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ENVIRONMENTAL ASSESSMENT REPORT TANK SYSTEM 106 AND 107 NAVAL HOSPITAL BUILDING 100 MILLINGTON SUPPACT TN

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ENSAFE/ALLEN & HOSHALL

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ENVIRONMENTAL ASSESSMENT REPORT
TANK SYSTEMS 106 AND 107
NAVAL HOSPITAL, BUILDING 100
NAVAL AIR STATION
MEMPHIS, TENNESSEE

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Southern Division
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Charleston, South Carolina

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ACRONYMS AND SYMBOLS

TITLE	DEFINITIONS
ACGIH	American Council of Governmental and Industrial Hygienists
ADI	Average Daily Intake
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society of Testing and Materials
BDL	Below Detection Limits
BG	Background
BGL	Below Ground Level
BW	Body Weight
CAG	Carcinogenic Assessment Group
CAP	Corrective Action Plan
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator (Explosimeter)
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	USEPA Contract Laboratory
CPC	Chemical-Protective Clothing
CPR	Cardiopulmonary Resuscitation
CSEP	Confined Space Entry Permit
CV	Coefficient of Variation
DOD	U.S. Department of Defense
DOT	U.S. Department of Transportation
DP	Duplicate (sample)
DQO	Data Quality Objective
DRO	Diesel Range Organics
E/A&H	EnSafe/Allen & Hoshall
EAP	Environmental Assessment Plan
EAR	Environmental Assessment Report
EFD	Engineering Field Division
EIC	Engineer-in-Charge
EP	Extraction Procedure/Exposure Period
EPA	United States Environmental Protection Agency
FB	Field Blank
FID	Flame Ionization Detector
GC	Gas Chromatography
GW	Groundwater (sample)
HASP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments of 1984
ID	Inside Diameter
IR	Average Soil Ingestion Rate
LEL	Lower Explosive Limit
LQAC	Laboratory Quality Assurance Coordinator
mg/kg	Milligrams/Kilogram
mg/L	Milligrams/Liter

MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSA	Mine Safety Administration
MSDS	Material Safety Data Sheet
msl	Mean Sea Level
MW	Monitoring Well
NASMEM	Naval Air Station Memphis
NAVFACENGCOM	Naval Facilities Engineering Command
NCP	National Oil and Hazardous Substances Contingency Plan
NCR	NEESA Contract Representative
NFA	No Further Action
NIOSH	National Institute of Occupational Safety and Health
ORP	Oxidation Reduction Potential
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
PEL	Permissible Exposure Limit
PID	Photoionization Detector
ppb	Parts Per Billion
PPE	Personal Protective Equipment
ppm	Parts Per Million
PVC	Poly-Vinyl Chloride
QA	Quality Assurance
QAO	Quality Assurance Officer
QAP	Quality Assurance Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
R	Acceptable Incremental Lifetime Cancer Risk
RB	Rinsate Blank
RCRA	Resource Conservation and Recovery Act
SB	Soil Boring
SCBA	Self-Contained Breathing Apparatus
SG	Soil Gas
SOP	Standard Operating Procedure
SOUTHDIV	Southern Division, Naval Facilities Engineering Command
SOW	Statement of Work
SVOC	Semivolatile Organic Compounds
TB	Trip Blank
TCLP	Toxicity Characteristic Leaching Procedure
TDEC	Tennessee Department of Environment and Conservation
TDS	Total Dissolved Solids
TLV	Threshold Limit Value
TPH	Total Petroleum Hydrocarbons
UEL	Upper Explosive Limit
μg/L	Micrograms/liter
UST	Underground Storage Tank
VOA	Volatile Organic Compounds
WBGT	Wet Globe Bulb Temperature Index

EXECUTIVE SUMMARY

EnSafe/Allen and Hoshall has completed initial environmental assessment activities at the Naval Hospital Building H-100 at the Naval Air Station Memphis located in Millington, Tennessee. This investigation was in response to a release of No. 2 fuel oil from an underground storage tank system used as a backup fuel supply for the hospital boiler system.

Soil and groundwater samples were collected and analyzed for Diesel Range Organic compounds to assess the extent of contamination. Initial results indicate that soils and groundwater in the area of the boiler room, the suspected release area, have been impacted. To a more limited extent, soils and groundwater in the area of the underground storage tanks have also been impacted.

Much of the soil contamination seems to be limited to the sandy engineered fill of the building foundation. This fill, located beneath the concrete boiler room floor, was found to range in thickness from 1.0 feet to 2.5 feet. However, it is possible that the fill extends to greater depths around building supports. Vertical migration of petroleum contaminants in the soil is apparently restricted by a natural clay layer encountered just below the sandy fill. Falling-head analysis indicates that the vertical permeabilities of this clay material ranged between 5.02×10^{-8} and 6.26×10^{-9} cm/sec.

Groundwater impacts in the area of the boiler room may have been caused by the migration of petroleum contaminants along building supports. There are several structural footings installed in this area which could have been providing a conduit for petroleum contaminant migration.

It is unclear at this time whether the low-level soil and groundwater contamination in the vicinity of the underground storage tanks are related to contamination in the area of the boiler room or to a small release (spill) at the tank pit. Continued monitoring of groundwater monitoring well MW-2, located at the southern edge of the tank pit and downgradient of the boiler room, may help in this determination.

A. INTRODUCTION

A release of No. 2 fuel oil was reported on June 7, 1991, at the Naval Hospital, Building H-100, Naval Air Station Memphis (NASMEM), located in Millington, Tennessee. This Environmental Assessment Report (EAR) discusses the investigation completed to determine the nature and extent of contamination resulting from the release. EnSafe/Allen & Hoshall (E/A&H) of Memphis, Tennessee, completed the assessment and prepared this EAR under contract N62467-89-D-0318 to Southern Division (SOUTHDIV) Naval Facilities Engineering Command, Charleston, South Carolina. This report was prepared in accordance with the EAR guidelines set forth by the Tennessee State Underground Storage Tank Reference Handbook.

The release of No. 2 fuel oil was reported to the Tennessee Department of the Environment and Conservation (TDEC) after fuel oil was seen seeping from an expansion joint near where the tank system piping intersected Building H-100. Following notification of the release, a limited investigation was completed by NASMEM personnel to determine the point of release. The tops of the underground storage tanks (USTs) and all pipe fittings were unearthed for visual inspection. Soil at the building-piping juncture was noted to have a strong petroleum odor.

Results of a tightness test, completed on June 13, 1991, by CTC Industrial Services Inc. of Memphis, Tennessee, indicated the tanks were within acceptable tightness limits. The tightness of the system piping, however, was outside acceptable limits, indicating a leak. The supply and return lines were replaced with above-ground lines. The original lines are still in place. No further releases have been reported.

The quantity and duration of the release is unknown. Apparently, the system only leaked during operation. Comments from area employees indicated fuel oil had been leaking for a number of years prior to the reported release.

The project objective was to define the vertical and lateral extent of contamination, if any, of the shallow soil zone and water table aquifer resulting from the fuel oil release. An Environmental Assessment Plan (EAP) was developed by E/A&H and implemented to produce data of technical quality to assess the current site conditions and included tasks necessary to determine the presence of contamination and the appropriate corrective action. The EAP prepared and implemented was consistent with the Tennessee State UST Guidelines and the appropriate Naval Energy and Environmental Support Activity (NEESA) requirements.

The scope of work required a shallow soil and groundwater investigation in the area of the release. The investigation involved completing eight shallow soil borings and installing four shallow monitoring wells. Samples were collected from all soil borings and monitoring wells and submitted for laboratory analysis. Soil samples were also collected from eight locations beneath the basement floor of Building H-100 in the suspected fuel oil release area. Sediment samples were collected from the drainage ditch southeast of Building H-100. This drainage ditch is the receptor of discharge from the storm water drainage system local to the release area.

Four groundwater samples and 22 soil samples were submitted for laboratory analysis. An eight-digit alphanumeric code was used to identify each sample. An example of this code is outlined below.

Example: NHSB0101

Where: NH	=	Naval Hospital (Site identifiers, digits 1 and 2)
S	=	Soil matrix (Sample matrix, digit 3)
B	=	Sample procedure soil boring (Sample procedure, digit 4)
01	=	Sample location boring 01 (Sample location, digits 5 and 6)
01	=	Sample interval 01 (Sample interval, digits 7 and 8)

Sample Matrix:

S = Soil
G = Groundwater

Sample procedures:

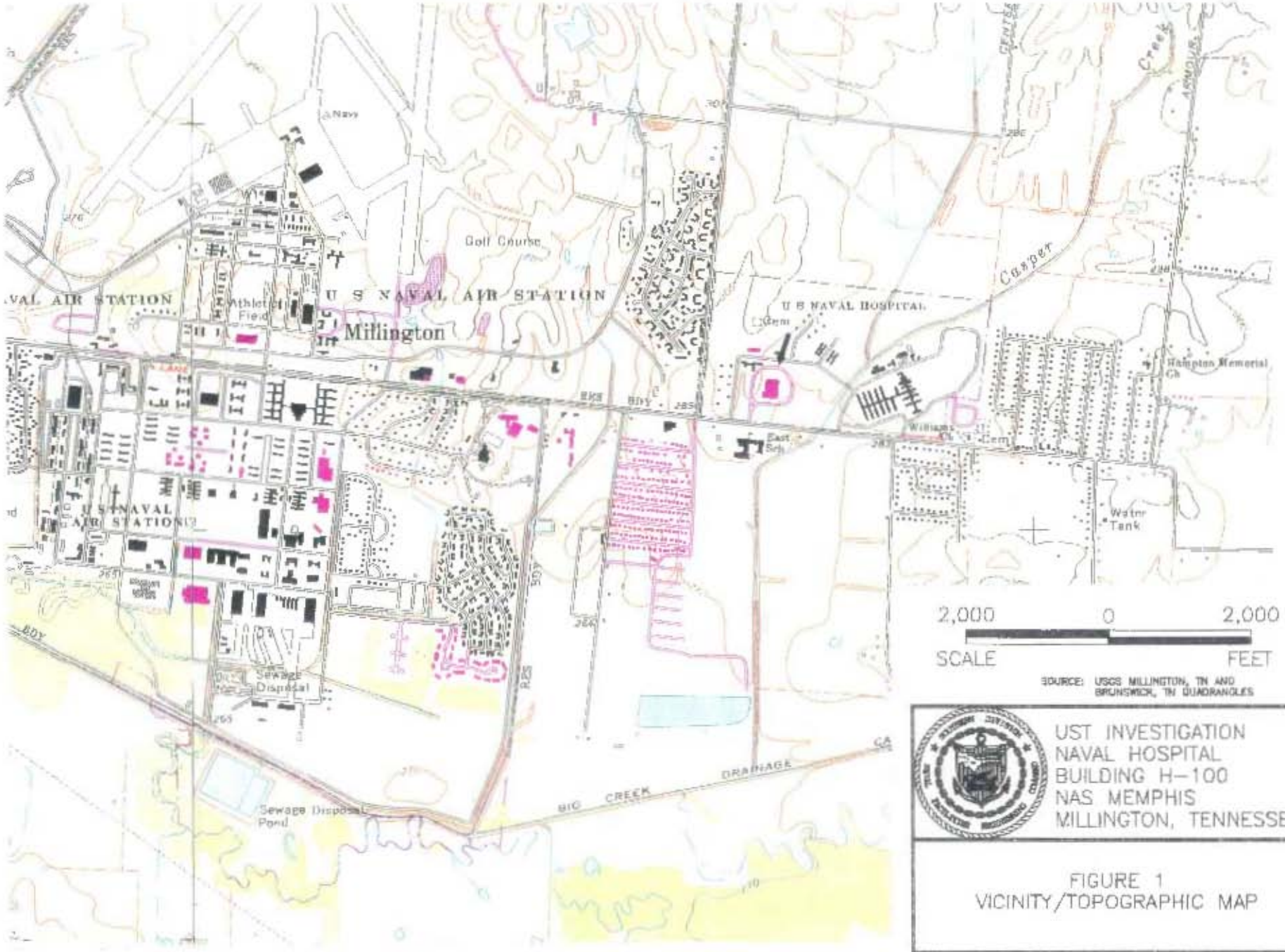
B = Soil boring
A = Hand auger
W = Monitoring Well

B. SITE LOCATION

The release occurred at the Naval Hospital, Building H-100, NASMEM, located in the east portion of the base (Figure 1). USTs 106 and 107, used to store No. 2 fuel oil as a backup fuel source for the hospital boiler system, are located east of the building, adjacent to the cooling tower (Figure 2).

Product was transported from the USTs to the boiler system by gravity flow via two supply lines. Excess and unused oil was returned to the USTs via two return lines by an electric pump. The return lines contained product only during operation of the system. The supply and return lines were routed around the footing of the cooling tower, buried a few feet below the surface.

Surface area drainage is to the south and southeast and is controlled by the parking lot and a storm drainage system. The area between the tanks and Building H-100 slopes steeply toward the building, as indicated by the elevation difference between wellheads MW-2 (286.13) and MW-4 (278.61). A culvert receives stormwater runoff from this low area. Runoff is directed to the southeast via the drainage system and discharged into an earthen ditch. Shallow groundwater at the site may be influenced by the south-southeasterly sloping topography.



SOURCE: USGS MILLINGTON, TN AND BRUNSWICK, TN QUADRANGLES

UST INVESTIGATION
NAVAL HOSPITAL
BUILDING H-100
NAS MEMPHIS
MILLINGTON, TENNESSEE

FIGURE 1
VICINITY/TOPOGRAPHIC MAP

DATE: 09/15/92 | DWG NAME: 026NSUST

The slope between the tank farm and the building is almost entirely covered with concrete (for slope control) and with components of the building support systems (cooling tower, circulation pumps, etc.), (Figure 2). The area is congested with overhead and underground electrical conduits and piping (for example, sewer lines, natural gas lines), which restricted available sampling points for both soil and groundwater.

C. GROUNDWATER INVESTIGATION

A limited hydrologic investigation was completed to assess the extent of groundwater contamination. The investigation required installing and sampling four shallow monitoring wells. The groundwater investigation was completed in accordance with the project-specific EAP.

Monitoring wells were identified with the prefix MW followed by the boring number. The well number indicates the order in which the wells were installed. All groundwater samples collected during this project are identified by the well number. Further discussion is provided in Section C.5, Groundwater Analytical Results.

Well placement was restricted by site structures and utilities and relied in part, on interpretation of the surface topography as an indicator of the groundwater flow direction. Placement was as follows: the first well was placed upgradient of the tanks and the point of release, the second well was placed downgradient of the tanks (at the southern edge of the tank pit), the third well was placed downgradient of the point of release, and the fourth well was placed as close as possible to the point of release. This placement rationale was consistent with state requirements.

C.1 Hydrogeology

Site soil boring and well logs indicate the uppermost geologic unit (loess) is composed of soft to medium stiff, clay and silty clay. Groundwater occurs under partially confined conditions along the more silty zones. Saturated soils were typically encountered 8 to 12 feet below ground

surface. Water levels were noted to be higher in completed monitoring wells. Piezometric surfaces range in elevation from 276.25 to 277.64 feet above mean sea level (msl) (07/13/92 data). Further discussion is provided in Section C.6, Water Level Data.

C.2 Monitoring Well Construction

Figure 2 indicates each monitoring well location. Each well boring was logged by the project geologist during drilling and sampling. Monitoring well borings were completed with 6.25-inch inside diameter (ID) hollow-stem augers. All wells were installed through the annulus of the augers into the water table.

Each well was constructed of a 10-foot section of 2-inch diameter, 0.010 slot, PVC screen attached to a 2-inch diameter, schedule 40, PVC riser. Well screens were positioned approximately 3 feet above and 7 feet below the top of the water table (saturated zone) to ensure adequate screening of "floater" contaminants, while allowing for temporal fluctuations in the water table.

A filter pack of clean 20/40 silica sand was placed through the auger annulus to a completed depth of approximately 2 feet above the top of the screen. A bentonite seal, approximately 2 feet thick, was placed above the sand filter pack. The bentonite was allowed to properly cure per manufacturer's specifications prior to completion of the well.

A bentonite-Portland cement mixture was placed above the bentonite seal up to a few feet from the surface. A flush-mount manhole with a watertight, bolt-down, loadbearing cover was installed and secured with cement to complete the well construction. Each manhole was identified as a monitoring well. The well boring log and construction diagrams are included in Appendix A. A summary of well construction materials is presented in Table 1.

Table 1
Well Construction Materials

Monitoring Well Identification	Calculated Material Volumes			Actual Material Volumes Used		
	Sand[a]	Bentonite[b]	Grout[c]	Sand	Bentonite	Grout
MW-1	6	1	7	7	1	10
MW-2	6	1	4	6	1	7
MW-3	6	1	4	6	1	6
MW-4	6	1	1	7	1 ½	1

Notes:
a Sand = 20/40 sieve size (100 pound bag)
b Bentonite = ¼-inch pellets (5-gallon bucket)
c Grout = Portland Type 1/Bentonite (95/5%) mixture (94 pound bag)

A benchmark was established at the top of each well casing and was surveyed by a State of Tennessee registered land surveyor (Jackson Person & Associates, Inc. of Memphis, Tennessee) to the nearest 0.01 foot incorporating USGS NAD '27. A copy of the survey is included as Plate 1 at the end of the report. Water levels were measured relative to the benchmark to aid in generating accurate and consistent groundwater elevation data.

C.3 Well Development

All wells were developed utilizing a surge block and a hand bailer. Development continued until the pH, temperature and conductivity stabilized and turbidity was reduced to a minimum. Data collected during well development are presented in Table 2. This data indicate that all wells were fully developed.

Development water was contained in DOT 17-C, open-top, 55-gallon drums, permanently labeled by well number and stored at a location onsite designated by NASMEM personnel. The material will be characterized through laboratory analysis to determine if it must be disposed of as hazardous waste or solid waste.

C.4 Monitoring Well Sampling

Monitoring well sampling involved reading the static water level and calculating well casing volume, purging the well casing of stagnated water, and retrieving the sample and placing it into properly labeled sample containers. Groundwater samples were collected using a dedicated PVC single-check valve bailer and nylon bailing rope.

Static Water Level Measurements were completed on all monitoring wells prior to purging. Static water level data are discussed in detail in Section C.6.

Monitoring Well Purging was completed for each well immediately prior to sampling. A minimum of three well casing volumes were removed during purging. Select water quality measurements were collected during purging, including pH, temperature, specific conductivity,

Table 2
Water Quality Data

Reading	Time CDT	Conductivity µS	pH	ORP mV	Temperature °C
Well Development					
MW-1 06/02/92					
1	1440	440	6.59	-026	19.2
2	1450	283	6.62	-031	18.9
2	1515	290	7.02	-017	19.2
3	1525	281	7.25	-021	18.9
4	1535	284	7.24	-020	18.8
MW-2 06/02/92					
1	1325	339	7.12	-089	21.6
2	1340	340	6.81	-062	20.4
3	1350	357	6.65	-059	20.3
4	1400	351	6.62	-054	20.6
5	1415	453	6.58	-051	20.8
MW-3 06/03/92					
1	1530	668	7.07	016	*
2	1540	634	7.32	-009	*
3	1547	624	7.44	-007	*
4	1554	620	7.52	006	*
5	1607	613	7.84	022	*
MW-4 06/03/92					
1	1611	630	7.66	-031	*

Table 2
Water Quality Data

Reading	Time CDT	Conductivity µS	pH	ORP mV	Temperature °C
Well Purging					
MW-1 06/04/92					
1	1416	238	6.81	-033	15.5
2	1417	244	6.78	-031	14.4
3	1421	256	6.68	-029	13.8
4	1426	227	6.60	-029	13.8
MW-2 06/04/92					
1	1335	367	6.67	031	18.6
2	1340	357	6.65	-002	15.6
3	1345	335	6.61	-009	15.6
4	1347	338	6.64	-020	15.5
MW-3 06/04/92					
1	1455	383	7.07	007	15.0
2	1500	334	7.04	-012	14.4
3	1505	356	7.12	-008	14.4
MW-4 06/04/92					
No data for MW-4					

Notes:
ORP = Oxidation Reduction Potential
* = Temperature Probe Malfunction

oxidation reduction potential (ORP) and turbidity. Data collected during the purging process are indicated in Table 2. Data indicate all measured water quality parameters were stable prior to sampling. No data were collected for MW-4 due to an equipment failure; however, three casing volumes of water were purged prior to sampling.

Groundwater samples were collected using a dedicated PVC single check valve bailer and nylon bailing rope. No free product was encountered during well sampling. Samples were transferred directly from the bailer to the appropriate sample containers.

C.5 Groundwater Analytical Results

Groundwater samples were submitted to CompuChem Laboratories for analysis by California modified EPA Method 8015 for diesel range organics (DRO), petroleum hydrocarbons. Laboratory analysis was conducted by CompuChem's western division laboratory in Sacramento,

California. All analyses were conducted in accordance with the laboratory's NEESA-approved Quality Assurance Plan (QAP). All samples were collected, analyzed and validated under NEESA Level C quality assurance protocols. The collected samples, along with appropriate QC samples (i.e., duplicates, rinsate blanks) were analyzed.

The overall quality of the analytical work for NAS Memphis is considered to be satisfactory and all data have been determined to be acceptable and usable (with the appropriate qualifiers) for EAR applications. The distribution of detected levels of DRO indicates the extent of impact is limited. Analytical results are presented in Table 3. Laboratory reports and associated chain of-custody forms are included as Appendix B.

Table 3
Groundwater Samples-Analytical Results

Well Number	Date Collected	Sample Number	Diesel Range Organics(ppb)
MW-1	6/4/92	NHGW01	BDL
MW-2	6/4/92	NHGW02	210
MW-2	6/4/92	NHGW02D	150
MW-3	6/4/92	NHGW03	BDL
MW-4	6/8/92	NHGW04	5500

Note:
BDL = Below Detection Limit

C.6 Water Level Data

Groundwater level data were collected from the four wells installed during this investigation. Three sets of data are presented in Table 4. Figures 3 and 4 present piezometric maps derived from data collected June 30, 1992 and July 31, 1992, respectively.

Table 4
Groundwater Elevations

WELL #	DATE	*DEPTH TO GROUNDWATER (FT)	*WELL DEPTH (FT)	**WELL ELEVATION (FT)	**POTENTIOMETRIC SURFACE ELEVATION (FT)
MW1	06/04/92	11.73	27.4	289.47	277.74
MW2	06/04/92	9.61	21.6	286.13	276.52
MW3	06/04/92	0.65	22.8	278.46	277.81
MW4	—	—	—	278.51	—
MW1	06/30/92	11.52	27.4	289.47	277.95
MW2	06/30/92	9.60	21.6	286.13	276.53
MW3	06/30/92	1.01	22.8	278.46	277.45
MW4	06/30/92	0.96	15.6	278.51	277.55
MW1	07/31/92	12.14	27.4	289.47	277.33
MW2	07/31/92	9.88	21.6	286.13	276.25
MW3	07/31/92	1.11	22.8	278.46	277.35
MW4	07/31/92	0.87	15.6	278.51	277.64

Notes:

* = Measured from Top of Casing (TOC) No Free Product Detected in Any Monitoring Wells
** = Measured from TOC Relative to Mean Sea Level
— = No data for MW-4 on 06/04/92

Water level data from June 30, 1992, indicated that groundwater flowed in a convergent east and southeast pattern, whereas July 31, 1992, data indicated a general southeast flow. Flow gradients were calculated from the prepared piezometric maps by measuring the change in groundwater elevation denoted by the isopleths with horizontal distance. For the following calculations, the southeast-trending flow lines in both Figures 3 and 4 were used as the lines of measurements:

Groundwater Flow Gradient = (Change in Elevation) ÷ (Horizontal Distance)

$\nabla = \Delta E/L$

6/30/91 (277.4-276.6)ft ÷ (45)ft

= 0.018

7/31/92 (277.4-276.6)ft ÷ (37) ft

= 0.022

The calculated flow gradients for the two measuring events are 0.018 and 0.022, with an average gradient of 0.020. The groundwater flow rate was calculated using the average flow gradient and estimated horizontal permeability and porosity of the water-bearing soil. Horizontal permeability was assumed to be one order of magnitude greater than the laboratory reported vertical permeabilities for the site soils (Section D). Porosity for a clay and silt medium was assumed at 0.40.

$$\text{Groundwater Flow Rate} = \frac{\text{(Horizontal Permeability) x (Flow Gradient)}}{\text{(Porosity)}}$$

$$v = \frac{K \nabla}{i} \qquad K = 10^{-7}\ \text{cm/sec or } 10^{-8}\ \text{ft/sec}$$

$$= \frac{(10^{-8}\ \text{ft/sec})(0.02)}{(0.40)}$$

$$= 5 \times 10^{-10}\ \text{ft/sec}$$

$$\text{or } 4.3 \times 10^{-5}\ \text{ft/day}$$

$$\text{or } 1.6 \times 10^{-2}\ \text{ft/year}$$

Hence, groundwater flow is very slow, on the order of 10^{-2} ft/year.

C.7 Groundwater Classification

The Tennessee State UST Guidelines set forth requirements to determine if the impacted aquifer is a drinking water source or a non-drinking water source. The cleanup level is directly dependent on classification of the aquifer use. This process consists of three parts including: (1) Water Use Survey, (2) Water Quality Analysis, and (3) Yield Testing. Each step completed during this investigation is discussed in sequence below.

Water Use Survey: The Shelby County Health Department surveyed the area local to the Naval Hospital to locate wells which were placed in the shallow aquifer used for agricultural or domestic water supplies. There were no records of wells local to the Naval Hospital that utilized the water table. A copy of the survey report is included as Appendix C. The Shelby County Board of utilities indicated to E/A&H that public water supply lines are in place to all residences and businesses within 0.5 miles of the hospital site. This is an indication no domestic wells are in use in this area.

Water Quality Analysis: A groundwater sample was collected from monitoring well MW-1 and analyzed for water quality based on the primary and secondary drinking water standards. The sample was submitted to Specialized Assays of Nashville, Tennessee, for analysis. Analytical results are listed in Table 5. Iron, manganese and turbidity were detected in excess of the primary and secondary water quality standards, indicating that the quality of the shallow aquifer does not meet the set criteria for a drinking water source, and should be classified as a non-drinking water supply.

Table 5
Water Quality - Analytical Results

PARAMETERS	RESULT	STDS	UNITS
PRIMARY STANDARDS			
Arsenic	0.006	0.05	ppm
Barium	0.18	1.0	ppm
Cadmium	<0.001	0.01	ppm
Chromium, Total	0.011	0.05	ppm
Fluoride, Electrode	0.29	4.0	ppm
Lead	0.009	0.05	ppm
Mercury	< 0.001	0.002	ppm
Nitrogen, Nitrate	0.82	10.0	ppm
Selenium	<0.005	0.01	ppm
Silver	<0.005	0.05	ppm
Turbidity	**10**	1.0	NTU
SECONDARY STANDARDS			
Total Hardness	220	—	mg/l as $CaCO_3$
Chloride	22.9	250	ppm
Color	3	15	Color Units
Copper	0.035	1.0	ppm
Detergents (MBAS)	<0.05	0.05	ppm
Iron	**13.8**	0.03	ppm
Manganese	**1.31**	0.05	ppm
Odor	0	3	T.O.N. Unit
pH	6.9	6.5 - 8.5	pH Units
Sodium	14.6	—	ppm
Sulfate	13.3	250	ppm
Solids, Dissolved	280	500	ppm
Zinc	0.37	5.0	ppm

Notes:
TON = Threshold Odor Number
NTU = neophelometric turbidity unit

Yield Test: No tests were completed to directly determine the yield of the water table aquifer. Analytical results indicate poor water quality; therefore, no formal yield test was deemed

necessary. It should be noted that recharge for wells MW-3 and MW-4 was slow when developing with a hand bailer. This slow recharge indicates that yield may be low for the water table aquifer.

The water table aquifer is a non-drinking water source. A water use survey did not indicate that the shallow aquifer was utilized as a water source (drinking or otherwise) local to the hospital. Also, laboratory analysis determined the water quality was not suitable as a drinking water source. Based on these data, a cleanup level of 1.000 ppm TPH is required by the Tennessee State UST Regulations.

C.8 Groundwater Contaminant Plume

Laboratory analysis detected DRO compounds in groundwater samples collected from monitoring wells MW-2 and MW-4 (Table 2). DRO compounds were not detected in groundwater samples collected from MW-1 or MW-3. The levels of DRO detected in samples from wells MW-2 and MW-4 differ more than an order of magnitude. Data from each well are discussed separately below.

MW-2: DRO compounds were detected in groundwater sample NHGW0201 at 210 μg/l. The compounds detected were listed as unknown hydrocarbons and not identified as diesel fuel. The unknown hydrocarbons are likely a component of No. 2 fuel oil.

Monitoring well MW-2 was installed at the southern edge of the tank farm. The hydrocarbons detected are likely restricted to the sand fill around the tanks trapped (both laterally and vertically) by the surrounding, relatively less permeable natural clay. These hydrocarbons may be an indicator of a small release (spill) at the tank pit. The extent is apparently limited as indicated by soil analytical data and boring log data. A discussion of soil data is included in Section D.5.

MW-4: Analysis of groundwater sample NHGW0401 detected diesel at 5500 μg/l. Monitoring well MW-4 was installed at the suspected point of release. The concentration of diesel fuel detected indicates impact to the water table aquifer; however, analytical data indicate the extent of groundwater contamination is limited.

The level of DRO detected in sample NHGW0401 may be biased high. MW-4 was installed at a very shallow depth where the top of the filter pack is less than 5 feet from the surface. It is possible that contaminated water present in the engineered fill beneath the building and concrete drive is infiltrating into the upper portion of the filter pack, resulting in a biased high representation of the DRO contamination in the groundwater at MW-4. This relationship is unclear. Continued monitoring of MW-4 may provide data to evaluate this relationship.

Cross-sectional maps which indicate groundwater elevations are included in Section D.1. Figure 5 in this section indicates the contaminant plume in the groundwater. Analytical data indicate the core of the plume is restricted to the area local to MW-4. DRO hydrocarbons were detected in a sample from MW-2 at levels below the action level of 1.0 ppm.

D. SOIL INVESTIGATION

A limited surface and shallow subsurface investigation was completed to assess the extent of soil contamination. The investigation required installing and sampling eight shallow soil borings (four completed as monitoring wells), collecting a series of soil samples from beneath the basement floor of Building H-100, and collecting sediment samples from the drainage ditch receiving storm water discharge from the release area. This soil investigation was completed in accordance with the project-specific EAP to comply with the Tennessee State Underground Storage Tank Regulations.

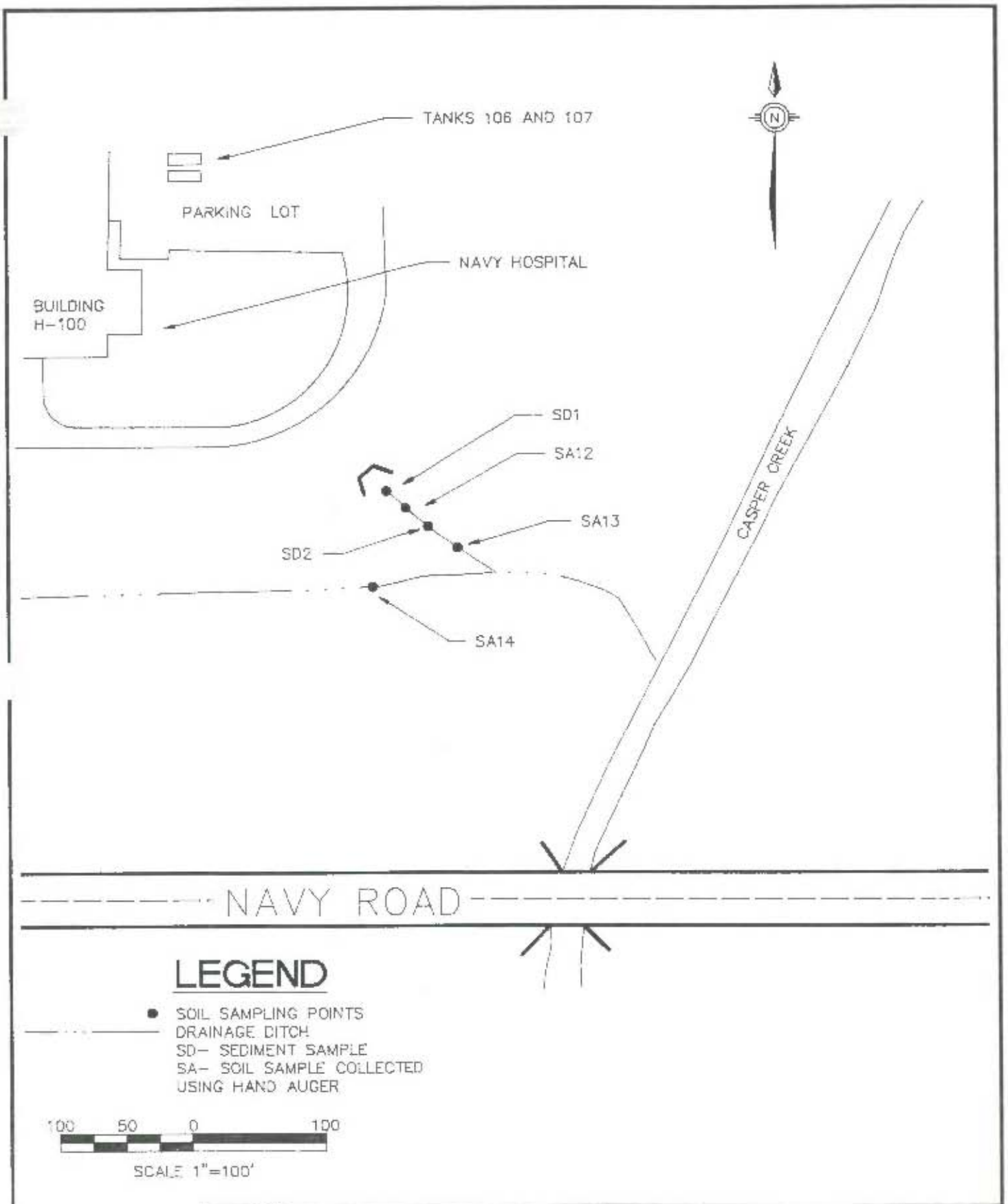
The placement rationale for soil borings was consistent with that of the monitoring wells. Soil boring placement was restricted by site structures and utilities and relied, in part, on

interpretation of the surface topography as an indicator of the groundwater flow direction. The location of sampling points beneath the basement floor were random biased but restricted by accessibility. Soil/sediment sampling points were selected to determine the extent of contamination at the discharge point and downstream. Figure 6 indicates the location of all soil and well borings along with sample locations through the basement floor. Figure 7 indicates all soil/sediment sample locations within the drainage ditch.

D.1 Geology

The regional geology and hydrogeology consists of a thick sequence of unconsolidated Quaternary and Tertiary sediments. This sequence comprises (in ascending order) the Wilcox Group, Claiborne Group and Terrace Deposits and the surficial Loess deposits. Two major aquifer systems are included in this sequence: the Fort Pillow Formation (Wilcox Group) and the Memphis Sand Formation (Lower Claiborne Group). These aquifers are overlain by the Jackson-Upper Claiborne confining unit (Jackson Clay, Cockfield, and Cook Mountain Formations). This significant confining unit retards the downward migration of shallow groundwater to the subordinate aquifers. Due to the confining nature of the Jackson-Upper Claiborne, and the limited (shallow) extent of the fuel oil release at the hospital, impact to the lower aquifer systems is not to be a concern at the NASMEM Hospital site.

The Terrace deposits and the surficial loess deposits are stratigraphically above the Jackson Clay. The Terrace deposits consist of Pleistocene and Pliocene age sand, gravel, some clay with thin layers of a ferrugineous sandstone and conglomerates at the base. This unit ranges in thickness from 0 to 100 feet and has limited uses as a groundwater source for agricultural applications.



ENVIRONMENTAL ASSESMENT
BUILDING H-100
NAS MEMPHIS

FIGURE 7
SOIL SAMPLING LOCATIONS
AT DRAINAGE DITCH

DATE: 09/15/92 | DWG NAME: 040SSLOC

The surficial loess deposits are windblown sediments comprising silt, silty clay, clay and minor amounts of sand. Loess is typically 0 to 65 feet thick in the Memphis area. Water-bearing zones are present in this unit; however, yield is low and water quality is poor. Fuel oil contamination at the Naval Hospital appears to be limited to the upper part of this unit.

Boring log data indicate the shallow soil profile (0 to 26 feet) consists of a silty clay with increasing amounts of silt with depth. The soil lithology varies slightly with depth ranging from an orange-brown silty clay with moderate amounts of organic, to a brown and gray mottled clay, to a saturated brown silty clay-clayey silt. Boring logs for this investigation are included in Appendix A.

Figures 8 and 9 are cross sections generated from soil boring data. Lithologic changes are subtle, both laterally and vertically. The profile is dominated by clays ranging from organic silty clays to inorganic clayey silt.

D.2 Drilling and Soil Sampling Methods

All borings were completed with 3.25-inch ID hollow-stem augers and samples collected with a standard 24-inch split-spoon sampler. Soil samples were collected continuously from a depth of 0 to 20 feet, then at 5-foot intervals to the termination depth. Samples were composited over a 4-foot interval by placing the soil sample in a stainless steel bowl and homogenizing the soil. Soil samples were collected from beneath the basement floor of Building H-100 by coring the concrete floor and retrieving the soil samples with a stainless steel hand auger. Samples were collected at discrete depth intervals just beneath the concrete and at the sand fill/natural clay interface.

Soil/sediment samples were collected from the drainage ditch southeast of Building H-100 (storm water discharge receptor) with a hand auger. Samples were collected at the surface and at 1 to 2 feet below the surface.

D.3 Soil Analytical Results

All soil samples were submitted to CompuChem Laboratories for analysis by California-modified EPA Method 8015 for DRO compounds. Analytical results of the laboratory analysis are presented in Table 6. Laboratory analysis detected DRO compounds in soil samples collected from borings B2, B4, B6, and B8. DRO compounds were also detected in soil samples collected beneath the basement and sediment samples collected from the drainage ditch.

Soil boring samples were split for headspace (organic vapor) analysis. Results of the headspace analysis are presented in Table 7. In general, headspace analysis did not indicate any zones of notable levels of volatile contamination. Volatile levels were below background levels for the majority of the samples scanned. No trends were noted in the data.

D.4 Soil Cleanup Levels

Two Shelby tubes samples were collected from boring B9 which was completed adjacent to monitoring well MW-4. These Shelby tube samples were collected from the zone of the highest and second highest suspected permeabilities. Shelby tubes samples were collected at 6 to 8 feet (B9-1) and 14 to 17 feet (B9-2). The selection of sampling depths was based on boring log data from boring/monitoring well MW-4. Falling-head analysis determined the vertical permeabilities as 5.02×10^{-8} cm/sec and 6.26×10^{-9} cm/sec for samples B9-1 and B9-2, respectively. Results of the falling head analysis are presented in Appendix D.

Based on the laboratory reported soil permeabilities, boring log data, the non-drinking water supply groundwater classification, and the limited extent of contamination, the soil cleanup levels should be 1000 mg/kg total petroleum hydrocarbons.

Table 6
Soil Samples - Analytical Results (ppm)

Soil Boring #	Sample #	Date Collected	Depth (ft)	Diesel Range Organics	Soil Boring #	Sample #	Date Collected	Depth (ft)	Diesel Range Organics
B1	NHSB0101	05/18/92	0-4	BDL	SA2	NHSA0201	05/21/92	0-1	11000
B1	NHSB0106	05/18/92	24-26	BDL	SA3	NHSA0301	05/21/92	0-1	BDL
B2	NHSB0201	05/19/92	0-4	10	SA4	NHSA0401	05/21/92	0-1	BDL
B2	NHSB0205	05/19/92	16-20	BDL	SA7	NHSA0701	07/14/92	0.0-0.8	5540
B3	NHSB0302	05/20/92	4-8	BDL	SA7	NHSA0702	07/14/92	2.3-2.8	23
B3	NHSB0305	05/20/92	16-20	BDL	SA8	NHSA0801	07/14/92	0.0-0.6	58
B4	NHSB0401	06/01/92	0-4	740	SA8	NHSA0802	07/14/92	1.5-2.0	BDL
B4	NHSB0402	06/01/92	4-8	50	SA9	NHSA0901	07/14/92	0.0-0.7	BDL
B4	NHSB0403	06/02/92	8-12	BDL	SA9	NHSA0902	07/14/92	1.9-2.5	BDL
B4	NHSB0404	06/02/92	12-16	BDL	SA10	NHSA1001	07/14/92	2.0-2.3	BDL
B4	NHSB0405	06/02/92	16-20	BDL	SA10	NHSA1002	07/14/92	6.0-6.5	4210
B5	NHSB0501	05/19/92	0-4	10	SA10	NHSA1003	07/14/92	8.0-8.5	610
B5	NHSB0504	05/19/92	12-16	BDL	SA11	NHSA1101	07/14/92	0.5-1.0	BDL
B6	NHSB0601	05/19/92	0-4	210	SA11	NHSA1102	07/14/92	4.0-5.0	BDL
B6	NHSB0603	05/19/92	8-12	BDL	**SOIL SAMPLES-DRAINAGE DITCH**				
B7	NHSB0701	05/20/92	0-4	BDL	SD1	NHSD0101	06/01/92	0-1	260
B7	NHSB0704	05/20/92	12-16	BDL	SD2	NHSD0201	06/01/92	0-1	240
B8	NHSB0802	05/26/92	4-8	35	SA12	NHSA1201	07/14/92	3-3.5	BDL
B8	NHSB0803	05/26/92	8-12	BDL	SA13	NHSA1301	07/14/92	0.5-1.0	BDL
B8	NHSB0805	05/26/92	16-20	BDL	SA13	NHSA1302	07/14/92	2.5-3.0	BDL
SOIL SAMPLES-BENEATH BASEMENT FLOOR					SA14	NHSA1401	07/14/92	0.5-1.0	BDL
SA1	NHSA0101	05/21/92	0-1	BDL	SA14	NHSA1402	07/14/92	2.0-2.5	BDL

Note: BDL = Below Detection Limit

Table 7
Headspace Data

Boring-Sample #	Depth (ft)	Headspace (ppm)	Boring-Sample #	Depth (ft)	Headspace (ppm)
B1-1	0-4	BG	B3-5	18-20	BG
B1-2	4-8	BG	B5-1	0-4	0.1
B1-3	8-12	BG	B5-2	4-8	0.2
B1-4	12-16	BG	B5-3	8-12	0.4
B1-5	16-20	BG	B5-4	12-16	0.3
B1-6	24-26	BG	B6-1	0-4	3.0
B2-1	0-4	BG	B6-2	4-8	1.1
B2-2	4-8	0.3	B6-3	8-12	1.0
B2-3	8-12	0.3	B7-1	0-4	BG
B3-2	4-8	0.4	B7-2	4-8	BG
B3-3	8-12	BG	B7-3	8-12	BG
B3-4	12-16	BG	B7-4	12-16	BG

Note:
BG = Background Readings

D.5 Soil Contaminant Plume

Figure 10 indicates the horizontal extent and magnitude of contamination. The boundaries of the mapped plume indicate the limited extent of the contamination. Vertical migration of the contaminants is apparently restricted by the natural clay layer. Lateral movement of contaminants may be restricted by the building substructures.

The fuel oil contamination appears to be retained and migrating along the sandy engineered fill of the building foundation. This hypothesis is supported by comparing analytical data and lithologic data. Review of the analytical data indicates a trend of dramatically decreasing concentration with increasing depth. The detected levels of DRO compounds drop significantly below the interface of the sandy engineered fill and the native clays. The vertical extent of TPH soil contamination is shown in Figure 11.

E. SIGNATURE PAGE

I, the undersigned, do hereby affirm that the information contained in this report is accurate and correct to the best of my knowledge and belief.

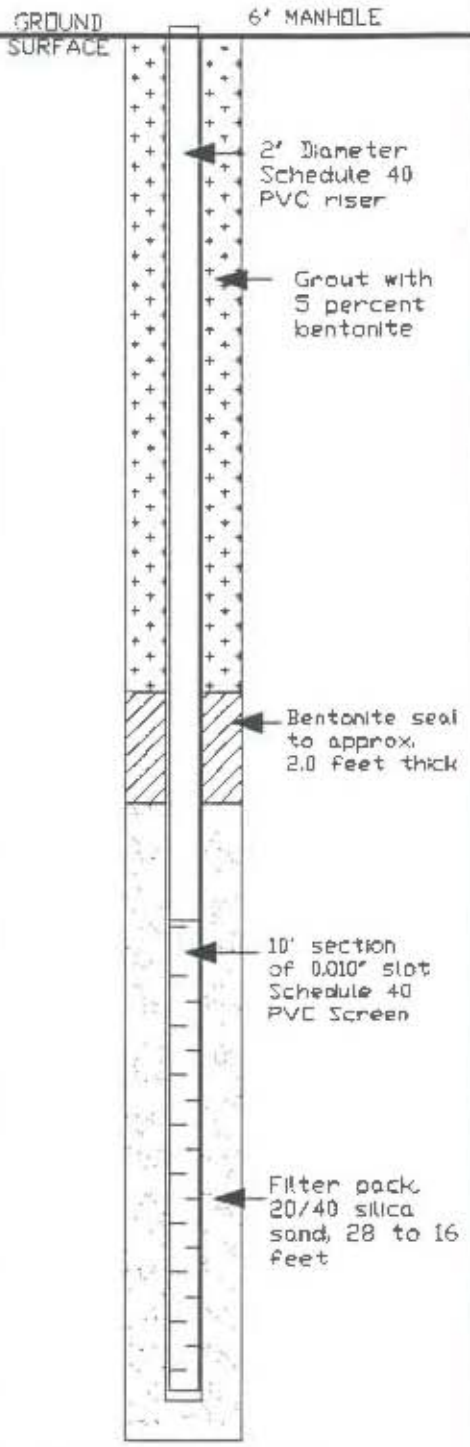
Approved by,

Paul V. Stoddard, P.G.
Registered Professional Geologist

Sept 18, 1992
Date

SAMPLE NUMBER DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
					BORING DATE 05/19/92
	SS	0		1018	(0-2 feet) No sample recovery.
	SS	50	13	1019	(2-4 feet) Reddish brown silty clay with organics.
5	SS	79	9	1027	(4-6 feet) Silty clay, brown with minor organics.
	SS	88	24	1037	(6-8 feet) Dark brown silty clay, with moderate amounts organics. (6.0 to 7.5). Dark gray silty clay with less silt than above.
10	SS	92	18	1043	(8-10 feet) Brown silty clay (8.0 to 8.3). Gray clayey silt, mostly silt (8.3 to 8.7). Brown silty clay with organics and some iron staining (8.7 to 9.8).
	SS	88	9	1051	(10-12 feet) Brown silty clay with moderate amounts of organics. Wet zone, 10.4 to 10.9.
	SS	50	7	1059	(12-14 feet) Brown silty clay (12.0 to 12.3). Moist silty clay with moderate gray clay.
15	SS	100	12	1104	(14-16 feet) Brown silty clay with moderate organics slighty moist. Clay brown mottled with gray clay.
	SS	100	5	1117	(16-18 feet) Brown silty clay (16.0 to 16.4). Moist, clayey silt with moderate organics, mottled with gray clay.
20	SS	100	7	1124	(18-20 feet) Gray to brown clayey silt mottled with brown clay, moist.
25	SS	100	8	1149	(24-26 feet) Dark gray clayey silt, wet, (note - resampled due to no recovery).
30					Boring terminated at 28.5 feet.

WELL CONSTRUCTION DETAILS



CASING SET @ 28.0 FEET.

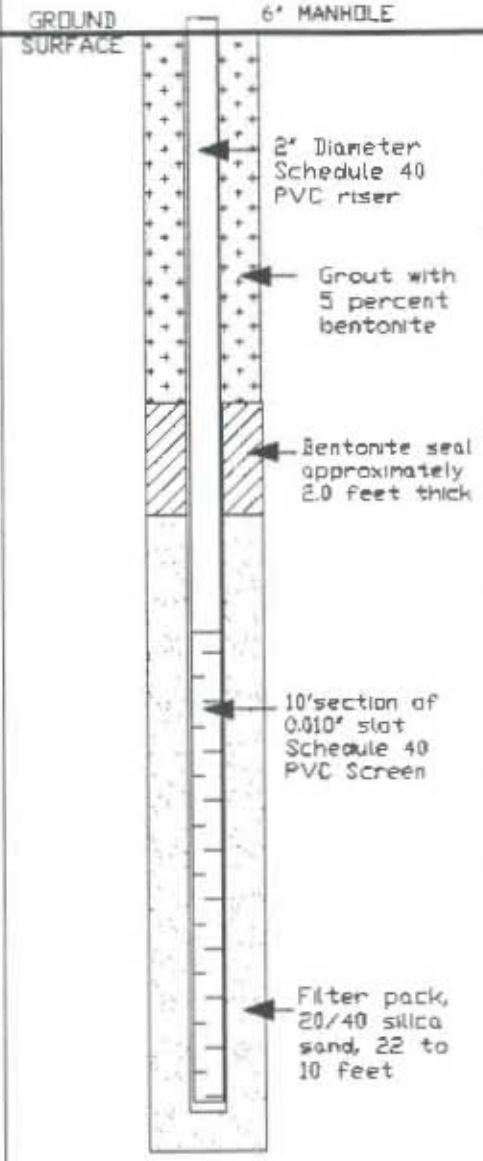
ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
NAVAL HOSPITAL
NAS MEMPHIS, TN.

BORING 1 / MONITORING WELL 1
BUILDING H-100

DATE: 06/11/92 | DWG NAME: NMH-MW1

SAMPLE NUMBER DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
					BORING DATE 05/19/92
	SS	86	17	1525	(0-2 feet) Dark brown clay with silt (0 to 0.7). Poorly sorted medium to coarse grained sand and fine gravel (0.7 to 1.75).
	SS	75	15	1526	(2-4 feet) Medium to coarse grained sand with fine gravel and minor amounts of silt and clay.
5	SS	92	8	1529	(4-6 feet) Medium to coarse grained sand with minor amounts of silt and clay.
	SS	96	4	1534	(6-8 feet) Medium to coarse grained sand with minor amounts of clay and fine gravel.
	SS	79	3	1541	(8-10 feet) Medium to coarse grained sand with minor amounts of silt, clay, and some fine gravel (8.0 to 9.4). Dark gray clay (9.4 to 9.6).
10	SS	88	6	1545	(10-12 feet) Sand, medium to coarse grained with minor amounts of silt and clay (10.0 to 11.3). Dark gray silty clay with minor organics.
	SS	100	6	1552	(12-14 feet) Brown clay with moderate amounts of organics.
15	SS	100	8	1558	(14-16 feet) Brown and gray mottled clay with minor amounts of silt, and moderate amounts of organics. Wet zone 14.8 to 15.0. Water table at 14.8.
	SS	100	5	1605	(16-18 feet) Brown and gray mottled silty clay with minor organics. Wet.
20	SS	100	7	1613	(18-20 feet) Gray to brown clayey silt. Wet.
					Boring completed to 22.5 feet. Well set at approximately 22.0 feet.
25					
30					

WELL CONSTRUCTION DETAILS



CASING SET @ 22.0 FEET.

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
NAVAL HOSPITAL
NAS MEMPHIS, TN.

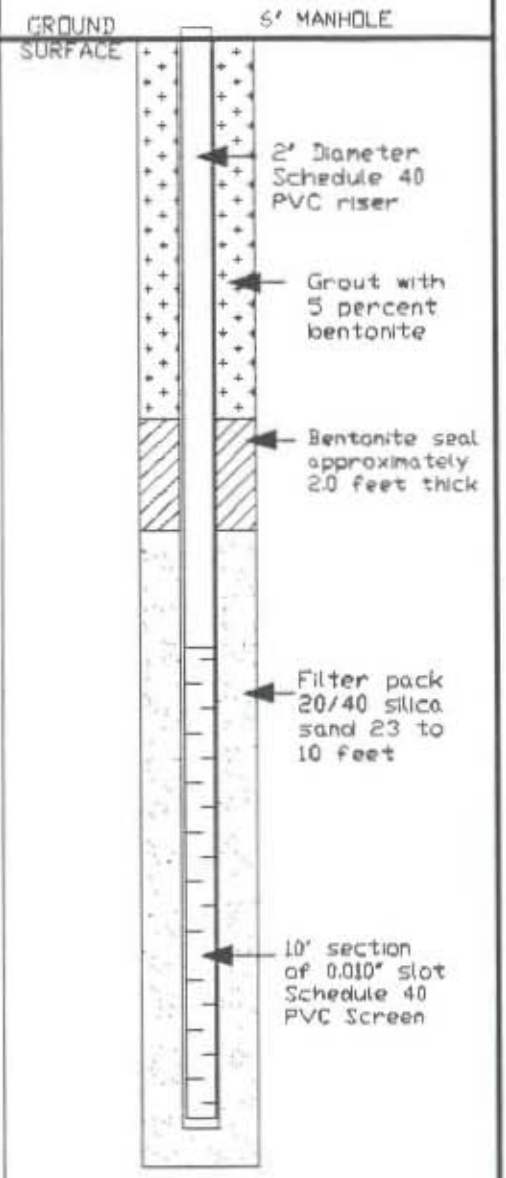
BORING 2 / MONITORING WELL 2
BUILDING H-100

DATE: 06/11/92

DWG NAME: NMH-MW2

SAMPLE NUMBER DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
					BORING DATE 05/20/92
	SS	0		1328	(0-2 feet) No sample recovery due to wooden supports beneath concrete surface.
	SS	0		1339	(2-4 feet) No sample recovery due to wooden supports beneath the concrete surface.
5	SS	100	7	1401	(4-6 feet) Brown and gray mottled silty clay with moderate amounts of organics.
	SS	100	4	1407	(6-8 feet) Brown to gray mottled silty clay, with moderate amounts of organics. Moist zone 6.5 to 6.8.
	SS	100	9	1409	(8-10 feet) Brown to gray mottled silty clay with a moderate amount of organics.
10	SS	100	6	1419	(10-12 feet) Brown to gray silt and clay with moderate amounts of organics.
	SS	100	7	1427	(12-14 feet) Brown and gray mottled clay with minor silts (12.0 to 13.8). Dark gray silty clay (13.8 to 14.0).
15	SS	65	5	1432	(14-16 feet) Dark green to gray clay with minor silt.
	SS	100	8	1445	(16-18 feet) Dark green clay little to no silt, moist (slightly plastic).
20	SS	100	12	1501	(18-20 feet) Dark green clay, moist and soft, slightly plastic.
					Well screened at approximately 23.0 feet, no additional samples collected.
25					
30					

WELL CONSTRUCTION DETAILS



CASING SET @ 23.0 FEET.

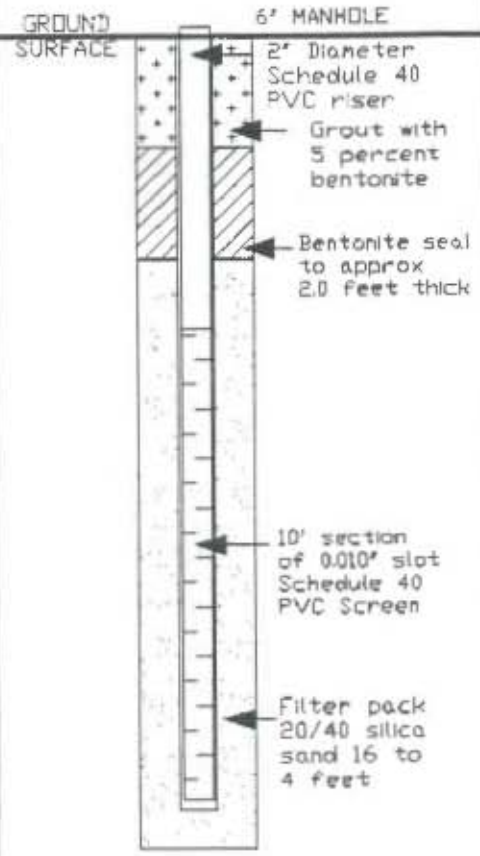
ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
NAVAL HOSPITAL
NAS MEMPHIS, TN.

BORING 3 / MONITORING WELL 3
BUILDING H-100

DATE: 06/17/92 | DWG NAME: NMH-MW3

SAMPLE NUMBER DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
					BORING DATE 06/1-2/92
	SS	71	10	1200	(0-2 feet) Medium to coarse grained sand (fill). Strong petroleum odor. Wet.
	SS	79	5	1209	(2-4 feet) Dark brown clay with minor amounts of silt and some organics.
5	SS	100	4	1221	(4-6 feet) Brown to gray clay with moderate silts and minor organics. Thin lignite seam at 4.3 feet.
	SS	100	5	1232	(6-8 feet) Medium brown to gray clay with silt and organics.
	SS	100	4	1238	(8-10 feet) Clayey silt, gray with little to no organics, moist.
10					NOTE: Drilled to 10 ft. on 06/01/92. Resumed drilling on 06/02/92. Delay due to rig breakdown.
	SS	100	2	0853	(10-12 feet) Brown silty clay with moderate amounts of organics. Wet zone, 10.4 to 10.9 ft.
	SS	100	4	0923	(12-14 feet) Dark green clayey silt, spongey and moist.
15	SS	100	4	0949	(14-16 feet) Dark green clay with minor silt. Slightly moist.
	SS	100	9	1001	(16-18 feet) Dark green clay with little or no silt, dry.
					Boring terminated at 16.5 feet. Well set at approximately 16.0 feet.
20					
25					
30					

WELL CONSTRUCTION DETAILS



CASING SET @ 16.0 FEET.

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
NAVAL HOSPITAL
NAS MEMPHIS, TN.

BORING 4 / MONITORING WELL 4
BUILDING H-100

DATE: 06/17/92

DWG NAME: NMH-MW4

DATE OF BORING: 05/19/92

SAMPLE NO & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS BG (BACKGROUND) = 0.1 ppm BBG = BELOW BACKGROUND
1	SS	83	22	1233	BG	(0-2 feet) Clay with moderate amounts of silts (0 to 0.8 feet). Poorly sorted, medium grained sand brown.
1	SS	83	13	1237	BG	(2-4 feet) Poorly sorted fined grained sand to fine gravel.
2 5	SS	79	16	1241	BG	(4-6 feet) Medium to coarse grained sand with some fine gravel.
2	SS	38	16	1243	BG	(6-8 feet) Medium grained sand (6.0 to 6.2). Dark brown to gray silty clay.
3	SS	71	10	1247	BG	(8-10 feet) Poorly sorted sand, silt and clay, dark brown to dark gray.
3 10	SS	33	7	1252	BG	(10-12 feet) Dark gray, silty clay moist.
4	SS	67	2	1256	BG	(12-14 feet) Dark gray silty clay (12.0 to 12.8 feet). Yellowish to brown silty clay (12.8 to 13.4 feet).
4 15	SS	100	7	1304	BG	(14-16 feet) Silty clay with a moderate amount of silt, moist.
20						Boring terminated at 16.0 feet, groundwater intersected.
25						

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
NAVAL HOSPITAL
NAS MEMPHIS, TN

BORING 5

DATE: 06/25/92 | DWG NAME: NHB4

DATE OF BORING: 05/19/92

SAMPLING NO. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS BG (BACKGROUND) = 0.1 ppm BBG = BELOW BACKGROUND
1	SS	42	8	1402	BG	(0-2 feet) Clay dark gray with lots of silts, slight petroleum odor.
1	SS	46	10	1408	BG	(2-4 feet) Medium grained, well sorted sand, (possibly fill).
2	SS	83	5	1411	BG	(4-6 feet) Medium grained, well sorted sand (possible fill).
2	SS	79	5	1416	BG	(6-8 feet) Medium grained sand fill.
3	SS	88	3	1426	BG	(8-10 feet) Medium grained sand, fill (8.0 to 9.8 feet). Dark gray silty clay, moist.
	SS	98	3	1431	BG	(10-12 feet) Medium grained, well sorted sand with silts and minor clays, wet.

Boring terminated at 12.0 feet, groundwater intersected.

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
NAVAL HOSPITAL
NAS MEMPHIS, TN

BORING 6

DATE: 06/25/92

DWG NAME: NHB6

DATE OF BORING: 05/20/92

SAMPLING No & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
						BG (BACKGROUND) = 0.1 ppm
1	SS	75	26	1105	BG	(0-2 feet) Dark brown to gray clay with some silts and minor organics.
1	SS	83	15	1108	BG	(2-4 feet) Dark brown silty clay.
2 5	SS	42	12	1110	BG	(4-6 feet) Dark brown silty clay with minor amounts of organics.
2	SS	100	5	1116	BG	(6-8 feet) Dark brown silty clay with minor amounts of organics.
3	SS	100	5	1123	BG	(8-10 feet) Dark brown silty clay with organics and some small roots.
3 10	SS	100	8	1126	BG	(10-12 feet) Brown clay with some silt and a moderate amount of organics and some iron staining.
4	SS	100	8	1127	BG	(12-14 feet) Brown clay and silt. Wet (13.8 to 14.0).
4 15	SS	100	4	1132	BG	(14-16 feet) Silty clay with a moderate amount of silt, moist.
20						Boring terminated at 16.0 feet, groundwater intersected.
25						

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
NAVAL HOSPITAL
NAS MEMPHIS, TN

BORING 7

DATE: 07/02/92

DWG NAME: NHB7

DATE OF BORING: 05/26/92

BG (BACKGROUND) = 0.3 ppm

SAMPLING No & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
1	SS	38	6	1247	BG	(0-2 feet) First 6 to 8 inches is concrete. Sand fill (0.0 to 0.3 feet).
1	SS	13	5	1248	BG	(2-4 feet) Low recovery, sand fill. Delay due to drill rig break down. Restarted the boring 06/02/92 1338 CDT.
2 5	SS	100	5	1342	BG	(4-6 feet) Brown gray mottled clay with some silts and moderate organics.
2	SS	100	5	1402	BG	(6-8 feet) Brown to gray mottled silty clay with minor amounts of silts and moderate amounts of organics.
2	SS	100	6	1422	BG	(8-10 feet) Brown to gray mottled silt and clay with a moderate amount of organics, moist.
10 3	SS	100	4	1430	BG	(10-12 feet) Brown to gray silty clay (10.0 to 11.2 feet). Dark green clay (11.2 to 12.0).
4	SS	100	6	1443	BG	(12-14 feet) Dark green clay with moderate silts, moist.
4 15	SS	100	4	1449	BG	(14-16 feet) Dark green clay with moderate amounts of silts and organics, moist.
5	SS	100	6	1458	BG	(16-18 feet) Dark green clay with a moderate amount of organics, wet.
20						Boring terminated at 18.0 feet, groundwater intersected.
25						

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
NAVAL HOSPITAL
NAS MEMPHIS, TN

BORING 8

DATE: 07/02/92

DWG NAME: NH88

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0101

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-1

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/01/92

Dilution : 1 GC-2

% Moisture: 16% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		12	U
Unknown HC as Diesel		12	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0106

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-2

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/01/92

Dilution : 1 GC-2

% Moisture: 20% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0201

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-3

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/01/92

Dilution : 1 GC-2

% Moisture: 4% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		10	U
Unknown HC as Diesel	10	10	

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0205

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-4

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/01/92

Dilution : 1 GC-2

% Moisture: 24% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0302

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-9

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/01/92

Dilution : 1 GC-2

% Moisture: 22% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0305

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-10

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/03/92

Dilution : 1 GC-2

% Moisture: 20% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0401

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) SOIL Lab Sample ID: 9680-1

Sample wt/vol: 30.0 (g/ml) G Date Received: 06/04/92

Date Analyzed: 06/18/92

Dilution : 10 GC-2

% Moisture: 19% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
JP-5		120	U
Diesel	740	120	
Unknown HC as Diesel		120	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0402

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) SOIL Lab Sample ID: 9680-2

Sample wt/vol: 30.0 (g/ml) G Date Received: 06/04/92

Date Analyzed: 06/18/92

Dilution : 1 GC-2

% Moisture: 23% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
JP-5		13	U
Diesel	50	13	
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0403

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) SOIL Lab Sample ID: 9680-3

Sample wt/vol: 30.0 (g/ml) G Date Received: 06/04/92

Date Analyzed: 06/17/92

Dilution : 1 GC-2

% Moisture: 23% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
JP-5		13	U
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0404

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) SOIL Lab Sample ID: 9680-4

Sample wt/vol: 30.0 (g/ml) G Date Received: 06/04/92

Date Analyzed: 06/17/92

Dilution : 1 GC-2

% Moisture: 20% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
JP-5		13	U
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0405

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) SOIL Lab Sample ID: 9680-5

Sample wt/vol: 30.0 (g/ml) G Date Received: 06/04/92

Date Analyzed: 06/17/92

Dilution : 1 GC-2

% Moisture: 21% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
JP-5		13	U
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0501

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-5

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/01/92

Dilution : 1 GC-2

% Moisture: 6% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		11	U
Unknown HC as Diesel	5	11	J

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0504

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-6

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/01/92

Dilution : 1 GC-2

% Moisture: 24% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0601

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-7

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/01/92

Dilution : 10 GC-2

% Moisture: 12% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel	210	110	
Unknown HC as Diesel		110	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0603

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-8

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/01/92

Dilution : 1 GC-2

% Moisture: 24% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		13	U
Unknown HC as Diesel	4	13	J

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0701

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-11

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/03/92

Dilution : 1 GC-2

% Moisture: 16% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		12	U
Unknown HC as Diesel		12	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0704

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9626 SDG No.: 9626

Matrix: (soil/water) SOIL Lab Sample ID: 9626-12

Sample wt/vol: 30.0 (g/ml) G Date Received: 05/21/92

Date Analyzed: 06/03/92

Dilution : 1 GC-2

% Moisture: 27% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		14	U
Unknown HC as Diesel		14	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0802

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) SOIL Lab Sample ID: 9680-6

Sample wt/vol: 30.0 (g/ml) G Date Received: 06/04/92

Date Analyzed: 06/18/92

Dilution : 1 GC-2

% Moisture: 23% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
JP-5		13	U
Diesel	35	13	
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB082D

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) SOIL Lab Sample ID: 9680-7

Sample wt/vol: 30.0 (g/ml) G Date Received: 06/04/92

Date Analyzed: 06/17/92

Dilution : 1 GC-2

% Moisture: 24% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
JP-5		13	U
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0803

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) SOIL Lab Sample ID: 9680-8

Sample wt/vol: 30.0 (g/ml) G Date Received: 06/04/92

Date Analyzed: 06/17/92

Dilution : 1 GC-2

% Moisture: 22% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
JP-5		13	U
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSB0805

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) SOIL Lab Sample ID: 9680-9

Sample wt/vol: 30.0 (g/ml) G Date Received: 06/04/92

Date Analyzed: 06/17/92

Dilution : 1 GC-2

% Moisture: 23% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
JP-5		13	U
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSA0101

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9639 SDG No.: 9639

Matrix: (soil/water) SOIL Lab Sample ID: 9639-1

Sample wt/vol: 30.3 (g/ml) G Date Received: 05/26/92

% Moisture: 20% Date Analyzed: 06/11/92

Dilution : 1 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		13	U
Unknown HC as Diesel	6	13	Z

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSA0201

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9639 SDG No.: 9639

Matrix: (soil/water) SOIL Lab Sample ID: 9639-2

Sample wt/vol: 30.5 (g/ml) G Date Received: 05/26/92

% Moisture: 13% Date Analyzed: 06/11/92

Dilution : 100 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel	11,000	1100	
Unknown HC as Diesel		1100	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSA0301

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9639 SDG No.: 9639

Matrix: (soil/water) SOIL Lab Sample ID: 9639-3

Sample wt/vol: 30.6 (g/ml) G Date Received: 05/26/92

% Moisture: 24% Date Analyzed: 06/11/92

Dilution : 1 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		13	U
Unknown HC as Diesel		13	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSA0401

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9639 SDG No.: 9639

Matrix: (soil/water) SOIL Lab Sample ID: 9639-4

Sample wt/vol: 30.3 (g/ml) G Date Received: 05/26/92

% Moisture: 1% Date Analyzed: 06/11/92

Dilution : 1 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		10	U
Unknown HC as Diesel		10	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSA0701

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-13

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 100 Date Analyzed: 08/04/92

% Moisture: 16% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel	5540	840	
Unknown Hydrocarbon		840	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSA0702

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-14

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 08/04/92

% Moisture: 24% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel	23	7.6	
Unknown Hydrocarbon		7.6	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSA0801

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-15

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 07/31/92

% Moisture: 12% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel	58	8.8	
Unknown Hydrocarbon		8.8	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSA0802

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-16

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 07/31/92

% Moisture: 21% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		7.9	U
Unknown Hydrocarbon		7.9	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSA0901

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-17

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 07/31/92

% Moisture: 22% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		7.8	U
Unknown Hydrocarbon		7.8	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSA0902

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-18

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 07/31/92

% Moisture: 20% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		8	U
Unknown Hydrocarbon		8	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHAS1001

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-8

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 08/04/92

% Moisture: 23% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		7.7	U
Unknown Hydrocarbon		7.7	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHAS1002

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-9

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 100 Date Analyzed: 08/04/92

% Moisture: 17% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel	4210	830	
Unknown Hydrocarbon		830	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHAS1003

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-10

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 10 Date Analyzed: 08/04/92

% Moisture: 23% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel	610	77	
Unknown Hydrocarbon		77	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHAS1101

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-6

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 08/04/92

% Moisture: 13% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		8.7	U
Unknown Hydrocarbon		8.7	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHAS1102

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-7

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 07/31/92

% Moisture: 14% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		8.6	U
Unknown Hydrocarbon		8.6	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSD0101 JRM E
~~NHSA0101~~

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) SOIL Lab Sample ID: 9680-10

Sample wt/vol: 30.0 (g/ml) G Date Received: 06/04/92

Date Analyzed: 06/18/92

Dilution : 20 GC-2

% Moisture: 18% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
JP-5		240	U
Diesel		240	U
Unknown HC as Diesel	260	240	

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHSD0201 ~~NHSA0201~~ Jm E

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) SOIL Lab Sample ID: 9680-11

Sample wt/vol: 30.0 (g/ml) G Date Received: 06/04/92

Date Analyzed: 06/18/92

Dilution : 20 GC-2

% Moisture: 38% Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
JP-5		320	U
Diesel		320	U
Unknown HC as Diesel	240	320	J

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

NHAS1201

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-1

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 08/04/92

Dilution : 1 Date Analyzed: 08/05/92

% Moisture: 26% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel	11	7.4	
Unknown Hydrocarbon		7.4	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHAS1301

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-2

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 08/03/92

% Moisture: 24% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		7.6	U
Unknown Hydrocarbon		7.6	U

U: not detected at indicated value.

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHAS1302

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-3

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 07/31/92

% Moisture: 23% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		7.7	U
Unknown Hydrocarbon		7.7	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHAS1401

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-4

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 07/31/92

% Moisture: 18% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		8.2	U
Unknown Hydrocarbon		8.2	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHAS1402

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) SOIL Lab Sample ID: 9835-5

Sample wt/vol: 30 (g/ml) G Date Received: 07/16/92

Extraction: JAR Date Extracted: 07/28/92

Dilution : 1 Date Analyzed: 07/31/92

% Moisture: 21% Instrument ID: GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: MG/KG	RL MG/KG	Q
Diesel		7.9	U
Unknown Hydrocarbon		7.9	U

U: not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHGW01

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9687 SDG No.: 9687

Matrix: (soil/water) WATER Lab Sample ID: 9687-1

Sample wt/vol: 1000 (g/ml) ML Date Received: 06/05/92

Date Analyzed: 06/17/92

Dilution : 1 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: UG/L	RL UG/L	Q
JP-5		50	U
Diesel		50	U
Unknown HC as Diesel		50	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHGW02

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9687 SDG No.: 9687

Matrix: (soil/water) WATER Lab Sample ID: 9687-2

Sample wt/vol: 1000 (g/ml) ML Date Received: 06/05/92

Date Analyzed: 06/18/92

Dilution : 1 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: UG/L	RL UG/L	Q
JP-5		50	U
Diesel		50	U
Unknown HC as Diesel	210	50	

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHGW02D

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9687 SDG No.: 9687

Matrix: (soil/water) WATER Lab Sample ID: 9687-3

Sample wt/vol: 1000 (g/ml) ML Date Received: 06/05/92

Date Analyzed: 06/18/92

Dilution : 1 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: UG/L	RL UG/L	Q
JP-5		50	U
Diesel		50	U
Unknown HC as Diesel	150	50	

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHGW03

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9687 SDG No.: 9687

Matrix: (soil/water) WATER Lab Sample ID: 9687-4

Sample wt/vol: 1000 (g/ml) ML Date Received: 06/05/92

Date Analyzed: 06/18/92

Dilution : 1 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: UG/L	RL UG/L	Q
JP-5		50	U
Diesel		50	U
Unknown HC as Diesel		50	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1

TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHGW04

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9696 SDG No.: 9696

Matrix: (soil/water) WATER Lab Sample ID: 9696-1

Sample wt/vol: 1000 (g/ml) ML Date Received: 06/09/92

Dilution : 10 Date Analyzed: 06/25/92

GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: UG/L	RL UG/L	Q
Diesel	5500	500	
Unknown HC as Diesel		500	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHFB0714

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) WATER Lab Sample ID: 9835-11

Sample wt/vol: 1 (g/mL) L Date Received: 07/16/92

Dilution : 1.1 Date Extracted: 07/22/92

% Moisture:NA Date Analyzed: 07/29/92

GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: (ug/L or mg/Kg) UG/L	Q
Diesel	50	U
Unknown Hydrocarbon Mixture.	50	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHRB0714

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9835 SDG No.: 9835

Matrix: (soil/water) WATER Lab Sample ID: 9835-12

Sample wt/vol: 1 (g/mL) L Date Received: 07/16/92

Dilution : 1.1 Date Extracted: 07/22/92

% Moisture:NA Date Analyzed: 07/29/92

GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: (ug/L or mg/Kg) UG/L	Q
Diesel	50	U
Unknown Hydrocarbon Mixture.	50	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHFB0001

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) WATER Lab Sample ID: 9680-13

Sample wt/vol: 950 (g/ml) ML Date Received: 06/04/92

Date Analyzed: 06/16/92

Dilution : 1 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: UG/L	RL UG/L	Q
JP-5		50	U
Diesel		50	U
Unknown HC as Diesel		50	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHFB0002

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) WATER Lab Sample ID: 9680-12

Sample wt/vol: 950 (g/ml) ML Date Received: 06/04/92

Date Analyzed: 06/16/92

Dilution : 1 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: UG/L	RL UG/L	Q
JP-5		50	U
Diesel		50	U
Unknown HC as Diesel		50	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHRB0601

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) WATER Lab Sample ID: 9680-14

Sample wt/vol: 950 (g/ml) ML Date Received: 06/04/92

Date Analyzed: 06/16/92

Dilution : 1 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: UG/L	RL UG/L	Q
JP-5		50	U
Diesel		50	U
Unknown HC as Diesel		50	U

U: Not detected at indicated value.

NAS MEMPHIS FACILITY ID# 9-7917709

1
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Client ID

NHRB0602

Lab Name: CHEMWEST LABS

Lab Code: CHEMW Case No.: 9680 SDG No.: 9680

Matrix: (soil/water) WATER Lab Sample ID: 9680-15

Sample wt/vol: 950 (g/ml) ML Date Received: 06/04/92

Date Analyzed: 06/16/92

Dilution : 1 GC-2

Column ID: DB-5

COMPOUND	CONCENTRATION UNITS: UG/L	RL UG/L	Q
JP-5		50	U
Diesel		50	U
Unknown HC as Diesel		50	U

U: Not detected at indicated value.

№ 125296

COMPUCHEM LABORATORIES

CHAIN-OF-CUSTODY RECORD

PROJECT NAME: NASMEM HOSP
PROJECT NUMBER: 2151-040
SAMPLERS (SIGNATURE)
Joe Matthews
PRINTED NAME

CLIENT ID (9 CHARACTERS) 1	2	3	4	5	6	7	8	9	# No. of Bottles/Vials	GC/MS 624-8240	625-8270	TCL-VOA	TCL-SVOA	Other:	GC 601-8010	602-8020	608-8080	8140	TCL PEST/PCB's	Herbicides	Other:	INORGANICS Metals	Cyanide	TAL Metals	Other:	OTHER TOC	TOX	Oil & Grease	Pet. Hydro.	Phenols	8015 DRO					MATRIX: Water/Soil	SAMPLING INFO DATE	TIME	REMARKS
N	H	G	W	0	4				1																						X						06-08-92	0853	Method 8015 DRO only NEESA Level UCM 14 day TAT

RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time
COMPANY NAME: ensafe	060892 1555	COMPANY NAME:		COMPANY NAME:	
RECEIVED BY: SUSAN GILBERT	Date/Time 6/9/92	RECEIVED BY:	Date/Time	RECEIVED BY:	Date/Time
COMPANY NAME: CHEMWEST LAB	09:30	COMPANY NAME:		COMPANY NAME:	
RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time
COMPANY NAME:		COMPANY NAME:		COMPANY NAME:	

SHIPPING INFORMATION
Number of Shipping Containers-
Method of Shipment
Fed EX
3563324494
Special Handling Requirements

LABORATORY: Compuchem West
ATTENTION: Don Tomek CC: Vince Schmidt
PROJECT NO.: 2157-040
PAGE 2 of 2

EN SAFE®
Environmental and Safety Designs, Inc.
5724 SUMMER TREES DR. MEMPHIS, TN 38134 (901)372-7962

CLIENT NAME: NAS MEM Hosp
COLLECTED BY: Joe Matthews

SAMPLE ID	DATE	TIME	comp	grab	well	SAMPLE LOCATION	# of containers	MEDIA (X): SOIL	WATER	SEDIMENT	GROUNDWATER	SAMPLE ANALYSIS (X): BTEX									REMARKS
NHFB0002	6/3/92	1755		✓		Dishwater	1		✓												Method 8015
NHFB0001	6/3/92	1810		✓		H-100 Valve ~~[illegible]~~ Feed	1		✓												DRO only
NHRB0601	6/1/92	1020		✓		Split Spoon	1		✓												NEESA
* NHRB0602	6/2/92	0810				Mixing bowl	1		✓												Level "C"
0																					Please Note
* chain of custody does not agree - ID # on jar read: NHRB0602																					Dates
																					Two week Verbals VA
																					* 6/4/92 @ 14:00 Per conversation between Joe Matthews & Bill McBerge please ck. off analysis on chain of custody & analyz. Bill

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:
[signature]	6/3/92	2105					

RELINQUISHED BY:	DATE	TIME	RECEIVED AT LAB BY:	DATE	TIME	REMARKS
			Bill McBerge	6/4/92	09:10	SAMPLES REC'D IN GOOD CONDITION

CHEMWEST LAB

NO LEAKAGE OR BREAKAGE

LABORATORY: Comprehensive
ATTENTION: Don Tamee
PROJECT NO.: 2157-040
PAGE 1 of 1

EN SAFE®
Environmental and Safety Designs, Inc.
5724 SUMMER TREES DR. MEMPHIS, TN 38134 (901) 372-7962

CLIENT NAME: NAS Memphis
COLLECTED BY: Greg Temple

SAMPLE ID	DATE	TIME	comp	grab	well	SAMPLE LOCATION	# of containers	MEDIA (X): SOIL	WATER	SEDIMENT	GROUNDWATER	SAMPLE ANALYSIS (X): POLS DRO								REMARKS
NHSA0101	5/21		✓			Baler Room	1	✓				✓								
NHSA0201	5/21		✓			" "	1	✓				✓								
NHSA0301	5/21		✓			" "	1	✓				✓								
NHSA0401	5/21		✓			Storage Area	1	✓				✓								

SAMPLES REC'D IN GOOD CONDITION
NO LEAKAGE OR BREAKAGE

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY: SUSAN GILBERT
Greg Temple	5/22		Federal Express		5/26/92	11:20	Susan Gilbert

RELINQUISHED BY:	DATE	TIME	RECEIVED AT LAB BY:	DATE	TIME	REMARKS
						CHEMWEST LAB

LABORATORY: Compy Chem West
ATTENTION: Don Tomek QC: Vince Schmidt
PROJECT NO.: 2151-040
PAGE 1 of 2

EN SAFE®
Environmental and Safety Designs, Inc.
5724 SUMMER TREES DR. MEMPHIS, TN 38134 (901) 372-7962

CLIENT NAME: NAS MEM HOSP
COLLECTED BY: Joe Matthews JRM

SAMPLE ID	DATE	TIME	comp	grab	well	SAMPLE LOCATION	# of containers	MEDIA (X): SOIL	WATER	SEDIMENT	GROUNDWATER	SAMPLE ANALYSIS (X): 8015 DRO									REMARKS
NHSB0401	6/1/92	1209	✓			Boring 4	1	✓													Method 8015
NHSB0402	6/1/92	1232	✓				1	✓													DRO only
NHSB0403	6/1/92	1238	✓				1	✓													NEESA
NHSB0404	6/2/92	0949	✓				1	✓													Level
NHSB0405	6/2/92	1001	✓				1	✓													"C"
NHSB0802	6/2/92	1402	✓			Boring 8	1	✓													
NHSB0802D	6/2/92	1407 ~~1430~~	✓				1	✓													Please
NHSB0803	6/2/92	1430	✓				1	✓													Note
NHSB0805	6/2/92	1508	✓				1	✓													Dates
NHSA0101	6/1/92	0835	✓			Drainage	1	✓													
NHSA0201	6/1/92	0845	✓			Ditch	1	✓													Two Week Verbal
																					VA

Bill McBerry

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:
[signature]	6/3/92	2105					

RELINQUISHED BY:	DATE	TIME	RECEIVED AT LAB BY:	DATE	TIME	REMARKS
			Bill McBerry BILL McBERRY	6/4/92	09:10	SAMPLES REC'D IN GOOD CONDITION. NO LEAKAGE OR BREAKAGE

CHEMWEST LAB

NAVY CLEAN
ENSAFE/ALLEN & HOSHALL
(901) 383-9115

CHAIN OF CUSTODY RECORD

PAGE 1 OF 2

CLIENT: CLEAN - NAS MEMHOSP
PROJECT MANAGER: Lawson Anderson
ADDRESS:
TELEPHONE NO.: (901) 383-9115
PROJECT NAME/NUMBER: N0040-C0111
FAX NO.: (901) 372-2451
MEDIA STATUS: (A, B, OR C) Soil
SAMPLERS: (SIGNATURE) Joe Matthews

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	8015 DRO only						REMARKS
[redacted]														Please Note Sample Dates
NHSB0101	5/18/92	1019	SB	8oz Jar (1oz)	4°C		1	X						
NHSB0106	5/18/92	1149					1	X						
NHSB0201	5/19/92	1536					1	X						
NHSB0205	5/17/92	1613					1	X						8015 DRO only
NHSB0501	5/19/92	1237					1	X						
NHSB0504	5/19/92	1304					1	X						NESESA
NHSB0601	5/19/92	1408					1	X						level
NHSB0603	5/19/92	1431					1	X						"C"
				Total # 8 Jars										

Fatima
1526 - NHSB0201
1613 - NHSB0205
1237 - NHSB0501

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE [signature]		SIGNATURE Rec'd [signature]	5/21/92	SIGNATURE		SIGNATURE	
PRINTED Joe Matthews		PRINTED SUSAN GILBERT		PRINTED		PRINTED	
COMPANY ENSAFE	TIME	COMPANY CHEMWEST LAB	TIME	COMPANY	TIME	COMPANY	TIME
REASON Shipping		REASON analysis	09:45	REASON		REASON	

METHOD OF SHIPMENT: FedX
SHIPMENT NO. 2551160290
SPECIAL INSTRUCTION: overnight

COMMENTS: SAMPLES REC'D IN GOOD CONDITION
NO LEAKAGE OR BREAKAGE

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CLNCOCR

№ 028232

COMPUCHEM LABORATORIES

CHAIN-OF-CUSTODY RECORD

PROJECT NAME: NAS Mem Hosp
PROJECT NUMBER: 2151-040
SAMPLERS (SIGNATURE): [signature]
Joe Matthews
PRINTED NAME

CLIENT ID (9 CHARACTERS) 1	2	3	4	5	6	7	8	9	# No. of Bottles/Vials	GC/MS 624-8240	625-8270	TCL-VOA	TCL-SVOA	Other:	GC 601-8010	602-8020	608-8080	8140	TCL PEST/PCB's	Herbicides	Other:	INORGANICS Metals	Cyanide	TAL Metals	Other:	OTHER TOC	TOX	Oil & Grease	Pet. Hydro.	Phenols	8015 DRO (only)				MATRIX: Water/Soil	SAMPLING INFO DATE 7/14/95	TIME CDT	REMARKS
N	H	S	A	1	2	0	1		1																						X				S	7/15	0915	Meets A Level "C"
N	H	S	A	1	3	0	1		1																						X				S	7/15	0935	
N	H	S	A	1	3	0	2		1																						X				S	7-15	0956	
N	H	S	A	1	4	0	1		1																						X				S	7-15	1003	
N	H	S	A	1	4	0	2		1																						X				S	7-15	1008	
N	H	S	A	1	1	0	1		1																						X				S	7-14	1536	
N	H	S	A	1	1	0	2		1																						X				S	7-14	1552	
N	H	S	A	1	0	0	1		1																						X				S	7-14	1421	
N	H	S	A	1	0	0	2		1																						X				S	7-14	1436	
N	H	S	A	1	0	0	3		1																						X				S	7-14	1450	

RELINQUISHED BY	Date/Time	RELINQUISHED BY	Date/Time	RELINQUISHED BY	Date/Time
[signature]	7/15/95 1605				
COMPANY NAME		COMPANY NAME		COMPANY NAME	
RECEIVED BY	Date/Time	RECEIVED BY	Date/Time	RECEIVED BY	Date/Time
COMPANY NAME		COMPANY NAME		COMPANY NAME	
RELINQUISHED BY	Date/Time	RELINQUISHED BY	Date/Time	RELINQUISHED BY	Date/Time
COMPANY NAME		COMPANY NAME		COMPANY NAME	

SHIPPING INFORMATION
Number of Shipping Containers-
Method of Shipment

Special Handling Requirements

№ 028197

COMPUCHEM LABORATORIES

CHAIN-OF-CUSTODY RECORD

PROJECT NAME: NAS MEM HOSP
PROJECT NUMBER: 2151-040
SAMPLERS (SIGNATURE)
Joe Matthews
PRINTED NAME

CLIENT ID (9 CHARACTERS) 1	2	3	4	5	6	7	8	9	# No. of Bottles/Vials	GC/MS 624-8240	625-8270	TCL-VOA	TCL-SVOA	Other:	GC 601-8010	602-8020	608-8080	B140	TCL PEST/PCB's	Herbicides	Other:	INORGANICS Metals	Cyanide	TAL Metals	Other:	OTHER TOC	TOX	Oil & Grease	Pet. Hydro.	Phenols	8015 DRO (only)					MATRIX: Water/Soil	SAMPLING INFO DATE 7/14/92	TIME	REMARKS
N	H	E	B	0	7	1	4		1																						X						7/14	1517	NEESA
N	H	R	B	0	7	1	4		1																						X						7/14	1523	Level "C"
N	H	S	A	0	7	0	1		1																						X						7/14	1228	
N	H	S	A	0	7	0	2		1																						X						7/14	1240	
N	H	S	A	0	8	0	1		1																						X						7-14	1251	
N	H	S	A	0	8	0	2		1																						X						7-14	1305	
N	H	S	A	0	9	0	1		1																						X						7-14	1319	1319
N	H	S	A	0	9	0	2		1																						X						7/14	1328	1328

RELINQUISHED BY	Date/Time	RELINQUISHED BY	Date/Time	RELINQUISHED BY	Date/Time
COMPANY NAME	7/15/92 1630	COMPANY NAME		COMPANY NAME	
RECEIVED BY	Date/Time	RECEIVED BY	Date/Time	RECEIVED BY	Date/Time
COMPANY NAME		COMPANY NAME		COMPANY NAME	
RELINQUISHED BY	Date/Time	RELINQUISHED BY	Date/Time	RELINQUISHED BY	Date/Time
COMPANY NAME		COMPANY NAME		COMPANY NAME	

SHIPPING INFORMATION
Number of Shipping Containers-
Method of Shipment

Special Handling Requirements

LABORATORY: Compy Chem West
ATTENTION: Don Tomek QC: Vince Schmidt
PROJECT NO.: 2151-040
PAGE 1 of 2

EN SAFE®
Environmental and Safety Designs, Inc.
5724 SUMMER TREES DR. MEMPHIS, TN 38134 (901)372-7962

CLIENT NAME: NAS MEM HOSP
COLLECTED BY: Joe Matthews JRM

SAMPLE ID	DATE	TIME	comp	grab	well	SAMPLE LOCATION	# of containers	MEDIA (X): SOIL	WATER	SEDIMENT	GROUNDWATER	SAMPLE ANALYSIS (X): 8015 DRO									REMARKS
NHSB0401	6/1/92	1209	✓			Bldg 4	1	✓				✓									Method 8015
NHSB0402	6/1/92	1232	✓				1	✓				✓									DRO only
NHSB0403	6/1/92	1238	✓				1	✓				✓									NEESA
NHSB0404	6/2/92	0949	✓				1	✓				✓									Level
NHSB0405	6/2/92	1001	✓				1	✓				✓									"C"
NHSB0802	6/2/92	1402	✓			Bldg 8	1	✓				✓									
NHSB0802D	6/2/92	1402 ~~1430~~	✓				1	✓				✓									
NHSB0803	6/2/92	1430	✓				1	✓				✓									
NHSB0805	6/2/92	1508	✓				1	✓				✓									
NHSA0101	6/1/92	0835	✓			Drainage	1	✓				✓									
NHSA0201	6/1/92	0845	✓			Ditch	1	✓				✓									

Please Note Dates

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:
[signature]	6/3/92	2105					

RELINQUISHED BY:	DATE	TIME	RECEIVED AT LAB BY:	DATE	TIME	REMARKS

LABORATORY: Compuchem West
ATTENTION: Don Tomek CC: Vince Schmidt
PROJECT NO.: 2157-040
PAGE 2 of 2

EN SAFE®
Environmental and Safety Designs, Inc.
5724 SUMMER TREES DR. MEMPHIS TN 38134 (901)372-7962

CLIENT NAME: NAS MEM Hosp
COLLECTED BY: Joe Matthews

SAMPLE ID	DATE	TIME	comp	grab	well	SAMPLE LOCATION	# of containers	SOIL	WATER	SEDIMENT	GROUNDWATER	MIS DRO								REMARKS
NHFB0002	6/3/92	1755		✓		DI Water	1		✓			✓			✓					Method 8015
NHFB0001	6/3/92	1810		✓		H-100 Water ~~Sample~~ Peat	1		✓			✓		✓						DRO only
NHRB0601	6/1/92	1020		✓		Split Spoon	1		✓			✓								NEESA
NHRB602	6/2/92	0820				Mixing Bowl	1		✓			✓								Level "C"
																				Please Note
																				Dates

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:
[signature]	6/4/92	2105					

RELINQUISHED BY:	DATE	TIME	RECEIVED AT LAB BY:	DATE	TIME	REMARKS

NAVY CLEAN
ENSAFE/ALLEN & HOSHALL
(901) 383-9115

CHAIN OF CUSTODY RECORD

PAGE 2 OF 2

CLIENT: CLEAN - NAS MEM HOSP
PROJECT MANAGER: LAWSON ANDERSON
ADDRESS:
TELEPHONE NO.: (901) 383-9115
PROJECT NAME/NUMBER: 00040-C0111
FAX. NO.: (901) 372-7962
MEDIA STATUS: (A, B, OR C): Soil
SAMPLERS: (SIGNATURE): Joe Matthews

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	8015 DRO (only)							REMARKS
NHSB0302	5/20/92	1407	SB	8oz Jar (1 per)	4°C		1	X							8015 DRO (only)
NHSB0305	5/20/92	1501					1	X							
NHSB0701	5/20/92	1108					1	X							
NHSB0704	5/20/92	1132					1	X							NEESA Level "C"
							4								

(A)

RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE:		SIGNATURE:		SIGNATURE:		SIGNATURE:	
PRINTED: Joe Matthews		PRINTED:		PRINTED:		PRINTED:	
COMPANY: ENSAFE		COMPANY:		COMPANY:		COMPANY:	
REASON: Shipping		REASON:		REASON:		REASON:	

METHOD OF SHIPMENT: FedX
SHIPMENT NO.: 2558150280
SPECIAL INSTRUCTION: overnight

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CLNCOCR

№ 025295

COMPUCHEM LABORATORIES

CHAIN-OF-CUSTODY RECORD

PROJECT NAME: NASHUENHDSP
PROJECT NUMBER: N004020111
SAMPLERS (SIGNATURE)
PRINTED NAME Greg Pierce

CLIENT ID (9 CHARACTERS) 1	2	3	4	5	6	7	8	9	# No. of Bottles/Vials	GC/MS 624-8240	625-8270	TCL-VOA	TCL-SVOA	Other:	GC 601-8010	602-8020	608-8080	8140	TCL PEST/PCB's	Herbicides	Other:	INORGANICS Metals	Cyanide	TAL Metals	Other:	OTHER TOC	TOX	Oil & Grease	Pet. Hydro.	Phenols	DRO 8015					MATRIX: Water/Soil	SAMPLING INFO DATE	TIME	REMARKS
N	H	G	W	0	1				1																						X						6/4/92	1610	Method 8015
N	H	G	W	0	2				1																						X								DRO only
N	H	G	W	0	2	D			1																						X								NEESA
N	H	G	W	0	3				1																						X								Level "C"

SAMPLES REC'D IN GOOD CONDITION
NO LEAKAGE OR BREAKAGE

RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time	SHIPPING INFORMATION
COMPANY NAME:	6/4/92 1610	COMPANY NAME:		COMPANY NAME:		Number of Shipping Containers-
RECEIVED BY: SUSAN GILBERT	Date/Time 6/5/92	RECEIVED BY:	Date/Time	RECEIVED BY:	Date/Time	Method of Shipment
COMPANY NAME: CHEMWEST LAB	0925	COMPANY NAME:		COMPANY NAME:		
RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time	RELINQUISHED BY:	Date/Time	Special Handling Requirements

MEMPHIS AND SHELBY COUNTY
HEALTH DEPARTMENT

RICHARD SWIGGART, M.P.A.
Director

SHERMAN KAHN, M.D.
Health Officer

DR. W. W. HERENTON
Mayor of Memphis

WILLIAM N. MORRIS, JR.
Mayor of Shelby County

August 6, 1992

EnSafe / Allen & Hoshall
5720 Summer Trees Drive, Suite 8
Memphis, Tennessee 38134

Attn: Lawson M. Anderson

RE: Environmental Site Assessment
Water Well Search
Millington Naval Air Station-Willis Gate
Intersection Of Navy Road And Third Avenue
Millington, Tennessee

Dear Mr. Anderson:

Please find enclosed a list of quasi-public, commercial, and residential wells located within an approximate two (2) mile radius of the above location that are contained in our files. This list does not contain the location of any public water supply wells that are operated by the Public Utility Division, nor does it contain wells used for groundwater monitoring. Public water well information may be obtained from Memphis Light, Gas, and Water Division, 245 South Main St., Memphis, Tennessee (901)528-4011. Information regarding monitoring wells associated with leaking petroleum storage tanks may be obtained from the Tennessee Department of Environment and Conservation, Division of Water Management, 2500 Mt. Moriah Road, (901)543-6695.

Our records indicate five (5) wells on the Naval Air Station property, however, information regarding the exact location, use, and depth of these wells is not included in our files. You may contact Lt. Ron Gruzesky, NAS Memphis, 873-5230 for additional information about these wells.

wp-0075I/115

814 JEFFERSON AVENUE, MEMPHIS, TENNESSEE 38105
PHONE (901) 576-7600 FAX (901) 576-7832

I hope this clarifies the facts for which we have records on file in our office. If Pollution Control can be of further assistance, feel free to contact me at 576-7775.

Sincerely,

S. L. Sherrill, Jr., Asst. Manager
POLLUTION CONTROL

ENCLOSURE

wp-0075I/116
WAS/SLS
HK-199

WATER WELL LIST

August 6, 1992

Water Well Number: 1
Owner of Well: James E. Krosp
Location of Well: 7378 Krosp Road
Mailing Address: James E. Krosp
7378 Krosp Road
Millington, TN 38053
Number of wells at this location: 1
Well Depth: 150 Feet
Well Classification: Residential

Water Well Number: 2
Owner of Well: Clifford O. Longmire
Location of Well: 7431 Krosp Road
Mailing Address: Clifford O. Longmire
7431 Krosp Road
Millington, TN 38053
Number of wells at this location: 1
Well Depth: 120 Feet
Well Classification: Residential

Water Well Number: 3
Owner of Well: Terry Longmire
Location of Well: 7473 Krosp Road
Mailing Address: Terry Longmire
7473 Krosp Road
Millington, TN 38053
Number of wells at this location: 1
Well Depth: 130 Feet
Well Classification: Residential

Water Well Number: 4
Owner of Well: Phoenix Zinc
Location of Well: 4525/4599 Big Creek Church Road
Mailing Address: 4525/4599 Big Creek Church Road
Millington, TN 38053
Number of wells at this location: 1
Well Depth: Not Listed
Well Classification: Commercial

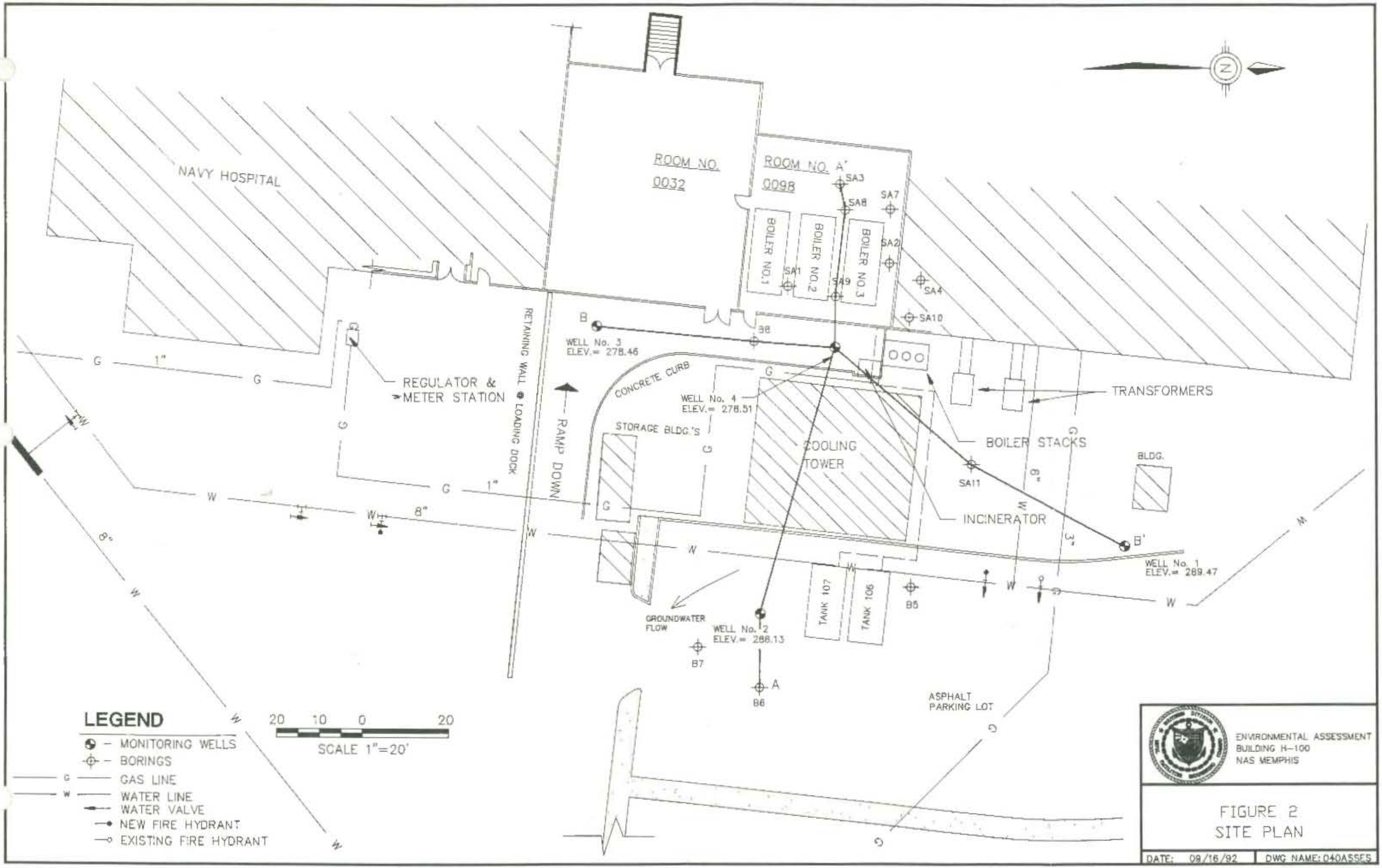
Water Well Number: 5
Owner of Well: Shelby County Conservation Board
Location of Well: Edmond Orgill Park
Mailing Address: Shelby County Conservation Board
2599 Avery
Memphis, TN 38053
Attn: Ed Price
Number of wells at this location: 1
Well Depth: Depth Not Listed
Well Classification: Irrigation And To Maintain Lake Level

August 6, 1992

Water Well Number: 6
Owner of Well: Harold Bradley
Location of Well: 5230 Bateman Road
Mailing Address: Harold Bradley
5230 Batman Road
Millington, TN 38053
Number of wells at this location: 1
Well Depth: 150 Feet
Well Classification: Residential

PERMEABILITY TEST RESULTS

Project	Boring	Depth, ft.	VDW, psf	Permeability cm/sec
Navy Hospital	B-9-1	4 - 6	91.4	5.02×10^{-8}
Navy Hospital	B-9-2	17	100.2	6.26×10^{-9}



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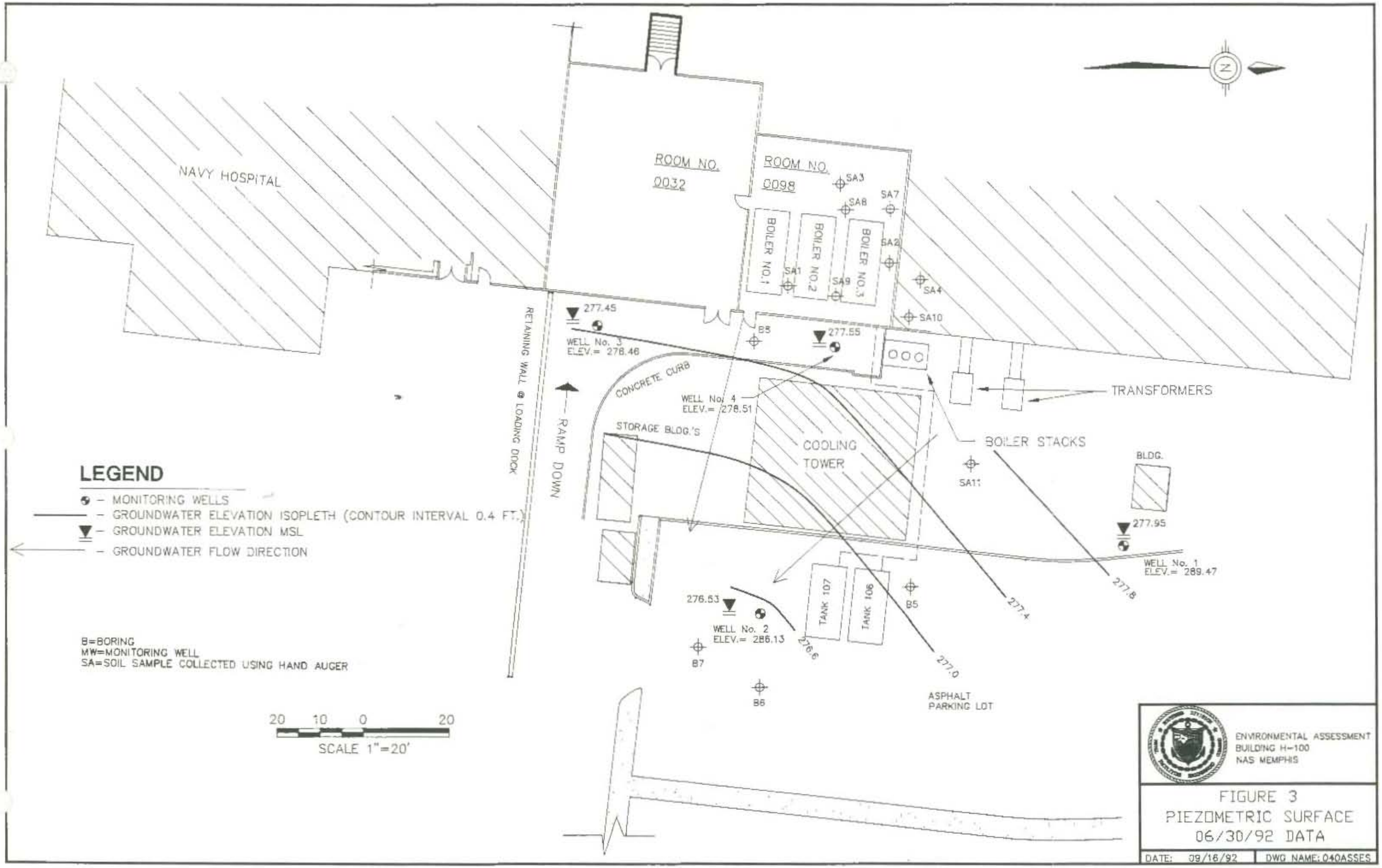
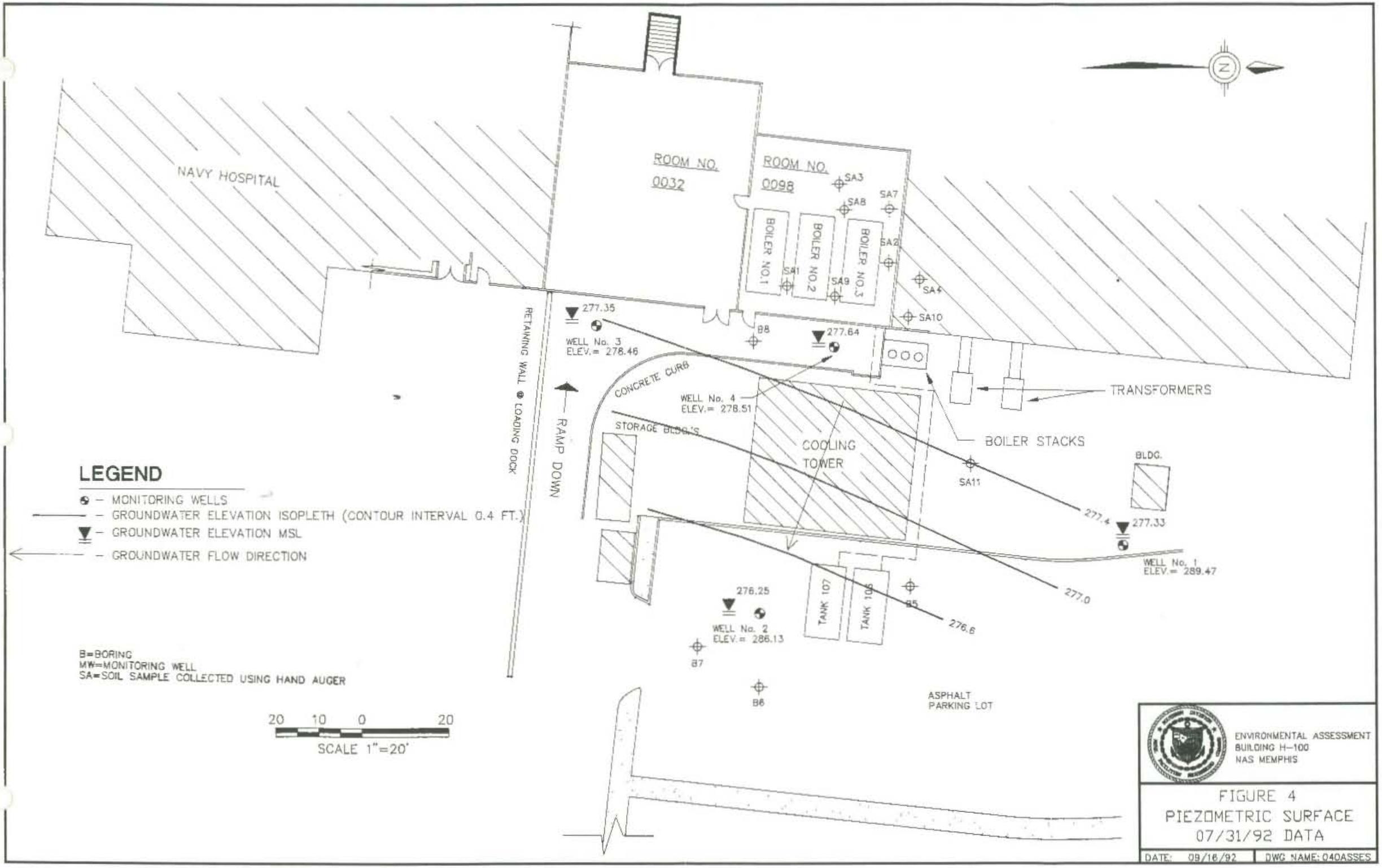
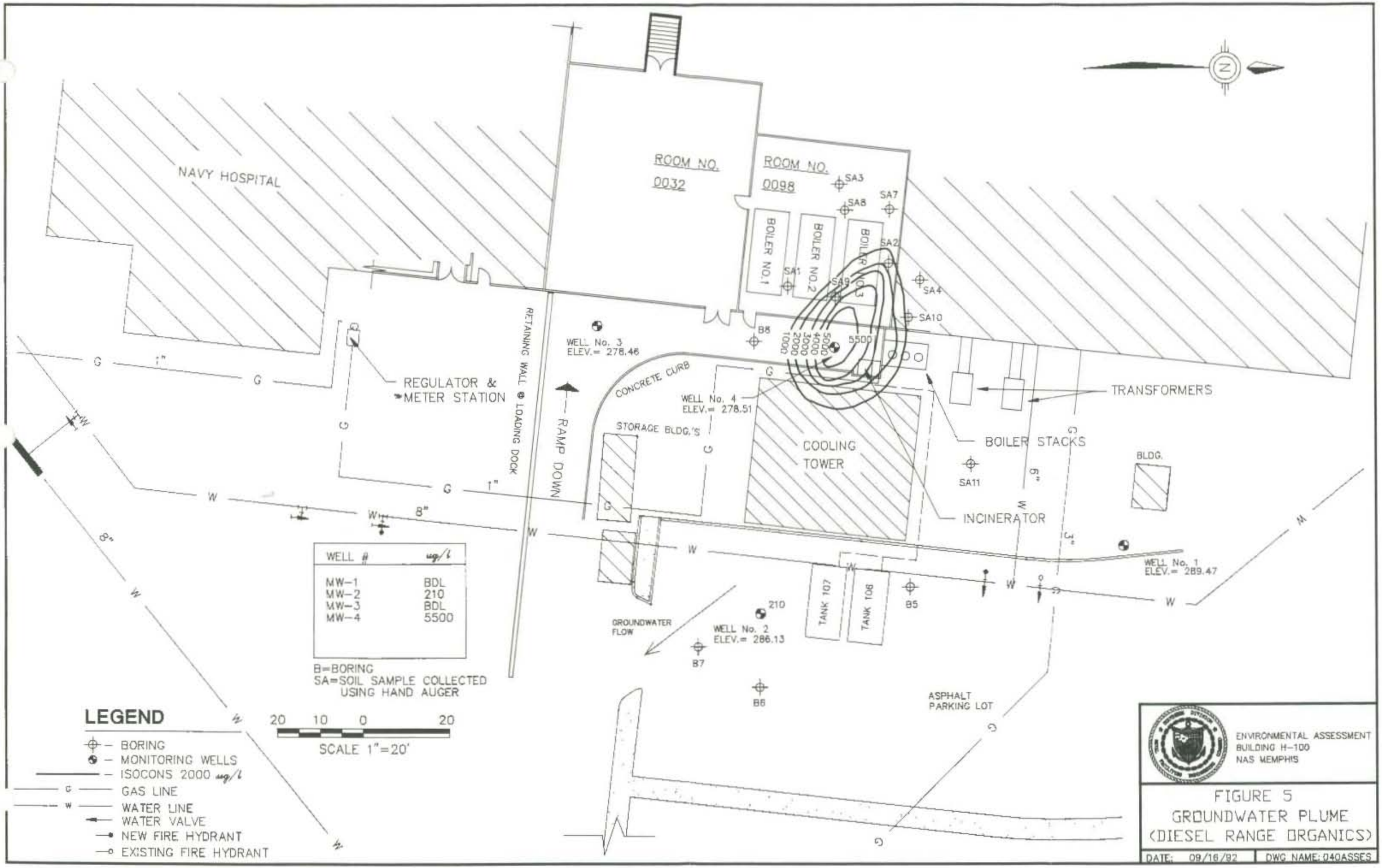


00447 GGG B22


NAVY HOSPITAL
ROOM NO. 0032
ROOM NO. 0098
BOILER NO.1
BOILER NO.2
BOILER NO.3
SA1
SA2
SA3
SA4
SA7
SA8
SA9
SA10
SA11
B8
277.64
277.35
WELL No. 3
ELEV.= 278.46
WELL No. 4
ELEV.= 278.51
CONCRETE CURB
STORAGE BLDG.'S
COOLING TOWER
TRANSFORMERS
BOILER STACKS
BLDG.
277.33
WELL No. 1
ELEV.= 289.47
277.4
277.0
276.6
276.25
WELL No. 2
ELEV.= 286.13
TANK 107
TANK 108
B5
B6
B7
ASPHALT PARKING LOT
RETAINING WALL @ LOADING DOCK
RAMP DOWN
LEGEND
MONITORING WELLS
GROUNDWATER ELEVATION ISOPLETH (CONTOUR INTERVAL 0.4 FT.)
GROUNDWATER ELEVATION MSL
GROUNDWATER FLOW DIRECTION
B=BORING
MW=MONITORING WELL
SA=SOIL SAMPLE COLLECTED USING HAND AUGER
20 10 0 20
SCALE 1"=20'
ENVIRONMENTAL ASSESSMENT
BUILDING H-100
NAS MEMPHIS
FIGURE 4
PIEZOMETRIC SURFACE
07/31/92 DATA
DATE: 09/16/92
DWG NAME: 040ASSES



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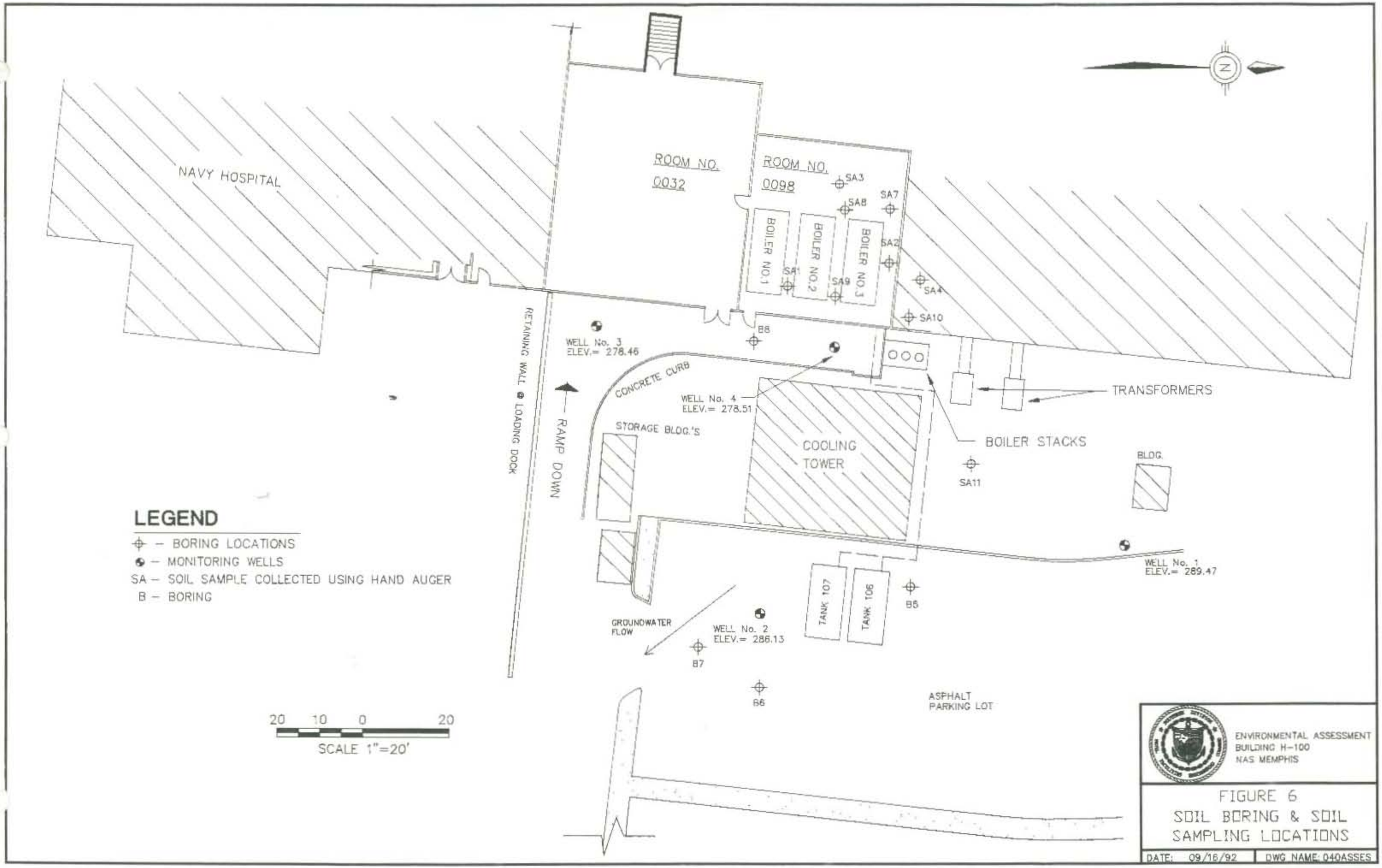

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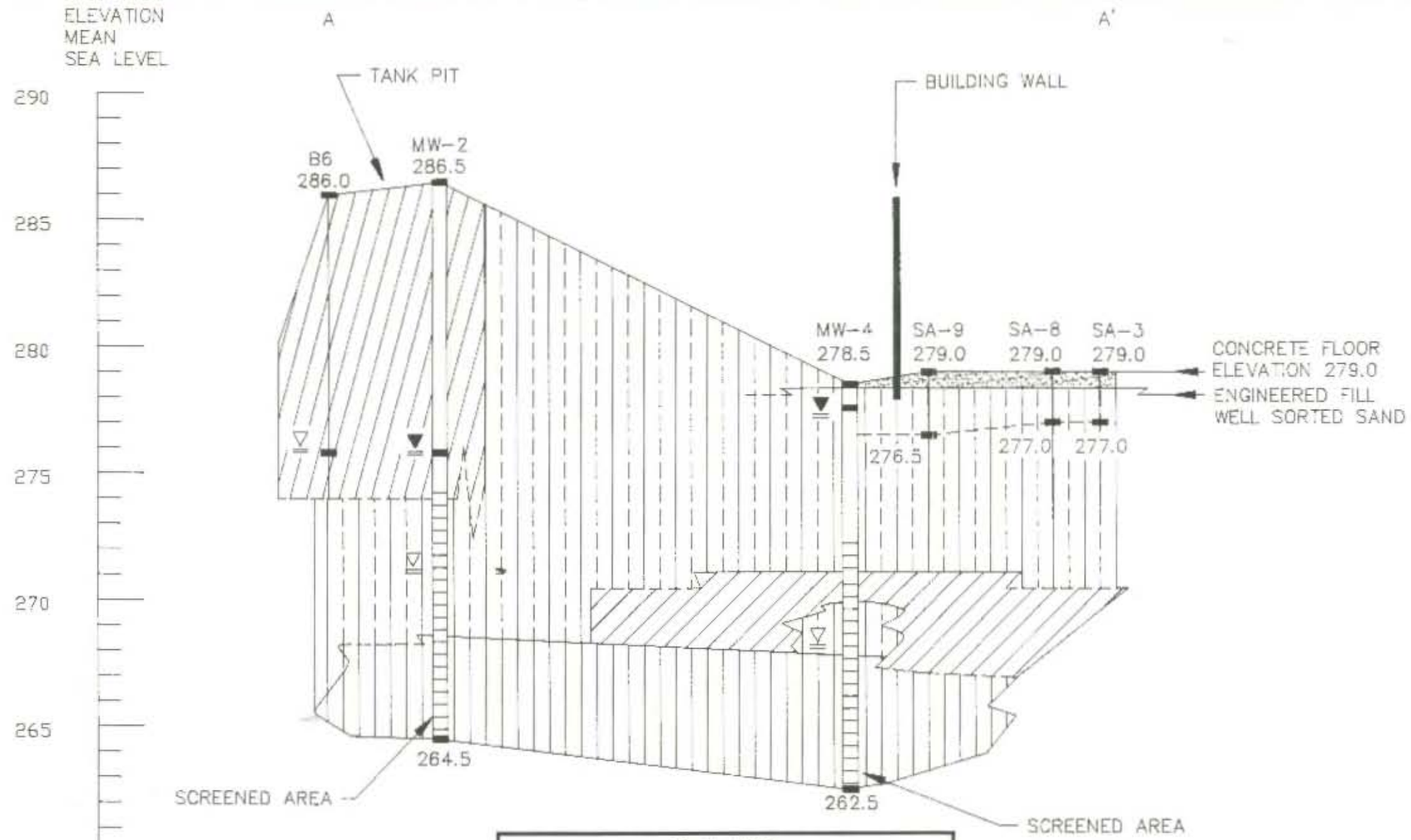
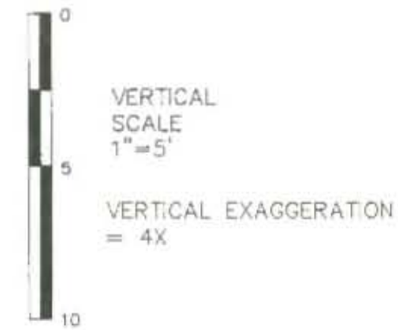
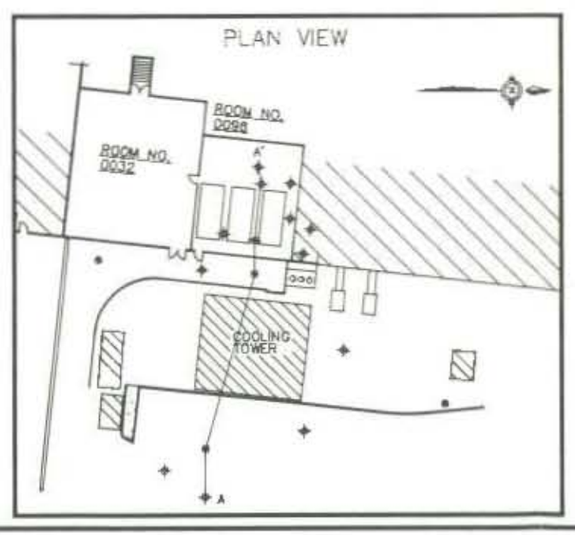




HORIZONTAL
SCALE 1"=20'



B=BORING
MW=MONITORING WELL
SA=SOIL SAMPLE COLLECTED USING HAND AUGER

LEGEND

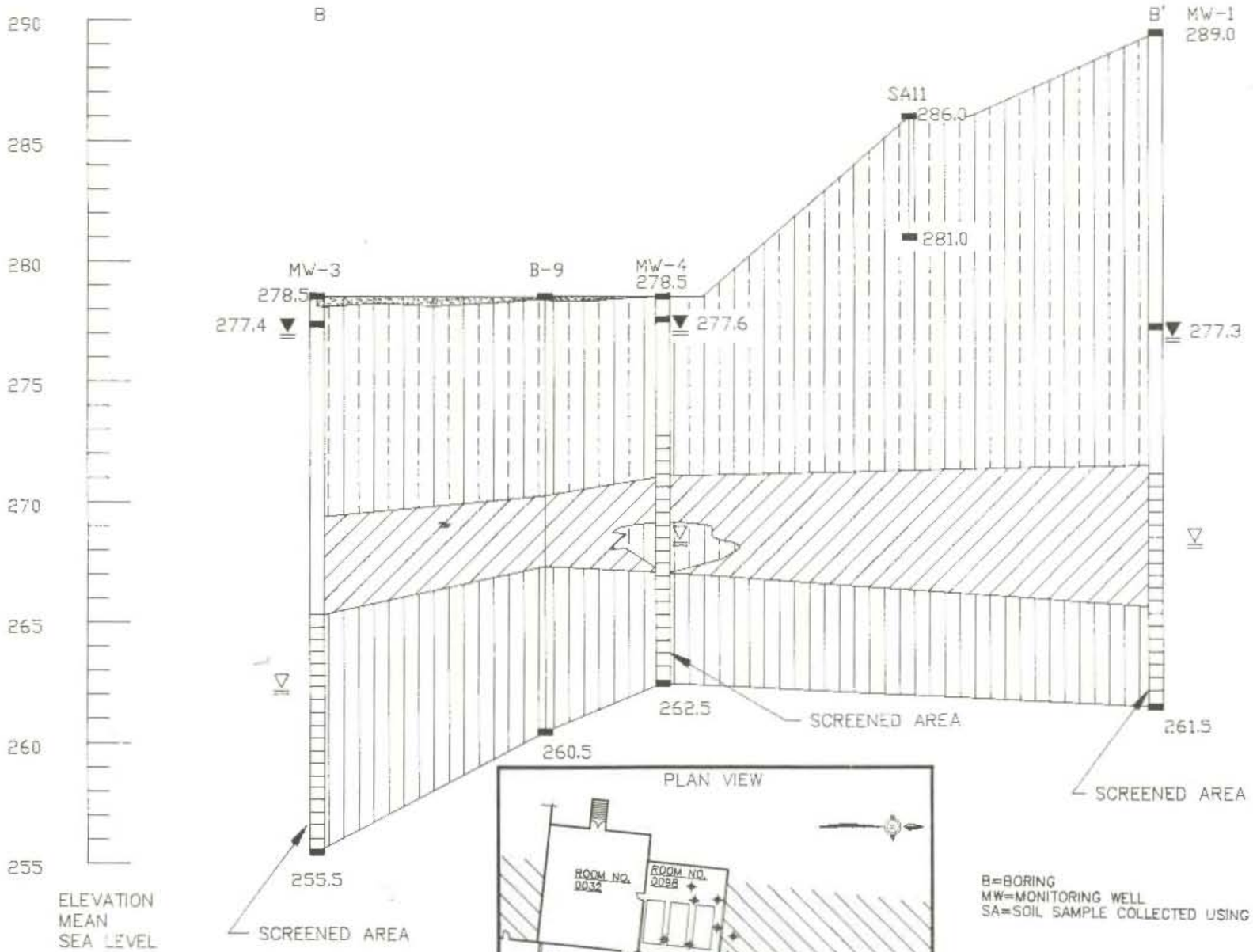
- PIEZOMETRIC SURFACE (07/31/92)
- DEPTH AT WHICH GROUNDWATER WAS INITIALLY ENCOUNTERED
- SC-CLAYEY SAND CLAY-SAND MIXTURE
- OL-SILTY CLAY W/ORGANICS
- CL-INORGANIC SILTY CLAY
- ML-INORGANIC CLAYEY SILT
- SW-WELL GRADED SAND

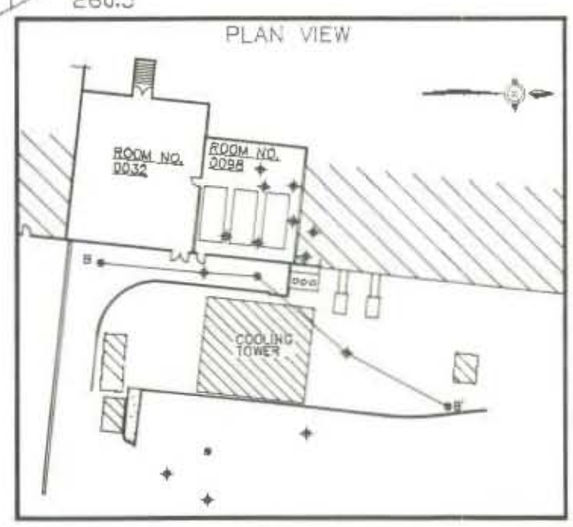
ENVIRONMENTAL ASESSMENT
BUILDING H-100
NAS MEMPHIS

FIGURE 8
CROSS SECTION
A-A'

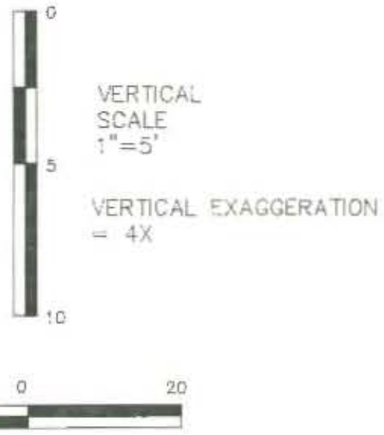
DATE: 09/15/92 | DWG NAME: 040FI8CR

00447GGGB52





B=BORING
MW=MONITORING WELL
SA=SOIL SAMPLE COLLECTED USING HAND AUGER



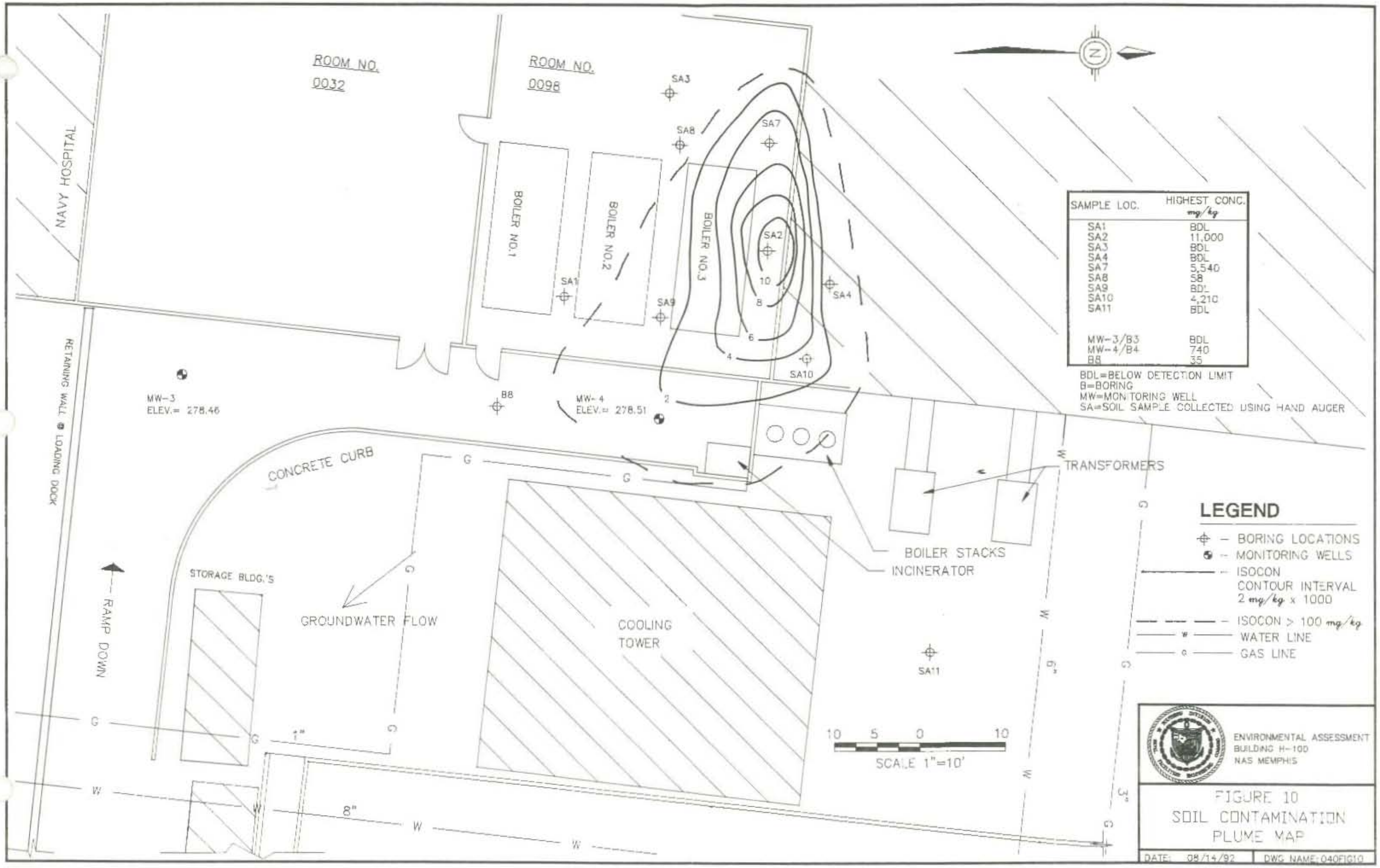
LEGEND

- PIEZOMETRIC SURFACE (07/31/92)
- DEPTH AT WHICH GROUNDWATER WAS INITIALLY ENCOUNTERED
- SW-WELL GRADED SAND
- OL-SILTY CLAY W/ORGANICS
- CL-INORGANIC SILTY CLAY
- ML-INORGANIC CLAYEY SILT

ENVIRONMENTAL ASESSMENT
BUILDING H-100
NAS MEMPHIS

FIGURE 9
CROSS SECTION
B-B'

DATE: 09/15/92 | DWG NAME: 040FI9CR



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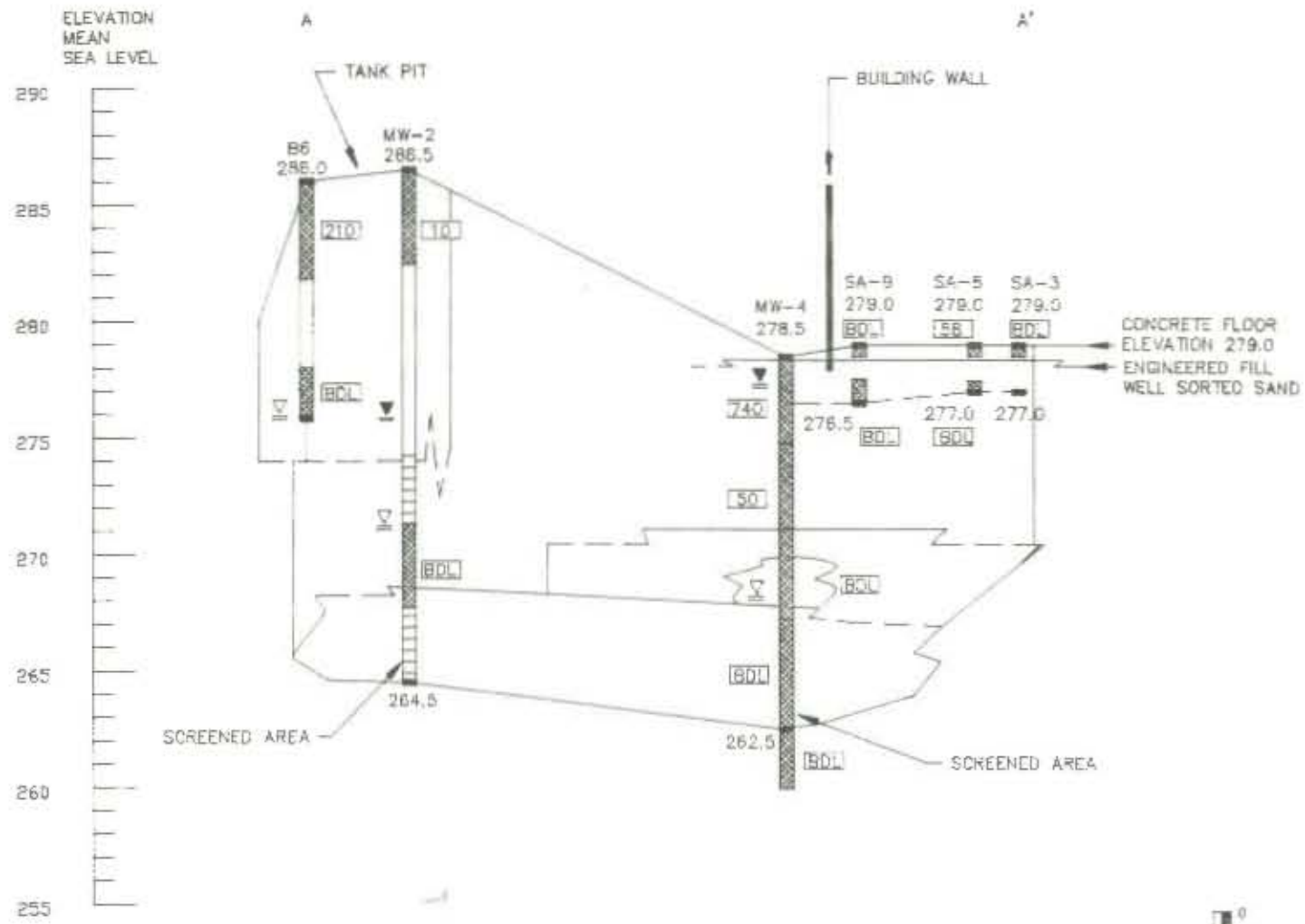
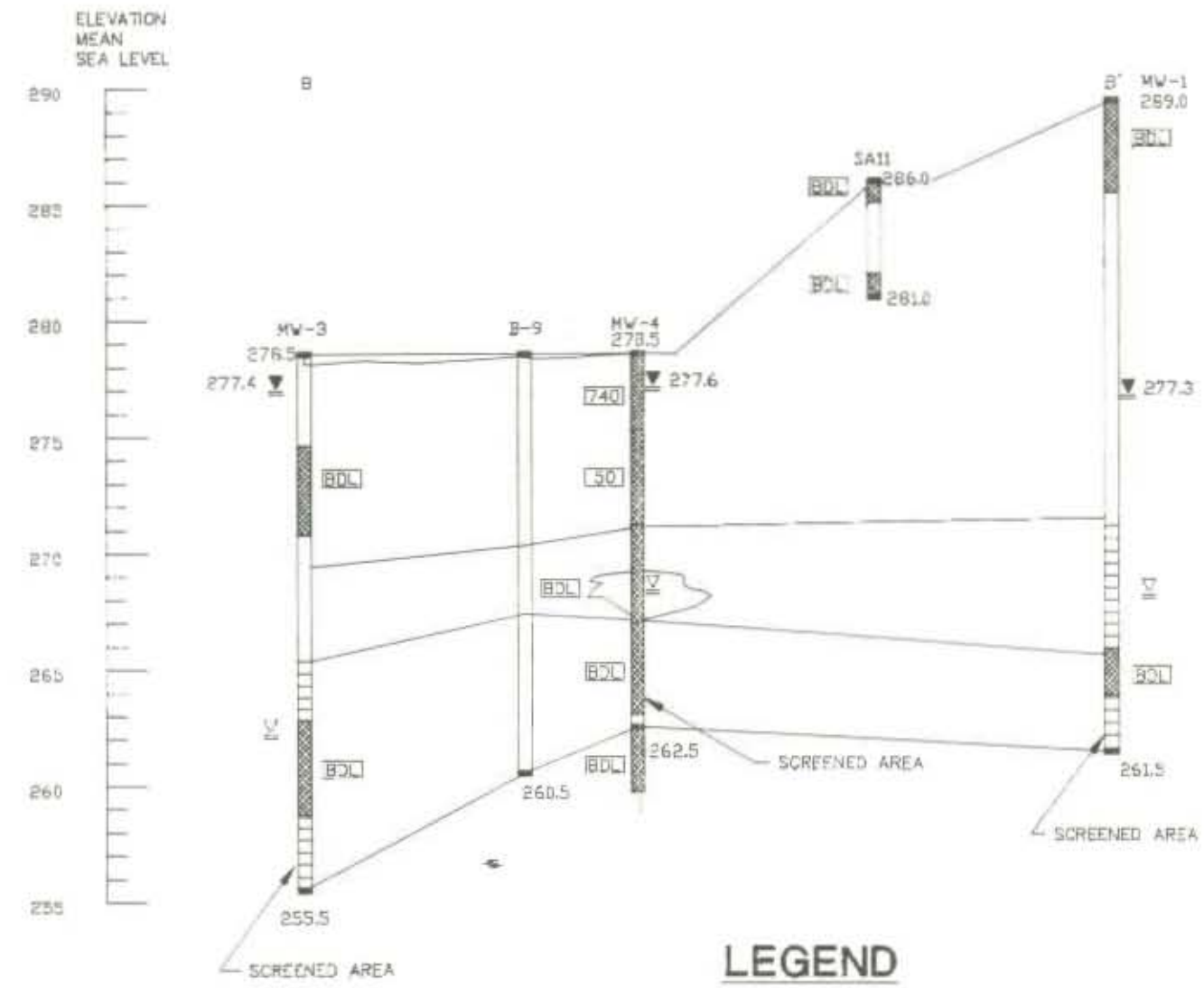
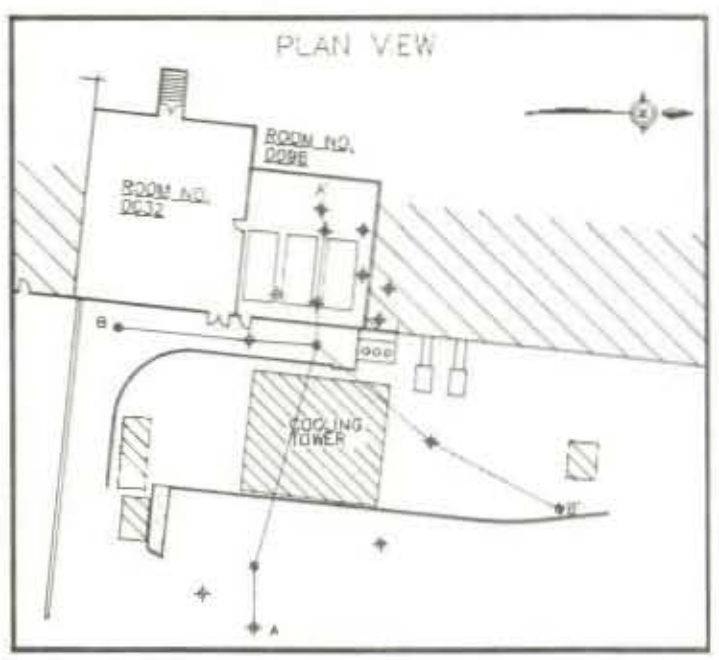






LEGEND

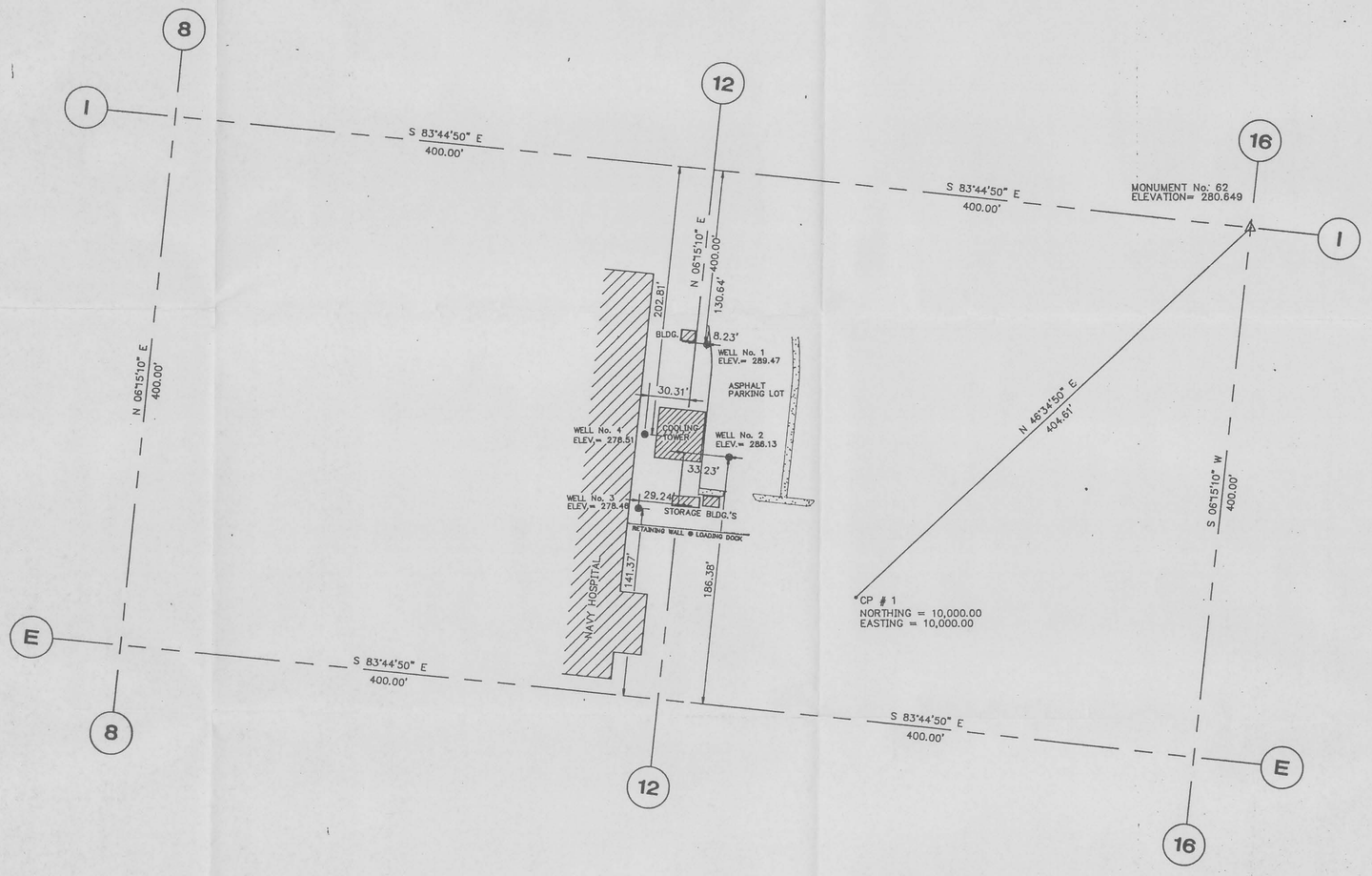
- PIEZOMETRIC SURFACE (07/31/92)
- DEPTH AT WHICH GROUNDWATER WAS INITIALLY ENCOUNTERED
- SAMPLE INTERVAL
- BDL BELOW DETECTION LIMITS
- 000 DIESEL RANGE ORGANICS CONCENTRATIONS IN PPM

ENVIRONMENTAL ASESSMENT
BUILDING H-100
NAS MEMPHIS

FIGURE 11
VERTICAL EXTENT OF
SOIL CONTAMINATION

DATE:09/15/92 | DWG NAME:040FIG11

MONITORING WELLS LOCATION SURVEY
NAVAL HOSPITAL
MILLINGTON, SHELBY COUNTY, TENNESSEE



CERTIFICATE OF SURVEY:

I HEREBY CERTIFY THAT THIS IS A CLASS "A" SURVEY AND THAT THE RATIO OF PRECISION OF THE UNADJUSTED SURVEY IS 1:7,500 OR GREATER.
JACKSON PERSON & ASSOCIATES, INC.

BY: Walter V. Person Jr.

WALTER V. PERSON JR., R.L.S., TENN. CERT. NO. 1595

WALTER V. PERSON JR. REGISTERED LANDSCAPE ARCHITECT TENNESSEE NO 1595

REVISIONS

BY	DATE	REMARKS

NOTES:

1. PLOT PREPARED FOR ENSAFE / ALLEN & HOSHALL
   A JOINT VENTURE FOR PROFESSIONAL SERVICES
   5724 SUMMER TREES DR. SUITE 6, MEMPHIS, TENNESSEE

LEGEND

● – MONITORING WELLS

△ – NAVY GRID MONUMENT

50 0 25 50 100 200

SCALE 1"=50'

JACKSON PERSON & ASSOCIATES, INC.
66 MONROE AVENUE, SUITE #104
MEMPHIS, TENNESSEE
(901)526-8386
LANDSCAPE ARCHITECTURE, PLANNING, AND SURVEYING

DATE: 7/11/92 JOB NO.: 92029S

00447GGB07X