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RAPID ASSESSMENT REPORT FOR UNDERGROUND STORAGE TANK NS200 (USTNS200) BUILDING 200 ZONE I WITH TRANSMITTAL CNC CHARLESTON SC
3/22/2000
TETRA TECH

# Rapid Assessment Report for UST NS200, Building 200

## Zone I
## Charleston Naval Complex
North Charleston, South Carolina

## Southern Division
## Naval Facilities Engineering Command
**Contract Number N62467-94-D-0888**

**Contract Task Order 0103**

January 2000

R4711993

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TTNUS/TAL-00-029/0270-3.2

22 March, 2000

Project Number 0270

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Department of the Navy
Southern Division
Naval Facilities Engineering Command
ATTN: Mr. Gabriel Magwood (Code 1849)
Remedial Project Manager
2155 Eagle Drive
North Charleston, South Carolina 29406

Reference: Clean Contract No. N62467-94-D0888
Contract Task Order No. 0103

Subject: Final Rapid Assessment Report
UST NS200, Building 200
SCDHEC Site ID #17624
Charleston Naval Complex
Charleston, South Carolina

Dear Mr. Magwood:

Enclosed is the final Rapid Assessment Report for Site UST NS200, Building 200, at CNC. If you have any questions regarding this report, or require additional information, please contact me at (850) 385-9899.

Very truly yours,

Denise Slowick

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

PC/dd

Enclosures (1)

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00-A007

January 25, 2000

Project Number 0270

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Bureau of Drinking Water Protection
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Reference: Clean Contract No. N62467-94-D0888
Contract Task Order No. 0103

Subject: Final Rapid Assessment Report
UST NS200, Building 200
Zone I, Charleston Naval Complex
North Charleston, South Carolina
SCDHEC Site ID #17624

Dear Mr. Bristol:

Tetra Tech NUS, Inc., is pleased to submit the enclosed final Rapid Assessment Report for Site UST NS200, Building 200, at CNC Zone I. If you have any questions regarding this report or require additional information, please contact me at (850) 385-9899.

Sincerely,

Gregory D. Swanson for:

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

PEC:ckf

Enclosures (1)

c: Mr. Gabriel Magwood, SOUTHDIV, 2155 Eagle Drive, North Charleston, SC, 29406
Mr. M. Perry/File (unbound)
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File/db

# Rapid Assessment Report for UST NS200, Building 200

# Zone I
# Charleston Naval Complex
North Charleston, South Carolina

## Southern Division
## Naval Facilities Engineering Command
**Contract Number N62467-94-D-0888**

**Contract Task Order 0103**

January 2000

R4711993

# RAPID ASSESSMENT REPORT
# FOR
# UST NS200, BUILDING 200

## ZONE I, CHARLESTON NAVAL COMPLEX
## NORTH CHARLESTON, SOUTH CAROLINA

**COMPREHENSIVE LONG-TERM**
**ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:**
**Southern Division**
**Naval Facilities Engineering Command**
**2155 Eagle Drive**
**North Charleston, South Carolina 29406**

**Submitted by:**
**Tetra Tech NUS, Inc.**
**661 Andersen Drive**
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**CONTRACT NUMBER N62467-94-D-0888**
**CONTRACT TASK ORDER 0103**

**JANUARY 2000**

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# CERTIFICATION PAGE

I certify that the information contained in this report and on any attachments is true, accurate, and complete to the best of my knowledge, information, and belief.

SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
No. 17132
GREGORY D. SWANSON

Approved By: 1/13/00

Gregory D. Swanson, P.E.
South Carolina Registration No. 17132
SCDHEC UST Site Rehabilitation Contractor Class I & II No. 24

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# EXECUTIVE SUMMARY

Tetra Tech NUS, Inc. (TtNUS) has completed an evaluation of the former underground storage tank (UST) NS200 site to supplement the Contamination Assessment Report (CAR) prepared by the Environmental Detachment Charleston (DET) and submitted to the Navy, Southern Division, Naval Facilities Engineering Command (SOUTHDIV) on March 10, 1999.

UST NS200 (site identification number 17624) is located in Zone I, at the former Charleston Naval Complex (CNC), in North Charleston, South Carolina. The site included one 1,000-gallon fuel oil UST system located at Building NS200. The UST provided fuel oil to the building's heating system since 1953. The tank was removed in April 1996.

Soil and groundwater samples collected during the UST removal in 1996 contained contamination. SOUTHDIV requested DET to further investigate the site. DET conducted a field investigation between April 6, 1998, and July 8, 1998, at the former UST NS200 site to assess the horizontal and vertical extent of soil and groundwater contamination. The CAR prepared by DET presented the findings of the investigation to SOUTHDIV for review and approval. The report contained herein is largely the same CAR prepared in March 1999; however, a Tier 1 and Tier 2 evaluation has been included to address possible risk associated with the petroleum contamination present at the site and revealed in the original CAR. This report was prepared using guidance prepared by the South Carolina Department of Health and Environmental Control (SCDHEC) *Risk-Based Corrective Action* [RBCA] *for Petroleum Releases* dated January 5, 1998.

**DET performed the following actions during the contamination assessment:**

- Reviewed *Zone I, RCRA Facility Investigation Report, Charleston Naval Complex* (E&A/H, 1996), to identify potential sources and receptors for petroleum hydrocarbons in the vicinity, to evaluate public and private potable wells, to locate utility line areas, to locate nearby surface water bodies, and to determine surface hydrology and drainage.

- Conducted site survey to identify utilities and to construct a site plan.

- Installed 25 soil borings to the water table approximately 6 to 7 feet below land surface (bls) using hand augers.

- Collected soil samples for field screening using an organic vapor analyzer.

- Collected soil samples from soil borings for laboratory analysis at a fixed-base analytical laboratory.

- Analyzed soil samples for benzene, toluene, ethylbenzene, and xylenes (BTEX) and naphthalene using U.S. Environmental Protection Agency (USEPA) Method 8260, polynuclear aromatic hydrocarbons (PAHs) using USEPA Method 8270, and cadmium using USEPA Method 3550.

- Installed three temporary, shallow monitoring wells to depths of approximately 15 feet bls.

- Conducted a well top and ground surface elevation survey.

- Collected groundwater samples from one existing, permanent monitoring well and three newly installed, temporary monitoring wells for laboratory analysis at a fixed-base analytical laboratory.

- Analyzed groundwater samples for BTEX, methyl tert-butyl ether, and naphthalene using USEPA Method 8260, PAHs using USEPA Method 8270, and cadmium using USEPA Method 6010.

- Installed seven soil borings to the water table using hand augers to delineate the areal extent of the free product discovered in monitoring well NBCT200TW01.

- Performed interim free product recovery operations with a hand bailer on monitoring well NBCT200TW01.

- Collected depth to groundwater measurements to evaluate the groundwater flow direction and to monitor depth of free product in NBCT200TW01.

**TtNUS performed the following actions during the supplemental evaluation:**

- Reviewed *Zone I, RCRA Facility Investigation Report, Charleston Naval Complex*, (E&A/H, 1996) to characterize the surficial aquifer in the former UST NS200 area.

- Reviewed all available, current utility maps of the Building NS200 area to determine exact routes of the sanitary sewer lines which run through the former UST NS200 site and to check for other potential utility receptors.

- Collected one round of groundwater level measurements (included gauging the free product in NBCT200TW01) in October 1999 to determine if any significant changes have occurred since the March 1999 measurements were taken by DET.

- Estimated total organic carbon content and total recoverable petroleum hydrocarbon content of UST NS200 soils using data from Sites 36 and 37 (also in Zone I) located approximately 1,500 feet to the east and in a similar hydrogeologic setting.

- Estimated soil grain size using sieve and hydrometer methods from Site 37.

- Performed a Tier 1 and Tier 2 evaluation of the risk present at the site.

**Conclusions**

- Benzene and naphthalene were detected in soil at the former UST NS200 site. The concentration of benzene at soil boring NBCT200S10 exceeds its soil leaching risk-based screening level (RBSL). However, soil concentrations do not exceed the dermal or ingestion RBSLs; therefore, a construction worker in a utility trench would not be considered at risk by soil. Inhalation of volatiles from exposed soil does not pose a threat when compared to calculated RBSLs. Additionally, soil leaching to groundwater would not pose a threat to the construction worker in a trench because SSTLs are not exceeded at the site.

- Free product is present at the former UST NS200 site in source monitoring well NBCT200TW01. The area of free product extends to the edge of building NS200 and approximately 20 feet north of the former UST location. The thickness of the free product over this area is undetermined, although interim product recovery operations appear to have reduced product thickness in the area of monitoring well NBCT200TW01.

- Groundwater beneath the free product at source monitoring well NBCT200TW01 is contaminated with benzene and naphthalene in concentrations exceeding their RBSLs. Because of free product presence, the concentrations for BTEX and naphthalene were calculated as the maximum solubility in equilibrium with fuel oil according to Raoult's Law. These calculated chemical of concern (CoC) concentrations were used for comparison to RBSLs and site-specific target levels (SSTLs). Groundwater at the site may pose a threat to a construction worker in a utility trench exposed to groundwater and to the Cooper River.

- The apparent flow direction of the shallow groundwater at the former UST NS200 site was generally toward the south between wells NBCT200TW01 and NBCT200TW03. However, the groundwater elevation data indicated a slight gradient to the north or a plateau effect between wells NBCT200TW02 and NBCL03001I. The Zone I RFI Report described a general zone-wide tendency toward the Cooper River. Inconsistencies in the groundwater flow direction at the site could be attributed to one or a combination of the following:

  1. Marine wall pilings along the shipyard waterfront.
  2. Tidal influences.
  3. Leakage from the force main that feeds into manhole 361 located near monitoring well NBCT200TW02.
  4. Infiltration to the gravity sewer line between manhole 361, located near monitoring well NBCT200TW02, to manhole 364-A, located at Hobson Avenue.

- The migration pathway of CoCs in groundwater leaving the former UST NS200 tank pit appears to be northward toward the Cooper River.

- Several utility lines pass to the east of the former UST NS200 pit within 5 to 30 feet.

- Nine of twenty-nine soil borings were terminated short of the water table when obstructions were encountered. The area of the former UST NS200 site contains many poorly documented and/or undocumented underground obstructions--including active and abandoned utilities, fill materials, and possibly foundations of demolished buildings. These obstructions will impede any future remediation or investigation activities at the former UST NS200 site.

**Recommendations for Further Action**

Corrective action is necessary at UST NS200. Because of the presence of free product, concentrations of BTEX and naphthalene were calculated based on each constituent's maximum water solubility in equilibrium with fuel oil. The calculated concentrations of benzene and naphthalene used for the maximum concentrations in groundwater are above the selected minimum RBSLs for a construction worker exposed to groundwater in a utility trench. In addition, the calculated benzene and naphthalene concentrations in groundwater are above the SSTLs for surface water exposure at the Cooper River. Therefore, corrective action is required. The goal of corrective action is to prevent an impact to the identified potential receptors (the construction worker in an on-site utility trench and the nearby surface water--Cooper River).

# 1.0 INTRODUCTION

UST NS200 is the site of the former underground storage tank (UST) system located adjacent to Building 200 at the Charleston Naval Complex (CNC), Zone I in North Charleston, South Carolina. This report was prepared by Tetra Tech NUS, Inc.'s (TtNUS's) Tallahassee, Florida, office located at 1401 Oven Park Drive, Suite 102, Tallahassee, Florida, 32308 (telephone number 850-385-9899) on behalf of the U.S. Navy Southern Division (SOUTHDIV) Naval Facilities Engineering Command (NAVFAC), 2155 Eagle Drive, North Charleston, South Carolina 29406 (telephone number 843-820-7307). Authorization to conduct the assessment for the Site was issued by NAVFAC under Contract Task Order (CTO) 0103.

Environmental Detachment Charleston (DET) performed a Contamination Assessment for SOUTHDIV at Building NS200. DET removed the 1,000-gallon UST in April 1996. Soil and groundwater samples collected during UST removal contained contamination. SOUTHDIV requested the DET to further investigate the site. The Contamination Assessment Report (CAR) prepared by DET on March 10, 1999, presented the findings of the investigation to SOUTHDIV for review and approval. The report contained herein is largely the same CAR prepared in March; however, a Tier 1 and Tier 2 evaluation has been included to address risk associated with the petroleum contamination that was revealed in the original CAR. The reporting format followed is the Rapid Assessment Report.

## 1.1 PURPOSE

Field investigations performed by the DET between April 6, 1998 and July 8, 1998, at the former UST NS200 site were used to assess the horizontal and vertical extent of soil and groundwater contamination. All fieldwork was coordinated by the DET. The purpose of this report is to present the findings of this investigation, perform a risk-based evaluation, and provide recommendations for remedial actions to be taken at the UST NS200 site.

## 1.2 SITE DESCRIPTION

The CNC is in the city of North Charleston, on the west bank of the Cooper River in Charleston County, South Carolina (Figure 1). The developed portion of the CNC occupies the west bank of the Cooper River starting at a boundary 2,300 feet upstream of Noisette Creek and ending at Shipyard Creek. The northern section of the CNC (Resource Conservation and Recovery Act [RCRA] Facility Investigation (RFI) Zones A, B, C, and D) contains a mixture of warehouses, offices, and former Navy housing areas. The central section of the CNC (RFI Zones E and F) was occupied primarily by the controlled industrial

area of the former Navy shipyard and its associated offices and warehouses. The southern section of the CNC (RFI Zones G, H, and D) along the Cooper River is occupied by piers, barracks, training buildings, offices, storehouses, and fuel tanks which formerly supported naval vessels ported year-round at Charleston. The north bank of Shipyard Creek in the southern part of the base is largely undeveloped and consists of recreational areas and a large dredge spoil area.

The former UST NS200 site is in RFI Zone I in the southern portion of the CNC. Zone I consists of the southern bank of the Cooper River between the former Naval Station Pier P and the tip of the CNC at the intersection of the Cooper River and Shipyard Creek. The northern section of Zone I contains former Naval Station piers, offices and quarters. The southern section of Zone I consists primarily of a dredge spoils area. Building NS200 is an office building located in the northern half of Zone I at 2224 South Hobson Avenue. Building NS200 is located on the north side of Hobson Avenue between Piers R and S (Figure 2). The National Oceanic and Atmospheric Administration (NOAA) Coastal Service Center currently occupies Building NS200. NOAA has renamed NS200 as CSC Building 2.

The former UST location is in an asphalt-paved area beside the east wall of Building NS200. A sanitary sewer pipe, located to the north of Building NS200, turns south/southwest and runs beside the tank location (Figure 2). An existing RFI monitoring well, NBCL037001I, installed near the sanitary sewer system, is located at a point near the sewer pipe approximately 60 feet north of the former UST location. The concrete foundation of an existing observation tower is located immediately south of the UST location. Building NS16, currently occupied by the United States Border Patrol, is located 40 feet east of the former UST location on the opposite side of the paved area.

## 1.3 SITE BACKGROUND

The UST at Building NS200 (South Carolina Department of Health and Environmental Control [SCDHEC] Groundwater Protection Division site number 17624) was a 1,000-gallon unregulated fuel oil tank installed in 1953. The date the tank was last used is unknown. The tank was constructed of steel and was connected to Building NS200 by two 5/8-inch copper lines run through a 3-inch cast iron pipe used as a protective sleeve. Between April 16, 1996, and April 29, 1996, the UST was removed, drained, cleaned, and cut up for recycling as scrap. The copper fuel lines were rinsed, capped, and left in place.

There were no recorded releases while the tank was in service. However, during tank removal, a buried, abandoned ventilation line was found attached to the tank. This vent line was open to the subsurface and apparently discharged fuel oil into the surrounding soil whenever the tank was filled to the top. Petroleum-contaminated soil was found throughout the excavation. A thin sheen of free product was

observed floating on a small (approximately 2 feet by 2 feet by less than 1 inch deep) puddle of water in the base of the excavation. Contaminated soil was transferred to a pilot bioremediation project at the CNC, and the excavation was filled to grade with clean soil and backfill.

Three soil samples were collected at the base of the excavation before it was backfilled and analyzed for polynuclear aromatic hydrocarbons (PAHs); benzene, toluene, ethylbenzene, and xylenes (BTEX); naphthalene; total petroleum hydrocarbons (TPH); and RCRA metals (mercury, cadmium, chromium, arsenic, barium, selenium, silver, and lead). Sample SPORT0009-1 collected at the south end of the tank contained naphthalene at a concentration exceeding its risk-based screening level (RBSL). Sample 0009-1 also contained benzene at levels above the RBSL. Sample SPORT0009-2 collected near the tank fill connection contained concentrations of naphthalene and cadmium in excess of screening level.

Where provided, RBSLs from Appendix B of the *Risk-Based Corrective Action* (RBCA) *for Petroleum Releases* (SCDHEC, January 5, 1998) were used in the preparation of this report.

The CNC is the site of an ongoing RFI; the UST NS200 location is in Zone I of the RFI. Data collected as part of the RFI, including geological information, hydrogeological information, well drilling logs, and groundwater sampling data, were used in the preparation of this report.

## 1.4 RECEPTOR SURVEY RESULTS

The site vicinity plan (Figure 2) depicts all known utilities located within 500 feet of the Building NS200 location. According to facility personnel, utility lines are typically located 2 to 6 feet below land surface (bls) (SPORTENDETCHASN, 1999). The following utility receptors are located within a 250-foot radius of the former UST NS200 at Building NS200 (see Appendix E for utility maps).

- A 4-inch sanitary sewer line originates at Building 1874 to the northwest of Building NS200 and becomes a 6-inch line as it turns southward toward Hobson Avenue (just west of monitoring wells NBCL037001I and NBCT200TW02). A sanitary sewer manhole (361) is located approximately 20 feet north of the former tank pit. A second 4-inch line (pressure supplied) exits pump station 2 northwest of Building NS200 and intersects at manhole 361. A third line, exiting Building NS200 on the west side, also enters at manhole 361. An 8-inch ductile iron line exits to the south of the manhole traversing the area of petroleum-impacted soil south toward Hobson Avenue.

- A 12-inch water line is located approximately 40 feet east of Building NS200 originating at Hobson Avenue and traveling north.

- A 54-inch storm drainage line is located approximately 50 feet east of Building NS200 (about 10 feet west of Building NS16). The storm drainage line originates in Hobson Avenue and travels north approximately 350 feet to the Cooper River at outfall number 48.

Utilities on site, and adjacent to the site within a 250-foot radius, that could serve as exposure points or as preferential pathways are shown in the following summary table:

| Utility | On-site or Distance/Direction from UST NS200 | Depth to Utility |
|---|---|---|
| Sanitary Sewer | On-site; ~5 ft. east, ~20 ft. north, and ~55 ft. north | 2 to 6 ft. bls |
| Fresh Water Supply | On-site; ~20 ft. east | 2 to 6 ft. bls |
| Storm Drainage | On-site; ~30 ft. east | 2 to 6 ft. bls |

Tables 1 and 2 contain a detailed list of potential receptors and pathways within a 1,000-foot radius for the current land use and for the future land use. The potential receptors and preferential pathways within a 1,000-foot radius of the site are summarized here:

| Description of Potential Receptor | Distance/Direction from Site |
|---|---|
| Construction workers in utility trenches | ~5 to ~30 ft. east of former tank pit |
| Surface water | ~170 ft. north – Cooper River |
| Commercial workers | On-site. No complete pathways |
| Trespassers | Not applicable. No complete pathways |
| Recreational visitors and/or residents | Not applicable. Current and future site use is commercial. No complete pathways |

A survey of groundwater users within a 7-mile radius of CNC was performed for the *Final RCRA Facility Investigation Report for Zone H* (EnSafe/Allen & Hoshall [E/A&H], 1996). According to this report, a survey of groundwater users within a 7-mile radius of CNC was conducted by the South Carolina Water Resources Commission to ascertain the extent of any shallow groundwater usage. Results of the water use investigation revealed that no drinking water wells, which utilize the shallow aquifer, are located within a 4-mile radius of CNC. Numerous monitoring wells are located within 1,000 feet of the site. The nearest surface water body to Building NS200 is the Cooper River located approximately 170 feet to the north.

There are no city, county, or state zoning ordinances as the property (CNC) is currently owned by the federal government. Information concerning zoning ordinances was obtained from the SOUTHDIV Remedial Project Manager located at 2155 Eagle Drive, North Charleston, South Carolina, 29406 (telephone number 843-820-7307).

# 2.0 ASSESSMENT INFORMATION

## 2.1 GEOLOGY

Based on information provided in the *Draft Zone I RCRA Facility Investigation Report* dated January 1996, Charleston South Carolina is located in the Southern Atlantic Coastal Plain. The surficial geology of the region consists of the Quaternary-age sands, silts, and clays of the Wando Formation. Below the Wando Formation are the Oligocene-age Ashley Formation and the Eocene-age Parkers Ferry and Harleyville Formations, known collectively as the Cooper Group. Below the Cooper Group is the Eocene-age Santee Limestone.

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

## 2.2 HYDROGEOLOGY

### 2.2.1 Regional

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

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

### 2.2.2 Site Specific

Three temporary monitoring wells (NBCT200TW01, NBCT200TW02, and NBCT200TW03) were advanced at the UST NS200 site under supervision of the DET on June 17, 1998 (Figure 3). The borings

for these wells ranged in depth from 15 to 17 feet bls and provided soil samples to characterize the subsurface lithology. One existing, permanent monitoring well (NBCL037001I), installed during the Zone I RFI investigation, is located near to the UST NS200 site and provided additional characterization information (Figure 3). During both drilling programs, lithologic samples collected using split-spoon samplers and drill cuttings were used to characterize the subsurface lithology.

Based on lithologic descriptions from the monitoring well borings, the subsurface generally consists of several feet (i.e., 2 to 5 feet) of sandy fill material across most of the site. The fill is a sandy mixture and contains some silt, clay, and fine gravel. Beneath the fill is a layer of dark brown silty sand about 2 feet thick that appears to thicken to the south in the vicinity of well NBCT200TW03. Beneath this layer is a consistent unit of light to yellow-brown clay that contains a sandy facies or sand interbeds. This unit appears to be about 12 feet thick in the immediate vicinity of the former UST (i.e., at NBCT200TW01), but thins to the north, south, and east. The interval beneath the clay is predominantly brown to greenish sand that contains clay matrix or clay interbeds. The lithology and stratigraphy of the site are illustrated in the geologic cross sections (Figures 4 and 5). Boring logs are presented in Appendix A.

The former UST NS200 site is located about 170 feet south of the Cooper River. The Zone I RFI investigation data indicated that the prevailing groundwater flow direction in the shallow aquifer in the UST NS200 vicinity was north-northeast toward the Cooper River. The initial round of groundwater data collected from the UST NS200 wells indicated a northward flow direction; however, numerous rounds of data collected during the subsequent free product recovery/monitoring events have demonstrated a persistent flow direction to the south. The groundwater gradient is low, and flow is likely predominant in the sandy intervals within the shallow groundwater zone.

## 2.3 SURFACE HYDROGEOLOGY

Parts of the southern portion of the CNC are drained by Shipyard Creek, while some northern areas are drained by Noisette Creek. The drainage basins of both waterways include areas other than the CNC. These waterways are tributaries of the Cooper River. Surface drainage over the remainder of the CNC flows directly into the Cooper River, which discharges into Charleston Harbor. Surface drainage at the former UST NS200 site flows directly into the Cooper River.

## 2.4 CONTAMINATION ASSESSMENT ACTIVITIES

### 2.4.1 Soil Boring Program

Soil borings were installed at Building NS200 to assess the horizontal and vertical extent of hydrocarbon contamination in the vadose zone at the site. A total of 25 soil borings were advanced toward the water table using stainless steel hand augers. Figure 3 shows soil boring locations.

The sampling grid was expanded twice in response to high soil vapor levels. The first expansion expanded the sample area by adding a new perimeter of delineation soil borings. The second expansion extended the delineation borings further outward and "chased" contamination along the outside of the sanitary sewer line running beside the former tank location. Nine soil borings (NBCT200S01, NBCT200S11, NBCT200S12, NBCT200S15, NBCT200S16, NBCT200S18, NBCT200S19, NBCT200S20, and NBCT200S28) were terminated short of the water table when obstructions were encountered at depths ranging from 2 feet to 6 feet bls.

Soil samples were collected from the underlying soils at 2-foot intervals. Soil samples were screened in the field by performing headspace analysis using an organic vapor analyzer (OVA) equipped with a flame ionization detector (FID). No effort was made to evaluate the possible presence of methane by utilizing a charcoal filter. The soil sample from each boring with the greatest OVA headspace analysis was submitted to an analytical laboratory to determine the relative concentrations of fuel oil contaminants in the soil. Where all samples from a soil boring had a "zero" headspace analysis, the sample collected closest to the water table was submitted for laboratory analysis. Characterization (source area) samples were collected from borings in the approximate location where contaminants were found during tank removal. Delineation or "clean" borings were made around a perimeter outside the suspected extent of contamination. Appendix A includes copies of the geologic soil borings.

### 2.4.2 Monitoring Well Installation Program

Monitoring wells were constructed at Building N5200 to assess the horizontal (and vertical) extent of potential groundwater contamination. Three shallow, temporary monitoring wells (designated NBCT200TW01, NBCT200TW02, and NBCT200TW03) were installed. Figure 3 shows the location of the monitoring wells. Appendix A includes copies of the monitoring well construction logs.

The general technical approach applied during the monitoring well installation program involved split-spoon sampling of the well borings at 5-foot intervals to confirm the geology above the water table and the

general depth to groundwater. All split-spoon soil samples were submitted to an analytical laboratory to determine the relative concentrations of fuel oil contaminants and cadmium metal in the soil.

The monitoring wells were shallow water-table monitoring wells drilled with 6-inch hollow-stem augers to a depth of approximately 15-feet bls where the encountered depths to the water table were approximately 6 to 7 feet bls. A 10-foot long, 0.010 slot, 2-inch inner diameter (ID) polyvinyl chloride (PVC) well screen was installed in each of the wells with the top of the well screen positioned approximately 2 feet above the encountered water table. The wells were completed with a 2-inch ID PVC riser extending approximately 2 feet above land surface closed with a locking cap. A No. 2 sandpack was installed around each well screen to a height of 2 feet above the top of the screen. A 2-foot layer of bentonite seal was installed on top of the sandpack.

Investigation-Derived Waste (IDW) from the monitoring well installation, well development, and groundwater sampling was disposed of as follows: IDW soil from the former UST NS200 site was combined with IDW soil from throughout the CNC and sent to a disposal contractor for incineration. IDW water was analyzed for pH before being disposed of in the North Charleston sanitary sewer system. When product was present in IDW water, the water was first processed through an oil/water separator before disposal.

## 2.5 GROUNDWATER ELEVATION SURVEY

To allow an accurate measurement of groundwater elevations at the wells and the direction of groundwater flow at the former UST NS200 site, a well top elevation survey was performed. The top of casing elevation (north side) of each well was surveyed to within ± 0.01 foot of vertical accuracy. The relative well locations were also surveyed to within ± 0.1 foot of horizontal accuracy and tied into the South Carolina state plane grid coordinate system. In addition to these data, ground surface elevations at the wells were surveyed. The relative horizontal locations and ground surface elevations of the soil borings sampled were also surveyed.

Groundwater levels in the monitoring wells were measured when groundwater was sampled. In addition, groundwater levels were measured several times afterwards at both high and low tides to determine if the tide affected the direction of groundwater flow. Groundwater level information is recorded in Table 3.

Free product was discovered in monitoring well NBCT200TW01 prior to sampling. After completion of groundwater sampling, interim free product recovery operations were begun.

## 2.6 SAMPLING AND ANALYSIS PROGRAM

Because the removed UST NS200 contained fuel oil, soil samples from the soil boring program were analyzed for the parameters listed for diesel or kerosene in Table 1 of the RBCA (SCDHEC, 1998). Soil samples were analyzed for BTEX, naphthalene, and PAHs. Soil samples collected by split-spoon from temporary monitoring well borings were analyzed for BTEX, naphthalene, PAHs, and total cadmium metal.

Groundwater sampling occurred on June 8, 1998. Laboratory analyses were performed on groundwater collected from the site temporary monitoring wells and existing monitoring well NBCL037001I. Free product was found in source temporary monitoring well NBCT200TW01. An oil/water interface probe registered the presence of a product film of no measurable thickness. Once the well purge was initiated in preparation for sampling, appreciable quantities of apparently unweathered free product were drawn from well NBCT200TW01. After unsuccessful attempts to draw off all free product while purging well NBCT200TW01, a sample was drawn by inserting the sample tubing below the free product layer.

Prior to sampling, the wells were purged of at least three well volumes. Purge water was monitored for pH, conductivity, and temperature parameters until stabilized to within 10 percent of three consecutive measurements. Peristaltic pumps were used to purge the wells and collect the samples.

The groundwater samples were analyzed for the parameters listed for diesel or kerosene in Table 1 of the RBCA (SCDHEC, 1998). Samples were analyzed for BTEX, naphthalene, methyl tert butyl ether (MTBE) and PAHs. In addition, groundwater samples were analyzed for cadmium metal.

## 2.7 SOIL CONTAMINATION RESULTS

Soil vapor monitoring results indicated the presence of petroleum hydrocarbon vapors extending east from the former UST NS200 site and north from the UST site in the direction of the sanitary sewer line. Fixed-base analytical laboratory results indicated that naphthalene and benzene in concentrations greater than the soil leaching RBSLs (for sandy soil, depth to groundwater 5 to 10 feet bls) were present in soil north of the former UST location. Figure 6 illustrates the analytical results of chemicals of concern (CoCs) for soil boring samples and spilt spoon samples collected during monitoring well installation. Table 4 summarizes the analytical results of all soil samples collected. Copies of the geologic soil boring logs are located in Appendix A. Copies of the analytical reports are contained in Appendix B.

Benzene and naphthalene were detected in excess of soil leaching RBSLs. Benzene exceeded the RBSL

in boring NBCT200S10 and naphthalene was exceeded in samples collected from borings NBCT200S02, NBCT200S03, NBCT200S10, and NBCT200S14. In addition, naphthalene was detected above the RBSL in the well borings for NBCT200TW01 and NBCT200TW02.

The results of cadmium metal analysis of soil and groundwater samples collected during the UST NS200 are presented in Tables 4 and 5. In all soil and groundwater samples analyzed for total cadmium, the cadmium concentration was less than the respective RBSL.

## 2.8 GROUNDWATER CONTAMINATION RESULTS

Petroleum hydrocarbons were detected in groundwater samples taken from the source temporary monitoring well NBCT200TW01 at the former UST location and in temporary monitoring well NBCT200TW02 and RFI monitoring well NBCL037001I north of the former UST NS200 site. Free product of uncertain thickness was encountered at monitoring well NBCT200TW01. No CoC was detected in background temporary monitoring well NBCT200TW03 located south of the former UST site. Figure 7 illustrates the analytical results for groundwater samples. Table 5 summarizes the analytical results for groundwater samples. Copies of the monitoring well construction logs are located in Appendix A. Copies of the fixed-base analytical laboratory reports are contained in Appendix B.

Benzene and naphthalene were detected in excess of their respective RBSLs in monitoring well NBCT200TW01 (13.7 and 524 µg/L, respectively). Additionally, monitoring well NBCT200TW02 contained naphthalene at a concentration greater than the RBSL (14.3 µg/L). Monitoring well NBCL037001I contained naphthalene at levels below the RBSL (4.04 µg/L).

## 2.9 FREE PRODUCT INVESTIGATION

The groundwater-sampling program discovered free product in monitoring well NBCT200TW01. To delineate the extent of free product, seven borings were advanced to the water table. Soil collected from the water table using a hand auger was visually examined for free product.

Shortly after the groundwater elevation survey, DET, at SOUTHDIV direction, began interim free product recovery operations at the NS200 site. Once a week, at low tide, monitoring well NBCT200TW01 was bailed with a hand bailer until there was no discernible free product in the water recovered. On each occasion, approximately 3 gallons of water and product were bailed from well NBCT200TW01. The mixed water and product were collected in 55-gallon drums and processed as IDW.

The free product investigation found that the area of free product extended to Building NS200 and the observation tower foundation on the west and south sides of the former UST location. To the east, free product has not extended beyond the sanitary sewer line. To the north, free product has extended into the area between the sewer line and building NS200 approximately 20 feet from the former UST location. The results of the free product investigation are shown in Figure 8.

The product thickness measured in monitoring well NBCT200TW01 during interim free product recovery (Table 3) has declined from a maximum of 0.87 feet (10.4 inches) on October 30, 1998, to a minimum of 0.01 feet (0.12 inches) in the most recent measurement taken October 20, 1999. However, measurements taken at high tide revealed approximately 5 inches more free product than measurements taken on the same day at low tide (based on September 30 and October 14, 1998, measurements).

## 2.10 AQUIFER CHARACTERISTICS AND EVALUATION

Groundwater level measurements were taken during the free product recovery operations from September 30, 1998, to March 3, 1999. TtNUS recorded water levels on October 20, 1999 (Table 3). Groundwater elevations recorded indicate that the potentiometric surface at the former UST NS200 site has continued to predominantly slope to the south--away from the river--since September 1998. Figure 9 illustrates the potentiometric surface as recorded by DET at low tide on September 30, 1998. Aquifer characterization data from the Zone I RFI Report (E/A&H, 1996) are located in Appendix C.

The apparent flow direction of the shallow groundwater at the site is generally toward the south (away from the Cooper River), especially between wells NBCT200TW01 and NBCT200TW03; however, during several monitoring events the groundwater elevation data indicated a plateau or a slight gradient to the north between wells NBCT200TW02 and NBCL03001I (toward the Cooper River). The Zone I RFI Report described a general zone-wide tendency toward the Cooper River. Inconsistencies in the groundwater flow direction at the site could be attributed to one or a combination of the following:

1. Marine wall pilings along the shipyard waterfront.
2. Tidal influences.
3. Leakage from the pressurized sanitary sewer line that feeds into manhole 361 located near monitoring well NBCT200TW02.
4. Infiltration to the gravity sewer line between manhole 361, located near monitoring well NBCT200TW02, to manhole 364-A, located at Hobson Avenue.

As part of the *Final RCRA Facility Investigation Report for Zone I*, rising and falling head slug tests were conducted on several shallow monitoring wells located throughout the Zone I Quaternary sand unit to determine the hydraulic conductivity of the surficial aquifer (E/A&H, 1996). Slug tests were conducted by instantaneously adding (falling head) or removing (rising head) a volume (slug) of water from the well and measuring the recovering water level with a data logger. A hydraulic conductivity value was then calculated for the rising head test and for the falling head test. The average hydraulic conductivity for each well was determined by calculating the geometric mean of the rising and falling head values. Because hydraulic conductivity data are lognormally distributed, the geometric mean was determined to be the most representative measure of central tendency.

The well construction details and boring logs for each well tested during the RCRA investigation were reviewed to determine which wells were most representative of the conditions present at UST NS200. To make this determination, the screened interval and proximity to the site were evaluated. Based on this evaluation, monitoring wells GDI 015 and 671 004 were selected as the most representative wells (see Appendix C for slug test data).

Potential movement of groundwater at the site may be described in terms of transportation by natural flow system in the saturated zone, assuming groundwater flow follows Darcy's Law. Using Darcy's Law the average linear groundwater velocity may be expressed as:

$$V = \left(\frac{K}{n}\right) x\, i$$

**where:**

V = average velocity

K = hydraulic conductivity = 2.88 ft/day
n = volumetric porosity = 0.35
(based on analyses of Qs samples in the *Zone I RFI Report*)
i = most recent hydraulic gradient measurement = 0.0142 ft/ft

therefore:

$$V = \left(\frac{2.88\ \mathrm{ft/day}}{0.35}\right) x\ 0.0142\ \mathrm{ft/ft}$$

$V = 0.1168\ \mathrm{ft/day}$ or 42.6 ft/year

In summary, the seepage velocity of the surficial aquifer was calculated to be approximately 43 feet per year based on a hydraulic conductivity of 2.88 feet per day, a hydraulic gradient of 0.0142 feet per foot, and a porosity of 35 percent for sandy soil.

## 2.11 FATE AND TRANSPORT MODELING

The Domenico Model is the fate and transport method used to estimate the distance downgradient the CoCs may migrate in 10- and 20-year time periods. The Domenico dilution/attenuation model is presented in the SCDHEC guidance document, *South Carolina Risk-Based Corrective Action for Petroleum Releases* (SCDHEC 1998). This model is very conservative in that it assumes an infinite mass, areal source condition through which groundwater flows. The model incorporates biological decay effects through a first-order decay process; however, this mechanism was ignored because SCDHEC guidance specifies that the decay rate must be assumed to be zero if site-specific decay rates have not been determined.

The impacted groundwater source area was modeled as 30 feet (15.00 meters) wide and 6.56 feet (2.0 meters) deep; these values are conservative defaults suggested by the American Society for Testing and Materials (ASTM) *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (ASTM, 1997). The maximum source concentrations are assumed to exist throughout the source area, further compounding the conservatism of the estimate.

Site-specific data were used for saturated hydraulic conductivity, hydraulic gradient, porosity, and fraction of organic carbon in soil (1.02E-05 m/sec, 0.0142 ft/ft, 0.35 $cm^3/cm^3$ and 2.01E-3 g-C/g-soil, respectively). The soil bulk density (1.45 $g/cm^3$) was determined using a porosity of 0.35 and assuming that the specific gravity of the soil particles is 2.7.

Because free product was previously detected in monitoring well NBCT200TW01, the theoretical groundwater concentration in equilibrium with kerosene based on Raoult's Law (see Appendix D) was calculated for each of the potential CoCs. These calculated values were used for the source concentration in predicting the 10- and 20-year plume migration. This analysis showed that the theoretical concentrations of benzene (0.31 mg/L), toluene (4.65 mg/L), and naphthalene (23.35 mg/L) each exceed the groundwater RBSLs; therefore, these CoCs were modeled.

The following estimates of dispersivity were used in the Domenico model as given in SCDHEC (1998):

| Parameter | Estimate |
|---|---|
| Longitudinal Dispersivity, $\alpha_x$ | x/10, where x= distance between the point of exposure and the source or compliance point |
| Transverse Dispersivity, $\alpha_y$ | $\alpha_x/3$ |
| Vertical Dispersivity, $\alpha_z$ | $\alpha_x/20$ |

## 2.12 PREDICTED MIGRATION AND ATTENUATION OF CHEMICALS OF CONCERN

The Domenico model was used to predict the distance at which the leading edge of the plume is attenuated to SCDHEC RBSLs in 10 and 20 years without using degradation due to biological decay. This was done by adjusting the time to 10 years ($3.15 \times 10^8$ sec) and 20 years ($6.31 \times 10^8$ sec) and solving for distance (x) by trial and error. The source was assumed to be the impacted area onsite. The distance was changed until the required distance that is necessary for the concentration to attenuate to the RBSLs was determined. Model estimates for 10 and 20 years are provided in the following table:

| Domenico Model Time Period | Chemical of Concern | Maximum Source Concentration(1) (mg/L) | RBSL or Point of Exposure Concentration (mg/L) | Estimated Distance Traveled (feet) | Time Period Equilibrium Reached (years) |
|---|---|---|---|---|---|
| **10 year** | Benzene | 0.31 | 0.005 | **295** | >10 |
| | Toluene | 4.65 | 1.00 | **47** | >10 |
| | Naphthalene | 23.35 | 0.01 | **14** | >10 |
| | | | | | |
| **20 year** | Benzene | 0.31 | 0.005 | **335** | >20 |
| | Toluene | 4.65 | 1.00 | **68** | >20 |
| | Naphthalene | 23.35 | 0.01 | **27** | >20 |

(1) Raoult's Law default concentration for theoretical solubility of organic constituent in product (kerosene or fuel oil).

The 10- and 20-year models indicate that the Cooper River, located approximately 170 feet from the source area, would not be protected from exposure to benzene. The Domenico 10-year and 20-year simulation spreadsheets are presented in Appendix D.

# 3.0 RISK EVALUATION

## 3.1 COMPARISON OF ANALYTICAL RESULTS WITH RBSLs

Performance of a Site Conceptual Model is required because the RBSLs for soil and groundwater were exceeded. Benzene and naphthalene exceeded the RBSLs for sandy soil where depths to groundwater are 5 to 10 feet bls. Free product has been observed at this site since 1998. Since free product is expected at the site, Raoult's Law was used to estimate the maximum CoC concentrations that can be present in the groundwater due to the free product. The theoretical maximum concentrations of benzene, toluene, and naphthalene based on Raoult's Law exceeded the RBSLs for groundwater. Exceeding RBSLs requires identification of current and future potential receptors and human exposure pathways.

## 3.2 SITE CONCEPTUAL EXPOSURE MODEL

This section focuses on the current and future land use issues concerning the site. Figure 1 shows that the site is bordered by the CNC to west and south, and by the Cooper River to the north and east. The area surrounding CNC is "mature urban," having long been developed with commercial, industrial, and residential land use. Commercial areas are primarily west of CNC; industrial areas are primarily to the north of the base along Shipyard Creek. The future use of the property is expected to be industrial or commercial for the foreseeable future after the property is made available for redevelopment as part of the Defense Base Realignment and Closure (BRAC) Act.

There are no potable water wells on the CNC. The former UST NS200 site is located more than ¼ mile inside the CNC boundary; therefore, no potable water wells are within a ¼ mile radius of the UST NS200 site. The nearest sensitive receptor is the Cooper River located approximately 200 feet north of the former UST pit (approximately 170 feet from the leading edge of the free product). Surface runoff from the former UST NS200 site would flow overland toward the Cooper River. There are no storm drains located between the former UST NS200 site and the Cooper River.

## 3.3 EXPOSURE PATHWAY ANALYSIS

This section presents the receptor characterizations of the potentially exposed populations in the vicinity of the site and identifies the potentially complete exposure pathways for those receptors. SCDHEC requires that only those exposure pathways with CoC concentrations exceeding Tier 1 RBSL concentrations are examined in a Tier 2 Risk-Based Corrective Action Report. Tables 1 and 2 present the exposure pathway assessments for current and future use scenarios.

### 3.3.1 On-Site Commercial/Industrial Worker

An on-site commercial or industrial worker is defined as a business employee who works in a commercial/ industrial capacity at the site. The future use of the property is expected to be industrial or commercial for the foreseeable future; therefore, an on-site worker was considered as a potential receptor. Incidental ingestion and dermal contact with impacted soil are expected to be negligible for commercial/industrial workers because they are located inside a building. Drinking water at this site is provided by the city; therefore, ingestion of groundwater is not a complete exposure pathway. Building NS200's foundation is assumed to be sufficient to prevent volatilization from both soil and groundwater into a commercial building, and there is no history of vapors in Building NS200. It is unlikely that any additional exposure pathways will exist for future on-site workers; therefore, no complete pathways exist for either current or future commercial/industrial workers.

### 3.3.2 On-Site Visitor

An on-site visitor is defined as any person other than a worker who might come on site. On-site visitors would have the same exposure pathways as commercial workers, but their exposure duration would be much shorter. This receptor does not have to be quantified because a potential on-site visitor's chemical intake would not drive risk or cleanup levels at the site.

### 3.3.3 On-Site Construction Worker

An on-site construction worker is defined as a laborer who would be involved in intrusive activities on or around the site, particularly in the area of subsurface utilities. On-site construction workers could be exposed to constituents in soil by the following pathways: inhalation of volatiles from soil, dermal contact with soil, and incidental ingestion of soil. Surficial soil is not impacted, but subsurface samples contained benzene and naphthalene at concentrations exceeding the RBSLs. On-site construction workers could be exposed to constituents in groundwater by the following pathways: inhalation of volatiles from groundwater, dermal contact with groundwater, incidental ingestion of groundwater, and soil leaching to the groundwater. A water line, storm sewer, and sanitary sewer are adjacent to the site; therefore, the point of exposure location for the on-site construction worker is considered to be at the source.

### 3.3.4 On-Site Resident

An on-site resident is defined as any person making his or her home at the site. This site is expected to remain a commercial/industrial facility; therefore, the on-site resident receptor was not considered further.

### 3.3.5 Off-Site Resident

An off-site resident is defined as any person making his or her home near the site. This receptor's location is either an actual current residence near the site or is a vacant lot or property on which a residence could be built. The site is located in an area that will likely remain commercial/industrial, including all downgradient properties to the Cooper River. Therefore, this potential receptor was not considered further.

### 3.3.6 Surface Water

The Cooper River is located approximately 170 feet to the north of the site. As Zone-wide groundwater flow has been identified as flowing toward the Cooper River, this potential receptor is considered.

## 3.4 IDENTIFICATION OF DATA REQUIREMENTS

No additional data are required to calculate SSTLs for the site.

## 3.5 SITE-SPECIFIC TARGET LEVELS

The Site Conceptual Model identified two possible receptors with seven potential pathways:

1. A construction worker in a utility trench who might ingest subsurface soil, have dermal contact with impacted subsurface soil, or inhale volatilized vapors from affected soil.
2. A construction worker in a utility trench who might ingest, have dermal contact with, or inhale vapors from contaminated groundwater.
3. The Cooper River was considered as a surface water receptor with one pathway: ingestion of affected river water.

Based on the site conceptual model, a Tier 2 evaluation was performed and is presented in the following sections.

### 3.5.1 Ingestion and Dermal Contact with Soil for a Construction Worker

The Site Conceptual Model identified the only potential receptor as a construction worker ingesting or having dermal contact with soil while working in a utility trench. For ingestion and dermal contact with soil while working in a utility trench, subsurface soil exposure to a construction worker is similar to surface soil exposure. The RBSLs given by SCDHEC for ingestion and dermal contact with surficial soils by a commercial worker are compared to the site soil concentrations in the table below. (RBSLs for commercial workers are conservative for construction workers. See footnote (**1**) below.)

| CoC | RBSL* (1) | S020106 | S030106 | S010103 | S140103 | TW10102 | TW10204 | TW20102 |
|---|---|---|---|---|---|---|---|---|
| Benzene | **200** | 0.002 | ND | 0.014 | ND | ND | ND | ND |
| Naphthalene(2) | **41,000** | 0.940 | 1.990 | 1.820 | 2.390 | 2.080 | 0.856 | 0.516 |

**Note:** All concentrations in mg/kg. Concentrations that exceed RBSL are bolded.
* RBSLs for ingestion or dermal contact with surficial soil (RBCA, Table B6).
(1) A commercial worker has a typically assumed exposure duration of 25 years and an exposure frequency of 250 days/year. A construction worker would be expected to have a much lower exposure duration and exposure frequency based on the nature of utility or construction work. The exposure frequency can be assumed to be 90 days/year and the exposure duration can be assumed to be 1 year. These assumptions are based on the nature of utility work. Therefore, the RBSLs for construction workers are expected to be higher than those for commercial workers.
(2) Naphthalene (Total) combines Naphthalene (8260 value) and 2-Methylnaphthalene (8270 value).

As shown in the above table, soil concentrations do not exceed the RBSLs for any CoC; therefore, a construction worker ingesting or contacting impacted soil is not considered at-risk and the dermal/ingestion pathway is not considered for further analysis.

### 3.5.2 Inhalation SSTLs

RBSLs for a construction worker in a trench inhaling volatile vapors from soil were calculated. The calculations are provided in Appendix D. The inhalation RBSLs were calculated using equations given in the ASTM *Standard Guide for Risk-Based Corrective Action Applied to Petroleum Release Sites, Designation E 1739-95E1* (1997). The following table summarizes the calculated RBSLs for the analyzed pathway:

| Chemical of Concern | Inhalation SSTL (mg/kg) | Maximum On-site Soil Concentration (mg/kg) | Exceeds SSTL? |
|---|---|---|---|
| Benzene | **7,853** | 0.014 | No |
| Naphthalenes | **3,123** | 2.390 | No |

Based on the above table, the construction worker exposed to subsurface soil is not at risk if inhaling benzene or naphthalenes volatilizing from the soil.

### 3.5.3 Ingestion, Dermal Contact, and Inhalation of Vapors from Groundwater Exposed to a Construction Worker

An additional completed pathway for construction workers is benzene and naphthalene in the groundwater possibly exposing the workers to CoCs while working in a utility trench. The construction worker's potential exposure to groundwater containing any of these CoCs was assumed to consist of three pathways: dermal contact, incidental ingestion, and inhalation of volatiles. Drinking water is provided by the city; therefore, ingestion of groundwater is not considered a complete pathway.

### 3.5.4 Calculation of Groundwater RBSLs Protective of a Construction Worker

Groundwater RBSLs provided by SCDHEC are for ingestion only; therefore, RBSLs were calculated for the additional pathways of dermal contact, incidental ingestion, and inhalation of volatiles. These calculated RBSLs will be compared to on-site maximum CoC concentrations in groundwater and later used in the soil leachibility model for determining whether the construction worker is at risk from groundwater leaching through site soils.

Groundwater RBSLs for the construction worker were calculated for three pathways: dermal contact, incidental ingestion, and inhalation of volatiles. A target cancer risk of $1 \times 10^{-6}$ and a target hazard quotient of 1 were used in the calculations. Standard defaults were used when available and applicable to a construction worker. When no standard parameters were available, conservative assumptions were used. Where possible, site-specific parameters were used for site conditions. For all pathways, the exposure frequency was assumed to be 90 days/year and the exposure duration was assumed to be 1 year. These assumptions were considered conservative based on the nature of utility work.

The dermal contact RBSLs were calculated using procedures in *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance* (USEPA Peer Consultation Workshop Draft, 1998). Based on expected limited contact with groundwater, the event frequency was assumed to be one event/day and the event duration was assumed to be 1 hour/event. The skin surface area available for contact was 4500 $cm^2$, based on one-fourth the skin surface area given in the risk assessment guidance document for a swimming adult.

The incidental ingestion RBSLs were calculated using the equation given in *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Interim Final)*, EPA/540/1-89/002 (USEPA 1989). An incidental ingestion rate of 0.01 L/day was assumed based on a fraction (12.5%) of the incidental ingestion rate for a wading adult (0.01 L/hr), considered for an 8-hour work day. The incidental ingestion rate for wading adults is given in *Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment* (USEPA Region IV 1995).

The inhalation RBSLs were calculated using equations given in the ASTM *Standard Guide for Risk-Based Corrective Action Applied to Petroleum Release Sites, Designation E 1739-95e1* (1997).

Because of the existence of free product on-site, the maximum solubility in equilibrium with fuel oil calculated using Raoult's Law was used for the maximum constituent concentrations in groundwater. Fuel oil constituents can vary greatly but were assumed for this investigation to be similar to kerosene, which is typically 44% naphthalene (Conoco, Inc., 1996. *CONCAWE Diesel Fuel / Kerosene*). Calculations are provided in Appendix D.

The following table summarizes the calculated RBSLs for the analyzed pathways (see attached calculations) and tabulates the minimum RBSL regardless of the pathway:

| | Dermal RBSL (mg/L) | Incidental Ingestion RBSL (mg/L) | Inhalation RBSL (mg/L) | Selected Minimum RBSL (mg/L) | Maximum On-site Groundwater Conc.[1] (mg/L) | Greater than the RBSL? |
|---|---|---|---|---|---|---|
| **Benzene** | 0.85 | 68.52 | 0.15 | **0.15** | 0.31 | **Yes** |
| **Toluene** | 23.98 | 5677.78 | 5.38 | **5.38** | 4.65 | No |
| **Naphthalene** | 1.63 | 1135.56 | 2.63 | **1.63** | 23.35 | **Yes** |

**Note:** * No inhalation reference dose is available for xylenes; therefore, no inhalation RBSL can be calculated.
[1] Raoult's Law concentration for theoretical solubility of organic constituent in product (kerosene or fuel oil).

Based on the above comparison table of calculated RBSLs and default on-site values using Raoult's Law, benzene and naphthalene in the groundwater pose a risk to a construction worker exposed to groundwater. Toluene concentration in groundwater does not pose a threat to the construction worker.

### 3.5.5 Soil Leaching to Groundwater Risk for a Construction Worker

The Soil Leachability Model was used to calculate SSTLs for the establishment of soil cleanup criteria for benzene and naphthalene in soil. Site-specific parameters were used when available; otherwise, values were estimated from the charts on pages C2 through C5 of the SCDHEC *Risk-Based Corrective Action Guidance for Petroleum Releases*, January 5, 1998. Because the only receptor for the groundwater

pathway is the construction worker, the minimum RBSLs calculated for the construction worker exposure were used as the groundwater target level.

| Chemical of Concern | Soil Leaching SSTL (mg/kg) | Maximum On-site Soil Concentration (mg/kg) | Exceeds SSTL? |
|---|---|---|---|
| Benzene | **0.32** | 0.014 | No |
| Naphthalene | **46** | 2.390 | No |

Based on the above table, the maximum soil concentrations of benzene and naphthalene found during the site assessment do not exceed the calculated soil leaching SSTLs for these CoCs; therefore, the construction worker is not considered at-risk if exposed to groundwater that has been contaminated from soil leaching.

### 3.5.6 SSTLs Protective of the Cooper River

SSTLs were developed which would protect the Cooper River from potential impact from discharge of impacted groundwater. The Domenico model was used to determine the groundwater SSTLs for benzene, toluene, and naphthalene under steady state conditions. The groundwater flow was assumed to be primarily north toward the Cooper River, 170 feet from the northernmost edge of the known free product extent (Figure 2). Monitoring well NBCT200TW01 contained free product (fuel oil) during several elevation-gauging events from September 30, 1998, to October 20, 1999; therefore, the area surrounding this monitoring well was considered to be the source for the modeling. Using the SCDHEC RBSL values at the point of exposure (Cooper River), the source area, and the compliance point SSTLs (monitoring well NBCL037001I located 20 feet north of the source location or 150 feet from Cooper River) were calculated and compared with the calculated source concentrations in NBCT200TW01.

Groundwater SSTLs protective of the Cooper River were determined to be:

| Chemical of Concern | Maximum On-site Groundwater Concentration* (mg/L) | Source SSTL [mg/L] | Compliance Point SSTL [mg/L] | Exceeds SSTL |
|---|---|---|---|---|
| Benzene | 0.31 | **0.063** | 0.050 | **Yes** |
| Toluene | 4.65 | **12.6** | 10.0 | No |
| Naphthalene | 23.35 | **0.12** | 0.10 | **Yes** |

**Note:** * Based on Raoult's Law

As shown above, benzene and naphthalene dissolved in site groundwater may pose a possible threat to the Cooper River. Appendix D provides the Domenico model calculations that generate the SSTLs.

### 3.5.7 Selected SSTLs

The selected SSTLs and the source concentrations are:

| Media of Concern | Chemical of Concern | Units | Minimum SSTL | Maximum Source Concentration | Exceeds SSTLs |
|---|---|---|---|---|---|
| **Soil** | Benzene | mg/kg | **0.32** | 0.014 | No |
| | Naphthalene | mg/kg | **46** | 2.390 | No |
| | | | | | |
| | Benzene | mg/L | **0.063** | 0.31 | Yes |
| **Groundwater** | Toluene | mg/L | **5.4** | 4.65 | No |
| | Naphthalene | mg/L | **0.12** | 23.35 | Yes |

Benzene and naphthalene in the soil do not pose a threat to the construction worker in a utility trench. The presence of toluene in groundwater is within acceptable risk limits as defined by the SCDHEC and is not a risk to the construction worker or the Cooper River. Benzene and naphthalene in groundwater may pose a threat to the construction worker in a utility trench and to the Cooper River.

## 3.6 CONCLUSIONS

The contamination assessment of the former UST NS200 detected levels of petroleum hydrocarbon contamination above RBSLs. The following summarizes the results of the investigation and the risk analysis.

- The apparent flow direction of the shallow groundwater at the site is generally toward the south, especially between wells NBCT200TW01 and NBCT200TW03; however, many times the groundwater elevation data indicated a plateau, or a slight gradient to the north, between wells NBCT200TW02 and NBCL03001I. The Zone I RFI Report indicated a general zone-wide tendency toward the Cooper River. Inconsistencies in the groundwater flow direction at the site could be attributed to (1) marine wall pilings installed between the piers along the shipyard waterfront, (2) tidal influences, (3) the proximity of the sanitary sewer line to the four monitoring wells (potentially draining or de-watering the area), and /or (4) leakage from the force main that feeds into the manhole near monitoring well NBCT200TW02.

- Benzene and naphthalene were detected in soil above the soil leaching RBSLs for sandy soil with groundwater depth between 5 and 10 feet bls.

- Free product has been measured in monitoring well NBCT200TW01. The concentrations in groundwater as calculated using Raoult's Law are above the groundwater RBSLs for benzene, toluene, and naphthalene.

- Potential receptors are identified as a construction worker in a utility trench exposed to groundwater or soil and the Cooper River. Pathways were identified as dermal contact, ingestion, inhalation, or soil leaching to groundwater.

- Maximum soil concentrations do not exceed the dermal, incidental ingestion, or inhalation RBSLs; therefore, a construction worker in a utility trench would not be considered at risk by soil. Additionally, soil leaching to groundwater would not pose a threat to the construction worker in a trench because SSTLs are not exceeded at the site.

- Maximum groundwater concentrations exceed the RBSLs for benzene and naphthalene. Therefore, the construction worker and the Cooper River may be at risk due to groundwater contaminated with benzene and naphthalene.

- SSTLs were formulated and can be used as cleanup goals.

## 3.7 RECOMMENDATIONS FOR FURTHER ACTION

Active corrective action is necessary at UST NS200. Because of the presence of free product, the representative concentrations of benzene and naphthalene in groundwater are above the selected minimum RBSLs for the construction worker. In addition, the concentrations of benzene and naphthalene in groundwater are above the SSTLs for surface water exposure at the Cooper River. Therefore, corrective action is required to reduce naphthalene and benzene in groundwater to concentrations below the formulated SSTLs. The goal of corrective action is to prevent an impact to the identified potential receptors (the construction worker in an on-site utility trench and the nearby surface water--Cooper River).

# 4.0 REFERENCES

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# TABLE 1

## CURRENT LAND USE - POTENTIAL RECEPTORS AND PATHWAYS WITHIN 1,000-FOOT RADIUS
## UST 200, BUILDING NS200
## ZONE I, CHARLESTON NAVAL COMPLEX
## NORTH CHARLESTON, SOUTH CAROLINA

| Media (for exposure) | Exposure Route | Pathway Selected for Evaluation? | Exposure point or Reason for Non-Selection | Data Requirements |
|---|---|---|---|---|
| Air | Inhalation | No | No volatilization to enclosed space. | |
| | Explosion Hazard | No | No explosion hazard. | |
| Groundwater | Ingestion | Yes | No water supply well downgradient. All water supplied by city. However, construction worker could be exposed to groundwater in utility trench. | RBSLs for construction worker exposure to groundwater. |
| | Dermal Contact | Yes | | |
| | Volatile Inhalation | Yes | | |
| Surface Water | Ingestion | Yes | Cooper River is 170 feet to the north (upgradient but downslope). | SSTLs for surface water ingestion at Cooper River. |
| | Dermal Contact | No | | |
| | Volatile Inhalation | No | | |
| Surficial Soil | Ingestion | No | No impacted surface soil. Asphalt and concrete cover impacted soil. | |
| | Dermal Contact | No | | |
| | Volatile Inhalation | No | | |
| | Leaching to Groundwater | No | | |
| Subsurface Soil | Ingestion | Yes | Construction worker in a utility trench could be exposed to contaminated soil and soil vapors. Sandy soils; groundwater is shallow: ~5 feet bls. | |
| | Dermal Contact | Yes | | |
| | Volatile Inhalation | Yes | | |
| | Leaching to Groundwater | Yes | | |

**TABLE 2**

**FUTURE LAND USE - POTENTIAL RECEPTORS AND PATHWAYS WITHIN 1,000-FOOT RADIUS**
**UST 200, BUILDING NS200**
**ZONE I, CHARLESTON NAVAL COMPLEX**
**NORTH CHARLESTON, SOUTH CAROLINA**

| Media (for exposure) | Exposure Route | Pathway Selected for Evaluation? | Exposure point or Reason for Non-Selection | Data Requirements |
|---|---|---|---|---|
| Air | Inhalation | No | No volatilization to enclosed space. | |
| | Explosion Hazard | No | No explosion hazard. | |
| Groundwater | Ingestion | Yes | No water supply well downgradient. All water is supplied by city. However, construction worker could be exposed to groundwater in utility trench. | RBSLs for construction worker exposure to groundwater. |
| | Dermal Contact | Yes | | |
| | Volatile Inhalation | Yes | | |
| Surface Water | Ingestion | Yes | Cooper River is 170 feet to the north (upgradient but downslope). | SSTLs for surface water ingestion at Cooper River. |
| | Dermal Contact | No | | |
| | Volatile Inhalation | No | | |
| Surficial Soil | Ingestion | No | No impacted surface soil. Asphalt and concrete cover impacted soil. | |
| | Dermal Contact | No | | |
| | Volatile Inhalation | No | | |
| | Leaching to Groundwater | No | | |
| Subsurface Soil | Ingestion | Yes | Construction worker in a utility trench could be exposed to contaminated soil and soil vapors. Sandy soils; groundwater is shallow: ~5 feet below land surface. | |
| | Dermal Contact | Yes | | |
| | Volatile Inhalation | Yes | | |
| | Leaching to Groundwater | Yes | | |

# TABLE 3

## GROUNDWATER ELEVATIONS
## UST 200, BUILDING NS200
## ZONE I, CHARLESTON NAVAL COMPLEX
## NORTH CHARLESTON, SOUTH CAROLINA

| Monitoring Well No. | Depth to Bottom of Screen (ft) | Top of Casing Elevation (ft) (MSL) | Date Measured | Depth to Free Product (BTOC) | Depth to Water (ft) (BTOC) | Groundwater Elevation (ft) (MSL) |
|---|---|---|---|---|---|---|
| NBCT200TW01* | 15.1 | 11.32 | 7/8/98 | -- | 9.12 | 2.20 |
| | | | 9/30/98, LT | 8.62 | 9.26 | 2.58 |
| | | | 9/30/98, HT | 8.36 | 8.58 | 2.92 |
| | | | 10/2/98 | NA | NA | NA |
| | | | 10/14/98, LT | 8.53 | 9.19 | 2.67 |
| | | | 10/14/98, HT | 8.22 | 8.44 | 3.06 |
| | | | 10/30/98 | 9.27 | 10.14 | 1.89 |
| | | | 11/5/98 | 9.05 | 9.33 | 2.22 |
| | | | 11/13/98 | 9.50 | 10.10 | 1.71 |
| | | | 11/19/98 | 9.54 | 9.95 | 1.71 |
| | | | 12/3/98 | 9.70 | 10.05 | 1.56 |
| | | | 12/4/98 | 9.70 | 10.09 | 1.55 |
| | | | 1/12/99 | 9.46 | 9.88 | 1.78 |
| | | | 1/20/99 | 9.35 | 9.46 | 1.95 |
| | | | 1/26/99 | 8.51 | 8.66 | 2.78 |
| | | | 2/1/99 | 8.09 | 8.25 | 3.20 |
| | | | 2/17/99 | 9.08 | 9.18 | 2.22 |
| | | | 3/3/99 | 9.11 | 9.23 | 2.19 |
| | | | 10/20/99 | 7.32 | 7.33 | 4.00 |
| NBCT200TW02 | 14.8 | 10.49 | 7/8/98 | | 8.45 | 2.04 |
| | | | 9/30/98, LT | | 7.81 | 2.68 |
| | | | 9/30/98, HT | | 7.58 | 2.91 |
| | | | 10/2/98 | | 7.75 | 2.74 |
| | | | 10/14/98, LT | | 7.65 | 2.84 |
| | | | 10/14/98, HT | | 7.41 | 3.08 |
| | | | 10/30/98 | | 8.51 | 1.98 |
| | | | 11/5/98 | | 8.24 | 2.25 |
| | | | 11/13/98 | | 8.72 | 1.77 |
| | | | 11/19/98 | | 8.73 | 1.76 |
| | | | 12/3/98 | | 8.84 | 1.65 |
| | | | 12/4/98 | | 8.83 | 1.66 |
| | | | 1/12/99 | | 8.56 | 1.93 |
| | | | 1/20/99 | | 8.47 | 2.02 |
| | | | 1/26/99 | | 7.51 | 2.98 |
| | | | 2/1/99 | | 7.05 | 3.44 |
| | | | 2/17/99 | | 8.15 | 2.34 |
| | | | 3/3/99 | | 8.21 | 2.28 |
| | | | 10/20/99 | | 6.60 | 3.89 |

# TABLE 3

## GROUNDWATER ELEVATIONS
## UST 200, BUILDING NS200
## ZONE I, CHARLESTON NAVAL COMPLEX
## NORTH CHARLESTON, SOUTH CAROLINA

| Monitoring Well No. | Depth to Bottom of Screen (ft) | Top of Casing Elevation (ft) (MSL) | Date Measured | Depth to Free Product (BTOC) | Depth to Water (ft) (BTOC) | Groundwater Elevation (ft) (MSL) |
|---|---|---|---|---|---|---|
| **MBCT200TW03** | 14.5 | 9.93 | 7/8/98 | | 7.75 | 2.18 |
| | | | 9/30/98, LT | | 8.19 | 1.74 |
| | | | 9/30/98, HT | | 7.23 | 2.70 |
| | | | 10/2/98 | | 8.09 | 1.84 |
| | | | 10/14/98, LT | | 8.12 | 1.81 |
| | | | 10/14/98, HT | | 7.09 | 2.84 |
| | | | 10/30/98 | | 8.60 | 1.33 |
| | | | 11/5/98 | | 8.24 | 1.69 |
| | | | 11/13/98 | | 8.72 | 1.21 |
| | | | 11/19/98 | | 8.76 | 1.17 |
| | | | 12/3/98 | | 8.84 | 1.09 |
| | | | 12/4/98 | | 8.89 | 1.04 |
| | | | 1/12/99 | | 8.80 | 1.13 |
| | | | 1/20/99 | | 8.54 | 1.39 |
| | | | 1/26/99 | | 8.09 | 1.84 |
| | | | 2/1/99 | | 7.49 | 2.44 |
| | | | 2/17/99 | | 8.46 | 1.47 |
| | | | 3/3/99 | | 8.41 | 1.52 |
| | | | 10/20/99 | | 6.46 | 3.47 |
| **NBCL037001I** | | 6.61 | 7/8/98 | | 4.59 | 2.02 |
| | | | 9/30/98, LT | | 3.85 | 2.76 |
| | | | 9/30/98, HT | | 3.68 | 2.93 |
| | | | 10/2/98 | | 3.80 | 2.81 |
| | | | 10/14/98, LT | | 3.69 | 2.92 |
| | | | 10/14/98, HT | | 3.49 | 3.12 |
| | | | 10/30/98 | | 4.59 | 2.02 |
| | | | 11/5/98 | | 4.32 | 2.29 |
| | | | 11/13/98 | | 4.82 | 1.79 |
| | | | 11/19/98 | | 4.81 | 1.80 |
| | | | 12/3/98 | | 4.92 | 1.69 |
| | | | 12/4/98 | | 4.90 | 1.71 |
| | | | 1/12/99 | | 4.63 | 1.98 |
| | | | 1/20/99 | | 4.55 | 2.06 |
| | | | 1/26/99 | | 3.53 | 3.08 |
| | | | 2/1/99 | | 3.14 | 3.47 |
| | | | 2/17/99 | | 4.24 | 2.37 |
| | | | 3/3/99 | | 4.34 | 2.27 |
| | | | 10/20/99 | | 2.64 | 3.97 |

**Notes:**

BTOC -- below top of casing

MSL -- mean sea level NA -- not available

LT -- low tide HT -- high tide

* Groundwater elevation calculation corrected for free product thickness in well as follows:

GW Elev. = TOC Elev. - [DTW-0.82(DTW-DTP)]

# TABLE 4

## SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN SOIL
## UST 200, BUILDING NS200
## ZONE I, CHARLESTON NAVAL COMPLEX
## NORTH CHARLESTON, SOUTH CAROLINA

| Site 200 / Soil Boring No. / Sample Depth | Benzene (mg/kg) | Ethyl-benzene (mg/kg) | Toluene (mg/kg) | Xylenes (total) (mg/kg) | Naphthalene (mg/kg) | Benzo(a) anthracene (mg/kg) | Benzo(b) fluoranthene (mg/kg) | Benzo(k) fluoranthene (mg/kg) | Chrysene (mg/kg) | Dibenzo(a,h) anthracene (mg/kg) | Cadmium (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **RBSL (1)** | **0.005** | **1.292** | **1.640** | **42.898** | **0.211** | **83.535** | **31.042** | **267.404** | **13.233** | **99.673** | **8.000** |
| **RBSL (2)** | **200** | **200,000** | **410,000** | **1,000,000** | **41,000** | **3.9** | **3.9** | **39** | **390** | **0.39** | **39** |
| 200S010102 | ND | 0.017 | 0.023 | 0.001 | ND | ND | ND | ND | ND | ND | ND |
| 200S020106 | 0.002 | 0.002 | ND | ND | **0.940** | ND | ND | ND | ND | ND | ND |
| 200S030106 | ND | 0.001 | ND | ND | **1.990** | ND | ND | ND | ND | ND | ND |
| 200S080104 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 200S100103 | **0.014** | 0.003 | 0.006 | 0.002 | **1.820** | ND | ND | ND | ND | ND | ND |
| 200S110102 | ND | 0.022 | ND | 0.010 | 0.001 | ND | ND | ND | ND | ND | ND |
| 200S120101 | ND | ND | ND | 0.002 | ND | ND | ND | ND | ND | ND | ND |
| 200S130103 | ND | ND | ND | 0.002 | ND | ND | ND | ND | ND | ND | ND |
| 200S140103 | ND | ND | ND | ND | **2.390** | ND | ND | ND | ND | ND | ND |
| 200S150101 | ND | 0.001 | ND | 0.002 | ND | ND | ND | ND | ND | ND | ND |
| 200S160103 | ND | 0.002 | ND | ND | 0.005 | ND | ND | ND | ND | ND | ND |
| 200S170102 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 200S180102 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 200S190102 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 200S200101 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 200S210101 | ND | ND | ND | 0.002 | ND | ND | ND | ND | ND | ND | ND |
| 200S220102 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |

# TABLE 4

## SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN SOIL
## UST 200, BUILDING NS200
## ZONE I, CHARLESTON NAVAL COMPLEX
## NORTH CHARLESTON, SOUTH CAROLINA

| Site 200 / Soil Boring No. / Sample Depth | Benzene (mg/kg) | Ethyl-benzene (mg/kg) | Toluene (mg/kg) | Xylenes (total) (mg/kg) | Naphthalene (mg/kg) | Benzo(a) anthracene (mg/kg) | Benzo(b) fluoranthene (mg/kg) | Benzo(k) fluoranthene (mg/kg) | Chrysene (mg/kg) | Dibenzo(a,h) anthracene (mg/kg) | Cadmium (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **RBSL [1]** | **0.005** | **1.292** | **1.640** | **42.898** | **0.211** | **83.535** | **31.042** | **267.404** | **13.233** | **99.673** | **8.000** |
| **RBSL [2]** | **200** | **200,000** | **410,000** | **1,000,000** | **41,000** | **3.9** | **3.9** | **39** | **390** | **0.39** | **39** |
| 200S230102 | ND | ND | ND | 0.001 | ND | ND | ND | ND | ND | ND | ND |
| 200S240101 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 200S250102 | ND | ND | ND | 0.001 | ND | ND | ND | ND | ND | ND | ND |
| 200S260103 | ND | ND | 0.002 | 0.001 | ND | ND | ND | ND | ND | ND | ND |
| 200S270103 | ND | ND | ND | 0.001 | ND | ND | ND | ND | ND | ND | ND |
| 200S280102 | ND | ND | 0.002 | 0.001 | 0.028 | ND | ND | ND | ND | ND | ND |
| 200S290103 | ND | ND | ND | ND | 0.001 | ND | ND | ND | ND | ND | ND |
| 200S310103 | ND | ND | ND | 0.003 | ND | ND | ND | ND | ND | ND | ND |
| 200TW10102 | ND | 0.006 | 0.008 | 0.016 | **2.080** | ND | ND | ND | ND | ND | 0.059 |
| 200TW10204 | ND | ND | ND | ND | **0.856** | ND | ND | ND | ND | ND | 0.256 |
| 200TW20102 | ND | 0.003 | ND | 0.002 | **0.516** | ND | ND | ND | ND | ND | 0.221 |
| 200TW20204 | ND | ND | ND | ND | 0.013 | ND | ND | ND | ND | ND | 0.168 |
| 200TW30102 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0.650 |

**Notes:**

Sample Collection Date: April 1998.

[1] RBSL for sandy soil; depth to groundwater 5 to 10 ft bls.

[2] RBSL for Commercial site where ingestion or dermal contact with surficial soil occurs.

ND – Not detected above laboratory practical quantitation limit.

# TABLE 5

## SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN GROUNDWATER
## UST 200, BUILDING NS200
## ZONE I, CHARLESTON NAVAL COMPLEX
## NORTH CHARLESTON, SOUTH CAROLINA

| Monitoring Well I.D. | Benzene (ug/L) | Ethyl-benzene (ug/L) | Toluene (ug/L) | Xylenes (total) (ug/L) | MTBE (ug/L) | Naphthalene (ug/L) | Benzo(a) anthracene (ug/L) | Benzo(b) fluoranthene (ug/L) | Benzo(k) fluoranthene (ug/L) | Chrysene (ug/L) | Dibenzo(a,h) anthracene (ug/L) | Cadmium (ug/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **RBSL [1]** | **5** | **700** | **1,000** | **10,000** | **40** | **10** | **10** | **10** | **10** | **10** | **10** | **5** |
| NBCT200TW01 [2] | **13.7** | 20.2 | 1.07 | 25.9 | ND | **524** | ND | ND | ND | ND | ND | 0.216 |
| NBCT200TW02 | ND | ND | 0.6 | ND | ND | **14.3** | ND | ND | ND | ND | ND | 0.381 |
| NBCT200TW03 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0.213 |
| NBCL037001I | ND | ND | 1.17 | ND | ND | 4.04 | ND | ND | ND | ND | ND | 0.644 |

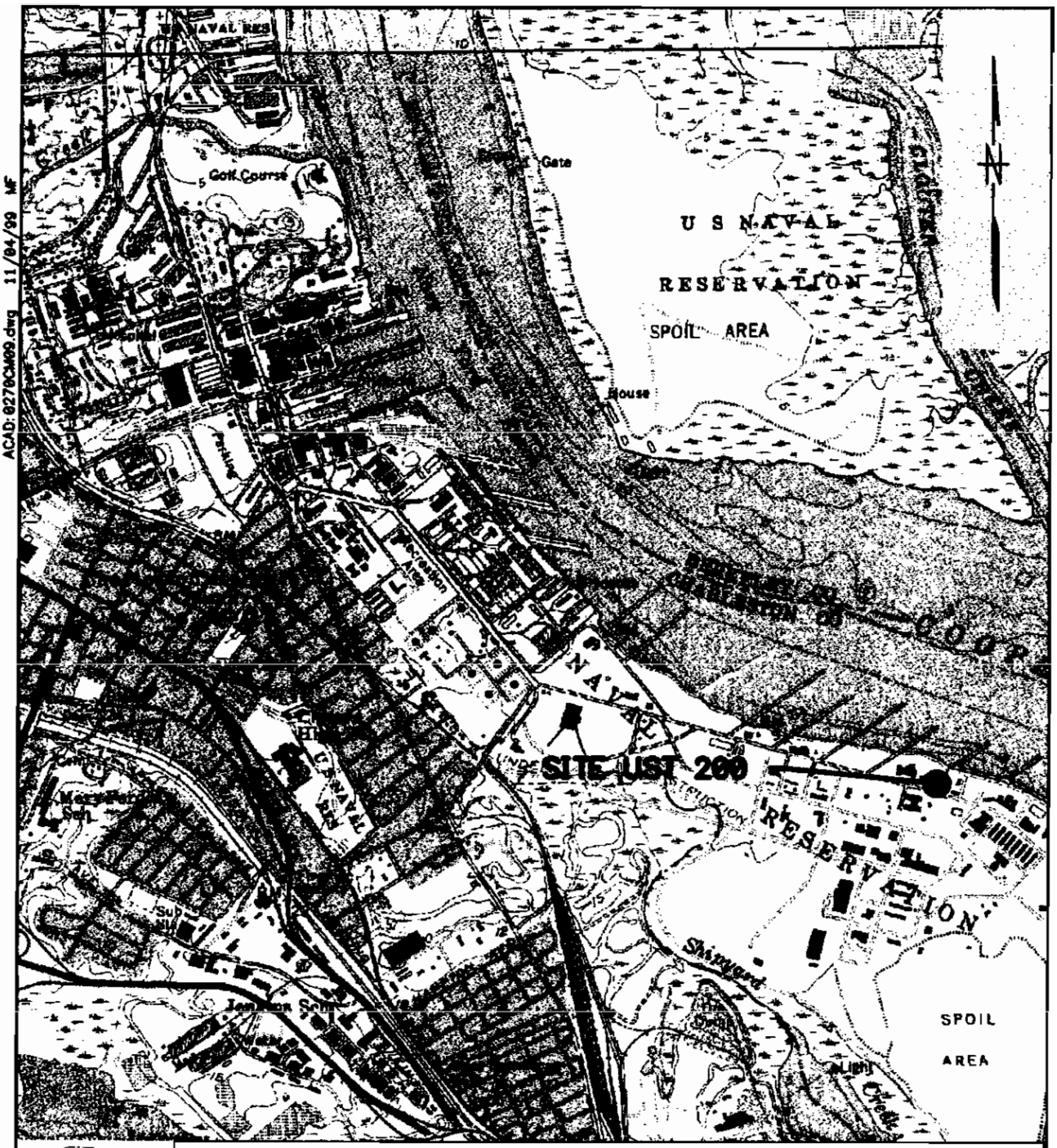
**Notes:**

Sample Collection Date: April 1998.

[1] RBSL for groundwater.

[2] Historical presence of free product in well NBCT200TW01

ACAD: 0270CM09.dwg 11/04/99 MF



SOURCE: QUADRANGLE MAP SOUTH CAROLINA, REVISED 1979
QUADRANGLE MAP NORTH CHARLESTON REVISED, 1979

0 2000 4000
SCALE IN FEET

| | | | |
|---|---|---|---|
| DRAWN BY MF DATE 11/4/99 | | | CONTRACT NO. 0270 |
| CHECKED BY DATE | | | APPROVED BY DATE |
| COST/SCHED-AREA | | | APPROVED BY DATE |
| SCALE AS NOTED | | | DRAWING NO. FIGURE 1 / REV. 0 |

SITE LOCATION MAP
SITE UST 200, BUILDING NS200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

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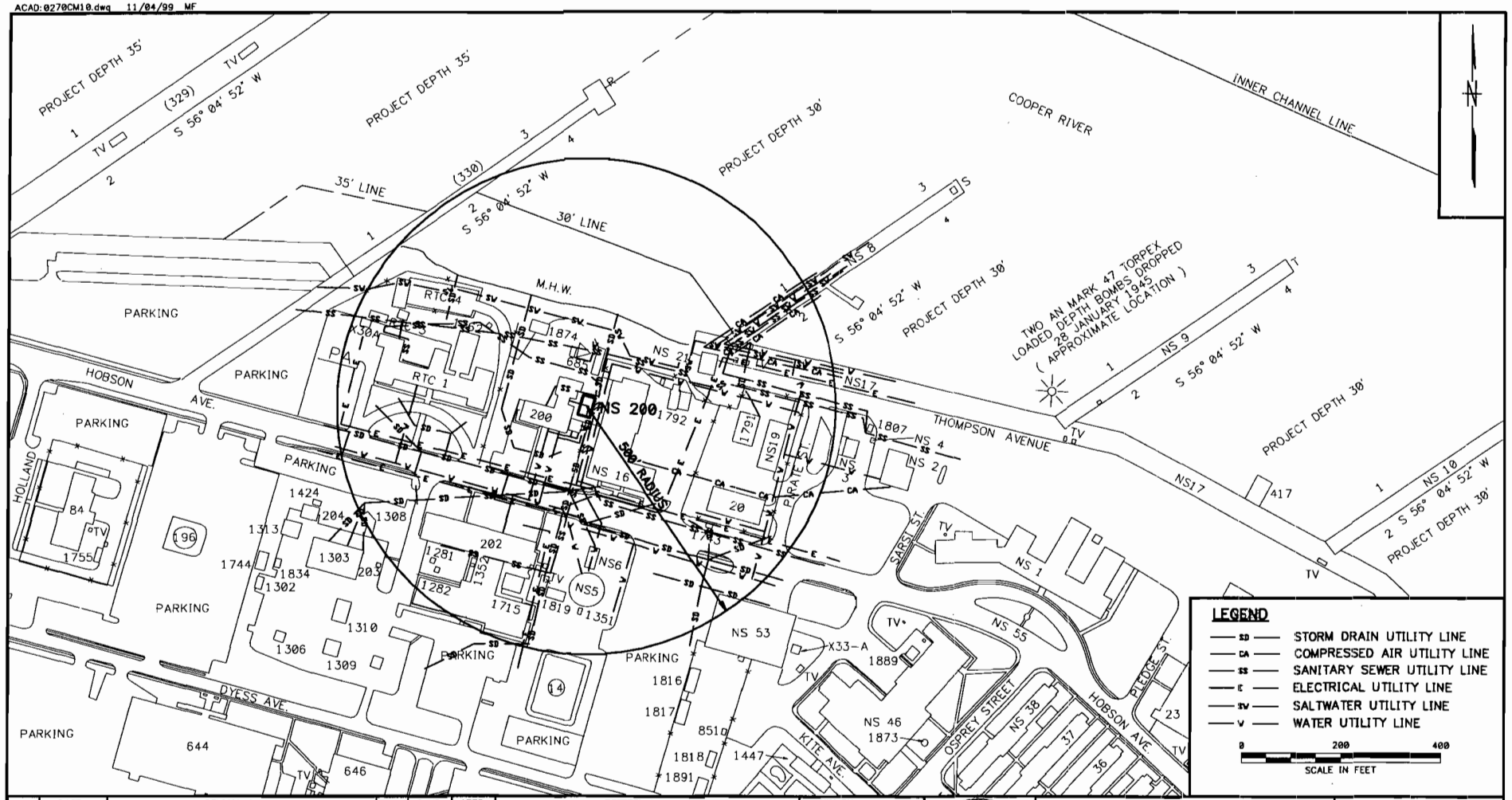


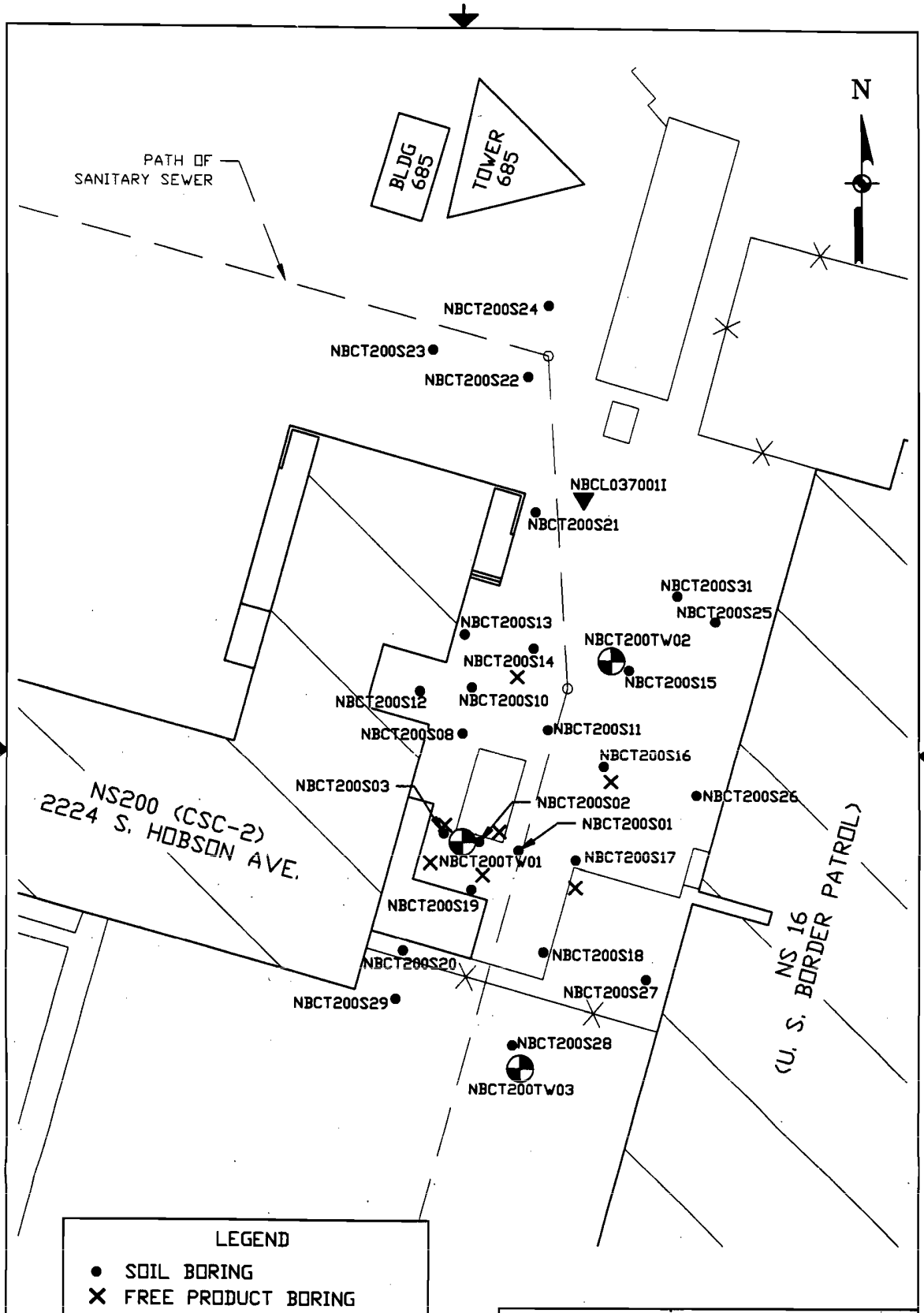

| NO. | DATE | REVISIONS | BY | CHKD | APPD | REFERENCES |
|---|---|---|---|---|---|---|
| | | | | | | |

DRAWN BY MF DATE 11/4/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

SITE VICINITY MAP
SITE UST 200, BUILDING NS 200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0270
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 2
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98




LEGEND

- ● SOIL BORING
- ✕ FREE PRODUCT BORING
- ▼ EXISTING MONITORING WELL
- ◐ NEW MONITORING WELL

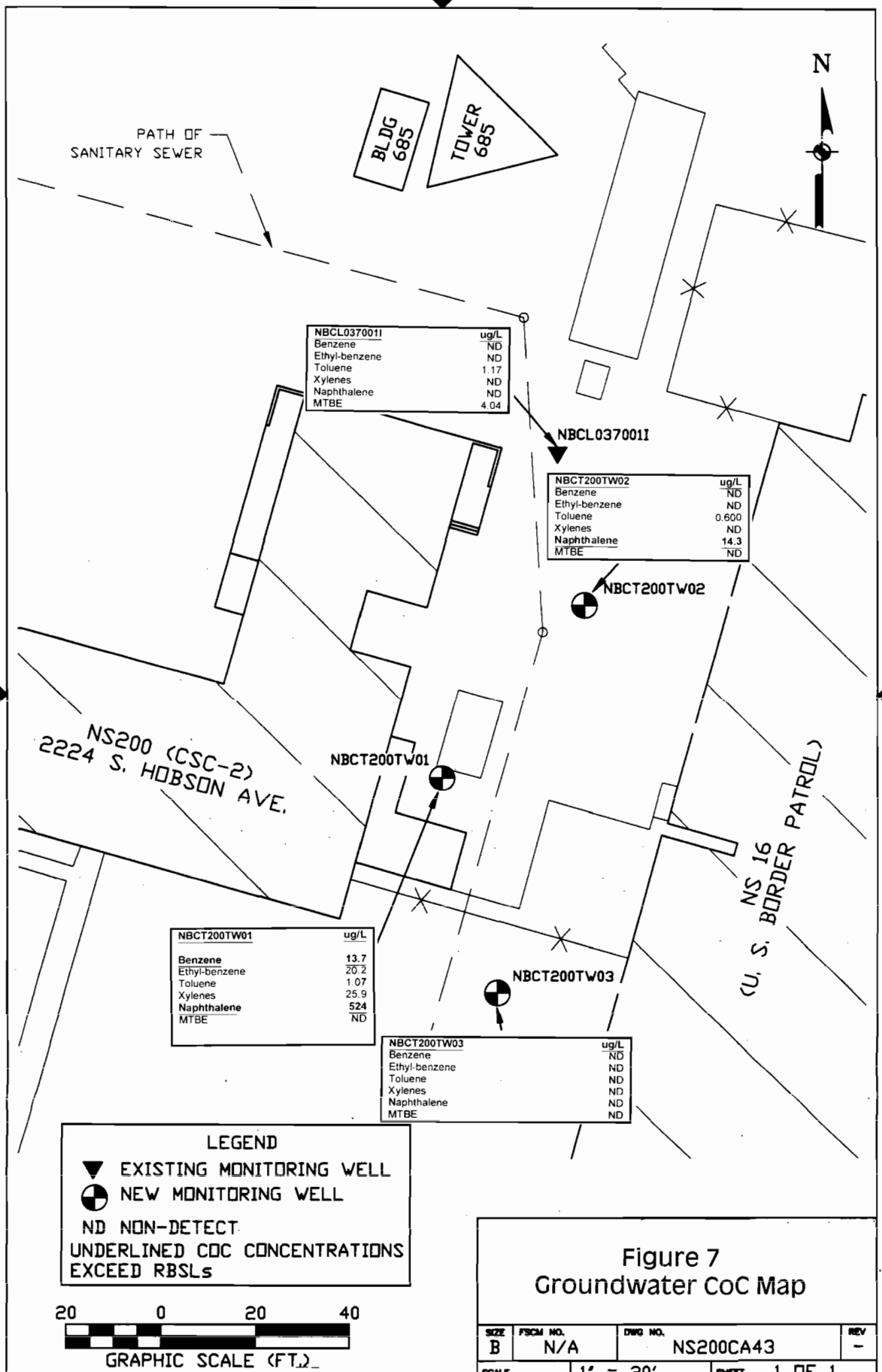
20 0 20 40

GRAPHIC SCALE (FT.)

Figure 3
UST NS200 Soil Boring & Monitoring Well Map

| SIZE | FSCM NO. | DWG NO. | REV |
|---|---|---|---|
| B | N/A | NS200CA31 | – |
| SCALE | 1" = 20' | SHEET | 1 OF 1 |

SOURCE: CONTAMINATION ASSESSMENT REPORT, ENVIRONMENTAL DETACHMENT CHARLESTON, MARCH 10, 1999




| NBCL037001I | ug/L |
|---|---|
| Benzene | ND |
| Ethyl-benzene | ND |
| Toluene | 1.17 |
| Xylenes | ND |
| Naphthalene | ND |
| MTBE | 4.04 |

| NBCT200TW02 | ug/L |
|---|---|
| Benzene | ND |
| Ethyl-benzene | ND |
| Toluene | 0.600 |
| Xylenes | ND |
| **Naphthalene** | **14.3** |
| MTBE | ND |

| NBCT200TW01 | ug/L |
|---|---|
| **Benzene** | **13.7** |
| Ethyl-benzene | 20.2 |
| Toluene | 1.07 |
| Xylenes | 25.9 |
| **Naphthalene** | **524** |
| MTBE | ND |

| NBCT200TW03 | ug/L |
|---|---|
| Benzene | ND |
| Ethyl-benzene | ND |
| Toluene | ND |
| Xylenes | ND |
| Naphthalene | ND |
| MTBE | ND |

LEGEND

▼ EXISTING MONITORING WELL

⊕ NEW MONITORING WELL

ND NON-DETECT

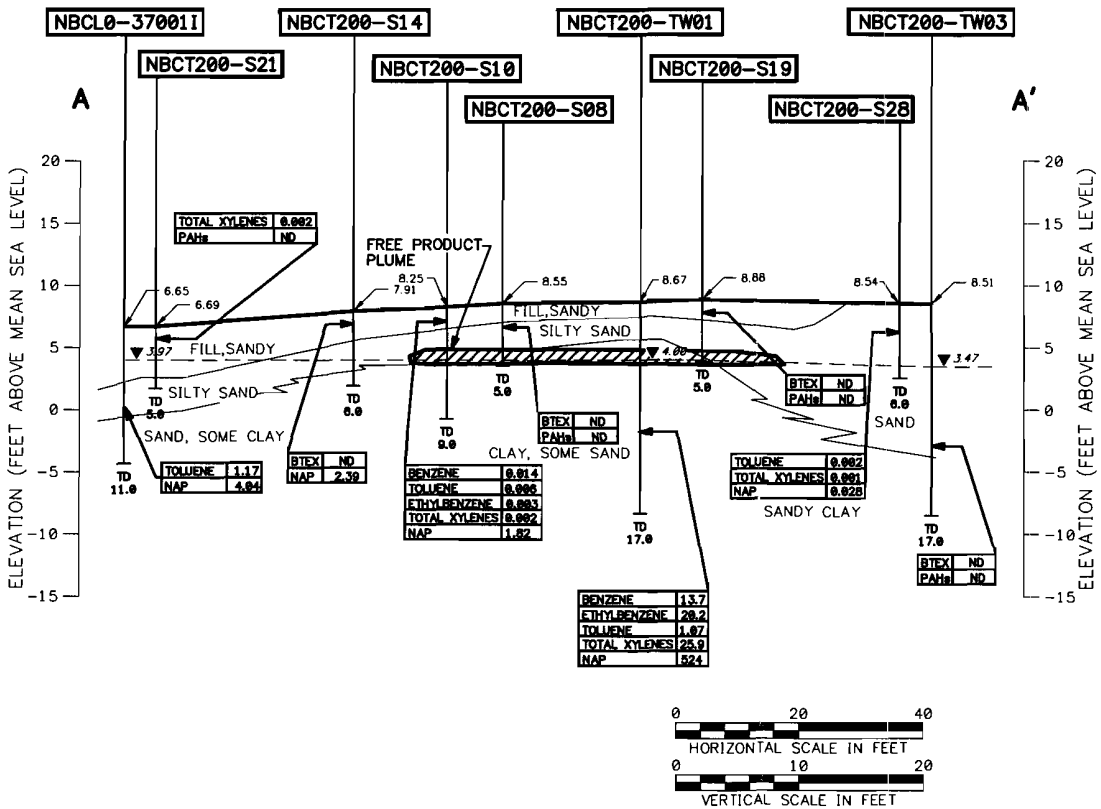
UNDERLINED COC CONCENTRATIONS EXCEED RBSLs

# Figure 7
# Groundwater CoC Map

| SIZE | FSCM NO. | DWG NO. | REV |
|---|---|---|---|
| B | N/A | NS200CA43 | - |
| SCALE | 1" = 20' | SHEET 1 OF 1 | |

SOURCE: CONTAMINATION ASSESSMENT REPORT, ENVIRONMENTAL DETACHMENT CHARLESTON, MARCH 10, 1999

ACAD:0270GX03.dwg 11/29/99 HJP




## LEGEND:

MONITORING WELL OR BORING NUMBER — NBCL0-37001I

GROUND SURFACE ELEVATION — 6.65

GROUND SURFACE

GROUNDWATER ELEVATION — WATER TABLE ON OCTOBER 28, 1999

LITHOLOGIC CONTACT (INFERRED BETWEEN BORINGS)

TOTAL DEPTH OF WELL OR BORING (FT BGS) — TD 11

NOTE: ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (FT AMSL)

SOIL PARAMETER CONCENTRATIONS ARE (mg/kg) AT SAMPLE DEPTH

GROUNDWATER PARAMETER CONCENTRATIONS ARE (ug/L) AT SAMPLE DEPTH

BTEX = BENZENE, TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES

NAP = NAPHTHALENE

PAHs = POLYNUCLEAR AROMATIC HYDORCARBONS

ND = NOT DETECTED (BELOW LABORATORY REPORTING LIMITS)

| NO. | DATE | REVISIONS | BY | CHKD | APPD | REFERENCES |
|---|---|---|---|---|---|---|
| | | | | | | |

DRAWN BY HJP DATE 11/14/99

CHECKED BY DATE

COST/SCHED—AREA

SCALE AS NOTED

GEOLOGICAL CROSS SECTION A-A'
SITE UST 200, BUILDING NS 200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0270

APPROVED BY DATE

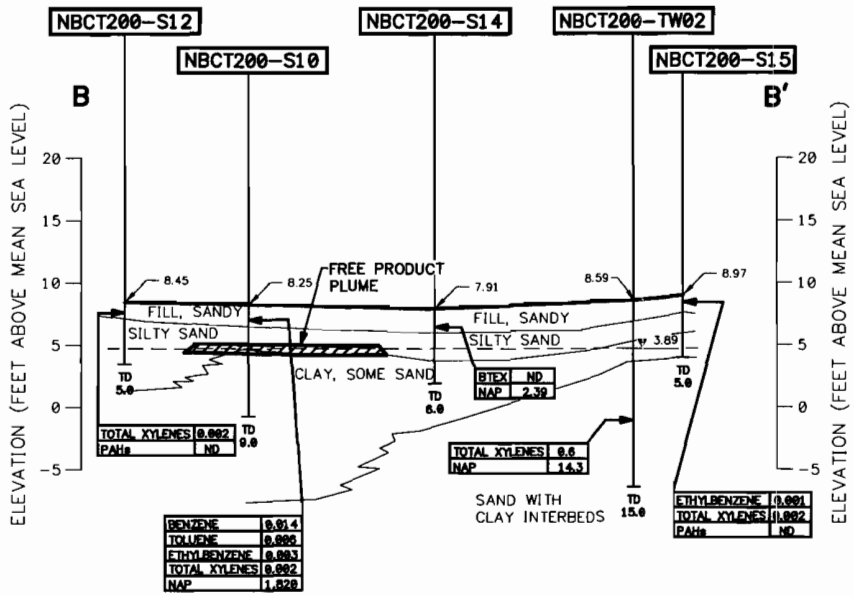
APPROVED BY DATE

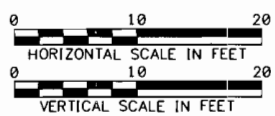
DRAWING NO. FIGURE 4

REV. 0

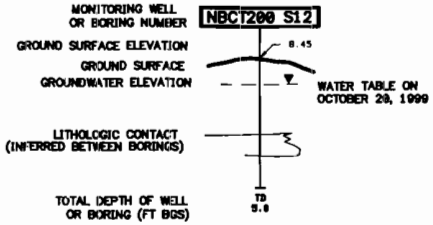
FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

ACAD:0270GX04.dwg 11/30/99 HJP




## LEGEND:




NOTE: ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (FT AMSL)

SOIL PARAMETER CONCENTRATIONS (mg/Kg) AT SAMPLE DEPTH
GROUNDWATER PARAMETER CONCENTRATIONS (ug/L) AT SAMPLE DEPTH

BTEX = BENZENE, TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES

NAP = NAPHTHALENE

PAHs = POLYNUCLEAR AROMATIC HYDORCARBONS

ND = NOT DETECTED (BELOW LABORATORY REPORTING LIMITS)

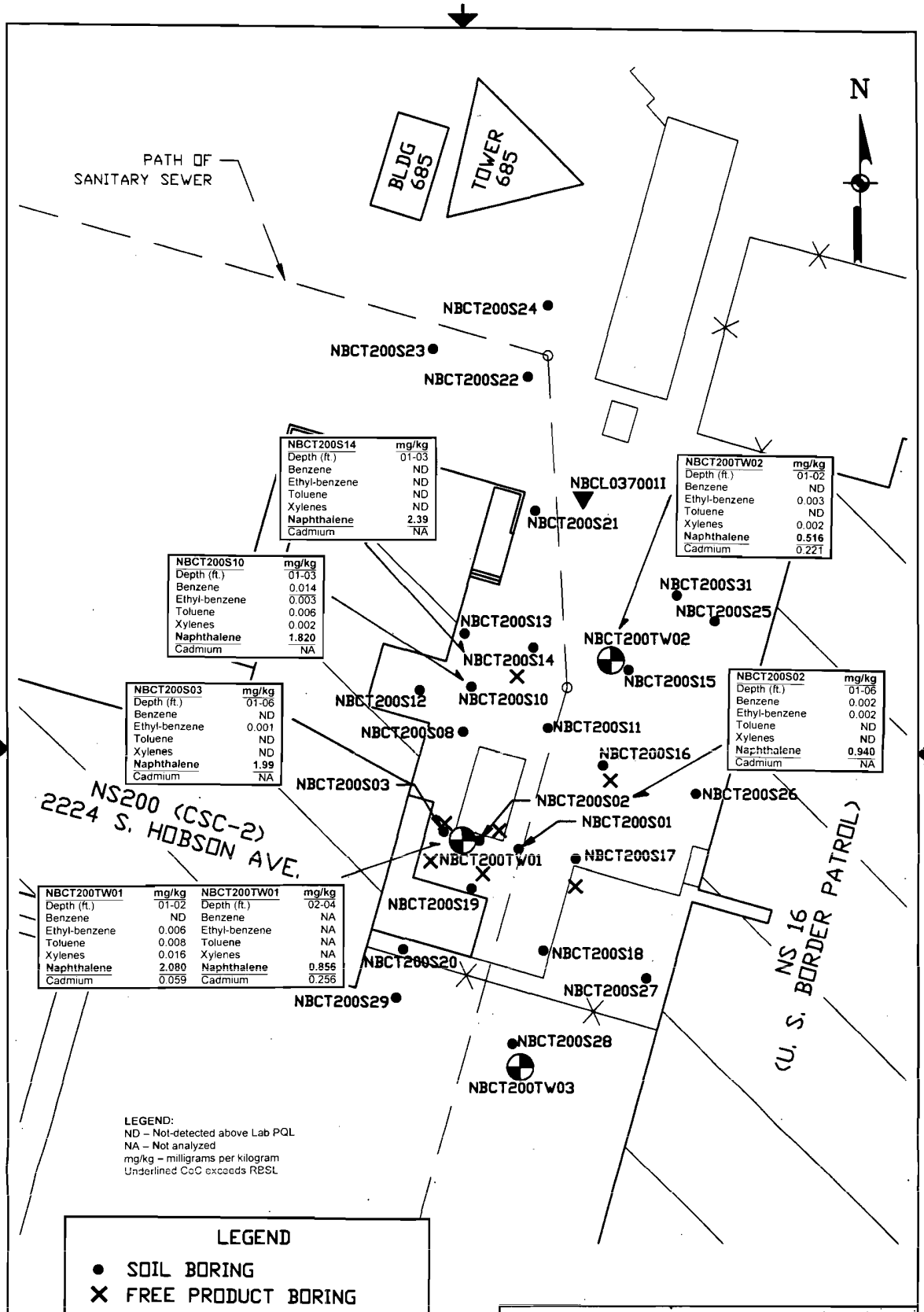
| NO. | DATE | REVISIONS | BY | CHKD | APPD | REFERENCES |
|---|---|---|---|---|---|---|
| | | | | | | |

DRAWN BY HJP DATE 11/24/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

GEOLOGICAL CROSS SECTION B-B'
SITE UST 200, BUILDING NS 200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0270
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 5
REV. 0

FORM CADD NO. SDIV_BM.DWG - REV 0 - 1/20/98




| NBCT200S14 | mg/kg |
|---|---|
| Depth (ft.) | 01-03 |
| Benzene | ND |
| Ethyl-benzene | ND |
| Toluene | ND |
| Xylenes | ND |
| **Naphthalene** | **2.39** |
| Cadmium | NA |

| NBCT200TW02 | mg/kg |
|---|---|
| Depth (ft.) | 01-02 |
| Benzene | ND |
| Ethyl-benzene | 0.003 |
| Toluene | ND |
| Xylenes | 0.002 |
| **Naphthalene** | **0.516** |
| Cadmium | 0.221 |

| NBCT200S10 | mg/kg |
|---|---|
| Depth (ft.) | 01-03 |
| Benzene | 0.014 |
| Ethyl-benzene | 0.003 |
| Toluene | 0.006 |
| Xylenes | 0.002 |
| **Naphthalene** | **1.820** |
| Cadmium | NA |

| NBCT200S03 | mg/kg |
|---|---|
| Depth (ft.) | 01-06 |
| Benzene | ND |
| Ethyl-benzene | 0.001 |
| Toluene | ND |
| Xylenes | ND |
| **Naphthalene** | **1.99** |
| Cadmium | NA |

| NBCT200S02 | mg/kg |
|---|---|
| Depth (ft.) | 01-06 |
| Benzene | 0.002 |
| Ethyl-benzene | 0.002 |
| Toluene | ND |
| Xylenes | ND |
| **Naphthalene** | **0.940** |
| Cadmium | NA |

| NBCT200TW01 | mg/kg | NBCT200TW01 | mg/kg |
|---|---|---|---|
| Depth (ft.) | 01-02 | Depth (ft.) | 02-04 |
| Benzene | ND | Benzene | NA |
| Ethyl-benzene | 0.006 | Ethyl-benzene | NA |
| Toluene | 0.008 | Toluene | NA |
| Xylenes | 0.016 | Xylenes | NA |
| **Naphthalene** | **2.080** | **Naphthalene** | **0.856** |
| Cadmium | 0.059 | Cadmium | 0.256 |

LEGEND:
ND – Not-detected above Lab PQL
NA – Not analyzed
mg/kg – milligrams per kilogram
Underlined CoC exceeds RBSL

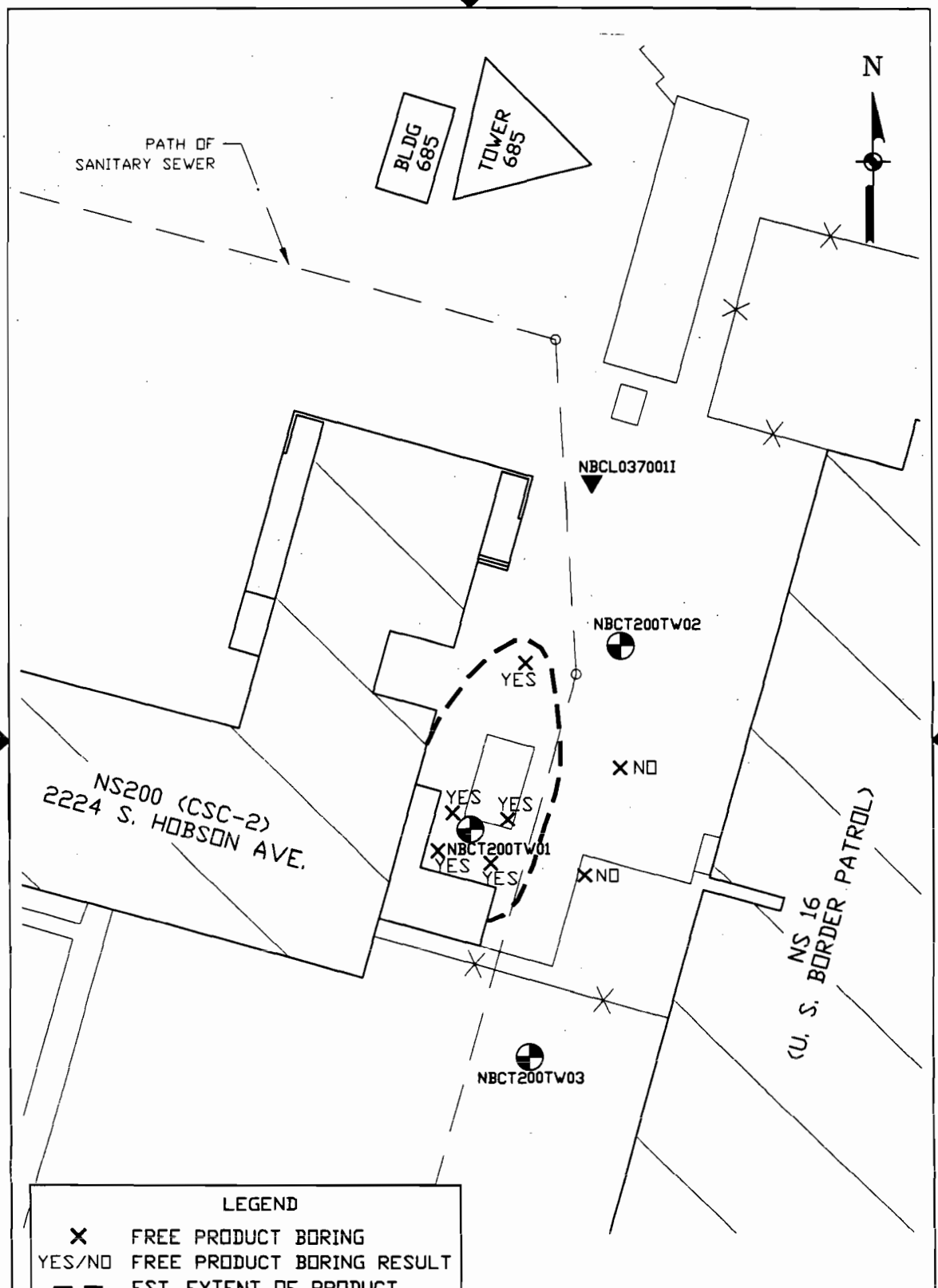
LEGEND
- ● SOIL BORING
- ✕ FREE PRODUCT BORING
- ▼ EXISTING MONITORING WELL
- ⊕ NEW MONITORING WELL

20 0 20 40
GRAPHIC SCALE (FT.)

SOURCE: CONTAMINATION ASSESSMENT REPORT, ENVIRONMENTAL DETACHMENT CHARLESTON, MARCH 10, 1999

Figure 6
Soil CoC Map

| SIZE | FSCM NO. | DWG NO. | REV |
|---|---|---|---|
| B | N/A | NS200CA31 | – |
| SCALE | 1" = 20' | SHEET 1 OF 1 | |




LEGEND

| | |
|---|---|
| X | FREE PRODUCT BORING |
| YES/NO | FREE PRODUCT BORING RESULT |
| - - | EST. EXTENT OF PRODUCT |
| ▼ | EXISTING MONITORING WELL |
| ⊕ | NEW MONITORING WELL |

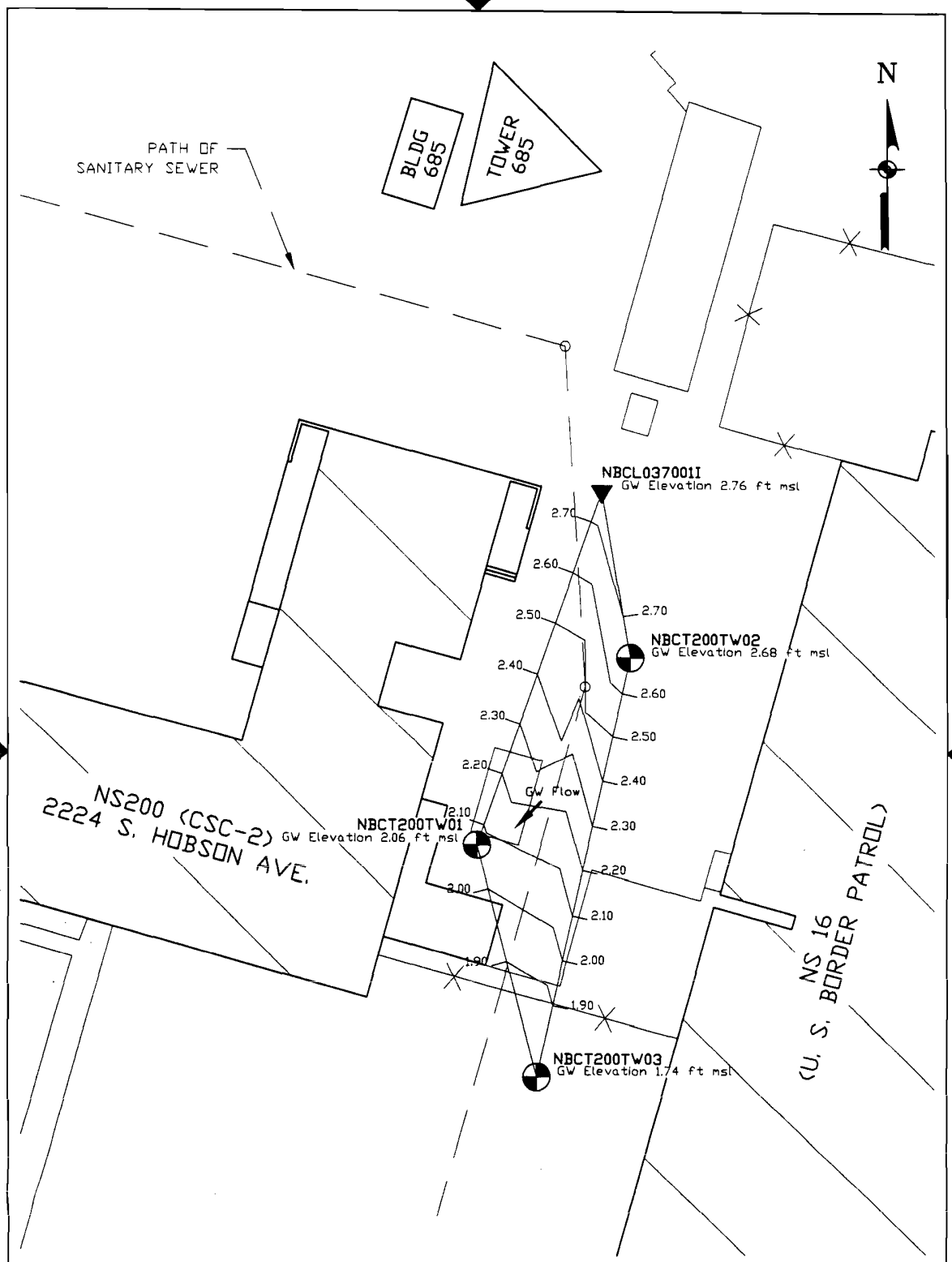
20 0 20 40

GRAPHIC SCALE (FT.)

SOURCE: CONTAMINATION ASSESSMENT REPORT, ENVIRONMENTAL DETACHMENT CHARLESTON, MARCH 10, 1999

Figure 8
Free Product Extent

| SIZE | FSCM NO. | DWG NO. | REV |
|---|---|---|---|
| B | N/A | NS200CA47 | - |
| SCALE | 1" = 20' | SHEET | 1 OF 1 |




LEGEND

▼ EXISTING MONITORING WELL

◐ NEW MONITORING WELL

20 0 20 40

GRAPHIC SCALE (FT.)

SOURCE: CONTAMINATION ASSESSMENT REPORT, ENVIRONMENTAL DETACHMENT CHARLESTON, MARCH 10, 1999

Figure 9
Potentiometric Surface Map
30 September 1998 (Low Tide)

| SIZE | FSCM NO. | DWG NO. | REV |
|---|---|---|---|
| B | N/A | NS200CA46 | – |
| SCALE | 1" = 20' | SHEET | 1 OF 1 |

# APPENDIX A

## GEOLOGIC BORING LOGS
## MONITORING WELL CONSTRUCTION LOGS

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | |
|---|---|
| JOB ORDER: T-SAP 200 | CLIENT: SOUTHDIV |
| DRILLING METHOD: HAND AUGER | BORING NO. 200S01 |
| | SHEET 1 OF 1 |
| SAMPLING METHOD: | BORING |
| GRAB: | START / FINISH |
| WATER LEVEL UNKNOWN | TIME / TIME |
| TIME | 1020 / 1020 |
| DATE | DATE / DATE |
| CASING DEPTH | 6-Apr-98 / 6-Apr |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371348.92 EASTING: 2325043.68

ELEVATION: 8.74 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

SUNNY WEATHER 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| HA | | | 1 / 1 | | 764 | 2 | X | DARK MUDDY SOIL - NO ODOR<br>SAMPLE NBCT200S010102 |
| | | | | | | 3 | | OBSTRUCTION ENCOUNTERED - BORING TERMINATED |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S02 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 7.5' BGS | TIME | TIME |
| TIME | 1045 | 1028 | 1045 |
| DATE | 6-Apr-98 | DATE | DATE |
| CASING DEPTH | | 6-Apr-98 | 6-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371350.65 EASTING: 2325035.67

ELEVATION: 8.73 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

SUNNY WEATHER 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 983 | 2 | | DARK MUDDY SOIL - NO ODOR |
| | | | | | | 3 | | |
| | | | | | 305 | 4 | | DARK MUDDY SOIL - PETROLEUM ODOR |
| | | | | | | 5 | | |
| HA | | | 1 / 3 | | 1375 | 6 | X | GRAY-BROWN/TAN SOIL - PETROLEUM ODOR<br>SAMPLE NBCT200S020106 |
| | | | | | | 7 | | GRAY-BROWN/TAN SOIL - PETROLEUM ODOR |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S03 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 7' BGS | TIME | TIME |
| TIME | 1115 | 1055 | 1115 |
| DATE | 6-Apr-98 | DATE | DATE |
| CASING DEPTH | | 6-Apr-98 | 6-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371352.36 EASTING: 2325028.43

ELEVATION: 8.82 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 1056 | 2 | | DARK GRAY-GREEN/BROWN SOIL - NO ODOR |
| | | | | | | 3 | | |
| | | | | | 1203 | 4 | | DARK GRAY/BLACK/BROWN SOIL - NO ODOR |
| | | | | | | 5 | | |
| HA | | | 1 / 3 | | 1252 | 6 | X | MOIST DARK BROWN/GREEN/BLACK SOIL - FUEL ODOR |
| | | | | | | | X | SAMPLE NBCT200S030106 |
| | | | | | 1005 | 7 | | WET BROWN/GREEN SOIL - HEAVY FUEL ODOR |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY ____ CHK BY: ____
DATE: ____

# ENVIRONMENTAL DETACHMENT CHARLESTON SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S08 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 7.5' BGS | TIME | TIME |
| TIME | 920 | 900 | 920 |
| DATE | 7-Apr-98 | DATE | DATE |
| CASING DEPTH: | | 7-Apr-98 | 7-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371372.94 EASTING: 2325032.36

ELEVATION: 8.55 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 518 | 2 | | BLACK MUDDY SOIL - SLIGHT FUEL ODOR |
| | | | | | | 3 | | |
| HA | | | 1 / 2 | | 830 | 4 | X | BLACK/BROWN SOIL - SLIGHT FUEL ODOR<br>SAMPLE NBCT200S080104 |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S10 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 7.75' BGS | TIME | TIME |
| TIME | 905 | 815 | 905 |
| DATE | 30-Jun-98 | DATE | DATE |
| CASING DEPTH | | 30-Jun-98 | 30-Jun-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371382.31 EASTING: 2325034.17

ELEVATION: 8.25 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

TEMPERATURE 80F, SUNNY, HAZY

| SAMPLER TYPE | IN. DRIVEN / IN. RECOVERED | DEPTH OF CASING | SAMPLE NO. / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 354 | 2 | | SAND-CLAY MIXTURE, LIGHT BROWN, MEDIUM STIFF, PRODUCT ODOR - SC |
| | | | | | | 3 | | |
| | | | | | 680 | 4 | | CLAY, YELLOWISH ORANGE, MEDIUM STIFF, PRODUCT ODOR - CH |
| | | | | | | 5 | | |
| HA | | | 1 / 3 | | 1449 | 6 | | CLAY, LIGHT BROWN WITH BLACK PRODUCT STAINS, MEDIUM STIFF, PRODUCT ODOR - CH |
| | | | | | | 7 | | **SAMPLE NBCT200S100103** |
| | | | | | 1059 | 8 | | CLAY WITH TRACE SAND, YELLOWISH ORANGE TO LIGHT GRAY, VERY SOFT, STRONG MOTHBALL (NAPHTHALENE) |
| | | | | | | 9 | | ODOR - CH |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | |
|---|---|
| JOB ORDER: T-SAP 200 | CLIENT: SOUTHDIV |
| DRILLING METHOD: HAND AUGER | BORING NO. 200S11 |
| | SHEET 1 OF 1 |
| SAMPLING METHOD: | BORING |
| GRAB: | START / FINISH |
| WATER LEVEL UNKNOWN | TIME / TIME |
| TIME | 925 / 925 |
| DATE | DATE / DATE |
| CASING DEPTH: | 7-Apr-98 / 7-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371373.77 EASTING: 2325049.71

ELEVATION: 8.50 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| HA | | | 1 / 1 | | 264 | 2 | X | BROWN SOIL - NO ODOR<br>SAMPLE NBCT200S110102 |
| | | | | | | 3 | | OBSTRUCTION ENCOUNTERED - BORING TERMINATED |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S12 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | UNKNOWN | TIME | TIME |
| TIME | | 1330 | 1340 |
| DATE | | DATE | DATE |
| CASING DEPTH | | 13-Apr-98 | 13-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371381.54 EASTING: 2325023.56

ELEVATION: 8.45 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

WEATHER SUNNY 70F

| SAMPLER TYPE | IN. DRIVEN / IN. RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| HA | | | 1 / 1 | | 513 | 2 | X | GREEN/BROWN SANDY SOIL<br>SAMPLE NBCT200S120101 |
| | | | | | | 3 | | |
| | | | | | 371 | 4 | | GREEN/BROWN SANDY SOIL - NO ODOR<br>ENCOUNTERED OBSTRUCTION (BLDG FOUNDATION) - |
| | | | | | | 5 | | BORING TERMINATED |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S13 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 6' BGS | TIME | TIME |
| TIME | 1355 | 1345 | 1355 |
| DATE | 13-Apr-98 | DATE | DATE |
| CASING DEPTH: | | 13-Apr-98 | 13-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371393.09 EASTING: 2325032.71

ELEVATION: 7.88 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

WEATHER SUNNY 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO. / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 0.00 | 2 | | SANDY BROWN SOIL - NO ODOR |
| | | | | | | 3 | | |
| | | | | | 90.00 | 4 | | GREEN/BROWN SANDY MOIST SOIL - NO ODOR |
| | | | | | | 5 | | |
| HA | | | 1 / 3 | | 171 | 6 | X | BROWN SANDY VERY MOIST SOIL - NO ODOR |
| | | | | | | | X | SAMPLE NBCT200S130103 |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY ____ CHK BY: ____
DATE: ____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S14 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 5' BGS | TIME | TIME |
| TIME | 1415 | 1400 | 1415 |
| DATE | 13-Apr-98 | DATE | DATE |
| CASING DEPTH | | 13-Apr-98 | 13-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371390.34 EASTING: 2325046.79

ELEVATION: 7.91 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

WEATHER SUNNY 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 130 | 2 | | SANDY GREEN/BROWN SOIL - NO ODOR |
| | | | | | | 3 | | |
| | | | | | 575 | 4 | | GREEN/GRAY/TAN SOIL - HEAVY PETRO ODOR |
| HA | | | 1 / 3 | | 671 | 5 | X | GREEN/BROWN CLAY SOIL - VERY MOIST - STRONG PETRO ODOR SAMPLE NBCT200S140103 |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY ____ CHK BY: ____
DATE: ____

# ENVIRONMENTAL DETACHMENT CHARLESTON SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S15 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL UNKNOWN | | TIME | TIME |
| TIME | | 845 | 855 |
| DATE | | DATE | DATE |
| CASING DEPTH | | 14-Apr-98 | 14-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371386.04 EASTING: 2325066.24

ELEVATION: 8.97 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

WEATHER SUNNY 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| HA | | | 1 / 1 | | 2.00 | 2 | X | BROWN SANDY SOIL - NO ODOR |
| | | | | | | | X | SAMPLE NBCT200S150101 |
| | | | | | | 3 | | |
| | | | | | 1.00 | 4 | | BROWN CLAY SOIL - NO ODOR |
| | | | | | | 5 | | OBSTRUCTION ENCOUNTERED - BORING TERMINATED |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
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| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | |
|---|---|
| JOB ORDER: T-SAP 200 | CLIENT: SOUTHDIV |
| DRILLING METHOD: HAND AUGER | BORING NO. 200S16 |
| | SHEET 1 OF 1 |
| SAMPLING METHOD: | BORING |
| GRAB: | START / FINISH |
| WATER LEVEL UNKNOWN | TIME / TIME |
| TIME | 900 / 910 |
| DATE | DATE / DATE |
| CASING DEPTH | 14-Apr-98 / 14-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371366.12 EASTING: 2325061.11

ELEVATION: 9.11 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

WEATHER SUNNY 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 76.00 | 2 | | BROWN/TAN CLAY SOIL - NO ODOR |
| | | | | | | 3 | | |
| | | | | | 123 | 4 | | BLACK/BROWN CLAY SOIL - NO ODOR |
| | | | | | | 5 | | |
| HA | | | 1 / 3 | | 855 | 6 | | MOIST GREEN/BROWN/BLACK SOIL - NO ODOR<br>SAMPLE NBCT200S160103 |
| | | | | | | 7 | | ENCOUNTERED WOODEN OBSTRUCTION - BORING TERMINATED |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
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| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S17 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 6' BGS | TIME | TIME |
| TIME | 950 | 930 | 950 |
| DATE | 14-Apr-98 | DATE | DATE |
| CASING DEPTH | | 14-Apr-98 | 14-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371346.98 EASTING: 2325055.39

ELEVATION: 9.04 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

| SAMPLER TYPE | IN. DRIVEN / IN. RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 0.00 | 2 | | SANDY BROWN SOIL - NO ODOR |
| | | | | | | 3 | | |
| HA | | | 1 / 2 | | 1577 | 4 | | MOIST SANDY GRAY/GREEN SOIL - NO ODOR<br>SAMPLE NBCT200S170102 |
| | | | | | | 5 | | |
| | | | | | 1350 | 6 | | MOIST GREEN/BLACK SOIL - NO ODOR |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | -2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
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| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S18 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL UNKNOWN | | TIME | TIME |
| TIME | | 1000 | 1010 |
| DATE | | DATE | DATE |
| CASING DEPTH | | 14-Apr-98 | 14-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371328.36 EASTING: 2325048.85

ELEVATION: 8.78 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

WEATHER SUNNY 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 0.00 | 2 | | BLACK/BROWN SOIL - NO ODOR |
| | | | | | | 3 | | |
| HA | | | 1 / 2 | | 304 | 4 | X | BLACK CLAY SOIL - NO ODOR |
| | | | | | | | X | SAMPLE NBCT200S180102 |
| | | | | | | 5 | | OBSTRUCTION ENCOUNTERED - BORING TERMINATED |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON SOIL BORING LOG

| | |
|---|---|
| JOB ORDER: T-SAP 200 | CLIENT: SOUTHDIV |
| DRILLING METHOD: HAND AUGER | BORING NO. 200S19 |
| | SHEET 1 OF 1 |
| SAMPLING METHOD: | BORING |
| GRAB: | START / FINISH |
| WATER LEVEL UNKNOWN | TIME / TIME |
| TIME | 1020 / 1030 |
| DATE | DATE / DATE |
| CASING DEPTH | 14-Apr-98 / 14-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371340.99 EASTING: 2325034.11

ELEVATION: 8.88 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

WEATHER SUNNY 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO. / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 401 | 2 | | GREEN/GRAY SANDY SOIL - NO ODOR |
| | | | | | | 3 | | |
| HA | | | 1 / 2 | | 1201 | 4 | | BLACK MOIST SOIL - NO ODOR<br>SAMPLE NBCT200S190102 |
| | | | | | | 5 | | OBSTRUCTION ENCOUNTERED @ 4' BGS - BORING TERMINATED |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S20 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL UNKNOWN | | TIME | TIME |
| TIME | | 1045 | 1045 |
| DATE | | DATE | DATE |
| CASING DEPTH | | 14-Apr-98 | 14-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371328.59 EASTING: 2325020.16

ELEVATION: 8.15 Ft. msl

SURFACE CONDITIONS: GRASS LAWN

WEATHER SUNNY 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| HA | | | 1 / 1 | | 187 | 2 | X | BLACK/GRAY SAND SOIL - NO ODOR |
| | | | | | | | X | SAMPLE NBCT200S200101 |
| | | | | | | 3 | | OBSTRUCTION ENCOUNTERED - BORING TERMINATED |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
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| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S21 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 4' BGS | TIME | TIME |
| TIME | 1400 | 1350 | 1400 |
| DATE | 16-Apr-98 | DATE | DATE |
| CASING DEPTH | | 16-Apr-98 | 16-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371418.10 EASTING: 2325047.16

ELEVATION: 6.69 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

SUNNY WEATHER. 78F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| HA | | | 1 / 1 | | 82.00 | 2 | | GREEN CLAY SOIL - SLIGHT MOISTURE - NO ODOR<br>SAMPLE NBCT200S210101 |
| | | | | | | 3 | | |
| | | | | | 35.00 | 4 | | DARK GRAY VERY MOIST SOIL - NO ODOR |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | -2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S22 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 4' BGS | TIME | TIME |
| TIME | 900 | 855 | 900 |
| DATE | 17-Apr-98 | DATE | DATE |
| CASING DEPTH: | | 17-Apr-98 | 17-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371445.30 EASTING: 2325045.63

ELEVATION: 5.95 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

WEATHER OVERCAST, TEMPERATURE IN 70s

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 34.00 | 2 | | GRAY SANDY MOIST SOIL - SEWER ODOR |
| | | | | | | 3 | | |
| HA | | | 1 / 2 | | 186.0 | 4 | X | BLACK CLAY MUD - SEWER ODOR<br>SAMPLE NBCT200S220102 |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
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| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S23 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 4' BGS | TIME | TIME |
| TIME | 850 | 840 | 850 |
| DATE | 17-Apr-98 | DATE | DATE |
| CASING DEPTH | | 17-Apr-98 | 17-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371450.83 EASTING: 2325026.26

ELEVATION: 5.82 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

WEATHER OVERCAST, TEMP IN 70s

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 1.90 | 2 | | GRAY SANDY SOIL - SEWER ODOR |
| | | | | | | 3 | | |
| HA | | | 1 / 2 | | 804 | 4 | | GRAY/TAN CLAY SOIL MOIST STRONG SEWER ODOR<br>SAMPLE NBCT200S230102 |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S24 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 4' BGS | TIME | TIME |
| TIME | 935 | 925 | 935 |
| DATE | 17-Apr-98 | DATE | DATE |
| CASING DEPTH | | 17-Apr-98 | 17-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371459.92 EASTING: 2325049.81

ELEVATION: 5.86 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

WEATHER OVERCAST, TEMPERATURE IN 70s

| SAMPLER TYPE | IN. DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| HA | | | 1 / 1 | | 290 | 2 | X | DARK GRAY SANDY MOIST SOIL - SLIGHT SEWER ODOR |
| | | | | | | | X | SAMPLE NBCT200S240101 |
| | | | | | | 3 | | |
| | | | | | 220 | 4 | | DARK GRAY MUDDY SOIL - STRONG SEWER ODOR |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON SOIL BORING LOG

| | |
|---|---|
| JOB ORDER: T-SAP 200 | CLIENT: SOUTHDIV |
| DRILLING METHOD: HAND AUGER | BORING NO. 200S25 |
| | SHEET 1 OF 1 |
| SAMPLING METHOD: | BORING |
| GRAB: | START / FINISH |
| WATER LEVEL UNKNOWN | TIME / TIME |
| TIME | 1325 / 1332 |
| DATE | DATE / DATE |
| CASING DEPTH | 16-Apr-98 / 16-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371395.95 EASTING: 2325083.75

ELEVATION: 9.43 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

SUNNY WEATHER, 78F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 3.00 | 2 | | BROWN SANDY SOIL - NO ODOR |
| | | | | | | 3 | | |
| HA | | | 1 / 2 | | 33.00 | 4 | X | BLACK/BROWN MUD - SLIGHT SEWER ODOR<br>SAMPLE **NBCT200S260102** |
| | | | | | | 5 | | OBSTRUCTION ENCOUNTERED - BORING TERMINATED |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY ____ CHK BY: ____
DATE: ____

# ENVIRONMENTAL DETACHMENT CHARLESTON SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S26 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 6' BGS | TIME | TIME |
| TIME | 1320 | 1308 | 1320 |
| DATE | 16-Apr-98 | DATE | DATE |
| CASING DEPTH | | 16-Apr-98 | 16-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371360.33 EASTING: 2325079.94

ELEVATION: 9.51 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

SUNNY WEATHER, 78F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 2.60 | 2 | | SANDY TAN SOIL - NO ODOR |
| | | | | | | 3 | | |
| | | | | | 185 | 4 | | SANDY BROWN MOIST SOIL - NO ODOR |
| | | | | | | 5 | | |
| HA | | | 1 / 3 | | 314 | 6 | | GREEN/BROWN MOIST CLAY - NO ODOR<br>SAMPLE NBCT200S260103 |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S27 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 6' BGS | TIME | TIME |
| TIME | 908 | 855 | 908 |
| DATE | 16-Apr-98 | DATE | DATE |
| CASING DEPTH | | 16-Apr-98 | 16-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371322.95 EASTING: 2325069.81

ELEVATION: 9.41 Ft. msl

SURFACE CONDITIONS: BARE SANDY SOIL

SUNNY WEATHER, 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 1.60 | 2 | | BLACK/BROWN SAND - NO ODOR |
| | | | | | | 3 | | |
| | | | | | 1.10 | 4 | | BLACK/TAN CLAY SOIL - NO ODOR |
| | | | | | | 5 | | |
| HA | | | 1 / 3 | | 2.30 | 6 | | BLACK/GRAY/GREEN SAND - MOIST - NO ODOR<br>SAMPLE NBCT200S270103 |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S28 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL UNKNOWN | | TIME | TIME |
| TIME | | 915 | 950 |
| DATE | | DATE | DATE |
| CASING DEPTH | | 16-Apr-98 | 16-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371309.55 EASTING: 2325042.50

ELEVATION: 8.54 Ft. msl

SURFACE CONDITIONS: GRASS LAWN

SUNNY WEATHER, 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 0.00 | 2 | | BROWN SANDY SOIL - NO ODOR |
| | | | | | | 3 | | |
| HA | | | 1 / 2 | | 15.6 | 4 | | BLACK SANDY SOIL - NO ODOR<br>SAMPLE NBCT200S280102 |
| | | | | | 2.50 | 5 | | BLACK SANDY SOIL - NO ODOR<br>OBSTRUCTION ENCOUNTERED - BORING TERMINATED |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S29 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 6' BGS | TIME | TIME |
| TIME | 1015 | 955 | 1015 |
| DATE | 16-Apr-98 | DATE | DATE |
| CASING DEPTH | | 16-Apr-98 | 16-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371318.83 EASTING: 2325018.67

ELEVATION: 7.76 Ft. msl

SURFACE CONDITIONS: GRASS LAWN

SUNNY WEATHER 70F

| SAMPLER TYPE | IN DRIVEN / IN RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 0.00 | 2 | | BROWN SANDY SOIL - NO ODOR |
| | | | | | | 3 | | |
| | | | | | 0.00 | 4 | | GRAY SANDY MOIST SOIL - NO ODOR |
| | | | | | | 5 | | |
| HA | | | 1 / 3 | | 0.00 | 6 | X | DARK MUDDY SOIL - NO ODOR<br>SAMPLE NBCT200S280103 |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# ENVIRONMENTAL DETACHMENT CHARLESTON
# SOIL BORING LOG

| | | | |
|---|---|---|---|
| JOB ORDER: T-SAP 200 | | CLIENT: SOUTHDIV | |
| DRILLING METHOD: HAND AUGER | | BORING NO. 200S31 | |
| | | SHEET 1 OF 1 | |
| SAMPLING METHOD: | | BORING | |
| GRAB: | | START | FINISH |
| WATER LEVEL | 6' BGS | TIME | TIME |
| TIME | 910 | 900 | 910 |
| DATE | 24-Apr-98 | DATE | DATE |
| CASING DEPTH | | 24-Apr-98 | 24-Apr-98 |

LOCATION OF BORING: BLDG NS200 (CSC 2)
2224 SOUTH HOBSON AVENUE
NORTH CHARLESTON SC

NORTHING: 371401.16 EASTING: 2325076.07

ELEVATION: 9.11 Ft. msl

SURFACE CONDITIONS: ASPHALT PAVEMENT

WEATHER SUNNY 68F

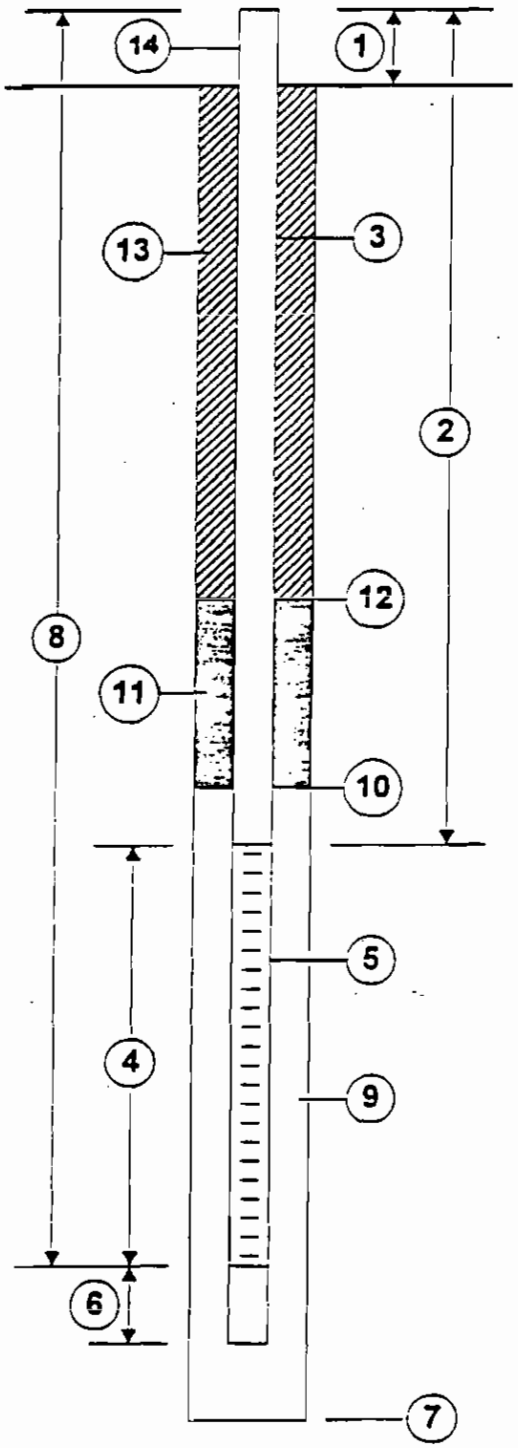
| SAMPLER TYPE | IN. DRIVEN / IN. RECOVERED | DEPTH OF CASING | SAMPLE NO / SAMPLE DEPTH | BLOWS/FT SAMPLER | OVA READING (PPM) | DEPTH IN FEET | SOIL GRAPH | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | 0.00 | 2 | | TAN SANDY SOIL - NO ODOR |
| | | | | | | 3 | | |
| | | | | | 0.00 | 4 | | BLACK MUDDY SOIL - SEWER ODOR |
| | | | | | | 5 | | |
| HA | | | 1 / 3 | | 0.00 | 6 | | BLACK MUDDY SOIL - STRONG SEWER ODOR<br>SAMPLE NBCT200S310103 |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |
| | | | | | | 1 | | |
| | | | | | | -2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 0 | | |

BY _____ CHK BY: _____
DATE: _____

# WELL CONSTRUCTION DETAILS

FORMER CHARLESTON NAVAL BASE BUILDING 200 FORMER UST INVESTIGATION

WELL NUMBER NBCT-200-TW-01
DATE OF INSTALLATION 06/17/98
INSTALLED BY CHARLESTON ENVIRONMENTAL DET. TANK SECTION / J. BIDDLE




1. Height of Casing above ground 2.58'
2. Total lenght of Riser pipe 7.68'
3. Type of Riser pipe 2" ID SCHEDULE 40 FLUSH THREAD PVC
4. Lenght of Screen 10.0'
5. Type of Screen 2" ID SCHEDULE 40 FLUSH THREAD PVC. 0.010" SLOT
6. Lenght of Sump 0.5' (INCLUDES 0.3' UNSLOTTED PORTION OF SCREEN.
7. Depth of Boring 17.0'
   Diameter of Boring 7.75" NOMINAL
8. Depth to Bottom of Screen 15.1'
9. Type of filter pack "DRILLERS SERVICES" NO. 2 FILTER SAND
   Quanity Used 375 Lbs
   Size 10 - 30 SCREEN SIZE
10. Depth to Top of Filter Pack 3.0'
11. Type of Seal "SHUR PEL" 1/2" BENTONITE PELLETS
    Quanity Used 75 Lbs.
12. Depth to Top of Seal 0.4'
13. Type of Grout NONE
    Grout Mixture N/A
    Method of Placement N/A
14. Type of Well Protection NONE AT INSTALLATION CONCRETE CAP TO BE POURED TO ASPHALT SURFACE.

COMMENTS:

Water Level 7.00' bgs @ 2 hours after well installation.

Secured with Locking well cap.

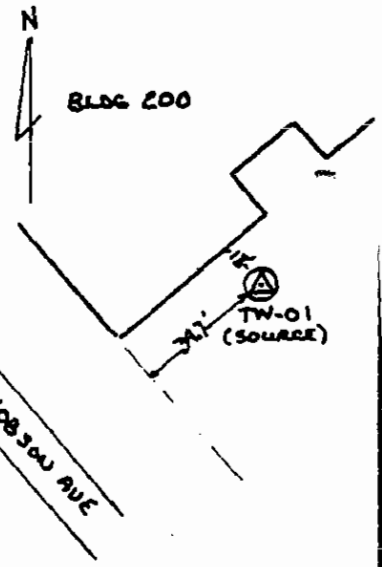
jb 6/18/98

Hole No. NBCT-20

| DRILLING LOG | DIVISION SOUTH ATLANTIC (USACE) | INSTALLATION FORMER CHARLESTON NAVAL BASE | SHEET 1 OF 2 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT INSTALLATION OF TEMPORARY MONITORING WELLS AT BUILDING 200 FORMER UST SITE | 10. SIZE AND TYPE OF BIT 4¼" ID HOLLOW STEM AUGER, 1 |
| 2. LOCATION (Coordinates or Station) SEE REMARKS COLUMN (g) | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) ID SPLIT SPO |
| 3. DRILLING AGENCY CHARLESTON ENVIRONMENTAL DETACHMENT (TANK SECT) | 12. MANUFACTURER'S DESIGNATION OF DRILL SIMCO 2400-SR-1 |
| 4. HOLE NO. (As shown on drawing title and file number) NBCT-200-TW-01 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED NONE |
| 5. NAME OF DRILLER | 14. TOTAL NUMBER CORE BOXES NO |
| | 15. ELEVATION GROUND WATER NOT DETERMINED |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT. | 16. DATE HOLE: STARTED 17 JUN 98; COMPLETED 17 JUN 98 |
| 7. THICKNESS OF OVERBURDEN >17.0' | 17. ELEVATION TOP OF HOLE NOT DETERMINED |
| 8. DEPTH DRILLED INTO ROCK N/A | 18. TOTAL CORE RECOVERY FOR BORING N/A |
| 9. TOTAL DEPTH OF HOLE 17.0' | 19. SIGNATURE OF INSPECTOR James A Biddle, GEOLOGIST |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | 0.35' | | ASPHALT | | | WATER LEVEL @ 8.0' DURING DRILLING. |
| | 2' | | (SM/SP) FINE TO MEDIUM SILTY SAND WITH SOME SILT, CLAY AND FINE GRAVEL, TAN TO LIGHT BROWN. VARIES TO POORLY GRADED SAND. APPEARS TO BE FILL MATERIAL | | | WATER LEVEL @ 7.00' AFTER 2 HOURS. (IN WELL CASING) |
| | 3.05' | | (SM) DARK BROWN, FINE, SILTY SAND WITH ORGANIC TEXTURE AND APPEARANCE | | | NOTE: AT 1.0' PID READS 1 PPM. |
| | 3.6' | | (SP) DARK GRAY, FINE, POORLY GRADED SAND WITH 10% SILT | | TW 01-1 (4') | |
| | 4' | | (CL) LIGHT BROWN, SANDY LEAN CLAY, FINE SAND FRACTION 15% | | | |
| | 6' | | W/ TRACES OF MEDIUM AND COARSE SAND | | | |
| | 8' | | | | | WATER DO: 8.0' |
| | | | | | TW 01-2 (8') SAMPLE | SLIGHT FUEL ODOR |
| | 10' | | (SP) GRAY, FINE TO MEDIUM, POORLY GRADED SAND WITH 15% SILT, SHELL FRAGMENTS, SATURATED | | | NOTE: EXCEPT FOR SPLITSPOON SAMPLE INTERVAL, DEPTHS FOR CHANGES OF MATERIAL ARE APPROXIMATIONS BASED ON DRILL CUTTINGS AND SOIL ON AUGER ON WITHDRAWAL FROM BORING. |
| | 10.5' | | (OL/OH) DARK BROWNISH-GRAY, HIGH LIQUID LIMIT ORGANIC SILT/CLAY, MEDIUM PLASTICITY | | | |
| | 12.0' | | | | | |




CONTINUED ON SHEET No. 2

NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.

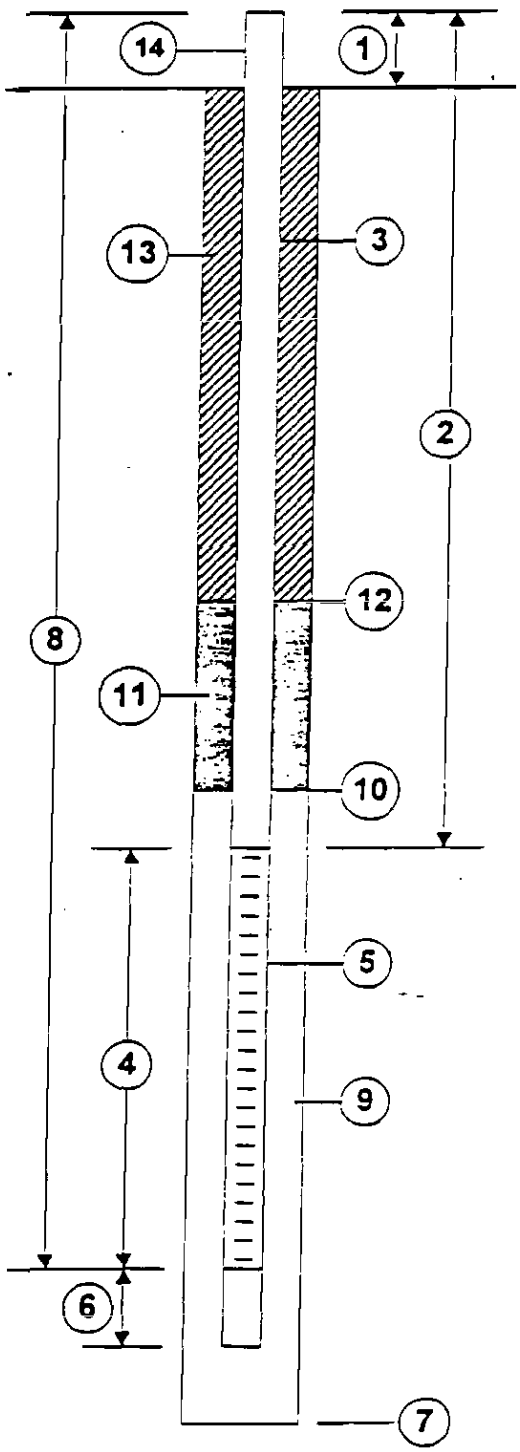
| DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE NOT DETERMINED | Hole No. NBCT-200-TW-6 |
|---|---|---|
| PROJECT TEMPORARY MONITORING WELLS AT BUILDING 200 FORMER UST SITE | INSTALLATION FORMER CHARLESTON NAVAL BASE | SHEET 2 OF 2 SHEETS |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | 12' | | (OL/OH) (CONTINUED FROM PREVIOUS SHEET) DARK BROWNISH-GRAY ORGANIC SILT AND CLAY. | | | BORING ORIGINALLY BORED TO 15.0'. OVER BORED TO 17.0' DUE TO EXCESSIVE MATERIAL IN HOLLOW STEM AUGER. |
| | 14' | | | | | |
| | 16' | | | | | |
| | 17' | | | | | |
| | | | BORING TERMINATED AT 17.0' | | | |

# WELL CONSTRUCTION DETAILS

FORMER CHARLESTON NAVAL BASE - BUILDING 200 FORMER UST SITE INVESTIGATION

WELL NUMBER NBCT-200-TW-02
DATE OF INSTALLATION 06/17/98
INSTALLED BY CHARLESTON ENVIRONMENTAL
DET. TANK SECT / J. BIDDLE




1. Height of Casing above ground 1.85'
2. Total lenght of Riser pipe 6.65'
3. Type of Riser pipe 2" ID SCHEDULE 40 FLUSH THREED PVC.
4. Lenght of Screen 10.0'
5. Type of Screen 2" ID SCHEDULE 40 PVC. FLUSH THREAD. 0.010" SLOT SIZE
6. Lenght of Sump 0.5' ( 0.3' UNSLOTTED PORTION OF SCREEN)
7. Depth of Boring 15.0'
   Diameter of Boring 7.75" NOMINAL
8. Depth to Bottom of Screen 14.8'
9. Type of filter pack "DRILLERS SERVICES" NO. 2 FILTER PACK SAND
   Quanity Used 325 LBS.
   Size 10-30 SCREEN SIZE
10. Depth to Top of Filter Pack 2.5'
11. Type of Seal "SHUR PEL" 1/2" BENTONITE PELLETS
    Quanity Used 75 Lbs.
12. Depth to Top of Seal 0.6'
13. Type of Grout NONE
    Grout Mixture N/A
    Method of Placement N/A
14. Type of Well Protection NONE AT THIS TIME
    Concrete Cap to be poured to Asphalt Surface.

COMMENTS:
Water level at 2 Hours: 6.63' bgs.
Secured w/ Locking well Cap.

jb 6/18/98

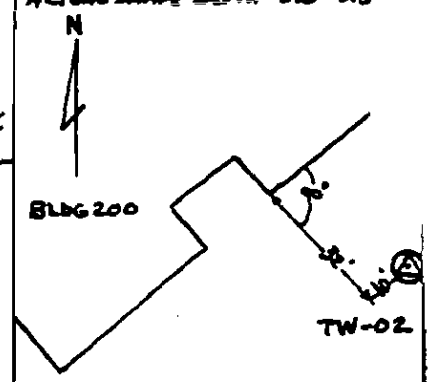
Hole No. NBCT-200

| DRILLING LOG | DIVISION SOUTH ATLANTIC | INSTALLATION FORMER CHARLESTON NAVAL BASE | SHEET 1 OF 2 SHEETS |
|---|---|---|---|

| | |
|---|---|
| 1. PROJECT INSTALLATION OF TEMPORARY MONITORING WELLS AT BUILDING 200 FORMER UST SITE | 10. SIZE AND TYPE OF BIT 4 1/4" ID HSA, 1 3/8" SPLITSPOON |
| 2. LOCATION (Coordinates or Station) SEE REMARKS COLUMN (g) | 11. DATUM FOR ELEVATION SHOWN (TBM or MSL) |
| 3. DRILLING AGENCY CHARLESTON ENVIRONMENTAL DETACHMENT | 12. MANUFACTURER'S DESIGNATION OF DRILL SIMCO 2400 SR-1 |
| 4. HOLE NO. (As shown on drawing title and file number) NBCT-200-TW-02 | 13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED NONE |
| 5. NAME OF DRILLER | 14. TOTAL NUMBER CORE BOXES NONE |
| | 15. ELEVATION GROUND WATER NOT DETERMINED |
| 6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT. | 16. DATE HOLE: STARTED 17 JUN 98; COMPLETED 17 JUN 98 |
| 7. THICKNESS OF OVERBURDEN >15.0' | 17. ELEVATION TOP OF HOLE NOT DETERMINED |
| 8. DEPTH DRILLED INTO ROCK N/A | 18. TOTAL CORE RECOVERY FOR BORING NA |
| 9. TOTAL DEPTH OF HOLE 15.0' | 19. SIGNATURE OF INSPECTOR James A. Biddle GEOLOGIST |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | 0' | | ASPHALT | | | WATER LEVEL DURING DRILLING NOT DETERMINED |
| | 0.45 | | (SM) LIGHT BROWN AND BROWN, FINE TO MEDIUM SILTY SAND WITH A TRACE OF FINE GRAVEL. | | | WATER LEVEL @ 2 HOURS 6.62' IN WELL CASING |
| | 2' | | FINE, NO GRAVEL | | | |
| | | | YELLOWISH-BROWN W/A TRACE OF COARSE | | | |
| | 4' | | (OL) DARK BROWN, BLACK CLAYEY ORGANIC SILT | | TW 02-1 (4') SAMPLE | ACTUAL SAMPLE DEPTH 3.5'-5.5' |
| | 4.2' | | (CL) YELLOWISH-BROWN AND MEDIUM GRAY SANDY, LEAN CLAY WITH 10-15% SILT | | | |
| | 5.3 | | (SP) GRAY, FINE TO MEDIUM, POORLY GRADED SAND WITH MINOR SHELL CONTENT | | | |
| | 6' | | | | | |
| | 8' | | (CL) YELLOWISH-BROWN, SILTY/SANDY LEAN CLAY, VERY LOW PLASTICITY | | TW 02-2 (8') SAMPLE | NOTE: CHANGES OF MATERIAL DEPTHS ARE APPROXIMATE AND DETERMINED FROM AUGER CUTTINGS AND SOIL REMAINING ON AUGER ON REMOVAL FROM BORING EXCEPT AT SPLITSPOON SAMPLE DEPTHS. |
| | 9' | | (SP) GRAY, FINE TO COARSE, POORLY GRADED SAND WITH 20% SHELL CONTENT, FIRST INDICATION OF WATER. | | | |
| | 10' | | | | | |

CONTINUED ON SHEET No. 2




NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.

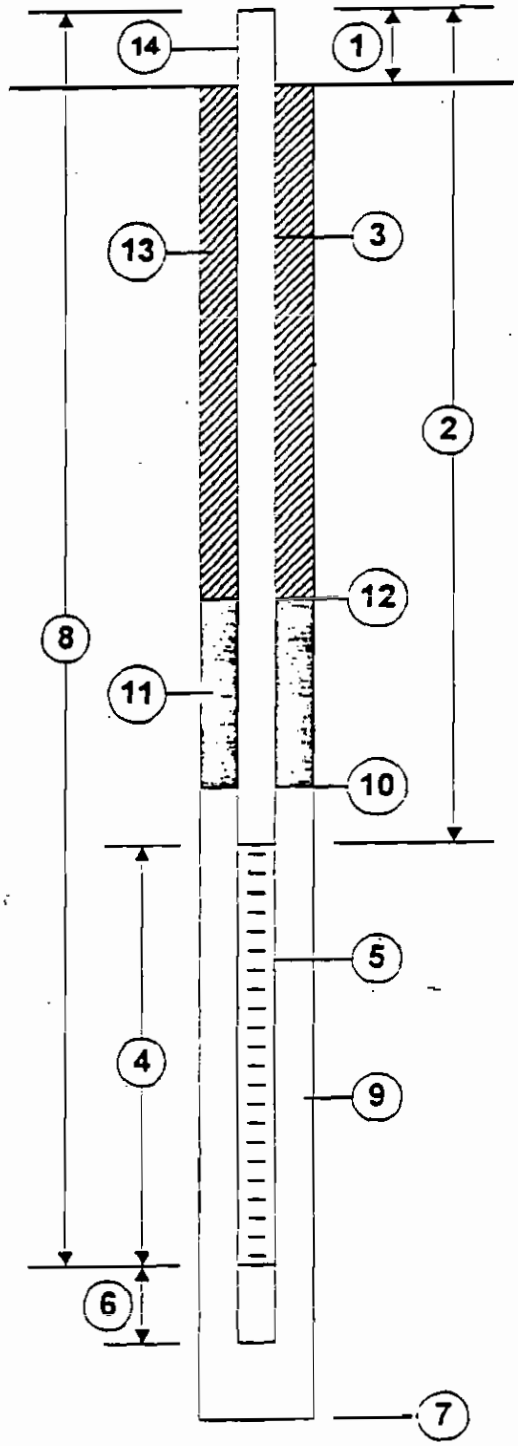
| DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE NOT DETERMINED | Hole No. NBCT-200-TW-0 |
|---|---|---|
| PROJECT INSTALLATION OF TEMPORARY MONITORING WELLS AT BLDG. 200 FORMER UST SITE | INSTALLATION FORMER CHARLESTON NAVAL BASE | SHEET 2 OF 2 SHEETS |

| ELEVATION a | DEPTH b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, d weathering, etc., if significa g |
|---|---|---|---|---|---|---|
| | 10' | | (SP) CONTINUED FROM SHEET NO 1 | | | |
| | 12' | | | | | |
| | 14' | | (CL) YELLOWISH-BROWN AND GRAY SANDY/SILTY LEAN CLAY, TRACE OF FINE GRAVEL | | | |
| | 15' | | | | | |
| | | | BORING TERMINATED AT 15.0' | | | |

# WELL CONSTRUCTION DETAILS

FORMER CHARLESTON NAVAL BASE BUILDING 200 FORMER UST SITE INVESTIGATION

WELL NUMBER NBCT-200-TW-03
DATE OF INSTALLATION 06/17/98
INSTALLED BY CHARLESTON ENVIRONMENTAL DETACHMENT TANK SECTION / J. BIDDLE




1. Height of Casing above ground 1.40'
2. Total lenght of Riser pipe 5.9'
3. Type of Riser pipe 2" ID SCHEDULE 40. FLUSH THREAD PVC
4. Lenght of Screen 10.0'
5. Type of Screen 2" ID SCHEDULE 40 PVC 0.010" SLOTTED
6. Lenght of Sump 0.5' (INCLUDES 0.3' UN SLOTTED PORTION OF SCREEN
7. Depth of Boring 17.0'
   Diameter of Boring 7.75" NOMINAL
8. Depth to Bottom of Screen 14.5'
9. Type of filter pack "DRILLERS SERVICES" No. 2 FILTER SAND.
   Quanity Used 400 Lbs
   Size 10-30 SCREEN SIZE
10. Depth to Top of Filter Pack 2.1'
11. Type of Seal "SHUR PEL" 1/2" BENTONITE PELLETS
    Quanity Used 60 Lbs.
12. Depth to Top of Seal 0.5'
13. Type of Grout NONE
    Grout Mixture N/A
    Method of Placement N/A
14. Type of Well Protection NONE AT THIS TIME

COMMENTS:
WATER LEVEL, 1 HOUR AFTER INSTALLATION: 6.42'.

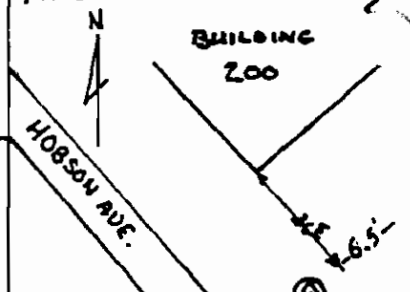
jb 6/18/98

MAF / WELL_FRM.VSD

Hole No. NBCT-200-TW

| DRILLING LOG | DIVISION SOUTH ATLANTIC | INSTALLATION CHARLESTON NAVAL BASE (FORMER) | SHEET 1 OF 2 SHEETS |
|---|---|---|---|

1. PROJECT INSTALLATION OF MONITORING WELLS AT BUILDING 200, FORMER UST SITE
2. LOCATION (Coordinates or Station) SEE REMARKS COLUMN (g)
3. DRILLING AGENCY CHARLESTON ENVIRONMENTAL DETACHMENT TANK SECT.
4. HOLE NO. (As shown on drawing title and file number) NBCT-200-TW-03
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN >17.0'
8. DEPTH DRILLED INTO ROCK N/A
9. TOTAL DEPTH OF HOLE 17.0'
10. SIZE AND TYPE OF BIT 4¼" ID HOLLOW STEM AUGER, 1 3/4"
11. DATUM FOR ELEVATION SHOWN (TBM or MSL) ID SPLITSPOON
12. MANUFACTURER'S DESIGNATION OF DRILL SIMCO 2400 SR-1
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2; UNDISTURBED NONE
14. TOTAL NUMBER CORE BOXES NONE
15. ELEVATION GROUND WATER NOT DETERMINED
16. DATE HOLE: STARTED 17 JUN 98; COMPLETED 17 JUN 98
17. ELEVATION TOP OF HOLE NOT DETERMINED
18. TOTAL CORE RECOVERY FOR BORING N/A %
19. SIGNATURE OF INSPECTOR James O. Biddy GEOLOGIST

| ELEVATION a | DEPTH 0' b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | (SM) BROWN, FINE SILTY SAND | | | WATER LEVEL DURING DRILLING: 7.0' |
| | | | LIGHT BROWN | | | WATER LEVEL AFTER 1 HOUR 6.42' |
| | 2' | | YELLOWISH-BROWN, 10% CLAY | | | NOTE: EXCEPT FOR SPLITSPOON SAMPLE INTERVALS, DEPTHS FOR CHANGE OF MATERIALS ARE APPROXIMATIONS BASED ON SOIL CUTTINGS AND SOIL ON AUGER ON WITH GRAVEL |
| | | | DARK BROWN, ORGANIC TEXTURE, APPEARANCE | | TW 03-1 (4') SAMPLE | FIRST PUSH DIDN'T PROVIDE SAMPLE. ONE 2" DIAMETER PIECE OF GRAVEL LODGED IN SHOE. |
| | 4' | | | | |   |
| | 4.6' | | (SP) LIGHT BROWN AND YELLOW-ORANGE F. POORLY GRADED SAND WITH 15% SILT | | | |
| | | | (SC) MEDIUM GRAYISH-BROWN, FINE CLAYEY SAND | | | |
| | 5.7' 6' | | (SP) MEDIUM BROWN, FINE TO MEDIUM GRAINED, POORLY GRADED SAND | | | WATER WITH DRILL CUTTINGS AT 7.0' FIRST INDICATION OF WATER |
| | 8' | | (SC) DARK GREENISH-BROWN, FINE TO MEDIUM CLAYEY SAND | | TW 03-2 (8') SAMPLE | |
| | 10' | | | | | |
| | 12' | | | | | |
| | | | CONTINUED ON SHEET NO. 2 | | | |

NOTE: SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.

| DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE NOT DETERMINED | Hole No. NBCT-200-TW- |
|---|---|---|
| PROJECT INSTALLATION OF MONITORING WELLS AT BUILDING 200 FORMER UST SITE | INSTALLATION FORMER CHARLESTON NAVAL BASE | SHEET 2 OF 2 SHEETS |

| ELEVATION a | DEPTH 12' b | LEGEND c | CLASSIFICATION OF MATERIALS (Description) d | % CORE RECOVERY e | BOX OR SAMPLE NO. f | REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g |
|---|---|---|---|---|---|---|
| | | | (SC) CONTINUED FROM SHEET NO. 1 | | | |
| | 14 | | (OL/OH) DARK GRAY, HIGH LIQUID LIMIT ORGANIC SILT, SEMI-PLASTIC | | | STRONG HYDROGEN SULFIDE ODOR |
| | 16 | | (OH) DARK GRAY, HIGH LIQUID LIMIT ORGANIC CLAY, PLASTIC | | | |
| | 17' | | BORING TERMINATED AT 7.0'. | | | |

# APPENDIX B

## ANALYTICAL LABORATORY DATA
## SOIL AND GROUNDWATER

Table E-1
Soil Sample Cross-Reference List
Former Building NS200 (NOAA CSC-2)
2224 South Hobson Avenue
North Charleston South Carolina

| DET Laboratory No. | Contamination Assessment Identification |
|---|---|
| SPORT0645-1 | Soil Trip Blank |
| SPORT0646-1 | NBCT200S010102 |
| SPORT0646-2 | NBCT200S020106 |
| SPORT0646-3 | NBCT200S030106 |
| SPORT0646-4 | NBCT200S080104 |
| SPORT0646-5 | NBCT200S110102 |
| SPORT0655-1 | Soil Trip Blank |
| SPORT0655-2 | NBCT200S120101 |
| SPORT0655-3 | NBCT200S130103 |
| SPORT0655-4 | NBCT200S140103 |
| SPORT0655-5 | NBCT200S150101 |
| SPORT0655-6 | NBCT200S160103 |
| SPORT0655-7 | NBCT200S170102 |
| SPORT0655-8 | NBCT200S180102 |
| SPORT0655-9 | NBCT200S190102 |
| SPORT0655-10 | NBCT200S200101 |
| SPORT0658-1 | Soil Trip Blank |
| SPORT0658-2 | NBCT200S270103 |
| SPORT0658-3 | NBCT200S280102 |
| SPORT0658-4 | NBCT200S290103 |
| SPORT0658-5 | NBCT200S260103 |
| SPORT0658-6 | NBCT200S250102 |
| SPORT0658-7 | NBCT200S210101 |
| SPORT0658-8 | NBCT200S230102 |
| SPORT0658-9 | NBCT200S220102 |
| SPORT0658-10 | NBCT200S240101 |
| SPORT0675-1 | Soil Trip Blank |
| SPORT0675-4 | NBCT100S310103 |
| SPORT0732-1 | Soil Trip Blank |
| SPORT0732-2 | NBCT200TW10102 |
| SPORT0732-3 | NBCT200TW10204 |
| SPORT0732-4 | NBCT200TW20102 |
| SPORT0732-5 | NBCT200TW20204 |
| SPORT0732-6 | NBCT200TW30102 |
| SPORT0744-1 | Soil Trip Blank |
| SPORT0744-2 | NBCT200S100103 |

# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E8747 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 14, 1998 

| | |
|---|---|
| Sample ID | : SPORT0645-1 |
| Lab ID | : 9804153-01 |
| Matrix | : Soil |
| Date Collected | : 04/06/98 |
| Date Received | : 04/07/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/09/98 | 1448 | 1198 | |
| Ethylbenzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.540 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| Bromofluorobenzene | BTEX-8260 | 88.2 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 90.8 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 87.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 88.2 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 90.8 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 87.2 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |

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*9804153-01*

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8745 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 14, 1998 

Sample ID : SPORT0645-1

| M = Method | Method-Description |
|---|---|

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87458 |
| NC | 233 | |
| SC | 13120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 15, 1998



| | |
|---|---|
| Sample ID | : SPORT0646-1 |
| Lab ID | : 9804154-01 |
| Matrix | : Soil |
| Date Collected | : 04/06/98 |
| Date Received | : 04/07/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/09/98 | 1626 | 119824 | 1 |
| Ethylbenzene | | 16.6 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | | 2.26 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 1.46 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.946 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphtene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | JCB | 04/13/98 | 1539 | 119721 | 2 |
| Acenaphthylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds

RDH 04/08/98 1000 119721 3

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87459 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 15, 1998 

Sample ID : SPORT0646-1

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 77.3 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 59.0 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 102. | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 95.2 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 91.6 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 91.8 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 95.2 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 91.6 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 91.8 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87 |
| NC | 233 | |
| SC | 10120 | |
| TN | 02934 | |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 15, 1998



| | |
|---|---|
| Sample ID | : SPORT0646-2 |
| Lab ID | : 9804154-02 |
| Matrix | : Soil |
| Date Collected | : 04/06/98 |
| Date Received | : 04/07/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | J | 1.94 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/10/98 | 1446 | 119[illegible] | 1 |
| Ethylbenzene | J | 1.50 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 940 | 10.0 | 20.0 | ug/kg | 10. | TCL | 04/09/98 | 1658 | 119824 | 1 |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | JCB | 04/13/98 | 1608 | 119721 | 2 |
| Acenaphthylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 696 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | | 995 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds RDH 04/08/98 1000 119721

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/874 |
| NC | 233 | |
| SC | 10120 | 10982 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 15, 1998 

Sample ID : SPORT0646-2

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 84.5 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 67.6 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 90.0 | (27.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 94.6 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 89.6 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 83.6 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 94.6 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 89.6 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 83.6 | (72.1 - 137.) |

| M = Method | Method Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | [illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 15, 1998



| | |
|---|---|
| Sample ID | : SPORT0646-3 |
| Lab ID | : 9804154-03 |
| Matrix | : Soil |
| Date Collected | : 04/06/98 |
| Date Received | : 04/07/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/09/98 | 1730 | 119824 | 1 |
| Ethylbenzene | J | 1.27 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.840 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 1990 | 20.0 | 40.0 | ug/kg | 20. | TCL | 04/10/98 | 1415 | 119824 | 1 |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | JCB | 04/13/98 | 1638 | 119721 | 2 |
| Acenaphthylene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Naphthalene | J | 240 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Phenanthrene | | 822 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**
GC/MS Base/Neutral Compounds

RDH 04/08/98 1000 119721 3

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/874 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 15, 1998 

Sample ID : SPORT0646-3

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 77.0 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 51.9 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 82.7 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 98.2 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 84.6 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 88.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 98.2 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 84.6 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 88.2 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* Indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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Laboratory Certifications

| STATE | OEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8745 |
| NC | 233 | |
| SC | 10120 | 10583 |
| TN | 02934 | 02 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 17, 1998



| | |
|---|---|
| Sample ID | : SPORT0646-4 |
| Lab ID | : 9804154-04 |
| Matrix | : Soil |
| Date Collected | : 04/07/98 |
| Date Received | : 04/07/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/09/98 | 1801 | 119824 | 1 |
| Ethylbenzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 15 items* | | | | | | | | | | | |
| Acenaphtnene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | RLC | 04/17/98 | 1349 | 120199 | 2 |
| Acenaphthylene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**
GC/MS Base/Neutral Compounds

HDB 04/17/98 0800 120199 3

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2105

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 17, 1998 

Sample ID : SPORT0646-4

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 81.7 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 84.9 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 78.1 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 100. | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 92.2 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 95.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 100. | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 92.2 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 95.2 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/874 |
| NC | 233 | |
| SC | 10120 | 10[illegible] |
| TN | 02934 | 0 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 15, 1998 

| | |
|---|---|
| Sample ID | : SPORT0646-5 |
| Lab ID | : 9804154-05 |
| Matrix | : Soil |
| Date Collected | : 04/07/98 |
| Date Received | : 04/07/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/09/98 | 1832 | 119824 | 1 |
| Ethylbenzene | | 21.7 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | | 9.50 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | J | 1.14 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | JCB | 04/13/98 | 1737 | 119721 | 2 |
| Acenaphthylene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 167 | 333 | ug/kg | 1.0 | | | | | |

The following prep procedures were performed:
GC/MS Base/Neutral Compounds

RDH 04/08/98 1000 119721 3

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87456 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 15, 1998



Sample ID : SPORT0646-5

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 76.8 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 55.4 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 96.3 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 100. | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 81.6 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 95.0 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 100. | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 81.6 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 95.0 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney

Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87244 | E87472/87 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

| | |
|---|---|
| Sample ID | : SPORT0655-1 |
| Lab ID | : 9804332-01 |
| Matrix | : Soil |
| Date Collected | : 04/13/98 |
| Date Received | : 04/14/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | JEB | 04/21/98 | 2121 | 120288 | 1 |
| Ethylbenzene | J | 1.40 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | | 2.20 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | | 5.15 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 5.80 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| Bromofluorobenzene | BTEX-8260 | 92.8 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 94.2 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 90.4 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 92.8 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 94.2 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 90.4 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |

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*9804332-01*

# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/E |
| NC | 233 | |
| SC | 10120 | 10002 |
| TN | C2934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

Sample ID : SPORT0655-1

| M = Method | Method-Description |
|---|---|

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

P O Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29414
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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | NPI |
|---|---|---|
| FL | E87156/87294 | E87472/87745 |
| NC | 251 | |
| SC | 10120 | 10982 |
| TN | 02934 | 029[illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 24, 1998



| | |
|---|---|
| Sample ID | : SPORT0655-2 |
| Lab ID | : 9804332-02 |
| Matrix | : Soil |
| Date Collected | : 04/13/98 |
| Date Received | : 04/14/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | JEB | 04/22/98 | 2153 | 120288 | 1 |
| Ethylbenzene | U | 1.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 2.40 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | RLC | 04/17/98 | 1653 | 120199 | 2 |
| Acenaphthylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds HDB 04/16/98 0800 120199 3

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

Sample ID : SPORT0655-2

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 81.6 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 87.7 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 80.1 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 97.8 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 91.2 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 89.6 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 97.8 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 91.2 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 89.6 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
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* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPA |
|---|---|---|
| FL | E87156/87294 | E87472/87 |
| NC | 233 | |
| SC | 10120 | 10982 |
| TN | 02934 | 0 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 24, 1998



Sample ID : SPORT0655-3
Lab ID : 9804332-03
Matrix : Soil
Date Collected : 04/13/98
Date Received : 04/14/98
Priority : Routine
Collector : Client

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | JEB | 04/21/98 | 2225 | 120288 | 1 |
| Ethylbenzene | U | 0.530 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 1.60 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenapthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | RLC | 04/17/98 | 1724 | 120199 | 2 |
| Acenaphthylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**
GC/MS Base/Neutral Compounds

HDB 04/16/98 0800 120199 3

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/874 |
| NC | 239 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

Sample ID : SPORT0655-3

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 73.9 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 82.2 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 71.0 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 102. | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 93.8 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 93.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 102. | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 93.8 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 93.2 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
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* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/874 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

| | |
|---|---|
| Sample ID | : SPORT0655-4 |
| Lab ID | : 9804332-04 |
| Matrix | : Soil |
| Date Collected | : 04/13/98 |
| Date Received | : 04/14/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 50.0 | 100 | ug/kg | 50. | JEB | 04/23/98 | 0424 | 120288 | 1 |
| Ethylbenzene | U | 0.00 | 50.0 | 100 | ug/kg | 50. | | | | | |
| Toluene | U | 0.00 | 50.0 | 100 | ug/kg | 50. | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 50.0 | 100 | ug/kg | 50. | | | | | |
| Naphthalene | | 2390 | 50.0 | 100 | ug/kg | 50. | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | RLC | 04/17/98 | 1754 | 120199 | 2 |
| Acenaphthylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | | 583 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 801 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | | 857 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | J | 179 | 165 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**
GC/MS Base/Neutral Compounds

HDB 04/16/98 0800 120199 3

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/1 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

Sample ID : SPORT0655-4

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 85.9 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 83.3 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 79.2 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 72.8 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 114. | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 72.6 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 72.8 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 114. | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 72.6 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
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* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/ |
| NC | 233 | |
| SC | 10120 | 10982 |
| TN | 02934 | [illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

| | |
|---|---|
| Sample ID | : SPORT0655-5 |
| Lab ID | : 9804332-05 |
| Matrix | : Soil |
| Date Collected | : 04/14/98 |
| Date Received | : 04/14/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | JEB | 04/22/98 | 2257 | 120288 | 1 |
| Ethylbenzene | J | 1.20 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 2.20 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | RLC | 04/17/98 | 1825 | 120199 | 2 |
| Acenaphthylene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**
GC/MS Base/Neutral Compounds

HDB 04/16/98 0800 120199 3

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87-472/8 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

Sample ID : SPORT0655-5

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 85.7 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 95.5 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 83.6 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 90.8 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 93.2 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 87.0 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 90.8 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 93.2 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 87.0 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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*9804332-05*

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | 887136/87294 | 887472/T |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

Sample ID : SPORT0635-6
Lab ID : 9804332-06
Matrix : Soil
Date Collected : 04/14/98
Date Received : 04/14/98
Priority : Routine
Collector : Client

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | JEB | 04/22/98 | 2329 | 120288 | 1 |
| Ethylbenzene | | 2.20 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.950 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 5.10 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | RLC | 04/17/98 | 1856 | 120199 | 2 |
| Acenaphthylene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 162 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**
GC/MS Base/Neutral Compounds

HDB 04/16/98 0800 120199 3

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

Sample ID : SPORT0655-6

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 77.0 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 86.6 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 79.1 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 100. | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 88.0 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 88.4 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 100. | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 88.0 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 88.4 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EM |
|---|---|---|
| FL | E87156/87294 | E87472/87 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 32934 | [illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 24, 1998



| | |
|---|---|
| Sample ID | : SPORT0655-7 |
| Lab ID | : 9804332-07 |
| Matrix | : Soil |
| Date Collected | : 04/14/98 |
| Date Received | : 04/14/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | JEB | 04/23/98 | 1642 | 120288 | 1 |
| Ethylbenzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | RLC | 04/17/98 | 1927 | 120199 | 2 |
| Acenaphthylene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**
GC/MS Base/Neutral Compounds

HDB 04/16/98 0800 120199 3

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPA |
|---|---|---|
| FL | 087158/87294 | E87472/8 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

Sample ID : SPORT0635-7

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 84.3 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 93.7 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 81.6 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 95.0 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 92.4 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 82.8 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 95.0 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 92.4 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 82.8 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
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This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87204 | E87472/87[illegible] |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02[illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 24, 1998



| | |
|---|---|
| Sample ID | : SPORT0655-8 |
| Lab ID | : 9804332-08 |
| Matrix | : Soil |
| Date Collected | : 04/14/98 |
| Date Received | : 04/14/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | JEB | 04/23/98 | 1714 | 120288 | 1 |
| Ethylbenzene | U | 0.360 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Napithalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | RLC | 04/17/98 | 1957 | 120199 | 2 |
| Acenaphthylene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**
GC/MS Base/Neutral Compounds

HDB 04/16/98 0800 120199 3

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

Sample ID : SPORT0655-8

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 80.0 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 84.7 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 83.7 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 101. | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 91.4 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 91.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 101. | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 91.4 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 91.2 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | [illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 24, 1998



| | |
|---|---|
| Sample ID | : SPORT0655-9 |
| Lab ID | : 9804332-09 |
| Matrix | : Soil |
| Date Collected | : 04/14/98 |
| Date Received | : 04/14/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | JEB | 04/23/98 | 1746 | 120288 | 1 |
| Ethylbenzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenapnthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | RLC | 04/17/98 | 2028 | 120199 | 2 |
| Acenaphthylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**
GC/MS Base/Neutral Compounds

HDB 04/16/98 0800 120199 3

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/1 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment/Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 24, 1998 

Sample ID : SPORT0635-9

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 72.2 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 82.3 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 77.4 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 103. | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 93.4 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 89.0 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 103. | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 93.4 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 89.0 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/ |
| NC | 231 | |
| SC | 10120 | [illegible] |
| TN | 02934 | |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 24, 1998



| | |
|---|---|
| Sample ID | : SPORT0655-10 |
| Lab ID | : 9804332-10 |
| Matrix | : Soil |
| Date Collected | : 04/14/98 |
| Date Received | : 04/14/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | JEB | 04/23/98 | 0353 | 120288 | 1 |
| Ethylbenzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | RLC | 04/17/98 | 2058 | 120199 | 2 |
| Acenaphthylene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 166 | 332 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**
GC/MS Base/Neutral Compounds

HDB 04/16/98 0800 120199 3

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*9804332-10*

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/R |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 24, 1998



Sample ID : SPORT0855-10

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 85.4 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 95.7 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 82.0 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 91.2 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 84.6 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 86.4 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 91.2 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 84.6 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 86.4 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | E[illegible] |
|---|---|---|
| FL | E87156/87294 | E [illegible] 7 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 28, 1998



| | |
|---|---|
| Sample ID | : SPORT0658-1 |
| Lab ID | : 9804461-01 |
| Matrix | : Soil |
| Date Collected | : 04/16/98 |
| Date Received | : 04/17/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/25/98 | 1519 | 120[illegible] | |
| Ethylbenzene | U | 0.985 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | J | 1.42 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 3.80 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 5.49 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| Bromofluorobenzene | BTEX-8260 | 90.8 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 88.8 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 86.0 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 90.8 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 88.8 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 86.0 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8. |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston. South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28. 1998 

Sample ID : SPORT0658-1

| M = Method | Method-Description |
|---|---|

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager. Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | [illegible]72[illegible] |
| NC | 233 | |
| SC | 10120 | [illegible]2 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

| | |
|---|---|
| Sample ID | : SPORT0658-2 |
| Lab ID | : 9804461-02 |
| Matrix | : Soil |
| Date Collected | : 04/16/98 |
| Date Received | : 04/17/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/25/98 | 1550 | 1[illegible] | |
| Ethylbenzene | U | 0.645 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 1.28 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | RLC | 04/26/98 | 2326 | 120497 | 2 |
| Acenaphthylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds HDB 04/21/98 1100 1204[illegible] 3

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

Sample ID : SPORT0658-2

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 87.5 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 110. | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 99.4 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 98.2 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 94.2 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 94.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 98.2 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 94.2 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 94.2 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
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* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| | | |
|---|---|---|
| STATE | GEL | F |
| FL | E87156/87294 | 8 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

| | |
|---|---|
| Sample ID | : SPORT0658-3 |
| Lab ID | : 9804461-03 |
| Matrix | : Soil |
| Date Collected | : 04/16/98 |
| Date Received | : 04/17/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.930 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/25/98 | 1621 | 120885 | |
| Ethylbenzene | U | 0.788 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | J | 1.61 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 1.25 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 27.8 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | | 370 | 164 | 330 | ug/kg | 1.0 | RLC | 04/26/98 | 2353 | 120497 | 2 |
| Acenaonthylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | J | 223 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds HDB 04/21/98 1100 120497 3

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106
Contact: Mr. Bill Hiers
Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

Sample ID : SPORT0658-3

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 82.7 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 106. | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 98.1 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 93.8 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 91.2 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 88.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 93.8 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 91.2 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 88.2 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
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J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
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Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | [illegible] |
|---|---|---|
| FL | E87156/87294 | '87 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: April 28, 1998



| | |
|---|---|
| Sample ID | : SPORT0658-4 |
| Lab ID | : 9804461-04 |
| Matrix | : Soil |
| Date Collected | : 04/16/98 |
| Date Received | : 04/17/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/25/98 | 1651 | 120[illegible] | |
| Ethylbenzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | J | 1.40 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | RLC | 04/27/98 | 0020 | 120497 | 2 |
| Acenaphthylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 164 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds HDB 04/21/98 1100 120497 3

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

Sample ID : SPORT0658-4

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 87.3 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 117. | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 91.7 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 89.6 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 86.0 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 83.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 89.6 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 86.0 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 83.2 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPA |
|---|---|---|
| FL | E87156/87294 | E 74 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

| | |
|---|---|
| Sample ID | : SPORT0658-5 |
| Lab ID | : 9804461-05 |
| Matrix | : Soil |
| Date Collected | : 04/16/98 |
| Date Received | : 04/17/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/25/98 | 1722 | 1208b | |
| Ethylbenzene | U | 0.578 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | J | 1.66 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 1.21 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | RLC | 04/27/98 | 0046 | 120497 | 2 |
| Acenaphthylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds HDB 04/21/98 1100 120497 3

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

Sample ID : SPORT0658-5

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 72.9 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 103. | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 90.0 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 106. | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 89.4 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 94.8 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 106. | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 89.4 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 94.8 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPA |
|---|---|---|
| FL | E87156/87294 | [illegible] |
| NC | 233 | |
| SC | 10120 | [illegible] |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

| | |
|---|---|
| Sample ID | : SPORT0658-6 |
| Lab ID | : 9804461-06 |
| Matrix | : Soil |
| Date Collected | : 04/16/98 |
| Date Received | : 04/17/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/25/98 | 1753 | 120[illegible] | |
| Ethylbenzene | U | 0.595 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 1.18 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | RLC | 04/27/98 | 1615 | 120497 | 2 |
| Acenaphthylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds HDB 04/21/98 1100 120497 [illegible]

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

Sample ID : SPORT0658-6

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 82.1 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 103. | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 89.1 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 116. | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 98.0 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 105. | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 116. | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 98.0 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 105. | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen D. Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | |
|---|---|---|
| FL | E87156/87294 | 72 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

| | |
|---|---|
| Sample ID | : SPORT0658-7 |
| Lab ID | : 9804461-07 |
| Matrix | : Soil |
| Date Collected | : 04/16/98 |
| Date Received | : 04/17/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/25/98 | 1823 | 120365 | 1 |
| Ethylbenzene | U | 0.760 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 1.59 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.448 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | RLC | 04/27/98 | 1642 | 120497 | 2 |
| Acenaphthylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds HDB 04/21/98 1100 120497 3

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/874 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

Sample ID : SPORT0658-7

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 73.7 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 96.2 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 84.0 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 95.2 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 82.2 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 89.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 95.2 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 82.2 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 89.2 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E874[illegible]5 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

| | |
|---|---|
| Sample ID | : SPORT0658-8 |
| Lab ID | : 9804461-08 |
| Matrix | : Soil |
| Date Collected | : 04/17/98 |
| Date Received | : 04/17/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/25/98 | 1853 | 12088 | |
| Ethylbenzene | U | 0.623 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 1.18 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | RLC | 04/27/98 | 1710 | 120497 | 2 |
| Acenaphthylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds HDB 04/21/98 1100 120497 3

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87- |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

Sample ID : SPORT0658-8

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 81.8 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 100. | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 88.9 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 96.0 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 91.6 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 90.8 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 96.0 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 91.6 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 90.8 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

P O Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29414
(803) 556-8171 • Fax (803) 766-1178

*9804461-08*

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# GENERAL ENGINEERING LABORATORIES

*Meeting today's needs with a vision for tomorrow.*

**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E8[illegible]74 |
| NC | 233 | |
| SC | 10120 | 10[illegible] |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

| | |
|---|---|
| Sample ID | : SPORT0658-9 |
| Lab ID | : 9804461-09 |
| Matrix | : Soil |
| Date Collected | : 04/17/98 |
| Date Received | : 04/17/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/27/98 | 1117 | 120 | |
| Ethylbenzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | RLC | 04/27/98 | 1736 | 120497 | 2 |
| Acenaphthylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 165 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds HDB 04/21/98 1100 12049[illegible]

# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/874: |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston. South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28. 1998 

Sample ID . SPORT0658-9

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 84.4 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 105. | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 89.9 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 88.0 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 84.4 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 85.8 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 88.0 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 84.4 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 85.8 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager. Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E[illegible]874 |
| NC | 233 | |
| SC | 10120 | 10[illegible] |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

| | |
|---|---|
| Sample ID | : SPORT0658-10 |
| Lab ID | : 9804461-10 |
| Matrix | : Soil |
| Date Collected | : 04/17/98 |
| Date Received | : 04/17/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 04/25/98 | 1954 | 12[illegible] | 1 |
| Ethylbenzene | U | 0.302 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.727 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | RLC | 04/27/98 | 1803 | 120497 | 2 |
| Acenaphthylene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 163 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds HDB 04/21/98 1100 12049[illegible] 3

# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8745 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: April 28, 1998 

Sample ID : SPORT0658-10

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 77.1 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 99.5 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 84.3 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 96.2 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 91.8 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 86.6 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 96.2 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 91.8 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 86.6 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
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Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPA |
|---|---|---|
| FL | E87156/87254 | E87472/8 |
| NC | 233 | |
| SC | 10120 | 10SC2 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: May 05, 1998



| | |
|---|---|
| Sample ID | : SPORT0675-1 |
| Lab ID | : 9804680-01 |
| Matrix | : Soil |
| Date Collected | : 04/24/98 |
| Date Received | : 04/24/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 05/01/98 | 0319 | 121259 | 1 |
| Ethylbenzene | J | 1.16 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | J | 1.17 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | | 6.37 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 5.50 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| Bromofluorobenzene | BTEX-8260 | 94.6 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 87.8 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 86.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 94.6 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 87.8 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 86.2 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472 |
| NC | 233 | |
| SC | 10120 | 10982 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: May 05, 1998 

| Sample ID | SPORT0675-1 |
|---|---|
| **M = Method** | **Method-Description** |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
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U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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Karen Blakeney
Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472 |
| NC | 233 | |
| SC | 10120 | 10982 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: May 08, 1998 

| | |
|---|---|
| Sample ID | : SPORT0675-4 |
| Lab ID | : 9804680-04 |
| Matrix | : Soil |
| Date Collected | : 04/24/98 |
| Date Received | : 04/24/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | TCL | 05/01/98 | 0351 | 121259 | 1 |
| Ethylbenzene | U | 0.538 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | J | 3.08 | 1.00 | 4.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.694 | 1.00 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | RLC | 05/06/98 | 1434 | 120940 | 2 |
| Acenaphthylene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 166 | 331 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 27.2 | 166 | 331 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds RDH 04/28/98 1510 120940 3

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8 |
| NC | Z33 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: May 08, 1998 

Sample ID : SPORT0675-4

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 77.0 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 99.0 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 89.6 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 100. | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 89.2 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 88.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 100. | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 89.2 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 88.2 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
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ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87451 |
| NC | 233 | |
| SC | 10120 | 10562 |
| TN | 02914 | 0293[illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

| | |
|---|---|
| Sample ID | : SPORT0732-1 |
| Lab ID | : 9806575-01 |
| Matrix | : Soil |
| Date Collected | : 06/17/98 |
| Date Received | : 06/18/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 0.250 | 1.00 | ug/kg | 1.0 | TCL | 06/24/98 | 1819 | 124774 | 1 |
| Ethylbenzene | U | 0.00 | 0.230 | 1.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 0.220 | 1.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 0.620 | 2.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | J | 0.980 | 0.420 | 1.00 | ug/kg | 1.0 | | | | | |

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| Bromofluorobenzene | BTEX-8260 | 101. | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 65.9 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 89.8 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 101. | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 65.9 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 89.8 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8 |
| NC | 232 | |
| SC | 10120 | 10582 |
| TN | C2934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

Sample ID : SPORT0732-1

| M = Method | Method-Description |
|---|---|

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8745 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 0297 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

| | |
|---|---|
| Sample ID | : SPORT0732-2 |
| Lab ID | : 9806575-02 |
| Matrix | : Soil |
| Date Collected | : 06/17/98 |
| Date Received | : 06/18/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 2.50 | 10.0 | ug/kg | 10. | TCL | 06/24/98 | 1850 | 124774 | 1 |
| Ethylbenzene | J | 6.30 | 2.30 | 10.0 | ug/kg | 10. | | | | | |
| Toluene | J | 7.70 | 2.20 | 10.0 | ug/kg | 10. | | | | | |
| Xylenes (TOTAL) | J | 16.3 | 6.20 | 20.0 | ug/kg | 10. | | | | | |
| Naphthalene | | 2080 | 42.0 | 100 | ug/kg | 100 | TCL | 06/25/98 | 1033 | 124774 | 1 |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 858 | 3300 | ug/kg | 10. | RLC | 06/23/98 | 0828 | 124509 | 2 |
| Acenaphthylene | U | 0.00 | 924 | 3300 | ug/kg | 10. | | | | | |
| Anthracene | U | 0.00 | 627 | 3300 | ug/kg | 10. | | | | | |
| Benzo(a)anthracene | U | 0.00 | 594 | 3300 | ug/kg | 10. | | | | | |
| Benzo(a)pyrene | U | 0.00 | 561 | 3300 | ug/kg | 10. | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 1020 | 3300 | ug/kg | 10. | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 594 | 3300 | ug/kg | 10. | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 858 | 3300 | ug/kg | 10. | | | | | |
| Chrysene | U | 0.00 | 462 | 3300 | ug/kg | 10. | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 561 | 3300 | ug/kg | 10. | | | | | |
| Fluoranthene | U | 0.00 | 792 | 3300 | ug/kg | 10. | | | | | |
| Fluorene | J | 1800 | 792 | 3300 | ug/kg | 10. | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 1390 | 3300 | ug/kg | 10. | | | | | |
| Naphthalene | U | 0.00 | 759 | 3300 | ug/kg | 10. | | | | | |
| Phenanthrene | J | 2790 | 759 | 3300 | ug/kg | 10. | | | | | |
| Pyrene | U | 0.00 | 627 | 3300 | ug/kg | 10. | | | | | |
| **Metals Analysis** | | | | | | | | | | | |
| Cadmium | J | 58.7 | 19.4 | 467 | ug/kg | 2.0 | MBL | 06/21/98 | 1418 | 124483 | 3 |

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

Sample ID : SPORT0732-2

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following prep procedures were performed:**

| | | | | | |
|---|---|---|---|---|---|
| GC/MS Base/Neutral Compounds | RDH | 06/19/98 | 1655 | 124509 | 4 |
| TRACE | FCD | 06/19/98 | 2000 | 124483 | 5 |

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 0.00* | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 0.00* | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 0.00* | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 96.3 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 66.1 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 80.7 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 96.3 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 66.1 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 80.7 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 6010A |
| M 4 | EPA 3550 |
| M 5 | EPA 3050 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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| STATE | GEL | EPI |
|---|---|---|
| FL | 257156/87294 | E87472/87451 |
| NC | 233 | |
| SC | 10120 | 10002 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

Sample ID : SPORT0732-2

| M = Method | Method-Description |
|---|---|

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney

Reviewed By

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|---|---|---|
| FL | E87156/87294 | E87472/874 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

| | |
|---|---|
| Sample ID | : SPORT0732-3 |
| Lab ID | : 9806575-03 |
| Matrix | : Soil |
| Date Collected | : 06/17/98 |
| Date Received | : 06/18/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 85.8 | 330 | ug/kg | 1.0 | RLC | 06/22/98 | 1340 | 124509 | 1 |
| Acenaphthylene | U | 0.00 | 92.4 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 62.7 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 59.4 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 56.1 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 102 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 59.4 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 85.8 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 46.2 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 56.1 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 79.2 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 79.2 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 139 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 856 | 75.9 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | | 1370 | 75.9 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | J | 309 | 62.7 | 330 | ug/kg | 1.0 | | | | | |
| **Metals Analysis** | | | | | | | | | | | |
| Cadmium | J | 256 | 20.8 | 500 | ug/kg | 2.0 | MBL | 06/21/98 | 1423 | 124483 | 2 |

**The following prep procedures were performed:**

| | | | | | |
|---|---|---|---|---|---|
| GC/MS Base/Neutral Compounds | RDH | 06/19/98 | 1655 | 124509 | 3 |
| TRACE | FGD | 06/19/98 | 2000 | 124483 | 4 |

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| STATE | GEL | EPI |
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| FL | E87156/87294 | E87472/8745 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: June 29, 1998



Sample ID : SPORT0732-3

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 70.7 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 59.5 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 82.8 | (37.3 - 128.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8270 |
| M 2 | EPA 6010A |
| M 3 | EPA 3550 |
| M 4 | EPA 3050 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
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| STATE | GEL | EPI |
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| FL | E87156/87294 | E87472/87475 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: June 29, 1998



| | |
|---|---|
| Sample ID | : SPORT0732-4 |
| Lab ID | : 9806575-04 |
| Matrix | : Soil |
| Date Collected | : 06/17/98 |
| Date Received | : 06/18/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 0.250 | 1.00 | ug/kg | 1.0 | TCL | 06/25/98 | 1550 | 124774 | 1 |
| Ethylbenzene | | 2.96 | 0.230 | 1.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 0.220 | 1.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | | 2.29 | 0.620 | 2.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 516 | 4.20 | 10.0 | ug/kg | 10. | TCL | 06/24/98 | 1921 | 124774 | 1 |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 339 | 1300 | ug/kg | 4.0 | RLC | 06/23/98 | 0857 | 124509 | 2 |
| Acenaphthylene | U | 0.00 | 365 | 1300 | ug/kg | 4.0 | | | | | |
| Anthracene | U | 0.00 | 248 | 1300 | ug/kg | 4.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 235 | 1300 | ug/kg | 4.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 222 | 1300 | ug/kg | 4.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 404 | 1300 | ug/kg | 4.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 235 | 1300 | ug/kg | 4.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 339 | 1300 | ug/kg | 4.0 | | | | | |
| Chrysene | U | 0.00 | 183 | 1300 | ug/kg | 4.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 222 | 1300 | ug/kg | 4.0 | | | | | |
| Fluoranthene | U | 0.00 | 313 | 1300 | ug/kg | 4.0 | | | | | |
| Fluorene | U | 0.00 | 313 | 1300 | ug/kg | 4.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 548 | 1300 | ug/kg | 4.0 | | | | | |
| Naphthalene | U | 0.00 | 300 | 1300 | ug/kg | 4.0 | | | | | |
| Phenanthrene | U | 0.00 | 300 | 1300 | ug/kg | 4.0 | | | | | |
| Pyrene | U | 0.00 | 248 | 1300 | ug/kg | 4.0 | | | | | |
| **Metals Analysis** | | | | | | | | | | | |
| Cadmium | J | 221 | 19.1 | 459 | ug/kg | 2.0 | MBL | 06/21/98 | 1428 | 124483 | 3 |

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87455 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 029[illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

Sample ID : SPORT0732-4

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following prep procedures were performed:**

| | | | | |
|---|---|---|---|---|
| GC/MS Base/Neutral Compounds | RDH | 06/19/98 | 1655 | 124509 4 |
| TRACE | FGD | 06/19/98 | 2000 | 124483 5 |

**Comments:**
A dilution was required for Extractable Organics due to matrix interference. As a result, the detection limits are elevated.

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 74.1 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 75.5 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 81.0 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 103. | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 66.0 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 86.2 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 103. | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 66.0 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 86.2 | (72.1 - 137.) |

| M = Method | Method Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 6010A |
| M 4 | EPA 3550 |
| M 5 | EPA 3050 |

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| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87451 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

Sample ID : SPORT0732-4

| M = Method | Method-Description |
|---|---|

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen D Blakeney

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| FL | E87156/87294 | E87472/87458 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

| | |
|---|---|
| Sample ID | : SPORT0732-5 |
| Lab ID | : 9806575-05 |
| Matrix | : Soil |
| Date Collected | : 06/17/98 |
| Date Received | : 06/18/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 0.250 | 1.00 | ug/kg | 1.0 | TCL | 06/24/98 | 1952 | 124774 | 1 |
| Ethylbenzene | U | 0.00 | 0.230 | 1.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 0.220 | 1.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 0.620 | 2.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 12.8 | 0.420 | 1.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 345 | 1330 | ug/kg | 4.0 | RLC | 06/23/98 | 0925 | 124509 | 2 |
| Acenaphthylene | U | 0.00 | 372 | 1330 | ug/kg | 4.0 | | | | | |
| Anthracene | U | 0.00 | 252 | 1330 | ug/kg | 4.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 239 | 1330 | ug/kg | 4.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 226 | 1330 | ug/kg | 4.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 412 | 1330 | ug/kg | 4.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 239 | 1330 | ug/kg | 4.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 345 | 1330 | ug/kg | 4.0 | | | | | |
| Chrysene | U | 0.00 | 186 | 1330 | ug/kg | 4.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 226 | 1330 | ug/kg | 4.0 | | | | | |
| Fluoranthene | U | 0.00 | 319 | 1330 | ug/kg | 4.0 | | | | | |
| Fluorene | U | 0.00 | 319 | 1330 | ug/kg | 4.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 558 | 1330 | ug/kg | 4.0 | | | | | |
| Naphthalene | U | 0.00 | 305 | 1330 | ug/kg | 4.0 | | | | | |
| Phenanthrene | U | 0.00 | 305 | 1330 | ug/kg | 4.0 | | | | | |
| Pyrene | U | 0.00 | 252 | 1330 | ug/kg | 4.0 | | | | | |
| **Metals Analysis** | | | | | | | | | | | |
| Cadmium | J | 168 | 20.4 | 490 | ug/kg | 2.0 | MBL | 06/21/98 | 1434 | 124483 | 3 |

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | GPI |
|---|---|---|
| FL | E87156/87294 | E87472/8745 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

Sample ID : SPORT0732-5

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following prep procedures were performed:**

| | | | | | |
|---|---|---|---|---|---|
| GC/MS Base/Neutral Compounds | RDH | 06/19/98 | 1655 | 124509 | 4 |
| TRACE | FGD | 06/19/98 | 2000 | 124483 | 5 |

**Comments:**
A dilution was required for Extractable Organics due to matrix interference. As a result, the detection limits are elevated.

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 79.9 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 80.5 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 94.6 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 89.9 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 68.8 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 95.8 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 89.9 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 68.8 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 95.8 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 6010A |
| M 4 | EPA 3550 |
| M 5 | EPA 3050 |

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
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| FL | E87156/87294 | E87472/87458 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

Sample ID : SPORT0732-5

| M = Method | Method-Description |
|---|---|

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87- |
| NC | 233 | |
| SC | .0120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 | Report Date: June 29, 1998 | 

| | |
|---|---|
| Sample ID | : SPORT0732-6 |
| Lab ID | : 9806575-06 |
| Matrix | : Soil |
| Date Collected | : 06/17/98 |
| Date Received | : 06/18/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 0.250 | 1.00 | ug/kg | 1.0 | TCL | 06/24/98 | 2023 | 124774 | 1 |
| Ethylbenzene | U | 0.00 | 0.230 | 1.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 0.220 | 1.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 0.620 | 2.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 0.420 | 1.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 86.6 | 333 | ug/kg | 1.0 | RLC | 06/23/98 | 0759 | 124509 | 2 |
| Acenaphthylene | U | 0.00 | 93.2 | 333 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 63.3 | 333 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 59.9 | 333 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 56.6 | 333 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 103 | 333 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 59.9 | 333 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 86.6 | 333 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 46.6 | 333 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 56.6 | 333 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 79.9 | 333 | ug/kg | 1.0 | | | | | |
| Fluorene | U | 0.00 | 79.9 | 333 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 140 | 333 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 76.6 | 333 | ug/kg | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 76.6 | 333 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 63.3 | 333 | ug/kg | 1.0 | | | | | |
| **Metals Analysis** | | | | | | | | | | | |
| Cadmium | | 650 | 20.6 | 495 | ug/kg | 2.0 | MBL | 06/21/98 | 1439 | 124483 | 3 |

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87459 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

Sample ID : SPORT0732-6

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|

The following prep procedures were performed:

| | | | | | |
|---|---|---|---|---|---|
| GC/MS Base/Neutral Compounds | RDH | 06/19/98 | 1655 | 124509 | 4 |
| TRACE | FGD | 06/19/98 | 2000 | 124483 | 5 |

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 59.9 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 59.3 | (23.0 - 120.) |
| p-Terphenyl-d14 | M610 | 88.1 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX-8260 | 91.9 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX-8260 | 70.9 | (63.4 - 136.) |
| Toluene-d8 | BTEX-8260 | 89.0 | (72.1 - 137.) |
| Bromofluorobenzene | NAP-8260 | 91.9 | (53.5 - 154.) |
| Dibromofluoromethane | NAP-8260 | 70.9 | (63.4 - 136.) |
| Toluene-d8 | NAP-8260 | 89.0 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 6010A |
| M 4 | EPA 3550 |
| M 5 | EPA 3050 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8745 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: June 29, 1998 

Sample ID : SPORT0732-6

| M = Method | Method-Description |
|---|---|

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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| STATE | GEL | SPI |
|---|---|---|
| FL | E87156/87294 | E87472/87451 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 09, 1998 

| | |
|---|---|
| Sample ID | : SPORT0744-1 |
| Lab ID | : 9806892-01 |
| Matrix | : Soil |
| Date Collected | : 06/30/98 |
| Date Received | : 06/30/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX + NAPTH. - 5 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 0.250 | 1.00 | ug/kg | 1.0 | TCL | 07/06/98 | 1532 | 125450 | 1 |
| Ethylbenzene | U | 0.00 | 0.230 | 1.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 0.420 | 1.00 | ug/kg | 1.0 | | | | | |
| Toluene | U | 0.00 | 0.220 | 1.00 | ug/kg | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 0.620 | 2.00 | ug/kg | 1.0 | | | | | |

**Comments:**
Volatile Organics contained matrix interferences. The sample matrix caused the internal standards to fall outside of the acceptable limits range. A second run confirmed this interference, however no target compounds were affected.

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| Bromofluorobenzene | BTEX+NAP-8260B | 96.8 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX+NAP-8260B | 115. | (63.4 - 136.) |
| Toluene-d8 | BTEX+NAP-8260B | 91.7 | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | SW846 8260B |

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/874 |
| NC | 233 | |
| SC | 10120 | 10982 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 09, 1998 

Sample ID : SPORT0744-1

| M = Method | Method-Description |
|---|---|

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL)
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney

Reviewed By

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87 |
| NC | 223 | |
| SC | 10120 | 10582 |
| VN | 02954 | 02[illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: July 09, 1998



Sample ID : SPORT0744-2
Lab ID : 9806892-02
Matrix : Soil
Date Collected : 06/30/98
Date Received : 06/30/98
Priority : Routine
Collector : Client

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX + NAPTH. - 5 items* | | | | | | | | | | | |
| Benzene | | 14.3 | 0.250 | 1.00 | ug/kg | 1.0 | TCL | 07/06/98 | 1605 | 125450 | 1 |
| Ethylbenzene | | 6.19 | 0.230 | 1.00 | ug/kg | 1.0 | | | | | |
| Naphthalene | | 1820 | 84.0 | 200 | ug/kg | 200 | TCL | 07/06/98 | 1850 | 125[illegible] | 1 |
| Toluene | | 3.38 | 0.220 | 1.00 | ug/kg | 1.0 | TCL | 07/06/98 | 1605 | 125[illegible] | 1 |
| Xylenes (TOTAL) | | 2.26 | 0.620 | 2.00 | ug/kg | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 85.3 | 330 | ug/kg | 1.0 | RLC | 07/06/98 | 0825 | 125215 | 2 |
| Acenaphthylene | U | 0.00 | 91.8 | 330 | ug/kg | 1.0 | | | | | |
| Anthracene | U | 0.00 | 62.3 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 59.0 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 55.8 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 102 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 59.0 | 330 | ug/kg | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 85.3 | 330 | ug/kg | 1.0 | | | | | |
| Chrysene | U | 0.00 | 45.9 | 330 | ug/kg | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 55.8 | 330 | ug/kg | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 78.7 | 330 | ug/kg | 1.0 | | | | | |
| Fluorene | J | 232 | 78.7 | 330 | ug/kg | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 138 | 330 | ug/kg | 1.0 | | | | | |
| Naphthalene | J | 269 | 75.4 | 330 | ug/kg | 1.0 | | | | | |
| Phenanthrene | J | 328 | 75.4 | 330 | ug/kg | 1.0 | | | | | |
| Pyrene | U | 0.00 | 62.3 | 330 | ug/kg | 1.0 | | | | | |

**The following prep procedures were performed:**

GC/MS Base/Neutral Compounds RDH 07/02/98 1440 125215 3

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| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/874 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 09, 1998 

Sample ID : SPORT0744-2

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 73.1 | (30.0 - 115.) |
| Nitrobenzene-d5 | M610 | 74.3 | (22.0 - 120.) |
| p-Terphenyl-d14 | M610 | 80.3 | (37.3 - 128.) |
| Bromofluorobenzene | BTEX+NAP-8260B | 90.0 | (53.5 - 154.) |
| Dibromofluoromethane | BTEX+NAP-8260B | 82.4 | (63.4 - 136.) |
| Toluene-d8 | BTEX+NAP-8260B | 106. | (72.1 - 137.) |

| M = Method | Method-Description |
|---|---|
| M 1 | SW846 8260B |
| M 2 | EPA 8270 |
| M 3 | EPA 3550 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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Table F-1
Groundwater Sample Cross-Reference List
Former Building NS200 (NOAA CSC-2)
2224 South Hobson Avenue
North Charleston South Carolina

| DET Laboratory No. | Contamination Assessment Identification |
|---|---|
| SPORT0747-01 | NBCT200TW02 |
| SPORT0747-02 | NBCL037001I |
| SPORT0747-03 | NBCT200TW03 |
| SPORT0747-04 | NBCT200TW01 |
| SPORT0747-05 | Trip Blank |

# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/8745 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 15, 1998 

Sample ID : SPORT0747-01
Lab ID : 9807208-01
Matrix : GroundH2O
Date Collected : 07/08/98
Date Received : 07/08/98
Priority : Routine
Collector : Client

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 0.250 | 1.00 | ug/l | 1.0 | JEB | 07/09/98 | 1821 | 125748 | 1 |
| Ethylbenzene | U | 0.00 | 0.230 | 1.00 | ug/l | 1.0 | | | | | |
| Toluene | J | 0.600 | 0.220 | 1.00 | ug/l | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 0.620 | 2.00 | ug/l | 1.0 | | | | | |
| Methyl Tert Butyl Ether | U | 0.00 | 2.59 | 5.00 | ug/l | 1.0 | | | | | |
| Naphthalene | | 14.3 | 0.420 | 1.00 | ug/l | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | WAM | 07/10/98 | 0202 | 125671 | 2 |
| Acenaphthylene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Anthracene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Chrysene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Fluorene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| Pyrene | U | 0.00 | 5.60 | 11.2 | ug/l | 1.0 | | | | | |
| **Metals Analysis** | | | | | | | | | | | |
| Cadmium | J | 0.381 | 0.208 | 5.00 | ug/l | 1.0 | MBL | 07/13/98 | 0520 | 125716 | 3 |

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/81 |
| NC | 233 | |
| SC | 10120 | [illegible] |
| TN | 02934 | [illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 15, 1998 

Sample ID : SPORT0747-01

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **The following prep procedures were performed:** | | | | | | | | | | | |
| GC/MS Base/Neutral Compounds | | | | | | | HDB | 07/09/98 | 1300 | 125671 | 4 |
| TRACE | | | | | | | FGD | 07/10/98 | 1600 | 125716 | 5 |

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 84.5 | (43.0 - 108.) |
| Nitrobenzene-d5 | M610 | 68.0 | (35.0 - 111.) |
| p-Terphenyl-d14 | M610 | 49.2 | (33.0 - 125.) |
| Bromofluorobenzene | BTEX-8260 | 104. | (60.2 - 139.) |
| Dibromofluoromethane | BTEX-8260 | 100. | (70.6 - 152.) |
| Toluene-d8 | BTEX-8260 | 104. | (68.4 - 135.) |
| Bromofluorobenzene | MTBE-8260 | 104. | (60.2 - 139.) |
| Dibromofluoromethane | MTBE-8260 | 100. | (70.6 - 152.) |
| Toluene-d8 | MTBE-8260 | 104. | (68.4 - 135.) |
| Bromofluorobenzene | NAP-8260 | 104. | (60.2 - 139.) |
| Dibromofluoromethane | NAP-8260 | 100. | (70.6 - 152.) |
| Toluene-d8 | NAP-8260 | 104. | (68.4 - 135.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 6010A |
| M 4 | EPA 3510 |
| M 5 | EPA 3005 |

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87234 | E87472/87458 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 15, 1998 

Sample ID : SPORT0747-01

| M = Method | Method-Description |
|---|---|

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney

Reviewed By

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87458 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: July 15, 1998



Sample ID : SPORT0747-02
Lab ID : 9807208-02
Matrix : GroundH2O
Date Collected : 07/08/98
Date Received : 07/08/98
Priority : Routine
Collector : Client

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 0.250 | 1.00 | ug/l | 1.0 | JEB | 07/09/98 | 1853 | 125748 | 1 |
| Ethylbenzene | U | 0.00 | 0.230 | 1.00 | ug/l | 1.0 | | | | | |
| Toluene | | 1.17 | 0.220 | 1.00 | ug/l | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 0.620 | 2.00 | ug/l | 1.0 | | | | | |
| Methyl Tert Butyl Ether | U | 0.00 | 2.59 | 5.00 | ug/l | 1.0 | | | | | |
| Naphthalene | | 4.04 | 0.420 | 1.00 | ug/l | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | WAM | 07/10/98 | 0231 | 125671 | 2 |
| Acenaphthylene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Anthracene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Chrysene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Fluorene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Pyrene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| **Metals Analysis** | | | | | | | | | | | |
| Cadmium | J | 0.644 | 0.208 | 5.00 | ug/l | 1.0 | MBL | 07/13/98 | 0526 | 125716 | 3 |

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87458 |
| NC | 233 | |
| SC | 10120 | 10982 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 15, 1998 

Sample ID : SPORT0747-02

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following prep procedures were performed:**

| | | | | | |
|---|---|---|---|---|---|
| GC/MS Base/Neutral Compounds | HDB | 07/09/98 | 1300 | 125671 | 4 |
| TRACE | FGD | 07/10/98 | 1600 | 125716 | 5 |

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 82.5 | (43.0 - 108.) |
| Nitrobenzene-d5 | M610 | 63.9 | (35.0 - 111.) |
| p-Terphenyl-d14 | M610 | 41.3 | (33.0 - 125.) |
| Bromofluorobenzene | BTEX-8260 | 98.2 | (60.2 - 139.) |
| Dibromofluoromethane | BTEX-8260 | 101. | (70.6 - 152.) |
| Toluene-d8 | BTEX-8260 | 104. | (68.4 - 135.) |
| Bromofluorobenzene | MTBE-8260 | 98.2 | (60.2 - 139.) |
| Dibromofluoromethane | MTBE-8260 | 101. | (70.6 - 152.) |
| Toluene-d8 | MTBE-8260 | 104. | (68.4 - 135.) |
| Bromofluorobenzene | NAP-8260 | 98.2 | (60.2 - 139.) |
| Dibromofluoromethane | NAP-8260 | 101. | (70.6 - 152.) |
| Toluene-d8 | NAP-8260 | 104. | (68.4 - 135.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 6010A |
| M 4 | EPA 3510 |
| M 5 | EPA 3005 |

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87459 |
| NC | 233 | |
| SC | 10120 | 10[illegible] |
| TN | 02934 | 029 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 | Report Date: July 15, 1998 | 

Sample ID : SPORTU747-02

| M = Method | Method-Description |
|---|---|

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney

Reviewed By

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# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87459 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 15, 1998 

Sample ID : SPORT0747-03
Lab ID : 9807208-03
Matrix : GroundH2O
Date Collected : 07/08/98
Date Received : 07/08/98
Priority : Routine
Collector : Client

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 0.250 | 1.00 | ug/l | 1.0 | JEB | 07/09/98 | 1925 | 125748 | 1 |
| Ethylbenzene | U | 0.00 | 0.230 | 1.00 | ug/l | 1.0 | | | | | |
| Toluene | U | 0.00 | 0.220 | 1.00 | ug/l | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 0.620 | 2.00 | ug/l | 1.0 | | | | | |
| Methyl Tert Butyl Ether | U | 0.00 | 2.59 | 5.00 | ug/l | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 0.420 | 1.00 | ug/l | 1.0 | | | | | |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | WAM | 07/10/98 | 0300 | 125671 | 2 |
| Acenaphthylene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Anthracene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Chrysene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Fluorene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Phenanthrene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| Pyrene | U | 0.00 | 6.00 | 12.0 | ug/l | 1.0 | | | | | |
| **Metals Analysis** | | | | | | | | | | | |
| Cadmium | J | 0.213 | 0.208 | 5.00 | ug/l | 1.0 | MBL | 07/13/98 | 0531 | 125716 | 3 |

# GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87458 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 15, 1998 

Sample ID : SPORT0747-03

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|

**The following prep procedures were performed:**

| | | | | |
|---|---|---|---|---|
| GC/MS Base/Neutral Compounds | HDB | 07/09/98 | 1300 | 125671 | 4 |
| TRACE | FGD | 07/10/98 | 1600 | 125716 | 5 |

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 77.0 | (43.0 - 108.) |
| Nitrobenzene-d5 | M610 | 61.8 | (35.0 - 111.) |
| p-Terphenyl-d14 | M610 | 41.2 | (33.0 - 125.) |
| Bromofluorobenzene | BTEX-8260 | 99.8 | (60.2 - 139.) |
| Dibromofluoromethane | BTEX-8260 | 103. | (70.6 - 152.) |
| Toluene-d8 | BTEX-8260 | 104. | (68.4 - 135.) |
| Bromofluorobenzene | MTBE-8260 | 99.8 | (60.2 - 139.) |
| Dibromofluoromethane | MTBE-8260 | 103. | (70.6 - 152.) |
| Toluene-d8 | MTBE-8260 | 104. | (68.4 - 135.) |
| Bromofluorobenzene | NAP-8260 | 99.8 | (60.2 - 139.) |
| Dibromofluoromethane | NAP-8260 | 103. | (70.6 - 152.) |
| Toluene-d8 | NAP-8260 | 104. | (68.4 - 135.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 6010A |
| M 4 | EPA 3510 |
| M 5 | EPA 3005 |

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87458 |
| NC | 233 | |
| SC | 10120 | 10982 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 15, 1998 

Sample ID : SPORT0747-03

| M = Method | Method-Description |
|---|---|

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney

Reviewed By

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/874[illegible] |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02[illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 15, 1998 

| | |
|---|---|
| Sample ID | : SPORT0747-04 |
| Lab ID | : 9807208-04 |
| Matrix | : GroundH2O |
| Date Collected | : 07/08/98 |
| Date Received | : 07/08/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | | 13.7 | 0.250 | 1.00 | ug/l | 1.0 | JEB | 07/09/98 | 1957 | 125748 | 1 |
| Ethylbenzene | | 20.2 | 0.230 | 1.00 | ug/l | 1.0 | | | | | |
| Toluene | | 1.07 | 0.220 | 1.00 | ug/l | 1.0 | | | | | |
| Xylenes (TOTAL) | | 25.9 | 0.620 | 2.00 | ug/l | 1.0 | | | | | |
| Methyl Tert Butyl Ether | U | 0.00 | 2.59 | 5.00 | ug/l | 1.0 | | | | | |
| Naphthalene | | 524 | 4.20 | 10.0 | ug/l | 10. | JEB | 07/10/98 | 1030 | 125748 | 1 |
| **Extractable Organics** | | | | | | | | | | | |
| *Polynuclear Aromatic Hydrocarbons - 16 items* | | | | | | | | | | | |
| Acenaphthene | J | 9.13 | 5.75 | 11.5 | ug/l | 1.0 | WAM | 07/10/98 | 0330 | 125671. | 2 |
| Acenaphthylene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Anthracene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Benzo(a)anthracene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Benzo(a)pyrene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Benzo(b)fluoranthene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Benzo(ghi)perylene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Benzo(k)fluoranthene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Chrysene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Dibenzo(a,h)anthracene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Fluoranthene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Fluorene | J | 10.1 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Indeno(1,2,3-c,d)pyrene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Naphthalene | | 110 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Phenanthrene | | 13.5 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| Pyrene | U | 0.00 | 5.75 | 11.5 | ug/l | 1.0 | | | | | |
| **Metals Analysis** | | | | | | | | | | | |
| Cadmium | J | 0.216 | 0.208 | 5.00 | ug/l | 1.0 | MBL | 07/13/98 | 0537 | 125716 | 3 |

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# GENERAL ENGINEERING LABORATORIES

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87458 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 15, 1998 

Sample ID : SPORT0747-04

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|

The following prep procedures were performed:

| | | | | | |
|---|---|---|---|---|---|
| GC/MS Base/Neutral Compounds | HDB | 07/09/98 | 1300 | 125671 | 4 |
| TRACE | FGD | 07/10/98 | 1600 | 125716 | 5 |

| Surrogate Recovery | Test | Percent % | Acceptable Limits |
|---|---|---|---|
| 2-Fluorobiphenyl | M610 | 83.0 | (43.0 - 108.) |
| Nitrobenzene-d5 | M610 | 63.8 | (35.0 - 111.) |
| p-Terphenyl-d14 | M610 | 51.3 | (33.0 - 125.) |
| Bromofluorobenzene | BTEX-8260 | 109. | (60.2 - 139.) |
| Dibromofluoromethane | BTEX-8260 | 102. | (70.6 - 152.) |
| Toluene-d8 | BTEX-8260 | 103. | (68.4 - 135.) |
| Bromofluorobenzene | MTBE-8260 | 109. | (60.2 - 139.) |
| Dibromofluoromethane | MTBE-8260 | 102. | (70.6 - 152.) |
| Toluene-d8 | MTBE-8260 | 103. | (68.4 - 135.) |
| Bromofluorobenzene | NAP-8260 | 109. | (60.2 - 139.) |
| Dibromofluoromethane | NAP-8260 | 102. | (70.6 - 152.) |
| Toluene-d8 | NAP-8260 | 103. | (68.4 - 135.) |

| M = Method | Method-Description |
|---|---|
| M 1 | EPA 8260 |
| M 2 | EPA 8270 |
| M 3 | EPA 6010A |
| M 4 | EPA 3510 |
| M 5 | EPA 3005 |

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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Laboratory Certifications

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87745 |
| NC | 233 | |
| SC | 10120 | 103 |
| TN | 02934 | 02 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 15, 1998 

Sample ID : SPORT0747-04

| M = Method | Method-Description |
|---|---|

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney

Reviewed By

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**Laboratory Certifications**

| STATE | GEL | EPI |
|---|---|---|
| FL | E87156/87294 | E87472/87458 |
| NC | 233 | |
| SC | 10120 | 10582 |
| TN | 02934 | 02934 |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 | Report Date: July 15, 1998 | 

| | |
|---|---|
| Sample ID | : SPORT0747-05 |
| Lab ID | : 9807208-05 |
| Matrix | : GroundH2O |
| Date Collected | : 07/07/98 |
| Date Received | : 07/08/98 |
| Priority | : Routine |
| Collector | : Client |

| Parameter | Qualifier | Result | DL | RL | Units | DF | Analyst | Date | Time | Batch | M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics** | | | | | | | | | | | |
| *BTEX - 4 items* | | | | | | | | | | | |
| Benzene | U | 0.00 | 0.250 | 1.00 | ug/l | 1.0 | JEB | 07/10/98 | 1102 | 125748 | 1 |
| Ethylbenzene | U | 0.00 | 0.230 | 1.00 | ug/l | 1.0 | | | | | |
| Toluene | U | 0.00 | 0.220 | 1.00 | ug/l | 1.0 | | | | | |
| Xylenes (TOTAL) | U | 0.00 | 0.620 | 2.00 | ug/l | 1.0 | | | | | |
| Methyl Tert Butyl Ether | U | 0.00 | 2.59 | 5.00 | ug/l | 1.0 | | | | | |
| Naphthalene | U | 0.00 | 0.420 | 1.00 | ug/l | 1.0 | | | | | |

| Surrogate Recovery | Test | Percent% | Acceptable Limits |
|---|---|---|---|
| Bromofluorobenzene | BTEX-8260 | 96.4 | (60.2 - 139.) |
| Dibromofluoromethane | BTEX-8260 | 98.2 | (70.6 - 152.) |
| Toluene-d8 | BTEX-8260 | 102. | (68.4 - 135.) |
| Bromofluorobenzene | MTBE-8260 | 96.4 | (60.2 - 139.) |
| Dibromofluoromethane | MTBE-8260 | 98.2 | (70.6 - 152.) |
| Toluene-d8 | MTBE-8260 | 102. | (68.4 - 135.) |
| Bromofluorobenzene | NAP-8260 | 96.4 | (60.2 - 139.) |
| Dibromofluoromethane | NAP-8260 | 98.2 | (70.6 - 152.) |
| Toluene-d8 | NAP-8260 | 102. | (68.4 - 135.) |

| M = Method | Method Description |
|---|---|
| M 1 | EPA 8260 |

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**Laboratory Certifications**

| STATE | GEL | EPA |
|---|---|---|
| FL | E87156/87294 | E87472/87458 |
| NC | 233 | |
| SC | 10120 | 10982 |
| TN | 02974 | 0299[illegible] |

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: July 15, 1998 

Sample ID : SPORT0747-05

| M = Method | Method-Description |
|---|---|

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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# APPENDIX C

# AQUIFER CHARACTERIZATION DATA

**SUMMARY OF SLUG TEST**
**SOUTH CAROLINA**
**Department of Health and Environmental Control (DHEC)**

## Site Data

**SITE ID #:** 17624 **COUNTY:** North Charleston, South Carolina

**FACILITY NAME:** Former Charleston Naval Complex

## Slug Data

See *Zone I RCRA Facility Investigation Report, E/A&H, 1996* for all data measurements.

Water Level Recovery Data was measured by a Hermit Data Logger.

| | Initial Rise | | Drawdown | |
|---|---|---|---|---|
| **Slug Test Conducted in well(s) number** | **GDI 015** | **671 004** | **GDI 015** | **671 004** |
| **Initial Rise/Drawdown in well (feet)** | ~1.9 | ~1.5 | ~1.5 | ~3.0 |
| **Radius of Well Casing (feet)** | 0.083 | 0.083 | 0.083 | 0.083 |
| **Effective Radius of Well (feet)** | 0.333 | 0.333 | 0.333 | 0.333 |
| **Static Saturated Aquifer Thickness (feet)** | 3 | 9.5 | 3 | 9.5 |
| **Length of Well Screen (feet)** | 3 | 9.5 | 3 | 9.5 |
| **Static Height of Water Column in Well (ft)** | 3 | 9.5 | 3 | 9.5 |

## Calculations

The method for aquifer calculations was: Bouwer-Rice

Calculated values by well were as follows:

| **Slug Test Conducted in well(s) number** | **GDI 015** | **671 004** | **GDI 015** | **671 004** |
|---|---|---|---|---|
| **Hydraulic Conductivity (ft/min.)** | 0.00063 | 0.0025 | 0.00074 | 0.0043 |

Thickness of the aquifer used to calculate hydraulic conductivity was 3 to 10 feet.
The aquifer is water table.
The estimated seepage velocity is 43 feet per year based on
a hydraulic conductivity of 0.0020 ft/min (for Quaternary sand aquifer), a hydraulic gradient of 0.0142 and
a porosity of 35 per cent for silty sand soil.

**Hydraulic Conductivity (ft/min) (Geometric Mean)** 0.0020

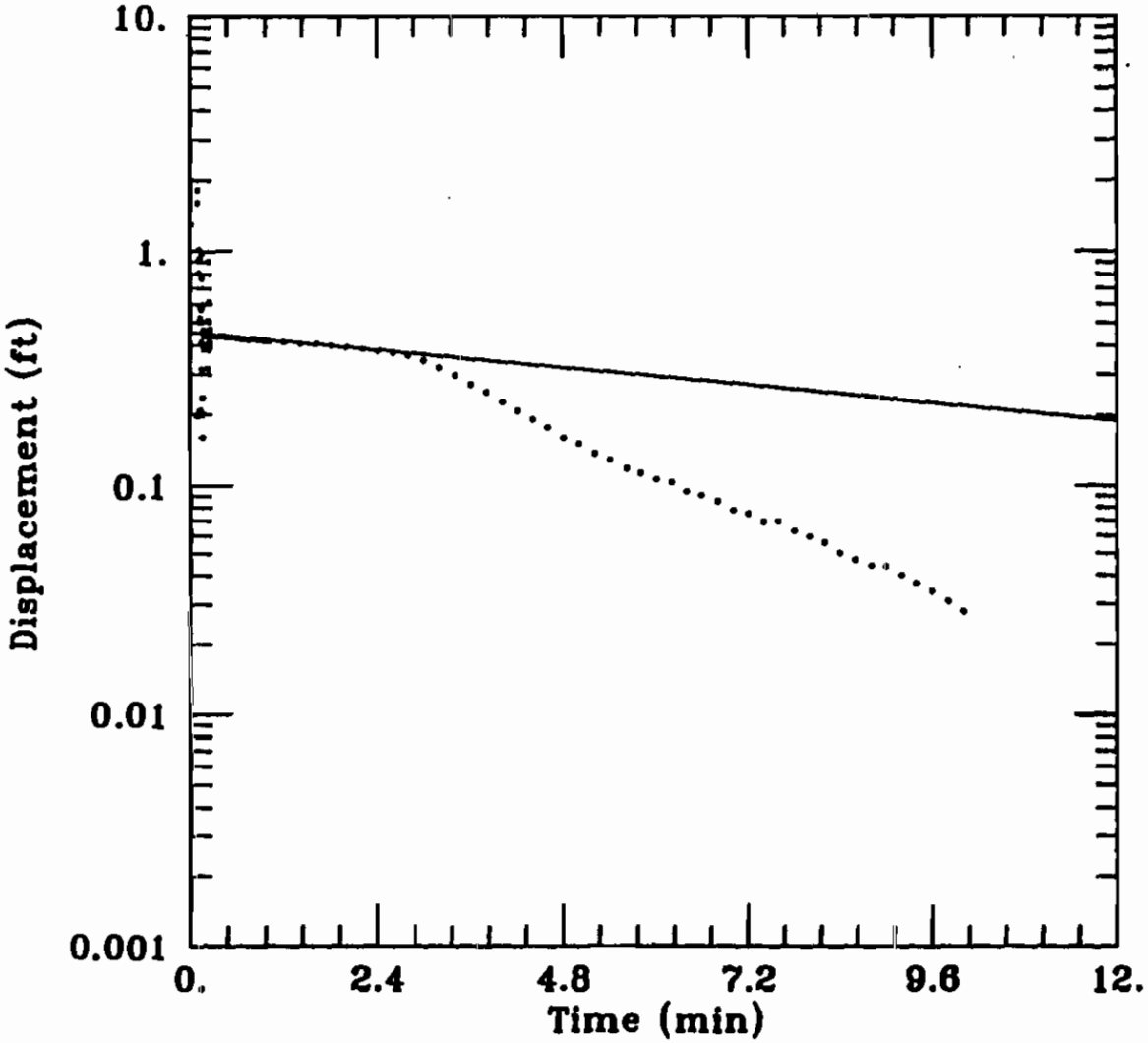
Client: ( ;AN

Company: E/A&H

Location: NAS CHARLESTON

Project: 2909-08450

# GDI015 Falling Head Slug Test




DATA SET:
015FAL.AQT
08/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

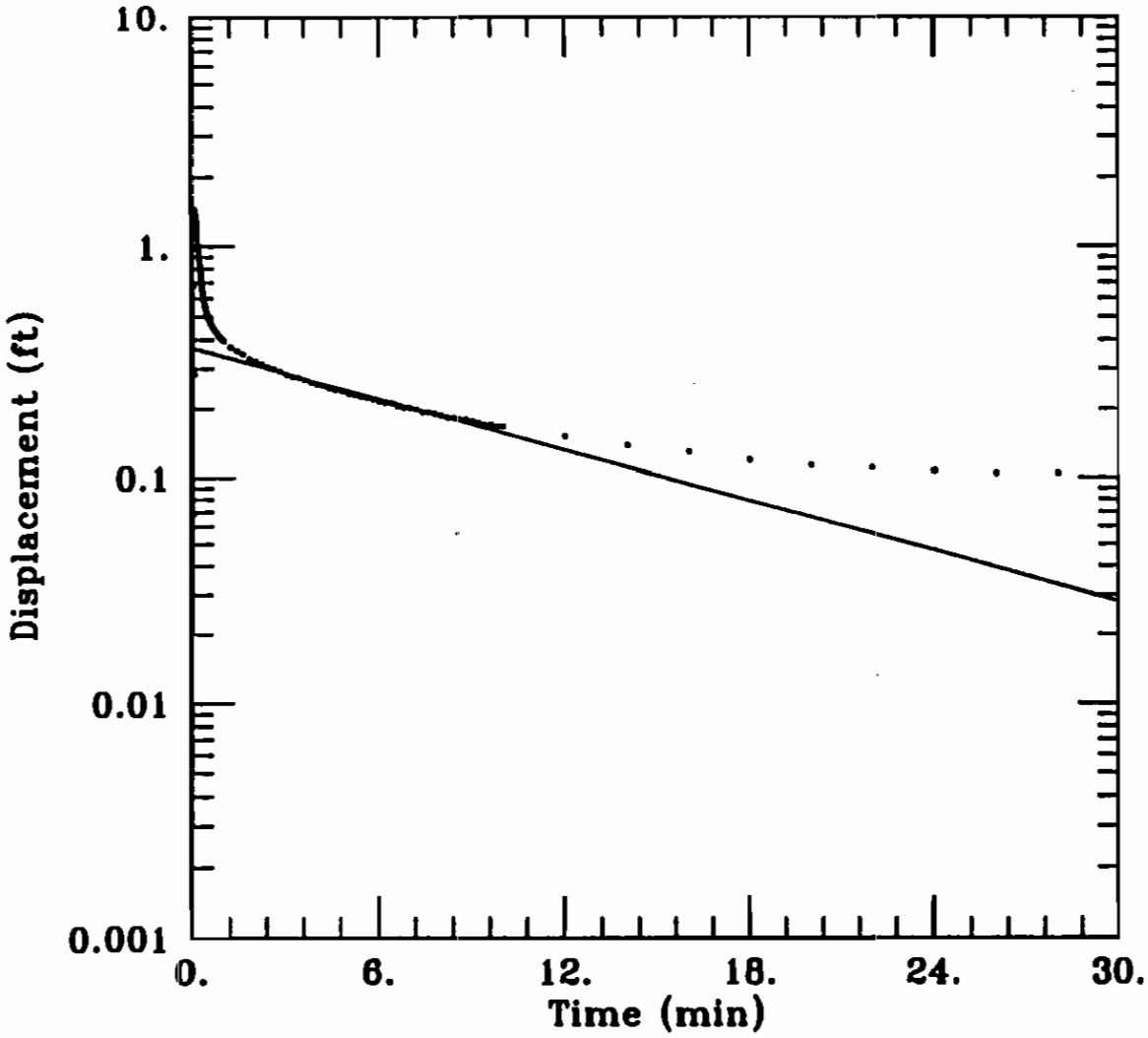
TEST DATA:
H0 = 1.3 ft
rc = 0.08333 ft
rw = 0.333 ft
L = 3. ft
b = 3. ft
H = 3. ft

PARAMETER ESTIMATES:
K = 0.0008311 ft/min
y0 = 0.4558 ft

AQTESOLV

Location: ..AS CHARLESTON | Project: 2909-08450

# GDI015 Rising Head Slug Test




DATA SET:
015RIS.AQT
08/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0 = 1.3 ft
rc = 0.08333 ft
rw = 0.333 ft
L = 3. ft
b = 3. ft
H = 3. ft

PARAMETER ESTIMATES:
K = 0.0007409 ft/min
y0 = 0.3684 ft

AQTESOLV

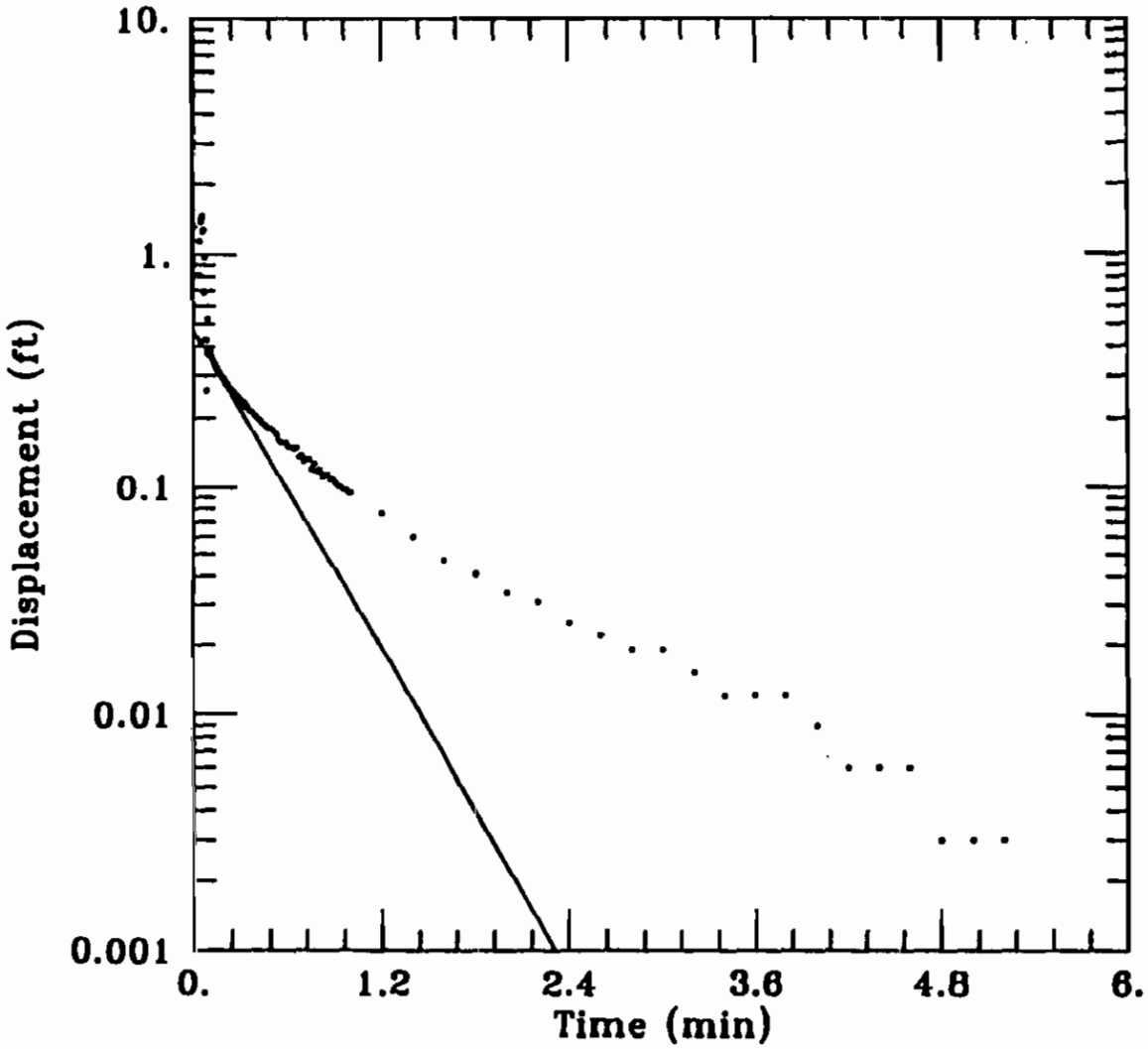
Client: EAN

Company: E/A&H

Location: NAS CHARLESTON

Project: 2909-08450

# 671004 Falling Head Slug Test




DATA SET:
67104FAL.AQT
08/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0 = 1.3 ft
rc = 0.08333 ft
rw = 0.333 ft
L = 9.5 ft
b = 9.5 ft
H = 9.5 ft

PARAMETER ESTIMATES:
K = 0.002453 ft/min
y0 = 0.4656 ft

AQTESOLV

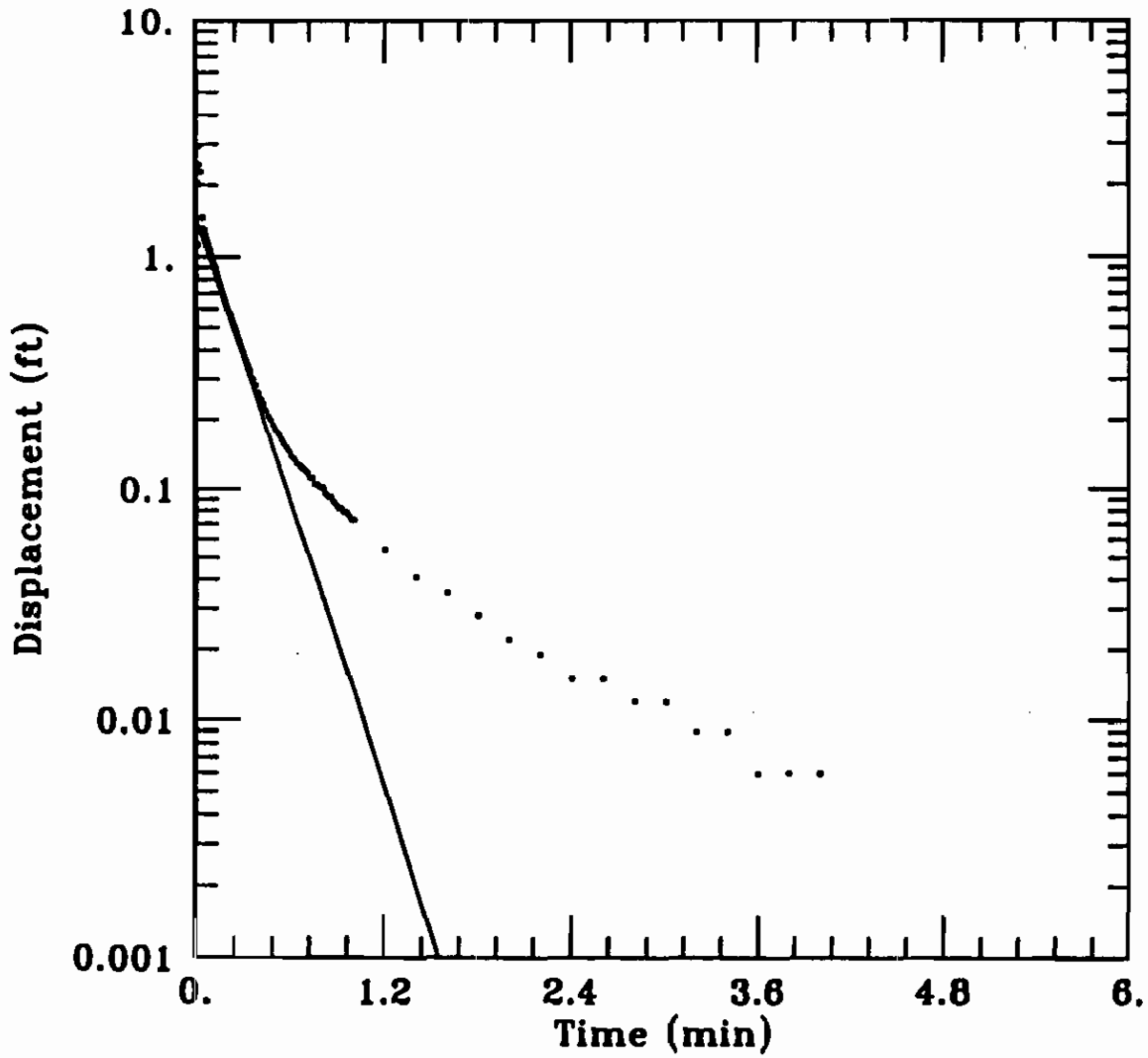
Client: ' ;AN

Company: E/A&H

Location: NAS CHARLESTON

Project: 2909-08450

# 671004 Rising Head Slug Test




DATA SET:
67104RIS.AQT
08/03/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0 = 1.3 ft
rc = 0.08333 ft
rw = 0.333 ft
L = 9.5 ft
b = 9.5 ft
H = 9.5 ft

PARAMETER ESTIMATES:
K = 0.004315 ft/min
y0 = 1.411 ft

AQTESOLV

# APPENDIX D

# RBCA CALCULATIONS

# IN-SITU SOIL RISK EVALUATION

SOUTH CAROLINA
Department of Health and Environmental Control (DHEC)

## Site Data

| | | | |
|---|---|---|---|
| SITE ID # | **17624** | COUNTY | **Columbia** |
| FACILITY NAME | **UST 200, Building NS200, Zone I** | | |
| STREET ADDRESS | **Former Charleston Naval Complex, North Charleston, SC** | | |

## Soil Risk Evaluation Data

| | | | | | |
|---|---|---|---|---|---|
| TPH | | **505** | mg/kg | | |
| Soil % SAND (Estimated) | | **83.3** | % | | |
| Soil % CLAY (Estimated) | | **4** | % | | |
| Worst Case Soil Analyses | Benzene | **0.014** | mg/kg | Cs | |
| | Naphthalene | **2.39** | mg/kg | Cs | |
| Natural Organic Carbon Content | | **2008** | mg/kg | foc | |
| Average Annual Recharge | | 25 | cm | Hw | |
| Distance from highest Soil Impact to water table | | **92** | cm | L | |
| Bulk Density of Soil | | **1.5** | g/cc | Bd | 1 |
| Wetting Front Suction (negative quantity) | | **10** | cm | Hf | 2 |
| Soil Hydraulic Conductivity | | **4.90E-03** | cm/sec | Kf | 3 |
| Porosity | | **0.45** | decimal % | Φ | 4 |
| Residual Water Content | | **0.04** | decimal % | Wr | 5 |

List possible human exposure pathways from surface soil.
Soil leaching to groundwater - utility worker in utility trench.

IN-SITU SOIL RISK EVALUATION

## UST 200
### Zone I

| Site 36 and 37 | | |
|---|---|---|
| **Sample I.D.** | **TRPH (mg/kg)** | **TOC (mg/kg)** |
| 36SLB010304 | 181 | |
| 36SLB010304D | 577 | |
| 36SLB020405 | 442 | |
| 36SLB030405 | 540 | |
| 36SLB040304 | 1300 | |
| 36SLB050405 | 878 | |
| 36SLB060304 | 234 | |
| 36SLB070304 | 351 | |
| 36SLB120304 | | 1040 |
| 36SLB120304D | | 2840 |
| 37SLB010607 | 299 | 2540 |
| 37SLB010607D | 244 | 1610 |
| **Site 36/37Average** | **505** | **2008** |

TRPH - Total recoverable petroleum hydrocarbons
TOC - Total organic carbon

# SOIL LEACHABILITY MODEL FOR BENZENE

## RISK-BASED CORRECTIVE ACTION FOR PETROLEUM RELEASES

**SITE INFORMATION:**

| | |
|---|---|
| Site: | UST 200, Building NS200, Zone I |
| Location: | Former Charleston Naval Complex, North Charleston, SC |

**REFERENCES:**

(1) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 1.
(2) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Teble 2.
(3) SCDHEC, RBCA For Petroleum Releeses, June 1995, Appendix B, Input Peremeters.
(4) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 1.
(5) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 2.
(6) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 3.
(7) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 4.
(8) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 5.

**INPUT:**

| | | | |
|---|---|---|---|
| COC | Chemical of Concern | | BENZENE |
| Bd | Soil Bulk Density (1) | g/cm3 | 1.5 |
| Crsbl | Risk Based Screening Level | mg/L | 0.15 |
| Cs | Concentration of COC in soil | mg/kg | 0.014 |
| DAF | Dilution/Attenuation Factor (2) | unitless | B |
| foc | Organic Carbon Content in Soil (3) | mg/kg | 2008 |
| H' | Henry's Law Constant (4) | unitless | 0.23 |
| Hf | Wetting front suction head (always negative) (5) | cm | -10 |
| Hw | Average Annual Recharge (3) | cm | 25.00 |
| Kf | Soil Hydraulic Conductivity (6) | cm/s | 4.90E-03 |
| Koc | Soil/Water Partioning Coefficient (2) | ml/g | B1 |
| L | Depth between soil sample with greatest COC concentration to groundwater. | cm | 92 |
| Φ | Porosity (7) | unitless | 0.45 |
| t1/2 | Biodegradation "half life" (2) | days | 16 |
| TPH | Total Petroleum Hydrocarbons, EPA Method 3550 | mg/kg | 505 |
| Wr | Residual Water Content (8) | volume fraction | 0.04 |

CALCULATIONS:

Equation Set I - Determine soil pore water concentration resulting from physical partioning (Cw).

Step 1 - Calculate the total organic carbon content (fcs) of the soil.

fcs = (foc + TPH/1.724)*1E-6 = 0.0023 decimal %

Step 2 - Calculate the concentration of COC in soil pore water (Cw) directly in contact with the contaminate soil.

Cw = Cs*((Wr *1g/cc + Bd)/((Bd*Koc*fcs) + Wr + ((ø-Wr)*H'))) = 0.0523 mg/l

Equation Set II - Determine the velocity of the soil pore water (Vw)

Step 1 - Calculate the air filled porosity (f) in decimal percent.

f = ø - Wr = 0.41 decimal %

Step 2 - Determine the time for water to percolate through the vadose zone soil (from depth of worst case soil sample to the water table at site).

t = (f/Kf)*(L-((Hw-Hf)*(ln((Hw + L-Hf)/(Hw-Hf))))) = 3,924 seconds

Step 3 - Determine the velocity of the water (Vw) in faet per year.

Vw = (L/30.48cm/ft)/(t/31,500,000sec/year) = 24,233 ft/year

Equation Set III - Determine the organic retardation effect (Vc) of the contaminant.

Step 1 - Calculate the soil/water distribution coefficient (Kd) (ml/g) for uncontaminated soil.

Kd = Koc*foc*1E-6 = 0.162648 ml/g

Step 2 - Calculate the retardation effect of natural soil organic matter on COC migration.

Vc = Vw/(1 + ((Bd*Kd)/ø)) = 15,714 ft/year

Equation Set IV - Determine biodegradation rates and provide final COC concentration (Cf) at depth of concern.

Step 1 - Calculate the time (Tc) in days required for the COC to reach groundwater.

Tc = 365 day/yr*((L/30.48cm/ft)/Vc) = 0.07 days

Step 2 - Calculate estimated concentration of COC in the soil pore water (Cp) necessary to protect groundwater.

Cp = 10^(log (Crsbl) + ((Tc/2.3)*(0.693/t1/2))) = 0.1505 mg/l

*COC concentration in soil pore water (Cw) is less than concentration necessary to protect groundwater (Cp). Not necessary to calculate SSTL*

Equation Set V - Calculate the Site Specific Target Level (SSTL) for the COC in soil.

Csstl for BENZENE in soil = Cp*DAF*(((Bd*Koc*fcs)+Wr+(F*'H'''))/(Wr*1g/cc+Bd)) = **0.322189** mg/kg

PREPARED BY: G.F. Lisco

Date 11-30-99

CHECKED BY: Albert T. Jenkins

Date 11-30-99

# IN-SITU SOIL RISK EVALUATION

SOUTH CAROLINA
Department of Health and Environmental Control (DHEC)

## Site Data

SITE ID # 17624
FACILITY NAME UST 200, Building NS200, Zone I

## Instructions

Provide results, separately, for each constituent in the worst case soil analysis.

## Data

List Constituent: BENZENE
(BTEX, Napth.)

| | | | | Table |
|---|---|---|---|---|
| Bioremediation "half-life" | 16 | days | t 1/2 | C2 |
| Soil/water partitioning coefficient | 81 | ml/g | K oc | C2 |

## Results

| | | | | Equation Set | Step |
|---|---|---|---|---|---|
| Total Organic Carbon Content | 0.0023 | decimal % | f cs | I | 1 |
| Leachate Concentration | 0.052 | mg/l | C w | I | 2 |
| Air Filled Porosity | 0.41 | decimal % | f | II | 1 |
| Infiltration Rate Time | 3,924 | seconds | t | II | 2 |
| Velocity of Water | 24,233 | ft/year | V w | II | 3 |
| Soil/Water Distribution Coefficient | 0.1626 | ml/g | K d | III | 1 |
| Contaminant Percolation Rate | 15,714 | ft/year | V c | III | 2 |
| Time to Reach Groundwater | 0.07 | days | T c | IV | 1 |
| Concentration reaching Groundwater | 0.1505 | mg/l | C p | IV | 2 |
| Site Specific Target Level | **0.3222** | mg/kg | C sstl | V | |

## Conclusions

Does concentration of chemical of concern in soil exceed SSTL? **NO**

Risk of Human Exposure due to contaminated soil.

_____ **YES** **X** **NO**

IN-SITU SOIL RISK EVALUATION

# SOIL LEACHABILITY MODEL FOR NAPHTHALENE

## RISK-BASED CORRECTIVE ACTION FOR PETROLEUM RELEASES

SITE INFORMATION:

| | |
|---|---|
| Site: | UST 200, Building NS200, Zone I |
| Location: | Former Charleston Naval Complex, North Charleston, SC |

REFERENCES:


(1) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 1.
(2) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 2.
(3) SCDHEC, RBCA For Petroleum Releeses, June 1995, Appendix B, Input Parameters.
(4) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 1.
(5) SCDHEC, RBCA For Petroleum Releeses, June 1995, Appendix B, Figure 2.
(6) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 3.
(7) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 4.
(8) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 5.


INPUT:

| | | | |
|---|---|---|---|
| COC | Chemical of Concern | | NAPHTHALENE |
| Bd | Soil Bulk Density (1) | g/cm3 | 1.5 |
| Crsbl | Risk Besed Screening Level | mg/L | 1.63 |
| Cs | Concentration of COC in soil | mg/kg | 2.39 |
| DAF | Dilution/Attenuation Factor (2) | unitless | 8 |
| foc | Organic Carbon Content in Soil (3) | mg/kg | 2008 |
| H' | Henry's Law Constant (4) | unitless | 0.002 |
| Hf | Wetting front suction head (always negative) (5) | cm | -10 |
| Hw | Average Annual Recharge (3) | cm | 25 |
| Kf | Soil Hydraulic Conductivity (6) | cm/s | 0.0049 |
| Koc | Soil/Water Partioning Coefficient (2) | ml/g | 1543 |
| L | Depth between soil semple with greatest COC concentration to groundwater. | cm | 92 |
| ø | Porosity (7) | unitless | 0.45 |
| t1/2 | Biodegradation "half life" (2) | days | 48 |
| TPH | Total Petroleum Hydrocarbons, EPA Method 3550 | mg/kg | 505 |
| Wr | Residual Water Content (8) | volume fraction | 0.04 |

CALCULATIONS:

Equation Set I - Determine soil pore water concentration resulting from physical partioning (Cw).

Step 1 - Calculate the total organic carbon content (fcs) of the soil.

fcs = (foc + TPH/1.724)*1E-6 = 0.0023 decimal %

Step 2 - Calculate the concentration of COC in soil pore water (Cw) directly in contact with the contaminate soil.

Cw = Cs*((Wr *1g/cc + Bd)/((Bd*Koc*fcs) + Wr + ((ø-Wr)*H'))) = 0.03 mg/l

Equation Set II - Determine the velocity of the soil pore water (Vw)

Step 1 - Calculate the air filled porosity (f) in decimal percent.

f = Ø - Wr = 0.41 decimal %

Step 2 - Determine the time for water to percolate through the vadose zone soil (from depth of worst case soil sample to the water table at site).

t = (f/Kf)*(L-(Hw-Hf))*(ln(Hw + ((L-Hf)/(Hw-Hf)))) = 3,924 seconds

Step 3 - Determine the velocity of the water (Vw) in feet per year.

Vw = (L/30.48cm/ft)/(t/31,500,000sec/year) = 24233 ft/year

Equation Set III - Determine the organic retardation effect (Vc) of the contaminant.

Step 1 - Calculate the soil/water distribution coefficient (Kd) (ml/g) for uncontaminated soil.

Kd = Koc*foc*1E-6 = 3.098344 ml/g

Step 2 - Calculate the retardation effect of naturel soil organic matter on COC migration.

Vc = Vw*(1 + ((Bd*Kd)/ø)) = 2,139 ft/year

Equation Set IV - Determine biodegradation rates and provide final COC concentration (Cf) at depth of concern.

Step 1 - Calculate the time (Tc) in days required for the COC to reach groundwater.

Tc = 365 day/yr*((L/30.48cm/ft)/Vc) = 0.51 days

Step 2 - Calculate estimated concentration of COC in the soil pore water (Cp) necessary to protect groundwater.

Cp = 10^(log (Crsbl) + ((Tc/2.3)*(0.693/t1/2))) = 1.64 mg/l

*COC concentration in soil pore water (Cp) is greater than Crsbl, therefore the SSTL must be calculated.*

Equation Set V - Calculate the Site Specific Target Level (SSTL) for the COC in soil.

Csstl for NAPHTHALENE in soil = Cp*DAF*(((Bd*Koc*fcs) + Wr + (F*'H''))/(Wr*1g/cc + Bd)) = 45.778875 mg/kg

PREPARED BY: H. F. Sisco Date 11-30-99

CHECKED BY: Allan T. Jenkins Date 11-30-99

# IN-SITU SOIL RISK EVALUATION

SOUTH CAROLINA
Department of Health and Environmental Control (DHEC)

## Site Data

SITE ID # 17624
FACILITY NAME UST 200, Building NS200, Zone I

## Instructions

Provide results, separately, for each constituent in the worst case soil analysis.

## Data

List Constituent: NAPHTHALENE
(BTEX, Napth.)

| | | | | Table |
|---|---|---|---|---|
| Bioremediation "half-life" | 48 | days | t 1/2 | C2 |
| Soil/water partitioning coefficient | 1543 | ml/g | K oc | C2 |

## Results

| | | | | Equation Set | Step |
|---|---|---|---|---|---|
| Total Organic Carbon Content | 0.0023 | decimal % | f cs | I | 1 |
| Leachate Concentration | 0.027 | mg/l | C w | I | 2 |
| Air Filled Porosity | 0.41 | decimal % | f | II | 1 |
| Infiltration Rate Time | 3,924 | seconds | t | II | 2 |
| Velocity of Water | 24,233 | ft/year | V w | II | 3 |
| Soil/Water Distribution Coefficient | 3.10 | ml/g | K d | III | 1 |
| Contaminant Percolation Rate | 2,139 | ft/year | V c | III | 2 |
| Time to Reach Groundwater | 1 | days | T c | IV | 1 |
| Concentration reaching Groundwater | 1.64 | mg/l | C p | IV | 2 |
| Site Specific Target Level | **46** | mg/kg | C sstl | V | |

## Conclusions

Does concentration of chemical of concern in soil exceed SSTL? **NO**

Risk of Human Exposure due to contaminated soil.

_____ **YES** **X** **NO**

IN-SITU SOIL RISK EVALUATION

# UST 200, BUILDING NS200
# ZONE I, CHARLESTON NAVAL COMPLEX
# NORTH CHARLESTON, SOUTH CAROLINA
# SCDHEC UST ID No. 17624

## HYDROCARBON CONSTITUENT CONCENTRATIONS IN WATER BASED ON RAOULT'S LAW

| Parameter Descriptions: | Units |
|---|---|
| $C_W$ = Aqueous Solubility of Organic Constituents Dissolved from Product | mg/L |
| $C_F$ = Concentration of the Constituent in the Fuel Oil | mg/L |
| $K_{FW}$ = Fuel/Water Partition Coefficient | |
| $P_F$ = Density of Fuel Oil | g/mL |
| $MW_F$ = Molecular Weight of Fuel Oil | g/mol |
| $C_{SAT}$ = Aqueous Solubility of the Pure Phase Constituent | mol/L |
| $MW_C$ = Molecular Weight of the Constituent | g/mol |
| $K_{FW} = (10^3(mL/L)\ p_F)/(MW_F * C_{SAT}/(1000 * MW_c))$ | |
| $C_W = C_F/K_{FW}$ | mg/L |

Source: "Solubility, Sorption, and Transport of Hydrophobic Organic Chemicals in Complex Mixtures," EPA Environmental Research Brief, EPA/600/M-91/009, Robert S. Kerr Environmental Research Laboratory, ADA, Oklahoma.
Source: "CONCAWE 1996 Diesel Fuel/Kerosene" Conoco, Inc., Houston Texas

| Key Assumptions: | |
|---|---|
| $MW_F$ : Molecular Weight of Kerosene, Source: "CONCAWE 1996 Diesel Fuel/Kerosene" Conoco Inc., Houston Texas. | 170 g/mol |
| $P_F$ : Density of the Product, Source: Conoco Material Safety Data Sheet for Diesel fuel/ Kerosene | 0.88 g/mL |

**Concentration of Chemical Constituents in Water Based on Molar Solubility**

| Constituent | $MW_F$ g/mol | $C_{SAT}$ mg/L | $MW_C$ g/mol | $P_F$ g/mL | $K_{FW}$ | $C_F$ mg/L | $C_W$ mg/L |
|---|---|---|---|---|---|---|---|
| Benzene | 170.00 | 1,750 | 78 | 0.88 | 230.72 | 72.16 | 0.31 |
| Toluene | 170.00 | 535 | 92 | 0.88 | 890.16 | 4,136.00 | 4.65 |
| Ethylbenzene | 170.00 | 152 | 106 | 0.88 | 3609.91 | 378.40 | 0.10 |
| Xylene | 170.00 | 198 | 106 | 0.88 | 2771.24 | 2,200.00 | 0.79 |
| Napthalene | 170.00 | 40 | 128.16 | 0.88 | 16585.41 | 387,200.00 | 23.35 |

Prepared By: G. F. Fisco Reviewed By: 11-30-99

**UST 200, BUILDING NS200**
**ZONE I, CHARLESTON NAVAL COMPLEX**
**NORTH CHARLESTON, SOUTH CAROLINA**
**SCDHEC UST ID No. 17624**

## Groundwater SSTLs Summary

| Constituent | SSTLs Protective of Surface Water (Cooper River) | | | SSTLs Protective of Construction Workers | | Minimum On-Site SSTLs[a] | Theoretical Aqueous Solubility of Organic Constituent in Product |
|---|---|---|---|---|---|---|---|
| | RBSL [mg/L] | $SSTL_{SOURCE}$ [mg/L] | $SSTL_{COMP}$ [mg/L] | RBSL [mg/L] | $SSTL_{SOURCE}$ [mg/L] | [mg/L] | [mg/L] |
| Benzene | 0.005 | 0.063 | 0.05 | 0.15 | 0.15 | 0.15 | 0.313 |
| Naphthalene | 0.01 | 0.126 | 0.1 | 1.63 | 1.63 | 1.63 | 23.346 |

RBSLs - Groundwater RBSLs which are protective of exposure at the receptor point
$SSTL_{SOURCE}$ - Groundwater SSTLs in the source area protective of RBSLs at the POE
$SSTL_{COMP}$ - Groundwater SSTLs at the compliance well that are protective of RBSLs at the off-site POE. There ere no compliance well SSTLs for the construction worker, because the construction worker is onsite.

(a) The mimimum on-site SSTLs are chosen as those SSTLs protective of both surface water (the Cooper River) and the on-site construction worker.

Prepared By: G. F. Bisco Reviewed By: Albert T. Jerkins

# UST 200, BUILDING NS200
# ZONE I, CHARLESTON NAVAL COMPLEX
# NORTH CHARLESTON, SOUTH CAROLINA

**DOMENICO'S DILUTION/ATTENUATION EQUATION FOR GROUNDWATER TRANSPORT**

## Predicted 10-year Migration of Constituents in Groundwater

| Parameter Descriptions: | Units |
|---|---|
| POE = Point of Exposure | |
| SSTL = Site-Specific Target Level | mg/L |
| $SSTL_{SOURCE}$ = Hydrocarbon Concentration in Plume Source Area protective of RBSLs at POE | mg/L |
| $SSTL_{COMP}$ = Hydrocarbon Concentration at Compliance Point protective of RBSLs at POE | mg/L |
| $X_{POE}$ = x = Distance from Plume Source to POE (along Centerline) | m |
| $X_{COMP}$ = x = Distance from POE to Compliance Point (along Centerline) | m |
| Y = Source Width (Perpendicular to Flow Direction) | m |
| Z = Source Depth (Perpendicular to Flow Direction in Vertical Plane) | m |
| $K_S$ = Saturated Hydraulic Conductivity | m/sec |
| i = Groundwater Gradient | cm/cm |
| $\theta$ = Porosity in Saturated Zone | $cm^3/cm^3$ |

| Parameter Descriptions: | Units |
|---|---|
| $\rho_S$ = Soil Bulk Density | $g/cm^3$ |
| $f_{OC}$ = Fraction Organic Carbon in Soil | g-C/g-soil |
| $\alpha_X$ = Longitudinal Dispersivity = x/10 | m |
| $\alpha_Y$ = Transverse Dispersivity = $\alpha_X/3$ | m |
| $\alpha_Z$ = Vertical Dispersivity = $\alpha_X/20$ | m |
| $k_{OC}$ = Organic Carbon Partition Coefficient | $cm^3$-$H_2O$/g-C |
| $k_D$ = Soil-Water Sorption Coefficient | $cm^3$-$H_2O$/g-soil |
| V = Pore Water Velocity | m/sec |
| $R_C$ = Constituent Retardation Factor | |
| $V/R_C$ = Maximum Transport Rate of Dissolved Constituent = $(K_s i)/(\theta R_C)$ | m/sec |
| RBSL = Risk-Based Screening Level in Water Provided by SCDHEC (1998) | mg/L |

**Dilution & Attenuation without Biological Decay**

| Constituent | $X_{POE}$ ft | $X_{POE}$ m | Y m | Z m | t sec | $K_S$ m/sec | i m/m | $\theta$ $cm^3/cm^3$ | $\rho_S$ $g/cm^3$ | $\alpha_X$ m | $\alpha_Y$ m | $\alpha_Z$ m | $f_{OC}$ g-C/g-soil | $k_{OC}$ $cm^3$-$H_2O$/g-C | $k_D$ $cm^3$-$H_2O$/g-soil | V m/sec | $R_C$ | $C_{POE}/C_{SOURCE}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | 295 | 89.9171 | 15 | 2 | 3.15E+08 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 8.99 | 3.00 | 0.45 | 2.01E-03 | 81 | 0.162648 | 4.12E-07 | 1.674 | 1.657E-02 |
| Toluene | 47 | 14.3258 | 15 | 2 | 3.15E+08 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 1.43 | 0.48 | 0.07 | 2.00E-02 | 133 | 2.66 | 4.12E-07 | 12.020 | 2.117E-01 |
| Naphthalene | 14 | 4.11485 | 15 | 2 | 3.15E+08 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 0.41 | 0.14 | 0.02 | 2.00E-02 | 1543 | 30.86 | 4.12E-07 | 128.849 | 3.264E-04 |

Source: South Carolina Department of Health and Environmental Control (SCDHEC) 1998. *Risk-Based Corrective Action for Petroleum Releases*, Bureau of Underground Storage Tank Management.

**DOMENICO DILUTION/ATTENUATION MODEL WITHOUT BIOLOGICAL DECAY**

$$\frac{C_X}{C_{SOURCE}} = \frac{1}{2} erfc\left[\frac{\left(x - \frac{vt}{R_c}\right)}{2\sqrt{\alpha_X \frac{vt}{R_c}}}\right] \times erf\left[\frac{Y}{4\sqrt{\alpha_Y x}}\right] \times erf\left[\frac{Z}{2\sqrt{\alpha_Z x}}\right]$$

| Constituent | $C_{SOURCE}$ mg/L | $C_X$ mg/L | $C_{RBSL}$ mg/L |
|---|---|---|---|
| Benzene | 0.313 | 0.005 | 0.005 |
| Toluene | 4.650 | 0.984 | 1.000 |
| Naphthalene | 23.350 | 0.008 | 0.010 |

Prepared By: G.F. Sisco

Reviewed By: Allan J. Jenkins

# UST 200, BUILDING NS200
# ZONE I, CHARLESTON NAVAL COMPLEX
# NORTH CHARLESTON, SOUTH CAROLINA

## DOMENICO'S DILUTION/ATTENUATION EQUATION FOR GROUNDWATER TRANSPORT

## Predicted 20-year Migration of Constituents in Groundwater

| Parameter Descriptions: | Units |
|---|---|
| POE = Point of Exposure | |
| SSTL = Site-Specific Target Level | mg/L |
| $SSTL_{SOURCE}$ = Hydrocarbon Concentration in Plume Source Area protective of RBSLs at POE | mg/L |
| $SSTL_{COMP}$ = Hydrocarbon Concentration at Compliance Point protective of RBSLs at POE | mg/L |
| $X_{POE}$ = x = Distance from Plume Source to POE (along Centerline) | m |
| $X_{COMP}$ = x = Distance from POE to Compliance Point (along Centerline) | m |
| Y = Source Width (Perpendicular to Flow Direction) | m |
| Z = Source Depth (Perpendicular to Flow Direction in Vertical Plane) | m |
| $K_s$ = Saturated Hydraulic Conductivity | m/sec |
| i = Groundwater Gradient | cm/cm |
| $\theta$ = Porosity in Saturated Zone | $cm^3/cm^3$ |

| Parameter Descriptions: | Units |
|---|---|
| $\rho_s$ = Soil Bulk Density | $g/cm^3$ |
| $f_{OC}$ = Fraction Organic Carbon in Soil | g-C/g-soil |
| $\alpha_X$ = Longitudinal Dispersivity = x/10 | m |
| $\alpha_Y$ = Transverse Dispersivity = $\alpha_X/3$ | m |
| $\alpha_Z$ = Vertical Dispersivity = $\alpha_X/20$ | m |
| $k_{OC}$ = Organic Carbon Partition Coefficient | $cm^3$-$H_2O$/g-C |
| $k_D$ = Soil-Water Sorption Coefficient | $cm^3$-$H_2O$/g-soil |
| V = Pore Water Velocity | m/sec |
| $R_C$ = Constituent Retardation Factor | |
| $V/R_C$ = Maximum Transport Rate of Dissolved Constituent = $(K_s i)/(\theta R_C)$ | m/sec |
| RBSL = Risk-Based Screening Level in Water Provided by SCDHEC (1998) | mg/L |

Dilution & Attenuation without Biological Decay

| Constituent | $X_{POE}$ ft | $X_{POE}$ m | Y m | Z m | t sec | $K_s$ m/sec | i m/m | $\theta$ $cm^3/cm$ | $\rho_s$ $g/cm^3$ | $\alpha_X$ m | $\alpha_Y$ m | $\alpha_Z$ m | $f_{OC}$ g-C/g-soil | $k_{OC}$ $cm^3$-$H_2O$/g-C | $k_D$ $cm^3$-$H_2O$/g-soil | V m/sec | $R_C$ | $C_{POE}/C_{SOURCE}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | 335 | 102.109 | 9 | 2 | 6.31E+08 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 10.21 | 3.40 | 0.51 | 2.01E-03 | 81 | 0.162648 | 4.12E-07 | 1.674 | 1.742E-02 |
| Toluene | 68 | 20.7267 | 9 | 2 | 6.31E+08 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 2.07 | 0.69 | 0.10 | 2.00E-02 | 133 | 2.66 | 4.12E-07 | 12.020 | 2.146E-01 |
| Naphthalene | 27 | 8.0773 | 9 | 2 | 6.31E+08 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 0.81 | 0.27 | 0.04 | 2.00E-02 | 1543 | 30.86 | 4.12E-07 | 128.849 | 3.777E-04 |

Source: South Carolina Department of Health and Environmental Control (SCDHEC) 1998. *Risk-Based Corrective Action for Petroleum Releases*, Bureau of Underground Storage Tank Management.

## DOMENICO DILUTION/ATTENUATION MODEL WITHOUT BIOLOGICAL DECAY

$$\frac{C_X}{C_{SOURCE}} = \frac{1}{2} erfc\left[\frac{\left(x - \frac{vt}{R_c}\right)}{2\sqrt{\alpha_X \frac{vt}{R_c}}}\right] \times erf\left[\frac{Y}{4\sqrt{\alpha_Y x}}\right] \times erf\left[\frac{Z}{2\sqrt{\alpha_Z x}}\right]$$

| Constituent | $C_{SOURCE}$ mg/L | $C_X$ mg/L | $C_{RBSL}$ mg/L |
|---|---|---|---|
| Benzene | 0.313 | 0.005 | 0.005 |
| Toluene | 4.650 | 0.998 | 1.000 |
| Naphthalene | 23.346 | 0.009 | 0.010 |

Prepared By: G.F. Sisco

Reviewed By: Albert Jenkins

# UST 200, BUILDING NS200
# ZONE I, CHARLESTON NAVAL COMPLEX
# NORTH CHARLESTON, SOUTH CAROLINA

## DOMENICO'S DILUTION/ATTENUATION EQUATION FOR GROUNDWATER TRANSPORT

## Predicted Time Period to Reach Equilibrium in Groundwater

| Parameter Descriptions: | Units |
|---|---|
| POE = Point of Exposure | |
| SSTL = Site-Specific Target Level | mg/L |
| $SSTL_{SOURCE}$ = Hydrocarbon Concentration in Plume Source Area protective of RBSLs at POE | mg/L |
| $SSTL_{COMP}$ = Hydrocarbon Concentration at Compliance Point protective of RBSLs at POE | mg/L |
| $X_{POE}$ = x = Distance from Plume Source to POE (along Centerline) | m |
| $X_{COMP}$ = x = Distance from POE to Compliance Point (along Centerline) | m |
| Y = Source Width (Perpendicular to Flow Direction) | m |
| Z = Source Depth (Perpendicular to Flow Direction in Vertical Plane) | m |
| $K_S$ = Saturated Hydraulic Conductivity | m/sec |
| i = Groundwater Gradient | cm/cm |
| $\theta$ = Porosity in Saturated Zone | $cm^3/cm^3$ |

| Parameter Descriptions: | Units |
|---|---|
| $\rho_S$ = Soil Bulk Density | $g/cm^3$ |
| $f_{OC}$ = Fraction Organic Carbon in Soil | g-C/g-soil |
| $\alpha_X$ = Longitudinal Dispersivity = x/10 | m |
| $\alpha_Y$ = Transverse Dispersivity = $\alpha_X/3$ | m |
| $\alpha_Z$ = Vertical Dispersivity = $\alpha_X/20$ | m |
| $k_{OC}$ = Organic Carbon Partition Coefficient | $cm^3$-$H_2O$/g-C |
| $k_D$ = Soil-Water Sorption Coefficient | $cm^3$-$H_2O$/g-soil |
| V = Pore Water Velocity | m/sec |
| $R_C$ = Constituent Retardation Factor | |
| $V/R_C$ = Maximum Transport Rate of Dissolved Constituent = $(K_S i)/(\theta R_C)$ | m/sec |
| RBSL = Risk-Based Screening Level in Water Provided by SCDHEC (1998) | mg/L |

**Dilution & Attenuation without Biological Decay**

| Constituent | $X_{POE}$ ft | $X_{POE}$ m | Y m | Z m | t sec | $K_S$ m/sec | i m/m | $\theta$ $cm^3/cm^3$ | $\rho_S$ $g/cm^3$ | $\alpha_X$ m | $\alpha_Y$ m | $\alpha_Z$ m | $f_{OC}$ g-C/g-soil | $k_{OC}$ $cm^3$-$H_2O$/g-C | $k_D$ $cm^3$-$H_2O$/g-soil | V m/sec | $R_C$ | $C_{POE}/C_{SOURCE}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | 335 | 102.109 | 7.62 | 0.91 | 6.31E+08 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 10.21 | 3.40 | 0.51 | 2.01E-03 | 81 | 0.162648 | 4.12E-07 | 1.674 | 6.753E-03 |
| Toluene | 68 | 20.7267 | 7.62 | 0.91 | 6.31E+08 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 2.07 | 0.69 | 0.10 | 2.01E-03 | 133 | 0.267064 | 4.12E-07 | 2.106 | 1.777E-01 |
| Naphthalene | 27 | 8.2297 | 7.62 | 0.91 | 6.31E+08 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 0.82 | 0.27 | 0.04 | 2.01E-03 | 1543 | 3.098344 | 4.12E-07 | 13.836 | 6.583E-01 |

Source: South Carolina Department of Health and Environmental Control (SCDHEC) 1998. *Risk-Based Corrective Action for Petroleum Releases*, Bureau of Underground Storage Tank Management.

## DOMENICO DILUTION/ATTENUATION MODEL WITHOUT BIOLOGICAL DECAY

$$\frac{C_X}{C_{SOURCE}} = \frac{1}{2} erfc\left[\frac{\left(x - \frac{vt}{R_c}\right)}{2\sqrt{\alpha_X \frac{vt}{R_c}}}\right] \times erf\left[\frac{Y}{4\sqrt{\alpha_Y x}}\right] \times erf\left[\frac{Z}{2\sqrt{\alpha_Z x}}\right]$$

| Constituent | $C_{SOURCE}$ mg/L | $C_X$ mg/L | RBSL mg/L |
|---|---|---|---|
| Benzene | 0.313 | 0.002 | 0.005 |
| Toluene | 4.646 | 0.825 | 1.000 |
| Naphthalene | 23.346 | 15.369 | 0.010 |

| Time to Steady State years |
|---|
| > 20 |
| > 20 |
| > 20 |

Prepared By: G. A. Lisco

Reviewed By: Albert T. Jenkins

**UST 200, BUILDING NS200**
**ZONE I, CHARLESTON NAVAL COMPLEX**
**NORTH CHARLESTON, SOUTH CAROLINA**
**SCDHEC UST ID No. 17624**

**DOMENICO'S DILUTION/ATTENUATION EQUATION FOR GROUNDWATER TRANSPORT**

## Site-Specific Target Level Calculations for Groundwater: Protection of the Cooper River

| Parameter Descriptions: | Units |
|---|---|
| POE = Point of Exposure | |
| SSTL = Site-Specific Target Level | mg/L |
| $SSTL_{SOURCE}$ = Hydrocarbon Concentration in Plume Source Area protective of RBSLs at POE | mg/L |
| $SSTL_{COMP}$ = Hydrocarbon Concentration at Compliance Point protective of RBSLs at POE | mg/L |
| $X_{POE}$ = x = Distance from Plume Source to POE (along Centerline) | m |
| $X_{COMP}$ = x = Distance from POE to Compliance Point (along Centerline) | m |
| Y = Source Width (Perpendicular to Flow Direction) | m |
| Z = Source Depth (Perpendicular to Flow Direction in Vertical Plane) | m |
| $K_S$ = Saturated Hydraulic Conductivity | m/sec |
| i = Groundwater Gradient | cm/cm |
| $\theta$ = Porosity in Saturated Zone | $cm^3/cm^3$ |

| Parameter Descriptions: | Units |
|---|---|
| $\rho_S$ = Soil Bulk Density | $g/cm^3$ |
| $f_{OC}$ = Fraction Organic Carbon in Soil | g-C/g-soil |
| $\alpha_X$ = Longitudinal Dispersivity = 0.1x | m |
| $\alpha_Y$ = Transverse Dispersivity = $\alpha_X/3$ | m |
| $\alpha_Z$ = Vertical Dispersivity = $a_X/20$ | m |
| $k_{OC}$ = Organic Carbon Partition Coefficient | $cm^3$-$H_2O$/g-C |
| $k_D$ = Soil-Water Sorption Coefficient | $cm^3$-$H_2O$/g-soil |
| V = Pore Water Velocity | m/sec |
| $R_C$ = Constituent Retardation Factor | |
| $V/R_C$ = Maximum Transport Rate of Dissolved Constituent = $(K_S i)/(\theta R_C)$ | m/sec |
| RBSL = Risk-Based Screening Level in Water Provided by SCDHEC (1998) | mg/L |

**Dilution & Attenuation without Biological Decay**

| Constituent | $X_{POE}$ ft | $X_{POE}$ m | Y m | Z m | t sec | $K_S$ m/sec | i m/m | $\theta$ $cm^3/cm^3$ | $\rho_S$ $g/cm^3$ | $\alpha_X$ m | $\alpha_Y$ m | $\alpha_Z$ m | $f_{OC}$ g-C/g-soil | $k_{OC}$ $cm^3$-$H_2O$/g-C | $k_D$ $cm^3$-$H_2O$/g-soil | V m/sec | $R_C$ | $C_{POE}/C_{SOURCE}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | 170 | 51.81663 | 9 | 2 | 1.00E+13 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 5.18 | 1.73 | 0.26 | 2.01E-03 | 81 | 0.162648 | 4.12E-07 | 1.674 | 7.915E-02 |
| Toluene | 170 | 51.81663 | 9 | 2 | 1.00E+13 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 5.18 | 1.73 | 0.26 | 2.00E-03 | 133 | 0.266 | 4.12E-07 | 2.102 | 7.915E-02 |
| Naphthalene | 170 | 51.81663 | 9 | 2 | 1.00E+13 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 5.18 | 1.73 | 0.26 | 2.00E-03 | 1543 | 3.086 | 4.12E-07 | 13.785 | 7.915E-02 |

| Constituent | $X_{COMP}$ ft | $X_{COMP}$ m | Y m | Z m | t sec | $K_S$ m/sec | i m/m | $\theta$ $cm^3/cm^3$ | $\rho_S$ $g/cm^3$ | $\alpha_X$ m | $\alpha_Y$ m | $\alpha_Z$ m | $f_{OC}$ g-C/g-soil | $k_{OC}$ $cm^3$-$H_2O$/g-C | $k_D$ $cm^3$-$H_2O$/g-soil | V m/sec | $R_C$ | $C_{POE}/C_{COMP}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | 150 | 45.72056 | 9 | 2 | 1.00E+13 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 4.57 | 1.52 | 0.23 | 2.01E-03 | 81 | 0.162648 | 4.12E-07 | 1.674 | 1.004E-01 |
| Toluene | 150 | 45.72056 | 9 | 2 | 1.00E+13 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 4.57 | 1.52 | 0.23 | 2.00E-03 | 133 | 0.266 | 4.12E-07 | 2.102 | 1.004E-01 |
| Naphthalene | 150 | 45.72056 | 9 | 2 | 1.00E+13 | 1.02E-05 | 0.0142 | 0.35 | 1.45 | 4.57 | 1.52 | 0.23 | 2.00E-03 | 1543 | 3.086 | 4.12E-07 | 13.785 | 1.004E-01 |

Source: South Carolina Department of Health and Environmental Control (SCDHEC) 1998. *Risk-Based Corrective Action for Petroleum Releases*, Bureau of Underground Storage Tank Management.

**DOMENICO DILUTION/ATTENUATION MODEL WITHOUT BIOLOGICAL DECAY**

$$\frac{C_X}{C_{SOURCE}} = \frac{1}{2} erfc\left[\frac{\left(x - \frac{vt}{R_c}\right)}{2\sqrt{\alpha_X \frac{vt}{R_c}}}\right] \times erf\left[\frac{Y}{4\sqrt{\alpha_Y x}}\right] \times erf\left[\frac{Z}{2\sqrt{\alpha_Z x}}\right]$$

| Constituent | Max. Source Conc. mg/L | $SSTL_{SOURCE}$ mg/L | $SSTL_{COMP}$ mg/L | POE RBSL mg/L | Exceeds SSTLs |
|---|---|---|---|---|---|
| Benzene | 0.31 | 0.063 | 0.050 | 0.005 | yes |
| Toluene | 4.65 | 12.635 | 9.957 | 1.000 | no |
| Naphthalene | 23.35 | 0.126 | 0.100 | 0.010 | yes |

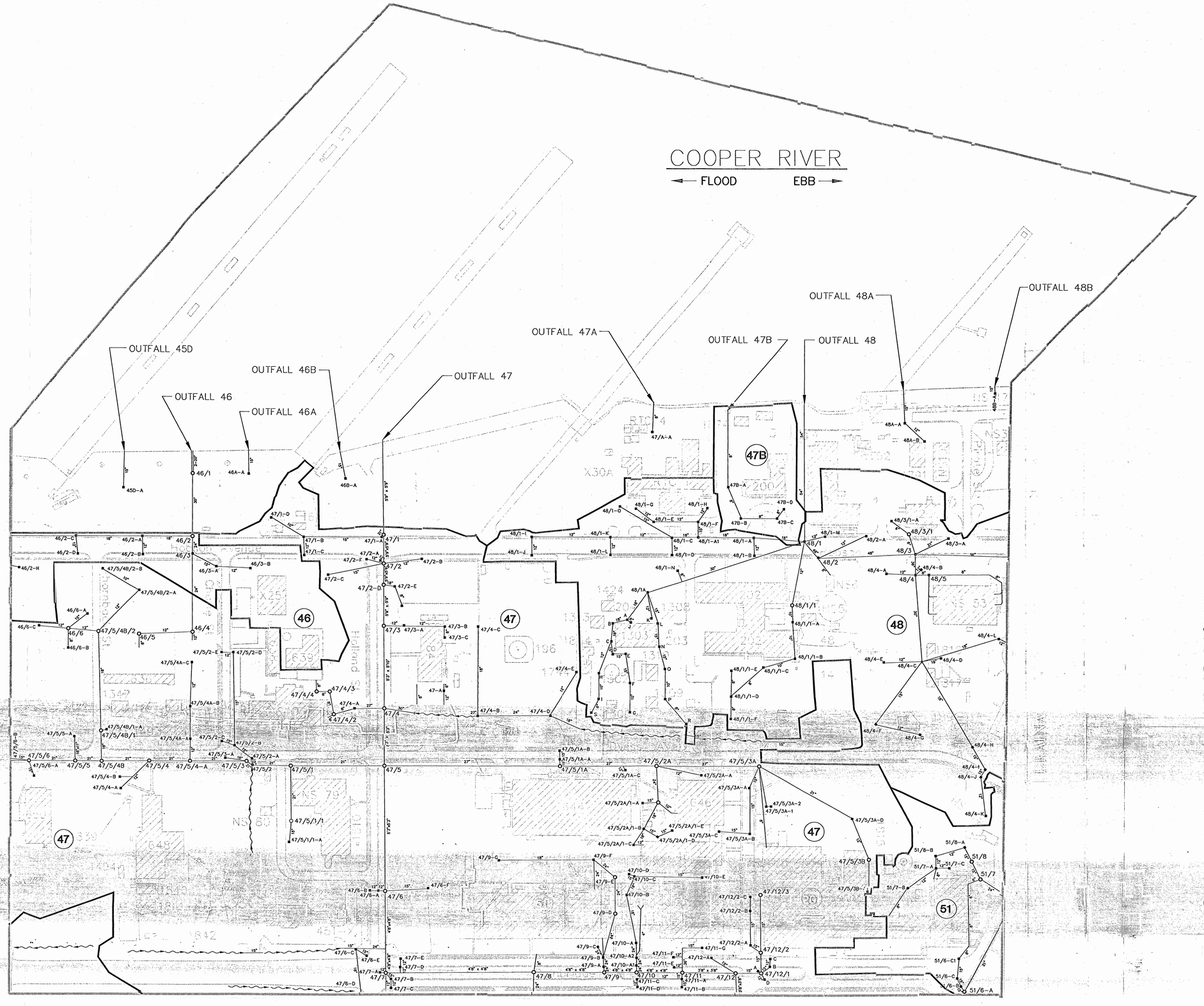
Prepared By: B.T. Bisco

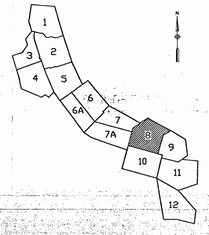
Reviewed By: Albert Jenkins

# APPENDIX E

# UTILITY MAPS

FILE COPY




## LEGEND

20/9/3 STRUCTURE IDENTIFICATION
EXISTING LINE
MANHOLE
CATCHBASIN
DITCH
20 DRAINAGE BASIN NUMBER
DRAINAGE BASIN BOUNDARY
AREA BOUNDARY
STRUCTURE NOT FOUND

GRAPHIC SCALE
100 0 50 100 200 400
( IN FEET )
1 inch = 100 ft.

FILE COPY

FILE COPY

DAVIS FLOYD
ENGINEERS ARCHITECTS
PLANNERS SCIENTISTS
GREENWOOD · CHARLESTON · COLUMBIA
SOUTH CAROLINA

CHARLESTON NAVAL COMPLEX
REDEVELOPMENT AUTHORITY
OWNER

CHARLESTON NAVAL COMPLEX
DRAINAGE SYSTEM
EVALUATION STUDY
PROJECT TITLE

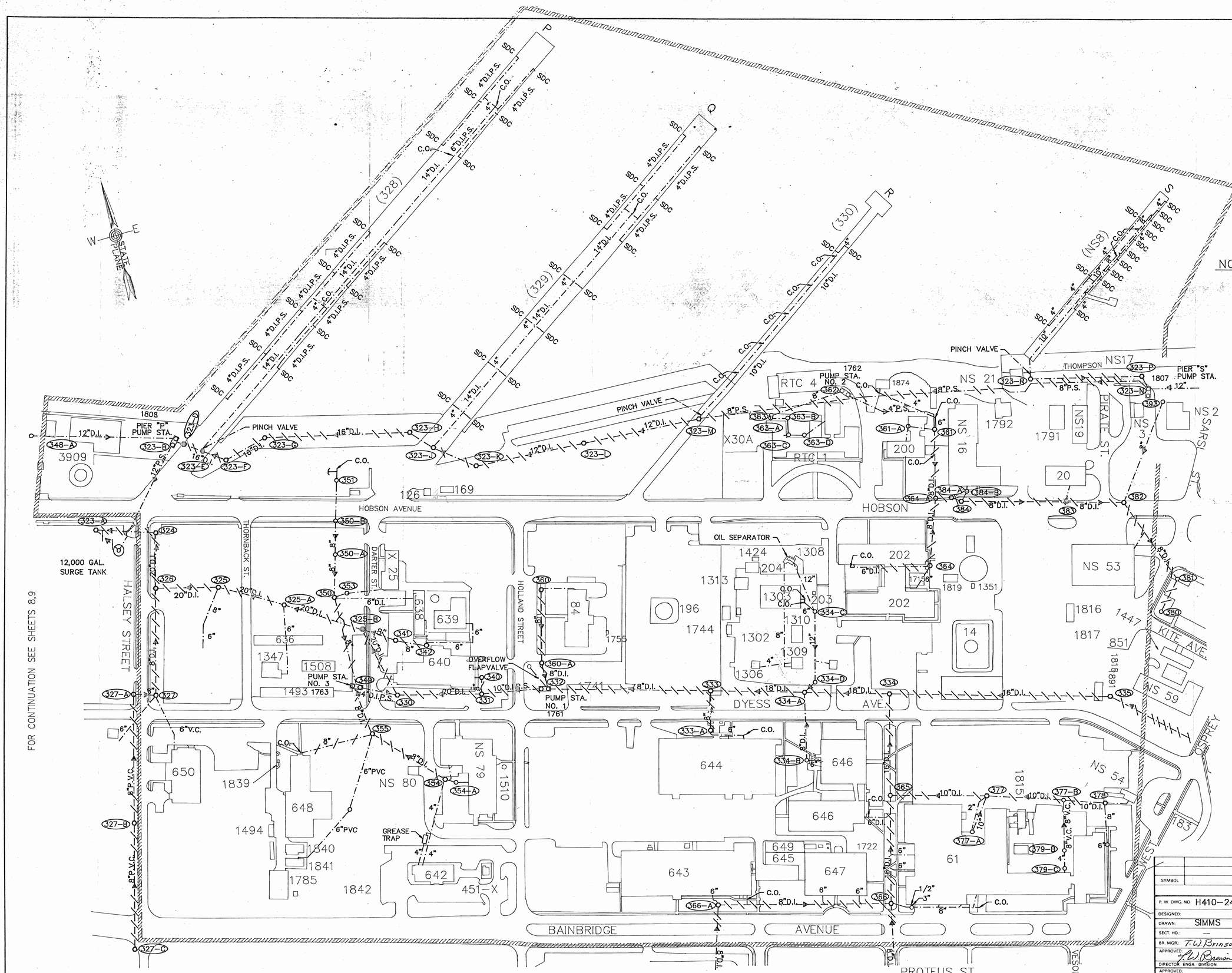
DRAINAGE INVENTORY
AREA 8
DRAWING TITLE

| NO. | REVISION | DRAWN | CHKD | DATE |
|---|---|---|---|---|
| | | J.R.R. | | |

DATE JANUARY, 1999
JOB NO. 30135.30

AREA 8

SHEET 10 OF 14




NOTE:

FOR DEFICIENCIES OR PROBLEM AREAS CHECK "WASTE WATER FACILITIES EVALUATION REPORT" CONTRACT # N62467-88-D-1604 BY DAVIS & FLOYD MARCH 1990

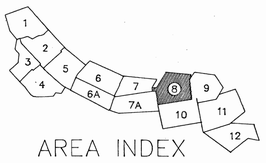
LEGEND

- LINE ON PILES
- MANHOLE
- MANHOLE-ESTIMATED LOCATION
- MANHOLE ON PILES
- LIFT STATION
- SANITARY SEWER
- PLUG
- DIRECTION OF FLOW
- SEPTIC TANK
- P.S. ----- PRESSURE SEWER
- C.O. ----- CLEAN OUT
- C.I. ----- CAST IRON
- D.I. ----- DUCTILE IRON
- S.D.C. --- SHIP DRAINAGE CONNECTION
- V.C. ----- VITRIFIED CLAY
- P.V.C. --- POLYVINYL CHLORIDE
- PP ----- POLYPROPYLENE
- AREA LIMITS

NOTES:

ALL BUILDING SEWERS ARE 4" UNLESS OTHERWISE NOTED.
ALL PIPES ARE V.C. UNLESS OTHERWISE NOTED.

100 0 50 100 200 300
GRAPHIC SCALE




AREA INDEX

# AREA 8

| SYMBOL | DESCRIPTION | DATE | APPROVAL |
|---|---|---|---|
| | REVISIONS | | |

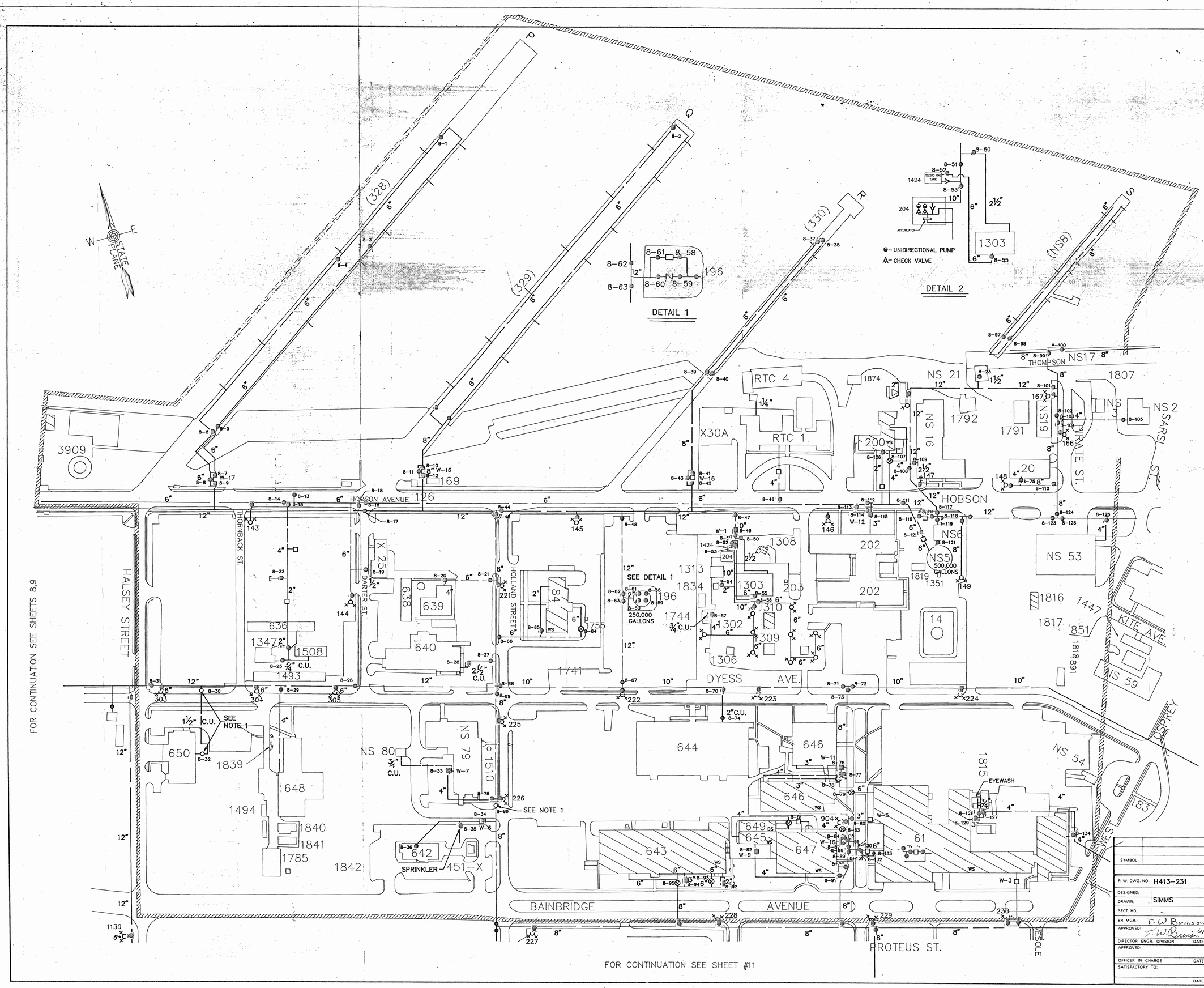
P. W. DWG. NO. H410-243
DESIGNED:
DRAWN: SIMMS
SECT. HD.: —
BR. MGR.: T.W. Brinson
APPROVED: T.W. Brinson 6/8/94
DIRECTOR ENGR. DIVISION DATE
APPROVED:
OFFICER IN CHARGE DATE
SATISFACTORY TO:
DATE

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON NAVAL SHIPYARD, CHARLESTON, S.C.

SEWAGE COLLECTION SYSTEM
AREA-8
APRIL 1994

REQUEST NO. — NAV. FAC. DRAWING NO.
CONSTR. CONTR. NO.
SCALE 1"=100' — SPEC. — SHEET 10 OF 14

CNSO 11012 1C (Rev. 12-82)




NOTES:

1. VALVE NOT VERIFIED

FW VALVES THIS SHEET
8-1 THRU 8-134

HYDRANT NUMBERS THIS SHEET
FW 143-149,166,167,221-226,303-305, 904

RESERVED
1026-1051 FW

LEGEND

| | |
|---|---|
| | METER AND VALVE |
| | METER |
| | WATER LINE |
| | VALVE |
| | VALVE NOT VERIFIED |
| | FIRE HYDRANT |
| PIV | POST INDICATOR VALVE |
| | CHECK VALVE |
| C.I. | CAST IRON |
| C.U. | COPPER |
| | SPIGOT |
| | PLUG |
| BF | BUTTERFLY VALVE |
| BFP | BACK FLOW PREVENTER |
| W20 | BUILDING WATER METER |
| WM10 | MASTER WATER METER |
| | BUILDINGS WITH SPRINKLER SYSTEM WS = WET SYSTEM DS = DRY SYSTEM FP = FIRE PUMP |
| | AREA LIMITS |

100 0 50 100 200 300
GRAPHIC SCALE

AREA INDEX

AREA 8

| SYMBOL | DESCRIPTION | DATE | APPROVAL |
|---|---|---|---|
| | REVISIONS | | |

P. W. DWG. NO. H413-231
DESIGNED:
DRAWN: SIMMS
SECT. HD.: –
BR. MGR.: T. W. Brinson
APPROVED: T. W. Brinson 6/4/94
DIRECTOR ENGR. DIVISION DATE
APPROVED:
OFFICER IN CHARGE DATE
SATISFACTORY TO:
DATE

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON NAVAL SHIPYARD, CHARLESTON, S.C.

FRESH WATER
DISTRIBUTION SYSTEM
AREA-8
APRIL 1994

REQUEST NO. | NAV. FAC. DRAWING NO.
CONSTR. CONTR. NO.
SCALE 1"=100' | SPEC. | SHEET 10 OF 14

CNSHO 11012 1C (Rev 12-82)