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SITE INVESTIGATION REPORT FOR BUILDING S 362 MILLINGTON SUPPACT TN
12/14/1992
ERC ENVIRONMENTAL AND ENERGY

**SITE INVESTIGATION REPORT
BUILDING S-362 (TRAINING MOCK-UP)
NAVAL AIR STATION MEMPHIS
Contract: N62467-92-D-4507
Delivery Order: 0001**

Prepared for:

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

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Under Subcontract to:



**ETI Corporation
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Memphis, TN 38138**

**ETI Project No. 92076-00
December 14, 1992**

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1.0 INTRODUCTION

This document describes the activities conducted during the performance of a Site Investigation (Investigation) at Building 362 (*Training Mock-Up Area*) at the Naval Air Station-Memphis (NAS-Memphis) in Millington, Shelby County, Tennessee (Site), as shown in *Figure 1* of *Appendix B*. The purpose of the Investigation was to identify the presence, if any, of subsurface soil and ground water hydrocarbon contamination at the location where a JP-5 fuel spill occurred. ETI Corporation (ETI) was retained by the NAS-Memphis (Public Works Environmental Division) to perform the Investigation and ETI subcontracted the work to Memphis Environmental Center, Inc. (MEC). This Site Investigation Report outlines procedures and sampling methods utilized by MEC during the performance of the Investigation and presents the results of laboratory analysis performed on soil and ground water samples.

The JP-5 fuel spill occurred on April 28, 1992. Approximately 25 gallons of product was released. On May 4, 1992, soil was excavated in the area of the spill. On May 14, 1992, NAS Public Works Department personnel collected surface and subsurface soil samples in the area of the spill. *Figure 2* of *Appendix B* shows the approximate limits of the temporary soil excavation required for sample collection. Analytical results from the four samples collected indicated petroleum hydrocarbon concentrations in the soil ranging from 38,900 parts per million (ppm) at the surface to 5,090 ppm at a depth of approximately 6 feet. The

soils removed in order to collect these samples were subsequently backfilled into the excavation.

2.0 SITE LOCATION

The Site is located in the southern portion of the south side of NAS-Memphis base. *Figure 1 of Appendix B* shows the general location of the Site. *Figure 3 of Appendix B* outlines the location of the Site with others buildings at NAS-Memphis.

3.0 SCOPE OF WORK

The scope of work performed during the Investigation included the following:

1. Drilling nine subsurface borings;
2. Collecting subsurface soil samples from the borings;
3. Installing four ground water monitoring wells;
4. Collecting ground water samples;
5. Subjecting soil samples to TPH and benzene, toluene and xylenes (BTX) analyses; and
6. Analyzing ground water samples for TPH and BTX.
7. Performing a disposal characterization (*BTX, TPH, toxicity characteristic leaching procedure (TCLP)-metals, TCLP-volatile organics, TCLP-TPH and PCBs*) on a composite sample from the drill cuttings. (*Data is not included in this report.*)

The findings presented in this report are formulated on the basis of the scope of work implemented. This scope of work specified the location and number of soil and ground water samples which were to be taken to determine whether petroleum product constituents are detectable in the subsurface locations sampled. The sampling was performed in those locations which would most likely identify subsurface contamination. Caution should be used in applying the results of the limited assessment in drawing conclusions concerning the portions of the Site from which no samples were collected.

4.0 IMPLEMENTATION OF SCOPE OF WORK

4.1 Subsurface Boring/Monitoring Well Installation

Professional Service Industries, Inc., under contract to MEC, drilled six subsurface borings on October 29, November 2 and November 3, 1992, as shown on *Figure 4 of Appendix B*. A truck-mounted rotary drill rig was used to install these borings. Three other soil borings (*B1, B2 and B5*) were advanced with a stainless steel hand-auger.

The borings were drilled and sampled at 1-2 foot increments from the ground surface to a depth of 7 to 13 feet. It is noted that ground water was encountered at each boring location. Cuttings generated during the drilling operation were placed into 55-gallon drums.

Split-spoon sampling techniques were used to collect soil samples from the borings installed with the drill rig. Samples were retrieved from the bucket of the hand auger at the other boring locations. The samples were removed from the sampling device and placed on clean aluminum foil. The exterior portion of each sample was trimmed to remove any smear.

The soil samples were visually examined for obvious signs of contamination and were classified in accordance with the Unified Soils Classification System. A portion of each sample was placed into a 250 milliliter (ml) glass jar and was immediately stored in a cooler maintained at 4° Centigrade.

Another portion of the sample was used to fill approximately 1/8 of a 125 ml jar to perform a headspace analysis. The sample was kept out of direct sunlight and allowed to equilibrate at ambient temperature prior to the analysis. The concentration of total organic vapors was measured with an 11.7 eV photoionization detector (PID). To obtain consistent headspace results, uniform soil volumes were used.

The results of the headspace analyses and a description of the subsurface soils encountered are presented on the boring logs in *Appendix C*.

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., highest headspace, soil ground water interface, etc.*).

Monitoring wells MW1 through MW4 as shown on *Figure 4* of *Appendix B* were completed in four of the borings to facilitate the collection of ground water samples. The monitoring wells were constructed by using 10 feet of ten-slot, 2-inch diameter, PVC well screen joined to 2-inch diameter, schedule 40 PVC riser with threaded joints. A well graded granular material was used as the filter pack and was placed to a depth of 1 foot above the top of the well screen. A 2-foot layer of high density bentonite pellets was placed above the filter pack. Concrete was used to backfill from the bentonite pellets to existing grade. The monitoring wells were protected with a locking, screw pill cap and a 6-inch diameter cast iron service manhole. The Monitoring Well Construction Diagram for each well, along with the corresponding soil profile, is located in *Appendix D*.

A representative of MEC determined the location and elevation of each well. The survey data is summarized in *Table 1* of *Appendix A*.

4.2 Ground Water Sampling

A disposable bailer was used to develop the wells. Each well was developed until at least seven well volumes were removed.

On November 4, 1992, ground water samples were collected for TPH and BTX analyses. A disposable bailer was used during the sample collection. Purging, prior to sampling, continued until at least three well volumes were removed. The purge and development water was collected and stored in 55-gallon drums. These drums are staged at Building 1694 (*Hazardous Waste Building*) awaiting appropriate disposal.

4.3 Decontamination

The sampling equipment, prior to the collection of soil samples and between each use, was cleansed in the following sequence:

1. Alconox wash;
2. Tap water rinse;
3. Methanol rinse; and
4. Distilled water rinse.

The drill rig and associated drilling equipment were steam cleaned prior to starting and between each sampling location.

4.4 Field QA/QC

Prior to delivery to the MEC laboratory, samples remained under the control of the field geologist at the Site. Samples were delivered to the MEC laboratory at the completion of each day's sample collection. Chain of custody forms were completed for each set of samples submitted to the analytical laboratory. Copies of the chain of custody forms for these samples are included in *Appendix E*.

5.0 DATA PRESENTATION

5.1 Regional Geology and Hydrogeology

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

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.

5.2 Vadose Zone Soils

The soils at the Site consisted of silty clays. Boring logs were developed from each monitoring well and soil boring performed at the Site and are included in *Appendix C*. The depth to ground water ranged from 3.31 feet (MW3) to 4.20 feet below the ground surface on November 23, 1992.

The soil samples collected during the Assessment were visually examined for obvious signs of contamination. The samples from MW1 (3-13 feet), MW3 (4-6 and 6-8 feet), MW4 (4-6 and 6-8 feet), B3 (2-8 feet), and all samples at B1, B2, B4 and B5 exhibited a petroleum odor. Selected samples were submitted for analysis as outlined in *Section 4.1*. The results of the laboratory analysis are summarized on *Table 2 of Appendix A*. The formal laboratory report is located in *Appendix G*.

5.3 Hydrogeology

Monitoring wells were installed at the Site to aid in the determination of the ground water gradient, flow direction and quality beneath the Site. The ground water elevations, measured on November 23, 1992, were plotted and the ground

water contours developed using *Quicksurf Version 2.6* as shown in *Figure 5* of *Appendix A*. No free product was detected in any of the monitoring wells.

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 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 ground water generally flows towards the east-northeast.

The ground water samples collected from the wells were submitted for BTX and TPH analyses. The results of the laboratory analyses are summarized on *Table 3* of *Appendix A*. The formal laboratory report is presented in *Appendix G*.

6.0 LABORATORY ANALYSIS

Applicable analytical methods listed in *Test Methods for Evaluating Solid Wastes - Physical Chemical Methods, SW846, 3rd Edition, USEPA Methods of Organic Chemical Analysis of Municipal and Industrial Wastewater* and the State of Tennessee Diesel Range Organics (DRO) and Gasoline Range Organics (GRO) Methods were used during the soil and ground water analysis. Detection limits provided in the methods were used as the technical requirements for analytical procedures.

Laboratory quality control samples were analyzed with each set of samples submitted to the MEC laboratory. The quality control samples consisted of laboratory blanks, matrix spikes, matrix spike duplicates and blank spikes. The quality assurance/quality control data is located in the laboratory report in *Appendix G*.

7.0 NATURE AND EXTENT OF CONTAMINATION

7.1 Subsurface Soil Characterization

Subsurface soil samples were collected during the Investigation. Twenty samples were analyzed for BTX and TPH. Three soil samples (*0-2 foot at MW2, 0-2 foot at MW3, and 0-2 foot at MW4*) of twenty contained concentrations of BTX and TPH below the method detection limit for each analysis. In addition, non-

detectable concentrations of BTX were found in the 4-6 foot sample at MW2, 0-1 foot sample at B1, and 0-2 foot sample at B4. BTX concentrations in the remaining samples ranged from 0.38 ppm (2-4 foot sample at B3) to 28.1 ppm (4-5 foot sample at B5). The seventeen samples which contained TPH at detectable levels had concentrations ranging from 187 ppm (0-2 foot sample at B4) to 5,178.4 ppm (4-5 foot sample at B1). The results of the laboratory analyses performed on the soil samples are summarized on *Figure 6 of Appendix B* and on *Table 2 of Appendix A*.

7.2 Ground Water Characterization

Ground water from the four monitoring wells was sampled and analyzed for BTX and TPH. Non-detectable concentrations of benzene were found in all of the samples at a detection limit of 5 parts per billion (ppb). BTX levels were also non-detectable. TPH was detected in all of the ground water samples at concentrations ranging from 295 ppb (MW4) to 3,156 ppb (MW1).

The concentration of benzene, toluene, ethyl benzene, xylenes (BTEX) and TPH identified in the ground water at each monitoring well is presented in *Figure 7 of Appendix B* and on *Table 3 of Appendix A*.

8.0 FINDINGS

As a result of the Investigation performed at the Site, the following findings were made:

1. Four monitoring wells were emplaced at the Site;
2. Ground water was determined to be at a depth of 3.31 feet (MW3) to 4.20 feet (MW1) below the ground surface on November 23, 1992;
3. Non-detectable concentrations of benzene was found in all of the ground water samples;
4. TPH concentrations ranging from 295 ppb to 3,156 ppb were detected in the ground water samples;
5. BTX concentrations ranging from *non-detected* to 28.1 ppm were detected in the soil samples; and
6. TPH concentrations ranging from *non-detected* to 5,178.4 ppm were detected in the soil samples.

9.0 CONCLUSIONS

The findings of this investigation indicate that both the soil and ground water in this area contain potentially significant concentrations of petroleum hydrocarbons. It is our opinion that, based on the extent of the contamination indicated, the April 28, 1992 spill of 25 gallons of JP-5 fuel is probably not the sole source of petroleum hydrocarbon contamination of soil and ground water in this area.

The concentrations of petroleum hydrocarbons indicated in both the soil and ground water in this area are in excess of even the least stringent action levels established by Tennessee Department of Environment and Conservation (TDEC) for releases from underground storage tank (UST) sites. However, since TDEC has not established corresponding criteria for sites other than USTs, the action cleanup levels that may be applicable to this site are indeterminate at this time.

APPENDIX A

TABLES

**TABLE 1
SUMMARY OF SURVEY DATA**

***NAVAL AIR STATION-MEMPHIS
Building 362 (Training Mock-Up Area)
Millington, Tennessee***

Monitoring Well Number	Well Depth (feet)	Screen Interval (feet)	Depth to Ground Water (feet)	Ground Water Elevation (feet)	Well Elevation (feet)	Measurement Date
MW1	15.0	5.0 - 15.0	4.91	258.83	263.74	11/04/92
MW2	14.0	4.0 - 14.0	4.19	259.08	263.27	11/04/92
MW3	14.0	4.0 - 14.0	3.94	259.23	263.17	11/04/92
MW4	14.0	4.0 - 14.0	4.46	259.13	263.59	11/04/92
MW1	15.0	5.0 - 15.0	4.20	259.54	263.74	11/23/92
MW2	14.0	4.0 - 14.0	3.37	259.90	263.27	11/23/92
MW3	14.0	4.0 - 14.0	3.31	259.86	263.17	11/23/92
MW4	14.0	4.0 - 14.0	3.98	259.61	263.59	11/23/92

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.

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TABLE 2 (page 1 of 2)
SUMMARY OF LABORATORY ANALYSIS PERFORMED ON SOIL SAMPLES

NAVAL AIR STATION-MEMPHIS
Building 362 (Training Mock-Up Area)
Millington, Tennessee

Sample Number	Location	Sampling Date	Depth (ft)	Headspace Reading (ppm)	Results (ppm)				
					Total Petroleum Hydrocarbons				BTX
					DRO	GRO	Total TPH	TPH (IR)	
102992-MR-01	MW1	10/29/92	1 - 3	450	2,820	49.3	2,869.3	N/A	26.0
102992-MR-02	MW1	10/29/92	3 - 5	180	801	34.1	835.1	N/A	3.45
110292-MR-01	MW2	11/02/92	0 - 2	<5	ND	ND	ND	N/A	ND
110292-MR-02	MW2	11/02/92	4 - 6	<5	263	ND	263	N/A	ND
110292-MR-03	MW3	11/02/92	0 - 2	<5	ND	ND	ND	N/A	ND
110292-MR-04	MW3	11/02/92	4 - 6	102	595	102	697	N/A	11.2
110292-MR-05	MW4	11/02/92	0 - 2	<5	ND	ND	ND	N/A	ND
110292-MR-06	MW4	11/02/92	4 - 6	48	479	15.2	494.2	N/A	5.06
110392-MR-07	B1	11/03/92	1 - 2	80	7,930	ND	7,930	N/A	2.06
110392-MR-08	B1	11/03/92	3 - 4	97	2,060	10.3	2,070.3	N/A	1.29
110392-MR-09	B1	11/03/92	4 - 5	88	5,160	18.4	5,178.4	N/A	5.19
110392-MR-010	B2	11/03/92	0 - 1	9	1,940	ND	1,940	N/A	ND
110392-MR-011	B2	11/03/92	1 - 2	48	4,200	ND	4,200	N/A	0.61
110392-MR-012	B2	11/03/92	4 - 5	108	2,450	23.1	2,473.1	N/A	2.69

TABLE 2 (page 2 of 2)
SUMMARY OF LABORATORY ANALYSIS PERFORMED ON SOIL SAMPLES

*NAVAL AIR STATION-MEMPHIS
 Building 362 (Training Mock-Up Area)
 Millington, Tennessee*

Sample Number	Location	Sampling Date	Depth (ft)	Headspace Reading (ppm)	Results (ppm)				
					Total Petroleum Hydrocarbons				BTX
					DRO	GRO	Total TPH	TPH (IR)	
110392-MR-013	B3	11/03/92	2 - 4	17	259	ND	259	N/A	0.38
110392-MR-014	B3	11/03/92	4 - 6	84	670	37.8	707.8	N/A	6.91
110392-MR-015	B4	11/03/92	0 - 2	40	187	ND	187	N/A	ND
110392-MR-016	B4	11/03/92	4 - 6	90	939	19.2	958.2	N/A	4.54
110392-MR-017	B5	11/03/92	1 - 2	96	189	10.8	199.8	N/A	2.72
110392-MR-018	B5	11/03/92	4 - 5	220	3,810	118	3,928	N/A	28.1

DRO = Diesel Range Organics
 GRO = Gasoline Range Organics
 TPH (IR) = Total Petroleum Hydrocarbons by Infrared Method

ppm = parts per million
 ND = Non-Detected
 N/A = Not Analyzed for Listed Parameter

TABLE 3
SUMMARY OF LABORATORY ANALYSIS PERFORMED ON GROUND WATER SAMPLES

*NAVAL AIR STATION-MEMPHIS
 Building 362 (Training Mock-Up Area)
 Millington, Tennessee*

Sample Number	Monitoring Well Number	Sampling Date	Analytical Results (ppb)						Limit of Quantitation/Detection (ppb)		
			<i>Benzene</i>	<i>BTX</i>	<i>TPH-DRO</i>	<i>TPH-GRO</i>	<i>Total TPH</i>	<i>TPH-IR</i>	<i>Benzene</i>	<i>TPH (DRO & GRO) ^a</i>	<i>TPH-IR</i>
110492-MR-01	MW1	11/04/92	ND	ND	2,980	176	3,156	N/A	5	100	1,000
110492-MR-02	MW1 (<i>dup</i>)	11/04/92	ND	ND	2,110	147	2,257	N/A	5	100	1,000
110492-MR-03	MW2	11/04/92	ND	ND	1,130	139	1,269	N/A	5	100	1,000
110492-MR-04	MW3	11/04/92	ND	ND	973	231	1,204	N/A	5	100	1,000
110492-MR-05	MW4	11/04/92	ND	ND	295	ND	295	N/A	5	100	1,000

^a Detection limit was 100 ppb for DRO and 100 ppb for GRO.

DRO = Diesel Range Organics

GRO = Gasoline Range Organics

TPH (IR) = Total Petroleum Hydrocarbons by Infrared Method

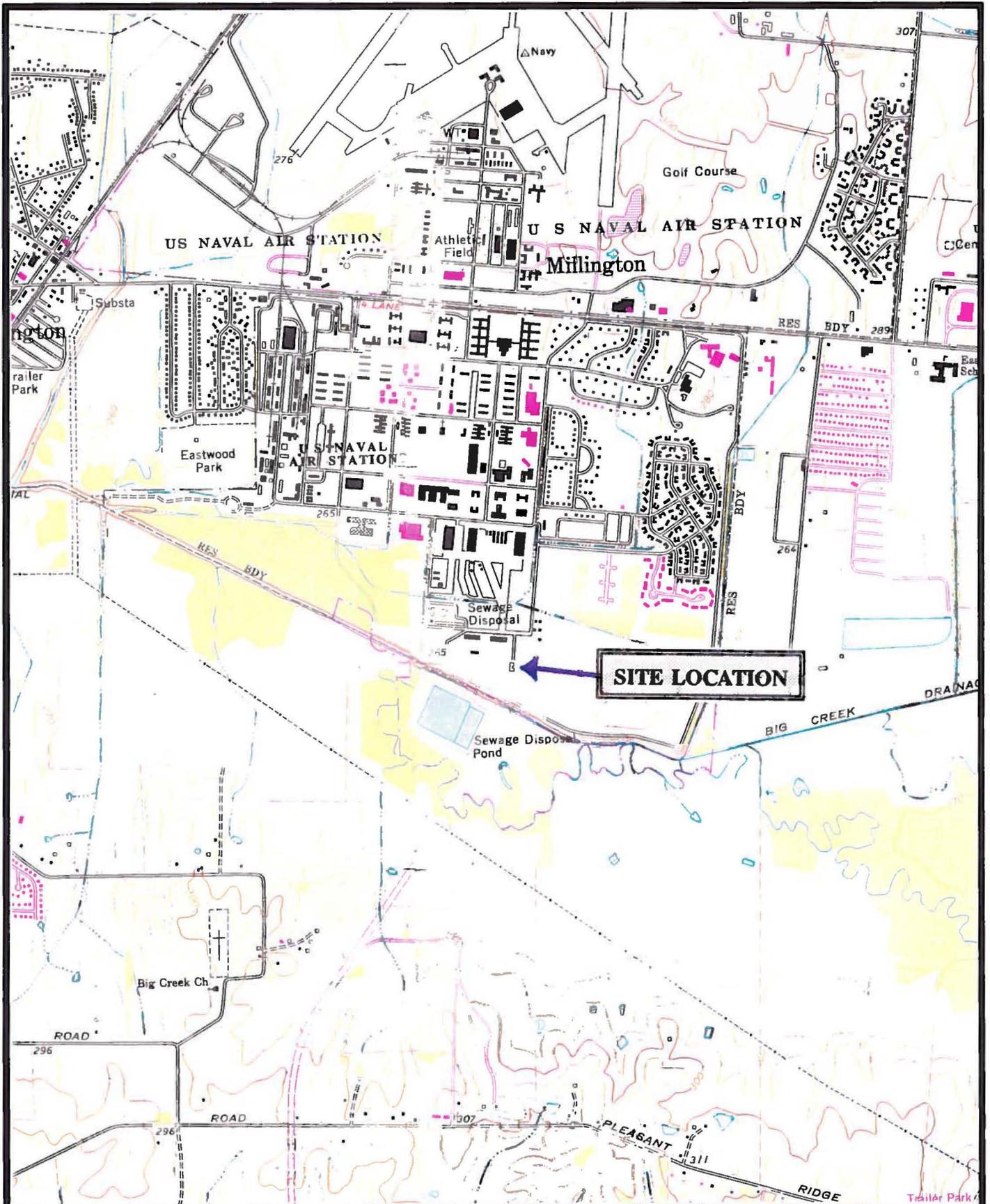
ND = Non-Detected

ppb = parts per billion

N/A = Not Analyzed for Listed Parameter

APPENDIX B

FIGURES



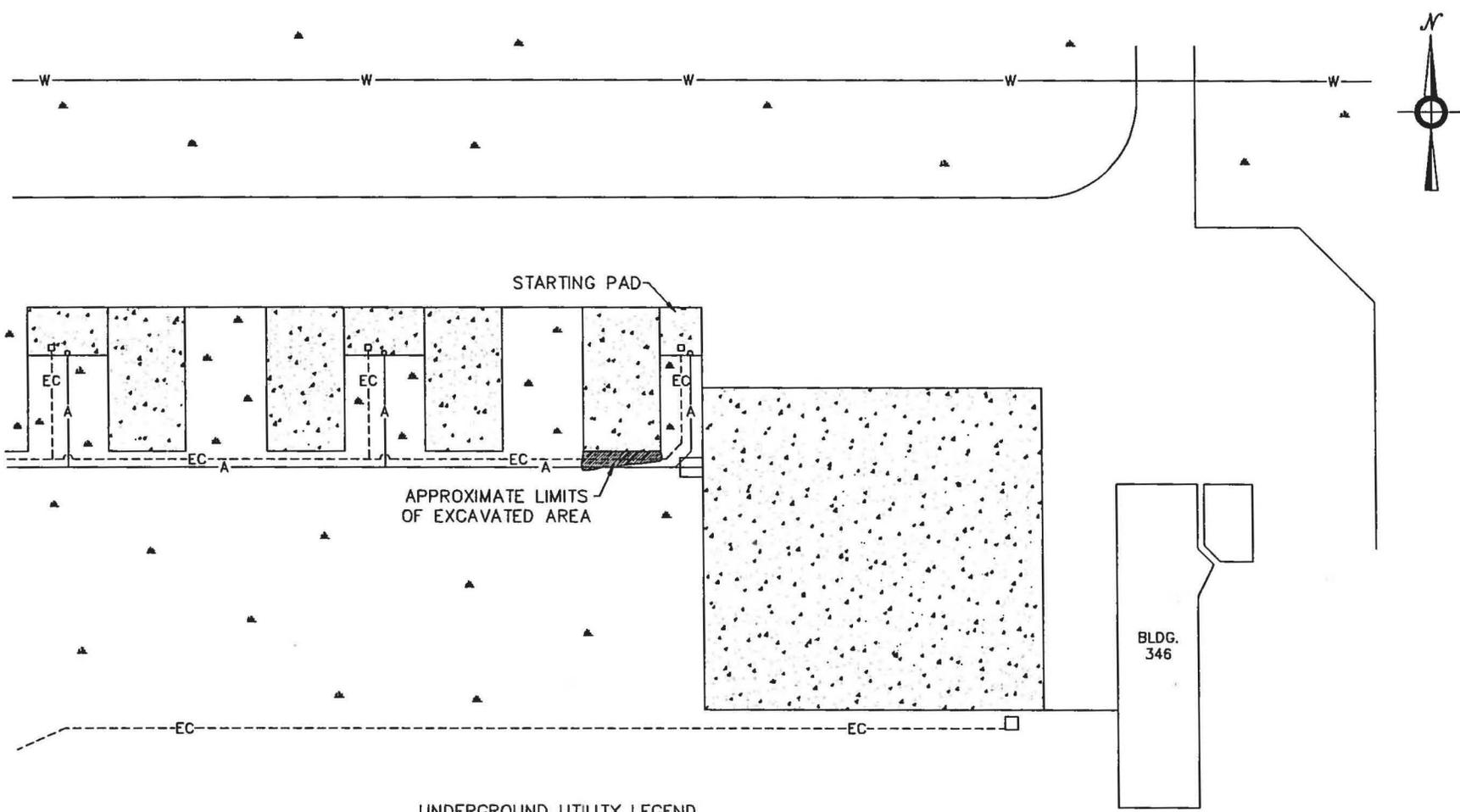
MEMPHIS ENVIRONMENTAL CENTER, INC.

DWG. NO. BP\BORDER
 DRAWN: DKO
 DATE: NOVEMBER 23, 1992

2803 Corporate Avenue, Suite 100
 Memphis, Tennessee 38132



FIGURE 1
 SITE LOCATION DIAGRAM
 NAVAL AIR STATION MEMPHIS
 BUILDING 362 TRAINING MOCK-UP AREA
 MILLINGTON, TENNESSEE



NOTE:
 UNDERGROUND UTILITIES LOCATED
 PER DRAWINGS PROVIDED BY NAS
 MEMPHIS P.W.D. AND ARE SUBJECT
 TO FIELD VERIFICATION PRIOR TO
 SUBSURFACE EXPLORATIONS.

DRAWING SOURCE: ETI, File No.: H7600P01.

UNDERGROUND UTILITY LEGEND

- A — AIR LINE
- W — WATER LINE
- - - EC - - - ELECTRICAL CABLE
-  CONCRETE SLAB
- ▲ GRASS AREA



FIGURE 2

MEMPHIS ENVIRONMENTAL CENTER, INC.

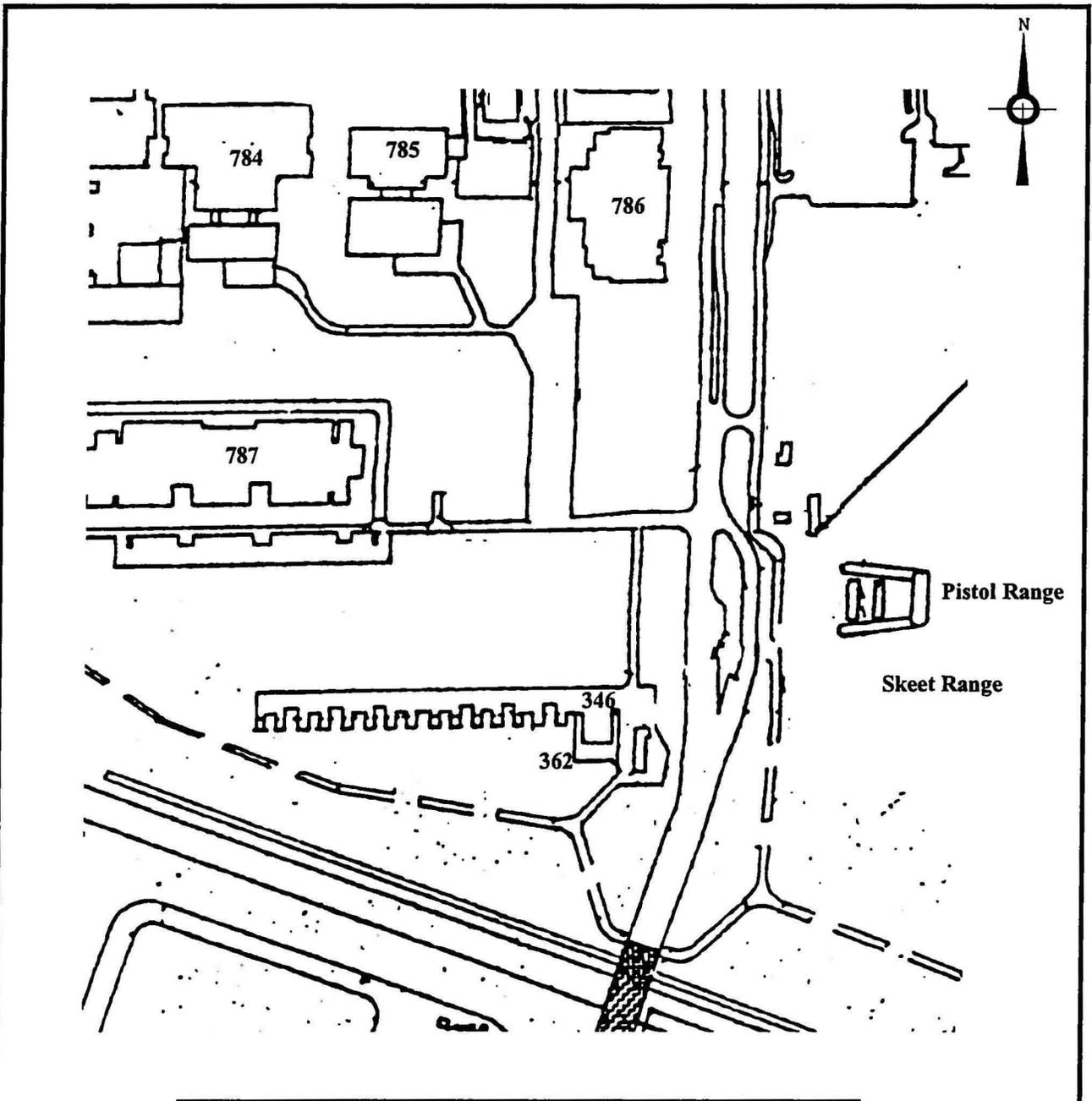
2803 Corporate Avenue, Suite 100
 Memphis, Tennessee 38132



REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE

DWG. NO.: N45003	SITE NO.: 386
DRAWN BY: DKD	CHECKED BY:
DATE: NOVEMBER 23, 1992	DATE:

SITE DIAGRAM
 NAVAL AIR STATION MEMPHIS
 BUILDING 362 TRAINING MOCK-UP AREA
 MILLINGTON, TENNESSEE



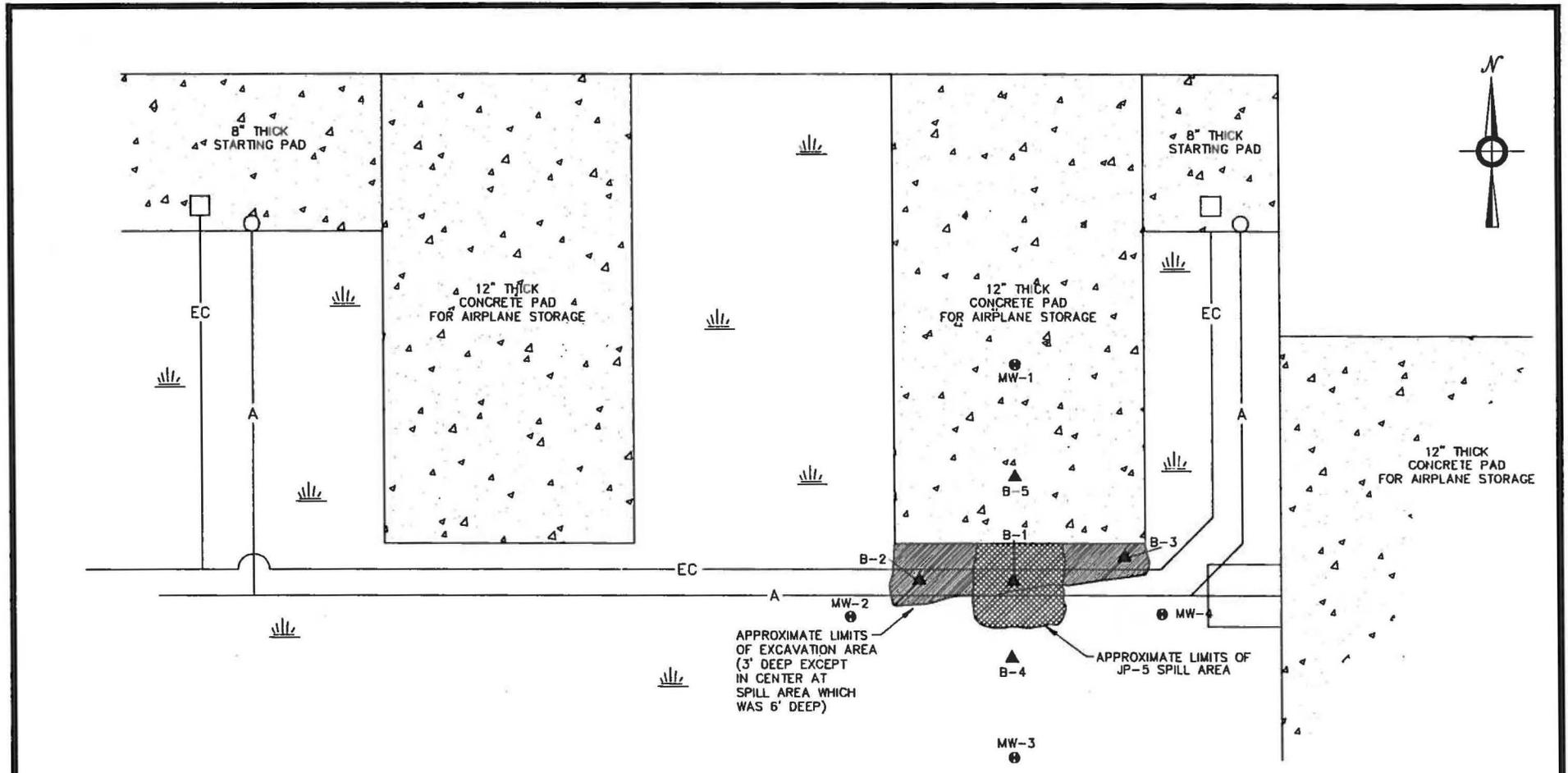
STRUCTURE INDEX	
NO.	DESCRIPTION
346	AD Training
362	Training Mock-up
784	Training (AMS)
785	Training (AMH)
786	Training (AME)
787	Training (AS)

MEMPHIS ENVIRONMENTAL CENTER, INC.

DWG. NO.: PM4/NAVAL003
 DRAWN: DKD
 DATE: NOV. 23, 1992

2603 Corporate Avenue, Suite 100
 Memphis, Tennessee 38132

FIGURE 3
VICINITY MAP
NAVAL AIR STATION MEMPHIS
BUILDING 362 TRAINING MOCK-UP AREA
MILLINGTON, TENNESSEE



NOTE:
 UNDERGROUND UTILITIES LOCATED
 PER DRAWINGS PROVIDED BY NAS
 MEMPHIS P.W.D. AND ARE SUBJECT
 TO FIELD VERIFICATION PRIOR TO
 SUBSURFACE EXPLORATIONS.

DRAWING SOURCE: ETI, File No.: H7600P02

UNDERGROUND UTILITY LEGEND

- A — AIR
- W — WATER
- EC — ELECTRICAL CABLE
-  CONCRETE SLAB
-  GRASS AREA
-  MONITORING WELL
-  SUBSURFACE BORING

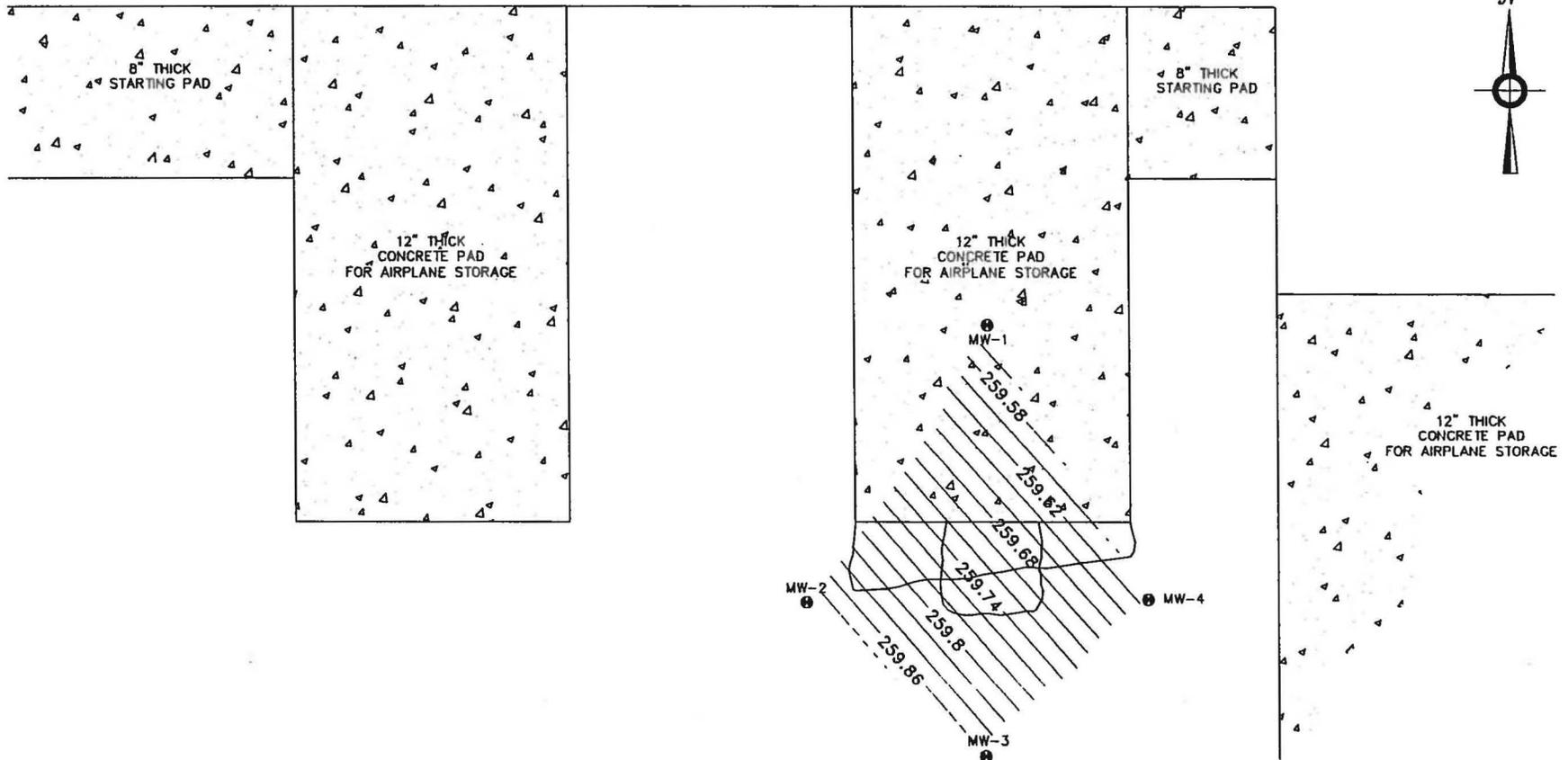


FIGURE 4

MEMPHIS ENVIRONMENTAL CENTER, INC.		
2803 Corporate Avenue, Suite 100 Memphis, Tennessee 38132		
DWG. NO.: H45004	SITE NO.: 386	
DRAWN BY: DKD	CHECKED BY:	
DATE: NOVEMBER 23, 1992	DATE:	

REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE

SUBSURFACE BORING/MONITORING WELL
 LOCATION DIAGRAM
 NAVAL AIR STATION MEMPHIS
 BUILDING 362 TRAINING MOCK-UP AREA
 MILLINGTON, TENNESSEE



NOTE:
1. MEASUREMENTS ARE IN FEET.

DRAWING SOURCE: ETI, File No.: H7600P02

LEGEND

-  CONCRETE SLAB
-  MONITORING WELL



FIGURE 5

MEMPHIS ENVIRONMENTAL CENTER, INC.		
2803 Corporate Avenue, Suite 100 Memphis, Tennessee 38132		
DWG. NO.: NAS004	SITE NO.: 306	
DRAWN BY: DKD	CHECKED BY:	
DATE: NOVEMBER 23, 1992	DATE:	

REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE

GROUND WATER CONTOUR DIAGRAM
(11/23/92)
NAVAL AIR STATION MEMPHIS
BUILDING 362 TRAINING MOCK-UP AREA
MILLINGTON, TENNESSEE

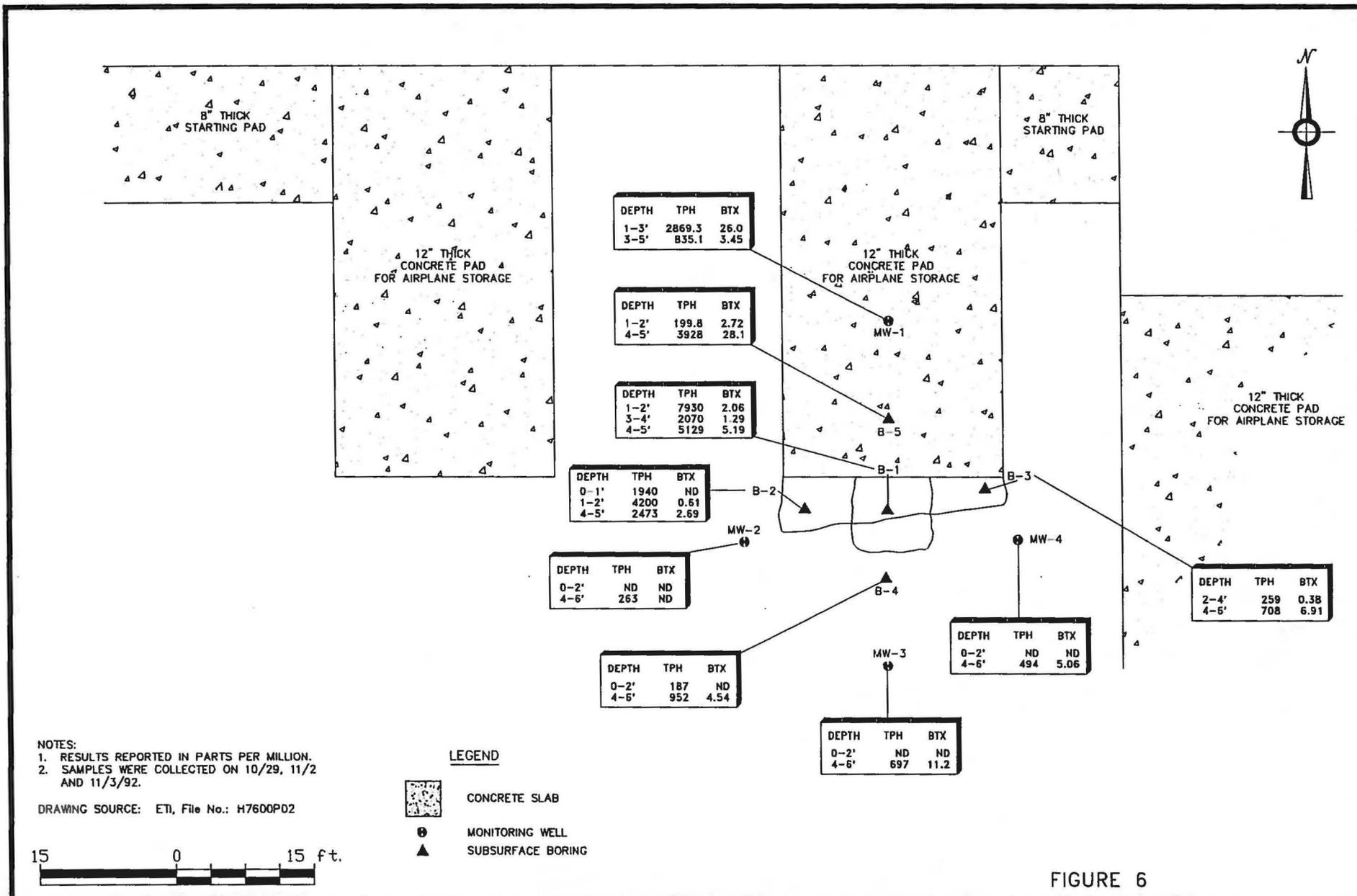


FIGURE 6

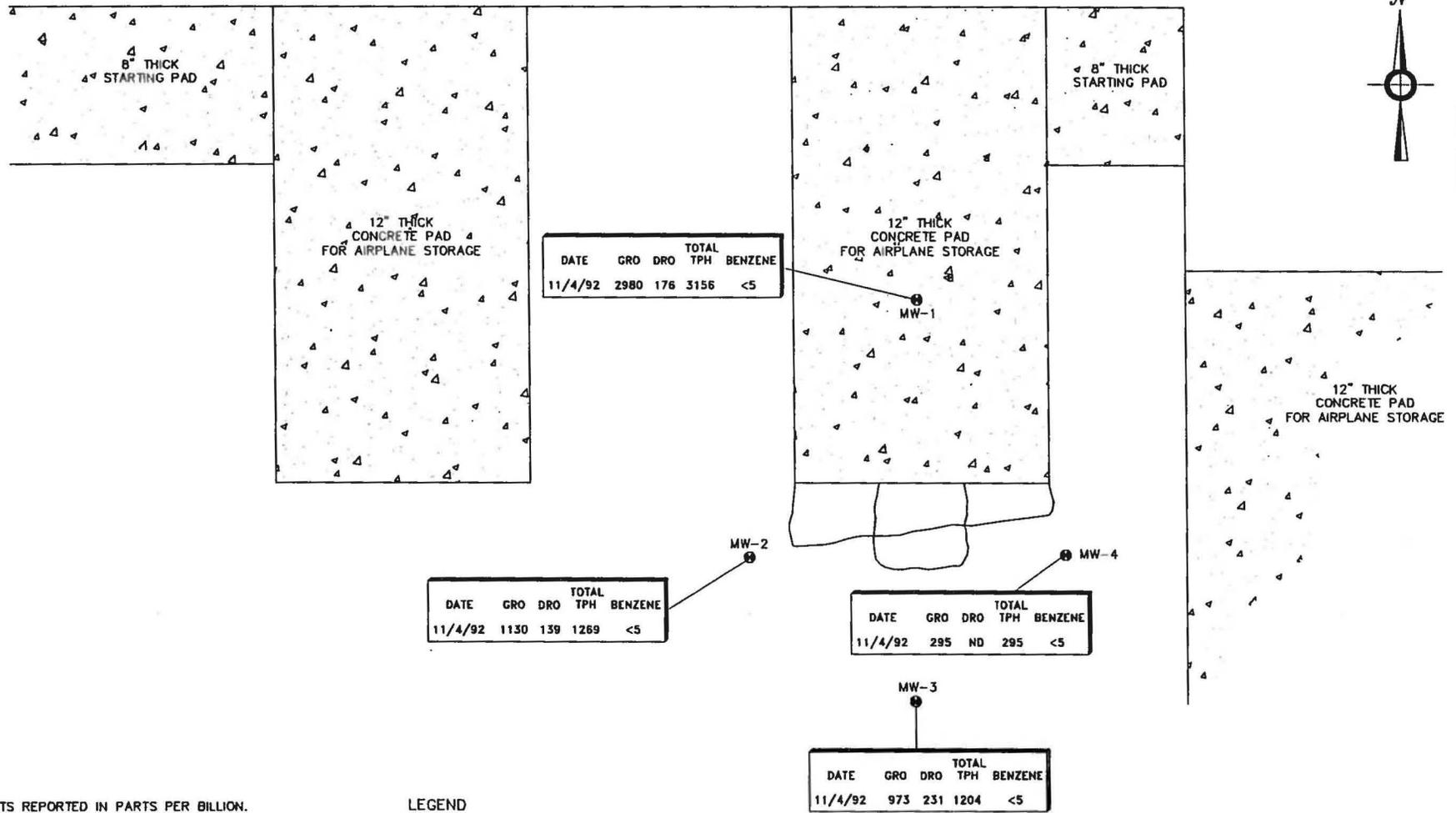
MEMPHIS ENVIRONMENTAL CENTER, INC.
 2003 Corporate Avenue, Suite 100
 Memphis, Tennessee 38132

DWG. NO.: NAS004
 DRAWN BY: DKD
 DATE: NOVEMBER 23, 1992

SITE NO.: 266
 CHECKED BY:
 DATE:

REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE

BTX AND TPH CONCENTRATION
 DIAGRAM (SOIL)
 NAVAL AIR STATION MEMPHIS
 BUILDING 362 TRAINING MOCK-UP AREA
 MILLINGTON, TENNESSEE



NOTE:
1. RESULTS REPORTED IN PARTS PER BILLION.

DRAWING SOURCE: ETI, File No.: H7600P02

LEGEND



CONCRETE SLAB



MONITORING WELL

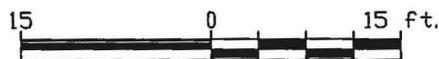


FIGURE 7

MEMPHIS ENVIRONMENTAL CENTER, INC.			
2803 Corporate Avenue, Suite 100 Memphis, Tennessee 38132			
DWG. NO.:	NAS004	SITE NO.:	386
DRAWN BY:	DKD	CHECKED BY:	
DATE:	NOVEMBER 23, 1992	DATE:	

REV. NO.	DESCRIPTION	REV. BY	CHECKED BY	DATE

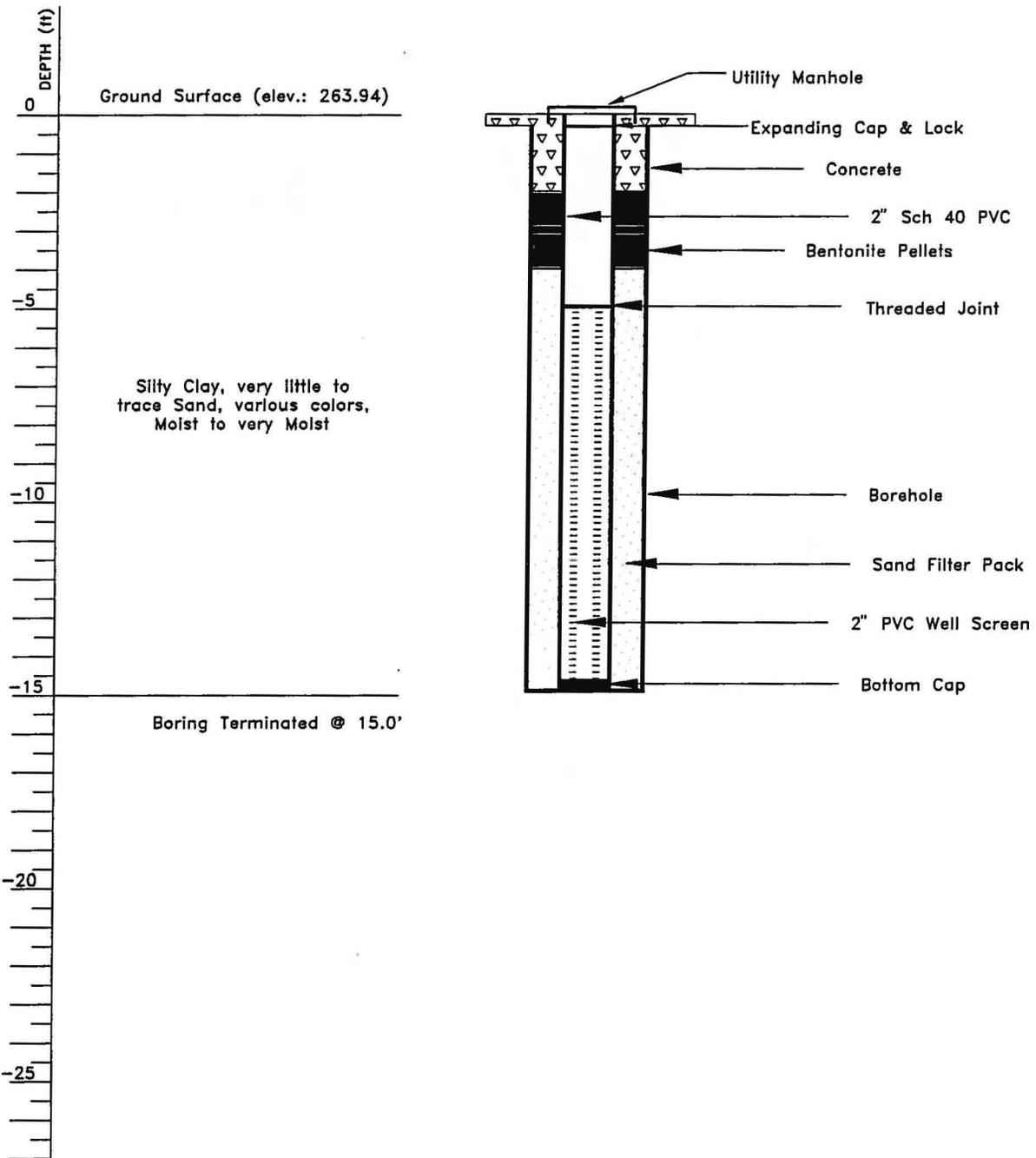
BTX AND TPH CONCENTRATION
DIAGRAM (GROUND WATER)
NAVAL AIR STATION MEMPHIS
BUILDING 362 TRAINING MOCK-UP AREA
MILLINGTON, TENNESSEE

APPENDIX C
SOIL BORING LOGS

APPENDIX D

MONITORING WELL CONSTRUCTION DIAGRAMS

CASING ELEVATION: <u>263.74</u>		WELL LOCATION: <u>MW-1</u>	DATE & TIME BEGAN: <u>10/29/92; 2:00pm</u>
DATUM: <u>Mean Sea Level</u>			DESCRIPTION OF WEATHER: <u>Cloudy 70°F</u>
DRILLING TECHNIQUE: Hollow Stem Auger Split-Spoon Sampler	GROUND WATER ELEVATIONS		DRILLER: <u>J. Rowland</u>
	DATE	ELEVATION	INSPECTOR: <u>M. Roberts</u>
	11/04/92	258.83	BORING TERMINATED AT:
	11/23/92	259.54	DEPTH (ft): <u>15.0</u>
			DATE & TIME: <u>10/29/92</u> <u>3:00pm</u>



MEMPHIS ENVIRONMENTAL CENTER, INC.

DWG. NO. NASMW-2

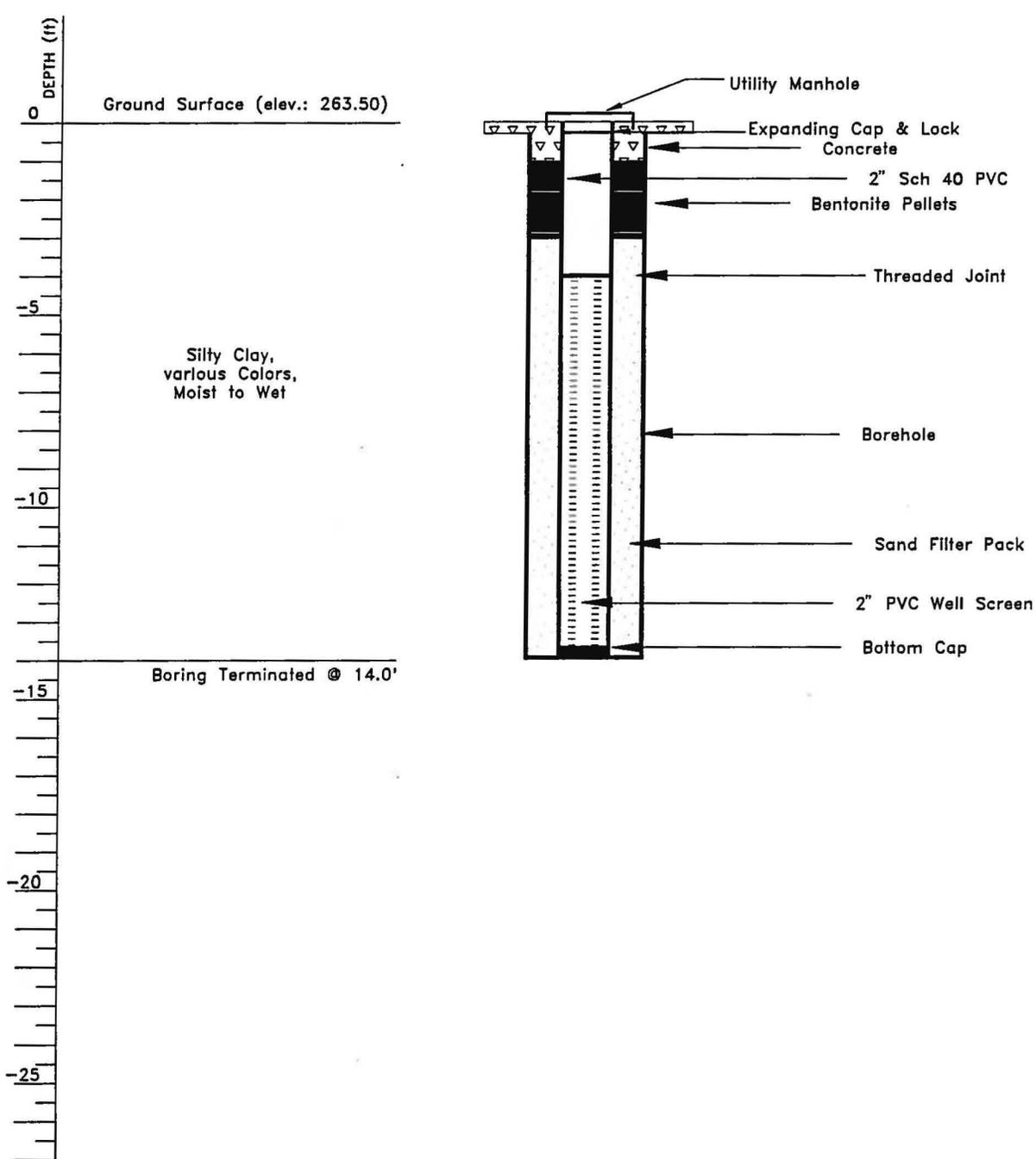
DRAWN: DKD

DATE: NOVEMBER 23, 1992

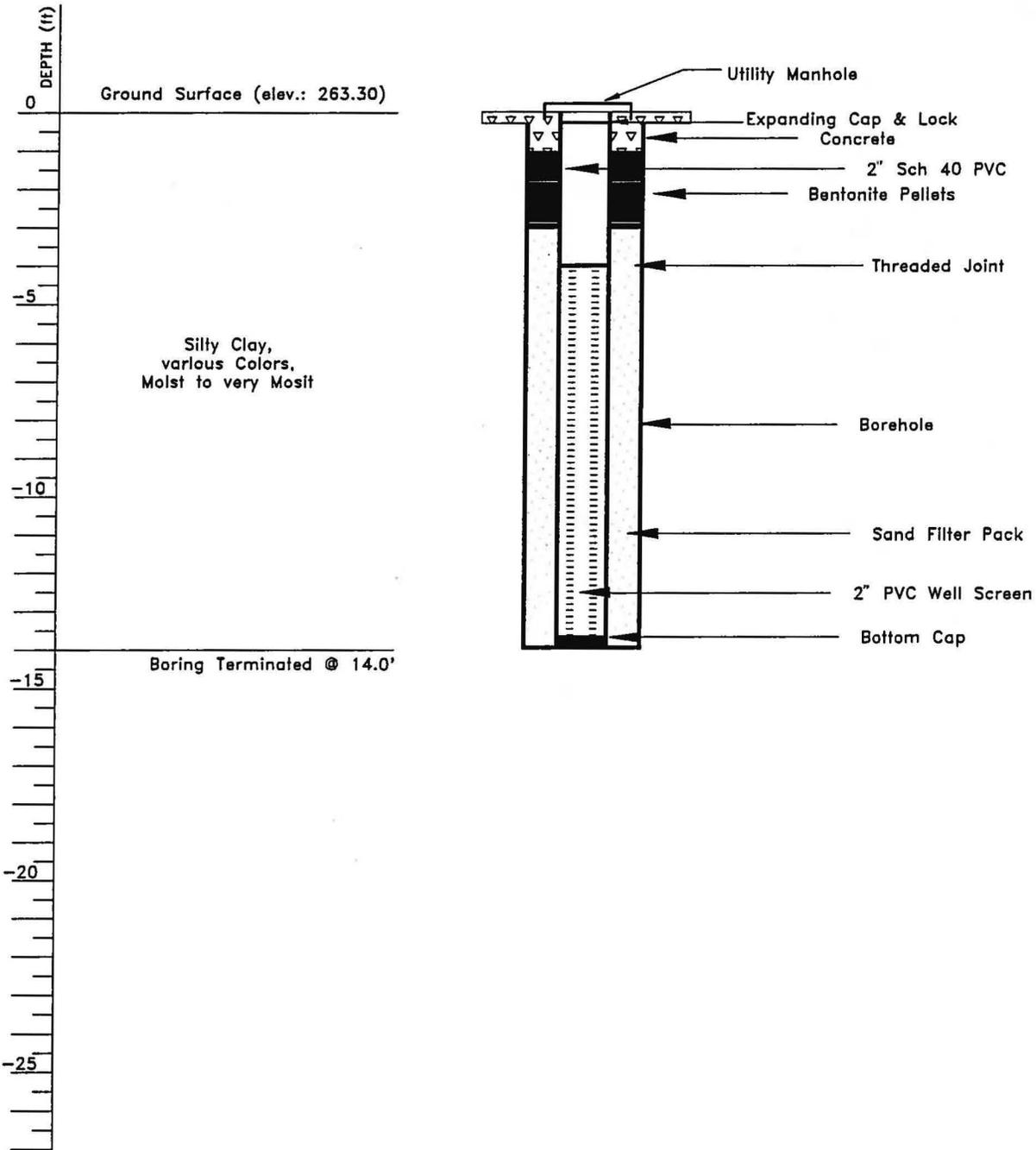
2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

MONITORING WELL CONSTRUCTION DIAGRAM
NAVAL AIR STATION MEMPHIS
BUILDING 362 TRAINING MOCK-UP AREA
MILLINGTON, TENNESSEE

CASING ELEVATION: <u>263.27</u>		WELL LOCATION: <u>MW-2</u>	DATE & TIME BEGAN: <u>11/02/92; 9:30am</u>
DATUM: <u>Mean Sea Level</u>			DESCRIPTION OF WEATHER: <u>Sunny & Windy 60°F</u>
DRILLING TECHNIQUE: Hollow Stem Auger Split-Spoon Sampler	GROUND WATER ELEVATIONS		DRILLER: <u>J. Rowland</u>
	DATE	ELEVATION	INSPECTOR: <u>M. Roberts</u>
	11/04/92	259.08	BORING TERMINATED AT:
	11/23/92	259.90	DEPTH (ft): <u>14.0</u>
			DATE & TIME: <u>11/02/92</u> <u>11:30am</u>



CASING ELEVATION: <u>263.17</u>		WELL LOCATION: <u>MW-3</u>	DATE & TIME BEGAN: <u>11/02/92; 12:30pm</u>
DATUM: <u>Mean Sea Level</u>			DESCRIPTION OF WEATHER: <u>Sunny & Windy 65°F</u>
DRILLING TECHNIQUE: Hollow Stem Auger Split-Spoon Sampler	GROUND WATER ELEVATIONS		DRILLER: <u>J. Rowland</u>
	DATE	ELEVATION	INSPECTOR: <u>M. Roberts</u>
	11/04/92	259.23	BORING TERMINATED AT:
	11/23/92	259.86	DEPTH (ft): <u>14.0</u>
			DATE & TIME: <u>11/02/92</u> <u>2:00 pm</u>



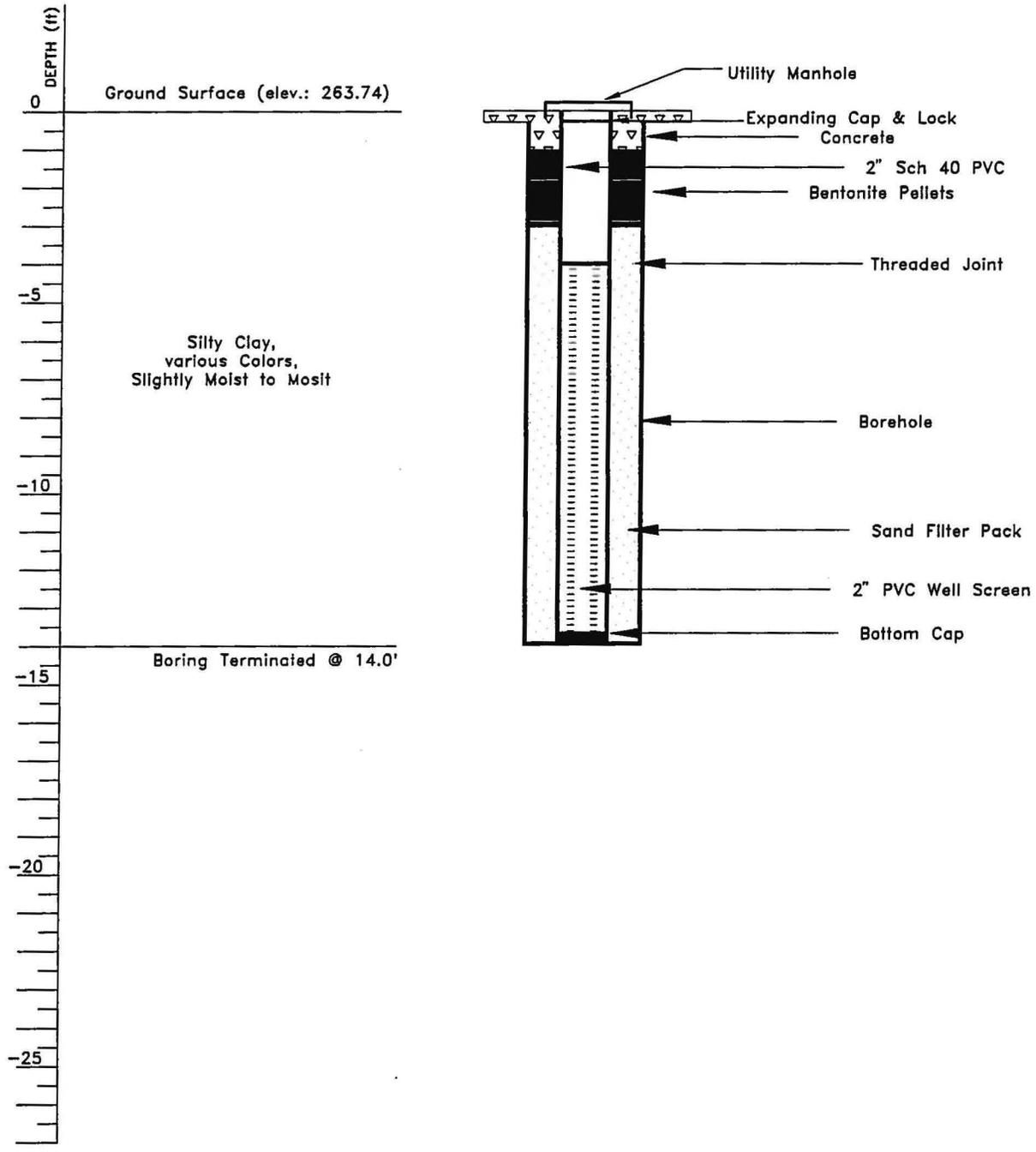
MEMPHIS ENVIRONMENTAL CENTER, INC.

DWG. NO. NASMW-3
 DRAWN: DKD
 DATE: NOVEMBER 23, 1992

2803 Corporate Avenue, Suite 100
 Memphis, Tennessee 38132

MONITORING WELL CONSTRUCTION DIAGRAM
 NAVAL AIR STATION MEMPHIS
 BUILDING 362 TRAINING MOCK-UP AREA
 MILLINGTON, TENNESSEE

CASING ELEVATION: <u>263.59</u>		WELL LOCATION: <u>MW-4</u>	DATE & TIME BEGAN: <u>11/02/92; 2:30pm</u>
DATUM: <u>Mean Sea Level</u>			DESCRIPTION OF WEATHER: <u>Sunny & Windy 65°F</u>
DRILLING TECHNIQUE: Hollow Stem Auger Split-Spoon Sampler	GROUND WATER ELEVATIONS		DRILLER: <u>J. Rowland</u>
	DATE	ELEVATION	INSPECTOR: <u>M. Roberts</u>
	11/04/92	259.13	BORING TERMINATED AT:
	11/23/92	259.61	DEPTH (ft): <u>14.0</u>
			DATE & TIME: <u>11/02/92 3:45pm</u>



MEMPHIS ENVIRONMENTAL CENTER, INC.

DWG. NO. NASMW-4
DRAWN: DKD
DATE: NOVEMBER 23, 1992

2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132



MONITORING WELL CONSTRUCTION DIAGRAM
NAVAL AIR STATION MEMPHIS
BUILDING 362 TRAINING MOCK-UP AREA
MILLINGTON, TENNESSEE

APPENDIX E

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:
386 06-02-00

PROJECT NAME: T. CLIMET
ETI-NAS

SAMPLER'S SIGNATURE

(sign)

[Signature]

MATRIX
NO. OF CONTAINERS

REMARKS

SEQ. NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION	MATRIX	NO. OF CONTAINERS	REMARKS
1	110292MR-01	11-2-92	9:30AM	MW-2, 0-2'	S	1	PTX, TTH (DHO - GKO)
2	-02		10:00 AM	MW-2, 4-6'	S	1	
3	-03		12:30PM	MW-3, 0-2'	S	1	
4	-04		12:45PM	MW-3, 4-6'	S	1	
5	-05		2:30PM	MW-4, 0-2'	S	1	
6	-06		3:00PM	MW-4, 4-6'	S	1	
7	110312MR-07	11-3-92	10:45 AM	B-1, 1-2'	S	1	
8	-08		11:00 AM	B-1, 3-4'	S	1	
9	-09		11:15 AM	B-1, 4-5'	S	1	
10	-010		12:45 PM	B-2, 0-1'	S	1	
11	-011		1:00 PM	↓, 1-2'	S	1	
12	-012		1:15 PM	↓, 4-5'	S	1	
13	-013		9:15 AM	B-3, 2-4'	S	1	
14	-014		9:30 AM	↓, 4-6'	S	1	
15	-015		9:50 AM	B-4, 0-2'	S	1	
16	-016		10:00 AM	↓, 4-6'	S	1	
17	-017		10:30 AM	B-5, 1-2'	S	1	
18	-018		10:45 AM	↓, 4-5'	S	1	

TOTAL NO. OF CONTAINERS - 18

RELINQUISHED BY:

1

[Signature]
(sign)

DATE/TIME

11-4-92/10:30AM

RECEIVED BY:

2

(sign)

RELINQUISHED BY:

2

(sign)

DATE/TIME

RECEIVED BY:

3

(sign)

METHOD OF SHIPMENT:

SHIPPED BY:

RECEIVED FOR LABORATORY BY:

DATE/TIME

[Signature]
(sign)

11/4/92 10:35AM

CONDITION OF SEAL UPON RECEIPT:

COOLER OPENED BY:

DATE/TIME

GENERAL CONDITION OF COOLER:

(sign)

FACILITY# 9-71165

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: 37A-08-06-00		PROJECT NAME: T. SCHMIDT ETI - NAS				
SAMPLER'S SIGNATURE <u>[Signature]</u> (sign)					MATRIX	NO. OF CONTAINERS		REMARKS	
SEQ. NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION	MATRIX	NO. OF CONTAINERS	REMARKS		
1	102992M-61	10-29-92	2:00PM	MW-1, 1-3'	S	1	PTX, TPH-DHO + GRO		
2	102992M-62	↓	2:20PM	MW-1, 3-5'	S	1	↓ ↓ ↓		
3	102992M-63	↓	2:00PM	MW-1 COMPOSITE	S	1	↓ ↓ ↓		
4	103097M-64	10-30-92	1:00PM	P-5 4-5'	S	1	TPH-DHO		
5	↓ -65	↓	1:15PM	P-5 5-6'	S	1	↓		
6	↓ -66		1:00PM	P-5 3-4'	S	1	↓		
TOTAL NO. OF CONTAINERS - 5									
RELINQUISHED BY: 1 <u>[Signature]</u> (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: <u>[Signature]</u> (sign)		DATE/TIME: 10/30/92 5:26 p.m.			
CONDITION OF SEAL UPON RECEIPT:				COOLER OPENED BY:			DATE/TIME:		
GENERAL CONDITION OF COOLER:				(sign) _____					

APPENDIX F

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.

APPENDIX G

ANALYTICAL REPORTS

STRATHMORE WRITING
CORPORATION

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
Sample(s) Type: Soil Samples

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

Quality Assurance Summary:

<u>Type of Analysis</u>	<u>Method</u>	<u>Holding Time</u>	<u>Surrogate Recovery</u>	<u>Matrix Spike Recoveries</u>	<u>Blanks</u>	<u>Overall Summary</u>
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 =


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 *[Signature]*

QA/QC Check *[Signature]*

Lab Manager *[Signature]*

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: [Signature]
 QA/QC Check: [Signature]
 Lab Manager: [Signature]

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
 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 - Blanks
 Volatile Organics By Method: SW846-8020
 Results given in: mg/Kg

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

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
 ND Non detected at stated limit
 NA Not analyzed

[] - Below LOQ, Above LOD

Report Number: R-921345
Project Number: 374-08-06-00

Memphis Environmental Center
Analytical Report

Report Date: 11-10-92 13:29

Description: E T I - NAVY AIR STATION #374

Total Petroleum Hydrocarbons By TENN-DRO/GRO
Results given in: mg/Kg

Prepared By [Signature]
QA/QC Check [Signature]
Lab Manager [Signature]

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
ND Non detected at stated limit
NA Not analyzed

[] - Below LOQ, Above LOD

Report Number: R-921345
Project Number: 374-08-06-00

Memphis Environmental Center

Report Date: 11-10-92 13:29

Description: E T I - NAVY AIR STATION #374

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

Prepared By: [Signature]
QA/QC Check: [Signature]
Lab Manager: [Signature]

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
ND Non detected at stated limit
NA Not analyzed

[] - Below LOQ, Above LOD

Report Number: R-921345
Project Number: 374-08-06-00

Memphis Environmental Center
QA/QC Report - Blanks

Report Date: 11-10-92 13:29

Description: E T I - NAVY AIR STATION #374

Total Petroleum Hydrocarbons By TENN-DRO/GRO
Results given in: mg/Kg

Prepared By PS
QA/QC Check PS
Lab Manager PS

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
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 - Blanks

Total Petroleum Hydrocarbons By TENN-DRO/GRO
Results given in: mg/Kg

Report Date: 11-10-92 13:29

Prepared By [Signature]
QA/QC Check [Signature]
Lab Manager [Signature]

Sample Number
Lab ID Number
Matrix Type
Date of Collection
Date of Receipt
Date of Extraction
Date of Analysis

	LIMIT OF DETECTION	LIMIT OF QUANTITATION	SURROGATE SPIKE LEVELS
--	--------------------------	-----------------------------	------------------------------

DRO - TPH	3.5	-	-
GRO - TPH	10	-	-
SURR.(Bromofluorobenzene) %	-	-	10
SURR.(o-Terphenyl) %	-	-	20
Total TPH	-	-	-

** 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
N A S
Sample(s) Type: Soil

Report No: R-921363
Report Date: 11/18/92
Facility ID#:

Quality Assurance Summary:

<u>Type of Analysis</u>	<u>Method</u>	<u>Holding Time</u>	<u>Surrogate Recovery</u>	<u>Matrix Spike Recoveries</u>	<u>Blanks</u>	<u>Overall Summary</u>
BTX	SW846-8020	A	A(N-1)	A(N-2)	A	A(See N-1 and N-2)
TPH	TENN-DRO/GRO	A	A(N-3)	A(N-4)	A	A(See N-3 and N-4)

NOTE 1: The recovery of the surrogate in sample #9207165 was above the accepted limit.

NOTE 2: These samples were analyzed as part of a larger set which included matrix spikes that had acceptable recoveries.

NOTE 3: In samples #9207161, #9207163, #9207165 and #9207172 the surrogate o-terphenyl was diluted out. In samples #9207164 and #9207167 the recovery was low due to the dilutions of the samples.

NOTE 4: 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 = See NOTE 2

N-3 = See NOTE 3

N-4 = See NOTE 4


QA Officer


Laboratory Manager

Report Number: R-921363
 Project Number: 386-06-02-00
 Description: E T I/NAS - SOIL SAMPLES

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

Report Date: 11-12-92 10:58
 Prepared By: [Signature]
 QA/QC Check: [Signature]
 Lab Manager: [Signature]

Sample Number	110292MR-01	110292MR-02	110292MR-03	110292MR-04	110292MR-05
Lab ID Number	9207155	9207156	9207157	9207158	9207159
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection	11-02-92	11-02-92	11-02-92	11-02-92	11-02-92
Date of Receipt	11-04-92	11-04-92	11-04-92	11-04-92	11-04-92
Date of Extraction	11-07-92	11-07-92	11-07-92	11-07-92	11-07-92
Date of Analysis	11-08-92	11-08-92	11-08-92	11-08-92	11-08-92

BTX (total)	ND	ND	ND	11.2	ND
Benzene	ND	ND	ND	ND	ND
SURR.(α,α,α -Trifluorotoluene)%	105	100	109	101	101
Toluene	ND	ND	ND	ND	ND
Xylenes	ND	ND	ND	11.2	ND

** NOTES :

Sample Number	110292MR-06	110392MR-07	110392MR-08	110392MR-09	110392MR-010
Lab ID Number	9207160	9207161	9207162	9207163	9207164
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection	11-02-92	11-03-92	11-03-92	11-03-92	11-03-92
Date of Receipt	11-04-92	11-04-92	11-04-92	11-04-92	11-04-92
Date of Extraction	11-07-92	11-07-92	11-07-92	11-07-92	11-07-92
Date of Analysis	11-08-92	11-08-92	11-08-92	11-08-92	11-08-92

BTX (total)	5.06	2.06	1.29	5.19	ND
Benzene	ND	ND	ND	ND	ND
SURR.(α,α,α -Trifluorotoluene)%	104	88.4	89.7	82.2	89.9
Toluene	ND	ND	ND	ND	ND
Xylenes	5.06	2.06	1.29	5.19	ND

** NOTES :

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

[] - Below LOQ, Above LOD

Report Number: R-921363
 Project Number: 386-06-02-00
 Description: E T I/NAS - SOIL SAMPLES

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

Report Date: 11-12-92 10:58
 Prepared By [Signature]
 QA/QC Check [Signature]
 Lab Manager [Signature]

Sample Number	110392MR-011	110392MR-012	110392MR-013	110392MR-014	110392MR-015
Lab ID Number	9207165	9207166	9207167	9207168	9207169
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL
Type	SAMPLE**	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection	11-03-92	11-03-92	11-03-92	11-03-92	11-03-92
Date of Receipt	11-04-92	11-04-92	11-04-92	11-04-92	11-04-92
Date of Extraction	11-07-92	11-07-92	11-07-92	11-07-92	11-07-92
Date of Analysis	11-08-92	11-08-92	11-08-92	11-08-92	11-08-92

BTX (total)	0.61	2.69	0.38	6.91	ND
Benzene	ND	ND	ND	ND	ND
SURR.(α,α,α -Trifluorotoluene)%	154	91.6	94.6	101	98.1
Toluene	ND	ND	ND	ND	ND
Xylenes	0.61	2.69	0.38	6.91	ND

** NOTES :

9207165*SAMPLE - RECOVERY FOR SURR.(α,α,α -Trifluorotoluene) ABOVE ACCEPTED LIMIT OF 133%.

Sample Number	110392MR-016	110392MR-017	110392MR-018
Lab ID Number	9207170	9207171	9207172
Matrix	SOIL	SOIL	SOIL
Type	SAMPLE	SAMPLE	SAMPLE
Date of Collection	11-03-92	11-03-92	11-03-92
Date of Receipt	11-04-92	11-04-92	11-04-92
Date of Extraction	11-07-92	11-07-92	11-07-92
Date of Analysis	11-08-92	11-08-92	11-08-92

BTX (total)	4.54	2.72	28.1
Benzene	ND	ND	ND
SURR.(α,α,α -Trifluorotoluene)%	93.0	98.7	63.9
Toluene	ND	0.42	0.80
Xylenes	4.54	2.30	27.2

** NOTES :

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

[] - Below LOQ, Above LOD

Report Number: R-921363
 Project Number: 386-06-02-00
 Description: E T I/NAS - SOIL SAMPLES

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

Report Date: 11-12-92 10:59
 Prepared By: [Signature]
 QA/QC Check: [Signature]
 Lab Manager: [Signature]

Sample Number	BLANK	BLANK	BLANK	LIMIT	LIMIT
Lab ID Number	11-07 SPK ADD	11-07 SPK RCV%	11-07-92	OF	OF
Matrix	SYSTEM	SYSTEM	SYSTEM	DETECTION	QUANTITATION
Type	SAMPLE	SAMPLE	SAMPLE**		
Date of Collection					
Date of Receipt					
Date of Extraction	11-07-92	11-07-92	11-07-92		
Date of Analysis	11-08-92	11-08-92	11-08-92		
BTX (total)	-	-	ND	-	-
Benzene	27.7	103	ND	0.5	-
SURR.(α,α,α -Trifluorotoluene)%	105	112	139	-	-
Toluene	28.7	111	ND	0.2	-
Xylenes	50.4	112	ND	0.2	-

**** NOTES :**

BLANK 11-07-92 - RECOVERY FOR SURR.(α,α,α -Trifluorotoluene) ABOVE ACCEPTED LIMIT OF 133%.

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)%	105
Toluene	-
Xylenes	-

**** NOTES :**

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

[] - Below LOQ, Above LOD

Report Number: R-921363
 Project Number: 386-06-02-00
 Description: E T I/NAS - SOIL SAMPLES

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

Report Date: 11-17-92 15:03
 Prepared By: [Signature]
 QA/QC Check: [Signature]
 Lab Manager: [Signature]

Sample Number	110292MR-01	110292MR-02	110292MR-03	110292MR-04	110292MR-05
Lab ID Number	9207155	9207156	9207157	9207158	9207159
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL
Type	SAMPLE**	SAMPLE**	SAMPLE**	SAMPLE**	SAMPLE**
Date of Collection	11-02-92	11-02-92	11-02-92	11-02-92	11-02-92
Date of Receipt	11-04-92	11-04-92	11-04-92	11-04-92	11-04-92
Date of Extraction	11-05-92	11-05-92	11-05-92	11-05-92	11-05-92
Date of Analysis	11-06-92	11-09-92	11-06-92	11-09-92	11-06-92
DRO - TPH	ND	263	ND	595	ND
GRO - TPH	ND	ND	ND	102	ND
SURR.(Bromofluorobenzene) %	86.4	63.7	75.5	138	88.1
SURR.(o-Terphenyl) %	63.6	65.6	76.6	64.2	65.2
Total TPH	ND	263	ND	697	ND

** NOTES :

- 9207155*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/06/92.
- 9207156*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/06/92. LOD FOR DRO-TPH 10 TIMES VALUE STATED.
- 9207157*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/06/92.
- 9207158*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION AND ANALYSIS DATE - 11/06/92. LOD FOR DRO-TPH 50 TIMES THE VALUE STATED.
- 9207159*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION AND ANALYSIS DATE - 11/09/92.

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

[] - Below LOQ, Above LOD

Report Number: R-921363
 Project Number: 386-06-02-00
 Description: E T I/NAS - SOIL SAMPLES

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

Report Date: 11-17-92 15:03
 Prepared By [Signature]
 QA/QC Check [Signature]
 Lab Manager [Signature]

Sample Number	110292MR-06	110392MR-07	110392MR-08	110392MR-09	110392MR-010
Lab ID Number	9207160	9207161	9207162	9207163	9207164
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL
Type	SAMPLE**	SAMPLE**	SAMPLE**	SAMPLE**	SAMPLE**
Date of Collection	11-02-92	11-03-92	11-03-92	11-03-92	11-03-92
Date of Receipt	11-04-92	11-04-92	11-04-92	11-04-92	11-04-92
Date of Extraction	11-05-92	11-05-92	11-05-92	11-05-92	11-05-92
Date of Analysis	11-09-92	11-09-92	11-09-92	11-09-92	11-09-92
DRO - TPH	479	7930	2060	5160	1940
GRO - TPH	15.2	ND	10.3	18.4	ND
SURR.(Bromofluorobenzene) %	78.5	87.5	84.0	89.4	73.1
SURR.(o-Terphenyl) %	75.1	-	55.6	-	46.8
Total TPH	494.2	7930	2070.3	5178.4	1940

** NOTES :

- 9207160*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 10 TIMES THE VALUE STATED.
- 9207161*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 100 TIMES THE VALUE STATED. SURR.(o-Terphenyl) DILUTED OUT.
- 9207162*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 50 TIMES THE VALUE STATED.
- 9207163*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 100 TIMES THE VALUE STATED. SURR.(o-Terphenyl) DILUTED OUT.
- 9207164*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 10 TIMES THE VALUE STATED. RECOVERY FOR SURR.(o-Terphenyl) BELOW ACCEPTED LIMIT OF 50% DUE TO DILUTION.

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

[] - Below LOQ, Above LOD

Report Number: R-921363
 Project Number: 386-06-02-00
 Description: E T I/NAS - SOIL SAMPLES

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

Report Date: 11-17-92 15:03
 Prepared By [Signature]
 QA/QC Check [Signature]
 Lab Manager [Signature]

Sample Number	110392MR-011	110392MR-012	110392MR-013	110392MR-014	110392MR-015
Lab ID Number	9207165	9207166	9207167	9207168	9207169
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL
Type	SAMPLE**	SAMPLE**	SAMPLE**	SAMPLE**	SAMPLE**
Date of Collection	11-03-92	11-03-92	11-03-92	11-03-92	11-03-92
Date of Receipt	11-04-92	11-04-92	11-04-92	11-04-92	11-04-92
Date of Extraction	11-05-92	11-05-92	11-05-92	11-05-92	11-05-92
Date of Analysis	11-09-92	11-09-92	11-09-92	11-09-92	11-09-92
DRO - TPH	4200	2450	259	670	187
GRO - TPH	ND	23.1	ND	37.8	ND
SURR.(Bromofluorobenzene) %	78.7	89.4	91.1	108	89.5
SURR.(o-Terphenyl) %	-	67.2	45.0	66.7	57.5
Total TPH	4200	2473.1	259	707.8	187

** NOTES :

- 9207165*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 100 TIMES THE VALUE STATED. SURR.(o-Terphenyl) DILUTED OUT.
- 9207166*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 50 TIMES THE VALUE STATED.
- 9207167*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 10 TIMES THE VALUE STATED. RECOVERY FOR SURR.(o-Terphenyl) BELOW ACCEPTED LIMIT OF 50% DUE TO DILUTION.
- 9207168*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 10 TIMES THE VALUE STATED.
- 9207169*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 10 TIMES THE VALUE STATED.

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

[] - Below LOQ, Above LOD

Report Number: R-921363
 Project Number: 386-06-02-00
 Description: E T I/NAS - SOIL SAMPLES

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

Report Date: 11-17-92 15:03
 Prepared By: [Signature]
 QA/QC Check: [Signature]
 Lab Manager: [Signature]

Sample Number	110392MR-016	110392MR-017	110392MR-018
Lab ID Number	9207170	9207171	9207172
Matrix	SOIL	SOIL	SOIL
Type	SAMPLE**	SAMPLE**	SAMPLE**
Date of Collection	11-03-92	11-03-92	11-03-92
Date of Receipt	11-04-92	11-04-92	11-04-92
Date of Extraction	11-05-92	11-05-92	11-05-92
Date of Analysis	11-09-92	11-09-92	11-09-92
DRO - TPH	939	189	3810
GRO - TPH	19.2	10.8	118
SURR.(Bromofluorobenzene) %	81.5	76.7	86.3
SURR.(o-Terphenyl) %	60.0	89.5	-
Total TPH	958.2	199.8	3928

** NOTES :

- 9207170*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 10 TIMES THE VALUE STATED.
- 9207171*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 10 TIMES THE VALUE STATED.
- 9207172*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION DATE - 11/09/92. LOD FOR DRO-TPH 100 TIMES THE VALUE STATED. SURR.(o-Terphenyl) DILUTED OUT.

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

[] - Below LOQ, Above LOD

Report Number: R-921363
 Project Number: 386-06-02-00
 Description: E T I/NAS - SOIL SAMPLES

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

Report Date: 11-17-92 15:03
 Prepared By [Signature]
 QA/QC Check [Signature]
 Lab Manager [Signature]

Sample Number	110292MR-01	110292MR-01	110292MR-01
Lab ID Number	9207155-SPIKE-1	9207155-SPIKE-1	9207155-SPIKE-1
Matrix	SOIL	SOIL	SOIL
Type	ADDED LEVEL	% RECOVERED 1	% RECOVERED 2
Date of Collection	11-02-92	11-02-92	11-02-92
Date of Receipt	11-04-92	11-04-92	11-04-92
Date of Extraction	11-05-92	11-05-92	11-05-92
Date of Analysis	11-06-92	11-06-92	11-06-92
DRO - TPH	60	74.5	78.5
GRO - TPH	-	-	-
SURR.(Bromofluorobenzene) %	-	-	-
SURR.(o-Terphenyl) %	0.8	83.9	87.8
Total TPH	-	-	-

** NOTES :

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

[] - Below LOQ, Above LOD

Report Number: R-921363
 Project Number: 386-06-02-00
 Description: E T I/NAS - SOIL SAMPLES

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

Report Date: 11-17-92 15:03
 Prepared By [Signature]
 QA/QC Check [Signature]
 Lab Manager [Signature]

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	11-05-92	11-06 SPK ADD	11-06 SPK RCV%1	11-06 SPK RCV%2	11-06-92-1
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	11-05-92	11-06-92	11-06-92	11-06-92	11-06-92
Date of Analysis	11-06-92	11-06-92	11-06-92	11-06-92	11-06-92

DRO - TPH	ND	-	-	-	-
GRO - TPH	-	50	70.2	67.4	ND
SURR.(Bromofluorobenzene) %	-	10	90.8	104	86.6
SURR.(o-Terphenyl) %	108	-	-	-	-
Total TPH	-	-	-	-	-

** NOTES :

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	11-06-92-2	11-09 SPK ADD	11-09 SPK RCV%1	11-09 SPK RCV%2	11-09-92-1
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	11-06-92	11-09-92	11-09-92	11-09-92	11-09-92
Date of Analysis	11-06-92	11-09-92	11-09-92	11-09-92	11-09-92

DRO - TPH	-	-	-	-	-
GRO - TPH	ND	50	67.0	68.9	ND
SURR.(Bromofluorobenzene) %	79.1	10	107	105	87.2
SURR.(o-Terphenyl) %	-	-	-	-	-
Total TPH	-	-	-	-	-

** NOTES :

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

[] - Below LOQ, Above LOD

Report Number: R-921363
 Project Number: 386-06-02-00
 Description: E T I/NAS - SOIL SAMPLES

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

Report Date: 11-17-92 15:03
 Prepared By: [Signature]
 QA/QC Check: [Signature]
 Lab Manager: [Signature]

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	11-09-92-2	11-5-1 SPK ADD	11-5-1 SPK RCV%	11-5-2 SPK ADD	11-5-2 SPK RCV%
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	11-09-92	11-05-92	11-05-92	11-05-92	11-05-92
Date of Analysis	11-09-92	11-06-92	11-06-92	11-06-92	11-06-92

DRO - TPH	-	60	87.1	60	80.1
GRO - TPH	ND	-	-	-	-
SURR.(Bromofluorobenzene) %	84.9	-	-	-	-
SURR.(o-Terphenyl) %	-	0.8	117	0.8	106
Total TPH	-	-	-	-	-

** 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	3.0	-	-
GRO - TPH	10	-	-
SURR.(Bromofluorobenzene) %	-	-	50
SURR.(o-Terphenyl) %	-	-	0.8
Total TPH	-	-	-

** 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
N A S
Sample(s) Type: Water

Report No: R-921371
Report Date: 11/18/92
Facility ID#:

Quality Assurance Summary:

<u>Type of Analysis</u>	<u>Method</u>	<u>Holding Time</u>	<u>Surrogate Recovery</u>	<u>Matrix Spike Recoveries</u>	<u>Blanks</u>	<u>Overall Summary</u>
BTX	EPA- 624 (capillary)	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 =


QA Officer


Laboratory Manager

Report Number: R-921371
Project Number: 386-06-02-00
Description: E T I - NAS - WATER SAMPLES

Memphis Environmental Center
Analytical Report
Volatile Organics By Method: 624
Results given in: ug/L

Report Date: 11-12-92 08:58
Prepared By *RMC*
QA/QC Check *ES*
Lab Manager *ES*

Sample Number	110492MR-01	110492MR-02	110492MR-03	110492MR-04	110492MR-05
Lab ID Number	9207212	9207213	9207214	9207215	9207216
Matrix	WATER	WATER	WATER	WATER	WATER
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection	11-04-92	11-04-92	11-04-92	11-04-92	11-04-92
Date of Receipt	11-05-92	11-05-92	11-05-92	11-05-92	11-05-92
Date of Extraction	11-09-92	11-09-92	11-09-92	11-09-92	11-09-92
Date of Analysis	11-09-92	11-09-92	11-09-92	11-09-92	11-09-92
BTX (total)	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND
SURR.(BFB) %	91	95	93	91	88
Toluene	ND	ND	ND	ND	ND
Xylenes	ND	ND	ND	ND	ND

** NOTES :

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

[] - Below LOQ, Above LOD

Report Number: R-921371
Project Number: 386-06-02-00
Description: E T I - NAS - WATER SAMPLES

Memphis Environmental Center
QA/QC Report - Spikes
Volatile Organics By Method: 624
Results given in: ug/L

Report Date: 11-12-92 08:58
Prepared By *ilm*
QA/QC Check *lg*
Lab Manager *lg*

Sample Number	110492MR-02	110492MR-02	110492MR-02
Lab ID Number	9207213-SPIKE-1	9207213-SPIKE-1	9207213-SPIKE-1
Matrix	WATER	WATER	WATER
Type	ADDED LEVEL	% RECOVERED 1	% RECOVERED 2
Date of Collection	11-04-92	11-04-92	11-04-92
Date of Receipt	11-05-92	11-05-92	11-05-92
Date of Extraction	11-09-92	11-09-92	11-09-92
Date of Analysis	11-09-92	11-09-92	11-09-92

BTX (total)	-	-	-
Benzene	50	103	106
SURR.(BFB) %	41.5	94	96
Toluene	50	101	102
Xylenes	-	-	-

** NOTES :

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

[] - Below LOQ, Above LOD

Report Number: R-921371
 Project Number: 386-06-02-00
 Description: E T I - NAS - WATER SAMPLES

Memphis Environmental Center
 QA/QC Report - Blanks
 Volatile Organics By Method: 624
 Results given in: ug/L

Report Date: 11-12-92 08:58
 Prepared By: *MM*
 QA/QC Check: *JG*
 Lab Manager: *JG*

Sample Number	BLANK	BLANK	BLANK	LIMIT	LIMIT
Lab ID Number	11-09 SPK ADD	11-09 SPK RCV%	11-09-92	OF	OF
Matrix	SYSTEM	SYSTEM	SYSTEM	DETECTION	QUANTITATION
Type	SAMPLE	SAMPLE	SAMPLE		
Date of Collection					
Date of Receipt					
Date of Extraction	11-09-92	11-09-92	11-09-92		
Date of Analysis	11-09-92	11-09-92	11-09-92		

BTX (total)	-	-	ND	-
Benzene	50	101	ND	5
SURR.(BFB) %	41.5	92	97	-
Toluene	50	102	ND	5
Xylenes	-	-	ND	5

** 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.(BFB) %	41.5
Toluene	-
Xylenes	-

** NOTES :

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

[] - Below LOQ, Above LOD

Report Number: R-921371
 Project Number: 386-06-02-00
 Description: E T I - NAS - WATER SAMPLES

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

Report Date: 11-17-92 11:30
 Prepared By [Signature]
 QA/QC Check [Signature]
 Lab Manager [Signature]

Sample Number	110492MR-01	110492MR-02	110492MR-03	110492MR-04	110492MR-05
Lab ID Number	9207212	9207213	9207214	9207215	9207216
Matrix	WATER	WATER	WATER	WATER	WATER
Type	SAMPLE**	SAMPLE**	SAMPLE**	SAMPLE**	SAMPLE**
Date of Collection	11-04-92	11-04-92	11-04-92	11-04-92	11-04-92
Date of Receipt	11-05-92	11-05-92	11-05-92	11-05-92	11-05-92
Date of Extraction	11-05-92	11-05-92	11-05-92	11-05-92	11-05-92
Date of Analysis	11-08-92	11-08-92	11-08-92	11-08-92	11-08-92
DRO - TPH	2980	2110	1130	973	295
GRO - TPH	176	147	139	231	ND
SURR.(Bromofluorobenzene) %	117	114	94.6	87.2	96.4
SURR.(o-Terphenyl) %	65.5	68.9	61.1	65.0	50.6
Total TPH	3156	2257	1269	1204	295

** NOTES :

- 9207212*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION AND ANALYSIS DATE - 11/10/92.
- 9207213*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION AND ANALYSIS DATE - 11/10/92.
- 9207214*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION AND ANALYSIS DATE - 11/10/92.
- 9207215*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION AND ANALYSIS DATE - 11/11/92.
- 9207216*SAMPLE - GRO-TPH AND SURR.(Bromofluorobenzene) EXTRACTION AND ANALYSIS DATE - 11/11/92.

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

[] - Below LOQ, Above LOD

Report Number: R-921371
 Project Number: 386-06-02-00
 Description: E T I - NAS - WATER SAMPLES

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

Report Date: 11-17-92 11:30
 Prepared By [Signature]
 QA/QC Check [Signature]
 Lab Manager [Signature]

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	11-10 SPK ADD	11-10 SPK RCV%1	11-10 SPK RCV%2	11-10-92	11-11 SPK ADD
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	11-10-92	11-10-92	11-10-92	11-10-92	11-11-92
Date of Analysis	11-10-92	11-10-92	11-10-92	11-10-92	11-11-92

DRO - TPH	-	-	-	-	-
GRO - TPH	1000	52.7	54.2	ND	1000
SURR.(Bromofluorobenzene) %	200	131	124	113	200
SURR.(o-Terphenyl) %	-	-	-	-	-
Total TPH	-	-	-	-	-

** NOTES :

Sample Number	BLANK	BLANK	BLANK	LIMIT	LIMIT
Lab ID Number	11-11 SPK RCV%1	11-11 SPK RCV%2	11-11-92	OF	OF
Matrix	SYSTEM	SYSTEM	SYSTEM	DETECTION	QUANTITATION
Type	SAMPLE	SAMPLE	SAMPLE		
Date of Collection					
Date of Receipt					
Date of Extraction	11-11-92	11-11-92	11-11-92		
Date of Analysis	11-11-92	11-11-92	11-11-92		

DRO - TPH	-	-	-	60	-
GRO - TPH	52.6	57.2	ND	100	-
SURR.(Bromofluorobenzene) %	131	135	107	-	-
SURR.(o-Terphenyl) %	-	-	-	-	-
Total TPH	-	-	-	-	-

** NOTES :

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

[] - Below LOQ, Above LOD

Report Number: R-921371
Project Number: 386-06-02-00
Description: E T I - NAS - WATER SAMPLES

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

Report Date: 11-17-92 11:31
Prepared By: *[Signature]*
QA/QC Check: *[Signature]*
Lab Manager: *[Signature]*

Sample Number
Lab ID Number
Matrix
Type

SURROGATE
SPIKE
LEVELS

Date of Collection
Date of Receipt
Date of Extraction
Date of Analysis

DRO - TPH	-
GRO - TPH	-
SURR.(Bromofluorobenzene) %	200
SURR.(o-Terphenyl) %	20
Total TPH	-

** NOTES :

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

[] - Below LOQ, Above LOD

Report Number: R-921371
 Project Number: 386-06-02-00
 Description: E T I - NAS - WATER SAMPLES

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

Report Date: 11-17-92 11:31
 Prepared By: *[Signature]*
 QA/QC Check: *[Signature]*
 Lab Manager: *[Signature]*

Sample Number	BLANK	BLANK	BLANK	BLANK	BLANK
Lab ID Number	11-05-92	11-5-1 SPK ADD	11-5-1 SPK RCV%	11-5-2 SPK ADD	11-5-2 SPK RCV%
Matrix	SYSTEM	SYSTEM	SYSTEM	SYSTEM	SYSTEM
Type	SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Date of Collection					
Date of Receipt					
Date of Extraction	11-05-92	11-05-92	11-05-92	11-05-92	11-05-92
Date of Analysis	11-07-92	11-07-92	11-07-92	11-07-92	11-07-92

DRO - TPH	ND	1500	81.3	1500	78.1
GRO - TPH	-	-	-	-	-
SURR.(Bromofluorobenzene) %	-	-	-	-	-
SURR.(o-Terphenyl) %	81.9	20	93.2	20	78.1
Total TPH	-	-	-	-	-

** 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	100	-	-
GRO - TPH	-	-	-
SURR.(Bromofluorobenzene) %	-	-	-
SURR.(o-Terphenyl) %	-	-	20
Total TPH	-	-	-

** NOTES :

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

[] - Below LOQ, Above LOD