

N61165.AR.003889
CNC CHARLESTON
5090.3a

WORKPLAN IMPLEMENTATION PROPOSAL PHASE II OFFSITE ENVIRONMENTAL
INVESTIGATION WITH TRANSMITTAL CNC CHARLESTON SC
7/14/1997
AMERADA HESS CORPORATION

REPORT

**WORKPLAN IMPLEMENTATION PROPOSAL
PHASE II: OFFSITE ENVIRONMENTAL INVESTIGATION WORKPLAN**

**AMERADA HESS - CHARLESTON SOUTH TERMINAL
4650 VIRGINIA AVENUE
NORTH CHARLESTON, SOUTH CAROLINA
GWRD # 14003**

JULY 1997



**H₂O ENVIRONMENTAL, INC.
SCIENTISTS & ENGINEERS**

AMERADA HESS CORPORATION

908-750-6000
908-750-6105 (FAX)

1 HESS PLAZA
WOODBIDGE, NJ 07095-0961

July 14, 1997

Mr. Daryle L. Fontenot, P.E.
Environmental Engineer
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, SC 29419-9010

Re: **Amerada Hess - Charleston South Terminal**
4650 Virginia Avenue
North Charleston, South Carolina
GWPD # 14003

Dear Mr. Fontenot:

Amerada Hess Corporation is conducting a subsurface study at the above referenced facility. In order to complete this investigation, the installation of one additional monitoring well is required. Amerada Hess Corporation hereby requests permission to install one (1) shallow, two-inch diameter monitoring well on your property.

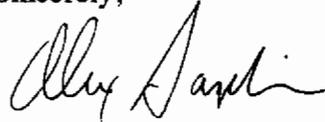
The sketches in the enclosed Work Plan illustrate the proposed location of the off-site monitoring well and monitoring well construction details. It will take approximately one day to install the well. The time of installation would be subject to your approval. The only part of the well that will be visible is the eight-inch steel lid, which will be cemented in place. The lid will be flush with the ground surface.

Amerada Hess Corporation will hold the site owner/manager harmless for any claims caused by the installation and existence of the well, and agrees to leave the property in its original appearance. We will need to access the well for sampling on a regular basis. If necessary, Amerada Hess Corporation will properly abandon/remove the well and restore the surface to its original appearance.

Please sign (grant permission) and return this letter to me as soon as possible, and hopefully within thirty (30) days following your receipt of this letter. A self-addressed stamped envelope is included for your convenience.

Please contact me directly at (908) 750-6918 should you have any questions concerning this request.

Sincerely,



Alejandro Sagebien,
Supervisor Environmental Projects

Permission Granted: ^{*} YES NO

** Pending written concurrence to conditions in Navy Correspondence (Code 18B1) of 11 AUG 97.*

BA



(Owner or Manager)

8/11/97
(Date)

ACS/tld

Enclosure

cc: Joseph Farry, H₂O Environmental, Inc., SC (w/o encl.)
P. M. Haid (w/o encl.)



DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 190010
2155 EAGLE DRIVE
NORTH CHARLESTON, S.C. 29419-9010

5090
Code 18B1
11 Aug 97

Amerada Hess Corporation
Mr. Alex Sagebien
Supervisor Environmental Projects
1 Hess Plaza
Woodbridge, NJ 07095-0961

**OFFSITE ENVIRONMENTAL INVESTIGATION AT AMERADA HESS CHARLESTON SOUTH
TERMINAL**

Dear Mr. Sagebien:

This letter is the follow-up to our telephone conversation on 11 Aug 97 concerning your environmental investigation at Charleston South Terminal and the Navy granting you permission to install a groundwater monitoring well on the Navy's property. Permission is granted for your contractor to install a groundwater monitoring well on the Navy's property as outlined in the Offsite Environmental Investigation Workplan of July 1997 (see attached letter). The Navy would like you to concur with some additional conditions concerning the installation of the well on Navy property. These conditions areas follows:

- 1) The Navy gets a copy of all sampling results.
- 2) Notify Daryle Fontenot before sampling is to take place.
- 3) Option for the Navy to take split samples.
- 4) The Navy will have access to the well on Navy property.

Please verify your concurrence with these conditions to me in writing. If you have any questions, please give me a call at (803) 820-5607 or at 743-9985, x15.

Sincerely,

A handwritten signature in black ink, appearing to read "Daryle L. Fontenot".

DARYLE L. FONTENOT, PE
BRAC Environmental Coordinator
Naval Base Charleston

WORKPLAN IMPLEMENTATION PROPOSAL
PHASE II: OFFSITE ENVIRONMENTAL INVESTIGATION WORKPLAN

AMERADA HESS - CHARLESTON SOUTH TERMINAL
4650 VIRGINIA AVENUE
NORTH CHARLESTON, SOUTH CAROLINA
GWRD # 14003

Prepared for:

Amerada Hess Corporation
One Hess Plaza
Woodbridge, NJ 07095

Prepared by:

H₂O Environmental, Inc.
130 Centrum Drive, Suite 3-B
Irmo, South Carolina 29063

JULY 1997

TABLE OF CONTENTS

	Page Number
Section 1.0 Introduction	1
1.1 Purpose	1
1.2 Objective	1
Section 2.0 Background	2
2.1 On-going Investigations: United States Naval Base	2
2.2 Previous HCST Investigations: Chronological Overview	3
2.3 Environmental Setting	7
2.4 Potable Well and Sensitive Receptor Survey	7
2.5 Site Specific Hydrogeology	7
2.5.1 Lithology	7
2.5.2 Ground Water Elevation, Flow Direction and Aquifer Characteristics	8
2.6 Soil Quality	8
2.7 Ground Water Quality	8
Section 3.0 Investigative Workplan	10
3.1 Proposed Off-site Soil Boring and Monitoring Well Locations	10
3.2 Data Collection	10
3.2.1 Soil Characterization	10
3.2.1.1 Field Screening	10
3.2.1.2 Soil Sampling for Laboratory Analysis	11
3.2.2 Ground Water Characterization	11
3.2.2.1 Monitoring Well Construction and Installation	11
3.2.2.2 Ground Water Elevation and Flow Direction	12
3.2.2.3 Monitoring Well Sampling for Laboratory Analysis	12
Section 4.0 Environmental Investigation Report	13
4.1 Progress Reports	13
4.2 Main Reports	13
4.3 Work Plan Schedule	14
Section 5.0 Community Relations Plan	15

FIGURES

- Figure 1.0 Site Location Map - USGS Quadrangle
- Figure 2.0 Site Plan - January 1997
- Figure 2.1 Vicinity Map - January 1997
- Figure 2.2 Vicinity Map - November 1996
- Figure 2.3 Site Plan - November 1996
- Figure 2.4 Vicinity Map with Proposed Well Locations
- Figure 3.0 Vicinity Ground Water Flow - January 1997
- Figure 3.1 Ground Water Flow - January 1997
- Figure 4.0 Soil Quality Distribution Map - January 1997
- Figure 5.0 Ground Water Quality Free Product Plume - January 1997
- Figure 5.1 Ground Water Quality with Benzene Contours - January 1997
- Figure 5.2 Ground Water Quality with BTEX Contours - January 1997
- Figure 6.0 Proposed Monitoring Well - Construction Details

TABLES

- Table 1.0 Summary of Liquid Level Measurements and Ground Water Elevations
- Table 1.1 Summary of Navy Well Liquid Level Measurements and Ground Water Elevations
- Table 2.0 Summary of Soil Analytical Results
- Table 3.0 Summary of Ground Water Analytical Data
- Table 3.1 Summary of Navy Analytical Data
- Table 3.2 Navy Off-site Geoprobe Program Results
- Table 4.0 Proposed Laboratory Analysis Methods

APPENDICES

- Appendix A Navy Restoration Advisory Board Meeting Minutes - January 14, 1997
-

INTRODUCTION

1.1 Purpose

H₂O Environmental, Inc. was requested by the Amerada Hess Corporation (AHC) to prepare an Off-site Environmental Investigation Workplan to assess the western extent of free phase and dissolved petroleum hydrocarbons identified at the Hess Charleston - South Terminal (HCST), 4650 Virginia Avenue, North Charleston, South Carolina. A site location map is provided as Figure 1.0 and a current site plan is illustrated in Figure 2.0.

This investigation was initiated due to the discovery of LNAPL in a monitor well installed in the northwest corner (immediately adjacent to the southwest corner of the HCST) of the Charleston Naval Base during an environmental investigation of Solid Waste Management Unit (SWMU) 39, Building 1604. The Navy's investigation is being conducted in accordance with their Resource Conservation and Recovery Act (RCRA) Permit and Installation Restoration Program. A total of 18 monitoring wells and 2 piezometers were installed in December 1996 to assess the horizontal extent of petroleum hydrocarbons at the HCST facility. The results of the on-site investigation were presented in the "Workplan Implementation Progress Report; Phase I: Source Removal and Assessment" dated February 1997. This workplan has been developed in response to the environmental investigation and subsequent results of laboratory analyses of 25 soil and 18 ground water samples collected in December 1996. In addition, light non-aqueous phase liquid (LNAPL) was found in three monitoring wells and two piezometers located in the southwest portion of the HCST property.

The HCST history, background, physiography, regional hydrogeology and results of previous site investigations have been previously discussed in the Environmental Investigation Workplan submitted to the South Carolina Department of Health and Environmental Control (SCDHEC) in December 1996.

1.2 Objective

The objective of the workplan is to use the existing site data to design an off-site environmental testing and analysis approach that will allow for the evaluation of the nature and downgradient extent of petroleum hydrocarbons known to be currently or previously handled at the HCST site which have been discharged to the soil and/or ground water.

BACKGROUND**2.1 On-going Investigations : United States Naval Base**

Environmental investigations have been on-going since 1980 at Naval Base Charleston under the Navy's Installation Restoration Program. This program was accelerated in 1993 by the Navy's Base Realignment and Closure (BRAC) assignment, which was intended to hasten economically beneficial reuse after closure. The accelerated cleanup is being implemented by the BRAC Cleanup Team, a partnership between the Navy, the U.S. Environmental Protection Agency, and the SCDHEC. The BRAC Cleanup Team uses the Environmental Baseline Survey (EBS) to categorize property according to its environmental condition, and to make decisions on cleanup, and lease/transfer of the property.

Solid Waste Management Unit (SWMU) 39, located in Zone A in the northwestern section of the Base, is the site of a former storage area for petroleum, oil and lubricant drums north of building 1604. Originally, the Navy was only investigating Building 1604 and the area immediately adjacent to it, but later expanded the investigation upon discovery that storage had occurred on the adjacent gravel area. Soil and ground water around SWMU 39 were sampled and ground water was found to contain petroleum constituents and traces of chlorinated solvents. Because of this, additional investigations were conducted to determine the extent of the contamination. Results from these studies have indicated that the ground water is affected up to the boundary of the base. Two substances have been detected in the ground water at the Naval Base property boundary. The first material is chlorinated solvents, typically used in vehicle maintenance degreasing. The other is a petroleum-based product, having constituents that are typical of No. 2 fuel oil.

The concentration of total chlorinated solvents in the ground water underlying SWMU 39 was 0.319 parts per million at 30 feet below ground surface and 0.222 parts per million 15 feet below ground surface. Concentrations detected at the Naval Base property boundary were 0.065 parts per million at 15 feet. Seven to eight inches of LNAPL were measured in monitoring well NBCA-039-011 located in the northwestern corner of the base.

Based on ground water hydraulic maps prepared for the Navy from data collected on August 7, 1996 at high and low tides, the ground water flow is towards the south (toward Noisette Creek) in the western and southern portion of Zone A and towards the east (towards the Cooper River) in the northeast portion of Zone A. A ground water mound is present in the vicinity of building

1608A south to building 1620. This ground water mound is probably the result of an isolated wetland, located between the two buildings referenced above, which is serving to recharge the surficial aquifer.

The Navy conducted a search of SCDHEC's well records and found that there are no drinking water wells in the area. In addition, the public water supply is not impacted because there are currently no public water supply wells in the investigation area.

The Navy has conducted additional sampling to determine the extent of the substances in the ground water along Virginia Avenue and O'Hear Avenue, and three neighborhood streets: Bethany, Alamo, and Buist. The Navy collected the samples along the rights-of-way. The Navy is currently evaluating the results and will determine if sampling on private property is necessary. After the results are gathered, the information will be used to determine the appropriate corrective actions. A site plan illustrating the off-site sampling locations conducted by the Navy is included in Appendix A. Based on the minutes of the Restoration Advisory Board meeting on January 14, 1997, some trichloroethene (TCE) was detected in the ground water from a sample collected in a screening well located on Crawford Street but the Navy does not see a connection between the release at SWMU 39 and the TCE detected at Crawford Street. Two additional screening wells were installed in January 1997 to further investigate the distribution of the TCE.

The results of analysis of ground water collected from Navy wells downgradient of the Hess property are summarized on Table 3.1. The results of the well point program are presented on Table 3.2. The locations of the wells are shown Figure 2.2 and the locations of the well points are shown on the figure in Appendix A.

2.2 Previous HCST Investigations : Chronological Overview

- 5-Sep-91 Excavation and construction of two stormwater retention ponds on the east side of the terminal were initiated. Strong petroleum hydrocarbon odors were noted by site personnel in an area outside of the eastern earthen berm approximately 400 feet west of the Cooper River. Burns and Roe Environmental Services, Inc. (BRESI) collected soil samples and the resulting laboratory analyses indicated a total benzene, toluene, ethyl benzene and xylenes (BTEX) concentration of 130 ug/kg and a total petroleum hydrocarbon (TPH) concentration of 1400 mg/kg.

- 14-Sep-91 BRESI personnel performed nine (9) soil borings in the retention pond area for field screening of samples using an organic vapor analyzer (OVA). Sample 4 at 2.5 feet BLS had the highest organic vapor concentration of 401 ppm. Subsequent laboratory analysis indicated the same sample had a maximum total BTEX

concentration of 330 ug/kg and a total TPH concentration of 786 mg/kg. Ground water from sample location 7 had a total BTEX concentration of 100 ug/l.

- 23-Sep-91 A Contamination Investigation Assessment Report was submitted to SCDHEC by Amerada Hess Corporation for the contaminated soil encountered during construction of the storm water retention ponds. The area investigated was previously used by Coastal Terminal, Inc. (predating Hess ownership in the early 1960's) for vehicle refueling and "Jerry Can" loading of diesel.
- 11-Oct-91 SCDHEC comments on the Contamination Investigation Assessment Report regarding petroleum hydrocarbon contamination in the area of the new stormwater retention ponds constructed at the facility. The plan proposes installing four wells (MW-1 through MW-4) in the area of the retention ponds.
- 26-Nov-91 Amerada Hess Corporation submits an Assessment Plan to SCDHEC to delineate the extent of soil and ground water contamination in the vicinity of the new retention ponds constructed at the facility.
- 4-Jan-92 to
6-Jan-92 Number 2 fuel oil spilled from tank # 9359 into the earthen bermed area during fuel transfer from a tanker ship. The spill occurred around the tank vent, gauging port and at a two foot seam in the tank roof. The spilled #2 fuel oil was recovered by pumping the product from a catch basin located on the east side of the southeast corner of the western containment area (east of tank # 9372). Reportedly, heavy rains two days prior to the spill had saturated the soil in the containment area and minimized the petroleum saturation in the soil. Water was used to wash down the sides of the tanks and rocks/soil within the containment area which facilitated the floating of the fuel oil. The fluids were directed towards the southeast catch basin of the containment area for recovery.
- 7-Jan-92 BRESI personnel collected 29 soil gas samples to a maximum depth of 1 foot below land surface (BLS) from 16 locations in the bermed cell containing tank # 9359 to determine the effectiveness of the soil washing conducted on January 6, 1992 and the lateral extent of any remaining petroleum hydrocarbons. All of the samples collected had total organic vapors less than 100 ppm utilizing a photoionization detector (PID) except for soil samples F (1798 ppm at 1'), W (1479 ppm at 1'), Z (111 ppm at land surface), AA (315 ppm at 1'), DD (180 ppm at land surface), and EE (131 ppm at 1').
- 13-Jan-92 SCDHEC approves the Assessment Plan to install four monitoring wells in the eastern portion of the HCST.

- 12-Feb-92 Summit Drilling, Inc., under the supervision of BRESI personnel, installed four (4) monitor wells in the area of the new stormwater retention ponds located on the east side of the facility. Organic vapors ranged from less than 50 ppm in the soils associated with MW-1, 3, and 4 to 1483 ppm at 4 to 6 feet BLS at the MW-2 location. Laboratory results of the soil collected 4 to 6 feet BLS at the MW-2 location indicated concentrations of 240 ug/kg total BTEX, 10,200 ug/kg naphthalene and 490 mg/kg TPH.
- 13-Feb-92 Top of casing elevations for MW-1 through MW-4 were surveyed by Herbert A. Niemyer, Jr. BRESI personnel sampled ground water from monitor wells MW-1 through MW-4 for analysis of BTEX, TPH and naphthalene. Maximum total BTEX concentrations were detected in the ground water from MW-2 at 49 ug/l. Naphthalene and TPH were not detected.
- 14-Feb-92 BRESI personnel measured liquid levels in MW-1 through MW-4. Ground water flow was determined to be towards the southeast. BRESI personnel also conducted a follow-up soil investigation in the western cell containing tank # 9359. The investigation consisted of the collection of 11 additional soil samples for screening with a PID. All of the samples collected had organic vapors less than 100 ppm except for samples 1B (1645 ppm at 1'), 5A (118 ppm at land surface), and 5B (147 ppm at 1'). Laboratory analysis of sample 1B indicated a total BTEX concentration of 4,300 ug/kg, 571 mg/kg TPH, and 4,150 ug/kg naphthalene. Sample 5B had a TPH concentration of 445 mg/kg and a naphthalene concentration of 4,150 ug/kg. Soil sample 6, collected at the surface, did not contain any detected constituents for the parameters analyzed.
- 5-Mar-92 Amerada Hess Corporation submits a Contamination Assessment Report to SCDHEC for the investigation performed in the new stormwater retention area at the HCST.
- 5-Jun-92 SCDHEC comments on the Contamination Assessment Report submitted March 5, 1992.
- 25-Jun-92 BRESI personnel resampled ground water from MW-1 for analysis of BTEX and PAHs and measured liquid levels in MW-1 through MW-4.
- 15-Jul-92 Amerada Hess Corporation submits additional ground water quality analytical data to SCDHEC for monitoring well MW-1.

- 10-Oct-96 H₂O personnel oversaw 5 test pit excavations in the vicinity of the former loading racks to determine the presence/absence of free phase petroleum hydrocarbons in the subsurface in response to the discovery of free product in the northwest corner of the Charleston Naval Base. Free phase petroleum hydrocarbons and odors were noted in all 5 test pits.
- 14-Dec-96 to
- 16-Dec-96 H₂O personnel provided oversight to the removal of the three former loading racks, associated piping and petroleum contaminated soil by 3R of Charleston, Inc. A total of 509.19 tons of contaminated soil were excavated and subsequently removed from the site for proper treatment and disposal Southern Soil Recovery (SSR). H₂O collected 8 soil samples for analysis of BTEX, MTBE, PAH's, TPH_g, and TPH_d. The former locations of the removed structures are shown on Figure 2.3.
- 17-Dec-96 to
- 21-Dec-96 H₂O personnel provided oversight to the installation of monitoring wells MW-5 through MW-22 and piezometers PZ-1 and PZ-2 by SAEDACCO. Soil samples were field screened with a portable PID and analyzed for BTEX, MTBE, PAH's, TPH_g, and TPH_d. Select soil samples were also analyzed for TOC and lead.
- 23-Dec-96 H₂O personnel collected five preburn soil samples for laboratory analysis of BTEX, PAH's, TPH_g, and TPH_d.
- 17-Jan-97 H₂O conducted a total fluids recovery pilot study using monitoring well MW-11 as the test well and monitoring wells MW-6, MW-9, PZ-1 and PZ-2 as observation wells. Liquid level measurements were collected from all new monitoring wells along with Navy wells located in Zone A of the Charleston Naval Base. Top of casing elevations for the new monitoring wells were surveyed and referenced to a common datum. Based on the pilot study, an average transmissivity of approximately 288 ft²/day and storativity of 0.001 was calculated using the Cooper-Jacob Modified Method for unconfined aquifers.
- 22-Jan-97 H₂O collected a full round of liquid level measurements from accessible monitoring wells located at the facility.
- Feb-97 Workplan Implementation Progress Report (WIPR); Phase I: Source Removal and Assessment.
- 8-Mar-97 3R removed the asbestos roofing panels and 509.19 tons of excavated soil for proper disposal at approved facilities.

2.3 Environmental Setting

The HCST facility is located at approximately 79° 58' 24" longitude and 32° 52' 43" latitude in North Charleston, Charleston County, South Carolina. The facility is located on the east side of Virginia Avenue and is bound on the north by the Koch Corporation Bulk Storage Petroleum Terminal, on the east by the Cooper River, and on the south by the Charleston Naval Base. The properties located along the Cooper River are primarily for industrial and government use. West of Virginia Avenue is a residential area.

The grade of the HCST facility is sloped slightly to the east with earthen berms segregating the tank farms for containment purposes. Overland drainage of stormwater is disrupted by the bermed cells and stormwater collected within the containment areas is diverted to two stormwater retention ponds (constructed in 1991) located east of the HCST bulk storage tanks.

2.4 Potable Well and Sensitive Receptor Survey

The South Carolina Department of Natural Resources conducted a well search within a half mile radius of the site and no wells were found.

As part of the Environmental Investigation, a search for sensitive receptors will be conducted within a 1/4 mile radius of the HCST property. The survey results will be used to dictate the degree of corrective actions, if required, that should be implemented to abate any identified constituents to within acceptable risk based guidelines. Risk-based corrective action modeling of the constituents of concern will be conducted to develop site specific soil and ground water cleanup goals to ensure the health, safety and welfare of the population in the surrounding area.

2.5 Site Specific Hydrogeology

2.5.1 Lithology

Soil samples collected during the December 1996 onsite investigation were inspected to determine the subsurface lithology at the site. In general, silty/clayey fine sand, very clayey fine sand and sandy clay is present from land surface to 18 feet below land surface (BLS), the maximum depth drilled. A 1 foot to 5 foot zone of sandy clay and clayey sand with shell fragments was encountered between 8.5 feet and 18 feet BLS in eight of the soil borings conducted. The geologic logs for the monitoring wells installed in December 1996 and geologic cross sections have been previously submitted in the Phase I Workplan Implementation Progress Report (WIPR) dated February 1997.

2.5.2 Ground Water Elevation, Flow Direction and Aquifer Characteristics

Liquid levels were measured in monitoring wells MW-5 through MW-22 on December 21, 1996 and on January 22, 1997. Liquid levels were also obtained from select monitoring wells located in the northern portion of the Naval base on January 22, 1997. The liquid level measurements and corrected water table elevations are shown on Tables 1.0 and 1.1 and the ground water flow on January 22, 1997 is illustrated on Figures 3.0 and 3.1. Based on the liquid levels collected to date, along with historical data presented by the Navy, the ground water flow in the western portion of the HCST is towards the south-southwest and towards the south-southeast in the northern portion of the Navy property. The overall hydraulic gradient observed at the HCST on January 22, 1997 was 0.0093 ft/ft (MW-22 to MW-5). Using a hydraulic conductivity of 29 ft/day (as reported in the WIPR) and an effective porosity of 0.35, the ground water flow velocity is approximately 0.77 ft/day or 281 ft/year. From the pumping test conducted in January 1997 and reported in the WIPR, the average transmissivity was calculated to be 288 ft²/day with an associated aquifer storativity of 0.001.

2.6 Soil Quality

Laboratory reports of analyses of soil samples collected from the subsurface in December 1996 were evaluated to determine if any of the constituents detected exceeded the SCDHEC risk based screening levels (RBSLs) for ingestion or dermal contact in a residential setting. Based on the data collected to date, none of the contaminants of concern had detected concentrations that exceeded the residential RBSL for any given constituent. The leaching potential RBSL for the compounds identified was exceeded for one or more constituents at all of the soil sample locations except at MW-8, MW-11, LS-3, PZ-1 and PZ-2 sample locations. Samples collected at MW-11, LS-3, PZ-1 and PZ-2 are within areas that were excavated during the product line removal operations. A summary of the soil quality is provided as Table 2.0 and the distribution of the detected constituents is illustrated in Figure 4.0.

2.7 Ground Water Quality

Laboratory reports of analyses of ground water samples collected from monitoring wells MW-5 through MW-22 on December 23, 1996 were evaluated to determine the ground water quality with respect to the RBSLs for ground water. Based on the water quality results, benzene concentrations ranged from not detected at a reporting limit of 5 ug/l in the ground water from monitor wells MW-8, 12, 20 and 22 to a maximum concentration of 598 ug/l in the ground water from MW-6. Toluene concentrations exceeding the RBSL of 1000 ug/l were detected in the

ground water from monitor wells MW-9, 15, and 18. Ethyl benzene concentrations above the RBSL of 700 ug/l were detected in the ground water from MW-16,17, and 21; and total xylenes concentrations above the RBSL of 10,000 ug/l were detected in the ground water from MW-15, 16, 17, and 18. Naphthalene concentrations above the RBSL of 25 ug/l were detected in the ground water from monitoring wells MW-5, 6, 9, 10, 11, 16, 17, and 19. A summary of the ground water analytical data is provided as Tables 3.0, 3.1 and 3.2 and the distribution of the LNAPL, BTEX, and benzene is illustrated in Figures 5.0, 5.1 and 5.2.

In order to delineate the western extent of free phase and/or dissolved petroleum hydrocarbons detected at the property boundary in the ground water from monitoring wells MW-5, 15, and 18, installation of water table monitoring wells west of the HCST facility is necessary. The following Off-site Investigation Workplan describes the effort required to define the western extent of the petroleum hydrocarbon plume.

INVESTIGATIVE WORKPLAN**3.1 Proposed Off-site Soil Boring and Monitoring Well Locations**

The off-site environmental investigation will be accomplished through a combination of soil and ground water sampling. The proposed drilling locations are shown in Figure 2.4 as MW-23, MW-24, MW-25 and MW-26. Analytical parameters for which the media will be analyzed are provided in Table 4.0. All drilling and sampling equipment will be pre-cleaned before drilling/sampling and decontaminated in-between drilling/sampling locations.

H₂O's proposed South Carolina certified laboratory for the environmental investigation is Hydrologic in Columbia, South Carolina. Method detection limits of the contract laboratory have been previously submitted in the Environmental Assessment Workplan dated December 1996. The sampling media and analytical methods have been selected to address the potential contamination that could be present off-site west of the southwestern portion of the HCST. All field activities will be conducted in accordance with OSHA 1910.120.

3.2 Data Collection**3.2.1 Soil Characterization****3.2.1.1 Field Screening**

Four (4) shallow monitoring wells are proposed off-site and west of the former loading rack area. Soil sampling will be conducted at each well location for a total of four (4) soil borings in this area.

Soil sampling will be conducted by collecting samples from the land surface to the water table in two foot intervals. It is anticipated that the ground water will be encountered at approximately 4 to 8 feet BLS. All samples collected during this assessment will be discrete grab samples; no composite samples will be collected. Soil samples will field screened with either a calibrated Foxboro Model 128 Organic Vapor Analyzer (OVA) with flame ionization detection or Photovac photoionization detection (PID) TIP meter. Naturally occurring methane will also be assessed using a granular activated carbon filter prior to field analysis, if the OVA is utilized. The samples collected will also be visually inspected and subjected to a water test to determine if any free phase petroleum hydrocarbons exist in the soil. The proposed soil boring locations coincide with proposed wells MW-23, MW-24, MW-25 and MW-26 as illustrated on Figure 2.4.

3.2.1.2 Soil Sampling for Laboratory Analysis

Based on the results of the total, filtered and visual field screening results, one sample at each location will be collected from the zone with the highest organic vapor concentration (excluding methane) for laboratory analysis for the parameters listed on Table 4.0. If no organic vapors (excluding methane) or visually apparent petroleum hydrocarbons are present in the samples collected from each bore hole, the sample collected immediately above the water table will be the designated sample for laboratory analysis. All soil samples will be collected using decontaminated stainless steel spoons and stainless steel bucket augers or split spoon samplers. The samples collected will be placed in the appropriate sample containers provided by the laboratory.

The soil quality data will be presented as Phase II of a Workplan Implementation Progress Report in both graphical and tabular format. The presentation will summarize the compounds detected and the distribution of the detected constituents in the western portion of the HCST.

3.2.2 Ground Water Characterization

3.2.2.1 Monitoring Well Construction and Installation

To investigate the environmental quality and ground water flow west of the western portion of the South Terminal facility, it is proposed to install four (4) shallow monitor wells to define the lateral extent of petroleum hydrocarbons that may exist in dissolved and free phase west of the site. As previously discussed, soil samples will be collected every two feet while advancing the borings and field screened with an OVA or PID and by visual inspection. Cuttings from the shallow wells will be containerized in labeled DOT approved 55-gallon drums for waste characterization prior to disposal at an approved facility. All wells will be developed by pumping to maximum clarity and the water generated will either be containerized in labeled DOT approved 55-gallon drums for proper treatment and disposal or transferred to one of the existing on-site bulk storage tanks until disposal alternatives can be evaluated. The proposed drilling contractor is South Atlantic Environmental Drilling and Construction Company (SAEDACCO).

The monitor wells proposed will be installed in borings advanced using the hollow stem auger technique. Upon completion of the soil boring to a depth of approximately 16 feet BLS, 4-inch diameter Schedule 40 PVC will be installed. The screened interval of the monitoring wells will consist of 12 feet of 0.010-inch machined slotted well screen on the bottom of 3.0 feet of solid riser. The annulus of the well will be sand packed with 20/30 silica filter sand to one foot above the well screen capped by 6-inches of bentonite seal and completed to the base of a water tight lockable cap with concrete. Traffic bearing manholes will be installed at grade to protect the well's integrity. The proposed monitor well construction is provided as Figure 6.0 and the

proposed locations are illustrated in Figure 2.4. AHC may elect to install additional monitoring wells as warranted during the course of the investigation.

Deeper monitor wells may be proposed in the future and the location and construction will be based on the results of the shallow environmental quality investigation.

3.2.2.2 Ground Water Elevation and Flow Direction

Upon completion of the installation of the off-site shallow monitor wells west of the facility, the top-of-casing elevations will be surveyed by a professional land surveyor to the nearest 0.01 feet relative to the National Geodetic Vertical Datum (NGVD). Liquid level measurements will be taken prior to each ground water sampling event to determine the required purge volume and the water table/free phase petroleum hydrocarbon elevation (if present). Based on the measurements obtained, the ground water flow direction will be evaluated. Since the facility is located adjacent to the Cooper River, diurnal water level measurements will be taken during one event to determine if tidal fluctuation has any effect on the water table elevation and corresponding ground water flow direction. This data will be presented in Phase II of the Workplan Implementation Progress Report in both graphical and tabular format.

3.2.2.3 Monitor Well Sampling for Laboratory Analysis

Ground water samples will be collected from all proposed off-site monitor wells to be installed west of the South Terminal facility that do not have measurable amounts of free phase petroleum hydrocarbons. A minimum of 48 hours after well installation will be allowed prior to the sampling event. The monitor wells will be purged 3 to 5 volumes using decontaminated Teflon bailers or new disposable bailers. The ground water samples will be placed in the appropriate laboratory supplied containers, placed on ice, and shipped via overnight courier or hand delivered to the contract laboratory.

Ground water from all product free monitor wells will be analyzed for the parameters listed on Table 4.0.

The ground water quality data will be provided in Phase II of the Workplan Implementation Progress Report in both graphical and tabular format. The tables will summarize the constituents detected west of the facility and the horizontal distribution of the light non-aqueous phase petroleum hydrocarbons (with apparent thickness) along with the dissolved fraction of compounds detected in the ground water underlying the western portion of the HCST.

ENVIRONMENTAL INVESTIGATION REPORT

Upon completion of the field activities proposed in this Off-site Environmental Investigation Workplan and receipt of the laboratory analytical results, H₂O will prepare Phase II to the Workplan Implementation Progress Report. The Report will summarize the tasks that were completed and present the results and conclusions regarding the investigation objectives and present all relevant data collected in the appropriate (tabular or graphical) format. The Report will include recommendations for interim recovery programs, further assessment, monitoring only, development of a corrective action plan or no further action/monitoring only as appropriate.

4.1 Progress Reports

The H₂O Investigation Project Manager, or his designate, will prepare quarterly progress reports for the duration of the investigation. The reports will address the following items:

- ◆ A description of work completed and an estimate of the percentage of the investigation completed
- ◆ A summary of findings during the reporting period
- ◆ Summaries of changes to the investigation
- ◆ Summaries of contacts with representatives of the local community, public interest groups or state government during the reporting period
- ◆ Summaries of problems or potential problems encountered during the reporting period and appropriate corrective action
- ◆ Changes in investigative personnel
- ◆ The projected work for the next reporting period.

4.2 Main Reports

Upon full horizontal and vertical definition of the identified petroleum hydrocarbons has been completed, an Environmental Investigation Report will be prepared and will include analysis and summary of the data collected to date. The report will describe the nature and extent of any detected constituents at the facility, describe potential impacts on human health and/or the environment, if any, and provide data to support a Corrective Action Plan. The information to be presented in the report will include:

- ◆ Data collected during the investigation and presentation formats will include, but not be limited to :
 - * Maps
 - * Well Boring logs
 - * Data tables
 - * Laboratory analysis forms
 - * Computer printouts
 - * Other graphical and tabular representations.

- ◆ Summary of data description of the extent, origin, direction and rate of movement of detected constituents above health-based levels.
- ◆ Tier II Risk Evaluation to determine site specific target levels, if appropriate
- ◆ Recommendations for additional investigation tasks, if appropriate
- ◆ Recommendations for interim corrective action such as LNAPL recovery
- ◆ Recommendations for a full scale remediation system, if appropriate

4.3 Workplan Schedule

30-May-97	Off-site Investigation Workplan Delivered To SCDHEC.
15-Jun-97	SCDHEC Approval To Install Off-site Monitoring Wells.
23-Jun-97	Installation Of Off-site Monitoring Wells.
26-Jun-97	Sampling / Gauging Of Off-site Monitoring Wells.
11-Jul-97	Draft Phase II Progress Report To Hess.
18-Jul-97	Final Phase II Progress Report to SCDHEC.

COMMUNITY RELATIONS PLAN

The Community Relations Plan (CRP) describes the methods to be used during the environmental investigation to disseminate pertinent information to specific authorities and organizations regarding the assessment.

The workplan is intended to collect additional information to determine the presence or absence of petroleum hydrocarbons constituents at the HCST. The activities as outlined in the off-site workplan are confined to the right-of-way west of the south terminal facility and are not expected to affect the local community. All activities (e.g., drilling, ground water sampling and soil sampling) associated with these activities should have little if any impact to neighbors and require no special considerations. Information presently available to Amerada Hess indicate that the South Terminal is unlikely to have released hazardous constituents into any drinking water supply or into surface waters above levels of concern. Should subsequent investigation suggest that there is a risk of exposure to off-site persons above health-based levels, notices will be issued to the community.

Upon the selection of a corrective action/remedy, SCDHEC has a mandatory 30 day public notice period, usually as publication in a local newspaper.

- ◆ An announcement of a 30-day comment period during which interested persons may submit written comments on the corrective action
- ◆ Name and telephone number of the permittee's contact person whom the public can contact for information upon request
- ◆ Name and telephone number of an Agency contact person whom the public could contact for the information about the permit, the modification request, applicable regulatory requirements, permit modification procedures, and the permittee's compliance history
- ◆ Information on viewing copies of the modification request and any supporting documents

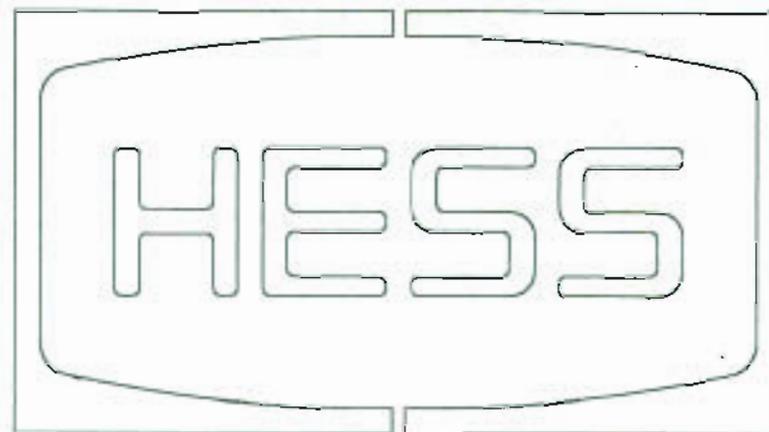
If necessary, the SCDHEC will be notified immediately upon implementation of the off-site investigation workplan. For information regarding the workplan, a primary contact will be established to answer questions pertaining to the investigation.

PAGE	DESCRIPTION	DRAWN BY	DATE
COVER	COVER AND INDEX	CHRIS PINELLI	05/23/97
1.0	LOCATION MAP; USGS QUADRANGLE	CHRIS PINELLI	01/29/97
2.0	SITE PLAN JANUARY 1997	CHRIS PINELLI	01/29/97
2.1	VICINITY MAP - JANUARY 1997	CHRIS PINELLI	01/29/97
2.2	VICINITY MAP- NOVEMBER 1996	CHRIS PINELLI	01/29/97
2.3	SITE PLAN - NOVEMBER 1996	CHRIS PINELLI	01/29/97
2.4	VICINITY MAP W/PROPOSED WELLS	CHRIS PINELLI	05/09/97
3.0	VICTY GROUND WATER FLOW- JAN 1997	CHRIS PINELLI	01/29/97
3.1	GROUND WATER FLOW- JAN 1997	CHRIS PINELLI	01/29/97
4.0	SOIL QUALITY DISTRIBUTION - JAN 1997	CHRIS PINELLI	01/29/97
5.0	GROUND WATER QUAL (PROD)- JAN 1997	CHRIS PINELLI	01/29/97
5.1	GROUND WATER QUAL (BENZ)- JAN 1997	CHRIS PINELLI	01/29/97
5.2	GROUND WATER QUAL (BTEX)- JAN 1997	CHRIS PINELLI	01/29/97
6.0	PROPOSED MONITORING WELL - DETAILS	CHRIS PINELLI	01/29/97

LEGEND

	MONITORING WELL		PROPERTY LINE
	COMPLIANCE WELL		UTILITIES: BELOW GRADE
	DEEP MONITORING WELL		UTILITIES: ABOVE GRADE
	RECOVERY WELL		FENCE
	PIEZOMETER		
	VAPOR EXTRACTION WELL		
	PROPOSED WELL		
	GROUND WATER FLOW DIRECTION		
	GROUND WATER ELEVATION		
	BENZENE (ug/l)		
	BTEX (ug/l)		
	MTBE (ug/l)		
	NAPHTHALENE (ug/l)		
	FREE PRODUCT PLUME		

AMERADA HESS CORPORATION



TERMINAL AT CHARLESTON, SC



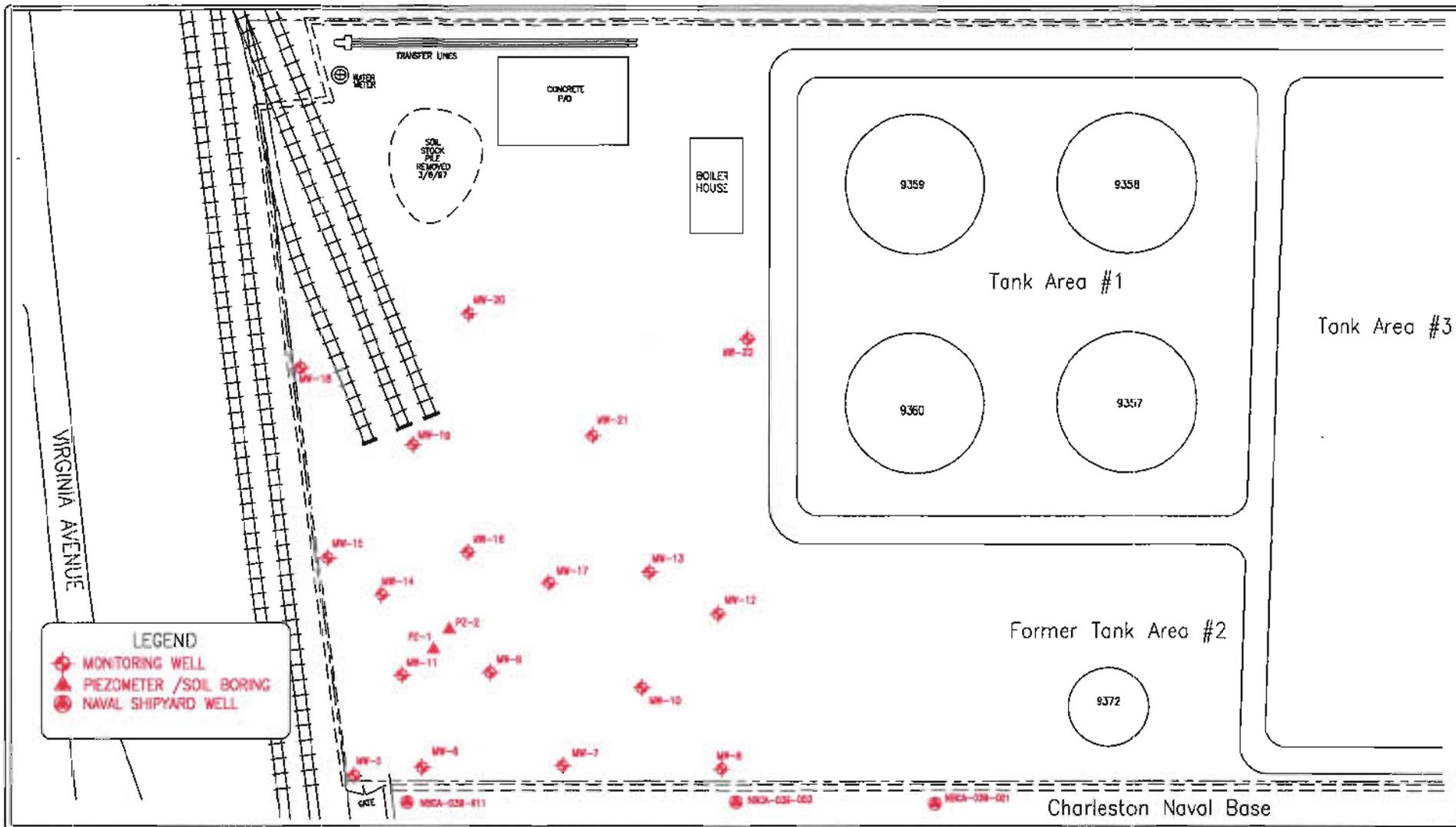
H₂O ENVIRONMENTAL, INC.
SCIENTISTS & ENGINEERS

130 CENTRUM DR, SUITE 3B
PHONE: 803 749 4080

IRMO, SC 29063
FAX 803 749 9911

PREPARED FOR:

PREPARED BY:



H₂O ENVIRONMENTAL, INC.
SCIENTISTS & ENGINEERS



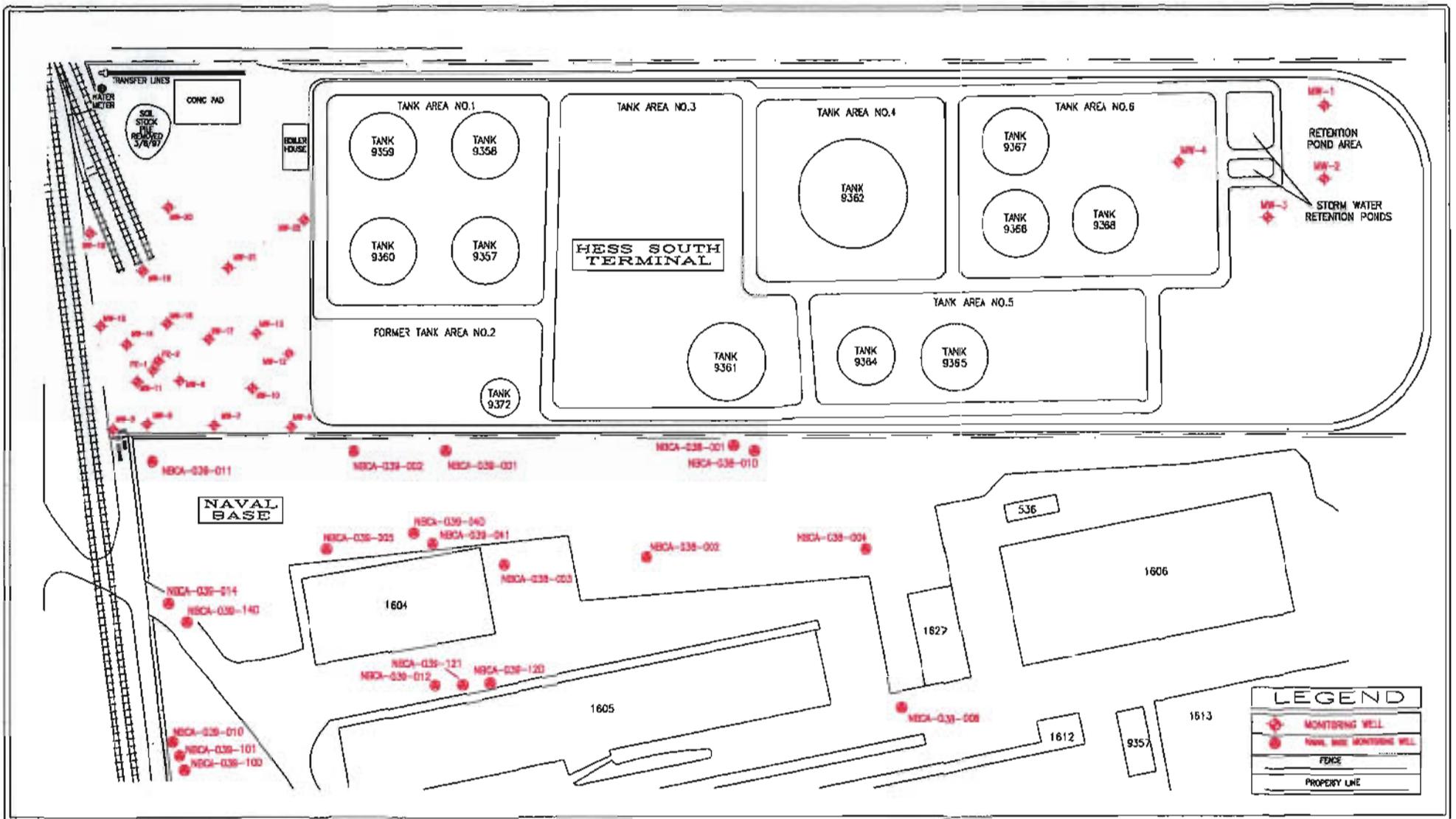
PREPARED FOR:
AMERADA HESS CORP.
CHARLESTON, SOUTH CAROLINA

SITE ADDRESS:
HESS SOUTH TERMINAL
4650 VIRGINIA AVENUE
CHARLESTON, SOUTH CAROLINA

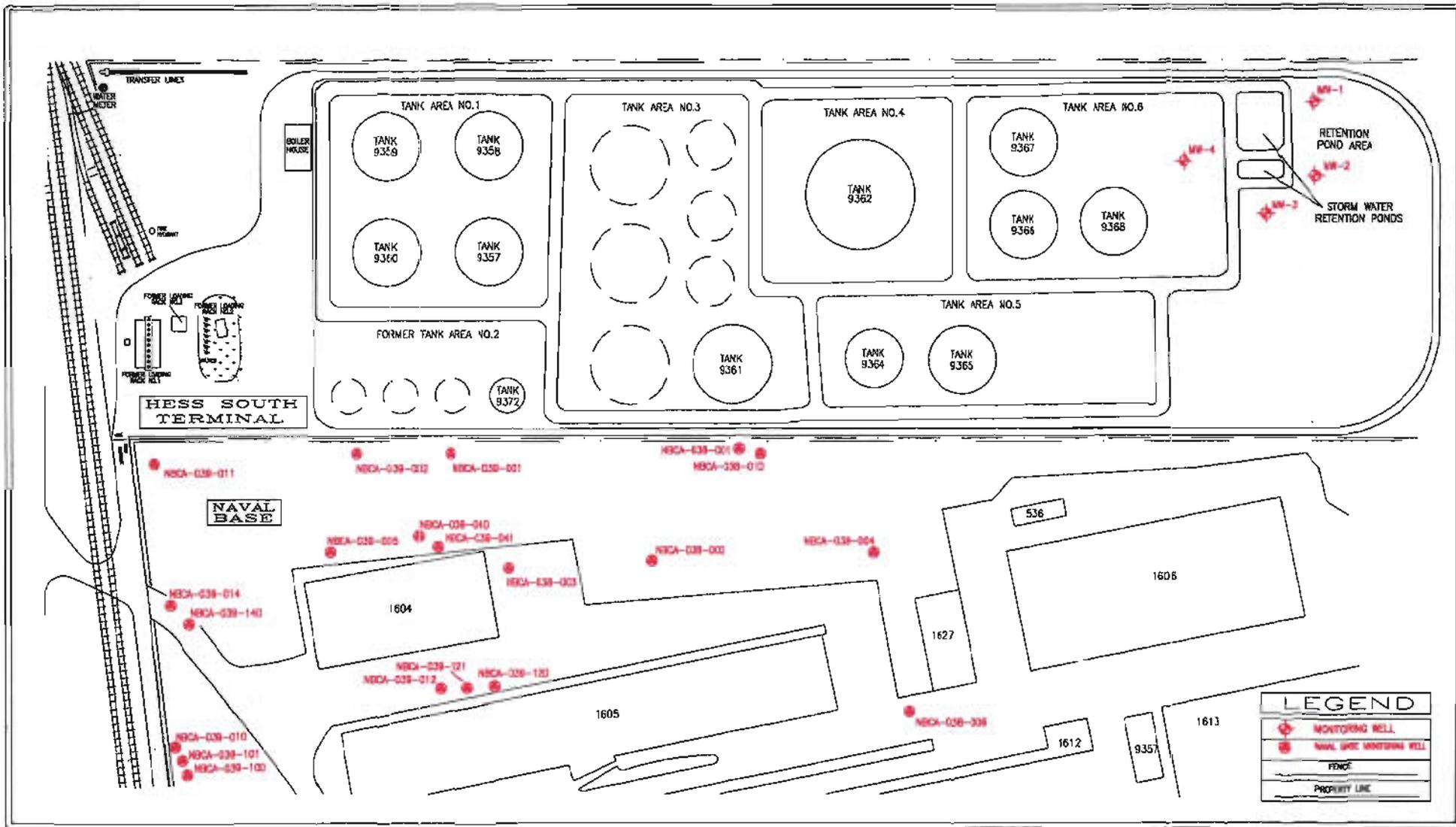


DRAWN BY: CHRIS PINELLI	DATE DRAWN: 01/29/97
JOB NUMBER: 1715.4066	FIGURE NUMBER: 2.0

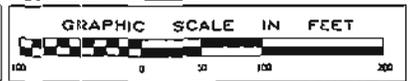
RELIEF TITLE: **SITE PLAN - JANUARY 1997**



H₂O ENVIRONMENTAL, INC. SCIENTISTS & ENGINEERS	GRAPHIC SCALE IN FEET 	PREPARED FOR: AMERADA HESS CORP CHARLESTON, SC	SITE ADDRESS: 4650 VIRGINIA AVENUE CHARLESTON, SC		DRAWN BY: CHRIS PINELLI	DATE DRAWN: 01/29/97
					USER NUMBER: 1715.4086	FIGURE NUMBER: 2.1
VICINITY MAP - JANUARY 1997						



H₂O **H₂O ENVIRONMENTAL, INC.**
SCIENTISTS & ENGINEERS



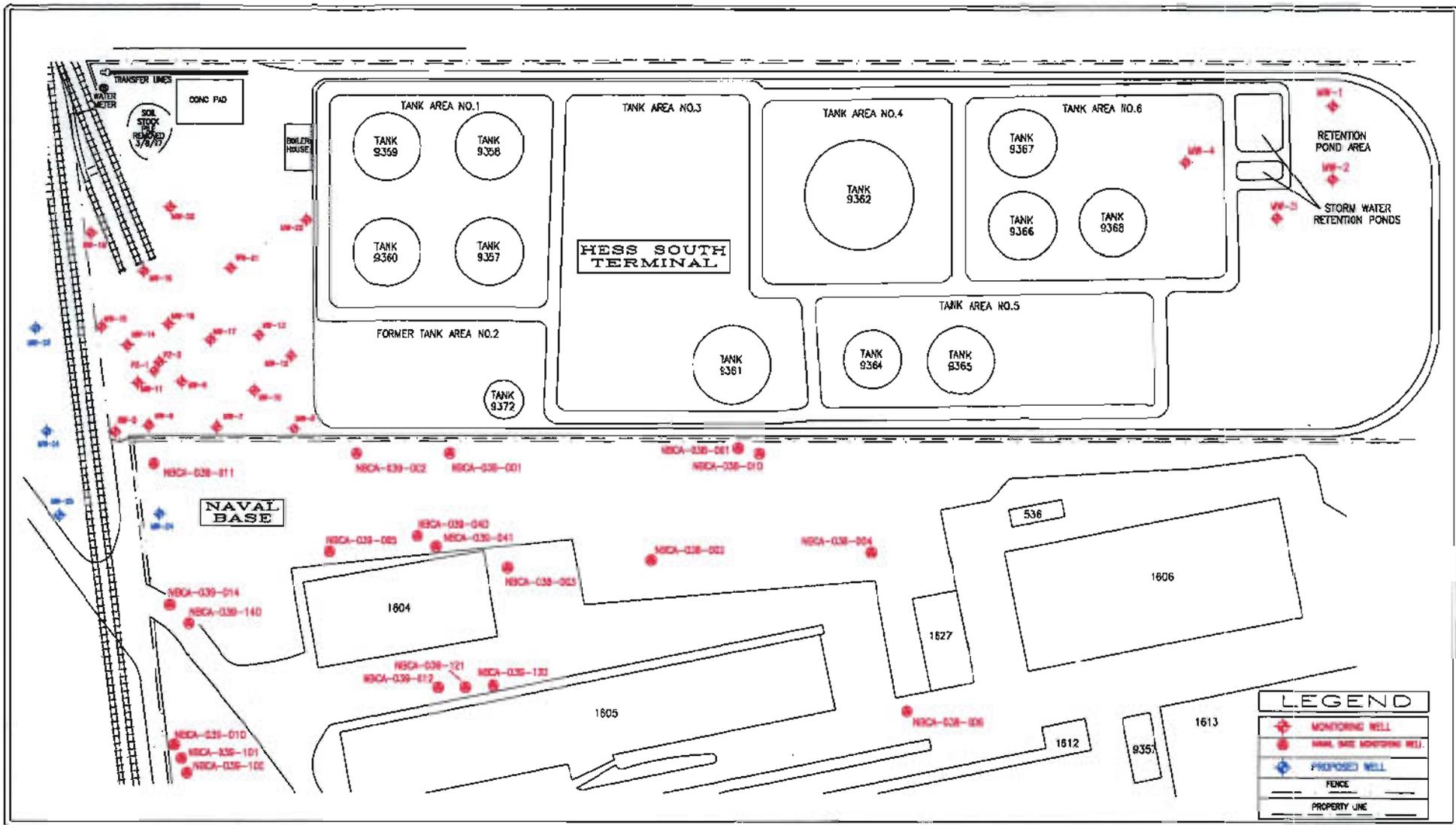
PREPARED FOR:
AMERADA HESS CORP
CHARLESTON, SC

SITE ADDRESS:
HESS SOUTH TERMINAL
4650 VIRGINIA AVENUE
CHARLESTON, SC

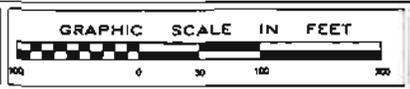


DRAWN BY: CHRIS PINELLI	DATE DRAWN: 01/29/97
JOB NUMBER: 1715.4066	FIGURE NUMBER: 2.2

FIGURE TITLE: **VICINITY MAP - NOVEMBER 1996**

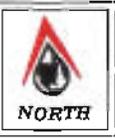


H₂O ENVIRONMENTAL, INC.
SCIENTISTS & ENGINEERS



PREPARED FOR:
AMERADA HESS CORP
CHARLESTON, SC

SITE ADDRESS:
465C VIRGINIA AVENUE
CHARLESTON, SC



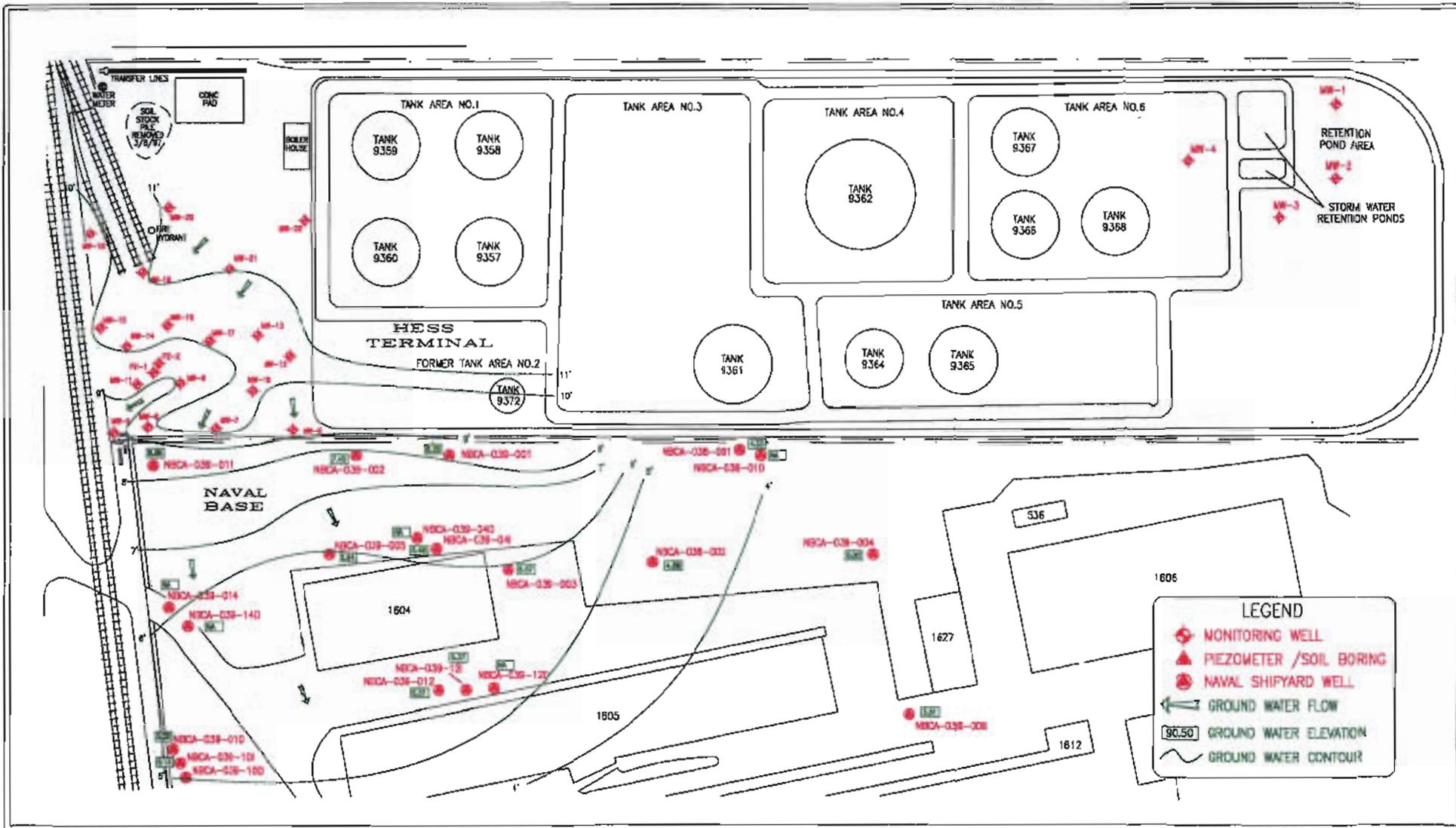
DRAWN BY:
CHRIS PINELLI

DATE DRAWN:
05/09/97

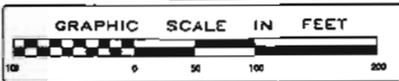
JOB NUMBER:
1715.4066

FILE NUMBER:
2.4

VICINITY MAP WITH PROPOSED WELL LOCATIONS



H₂O ENVIRONMENTAL, INC.
SCIENTISTS & ENGINEERS



PREPARED FOR:
AMERADA HESS CORP
CHARLESTON, SC

SITE ADDRESS:
HESS SOUTH TERMINAL
4650 VIRGINIA AVENUE
CHARLESTON, SC



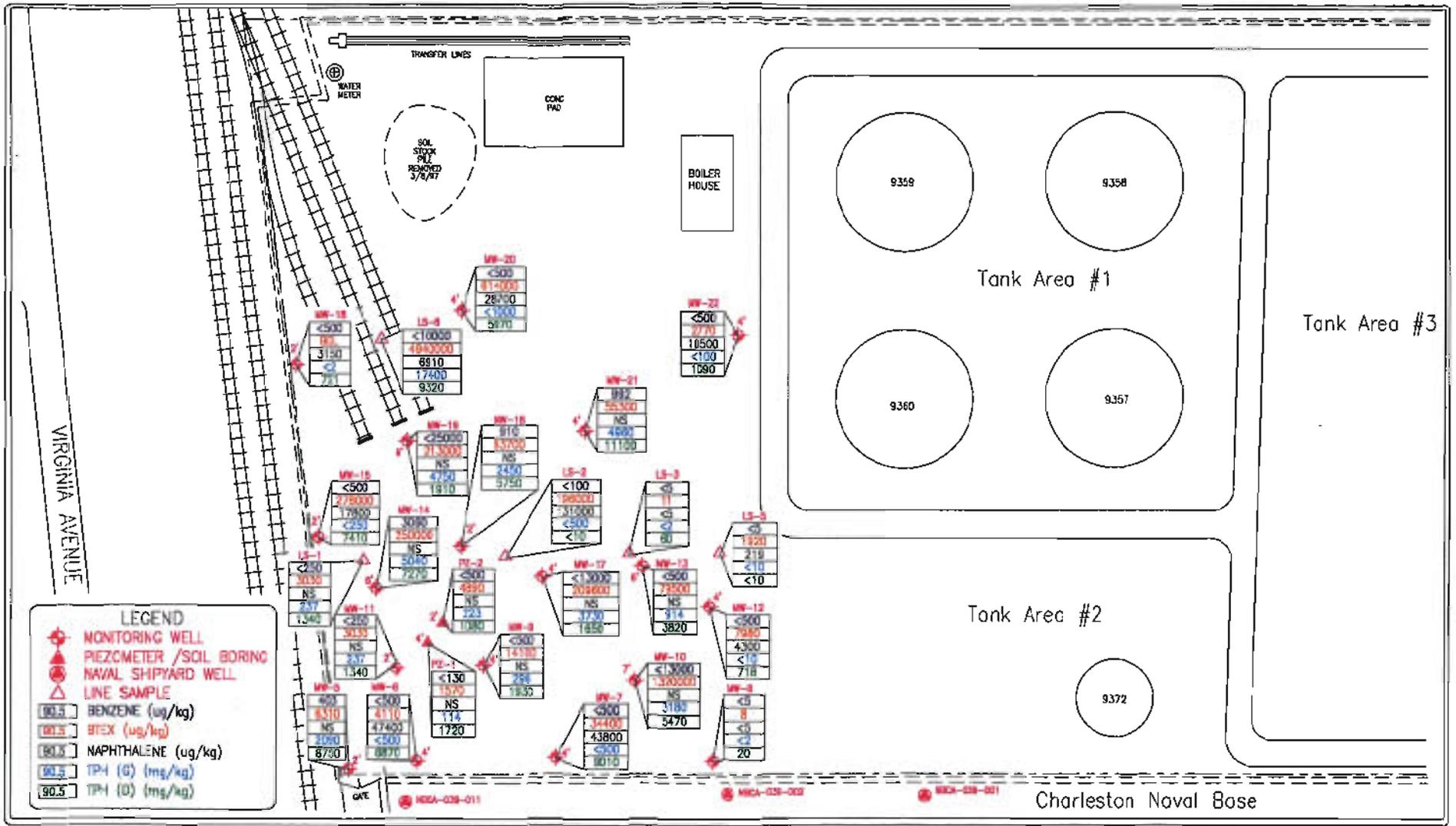
DRAWN BY:
CHRIS PINELLI

DATE DRAWN:
01/29/97

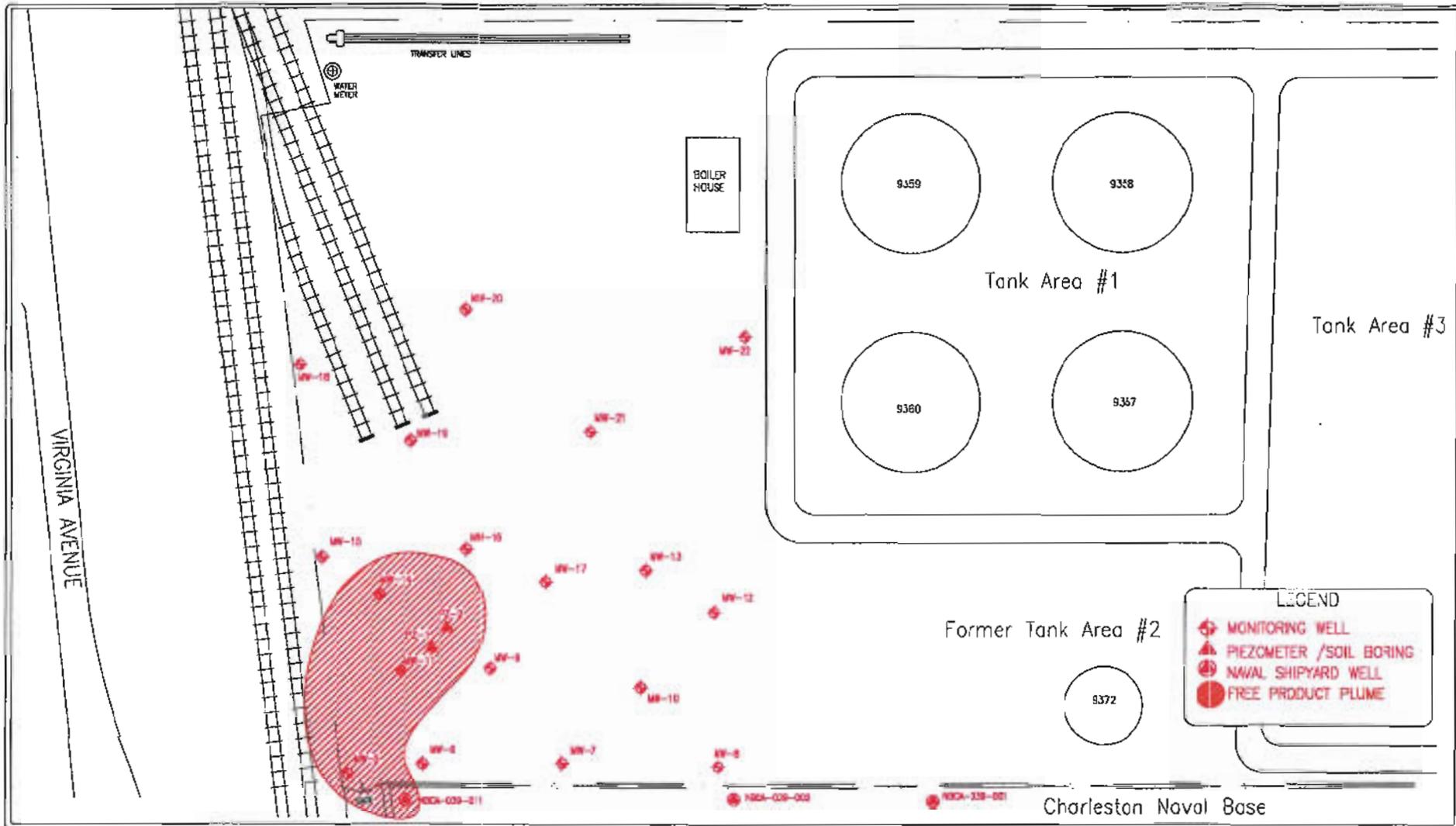
JOB NUMBER:
1715.4066

FIGURE NUMBER:
3.0

VICINITY GROUND WATER FLOW - JANUARY 1997



H₂O ENVIRONMENTAL, INC. SCIENTISTS & ENGINEERS	GRAPHIC SCALE IN FEET 	PREPARED FOR: AMERADA HESS CORP. CHARLESTON, SOUTH CAROLINA	SITE ADDRESS: 4650 VIRGINIA AVENUE CHARLESTON, SOUTH CAROLINA	DRAWN BY: CHRIS PINELLU	DATE DRAING: 01/29/97
		SOIL QUALITY DISTRIBUTION MAP -- JANUARY 1997	NORTH 	JOB NUMBER: 1715.4066	SCALE NUMBER: 4.0



LEGEND

- MONITORING WELL
- PIEZOMETER /SOIL BORING
- NAVAL SHIPYARD WELL
- FREE PRODUCT PLUME

H₂O ENVIRONMENTAL, INC.
SCIENTISTS & ENGINEERS



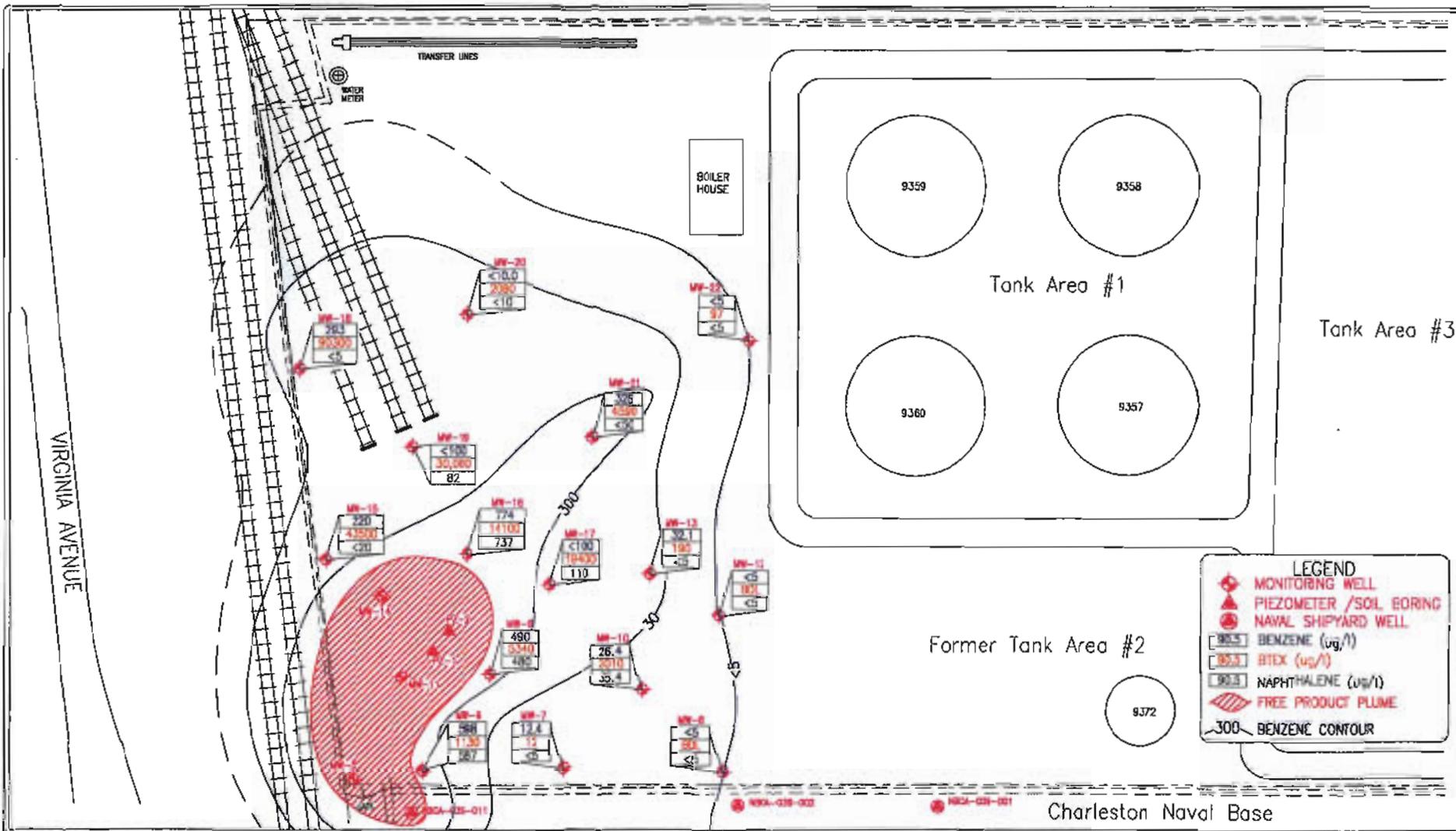
PREPARED FOR:
AMERADA HESS CORP.
CHARLESTON, SOUTH CAROLINA

SITE ADDRESS:
HESS SOUTH TERMINAL
4650 VIRGINIA AVENUE
CHARLESTON, SOUTH CAROLINA



DRAWN BY: CHRIS PINELLI	DATE DRAWN: 01/29/97
JOB NUMBER: 1715.4066	FIGURE NUMBER: 5.0

FIGURE TITLE: GROUND WATER QUALITY FREE PRODUCT PLUME - JANUARY 1997



H₂O ENVIRONMENTAL, INC.
SCIENTISTS & ENGINEERS



PREPARED FOR:
AMERADA HESS CORP.
CHARLESTON, SOUTH CAROLINA

SITE ADDRESS:
HESS SOUTH TERMINAL
4650 VIRGINIA AVENUE
CHARLESTON, SOUTH CAROLINA



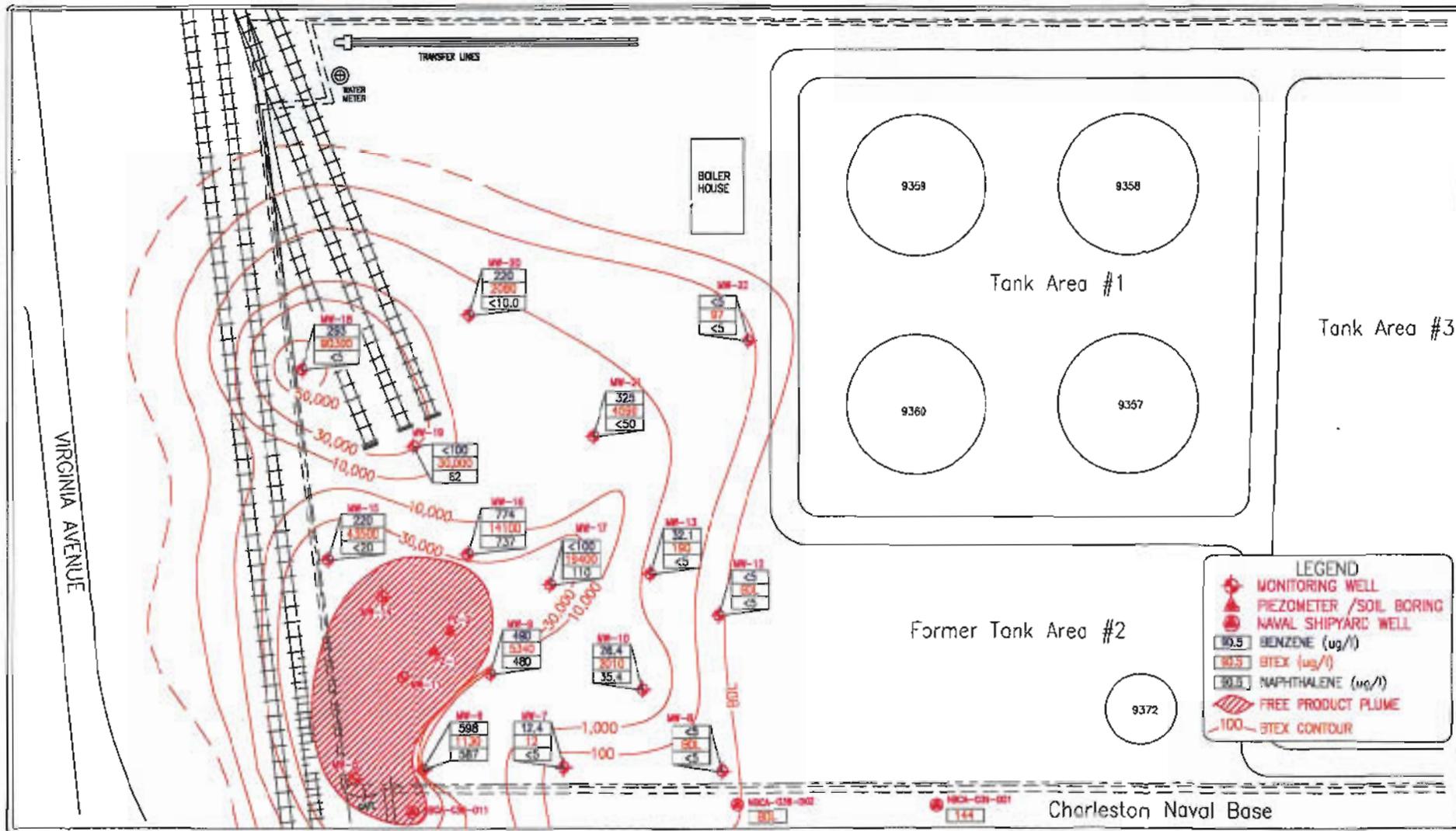
DRAWN BY:
CHRIS PINELLI

DATE DRAWN:
01/29/97

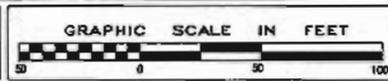
JOB NUMBER:
1715.4066

FIGURE NUMBER:
5.1

GROUND WATER QUALITY WITH BENZENE CONTOURS - JANUARY 1997

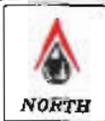


H₂O ENVIRONMENTAL, INC.
SCIENTISTS & ENGINEERS



PREPARED FOR
AMERADA HESS CORP.
CHARLESTON, SOUTH CAROLINA

SITE ADDRESS
HESS SOUTH TERMINAL
4650 VIRGINIA AVENUE
CHARLESTON, SOUTH CAROLINA



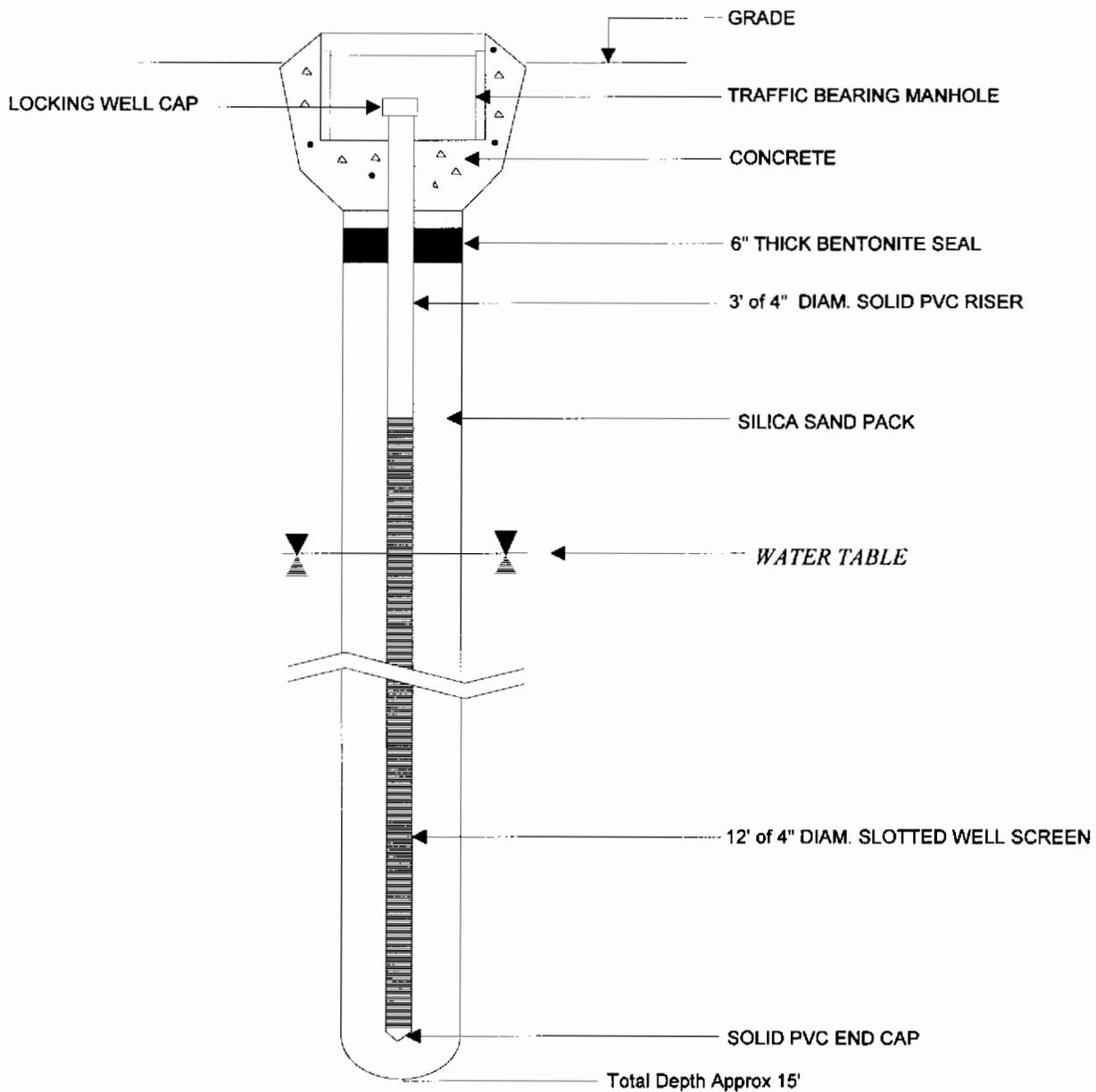
DRAWN BY
CHRIS PINELLI

JOB NUMBER
1715.4086

DATE DRAWN
01/29/97

FIGURE NUMBER
5.2

GROUND WATER QUALITY WITH BTEX CONTOURS - JANUARY 1997



H₂O ENVIRONMENTAL, INC.
 SCIENTISTS & ENGINEERS

SITE

Amerada Hess Bulk Storage Terminal
 Charleston, South Carolina

TITLE

PROPOSED MONITORING WELL - CONSTRUCTION DETAILS

FIG
 6.0

TABLES

TABLE 1.0

**SUMMARY OF LIQUID LEVEL MEASUREMENTS AND
GROUND WATER ELEVATIONS**

Amerada Hess - Charleston South Terminal
North Charleston, South Carolina

Well I.D.	Date Measured	Top of Casing (Ft)	Depth to Product (Ft)	Depth to Water (Ft)	Product Thickness (Ft)	Corr. Ground Water Elevation (Ft)
MW-5	12/21/96	14.89	6.11	6.21	0.10	8.68
	1/22/97			6.21		8.76
MW-6	12/21/96	16.88		6.87		10.01
	1/22/97			6.90		9.98
MW-7	12/21/96	16.22		6.79		9.43
	1/17/97			6.02		10.20
MW-8	12/21/96	16.51		7.60		8.91
	1/22/97			7.40		9.11
MW-9	12/21/96	16.40		6.76		9.64
	1/22/97			6.69		9.71
MW-10	12/21/96	16.97		6.98		9.99
	1/22/97			6.91		10.06
MW-11	12/21/96	16.32	7.65	8.50	0.85	8.50
	1/22/97		6.25	9.04	2.79	9.51
MW-12	12/21/96	16.20		5.95		10.25
	1/22/97			5.91		10.29
MW-13	12/21/96	17.09		6.70		10.39
	1/22/97			6.64		10.45
MW-14	12/21/96	16.49	6.29	7.40	0.29	9.09
	1/22/97			6.58		10.14
MW-15	12/21/96	16.00		5.85		10.15
	1/22/97			5.90		10.10
MW-16	12/21/96	16.47		6.15		10.32
	1/22/97			6.18		10.29
MW-17	12/21/96	16.55		6.38		10.17
	1/22/97			6.31		10.24
MW-18	12/21/96	17.50		7.40		10.10
	1/22/97			7.54		9.96
MW-19	1/22/97	17.44		6.47		10.97
MW-20	12/21/96	17.43		6.35		11.08
	1/22/97			6.32		11.11
MW-21	12/21/96	16.74		5.83		10.91
	1/22/97			5.75		10.99
MW-22	12/21/96	17.24		5.65		11.59
	1/22/97			5.59		11.65
PZ-1	12/21/96	16.23	6.35	7.55	1.20	9.64
	1/22/97		6.15	8.29	2.14	9.65
PZ-2	12/21/96	16.62	6.80	7.25	0.45	9.73
	1/22/97		6.60	7.94	1.34	9.75

TABLE 1.1

**SUMMARY OF NAVY WELL LIQUID LEVEL MEASUREMENTS
AND GROUND WATER ELEVATIONS**

Amerada Hess - Charleston South Terminal
North Charleston, South Carolina

Well I.D.	Date Measured	TOC (ft)	Depth to Water	Corrected TOC Elev
NBCA-038	1/22/97			
001		7.13	2.80	4.33
01D		7.63	5.84	1.79
002		8.42	3.74	4.68
NBCA-039	1/22/97			
001		13.47	5.22	8.25
002		14.35	6.90	7.45
003		8.64	3.07	5.57
004		11.72	5.72	6.00
04D		9.77	7.88	1.89
04I		9.22	2.74	6.48
005		12.67	6.73	5.94
006		8.93	5.42	3.51
010		13.74	8.72	5.02
10D		13.35	10.90	2.45
10I		13.49	8.36	5.13
011		15.20	6.55/6.92	8.65/8.28
012		8.54	3.03	5.51
12D		8.56	6.68	1.88
12I		8.66	3.29	5.37

Notes:

Depth to Water in Well NBCA-39-011 is combination Oil/Water 0.37' thick oil phase

TABLE 2.0

SUMMARY OF SOIL ANALYTICAL RESULTS

Amerada Hess - Charleston South Terminal
North Charleston, South Carolina

Well I.D.	Well Depth	Date Sampled	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	Naphthalene	PAH	TPH (G)	TPH (D)
MW-5	2'	12/26/96	403	414	2,930	2,563	6,310	<250	NS	NS	2,090	8,750
MW-6	4'	12/17/96	<500	<500	<500	4,110	4,110	-	47,400	*	<500	6,870
MW-7	4'	12/17/96	<500	<500	<500	34,400	34,400	-	43,800	*	<500	9,010
MW-8	4'	12/17/96	<5.0	<5.0	<5.0	8	8	-	<5.0	<660	<2.0	20
MW-9	4'	12/26/96	<500	854	1,910	11,370	14,100	<500	NS	NS	296	1,930
MW-10	7'	12/26/96	<12,500	<12,500	231,000	1,089,000	1,320,000	<12,500	NS	NS	3,180	5,470
MW-11	2'	12/26/96	<250	<250	446	2,582	3,030	325	NS	NS	237	1,340
MW-13	6'	12/26/96	<500	519	24,100	54,920	79,500	<500	NS	NS	914	3,820
MW-12	4'	12/17/96	<500	<500	<500	7,980	7,980	-	4,300	<660	<10.0	718
MW-14	6'	12/26/96	3,060	14,500	24,000	208,900	250,000	<2,500	NS	NS	5,040	7,770
MW-15	2'	12/17/96	<500	<500	<500	278,000	278,000	-	17,800	*	<250	7,410
MW-16	2'	12/26/96	910	1,370	25,700	65,740	93,700	<500	NS	NS	2,450	5,750
MW-17	4'	12/26/96	<13,000	<13,000	35,200	174,400	209,600	<13,000	NS	NS	3,730	1,650
MW-18	2'	12/17/96	<500	<500	<500	<500	BDL	-	3,150	<660	<2.0	721
MW-19	6'	12/26/96	<25,000	<25,000	<25,000	213,000	213,000	<25,000	NS	NS	4,750	1,910
MW-20	4'	12/17/96	<500	<500	<500	614,000	614,000	-	28,700	*	<1,000	5,970
MW-21	4'	12/26/96	992	729	33,600	19,950	55,300	771	NS	NS	4,960	11,100
MW-22	4'	12/17/96	<500	<500	<500	2770	2770	-	10,500	<660	<100	1,090
PZ-1	4'	12/26/96	<130	<130	191	1369	1570	<130	NS	NS	114	1,720
PZ-2	2'	12/26/96	<500	<500	808	4,084	4,890	<500	NS	NS	223	1,080
LS-1	-	12/14/96	91.8	786	9,190	45,600	55,700	<100	68,100	*	<500	11,100
LS-2	-	12/14/96	<100	470	12,200	183,000	196,000	<100	131,000	<660	<500	<10.0
LS-3	-	12/14/96	<5.0	<5.0	<5.0	10.7	11	<5.0	<5.0	<660	<2.0	60
LS-5	-	12/14/96	<5.0	<5.0	61	1860	1920	<5.0	219	<660	<10.0	<10.0
LS-8	-	12/16/96	<10,000	47,700	39,700	4,850,000	4,940,000	<10,000	6,910	<600	17,400	9,320
SP-1	-	12/23/96	<100	687	539	627,000	628,000	NS	18,000	*	1,653	2,850
SP-2	-	12/23/96	<100	1,030	3,620	637,000	642,000	NS	7,760	<660	1,040	<10.0
SP-3	-	12/23/96	<100	<100	348	67,000	67,300	NS	<100	<660	1,460	<10.0
SP-4	-	12/23/96	<200	<200	572	73,700	74,300	NS	8,400	<660	2,640	<10.0
SP-5	-	12/23/96	<200	468	1,370	46,100	47,900	NS	11,400	<660	1,600	<10.0

* Denotes PAH's Detected (See next page for separate table listing results)

TABLE 2.0 (Cont.)

SUMMARY OF SOIL ANALYTICAL RESULTS

Amerada Hess - Charleston South Terminal
North Charleston, South Carolina

Well I.D.	Well Depth	Date Sampled	Lead	TOC
MW-6	4'	12/17/96	4.7	6100
MW-8	17'	12/17/96	-	3660
	2'	12/17/96	-	1250
MW-17	4'	12/26/96	-	2220
MW-19	6'	12/26/96	-	6290

PAH's DETECTED

Well I.D.	Phenanthrene	Anthra-cene	Fluoranthene	Fluorene	Pyrene	Benzo (a) anthracene	Benzo (b) fluoranthene	Benzo (k) fluoranthene
MW-6	2420	-	-	-	-	-	-	-
MW-7	-	2310	-	-	-	-	-	-
MW-15	970	-	-	-	-	-	-	-
MW-20	2090	-	713	863	827	-	-	-
LS-1	4060	-	-	-	-	-	-	-
LS-8	2060	-	-	-	5310	-	-	-
SP-1	-	-	-	-	-	736	1080	1240

Notes:

BTEX = The sum of Benzene, Toluene, Ethylbenzene, and Xylenes

MTBE = Methyl-tert-butyl-ether

TOC = Total Organic Carbon

Concentrations for BTEX, MTBE, and PAH's are in ug/kg

Concentrations for TPH, TOC, and Lead are in mg/kg

TABLE 3.0 (Cont.)

SUMMARY OF APPENDIX 9 GROUND WATER ANALYTICAL DATA

Amerada Hess - Charleston South Terminal
North Charleston, South Carolina

8240	MW-11	MW-17	MW-19	Action Levels
Benzene	NS	BDL	BDL	5
Toluene	NS	BDL	BDL	1,000
Ethyl Benzene	NS	4400	BDL	700
Xylenes	NS	15,000	30,000	10,000
Total BTEX	NS	19,400	30,000	
MTBE	NS			40

8270	MW-11	MW-17	MW-19	Action Levels
Naphthalene	340	110	82	25
2-Methylnaphthalene	300	130	99	-
Phenol	8	BDL	BDL	-
2,4-Dimethylphenol	BDL	65	150	-
2-Methylphenol	BDL	BDL	14	-
Fluorene	6	BDL	BDL	-

3520/8080 (Pesticides)	MW-11	MW-17	MW-19	Action Levels
	ND	ND	ND	-

8150 (Herbicides)	MW-11	MW-17	MW-19	Action Levels
2,4,5-T (Weedone)	0.36	0.13	BDL	-

6010/7060 (Metals)	MW-11	MW-17	MW-19	Action Levels
Arsenic	29	8	21	50
Barrium	36	55	44	1,000
Chromium	14	14	14	50
Lead	6	7	7	50
Zinc	40	51	38	5,000

Benzyl alcohol and Dibenzofuran were detected at levels near the detection limits and bis (2-Ethylhexyl) Phthalate was found in the trip blank. These compounds are not considered to be significant (common laboratory contaminants, etc.)

All concentrations are in ug/l
Samples Collected 12/23/96

TABLE 3.1

SUMMARY OF NAVY ANALYTICAL DATA

Amerada Hess - Charleston South Terminal
North Charleston, South Carolina

Well I.D.	Date Sampled	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total BTEX	Naphthalene	PAH
NBCA-038-001	2/7/95	<5	<5	<5	<5	ND		
	4/23/96	47	<3.9	9	68	124	<11	ND
	6/20/96	35	<2.2	10	81	126	<11	ND
	10/7/96	110	<4	34	72	216	<10	ND
NBCA-038-01D	2/7/95	<5	<5	<5	<5	ND	<12	ND
NBCA-039-002	12/3/95	<5	<5	<5	<5	ND	<12	ND
	12/5/95	<5	<5	<5	<5	ND	<12	ND
	4/23/96	<5	<5	<5	<5	ND	<10	ND
	6/20/96	<5	<5	<5	<5	ND	<11	ND
	10/8/96	<5	<5	<5	<5	ND	<11	ND
NBCA-039-04D	12/6/95	<5	<5	<5	<5	ND	<11	ND
	4/25/96	<5	<5	<5	<5	ND	<11	ND
	6/21/96	<5	<5	<5	<5	ND	<12	ND
	10/8/96	<5	<5	<5	<5	ND	<12	ND
	10/21/96	<5	<5	<5	<5	ND		
NBCA-039-005	12/6/95	90	<5	<1.4	<5	90	<9.1	13
	4/24/96	100	<1.7	<3	11	111	64	87
	6/21/96	170	<1.3	<1.1	<4.5	170	<35	ND
	10/9/96	78	<5	<5	<5	78	<10	ND
NBCA-039-010	8/1/96	<5	<5	<5	<5	ND		
	10/11/96	<5	<5	<5	<5	ND	<4	ND
	3/11/97	<5	<5	<5	<5	ND	<10	ND
NBCA-039-10I	9/28/96	<5	<4	<5	<5	ND	<10	ND
	11/6/96	<5	<5	<5	<5	ND		
	3/11/97	<5	<5	<5	<5	ND	<10	ND
NBCA-039-10D	9/28/96	<5	<5	<5	<5	ND	<9.1	ND
	11/6/96	<5	<5	<5	<5	ND	<10	ND
	3/11/97	<5	<5	<5	<5	ND	<10	ND
NBCA-039-011	8/2/96	620	140	190	413	1363	4	
	10/10/96	200	24	140	165	529	330	540
	10/15/96	200	<5	190	440	830	480	794
NBCA-039-014	2/6/97	8	<5	<5	<5	8	<5	ND
	3/20/97	23	<5	<5	<5	23	<10	ND
	2/6/97	8	<5	<5	<5	8	<5	ND
NBCA-039-14D	2/6/97	<5	<5	<5	<5	ND	<10	ND
	3/21/97	<5	<5	<5	<5	ND	<10	ND
NBCA-039-15D	2/6/97	<5	<5	<5	<5	ND	<10	ND
NBCA-038-001	12/7/96	<5	<5	<5	<5	ND		
NBCA-038-002	12/7/96	<5	<5	<5	<5	ND		
NBCA-038-01D	12/7/96	<5	<5	<5	<5	ND		

Notes: All concentrations are in ug/l

TABLE 3.2

NAVY OFFSITE GEOPROBE PROGRAM RESULTS

Amerada Hess - Charleston South Terminal
 North Charleston, South Carolina

Well I.D.	Date Sampled	Benzene	Toluene	Ethyl- benzene	Total Xylenes	Total BTEX
039-G-P022-11	9/26/96	<5	5	<5	<5	5
039-G-P022-23	3/26/96	<5	<5	<5	<5	ND
039-G-P023-12	9/25/96	<5	<5	<5	<5	ND
039-G-P023-26	9/25/96	<5	<5	<5	<5	ND
039-G-P024-12	9/25/96	<5	<5	<5	<5	ND
039-G-P024-26	9/25/96	<5	<5	<5	<5	ND
039-G-P025-10	9/27/96	<4	<1	<5	10	10
039-G-P025-20	9/27/96	<3	<5	<5	8	8
039-G-P026-11	9/30/96	<5	<5	<5	<10	ND
039-G-P027-11	9/27/96	<5	<5	<5	<10	ND
039-G-P029-10	9/30/96	<5	<2	<5	<10	ND
039-G-P031-27	9/26/96	<5	<5	<5	<5	ND
039-G-P032-11	9/27/96	<5	<2	<5	<5	ND
039-G-P033-11	9/26/96	<5	<5	<5	<5	ND
039-G-P033-25	9/26/96	<5	<5	<5	<5	ND
039-G-P034-11	9/27/96	<5	<5	<5	<5	ND
039-G-P035-11	9/27/96	<5	<5	<5	<5	ND
039-G-P035-30	9/27/96	<5	<5	<5	<5	ND
039-G-P036-11	9/27/96	<5	<5	<5	<5	ND
039-G-P037-11	9/30/96	<2	<5	<5	<5	ND
039-G-P037-19	9/30/96	<5	<5	<5	<5	ND

Notes: All concentrations are in ug/l.

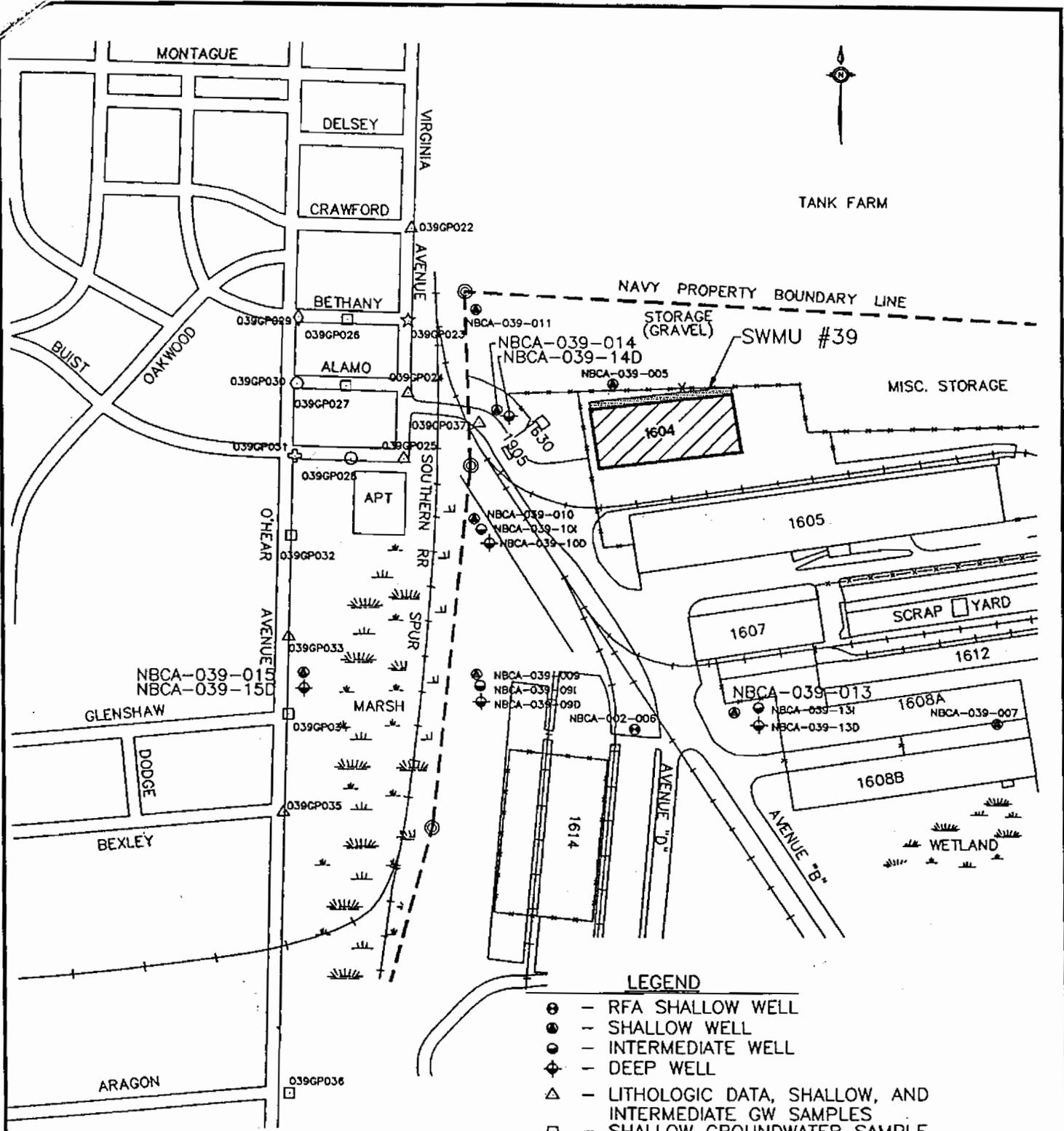
TABLE 4.0**PROPOSED LABORATORY ANALYSIS METHODS**

Amerada Hess - Charleston South Terminal
North Charleston, South Carolina

Soil	Quantity	EPA Method	Detection Limits
BTEX	32	8020	5.0 ug/kg
MTBE	32	8020	5.0 ug/kg
Naphthalene	32	8020	5.0 ug/kg
PAHs	32	8270	80 ug/kg
TPH - Gasoline	32	5030/8015M	1 mg/kg
TPH - Diesel	32	3550/8015M	1 mg/kg

Water	Quantity	EPA Method	Detection Limits
BTEX	19	8260	1.0 ug/l
MTBE	19	8260	5.0 ug/l
Naphthalene	19	8260	5.0 ug/l
PAHs	19	8270	2.0 ug/l

APPENDIX A
NAVY RAB MEETING MINUTES - January 14, 1997



TANK FARM

NAVY PROPERTY BOUNDARY LINE

STORAGE (GRAVEL)

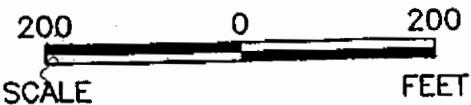
SWMU #39

MISC. STORAGE

WETLAND

LEGEND

- ⊕ - RFA SHALLOW WELL
- - SHALLOW WELL
- ⊙ - INTERMEDIATE WELL
- ⊕ - DEEP WELL
- △ - LITHOLOGIC DATA, SHALLOW, AND INTERMEDIATE GW SAMPLES
- - SHALLOW GROUNDWATER SAMPLE
- - BORING, NO SAMPLE COLLECTED (CLAY)
- ☆ - SHALLOW AND INTERMEDIATE GW SAMPLES
- ◇ - LITHOLOGIC DATA, SHALLOW GW SAMPLES
- ⊕ - LITHOLOGIC DATA, INTERMEDIATE GW SAMPLES



NAVAL BASE CHARLESTON
CHARLESTON, S.C.

FIGURE 1
PROPOSED WELL LOCATIONS
AT SWMU 39

NAVAL BASE CHARLESTON
RESTORATION ADVISORY BOARD (RAB)
Minutes of 14 January 1997

1. Introduction of the RAB Members and Guests

Ms. Wannetta Mallette introduced herself as the newly elected Community Co-Chair for 1997. She thanked her fellow members for electing her and said she's looking forward to an exciting year for the RAB as the corrective action process moves from the investigative stage into the corrective measures stage. Ms. Mallette noted that there were many new faces in the audience, and asked both the members and guests to introduce themselves. She reminded everyone that the RAB is an oversight group working with the Navy and environmental regulators on the environmental cleanup of the base and that the RAB community members represent the general public.

2. RAB Members Attending

Mr. Oliver Addison
Mr. Ray Anderson
Mr. Steve Best
Mr. Doyle Brittain
Mr. James Conner
Mr. Bobby Dearhart
Mr. Daryle Fontenot
Mr. Tom Fressilli
Mr. Wilburn Gilliard

Ms. Gussie Greene
Mr. Donald Harbert
Mr. Ralph Laney
Ms. Wannetta Mallette
Mr. Arthur Pinckney
Mr. Odell Price
Ms. Ann Ragan
LDCR Paul Rose
Ms. Priscilla Wendt

3. Guests Attending

Mr. Tony Hunt	NAVFAC, SouthDiv
Mr. Brian Stockmaster	NAVFAC, SouthDiv
Mr. Gabriel Magwood	NAVFAC, SouthDiv
Mr. Jay Bassett	EPA Region 4
Mr. Paul M. Bergstrand	SCDHEC
Mr. Rob Durlap	SCDNR
Ms. June Mirecki	College of Charleston
Mr. J.B. Lawrence	CEERD
Mr. Jack Arney	Shipyards Detachment
Mr. John Sulkowski	E.T.C., Inc.
Ms. Donna Kopeski	Galileo
Ms. June M. Brittain	Concerned Citizen
Ms. Bertha L. Singleton	Community Member
Mr. Joseph Johnson	Community Member
Ms. Myrtle Barnett	Community Member
Ms. Rosa Lee Benekin	Community Member
Ms. Pamela Williams	Community Member

Mr. Leroy Carr	Chicora/Cherokee
Mr. Anthony Joyner	Chicora/Cherokee
Mr. Ken Ayoub	Chicora/Cherokee
Ms. Edith Askins	N. Charleston Weed and Seed
Ms. Diane Cutler	EnSafe/Allen&Hoshall
Mr. Dave Backus	EnSafe/Allen&Hoshall
Mr. Larry Bowers	EnSafe/Allen&Hoshall
Ms. Sandy Reagan	EnSafe/Allen&Hoshall
Mr. Ron Severson	EnSafe/Allen&Hoshall

4. Administrative Remarks and Comments on Minutes

Ms. Mallette asked for administrative remarks or comments on the minutes from the last meeting. No comments were made.

5. Subcommittee Reports

The Community Relations Subcommittee was scheduled to meet prior to the RAB meeting. Only Daryle Fontenot and Diane Cutler, the E/A&H resource person were in attendance. Since none of the community members attended, there are no new issues to report. The next meeting is scheduled for February 11, 1997 at 3:30 at Building NH-51 at the Naval Base. The Community Relations Subcommittee consists of 5 members including Mr. Fontenot.

6. Reuse Update

Nobody from the Redevelopment Authority was present to provide an update.

7. Environmental Cleanup Progress Report

Chicora Tank Farm Update

Mr. Fontenot reported that the Navy is currently awaiting feedback from the Redevelopment Authority and the City of North Charleston regarding who will be the user of the Chicora Tank Farm property. The RAB sent a letter to the Mayor stating that they were in favor of the partial demolition of the tanks. At the last meeting, a detailed presentation was given regarding the environmental investigations that have taken place at the Chicora Tank Farm. Anyone interested in obtaining a copy of that material should contact Mr. Fontenot. A discussion of those materials can also be found in last month's meeting minutes. Mr. Bobby Dearhart asked when the decision regarding the user of the tank farm will be made. Mr. Fontenot replied that it is up to the RDA and the City to meet and decide upon. Ms. Mallette added that she had hoped that the Chicora issue would be on the City Council's health and safety agenda for tonight, but it is not, so she does not know when it will be discussed and resolved. Mr. Fontenot also added that the Shipyard Detachment will be responsible for conducting the closure of the tanks.

Status of Environmental Programs

Mr. Fontenot provided an update on project status. Currently there are three Environmental Baseline Survey to Lease (EBSL)/Finding of Suitability to Lease (FOSL) documents at Southern Division that are awaiting Commanding Officer signature. These documents, once signed, release the property for the Redevelopment Authority to lease. One of these documents includes

231 facilities. Once all three of the EBSLs/FOSLs are signed next week, there will be approximately 700 facilities available for reuse by the RDA.

The Naval Annex is currently awaiting a reuse plan from the RDA before the environmental assessment can be completed.

To date, the Navy has removed approximately 70 underground storage tanks at the shipyard and has about 12 more to go.

Building 32 asbestos remediation is in progress, and the Detachment is handling that work as well.

Mr. Fontenot introduced Mr. Tony Hunt with Southern Division to present the RCRA Corrective Action update. For the benefit of the first-time guests in the audience, Mr. Fontenot explained that the Resource Conservation and Recovery Act (RCRA) is the environmental law that regulates the cleanup of hazardous waste sites on the Naval Base property. Mr. Hunt began by explaining that the RCRA Facility Investigation (RFI) step of the RCRA Corrective Action process requires collecting water and soil samples on base to determine the extent of contamination.

For those tracking funding, Zone J (water bodies) will be awarded later this month, and the Zone L proposal is still being evaluated.

In December, the Navy held its 90% progress meeting for Zone D which is the area near the credit union. An agreement was reached that the field work in Zone D was complete and that preparation of the RFI report can begin. Progress meetings for Zones K, F, and G were held. Zone K is the non-contiguous areas, and Zones F and G are approximately in the middle of the base. A scoping meeting was held for the Comprehensive Corrective Measures Work Plan. Also, the Zones J and L Work Plans were approved by South Carolina Department of Health and Environmental Control (SCDHEC) on December 13th.

Mr. Hunt provided an update on Solid Waste Management Unit (SWMU) 39. SWMUs are the sites that are being investigated at the Naval Base. A SWMU can be an area where wastes were at one time stored, and are suspected or show evidence of a release. SWMU 39 is an area that stored Petroleum, Oils, and Lubricants (POLs) in the DRMO area near the Virginia Avenue gate. Mr. Hunt showed a map of the area and explained that water samples were collected to determine if there were any releases. The Navy found some chlorinated solvents that they looked at further, and some petroleum products. Then, in order to see if the material was moving off-base, screening samples were collected outside the Navy base property using a cone penetrometer. The Navy did not find any chlorinated solvents in the neighborhood.

However, they did find some TCE in a well on Crawford Street, but after comparing the findings to what was found on base and groundwater flow direction, the Navy does not think the TCE in the Crawford Street well is coming from the Navy Base. Since then, the Navy installed two more wells to further investigate if the TCE was coming from the Base. Those wells were installed last week and the Navy hopes to have results available by the next RAB meeting.

In addition, Hess (the adjacent property owner) is working with SCDHEC to investigate if the petroleum contamination found originated from the Hess facility.

The Zone B RFI report has been approved. The Navy hopes to resolve comments on the Zone H RFI report in January. Zone H is the first Zone scheduled for the Corrective Measures Study. Also in January, the Navy expects to submit the Draft Comprehensive Corrective Measures Study (CMS) Work Plan to the Project Team for review. The Navy will be moving into the Corrective Measures process very soon and will be looking for community input.

Mr. Jim Conner asked how deep the wells are. Mr. Hunt answered that the Hess Well is about 45 feet deep and the wells that were just installed last week are 55 feet deep. Shallow wells have also been installed.

A guest from the audience asked what type of substance was maintained in the Hess tanks. Mr. Hunt replied that the tanks contain a fuel that is chemically similar to diesel. The same guest continued by asking what the purpose was for the wells. Mr. Hunt stated that the Navy's wells were installed to detect if contamination was moving offsite (from the base) or on-site (onto the base), and as it turned out, it looks as if it is moving onsite.

Mr. Arthur Pinckney asked for clarification on Mr. Hunt's earlier statement that the contamination found off base was not from the Navy. Mr. Hunt reiterated that TCE was found in an offsite well, yet the Navy had TCE and degradation compounds. Also, based on the shallow groundwater flow direction which flows from north to south, if a release occurred on the Navy property, the contamination flow would head toward Noisette Creek. Based on the information that the Navy has, they do not see a connection between the release at SWMU 39 and the TCE found in the well on Crawford Street. The next step is to collect data from the two newest well locations and write a letter to SCDHEC suggesting that there may be another potential source of contamination that is not on the Navy base.

Ms. Mallette asked if Hess is also installing wells. Mr. Hunt replied that Hess is conducting investigations and working closely with SCDHEC.

Mr. Pinckney asked that if Hess did find a leak, would they have to involve the community. Mr. Fontenot stated that right now all their testing is taking place on their own property.

Corrective Measures Study

Mr. Fontenot introduced Mr. Larry Bowers with EnSafe/Allen&Hoshall as the speaker for the Corrective Measures Study (CMS) presentation. The presentation is considered a training session for the community members so they understand the CMS process. This is the point in the environmental investigation where the RAB and community members will provide their input to the Navy regarding cleanup decisions.

Mr. Bowers began by stating that the goal of his presentation is to present an overview of the CMS process. At the end of the presentation will be a short exercise lead by Ms. Ann Ragan from SCDHEC that will request input from the RAB and community.

Mr. Bowers began his presentation by reviewing the four main steps of the RCRA Corrective Action Process:

Step 1 RCRA Facility Assessment (RFA) -Historical study looking at buildings and property and determining past use. Non-invasive study (no sampling or digging - it is primarily research).

Step 2 RCRA Facility Assessment (RFI) -This is the step that has been underway for a couple of years and is still ongoing today. Sampling and analysis takes place to define the extent of contamination on the property.

Step 3 Corrective Measures Study (CMS)-The step the Navy is just getting into which evaluates the different cleanup alternatives.

Step 4 Corrective Measures Implementation (CMI) - The actual remedial design and cleanup.

The CMS is a study that is used to determine and rank potential remedial alternatives at a site. The CMS is not intended to select or choose the final cleanup (remember, it is only supposed to rank the different alternatives). The CMS does not suggest that cleanup is required for each site. For example, one of the remedial alternatives might be "no further action." Also, the CMS is not the actual cleanup step. Cleanup takes place during the CMI.

There are three main components of a CMS:

1. - Identify potential remedial alternatives
2. - Screen potential remedial alternatives
3. - Evaluate or rank potential remedial alternatives

Identifying potential remedial alternatives is like brainstorming. It takes professional experience to know what kind of contaminants are out there and what works to clean them up. The next step is screening the potential remedial alternatives. Screening actually eliminates some of the options. For example, options can be eliminated because of the characteristics of a site or the waste at a site, or because a certain technology isn't reliable.

The third step is to rank the potential remedial alternatives. To do this, certain criteria must be evaluated. There are nine criteria, four are considered "primary" and must be met. The five remaining criteria are called "secondary."

Mr. Bowers showed an example of a table used to evaluate the different options. He explained that alternatives will be ranked by site, or group of sites. The Navy and environmental regulators will be asking the community for their input on the importance of the evaluation criteria so it can be factored into this process and used to rank the best cleanup option(s). Using this table is a way to put objective measurements into the process.

After the alternatives are ranked, a public comment period will be provided and a public meeting will be held to discuss the alternatives.

In preparation for Ms. Ragan's exercise, Mr. Bowers provided an explanation of each of the criteria:

Primary Criteria - must be met

Protect Human Health and the Environment - Cleanup may not be necessary to meet this criteria. For example, if contaminated drinking water was the problem at a particular site, providing residents with fresh drinking water from another source may be a viable solution.

Attain Cleanup Standards - State and/or federal regulations or risk factors require that contaminants be cleaned up to a level that is considered acceptable.

Control Source of Release - Remove or control the source of contamination.

Comply With Applicable Standards - The technology that is selected must meet applicable standards.

Secondary Criteria

Long-term Reliability and Effectiveness - Some treatment systems run for many years. Their long-term reliability and effectiveness must be considered.

Reduction in Toxicity, Mobility, and Volume - Although it seems like you would always want to meet this criteria, it is not always the best choice. For example, in the case of unexploded ordnance (UXO), it may be more risky to search, unearth, and decommission the UXO than to let it stay where it is.

Short-term Effectiveness - Most of the time, short-term effectiveness comes into play in a highly populated area where contamination may cause a high risk among residents or workers. It would be used to quickly reduce risk.

Implementability - How easy is it to implement the specific technology?

Cost - Considerations may include how much it will cost, and how much is in the budget for cleanup.

Ms. Priscilla Wendt asked if implementability includes technical feasibility? Mr. Bowers replied that if an alternative was not technically feasible, it would be screened out in the screening process.

Ms. Ragan lead an exercise to collect RAB and community member input. She hung up nine pieces of poster paper at the back of the room, each with one of the nine evaluation criteria written on it. Then she handed out seven star stickers to each RAB and community member. Each member was instructed that they should use each star as one vote to choose the criteria most important to them. All seven stars could be placed on one criteria, or one on each of seven, or any combination in between. Ms. Ragan said that after everybody has had the opportunity to stick their stars on the nine criteria posters, she will take the posters back to her office, tally up the results, and be ready to discuss them at the next RAB meeting in February.

After the exercise, a quick review revealed that the big winner among the nine criteria was protecting human health and the environment.

Follow-up Questions for North Charleston Council members regarding Chicora

Ms. Mallette asked Mr. Ray Anderson if he had any updates from the North Charleston City Council meeting regarding the Chicora Tank Farm issue. Mr. Anderson said that the Mayor had received the letter from the RAB stating their choice in closure options. Right now the City is looking at other park and recreational areas and considering those in their decisions about the Chicora property. No decisions have been made yet.

Mr. Fontenot added for clarification that the RAB supports partial demolition as the closure method for the tanks.

Mr. Jim Conner asked what will be done with the pipelines under the Chicora tank farm. Mr. Fontenot answered that they will be drained, cleaned, and grouted from both ends (meaning that they will be filled with an inert solid).

Ms. Greene asked if partial demolition is the final decision. Mr. Fontenot verified that it is not, because a decision can't be made about closure until a decision is made about reuse.

A question was asked that although Chicora Tank farm was recommended for no further action, it is located in Zone G, which will go through a Corrective Measures Study, so will Chicora be required to undergo a CMS? Mr. Fontenot replied that Chicora Tank Farm was not part of the RCRA Corrective Action process so it will not undergo the CMS. Ms. Ragan added that Chicora was investigated under a different regulatory program.

Ms. Greene asked members of the audience who live in close proximity to the Tank Farm to share their concerns about it. One gentleman was concerned about oil and gas contamination. Mr. Fontenot explained that environmental investigations were completed and no contamination was found that would require cleanup. SCDHEC supports that finding.

One guest asked what is in the tanks. Mr. Fontenot responded that all the tanks are empty with the exception of one that has some used oil in it. None of the tanks are in use. Another guest was concerned that the pipes have corroded over time and leaked oil. Again, Mr. Fontenot emphasized that environmental investigation have been completed and that no contamination was found that would require any cleanup.

One woman reported that she smells a strong odor of gas when she walks by the Tank Farm. Neither DHEC or the Navy knew where the odor was coming from.

Another guest asked who performed the environmental investigation at the Tank Farm. Mr. Fontenot answered that the study was completed in 1994 by an environmental contractor that was hired by the Navy. The investigation was required by and overseen by DHEC. After the study was completed, the Navy went through a year of quarterly monitoring to see if there were any releases to groundwater or soil. A copy of the report that details all the finding can be reviewed at the Dorchester Road branch of the Charleston Regional Library. Also, Mr. Fontenot has copies of the presentation that was given on the Chicora Tank Farm environmental investigation at the December RAB, and minutes from that meeting also discuss the issues that were addressed.

Mr. Pinckney asked if it would be possible to bring someone in to talk to the RAB and the community about environmental justice issues. Mr. Fontenot replied that he will talk to his Public Affairs Officer at Southern Division to see if they can arrange for it.

Another guest asked what will the demolished tanks be filled with, what will happen if the fill material settles and creates holes in the ground, and who will be responsible for it if it happens.

Mr. Fontenot answered that the tanks will be abandoned by caving the tanks in on themselves and then adding surrounding soil and a clay or man-made cap that will reduce permeability and keep water from seeping through it. The site will be graded to make sure it drains adequately.

A woman from the audience asked if there were any other similar cases to this. Mr. Fontenot said that he knows of solid waste landfills being capped and turned into recreational facilities (Mt. Trashmore in Virginia) but can't think of any other Navy sites.

Mr. Fontenot reiterated that environmental issues have been investigated and no contamination was found in either soil or water that would require any cleanup. The current issue at Chicora is the closure of the tanks - how to close them so the property can be reused.

8. Introduction of the New EPA Representative

Mr. Doyle Brittain introduced Mr. Jay Bassett who will be replacing Mr. Brittain as the EPA representative of the Charleston RAB. This will be Mr. Brittain's last meeting and he shared that he has enjoyed working with the RAB. He said he feels that a lot of progress has been made at Naval Base Charleston and in fact next month, one of the agenda items will include a discussion of the progress that has been made over the last few years. Mr. Bassett is very experienced in this process and will not require a training period. However, Mr. Brittain suggested that the RAB help Mr. Bassett by informing him about their specific concerns. Mr. Brittain thanked the RAB and added that he has enjoyed the opportunity of working with them.

On behalf of the entire RAB, Ms. Mallette welcomed Mr. Bassett and thanked Mr. Brittain for all his support and service which was met with a round of applause.

Ms. Ragan stated that DHEC is having a plaque made for Mr. Brittain because he has vested so much personally and professionally in this project. On behalf of DHEC and South Carolina Ms. Ragan thanked Mr. Brittain and wished him well.

9. Remaining Questions and Comments

One gentleman in the audience asked how he could be informed of upcoming meetings. Mr. Fontenot asked him and anyone else who is interested to provide their name and address at the back table and they will be added to the mailing list.

Ms. Mallette asked for a show of hands from RAB members if they felt the current location is a good place for upcoming meetings.

10. Adjournment

Ms. Mallette thanked the community members for coming out to the meeting, and said that it was one of the largest turnouts for community members in a long time.