DRAFT ENVIRONMENTAL ASSESSMENT REPORT FOR BUILDING S237 MILLINGTON SUPPACT TN

11/12/1992

MEMPHIS ENVIRONMENTAL CENTER, INC.

ENVIRONMENT ASSESSMENT REPORT
BUILDING S-237
FACILITY ID NUMBER: 9-791685
NAVAL AIR STATION MEMPHIS

Contract: N62467-92-D-4507
Delivery Order: Intial Contract

Prepared for:

Public Works Department
Environmental Division
Naval Air Station Memphis
P. O. Box 54306
Millington, TN 38054

Prepared by:

Memphis Environmental Center, Inc.
2603 Corporate Avenue, Suite 100
Memphis, TN 38132

Under Subcontract to:

ETI Corporation
6799 Great Oaks Road, Suite 100
Memphis, TN 38138

DRAFT

ETI Project No. 92046-00
November 12, 1992

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EXECUTIVE SUMMARY

This Environmental Assessment Report (EAR) is being submitted to the Tennessee Department of Environment and Conservation (TDEC), Division of Underground Storage Tanks *(Memphis office)*, to summarize the sampling methodology and analytical protocols utilized to define the extent of petroleum contamination in the subsurface soil and ground water at Building S-237 located at the Naval Air Station, Memphis in Millington, Tennessee (Site). The Environmental Assessment Report Guidelines provided during the January 1992 Underground Storage Tank Conference were used as a model during the EAR preparation.

Eleven soil borings were performed at the Site to define the horizontal and vertical extent of contamination. Soil samples were collected at each boring location and 36 samples were submitted for total petroleum hydrocarbons (TPH) analysis. Four of the soil samples were determined to contain concentrations of TPH above the most stringent TDEC action level for soil of 100 parts per million (ppm).

Six monitoring wells were installed and sampled to define the horizontal extent of ground water contamination. The ground water samples were analyzed for TPH. Review of the laboratory data indicates that the contaminant plume was defined and figures are included in the EAR to confirm this statement.

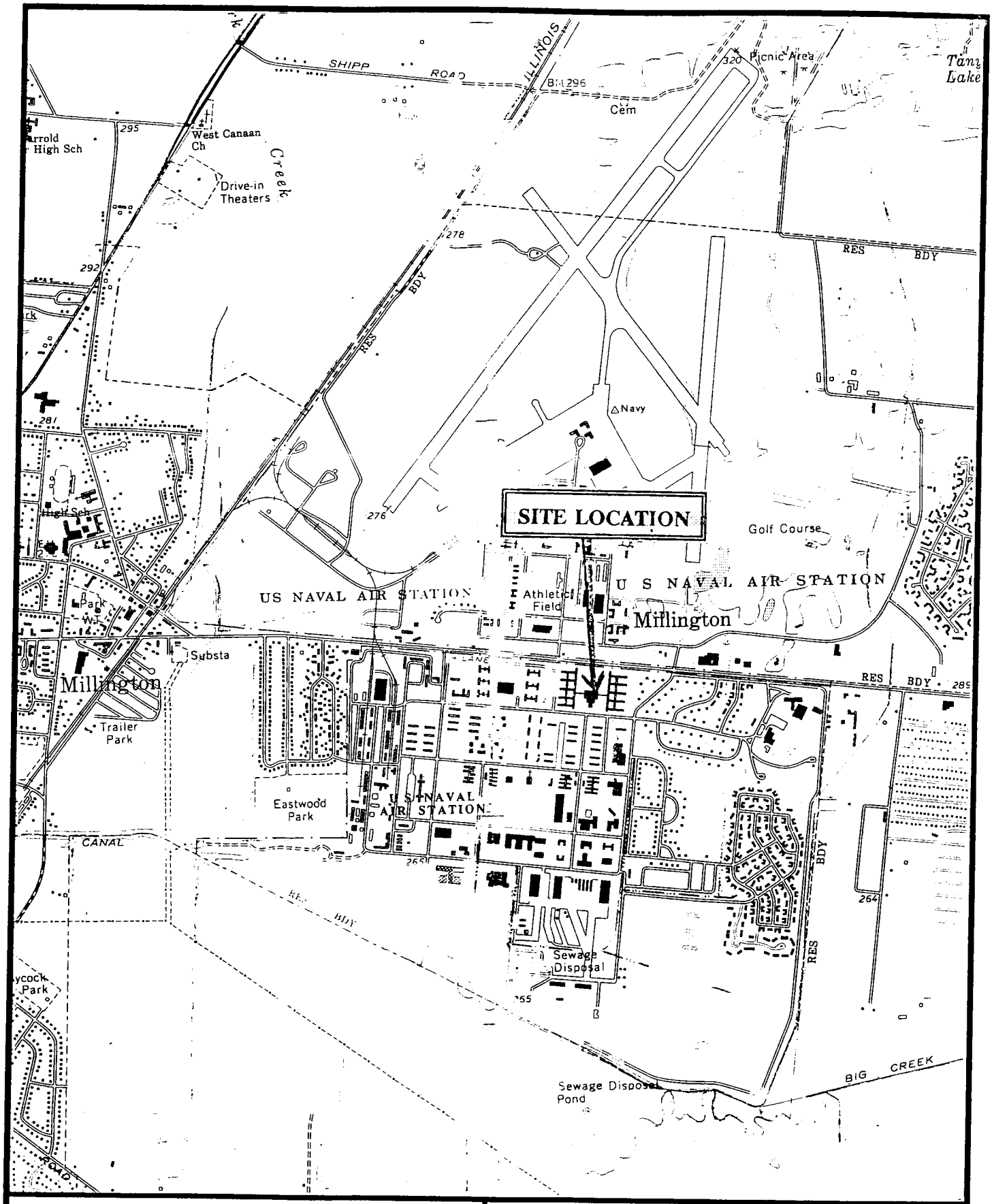
Data generated during the Assessment implementation and EAR preparation will be used in the compilation of the Corrective Action Plan.

GW clean up law 1 PPM TPH
Soil 500 PPM

1.0 INTRODUCTION

This document provides a description of the field and laboratory activities performed during the implementation of an Environmental Assessment (Assessment) at Building S-237 at the Naval Air Station-Memphis (NAS-Memphis) in Millington, Shelby County, Tennessee (Site), as shown in ***Figure 1*** *(following page 1)*. ETI Corporation (ETI) was retained by the NAS-Memphis, Public Works Engineering Division to implement the Assessment and ETI subcontracted the work to Memphis Environmental Center, Inc. (MEC). This Environmental Assessment Report (EAR) outlines procedures and sampling methods utilized by MEC during the implementation of the Assessment and presents the results of laboratory analysis performed on soil and ground water samples.

During March 1991, new piping was being laid to the 550-gallon, steel diesel fuel underground storage tank (UST) at the Site. The UST system served as a fuel supply for an emergency generator which was located at the facility. During the system upgrade, technicians of NAS-Memphis observed that the top of the UST was rusted and damaged. The installation was halted and a visual inspection of the UST was performed which revealed that significant corrosion had affected the integrity of the UST and, therefore, removal was warranted. A representative of Environmental and Safety Designs, Inc. (ENSAFE) collected three soil samples from the excavation after the UST removal and the samples were analyzed for total petroleum hydrocarbons (TPH). The soil samples contained concentrations of TPH of 557 parts per million (ppm), 1,540 ppm and 957 ppm, respectively.



MEMPHIS ENVIRONMENTAL CENTER, INC.	FIGURE 1 SITE LOCATION DIAGRAM NAVAL AIR STATION BUILDING S-237 FACILITY ID NO.: 9-791685 MILLINGTON, TENNESSEE
DWG. NO. BP\BORDER DRAWN: DKD DATE: NOVEMBER 5, 1992	2603 Corporate Avenue, Suite 100 Memphis, Tennessee 38132

2.0 SITE LOCATION

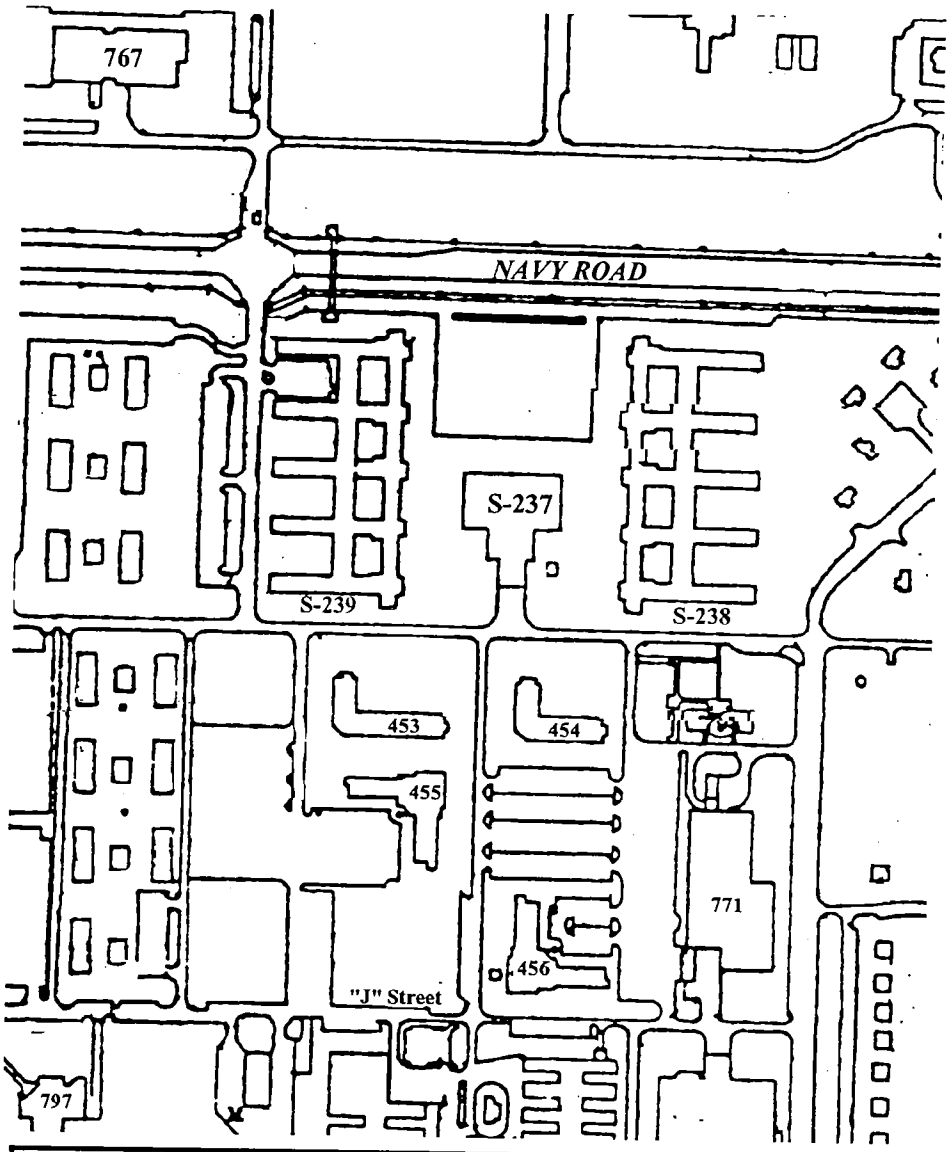
The Site is located in the northern portion of the NAS-Memphis base. ***Figure 1*** *(following page 1)* shows the general location of the Site. ***Figure 2*** *(following page 2)* outlines the location of the Site with others buildings at NAS-Memphis.

According to the United States Geological Survey quadrangle, the Site elevation is approximately 270 to 275 feet. As shown in ***Figure 1*** *(following page 1)*, the areas surrounding the Site are at elevations of 260 feet (*south*) to 280 feet (*north and east*). ***Figure 3A*** *(following page 2)* outlines the location or utilities in the vicinity of the Site.

3.0 GROUND WATER INVESTIGATION

3.1 General

Six monitoring wells were installed to define the extent and degree of ground water contamination at the Site. Professional Service Industries, Inc., under the direction of MEC, installed five of the monitoring wells. A representative of MEC installed the sixth monitoring well using hand-auger techniques. ***Figure 3B*** *(following page 2)* shows the monitoring well locations.



STRUCTURE INDEX

NO.	DESCRIPTION
S-237	Data Processing Center
S-238	Marine HQ/Restricted BKS/NIS
S-239	Adminstration
453	HEQ
454	HEQ
455	Barracks
456	Barracks
767	Theater
771	Dispensary and Dental Clinic
797	Hobby Shop

MEMPHIS ENVIRONMENTAL CENTER, INC.

2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO.: PM4/NAVAL002	
DRAWN: DKD	
DATE: NOV. 10, 1992	

FIGURE 2
VICINITY MAP
NAVAL AIR STATION; BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

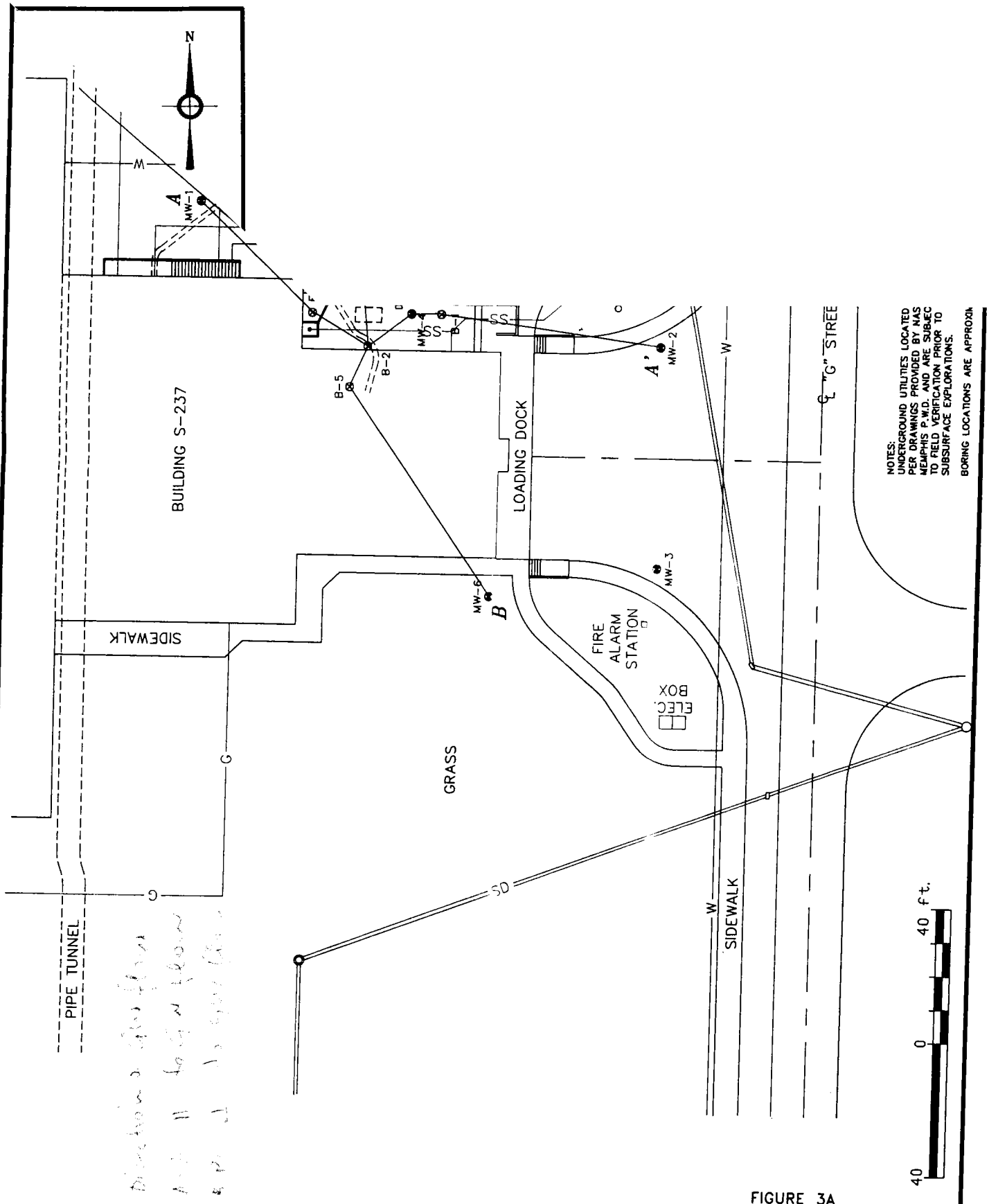


FIGURE 3A

MEMPHIS ENVIRONMENTAL CENTER, INC. 3603 Corporate Avenue, Suite 100 Memphis, Tennessee 38132		REV. NO.	DESCRIPTION	REV.	CHECKED BY	DATE
DWG. NO.: NAVAL001	SITE NO.: 374					
DRAWN BY: DKD	CHECKED BY:					
DATE: NOVEMBER 2, 1992	DATE:					

SUBSURFACE SOIL CROSS SECTION/
UTILITY DIAGRAM
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

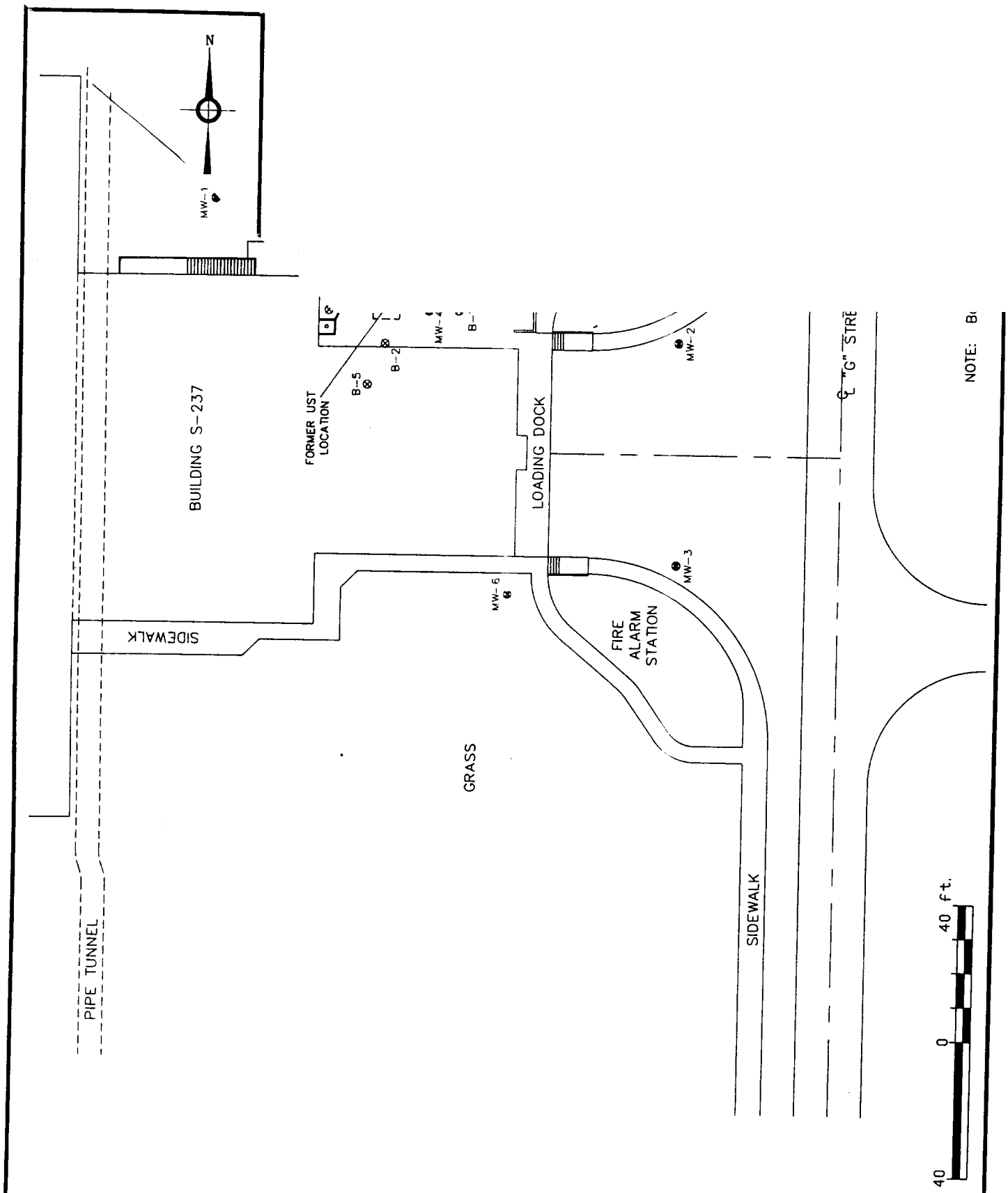


FIGURE 3B

MEMPHIS ENVIRONMENTAL CENTER, INC.		REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE
2503 Corporate Avenue, Suite 100 Memphis, Tennessee 38132						
DWG. NO.: NAVAL001	SITE NO.: 374					
DRAWN BY: DKD	CHECKED BY:					
DATE: NOVEMBER 2, 1992	DATE:					

MONITORING WELL/BORING LOCATION DIAGRAM
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

On September 22 and 23, 1992, the initial four monitoring wells *(MW1 through MW4)* were placed around the former UST excavation. Ground water samples were recovered from each of the monitoring wells and analyzed for TPH. The analytical results indicated levels of TPH in MW4 above the Tennessee Department of Environment and Conservation, Division of Underground Storage Tanks, (TDEC) action level of 100 parts per billion (ppb) for ground water which is utilized for drinking water.

To further define the extent of hydrocarbons in the ground water, two additional wells (*MW5 and MW6*) were emplaced on October 13, 1992, as part of Phase II of the Environmental Assessment. The concentration of TPH detected in the ground water from MW5 and MW6 were below TDEC's action level.

Each monitoring well was surveyed to locate the vertical and horizontal coordinates. The elevations of each well are presented in ***Table 1*** *(following page 3)*.

3.2 Regional Hydrogeology

A review of periodicals and reference material (***Appendix A***) revealed that four aquifers exist in the Memphis area. These are, in a depositional younger to older sequence: alluvium, fluvial (terrace deposits), Memphis Sand, and Fort Pillow Sand. In the area of the Site, the shallow aquifer is comprised of fluvial deposits.

TABLE 1
SUMMARY OF SURVEY DATA & GROUND WATER MEASUREMENTS

NAVAL AIR STATION
Building S-237
Millington, Tennessee
Facility I.D. Number: 9-791685

Monitoring Well Number	Well Depth (feet)	Screen Interval (feet)	Depth to Ground Water (feet)	Ground Water Elevation (feet)	Well Elevation (feet)	Measurement Date
MW1	16.00	6.0 - 16.0	8.97	92.81	101.78	9-26-92
MW2	15.00	5.0 - 15.0	3.71	92.68	96.39	9-26-92
MW3	15.00	5.0 - 15.0	3.65	92.75	96.40	9-26-92
MW4	10.00	5.0 - 10.0	5.93	93.48	99.41	9-26-92
MW1	16.00	6.0 - 16.0	9.69	92.09	101.78	10-15-92
MW2	15.00	5.0 - 15.0	4.47	91.92	96.39	10-15-92
MW3	15.00	5.0 - 15.0	4.26	92.14	96.40	10-15-92
MW4	10.00	5.0 - 10.0	7.07	92.34	99.41	10-15-92
MW5	15.00	5.0 - 15.0	9.03	92.25	101.28	10-15-92
MW6	15.00	5.0 - 15.0	10.25	91.85	102.10	10-15-92

Notes:
1. No free product was detected during the site visits.
2. An oil/water interface probe was used to determine if free product was present.
3. Southeast corner of building was used as a benchmark. Elevation was assumed as 100.00.

These deposits are considered to be remnant terraces of ancestral graded streams. Regionally, the shallow aquifer is separated from the deeper Memphis and Fort Pillow Sands by the Jackson-Upper Claiborne confining unit.

3.3 Site Hydrogeology

Ground water elevations were measured on September 26 and October 15, 1992. The results of each measurement are included on the individual Monitoring Well Construction Diagrams in ***Appendix C***. The ground water elevations from the site visit of October 15, 1992, were plotted and the ground water contours developed using *Quicksurf Version 2.6* as shown in ***Figure 4*** *(following page 4)*.

Quicksurf is a contouring program developed by Scheiber Instruments, Inc. Quicksurf requires that the data be entered as cartesian coordinates. The well locations are reported as "x-y" coordinates and the ground water elevation is entered as the "z" coordinate. To assure accuracy, a density of 100 is used for the grid. Quicksurf builds a network of triangles that connect all control points in an optimal pattern. The shape and curvature of the surface at each control point is calculated by examining the neighboring points. A polynomial is defined for each triangle which honors slope, curvature and the three vertices, so that the entire surface is a "patchwork" of polynomials that honors the control points and has a continuous slope

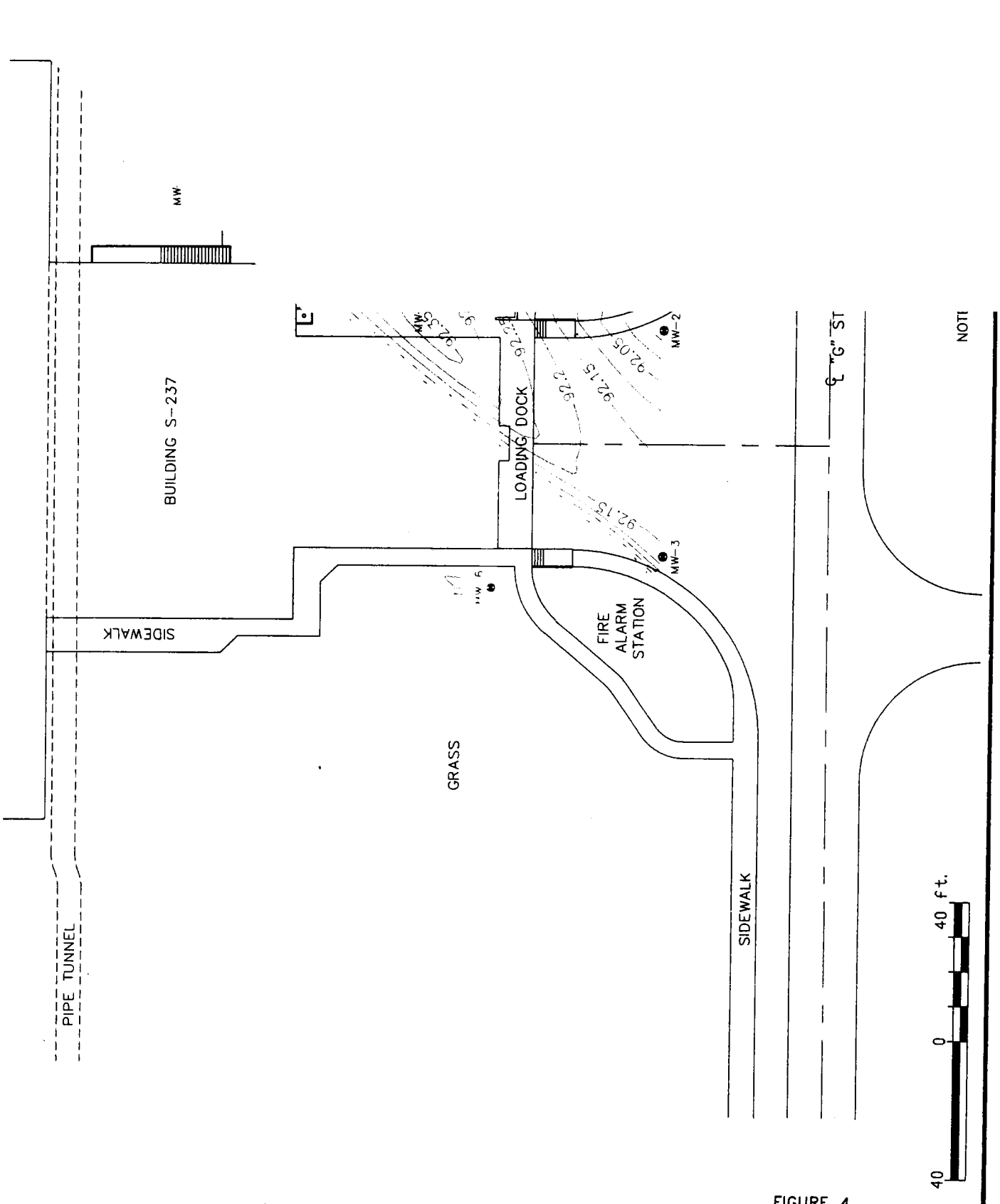


FIGURE 4

MEMPHIS ENVIRONMENTAL CENTER, INC. 2603 Corporate Avenue, Suite 100 Memphis, Tennessee 38132		REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE	GROUND WATER CONTOUR DIAGRAM (10/15/92) NAVAL AIR STATION BUILDING S-237 FACILITY ID NO.: 9-791685 MILLINGTON, TENNESSEE
DWG. NO.: NAVAL001	SITE NO.: 374						
DRAWN BY: DKD	CHECKED BY:						
DATE: NOVEMBER 2, 1992	DATE:						

and curvature. This surface model is used to build a grid and contours are generated by linear interpolation throughout the grid.

Review of the water level data indicates that mounding of the ground water table is occurring at the former UST excavation. The contours generally show that ground water flow is towards the south-southwest.

The hydraulic gradient ***(i)***, was determined by subtracting the difference in head between an up-gradient and a down-gradient well, divided by the distance between the two points. The gradient at the Site is 0.001 (between MW1 and MW2). Gradient calculations are presented in ***Appendix B***.

A slug test was performed to determine the hydraulic conductivity ***(K)***. A slug test is conducted by measuring static water levels within a borehole or monitoring well. A slug *(a solid length of teflon)* is lowered below the water table. Immediately after the slug is lowered, the water level is measured at timed intervals as the water level returns to the static level. The data is reduced by determining the ratio of the initial rise above static level ***(H_o and H)*** and the level of water at same time ***(t)***. The data is plotted by computing the ratio H/H_o plotted versus time on semi-logarithmic paper.

The transmissive zone in the vicinity of this well was determined to have a hydraulic conductivity of 2.11 feet per day *(geometric mean)*. Slug test data were reduced using the Hvorslev method and are presented in ***Appendix B***.

The Darcian Flux ***(Q)***, or volume of water discharged beneath the site, was calculated using the following equation and incorporating ***(i)*** and ***(K)***:

Q = KiA;

where A = Area of aquifer material

The calculated Darcian Flux is 1.53 cubic feet per day, or 11.49 gallons per day.

The Darcian Velocity, an average of the velocities of the ground water within the aquifer pore spaces, was calculated using the following formula:

v = Q/A;

where v = Darcian Velocity

The Darcian Velocity was calculated to be 0.002 feet per day.

The average linear velocity, an average of the velocity of ground water in the aquifer pore spaces relative to the porosity of the aquifer, was calculated using the following formula:

$$V = Q/nA;$$

where V = Average Linear Velocity

n = porosity of the aquifer material

The calculated average linear velocity was 0.007 feet per day. The rate at which ground water apparently travels beneath the site is 0.007 feet per day or 2.6 feet per year. Calculations for Q, v and V are presented in ***Appendix B***.

3.4 Monitoring Well Construction

The monitoring wells were constructed using either 5 to 10 feet of ten-slot, 2-inch diameter PVC well screen joined to 2-inch diameter, schedule 40 PVC riser with threaded joints. A 20-40 grade sand was placed in the annular space to approximately 1 to 2 feet above the well screen. A bentonite pellet seal approximately 2 feet thick was placed above the sand pack and hydrated prior to

backfilling the annulus with a bentonite-portland cement grout. The well was finished by adding a steel protective cover with a locking cap embedded in concrete. A construction diagram for each monitoring well, along with a soil profile, are contained in ***Appendix C.***

A summary of each well construction is also provided in ***Table 1*** *(following page 3)*

3.5 Well Development

The monitoring wells were developed with a disposable bottom filling bailer. Development continued until a minimum of seven well volumes were removed or to dryness, whichever occurred first. All water removed from the monitoring wells was placed in 55-gallon drums and staged at the Site until an appropriate disposal method was determined.

3.6 Ground Water Sampling

Purging of the well prior to sampling continued until three well volumes were bailed or to dryness, whichever occurred first. The purge water was collected and stored in the same manner as the well development water. Samples were

collected by using a disposable bottom filling bailer attached to a nylon rope. The water level in each well was measured prior to purging or sampling.

The samples for TPH analysis were placed in 1-liter glass amber bottles. The samples were immediately stored in an ice-filled cooler maintained at 4° Centigrade prior to shipment to the laboratory for analysis. Each sample was assigned a unique number and labeled. The standard chain of custody procedures were followed from the time of sampling to completion of laboratory analysis. Copies of the chain of custody forms are presented in ***Appendix D.***

3.7 Ground Water Analysis

The ground water samples were transported to MEC's laboratory and analyzed for TPH. The procedures provided in the State of Tennessee Diesel Range Organics (DRO) and Gasoline Range Organics (GRO) methods were used to analyze the ground water samples.

Table 2 *(following page 9)* presents a summary of the analytical data for ground water. The analytical reports are included in ***Appendix E.***

TABLE 2
SUMMARY OF LABORATORY ANALYSIS PERFORMED ON GROUND WATER SAMPLES

NAVAL AIR STATION
Building S-237
Millington, Tennessee
Facility I.D. Number: 9-791685

Sample Number	Monitoring Well Number	Sampling Date	Analytical Results (ppb)			Limit of Quantitation/Detection (ppb)	
			Benzene	BTX	TPH (DRO)	Benzene	TPH (DRO)
092692-JJ-01	MW1	9-26-92	N/A	N/A	90.3	5	50
092692-JJ-02	MW1 (dup)	9-26-92	N/A	N/A	ND	5	50
092692-JJ-05	MW2	9-26-92	N/A	N/A	ND	5	50
092692-JJ-04	MW3	9-26-92	N/A	N/A	ND	5	50
092692-JJ-03	MW4	9-26-92	N/A	N/A	17,700[a]	5	50
101592-MR-01	MW5	10-15-92	N/A	N/A	ND	5	50
101592-MR-02	MW5 (dup)	10-15-92	N/A	N/A	ND	5	50
101592-MR-03	MW6	10-15-92	N/A	N/A	117	5	50

[a] Limit of detection was 10 times the value stated
DRO = Diesel Range Organics
N/A = Not Analyzed for Listed Parameter

ppb = parts per billion
ND = Non-Detected

3.8 Ground Water Level Data

As stated in *Section 3.2*, ground water elevations were measured on September 26 and October 15, 1992. The results of each measurement are presented on the monitoring well construction diagrams in ***Appendix C***.

3.9 Ground Water Classification

3.9.1 Water Use Survey

NAS-Memphis Public Works Engineering Division personnel reviewed available records to determine the existence of drinking water wells in an approximate 1-mile radius of the Site. This review revealed that two wells were located in the search area. According to the drillers log, these wells are 1,460 feet and 1,542 feet deep. Copies of the water well drillers logs are included in ***Appendix F***.

3.9.2 Ground Water Sampling

On September 28, 1992, a sample was collected from MW1 and submitted for iron, manganese, zinc and copper analysis. The laboratory analysis showed the sample to have an iron concentration at 28.1 ppm and manganese concentration at 4.6 ppm. The secondary drinking water standards

for iron and manganese are 0.3 and 0.05 ppm, respectively. The analytical report for these analyses has been included in ***Appendix G.***

3.9.3 Conclusion

It is believed that the aquifer at this site should be classified as non-drinking water and a cleanup objective of 1,000 ppb of TPH should be established. This conclusion is based upon the fact that no drinking water well within a 1/2-mile radius of the Site is screened in this aquifer, and because the ground water sample from MW1 exceeded the secondary drinking water standard for manganese and iron.

3.10 Ground Water Contaminant Plume Maps

Figures 5 and ***6*** *(following page 11)* depict the horizontal limits of TPH contamination identified in the ground water samples. ***Figure 7*** *(following page 11)* depicts the vertical extent of TPH in the ground water.

FIGURE 5

MEMPHIS ENVIRONMENTAL CENTER, INC.		REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE	TPH CONCENTRATION DIAGRAM (GROUND WATER) NAVAL AIR STATION BUILDING S-237 FACILITY ID NO.: 9-791685 MILLINGTON, TENNESSEE
2803 Corporate Avenue, Suite 100 Memphis, Tennessee 38132							
DWG. NO.: NAVAL001	SITE NO.: 374						
DRAWN BY: DKD	CHECKED BY:						
DATE: NOVEMBER 2, 1992	DATE:						

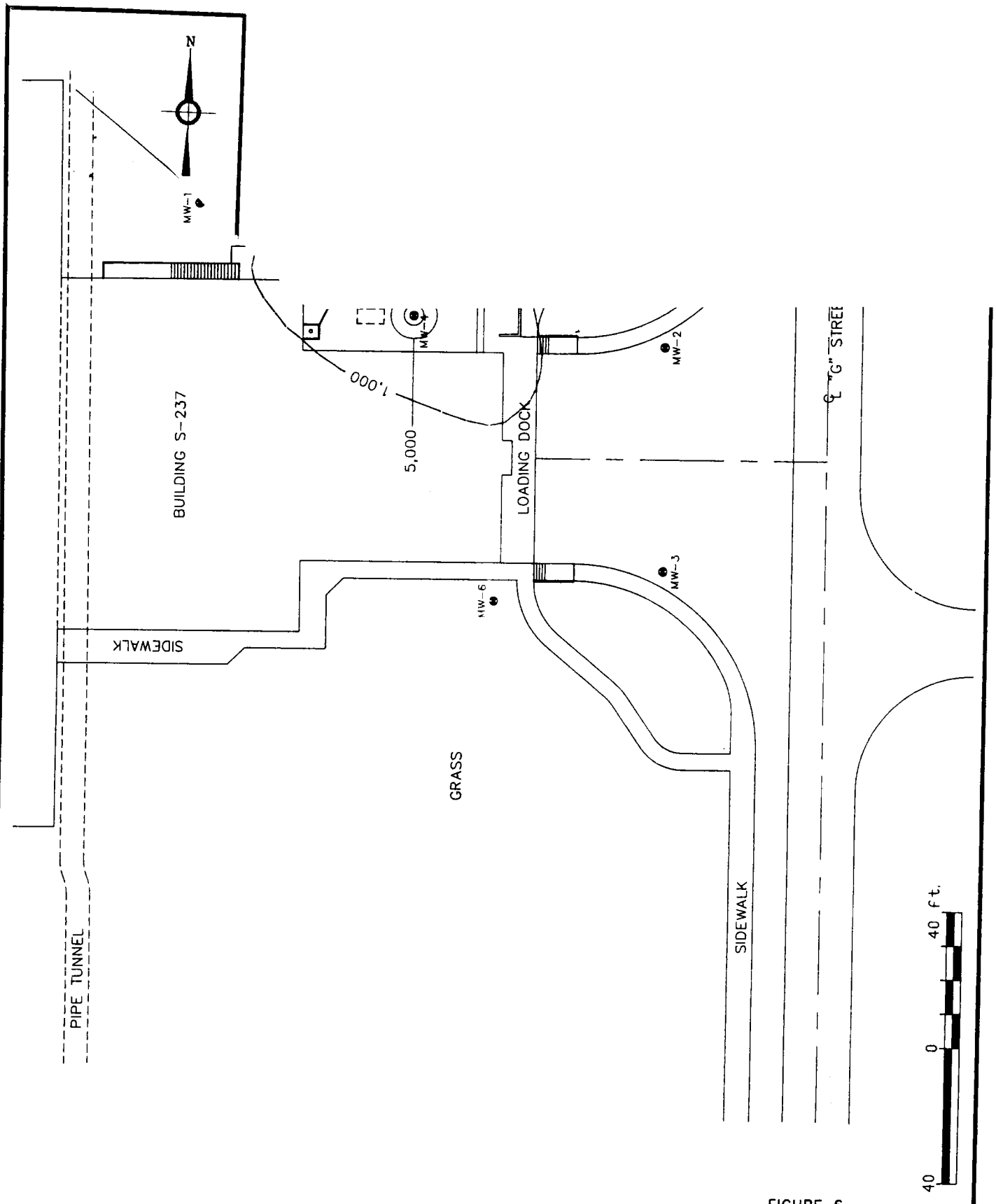
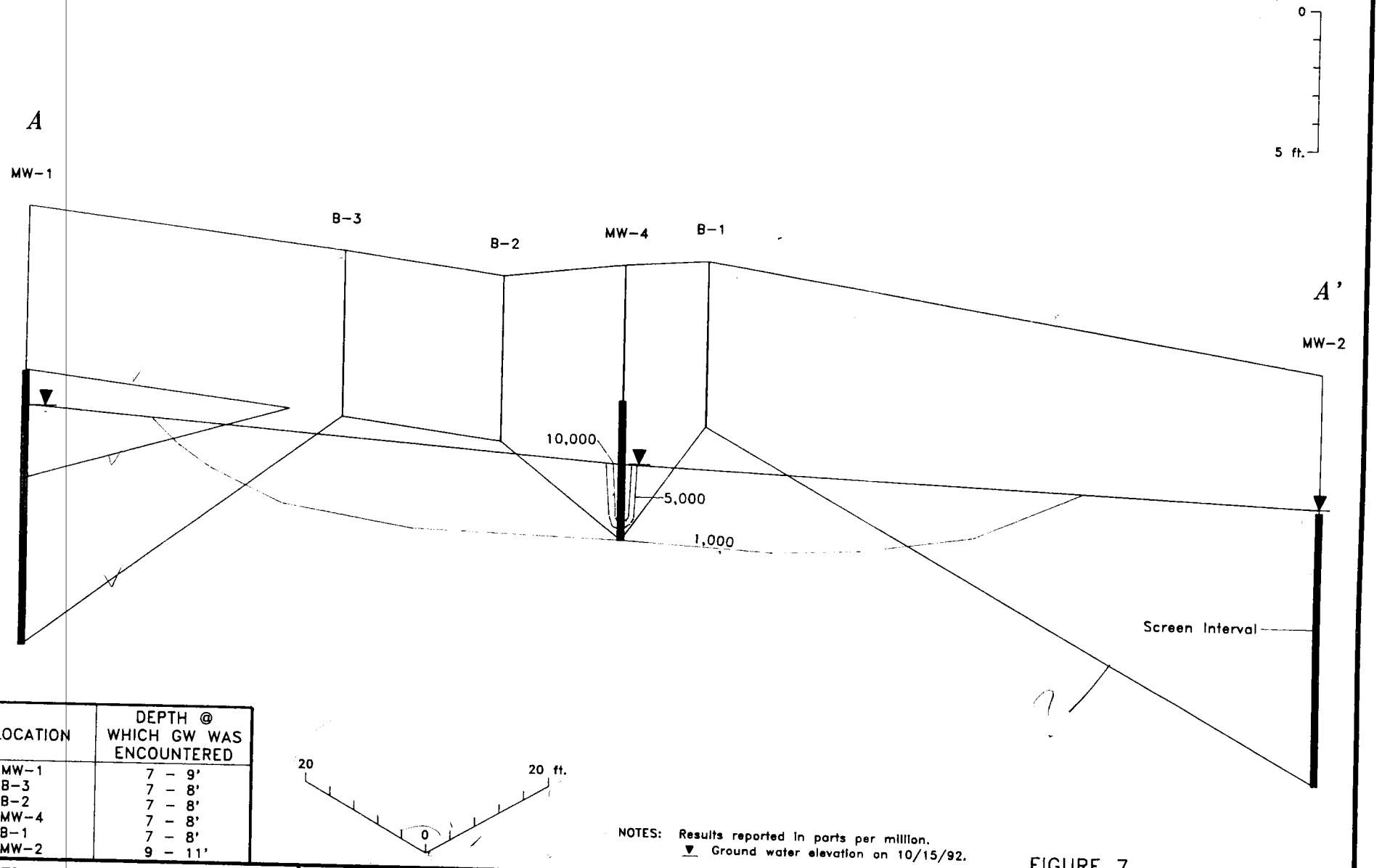


FIGURE 6

MEMPHIS ENVIRONMENTAL CENTER, INC. 2603 Corporate Avenue, Suite 100 Memphis, Tennessee 38132		REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE	TPH CONCENTRATION CONTOUR DIAGRAM (GROUND WATER) NAVAL AIR STATION BUILDING S-237 FACILITY ID NO.: 9-791685 MILLINGTON, TENNESSEE
DWG. NO.: NAVAL001	SITE NO.: 374						
DRAWN BY: DKD	CHECKED BY:						
DATE: NOVEMBER 2, 1992	DATE:						



LOCATION	DEPTH @ WHICH GW WAS ENCOUNTERED
MW-1	7 - 9'
B-3	7 - 8'
B-2	7 - 8'
MW-4	7 - 8'
B-1	7 - 8'
MW-2	9 - 11'

NOTES: Results reported in parts per million.
▼ Ground water elevation on 10/15/92.

FIGURE 7

TPH CONCENTRATION IN GROUND WATER
CROSS SECTION A-A'
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

MEMPHIS ENVIRONMENTAL CENTER, INC.
2803 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO.: NAVALAA	SITE NO.: 374
DRAWN BY: DKD	CHECKED BY:
DATE: NOVEMBER 9, 1992	DATE:

REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE

4.0 SOIL INVESTIGATION

4.1 Regional Geology

Shelby County lies within the Gulf Coastal Plain Province which includes the Mississippi Embayment Physiographic subdivision. The eastern 3/4 of the Shelby County area are characterized by sediments of the Gulf Coastal Plain and the western 1/4 sediments are characteristic of the Mississippi Embayment sediments. The principal river in the area is the Mississippi with local tributaries being the Wolf and Loosahatchie Rivers, and Nonconnah Creek.

The Mississippi Embayment is flat lying and is characterized by features of fluvial deposition: point bar deposits, abandoned channels, and natural levees which occupy a structural trough trending north-south along the axis of the Mississippi River.

As much as 3,000 feet of unconsolidated deposits (consisting chiefly of sand, clay, gravel and lignite) overlie the Paleozoic carbonate bedrock in the Memphis area. Only the formations in the upper 1,000 feet are significant to this investigation.

From youngest to oldest are recent alluvium, Pleistocene loess, Pleistocene and Pliocene alluvium and fluvial deposits, the Eocene clay deposits, and the Memphis Sand.

Alluvium - The surficial alluvium consists of heterogeneous accumulations of clay, silt, sand and gravel deposited by modern streams and their ancient counterparts. The irregular shape and discontinuity are reflective of the cyclical flow regimes and depositional history of the streams. The thickness of the alluvium ranges from 0 to 175 feet.

Pleistocene Loess - Loess deposits are wind blown silts of Pleistocene age and are considered to be a glaciation product. Weathering of the silts has caused the secondary formation of clay minerals, thus lowering the permeability of this unit.

Pleistocene and Pliocene Alluvium and Fluvial Deposits - These deposits are similar to the recent alluvium, and are laterally continuous in the Memphis area. These deposits are thought to be remnant terraces of ancestral graded streams.

Eocene Clay Formations - Underlying the fluvial deposits are clays with minor lenses and interbeds of fine sand and lignite. This clay formation is of late Eocene Age and, based on borehole records, cannot be differentiated into the Jackson Formation, Cookfield Formation or the Cook Mountain Formation of the Upper

Claiborne Group. In this narrative, as in other documents, this unit will be referred to as the Jackson Clay. This unit effectively serves as the base of the shallow flow system.

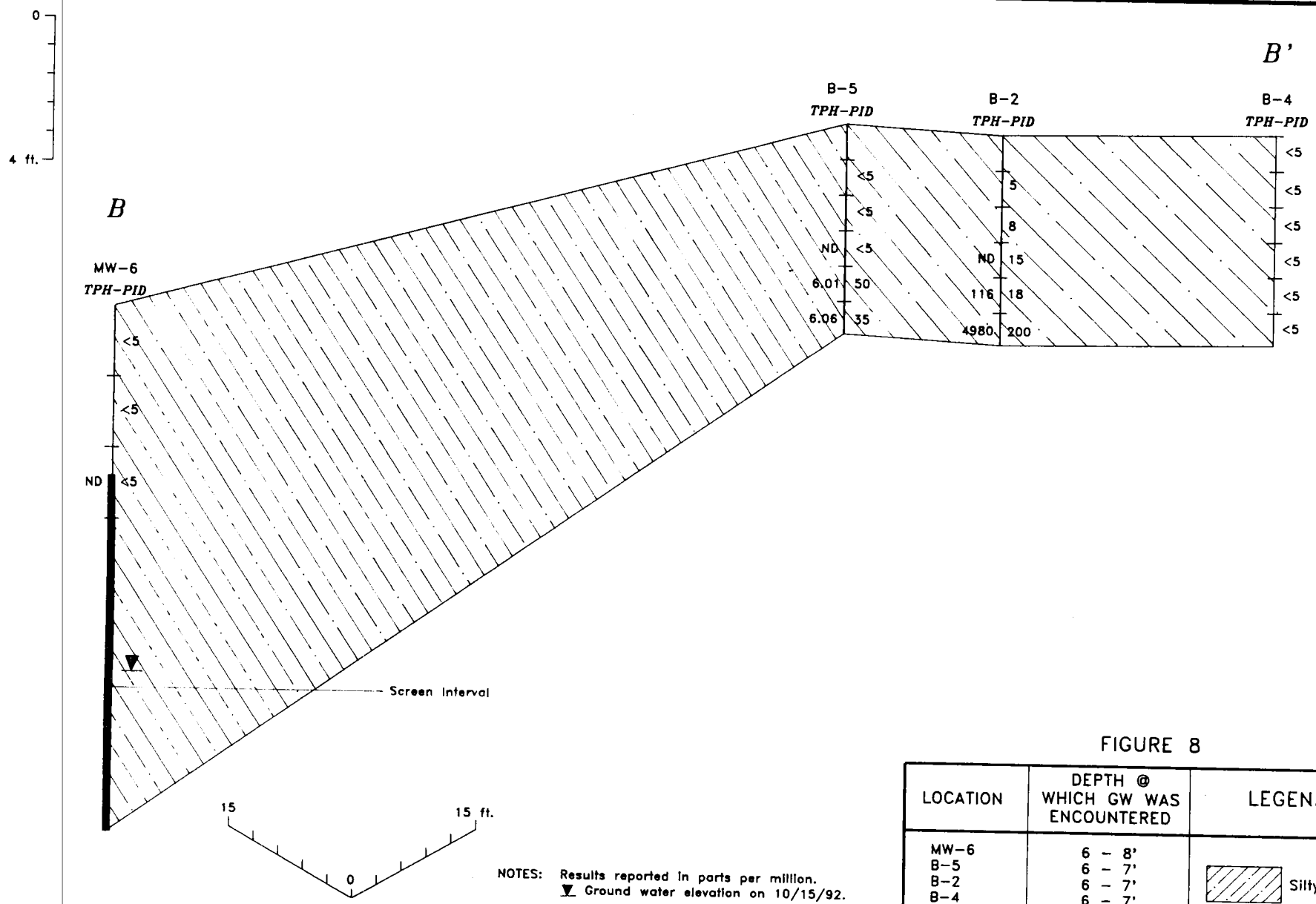
The Jackson Clay was deposited during the most recent marine transgressive sequence into the Mississippi Embayment. The upper surface of this unit is erosional and the lower contact is poorly defined. Observed thickness of this unit ranges from 0 to 330 feet in the Memphis area.

4.2 Site Geology

The soils at the Site generally consist of silty clays. A fine to coarse sand layer was encountered between 6 and 10 feet at MW1. Boring logs were developed from each monitoring well and soil boring performed at the Site. Stratigraphic cross-sections developed from the boring logs are presented as ***Figures 8*** and ***9*** *(following page 14)*.

4.3 Soil Boring Results

The soil borings were continuously advanced using a truck mounted drill rig, hollow stem auger and split-barrel samplers for MW1, MW2, MW3, MW5 and MW6. One monitoring well and all of the soil borings (*B1 through B5*) were advanced via



NOTES: Results reported in parts per million.
▼ Ground water elevation on 10/15/92.

FIGURE 8

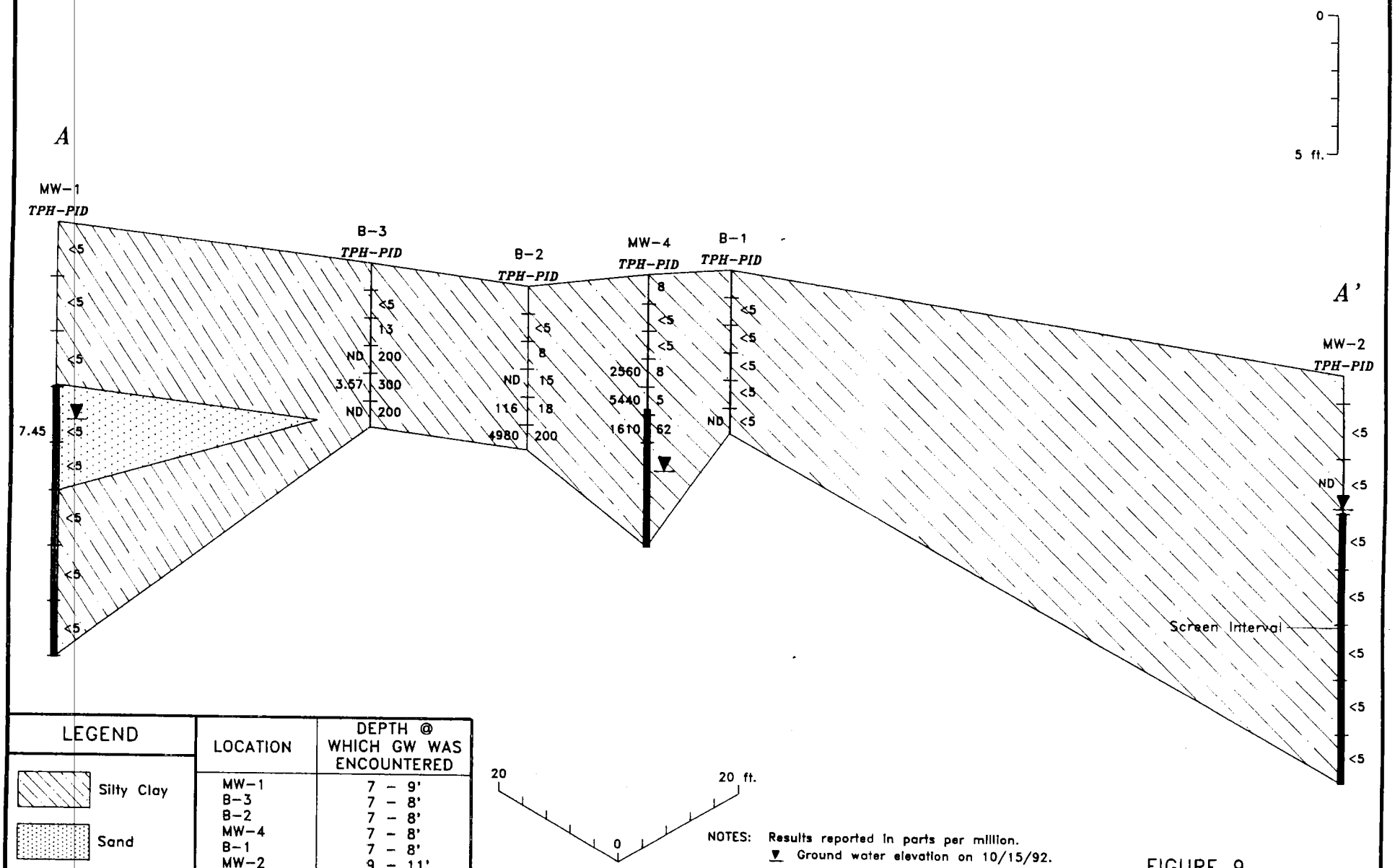
LOCATION	DEPTH @ WHICH GW WAS ENCOUNTERED	LEGEND
MW-6	6 – 8'	
B-5	6 – 7'	
B-2	6 – 7'	
B-4	6 – 7'	Silty Clay

SUBSURFACE SOIL CROSS SECTION B-B'
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

MEMPHIS ENVIRONMENTAL CENTER, INC.
2803 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE

DWG. NO.: SITE NO.:
DRAWN BY: CHECKED BY:
DATE: DATE:



LEGEND	LOCATION	DEPTH @ WHICH GW WAS ENCOUNTERED
Silty Clay	MW-1	7 – 9'
Sand	B-3	7 – 8'
	B-2	7 – 8'
	MW-4	7 – 8'
	B-1	7 – 8'
	MW-2	9 – 11'

NOTES: Results reported in parts per million.
▼ Ground water elevation on 10/15/92.

FIGURE 9

MEMPHIS ENVIRONMENTAL CENTER, INC.
2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO.: NAVALAA	SITE NO.: 374
DRAWN BY: DKD	CHECKED BY:
DATE: NOVEMBER 9, 1992	DATE:

REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE

SUBSURFACE SOIL CROSS SECTION A–A'
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

a stainless steel hand-auger. Borings B1 through B5 were installed to assist in the delineation of the subsurface soil contamination. Soil samples were collected at 2-foot intervals at each of the boring locations. The soil boring log for each boring is presented in ***Appendix H.***

4.4 Analytical Results

The soil samples were removed from the sampler or the bucket from the hand-auger and placed on clean aluminum foil. The exterior portion of each sample was trimmed to remove any smear. Soils were classified in accordance with the Unified Soils Classification System prior to placement in 125 ml sample jars. The 125 ml samples were placed in a cooler with ice for shipment to the analytical laboratory.

Approximately 1/8 of a second 125 ml sample jar was filled with soil to perform a headspace analysis. The sample was kept out of direct sunlight and allowed to equilibrate at ambient temperature prior to the analysis. To obtain consistent headspace results, uniform soil volumes were used. The results of the soil classification and the headspace test results are presented on the soil boring logs included in ***Appendix H.***

Selected soil samples were submitted to the MEC laboratory for TPH analysis. The sample selection was based upon the headspace readings and the sample collection point *(i.e., bottom sample, highest headspace or soil ground water interface)*. Samples were shipped to the analytical laboratory under standard chain of custody procedures. Copies of the chain of custody forms are included in ***Appendix D.***

The State of Tennessee DRO and GRO methods were utilized to determine the TPH content of the soil samples. The 3-4, 4-5 and 5-6 foot samples from MW4 and the 5-6 foot sample from B-2 contained TPH which exceeded the 100 ppm TDEC action level. The results of the laboratory analysis are summarized on ***Table 3*** *(following page 16)*. The laboratory reports are included in ***Appendix E.***

4.5 Soil Clean-up Levels

Two shelby tube samples for permeability analysis were collected from a boring installed in the area of MW4. The borehole was advanced to the sampling depth with a stainless steel hand-auger. The shelby tubes were obtained from the 3-5 foot and 5-7 foot interval. The ends of the shelby tubes were capped, secured with duct tape upon removal from the soil boring, and transported to Professional Service Industries, Inc. *(Memphis, Tennessee)* for analysis. The pressure chamber method was used to determine the permeability of the samples. The analysis showed the samples to have a permeability of 5.12 x 10^{-6} centimeters per second *(3-5 foot sample)* and

TABLE 3
SUMMARY OF LABORATORY ANALYSIS PERFORMED ON SOIL SAMPLES

NAVAL AIR STATION
Building S-237
Millington, Tennessee
Facility I.D. Number: 9-791685

Sample Number	Location	Sampling Date	Depth (ft)	Headspace Reading (ppm)	Results (parts per million)	
					TPH (DRO)	*BTX*
092392-MR-06	MW1	9-23-92	7 - 9	<5	7.45	N/A
092392-MR-02	MW2	9-23-92	3 - 5	<5	ND	N/A
092392-MR-01	MW3	9-23-92	3 - 5	<5	ND	N/A
092492-MR-03	MW4	9-24-92	3 - 4	8	2,560	N/A
092492-MR-04	MW4	9-24-92	4 - 5	5	5,440	N/A
092492-MR-05	MW4	9-24-92	5 - 6	62	1,610	N/A
101392-MR-09	MW5	10-13-92	4 - 6	<5	ND	N/A
101392-MR-10	MW6	10-13-92	4 - 6	<5	ND	N/A
101392-MR-01	B1	10-13-92	5 - 6	<5	ND	N/A
101392-MR-02	B2	10-13-92	3 - 4	15	ND	N/A
101392-MR-03	B2	10-13-92	4 - 5	18	116	N/A
101392-MR-04	B2	10-13-92	5 - 6	200	4,980	N/A
101392-MR-05	B3	10-13-92	3 - 4	200	ND	N/A
101392-MR-06	B3	10-13-92	4 - 5	300	3.57	N/A
101392-MR-07	B3	10-13-92	5 - 6	200	ND	N/A
101392-MR-08	B4	10-13-92	5 - 6	<5	ND	N/A
103092-MR-06	B5	10-30-92	3 - 4	<5	ND	N/A
103092-MR-04	B5	10-30-92	4 - 5	<5	6.01	N/A
103092-MR-05	B5	10-30-92	5 - 6	<5	6.06	N/A

DRO = Diesel Range Organics
N/A = Not Analyzed for Listed Parameter

ppm = parts per million
ND = Non-Detected

6.77 x 10^{-6} centimeters per second *(5-7 foot sample)*. Based upon TDEC policy *(dated April 15, 1990)*, it is believed that a TPH cleanup criteria of 500 ppm should be established for this Site.

4.6 Soil Contaminant Plume Maps

Figures 10, 11 and *12 (following page 17)* outline the areas of the Site where TPH levels of greater than 500 ppm are known or suspected to exist.

5.0 CERTIFICATION

I, the undersigned, do hereby affirm that the information contained in this Environmental Assessment Report *(for Building S-237 located on Naval Air Station-Memphis in Millington, Shelby County, Tennessee, Facility ID Number: 9-791685)* is accurate and correct to the best of my knowledge and belief.

Signature: _____

Printed Name: **Michael E. Taylor**

Title & License No.: **<**

Date: **November <, 1992**

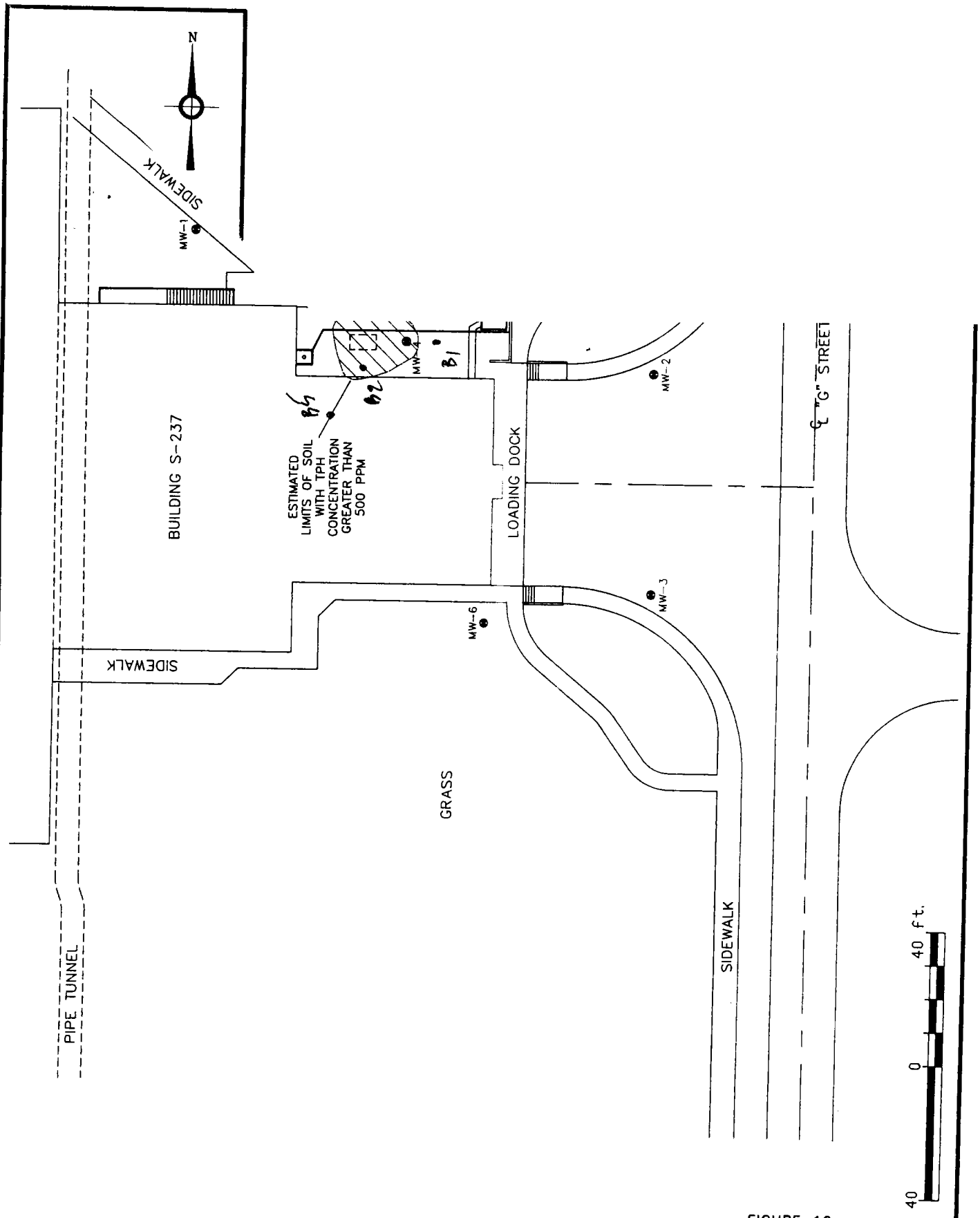
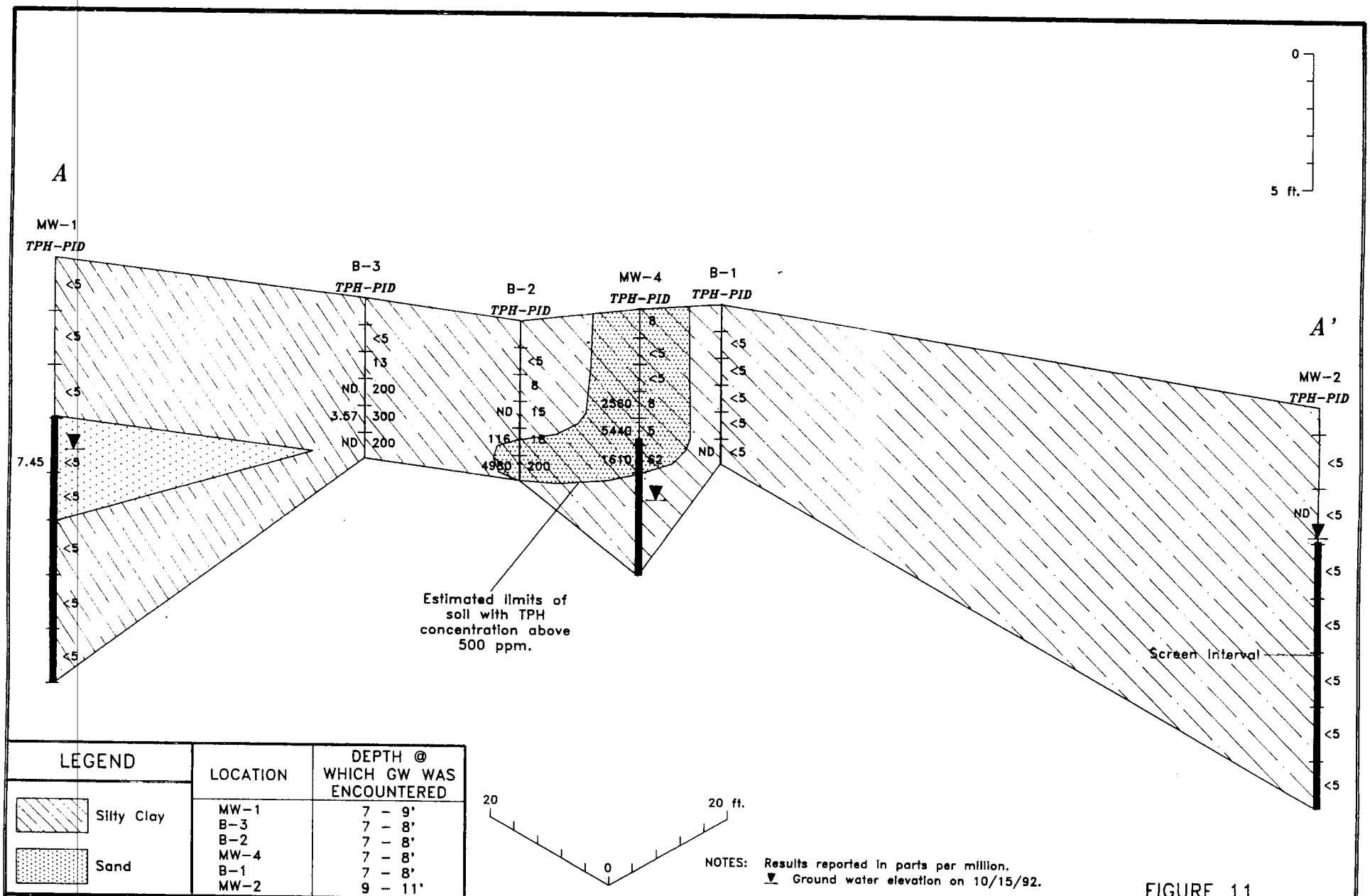


FIGURE 10

MEMPHIS ENVIRONMENTAL CENTER, INC. 2803 Corporate Avenue, Suite 100 Memphis, Tennessee 38132		REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE
DWG. NO.: NAVAL001	SITE NO.: 374					
DRAWN BY: DKD	CHECKED BY:					
DATE: NOVEMBER 2, 1992	DATE:					

SUBSURFACE SOIL CONTAMINATION DIAGRAM
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE



LEGEND	LOCATION	DEPTH @ WHICH GW WAS ENCOUNTERED
Silty Clay	MW-1	7 – 9'
Sand	B-3	7 – 8'
	B-2	7 – 8'
	MW-4	7 – 8'
	B-1	7 – 8'
	MW-2	9 – 11'

NOTES: Results reported in parts per million.
▼ Ground water elevation on 10/15/92.

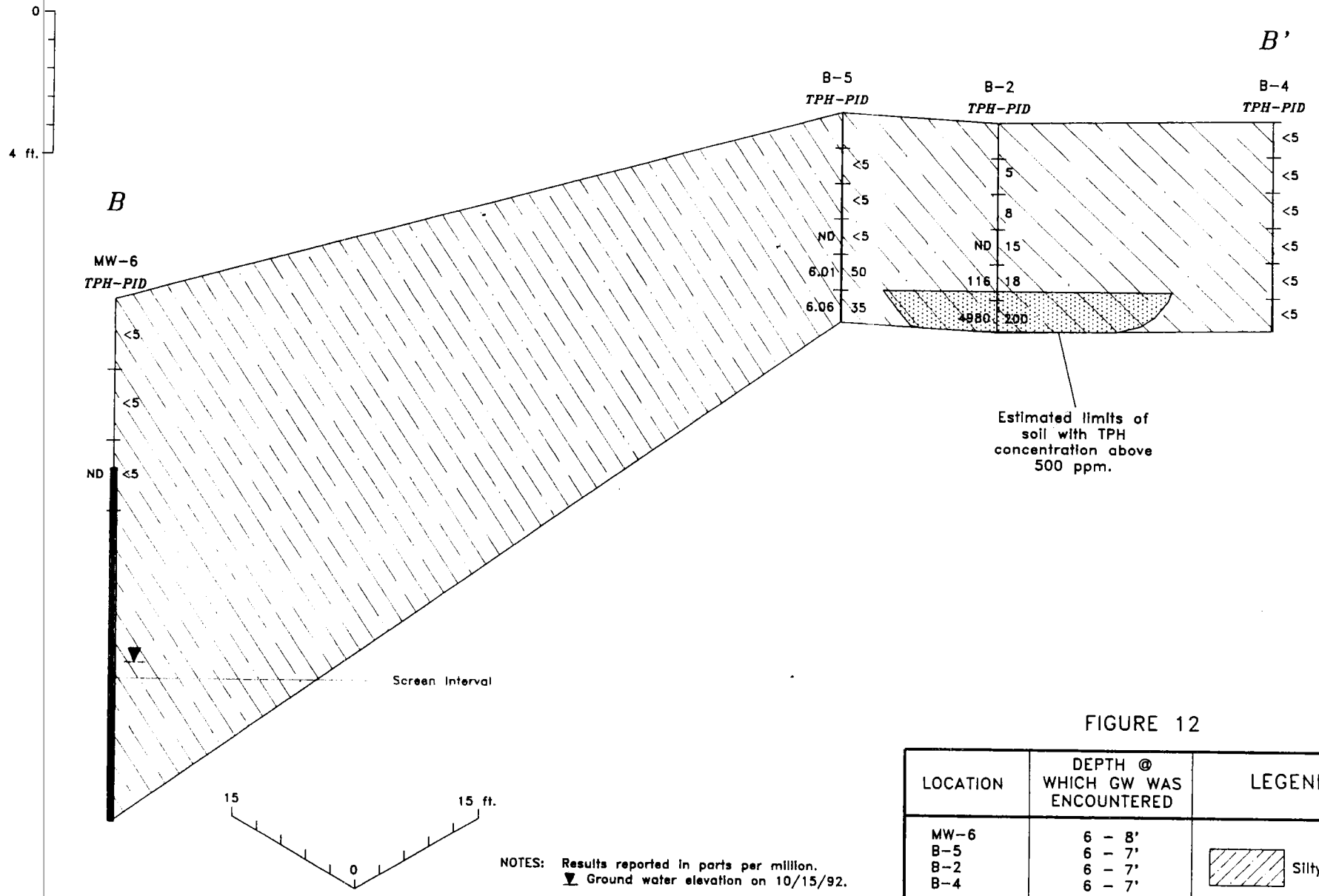
FIGURE 11

MEMPHIS ENVIRONMENTAL CENTER, INC.
2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO.: NAVALAA	SITE NO.: 374
DRAWN BY: DKD	CHECKED BY:
DATE: NOVEMBER 9, 1992	DATE:

REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE

SUBSURFACE SOIL CROSS SECTION A–A'
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE



NOTES: Results reported in parts per million.
▼ Ground water elevation on 10/15/92.

FIGURE 12

LOCATION	DEPTH @ WHICH GW WAS ENCOUNTERED	LEGEND
MW-6	6 - 8'	Silty Clay
B-5	6 - 7'	
B-2	6 - 7'	
B-4	6 - 7'	

SUBSURFACE SOIL CROSS SECTION B-B'
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

MEMPHIS ENVIRONMENTAL CENTER, INC.
2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO.: NAVALBB	SITE NO.: 374
DRAWN BY: DKD	CHECKED BY:
DATE: NOVEMBER 9, 1992	DATE:

REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE

APPENDIX A

REFERENCES

REFERENCES

1. "Hydrology of Aquifer Systems in the Memphis, Tennessee Area", J.H. Criner, C.P. Sun, and D.J. Nyman, U.S. Geological Survey Water Supply Paper 1779-0.

2. "Effects of Urban Development on the Aquifers in the Memphis, Tennessee Area", D.D. Graham, U.S. Geological Survey Water Resources Investigation Report 82-4024.

3. "Potential for Leakage Among the Principal Aquifers in the Memphis, Tennessee Area", D.D. Graham, U.S. Geological Survey Water Resources Investigation Report 85-4295.

4. "MLGW Water System Contingency Study", Dr. John W. Smith and Zulhizzan B. Ishak/Muhamed, Memphis State University, December, 1989.

5. "Environmental Assessment Form", Environmental and Safety Designs, 1991.

APPENDIX B

GRADIENT CALCULATIONS/SLUG TEST DATA

HYDRAULIC GRADIENT CALCULATIONS

Hydraulic gradients *(i)* are calculated using the following formula:

i = dh/L*;

Where i = hydraulic gradient

dh = change in head between two wells

L = distance between two wells

The change in head between MW1 and MW2 is .17 feet, the distance between the wells is 145 feet. The resulting i = 0.001.

* *Ground Water Hydrology; Todd, 1959, p. 46.*
Groundwater; Freeze and Cherry, 1979, p. 24.

DARCIAN FLUX CALCULATION

The Darcian Flux is calculated using the following equation:

Q = KiA*;

Q = Darcian Flux

K = Hydraulic Conductivity, 2.11 ft/day

i = Hydraulic gradient, 0.001

A = Aquifer cross-section in square feet

Assume A = 728 square feet

The Darcian Flux is calculated as 1.53 cubic feet per day, or 11.49 gallons per day. Also, 1.53 cubic feet, or 11.49 gallons per day are moving through the screened thickness of the saturated geologic materials.

* *Ground Water Hydrology; Todd, 1959, p. 46.*
Groundwater; Freeze and Cherry, 1979, p. 16.

A = Cross-sectional area of aquifer (L x D)
L = Maximum width of contaminant plume (~109 feet)
D = Saturated thickness of screened aquifer (7.0 feet)

DARCIAN VELOCITY CALCULATION

The Darcian Velocity is calculated using the following formula:

$v = Q/A^*$;

Where v = Darcian Velocity

Q = Darcian Flux, 1.53 ft^3/day

A = Cross-sectional area of aquifer, 728 square feet

The Darcian Velocity is calculated as 0.002 feet per day. Freeze and Cherry refer to v as the specific discharge.

* *Ground Water Hydrology; Todd, 1959, p. 46.*
Groundwater; Freeze and Cherry, 1979, p. 71.

AVERAGE LINEAR VELOCITY CALCULATION

The average linear velocity is calculated using the following equation:

$V = Q/(nA)$*;

Where V = average linear velocity

Q = Darcian Flux, 1.5 ft^3/day

n = porosity of aquifer, assume .30

A = Cross-sectional area of aquifer
728 square feet

The calculated average linear velocity is 0.007 feet per day.

* *Groundwater; Freeze and Cherry, 1979, p. 71.*

SLUG TEST DATA

MW-1
NAVAL AIR STATION, Building S-237
Millington, Tennessee
Facility ID Number: 9-791685

Time *(seconds)*	Water Level *(feet)*	Change in Water Level (h) *(feet)*	h/h_o
static	9.41	---	---
15	9.44	0.03	1.00
30	9.43	0.02	0.67
60	9.42	0.01	0.33
135	9.41	---	---

$$K = \frac{r^2 \ln (L/R)}{2LT_o}, \textit{ where}$$

r = radius of well casing
R = radius of well screen
L = length of screen
T_o = time for water level to rise or fall to 37% of the initial change

---

r = 1" (.083')
R = 3.25" (.271')
L = 6'
T_o = 55 seconds
K = 2.62 feet/day

SLUG TEST DATA

MW-3A
NAVAL AIR STATION, Building S-237
Millington, Tennessee
Facility ID Number: 9-791685

Time *(seconds)*	Water Level *(feet)*	Change in Water Level (h) *(feet)*	h/h_o
static	3.46	---	---
15	3.31	0.15	1.00
30	3.40	0.06	0.40
45	3.42	0.04	0.27
60	3.43	0.03	0.20
75	3.44	0.02	0.13
105	3.45	0.01	0.07
285	3.46	---	---

$$K = \frac{r^2 \ln (L/R)}{2LT_o}, \textit{ where}$$

r = radius of well casing
R = radius of well screen
L = length of screen
T_o = time for water level to rise or fall to 37% of the initial change

---

r = 1" (.083')
R = 3.25" (.271')
L = 11'
T_o = 40 seconds
K = 2.45 feet/day

SLUG TEST DATA

MW-3B
NAVAL AIR STATION, Building S-237
Millington, Tennessee
Facility ID Number: 9-791685

Time *(seconds)*	Water Level *(feet)*	Change in Water Level (h) *(feet)*	h/h_o
static	3.46	---	---
15	3.54	0.08	1.00
30	3.54	0.08	1.00
45	3.53	0.07	.88
60	3.51	0.05	.63
75	3.50	0.04	.50
105	3.49	0.03	.30
150	3.48	0.02	.25
270	3.47	0.01	.13
540	3.46	---	---

$$K = \frac{r^2 \ln (L/R)}{2LT_o}, \text{ where}$$

r = radius of well casing
R = radius of well screen
L = length of screen
T_o = time for water level to rise or fall to 37% of the initial change

---

r = 1" (.083')
R = 3.25" (.271')
L = 11'
T_o = 105 seconds
K = 1.50 feet/day

APPENDIX C

MONITORING WELL CONSTRUCTION DIAGRAMS

CASING ELEVATION: 101.78

DATUM: SE Corner of Building

WELL LOCATION: MW-1

DATE & TIME BEGAN: 09/23/92; 10:50am

DESCRIPTION OF WEATHER: Sunny 75°F

DRILLER: L. Smith

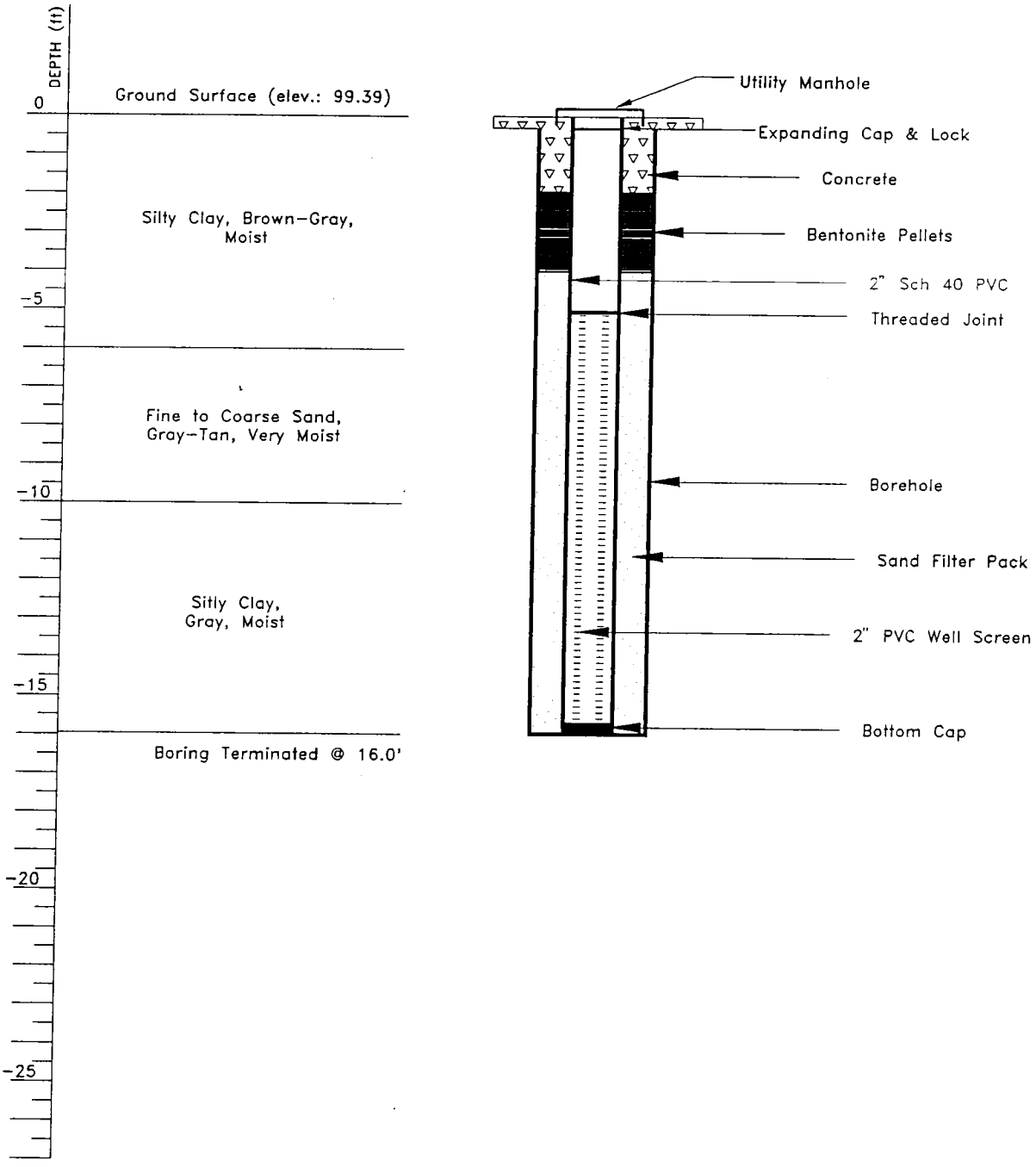
INSPECTOR: M. Roberts

BORING TERMINATED AT:
DEPTH (ft): 15.0
DATE & TIME: 09/23/92 1:00pm

DRILLING TECHNIQUE:
Hollow Stem Auger
Split-Spoon Sampler

GROUND WATER ELEVATIONS

DATE	ELEVATION
09/26/92	92.81
10/15/92	92.09



MEMPHIS ENVIRONMENTAL CENTER, INC.

2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO. NAVALMW1
DRAWN: DKD
DATE: NOVEMBER 2, 1992

MONITORING WELL CONSTRUCTION DIAGRAM
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

CASING ELEVATION: 96.39

DATUM: SE Corner of Building

WELL LOCATION: MW-2

DATE & TIME BEGAN: 09/22/92; 1:20pm

DESCRIPTION OF WEATHER: Light Rain 75°F

DRILLER: L. Smith

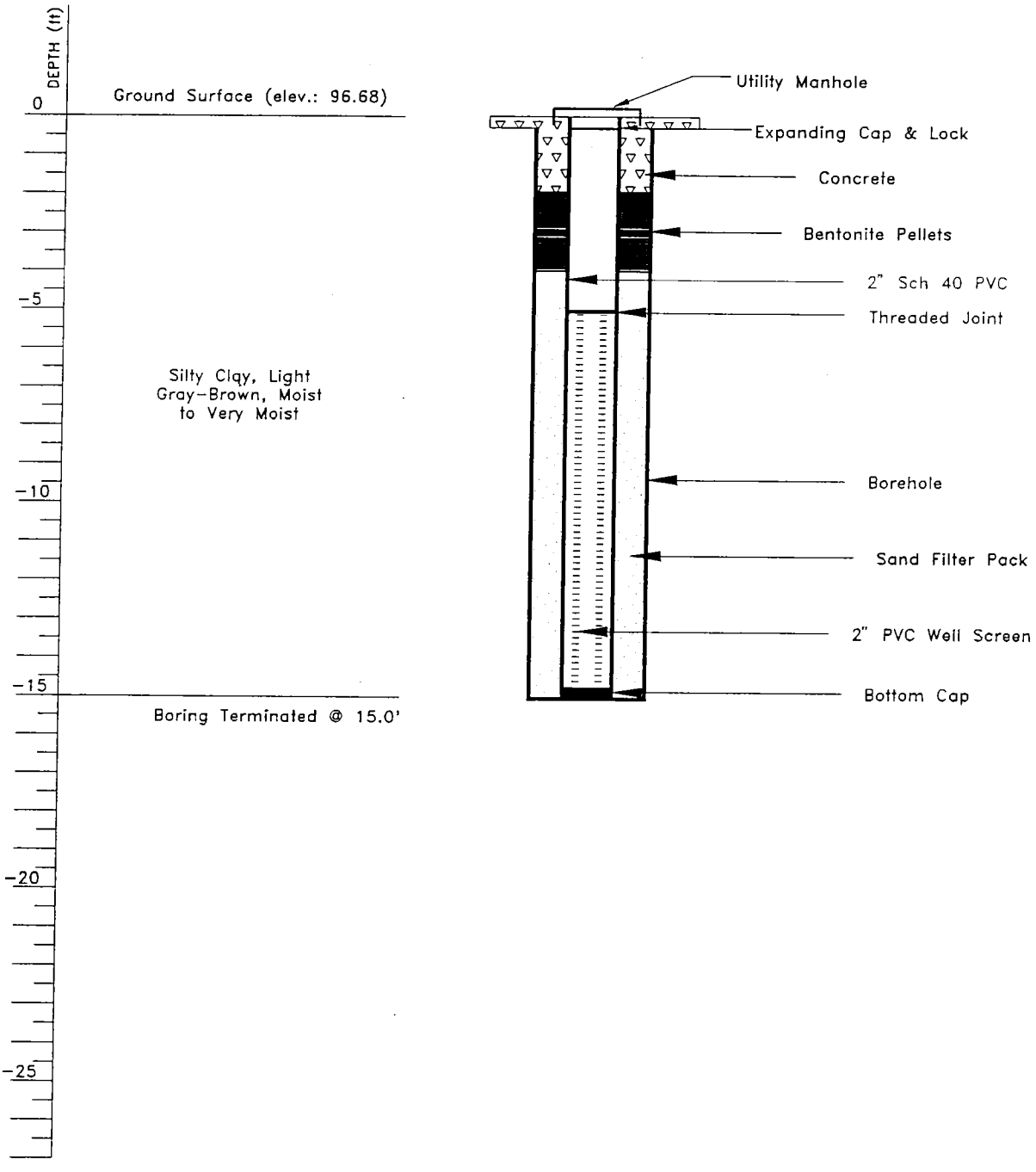
INSPECTOR: M. Roberts

BORING TERMINATED AT:
DEPTH (ft): 15.0
DATE & TIME: 09/22/92 1:50pm

DRILLING TECHNIQUE:
Hollow Stem Auger
Split-Spoon Sampler

GROUND WATER ELEVATIONS

DATE	ELEVATION
09/26/92	92.68
10/15/92	91.92



MEMPHIS ENVIRONMENTAL CENTER, INC.

DWG. NO. NAVALMW2
DRAWN: DKD
DATE: NOVEMBER 2, 1992

2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

MONITORING WELL CONSTRUCTION DIAGRAM
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

CASING ELEVATION: 96.40

DATUM: SE Corner of Building

WELL LOCATION: MW-3

DATE & TIME BEGAN: 09/22/92; 11:00am

DESCRIPTION OF WEATHER: Heavy Rain 70°F

DRILLER: L. Smith

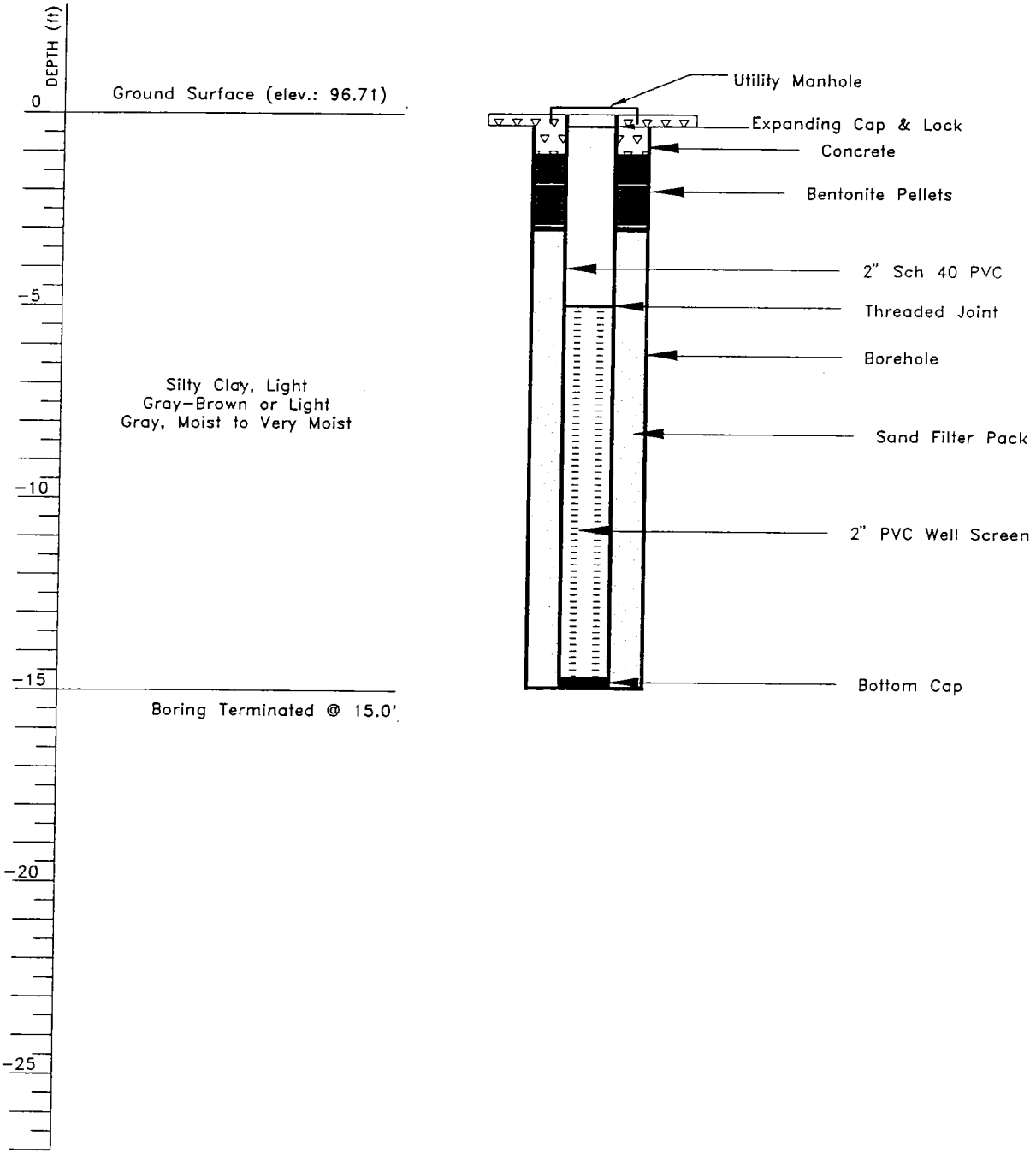
INSPECTOR: M. Roberts

BORING TERMINATED AT:
DEPTH (ft): 15.0
DATE & TIME: 09/22/92 1:00pm

DRILLING TECHNIQUE:
Hollow Stem Auger
Split-Spoon Sampler

GROUND WATER ELEVATIONS

DATE	ELEVATION
09/26/92	92.75
10/15/92	92.14



MEMPHIS ENVIRONMENTAL CENTER, INC.

2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO.	NAVALMW3
DRAWN:	DKD
DATE:	NOVEMBER 2, 1992

MONITORING WELL CONSTRUCTION DIAGRAM
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

CASING ELEVATION: 99.41

DATUM: SE Corner of Building

WELL LOCATION: MW-4

DATE & TIME BEGAN: 09/23/92; 5:00pm

DESCRIPTION OF WEATHER: Sunny 75°F

DRILLING TECHNIQUE: Stainless Steel Hand Auger

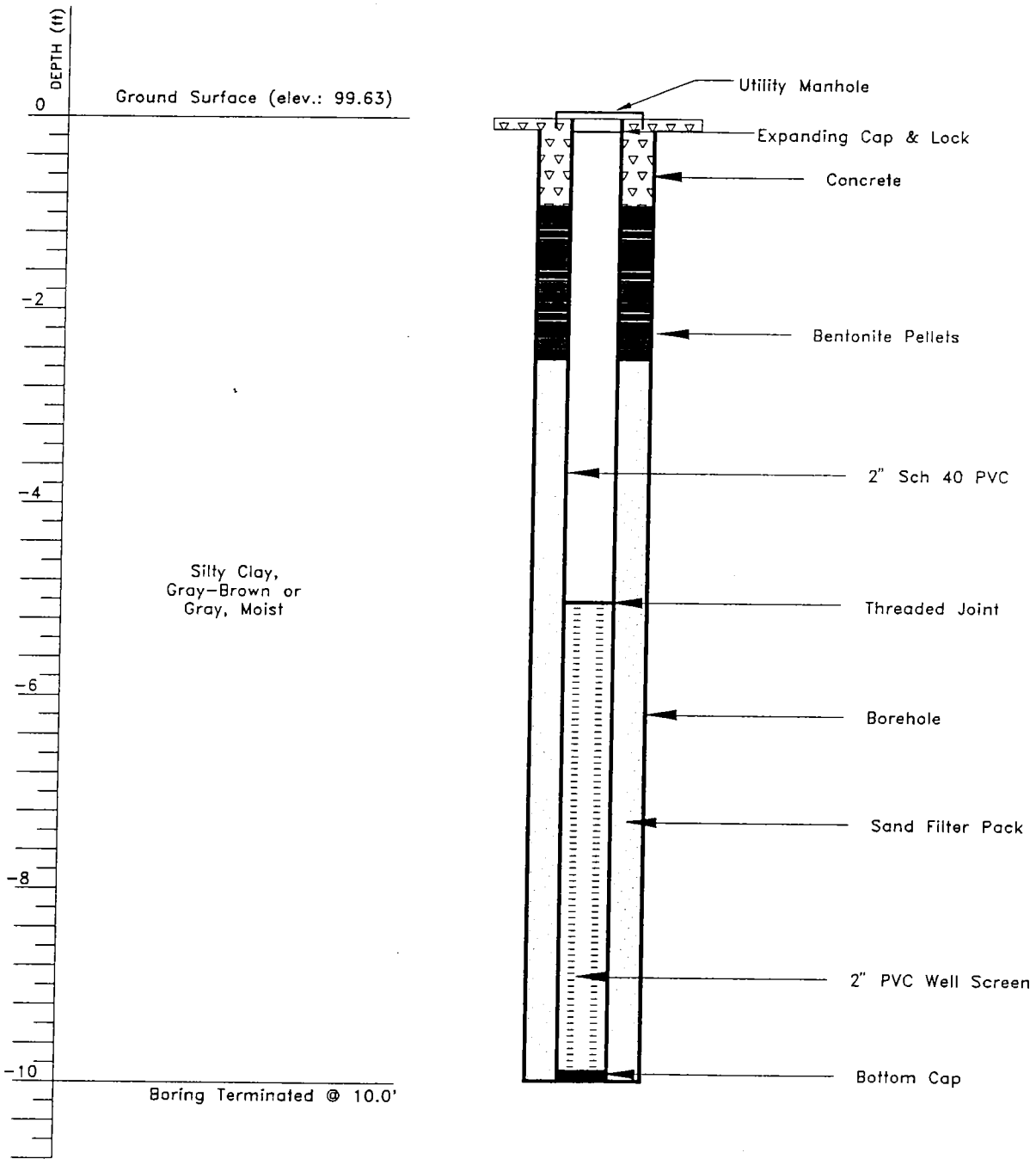
GROUND WATER ELEVATIONS

DATE	ELEVATION
09/26/92	93.48
10/15/92	92.34

DRILLER: J. Johnston

INSPECTOR: M. Roberts

BORING TERMINATED AT:
DEPTH (ft): 10.0
DATE & TIME: 09/24/92 10:00am



MEMPHIS ENVIRONMENTAL CENTER, INC.
2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO. NAVALMW4
DRAWN: DKD
DATE: NOVEMBER 2, 1992

MONITORING WELL CONSTRUCTION DIAGRAM
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

CASING ELEVATION: 101.28

DATUM: SE Corner of Building

WELL LOCATION: MW-5

DATE & TIME BEGAN: 10/13/92; 10:00am

DESCRIPTION OF WEATHER: Sunny 75°F

DRILLER: J. Holcomb

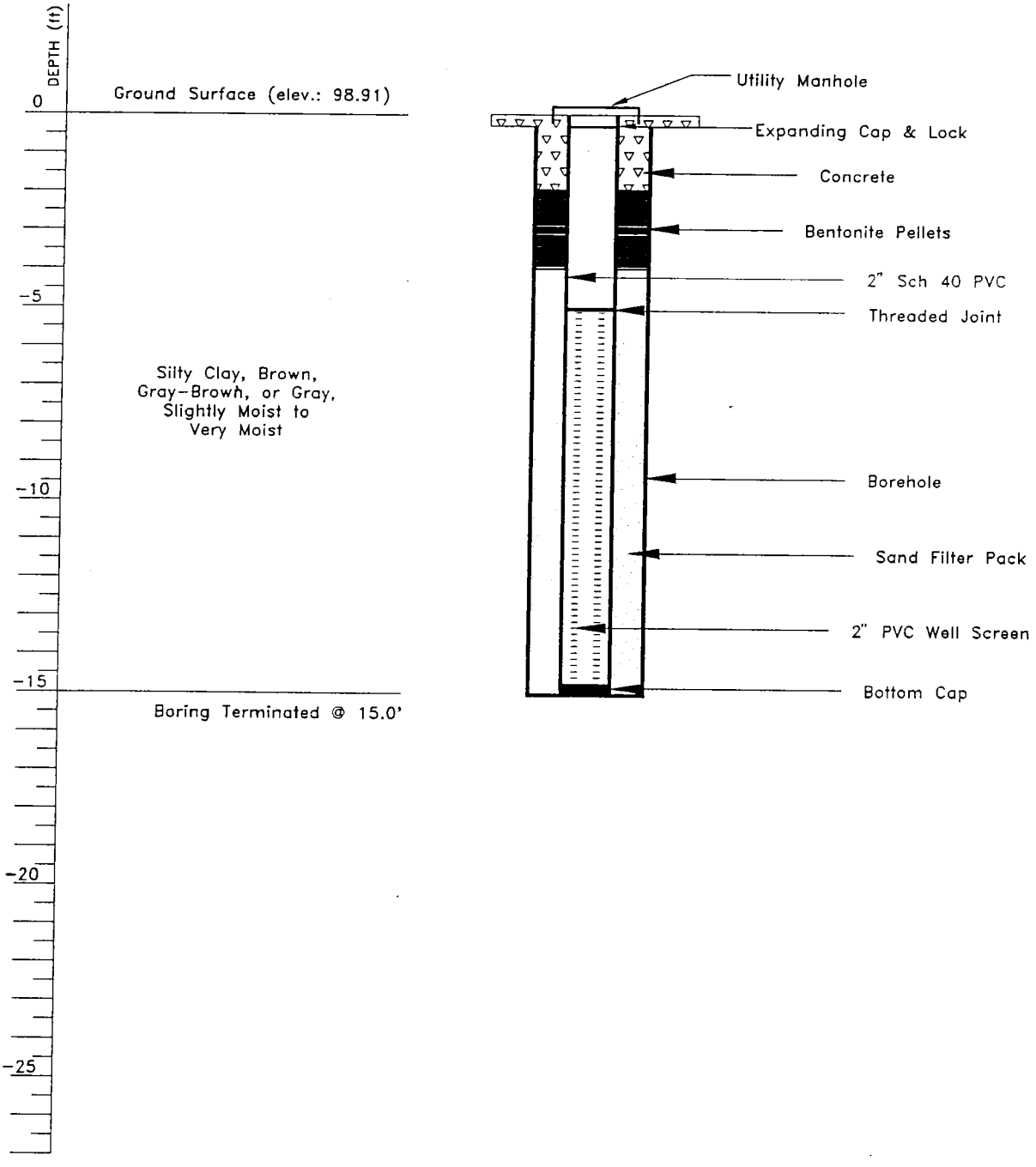
INSPECTOR: M. Roberts

BORING TERMINATED AT:
DEPTH (ft): 15.0
DATE & TIME: 10/13/92 11:00am

DRILLING TECHNIQUE:
Hollow Stem Auger
Split-Spoon Sampler

GROUND WATER ELEVATIONS

DATE	ELEVATION
10/15/92	92.25



MEMPHIS ENVIRONMENTAL CENTER, INC.

DWG. NO.	NAVALMW5
DRAWN:	DKD
DATE:	NOVEMBER 2, 1992

2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

MONITORING WELL CONSTRUCTION DIAGRAM
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

CASING ELEVATION: 102.10

DATUM: SE Corner of Building

WELL LOCATION: MW-6

DATE & TIME BEGAN: 10/13/92; 12:00pm

DESCRIPTION OF WEATHER: Sunny 75°F

DRILLER: J. Holcomb

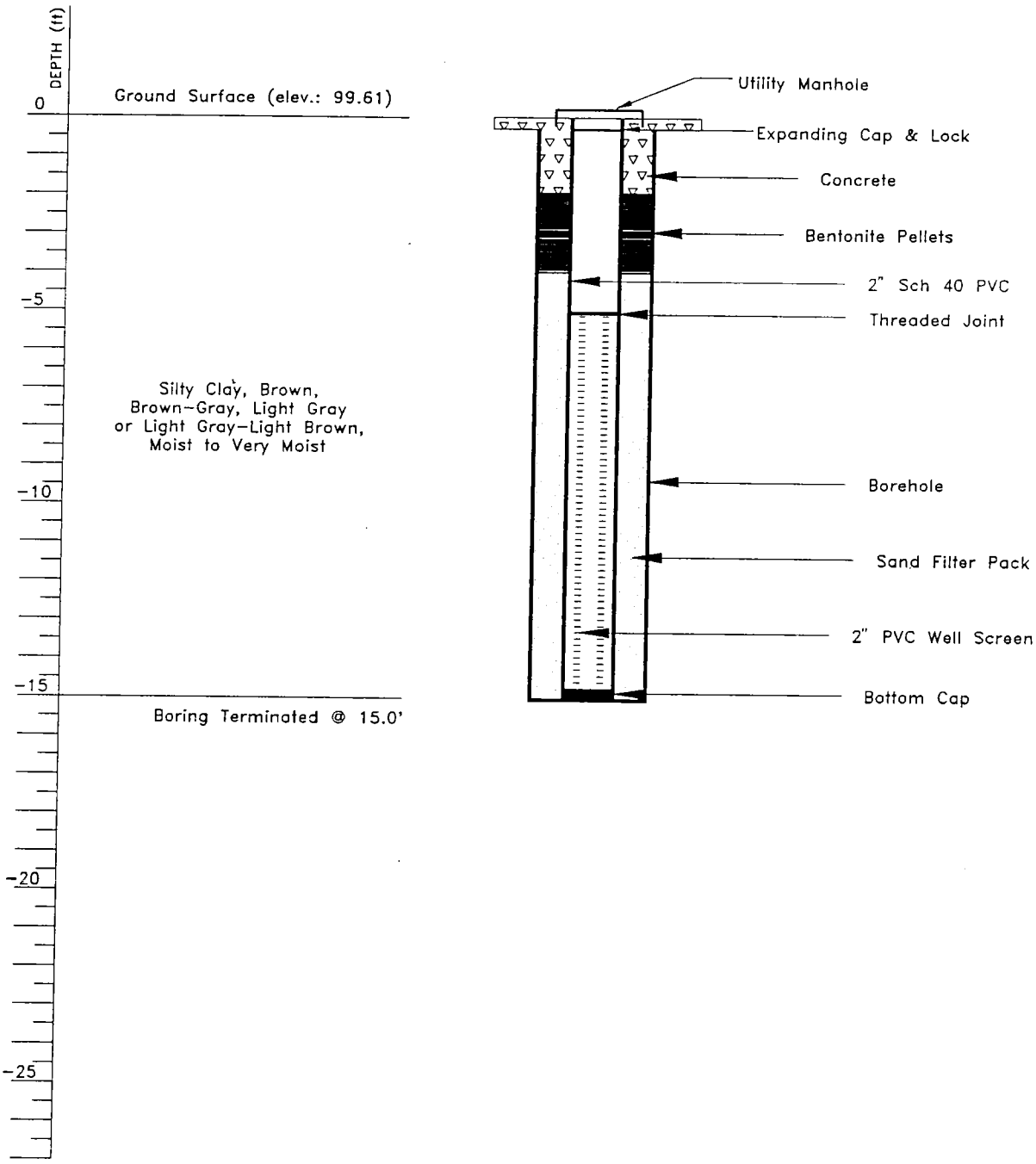
INSPECTOR: M. Roberts

BORING TERMINATED AT:
DEPTH (ft): 15.0
DATE & TIME: 10/13/92 12:45pm

DRILLING TECHNIQUE:
Hollow Stem Auger
Split-Spoon Sampler

GROUND WATER ELEVATIONS

DATE	ELEVATION
10/15/92	91.85



MEMPHIS ENVIRONMENTAL CENTER, INC.

2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO.	NAVALMW6
DRAWN:	DKD
DATE:	NOVEMBER 2, 1992

MONITORING WELL CONSTRUCTION DIAGRAM
NAVAL AIR STATION
BUILDING S-237
FACILITY ID NO.: 9-791685
MILLINGTON, TENNESSEE

APPENDIX D

CHAIN OF CUSTODY FORMS

MEMPHIS ENVIRONMENTAL CENTER
2603 Corporate Ave., Suite 100, Memphis, TN 38132
Telephone (901) 345-1788

SHIPPED TO (Laboratory Name): MEC

CHAIN OF CUSTODY RECORD

PROJECT NO: 374-08-06-00

PROJECT NAME: DALE SCHMIDT NAS

SAMPLER'S SIGNATURE [signature] (sign)

SEQ. NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION	MATRIX	NO. OF CONTAINERS	REMARKS
1	092392MR-01	9-23-92	11:15AM	MW-3, B	S	1	TPH-DRO
2	↓ -02	↓	1:00PM	MW-2, B	S	1	↓
3	↓ -03	↓	4:00PM	MW-4, D	S	1	↓
4	092492MR-04	9-24-92	4:15PM	↓, E	S	1	↓
5	↓ -05	↓	4:30PM	↓, F	S	1	↓
6	↓ -06	↓		MW-1, D	S	1	↓

TOTAL NO. OF CONTAINERS — 6

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
1 [signature] (sign)	9-25-92 / 9:45AM	2 [signature] (sign)
2 [signature] (sign)	9-25-92 / 2:00pm	3 (sign)

METHOD OF SHIPMENT:	SHIPPED BY:	RECEIVED FOR LABORATORY BY:	DATE/TIME
		(sign) [signature]	9/25/92 2PM

CONDITION OF SEAL UPON RECEIPT:	COOLER OPENED BY:	DATE/TIME
GENERAL CONDITION OF COOLER:	(sign)	

WHITE — Receiving Laboratory Copy YELLOW — Shipper's Copy PINK — MEC Laborotory Copy GOLDENROD — MEC Office Copy **NO:** 1

MEMPHIS ENVIRONMENTAL CENTER
2603 Corporate Ave., Suite 100, Memphis, TN 38132
Telephone (901) 345-1788

SHIPPED TO (Laboratory Name): MEC

CHAIN OF CUSTODY RECORD

PROJECT NO: 374-0806-04

PROJECT NAME: Dave Schmidt Naval Air Station

SAMPLER'S SIGNATURE [signature] (sign)

SEQ. NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION	MATRIX	NO. OF CONTAINERS	REMARKS
1	092692-JJ-01	9-26-92	3:15	MW-1	W	2	TPH - DRO
2	02	↓	3:15	MW-1 DUP.	W	2	↓
3	03	↓	4:05	MW-4	W	2	↓
4	04	↓	5:00	MW-3	W	2	↓
5	05	↓	5:15	MW-2	W	2	↓

Facility ID #
9-791685

TOTAL NO. OF CONTAINERS — 10

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
1 [signature] (sign)	9-26-92 / 7:30 AM	2 (sign)
RELINQUISHED BY: 2 (sign)	DATE/TIME	RECEIVED BY: 3 (sign)

METHOD OF SHIPMENT:	SHIPPED BY:	RECEIVED FOR LABORATORY BY:	DATE/TIME
		(sign) Victoria Pinto	9-26-92 7:30 AM

CONDITION OF SEAL UPON RECEIPT:	COOLER OPENED BY:	DATE/TIME
GENERAL CONDITION OF COOLER:	(sign)	

WHITE — Receiving Laboratory Copy YELLOW — Shipper's Copy PINK — MEC Laboratory Copy GOLDENROD — MEC Office Copy NO: 1

MEMPHIS ENVIRONMENTAL CENTER
2603 Corporate Ave., Suite 100, Memphis, TN 38132
Telephone (901) 345-1788

SHIPPED TO (Laboratory Name): MCC

CHAIN OF CUSTODY RECORD

PROJECT NO: 374-0806-00

PROJECT NAME: Naval Air Station

SAMPLER'S SIGNATURE John Johnson (sign)

SEQ. NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION	MATRIX	NO. OF CONTAINERS	REMARKS
1	092892-JJ-01	4-28-92	5:15pm	MW-1	S	2	Copper, Iron,
							Zinc & Manganese
							Facility ID #
							9-791685

TOTAL NO. OF CONTAINERS — 2

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
1 John Johnson (sign)	4-28-92 / 6:25pm	2 ______ (sign)
RELINQUISHED BY: 2 ______ (sign)	**DATE/TIME**	**RECEIVED BY:** 3 ______ (sign)

METHOD OF SHIPMENT:	SHIPPED BY:	RECEIVED FOR LABORATORY BY:	DATE/TIME
		(sign) [signature]	4/28/92 6:30

CONDITION OF SEAL UPON RECEIPT:	COOLER OPENED BY:	DATE/TIME
GENERAL CONDITION OF COOLER:	(sign) ______	

FACILITY # 9-791685

MEMPHIS ENVIRONMENTAL CENTER
2603 Corporate Ave., Suite 100, Memphis, TN 38132
Telephone (901) 345-1788

SHIPPED TO (Laboratory Name): MEC

CHAIN OF CUSTODY RECORD

PROJECT NO: 374-08-06-00 (ETI)

PROJECT NAME: D. SCHMIDT NAS, BLDG. S-237

SAMPLER'S SIGNATURE Mike Roberts (sign)

SEQ. NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION	MATRIX	NO. OF CONTAINERS	REMARKS
1	101392 MR-01	10-12-92	4:30 PM	B-1, 5'-6'	S	1	TPH-DRO
2	-02		2:30 PM	B-2, 3'-4'	S	1	
3	-03		2:45 PM	B-2, 4'-5'	S	1	
4	-04		3:00 PM	B-2, 5'-6'	S	1	
5	-05		5:00 PM	B-3, 3'-4'	S	1	
6	-06		5:15 PM	B-3, 4'-5'	S	1	
7	-07		5:30 PM	B-3, 5'-6'	S	1	
8	-08		3:45 PM	B-4, 5'-6'	S	1	
9	-09		10:15 AM	MW-5, C	S	1	
10	-010		12:15 PM	MW-6, C	S	1	
				TOTAL NO. OF CONTAINERS —		10	

RELINQUISHED BY: 1 Mike Roberts (sign) — **DATE/TIME** 10-14-92 / 9:11 AM — **RECEIVED BY:** 2 _____ (sign)

RELINQUISHED BY: 2 _____ (sign) — **DATE/TIME** _____ — **RECEIVED BY:** 3 _____ (sign)

METHOD OF SHIPMENT: _____ — **SHIPPED BY:** _____ — **RECEIVED FOR LABORATORY BY:** (sign) _____ — **DATE/TIME** 10/14/92 / 09:11 AM

CONDITION OF SEAL UPON RECEIPT: _____ — **COOLER OPENED BY:** (sign) _____ — **DATE/TIME** _____

GENERAL CONDITION OF COOLER: _____

WHITE — Receiving Laboratory Copy YELLOW — Shipper's Copy PINK — MEC Laborotory Copy GOLDENROD — MEC Office Copy **NO:** 1

FACILITY # - 9-47165

MEMPHIS ENVIRONMENTAL CENTER
2603 Corporate Ave., Suite 100, Memphis, TN 38132
Telephone (901) 345-1788

SHIPPED TO (Laboratory Name): MEC

CHAIN OF CUSTODY RECORD

PROJECT NO: 374-08-06-00

PROJECT NAME: D. SCHMIDT ETI - NAS

SAMPLER'S SIGNATURE _____ (sign)

SEQ. NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION	MATRIX	NO. OF CONTAINERS	REMARKS
1	101592MB-01	10-15-92	4:00PM	MW-5	W	2	TPH-DRO
2	-02	"	4:00PM	MW-5 (DUP)	W	2	"
3	-03	"	4:00PM	MW-6	W	2	"
							PRESERVED W/ HCL
				TOTAL NO. OF CONTAINERS —		6	

RELINQUISHED BY: 1 _____ (sign) — **DATE/TIME** 10-15-92 / 7:00PM — **RECEIVED BY:** 2 _____ (sign)

RELINQUISHED BY: 2 _____ (sign) — **DATE/TIME** _____ — **RECEIVED BY:** 3 _____ (sign)

METHOD OF SHIPMENT:	SHIPPED BY:	RECEIVED FOR LABORATORY BY: (sign) Willie Golden	DATE/TIME 10-15-92 / 10-15-92
CONDITION OF SEAL UPON RECEIPT:		COOLER OPENED BY: (sign) _____	DATE/TIME _____
GENERAL CONDITION OF COOLER:			

WHITE — Receiving Laboratory Copy YELLOW — Shipper's Copy PINK — MEC Laborotory Copy GOLDENROD — MEC Office Copy NO: 1

FACILITY # 9-7116E5

MEMPHIS ENVIRONMENTAL CENTER
2603 Corporate Ave., Suite 100, Memphis, TN 38132
Telephone (901) 345-1788

SHIPPED TO (Laboratory Name): MEC

CHAIN OF CUSTODY RECORD

PROJECT NO: 374-08-06-00

PROJECT NAME: D. SCHMIDT ETI (NAS)

SAMPLER'S SIGNATURE _____ (sign)

SEQ. NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION	MATRIX	NO. OF CONTAINERS	REMARKS
1	101692MR-01	10-16-92	~~2:00PM~~	MW-5 DRUM CUTTINGS	S	1	TPH-DRO
2	101692MR-02	10-16-92		MW-6 ↓	S	1	↓

TOTAL NO. OF CONTAINERS — 2

RELINQUISHED BY: 1 _____ (sign) **DATE/TIME** 10-16-92 / 4:25PM **RECEIVED BY:** 2 _____ (sign)

RELINQUISHED BY: 2 _____ (sign) **DATE/TIME** _____ **RECEIVED BY:** 3 _____ (sign)

METHOD OF SHIPMENT: **SHIPPED BY:** **RECEIVED FOR LABORATORY BY:** _____ (sign) **DATE/TIME** 10-16-92 4:25 PM

CONDITION OF SEAL UPON RECEIPT: **COOLER OPENED BY:** _____ (sign) **DATE/TIME** _____

GENERAL CONDITION OF COOLER:

WHITE — Receiving Laboratory Copy YELLOW — Shipper's Copy PINK — MEC Laborotory Copy GOLDENROD — MEC Office Copy **NO:** 1

FACILITY #1 9 - FILES

MEMPHIS ENVIRONMENTAL CENTER
2603 Corporate Ave., Suite 100, Memphis, TN 38132
Telephone (901) 345-1788

SHIPPED TO (Laboratory Name): MEC

CHAIN OF CUSTODY RECORD

PROJECT NO: 374-02-06-00

PROJECT NAME: T. SCHMIDT ETI - NAS

SAMPLER'S SIGNATURE _____ (sign)

SEQ. NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION	MATRIX	NO. OF CONTAINERS	REMARKS
~~1~~	~~1629972MW-01~~	~~10-29-92~~	~~2:00PM~~	~~MW-1, 1-3'~~	~~S~~	~~1~~	~~PTX, TTH - MEC - GRO~~
~~2~~	~~1629972MW-02~~	↓	~~2:20PM~~	~~MW-1, 3-5'~~	~~S~~	~~1~~	↓
~~3~~	~~1629972MW-03~~		~~2:40PM~~	~~MW-1 COMPOSITE~~	~~S~~	~~1~~	
4	1630972MW-04	10-30-92	1:00PM	P-5 1'-5'	S	1	TTH - TPH
5	↓ -05	↓	1:15PM	P-5 5'-6'	S	1	↓
6	↓ -06		1:30PM	P-5 3'-4'	S	1	↓

TOTAL NO. OF CONTAINERS — 5

RELINQUISHED BY: 1 _____ (sign) **DATE/TIME** 10-30-92 / 5:15PM **RECEIVED BY:** 2 _____ (sign)

RELINQUISHED BY: 2 _____ (sign) **DATE/TIME** _____ **RECEIVED BY:** 3 _____ (sign)

METHOD OF SHIPMENT: **SHIPPED BY:** **RECEIVED FOR LABORATORY BY:** (sign) _____ **DATE/TIME** 11/3/92 2:20 p.m.

CONDITION OF SEAL UPON RECEIPT: **COOLER OPENED BY:** **DATE/TIME**

GENERAL CONDITION OF COOLER: (sign) _____

WHITE — Receiving Laboratory Copy YELLOW — Shipper's Copy PINK — MEC Laboratory Copy GOLDENROD — MEC Office Copy NO: 1

APPENDIX E

ANALYTICAL REPORTS (GROUND WATER & SOIL)

MEMPHIS ENVIRONMENTAL CENTER, INC.

ENVIRONMENTAL ANALYTICAL LABORATORY
2603 Corporate Avenue, East Suite 100
Memphis, Tennessee 38132
(901)-345-1788

Client Contact: Dave Schmidt
Project: E T I
Navy Air Station Site 374
Sample(s) Type: Soil Samples

Report No: R-921345
Report Date: 11/11/92
Facility ID#: 9-791685

Quality Assurance Summary:

Type of Analysis	Method	Holding Time	Surrogate Recovery	Matrix Spike Recoveries	Blanks	Overall Summary
BTX	SW846-8020	A	A	A	A	A
TPH	TENN-DRO/GRO	A	A	A(N-1)	A	A(See N-1)

NOTE 1: Laboratory control samples (blank spikes) were analyzed as required by the methods and had acceptable recoveries.

A = Requirements set by method were met
NA = Not applicable
N-1 = See NOTE 1
N-2 =
N-3 =
N-4 =

Terri Gray
QA Officer

Laboratory Manager

Report Number: R-921345
Project Number: 374-08-06-00
Description: E T I - NAVY AIR STATION #374

Memphis Environmental Center
Analytical Report
Volatile Organics By Method: SW846-8020
Results given in: mg/Kg

Report Date: 11-10-92 13:28
Prepared By
QA/QC Check
Lab Manager

Sample Number	102992-MR-01	102992-MR-02
Lab ID Number	9207082	9207083
Matrix	SOIL	SOIL
Type	SAMPLE	SAMPLE
Date of Collection	10-29-92	10-29-92
Date of Receipt	10-30-92	10-30-92
Date of Extraction	11-02-92	11-02-92
Date of Analysis	11-03-92	11-03-92
BTX (total)	26.0	3.45
Benzene	ND	ND
SURR.(α,α,α-Trifluorotoluene)%	63.1	91.5
Toluene	2.44	ND
Xylenes	23.5	3.45

** NOTES :

- Not Applicable
ND Non detected at stated limit
NA Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921345
Project Number: 374-08-06-00
Description: E T I - NAVY AIR STATION #374

Memphis Environmental Center
QA/QC Report - Spikes
Volatile Organics By Method: SW846-8020
Results given in: mg/Kg

Report Date: 11-10-92 13:28
Prepared By
QA/QC Check
Lab Manager

Sample Number	102992-MR-01	102992-MR-01	102992-MR-01
Lab ID Number	9207082-SPIKE-1	9207082-SPIKE-1	9207082-SPIKE-1
Matrix	SOIL	SOIL	SOIL
Type	ADDED LEVEL	% RECOVERED 1	% RECOVERED 2
Date of Collection	10-29-92	10-29-92	10-29-92
Date of Receipt	10-30-92	10-30-92	10-30-92
Date of Extraction	11-02-92	11-02-92	11-02-92
Date of Analysis	11-03-92	11-03-92	11-03-92
BTX (total)	-	-	-
Benzene	26.4	68.6	86.8
SURR.(α,α,α-Trifluorotoluene)%	106	63.8	79.0
Toluene	29.1	71.7	86.6
Xylenes	65.7	69.4	77.4

** NOTES :

- Not Applicable
) Non detected at stated limit
\ Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921345
Project Number: 374-08-06-00
Description: E T I - NAVY AIR STATION #374

Memphis Environmental Center
QA/QC Report - Blanks
Volatile Organics By Method: SW846-8020
Results given in: mg/Kg

Report Date: 11-10-92 13:28
Prepared By
QA/QC Check
Lab Manager

Sample Number	BLANK	BLANK	BLANK	LIMIT	LIMIT
Lab ID Number	11-02 SPK ADD	11-02 SPK RCV%	11-02-92	OF	OF
Matrix	SYSTEM	SYSTEM	SYSTEM	DETECTION	QUANTITATION
Type	SAMPLE	SAMPLE	SAMPLE		
Date of Collection					
Date of Receipt					
Date of Extraction	11-02-92	11-02-92	11-02-92		
Date of Analysis	11-03-92	11-03-92	11-03-92		
BTX (total)	-	-	ND	-	-
Benzene	26.4	126	ND	0.5	-
SURR.(α,α,α-Trifluorotoluene)%	106	126	73.5	-	-
Toluene	29.1	133	ND	0.2	-
Xylenes	65.7	119	ND	0.2	-

** NOTES :

Sample Number	SURROGATE
Lab ID Number	SPIKE
Matrix	LEVELS
Type	
Date of Collection	
Date of Receipt	
Date of Extraction	
Date of Analysis	
BTX (total)	-
Benzene	-
SURR.(α,α,α-Trifluorotoluene)%	106
Toluene	-
Xylenes	-

** NOTES :

- Not Applicable
D Non detected at stated limit
A Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921345
Project Number: 374-08-06-00
Description: E T I - NAVY AIR STATION #374

Memphis Environmental Center
Analytical Report
Total Petroleum Hydrocarbons By TENN-DRO/GRO
Results given in: mg/Kg

Report Date: 11-10-92 13:29
Prepared By
QA/QC Check
Lab Manager

Sample Number	102992-MR-01	102992-MR-02	103092-MR-04	103092-MR-05	103092-MR-06
Lab ID Number	9207082	9207083	9207084	9207085	9207086
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL
Type	SAMPLE**	SAMPLE**	SAMPLE	SAMPLE	SAMPLE
Date of Collection	10-29-92	10-29-92	10-30-92	10-30-92	10-30-92
Date of Receipt	10-30-92	10-30-92	10-30-92	10-30-92	10-30-92
Date of Extraction	11-02-92	11-02-92	11-02-92	11-02-92	11-02-92
Date of Analysis	11-04-92	11-04-92	11-03-92	11-03-92	11-03-92
DRO - TPH	2820	801	6.01	6.06	ND
GRO - TPH	49.3	34.1	-	-	-
SURR.(Bromofluorobenzene) %	112	91.7	-	-	-
SURR.(o-Terphenyl) %	133	121	106	89.4	109
Total TPH	2869.3	835.1	-	-	-

** NOTES :

9207082*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION AND ANALYSIS DATE - 11/03/92.
LOD FOR DRO-TPH 50 TIMES VALUE STATED.

9207083*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION AND ANALYSIS DATE - 11/03/92.
LOD FOR DRO-TPH 10 TIMES VALUE STATED.

- Not Applicable
) Non detected at stated limit
\ Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921345
Project Number: 374-08-06-00
Description: E T I - NAVY AIR STATION #374

Memphis Environmental Center
QA/QC Report - Spikes
Total Petroleum Hydrocarbons By TENN-DRO/GRO
Results given in: mg/Kg

Report Date: 11-10-92 13:29
Prepared By
QA/QC Check
Lab Manager

Sample Number	102992-MR-01	102992-MR-01	102992-MR-01
Lab ID Number	9207082-SPIKE-1	9207082-SPIKE-1	9207082-SPIKE-1
Matrix	SOIL	SOIL	SOIL
Type	ADDED LEVEL	% RECOVERED 1**	% RECOVERED 2**
Date of Collection	10-29-92	10-29-92	10-29-92
Date of Receipt	10-30-92	10-30-92	10-30-92
Date of Extraction	11-02-92	11-02-92	11-02-92
Date of Analysis	11-03-92	11-03-92	11-03-92
DRO - TPH	60	-	-
GRO - TPH	-	-	-
SURR.(Bromofluorobenzene) %	-	-	-
SURR.(o-Terphenyl) %	0.8	-	-
Total TPH	-	-	-

** NOTES :
9207082*SPK1RCV1 - MATRIX SPIKE DILUTED OUT. NO RECOVERIES AVAILABLE.
9207082*SPK1RCV2 - MATRIX SPIKE DILUTED OUT. NO RECOVERIES AVAILABLE.

- Not Applicable
) Non detected at stated limit
\ Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921345
Project Number: 374-08-06-00
Description: E T I - NAVY AIR STATION #374

Memphis Environmental Center
QA/QC Report - Blanks
Total Petroleum Hydrocarbons By TENN-DRO/GRO
Results given in: mg/Kg

Report Date: 11-10-92 13:29
Prepared By
QA/QC Check
Lab Manager

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	11-02-1 SPK ADD	11-02-1 SPK RCV%	11-02-2 SPK ADD	11-02-2 SPK RCV%	11-02-92
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	11-02-92	11-02-92	11-02-92	11-02-92	11-02-92
Date of Analysis	11-03-92	11-03-92	11-03-92	11-03-92	11-03-92
DRO - TPH	60	83.2	60	87.3	ND
GRO - TPH	-	-	-	-	-
SURR.(Bromofluorobenzene) %	-	-	-	-	-
SURR.(o-Terphenyl) %	0.8	130	0.8	127	115
Total TPH	-	-	-	-	-

** NOTES :

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	11-03 SPK ADD	11-03 SPK RCV%1	11-03 SPK RCV%2	11-03-92-1	11-03-92-2
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	11-03-92	11-03-92	11-03-92	11-03-92	11-03-92
Date of Analysis	11-03-92	11-03-92	11-03-92	11-03-92	11-03-92
DRO - TPH	-	-	-	-	-
GRO - TPH	50	71.3	73.6	ND	ND
SURR.(Bromofluorobenzene) %	10	106	102	81.6	78.4
SURR.(o-Terphenyl) %	-	-	-	-	-
Total TPH	-	-	-	-	-

** NOTES :

- Not Applicable
D Non detected at stated limit
A Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921345
Project Number: 374-08-06-00
Description: E T I - NAVY AIR STATION #374

Memphis Environmental Center
QA/QC Report - Blanks
Total Petroleum Hydrocarbons By TENN-DRO/GRO
Results given in: mg/Kg

Report Date: 11-10-92 13:29
Prepared By
QA/QC Check
Lab Manager

Sample Number Lab ID Number Matrix Type	LIMIT OF DETECTION	LIMIT OF QUANTITATION	SURROGATE SPIKE LEVELS
Date of Collection			
Date of Receipt			
Date of Extraction			
Date of Analysis			
DRO - TPH	3.5	-	-
GRO - TPH	10	-	-
SURR.(Bromofluorobenzene) %	-	-	10
SURR.(o-Terphenyl) %	-	-	20
Total TPH	-	-	-

** NOTES :

- Not Applicable
D Non detected at stated limit
A Not analyzed

[ ] - Below LOQ, Above LOD

MEMPHIS ENVIRONMENTAL CENTER, INC.

ENVIRONMENTAL ANALYTICAL LABORATORY
2603 Corporate Avenue, East Suite 100
Memphis, Tennessee 38132
(901)-345-1788

Client Contact: Dave Schmidt
Project: E T I
NAS
Sample(s) Type: Soil Samples

Report No: R-921278
Report Date: 11/03/92
Facility ID#: 9-791685

Quality Assurance Summary:

Type of Analysis	Method	Holding Time	Surrogate Recovery	Matrix Spike Recoveries	Blanks	Overall Summary
TPH	TENN-DRO	A	A	A(N-1)	A	A(See N-1)

NOTE 1: Laboratory control samples (blank spikes) were analyzed as required by the methods and had acceptable recoveries.

A = Requirements set by method were met
NA = Not applicable
N-1 = See NOTE 1
N-2 =
N-3 =

Terri Gray
QA Officer

Laboratory Manager

Report Number: R-921278
Project Number: 374-08-06-00
Description: E T I - NAS - SOIL/#9-791685

Memphis Environmental Center
Analytical Report
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: mg/Kg

Report Date: 10-29-92 15:13
Prepared By
QA/QC Check
Lab Manager

Sample Number	101692MR-01	101692MR-02
Lab ID Number	9206687	9206688
Matrix	SOIL	SOIL
Type	SAMPLE	SAMPLE
Date of Collection	10-16-92	10-16-92
Date of Receipt	10-16-92	10-16-92
Date of Extraction	10-18-92	10-18-92
Date of Analysis	10-22-92	10-22-92
DRO - TPH	ND	ND
SURR.(o-Terphenyl) %	79.4	81.2

** NOTES :

- Not Applicable
ID Non detected at stated limit
'A Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921278
Project Number: 374-08-06-00
Description: E T I - NAS - SOIL/#9-791685

Memphis Environmental Center
QA/QC Report - Spikes
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: mg/Kg

Report Date: 10-29-92 15:13
Prepared By
QA/QC Check
Lab Manager

Sample Number	101692MR-01	101692MR-01	101692MR-01
Lab ID Number	9206687-SPIKE-1	9206687-SPIKE-1	9206687-SPIKE-1
Matrix	SOIL	SOIL	SOIL
Type	ADDED LEVEL	% RECOVERED 1	% RECOVERED 2
Date of Collection	10-16-92	10-16-92	10-16-92
Date of Receipt	10-16-92	10-16-92	10-16-92
Date of Extraction	10-18-92	10-18-92	10-18-92
Date of Analysis	10-22-92	10-22-92	10-22-92
DRO - TPH	60	73.1	69.0
SURR.(o-Terphenyl) %	0.8	81.0	85.3

** NOTES :

- Not Applicable
ND Non detected at stated limit
NA Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921278
Project Number: 374-08-06-00
Description: E T I - NAS - SOIL/#9-791685

Memphis Environmental Center
QA/QC Report - Blanks
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: mg/Kg

Report Date: 10-29-92 15:13
Prepared By
QA/QC Check
Lab Manager

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	10-18-1 SPK ADD	10-18-1 SPK RCV%	10-18-2 SPK ADD	10-18-2 SPK RCV%	10-18-92-1
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	10-18-92	10-18-92	10-18-92	10-18-92	10-18-92
Date of Analysis	10-22-92	10-22-92	10-22-92	10-22-92	10-22-92
DRO - TPH	60	70.2	60	67.8	ND
SURR.(o-Terphenyl) %	0.8	85.5	0.8	87.0	101

** NOTES :

Sample Number	LIMIT	LIMIT	SURROGATE
Lab ID Number	OF	OF	SPIKE
Matrix	DETECTION	QUANTITATION	LEVELS
Type			
Date of Collection			
Date of Receipt			
Date of Extraction			
Date of Analysis			
DRO - TPH	3.5	-	-
SURR.(o-Terphenyl) %	-	-	0.8

** NOTES :

- Not Applicable
D Non detected at stated limit
A Not analyzed

[ ] - Below LOQ, Above LOD

MEMPHIS ENVIRONMENTAL CENTER, INC.

ENVIRONMENTAL ANALYTICAL LABORATORY
2603 Corporate Avenue, East Suite 100
Memphis, Tennessee 38132
(901)-345-1788

Client Contact: Dave Schmidt
Project: E T I
Navy Base
Sample(s) Type: Water Samples

Report No: R-921274
Report Date: 10/26/92
Facility ID#: 9-791685

Quality Assurance Summary:

Type of Analysis	Method	Holding Time	Surrogate Recovery	Matrix Spike Recoveries	Blanks	Overall Summary
TPH	TENN-DRO	A	A	A(N-1)	A	A(See N-1)

NOTE 1: Laboratory control samples (blank spikes) were analyzed as required by the methods and had acceptable recoveries.

A = Requirements set by method were met
NA = Not applicable
N-1 = See NOTE 1
N-2 =
N-3 =

Terri Gray
QA Officer

Laboratory Manager

Report Number: R-921274
Project Number: 374-08-06-00
Description: E T I - NAS - WATER #9-791685

Memphis Environmental Center
Analytical Report
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: ug/L

Report Date: 10-25-92 14:27
Prepared By
QA/QC Check
Lab Manager

Sample Number	101592MR-01	101592MR-02	101592MR-03
Lab ID Number	9206669	9206670	9206671
Matrix	WATER	WATER	WATER
Type	SAMPLE	SAMPLE	SAMPLE
Date of Collection	10-15-92	10-15-92	10-15-92
Date of Receipt	10-15-92	10-15-92	10-15-92
Date of Extraction	10-16-92	10-16-92	10-16-92
Date of Analysis	10-21-92	10-21-92	10-21-92
DRO - TPH	ND	ND	117
SURR.(o-Terphenyl) %	107	94.1	103

** NOTES :

- Not Applicable
D Non detected at stated limit
A Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921274
Project Number: 374-08-06-00
Description: E T I - NAS - WATER #9-791685

Memphis Environmental Center
QA/QC Report - Laboratory Duplicate Samples
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: ug/L

Report Date: 10-25-92 14:28
Prepared By
QA/QC Check
Lab Manager

Sample Number	101592MR-03	101592MR-03
Lab ID Number	9206671	9206671
Matrix	WATER	WATER
Type	SAMPLE	LAB DUPLICATE
Date of Collection	10-15-92	10-15-92
Date of Receipt	10-15-92	10-15-92
Date of Extraction	10-16-92	10-16-92
Date of Analysis	10-21-92	10-21-92
DRO - TPH	117	101
SURR.(o-Terphenyl) %	103	101

** NOTES :

- Not Applicable
ID Non detected at stated limit
IA Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921274
Project Number: 374-08-06-00
Description: E T I - NAS - WATER #9-791685

Memphis Environmental Center
QA/QC Report - Spikes
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: ug/L

Report Date: 10-25-92 14:28
Prepared By
QA/QC Check
Lab Manager

Sample Number	101592MR-01	101592MR-01
Lab ID Number	9206669-SPIKE-1	9206669-SPIKE-1
Matrix	WATER	WATER
Type	ADDED LEVEL	% RECOVERED 1
Date of Collection	10-15-92	10-15-92
Date of Receipt	10-15-92	10-15-92
Date of Extraction	10-16-92	10-16-92
Date of Analysis	10-21-92	10-21-92
DRO - TPH	1500	74.8
SURR.(o-Terphenyl) %	20	99.4

** NOTES :

- Not Applicable
ND Non detected at stated limit
A Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921274
Project Number: 374-08-06-00
Description: E T I - NAS - WATER #9-791685

Memphis Environmental Center
QA/QC Report - Blanks
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: ug/L

Report Date: 10-25-92 14:28
Prepared By
QA/QC Check
Lab Manager

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	10-16-1 SPK ADD	10-16-1 SPK RCV%	10-16-2 SPK ADD	10-16-2 SPK RCV%	10-16-92
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	10-16-92	10-16-92	10-16-92	10-16-92	10-16-92
Date of Analysis	10-21-92	10-21-92	10-21-92	10-21-92	10-21-92
DRO - TPH	1500	64.2	1500	76.7	ND
SURR.(o-Terphenyl) %	20	96.9	20	100	97.2

** NOTES :

Sample Number	LIMIT	LIMIT	SURROGATE
Lab ID Number	OF	OF	SPIKE
Matrix	DETECTION	QUANTITATION	LEVELS
Type			
Date of Collection			
Date of Receipt			
Date of Extraction			
Date of Analysis			
DRO - TPH	50	-	-
SURR.(o-Terphenyl) %	-	-	20

** NOTES :

- Not Applicable
ND Non detected at stated limit
NA Not analyzed

[ ] - Below LOQ, Above LOD

MEMPHIS ENVIRONMENTAL CENTER, INC.

ENVIRONMENTAL ANALYTICAL LABORATORY
2603 Corporate Avenue, East Suite 100
Memphis, Tennessee 38132
(901)-345-1788

Client Contact: Dave Schmidt
Project: E T I
Navy Base
Sample(s) Type: Soil Samples

Report No: R-921266
Report Date: 10/22/92
Facility ID#:

Quality Assurance Summary:

Type of Analysis	Method	Holding Time	Surrogate Recovery	Matrix Spike Recoveries	Blanks	Overall Summary
TPH	TENN-DRO	A	A(N-1)	A	A	A(See N-1)

NOTE 1: In sample #9206637 the surrogate was diluted out.

A = Requirements set by method were met
NA = Not applicable
N-1 = See NOTE 1
N-2 =
N-3 =

Terri Gray
QA Officer

Laboratory Manager

Report Number: R-921266
Project Number: 374-08-06-00
Description: E T I NAVY BASE - SOIL SAMPLES

Memphis Environmental Center
Analytical Report
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: mg/Kg

Report Date: 10-21-92 10:03
Prepared By
QA/QC Check
Lab Manager

Sample Number	101392MR-01	101392MR-02	101392MR-03	101392MR-04	101392MR-05
Lab ID Number	9206634	9206635	9206636	9206637	9206638
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL
Type	SAMPLE	SAMPLE	SAMPLE**	SAMPLE**	SAMPLE
Date of Collection	10-13-92	10-13-92	10-13-92	10-13-92	10-13-92
Date of Receipt	10-14-92	10-14-92	10-14-92	10-14-92	10-14-92
Date of Extraction	10-15-92	10-15-92	10-15-92	10-15-92	10-15-92
Date of Analysis	10-20-92	10-20-92	10-21-92	10-21-92	10-20-92
DRO - TPH	ND	ND	116	4980	ND
SURR.(o-Terphenyl) %	87.5	90.3	73.2	-	98.8

** NOTES :
9206636*SAMPLE - LOD FOR DRO-TPH IS 10 TIMES THE VALUE STATED.
9206637*SAMPLE - LOD FOR DRO-TPH IS 100 TIMES THE VALUE STATED. SURROGATE DILUTED OUT.

Sample Number	101392MR-06	101392MR-07	101392MR-08	101392MR-09	101392MR-10
Lab ID Number	9206639	9206640	9206641	9206642	9206643
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection	10-13-92	10-13-92	10-13-92	10-13-92	10-13-92
Date of Receipt	10-14-92	10-14-92	10-14-92	10-14-92	10-14-92
Date of Extraction	10-15-92	10-15-92	10-15-92	10-15-92	10-15-92
Date of Analysis	10-20-92	10-20-92	10-20-92	10-20-92	10-20-92
DRO - TPH	3.57	ND	ND	ND	ND
SURR.(o-Terphenyl) %	78.3	92.7	92.6	76.5	91.3

** NOTES :

- Not Applicable
ID Non detected at stated limit
IA Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921266
Project Number: 374-08-06-00
Description: E T I NAVY BASE - SOIL SAMPLES

Memphis Environmental Center
QA/QC Report - Spikes
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: mg/Kg

Report Date: 10-21-92 10:03
Prepared By
QA/QC Check
Lab Manager

Sample Number	101392MR-01	101392MR-01	101392MR-01
Lab ID Number	9206634-SPIKE-1	9206634-SPIKE-1	9206634-SPIKE-1
Matrix	SOIL	SOIL	SOIL
Type	ADDED LEVEL	% RECOVERED 1	% RECOVERED 2
Date of Collection	10-13-92	10-13-92	10-13-92
Date of Receipt	10-14-92	10-14-92	10-14-92
Date of Extraction	10-15-92	10-15-92	10-15-92
Date of Analysis	10-20-92	10-20-92	10-20-92
DRO - TPH	60	70.5	79.2
SURR.(o-Terphenyl) %	0.8	95.3	93.1

** NOTES :

- Not Applicable
ND Non detected at stated limit
NA Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921266
Project Number: 374-08-06-00
Description: E T I NAVY BASE - SOIL SAMPLES

Memphis Environmental Center
QA/QC Report - Blanks
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: mg/Kg

Report Date: 10-21-92 10:04
Prepared By
QA/QC Check
Lab Manager

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	10-15-1 SPK ADD	10-15-1 SPK RCV%	10-15-2 SPK ADD	10-15-2 SPK RCV%	10-15-92
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	10-15-92	10-15-92	10-15-92	10-15-92	10-15-92
Date of Analysis	10-20-92	10-20-92	10-20-92	10-20-92	10-20-92
DRO - TPH	60	65.2	60	58.5	ND
SURR.(o-Terphenyl) %	0.8	98.9	0.8	89.00	104

** NOTES :

Sample Number	LIMIT	LIMIT	SURROGATE
Lab ID Number	OF	OF	SPIKE
Matrix	DETECTION	QUANTITATION	LEVELS
Type			
Date of Collection			
Date of Receipt			
Date of Extraction			
Date of Analysis			
DRO - TPH	3.5	-	-
SURR.(o-Terphenyl) %	-	-	0.8

** NOTES :

- Not Applicable
ND Non detected at stated limit
NA Not analyzed

[ ] - Below LOQ, Above LOD

MEMPHIS ENVIRONMENTAL CENTER, INC.

ENVIRONMENTAL ANALYTICAL LABORATORY
2603 Corporate Avenue, East Suite 100
Memphis, Tennessee 38132
(901)-345-1788

Client Contact: Dave Schmidt
Project: Naval Air Station

Report No: R-921186
Report Date: 10/06/92
Facility ID#:

Sample(s) Type: Water Samples

Quality Assurance Summary:

Type of Analysis	Method	Holding Time	Surrogate Recovery	Matrix Spike Recoveries	Blanks	Overall Summary
TPH	TENN-DRO	A	A	A(N-1)	A	A(See N-1)

NOTE 1: Laboratory control samples (blank spikes) were analyzed as required by the method and had acceptable recoveries.

A = Requirements set by method were met
NA = Not applicable
N-1 = See NOTE 1
N-2 =
N-3 =

Terri Gray
QA Officer

Laboratory Manager

Report Number: R-921186
Project Number: 374-08-06-00
Description: NAVAL AIR STATION - WATER

Memphis Environmental Center
Analytical Report
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: ug/L

Report Date: 10-04-92 13:39
Prepared By
QA/QC Check
Lab Manager

Sample Number	092692-JJ-01	092692-JJ-02	092692-JJ-03	092692-JJ-04	092692-JJ-05
Lab ID Number	9206059	9206060	9206061	9206062	9206063
Matrix	WATER	WATER	WATER	WATER	WATER
Type	SAMPLE	SAMPLE	SAMPLE**	SAMPLE	SAMPLE
Date of Collection	09-26-92	09-26-92	09-26-92	09-26-92	09-26-92
Date of Receipt	09-26-92	09-26-92	09-26-92	09-26-92	09-26-92
Date of Extraction	09-29-92	09-29-92	09-29-92	09-29-92	09-29-92
Date of Analysis	10-02-92	10-02-92	10-02-92	10-02-92	10-02-92
DRO - TPH	90.3	ND	17700	ND	ND
SURR.(o-Terphenyl) %	60.4	99.0	60.3	65.0	104

** NOTES :
9206061*SAMPLE - LOD FOR DRO-TPH 10 TIMES THE VALUE STATED.

- Not Applicable
Non detected at stated limit
Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921186
Project Number: 374-08-06-00
Description: NAVAL AIR STATION - WATER

Memphis Environmental Center
QA/QC Report - Blanks
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: ug/L

Report Date: 10-04-92 13:39
Prepared By
QA/QC Check
Lab Manager

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	09-29-92	9-29-1 SPK ADD	9-29-1 SPK RCV%	9-29-2 SPK ADD	9-29-2 SPK RCV%
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	09-29-92	09-29-92	09-29-92	09-29-92	09-29-92
Date of Analysis	10-02-92	10-02-92	10-02-92	10-02-92	10-02-92
DRO - TPH	ND	1500	90.2	1500	90.6
SURR.(o-Terphenyl) %	84.2	20	97.1	20	93.4

** NOTES :

Sample Number	LIMIT	LIMIT	SURROGATE
Lab ID Number	OF	OF	SPIKE
Matrix	DETECTION	QUANTITATION	LEVELS
Type			
Date of Collection			
Date of Receipt			
Date of Extraction			
Date of Analysis			
DRO - TPH	50	-	-
SURR.(o-Terphenyl) %	-	-	20

* NOTES :

- Not Applicable
) Non detected at stated limit
\ Not analyzed

[ ] - Below LOQ, Above LOD

MEMPHIS ENVIRONMENTAL CENTER, INC.

ENVIRONMENTAL ANALYTICAL LABORATORY
2603 Corporate Avenue, East Suite 100
Memphis, Tennessee 38132
(901)-345-1788

Client Contact: Dave Schmidt
Project: E T I
Navy Base
Sample(s) Type: Soil Samples

Report No: R-921169
Report Date: 10/02/92
Facility ID#:

Quality Assurance Summary:

Type of Analysis	Method	Holding Time	Surrogate Recovery	Matrix Spike Recoveries	Blanks	Overall Summary
TPH	TENN-DRO	A	A(N-1)	A(N-2)	A	A(See N-1 and N-2)

NOTE 1: As stated in the report, the surrogate was diluted out in sample #9205931.

NOTE 2: Laboratory control samples (blank spikes) were analyzed as required by the method and had acceptable recoveries.

A = Requirements set by method were met
NA = Not applicable
N-1 = See NOTE 1
N-2 = See NOTE 2
N-3 =

Jerri Gray
QA Officer

Laboratory Manager

Report Number: R-921169
Project Number: 374-08-06-00
Description: ETI/NAVY BASE - SOIL SAMPLE

Memphis Environmental Center
Analytical Report
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: mg/Kg

Report Date: 09-30-92 16:21
Prepared By
QA/QC Check
Lab Manager

Sample Number	092392MR-01	092392MR-02	092392MR-03	092492MR-04	092492MR-05
Lab ID Number	9205929	9205930	9205931	9205932	9205933
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL
Type	SAMPLE	SAMPLE	SAMPLE**	SAMPLE**	SAMPLE**
Date of Collection	09-23-92	09-23-92	09-23-92	09-24-92	09-24-92
Date of Receipt	09-25-92	09-25-92	09-25-92	09-25-92	09-25-92
Date of Extraction	09-26-92	09-26-92	09-26-92	09-26-92	09-26-92
Date of Analysis	09-28-92	09-28-92	09-29-92	09-29-92	09-29-92
DRO - TPH	ND	ND	2560	5440	1610
SURR.(o-Terphenyl) %	81.1	86.1	-	88.5	110

** NOTES :
9205931*SAMPLE - SURR.(o-Terphenyl) DILUTED OUT. LOD FOR DRO-TPH 100 TIMES THE VALUE STATED.
9205932*SAMPLE - LOD FOR DRO-TPH 50 TIMES THE VALUE STATED.
9205933*SAMPLE - LOD FOR DRO-TPH 100 TIMES THE VALUE STATED.

Sample Number	092492MR-06
Lab ID Number	9205934
Matrix	SOIL
Type	SAMPLE
Date of Collection	09-24-92
Date of Receipt	09-25-92
Date of Extraction	09-26-92
Date of Analysis	09-29-92
DRO - TPH	7.45
SURR.(o-Terphenyl) %	77.4

** NOTES :

- Not Applicable
ND Non detected at stated limit
A Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921169
Project Number: 374-08-06-00
Description: ETI/NAVY BASE - SOIL SAMPLE

Memphis Environmental Center
QA/QC Report - Blanks
Total Petroleum Hydrocarbons By TENN-DRO
Results given in: mg/Kg

Report Date: 09-30-92 16:21
Prepared By
QA/QC Check
Lab Manager

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	09-26-92	9-26-1 SPK ADD	9-26-1 SPK RCV%	9-26-2 SPK ADD	9-26-2 SPK RCV%
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	09-26-92	09-26-92	09-26-92	09-26-92	09-26-92
Date of Analysis	09-28-92	09-28-92	09-28-92	09-28-92	09-28-92
DRO - TPH	ND	60	68.7	60	70.6
SURR.(o-Terphenyl) %	87.2	0.8	69.1	0.8	79.9

** NOTES :

Sample Number	LIMIT	LIMIT	SURROGATE
Lab ID Number	OF	OF	SPIKE
Matrix	DETECTION	QUANTITATION	LEVELS
Type			
Date of Collection			
Date of Receipt			
Date of Extraction			
Date of Analysis			
DRO - TPH	2.5	-	-
SURR.(o-Terphenyl) %	-	-	0.8

** NOTES :

- Not Applicable
ND Non detected at stated limit
NA Not analyzed

[ ] - Below LOQ, Above LOD

APPENDIX F

WATER WELL DRILLERS LOGS

FORMATION LOG OF THE WELL OR TEST HOLE

STARTED TEST HOLE 09/20 19 85 FINISHED ______ 19 ___ TEST HOLE NUMBER 4

LOCATION NAS, Memphis, Millington, TN SEC ____ TS ____ RANGE ____ ELEVATION ____

TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION
0- 40		Clay
40- 66		Sand & Gravel
66- 137		Clay
137- 138		Rock
138- 174		Clay
174- 220		Sand & clay streaks
220- 250		Clay
250- 265		Sandy clay
265- 320		Fine sand & clay streaks
320- 336		Medium sand & clay streaks
336- 391		Sandy clay
391- 430		Sandy clay
430- 461		Hard clay
461- 537		Medium coarse sand & clay sts.
537- 564		Hard sandy clay
564- 725		Fine sand & clay streaks lignite
725- 837		Fine sand & clay streaks lignite ½x½
837- 863		Hard sandy clay
863- 875		Hard clay & sand streaks
875- 961		Fine sand & clay streaks lignite.
961-1038		Med. sand & clay streaks lig.
1038-1051		Fine sand & clay streaks
1051-1069		Hard sandy clay & lignite
1069-1091		Hard sandy clay & lignite & rock streaks
1091-1092		Rock
1092-1132		Hard clay & rock streaks lig.
1132-1290		Hard sandy clay, lignite & rock streaks
1290-1365		Sandy clay
1365-1429		Fine sand & clay streaks ½x½
1429-1434		Sandy clay
1434-1454		Fine san[d &] clay streaks, lig.
1454-1460		Sand & clay streaks
1460-		Hard san[dy] clay
SAMPLES:		
1)1365-1370		5)1385-1390 9)1405-1410
2)1370-1375		6)1390-1395 10)1410-1415
3)1375-1380		7)1395-1400 11)1415-1420
4)1380-1385		8)1400-1405 12)1420-1425

TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION
13)1425-1430		
14)1430-1435		
15)1435-1440		
16)1440-1445		
17)1445-1450		
18)1450-1455		

MUD PIT SIZE ____ FT. X ____ FT. ____ X ____ FT. DEEP

TYPE BIT USED TO CUT SAND ____

SIZE OF TEST HOLE THROUGH SAND ____

TYPE OF BIT USED TO CUT UPPER FORMATIONS ____ SIZE ____

TYPE MUD PUMP USED ____

DRILLING PRESSURE IN SAND ____

TYPE OF MUD USED ____

NOTES:

☒ ACCEPTED ☐ NOT ACCEPTED
☐ ACCEPTED AS CORRECTED
☐ REVISE AND RESUBMIT

Checking is for compliance with the information ... the plans and/or specifications and for ... the design concept of the project only ... responsible for dimensions to be ... the job and for the coordination of the work of all trades and subject to all Contract requirements.

BY [signature] DATE 10/1/85

ALLEN & HOSHALL, INC.

	PRELIMINARY TEST	FINAL TEST
STATIC WATER LEVEL		
PUMPED G. P. M.		
PRESSURE, POUNDS		
DRAWDOWN		
G. P. F. D.		
GUARANTEED G. P. M.		
GUARANTEED PRESSURE		
DATE OF TEST		

REMARKS

DRILLER T. Lynwood Hathcock

FIELD SUP'T Merrill Chrestman

FORMATION LOG OF THE WELL OR TEST HOLE

STARTED TEST HOLE 8/1 19 85 FINISHED ____ 19 ____ TEST HOLE NUMBER 5

LOCATION NAS, Memphis, Millington, TN SEC. ____ TS. ____ RANGE ____ ELEVATION ____

TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION
0 - 35		Clay
35 - 96		Sand & Gravel & Rock Strata
96 -140		Clay
140 -160		Sandy Clay & Sand
160 -206		Sand & Clay
206 -289		Hard Clay & Sandy Clay
289 -545		Med. Sand & Clay & Lignite
545 -550		Clay
550 -633		Med. Sand & Clay & Lignite
633 -817		Med. Fine Sand & Clay
817 -893		Hard Sandy Clay
893 -945		Med. Corse Sand, Clay & Lignit
945 -1030		Fine Sand, Clay & Lignite
1030 -1154		Hard Sandy Clay & Lignite
1154 -1164		Sandy Clay
1164 -1265		Hard Sand, Clay & Lignite
1265 -1348		Fine Sand, Clay & Lignite
1348 -1354		Clay & Sand
1354 -1375		Fine Sand & Clay, & Lignite
1375 -1380		Clay & Sand
1380 -1385		Fine Sand, Clay & Lignite
1385 -1423		Sand & Clay ½x½
1423 -1440		Fine Sand, Clay & Lignite
1440-1453		Clay
1453 -1473		Sandy Clay & Sand
1473 -1542		Clay
SAMPLES:		
1-1265-1270		
2-1270-1275		21-1365-1370
3-1275-1280		22-1370-1375
4-1280-1285		23-1375-1380
5-1285-1290		24-1380-1385
6-1290-1295		25-1385-1390
7-1295-1300		26-1390-1395
8-1300-1305		27-1395-1400
9-1305-1310		28-1400-1405
10-1310-1315		29-1405-1410
11-1315-1320		30-1410-1415

TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION
12-1320-1325		31-1415-1420
13-1325-1330		32-1420-1425
14-1330-1335		33-1425-1430
15-1335-1340		34-1430-1435
16-1340-1345		35-1435-1440
17-1345-1350		
18-1350-1355		
19-1355-1360		
20-1360-1365		

MUD PIT SIZE ____ FT. X ____ FT. ____ X ____ FT. DEE

TYPE BIT USED TO CUT SAND ____

SIZE OF TEST HOLE THROUGH SAND ____

TYPE OF BIT USED TO CUT UPPER FORMATIONS ____

SIZE ____

TYPE MUD PUMP USED ____

DRILLING PRESSURE IN SAND ____

TYPE OF MUD USED ____

NOTES: ____

TEST DATA

	PRELIMINARY TEST	FINAL TEST
STATIC WATER LEVEL		
PUMPED G. P. M.		
PRESSURE, POUNDS		
DRAWDOWN		
G. P. F. D.		
GUARANTEED G. P. M.		
GUARANTEED PRESSURE		
DATE OF TEST		

REMARKS

DRILLER T. Lynwood Hathcock

FIELD SUP'T Merrill Chrestman

☒ ACCEPTED ☐ NOT ACCEPTED

☐ ACCEPTED AS CORRECTED

☐ REVISE AND RESUBMIT

Checking is for compliance with the [illegible] the plans and/or specifications and for [illegible] the design concept of the project only. [illegible] sponsible for dimensions to be confirmed and [illegible] the job and for the construction of the work of all trades and subject to all Contract requirements.

BY B.R. Lemon DATE 9/12/85

APPENDIX G

GROUND WATER ANALYTICAL REPORTS (METALS)

MEMPHIS ENVIRONMENTAL CENTER, INC.

ENVIRONMENTAL ANALYTICAL LABORATORY
2603 Corporate Avenue, East Suite 100
Memphis, Tennessee 38132
(901)-345-1788

Client Contact: Dave Schmidt
Project: E T I
Navy Base
Sample(s) Type: Water Sample

Report No: R-921193
Report Date: 10/20/92
Facility ID#:

Quality Assurance Summary:

Type of Analysis	Method	Holding Time	Surrogate Recovery	Matrix Spike Recoveries	Blanks	Overall Summary
METALS	SW846-6010	A	NA	N-1	A	A(See N-1)

NOTE 1: The matrix spike recoveries for iron and manganese were invalid due to the level of contamination of these elements in the sample.

A = Requirements set by method were met
NA = Not applicable
N-1 = See NOTE 1
N-2 =
N-3 =

Terri Gray
QA Officer

Laboratory Manager

Report Number: R-921193
Project Number: 374-08-06-00
Description: ETI/NAVY BASE - WATER SAMPLE

Memphis Environmental Center
Analytical Report
Metals By SW846-6010
Results given in: ug/L

Report Date: 10-09-92 10:50
Prepared By
QA/QC Check
Lab Manager

Sample Number	092892-JJ-01
Lab ID Number	9206126
Matrix	WATER
Type	SAMPLE**
Date of Collection	09-28-92
Date of Receipt	09-28-92
Date of Digestion	10-92
Date of Analysis	10-92
Copper	ND
Iron	28100
Manganese	4600
Zinc	149

** NOTES :
9206126*SAMPLE - SAMPLE RERUN (DIGESTION AND ANALYSIS) FOR Fe DUE TO UNACCEPTABLE BLANK SPIKE RECOVERY.

- Not Applicable
) Non detected at stated limit
(Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921193
Project Number: 374-08-06-00
Description: ETI/NAVY BASE - WATER SAMPLE

Memphis Environmental Center
QA/QC Report - Spikes
Metals By SW846-6010
Results given in: ug/L

Report Date: 10-09-92 10:50
Prepared By
QA/QC Check
Lab Manager

Sample Number	092892-JJ-01	092892-JJ-01	092892-JJ-01
Lab ID Number	9206126-SPIKE-1	9206126-SPIKE-1	9206126-SPIKE-1
Matrix	WATER	WATER	WATER
Type	ADDED LEVEL	% RECOVERED 1**	% RECOVERED 2**
Date of Collection	09-28-92	09-28-92	09-28-92
Date of Receipt	09-28-92	09-28-92	09-28-92
Date of Digestion	10-92	10-92	10-92
Date of Analysis	10-92	10-92	10-92
Copper	1000	89.0	91.0
Iron	3000	-	-
Manganese	1000	-	-
Zinc	500	99.6	102

** NOTES :
9206126*SPK1RCV1 - INVALID SPIKE DATA FOR Iron AND Manganese DUE TO HIGH CONCENTRATION OF SAMPLE.
9206126*SPK1RCV2 - INVALID SPIKE DATA FOR Iron AND Manganese DUE TO HIGH CONCENTRATION OF SAMPLE.

- Not Applicable
ND Non detected at stated limit
NA Not analyzed

[ ] - Below LOQ, Above LOD

Report Number: R-921193
Project Number: 374-08-06-00
Description: ETI/NAVY BASE - WATER SAMPLE

Memphis Environmental Center
QA/QC Report - Blanks
Metals By SW846-6010
Results given in: ug/L

Report Date: 10-09-92 10:50
Prepared By
QA/QC Check
Lab Manager

Sample Number Lab ID Number Matrix Type	BLANK 10-02 SPK ADD SYSTEM SAMPLE	BLANK 10-02 SPK RCV% SYSTEM SAMPLE	BLANK 10-92 SYSTEM SAMPLE	LIMIT OF DETECTION	LIMIT OF QUANTITATION
Date of Collection					
Date of Receipt					
Date of Digestion	10-92	10-92	10-92		
Date of Analysis	10-92	10-92	10-92		
Copper	1000	86.0	ND	20	-
Iron	3000	99.7	ND	100	-
Manganese	1000	96.0	ND	15	-
Zinc	500	94.4	ND	20	-

** NOTES :

- Not Applicable
D Non detected at stated limit
A Not analyzed

[ ] - Below LOQ, Above LOD

APPENDIX H

SOIL BORING LOGS

SOIL BORING LOG

PROJECT NAME: NAVAL AIR STATION - BUILDING S-237 MILLINGTON, TENNESSEE - FACILITY ID NUMBER: 9-791685	JOB NO. 374	BORING NO.: B-1 SHEET 1 OF 1

GROUND SURFACE ELEVATION: 99.76 DATUM: SOUTHEAST BUILDING CORNER	BORING LOCATION: SEE BORING LOCATION DIAGRAM	DATE BEGAN: 10-13-92 TIME BEGAN: 4:30 PM DESCRIPTION OF WEATHER: SUNNY, 75°F DRILLER : M. ROBERTS INSPECTOR : M. ROBERTS BORING TERMINATED AT: DEPTH: 6.0 FEET DATE : 10-13-92 TIME : 5:00 PM
DRILLING TECHNIQUE: - STAINLESS STEEL HAND-AUGER	NOTES: * SAMPLE SUBMITTED FOR ANALYSIS	

PETROLEUM ODOR? (YES or N)	SAMPLE DEPTH (ft) FROM - TO	SAMPLE ID	STANDARD PENETRATION TEST - N (Blows/ft)	HEADSPACE READING (ppm)	SAMPLE DESCRIPTION
N	1 - 2	A	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	2 - 3	B	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	3 - 4	C	HAND-AUGER	<5	MOIST DARK GRAY SILTY CLAY
N	4 - 5	D	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	5 - 6	E *	HAND-AUGER	<5	MOIST LIGHT GRAY-BROWN SILTY CLAY

SOIL BORING LOG

PROJECT NAME: NAVAL AIR STATION - BUILDING S-237
MILLINGTON, TENNESSEE - FACILITY ID NUMBER: 9-791685

JOB NO. 374

BORING NO.: B-2
SHEET 1 OF 1

GROUND SURFACE ELEVATION: 99.74

DATUM: SOUTHEAST BUILDING CORNER

BORING LOCATION:

SEE BORING LOCATION DIAGRAM

DATE BEGAN: 10-13-92
TIME BEGAN: 2:30 PM
DESCRIPTION OF WEATHER: SUNNY, 75°F
DRILLER : M. ROBERTS
INSPECTOR : M. ROBERTS
BORING TERMINATED AT:
DEPTH: 6.0 FEET
DATE : 10-13-92
TIME : 3:00 PM

DRILLING TECHNIQUE:

- STAINLESS STEEL HAND-AUGER

NOTES:

* SAMPLE SUBMITTED FOR ANALYSIS

PETROLEUM ODOR? (YES or N)	SAMPLE DEPTH (ft) FROM - TO	SAMPLE ID	STANDARD PENETRATION TEST - N (Blows/ft)	HEADSPACE READING (ppm)	SAMPLE DESCRIPTION
N	1 - 2	A	HAND-AUGER	5	MOIST GRAY-BROWN SILTY CLAY
N	2 - 3	B	HAND-AUGER	8	SLIGHTLY MOIST DARK GRAY-BLACK SILTY CLAY
N	3 - 4	C *	HAND-AUGER	15	SLIGHTLY MOIST DARK GRAY-BLACK SILTY CLAY
YES	4 - 5	D *	HAND-AUGER	18	SLIGHTLY MOIST DARK GRAY-GREEN SILTY CLAY
YES	5 - 6	E *	HAND-AUGER	200	SLIGHTLY MOIST GREEN-GRAY SILTY CLAY

SOIL BORING LOG

PROJECT NAME: NAVAL AIR STATION - BUILDING S-237
MILLINGTON, TENNESSEE - FACILITY ID NUMBER: 9-791685

JOB NO. 374

BORING NO.: B-3
SHEET 1 OF 1

GROUND SURFACE ELEVATION: 99.91

DATUM: SOUTHEAST BUILDING CORNER

BORING LOCATION:

SEE BORING LOCATION DIAGRAM

DATE BEGAN: 10-13-92
TIME BEGAN: 5:00 PM
DESCRIPTION OF WEATHER: SUNNY, 75°F
DRILLER : M. ROBERTS
INSPECTOR : M. ROBERTS
BORING TERMINATED AT:
DEPTH: 6.0 FEET
DATE : 10-13-92
TIME : 5:30 PM

DRILLING TECHNIQUE:

- STAINLESS STEEL HAND-AUGER

NOTES:

* SAMPLE SUBMITTED FOR ANALYSIS

PETROLEUM ODOR? (YES or N)	SAMPLE DEPTH (ft) FROM - TO	SAMPLE ID	STANDARD PENETRATION TEST - N (Blows/ft)	HEADSPACE READING (ppm)	SAMPLE DESCRIPTION
N	1 - 2	A	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	2 - 3	B	HAND-AUGER	13	MOIST DARK GRAY SILTY CLAY
N	3 - 4	C *	HAND-AUGER	200	MOIST DARK GRAY SILTY CLAY
N	4 - 5	D *	HAND-AUGER	300	MOIST DARK GRAY SILTY CLAY
N	5 - 6	E *	HAND-AUGER	200	MOIST DARK GRAY SILTY CLAY

SOIL BORING LOG

PROJECT NAME: NAVAL AIR STATION - BUILDING S-237
MILLINGTON, TENNESSEE - FACILITY ID NUMBER: 9-791685

JOB NO. 374

BORING NO.: B-4
SHEET 1 OF 1

GROUND SURFACE ELEVATION: 99.65

DATUM: SOUTHEAST BUILDING CORNER

BORING LOCATION:

SEE BORING LOCATION DIAGRAM

DATE BEGAN: 10-13-92
TIME BEGAN: 3:30 PM
DESCRIPTION OF
WEATHER: SUNNY, 78°F
DRILLER : M. ROBERTS
INSPECTOR : M. ROBERTS
BORING TERMINATED AT:
DEPTH: 6.0 FEET
DATE : 10-13-92
TIME : 4:00 PM

DRILLING TECHNIQUE:

- STAINLESS STEEL HAND-AUGER

NOTES:

* SAMPLE SUBMITTED FOR ANALYSIS

PETROLEUM ODOR? (YES or N)	SAMPLE DEPTH (ft) FROM - TO	SAMPLE ID	STANDARD PENETRATION TEST - N (Blows/ft)	HEADSPACE READING (ppm)	SAMPLE DESCRIPTION
N	0 - 1	A	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	1 - 2	B	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	2 - 3	C	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	3 - 4	D	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	4 - 5	E	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	5 - 6	F *	HAND-AUGER	<5	MOIST BROWN SILTY CLAY

SOIL BORING LOG

PROJECT NAME: NAVAL AIR STATION - BUILDING S-237
MILLINGTON, TENNESSEE - FACILITY ID NUMBER: 9-791685

JOB NO. 374

BORING NO.: B-5
SHEET 1 OF 1

GROUND SURFACE ELEVATION: ---

DATUM: ---

BORING LOCATION:

SEE BORING LOCATION DIAGRAM

DATE BEGAN: 10-30-92
TIME BEGAN: 12:30 PM
DESCRIPTION OF WEATHER: RAINY, 65°F
DRILLER : M. ROBERTS
INSPECTOR : M. ROBERTS
BORING TERMINATED AT:
DEPTH: 6.0 FEET
DATE : 10-30-92
TIME : 1:30 PM

DRILLING TECHNIQUE:

- STAINLESS STEEL HAND-AUGER

NOTES:

* SAMPLE SUBMITTED FOR ANALYSIS

PETROLEUM ODOR? (YES or N)	SAMPLE DEPTH (ft) FROM - TO	SAMPLE ID	STANDARD PENETRATION TEST - N (Blows/ft)	HEADSPACE READING (ppm)	SAMPLE DESCRIPTION
N	1 - 2	A	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	2 - 3	B	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	3 - 4	C *	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	4 - 5	D *	HAND-AUGER	50	MOIST BROWN-DARK GRAY SILTY CLAY
N	5 - 6	E *	HAND-AUGER	35	MOIST TO VERY MOIST GREEN-GRAY SILTY CLAY

SOIL BORING LOG

PROJECT NAME: NAVAL AIR STATION - BUILDING S-237 MILLINGTON, TENNESSEE - FACILITY ID NUMBER: 9-791685	JOB NO. 374	BORING NO.: MW1 SHEET 1 OF 1

GROUND SURFACE ELEVATION: 99.39 DATUM: SOUTHEAST BUILDING CORNER	BORING LOCATION: SEE BORING LOCATION DIAGRAM	DATE BEGAN: 09-23-92 TIME BEGAN: 10:50 AM DESCRIPTION OF WEATHER: SUNNY, 75°F DRILLER : L. SMITH INSPECTOR : M. ROBERTS BORING TERMINATED AT: DEPTH: 16.0 FEET DATE : 09-23-92 TIME : 1:00 PM
DRILLING TECHNIQUE: - HOLLOW-STEM AUGER - SPLIT-SPOON SAMPLER	NOTES: * SAMPLE SUBMITTED FOR ANALYSIS - GROUND WATER ENCOUNTERED BETWEEN 7.0 AND 9.0 FEET	

PETROLEUM ODOR? (YES or N)	SAMPLE DEPTH (ft) FROM - TO	SAMPLE ID	STANDARD PENETRATION TEST - N (Blows/ft)	HEADSPACE READING (ppm)	SAMPLE DESCRIPTION
N	0 - 2	A	HAND-AUGER	<5	MOIST BROWN-GRAY SILTY CLAY
N	2 - 4	B	HAND-AUGER	<5	MOIST BROWN-GRAY SILTY CLAY
N	4 - 6	C	HAND-AUGER	<5	MOIST BROWN-GRAY SILTY CLAY
N	6 - 8	D *	HAND-AUGER	<5	VERY MOIST FINE TO COARSE GRAY-TAN SAND
N	8 - 10	E	1-1-1-1	<5	VERY MOIST FINE TO COARSE GRAY-TAN SAND
N	10 - 12	F	1-1-1-4	<5	MOIST GRAY SILTY CLAY
N	12 - 14	G	2-3-5-5	<5	MOIST GRAY SILTY CLAY
N	14 - 16	H	3-3-3-5	<5	MOIST GRAY SILTY CLAY

SOIL BORING LOG

PROJECT NAME: NAVAL AIR STATION - BUILDING S-237 MILLINGTON, TENNESSEE - FACILITY ID NUMBER: 9-791685	JOB NO. 374	BORING NO.: MW2 SHEET 1 OF 1

GROUND SURFACE ELEVATION: 96.68 DATUM: SOUTHEAST BUILDING CORNER	BORING LOCATION: SEE BORING LOCATION DIAGRAM	DATE BEGAN: 09-22-92 TIME BEGAN: 12:50 PM DESCRIPTION OF WEATHER: LIGHT RAIN, 75°F DRILLER : L. SMITH INSPECTOR : M. ROBERTS BORING TERMINATED AT: DEPTH: 15.0 FEET DATE : 09-22-92 TIME : 1:45 PM
DRILLING TECHNIQUE: - HOLLOW-STEM AUGER - SPLIT-SPOON SAMPLER	NOTES: * SAMPLE SUBMITTED FOR ANALYSIS - GROUND WATER ENCOUNTERED BETWEEN 9.0 AND 11.0 FEET	

PETROLEUM ODOR? (YES or N)	SAMPLE DEPTH (ft) FROM - TO	SAMPLE ID	STANDARD PENETRATION TEST - N (Blows/ft)	HEADSPACE READING (ppm)	SAMPLE DESCRIPTION
N	1 - 3	A	HAND-AUGER	<5	MOIST LIGHT GRAY-BROWN SILTY CLAY
N	3 - 5	B *	HAND-AUGER	<5	MOIST LIGHT GRAY-BROWN SILTY CLAY
N	5 - 7	C	1-2-2-2	<5	MOIST LIGHT GRAY-BROWN SILTY CLAY
N	7 - 9	D	2-2-2-3	<5	MOIST LIGHT GRAY-BROWN SILTY CLAY
N	9 - 11	E	2-3-3-4	<5	VERY MOIST LIGHT GRAY-BROWN SILTY CLAY
N	11 - 13	F	3-3-3-4	<5	MOIST LIGHT GRAY-BROWN SILTY CLAY
N	13 - 15	G	3-4-3-5	<5	MOIST LIGHT GRAY-BROWN SILTY CLAY

SOIL BORING LOG

PROJECT NAME: NAVAL AIR STATION - BUILDING S-237
MILLINGTON, TENNESSEE - FACILITY ID NUMBER: 9-791685

JOB NO. 374

BORING NO.: MW3
SHEET 1 OF 1

GROUND SURFACE ELEVATION: 96.71

DATUM: SOUTHEAST BUILDING CORNER

BORING LOCATION:

SEE BORING LOCATION DIAGRAM

DATE BEGAN: 09-22-92
TIME BEGAN: 11:00 AM
DESCRIPTION OF
WEATHER: HEAVY RAIN, 70°F
DRILLER : L. SMITH
INSPECTOR : M. ROBERTS
BORING TERMINATED AT:
DEPTH: 15.0 FEET
DATE : 09-22-92
TIME : 1:00 PM

DRILLING TECHNIQUE:

- HOLLOW-STEM AUGER
- SPLIT-SPOON SAMPLER

NOTES:

* SAMPLE SUBMITTED FOR ANALYSIS

- GROUND WATER ENCOUNTERED BETWEEN 7.0 AND 9.0 FEET

PETROLEUM ODOR? (YES or N)	SAMPLE DEPTH (ft) FROM - TO	SAMPLE ID	STANDARD PENETRATION TEST - N (Blows/ft)	HEADSPACE READING (ppm)	SAMPLE DESCRIPTION
N	1 - 3	A	HAND-AUGER	<5	MOIST LIGHT GRAY SILTY CLAY
N	3 - 5	B *	HAND-AUGER	<5	MOIST LIGHT GRAY-BROWN SILTY CLAY
N	5 - 7	C	1-2-2-2	<5	MOIST LIGHT GRAY-BROWN SILTY CLAY
N	7 - 9	D	1-1-1-2	<5	VERY MOIST LIGHT GRAY-BROWN SILTY CLAY
N	9 - 11	E	1-2-4-5	<5	MOIST LIGHT GRAY SILTY CLAY
N	11 - 13	F	2-3-3-3	<5	MOIST LIGHT GRAY SILTY CLAY
N	13 - 15	G	4-5-8-10	<5	MOIST LIGHT GRAY SILTY CLAY

SOIL BORING LOG

PROJECT NAME: NAVAL AIR STATION - BUILDING S-237 MILLINGTON, TENNESSEE - FACILITY ID NUMBER: 9-791685	JOB NO. 374	BORING NO.: MW4 SHEET 1 OF 1

GROUND SURFACE ELEVATION: 99.63 DATUM: SOUTHEAST BUILDING CORNER	BORING LOCATION: SEE BORING LOCATION DIAGRAM	DATE BEGAN: 09-23-92 TIME BEGAN: 3:45 PM DESCRIPTION OF WEATHER: SUNNY, 75°F DRILLER : J. JOHNSTON INSPECTOR : M. ROBERTS BORING TERMINATED AT: DEPTH: 10.0 FEET DATE : 09-23-92 TIME : 4:30 PM
DRILLING TECHNIQUE: - STAINLESS STEEL HAND-AUGER	NOTES: * SAMPLE SUBMITTED FOR ANALYSIS - GROUND WATER ENCOUNTERED BETWEEN 7.0 AND 8.0 FEET	

PETROLEUM ODOR? (YES or N)	SAMPLE DEPTH (ft) FROM - TO	SAMPLE ID	STANDARD PENETRATION TEST - N (Blows/ft)	HEADSPACE READING (ppm)	SAMPLE DESCRIPTION
N	0 - 1	A	HAND-AUGER	8	MOIST BROWN SILTY CLAY
N	1 - 2	B	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	2 - 3	C	HAND-AUGER	<5	MOIST GRAY-BROWN SILTY CLAY
N	3 - 4	D *	HAND-AUGER	8	MOIST GRAY-BROWN SILTY CLAY
N	4 - 5	E *	HAND-AUGER	5	MOIST GRAY-BROWN SILTY CLAY
YES	5 - 6	F *	HAND-AUGER	62	MOIST GRAY-BROWN SILTY CLAY
YES	6 - 7	G	HAND-AUGER	---	MOIST GRAY SILTY CLAY
YES	7 - 7.5	H	HAND-AUGER	---	MOIST GRAY SILTY CLAY
---	7.5 - 10.0	---	HAND-AUGER	---	MOIST GRAY SILTY CLAY

SOIL BORING LOG

PROJECT NAME: NAVAL AIR STATION - BUILDING S-237
MILLINGTON, TENNESSEE - FACILITY ID NUMBER: 9-791685

JOB NO. 374

BORING NO.: MW5
SHEET 1 OF 1

GROUND SURFACE ELEVATION: 98.91

DATUM: SOUTHEAST BUILDING CORNER

BORING LOCATION:

SEE BORING LOCATION DIAGRAM

DATE BEGAN: 10-13-92
TIME BEGAN: 10:00 AM
DESCRIPTION OF
WEATHER: SUNNY, 75°F
DRILLER : J. HOLCOMB
INSPECTOR : M. ROBERTS
BORING TERMINATED AT:
DEPTH: 15.0 FEET
DATE : 10-13-92
TIME : 11:00 AM

DRILLING TECHNIQUE:

- HOLLOW-STEM AUGER
- 5-FOOT CONTINUOUS SAMPLER

NOTES:

* SAMPLE SUBMITTED FOR ANALYSIS

- GROUND WATER ENCOUNTERED BETWEEN 6.0 AND 8.0 FEET

PETROLEUM ODOR? (YES or N)	SAMPLE DEPTH (ft) FROM - TO	SAMPLE ID	STANDARD PENETRATION TEST - N (Blows/ft)	HEADSPACE READING (ppm)	SAMPLE DESCRIPTION
N	0 - 2	A	HAND-AUGER	<5	SLIGHTLY MOIST BROWN SILTY CLAY
N	2 - 4	B	HAND-AUGER	<5	SLIGHTLY MOIST BROWN SILTY CLAY
N	4 - 6	C *	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	6 - 8	D	HAND-AUGER	---	VERY MOIST GRAY-BROWN SILTY CLAY
N	8 - 10	E	CONTINUOUS SAMPLER	---	MOIST GRAY SILTY CLAY
N	10 - 12	F	CONTINUOUS SAMPLER	---	MOIST GRAY SILTY CLAY
N	12 - 14	G	CONTINUOUS SAMPLER	---	MOIST GRAY SILTY CLAY
N	14 - 15	H	CONTINUOUS SAMPLER	---	MOIST GRAY SILTY CLAY

SOIL BORING LOG

PROJECT NAME: NAVAL AIR STATION - BUILDING S-237
MILLINGTON, TENNESSEE - FACILITY ID NUMBER: 9-791685

JOB NO. 374

BORING NO.: MW6
SHEET 1 OF 1

GROUND SURFACE ELEVATION: 99.61

DATUM: SOUTHEAST BUILDING CORNER

BORING LOCATION:

SEE BORING LOCATION DIAGRAM

DATE BEGAN: 10-13-92
TIME BEGAN: 12:00 NOON
DESCRIPTION OF WEATHER: SUNNY, 75°F
DRILLER : J. HOLCOMB
INSPECTOR : M. ROBERTS
BORING TERMINATED AT:
DEPTH: 15.0 FEET
DATE : 10-13-92
TIME : 12:45 PM

DRILLING TECHNIQUE:

- HOLLOW-STEM AUGER
- 5-FOOT CONTINUOUS SAMPLER

NOTES:

* SAMPLE SUBMITTED FOR ANALYSIS

- GROUND WATER ENCOUNTERED BETWEEN 6.0 AND 8.0 FEET

PETROLEUM ODOR? (YES or N)	SAMPLE DEPTH (ft) FROM - TO	SAMPLE ID	STANDARD PENETRATION TEST - N (Blows/ft)	HEADSPACE READING (ppm)	SAMPLE DESCRIPTION
N	0 - 2	A	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	2 - 4	B	HAND-AUGER	<5	MOIST BROWN SILTY CLAY
N	4 - 6	C *	CONTINUOUS SAMPLER	<5	MOIST BROWN-GRAY SILTY CLAY
N	6 - 8	D	CONTINUOUS SAMPLER	---	MOIST LIGHT GRAY SILTY CLAY
N	8 - 10	E	CONTINUOUS SAMPLER	---	VERY MOIST LIGHT GRAY SILTY CLAY
N	10 - 12	F	CONTINUOUS SAMPLER	---	VERY MOIST LIGHT GRAY SILTY CLAY
N	12 - 14	G	CONTINUOUS SAMPLER	---	VERY MOIST LIGHT GRAY-LIGHT BROWN SILTY CLAY
N	14 - 15	H	CONTINUOUS SAMPLER	---	VERY MOIST LIGHT GRAY-LIGHT BROWN SILTY CLAY