fittings.

### 5.5 Special Requirements for Installation of Well Service Piping:

5.5.1 Installation, General: Connect well service piping to the ground water main. Where the main has not been installed, terminate well service lines approximately 2 feet from the new main location at a point directed by the Contracting Officer; such well service lines shall be closed with plugs or caps.

unless sewer line is made of pressure pipe with rubber-gasketed joints and no joint is located within 3 feet horizontally of the crossing. Lay ground water lines which cross sewer force mains and inverted siphons at least 2 feet above these sewer lines; when joints in the sewer line are closer than 3 feet horizontally from the water line, encase these joints in concrete. Do not lay lines in the same trench with electric wiring.

5.1.2 Earthwork: Do earthwork in accordance with Section 02225, "Excavation, Backfilling, and Compaction for Utilities."

5.1.3 Pipe Laying and Jointing: Pipe, fittings, valves, and accessories will be carefully inspected by the Contracting Officer before and after installation and those found defective will be rejected. Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other ground water line material into trenches. Cut pipe accurately to measurements established at the site and work into place without springing or forcing. Replace by one of the proper dimensions any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Grade the pipeline in straight lines, taking care to avoid the formation of any dips or low points. Support pipe at its proper elevation and grade, taking care to secure firm and uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate joints, and couplings. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each day's work, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather are unsuitable.

5.1.4 Installation Beneath Railroad Right-of-Way: Where pipeline passes under the right-of-way of a commercial railroad, install piping in accordance with the specifications for pipelines conveying non-flammable substances in Chapter 1, Part 5, of AREA Manual for Railway Engineering.

## 5.2 Special Requirements for Installation of Ductile-Iron Piping:

5.2.1 Installation, General: Install pipe and fittings in accordance with the general requirements for installation of pipelines and with the requirements of AWWA C600 for pipe installation, joint assembly, and valve-and-fitting installation, except as otherwise specified in the other subparagraphs hereunder.

5.2.2 Jointing: Make mechanical joints with the gaskets, glands, bolts, and nuts previously specified for this type joint; assemble these joints in accordance with the applicable requirements of AWWA C600 for joint assembly and with the recommendations of Appendix A to AWWA C111/A21.11. Make flanged joints with the gaskets, bolts, and nuts previously specified for this type joint. Make flanged joints up tight; taking care to avoid undue strain on

4.3.3 Flow Meter: AWWA C701 turbine type, ductile iron body, flanged end connections, gpm readout, unless otherwise indicated.

4.3.4 Globe valves on ground water mains shall be Class 125; cast iron body per ASTM A-126 GR B; bronze trim per ASTM B-62; 125 lb flat face flanged connections; bolted bonnet; OS & Y.

Globe valves on well service lines shall be Class 800 forged carbon steel per ASTM A-105, bolted bonnet, OS&Y, conventional port opening; screwed ends.

4.3.5 Sleeve-type Mechanical Couplings: Couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects; the design shall be such as to provide for confinement and compression of the gaskets. For steel piping, the middle ring shall be of steel and the follower rings shall be of steel or malleable iron. Malleable iron shall conform to ASTM A 47. Steel shall have a strength not less than that of the pipe. Gaskets shall be designed for long life and resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in AWWA C111/A21.11. Bolts shall be track-head type; bolts and nuts shall be either of the following: bolts conforming to the tensile requirements of ASTM A 307, Grade A, with nuts conforming to the tensile requirements of ASTM A 563, Grade A; or round-head square-neck type bolts conforming to ANSI B18.5 with hex nuts conforming to ANSI B18.2.2. Bolts shall be 5/8 inch in diameter; minimum number of bolts for each coupling shall be 3 for 2-inch pipe. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint.

4.3.6 Orifice Union: Orifice union shall be for a 1-inch pipe and shall have an orifice diameter of 1/4 inch. The union shall be 3000 lb., screwed ends, 1 " NPT conforming to ASTM A105.

## 5. INSTALLATION OF PIPELINES:

5.1 General Requirements: These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements..." paragraphs hereunder.

5.1.1 Location of Ground Water Lines: Where the location of the ground water line is not clearly defined by dimensions on the drawings, do not lay ground water line closer horizontally than 10 feet from any sewer line. Where ground water lines cross under gravity sewer lines, encase sewer line fully in concrete for a distance of at least 10 feet on each side of the crossing,

#### 4.1.2.4 Lining and Coating:

4.1.2.4.1 Coal-Tar Enamel Coating: Except as otherwise specified in this paragraph, piping shall be prepared, primed, and coated with hot-applied coal-tar enamel with a bonded single layer of felt wrap in accordance with AWWA C203. Asbestos felt shall not be used; felt material shall be fibrous-glass mat as specified in Appendix Sec. A2.1 of AWWA C203. Coating shall be shop-applied.

4.1.3 Piping Beneath Railroad Right-of-Way: Where pipeline passes under the right-of-way of a commercial railroad, piping shall conform to the specifications for pipelines conveying non-flammable substances in Chapter 1, Part 5 of AREA Manual for Railway Engineering, except as otherwise specified in this paragraph. For casing pipe provide steel pipe as specified in Section 02225.

4.2 Piping Materials for Well Service Lines: Where pipe sections made of dissimilar metals are to be joined, an insulating joint as specified below in paragraph, "Insulating Joints," shall be provided.

4.2.1 Steel Pipe and Associated Fittings: Pipe shall conform to ASTM A 120, Standard Weight, zinc-coated. Fittings shall conform to Fed. Spec. WW-P-501, Type II, Class 125; or to Fed. Spec. WW-P-521, Type II, threaded.

4.2.2 Insulating Joints: Joints between pipe of dissimilar metals shall have a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact between adjacent sections of piping.

#### 4.3 Valves, and Other Accessories:

4.3.1 Gate Valves: Valves shall conform to Fed. Spec. WW-V-58 or to UL 262. Except as otherwise specified in this paragraph, valves conforming to Fed. Spec. WW-V-58 shall be Design OSY, Type II, Class 1, and End Connection F. Except as otherwise specified in this paragraph, valves conforming to UL 262 shall be outside-screw-and-yoke type, shall have split wedge or double disc type gate and flanged end connections, and shall be designed for a hydraulic working pressure of 175 psi. Valves shall be provided with handwheels and shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair.

4.3.2 Check Valves: Valves shall be swing-check type conforming to Mil. Spec. MIL-V-18436 or to UL 312. Valves conforming to Mil. Spec. MIL-V-18436 shall be Type III, Group B or Group C, Trim 2 or Trim 5, and Class 125 or Class 175 for Group B valves and Class 1560 for Group C valves. Valves conforming to UL 312 shall have cast iron or steel body and cover and shall be designed for a working pressure of 175 psi. Valves shall have clear port opening. Valves shall have flanged ends where indicated.

to the requirements specified therein for "Special Sections." Wall thickness for pipe and fittings shall be as specified in the following paragraph. Pipe and fittings shall have coal-tar enamel coating. Ends of pipe and fittings shall be suitable for the joints and jointing materials used.

4.1.2.2 Wall Thickness for Pipe and Fittings: Wall thickness of steel pipe and fittings shall be determined by the manufacturer of the pipe and shall be calculated in the following manner. Design shall be for the following minimum conditions:

Pressure rating	150 psi
Earth cover	5 feet
Water hammer	40 percent of pressure rating
Live load	AASHTO H-20 truck loading
Allowable deflection	2 percent of nominal pipe diameter

Pipe wall thickness shall be calculated on the basis of an allowable fiber stress in the steel equal to 50 percent of the minimum yield strength of the steel used in the manufacture of the pipe; but in no case shall the pipe wall thickness be less than that listed in AWWA Manual M11, Chapter 3, "Standards for Steel Pipe." Design procedure shall be in accordance with the methods given in AWWA Manual M11, except that the value of E', modulus of soil reaction, shall be 1000. Design calculations for the pipe shall be submitted for approval. Pipe manufacturing shall not begin until calculations have been approved. Wall thickness of fittings shall be not less than that required for the pipe. All fittings shall be designed to withstand the hydrostatic pressure test specified herein in paragraphs, "Testing Procedure;" and "Special Test Requirements." When necessary to meet the pressure test requirements, fittings shall be suitably reinforced in accordance with methods given in AWWA Manual M11.

#### 4.1.2.3 Joints and Jointing Materials;

4.1.2.3.1 Joints, General: Joints for pipe and fittings shall be the mechanically coupled type using a sleeve-type mechanical coupling, except as otherwise indicated. Joints shall be flanged joints where indicated.

4.1.2.3.2 Mechanically Coupled Joints Using a Sleeve-Type Mechanical Coupling: Sleeve-type mechanical couplings shall be as specified in paragraph, "Sleeve-Type Mechanical Couplings."

4.1.2.3.3 Flanged Joints: Pipe ends shall be provided with steel flanges conforming to AWWA C207; flanges shall be Class D. Bolts and nuts for flanged connections shall conform to the requirements specified in AWWA C207. Gaskets shall be rubber as specified in AWWA C207; asbestos gaskets will not be allowed.

performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

### 3. DELIVERY, STORAGE, AND HANDLING OF MATERIALS:

3.1 Delivery and Storage: Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

3.2 Handling: Handle pipe, fittings, valves, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry pipe to the trench; do not drag it. Do not leave rubber gaskets that are not to be installed immediately out in the sunlight, but store under cover out of direct sunlight. Handle steel pipe with coal-tar enamel coating in accordance with the provisions for handling coal-tar-enamel coated pipe in AWWA C203.

### 4. MATERIALS

#### 4.1 Piping Materials for Water Distribution Mains:

##### 4.1.1 Ductile-Iron Piping:

4.1.1.1 Pipe and Fittings: Ductile-iron pipe shall conform to AWWA C151 and shall be Thickness Class 50 minimum. Flanged pipe shall conform to AWWA C115/A21.15. Fittings shall conform to AWWA C110. Fittings shall have pressure rating at least equivalent to that of the pipe. Ends of pipe and fittings shall be suitable for the joints specified in the following paragraph. Pipe and fittings shall have cement mortar lining conforming to AWWA C104/A21.4, standard thickness.

##### 4.1.1.2 Joints and Jointing Material:

4.1.1.2.1 Joints, General: Joints for pipe and fittings shall be mechanical-joints except as otherwise indicated. Joints shall be flanged joints where indicated.

4.1.1.2.2 Mechanical Joints: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets shall conform to AWWA C111/A21.11.

4.1.1.2.3 Flanged Joints: Bolts, nuts, and gaskets for flanged connections shall be as recommended in the Appendix to AWWA C115/A21.15.

##### 4.1.2 Steel Water Main Piping:

4.1.2.1 Pipe and Fittings: Pipe shall conform to AWWA C200. Fittings shall conform to AWWA C208 and to AWWA C200, with special reference

1983 Detailing for Steel Construction  
1984 Engineering for Steel Construction

1.1.7 American Society for Testing and Materials (ASTM) Publications:

A 36-81a Structural Steel  
A 53-84a Pipe, Steel, Black and Hot-Dipped, Zinc-Coated  
Welded and Seamless  
A 108-81 Steel Bars, Carbon, Cold Finished, Standard Quality  
A 123-78 Zinc (Hot-Galvanized) Coatings on Products  
Fabricated From Rolled, Pressed, and Forged Steel  
Shapes, Plates, Bars, and Strip  
A 153-82 Zinc Coating (Hot-Dip) on Iron and Steel Hardware  
A 307-84 Carbon Steel Externally Threaded Standard Fasteners  
A 325-84 High-Strength Bolts for Structural Steel Joints  
A 370-77 Mechanical Testing of Steel Products  
A 490-83a Heat-Treated Steel Structural Bolts, 150 ksi Minimum  
Tensile Strength  
A 500-84 Cold-Formed Welded and Seamless Carbon Steel  
Structural Tubing in Rounds and Shapes  
A 501-84 Hot-Formed Welded and Seamless Carbon Steel  
Structural Tubing  
A 563-84 Carbon and Alloy Steel Nuts  
A 588-84a High-Strength Low-Alloy Structural Steel with 50 ksi  
(345 MPa) Minimum Yield Point to 4 in. (100 mm)  
Thick  
A 618-84 Hot-Formed Welded and Seamless High-Strength Low-  
Alloy Structural Tubing  
C 827-82 Early Volume Change of Cementitious Mixtures  
F 436-84 Hardened Steel Washers

1.1.8 American Welding Society, Inc. (AWS) Publication:

D1.1-84 Structural Welding Code - Steel

1.1.9 Steel Structures Painting Council (SSPC) Publications:

PS 8.01-82	One-Coat Rust Preventive Painting System With Thick-Film Compounds
SP 3-82	Power Tool Cleaning
SP 6-82	Commercial Blast Cleaning

1.2 DESCRIPTION OF WORK: The work includes the fabrication, erection, and shop painting of structural steel. Provide in accordance with AISC "Manual of Steel Construction" except as specified herein. In the AISC "Manual of Steel Construction" referred to herein, the "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings," the "Code of Standard Practice for Steel Buildings and Bridges," and "Structural Joints Using ASTM A 325 or A 490 Bolts" shall be considered a part thereto.

1.3 SUBMITTALS:

1.3.1 Shop Drawings: Submit for approval by the Contracting Officer prior to fabrication. Prepare in accordance with the AISC "Detailing for Steel Construction" and AISC "Engineering for Steel Construction." Shop drawings shall not be reproductions of contract drawings. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Use AWS standard welding symbols.

1.3.2 Erection Plan: Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing, and a detailed sequence of welding, including each welding procedure required.

1.3.3 Manufacturer's Certificates of Compliance:

- a. Steel
- b. Bolts, nuts, and washers
- c. Shop painting materials
- d. Welding electrodes and rods
- e. Nonshrink grout
- f. Galvanizing
- g. Pins and rollers

1.3.4 Welder, Welding Operation, and Tacker Qualification: Prior to welding, submit certification for each stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests.

1.4 DELIVERY AND STORAGE: Handle, store, and protect materials in accordance with the manufacturer's recommendations. Replace damaged items with new items, or repair as approved by the Contracting Officer.

PART 2 - PRODUCTS

2.1 STEEL:

2.1.1 Structural Steel: ASTM A 36.

2.1.2 Structural Steel Tubing: ASTM A 500, Grade B.

2.1.3 Steel Pipe: ASTM A 53, Type E or S, Grade B, Standard weight class, ASTM A 501.

2.2 BOLTS, NUTS, AND WASHERS: Provide the following unless indicated otherwise.

~~2.2.1 Structural Steel, Steel Pipe:~~

~~2.2.1.1 Bolts: ASTM A 307, Grade A; ASTM A 325, Type 1 or 2.~~

~~2.2.1.2 Nuts: ASTM A 563, Grade A, heavy hex style, except nuts under 1-1/2 inch may be provided in hex style.~~

~~2.2.1.3 Washers: ANSI B18.22.1, Type B.~~

2.2.2 High-Strength Structural Steel, Structural Steel Tubing:

2.2.2.1 Bolts: ASTM A 325, Type 1 or 2; ASTM A 490, Type 1 or 2.

2.2.2.2 Nuts: ASTM A 563, Grade and Style as specified in the applicable ASTM bolt standard.

2.2.2.3 Washers: ASTM F 436, plain carbon steel.

2.2.3 Load Indicator Bolts: ASTM A 325, Type 1; ASTM A 490, Type 1, with a manufactured notch between the bolt tip and threads. The bolt shall be designed to react to the opposing rotational torques applied by the installation wrench, with the bolt tip automatically shearing off when the proper tension is obtained.

2.2.4 Load Indicator Washers: ASTM A 325, Type 1; ASTM A 490, Type 1 or 2 steel washer manufactured with protrusions on one face of the washer and designed for use with high-strength bolts. As the bolt is tightened, the washer protrusions shall partially flatten to a specified gap, indicating the design bolt tension has been obtained.

2.3 SHOP PAINTING:

2.3.1 Pretreatment: Mil. Spec. DOD-P-15328 OR Fed. Spec. TT-C-490, Type I, II, or IV.

2.3.2 Primer: Fed. Spec. TT-P-645.

2.3.3 Rust Preventive: SSPC PS 8.01, suitable for temporary protection.

#### 2.4 STRUCTURAL STEEL ACCESSORIES:

2.4.1 Welding Electrodes and Rods: AWS D1.1.

2.4.2 Nonshrink Grout: COE CRD-C-621, with no ASTM C 827 shrinkage. Grout shall be nonmetallic.

2.4.3 Welded Shear Stud Connectors: ASTM A 108, Grade 1015, 1018, or 1020, cold drawn bars, semi or fully killed. Finished studs shall not contain injurious laps, fins, seams, cracks, twists, bends, and other injurious defects, and shall provide the following ASTM A 370 properties:

Tensile strength (min.)	60,000 psi
Yield strength (min.)	50,000 psi
Elongation (min.)	20 percent in 2 inches.
Area Reduction (min.)	50 percent

### PART 3 - EXECUTION

#### 3.1 FABRICATION:

3.1.1 Markings: Prior to erection, members shall be provided with a painted erection mark. In addition, connecting parts assembled in the shop for reaming holes in field connections shall be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded or on surfaces of weathering steels that will be exposed in the completed structure. Do not locate match markings in areas that will decrease member strength or cause stress concentrations.

3.1.2 Shop Painting: Shop paint structural steel, except as modified herein. Do not paint steel surfaces embedded in concrete, galvanized surfaces, bearing surfaces, or surfaces within 1/2 inch of the toe of the welds prior to welding except surfaces on which metal decking or shear studs are to be welded. Prior to assembly, paint surfaces which will be concealed or inaccessible after assembly. Do not apply paint in foggy or rainy weather; when the ambient temperature is below 45 degrees F or over 95 degrees F; or when paint may be exposed to temperatures below 40 degrees F within 48 hours after application, unless approved otherwise.

3.1.2.1 Cleaning: SSPC SP 6, except as modified herein. SSPC SP 3 or SP 6 for steel surfaces exposed in spaces above ceilings, attic spaces, crawl spaces, furred spaces, and chases. In addition, maintain steel surfaces free from rust, dirt, oil, grease, and other contaminants through final assembly.

3.1.2.2 Pretreatment: Immediately after cleaning, provide the metal surfaces with one coat of Mil. Spec. DOD-P-15328 pretreatment to a dry film thickness of 0.3 to 0.5 mil. Fed. Spec. TT-C-490 pretreatment may be applied to SSPC SP 6 cleaned surfaces, in accordance with Fed. Spec. TT-C-490.

3.1.2.3 Priming: Immediately after the pretreatment coating has dried, apply primer to a minimum dry film thickness of 2.0 mil. Repair damaged primed surfaces with an additional coat of primer.

3.1.3 Bearing Surfaces and Friction Type Joints: In the shop, coat with a temporary rust preventive. Remove coating, as recommended by the coating manufacturer, immediately prior to field erection.

3.2 ERECTION: Except when load indicator bolts or washers are used, calibration wrenches shall be calibrated every two working days on a minimum of three typical bolts of each diameter. Provide for drainage in structural steel.

3.2.1 Base Plates and Bearing Plates: After final positioning of steel members, provide full bearing under plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer's instructions.

3.3 CONNECTIONS: Connections not detailed shall be designed in accordance with AISC "Manual of Steel Construction." Build connections into existing work. Do not tighten anchor bolts set in concrete with impact torque wrenches. Punch, subpunch and ream, or drill bolt and pin holes.

3.4. WELDING: AWS D1.1. Provide AWS D1.1 qualified welders, welding operators, and tackers.

3.4.1 Removal to Temporary Welds, Run-Off Plates, and Backing Strips: Remove only from finished areas.

3.5 HIGH-STRENGTH STRUCTURAL JOINTS: AISC "Manual of Steel Construction" for designing, assembling, and testing.

3.5.1 Installation of Load Indicator Washers (LIW): Install the LIW under the bolt head and tighten the nut where possible. If the LIW is installed adjacent to the turned element, provide a flat ASTM F 436 washer between the LIW and nut when the nut is turned for tightening and between the LIW and bolt head when the bolt is turned for tightening.

3.6 TESTS AND INSPECTIONS: Perform field tests and provide labor, equipment, and incidentals required for testing except that electric power for field tests will be furnished as set forth in Division 1.

3.6.1 Welds:

3.6.1.1 Visual Inspection: AWS D1.1, Section 6. Provide AWS-certified welding inspectors for fabrication/erection inspection and testing and verification inspections. Welding inspectors shall visually inspect and mark welds, including fillet weld end returns.

3.6.1.2 Nondestructive Testing: AWS D1.1. Test locations shall be selected by the Contracting Officer. If more than 20 percent of welds made by a welder contain defects identified by testing, then all welds made by

that welder shall be tested by radiographic or ultrasonic testing, as approved by the Contracting Officer. When all welds made by an individual welder are required to be tested, magnetic particle testing shall be used only in areas inaccessible to either radiographic or ultrasonic testing. Retest defective areas after repair.

3.6.1.2.1 Testing Frequency: Provide the following types and number of tests:

<u>Test Type</u>	<u>Number of Tests</u>
Radiographic	0
Ultrasonic	5
Magnetic Particle	0
Dye Penetrant	0

\*\*\* END OF SECTION \*\*\*

SECTION 05311

STEEL ROOF DECKING

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1. American Iron and Steel Institute (AISI) Publication:

Specification for the Design of Cold-Formed Steel Structural Members (1980 Edition)

1.1.2 - American Society for Testing and Materials (ASTM) Publication:

A-525-81. General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

1.1.3 American Welding Society (AWS) Publication:

D1.3-80 Welding Sheet Steel in Structures

1.1.5 Steel Deck Institute (SDI) Publication:

SDI-82 Design Manual for Composite Decks, Form Decks and Roof Decks

SDI-Jan 81 Diaphragm Design Manual, First Edition

1.2 SUBMITTALS:

1.2.1 Samples: Submit for approval one sample of the proposed deck units and each type of accessory, along with the manufacturer's design calculations, before work is started.

1.2.2 Shop Drawings: Submit shop drawings for all deck units and accessories before work is started. The drawings shall show a large-scale cross-sectional detail of the decking, various connections, bearing on structural supports, methods of anchoring, attachment of accessories, roof layout(s), placement directions, and other pertinent details.

1.2.3 Certificates of Conformance or Compliance: Submit for approval certificates from the manufacturer showing the seismic shear test results and the seismic flexibility of the diaphragm. Certification shall include a statement that the deck diaphragm will perform with diaphragm action when installed as shown on the shop drawings.

1.3 DELIVERY AND STORAGE: Deliver, store and handle steel deck in a manner to protect it from corrosion, deformation, and other types of damage.

Exercise special care not to damage the material or overload the decking during the entire construction period. The maximum uniform distributed storage load shall not exceed the design live load. All damaged material shall be replaced by the Contractor.

## PART 2 - PRODUCTS

### 2.1 DESIGN:

2.1.1 Steel Roof Deck: Designed in accordance with the AISI "Specifications for the Design of Cold-formed Steel Structural Members," except as specified otherwise herein. Do not use stiffening grooves in the top surface of ribs for roof decks which are to receive insulation. Avoid simple short spans; extend deck units over three or more supports unless absolutely impractical. Deck and accessories shall be the products of a manufacturer regularly engaged in the manufacture of steel roof decking. Additionally, design short span ribbed deck, characterized by longitudinal bearing ribs having a depth of less than 3 inches, in accordance with SDI Design Manual for Composite Decks, Form Decks and Roof Decks, except as specified otherwise herein. The deck shall be capable of resisting the seismic shear and within the flexibility category indicated.

2.1.2 Design Loads: Design roof deck to support a live load of 20 pounds per square foot; assume dead load as 10 psf. Maximum allowable deflection under total loading shall be 1/240 of the clear span. Roof deck having a cross-sectional configuration that differs from the units indicated may be used, provided that the properties of the proposed units are equal to, or greater than, the properties of the units indicated. Design side edges of deck units to lap or interlock with adjoining deck units.

### 2.2 MATERIALS:

2.2.1 Steel: Flat rolled carbon steel sheets of structural quality, properties conforming to AISI "Specifications for the Design of Cold-Formed Steel Structural Members."

2.2.2 Zinc-coated Steel: Provide zinc-coated steel deck and accessories conforming to ASTM A 525 G90. Zinc-coated steel will not require shop painting.

2.2.3 Accessories: Provide accessories of the same material as the deck and not lighter than 20-gage, unless specified otherwise herein. Provide manufacturer's standard type accessories, as specified herein.

2.2.3.1 Adjusting Plates: Provide adjusting plates or segments of roof units in locations too narrow to accommodate full-size roof units. As far as practicable, provide plates of the same gage and configuration as the roof units. Factory cut plates of predetermined sizes.

2.2.3.2 End Closures: Provide end closures of minimum 22 gage to close the open ends at eaves.

2.2.3.3 Cover Plates: Provide butt cover plates, underlapping sleeves; or 2 inches wide noncombustible, pressure sensitive tape at end joints between adjoining nonlapping units.

2.2.3.4 Miscellaneous Accessories: Provide cant strips, ridge and valley plates, and various types of plates and closures as indicated or as necessary to complete the work. Provide all accessories required for a finished installation.

### PART 3 - EXECUTION

3.1 INSPECTION OF SUPPORT STRUCTURE: Prior to starting installation of any steel roof deck and accessories, inspect the support structure to verify that the structure will permit the indicated field installation of the steel roof deck system without modification.

3.2 INSTALLATION: Install steel roof deck units in accordance with approved shop drawings. Place units on structural supports, properly adjusted, leveled, and aligned at right angles to supports. Report inaccuracies in alignment or leveling to the Contracting Officer and make necessary corrections before deck units are anchored permanently in place. Locate end laps over supports only, with minimum lap of 2 inches. Do not use unanchored deck units as a work or storage platform. Permanently anchor all units placed by the end of each working day.

#### 3.2.1 Anchorage Methods:

3.2.1.1 Non-Diaphragm Action Decks: Immediately after placement and alignment, and after inaccuracies have been corrected, permanently fasten steel roof deck units in place by self-drilling screws. Use methods as recommended by the Steel Deck Institute, subject to approval. Length of side and end laps of deck and intervals of fastening shall be as recommended by the steel deck manufacturer. Clamp or weight deck units to provide firm contact between deck units and structural supports while welding or fastening is being performed.

3.2.1.1.1 Fasteners - Screwed: Designed fasteners for anchoring the deck to structural supports and adjoining units to withstand the design loads specified herein; standard with the Steel Deck Institute and the manufacturer. Provide fasteners of a positive locking type; approved prior to installation.

3.2.2 Diaphragm Action Decks: Design fasteners for anchoring the decking to the structural supports and adjoining units to withstand the design loads specified herein. Size and spacing of attachments shall conform to the requirements of the Steel Deck Institute Diaphragm Design Manual.

3.2.3 Accessories: Install cover plates, adjusting plates, finish strips, closures and closure sheets as necessary to complete the work. Install finish strips and closure sheets so as to lap one support a minimum of 2 inches.

3.2.4 Openings: Reinforce and frame openings through roof as necessary for rigidity and load-carrying capacity. Holes or other openings required for the work of other trades shall be drilled or cut and adequately reinforced by the respective trade; such holes or other openings larger than 6 inches in diameter shall be approved by the deck manufacturer.

3.2.5 Inspection: Inspect the decking top surface for flatness after installation. The top flanges of each sheet must be flat with no concavity or convexity which exceeds 1/16-inch (1.58 mm). A straight edge placed across any three contact surfaces shall not leave a gap of more than 1/16-inch between the straight edge and any point of the contact surface, corrective measures or replacement shall be provided. Reinspect the decking after corrective measures or replacement has been performed.

\*\*\* END OF SECTION \*\*\*

SECTION 16011

ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 Federal Specification (Fed. Spec.):

L-P-387A Plastic Sheet, Laminated, Thermosetting (for  
& Int. Am. 2 Design Plates)

1.1.2 American National Standards Institute (ANSI) Publications:

Z35.1-72 Accident Prevention Signs

1.1.3 Institute of Electrical and Electronics Engineers (IEEE)  
Publication:

100-1984 Standard Dictionary of Electrical and  
Electronics Terms

1.1.5 National Fire Protection Association (NFPA) Publication:

70B-83 Electrical Equipment Maintenance

1.2 APPLICATION: This section applies to all sections of Division 16, "Electrical," of this project except as specified otherwise in each individual section.

1.3 DEFINITION OF ELECTRICAL TERMS: Unless otherwise specified or indicated, electrical terms used in these specifications, and on the drawings, shall be as defined in IEEE Standard No. 100.

1.4 SUBMITTALS: Obtain approval before procurement, fabrication, or delivery of items to the job site. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Military, Industry, and technical society publication references, and other information necessary to establish contract compliance of each item to be furnished.

1.4.1 Shop Drawings: In addition to the requirements specified elsewhere, shop drawings shall meet the following requirements. Drawings shall be a minimum of 8.5 inches by 11 inches in size, except as specified otherwise. Drawings shall include complete ratings information, wiring

diagrams, and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to assure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. If equipment is disapproved, revised drawings to show acceptable equipment and resubmit.

1.4.2 Manufacturer's Data: Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts.

1.4.3 Publication Compliance: Where equipment or materials are specified to conform to industry and technical society publications of organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), and Underwriters Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. In lieu of the label or listing, submit a certificate from an approved independent testing organization, adequately equipped and competent to perform such services, stating that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's publication.

1.4.4 Certified Test Reports: Furnish as specified in Section 01401, "Quality Control".

1.4.5 Certificates of Compliance: Submit manufacturer's certifications as required on products, materials, finish, and equipment indicated in the technical sections. Certifications shall be documents prepared specifically for this contract. Preprinted certifications and copies of previously submitted documents will not be acceptable. The manufacturer's certifications shall name the appropriate products, equipment, or materials and the publication specified as controlling the quality of that item. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; or "equal or exceed the service and performance of the specified materials." Certifications shall simply state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance.

1.5 OPERATION AND MAINTENANCE MANUAL: Submit as required for systems and equipment indicated in the technical sections. Furnish three copies,

bound in hardback binders or an approved equivalent. Furnish one complete manual prior to performance of systems or equipment tests, and furnish the remaining manuals prior to contract completion. Inscribe the following identification on the cover: the words "OPERATION AND MAINTENANCE MANUAL," the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment. Include a table of contents and assemble the manual to conform to the table of contents, with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include:

- a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the system or equipment.
- b. A control sequence describing startup, operation, and shutdown.
- c. Description of the function of each principal item of equipment.
- d. Installation and maintenance instructions.
- e. Safety precautions.
- f. Diagrams and illustrations.
- g. Testing methods.
- h. Performance data.
- i. Parts list. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
- j. Appendix: List qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.

1.6 POSTED OPERATING INSTRUCTIONS: Furnish approved operating instructions for systems and equipment indicated in the technical sections for use by operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal system and equipment. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions as directed. Attach or post operating instructions adjacent to each principal system and equipment including startup, proper adjustment, operating, lubrication, shutdown, safety precautions, procedure in the event of equipment failure, and other items of instruction as recommended by the manufacturer of each system or equipment. Provide weather-resistant materials or weatherproof enclosures for operating instructions exposed to the weather. Operating

instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.7 INSTRUCTION TO GOVERNMENT PERSONNEL: Where indicated in the technical sections, furnish the services of competent instructors to give full instruction to Government personnel in the adjustment, operation, and maintenance of systems and equipment, including pertinent safety requirements as required. Each instructor shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours) of instruction furnished shall be as specified in each individual section.

1.8 DELIVERY AND STORAGE: Handle, store, and protect equipment and materials in accordance with the manufacturer's recommendations and with the requirements of NFPA 70B; Appendix I, titled "Equipment Storage and Maintenance During Construction." Replace damaged or defective items with new items.

1.9 CATALOGED PRODUCTS/SERVICE AVAILABILITY: Materials and equipment shall be current products by manufacturers regularly engaged in the production of such products. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The 2-year period shall be satisfactorily completed by a product for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished. The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.10 MANUFACTURER'S RECOMMENDATIONS: Where installation procedures or any part thereof are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendations shall be cause for rejection of the equipment or material.

1.11 MOTORS AND MOTOR CONTROLS FOR MECHANICAL EQUIPMENT: The electrical components of mechanical equipment, such as motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, and other devices functioning to control mechanical equipment, and control wiring and conduit for circuits rated 100 volts or less, are specified in the section covering the associated mechanical equipment, rather than in

Division 16. The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, and the electrical power circuits shall be furnished and installed under Division 16.

## PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT: All materials, equipment, and devices shall, as a minimum, meet the requirements of UL where UL standards are established for those items, and the requirements of NFPA 70. All items shall be new unless specified or indicated otherwise.

2.2 NAMEPLATES: Fed. Spec. L-P-387. Provide laminated plastic nameplates for each panelboard, equipment enclosure, relay, switch, and device. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125-inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the black core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be a minimum of 0.25-inch high normal block style.

2.3 WARNING SIGNS: ANSI Z35.1. Provide warning signs for the enclosures of electrical substations, transformers, and switchgear having a nominal rating exceeding 600 volts; when such equipment is guarded by a fence, mount signs on the fence. Provide metal signs with the legend "DANGER HIGH VOLTAGE KEEP OUT" printed in three lines of nominal 3-inch high letters.

\*\*\* END OF SECTION \*\*\*

SECTION 16301

UNDERGROUND ELECTRICAL WORK

PART 1 - GENERAL

1.1 PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the test by the basic designation only.

1.1.1 Underwriters Laboratories Inc. (UL) Publications:

6-1981	Rigid Metallic Conduit (August, 1986)
467-1984	Grounding and Bonding Equipment (November, 1986)
510-1982	Insulating Tape (October, 1986)
514A-1983	Metallic Outlet Boxes (February, 1987)
651-1988	Schedule 40 and 80 Rigid PVC Conduit
854-1979	Service Entrance Cables (February, 1987)

1.1.2 National Electrical Manufacturers Association (NEMA) Publications:

RN1-1986	PVC Externally Coated Rigid Galvanized Steel Conduit and Electrical Metallic Tubing
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1.1.3 American National Standards Institute (ANSI) Publication:

C2-1987	National Electrical Safety Code (NESC)
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1.1.4 National Fire Protection Association (NFPA) Publication:

70-1987	National Electrical Code (NEC)
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1.1.5 American Society for Testing and Materials (ASTM) Publications:

A123-84	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A153-82	Zinc Coating (Hot-Dip) on Iron and Steel Hardware

1.2 GENERAL REQUIREMENTS: Section 16011, ELECTRICAL GENERAL REQUIREMENTS, applies to this section with additions and modifications specified herein.

1.2.1 Code Compliance: The work shall comply with the requirements of NFPA-70 and ANSI C2.

1.2.2 Verification of Dimensions: The Contractor shall verify dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing the work.

1.2.3 Prevention of Corrosion: Metallic materials shall be protected against corrosion. Aluminum shall not be used in contact with earth or concrete. Ferrous metal hardware and other items shall be hot-dip galvanized in accordance with ASTM A123 or ASTM A153.

1.3 SUBMITTALS: The following information shall be submitted for approval.

1.3.1 Catalog Information:

Pull Boxes  
Conduit (each type)  
Insulating Tape  
Low Voltage Wire & Cables  
Cable Lubricants  
Low Voltage Terminals and Lugs

1.3.2 Manufacturer's Instructions

a. Terminator/splice manufacturer's installation instructions.

## PART 2- PRODUCTS

2.1 MATERIALS AND EQUIPMENT GENERAL: Provide materials and equipment listed by UL or approved by Factory Mutual (FM) System, when such equipment is listed or approved.

2.2 CONDUIT:

2.2.1 Rigid Metal Conduit: UL 6, hot-dip galvanized, threaded type.

2.2.2 Outlet boxes for Use with Steel Conduit and Rigid: Shall be cast metal with gasketed closures conforming to UL 514A.

2.2.3 Rigid Plastic Conduit for Underground Use: UL 651, Schedule 40 PVC.

2.3 TAPE: Plastic insulating tape shall conform to the requirements of UL 510.

2.4 WIRE AND CABLE: Conductor and conduit sizes indicated or for copper conductors unless otherwise noted. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be used.

2.4.1 Conductors: All conductors shall be copper.

2.4.2 Low Voltage Wire and Cable: UL 854, Type THWN, 600-volt.

2.4.3 Pull Wire: Shall be nylon or plastic having minimum tensile strength of 200 lbs. Minimum 24 inches of slack shall be left at each end of pull wires.

2.4.4 Grounding and Bonding Equipment: Shall conform to UL 467. Ground rods shall be copper-clad steel with diameter adequate to permit driving to full length of the rod, but not less than 3/4 inches in diameter. Each rod shall be an assembly of 10 feet long sectional rods coupled together, having the total length as indicated.

2.5 CONCRETE: For electrical requirements shall be at least 3000 psi concrete with one-inch maximum aggregate conforming to the requirements of Division 3 of these specifications.

2.6 HAZARDOUS LOCATIONS: Electrical materials, equipment, and devices for installation in hazardous locations, as defined by NFPA 70, shall be specifically approved by Underwriters' Laboratories, Inc., or Factory Mutual for the particular "Class," "Division," and "Group" of hazardous locations involved. All equipment shall be suitable for Class 1 Division 2 and weatherproof service.

### PART 3- EXECUTION

3.1 GENERAL: Installation shall conform to ANSI C2 and NFPA 70 except as otherwise specified or indicated.

3.1.1 Hazardous Locations: Work in hazardous locations, as defined by NFPA 70, shall be performed in strict accordance with NFPA 70 for the particular "Class," "Division," and "Group" of hazardous locations involved. Provide conduit and cable seals where required by NFPA 70. All conduit shall have tapered threads.

3.2 ELECTRICAL INTERRUPTIONS: Shall be scheduled as specified in Section 01011, "GENERAL PARAGRAPHS."

3.3 CONDUIT PROTECTION AT CONCRETE PENETRATIONS: All galvanized conduits which penetrate concrete (slabs, pavement, and walls) in wet locations, shall be protected by a PVC sheath at the penetration; PVC sheath shall be 40 mils thick conforming to NEMA RN1, and shall extend from at least 2 inches within the concrete to the first coupling or fitting outside the concrete (minimum of 6 inches from penetration).

3.4 UNDERGROUND CONDUIT/DUCT WITHOUT CONCRETE ENCASEMENT:

3.4.1 Conduit Type: Shall be EPC-40-PVC unless indicated or specified otherwise.

3.4.1 Installation: The top of the conduit shall be not less than 24 inches below grade, shall have a minimum slope of 3 inches in each 100 feet away from enclosures and/or devices and toward pull boxes and other necessary drainage points, and shall run in straight lines except where a change of direction is necessary. A brush, having stiff bristles, shall then be drawn through until the conduit is clear of all particles of earth, sand or gravel; conduit plugs shall then immediately be installed. There shall be not less than 3 inches clearance from the conduit to each side of the trench. A minimum clearance of 2 1/2 inches shall be provided between adjacent conduits. The bottom of the trenches shall be graded smooth; where rock, soft spots, and/or sharp-edged materials are encountered, the bottom shall be excavated for an additional 3 inches, filled and tamped level with the original bottom with sand or earth free from particles, that would be retained on a 1/4-inch sieve.

3.4.3 Under Roads: Conduits to be installed under existing roads shall be zinc coated, rigid steel. Where conduit runs under existing roads, the pavement shall be cut and patched as indicated. The rigid steel conduit shall extend at least 5 feet beyond the edges of roads.

3.5 OMITTED:

3.6 WARNING TAPE: Provide a plastic warning tape in the backfill above all underground cables, conduits and duct banks. The tape shall be 3 inches wide, shall be bright, fade-resistant yellow in color, and shall include an imprinted legend "CAUTION BURIED ELECTRIC LINE BELOW," repeated continuously throughout the entire length. Tape shall be buried 12 inches below top of trench.

3.7 EARTHWORK: Earthwork, including excavation, backfilling, and compaction, shall be in accordance with Division 2 of these specifications.

3.8 FIELD PAINTING: Steel frames not buried in masonry and steel covers shall be cleaned of mortar, dirt, and grease by an approved blasting process. Surfaces that cannot be cleaned satisfactorily by blasting shall be cleaned to bare metal by wire brushing and other mechanical means. Surfaces contaminated with rust, dirt, oil, grease, or other contaminants shall be washed with solvents until thoroughly cleaned. Immediately after cleaning, surfaces shall be coated with a pretreatment coating or be given a crystalline phosphate coating. As soon as practicable after the pretreatment coating has dried, treated surfaces shall be primed with a coat of zinc-chromate primer and one coat of synthetic exterior gloss enamel.

### 3.9 RECONDITIONING OF SURFACES:

3.9.1 Unpaved Surfaces: Disturbed during the installation of duct shall be restored to their original elevation and condition. Sod or topsoil shall be preserved carefully and replaced after the backfilling is completed. Sod that is damaged shall be replaced by sod of quality equal to that removed. When the surface is disturbed in a newly seeded area, the restored surface shall be reseeded with the same quantity and formula of seed as that used in the original seeding.

3.9.2 Paving Repairs: Where trenches, pits, or other excavations are made in existing roadways and other areas of pavement where surface treatment of any kind exists, such surface treatment or pavement shall be restored to the same thickness and in the same kind as previously existed, except as otherwise specified, and to match and tie into the adjacent and surrounding existing surfaces in a neat and acceptable manner.

3.10 CABLE PULLING: Swab out to remove foreign material before the pulling of cables. Pull cables down grade with the feed-in point at the pull box of the highest elevation. Use flexible cable feeds to convey cables through the pull box opening and into the duct runs. Cable slack shall be accumulated at each handhole or junction box where space permits by training the cable around the interior to form one complete loop. Minimum allowable bending radii shall be maintained in forming such loops.

3.10.1 Lubricants: For assisting in the pulling of cables shall be those specifically recommended by the cable manufacturer. The lubricant shall not be deleterious to the cable sheath, jacket, or outer coverings.

3.10.2 Cable Pulling Tensions: Shall not exceed the maximum pulling tension recommended by the cable manufacturer.

3.10.3 Grounding Conductor: Secondary cable runs, 600 volts and less, in non-metallic conduit shall include an insulated copper equipment grounding conductor sized as required by the rating of the overcurrent device supplying the phase conductors.

### 3.12 GROUNDING:

3.12.1 General: Grounding shall be as indicated, and as required by NFPA-70 and ANSI C2.

3.12.2 Grounding Connections: Which are buried or otherwise normally inaccessible, and excepting specifically those connections for which access for periodic testing is required, shall be made by exothermic weld or compression connector. Exothermic welds shall be made strictly in accordance with the weld manufacturer's written recommendations. Welds which have "puffed up" or which show convex surfaces, indicating improper cleaning, are not acceptable. No mechanical connector is required at exothermic weldments. Compression connector shall be the type which uses a hydraulic compression tool to provide the correct circumferential pressure. Tools and dies shall be

as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire.

3.12.3 Grounding Conductors: Shall be bare soft-drawn copper wire No. 4 AWG minimum unless otherwise indicated or specified.

3.13 FIELD TESTS: As an exception to requirements that may be stated elsewhere in the contract, the Contracting Officer shall be given 5 working days notice prior to all tests. The Contractor shall demonstrate that all circuits and devices are in good operating condition.

3.13.1 Test on 600-Volt Wiring: Test all 600-volt wiring to verify that no short circuits or accidental grounds exist. Perform insulation resistance tests on all wiring No. 6 AWG and larger using an instrument which applies a voltage of approximately 500 volts to provide a direct reading of resistance; minimum resistance shall be 250,000 ohms. Provide written results for approval.

\*\*\* END OF SECTION \*\*\*

SECTION 16302

OVERHEAD ELECTRICAL WORK

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 American National Standards Institute (ANSI) Publications:

C2-87	National Electrical Safety Code
C29.4-84	Wet Process Porcelain Insulators (Strain Type)
C29.5-84	Wet Process Porcelain Insulators (Low and Medium Voltage Pin Type)
C37.42-81	Distribution and Fuse Links Cutouts
C57.12.20-81	Overhead Type Distribution Transformers, 500 kVA and Smaller; 67,000 Volts and Below; Low Voltage, 15,000 Volts and Below
C57.13-78	Instrument Transformers

1.1.2 American Society for Testing and Materials (ASTM) Publications:

A 153-82	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A 475-78	Zinc-Coated Steel Wire Strand
B 1-85	Hard-Drawn Copper Wire
B 2	Medium Hard-Drawn Copper Wire
B 3-74 (R 1985)	Soft or Annealed Copper Wire
B 8-86	Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, or Soft
B 228-81	Concentric-Lay-Stranded Copper-Clad Steel Conductors

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1.1.3 National Electrical Manufacturer's Association (NEMA)

Publications:

LAL-86	Surge Arresters
WC8-1976 (R 1987)	Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (ICEA S- 68-516)

1.1.4 National Fire Protection Association (NFPA) Publication:

70-1987	National Electrical Code
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1.1.5 Rural Electrification Administration (REA) Publications:

44-2 (Jan 1980)	Wood Poles, Stubs and Anchor Logs
44-3 (Jan 1972)	Wood Crossarms (Solid and Laminated), Transmission Timbers and Pole Keys
43-5 (Aug 1977) Supplements 1 & 2	List of Materials Acceptable for Use on Electric Systems of REA Borrowers

1.1.6 Underwriter's Laboratories (UL) Publication:

UL 6-81 (R 1986)	Rigid Metallic Conduit
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1.1.7 Federal Specifications (Fed. Spec.):

TT-W-00571J	Wood Preservation, Treating Practices
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1.1.8 Military Specifications (Mil Spec.):

MIL-A-3777A(2)	Anchor, Guy and Rods
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1.1.9 Association of Edison Illuminating Companies (AEIC) Publication:

CS6-82	Ethylene Propylene Rubber Insulated Shielded Power Cables
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1.2 GENERAL REQUIREMENTS: Section 16011, "GENERAL REQUIREMENTS,  
ELECTRICAL" with the following additions and modifications:

1.2.1 Submittals: Submit the following information for approval:

1.2.1.1 Catalog Information:

Conductor (list each size and type)  
Insulator (list each size and type)  
Circuit breakers  
Cutouts  
Transformers  
Surge Arrester  
Panelboards  
All other electrical materials and equipment

1.2.1.2 Shop Drawings:

Circuit breakers  
Transformers

1.2.1.3 Certification of Competency:

Cable splicer - terminator

1.2.1.4 Manufacturer's Certification:

Transformer tests including routine and design tests  
Wood pole treatment  
Crossarm treatment

PART 2 - PRODUCTS

2.1 MATERIALS: Materials specified herein or shown on the contract drawings which are identical to materials listed in REA 43-5 shall be considered as conforming to all requirements.

2.1.1 Poles: Provide wood poles machine trimmed by turning, Douglas Fir, Lodgepole Pine, or Southern Yellow Pine conforming to REA 44-2. Poles must be gained, bored and roofed before treatment. Poles shall be full length pressure treated with creosote. Poles shall be branded by the manufacturer with his mark and date of treatment, height and class of pole, wood species, preservation code, and retention. Place the brand so that the bottom of the brand or disc is 10 feet from the pole butt for poles up to 50 feet long.

2.1.2 Crossarms: Provide wood crossarms conforming to REA 44-3. Crossarms shall be pressure treated with creosote. Treatment shall conform to REA 44-3.

2.1.2.1 Provide crossarm braces of steel angle for 28-inch lengths with 8-foot crossarms.

2.1.3 Hardware: Pole line hardware shall be hot dip galvanized conforming to ASTM A 153.

2.1.4 Insulators: Provide wet-process porcelain insulators which are radio interference freed.

Guy Strain Insulators shall be Class 54.1 per ANSI C29.4  
Pin insulators shall be Class 55-1 per ANSI C29.5 and shall be radio interference freed.

2.1.5 Bare Conductors: All conductors larger than 2 AWG shall be stranded.

2.1.5.1 Solid copper conductors, hard-drawn, medium hard-drawn, and soft-drawn shall conform to ASTM B 1, B 2, and B 3, respectively. Stranded conductors shall conform to ASTM B 8.

2.1.6 Guy Strand: Provide High-strength, 7-strand steel cable with Class A or B galvanizing per ASTM A 475.

2.1.6.1 Provide 3-bolt clamp guy terminations designed for use with the particular strand and developing at least the ultimate breaking strength of the strand.

2.1.6.2 Provide round guy guards 8 feet long colored yellow. Material shall be plastic.

2.1.6.3 Provide thimble eye guy attachment using a lift plate on the down side.

2.1.7 Anchors and Anchor Rods: Anchors and anchor rods shall conform to Mil Spec. MIL-A-3777 and shall be of hot-dip galvanized steel. The manufacturer's rated holding force shall be a minimum of twice the guy support load.

2.1.8 Ground Rods: Provide copper-encased steel ground rods at least 3/4-inch diameter and 10 feet long unless otherwise indicated. Die-stamp each near the top with the name or trademark of the manufacturer and length of the rod in feet. The rods shall have a hard, clean, smooth, continuous, surface throughout the length of the rod.

2.1.9 Ground Wire: Provide soft drawn copper wire ground conductors no smaller than No. 6 AWG. Ground wire protectors shall be half round wood molding.

2.1.9.1 Wood molding for ground wire guards shall be of yellow pine or fir, preservative treated in accordance with Fed. Spec. TT-W-571, or shall be of cedar or cypress.

2.1.10 Surge Arresters: Provide valve type surge arrestors conforming to NEMA LAL. RMS rating shall be 3 kV. Front of wave sparkover shall be 17 kV or less. Discharge voltage at 10 kA shall be 13.8 kV or less.

2.1.11 Fused Cutouts: Provide drop-out expulsion fused cutouts rated 15/30 amperes at 5 kV Gnd. Y. Asymmetrical interrupting ratings shall be 12,000 amperes. Cutout shall include factory-installed attachment hooks designed for use with a portable loadbreak device. Cutouts shall conform to ANSI C37.42 and be fused as indicated on the drawings.

2.1.12 Conduit Risers: Provide rigid galvanized steel conduit conforming to UL 6.

2.1.12.1 Conductors (See 16301).

2.1.13 Transformers: Provide oil insulated, self cooled, two winding distribution transformers in accordance with the requirements of ANSI C57.12.20. Provide high voltage winding with "normal" and four full capacity taps, 2 taps, 2-1/2 percent above normal and 2 taps, 2-1/2 percent below normal. Show transformer kVA capacity clearly by 2-1/2-inch arabic numerals placed near the low voltage bushings. Transformer ratings and connections shall be as indicated on drawings.

2.1.13.1 Manufacturer Tests: Transformers shall be a catalogued product of the manufacturer and as such, tests made by the manufacturer previously on an electrically identical unit shall be submitted in lieu of witnessed tests when certified by competent personnel of the manufacturer's testing division. Tests shall include ratio, load loss, no load loss, exciting current, resistance, impedance and sound levels.

2.1.14.1 Certification of the qualifications of the cable splicer, shall be submitted, for approval, 30 days before splices or terminations are to be made in medium voltage (5 kV to 35 kV) cables. The certification shall include the training, and experience of the individual on the specific type and classification of cable to be provided under this contract. The certification shall indicate that the individual has had three or more years recent experience splicing and terminating medium voltage cables. The certification shall also list a minimum of three splices/terminations that have been in operation for more than one year. In addition, the individual may be required to perform a dummy or practice splice/termination in the presence of the Contracting Officer, before being approved as a qualified cable splicer. If that additional requirement is imposed, the Contractor shall provide short sections of the approved types of cables along with the approved type of splice/termination kit, and detailed manufacturer's instructions for the cable to be spliced. The OICC reserves the right to require additional proof of competency or to reject the individual and call for certification of an alternate cable slicer.

2.2 OVERHEAD WIRE AND CABLE: Conductor and conduit sizes indicated are for copper conductors unless otherwise noted. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be used.

2.2.1 Conductors: All conductors shall be copper.

2.2.2 Medium Voltage Cable: NEMA WC8 and AEIC CS6; Shall be rated as indicated and shall have a jacket. Cable shall meet NEMA WC8 and AEIC CS6 for ethylene-propylene-rubber insulation. The year of manufacture shall be durably marked on the outer surface of each cable at regular intervals throughout cable length.

PART 3 - EXECUTION

3.1 INSTALLATION: Provide overhead pole line installation conforming to the requirements of ANSI C2 (NEC) for Grade B construction of overhead lines in medium loading districts and NEC for overhead services. Regard NEC statements using the term "should" as mandatory unless an exception therefrom in writing is granted by the Contracting Officer.

3.1.1 Pole Setting: Pole holes shall be at least as large at the top as at the bottom and shall be large enough to provide 4 inches clearance between the pole and the side of the hole.

3.1.1.1 Pole setting depths shall be as follows:

<u>Length of Pole (feet)</u>	<u>Setting in Soil (feet)</u>	<u>Setting in Solid Rock (feet)</u>
45	6.5	4.5

3.1.1.2 "Setting in Soil" depths shall apply where pole holes are in soil, sand, or gravel or any combination of these; where the soil layer over solid rock is more than 2 feet deep; where the hole in solid rock is not substantially vertical; or where the diameter of the hole at the surface of the rock exceeds twice the diameter of the pole at the same level. At corners, dead ends and other points of extra strain, poles 40 feet or more long shall be set 6 inches deeper.

3.1.1.3 "Setting in Solid Rock" shall apply where poles are to be set in solid rock and where the hole is substantially vertical, approximately uniform in diameter and large enough to permit the use of tamping bars the full depth of the hole.

3.1.1.4 Where there is a layer of soil 2 feet or less in depth over solid rock, the depth of the hole shall be the depth of the soil in addition to the depth specified under "Setting in All Solid Rock" provided, however, that such depth shall not exceed the depth specified under "Setting in Soil."

3.1.1.5 On sloping ground, always measure the depth of the hole from the low side of the hole.

3.1.1.6 Thoroughly tamp pole backfill for the full depth of the hole and mound the excess fill around the pole.

3.1.1.7 Set poles so that alternate crossarm gains face in the opposite directions, except at terminals and dead ends where the gains of the last two poles shall be on the side facing the terminal or dead end. On unusually long spans, set the poles so that the crossarm comes on the side of the pole away from the long span. Where pole top pins are used, they shall be on the opposite side of the pole from the gain, with the flat side against the pole.

3.1.1.8 Set poles in alignment and plumb except at corners, terminals, angles, junctions, or other points of strain, where they shall be set and raked against the strain, not less than 2 inches for each 10 feet of pole length above grade, nor more than 4 inches for each 10 feet of pole length after conductors are installed at the required tension.

3.1.1.9 Provide plastic pole roof with eight nailing tabs. Place on pole top and nail each tab down with a 1-1/4-inch nail.

3.1.2 Anchors and Guys: Place anchors in line with the strain and as nearly as possible a distance from the pole equal to the vertical distance from the pole ground line to the point of guy attachment on the pole.

3.1.2.1 Set anchors in place with the anchor rod aligned with, and pointing directly at, the guy attachment on the pole with the anchor rod projecting 6 to 9 inches out of the ground to prevent burial of the rod eye.

3.1.2.2 Complete the anchor and guy installation, dead end to dead end, and tighten the guy before wire stringing and sagging is begun on that line section. Effectively ground and bond guys to the system ground.

3.1.3 Hardware: Install hardware with washer against the wood and with nuts and lock nuts applied wrench tight.

3.1.4 Grounding: Grounding shall be as indicated and shall conform to ANSI C2.

3.1.4.1 Make ground rod connections on pole lines by thermit weld for all ground wire or wire to rod connections.

3.1.4.2 Make thermit welds strictly in accordance with the manufacturer's written recommendations. Welds which have puffed up or which show convex surfaces indicating improper cleaning, are not acceptable. No mechanical connectors are required at thermit weldments.

3.1.4.3 Ground noncurrent carrying metal parts of equipment or enclosures.

3.1.4.4 The secondary neutral and the tank of each transformer shall be interconnected and connected to ground.

3.1.4.5 Protect grounding conductors which are run on the surface of wood poles by wood molding.

3.1.5 Conductors: Conductors shall be handled with all care necessary to prevent nicking, kinking, gouging, flattening, or otherwise deforming or weakening the conductor or impairing its conductivity. Remove all damaged sections of conductor and splice the conductor.

3.1.5.1 Conductor splices, as installed, shall exceed the ultimate rated strength of the conductor and shall be of the type recommended by the conductor manufacturer. No splice shall be permitted within 10 feet of any support.

3.1.5.2 Ties on pin insulators shall be tight against the conductor and insulator and ends shall be turned down flat against the conductor so that no wire ends project.

3.1.5.3 Existing conductors to be reinstalled or resagged shall be strung to "FINAL" sag table values for the particular conductor type and size involved.

3.1.5.4 String new conductors to "INITIAL" sag table values recommended by the manufacturer for the conductor type and size of conductor and ruling span indicated.

3.1.5.5 Dead end fittings shall conform to the written recommendations of the conductor manufacturer and shall develop the full ultimate strength of the conductor.

3.1.6 Risers: Secure conduits on poles by two hole galvanized steel pipe straps spaced no more than 4 feet apart. Ground metallic conduits.

3.2 FIELD TESTS: As an exception to requirements that may be stated elsewhere in the contract, the Contracting Officer shall be given 5 working days notice prior to all tests.

3.2.1 Devices Subject to Manual Operation: Each device subject to manual operation shall be operated at least three times, demonstrating satisfactory operation each time.

\*\*\* END OF SECTION \*\*\*

GENERAL WAGE DECISION NO. SC89-10

Supersedes General Wage Decision No. SC88-10

State: SOUTH CAROLINA

County(ies): Statewide

Construction Type: Heavy, Sewer & Water Line

Construction Description: HEAVY AND SEWER & WATER LINE CONSTRUCTION PROJECTS (excluding Dam Construction Projects).

Modification Record:

No.

Publication Date

Page No.(s)



	Basic Hourly Rates	Fringe Benefits
BOILERMAKERS (TANK WORK)	12.96	3.315
BRICKLAYERS	6.40	
CARPENTERS	7.42	
CEMENT MASONS/CONCRETE FINISHERS	6.93	
ELECTRICIANS/LINEMEN	10.08	
IRONWORKERS	10.98	
LABORERS:		
Unskilled	4.25	
Pipelayer	4.94	
Chain Saw	4.63	
MANHOLE BUILDERS	4.75	
PIPEFITTERS:		
Berkeley County	12.40	1.73
Remaining Counties	9.09	
POWER EQUIPMENT OPERATORS:		
Backhoe	6.40	
Bulldozer	5.90	
Crane	7.98	
Dragline	6.06	
Front End Loader	5.79	
Mechanic	7.09	
Motor Grader	7.15	
Scraper-Pan	5.48	
TRUCK DRIVERS	4.80	
WELDERS: Receive rate prescribed for craft performing operation to which welding is incidental.		

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR, 5.5 (a) (1) (ii)).