N00639.AR.000951
NSA MID SOUTH
5090.3a

GROUNDWATER WELL MANAGEMENT PLAN MILLINGTON SUPPACT TN
12/1/2003
NAVFAC SOUTHERN

GROUNDWATER WELL MANAGEMENT PLAN

NAVAL SUPPORT ACTIVITY MID-SOUTH MILLINGTON, TENNESSEE

REVISION: 7

CONTRACT NUMBER: N62467-89-D-0318
CTO-0094
CTO-0146

Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering Command
Charleston, South Carolina

Prepared by:

EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901) 372-7962
www.ensafe.com

December 2003

GROUNDWATER WELL MANAGEMENT PLAN

NAVAL SUPPORT ACTIVITY MID-SOUTH MILLINGTON, TENNESSEE

REVISION: 7

CONTRACT NUMBER: N62467-89-D-0318
CTO-0094
CTO-0146

Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering Command
Charleston, South Carolina

Prepared by:

EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901) 372-7962
www.ensafe.com

The Contractor, EnSafe Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0318 is complete, accurate, and complies with all requirements of the contract.

Date: December 5, 2003
Signature: _____
Name: John Stedman
Title: Task Order Manager

Table of Contents

List of Figures

List of Tables

List of Appendices

EXECUTIVE SUMMARY

This plan updates all previous revisions of the Groundwater Monitoring Well Management Plan originally prepared by EnSafe/Allen & Hoshall in 1995 and outlines inspection criteria and maintenance procedures for wells at the Naval Support Activity (NSA) Mid-South, Millington, Tennessee. Maintenance procedures are designed to ensure well integrity and compliance with local, state, and federal regulations. There are presently 284 groundwater monitoring wells and piezometers, two leak detection wells, five potable water supply wells, and four non-potable water wells in use at and around NSA Mid-South. As part of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), four private wells located offsite of the base property have also been monitored (i.e., water level measurements and/or groundwater sampling). The potable, non-potable and private wells are not covered under this management plan and are listed as reference only.

Most of the monitoring wells were installed at NSA Mid-South sites designated as Solid Waste Management Units (SWMUs) during the RFI. Some of these SWMUs have been or are nearing official closure. In accordance with a September 23, 1997, technical memorandum, several wells were closed in 1998. Many of the leak detection wells at NSA Mid-South were also closed in 1998 as the tank systems associated with them were removed. As a result, the well database (Appendix A) has been periodically updated by the Activity (or a designee). The table on the following page provides a summary of the wells currently in the database. Of the 455 wells listed in the summary table, four original closed potable water wells screened in the Memphis Sand aquifer (see Section 3.3.5.3) are not listed in the database.

Naval Support Activity Mid-South
Groundwater Well Summary
November 2001

Well Type	Tank Pit	Alluvium	Loess	Fluvial Deposits	Cockfield Formation	Memphis Sand	Fort Pillow	Total	Data Source
RFI — Open	0	58	22	164	12	0	0	256	Table 3-1
RFI — Closed	0	6	35	19	4	0	0	64	Appendix A
Leak Detection — Open	2	0	0	0	0	0	0	2	Table 3-2
Leak Detection — Closed	39	0	0	0	0	0	0	39	Table 3-2
UST — Open	0	0	28	0	0	0	0	28	Table 3-3
UST — Closed	0	0	47	0	0	0	0	47	Table 3-3
Potable Water — Open	0	0	0	0	0	2	3	5	Table 3-4
Potable Water — Closed	0	0	0	0	0	4	1	5	Sect. 3.3.5.3
Non-Potable/Other — Open	0	0	0	2	1	1	0	4	Table 3-5
Non-Potable/Other — Closed	0	0	0	0	1	0	0	1	Table 3-5
Private (Offsite) — Open	0	0	0	3	0	0	0	3	Appendix A
Private (Offsite) — Closed	0	0	0	1	0	0	0	1	Appendix A
Total	41	64	132	189	18	7	4	455	

1.0 INTRODUCTION

This revision updates the original Groundwater Monitoring Well Management Plan prepared by EnSafe/Allen & Hoshall (E/A&H) in 1995 and subsequent revisions, with the most recent being Revision 6 prepared by EnSafe Inc. in November 2001. It outlines inspection criteria and maintenance procedures for all monitoring wells installed at the Naval Support Activity (NSA) Mid-South, Millington, Tennessee. Maintenance procedures are designed to ensure well integrity and continued compliance with local, state, and federal regulations. This revised document will be referred to as the Groundwater Well Management Plan (GWMP) for NSA Mid-South, Millington, Tennessee.

During preparation of this plan, EnSafe reviewed reports related to groundwater investigations, Resource Conservation and Recovery Act (RCRA) Facility Investigations (RFIs), underground storage tank (UST) related investigations and monitoring programs, and Activity records to determine how many permanent or temporary groundwater monitoring wells have been installed at NSA Mid-South. Based on this research, EnSafe determined that 455 wells and piezometers have been installed over the years. Of these, 157 wells have since been closed and 298 monitoring wells remain open.

According to the original E/A&H plan, 119 wells had been installed at NSA Mid-South and 113 of them were field-located. Seventeen of these wells were closed in accordance with the original plan or as part of tank system closures. The six not field-located were leak detection wells that are believed to have been removed with their associated tank systems. Four former production wells identified in the original plan were not included in the 119 well count; they were closed during a well upgrade in 1985. Four wells installed in 1994 following a petroleum spill at the Building S-362 Training Mock-Up Facility were not identified when the original well management plan was completed. These wells were incorporated into the SWMU 65 RFI and have since been closed.

In addition to the 119 wells identified in the original plan, E/A&H installed RFI and UST related monitoring wells in 1995 and 1996. EnSafe installed additional RFI and UST monitoring wells from

1997 to 1999, and seven more wells for the Area of Concern A Corrective Measures Study (CMS) in 2000 and 2001. In August 1999, the U.S. Geological Survey (USGS) installed one monitoring well (002G17UA) offsite at SWMU 2. As part of a pilot scale remediation system, Parsons Engineering Science, installed 24 wells on the airfield apron near the former N-6 hangar in 2000. In 2002, EnSafe installed three, eight, and four additional wells at SWMUs 14, 15, and 39, respectively, to support CMS's. Overview site maps (Northern and Southern Sections) located in Appendix C show the location and status (open or closed) of each well. Section 3 of this plan provides a brief description of well site locations.

This plan includes a database with information on well configuration, date of installation, state plane coordinates, wellhead elevation, etc. This database is included as Appendix A and is provided electronically on a 3.25-inch diskette in database (*.DBF), Access (*.MDB) and Excel (*.XLS) formats.

2.0 WELL INSPECTION CRITERIA AND MAINTENANCE PROCEDURES

Each NSA Mid-South well must comply with the following applicable or relevant and appropriate requirements:

- Southern Division, Naval Facilities Engineering Command, *Guidelines for Groundwater Monitoring Well Installations*; Naval Energy and Environmental Support Activity *Groundwater Monitoring Guide*, NEESA 20.2-031A, February 1985.

- Rules of the Tennessee Department of Environment and Conservation (TDEC), Division of Water Supply, Chapter 1200-4-10 *Well Construction and Abandonment Standards*;

- Memphis-Shelby County Health Department (MSCHD) *Shelby County Well Construction Code.*

Relevant sections of these documents are included as Appendix B.

2.1 Inspection

Under the original plan, each monitoring and leak detection well was inspected using standard criteria. The general condition, the wellhead condition, the well annulus condition, and well construction specifications were assessed. Target inspection items are listed in Table 2-1. Wellhead conditions were ranked as:

1) Good
2) Minor damage
4) Moderate damage
5) Severe damage

A rating of good indicates that there is no damage associated with the well. Minor damage rating would include such things as cracked or broken well caps, rusted locks, and peeling paint. Moderate damage includes broken hinges on pro cover, broken manhole cover or stripped bolts

on flush mount wells, cracked or broken concrete pads or protective posts out of ground. Severe damage includes well head and concrete pad pulled from or shifted on ground (heavy equipment running into it), broken well pipe riser, or clogged/ collapsed well. The routine inspection of each well shall utilize the Groundwater Monitoring Well Inspection Form shown in Figure 2-1.

Table 2-1
Monitoring Well Specifications
(Target Inspection Items)

Above-Grade Mounts:	**Flush-Grade Mounts:**
Well pad:	Well pad:
Condition	Condition
Size (4' x 4' x 0.5')	Size (2' x 2' x 0.5')
Wellhead/Security Casing:	Wellhead/Manhole cover:
Condition	Condition
Brass, keyed-alike locks	Leak-resistant well cap (Hex-key type)
Leak-resistant well cap (Hex-key type)	22-gauge steel, load-bearing
Paint — condition and color (high-visibility yellow epoxy AASHTO[a] — M220)	Bolt down
	Gasket condition
	Labeled — "Monitoring Well — Do Not Fill"
Guard post:	Guard post:
Condition	Not applicable
Number (4 required)[b]	
Cement filled	
Well Annulus:	**Well Data:**
Riser pipe:	Water level
Condition (at surface and above grade)	Headspace-organic vapor concentration
Total depth:	Odor
Well open to reported construction depth	Significant sediment accumulation

Notes:
[a] — American Association of State Highway and Transportation Officials, SOUTHDIV specifications.
[b] — Well cluster may have less than 4 guard posts per well for protection if the wells are closely placed.

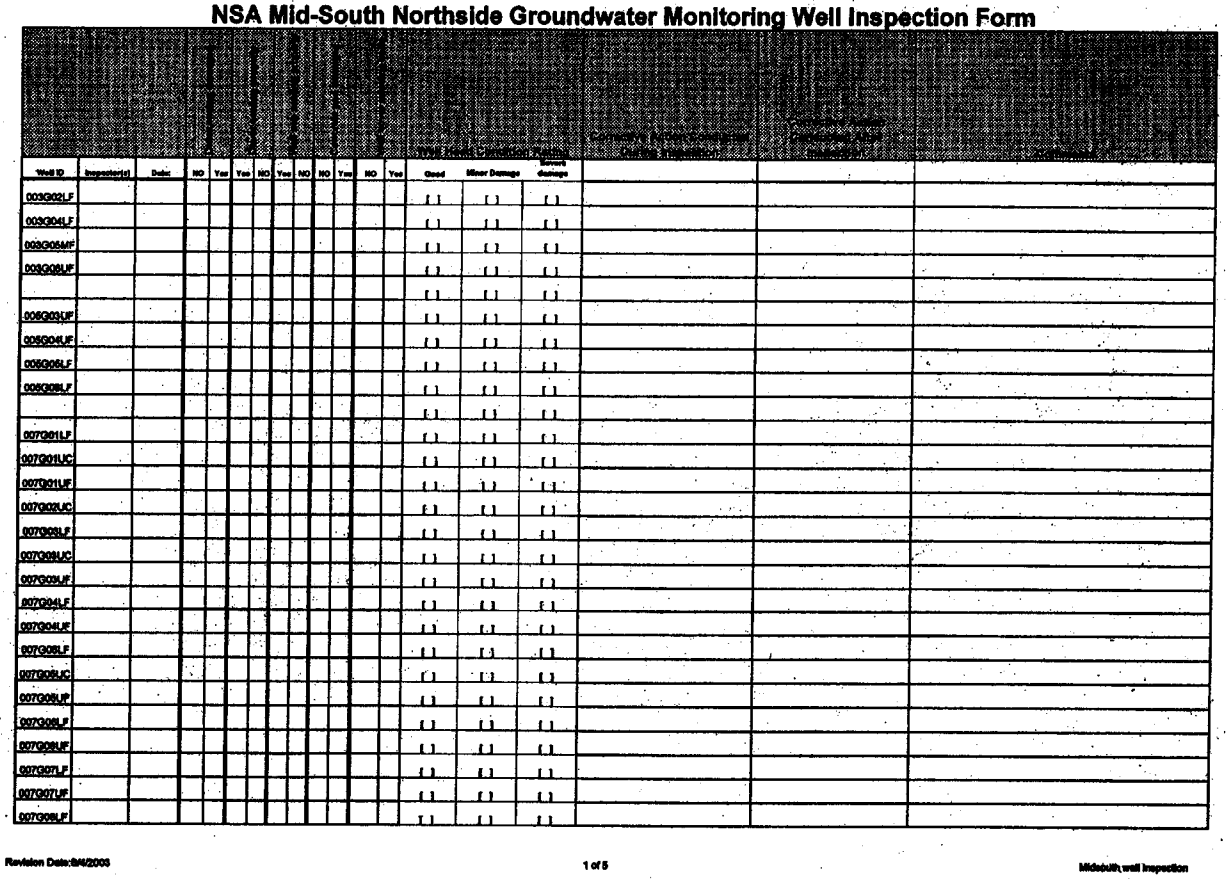
2.2 Maintenance

Well inspections shall be conducted twice a year to ensure that well caps, locks, and manhole gaskets are functioning properly. The rubber bushing on the well caps may become damaged or break down with time, thus reducing the wellhead security. Additionally, locks may seize-up or become clogged. Locks may be cleaned or *lightly* lubricated with common products, such as WD-40, as long as contaminants do not enter the well.

Groundwater Monitoring Well Inspection Form layout:

Column 1 — Well Identification Name, Inspector(s) Name and Date.
Column 2 — Outer Casing Damage — Yes or No.
Column 3 — Cover Sealing Properly — Yes or No

NSA Mid-South Northside Groundwater Monitoring Well Inspection Form



Column 4 — Well Cap Sealing Properly — Yes or No
Column 5 — Concrete Pad Damage — Yes or No
Column 6 — Well Cover Missing Bolts — Yes or No (flush mount wells only)
Column 7 — Well Head Condition Rating — Good, Minor Damage, Severe Damage
Column 8 — Corrective Action Conducted During Inspection
Column 9 — Corrective Action Conducted After Inspection
Column 10 — Comments

Figure 2-1 Example of Monitoring Well Inspection Form

This page intentionally left blank.

Gaskets on manhole cover rims may become dirty, dried, cracked, or otherwise damaged, allowing rainwater runoff or other contaminants to enter the manhole and potentially the well. Bolts may become stripped over time, thus preventing a snug fit between the cover and gasket and allowing rainwater runoff or other contaminants to enter the manhole. These items must be replaced if they show signs of damage.

2.3 Contingencies

The Environmental Division of the NSA Public Works must be notified immediately if a damaged well is discovered by NSA personnel. Under the original plan, a tag placed on each well lists the telephone number to call (874-5462). If a well becomes damaged or does not adequately protect the wellhead, it should be repaired as soon as practical. Immediate action may be required to prevent further damage or to prevent surface water, rainwater, or contaminants from entering the well casing. Failure to protect the wellhead and the associated water-unit may result in fines from the MSCHD and/or TDEC.

2.4 Well Repairs/Closures

Under current *Shelby County Well Construction Codes* (August 2001), major well repair, closure, or significant modification requires a permit. The codes do not have a "grandfather" provision for unpermitted wells installed before 1988, when the well codes were established. A permit application may be acquired from the MSCHD, Pollution Control Division, Groundwater Division, 814 Jefferson Avenue, Memphis, Tennessee 38105, or by calling (901) 576-7775.

This page intentionally left blank.

3.0 WELL BACKGROUND INFORMATION

This section describes the different well classes (types) and their associated geological formations, summarizes NSA Mid-South geology, and briefly discusses the origin of NSA Mid-South wells.

3.1 Well Classification

Wells are classified in one of four categories:

- Monitoring Wells — installed for site investigations to assess groundwater quality
- Leak Detection Wells — installed in UST tank pits to monitor for product release
- Potable Wells — drinking water supply wells
- Other Wells — non-potable water supply wells

Wells are sub-classified based on the geologic formation in which they are screened:

- Loess — LS
- Alluvium — lower (LA) and upper (UA)
- Fluvial Deposits — lower (LF), middle (MF), or upper (UF)
- Cockfield Formation — upper (UC)
- Memphis Sand — (production wells)
- Fort Pillow Sand, Wilcox Group — (production wells)
- Tank Pit — Fill dirt (leak detection wells only)

This plan currently includes 290 monitoring wells, two leak detection wells, five potable water supply wells, and four non-potable water wells. Most wells at NSA Mid-South are monitoring wells installed as part of RFIs or UST Environmental Assessments (EAs). Leak detection wells were installed under a UST upgrade program completed in 1989 and 1990. The remaining wells were installed for various reasons including potable and irrigation water supplies. Boring and well construction logs are in Appendix D.

3.2 NSA Mid-South Geology

A conceptual model of NSA Mid-South hydrogeology is presented in the *Hydrogeology of Post-Wilcox Group Stratigraphic Units in the Area of the Naval Air Station Memphis,*

Near Millington, Tennessee (Kingsbury and Carmichael, 1995). The hydrogeology of NSA Mid-South is summarized below.

The two principal stratigraphic units investigated during RFIs and UST EAs at NSA Mid-South are the loess/alluvium and fluvial deposits. The loess — eolian deposits consisting of silt, silty clay, clay, and minor amounts of sand — is the principal unit occurring at land surface throughout NSA Mid-South. Alluvium, which is restricted to stream valleys, includes alleviated or reworked loess. The loess is typically 0 to 65 feet thick in the Memphis area; at NSA Mid-South it ranges from 15 to 45 feet thick. Water-bearing zones are present primarily in the upper part of the loess (between 5 and 15 feet); however, yields are low and water quality does not meet several primary and secondary drinking water standards including turbidity, iron, and manganese. The fluvial deposits, which underlie the loess in upland areas, consist of sand, gravel, and some clay, with thin layers of ferruginous sandstone and conglomerate at the base. This unit ranges from 0 to 100 feet thick in the Memphis area. At NSA Mid-South, it ranges from 10 to 35 feet thick and represents the most significant component of the surficial aquifer. Many shallow domestic wells in rural areas surrounding Memphis have been completed in the fluvial deposits.

Below the fluvial deposits are the Cockfield Formation and the Cook Mountain Formation of the Jackson-Upper Claiborne confining unit. The Cockfield is a heterogeneous formation of very fine silty sand interbedded with clay and silt lenses or clay with interbedded fine sand lenses. Water-bearing sands are present in the upper Cockfield Formation. Below the Cockfield is the Cook Mountain Formation, which is predominantly clay and silty clay. It is considered a principal regional confining unit between the surficial water-bearing zones and the underlying aquifers. The lower portion of the Claiborne Group is the Memphis Sand which is made up of sand, clay, and minor amounts of lignite. The Memphis Sand aquifer is one of the primary drinking water aquifers in the Memphis area. Two NSA Mid-South potable water supply wells (PW-1 and PW-2) have drawn from the Memphis Sand aquifer since the 1940s.

The Wilcox Group underlies the Claiborne Group and consists of the Flour Island Formation and the Fort Pillow Formation. The Flour Island is a confining unit separating the Memphis Sand and Fort Pillow aquifers. The Fort Pillow aquifer is a regional drinking water source. Three production wells at NSA Mid-South pump potable water from the Fort Pillow aquifer: PW3, PW4, and PW5.

3.3 Well Sites and Origins

Site descriptions are based on well origin: RFIs, UST EAs, leak detection wells, and miscellaneous wells. At some sites, particularly RFI Sites 5 and 7, several well types are present within larger RFI site boundaries. For this reason, they are listed under each site category. This practice produces redundant RFI and UST site information, but is necessary for future plan users to be able to properly identify similar wells or well types in the field.

Monitoring wells were installed during RFIs or UST EAs to assess groundwater impacts related to known or suspected releases of regulated materials or wastes. Leak detection wells were installed to monitor UST systems for product leaks. Potable wells were installed to supply drinking water to the base. Two non-potable supply wells were installed for irrigation or other non-potable needs.

3.3.1 RFI-Related Monitoring Wells

Under RCRA, 52 of 67 solid waste management units (SWMUs) and one area of concern (AOC) were identified for investigation at NSA Mid-South. Under a Verification Study (VS) by Geraghty & Miller (G&M) in 1984 and 1985, 12 monitoring wells were installed at four of the RCRA sites. E/A&H initiated a series of RFIs in 1995 and 1996 during which the 52 SWMUs were divided into eight assemblies (A through H). The Northside fluvial deposits groundwater was designated AOC A when it became apparent there were multiple, co-mingled plumes of various origins on the NSA Mid-South Northside. Monitoring wells associated with a number of different SWMUs were used to evaluate AOC A; therefore, there are no monitoring wells with an AOC A ID. The majority of the AOC A wells resulted from an expansion of the SWMU 7 RFI, and consequently have a SWMU 7 ID.

The USGS installed four wells adjacent to Building 1698 (near SWMU 40) for long-term monitoring of water levels. Three were installed in April 1995 and screened in the loess, lower fluvial deposits, and the Cockfield Formation. In August 1995, one additional well was installed and screened in the upper fluvial deposits. While these wells were not installed as part of the SWMU 40 investigation, they were sampled to support that investigation. Water level data from these wells were used to assist USGS in developing a conceptual model of base-wide hydrogeology in support of the overall RFI.

Table 3-1 shows the number of wells currently present at each site by assembly.

Table 3-1
Existing RFI Monitoring Wells and Piezometers

Assembly	Site	Alluvium	Loess[a]	Fluvial[b]	Cockfield	Total
Assembly A	SWMU 3	0	0	2	0	**2**
	SWMU 5	0	2	6	0	**8**
	SWMU 7	0	4	77[c]	7	**88**
	SWMU 8	0	0	0	0	**0**
	SWMU 60	0	0	2	0	**2**
	SWMU 66	0	0	0	0	**0**
Assembly B	SWMU 40	0	0	0	0	**0**
Assembly C	SWMU 15	0	5	8	0	**13**
	SWMU 18	0	0	1	0	**1**
	SWMU 21	0	0	4	0	**4**
Assembly E	SWMU 2	46	0	0	0	**46**
	SWMU 9	4	0	0	0	**4**
	SWMU 14	0	8	4	0	**12**
	SWMU 59	0	1	1	0	**2**
	SWMU 65	3	0	0	0	**3**
Assembly F	SWMU 20	0	0	4	0	**4**
	SWMU 39	0	0	15	0	**15**
Assembly H	SWMU 41	4	0	0	0	**4**
Background	BG	1	1	14	4	**20**
Parsons	PES	0	0	24	0	**24**
USGS	USGS	0	1	2	1	**4**
Total		**58**	**22**	**164**	**12**	**256**

Notes:
a — Does not include one UST loess well at SWMU 5 and four UST loess wells at N-12 (see Table 3-3).
b — Includes AOC A pilot study injection and extraction wells at SWMU 7 and Parsons sites.
c — Includes two lower fluvial deposits wells at N-12 (N12G01LF and N12G02LF).

3.3.1.1 Assembly A

Assembly A consists of eight SWMUs: 1, 3, 5, 7, 8, 60, 66, and 67. Monitoring wells were installed at all of these SWMUs, except SWMUs 1 and 67.

SWMU 3 (*N-121 Plating Shop Dry Well*) Building N-121 was a metal plating shop which operated from the early 1950s to the early or mid-1970s. Wastes from this plating shop were disposed of in a dry well (10' x 10' x 6' pit filled with gravel) on the south side of the building, adjacent to Casablanca Street. This dry well was removed in September 1996.

Three monitoring wells were installed by G&M during the 1985 VS. During an RFI at SWMU 3 in early 1995, E/A&H installed eight additional RFI monitoring wells, which were screened in either the loess or fluvial deposits. Two monitoring wells are currently active at SWMU 3. Locations of monitoring wells at SWMU 3 are shown on Figure 3-1.

SWMU 5 (*Aircraft Fire Fighting Training Area [AFFTA]*) operated from 1949 until its closure in October 1996. RFI and UST EA monitoring wells, and leak detection wells, have been installed at SWMU 5 over the years. During a UST EA completed by E/A&H in 1992, 11 monitoring wells were installed in the loess. E/A&H installed 14 additional monitoring wells onsite in a 1995 RFI, and incorporated the existing UST EA wells into the investigation. Seven RFI wells were screened in the loess and seven were screened in the upper fluvial deposits. Two of the fluvial wells (005G4AUF and 005G4BUF) were installed alongside 004G04UF as part of a rotasonic drilling demonstration and were closed shortly thereafter. A lower fluvial well was added in 1998. Sixteen (15 loess and one fluvial) of 26 monitoring wells have been closed, including Well 005FF08LS, which was abandoned in December 1997 to facilitate a Voluntary Corrective Action conducted by the Navy. Following the VCA, the USGS installed a 4-inch diameter replacement well to determine the effectiveness of the soil removal and to serve as a recovery well. Locations of monitoring wells at SWMU 5 are shown on Figure 3-2 .

SWMU 7 (*N-126 Plating Shop Dry Well*), a dry well associated with a plating shop in hangar N-126, operated from 1955 to 1978. Plating wastes are reported to have been piped to

the dry well outside, near the southeast corner of the hangar. G&M installed a middle fluvial deposits monitoring well through the dry well during the VS in 1985. The monitoring well was abandoned in June 1996 and the dry well was removed in September 1996. E/A&H installed 43 RFI wells at SWMU 7 and the airfield apron area from February 1995 to March 1996. From 1997 to mid-1999, EnSafe installed an additional 47 RFI wells and piezometers as part of the AOC A investigation, which extended the original SWMU 7/airfield apron investigation area beyond the main runway and past the northwestern base boundary. Wells at the first nine locations were installed in clusters of four and screened in the loess, upper fluvial deposits, lower fluvial deposits, and the upper Cockfield Formation. An existing loess monitoring well (N9407LS) associated with a 1995 UST EA was renamed 007G08LS to serve as the loess well for cluster number 8. With the exception of three loess wells (007G37F1, 007G37L1 and 007G37L2) installed for an aquifer test, subsequent well installations focused on the upper and/or lower fluvial deposits based on sampling results. In the latter stages of the investigation, some wells were screened in the middle fluvial deposits, and others were screened throughout the entire thickness of the fluvial deposits. Thirteen SWMU 7 RFI wells have been closed.

In 1996, two lower fluvial deposits monitoring wells (N12G01LF and N12G02LF) were installed adjacent to Building N-12 and PW-1, respectively, to assess the possible impact on PW-1 of suspected chlorinated solvent releases from activities associated with Building N-12, a former print shop.

Two monitoring wells (007G58LF and 007G59LF), two injection wells (007G60LF and 007G61LF) and one extraction well (007G57LF) were installed in December 1999 for an enhanced bio-remediation pilot study conducted by EnSafe. In August of 2000, two additional wells monitoring wells (007G62LF and 007G63LF) were installed as part of the system.

A second pilot study was conducted by Parsons Engineering Science to evaluate the feasibility of using vegetable oil injection to remediate a portion of the AOC A groundwater plume, specifically the area of higher chlorinated solvent contamination in the vicinity of monitoring wells 007G15UF and 007G15LF near the former N-6 hanger. Eight injection (four upper and lower fluvial pairs) and

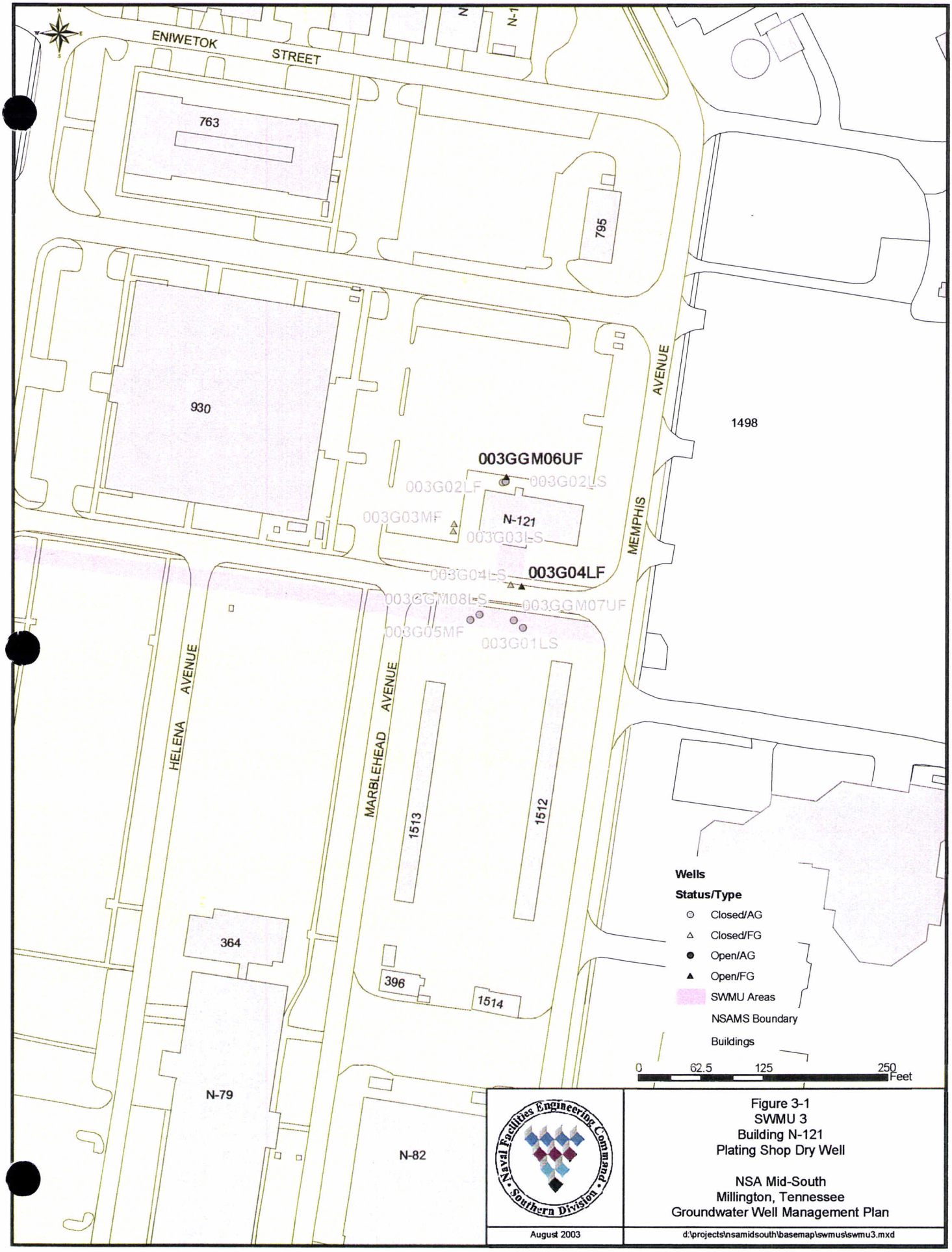
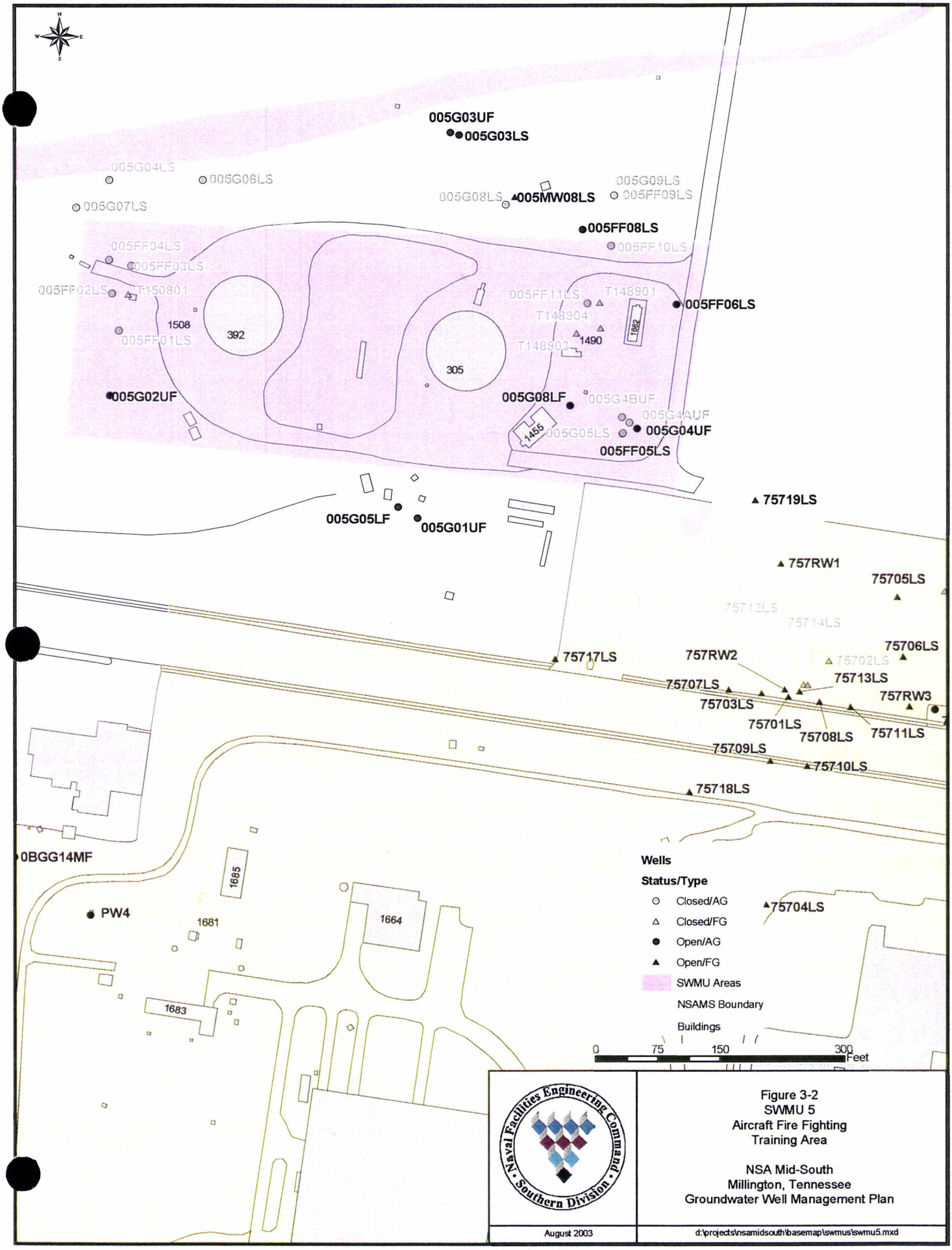


Figure 3-1
SWMU 3
Building N-121
Plating Shop Dry Well

NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan

August 2003

d:\projects\nsamidsouth\basemap\swmus\swmu3.mxd


005G03UF
005G03LS
005G04LS
005G06LS
005G07LS
005G08LS
005MW08LS
005G09LS
005FF09LS
005FF08LS
005FF10LS
005FF04LS
005FF03LS
005FF02LS
T150801
005FF11LS
T148901
T148904
T148903
005FF06LS
1508
392
005FF01LS
305
1490
1662
005G02UF
005G08LF
005G4BUF
005G4AUF
1455
005G05LS
005G04UF
005FF05LS
005G05LF
005G01UF
75719LS
757RW1
75705LS
75712LS
75714LS
75706LS
75717LS
757RW2
75702LS
75713LS
75707LS
75703LS
757RW3
75701LS
75708LS
75711LS
75709LS
75710LS
75718LS
0BGG14MF
1685
PW4
1681
1664
1683
75704LS
Wells
Status/Type
Closed/AG
Closed/FG
Open/AG
Open/FG
SWMU Areas
NSAMS Boundary
Buildings
0
75
150
300
Feet
Naval Facilities Engineering Command
Southern Division
Figure 3-2
SWMU 5
Aircraft Fire Fighting
Training Area
NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan
August 2003
d:\projects\nsamidsouth\basemap\swmus\swmu5.mxd

16 monitoring (eight pairs) wells were installed in the former N-6 area in August 2000. The 10 foot-long injection well screens were staggered so that the vegetable oil zone of influence would extend vertically from 45 to 85 feet below land surface and approximately 60 feet laterally. Additional well installation details are provided in the *Final Work Plan for Field Application to Enhance In Situ Bioremediation of Chlorinated Solvents via Vegetable Oil Injection at Site N-6, Former Naval Support Activity Mid-South, Millington, Tennessee* (Parsons, 2000).

Figures 3-3a, 3-3b, and 3-3c show the locations of active and closed wells associated with SWMU 7 and AOC A.

SWMU 8 (*Cemetery Disposal Area*) was a hazardous materials disposal area reported to have operated from 1965 to 1980. It is adjacent to the northern end of the main runway (Runway 4-22), and north of Chamberlayne Cemetery. In 1985, G&M installed three fluvial deposits wells during the VS. In early 1995, E/A&H installed four RFI fluvial deposits wells. Two of the G&M wells (008GMW10 and 008GMW12) were closed in November 1995 by E/A&H. Three loess wells were installed during the RFI, but closed within a few weeks because they produced no groundwater. After transfer of the property to the Millington Municipal Airport Authority, two additional wells (008G01FL and 008GMW11) were abandoned in January 1998 during a grading project. In November 1999, the three remaining monitoring wells were grouted in place by EnSafe in accordance with MSCHD guidance. Locations of the former monitoring wells at SWMU 8 are shown on the overview map (Northern Section) in Appendix C.

SWMU 60 (*Northside Landfill — Western Portion*) is reported to have been used primarily for disposal of demolition debris. The landfill was apparently active between 1951 and 1986. SWMU 60, which is in the southwest portion of the NSA Mid-South Northside, is bounded on the south by Dakar Street, on the west by Outlet Road, to the east by an unpaved perimeter road, and on the north by abandoned Illinois Central Railroad spurs. E/A&H installed 10 monitoring wells during an RFI in early 1995; however, three wells (060G01LS, 060G01LF, and 060G05LS) were

closed to facilitate a Voluntary Corrective Action conducted by the Navy in December 1997. Five more monitoring wells (060G02LS, 060G03LF, 060G03LS, 060G04LS, and 060G06LS) were closed in November 1998. SWMU 60 monitoring wells were screened in the loess and lower fluvial deposits. Monitoring wells 060G02LF and 060G04LF are currently active at this site and provide long-term monitoring of groundwater from SWMU 10 (Northside Landfill — Eastern Portion) which is approximately 500 feet upgradient of SWMU 60. Monitoring well locations associated with SWMU 60 are shown in Figure 3-4.

SWMU 66 *(Radar Disposal Area)* was used by the MWR as a debris disposal area for an unknown period of time. SWMU 66, which is in the northeast portion of the NSA Mid-South Northside, is bounded on the west by an abandoned runway, to the north by an abandoned radar facility, and to the east by pasture. As part of the investigation at SWMU 66, one monitoring well (066G01LF) was installed by EnSafe in May 1998 and has since then been abandoned. This monitoring well location is shown on the overview map (Northern Section) in Appendix C.

3.3.1.2 Assembly B

Assembly B includes SWMU 40 Salvage Yard No. 1, where four monitoring wells are currently installed: USGS01LS, USGS02LF, USGS03UC,and USGS04LF. These wells were installed by the U. S. Geological Survey (USGS) to gather hydrological data, but were sampled during the SWMU 40 RFI. Figure 3-5 shows the location of the USGS monitoring wells at SWMU 40.

3.3.1.3 Assembly C

Assembly C includes SWMUs 15, 18, 21, 26, 27, and 62. These SWMUs required Confirmatory Sampling Investigations (CSIs) to verify whether releases had occurred and, if so, whether RFI characterization was necessary. No monitoring wells were installed at SWMUs 26, 27, or 62.

SWMU 15 (*N-94 Underground Tank Farm*), which was southwest of Building N-94, consisted of ten 10,000- to 25,000-gallon USTs that stored aviation gasoline and lubricating oil. The USTs were

007G54LF
Taxiway
007G11LF
007G25MF
007G24MF
N-2
007G23LF
007G32LF
007G22UC
007G22LF
N-4
007G27LF
007G21LF
007G20LF
Tarmac
007G18LF
007G57LF
007G04UC
007G04LF
007G04UF
007G59LF
007G58LF
007G62LF
007G63LF
007G61LF
007G60LF
N-126
007G05LF
007G05UF
007G05UC
1651
1652
1600
1591
N-88
007G02UC
007G03UF
007G03LF
007G03UC
007G09LF
007G09UF
007G09UC
007G01UF
007G01LF
007G01UC
015G01UF
015G01LF
N-94
015G08LS
1620
015G04UF
015G04LF
N9405LS
N12G04LS
N12G02LS
N12G02LF
N12G03LS
N12G01LF
N12G01LS
N-12
015G07LS
899
N9406LS
007G08LS
N9407LS
015G05LS
007G08UF
007G08LF
015G02LF
015G02UF
007G07UF
007G07LF
1217
015G03LS
015G04LS
1671
015G02LS
015G01LS
243
015G03LF
015G03UF
ENIWETOK STREET
N-16
N-13
N-14
007G06UC
007G06LF
007G06UF
296
PW2
345
DAKAR STREET
007G17LF
USGS03UC
USGS04FL
USGS02FL
1694
007G16LF
1603
1577
N-48
N-7
N-9
FUNAFUTI STREET
N-11
021G01LF
021G04UF
021G03LF
018G01LF
N-102
N-112
N-122
350
N-4
N-5
N-6
N-7
763
774
1637
T163703
T163701
T163702
PES-MW-8D
PES-MW-8S
PES-MW-7D
PES-MW-7S
PES-MW-5D
PES-MW-5S
PES-MW-6D
PES-MW-6S
PES-MW-4D
PES-MW-4S
PES-MW-3D
PES-MW-3S
PES-MW-2D
PES-MW-2S
PES-INJ-4
007G15UF
007G15LF
PES-INJ-3
PES-INJ-2
PES-INJ-1
PES-MW-1S
PES-MW-1D
Wells
Status/Type
Closed/AG
Closed/FG
Open/AG
Open/FG
SWMU Areas
NSAMS Boundary
Buildings
GAR
0
87.5
175
350
Feet
Figure 3-3a
SWMU 7 - AOC A (Airfield)
NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan
Naval Facilities Engineering Command • Southern Division • Pearl
August 2003
d:\projects\nsamidsouth\basemap\swmus\swmu7_a.mxd

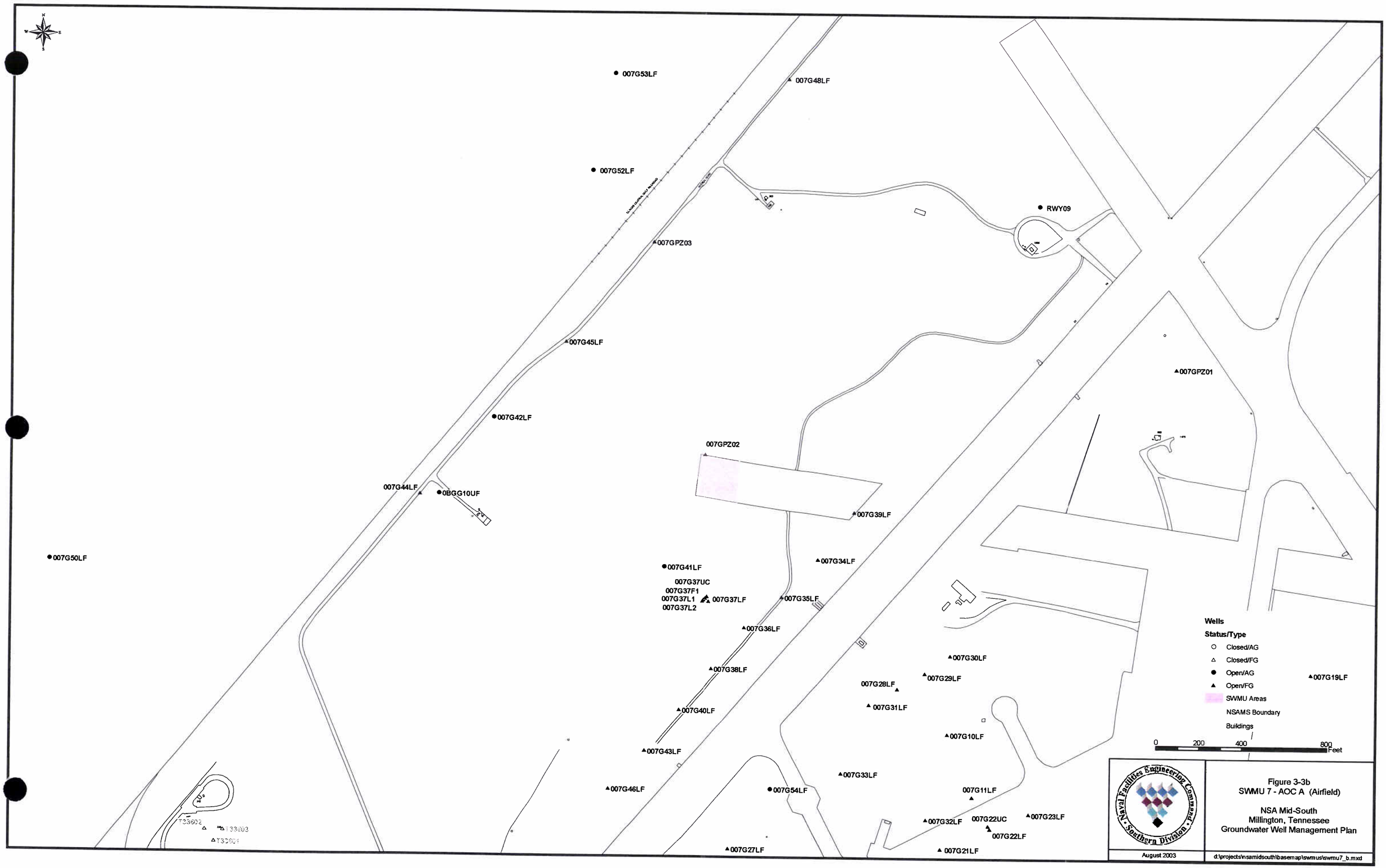


Figure 3-3b
SWMU 7 - AOC A (Airfield)

NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan

August 2003

d:\projects\nsamidsouth\basemap\swmus\swmu7_b.mxd

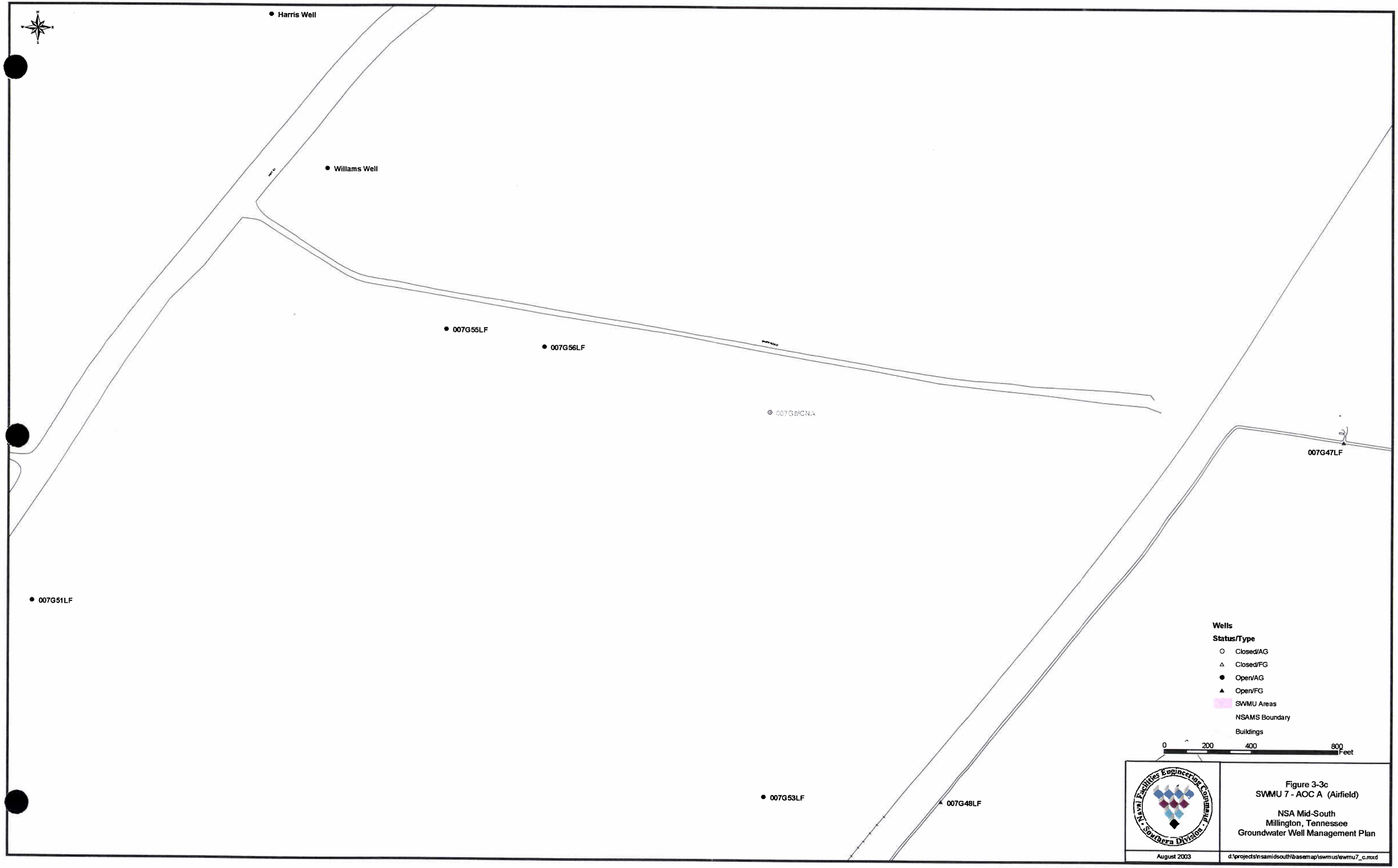


Figure 3-3c
SWMU 7 - AOC A (Airfield)

NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan

August 2003

d:\projects\nsamidsouth\basemap\swmus\swmu7_c.mxd

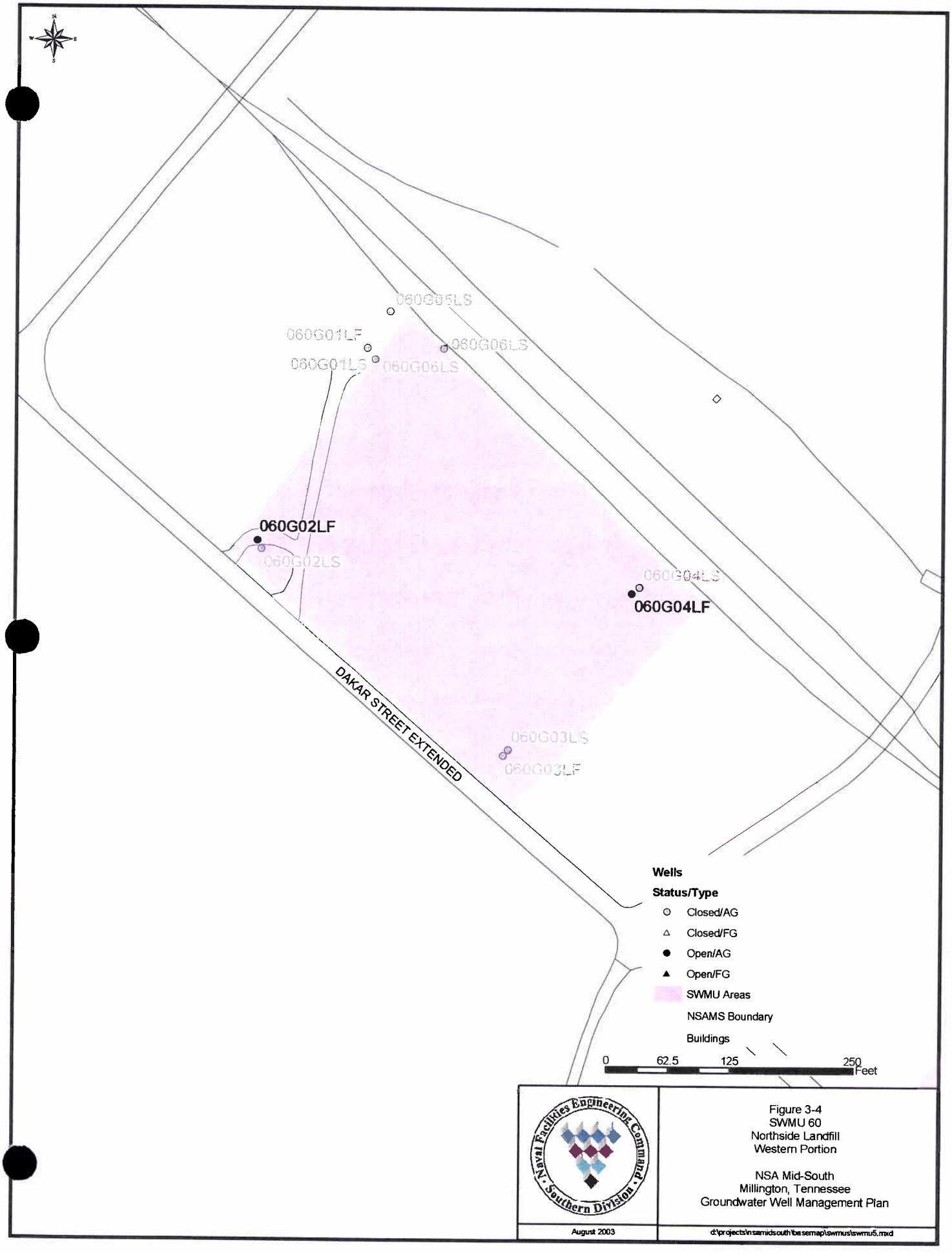
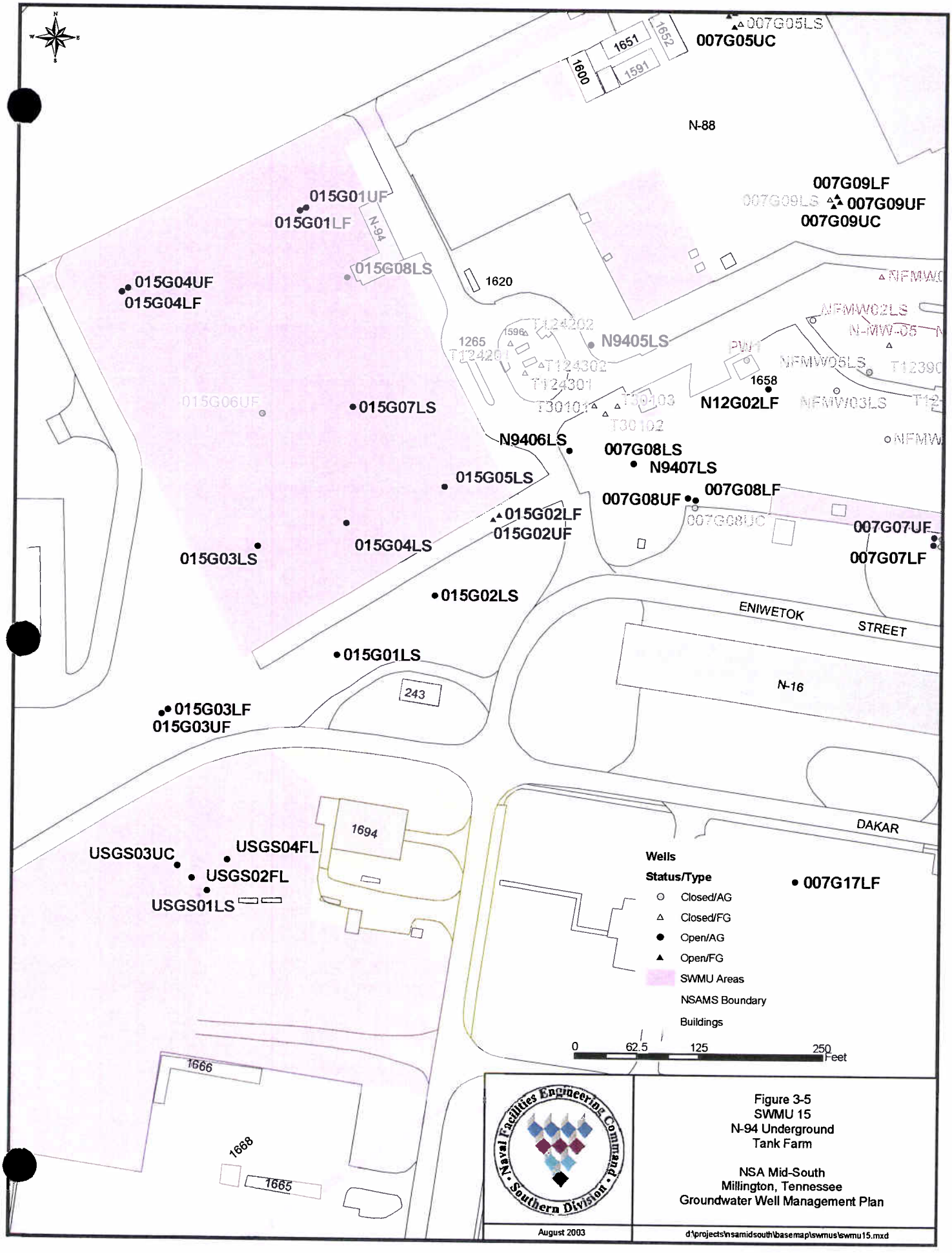


Figure 3-4
SWMU 60
Northside Landfill
Western Portion

NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan


007G05LS
007G05UC
1651
1652
1600
1591
N-88
007G09LF
007G09LS
007G09UF
007G09UC
015G01UF
015G01LF
N-94
015G08LS
1620
015G04UF
015G04LF
NFMW
NFMW02LS
N-MW-05
T124202
1265
1596
T124201
N9405LS
PW1
NFMW05LS
T124302
T124301
1658
015G06UF
015G07LS
T30101
T30103
N12G02LF
NFMW03LS
T30102
NFMW
N9406LS
007G08LS
N9407LS
015G05LS
007G08LF
007G08UF
007G08UC
015G02LF
015G02UF
007G07UF
015G04LS
015G03LS
007G07LF
015G02LS
ENIWETOK
STREET
015G01LS
N-16
243
015G03LF
015G03UF
DAKAR
1694
USGS03UC
USGS04FL
USGS02FL
USGS01LS
007G17LF
Wells
Status/Type
Closed/AG
Closed/FG
Open/AG
Open/FG
SWMU Areas
NSAMS Boundary
Buildings
0
62.5
125
250
Feet
1666
1668
1665
Naval Facilities Engineering Command
Southern Division
Figure 3-5
SWMU 15
N-94 Underground
Tank Farm
NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan
August 2003
d:\projects\nsamidsouth\basemap\swmus\swmu15.mxd

in service from 1943 until they were abandoned in 1986. They were removed in early 1992 under the Navy's UST program. Eight fluvial deposits monitoring wells (015G01LF, 01UF, 02LF, 02UF, 03LF, 03UF, 04LF and 04UF) were installed by E/A&H in 1996 during a follow-up RFI. Seven loess and one upper alluvial wells (015G01LS, 02LS, 03LS, 04LS,05LS, 06UF, 07LS, and 08LS) were installed in April 2002 for the CMS. The upper alluvial well (015G06UF) was abandoned later in 2001 and two wells (015G04LS, 015G07LS) were closed in August 2003. Figure 3-5 shows monitoring well locations for SWMU 15.

SWMU 18 *(N-112 Underground Waste Tank)* was an underground waste storage tank for the Building N-112 (Ground Support Equipment Shop) area. The tank and contaminated soil were removed on September 6, 1996, during a Voluntary Corrective Action (VCA) conducted by the Navy. The VCA provided evidence of a past release from this tank and an RFI was performed. As part of the RFI, one well (018G01LF) was installed on April 13, 1999, and screened in the fluvial deposits. Groundwater contamination at SWMU 18 has been incorporated into the AOC A Corrective Measures Study. Figure 3-6 shows well location at SWMU 18.

SWMU 21 (*N-10 Underground Waste Tank*), a 3,000-gallon UST near Building N-9 collected waste oil and hydraulic fluid from an automobile repair and aircraft maintenance shop. It was installed in 1943 and removed in November 1991. Four fluvial deposits monitoring wells (021G01LF, 02LF, 03LF, and 04UF) were installed by E/A&H in 1996 as part of the RFI. Groundwater contamination at SWMU 21 has been incorporated into the AOC A Corrective Measures Study. Figure 3-7 shows the monitoring well locations.

3.3.1.4 Assembly E

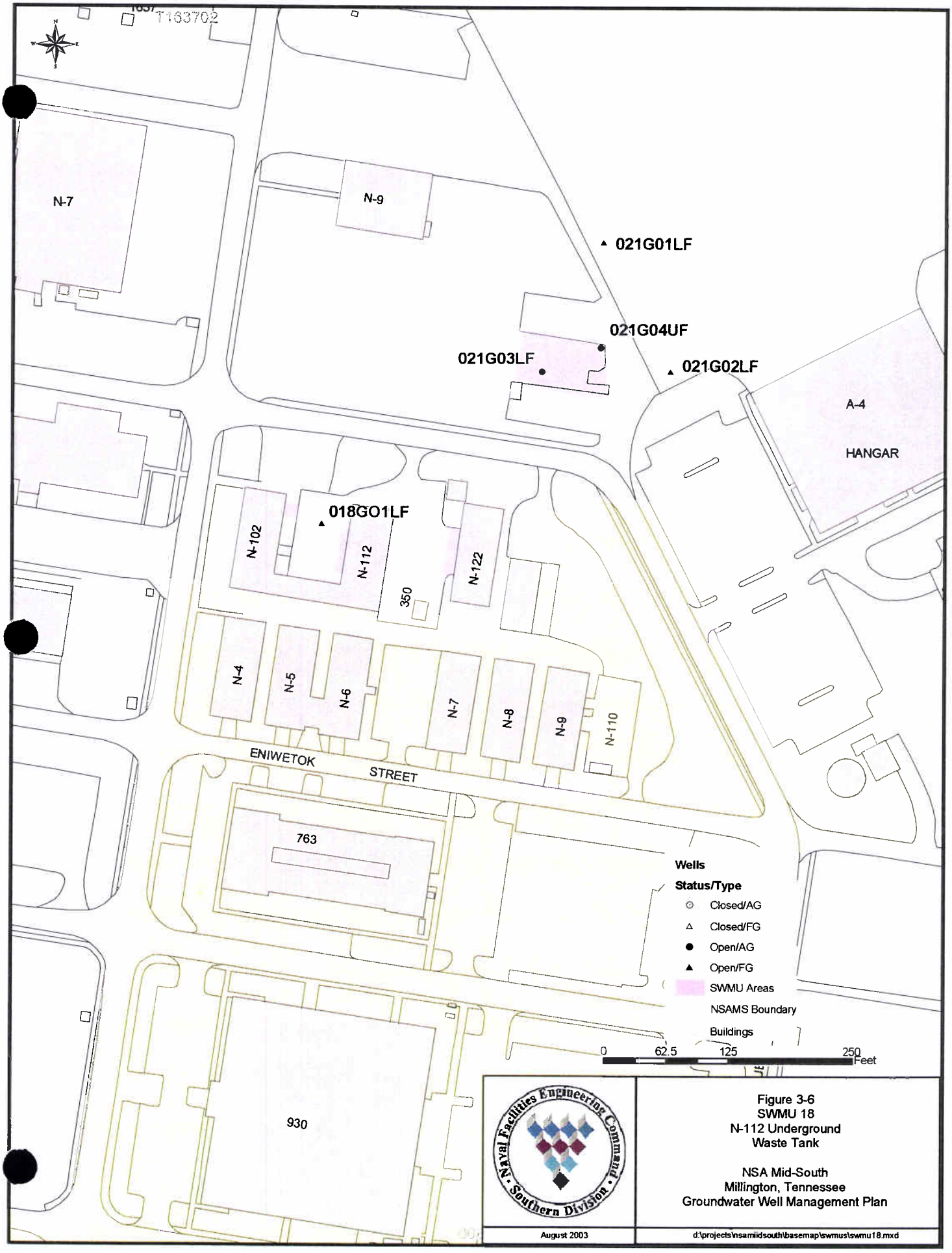
Assembly E includes SWMUs 2, 9, 14, 38, 59, and 65, which required full RFI characterization. Monitoring wells were installed at each Assembly E SWMU, except SWMU 38 (drainage ditches). No monitoring wells were installed at SWMU 38.

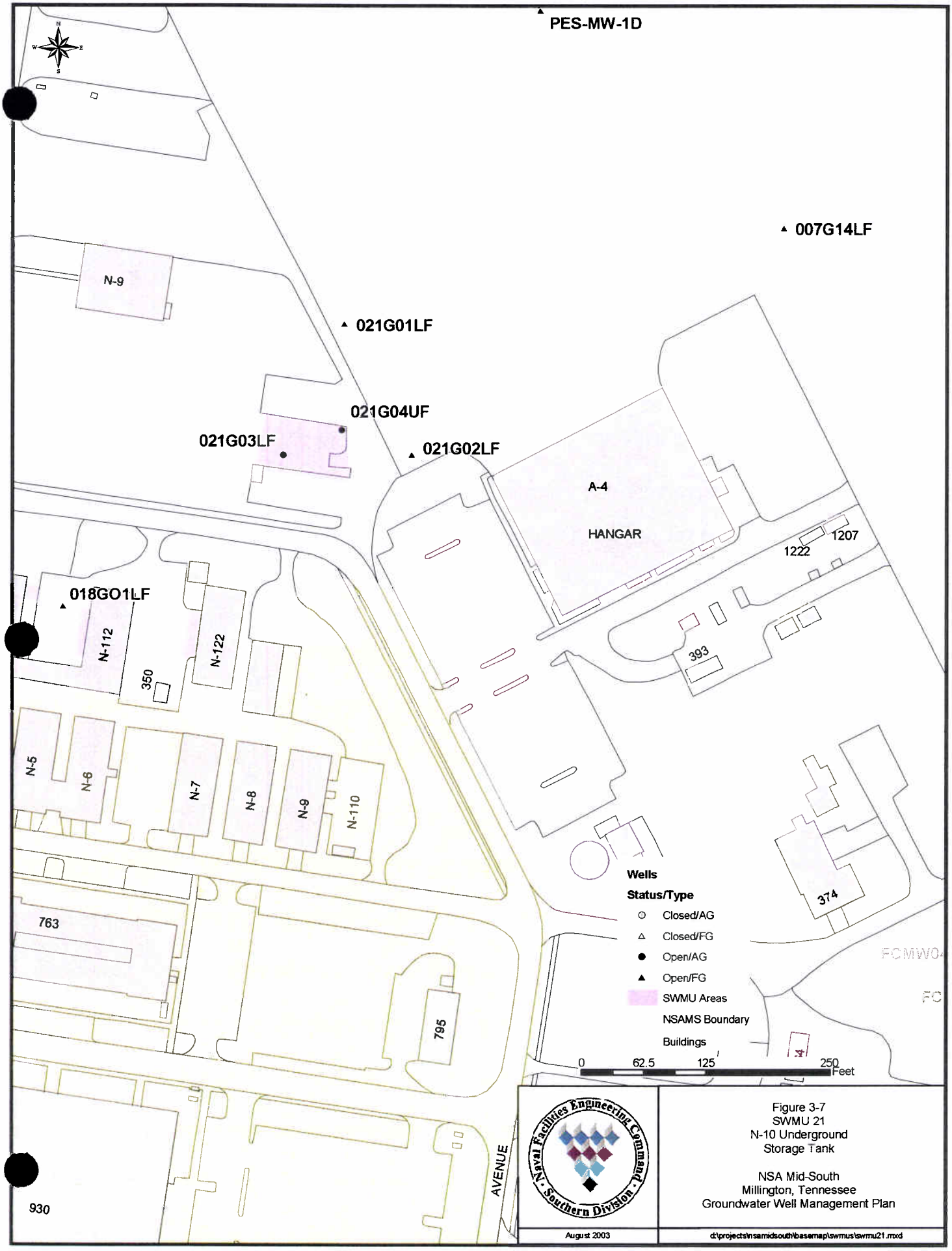
SWMU 2 (*Southside Landfill*) operated from 1942 to 1970 at the southeast corner of NSA Mid-South, adjacent to Big Creek Drainage Canal. G&M installed five monitoring wells

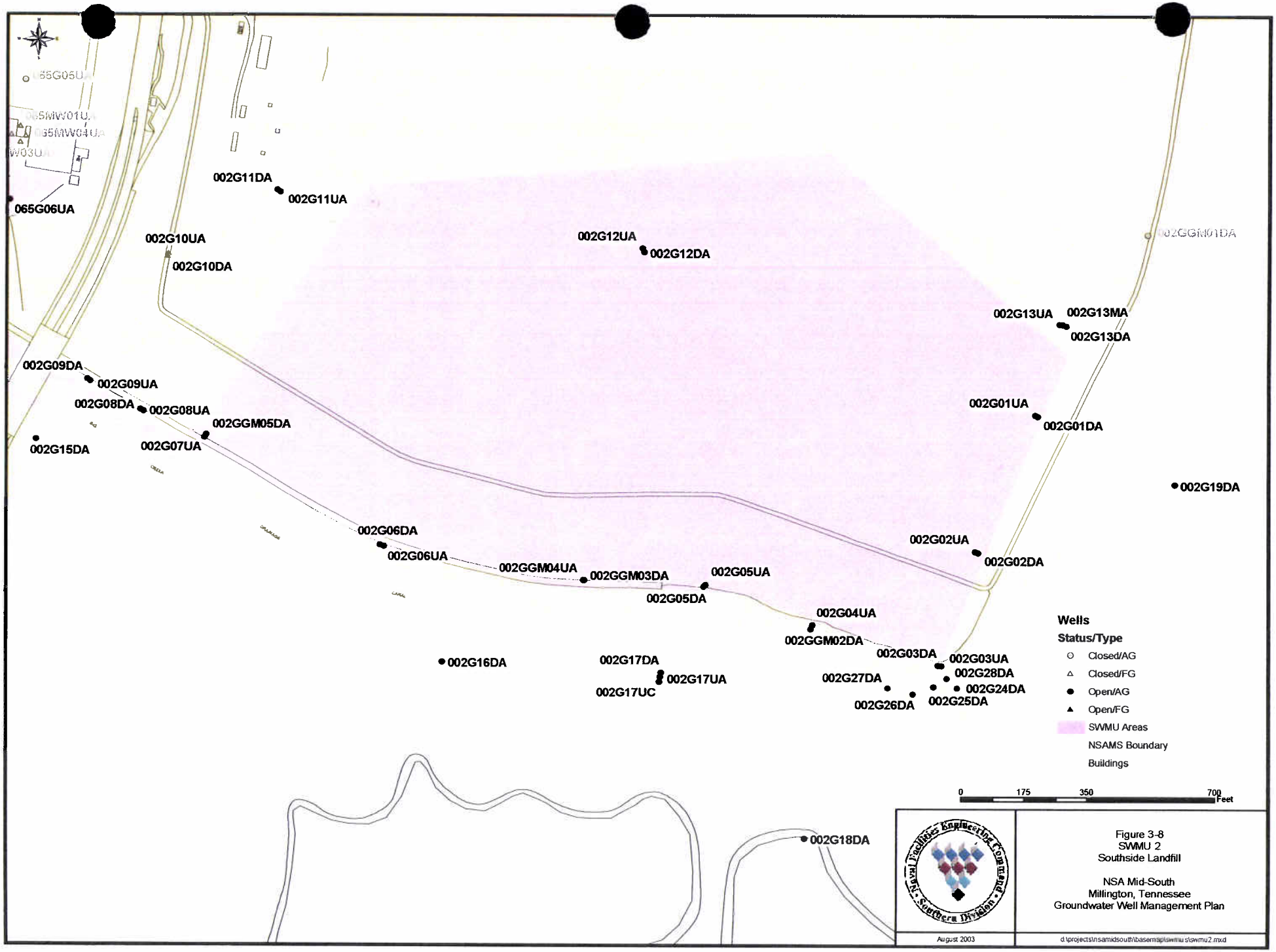
(002GGM01DA, 02DA, 03DA, 04UA, and 05DA) during the VS. E/A&H installed 27 additional monitoring wells (002G01DA, 01UA, 02DA, 02UA, 03DA, 03UA, 04UA, 05DA, 05UA, 06DA, 06UA, 07UA, 08DA, 08UA, 09DA, 09UA, 10DA, 10UA, 11DA, 11UA, 12DA, 12UA, 13DA, 13MA, 13UA, 14DA, and 14UA) which were screened in the alluvium during the RFI in 1996. EnSafe installed nine more wells (002G15DA, 16DA, 17DA,17UA, 18DA, 19DA, 20DA, 22DA, and 23DA) south of the Big Creek Drainage Canal in June 1998. In October 1998, monitoring well 002GM01DA (GM-1) was abandoned due to a U.S. Army Corps of Engineers' levee construction project. In August 1999 USGS installed one additional offsite monitoring well (002G17UA). In June 2001, five additional monitoring wells (002G24DA, 25DA, 26DA, 27DA, and 28DA) were installed along Big Creek, to further evaluate whether contaminants are migrating offsite. Figure 3-8 shows the well locations.

SWMU 9 (*Sewage Lagoons*) consists of two sewage lagoons on the southern boundary of the NSA Mid-South Southside, approximately 175 feet south of the Big Creek Drainage Canal and 200 feet west of the South Gate. The lagoons were once part of the base wastewater treatment system. The system primarily treated domestic wastewater, but reportedly did receive limited industrial wastewater from aircraft maintenance facilities. The lagoons were operated from 1969 until 1978, when the base connected its sewer system to the city of Millington's sewage treatment system. Four RFI wells (009G01LF, 02LF, 03LF, and 04LF) were installed at SWMU 9; all were screened in the alluvium. Figure 3-9 shows these well locations.

SWMU 14 (*Building S-140 Site and Seventh Avenue Ditch*) contained a paint spray booth, a paint removal area, and a paint wash-down area used to train Navy personnel in painting processes. It operated from 1943 until the building was demolished in 1985. Nine monitoring wells were installed during the RFI; five were screened in the loess and four were screened in the fluvial deposits. In April 2002, three additional loess wells were installed as part of the monitored natural attenuation treatability study. Figure 3-10 shows the monitoring well locations for SWMU 14.


T163702
N-7
N-9
021G01LF
021G04UF
021G03LF
021G02LF
A-4
HANGAR
018GO1LF
N-102
N-112
350
N-122
N-4
N-5
N-6
N-7
N-8
N-9
N-110
ENIWETOK
STREET
763
930
Wells
Status/Type
Closed/AG
Closed/FG
Open/AG
Open/FG
SWMU Areas
NSAMS Boundary
Buildings
0
62.5
125
250
Feet
Naval Facilities Engineering Command
Southern Division
Figure 3-6
SWMU 18
N-112 Underground
Waste Tank
NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan
August 2003
d:\projects\nsamidsouth\basemap\swmus\swmu18.mxd


PES-MW-1D
007G14LF
021G01LF
021G04UF
021G03LF
021G02LF
018GO1LF
N-9
A-4
HANGAR
1222
1207
393
N-112
N-122
350
N-5
N-6
N-7
N-8
N-9
N-110
763
795
374
930
AVENUE
Wells
Status/Type
Closed/AG
Closed/FG
Open/AG
Open/FG
SWMU Areas
NSAMS Boundary
Buildings
0
62.5
125
250
Feet
Naval Facilities Engineering Command
Southern Division
Figure 3-7
SWMU 21
N-10 Underground
Storage Tank
NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan
August 2003
d:\projects\nsamidsouth\basemap\swmus\swmu21.mxd


065G05UA
065MW01UA
065MW04UA
065G06UA
002G11DA
002G11UA
002G10UA
002G10DA
002G12UA
002G12DA
002GGM01DA
002G13UA
002G13MA
002G13DA
002G09DA
002G09UA
002G08DA
002G08UA
002GGM05DA
002G15DA
002G07UA
002G01UA
002G01DA
002G19DA
002G06DA
002G06UA
002GGM04UA
002GGM03DA
002G05UA
002G05DA
002G02UA
002G02DA
002G04UA
002GGM02DA
002G03DA
002G03UA
002G28DA
002G24DA
002G16DA
002G17DA
002G17UA
002G17UC
002G27DA
002G26DA
002G25DA
002G18DA
Wells
Status/Type
Closed/AG
Closed/FG
Open/AG
Open/FG
SWMU Areas
NSAMS Boundary
Buildings
0
175
350
700
Feet
Naval Facilities Engineering Command
Southern Division
Figure 3-8
SWMU 2
Southside Landfill
NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan
August 2003
d:\projects\nsamidsouth\basemaps\swmu s\swmu2.mxd

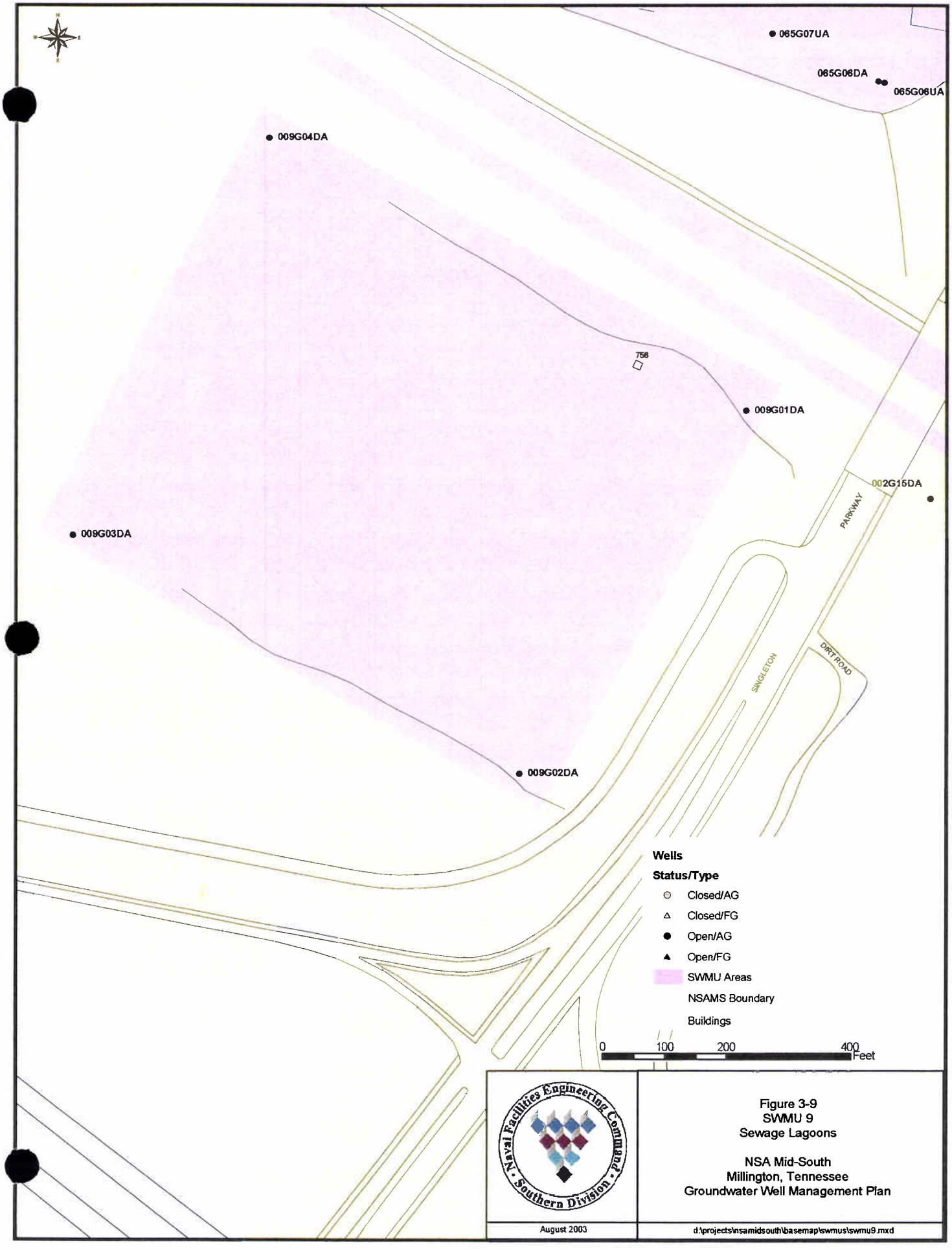
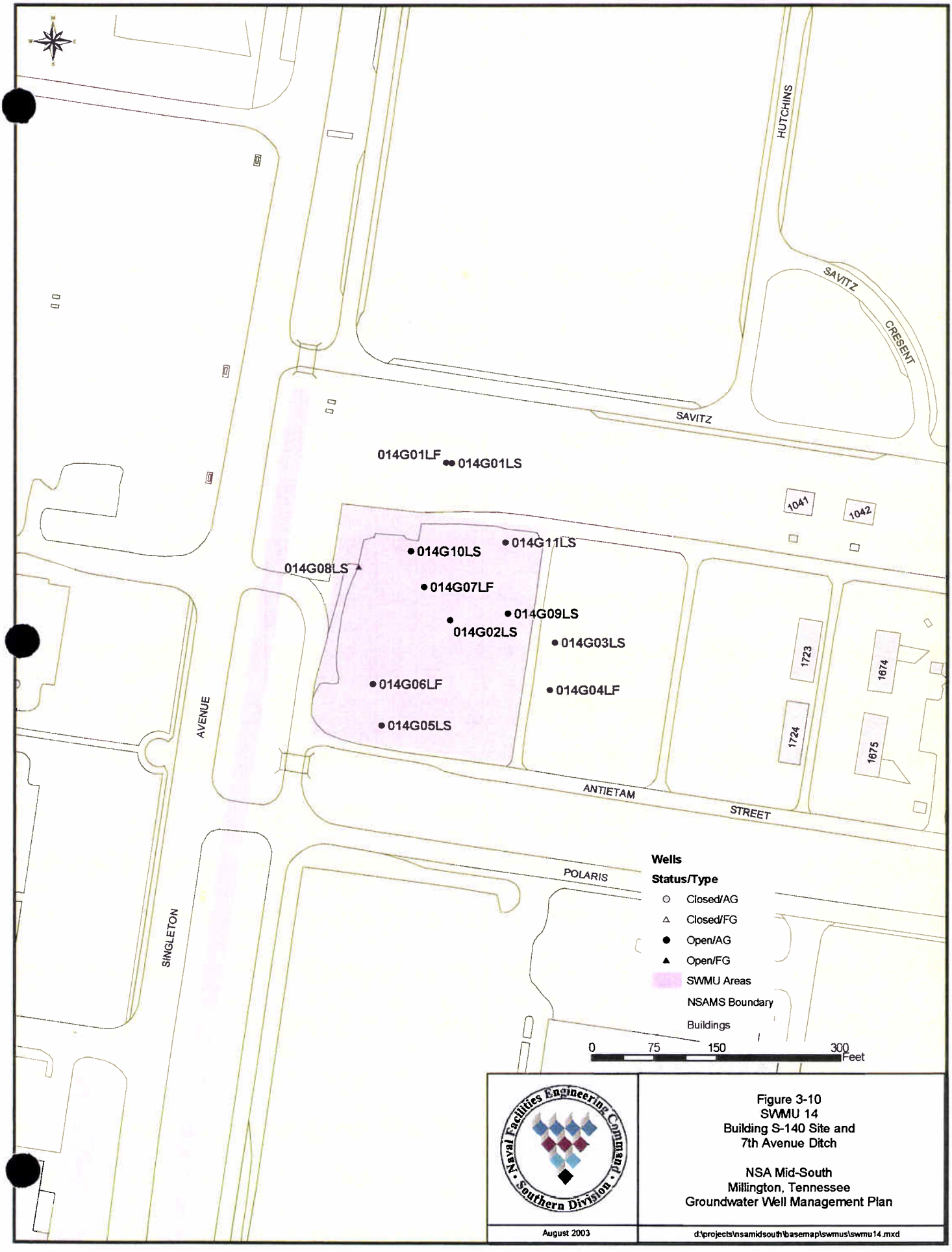


Figure 3-9
SWMU 9
Sewage Lagoons

NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan


HUTCHINS
SAVITZ CRESENT
SAVITZ
014G01LF
014G01LS
1041
1042
014G10LS
014G11LS
014G08LS
014G07LF
014G09LS
014G02LS
014G03LS
014G06LF
014G04LF
014G05LS
1723
1674
1724
1675
AVENUE
ANTIETAM STREET
POLARIS
SINGLETON
Wells
Status/Type
Closed/AG
Closed/FG
Open/AG
Open/FG
SWMU Areas
NSAMS Boundary
Buildings
0 75 150 300
Feet
Naval Facilities Engineering Command
Southern Division
Figure 3-10
SWMU 14
Building S-140 Site and
7th Avenue Ditch
NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan
August 2003
d:\projects\nsamidsouth\basemap\swmus\swmu14.mxd

SWMU 59 (*Pesticide Storage Facility [Old Pesticide Shop]*) stored pesticides and fertilizers. The age of the facility is unknown. Four monitoring wells (059G01LS, 02LS, 03LS and 03UF) were installed by E/A&H in 1996 during the RFI; three were screened in the loess and one was screened in the fluvial deposits. One well, 059G02LS,was closed during demolition of Building S-235 in the summer of 1998 to facilitate a Voluntary Corrective Action being conducted by EnSafe. In 2002, 059G01LS was damaged during construction activities; therefore, it was closed. Figure 3-11 shows monitoring well locations for SWMU 59.

SWMU 65 (*Building S-362 [Training Mock-Up Site*]) was used to train personnel in aircraft start-up. The site operated from the early 1950s until 1995. Four shallow alluvium monitoring wells (065MW01UA, 02UA, 03UA and 04UA) were installed by Memphis Environmental Center in November 1992 to investigate a JP-5 jet fuel spill at the site. Four additional monitoring wells (065G05UA, 06DA, 06UA and 07UA) were installed in the alluvium by E/A&H in 1996 during the RFI. One alluvium monitoring well (065G05UA) and the four MEC wells were abandoned in November 1998. Figure 3-12 shows the location of monitoring wells for SWMU 65.

3.3.1.5 Assembly F

Assembly F includes SWMUs 17, 19, 20, 22/63, 30, and 39. These SWMUs required Confirmatory Sampling Investigations (CSIs) to verify whether releases had occurred and, if so, whether RFI characterization was necessary. No monitoring wells were installed at SWMUs 17, 19, 22/63, or 30.

SWMU 20 *(1594 Underground Waste Tank)* was an abandoned underground waste tank reported to have received waste oil and hydraulic fluid generated by the Air Traffic Control School. The installation date of the tank, which was removed in May 1992 is unknown. As part of an ongoing RFI, three piezometers (PZ01, PZ02, and PZ03) (May 1998) and one monitoring well (020G0LF1) (April 1999) were installed. Figure 3-13 shows the location of piezometers and monitoring wells for SWMU 20.

SWMU 39 *(S-74 PCB Storage Area)* consisted of a concrete slab outside of Buildings S-74 and S-212. Transformers and drums of oil were stored on the slab until Building S-74 was demolished in 1995. Building S-74 was built in 1943 and operated as a laundry facility until 1981 (38 years). Building S-212 was built in 1947 and stored solvents used at Building S-74. As part of an ongoing RFI, five piezometers (039GPZ01, PZ02, PZ03, PZ04 and PZ05) (three in May 1998 and two in December 1998) were installed. Three of these piezometers have since been closed with only PZ-04 and PZ-05 still open. In March 1999, nine monitoring wells (039G01LF - 039G09LF) were installed as part of the investigation; in May 2002, four additional monitoring wells (039G10LF - 039G13LF) were installed for the CMS. All wells and piezometers are screened in the fluvial deposits. Figure 3-14 shows the location of monitoring wells and piezometers at SWMU 39.

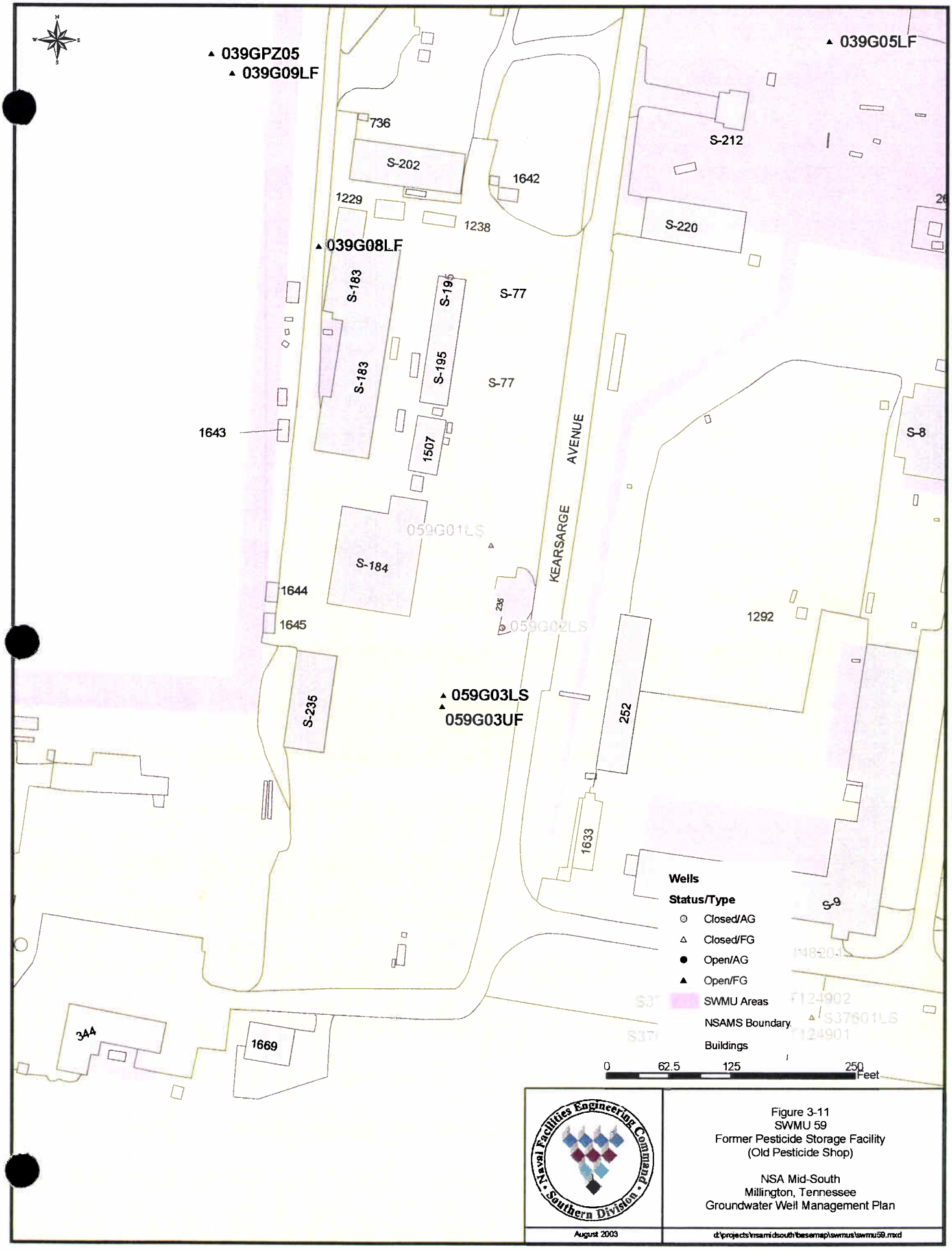
3.3.1.6 Assembly H

Assembly H includes SWMUs 23, 24, and 41. These SWMUs required Confirmatory Sampling Investigations (CSIs) to verify whether releases had occurred and, if so, whether RFI characterization was necessary. No monitoring wells were installed at SWMUs 23 or 24.

SWMU 41 *(Salvage Yard No. 2)* is an approximately 5,700-square-yard asphalt-covered storage yard used as a nonhazardous storage area. The salvage yard is reported to have been in operation since 1944. Although designated for nonhazardous storage, it may have received hazardous material. The yard was reported to have stored scrap metal, derelict equipment (planes, helicopters, etc.), tires, furniture, and batteries. Four monitoring wells (041G01DA - 041G04DA) screened in the alluvium were installed in April 1999 as part of the RFI. Figure 3-15 shows the location of the active monitoring wells for SWMU 41.

3.3.2 RFI Background Wells

Twenty-four background monitoring wells were installed at 14 locations around NSA Mid-South to establish ambient groundwater quality for the RFIs. The background wells were screened in either the loess, alluvium, upper fluvial deposits, lower fluvial deposits, or upper Cockfield Formation. Four of the wells have been closed. The background well sites are shown on the overview site maps (Northern and Southern Sections) located in Appendix C.


039GPZ05
039G09LF
039G05LF
736
S-202
1642
S-212
1229
1238
S-220
039G08LF
S-183
S-195
S-77
S-183
S-195
S-77
1643
1507
AVENUE
KEARSARGE
S-8
059G01LS
S-184
1644
1645
059G02LS
1292
059G03LS
059G03UF
S-235
252
1633
S-9
344
1669
Wells
Status/Type
Closed/AG
Closed/FG
Open/AG
Open/FG
SWMU Areas
NSAMS Boundary
Buildings
0
62.5
125
250
Feet
Naval Facilities Engineering Command
Southern Division
August 2003
Figure 3-11
SWMU 59
Former Pesticide Storage Facility
(Old Pesticide Shop)
NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan
d:\projects\nsamidsouth\basemap\swmus\swmu59.mxd

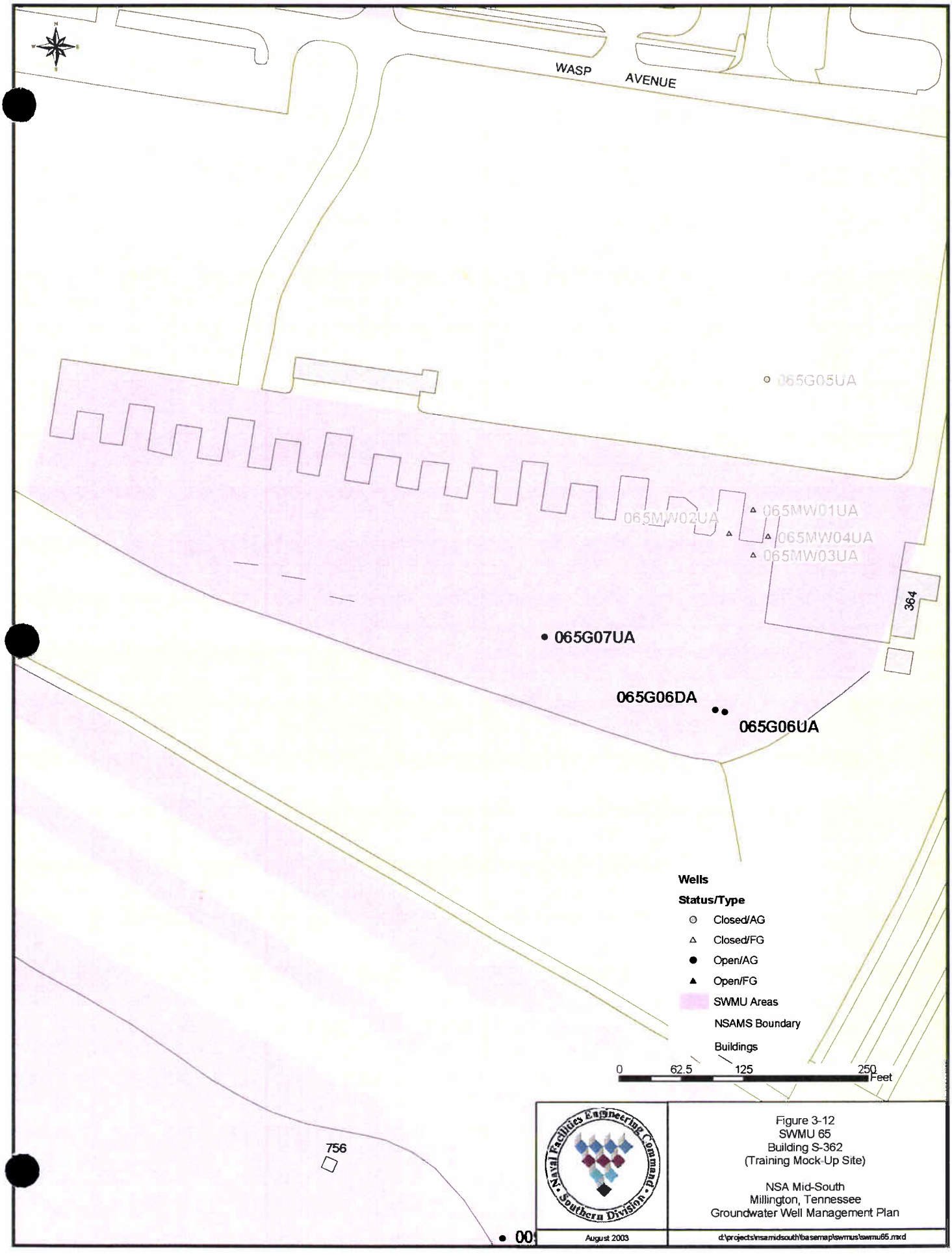


Figure 3-12
SWMU 65
Building S-362
(Training Mock-Up Site)

NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan

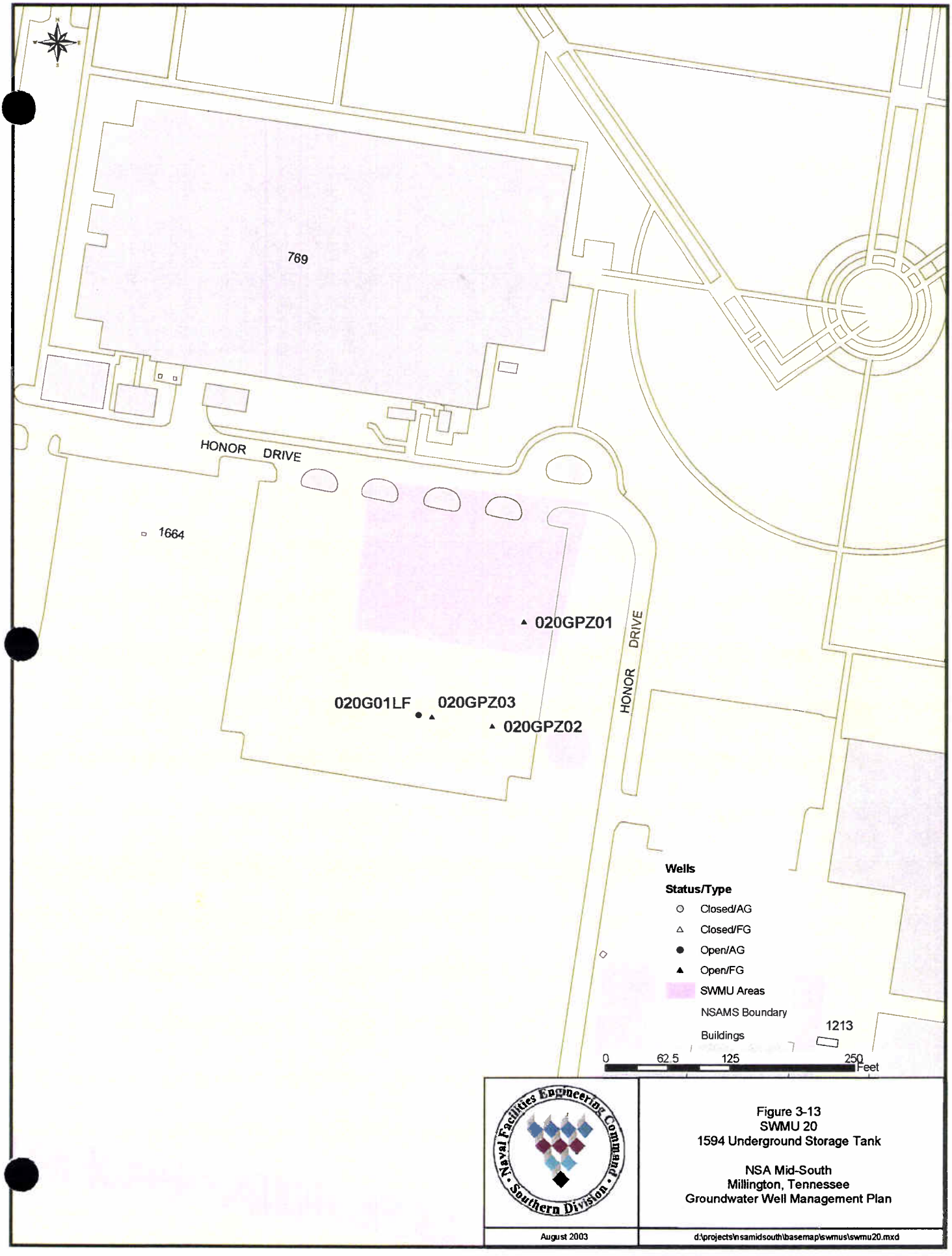
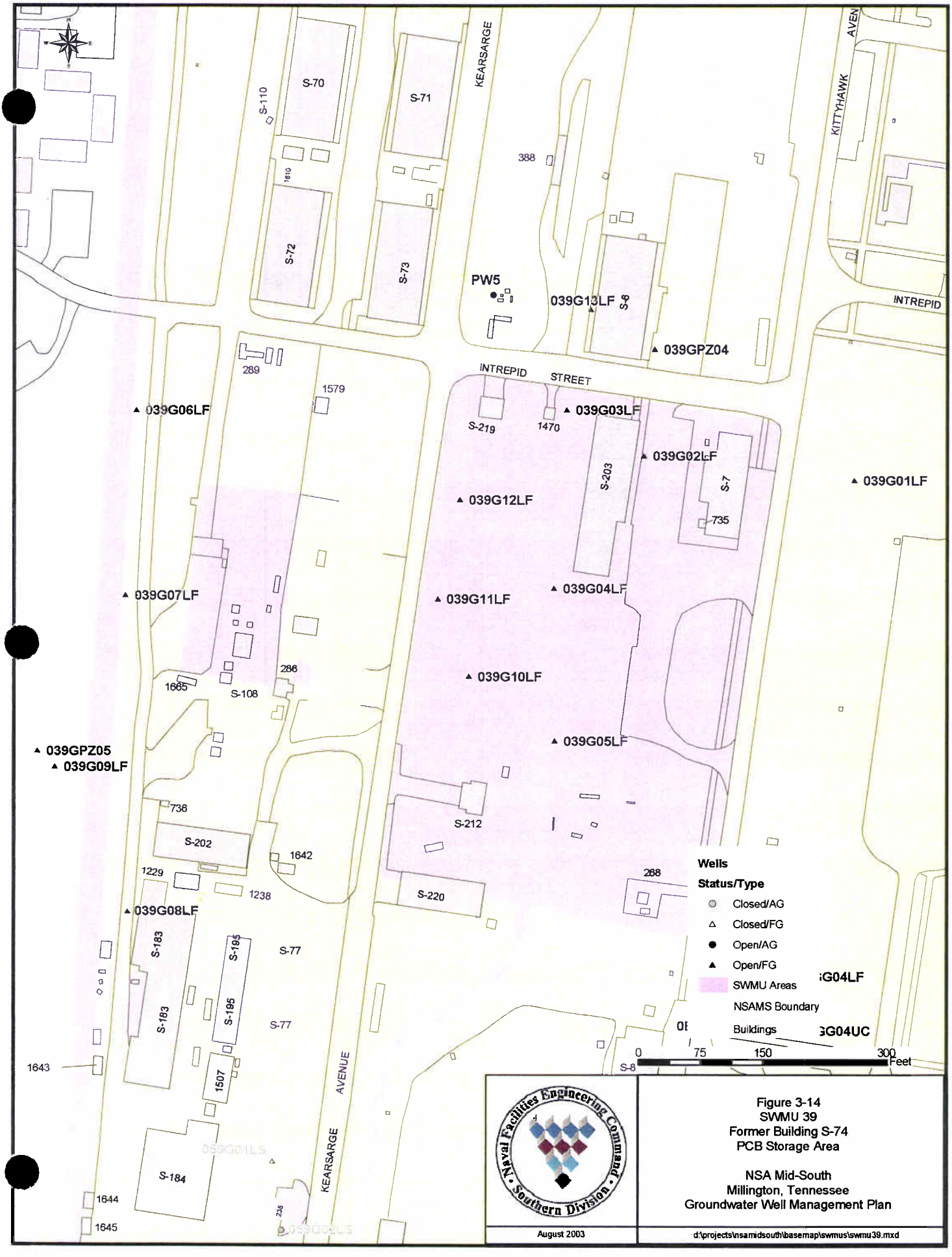


Figure 3-13
SWMU 20
1594 Underground Storage Tank

NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan

August 2003

d:\projects\nsamidsouth\basemap\swmus\swmu20.mxd


KEARSARGE
KITTYHAWK
AVEN
INTREPID
INTREPID STREET
S-70
S-71
S-72
S-73
S-110
1610
388
PW5
039G13LF
S-6
039GPZ04
289
1579
039G06LF
S-219
1470
039G03LF
039G02LF
S-203
S-7
735
039G01LF
039G12LF
039G07LF
039G11LF
039G04LF
286
1665
S-108
039G10LF
039GPZ05
039G09LF
039G05LF
736
S-212
S-202
1642
1229
1238
288
S-220
039G08LF
S-183
S-195
S-77
1643
1507
S-184
1644
1645
KEARSARGE AVENUE
Wells
Status/Type
Closed/AG
Closed/FG
Open/AG
Open/FG
SWMU Areas
NSAMS Boundary
Buildings
0
75
150
300
Feet
Figure 3-14
SWMU 39
Former Building S-74
PCB Storage Area
NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan
Naval Facilities Engineering Command
Southern Division
August 2003
d:\projects\nsamidsouth\basemap\swmus\swmu39.mxd

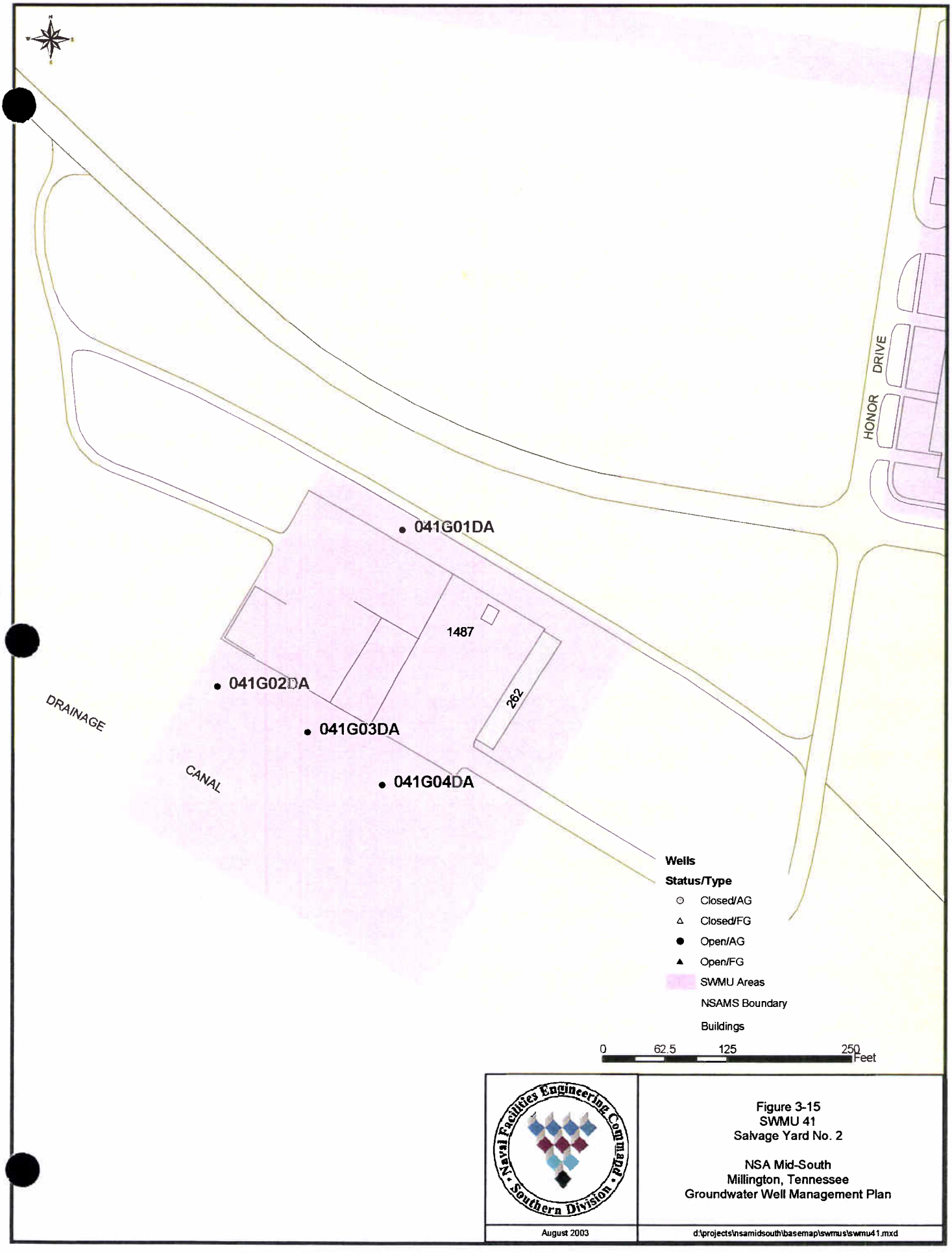


Figure 3-15
SWMU 41
Salvage Yard No. 2

NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan

August 2003

d:\projects\nsamidsouth\basemap\swmus\swmu41.mxd

3.3.3 Leak Detection Wells

Eight NSA Mid-South sites have had leak detection wells. Four leak detection wells were installed at the Navy Exchange Service Station on Navy Road in 1987 by Professional Services Industries (PSI; formerly Pittsburgh Testing and Engineering). Engineering, Design, and Geosciences Group, Inc. (EDGe; currently Ogden Engineering and Environmental Services, Inc.), installed 37 leak detection wells at seven UST sites between late 1989 and early 1990 as part of a UST upgrade program. With the exception of two wells at the Navy Exchange Service Station, all of these leak detection wells have been closed as a result of UST removals or closures. Table 3-2 lists each tank site and the number of leak detection wells formerly associated with them. Location of leak detection wells are shown on the overview site maps (Northern and Southern Sections) located in Appendix C.

Table 3-2
Leak Detection Wells

UST Site Name	Closest Building	Tank Number	Closed Leak Detection Wells	Site Map Figure #
North Fuel Farm	N-94	T301[a]	3	3-3
	N-94	T1242[a]	2	
	N-94	T1243[a]	2	
	N-126	T304[a]	2	
	N-126	T1239[a]	3	
JP-5 Fuel Farm	339	T336[b]	3	3-14
	339	T337[b]	3	
Navy Exchange	757	Unknown	2[c]	3-16
Navy Flying Club	374	T1205N[a]	2	3-17
	374	T1205S[a]	2	
Southside Service Station	S-376	T1482[a]	3	3-18
	S-376	T1249[a]	2	
AFFTA	1455	T1508[a]	3	3-2
	1455	T1489[a]	4	
Tank 1637	774	T1637	3	3-15

Notes:
a — Tank has been removed.
b — Tank has been cleaned for non-potable water storage.
c — Two other wells remain open.

3.3.4 UST and Miscellaneous Investigations

Monitoring wells have been installed during environmental assessments at 10 UST sites at NSA Mid South under TDEC UST Division regulations. While completing UST-related investigations at these sites, EnSafe, E/A&H and other contractors have installed 73 monitoring wells screened in the loess. Table 3-3 summarizes the UST assessments.

Table 3-3
UST Environmental Assessments

Site	Date mm/yr	Associated Tank(s)	Closed Monitoring Wells	Open Monitoring Wells	Related SWMUs
Navy Flying Club	05/93	T1205N, T1205S	6	0	None
N-126	05/93 07/94	T304, T1239 T7, T303, T1241	4 7	0 0	None
N-94	01/92	T301, T1242, T1243	0	3	7
AFFTA	07/92 06/94	T1489, T1508	7	4	5
Navy Hospital	05/92	T106, T107 (Not Regulated)	4	0	None
S-50	06/93	Not listed (Not Regulated)	5	0	None
S-376	07/92	T1249, T1482	4	0	None
Navy Exchange	02/86- 06/90	Unknown	6	20	None
S-237	09/92	T237	6	0	None
N-12	01/98	N-12	0	4	None

Navy Exchange (Building 757)

Resulting from a petroleum release in 1996, several investigations have been completed at the Navy Exchange Service Station. Since 1986, 19 monitoring wells have been installed by three different contractors: PSI, Harding-Lawson Associates, and EDGe. In 2001, CCI installed three recovery wells in the gravel backfill following a contaminated soil removal corrective action. A search of the Activity files and MSCHD records produced well construction logs for 21 of the 23 monitoring wells. Three monitoring wells (75702LS, 75712LS, and 75714LS) were closed in 2001 during the site's corrective action. Additionally, monitoring well 75715LS was closed at an

unknown date. Figure 3-16 shows the locations of active and abandoned wells at the Navy Exchange.

Navy Flying Club

A UST EA was completed at the Navy Flying Club in May 1993 to investigate petroleum releases from two USTs (T1205N and T1205S). Six monitoring wells (FCMW01LS -FCMW06LS) were installed by E/A&H and screened in the loess. The six EA monitoring wells were abandoned in March 1999 after TDEC approved closure of the site. Monitoring well locations are shown on the overview map (Northern Section) in Appendix C.

Southside Service Station (Building S-376)

In July 1992, four loess monitoring wells (S37601LS — S37604LS) were installed at the Southside Service Station (Building S-376) to assess a petroleum release. All four were screened in the loess and have been closed. Locations of these wells are shown on the overview map (Southern Section) in Appendix C.

North Fuel Farm (N-94 and N-126)

Four UST EAs were completed by EnSafe and E/A&H in the North Fuel Farm area. In October 1992, three loess monitoring wells (N9405LS, N9406LS, and N9407LS) were installed by EnSafe to complement four existing leak detection wells around the tank pits for tanks T301, T1242, and T1243. These wells (Figure 3-3) were used to assess possible releases from the vehiclefueling station at the N-94 Tank Farm Office. N9407LS was later renamed 007G08LS and functioned as the loess monitoring well in well cluster number 8 for the SWMU 7 RFI.

E/A&H completed a second UST EA around tanks T7, T303, and T1241 in May 1993, when six loess monitoring wells were installed. The 1993 wells are shown on Figure 3-3 as NFMW01LS through NFMW06LS. In July 1994, E/A&H installed three loess wells (N001LS, N002LS, N003LS) to assess the area around the third set of tanks (T304 and T1239). The 1993 and 1994 investigations were then combined. Tanks T304 and T1239 were removed by Morrison Knudsen Corp. in July 1997. Three monitoring wells (N001LS, N002LS, and N003LS) were abandoned and one recovery well (RW-1) was installed in the area during removal of the USTs. During September 1998, loess

monitoring well NFMW05LS was closed to remove impacted soil from the area. In October 1998, a 4-inch-diameter recovery well (N-MW-05) was installed to replace the abandoned NFMW05LS well. Both recovery wells (RW-1 and N-MW-05) and the five other NFMW wells have since been abandoned.

Four loess monitoring wells (N12G01LS through N12G04LS) were installed around Building N-12 (south of Hangar N-126 and east of North Fuel Farm) in January 1998 to investigate a release from a small fuel tank. These wells are currently open.

Aircraft Fire Fighting Training Area (SWMU 5)

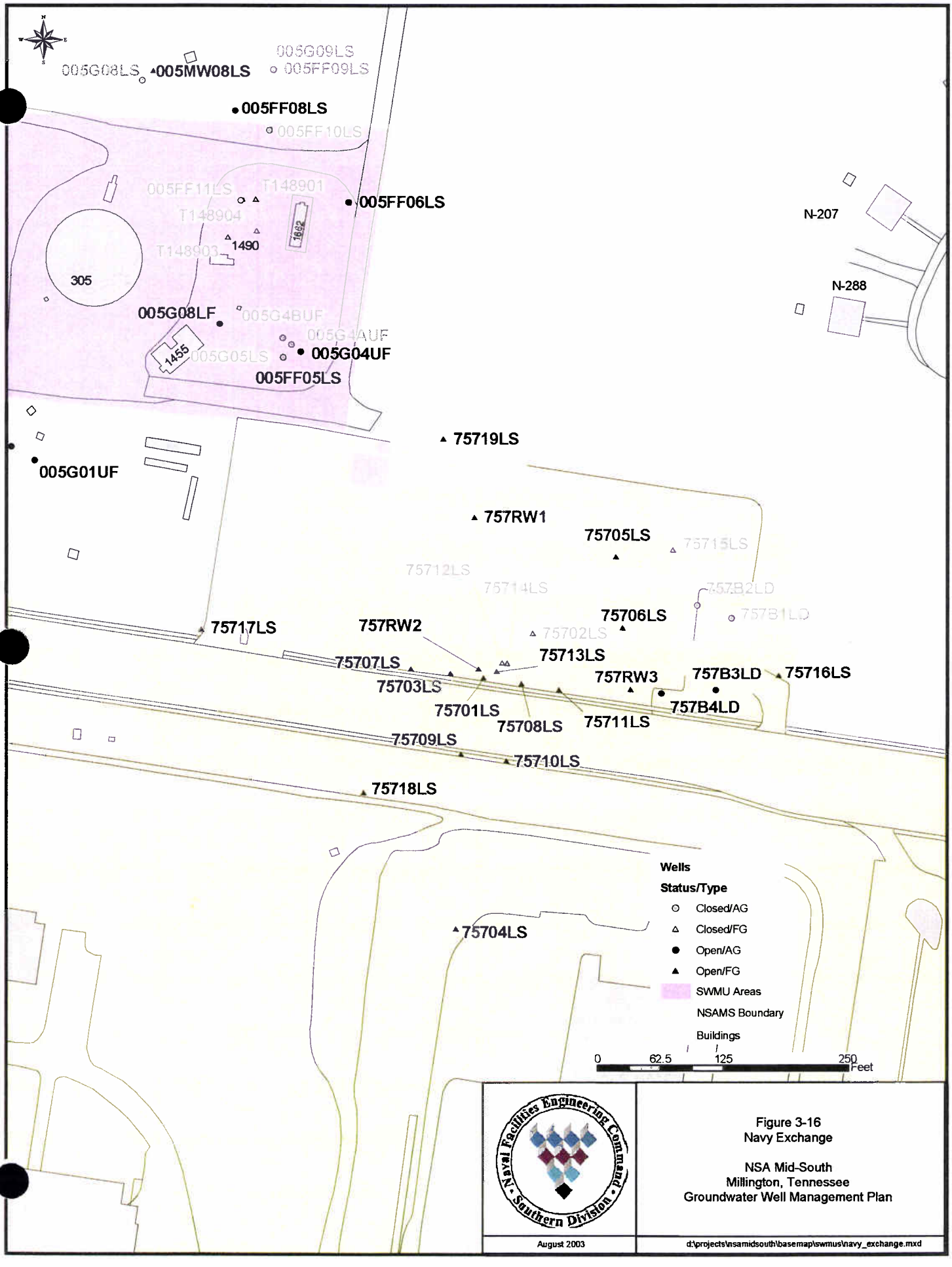
During a UST EA at the AFFTA in 1992, E/A&H installed 11 monitoring wells screened in the loess. Three wells were installed around tank T1508 and eight were installed around tank T1489. In 1995, the TDEC UST Division instructed the Navy to incorporate the findings of the UST EA into the SWMU 5 RFI. Seven additional loess monitoring wells were installed around the facility during the RFI. Seven of the eleven UST wells have been closed, including 005FF08LS which was abandoned during a contaminated soil removal, then replaced with a 4-inch-diameter recovery well (005G08LS). Five of the seven loess wells installed during the RFI have been closed. Figure 3-2 shows the locations of AFFTA/SWMU 5 wells.

Building S-237

Memphis Environmental Center completed a UST investigation at Building S-237, where six monitoring wells (S23701LS - S32706LS) were installed in September 1992. No report on the effort was located during assembly of the original well management plan; however, well permits and well logs were on file at the MSCHD. All six monitoring wells have been abandoned. Monitoring well locations are shown on the overview map (Southern Section) in Appendix C.

Navy Hospital

Four loess monitoring wells were installed by E/A&H in May 1992 to assess the release of fuel oil at the east end of the Naval Hospital, Building H-100. Monitoring well NH02LS was abandoned in August of 1996 and the other three (NH01LS, NH03LS, and NH04LS) were closed in March 1999.


005G08LS
005MW08LS
005G09LS
005FF09LS
005FF08LS
005FF10LS
005FF11LS
T148901
T148904
T148903
005FF06LS
1490
1662
305
005G08LF
005G4BUF
005G4AUF
1455
005G05LS
005G04UF
005FF05LS
N-207
N-288
75719LS
005G01UF
757RW1
75705LS
75715LS
75712LS
75714LS
757B2LD
757B1LD
75706LS
75717LS
757RW2
75702LS
75713LS
75707LS
75703LS
757RW3
757B3LD
75716LS
757B4LD
75701LS
75708LS
75711LS
75709LS
75710LS
75718LS
75704LS
Wells
Status/Type
Closed/AG
Closed/FG
Open/AG
Open/FG
SWMU Areas
NSAMS Boundary
Buildings
0
62.5
125
250
Feet
Naval Facilities Engineering Command • Southern Division •
Figure 3-16
Navy Exchange
NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan
August 2003
d:\projects\nsamidsouth\basemap\swmus\navy_exchange.mxd

The Navy Hospital UST site was closed after approval of a report prepared in accordance with *Technical Guidance Document (TGD) — 015, Procedure to Obtain Closure for Sites in the Monitoring Only Program, State of Tennessee, Department of Underground Storage Tanks, August 1, 1996.* Monitoring well locations are shown on the overview map (Northern Section) in Appendix C.

Building S-50

During a UST EA completed in June 1993 by E/A&H to assess a fuel oil UST release at Building S-50, five loess monitoring wells were installed. TDEC granted site closure in early 1994, and the wells were abandoned in August 1994. Overview map (Southern Section) in Appendix C shows locations of Building S-50 abandoned wells.

3.3.5 Other Water Wells

3.3.5.1 Production (Potable Water Supply) Wells

Four production wells currently supply NSA Mid-South with potable water. Table 3-4 lists their production capacity and total depth. A fifth production well (PW-N1), which is currently out of service, was active until November 30, 1994, when it was placed on emergency standby status as a precautionary measure because solvent contaminants were identified in the fluvial deposits nearby. Each production well is secured by a chain-link fence and locked gates. The Appendix C overview maps (Northern and Southern Sections) show the production well locations.

Table 3-4
Production Wells

Production Wells	Depth (Feet)	Formation	Capacity (gpm[a])
PW-N1	523	Memphis Sand	700-1,000
PW-N2	466	Memphis Sand	700-1,000
PW-N3	1,450	Fort Pillow	1,000-1,476
PW-S4	1,450	Fort Pillow	900-1,404
PW-S5	1,435	Fort Pillow	1,400-1,823

Note:
a — Gallons Per Minute

3.3.5.2 Non-Potable Water Supply Wells

Four of five non-potable water supply wells at NSA Mid-South are currently open. Table 3-5 lists these wells and their current use.

Table 3-5
Non-Potable Water Wells

Well Number	Current Use	Formation	Building
V-107 (OCP-1)	Ambient Monitoring	Fluvial Deposits	Building S-89
V-57 (GC-1)	Irrigation	Memphis Sand	Building S-26A
V-81 (RWY-9)	Ambient Monitoring	Fluvial Deposits	West end of runway 9-27
V-77 (N761-1)	Ambient Monitoring	Cockfield Formation	Building N-761 Lakehouse
S172-1	Closed 11/96	Cockfield Formation	Building S-172/Lakehouse

OCP-1 is in the Bathhouse (Building S-198) next to a small boiler and was used to fill the Officers Club pool with water. This well is screened in the fluvial deposits. The pump housing and connector rods were removed by the U.S. Geological Survey in late 1995. This well is currently used for ambient water level monitoring. Overview map (Southern Section) in Appendix C shows monitoring well location.

GC-1 is across Attu Street Extended from the golf course club house (Building N-26A). A pump is mounted at the wellhead. This well supplies irrigation water from the Memphis Sand aquifer to the golf course and is not connected to the potable water system. No additional specifications have been obtained for this well. Overview site maps in Appendix C shows monitoring well location.

RWY-9 is at the edge of the farm field north of the approach end of Runway 9, east of the radio receiver, Building 382. The well has a 4-inch polyvinyl chloride (PVC) casing and is screened in the fluvial deposits. The age and use of this well were not determined; however, since it is in a farm area and shallow, this well was likely used for irrigation. Overview map (Northern Section) in Appendix C shows monitoring well location.

N761-1 is inside the dining room closet of the Lakehouse (Building N-761). The 4-inch PVC casing is flush mounted with the floor. The age and original purpose of this well are not known, but it is currently used for ambient water level monitoring. This well is screened in the Cockfield Formation. Overview map (Northern Section) in Appendix C shows monitoring well location.

S172-1 was a 4-inch PVC well in a small storage yard just east of the Lakehouse, and adjacent to Building S-172. This well was closed by grouting in place in accordance with MSCHD *Well Construction Codes* in November 1995 by E/A&H. The purpose and age of this well are not known. It was screened in the Cockfield Formation. Overview map (Northern Section) in Appendix C shows monitoring well location.

3.3.5.3 Abandoned Production and Test Wells

Six production wells supplied potable water to NSA Mid-South from 1942 until 1983. As part of the potable water system upgrade, four wells (N-2, S-1, S-2, and S-3) were closed due to poor water quality (i.e., high iron content and high dissolved solids). The wells are reported to be 340 to 510 feet deep and screened in the "500 Foot Sands" aquifer, also known as the Memphis Sand aquifer. These wells were closed by completely filling each well casing with concrete. The two remaining wells, No. 1 (PW-N1) and No. 2 (PW-N2), were upgraded and three new potable wells were installed (PW-N3, PW-S4, and PW-S5). As part of the upgrade, a test well (TW01) was installed to assess the use of the Fort Pillow Aquifer of the Wilcox group as a water supply at NSA Mid-South. TW01 is near PW-S4 in the northwest corner of the NSA Mid-South Southside. The wellhead is an 8-inch steel casing that has been welded shut and secured. Wells PW-N3, PW-S4, and PW-S5 were screened in the Fort Pillow aquifer.

This page intentionally left blank.

Appendix A

Well Database

The following monitoring wells are located off base property:

002G15DA	**002G16DA**
002G17DA	**002G17UC**
002G18DA	**002G19DA**
002G20DA	**002G22DA**
002G23DA	**007G50LF**
007G51LF	**007G52LF**
007G53LF	**007G55LF**
007G56LF	**007GMCNA**
Williams	**Harris**
JonesWell	

GROUNDWATER MONITORING WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNINVL	SCRNL	SCRNS	GND MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
1	002G01DA	817079.4	383123.7	269.55	ALLUVIUM	MW-RFI-E	AG	021296	58	2.85	PVC	2	48' - 58'	10	0.01	266.9	4	H	E/A&H	OPEN	BLA
2	002G01UA	817072.7	383127.5	269.30	ALLUVIUM	MW-RFI-E	AG	021396	27	2.57999	PVC	2	17' - 27'	10	0.01	266.72	4	H	E/A&H	OPEN	BLA
3	002G02DA	816914.1	382744.3	269.56	ALLUVIUM	MW-RFI-E	AG	020796	51	2.47	PVC	2	41' - 51'	10	0.01	267.08	4	H	E/A&H	OPEN	BLA
4	002G02UA	816909.9	382747.2	269.57	ALLUVIUM	MW-RFI-E	AG	021396	27	2.13999	PVC	2	17' - 27'	10	0.01	267.43	4	H	E/A&H	OPEN	BLA
5	002G03DA	816801.6	382431.8	269.62	ALLUVIUM	MW-RFI-E	AG	020696	48	2.45999	PVC	2	38' - 48'	10	0.01	267.18	4	H	E/A&H	OPEN	BLA
6	002G03UA	816811.5	382429.8	269.73	ALLUVIUM	MW-RFI-E	AG	020696	27	2.45	PVC	2	17 - 27'	10	0.01	267.28	4	H	E/A&H	OPEN	BLA
7	002G04UA	816456.9	382542.8	268.76	ALLUVIUM	MW-RFI-E	AG	020596	27	2.23	PVC	2	17' - 27'	10	0.01	266.53	4	H	E/A&H	OPEN	BLA
8	002G05DA	816154.1	382650.0	269.33	ALLUVIUM	MW-RFI-E	AG	020596	50.5	2.16999	PVC	2	40.5' - 50.5'	10	0.01	267.16	4	H	E/A&H	OPEN	BLA
9	002G05UA	816158.7	382653.8	269.39	ALLUVIUM	MW-RFI-E	AG	020596	27	2.25	PVC	2	17' - 27'	10	0.01	267.14	4	H	E/A&H	OPEN	BLA
10	002G06DA	815254.4	382763.8	269.69	ALLUVIUM	MW-RFI-E	AG	020296	54.5	1.82999	PVC	2	44.5' - 54.5'	10	0.01	267.86	4	H	E/A&H	OPEN	BLA
11	002G06UA	815264.8	382760.2	269.81	ALLUVIUM	MW-RFI-E	AG	020296	27	1.79	PVC	2	17' - 27'	10	0.01	267.82	4	H	E/A&H	OPEN	BLA
12	002G07UA	814765.1	383061.9	268.21	ALLUVIUM	MW-RFI-E	AG	020196	27	2.10999	PVC	2	17' - 27'	10	0.01	266.1	4	H	E/A&H	OPEN	BLA
13	002G08DA	814589.7	383140.9	269.33	ALLUVIUM	MW-RFI-E	AG	013196	55	2.22999	PVC	2	45' - 55'	10	0.01	267.1	4	H	E/A&H	OPEN	BLA
14	002G08UA	814587.8	383135.8	269.37	ALLUVIUM	MW-RFI-E	AG	020196	27	2.32	PVC	2	17' - 27'	10	0.01	267.05	4	H	E/A&H	OPEN	BLA
15	002G09DA	814443.9	383225.4	267.96	ALLUVIUM	MW-RFI-E	AG	013096	46	2.44999	PVC	2	36' - 46'	10	0.01	265.51	4	H	E/A&H	OPEN	BLA
16	002G09UA	814452.3	383220.3	268.09	ALLUVIUM	MW-RFI-E	AG	013096	27	2.40999	PVC	2	17' - 27'	10	0.01	265.68	4	H	E/A&H	OPEN	BLA
17	002G10DA	814662.2	383567.2	270.17	ALLUVIUM	MW-RFI-E	FG	021396	50	-0.25	PVC	2	40' - 50'	10	0.01	270.36	0	H	E/A&H	OPEN	BLA
18	002G10UA	814663.9	383575.9	270.19	ALLUVIUM	MW-RFI-E	FG	021396	32	-0.32	PVC	2	22' - 32'	10	0.01	270.36	0	H	E/A&H	OPEN	BLA
19	002G11DA	814966.6	383752.9	266.77	ALLUVIUM	MW-RFI-E	AG	011796	42.2	1.59999	PVC	2	32.2' - 42.2'	10	0.01	265.17	4	H	E/A&H	OPEN	BLA
20	002G11UA	814974.9	383747.3	266.91	ALLUVIUM	MW-RFI-E	AG	011896	26.75	1.79	PVC	2	16.75'-26.75'	10	0.01	265.12	4	H	E/A&H	OPEN	BLA
21	002G12DA	815968.4	383581.1	268.62	ALLUVIUM	MW-RFI-E	AG	013096	48.5	2.06999	PVC	2	38.5' - 48.5'	10	0.01	266.56	4	H	E/A&H	OPEN	BLA
22	002G12UA	815963.8	383591.7	268.83	ALLUVIUM	MW-RFI-E	AG	012996	27	1.98	PVC	2	17' - 27'	10	0.01	266.84	4	H	E/A&H	OPEN	BLA
23	002G13DA	817157.3	383977.1	268.12	ALLUVIUM	MW-RFI-E	AG	012096	65	2.07	PVC	2	55' - 65'	10	0.01	267.05	4	H	E/A&H	OPEN	BLA
24	002G13MA	817148.0	383381.3	268.20	ALLUVIUM	MW-RFI-E	AG	012296	46	1.95999	PVC	2	36' - 46'	10	0.01	267.23	4	H	E/A&H	OPEN	BLA
25	002G13UA	817138.9	383382.3	268.96	ALLUVIUM	MW-RFI-E	AG	012396	27	1.82999	PVC	2	17' - 27'	10	0.01	267.13	4	H	E/A&H	OPEN	BLA
26	002G14DA	817444.9	384419.9	271.00	ALLUVIUM	MW-RFI-E	AG	021496	50	2	PVC	2	40' - 50'	10	0.01	269	4	H	E/A&H	OPEN	BLA
27	002G14UA	817436.7	384419.8	271.23	ALLUVIUM	MW-RFI-E	AG	021496	27	2.06	PVC	2	17' - 27'	10	0.01	269.17	4	H	E/A&H	OPEN	BLA
28	002G15DA	814302.4	383055.5	269.20	ALLUVIUM	MW-RFI-E	AG	06_98	57.30	2.9	PVC	2	47' - 57'	10	0.01	266.30	4	H	ENSAFE	OPEN	BLA
29	002G16DA	815425.7	382440.0	270.52	ALLUVIUM	MW-RFI-E	AG	06_98	76.50	3	PVC	2	46' - 56'	10	0.01	267.52	4	H	ENSAFE	OPEN	BLA
30	002G17UA	814302.4	383070.5	NA	ALLUVIUM	MW-RFI-E	AG	81899	30	NA	PVC	2	20' - 30'	10	0.01	NA	4	BOX	USGS	OPEN	BLA
31	002G17DA	816037.3	382410.1	271.27	ALLUVIUM	MW-RFI-E	AG	06_98	77.50	3	PVC	2	40' - 50'	10	0.01	268.27	4	BOX	ENSAFE	OPEN	BLA
32	002G17UC	816031.6	382384.7	271.15	ALLUVIUM	MW-RFI-E	AG	06_98	77.30	2.9	PVC	2	57' - 67'	10	0.01	268.25	4	BOX	ENSAFE	OPEN	BLA
33	002G18DA	816435.6	381849.2	271.30	ALLUVIUM	MW-RFI-E	AG	06_98	57.40	2.9	PVC	2	37' - 47'	10	0.01	268.40	4	H	ENSAFE	OPEN	BLA
34	002G19DA	817457.1	382834.0	271.21	ALLUVIUM	MW-RFI-E	AG	06_98	57.10	3.1	PVC	2	47' - 57'	10	0.01	268.11	4	H	ENSAFE	OPEN	BLA
35	002G20DA	814913.2	380712.2	270.06	ALLUVIUM	MW-RFI-E	AG	06_98	57.00	3	PVC	2	43' - 53'	10	0.01	267.06	4	H	ENSAFE	OPEN	BLA
36	002G22DA	813672.1	381757.1	269.85	ALLUVIUM	MW-RFI-E	AG	06_98	56.60	3.2	PVC	2	37' - 47'	10	0.01	266.65	4	H	ENSAFE	OPEN	BLA; 002G21 was a boring
37	002G23DA	816315.3	379536.3	273.38	ALLUVIUM	MW-RFI-E	AG	06_98	56.50	2.81	PVC	2	46' - 56'	10	0.01	270.57	4	H	ENSAFE	OPEN	BLA
38	002G24DA	816855.7	382368.9	271.59	ALLUVIUM	MW-CMS-E	AG	61201	58	1.89	PVC	2	41.4' - 51.4'	10	0.01	269.7	4	H	ENSAFE	OPEN	BLA
39	002G25DA	816790.4	382371.5	272.08	ALLUVIUM	MW-CMS-E	AG	61301	53	2.43	PVC	2	43' - 53'	10	0.01	270.37	4	H	ENSAFE	OPEN	BLA
40	002G26DA	816733.3	382351.4	266.52	ALLUVIUM	MW-CMS-E	AG	61401	48	1.74	PVC	2	38' - 48'	10	0.01	264.78	4	H	ENSAFE	OPEN	BLA
41	002G27DA	816864.5	382368.1	264.52	ALLUVIUM	MW-CMS-E	AG	61401	42.5	1.71	PVC	2	32.5' - 42.5'	10	0.01	262.81	4	H	ENSAFE	OPEN	BLA
42	002G28DA	816926.7	382395.4	269.83	ALLUVIUM	MW-CMS-E	AG	61601	50	1.99	PVC	2	40' - 50'	10	0.01	268.3	4	H	ENSAFE	OPEN	BLA
43	002GGM02DA	816452.5	382531.7	269.45	ALLUVIUM	MW-RFI-E	AG	061795	44	1.85	PVC	2	39' - 44'	5	0.01	267.6	4	H	G&M	OPEN	BLA
44	002GGM03DA	815822.4	382667.1	270.54	ALLUVIUM	MW-RFI-E	AG	121484	45	1.7	PVC	2	40' - 45'	5	0.01	268.84	4	H	G&M	OPEN	BLA
45	002GGM04UA	815818.6	382667.3	270.30	ALLUVIUM	MW-RFI-E	AG	121584	22	1.72	PVC	2	17' - 22'	5	0.01	268.58	4	H	G&M	OPEN	BLA
46	002GGM05DA	814768.9	383070.5	268.29	ALLUVIUM	MW-RFI-E	AG	121584	57	1.8	PVC	2	52' - 57'	5	0.01	266.49	4	H	G&M	OPEN	BLA
47	002GGM01DA	817381.8	383631.8	269.73	ALLUVIUM	MW-RFI-E	AG	120784	50.00	1.83	PVC	2	44' - 49'	5	0.01	267.9	0	N	G&M	CLOSED	BLA
48	003G01LS	814885.0	390696.4	286.41	LOESS	MW-RFI-A	AG	012595	22.55	1.42	PVC	2	12'- 22'	10	0.01	284.83	0	N	E/A&H	CLOSED	BLA
49	003G02LF	814864.5	390841.1	289.63	FLUVIAL	MW-RFI-A	AG	012695	20.00	3.63	PVC	2	10' - 20'	10	0.01	286	0	N	E/A&H	CLOSED	BLA
50	003G02LS	814867.4	390842.1	289.23	LOESS	MW-RFI-A	AG	012595	22.81	3.17	PVC	2	12.3' - 22.3'	10	0.01	286.13	0	N	E/A&H	CLOSED	BLA
51	003G02LS	814815.9	390800.4	285.03	LOESS	MW-RFI-A	FG	012695	19.75	-0.19	PVC	2	9.3' - 19.3'	10	0.01	285.05	0	N	E/A&H	CLOSED	BLA
52	003G03MF	814814.6	390793.1	284.90	FLUVIAL	MW-RFI-A	FG	012895	60.58	2.13	PVC	2	50.1' - 60.1'	10	0.01	282.65	0	N	E/A&H	CLOSED	BLA
53	003G04LF	814982.7	390736.4	284.27	FLUVIAL	MW-RFI-A	FG	012795	85.95	-0.33	PVC	2	75.5'-85.5'	10	0.01	284.35	0	H	E/A&H	OPEN	BLA
54	003G04LS	814972.8	390740.1	284.31	LOESS	MW-RFI-A	FG	012595	19.98	-0.19	PVC	2	9.5' - 19.5'	10	0.01	284.26	0	N	E/A&H	CLOSED	BLA
55	003G05MF	814831.8	390704.0	286.20	FLUVIAL	MW-RFI-A	AG	013095	86.72	2.11	PVC	2	56.2' - 66.2'	10	0.01	283.69	0	N	E/A&H	CLOSED	BLA

GROUNDWATER MONITORING WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNINVL	SCRNL	SCRNS	GND MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
56	003GGM06UF	814867.9	390847.4	286.25	FLUVIAL	MW-RFI-A	FG	120784	50	2.19	PVC	2	45' - 50'	5	0.01	286.47	4	H	G&M	OPEN	BLA
57	003GGM07UF	814876.4	390704.0	285.97	FLUVIAL	MW-RFI-A	AG	121184	60	2.48	PVC	2	55' - 60'	5	0.01	283.94	0	N	G&M	CLOSED	BLA
58	003GGM08LS	814841.7	390709.6	286.64	LOESS	MW-RFI-A	AG	121384	20	1.87	PVC	2	15' - 20'	5	0.01	285.13	0	N	G&M	CLOSED	BLA
59	005FF01LS	810977.6	390093.1	268.67	LOESS	MW-UST	AG	062292	20.3	1.58	PVC	2	15' - 20'	5	0.01	267.485	0	N	E/A&H	CLOSED	BLA
60	005FF02LS	810969.3	390137.6	267.77	LOESS	MW-UST	AG	062292	20.26	1.35	PVC	2	15' - 20'	5	0.01	266.804	0	N	E/A&H	CLOSED	BLA
61	005FF03LS	810952.6	390171.5	268.04	LOESS	MW-UST	AG	062292	21.29	1.31	PVC	2	16' - 21'	5	0.01	267.062	0	N	E/A&H	CLOSED	BLA
62	005FF04LS	810965.8	390178.8	267.44	LOESS	MW-UST	AG	062292	18.3	1.58	PVC	2	8' - 18'	10	0.01	266.218	0	N	E/A&H	CLOSED	BLA
63	005FF05LS	811385.2	389870.6	268.73	LOESS	MW-UST	AG	062492	18.06	1.61	PVC	2	8' - 18'	10	0.01	267.513	4	H	E/A&H	OPEN	BLA
64	005FF06LS	811650.1	390124.4	270.25	LOESS	MW-UST	AG	062492	22.68	1.62	PVC	2	12' - 22'	10	0.01	269.140	4	H	E/A&H	OPEN	BLA
65	005FF07LS	811538.6	390216.4	267.95	LOESS	MW-UST	AG	62592	17.92	1.44	PVC	2	7' - 17'	10	0.01	266.82	4	H	E/A&H	OPEN	BLA
66	005FF08LS	811444.8	390244.5	268.04	LOESS	MW-UST	AG	062592	17.92	1.44	PVC	2	7' - 17'	10	0.01	266.817	0	N	E/A&H	CLOSED	BLA
67	005FF09LS	811575.1	390255.6	267.73	LOESS	MW-UST	AG	062692	18.14	1.65	PVC	2	8' - 18'	10	0.01	266.424	4	H	E/A&H	OPEN	BLA
68	005FF10LS	811571.4	390195.2	268.16	LOESS	MW-UST	AG	062692	19.33	1.63	PVC	2	9' - 19'	10	0.01	266.890	0	N	E/A&H	CLOSED	BLA
69	005FF11LS	811542.7	390126.2	270.05	LOESS	MW-UST	AG	062692	18.23	1.57	PVC	2	8' - 18'	10	0.01	268.882	0	N	E/A&H	CLOSED	BLA
70	005G01UF	811337.6	389869.3	271.09	FLUVIAL	MW-RFI-A	AG	012995	54.5	2.39	PVC	2	44' - 54'	10	0.01	268.64	4	H	E/A&H	OPEN	BLA
71	005G02UF	810966.4	390019.5	270.06	FLUVIAL	MW-RFI-A	AG	021195	52.53	2.32	PVC	2	42' - 52'	10	0.01	267.74	4	H	E/A&H	OPEN	BLA
72	005G02LS	811386.1	390328.8	267.97	LOESS	MW-RFI-A	AG	021295	21.33	2.45	PVC	2	10.8' - 20.8'	10	0.01	266.46	4	H	E/A&H	OPEN	BLA
73	005G03UF	811377.6	390331.8	267.42	FLUVIAL	MW-RFI-A	AG	021295	53.37	2.01	PVC	2	41.8' - 51.8'	10	0.01	265.45	4	H	E/A&H	OPEN	BLA
74	005G04LS	810965.8	390274.2	266.92	LOESS	MW-RFI-A	AG	21196	20	2.83	PVC	2	ND	ND	0.01	264.7	0	N	ND	CLOSED	
75	005G04UF	811002.4	389978.1	269.03	FLUVIAL	MW-RFI-A	AG	021195	52.14	2.31	PVC	2	41.6' - 51.6'	10	0.01	266.72	4	H	E/A&H	OPEN	BLA
76	005G05LF	811314.0	389882.8	271.22	FLUVIAL	MW-RFI-A	AG	012995	68.1	2.52	PVC	2	57.6' - 67.6'	10	0.01	268.69	4	H	E/A&H	OPEN	BLA
77	005G05LS	811585.2	389970.6	268.73	LOESS	MW-RFI-A	AG	12995	16	1.97	PVC	2	ND	ND	0.01	266.76	0	N	ND	CLOSED	
78	005G06LS	811078.6	390274.3	266.83	LOESS	MW-RFI-A	AG	012995	20.78	2.22	PVC	2	10.3' - 20.3'	10	0.01	264.53	0	N	E/A&H	CLOSED	BLA
79	005G07LS	810925.6	390241.2	266.95	LOESS	MW-RFI-A	AG	012995	21.22	2.39	PVC	2	10.7' - 20.7'	10	0.01	264.48	0	N	E/A&H	CLOSED	BLA
80	005G08LF	811521.8	390003.8	270.38	FLUVIAL	MW-RFI-A	AG	080598	74.9	2.49	PVC	2	55'-65'	10	0.01	267.89	4	H	ENSAFE	OPEN	BLA
81	005G08LS	811465.9	390254.2	268.60	LOESS	MW-RFI-A	AG	013095	16.1	1.96	PVC	4	6.1' - 16.1'	10	0.01	266.08	0	H	USGS	OPEN	Replaced FF08LS
82	005G09LS	811575.1	390255.6	267.73	LOESS	MW-RFI-A	AG	012995	16.7	1.91	PVC	2	ND	ND	0.01	265.82	0	N	ND	CLOSED	
83	005G4AUF	811383.5	389983.1	269.19	FLUVIAL	MW-RFI-A	AG	022795	53.6	2.17	PVC	2	43.1' - 53.1'	10	0.01	266.93	0	N	E/A&H	CLOSED	BLA
84	005G4BUF	811694.8	389969.7	269.71	FLUVIAL	MW-RFI-A	AG	022795	52.2	2.02	PVC	2	42.7' - 52.7'	10	0.01	266.74	0	N	E/A&H	CLOSED	BLA
85	007G01LF	813857.9	391813.7	284.91	FLUVIAL	MW-RFI-A	AG	022595	71.77	1.92	PVC	2	61.3' - 71.3'	10	0.01	282.98	4	H	E/A&H	OPEN	BLA
86	007G01LS	813646.8	391816.3	284.74	LOESS	MW-RFI-A	AG	021195	22.52	2.29	PVC	2	12' - 22'	10	0.01	282.45	4	N	E/A&H	CLOSED	BLA
87	007G01UC	813649.8	391809.5	284.64	COCKFIELD	MW-RFI-A	AG	022495	109.8	2.17	PVC	2	99.3' - 109.3'	10	0.01	282.34	4	H	E/A&H	OPEN	BLA
88	007G01UF	813654.8	391820.4	285.00	FLUVIAL	MW-RFI-A	AG	022595	42.14	2.04	PVC	2	31.6' - 41.6'	10	0.01	282.95	4	H	E/A&H	OPEN	BLA
89	007G02LS	813743.2	391997.9	283.00	LOESS	MW-RFI-A	FG	020795	15	0	PVC	2	10'-20'	10	0.01	283	0	N	E/A&H	CLOSED	BLA; no UF/LF at this
90	007G02UC	813749.8	391986.1	283.18	COCKFIELD	MW-RFI-A	FG	022495	116.87	ND	PVC	2	106.4' - 116.4'	10	0.01	283.22	0	H	E/A&H	OPEN	BLA
91	007G03LF	813897.2	391835.9	283.52	FLUVIAL	MW-RFI-A	FG	021395	80.68	-0.52	PVC	2	70.2' - 80.2'	10	0.01	283.84	0	H	E/A&H	OPEN	BLA
92	007G03LS	813903.4	391834.2	283.47	LOESS	MW-RFI-A	FG	021195	21.1	-0.42	PVC	2	10.6' - 20.6'	10	0.01	283.89	0	N	E/A&H	CLOSED	BLA
93	007G03UC	813908.4	391840.7	283.47	COCKFIELD	MW-RFI-A	FG	021495	110.64	-0.46	PVC	2	100.2' - 110.2'	10	0.01	283.95	0	H	E/A&H	OPEN	BLA
94	007G03UF	813899.1	391842.2	283.26	FLUVIAL	MW-RFI-A	FG	021395	48.95	-0.57	PVC	2	38.3' - 48.3'	10	0.01	283.73	0	H	E/A&H	OPEN	BLA
95	007G04LF	813772.8	392183.3	283.12	FLUVIAL	MW-RFI-A	FG	022195	70.16	-0.67	PVC	2	59.7' - 69.7'	10	0.01	283.67	0	H	E/A&H	OPEN	BLA
96	007G04LS	813770.0	392172.0	283.87	LOESS	MW-RFI-A	FG	021795	20	0	PVC	2	10'-20'	10	0.01	283.87	0	N	E/A&H	CLOSED	BLA
97	007G04UC	813766.1	392179.6	283.39	COCKFIELD	MW-RFI-A	FG	021695	135.43	-0.34	PVC	2	124.9' - 134.9'	10	0.01	283.76	0	H	E/A&H	OPEN	BLA
98	007G04UF	813776.9	392175.8	283.21	FLUVIAL	MW-RFI-A	FG	022195	48.16	-0.5	PVC	2	37.7' - 47.7'	10	0.01	283.88	0	H	E/A&H	OPEN	BLA
99	007G05LF	813333.2	392052.0	282.26	FLUVIAL	MW-RFI-A	FG	022295	79.24	-0.41	PVC	2	68.7' - 78.7'	10	0.01	282.61	0	H	E/A&H	OPEN	BLA
100	007G05LS	813345.1	392043.9	282.43	LOESS	MW-RFI-A	FG	020995	20.4	-0.41	PVC	2	9.9' - 19.9'	10	0.01	282.78	0	N	E/A&H	CLOSED	BLA
101	007G05UC	813338.6	392040.9	282.38	COCKFIELD	MW-RFI-A	FG	022195	135	-0.34	PVC	2	124.5' - 134.5'	10	0.01	282.67	0	H	E/A&H	OPEN	BLA
102	007G05UF	813339.3	392054.9	282.42	FLUVIAL	MW-RFI-A	FG	022295	48.44	-0.41	PVC	2	37.9' - 47.9'	10	0.01	282.75	0	H	E/A&H	OPEN	BLA
103	007G06LF	813821.3	391462.4	286.52	FLUVIAL	MW-RFI-A	AG	021595	80.67	2	PVC	2	70.2' - 80.2'	10	0.01	284.47	4	H	E/A&H	OPEN	BLA
104	007G06LS	813812.0	391475.0	286.37	LOESS	MW-RFI-A	AG	021095	22.77	2.13	PVC	2	12.2' - 22.2'	10	0.01	284.21	0	N	E/A&H	CLOSED	BLA
105	007G06UC	813813.3	391462.8	286.49	COCKFIELD	MW-RFI-A	AG	021495	96.5	2.17	PVC	2	86' - 96'	10	0.01	284.29	0	N	E/A&H	CLOSED	BLA
106	007G06UF	813819.5	391473.9	286.48	FLUVIAL	MW-RFI-A	AG	022295	52.88	2.08	PVC	2	42.4' - 52.4'	10	0.01	284.37	4	H	E/A&H	OPEN	BLA
107	007G07LF	813544.9	391521.8	283.68	FLUVIAL	MW-RFI-A	AG	022395	80.94	1.67	PVC	2	70.4' - 80.4'	10	0.01	282.01	4	H	E/A&H	OPEN	BLA
108	007G07LS	813553.8	391528.0	284.44	LOESS	MW-RFI-A	AG	021095	22.66	2.46	PVC	2	12.2' - 22.2'	10	0.01	281.98	0	N	E/A&H	CLOSED	BLA
109	007G07UC	813552.7	391521.3	283.94	COCKFIELD	MW-RFI-A	AG	022295	105	1.96	PVC	2	94.5' - 104.5'	10	0.01	281.94	0	N	E/A&H	CLOSED	BLA
110	007G07UF	813545.9	391529.3	283.98	FLUVIAL	MW-RFI-A	AG	022395	53	1.96	PVC	2	42.5' - 52.5'	10	0.01	282.01	4	H	E/A&H	OPEN	BLA

GROUNDWATER MONITORING WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNINVL	SCRNL	SCRNS	GND MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
111	007G08LF	813303.5	391566.7	282.92	FLUVIAL	MW-RFI-A	AG	022595	79.06	1.96	PVC	2	68.6' - 78.6'	10	0.01	281.01	4	H	E/A&H	OPEN	BLA
112	007G08LS	813241.0	391602.0	286.32	LOESS	MW-RFI-A	AG	100892	17.8	2.53	PVC	2	10' - 20'	10	0.01	283.78	4	H	ND	OPEN	aka N9407LS
113	007G08UC	813303.4	391558.2	282.10	COCKFIELD	MW-RFI-A	AG	022495	126.2	2.04	PVC	2	117.7' - 127.7'	10	0.01	281.06	0	N	E/A&H	CLOSED	BLA
114	007G08UF	813285.7	391567.6	282.93	FLUVIAL	MW-RFI-A	AG	022595	45.04	2.13	PVC	2	38.5' - 48.5'	10	0.01	280.73	4	H	E/A&H	OPEN	BLA
115	007G09LF	813444.5	391872.2	282.85	FLUVIAL	MW-RFI-A	FG	021595	80.9	-0.34	PVC	2	70.4' - 80.4'	10	0.01	282.96	0	H	E/A&H	OPEN	BLA
116	007G09LS	813437.4	391868.9	282.54	LOESS	MW-RFI-A	FG	021295	20.15	-0.34	PVC	2	9.7' - 19.7'	10	0.01	282.89	0	N	E/A&H	CLOSED	BLA
117	007G09UC	813441.2	391862.5	282.55	COCKFIELD	MW-RFI-A	FG	021595	114.32	-0.34	PVC	2	103.8' - 113.8'	10	0.01	282.82	0	H	E/A&H	OPEN	BLA
118	007G09UF	813447.7	391866.3	282.90	FLUVIAL	MW-RFI-A	FG	021695	45.54	-0.41	PVC	2	35' - 45'	10	0.01	283.31	0	H	E/A&H	OPEN	BLA
119	007G10LF	813702.7	393099.1	282.01	FLUVIAL	MW-RFI-A	FG	031896	78	-0.21	PVC	2	68' - 78'	10	0.01	282.222	0	H	E/A&H	OPEN	BLA
120	007G11LF	813820.5	392805.6	282.94	FLUVIAL	MW-RFI-A	FG	031896	70	-0.42	PVC	2	60' - 70'	10	0.01	283.149	0	H	E/A&H	OPEN	BLA
121	007G12LF	814737.9	393025.9	298.78	FLUVIAL	MW-RFI-A	FG	031896	90	-0.42	PVC	2	80' - 90'	10	0.01	299.097	0	H	E/A&H	OPEN	BLA
122	007G13LF	814424.4	392303.1	292.96	FLUVIAL	MW-RFI-A	FG	031796	76	-0.32	PVC	2	66' - 76'	10	0.01	293.137	0	H	E/A&H	OPEN	BLA
123	007G14LF	815387.0	391998.1	296.43	FLUVIAL	MW-RFI-A	FG	031796	94	-0.21	PVC	2	84' - 94'	10	0.01	296.645	0	H	E/A&H	OPEN	BLA
124	007G15LF	814961.2	392221.1	293.36	FLUVIAL	MW-RFI-A	FG	031996	100	-0.42	PVC	2	90' - 100'	10	0.01	293.664	0	H	E/A&H	OPEN	BLA
125	007G15UF	814956.6	392229.8	292.91	FLUVIAL	MW-RFI-A	FG	031996	50	-0.79	PVC	2	40' - 50'	10	0.01	293.794	0	H	E/A&H	OPEN	BLA
126	007G16LF	814103.5	391871.7	287.63	FLUVIAL	MW-RFI-A	AG	031596	80	2.35100	PVC	2	70' - 80'	10	0.01	285.28	4	H	E/A&H	OPEN	BLA
127	007G17LF	813408.7	391181.3	283.20	FLUVIAL	MW-RFI-A	AG	031596	72	2.31	PVC	2	62' - 72'	10	0.01	280.893	4	H	E/A&H	OPEN	BLA
128	007G18LF	812726.2	392222.8	277.58	FLUVIAL	MW-RFI-A	FG	031996	100	-0.08	PVC	2	90' - 100'	10	0.01	277.804	0	H	E/A&H	OPEN	BLA
129	007G19LF	815410.0	393398.7	291.58	FLUVIAL	MW-RFI-A	FG	031497	69	ND	PVC	2	57'-67'	10	0.01	ND	0	H	ENSAFE	OPEN	BLA
130	007G20LF	813486.0	392485.9	282.70	FLUVIAL	MW-RFI-A	FG	071398	75.00	-0.12	PVC	2	65'-75'	10	0.01	282.62	0	H	ENSAFE	OPEN	BLA
131	007G21LF	813675.0	392560.3	283.66	FLUVIAL	MW-RFI-A	FG	071498	75.00	-0.29	PVC	2	65'-75'	10	0.01	283.96	0	H	ENSAFE	OPEN	BLA
132	007G22LF	813869.9	392656.1	284.88	FLUVIAL	MW-RFI-A	FG	071998	77.50	-0.29	PVC	2	67.5'-77.5'	10	0.01	285.15	0	H	ENSAFE	OPEN	BLA
133	007G22UC	813869.0	392671.6	284.63	COCKFIELD	MW-RFI-A	FG	072998	103.00	-0.22	PVC	2	93'-103'	10	0.01	285.05	0	H	ENSAFE	OPEN	BLA
134	007G23LF	814087.3	392726.4	285.85	FLUVIAL	MW-RFI-A	FG	073198	82.00	-0.26	PVC	2	72'-82'	10	0.01	286.19	0	H	ENSAFE	OPEN	BLA
135	007G24MF	814610.9	392815.6	289.06	FLUVIAL	MW-RFI-A	FG	073098	70.00	-0.25	PVC	2	60'-70'	10	0.01	289.31	0	H	ENSAFE	OPEN	BLA
136	007G25MF	814789.9	392868.0	289.97	FLUVIAL	MW-RFI-A	FG	080498	81.50	-0.33	PVC	2	71.5'-81.5'	10	0.01	290.30	0	H	ENSAFE	OPEN	BLA
137	007G26MF	814922.5	392954.1	290.13	FLUVIAL	MW-RFI-A	FG	080298	70.00	-0.27	PVC	2	60'-70'	10	0.01	290.40	0	H	ENSAFE	OPEN	BLA
138	007G27LF	812680.9	392553.5	276.77	FLUVIAL	MW-RFI-A	FG	072198	117.00	-0.09	PVC	2	107'-117'	10	0.01	276.86	0	H	ENSAFE	OPEN	BLA
139	007G28LF	813467.3	393309.6	281.91	FLUVIAL	MW-RFI-A	FG	071898	80.50	0.04	PVC	2	70.5'-80.5'	10	0.01	281.87	0	H	ENSAFE	OPEN	BLA
140	007G29LF	813594.0	393384.3	282.29	FLUVIAL	MW-RFI-A	FG	071798	80.00	-0.08	PVC	2	70'-80'	10	0.01	282.37	0	H	ENSAFE	OPEN	BLA
141	007G30LF	813714.3	393464.2	282.99	FLUVIAL	MW-RFI-A	FG	071998	80.00	-0.08	PVC	2	70'-80'	10	0.01	283.07	0	H	ENSAFE	OPEN	BLA
142	007G31LF	813353.8	393234.2	280.79	FLUVIAL	MW-RFI-A	FG	111898	78.00	ND	PVC	2	68'-78'	10	0.01	281.09	0	H	ENSAFE	OPEN	BLA
143	007G32LF	813604.1	393089.2	281.97	FLUVIAL	MW-RFI-A	FG	111998	78.00	ND	PVC	2	68'-78'	10	0.01	282.00	0	H	ENSAFE	OPEN	BLA
144	007G33LF	813206.4	392912.1	279.55	FLUVIAL	MW-RFI-A	FG	112098	85.00	ND	PVC	2	75'-85'	10	0.01	280.00	0	H	ENSAFE	OPEN	BLA
145	007G34LF	812981.7	393015.9	283.22	FLUVIAL	MW-RFI-A	FG	112198	91.00	1	PVC	2	81'-91'	10	0.01	284.00	0	H	ENSAFE	OPEN	BLA
146	007G35LF	812924.6	393736.6	281.77	FLUVIAL	MW-RFI-A	FG	112298	91.00	ND	PVC	2	81'-91'	10	0.01	282.00	0	H	ENSAFE	OPEN	BLA
147	007G36LF	812747.6	393592.0	280.72	FLUVIAL	MW-RFI-A	FG	112298	92.00	ND	PVC	2	82'-92'	10	0.01	281.00	0	H	ENSAFE	OPEN	BLA
148	007G37F1	812560.3	393729.0	280.29	LOESS	MW-RFI-A	FG	071499	90.00	-0.67	PVC	2	50'-90'	10	0.01	280.96	0	H	ENSAFE	OPEN	BLA; aquifer test
149	007G37L1	812553.3	393723.0	280.13	LOESS	MW-RFI-A	FG	072099	20.00	-0.81	PVC	2	10'-20'	10	0.01	280.94	0	H	ENSAFE	OPEN	BLA; aquifer test
150	007G37L2	812546.6	393715.6	280.22	LOESS	MW-RFI-A	FG	072099	40.00	-0.6	PVC	2	30'-40'	10	0.01	280.82	0	H	ENSAFE	OPEN	BLA; aquifer test
151	007G37LF	812875.8	393714.2	280.58	FLUVIAL	MW-RFI-A	AG	020299	91.00	0.07	PVC	4	51'-91'	40	0.01	280.52	4	H	ENSAFE	OPEN	BLA
152	007G37UC	812568.2	393734.7	280.42	COCKFIELD	MW-RFI-A	FG	071498	125.00	-0.85	PVC	2	115'-125'	10	0.01	281.07	0	H	ENSAFE	OPEN	BLA
153	007G38LF	812593.3	393399.2	279.96	FLUVIAL	MW-RFI-A	FG	020399	88.00	-0.16	PVC	2	48'-88'	40	0.01	280.12	0	H	ENSAFE	OPEN	BLA
154	007G39LF	812257.8	394136.8	284.91	FLUVIAL	MW-RFI-A	FG	020599	94.00	-0.32	PVC	2	54'-94'	40	0.01	285.23	0	H	ENSAFE	OPEN	BLA
155	007G40LF	812442.2	393202.9	279.03	FLUVIAL	MW-RFI-A	FG	020699	97.00	-0.18	PVC	2	57'-87'	30	0.01	279.21	0	H	ENSAFE	OPEN	BLA
156	007G41LF	812367.7	393876.5	281.89	FLUVIAL	MW-RFI-A	AG	020899	93.00	2.44	PVC	2	53'-93'	40	0.01	279.45	4	H	ENSAFE	OPEN	BLA
157	007G42LF	811564.9	394573.3	277.01	FLUVIAL	MW-RFI-A	AG	021099	85.00	2.1	PVC	2	45'-85'	40	0.01	274.91	4	H	ENSAFE	OPEN	BLA
158	007G43LF	812282.5	393011.3	277.25	FLUVIAL	MW-RFI-A	FG	021699	84.00	-0.26	PVC	2	44'-84'	40	0.01	277.51	0	H	ENSAFE	OPEN	BLA
159	007G44LF	811223.5	394206.6	274.41	FLUVIAL	MW-RFI-A	FG	021799	85.00	0.04	PVC	2	45'-85'	40	0.01	274.37	4	H	ENSAFE	OPEN	BLA
160	007G45LF	811901.4	394931.5	276.90	FLUVIAL	MW-RFI-A	FG	021999	83.00	-0.17	PVC	2	43'-83'	40	0.01	277.07	0	H	ENSAFE	OPEN	BLA
161	007G46LF	812114.6	392820.6	275.92	FLUVIAL	MW-RFI-A	FG	022199	82.00	-0.29	PVC	2	42'-82'	40	0.01	276.21	0	H	ENSAFE	OPEN	BLA
162	007G47LF	814805.3	397855.1	302.04	FLUVIAL	MW-RFI-A	FG	022899	82.00	-0.18	PVC	2	72'-82'	10	0.01	302.22	0	H	ENSAFE	OPEN	BLA
163	007G48LF	812942.1	396174.7	279.71	FLUVIAL	MW-RFI-A	FG	022399	113.00	-0.18	PVC	2	43'-113'	70	0.01	279.89	0	H	ENSAFE	OPEN	BLA
164	007G49LF	814783.2	392931.0	289.68	FLUVIAL	MW-RFI-A	FG	041399	98	0.3	PVC	2	86.5'-96.5'	40	0.01	289.98	0	H	ENSAFE	OPEN	BLA
165	007G50LF	809491.6	391883.0	271.11	FLUVIAL	MW-RFI-A	AG	07_99	ND	ND	PVC	2	ND	ND	0.01	261.71	4	H	USGS	OPEN	

GROUNDWATER MONITORING WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNINVL	SCRNL	SCRNS	GND MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
166	007G51LF	808735.7	397084.8	278.73	FLUVIAL	MW-RFI-A	FG	07_99	ND	ND	PVC	2	ND	ND	0.01	279.17	0	H	USGS	OPEN	
167	007G52LF	812022.1	395738.0	278.20	FLUVIAL	MW-RFI-A	AG	071499	85	2.86	PVC	2	75'-85'	10	0.01	275.34	4	H	ENSAFE	OPEN	BLA
168	007G53LF	812124.5	396195.0	280.16	FLUVIAL	MW-RFI-A	AG	071499	78	3.04	PVC	2	68'-78'	10	0.01	277.12	4	H	ENSAFE	OPEN	BLA
169	007G54LF	812878.3	392837.0	278.64	FLUVIAL	MW-RFI-A	AG	072099	85	-0.3	PVC	2	75'-85'	10	0.01	278.94	4	H	ENSAFE	OPEN	BLA
170	007G55LF	810649.4	398360.0	282.00	FLUVIAL	MW-RFI-A	AG	072099	105	3.24	PVC	2	85'-105'	10	0.01	278.76	4	BOX	ENSAFE	OPEN	BLA
171	007G56LF	811099.6	398282.0	280.63	FLUVIAL	MW-RFI-A	AG	072099	115	3.54	PVC	2	105'-115'	10	0.01	277.09	4	H	ENSAFE	OPEN	BLA
172	007G57LF	813751.3	397231.8	281.71	FLUVIAL	MW-CMS	FG	120399	75	-1.67	PVC	4	42'-72'	30	0.01	283.58	0	H	ENSAFE	OPEN	BLA; CMS; original TOC =
173	007G58LF	813776.4	392157.5	283.21	FLUVIAL	MW-CMS	FG	120399	80	-0.41	PVC	4	42'-72'	30	0.01	283.63	0	H	ENSAFE	OPEN	BLA; CMS; resurveyed 3/00
174	007G59LF	813790.3	392164.0	283.19	FLUVIAL	MW-CMS	FG	120399	75	-0.32	PVC	4	42'-72'	30	0.01	283.53	0	H	ENSAFE	OPEN	BLA; CMS; resurveyed 3/00
175	007G60LF	813797.4	392114.0	282.42	FLUVIAL	MW-CMS	FG	120399	85	-1.24	PVC	4	45'-75'	30	0.01	283.28	0	H	ENSAFE	OPEN	BLA; CMS
176	007G61LF	813813.1	392122.5	282.55	FLUVIAL	MW-CMS	FG	120399	75	-0.97	PVC	4	45'-75'	30	0.01	283.04	0	H	ENSAFE	OPEN	BLA; CMS
177	007G62LF	813795.3	392125.2	283.37	FLUVIAL	MW-CMS	FG	80300	75	-0.3	PVC	2	45' - 75'	30	0.01	283.37	0	H	ENSAFE	OPEN	BLA
178	007G63LF	813806.5	392130.7	283.40	FLUVIAL	MW-CMS	FG	80300	75	-0.24	PVC	2	45' - 75'	30	0.01	283.4	0	H	ENSAFE	OPEN	BLA
179	HARRIS	809840.1	399819.8	284.58	FLUVIAL	PRIVATE	AG	ND	ND	ND	PVC	ND	ND	ND	ND	ND	0	ND	MIZE	OPEN	Not in use. Behind house
180	WILLIAMS	810098.4	399105.3	280.03	FLUVIAL	PRIVATE	AG	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	P	ND	OPEN	Nursery well
181	007GGM05MF	813750.6	392002.0	283.79	FLUVIAL	MW-RFI-A	FG	061085	48.9	0	PVC	2	ND	ND	ND	283.79	0	N	G&M	CLOSED	BLA; aka 0GMG05MF
182	007GMCNA	812147.0	397981.0	285.58	FLUVIAL	PRIVATE	AG	ND	ND	ND	PVC	2	ND	ND	ND	282.00	0	N	UNKNOWN	CLOSED	aka U-119 (McNa)
183	007GPZ01	814764.1	394828.4	285.49	FLUVIAL	MW-RFI-A	FG	112098	85	1	PVC	1	55' - 85'	10	0.01	286	0	H	ENSAFE	OPEN	BLA
184	007GPZ02	812554.9	394404.1	281.52	FLUVIAL	MW-RFI-A	FG	112098	65	0	PVC	1	55' - 65'	10	0.01	282	0	H	ENSAFE	OPEN	BLA
185	007GPZ03	812309.5	395402.1	278.18	FLUVIAL	MW-RFI-A	FG	112098	85	0	PVC	1	75' - 85'	10	0.01	279	0	H	ENSAFE	OPEN	BLA
186	007GPZ04	811191.7	392225.5	269.58	FLUVIAL	MW-RFI-A	FG	112098	87	0	PVC	1	75' - 85'	10	0.01	270	0	H	ENSAFE	OPEN	BLA
187	008G01FL	816350.3	398026.2	324.83	FLUVIAL	MW-RFI-A	AG	013195	50	2.69	PVC	2	30'-35'	5	0.01	322.14	0	N	E/A&H	CLOSED	BLA
188	008G02FL	816085.4	397857.5	327.56	FLUVIAL	MW-RFI-A	AG	021095	36.28	2.35	PVC	2	26.8' - 36.8'	10	0.01	324.94	0	N	E/A&H	CLOSED	BLA
189	008G02LS	816109.0	397873.0	ND	LOESS	MW-RFI-A	AG	020195	20	ND	PVC	2	10'-20'	10	0.01	325	0	N	E/A&H	CLOSED	BLA
190	008G03FL	816062.4	397926.7	327.46	FLUVIAL	MW-RFI-A	AG	020995	32.47	2.14	PVC	2	22' - 32'	10	0.01	325.23	0	N	E/A&H	CLOSED	BLA
191	008G04FL	816099.6	397986.2	327.37	FLUVIAL	MW-RFI-A	AG	020995	32.28	2.71	PVC	2	22.8' - 31.8'	10	0.01	324.43	0	N	E/A&H	CLOSED	BLA
192	008GGM10LS	816108.9	397946.4	329.56	LOESS	MW-RFI-BG	AG	061385	53	2.43	PVC	2	ND	ND	0.01	327.19	0	N	G&M	CLOSED	BLA
193	008GGM11LS	816199.1	398032.6	322.06	LOESS	MW-RFI-BG	AG	061485	30	2.73	PVC	2	25'-30'	5	0.01	319.33	0	N	G&M	CLOSED	BLA
194	008GGM12LS	816047.0	398050.4	324.86	LOESS	MW-RFI-BG	AG	061390	25.00	2.74	PVC	2	20'-25'	5	0.01	322.14	0	N	G&M	CLOSED	BLA
195	009G01DA	814064.6	383197.5	271.62	ALLUVIUM	MW-RFI-E	AG	021596	58	1.93	PVC	2	48'-58'	10	0.01	269.69	4	H	E/A&H	OPEN	BLA
196	009G02DA	813641.1	382613.2	270.80	ALLUVIUM	MW-RFI-E	AG	021696	46	1.95	PVC	2	36' - 46'	10	0.01	268.85	4	H	E/A&H	OPEN	BLA
197	009G03DA	812919.4	382996.7	269.05	ALLUVIUM	MW-RFI-E	AG	020196	55	1.87	PVC	2	45' - 55'	10	0.01	267.18	4	H	E/A&H	OPEN	BLA
198	009G04DA	813235.5	383635.2	270.09	ALLUVIUM	MW-RFI-E	AG	021596	72	1.94	PVC	2	62' - 72'	10	0.01	268.15	4	H	E/A&H	OPEN	BLA
199	014G01LF	815126.6	386066.9	269.11	FLUVIAL	MW-RFI-E	AG	012996	47	1.868	PVC	2	37' - 47'	10	0.01	267.242	4	H	E/A&H	OPEN	BLA
200	014G01LS	815133.7	386066.3	269.17	LOESS	MW-RFI-E	AG	012996	20.4	1.80500	PVC	2	10.4' - 20.4'	10	0.01	267.365	4	H	E/A&H	OPEN	BLA
201	014G02LS	815151.9	385976.0	270.12	LOESS	MW-RFI-E	AG	021496	20	1.67599	PVC	2	10' - 20'	10	0.01	268.444	4	H	E/A&H	OPEN	BLA
202	014G03LS	815258.5	385850.7	271.09	LOESS	MW-RFI-E	AG	021496	20	2.45499	PVC	2	10' - 20'	10	0.01	268.635	4	H	E/A&H	OPEN	BLA
203	014G04LF	815252.6	385792.7	270.88	FLUVIAL	MW-RFI-E	AG	012396	49	2.08099	PVC	2	39' - 49'	10	0.01	268.818	4	H	E/A&H	OPEN	BLA
204	014G05LS	815048.7	385749.7	270.12	LOESS	MW-RFI-E	AG	012196	20	1.88	PVC	2	10' - 20'	10	0.01	268.24	4	H	E/A&H	OPEN	BLA
205	014G06LF	815038.1	385800.0	270.57	FLUVIAL	MW-RFI-E	AG	012196	49	1.94599	PVC	2	39' - 49'	10	0.01	268.624	4	H	E/A&H	OPEN	BLA
206	014G07LF	815100.1	385917.7	270.63	FLUVIAL	MW-RFI-E	AG	012296	48	1.74799	PVC	2	38' - 48'	10	0.01	268.882	4	H	E/A&H	OPEN	BLA
207	014G08LS	815021.2	385941.3	268.14	LOESS	MW-RFI-E	FG	012296	20	-0.5	PVC	2	10' - 20'	10	0.01	268.515	0	H	E/A&H	OPEN	BLA
208	014G09LS	815202.1	385885.9	269.96	LOESS	MW-CMS-E	AG	042202	20	1.93	PVC	2	10'-20'	10	0.01	268.03	0	H	ENSAFE	OPEN	BLA
209	014G10LS	815084.1	385960.1	270.83	LOESS	MW-CMS-E	AG	042202	20	2.21	PVC	2	10'-20'	10	0.01	268.62	0	H	ENSAFE	OPEN	BLA
210	014G11LS	815199.1	385970.7	269.98	LOESS	MW-CMS-E	AG	042202	20	2.11	PVC	2	10'-20'	10	0.01	267.85	0	H	ENSAFE	OPEN	BLA
211	015G01LF	812891.2	391853.0	281.90	FLUVIAL	MW-RFI-C	AG	031396	85	2.43	PVC	2	75' - 85'	10	0.01	279.47	4	H	E/A&H	OPEN	BLA
212	015G01UF	812907.6	391859.2	282.06	FLUVIAL	MW-RFI-C	AG	031496	50	2.43	PVC	2	40' - 50'	10	0.01	279.63	4	H	E/A&H	OPEN	BLA
213	015G02LF	813106.3	391548.8	282.85	FLUVIAL	MW-RFI-C	FG	030696	85	-0.42	PVC	2	75' - 85'	10	0.01	283.36	0	H	E/A&H	OPEN	BLA
214	015G02UF	813100.0	391544.2	283.00	FLUVIAL	MW-RFI-C	FG	031196	46	-0.34	PVC	2	36' - 46'	10	0.01	283.2	0	H	E/A&H	OPEN	BLA
215	015G03LF	812773.6	391349.6	282.55	FLUVIAL	MW-RFI-C	AG	031296	88	2.26	PVC	2	78' - 88'	10	0.01	280.29	0	H	E/A&H	OPEN	BLA
216	015G03UF	812766.6	391345.7	282.36	FLUVIAL	MW-RFI-C	AG	031296	54	2.26	PVC	2	44' - 54'	10	0.01	280.1	0	H	E/A&H	OPEN	BLA
217	015G04LF	812722.5	391769.5	280.41	FLUVIAL	MW-RFI-C	AG	031396	96	2.41	PVC	2	86' - 96'	10	0.01	278	0	H	E/A&H	OPEN	BLA
218	015G04UF	812728.9	391773.3	280.55	FLUVIAL	MW-RFI-C	AG	031396	46	2.41	PVC	2	46' - 56'	10	0.01	278.14	0	H	E/A&H	OPEN	BLA
219	015G01LS	812943.1	391407.4	278.52	LOESS	MW-CMS-C	AG	042602	18	1.71	PVC	2	8' - 18'	10	0.01	276.81	0	H	ENSAFE	OPEN	BLA
220	015G02LS	813041.7	391467.4	280.04	LOESS	MW-CMS-C	AG	042602	18	2.02	PVC	2	8' - 18'	10	0.01	278.02	0	H	ENSAFE	OPEN	BLA

GROUNDWATER MONITORING WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNINVL	SCRNL	SCRNS	GND MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
221	015G03LS	812862.1	391514.9	279.40	LOESS	MW-CMS-C	AG	042502	18	1.88	PVC	2	8.5' - 18.5'	10	0.01	277.82	0	H	ENSAFE	OPEN	BLA
222	015G04LS	812951.2	391539.2	280.51	LOESS	MW-CMS-C	AG	042602	28	2.02	PVC	2	9.8' - 19.8'	10	0.01	278.49	0	N	ENSAFE	CLOSED	BLA
223	015G05LS	813050.3	391577.1	282.85	LOESS	MW-CMS-C	AG	042502	20	2.23	PVC	2	9' - 19'	10	0.01	280.72	0	H	ENSAFE	OPEN	BLA
224	015G06UF	812885.3	391649.2	279.82	FLUVIAL	MW-CMS-C	AG	042402	38	1.88	PVC	2	28' - 38'	10	0.01	277.93	0	N	ENSAFE	CLOSED	BLA
225	015G07LS	812956.5	391656.5	280.72	LOESS	MW-CMS-C	AG	042402	23	1.85	PVC	2	11' - 21'	10	0.01	278.87	0	N	ENSAFE	CLOSED	BLA
226	015G08LS	812949.7	391786.1	282.53	LOESS	MW-CMS-C	AG	061202	20	2.74	PVC	2	10' - 20'	10	0.01	279.79	0	H	ENSAFE	OPEN	BLA
227	018G01LF	814582.6	391519.4	289.07	FLUVIAL	MW-RFI-C	FG	041399	93	-0.24	PVC	2	48'-88'	40	0.01	289.31	0	H	ENSAFE	OPEN	BLA
228	020G01LF	813075.9	385490.4	266.05	FLUVIAL	MW-RFI-F	AG	041099	76	-0.18	PVC	2	46'-76'	30	0.01	266.23	0	H	ENSAFE	OPEN	BLA
229	020GPZ01	813182.4	385585.0	265.72	FLUVIAL	MW-RFI-F	FG	041099	50.25	ND	PVC	1	45.25' - 50.25'	5	0.01	ND	0	H	ENSAFE	OPEN	
230	020GPZ02	813150.8	385479.3	265.93	FLUVIAL	MW-RFI-F	FG	041099	49.00	ND	PVC	1	44- 49'	5	0.01	ND	0	H	ENSAFE	OPEN	
231	020GPZ03	813090.0	385488.6	266.11	FLUVIAL	MW-RFI-F	FG	041099	47.00	ND	PVC	1	42' - 47'	5	0.01	ND	0	H	ENSAFE	OPEN	
232	021G01LF	814865.6	391801.7	295.42	FLUVIAL	MW-RFI-C	FG	022196	90	-0.53	PVC	2	80' - 90'	10	0.01	293.82	0	H	E/A&H	OPEN	BLA
233	021G02LF	814933.3	391871.8	294.57	FLUVIAL	MW-RFI-C	FG	022796	87	-0.42	PVC	2	77' - 87'	10	0.01	294.74	0	H	E/A&H	OPEN	BLA
234	021G03LF	814864.1	391871.8	294.43	FLUVIAL	MW-RFI-C	AG	022896	88	2.2	PVC	2	78' - 88'	10	0.01	292.23	4	H	E/A&H	OPEN	BLA
235	021G04UF	814862.1	391696.1	295.71	FLUVIAL	MW-RFI-C	AG	022796	50	2.05	PVC	2	40' - 50'	10	0.01	293.66	4	H	E/A&H	OPEN	BLA
236	039G01LF	811597.6	387714.0	261.13	FLUVIAL	MW-RFI-F	FG	032399	78	-0.31	PVC	2	44' - 74'	30	0.01	261.13	0	H	ENSAFE	OPEN	BLA
237	039G02LF	811343.9	387743.7	263.47	FLUVIAL	MW-RFI-F	FG	032499	108	-0.17	PVC	2	43' - 103'	60	0.01	263.47	0	H	ENSAFE	OPEN	BLA
238	039G03LF	811251.2	387798.6	262.33	FLUVIAL	MW-RFI-F	FG	032599	108	-0.41	PVC	2	43' - 103'	60	0.01	262.33	0	H	ENSAFE	OPEN	BLA
239	039G04LF	811236.1	387585.3	263.17	FLUVIAL	MW-RFI-F	FG	032699	103	-0.23	PVC	2	43' - 103'	60	0.01	263.17	0	H	ENSAFE	OPEN	BLA
240	039G05LF	811236.9	387399.9	262.43	FLUVIAL	MW-RFI-F	FG	032799	98	-0.27	PVC	2	43' - 93'	50	0.01	262.43	0	H	ENSAFE	OPEN	BLA
241	039G06LF	810731.7	387768.0	280.96	FLUVIAL	MW-RFI-F	FG	032898	78	-0.29	PVC	2	40' - 70'	30	0.01	280.96	0	H	ENSAFE	OPEN	BLA
242	039G07LF	810718.5	387575.9	262.79	FLUVIAL	MW-RFI-F	FG	033099	98	-0.35	PVC	2	43' - 93'	50	0.01	262.79	0	H	ENSAFE	OPEN	BLA
243	039G08LF	810721.7	387194.2	262.40	FLUVIAL	MW-RFI-F	FG	040899	98	-0.44	PVC	2	45' - 95'	50	0.01	262.4	0	H	ENSAFE	OPEN	BLA
244	039G09LF	810634.4	387349.2	262.85	FLUVIAL	MW-RFI-F	FG	040799	98	-0.19	PVC	2	43.5' - 93.5'	50	0.01	262.85	0	H	ENSAFE	OPEN	BLA
245	039G10LF	811193.4	387478.0	263.59	FLUVIAL	MW-CMS-F	FG	052202	94	-0.31	PVC	2	84' - 94'	10	0.01	263.9	0	H	ENSAFE	OPEN	BLA
246	039G11LF	811095.8	387572.2	263.05	FLUVIAL	MW-CMS-F	FG	052002	97	-0.1	PVC	2	87' - 97'	10	0.01	263.15	0	H	ENSAFE	OPEN	BLA
247	039G12LF	811122.5	387690.5	262.61	FLUVIAL	MW-CMS-F	FG	052102	91	-0.17	PVC	2	81' - 91'	10	0.01	262.78	0	H	ENSAFE	OPEN	BLA
248	039G13LF	811279.8	387918.4	263.76	FLUVIAL	MW-CMS-F	FG	052202	98	-0.22	PVC	2	88' - 98'	10	0.01	263.98	0	H	ENSAFE	OPEN	BLA
249	039GPZ01	811197.0	387617.0	265.30	FLUVIAL	MW-RFI-F	FG	03_99	ND	ND	PVC	1	ND	5	0.01	ND	0	N	ENSAFE	CLOSED	
250	039GPZ02	810935.0	387403.8	266.33	FLUVIAL	MW-RFI-F	FG	03_99	ND	ND	PVC	1	ND	5	0.01	ND	0	N	ENSAFE	CLOSED	
251	039GPZ03	810725.3	387658.6	265.35	FLUVIAL	MW-RFI-F	FG	03_99	ND	ND	PVC	1	ND	5	0.01	ND	0	N	ENSAFE	CLOSED	
252	039GPZ04	811156.7	387872.3	263.36	FLUVIAL	MW-RFI-F	FG	03_99	53.5	ND	PVC	1	48.5' - 53.5'	5	0.01	ND	0	H	ENSAFE	OPEN	
253	039GPZ05	810613.2	387386.8	262.81	FLUVIAL	MW-RFI-F	FG	03_99	54.00	ND	PVC	1	49' - 54'	5	0.01	ND	0	H	ENSAFE	OPEN	
254	041G01DA	812591.5	384512.4	267.51	ALLUVIUM	MW-RFI-G	AG	040899	88	2.43	PVC	2	48'-88'	40	0.01	267.51	4	H	ENSAFE	OPEN	BLA
255	041G02DA	812495.7	384355.3	265.92	ALLUVIUM	MW-RFI-G	AG	040999	88	2.84	PVC	2	48.3'-81.3'	35	0.01	265.92	4	H	ENSAFE	OPEN	BLA
256	041G03DA	812587.1	384309.2	265.41	ALLUVIUM	MW-RFI-G	AG	041199	83	2.33	PVC	2	44'-79'	35	0.01	265.41	4	H	ENSAFE	OPEN	BLA
257	041G04DA	812661.7	384255.6	264.93	ALLUVIUM	MW-RFI-G	AG	041199	88	2.39	PVC	2	44.6'-79.6'	35	0.01	264.93	4	H	ENSAFE	OPEN	BLA
258	059G01LS	810896.8	386895.3	263.24	LOESS	MW-RFI-E	FG	030496	20	-0.35	PVC	2	10' - 20'	10	0.01	263.403	0	N	E/A&H	CLOSED	BLA
259	059G02LS	810908.1	386812.6	265.18	LOESS	MW-RFI-E	AG	030296	20	2.01600	PVC	2	10' - 20'	10	0.01	263.164	0	N	E/A&H	CLOSED	BLA
260	059G03LS	810849.3	386742.5	263.35	LOESS	MW-RFI-E	FG	030496	20	-0.34	PVC	2	10' - 20'	10	0.01	263.535	0	H	E/A&H	OPEN	BLA
261	059G03UF	810847.9	386731.5	263.32	FLUVIAL	MW-RFI-E	FG	030496	50	-0.42	PVC	2	40' - 50'	10	0.01	263.506	0	H	E/A&H	OPEN	BLA
262	060G01LF	810324.8	391547.9	271.44	FLUVIAL	MW-RFI-A	AG	020295	75	2.35	PVC	2	65'-75'	10	0.01	269.19	0	N	E/A&H	CLOSED	BLA
263	060G01LS	810333.5	391525.9	271.88	LOESS	MW-RFI-A	AG	020295	18.65	2.13	PVC	2	ND	ND	0.01	269.75	0	N	E/A&H	CLOSED	
264	060G02LF	810214.2	391552.9	270.90	FLUVIAL	MW-RFI-A	AG	020295	94.56	2.47	PVC	2	85.1' - 95.1'	10	0.01	268.36	4	H	E/A&H	OPEN	BLA
265	060G02LS	810219.4	391344.6	270.84	LOESS	MW-RFI-A	AG	020195	22.68	1.99	PVC	2	12.2' - 22.2'	10	0.01	268.76	0	N	E/A&H	CLOSED	BLA
266	060G03LF	810464.9	391136.7	271.52	FLUVIAL	MW-RFI-A	AG	020795	90.63	2.62	PVC	2	80.1' - 90.1'	10	0.01	268.83	0	N	E/A&H	CLOSED	BLA
267	060G03LS	810470.1	391142.5	271.40	LOESS	MW-RFI-A	AG	020195	22.51	1.77	PVC	2	12' - 22'	10	0.01	269.63	0	N	E/A&H	CLOSED	BLA
268	060G04LF	810594.2	391301.2	272.31	FLUVIAL	MW-RFI-A	AG	020695	99.8	2.64	PVC	2	89.3' - 99.3'	10	0.01	269.56	4	H	E/A&H	OPEN	BLA
269	060G04LS	810601.7	391307.6	272.11	LOESS	MW-RFI-A	AG	013195	22.62	2.54	PVC	2	12.1' - 22.1'	10	0.01	269.45	0	N	E/A&H	CLOSED	BLA
270	060G05LS	810348.0	391584.0	272.00	LOESS	MW-RFI-A	AG	021395	20	2.3	PVC	2	10'-20'	10	0.01	269.7	0	N	E/A&H	CLOSED	BLA
271	060G06LS	810388.3	391525.2	271.98	LOESS	MW-RFI-A	AG	021395	28	2.13	PVC	2	10'-20'	10	0.01	269.75	0	N	E/A&H	CLOSED	BLA
272	065G05UA	814289.9	384057.1	286.04	ALLUVIUM	MW-RFI-E	AG	021796	20	1.94	PVC	2	10' - 20'	10	0.01	264.1	0	N	E/A&H	CLOSED	BLA
273	065G06UA	814217.8	383725.2	286.12	ALLUVIUM	MW-RFI-E	AG	021796	42	1.94	PVC	2	32' - 42'	10	0.01	264.18	4	H	E/A&H	OPEN	BLA
274	065G08UA	814227.2	383723.3	286.28	ALLUVIUM	MW-RFI-E	AG	021796	20	2.03	PVC	2	10' - 20'	10	0.01	264.25	4	H	E/A&H	OPEN	BLA
275	065G07UA	814046.4	383900.0	284.96	ALLUVIUM	MW-RFI-E	AG	021796	20	2.01	PVC	2	10' - 20'	10	0.01	262.95	4	H	E/A&H	OPEN	BLA

GROUNDWATER MONITORING WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNINVL	SCRNL	SCRNS	GND MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
276	065MW01UA	814256.0	383927.0	263.74	ALLUVIUM	MW-RFI-E	FG	102992	15	-0.2	PVC	2	5' - 15'	10	0.01	263.94	0	N	MEC	CLOSED	BLA
277	065MW02UA	814232.0	383903.0	263.27	ALLUVIUM	MW-RFI-E	FG	110292	15	-0.23	PVC	2	5' - 15'	10	0.01	263.5	0	N	MEC	CLOSED	BLA
278	065MW03UA	814256.0	383882.0	263.17	ALLUVIUM	MW-RFI-E	FG	110292	15	-0.23	PVC	2	5' - 15'	10	0.01	263.3	0	N	MEC	CLOSED	BLA
279	065MW04UA	814271.0	383900.0	263.59	ALLUVIUM	MW-RFI-E	FG	110292	15	-0.15	PVC	2	5' - 15'	10	0.01	263.74	0	N	MEC	CLOSED	BLA
280	068G01FL	817162.6	394651.7	319.47	FLUVIAL	MW-RFI-A	AG	050498	37	2.39	PVC	2	27'-37'	10	0.01	317.08	0	N	ENSAFE	CLOSED	
281	0BGG01UF	819343.2	388918.2	286.51	FLUVIAL	MW-RFI-BG	AG	010995	85.3	2.1	PVC	2	54.6' - 64.6'	10	0.01	286.33	4	H	E/A&H	OPEN	BLA
282	0BGG01LS	819356.7	389026.9	286.10	LOESS	MW-RFI-BG	AG	011085	18	1.38	PVC	2	7.5' - 17.5'	10	0.01	286.55	0	N	E/A&H	CLOSED	BLA
283	0BGG01UF	819350.0	389027.5	286.58	FLUVIAL	MW-RFI-BG	AG	011495	46	2.04	PVC	2	35.5' - 45.5'	10	0.01	286.49	4	H	E/A&H	OPEN	BLA
284	0BGG02LF	817894.6	386944.7	274.74	FLUVIAL	MW-RFI-BG	AG	011795	94.25	2.08	PVC	2	53.5' - 63.5'	10	0.01	274.46	4	H	E/A&H	OPEN	BLA
285	0BGG02LS	817884.2	386925.0	274.97	LOESS	MW-RFI-BG	AG	011295	20	2.52	PVC	2	9.5' - 19.5'	10	0.01	274.32	0	N	E/A&H	CLOSED	BLA
286	0BGG02UF	817889.7	386835.2	274.66	FLUVIAL	MW-RFI-BG	AG	011795	45.96	2	PVC	2	35.5' - 45.5'	10	0.01	271.76	4	H	E/A&H	OPEN	BLA
287	0BGG03UC	818516.0	393711.0	ND	COCKFIELD	MW-RFI-BG	AG	ND	48.80	ND	PVC	2	ND	ND	0.01	321.19	0	N	ND	CLOSED	
288	0BGG04LF	811504.4	387056.4	264.63	FLUVIAL	MW-RFI-BG	AG	011195	70.5	2.19	PVC	2	60.5' - 70.5'	10	0.01	264.15	4	H	E/A&H	OPEN	BLA
289	0BGG04LS	811484.9	387060.1	264.94	LOESS	MW-RFI-BG	AG	011195	20.5	2.5	PVC	2	10.5' - 20.5'	10	0.01	264.3	4	H	E/A&H	OPEN	BLA
290	0BGG04UC	811514.7*	387054.7*	264.55*	COCKFIELD	MW-RFI-BG	AG	072198	105	2.04*	PVC	2	93' - 103'	10	0.01	264.3*	4	H	ENSAFE	OPEN	BLA *= estimated
291	0BGG04UF	811484.2	387059.4	264.62	FLUVIAL	MW-RFI-BG	AG	011995	50	2.08	PVC	2	40' - 50'	10	0.01	264.28	4	H	E/A&H	OPEN	BLA
292	0BGG05LF	810280.7	389941.4	288.02	FLUVIAL	MW-RFI-BG	AG	011295	78.17	2.133	PVC	2	68' - 78'	10	0.01	288.887	4	H	E/A&H	OPEN	BLA
293	0BGG05LS	810288.6	389919.8	288.61	LOESS	MW-RFI-BG	AG	011295	20.7	2.27	PVC	2	10.5' - 20.5'	10	0.01	288.34	0	N	E/A&H	CLOSED	BLA
294	0BGG05UF	810290.5	389930.9	288.18	FLUVIAL	MW-RFI-BG	AG	011295	56.03	1.92	PVC	2	44.5' - 54.5'	10	0.01	288.26	4	H	E/A&H	OPEN	BLA
295	0BGG06UC	818908.1	393504.5	320.02	COCKFIELD	MW-RFI-BG	FG	022996	62	-0.34	PVC	2	52' - 62'	10	0.01	320.25	0	H	E/A&H	OPEN	BLA
296	0BGG07UC	818506.5	393700.9	323.23	COCKFIELD	MW-RFI-BG	AG	030296	60	2.15	PVC	2	50' - 60'	10	0.01	321.08	4	H	E/A&H	OPEN	BLA
297	0BGG08UF	820054.9	391868.3	299.67	FLUVIAL	MW-RFI-BG	FG	031796	60	-0.32	PVC	2	50' - 60'	10	0.01	299.88	0	H	E/A&H	OPEN	BLA
298	0BGG09MF	817163.7	390512.6	314.82	FLUVIAL	MW-RFI-BG	AG	040396	72	2.12	PVC	2	62' - 72'	10	0.01	312.7	4	H	E/A&H	OPEN	BLA
299	0BGG09UF	817167.8	390518.5	315.20	FLUVIAL	MW-RFI-BG	AG	031496	55	2.81	PVC	2	45' - 55'	10	0.01	312.39	0	N	E/A&H	CLOSED	BLA
300	0BGG10UF	811312.4	394211.1	275.50	FLUVIAL	MW-RFI-BG	AG	030196	66	1.92	PVC	2	56' - 66'	10	0.01	273.58	4	H	E/A&H	OPEN	BLA
301	0BGG11MA	810291.8	396360.5	283.84	ALLUVIUM	MW-RFI-BG	AG	021896	48	2.03	PVC	2	38' - 48'	10	0.01	281.81	4	H	E/A&H	OPEN	BLA
302	0BGG12UF	814713.0	388949.4	268.71	FLUVIAL	MW-RFI-BG	FG	021896	46	-0.41	PVC	2	36' - 46'	10	0.01	268.9	0	H	E/A&H	OPEN	BLA
303	0BGG13UF	822202.5	389897.1	292.28	FLUVIAL	MW-RFI-BG	AG	030596	55	2.58	PVC	2	45' - 55'	10	0.01	289.7	4	H	E/A&H	OPEN	BLA
304	0BGG14MF	810851.0	389460.0	288.43	FLUVIAL	MW-RFI-BG	AG	030396	57.8	2.5	PVC	2	47' - 57'	10	0.01	285.98	4	H	E/A&H	OPEN	BLA, originally JET1
305	75701LS	811795.8	389852.0	270.84	LOESS	MW-UST	FG	010787	20.7	-0.43	PVC	4	5.5' - 20.5'	14.8	0.02	271.07	0	H	HLA	OPEN	BLA
306	75702LS	811835.0	389697.0	270.81	LOESS	MW-UST	FG	010887	19.6	-0.33	PVC	4	5' - 19'	14.8	0.02	271.14	0	N	HLA	CLOSED	BLA
307	75703LS	811753.0	389657.0	270.42	LOESS	MW-UST	FG	010887	19.9	-0.52	PVC	4	5' - 19'	14.8	0.02	270.94	0	H	HLA	OPEN	BLA
308	75704LS	811758.0	389403.0	268.97	LOESS	MW-UST	FG	010987	19.7	-0.63	PVC	4	5' - 19'	14.8	0.02	269.6	0	H	HLA	OPEN	BLA
309	75705LS	811917.0	389773.0	271.42	LOESS	MW-UST	FG	010987	19.7	-0.3	PVC	4	5' - 19'	14.8	0.02	271.72	0	H	HLA	OPEN	BLA
310	75706LS	811924.0	389702.0	270.94	LOESS	MW-UST	FG	010987	19.7	-0.32	PVC	4	5' - 19'	14.8	0.02	271.26	0	H	HLA	OPEN	BLA
311	75707LS	811713.0	389662.0	270.68	LOESS	MW-UST	FG	110987	25.5	-0.5	PVC	4	5' - 25'	20	0.02	270.68	0	H	HLA	OPEN	BLA
312	75708LS	811923.0	389647.0	271.26	LOESS	MW-UST	FG	110387	25.5	-0.3	PVC	4	5' - 25'	20	0.02	271.56	0	H	HLA	OPEN	BLA
313	75709LS	811783.0	389577.0	271.39	LOESS	MW-UST	FG	110487	25.5	-0.34	PVC	4	5' - 25'	20	0.02	271.73	0	H	HLA	OPEN	BLA
314	75710LS	811888.0	389570.0	271.22	LOESS	MW-UST	FG	110487	25.5	-0.69	PVC	4	5' - 25'	20	0.02	271.91	0	H	HLA	OPEN	BLA
315	75711LS	811860.4	389641.5	270.89	LOESS	MW-UST	FG	110587	25.5	-0.27	PVC	4	5' - 25'	20	0.02	271.57	0	H	HLA	OPEN	BLA
316	75712LS	811804.0	389668.0	270.83	LOESS	MW-UST	FG	060190	30	-0.43	PVC	6	20' - 30'	10	0.02	271.26	0	N	ERCE	CLOSED	BLA
317	75713LS	811799.0	389659.0	270.80	LOESS	MW-UST	FG	060190	30	-0.28	PVC	4	26' - 30'	4	0.02	271.08	0	H	ERCE	OPEN	BLA
318	75714LS	811809.0	389668.0	270.37	LOESS	MW-UST	FG	060490	29	-0.42	PVC	4	19' - 29'	9.5	0.02	270.79	0	N	ERCE	CLOSED	BLA
319	75715LS	811974.0	389780.0	272.29	LOESS	MW-UST	FG	060590	15	-0.35	PVC	4	5'-15'	10	0.02	272.64	0	N	ERCE	CLOSED	BLA
320	75716LS	812079.0	389655.0	273.86	LOESS	MW-UST	FG	061390	15	-0.39	PVC	4	5' - 15'	9.5	0.02	274.25	0	H	ERCE	OPEN	BLA
321	75717LS	811804.0	389700.0	269.71	LOESS	MW-UST	FG	061390	15	-0.52	PVC	4	5' - 15'	9.5	0.02	269.03	0	H	ERCE	OPEN	BLA
322	75718LS	811868.0	389538.0	268.09	LOESS	MW-UST	FG	061390	15	-0.52	PVC	4	5' - 15'	9.5	0.02	267.41	0	H	ERCE	OPEN	BLA
323	75719LS	811745.2	389690.7	268.80	LOESS	MW-UST	FG	061390	15	-0.55	PVC	4	5' - 15'	9.5	0.02	269.345	0	H	ERCE	OPEN	BLA
324	757B1LD	812052.0	389712.0	275.10	TANK PIT	LD-UST	AG	02__86	15	0.82	PVC	4	ND	ND	ND	274.28	0	N	ND	CLOSED	
325	757B2LD	811999.0	389725.0	274.66	TANK PIT	LD-UST	AG	02__86	15	0.71	PVC	4	ND	ND	ND	273.96	0	N	ND	CLOSED	
326	757B3LD	812016.0	389641.0	274.63	TANK PIT	LD-UST	AG	02__86	15	0.4	PVC	4	ND	ND	ND	274.23	4	H	PSI	OPEN	
327	757B4LD	811962.0	389638.0	273.69	TANK PIT	LD-UST	AG	02__86	15	0.28	PVC	4	ND	ND	ND	273.41	0	H	PSI	OPEN	
328	757RW-1	ND	ND	ND	EXC. PIT	RW-UST	FG	ND	17.02	ND	PVC	6	0' - 17.02'	17.02	ND	ND	0	H	CCI	OPEN	
329	757RW-2	ND	ND	ND	EXC. PIT	RW-UST	FG	ND	11.8	ND	PVC	6	0' - 11.80'	11.8	ND	ND	0	H	CCI	OPEN	
330	757RW-3	ND	ND	ND	EXC. PIT	RW-UST	FG	ND	15.13	ND	PVC	6	0' - 15.13'	15.13	ND	ND	0	H	CCI	OPEN	

GROUNDWATER MONITORING WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNINVL	SCRNL	SCRNS	GND MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
331	FCMW01LS	815645.0	391289.3	300.27	LOESS	MW-UST	AG	051193	17.57	2.08	PVC	2	7' - 17'	10	0.01	298.19	0	N	E/A&H	CLOSED	BLA
332	FCMW02LS	815594.0	391124.0	297.63	LOESS	MW-UST	AG	051293	22.8	2.22	PVC	2	7' - 22'	15	0.01	295.41	0	N	E/A&H	CLOSED	BLA
333	FCMW03LS	815539.0	391127.0	297.65	LOESS	MW-UST	AG	051292	22.8	2.21	PVC	2	7' - 22'	15	0.01	295.44	0	N	E/A&H	CLOSED	BLA
334	FCMW04LS	815501.0	391181.0	297.98	LOESS	MW-UST	AG	051293	22.95	2.24	PVC	2	7' - 22'	15	0.01	295.74	0	N	E/A&H	CLOSED	BLA
335	FCMW05LS	815567.0	391180.0	298.29	LOESS	MW-UST	AG	051193	22.55	2.29	PVC	2	7' - 22'	15	0.01	296	0	N	E/A&H	CLOSED	BLA
336	FCMW06LS	815513.0	391066.0	295.72	LOESS	MW-UST	AG	071593	23.1	2.16	PVC	2	8' - 23'	15	0.01	293.56	0	N	E/A&H	CLOSED	BLA
337	GC01	818373.0	389371.8	300.93	MPH SAND	NON-POT	AG	061787	480	4.93	Steel	12.0x10.0	440' - 480'	40	0.03	296	0	P	PWORKS	OPEN	
338	JonesWell	813701.4	377118.7	315.14	FLUVIAL	PRIVATE	AG	ND	70	ND	Steel	2	ND	ND	ND	ND	0	P	ND	OPEN	Private well
339	N001LS	813592.0	391722.0	274.90	LOESS	MW-UST	AG	071194	20	2.8	PVC	2	5'-20'	15	0.01	272.1	0	N	ENSAFE	CLOSED	BLA
340	N002LS	813636.0	391722.0	272.19	LOESS	MW-UST	AG	071194	20	2.45	PVC	2	5'-20'	15	0.01	269.74	0	N	ENSAFE	CLOSED	BLA
341	N003LS	813568.0	391697.0	274.34	LOESS	MW-UST	AG	071294	20	2.6	PVC	2	6'-20'	15	0.01	271.74	0	N	ENSAFE	CLOSED	BLA
342	N12G01LF	813738.4	391526.6	285.30	FLUVIAL	MW-RFI-A	AG	072198	87	2.02	PVC	2	71.5'-81.5'	10	0.01	283.28	4	H	ENSAFE	OPEN	BLA
343	N12G01LS	813678.8	391682.7	284.90	LOESS	MW-UST	FG	010698	18	-0.28	PVC	2	3'-18'	15	0.01	285.18	4	H	ENSAFE	OPEN	BLA
344	N12G02LF	813376.4	391678.3	285.64	FLUVIAL	MW-RFI-A	AG	080498	85	2.36	PVC	2	67'-77'	10	0.01	283.48	4	H	ENSAFE	OPEN	BLA
345	N12G02LS	813992.2	391678.8	287.08	LOESS	MW-UST	AG	010698	19	2.23	PVC	2	4'-19'	15	0.01	284.83	4	H	ENSAFE	OPEN	BLA
346	N12G03LS	813786.4	391672.9	286.69	LOESS	MW-UST	AG	010798	19	2.1	PVC	2	3'-18'	15	0.01	284.59	4	H	ENSAFE	OPEN	BLA
347	N12G04LS	813887.7	391660.4	287.41	LOESS	MW-UST	AG	010898	18	2.01	PVC	2	3'-18'	15	0.01	285.4	4	H	ENSAFE	OPEN	BLA
348	N76101	819379.6	398870.8	323.57	COCKFIELD	NON-POT	FG	072167	215	0.01	PVC	4	200' - 215'	15	ND	323.56	0	H	UNKNOWN	OPEN	aka V-77 (Lake)
349	N9405LS	813197.0	391720.0	285.99	LOESS	MW-UST	AG	010892	20	3.32	PVC	4	5' - 15'	10	0.01	282.67	3	H	ENSAFE	OPEN	BLA; 01LS-04LS were
350	N9406LS	813176.0	391615.0	286.71	LOESS	MW-UST	AG	010892	17	2.44	PVC	4	7' - 17'	10	0.01	284.27	3	H	ENSAFE	OPEN	BLA
351	NFMW01LS	813795.0	391726.0	295.96	LOESS	MW-UST	AG	051393	22.51	2.27	PVC	2	7' - 22'	15	0.01	293.71	0	N	E/A&H	CLOSED	BLA
352	NFMW02LS	813421.0	391747.0	294.80	LOESS	MW-UST	AG	051493	22.55	2.28	PVC	2	7' - 22'	15	0.01	292.52	0	N	E/A&H	CLOSED	BLA
353	NFMW03LS	813446.0	391677.0	295.69	LOESS	MW-UST	AG	051792	22.57	2.13	PVC	2	7' - 22'	15	0.01	293.56	0	N	E/A&H	CLOSED	BLA
354	NFMW04LS	813498.0	391629.0	296.61	LOESS	MW-UST	AG	051493	27.3	2.39	PVC	2	7' - 27'	20	0.01	294.22	0	N	E/A&H	CLOSED	BLA
355	NFMW05LS	813479.0	391696.0	285.25	LOESS	MW-UST	AG	051393	27.55	2.08	PVC	2	7' - 27'	20	0.01	283.17	0	N	E/A&H	CLOSED	BLA
356	NFMW06LS	813490.0	391792.0	282.03	LOESS	MW-UST	FG	071593	20.15	-0.26	PVC	2	5' - 20'	15	0.01	282.29	0	N	E/A&H	CLOSED	BLA
357	NH01LS	821761.0	388800.0	288.01	LOESS	MW-UST	FG	051892	27.4	-0.22	PVC	2	17' - 27'	10	0.01	288.23	0	N	E/A&H	CLOSED	BLA
358	NH02LS	821772.0	388714.0	286.30	LOESS	MW-UST	FG	051992	22	-0.45	PVC	2	12'-22'	10	0.01	286.75	0	N	E/A&H	CLOSED	BLA
359	NH03LS	821704.0	388677.0	279.48	LOESS	MW-UST	FG	052092	22.8	-0.47	PVC	2	12' - 22'	10	0.01	279.95	0	N	E/A&H	CLOSED	BLA
360	NH04LS	821715.0	388740.0	271.16	LOESS	MW-UST	FG	060292	15.8	-0.23	PVC	2	5' - 15'	10	0.01	271.39	0	N	E/A&H	CLOSED	BLA
361	N-MW-05	813499.0	391723.0	282.00	LOESS	MW-UST	FG	10_98	25.00	1.00	PVC	4	10' - 25'	15	0.01	281	0	N	ENSAFE	CLOSED	BLA
362	OCP01	817373.1	387768.0	*295.40*	FLUVIAL	NON-POT	AG	No data	79	-0.6	Steel	4	ND	ND	ND	296.00*	0	H	PWORKS	OPEN	estimated from USGS topo,
363	PW-N1	813394.0	391706.0	284.58	MPH SAND	POTABLE	AG	81493	523	2.68	Steel	12.0x8.0	462' - 518'	56	0.03	282	0	P	PWORKS	OPEN	Off line, aka V-20
364	PW-N2	814097.0	391295.0	287.23	MPH SAND	POTABLE	AG	102460	471	2.23	Steel	12.0x8.0	415' - 465'	50	0.008	285	0	P	PWORKS	OPEN	aka V-4
365	PW-N3	812921.0	389653.0	294.77	FT PILLOW	POTABLE	AG	71985	1455	1.77	Steel	18.0x12.0	1335' - 1450'	105.00*	0.03	293	0	P	PWORKS	OPEN	BLA, aka U-60
366	PW-S4	810942.0	389390.0	269.71	FT PILLOW	POTABLE	AG	101885	1454	3.71	Steel	18.0x12.0	1346' - 1449'	90.00*	0.03	266	0	P	PWORKS	OPEN	Unused, BLA, aka U-58
367	PW-S5	811162.0	387936.0	267.00	FT PILLOW	POTABLE	AG	90685	1439	3	Steel	18.0x12.0	1272' - 1434'	137.00*	0.03	264	0	P	PWORKS	OPEN	BLA, aka U-59
368	RW-1			ND	LOESS	MW-UST	FG	071097	25	ND	PVC	6	2' - 21.66'	19.66	0.01	ND	0	N	ENSAFE	CLOSED	Tanks T304 and T1239
369	RWY09	814118.8	395587.3	294.11	FLUVIAL	NON-POT	AG	No data	79	0.5	PVC	4	69' - 79'	10	ND	293.5	0	H	UNKNOWN	OPEN	aka V-81 (Rwy) F
370	S23701LS	814663.0	388561.0	283.73	LOESS	MW-UST	AG	092392	18	2.41	PVC	2	6' - 16'	10	0.01	281.32	0	N	MEC	CLOSED	BLA
371	S23702LS	814595.0	388415.0	272.13	LOESS	MW-UST	FG	092292	16	-0.31	PVC	2	5' - 15'	10	0.01	272.45	0	N	MEC	CLOSED	BLA
372	S23703LS	814532.0	388433.0	267.58	LOESS	MW-UST	FG	092392	15	-0.28	PVC	2	5' - 15'	10	0.01	267.86	0	N	MEC	CLOSED	BLA
373	S23704LS	814618.0	388497.0	269.69	LOESS	MW-UST	FG	92392	10	-0.21	PVC	2	5' - 10'	5	0.01	269.9	0	N	MEC	CLOSED	BLA
374	S23705LS	814649.0	388477.0	273.31	LOESS	MW-UST	AG	101392	15	2.38	PVC	2	5' - 15'	10	0.01	270.93	0	N	MEC	CLOSED	BLA
375	S23706LS	814529.0	388485.0	272.37	LOESS	MW-UST	AG	101392	15	2.47	PVC	2	5' - 15'	10	0.01	269.9	0	N	MEC	CLOSED	BLA
376	S37601LS	811222.0	386420.0	264.93	LOESS	MW-UST	FG	072992	15	-0.16	PVC	2	5' - 15'	10	0.01	265.09	0	N	E/A&H	CLOSED	BLA
377	S37602LS	811167.0	386459.0	265.02	LOESS	MW-UST	FG	072992	15	-0.07	PVC	2	5' - 15'	10	0.01	265.09	0	N	E/A&H	CLOSED	BLA
378	S37603LS	811127.0	386434.0	264.79	LOESS	MW-UST	FG	073092	15	-0.3	PVC	2	5' - 15'	10	0.01	265.09	0	N	E/A&H	CLOSED	BLA
379	S37604LS	811121.0	386403.0	264.48	LOESS	MW-UST	FG	073092	15	-0.28	PVC	2	5' - 15'	10	0.01	264.76	0	N	E/A&H	CLOSED	BLA
380	S50G01LS	814581.0	387301.0	287.14	LOESS	MW-UST	FG	061593	21.8	-0.25	PVC	2	6.8'-21.8'	15	0.01	287.39	0	N	E/A&H	CLOSED	BLA
381	S50G02LS	814514.0	387290.0	286.98	LOESS	MW-UST	FG	061593	21.8	-0.43	PVC	2	6.3'-21.3'	15	0.01	287.39	0	N	E/A&H	CLOSED	BLA
382	S50G03LS	814524.0	387367.0	287.25	LOESS	MW-UST	FG	061693	21.4	-0.47	PVC	2	6.4'-21.4'	15	0.01	287.72	0	N	E/A&H	CLOSED	BLA
383	S50G04LS	814429.0	387308.0	286.58	LOESS	MW-UST	FG	061793	21.1	-0.15	PVC	2	6.1'-21.1'	15	0.01	286.73	0	N	E/A&H	CLOSED	BLA
384	S50G05LS	814533.0	387307.0	271.08	LOESS	MW-UST	FG	061893	21.1	-0.25	PVC	2	6.1'-21.1'	15	0.01	271.33	0	N	E/A&H	CLOSED	BLA

GROUNDWATER MONITORING WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNINVL	SCRNL	SCRNS	GND MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
385	T1205N01	815570.0	391195.0	296.00	TANK PIT	LD-UST	FG	010490	15	ND	PVC	2	2.5' - 15'	12.5	0.01	296.00	0	N	UNKNOWN	CLOSED	BLA
386	T1205N02	815580.0	391201.0	296.00	TANK PIT	LD-UST	FG	010490	15	ND	PVC	2	2.5' - 15'	12.5	0.01	296.00	0	N	UNKNOWN	CLOSED	BLA
387	T1205S01	815575.0	391185.0	295.77	TANK PIT	LD-UST	FG	010490	15	-0.16	PVC	2	2.5' - 15'	12.5	0.01	295.93	0	N	UNKNOWN	CLOSED	BLA
388	T1205S02	815587.0	391193.0	296.09	TANK PIT	LD-UST	FG	010490	15	0.16	PVC	2	2.5' - 15'	12.5	0.01	295.93	0	N	UNKNOWN	CLOSED	BLA
389	T123901	813577.0	391683.0	283.92	TANK PIT	LD-UST	FG	010990	15	-0.2	PVC	2	2.5' - 15'	12.5	0.01	284.12	0	N	UNKNOWN	CLOSED	BLA
390	T123902	813569.0	391715.0	282.95	TANK PIT	LD-UST	FG	010490	15	-0.34	PVC	2	2.5' - 15'	12.5	0.01	283.46	0	N	UNKNOWN	CLOSED	BLA
391	T123903	813635.0	391704.0	283.35	TANK PIT	LD-UST	FG	010990	15	-0.77	PVC	2	2.5' - 15'	12.5	0.01	284.12	0	N	UNKNOWN	CLOSED	BLA
392	T124201	813116.0	391721.0	283.58	TANK PIT	LD-UST	FG	010490	15	-0.51	PVC	2	2.5' - 15'	12.5	0.01	284.12	0	N	UNKNOWN	CLOSED	BLA; aka N9401LS
393	T124202	813131.0	391731.0	283.72	TANK PIT	LD-UST	FG	010490	15	-0.4	PVC	2	2.5' - 15'	12.5	0.01	284.12	0	N	UNKNOWN	CLOSED	BLA; aka N9402LS
394	T124301	813131.0	391692.0	284.09	TANK PIT	LD-UST	FG	010590	15	-0.36	PVC	2	2.5' - 15'	12.5	0.01	284.45	0	N	UNKNOWN	CLOSED	BLA; aka N9403LS
395	T124302	813147.0	391700.0	283.82	TANK PIT	LD-UST	FG	010990	15	-0.3	PVC	2	2.5' - 15'	12.5	0.01	284.12	0	N	UNKNOWN	CLOSED	BLA; aka N9404LS
396	T124901	811190.0	386412.0	264.83	TANK PIT	LD-UST	FG	010690	15	-0.26	PVC	2	2.5' - 15'	12.5	0.01	265.09	0	N	UNKNOWN	CLOSED	BLA
397	T124902	811198.0	386424.0	265.02	TANK PIT	LD-UST	FG	010690	15	-0.07	PVC	2	2.5' - 15'	12.5	0.01	265.09	0	N	UNKNOWN	CLOSED	BLA
398	T148201	811186.0	386471.0	265.46	TANK PIT	LD-UST	FG	010690	15	-0.29	PVC	2	2.5' - 15'	12.5	0.01	265.75	0	N	UNKNOWN	CLOSED	BLA
399	T148202	No Data	No Data	No Data	TANK PIT	LD-UST	FG	010690	15	No Data	PVC	2	2.5' - 15'	12.5	0.01	No Data	0	N	UNKNOWN	CLOSED	BLA
400	T148203	811156.0	386412.0	264.55	TANK PIT	LD-UST	FG	010690	15	-0.21	PVC	2	2.5' - 15'	12.5	0.01	264.76	0	N	UNKNOWN	CLOSED	BLA
401	T148901	811157.9	390127.2	267.42	TANK PIT	LD-UST	FG	122989	15	0.27	PVC	2	2.5' - 15'	12.5	0.01	267.15	0	N	UNKNOWN	CLOSED	BLA
402	T148902	No Data	No Data	No Data	TANK PIT	LD-UST	FG	122989	15	No Data	PVC	2	2.5' - 15'	12.5	0.01	No Data	0	N	UNKNOWN	CLOSED	BLA
403	T148903	811150.0	390090.0	267.84	TANK PIT	LD-UST	FG	122989	15	-0.53	PVC	2	2.5' - 15'	12.5	0.01	268.37	0	N	UNKNOWN	CLOSED	BLA
404	T148904	811159.0	390096.0	267.29	TANK PIT	LD-UST	FG	122989	15	-0.75	PVC	2	2.5' - 15'	12.5	0.01	268.04	0	N	UNKNOWN	CLOSED	BLA
405	T150801	810989.0	390137.0	268.00	TANK PIT	LD-UST	FG	122989	15	-0.37	PVC	2	2.5' - 15'	12.5	0.01	268.37	0	N	UNKNOWN	CLOSED	BLA
406	T150802	No Data	No Data	267.74	TANK PIT	LD-UST	FG	122989	15	No Data	PVC	2	2.5' - 15'	12.5	0.01	No Data	0	N	UNKNOWN	CLOSED	BLA
407	T150803	No Data	No Data	266.67	TANK PIT	LD-UST	FG	122989	15	No Data	PVC	2	2.5' - 15'	12.5	0.01	No Data	0	N	UNKNOWN	CLOSED	BLA
408	T163701	814420.0	392044.0	288.47	TANK PIT	LD-UST	FG	010590	15	-0.37	PVC	2	2.5' - 15'	12.5	0.01	288.84	0	N	ERCR	CLOSED	BLA
409	T163702	814407.0	392039.0	288.13	TANK PIT	LD-UST	FG	010590	15	-0.26	PVC	2	2.5'-15'	12.5	0.01	288.39	0	N	ERCR	CLOSED	BLA
410	T163703	814364.0	392050.0	288.45	TANK PIT	LD-UST	FG	010590	15	-0.26	PVC	2	2.5' - 15'	12.5	0.01	288.71	0	N	ERCR	CLOSED	BLA
411	T30101	813201.0	391660.0	283.59	TANK PIT	LD-UST	FG	010990	15	-0.2	PVC	2	2.5' - 15'	12.5	0.01	283.79	0	N	ERCR	CLOSED	BLA
412	T30102	813212.0	391652.0	283.28	TANK PIT	LD-UST	FG	010990	15	-0.18	PVC	2	2.5' - 15'	12.5	0.01	283.46	0	N	ERCR	CLOSED	BLA
413	T30103	813224.0	391660.0	283.20	TANK PIT	LD-UST	FG	010990	15	-0.26	PVC	2	2.5' - 15'	12.5	0.01	283.46	0	N	ERCR	CLOSED	BLA
414	T30401	813665.0	391685.0	284.15	TANK PIT	LD-UST	FG	010990	15	-0.32	PVC	2	2.5' - 15'	12.5	0.01	284.45	0	N	ERCR	CLOSED	BLA
415	T30402	813684.0	391709.0	283.43	TANK PIT	LD-UST	FG	010990	15	-0.36	PVC	2	2.5'-15'	12.5	0.01	283.79	0	N	ERCR	CLOSED	BLA
416	T33601	810272.0	392564.0	271.00	TANK PIT	LD-UST	FG	010390	15	-0.15	PVC	2	2.5' - 15'	12.5	0.01	271.15	0	N	ERCR	CLOSED	BLA
417	T33602	810229.0	392622.0	270.64	TANK PIT	LD-UST	FG	010390	15	-0.39	PVC	2	2.5' - 15'	12.5	0.01	271.03	0	N	ERCR	CLOSED	BLA
418	T33603	810314.0	392621.0	270.73	TANK PIT	LD-UST	FG	010390	15	-0.24	PVC	2	2.5' - 15'	12.5	0.01	270.97	0	N	ERCR	CLOSED	BLA
419	T33701	810510.0	392387.0	270.60	TANK PIT	LD-UST	FG	010390	15	-0.31	PVC	2	2.5' - 15'	12.5	0.01	270.91	0	N	ERCR	CLOSED	BLA
420	T33702	810433.0	392432.0	271.26	TANK PIT	LD-UST	FG	010390	15	-0.31	PVC	2	2.5' - 15'	12.5	0.01	271.57	0	N	ERCR	CLOSED	BLA
421	T33703	810616.0	392462.0	270.96	TANK PIT	LD-UST	FG	010390	15	-0.36	PVC	2	2.5' - 15'	12.5	0.01	271.32	0	N	ERCR	CLOSED	BLA
422	TW01	810714.0	389456.5	271.02	WILCOX	MW-MISC	AG	10_89	ND	ND	Steel	8	ND	ND	ND	ND	0	N	PWORKS	CLOSED	
423	USGS01LS	812814.1	391167.4	277.52	LOESS	MW-USGS	AG	041295	10.8	4.53	PVC	4	8' - 18'	10	0.01	273	4	BOX	USGS	OPEN	BLA, aka U-102LS
424	USGS02FL	812788.8	391179.6	277.74	FLUVIAL	MW-USGS	AG	041595	70.5	4.77	PVC	4	59' - 69'	10	0.01	273	4	BOX	USGS	OPEN	BLA, aka U-102LF
425	USGS03UC	812784.0	391192.4	277.73	COCKFIELD	MW-USGS	AG	041495	120	4.73	PVC	4	105' - 115'	10	0.01	273	4	BOX	USGS	OPEN	BLA, aka U-102C
426	USGS04FL	812834.3	391198.4	ND	FLUVIAL	MW-USGS	AG	061595	70.5	ND	PVC	4	40' - 70'	30	0.01	273	4	BOX	USGS	OPEN	BLA, aka U-103
427	S172-1	819529.6	398783.0	332.87	COCKFIELD	NON-POT	ND	ND	189	ND	ND	ND	ND	ND	ND	331.8	0	N	ND	CLOSED	Lakehouse storage
428	PES-INJ-1S	815028.5	392214.5	293.44	FLUVIAL	MW-PES	FG	071900	65	ND	PVC	2	55.0 - 65.0	10	ND	ND	0	H	PARSONS	OPEN	
429	PES-INJ-1D	815028.5	392214.5	293.44	FLUVIAL	MW-PES	FG	071901	85	ND	PVC	2	75.0 - 85.0	10	ND	ND	0	H	PARSONS	OPEN	
430	PES-INJ-2S	815042.4	392218.9	293.20	FLUVIAL	MW-PES	FG	072000	54.8	ND	PVC	2	44.8 - 54.8	10	ND	ND	0	H	PARSONS	OPEN	
431	PES-INJ-2D	815042.6	392218.9	293.21	FLUVIAL	MW-PES	FG	072001	75	ND	PVC	2	65.0 - 75.0	10	ND	ND	0	H	PARSONS	OPEN	
432	PES-INJ-3S	815056.3	392224.7	293.09	FLUVIAL	MW-PES	FG	072300	65	ND	PVC	2	55.0 - 65.0	10	ND	ND	0	H	PARSONS	OPEN	
433	PES-INJ-3D	815056.3	392224.7	293.12	FLUVIAL	MW-PES	FG	072300	85	ND	PVC	2	75.0 - 85.0	10	ND	ND	0	H	PARSONS	OPEN	
434	PES-INJ-4S	815070.4	392230.1	293.44	FLUVIAL	MW-PES	FG	072300	55.4	ND	PVC	2	45.4 - 55.4	10	ND	ND	0	H	PARSONS	OPEN	
435	PES-INJ-4D	815070.4	392230.1	293.40	FLUVIAL	MW-PES	FG	072300	75	ND	PVC	2	65.0 - 75.0	10	ND	ND	0	H	PARSONS	OPEN	
436	PES-MW-1S	815062.2	392115.6	293.37	FLUVIAL	MW-PES	FG	071800	55.3	ND	PVC	2	45.3 - 55.3	10	ND	ND	0	H	PARSONS	OPEN	
437	PES-MW-1D	815062.2	392115.6	293.33	FLUVIAL	MW-PES	FG	071800	80	ND	PVC	2	70.0 - 80.0	10	ND	ND	0	H	PARSONS	OPEN	
438	PES-MW-2S	815038.3	392229.4	293.38	FLUVIAL	MW-PES	FG	080100	65	ND	PVC	2	55.0 - 65.0	10	ND	ND	0	H	PARSONS	OPEN	
439	PES-MW-2D	815038.3	392229.4	293.32	FLUVIAL	MW-PES	FG	080100	85	ND	PVC	2	75.0 - 85.0	10	ND	ND	0	H	PARSONS	OPEN	

GROUNDWATER MONITORING WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNINVL	SCRNL	SCRNS	GND	MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
440	PES-MW-3S	815052.4	392235.2	293.38	FLUVIAL	MW-PES	FG	072400	55	ND	PVC	2	45.0 - 55.0	10	ND		ND	0	H	PARSONS	OPEN	
441	PES-MW-3D	815052.4	392235.2	293.40	FLUVIAL	MW-PES	FG	072400	75	ND	PVC	2	65.0 - 75.0	10	ND		ND	0	H	PARSONS	OPEN	
442	PES-MW-4S	815034.0	392241.8	293.34	FLUVIAL	MW-PES	FG	072100	65	ND	PVC	2	55.0 - 65.0	10	ND		ND	0	H	PARSONS	OPEN	
443	PES-MW-4D	815034.0	392241.3	293.34	FLUVIAL	MW-PES	FG	072100	85	ND	PVC	2	75.0 - 85.0	10	ND		ND	0	H	PARSONS	OPEN	
444	PES-MW-5S	815028.1	392250.1	293.27	FLUVIAL	MW-PES	FG	072000	55.4	ND	PVC	2	45.4 - 55.4	10	ND		ND	0	H	PARSONS	OPEN	
445	PES-MW-5D	815028.1	392250.1	293.27	FLUVIAL	MW-PES	FG	072001	75	ND	PVC	2	65.0 - 75.0	10	ND		ND	0	H	PARSONS	OPEN	
446	PES-MW-6S	815046.0	392251.7	293.28	FLUVIAL	MW-PES	FG	072200	65	ND	PVC	2	55.0 - 65.0	10	ND		ND	0	H	PARSONS	OPEN	
447	PES-MW-6D	815046.0	392251.7	293.31	FLUVIAL	MW-PES	FG	072200	85	ND	PVC	2	75.0 - 85.0	10	ND		ND	0	H	PARSONS	OPEN	
448	PES-MW-7S	815033.1	392273.1	293.10	FLUVIAL	MW-PES	FG	072100	55	ND	PVC	2	45.0 - 55.0	10	ND		ND	0	H	PARSONS	OPEN	
449	PES-MW-7D	815033.1	392273.1	293.08	FLUVIAL	MW-PES	FG	072100	75	ND	PVC	2	65.0 - 75.0	10	ND		ND	0	H	PARSONS	OPEN	
450	PES-MW-8S	815011.2	392221.8	292.94	FLUVIAL	MW-PES	FG	072200	65	ND	PVC	2	55.0 - 65.0	10	ND		ND	0	H	PARSONS	OPEN	
451	PES-MW-8D	815011.2	392221.4	292.94	FLUVIAL	MW-PES	FG	072200	85.3	ND	PVC	2	75.3 - 85.3	10	ND		ND	0	H	PARSONS	OPEN	
																				TOTAL OPEN:	298	

LEGEND:

H = Hex lock cap	AG = Above Grade
N = None	FG = Flush Grade
P = Pump	BLA = Boring Log Available
ND = No Data	BOX = USGS Gage Box

Appendix B
Applicable or Relevant
and
Appropriate Requirements

Rev: 4
Date: 27 MAR 89

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

GUIDELINES FOR GROUNDWATER MONITORING WELL INSTALLATION

PART 1: GENERAL

1.1 INTRODUCTION

Groundwater monitoring wells shall be located at sites approved by the Southern Division Engineer-In-Charge (EIC) and the Activity Environmental Coordinator (EC). All applicable local, state and federal regulations concerning well installations or soil borings shall be followed.

1.2 APPLICABLE PUBLICATIONS

The publications listed below form a part of this guideline to the extent referenced. The publications are referred to in this text by designation only. The latest revision of the specifications shall be followed.

1.2.1 American Association of State Highway and Transportation Officals (AASHTO)

M 220	Epoxy Coatings Specifications

1.2.2 American Society of Testing and Materials (ASTM)

A 120	Pipe, Steel, Black and Hot-dipped, Zinc coated, welded and seamless
A 312	Seamless and Welded Austenitic Stainless Steel Pipe
B 209	Aluminum and Aluminum-alloy Sheet and Plate
C 150	Portland Cement
C 778	Standard Sand
D 1457	Polytetrafluoroethylene (PTFE) Molding and Extrusion Materials
D 1785	Standard Specification of Polyvinyl Chloride Pipe (PVC Pipe, Schedules 40, 80, 120)
D 1586	Method for Penetration Test and Split Barrel Sampling of Soils

2.1.6 Annular Space Fill Materials

a. Filter pack shall be 98% pure silica, cleaned with potable water, have a uniformity coefficient of 1-3, and a specific gravity of 2.6 - 2.7. The filter pack shall meet ASTM C 775 standard sand specifications.

b. 1/4-inch bentonite pellets shall be 90% montmorillonite clay, with a bulk dry density 80 lbs/cu ft, a specific gravity 1.2, and a pH of 8.5-10.5.

c. Granular bentonite shall conform to API std 13-A for bentonite.

d. Portland Cement shall conform to ASTM C 150 Type I.

2.1.7 Surface Casing: shall be constructed of steel meeting ASTM A 120 and shall have a wall thickness as specified below.

a. 24 inch diameter 0.25 inch wall thickness
b. 20 inch diameter 0.25 inch wall thickness
c. 16 inch diameter 0.25 inch wall thickness
d. 10.75 inch diameter 0.25 inch wall thickness

e. 24 inch diameter 0.50 inch wall thickness
f. 20 inch diameter 0.50 inch wall thickness
g. 16 inch diameter 0.50 inch wall thickness
h. 10.75 inch diameter 0.365 inch wall thickness

2.1.8 Surface Completion: all materials provided for a well surface completion shall conform to the specifications listed below.

a. Locking 16-gauge steel protective well cover, round or square and 5-ft in length

b. Flush mount 22-gauge steel, water resistant welded box with 3/8-inch steel lid, locking device and padlock guard

c. Concrete pad at ground surface (3' X 4' X 6") ASTM C 150

d Padlock (brass, corrosion resistant, keyed-alike) ASTM F 883

e. Steel protective post (4-inch diameter, 6-ft length, 1/4-inch thickness, concrete filled) ASTM A 120.

f. Well designation sign, sheet alumnium, ASTM B 209, 1/8 inch by 18 inch by 6 inch, anchors and fasteners compatible with sign, designation to be provided by EIC, the designation shall be stamped into the plate with 4-inch letters and numbers.

g. High visibility yellow epoxy paint AASHTO M220.

FEBRUARY 1985

GROUND-WATER MONITORING GUIDE

NEESA 20.2-031A

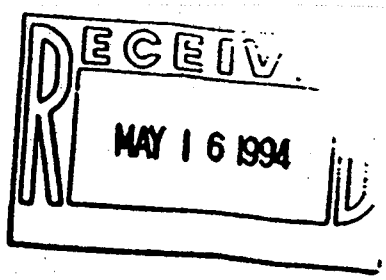
NAVAL ENERGY AND ENVIRONMENTAL
SUPPORT ACTIVITY
Port Hueneme, California 93043

shrink and crack upon curing (Barcelona, Gibb, and Miller, 1983) and that the seal between the casing and grout may not be perfect, but the procedure described is generally accepted as the safest method of preventing downhole migration of contaminants. Expanding cements are being considered (Barcelona, Gibb, and Miller, 1983), but experimental data that compares the performance of different grout mixtures are not available.

5.5 SURFACE PROTECTION. The surface extension of the monitoring well is protected by an oversize, steel casing approximately 5 feet long. This casing is sleeved over the monitoring well and grouted from 2 feet below the ground surface to the ground surface. Three feet of the oversize casing extends to slightly above the top of the monitoring well cap. The protective casing may be set and grouted in place during monitor well completion; otherwise, the grouting of the annulus should be stopped about 2 feet below the surface to leave room for grouting the protective casing. A drain hole just above the final grout level will permit the escape of any water that might collect between the well casing and the protective casing. This drain is especially important if the well casing is plastic because during the winter season trapped water might freeze and rupture the well casing. Even during warm or cool seasons, trapped water would be stagnant, malodorous, and encourage pest growth.

If the ground-water monitoring well is located in a trafficked area, three or four protective posts in a triangular or rectangular pattern 3 to 4 feet from the well will protect the well from damage. Steel pipe, 4 to 6 inches in diameter, set 3 to 4 ft in concrete or cement grout and extending 4 to 5 feet above ground is sufficient protection. Larger diameter pipe, later filled with concrete, or steel I beams set 6 to 8 feet in concrete can be used in high threat areas. Treated posts set 2 to 3 feet in soil will protect the well from incidental traffic. All protective post, and casing, should be painted for both visibility and protection from the environment.

5.6 AQUIFER PROTECTION. Primary aquifer protection is afforded by the downhole bentonite sealer and grouted annulus, but repetitive sampling and the attendant foot traffic in the immediate vicinity of the well can encourage



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Supply
401 Church Street, L & C Tower 6th Floor
Nashville Tennessee 37243-1549

ANNOUNCEMENT

NEW RULES FOR WATER WELL CONSTRUCTION
TO BECOME EFFECTIVE AUGUST 5 1993 -

THE DEPARTMENT'S PROPOSED NEW RULES FOR WATER WELL CONSTRUCTION HAVE BEEN APPROVED BY THE ATTORNEY GENERAL AND FILED WITH THE SECRETARY OF STATE. THEY WILL BECOME EFFECTIVE AUGUST 5, 1993.

The most drastic change to be wrought by these new rules is the requirement for payment of a one-time registration/inspection fee of $ 75.00 to be paid to the Department by the supervising driller when he files his report of well completion. All water wells drilled on or after August 5, 1993 must have the seventy five dollar ($75) registration/inspection fee submitted with the well completion report. These reports must also be submitted within thirty days from date of completion of drilling each water well. Other major changes include increasing the minimum standards for steel well casing. For example, the nominal six-inch I.D. steel casing must have a minimum wall thickness of .185 inch and weigh almost 13 pounds per foot. The .155 inch wall thickness, 11-pound-per-foot, well casing can no longer be used.

Rules for disinfection and repair of water wells have also been revised and made more specific as to when and how water wells must be treated to avoid bacterial contamination. Similarly, requirements for well development have been strengthened to avoid "muddy wells."

Official copies of the new rules are being printed and will be circulated to all concerned as soon as they become available. In the meantime, the enclosed copy, which is a duplicate of the rules as they were submitted to the Attorney General's office, are essentially complete and correct. Please note that the old set of rules known as chapter 400-4-2 will be repealed in their entirety when the new rules become effective.

Instructions and guidelines will be forthcoming to assist all concerned in complying with the new rules for constructing and repairing "wells for the production of water." Please bear with us in this time for change. There are, to be sure, many questions to be answered and many procedures to be worked out to the satisfaction of all concerned. Hopefully, both the resource and the business will benefit.

4. Cathodic protection wells.

5. Wells used for dewatering purposes in construction work.

6. Monitor wells, geotechnical test borings and piezometers that are regulated by rules of the Water Quality Control Board or otherwise by the Department.

7. Ponds, pits, sumps and drainage trenches.

8. Contaminant recovery wells otherwise regulated by the Department.

(27) "Pumps" and "pumping equipment" means any equipment or materials utilized or intended for use in withdrawing or obtaining ground-water, including well seals.

(28) "Recovery well" means any well constructed for the purpose of removing contaminated ground water or other liquids from the subsurface.

(29) "Repair" means work involved in deepening, reaming, sealing, installing, or changing casing depths, perforating, screening, or cleaning, acidizing, or redevelopment of a well excavation, or any other work which results in breaking or opening a well seal.

(30) "Standard Dimension Ratio (SDR)" means the quotient obtained when the outside diameter of thermoplastic well casing is divided by the wall thickness.

(31) "Static water level" means the level at which the water stands in the well when the well is not being pumped and is expressed as the distance from a fixed reference point to the water level in the well.

(32) "Supervision" means the act of overseeing, directing and managing workers engaged in the business of constructing wells, or installing pumps or installing water treatment equipment on well or spring supplies.

(33) "Well" or "water well" means a hole drilled, re-drilled or dug into the earth, by boring or otherwise, for the production of water.

(34) "Well construction" means all acts necessary to construct wells for the production of water including but not limited to the location and excavation of the well; placement of casings, screens and fittings; development and testing.

(35) "Well development" means the procedures used to remove mud or fine material from the drilled borehole, correct any damage to the aquifer that occurred during drilling and improve the water passageways into the well from the aquifer.

(36) "Well driller" or "water-well contractor" means any individual, firm or corporation engaged in the business of constructing wells.

(37) "Well head" means the upper terminal of the well including adapters, ports, valves, seals, and other attachments.

(38) "Well seal" means an approved arrangement or device used to cap a well or to establish and maintain a junction between the casing of a well and the piping or equipment installed therein, the purpose or function of which is to prevent pollutants from entering the well at the upper terminal.

Statutory Authority: T.C.A. 69-11-106 and T.C.A. 4-5-201 et. seq.

NEW RULES

TABLE OF CONTENTS

1200-4-9-.10 WELL CONSTRUCTION STANDARDS

These rules will apply solely to wells constructed for the production of water from underground sources and have no application to wells constructed for quarry blast holes or mineral prospecting, or any purpose other than production of water.

(1) Requirements

(a) No person shall construct, reconstruct, or repair, or cause to be constructed, reconstructed or repaired any water well; nor shall any person install, repair, or cause to be installed or repaired any pump, pumping equipment, water filter or water treatment device to be used on a water well except in accordance with the provisions of the Water Wells Act (T.C.A. 69-11-101 et. seq.) and these rules.

(b) Every well driller, within thirty (30) days after completion of a water well, shall submit a report on the construction or reconstruction of the well to the Department. The well completion report shall be made on form provided by the Department or a reasonable facsimile approved the Department.

(c) For each water well completed in Tennessee after the effective date of this rule, a one-time registration/inspection fee of seventy five dollars ($75.00) shall be paid to the Department by the driller or contractor who supervised the drilling of the well.

1. The fee shall be submitted to the Department by the driller at the time of submission of the well completion report.

2. The amount of the registration/inspection fee shall be reviewed annually by the Board and their recommendations for adjustment of the fee shall be presented to the Commissioner for final action.

3. The requirement of payment to the Department of a one-time registration/inspection fee shall not apply to water wells drilled in any local jurisdiction which is authorized, by private act or pursuant to the provisions of an adopted "home rule" charter, to regulate the location and construction of water wells and which has established a fee for the inspection of water wells.

(d) When strict compliance with these standards is impractical, the driller or installer shall make application to the Department for approval of equivalent alternative standards (a variance) prior to the work being done. The Department may grant the request for a variance based on if it determines the proposed standards offer an equivalent or higher level of protection to the environment. In an emergency or in exceptional instances, the Department will respond to a verbal request provided the applicant submits a written application within ten (10) days of the verbal application.

Statutory Authority: T.C.A. 69-11-106, T.C.A. 68-1-1303 and T.C.A. 4-5-201 et. seq.

(2) Location

(a) The construction of a water well is prohibited at other than a safe distance from any known potential source of contamination. The minimum safe distances shown in Table A shall apply for the sources of contamination listed therein:

(b) A water-supply well may be constructed in an area subject to flooding provided the top of the water tight casing terminates not less than two (2) feet above the maximum recorded flood elevation.

(c) Location to buildings, pits, and basements:

1. A well located adjacent to a building shall be so located that the center line of the well extended vertically will clear any projection from the building by not less than five (5) feet.

2. New wells shall not be constructed in pits or basements.

(d) New wells shall not be constructed closer than 25 feet from property lines or highway rights-of-way.

TABLE A

MINIMUM DISTANCES TO SEPARATE WATER WELLS
FROM POTENTIAL SOURCES OF CONTAMINATION

SOURCES OF CONTAMINATION	MINIMUM DISTANCES
Animal pens or feed lots	100 feet
Leaching Pits sewage lagoons	100 feet
Pit Privys or sewer lines	75 feet
Sludge disposal sites	100 feet
Subsurface Sewage Disposal Systems	50 feet
Septic tanks and drain fields	50 feet

(3). Source of Water Supply

(a) The source of water for any well shall be at least twenty (20) feet below the surface of the ground.

(b) The driller shall develop the most favorable water-bearing zone(s) and seal off any source(s) of less desirable quality.

(c) It shall be the duty of any person attempting to construct a water well to seal off salt water, oil, gas, or any other fluid or material which might contaminate a source of fresh water.

(4) Drilling Fluids

(a) Water used for drilling shall be obtained from a potable water source, or shall be treated with enough liquid bleach or hypochlorite granules to retain a free-chlorine residual content of at least 5 parts per million (ppm).

(b) Drilling fluids and additives shall be materials specified by the manufacturer for use in water well construction and approved by the Department.

(c) During the course of drilling a water well with air rotary equipment, a minimum of three (3) gallons per minute of water must be injected or added into the air stream.

(5) Casing

(a) Wells drilled for the production of water shall be cased with watertight casing extending from at least six (6) inches above to at least twenty (20) feet below the land surface. For wells located in areas subject to flooding, see rule 1200-4-9-.10(2)(b).

1. The watertight casing in wells constructed to obtain water from a consolidated rock formation shall be firmly seated and sealed below all crevices that release inferior quality water or mud into the well or to a depth of at least five (5) feet below the top of the consolidated rock whichever is greater.

2. The watertight casing in wells constructed to produce water from an unconsolidated aquifer (such as saturated gravel or sand) shall extend at least to the top of the aquifer or to a depth of 20 feet which ever is greater.

(b) Except as otherwise specified in these regulations, the permanent well casing shall:

1. Be new, seamless or welded, black or galvanized steel pipe conforming to the weights and dimensions given in Table B and meeting the American Society for Testing and Materials (ASTM) Standards A53-87b or A589-85. Used or reject pipe shall not be used;

2. Have water-tight joints that may be welded, or threaded and coupled; and

3. Be equipped with a drive shoe if the casing is to be driven.

4. Pipe sizes that are not listed in Table B and are less than ten (10) inches in diameter shall match listed values as closely as possible.

5. Pipe sizes that are ten (10) inches in diameter or larger shall be Schedule 20 pipe as a minimum.

TABLE B

MINIMUM DIMENSIONS AND WEIGHTS FOR WATER WELL CASING

Diameters in inches		Minimum Wall Thickness	Weights in Pounds per Foot
External	Internal	in Inches	Plain Ends Only
3.500	3.250	0.125	4.51
4.000	3.732	0.134	5.53
4.500	4.216	0.142	6.61
5.500	5.192	0.154	8.79
6.000	5.672	0.164	10.22
6.625	6.255	0.185	12.72
8.625	8.249	0.188	16.90

(c) Thermoplastic well casing may be installed in wells constructed to obtain water from unconsolidated aquifiers (such as saturated gravel, sand or overburden) provided:

1. The casing is new;

2. The casing meets or exceeds the requirements of ASTM Standard F-480-88 and bears the NSF (National Sanitation Foundation) seal in each section of casing;

3. The Standard Dimension Ratio (SDR) shall not exceed 26;

4. The casing is installed after the borehole has been drilled to th final depth of the finished well, and no additional drilling tak place after the casing has been installed; and

5. Joints shall be solvent cemented with a quick-setting cement, or threaded and coupled.

(d) In areas where the water is obtained from overburden above the consolidated rock surface, the casing shall be set at or just above the consolidated rock. A screen may be attached to the bottom of the casing or the lowermost few feet of the casing may be slotted or perforated to allow water to enter the well provided the top of the screen or the topmost perforation in the casing is at least 20 feet below land surface. The completed well shall be finished so that extraneous material such as sediment cannot enter the well.

(6) Backfilling and Grouting

(a) The annular space between the casing and borehole wall of the well shall be backfilled with an impervious material such as grout, bentonite chips or cuttings mixed with bentonite granules or pellets.

(b) Placement of the backfill material shall be done in such a way that there are no bridges or gaps in the annulus. The top of the backfill material shall remain level with the land surface surrounding the well.

(c) If bentonite-based grout is used for backfill, it shall be placed accordance with the manufacturers recommendations.

(d) If cement-based grout is used for backfill, it shall be placed around the casing by one of the following methods:

1. Pressure

The annular space between the casing and the borehole wall shall be a minimum of one and five-tenths (1.5) inches, and grout shall be pumped or forced under pressure through the bottom of the casing until it fills the annular space around the casing and overflows at the surface; or

2. Pumping

The annular space between the casing and formation shall be a minimum of two (2) inches and grout shall be pumped into place through a pipe or hose extended to the bottom of the annular space which can be raised as the grout is applied, but the grout pipe or hose shall remain submerged in grout during the entire application; or

3. Other

The annular space between the casing and the borehole wall sh be a minimum of three (3) inches and the annular space shal completely filled with grout by any method that will insure

complete filling of the space, provided the annular area does not contain water or other fluid. If the annular area contains water or other fluid, it shall be evacuated of fluid or the grout shall be placed by the pumping or pressure method.

(7) Well Screens

(a) Any water well finished in an unconsolidated rock formation shall be equipped with a screen or perforated pipe that will adequately prevent the entrance of soil or formation material into the well after the well has been developed and completed by the well contractor.

(b) The well screen shall:

1. Be of steel, stainless steel, plastic or other Department approved material and shall be of a strength to satisfactorily withstand chemical and physical forces applied to it during and after installation;

2. Be of a design to permit optimum development of the aquifer with minimum head loss consistent with the intended use of the well;

3. Have openings designed to prevent clogging and shall be free of rough edges, irregularities or other defects that may accelerate or contribute to corrosion or clogging; and

4. Be provided with such fittings as are necessary to seal the top of the screen to the watertight casing and to close the bottom. If the screen is installed through the casing, a packer, seal or other approved design shall be used to prevent the entry of ground water into the well through any openings other than the screen.

(c) Multi-screened wells shall not connect aquifers or zones which have differences in:

1. Water quality to the extent that intermixing of the waters would result in deterioration of the water quality in any aquifer or zone.

2. Static water levels that would result in depletion of water from any aquifer or zone, or significant loss of head in any aquifer or zone.

(8) Gravel-Packed Wells

(a) In constructing a gravel-packed well:

1. The gravel shall be composed of quartz, granite, or similar rock material and shall be clean, rounded, uniform, water-washed and free from clay, silt, or other deleterious material.

2. The gravel shall be placed in the annular space around the screens and casing by any method that will insure accurate placement and avoid bridging or segregation.

3. The gravel pack shall have a minimum thickness of at least two (2) inches and shall not extend more than ten (10) feet above the top of the screen or perforated pipe.

4. The gravel shall be disinfected using water with a free chlorine residual of at least 50 parts per million (ppm).

(b) The gravel pack shall not connect aquifers or zones which have differences:

1. In water quality that would result in deterioration of the water quality in any aquifer or zone.

2. In static water levels that would result in depletion of water from any aquifer or significant loss of head in any aquifer or zone.

(9) Large Diameter Wells

(a) Large-diameter bored or augered wells may be cased with concrete pipe provided such wells are constructed as follows:

1. The bore hole shall have a minimum diameter of six (6) inches larger than the outside diameter of the casing.

2. The annular space around the casing shall be filled with grout to a depth at least five feet below the static water level or twenty (20) feet below land surface, whichever is greater. The grout shall be placed in accordance with the requirements of rule 1200-4-9-.10(6)(d).

3. The annular space around the casing below the grout shall be completely filled with sand or gravel that has been disinfected with water containing a free-chlorine residual of at least 50 parts per million (ppm).

4. The sand or gravel material shall be composed of quartz, granite, or similar rock material and shall be clean, rounded, uniform, water-washed and free from clay, silt, or other deleterious material.

(b) The wellhead shall be completed in the same manner as required for other water-supply wells.

(10) Well Development

Prior to completion of a well for water supply, the driller shall take all steps necessary to:

(a) Remove any mud, drill cuttings, or other foreign matter from the entire depth of the well;

(b) Correct any damage to the aquifer that might have occurred during drilling; and

(c) Disinfect the well.

(11) Wellhead Completion

(a) The top of the casing shall be cut off smooth and level, be free from dents and cracks, and shall terminate at least six (6) inches above the land surface except in areas subject to flooding. See Rule 1200-4-9-.10(2)(b).

(b) No well casing shall be cut off or cut into below ground surface except by a licensed driller or licensed installer to install a pitless unit or adapter. Pitless units or adapters shall comply with the Water Systems Council's Pitless Adapter Division (PAD) PAS-1 (6th Ed., March 1987) and shall bear the PAD symbol of certification or shall otherwise have been approved by the Department.

(c) Pitless units or adapters shall be constructed and installed so as to prevent the entrance of contaminants into the well or potable water supply, conduct water from the well, protect the water from freezing, and provide access to water system parts within the well.

(d) The surface surrounding the well head shall slope away from the well head in all directions.

(e) Every water well that flows under natural artesian pressure shall be equipped with a valve so that the flow can be completely stopped.

Statutory Authority: T.C.A. 69-11-106 and T.C.A. 4-5-201 et. seq.

1200-4-9-.11 INSTALLATION OF PUMPS, FILTERS AND WATER TREATMENT UNITS

Primary responsibility for compliance with the provisions set forth herein for the installation of water well pumps, filters and water treatment units rests with the installer of these devices.

(1) The capacity of the pump shall be consistent with the intended use and yield characteristics of the well.

(2) The pump and related equipment for the well shall be conveniently located to permit easy access and removal for repair and maintenance.

(3) The base plate of a pump placed directly over the well shall be designed to form a watertight seal with the well casing or pump foundation.

(4) In installations where the pump is not located directly over the well, the annular space between the casing and pump intake or discharge piping shall be closed with a watertight seal designed specifically for this purpose.

(5) The well shall be properly vented at the wellhead to allow for pressure changes within the well. The vent shall be screened to prevent entry of insects.

(6) Any suction line installed underground between the well and pump sha be surrounded by six (6) inches of impervious material such as cemen or encased in a larger pipe that is sealed at each end.

(7) All conduits, valves and other plumbing fixtures used to convey water from a water-supply well to any building or other outlet shall be installed in accordance with manufacturer's requirements.

(8) All pressure tanks shall be installed above ground unless the tank is specifically designated by the manufacturer for below ground burial.

(9) The electrical wiring and equipment used in connection with the installation of a water well pump shall:

(a) Meet underwriters specifications;

(b) Be installed in accordance with the National Electrical Code or local codes and ordinances if the latter are more restrictive;

(c) Be equipped with a fused or circuit breaker disconnect switch.

(d) Be served by an entirely separate circuit from other equipment.

(10) Water filters and water treatment units shall be installed and serviced to accommodate water quality problems as determined by physica chemical or bacteriological evaluation or field test; and the funct of the equipment shall achieve the results specified by the manufactur In servicing and installing treatment units the sanitation of the wate supply shall be protected.

Statutory Authority: T.C.A. 69-11-106 and T.C.A. 4-5-201 et. seq.

1200-4-9-.12 DISINFECTION OF WATER WELLS

(1) All water wells shall be disinfected upon completion of construction, reworking, pump installation or repairs as follows:

(a) A chlorine solution shall be placed in the well in sufficient dosage to produce a chlorine residual of at least one hundred (100) parts per million (ppm) in the water standing in the well (see Tables C and D for the correct amount). A chlorine solution may be prepared by dissolving dry hypochlorite granules (trade names include HTH, Chlor-Tabs, etc.) in water or by liquid bleach (trade names include Clorox, Purex, etc). (CAUTION: When working with chlorine, persons should be in a well ventilated place. The powder or strong liquid should not come in contact with skin or clothing. Solutions are best handled in wood, plastic or crockery containers because metals are corroded by strong chlorine solutions).

Table C - Quantity of disinfectant required to produce a free chlorine residual of 100 parts per million (ppm) in drilled wells

Feet of Water	Liquid Bleach (Clorox, Purex, etc.) (5.25 % Chlorine) Well Diameter			Dry Granules (HTH, Clor-Tabs, etc.) (70% Chlorine) Well Diameter			Feet of Water
	4-inch	6-inch	8-inch	4-inch	6-inch	8-inch	
10	1/4 cup	1/2 cup	1 cup	1 tab.	2 tabs.	1/2 oz.	10
20	1/2 cup	1 cup	1 pt.	2 tabs.	4 tabs.	1 oz.	20
30	3/4 cup	1 1/2 cups	1 1/2 pts.	3 tabs.	1 oz.	1 1/2 ozs.	30
40	1 cup	1 pt.	1 3/4 pts.	4 tabs.	1 1/4 ozs.	2 ozs.	40
50	1 1/4 cups	1 1/4 pts.	1 qt.	5 tabs.	1 1/2 ozs.	2 1/2 ozs.	50
60	1 1/3 cups	1 1/2 pts.	1 1/4 qts.	6 tabs.	1 3/4 ozs.	3 ozs.	60
70	1 1/2 cups	1 3/4 pts.	1 1/2 qts.	1 oz.	2 ozs.	3 1/2 ozs.	70
80	1 3/4 cups	1 qt.	1 3/4 qts.	1 oz.	2 1/4 ozs.	4 ozs.	80
90	1 pt.	1 1/4 qts.	2 qts.	1 1/4 ozs.	2 1/2 ozs.	4 1/2 ozs.	90
100	1 1/4 pt.	1 1/4 qts.	2 1/4 qts.	1 1/4 ozs.	3 ozs.	5 ozs.	100
120	1 1/3 pts.	1 1/2 qts.	2 1/2 qts.	1 1/2 ozs.	3 1/2 ozs.	6 ozs.	120
140	1 1/2 pts.	1 3/4 qts.	3 qts.	1 3/4 ozs.	4 ozs.	7 ozs.	140
160	1 3/4 pts.	2 qts.	3 1/2 qts.	2 ozs.	4 1/2 ozs.	1/2 lbs.	160
180	1 qt.	2 1/4 qts.	1 gal.	2 1/4 ozs.	5 ozs.	2/3 lbs.	180
200	1 1/4 qts.	2 1/2 qts.	1 1/4 gal.	2 1/2 ozs.	6 ozs.	3/4 lbs.	200
250	1 1/2 qts.	3 qts	1 1/2 gals.	3 1/4 ozs.	1/2 lb.	1 lbs.	250
300	2 qts.	1 gal.	1 3/4 gals.	5 ozs.	2/3 lb.	1 lbs.	300
400	9 1/2 qts.	1 1/4 gal.	2 1/4 gals.	6 1/4 ozs.	3/4 lbs.	1 1/2 lbs.	400
500	2 3/4 qts.	1 1/2 gal.	2 3/4 gals.		1 lbs.	2 lbs.	500

Measures:
2 cups = 1 pint (pt)
2 pints = 1 quart (qt)
4 quarts = 1 gallon (gal)
7 tablets = 1 ounce (oz)
8 ounces = 1/2 pound (lb)
16 ounces = 1 pound (lb)

Equations for calculating amount of disinfectant required to chlorinate drilled wells with diameters larger than 8 inches:

Pints of liquid bleach = $D^2 h \div 1500$
Ounces of dry granules = $D^2 h \div 1300$,

where: D = Diameter of well in inches
h = height of water above bottom of well in feet.

(b) Place the required amount of liquid bleach or dry granules in the well by one of the following methods:

1. Dry granules or tablets may be dropped in the top of the well and allowed to settle to the bottom; or

2. Liquid bleach may be mixed with water and poured in the top of the well and allowed to settle to the bottom.

(c) Agitate the water in the well to insure thorough dispersion of the chlorine throughout the entire length of the well.

(d) The well casing, pump column and any other equipment above the water level in the well, shall be thoroughly rinsed with the chlorine solution as a part of the disinfecting process.

(e) The chlorine treated water shall stand in the well for a period not less than twelve (12) hours. The well shall, thereafter, be pumped until the odor of the chlorine is no longer detectable.

1200-4-9-.13 REPAIR OF WATER WELLS

(1) All materials used in the replacement or repair of any water well shall meet the requirements for a new installation.

(2) Plastic pipe approved by the National Sanitation Foundation (NSF) and rated at 160 psi (SDR = 26) may be used for liner casing. The liner casing shall be installed with centering guides to insure proper centering in the well and the annular space around the liner casing shall be completely sealed at both ends to repell the inflow of extraneous material from the lined interval.

(3) Repairs to wells completed with the top of the well casing terminating below ground shall include extending the well casing above land surface in accordance with rule 1200-4-9-.10(5)(a).

Statutory Authority: T.C.A. 69-11-106 and T.C.A. 4-5-201 et. seq.

1200-4-9-.14 WELL REGISTRATION - IDENTIFICATION

(1) Each water well constructed or reconstructed after the effective date of this rule shall be equipped immediately upon completion by the driller of the well with an identification tag or decal bearing a registration number to be supplied by the Department.

(2) The identification tag or decal shall be securely attached to the well casing or other appurtenance where it is readily visible.

(3) The identification tag or decal shall not be removed from the well unless otherwise approved by the Department.

I certify that this is an accurate and complete copy of rulemaking hearing rules, lawfully promulgated and adopted by the Department of Environment and Conservation on the 21st day of January, 1993. Further, I certify that these rules are properly presented for filing, a notice of rulemaking hearing has been filed in the Department of State on the 27th day of January, 1992 and such notice of rulemaking hearing having been published in the February, 1992, issue of the Tennessee Administrative REgister, and such rulemaking hearing having been conducted pursuant thereto on the 17th, 18th, and 19th day of March 1992.

J. W. Luna, Commissioner
Tennessee Department of Environment
and Conservation

Subscribed and sworn to before me this the 21st day of January 1993.

Paulette L. Gaugh
Notary Public

My commission expires on the 27th day of July, 1996.

All rulemaking hearing rules provided for herein have been examined by the Attorney General and Reporter of the State of Tennessee and are approved as to legality pursuant to the provisions of the Administrative Procedures Act, Tennessee Code Annotated, Title 4, Chapter 5.

Charles W. Burson
Charles W. Burson
Attorney General and Reporter

The rulemaking hearing rules set our herein were properly filed in the Department of State, and will be effective on the 5 day of August, 1993.

1993 JUL 21 PM 1:27
SECRETARY OF STATE

~~Bryant Millsaps~~ Riley C. Darnell
Secretary of State

By: Richard Arnold

DR/ES:BD223/07/PEGS

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION DIVISION OF UNDERGROUND STORAGE TANKS

ENVIRONMENTAL ASSESSMENT GUIDELINES

JANUARY 1994

II. GROUND WATER INVESTIGATION PROCEDURES

A. Number, Type and Location of Monitoring Wells

A minimum of four (4) single cased or open hole monitoring wells shall be required to begin the ground water investigation. These wells shall be constructed by converting borings B-1 through B-4 into monitoring wells.

All single cased or open hole monitoring wells shall be installed to monitor the uppermost water bearing zone.

If site specific data or geologic conditions require the monitoring of aquifers other than the uppermost, then double cased monitoring wells shall be required. To prevent the vertical movement of contaminants within a borehole or to prevent the cross contamination of multiple aquifers, double cased monitoring wells shall be installed when monitoring a separate, deeper aquifer for contamination. If conditions exist where double cased monitoring wells are required to seal off contaminant zones, the Division shall be contacted and prior approval received before proceeding.

After the installation and sampling of the first four (4) soil borings and monitoring wells the site shall be ranked in accordance with Technical Guidance Document - 014. If the owner/operator decides to proceed with the investigation or is required to based on the site ranking, additional monitoring wells may be required. These additional monitoring wells will be required if the ground water contamination has not been defined to the applicable cleanup levels. If additional monitoring wells are installed they shall not be placed within fifty (50) feet of any other monitoring wells unless prior approval has been granted by the Division.

Prior to installing additional ground water monitoring wells, the following innovative ground water investigative technologies may be used if site conditions are suitable:

1. A soil vapor survey, either active or passive, to estimate the size and location of the ground water contaminant plume and optimize the placement of additional monitoring wells; or,

2. A direct push or hydraulic push instrument to retrieve ground water samples. Once the extent of the ground water contamination is defined, additional ground water wells shall be required for future monitoring.

The Environmental Assessment Report (EAR) shall contain written documentation of the order in which each additional monitoring well was installed, the date of installation, and the rationale for the placement of each monitoring well. The rationale shall include, but not be limited to the distance, depth, and direction of the monitoring wells from all previous monitoring well, taking into consideration:

1. The estimated and/or known contaminant levels in all previously installed monitoring wells;
2. The estimated rate of contaminant migration based on site specific data gathered from all previously installed monitoring wells;
3. The estimated or known ground water flow direction and other factors that could influence the direction of the ground water contaminant plume migration;
4. The estimated and/or known rate of the decline of contaminant levels between all previously installed monitoring wells; and
5. The results of a soil vapor survey, if performed.

The objective in selecting the additional monitoring well locations is to define the outer limits of the ground water contaminant plume without installing a number of intermediate monitoring wells. Without proper rationale for the placement of additional monitoring wells, the cost of the work may not be reimbursed from the Petroleum Underground Storage Tank Fund.

B. Drilling Methods

The following drilling methods are acceptable to the Division:

1. Hollow Stem Auger
2. Air Rotary(downhole hammer or tri-cone)

The following drilling methods shall be allowed only upon special approval of the Division:

1. Mud Rotary
2. Cable Tool

3. Rock Coring
4. Wash Rotary (Tri-Cone)

C. Special Procedures for Documenting Results of Bedrock Sections

1. Camera Logging Procedures

Approval shall be received from the Division prior to camera logging any bedrock wells. Approval shall be granted on a well by well basis. All bedrock wells allowed to be camera logged shall be properly developed prior to logging. The development shall consist of purging the well with a pump to remove particulate matter derived from the drilling process. The pump shall be raised and lowered throughout the water column during purging operations. A minimum of three (3) well volumes shall be purged from the well and the well shall remain undisturbed for a minimum of twenty four (24) hours prior to logging.

All video tapes produced shall be labeled with the following information: facility name, facility ID, monitoring well number, date, time, logging company name and name of professional in charge. All logs shall have a depth indicator visible on the video image. A copy of each log shall be submitted with the EAR.

2. Rock Coring

Approval shall be received from the Division prior to rock coring any bedrock wells. Approval shall be granted on a well by well basis. The core shall be logged and photographed.

D. Single Cased Monitoring Well Installation Procedures

1. Casing and Screen Type

The casing and screen shall be constructed of two (2) inch I.D., pre-cleaned, flush threaded, Schedule 40 PVC. The screen shall have 0.01 inch factory milled slots. The well screen shall be terminated with a threaded end cap and the casing shall be terminated with a locking, watertight cap. If free product is encountered, larger diameter wells may be installed for free product recovery.

2. Screen Length and Placement

The screen length and placement shall be such that the screen intersects the water table at all times. If the screen is placed such so that ground water does not enter the well, the cost for the installation of the monitoring well may not be reimbursed from the Petroleum Underground Storage Tank Fund. Typical placement is such that seven (7) feet of screen is in the water table with three (3) feet of screen above or ten (10) feet of screen in the water table and five (5) feet of screen above. Longer screen lengths may be necessary for areas with large seasonal ground water fluctuations. A centralizer shall be used in all single cased monitoring wells with a total depth greater than twenty (20) feet.

If free product is encountered, greater screen lengths (i.e. 20 feet) may be warranted in order to allow for depression of the water table during free product removal operations provided the extra depth does not result in the breaching of a confining unit.

If a confined aquifer is encountered, the water bearing section of the aquifer shall be screened.

3. Minimum Borehole Diameter

The borehole diameter shall be a minimum of four (4) inches larger than the outside diameter (O.D.) of the well casing. For example, a 2.5 inch O.D. casing would require a 6.5 inch diameter borehole. A waiver is granted in cases if a 5.5 inch O.D. or larger core barrel will be used to drill the bedrock portion of the hole.

4. Placement and Type of Filter Pack

A minimum of six (6) inches of the filter pack material shall be placed under the bottom of the well screen to provide a firm footing. The filter pack shall extend two (2) feet above the top of the screened section. A weighted tape shall be used to help prevent bridging and ensure the proper placement of the filter pack. If the total depth of the borehole exceeds thirty (30) feet, a tremie pipe shall be utilized to properly place

the filter pack unless the well is being installed through a hollow stem auger. The filter pack shall consist of clean, washed, well sorted silica sand.

5. Placement and Type of Filter Pack Seal

The filter pack seal shall be placed atop the filter pack and have a minimum thickness of two (2) feet. The filter pack seal shall consist of a high solids, pure bentonite material. A weighted tape shall be used to help prevent bridging and ensure the proper placement of the filter pack seal. If the total depth to the top of the filter pack exceeds thirty (30) feet, a tremie pipe shall be utilized to place the filter pack seal unless the well is being installed through a hollow stem auger. If the bentonite seal is placed above the water table, two (2) gallons of potable water shall be used to hydrate the pellets. The hydration time for the bentonite pellets shall be a minimum of one (1) hour.

6. Placement and Type of Annular Grout

The annular grout shall extend from the top of the filter pack seal to within two feet of the surface. The annular grout shall consist of a mixture of Portland cement and 4%-6% powdered bentonite. A grout density of 13.5 to 14.1 lbs/gal shall be obtained and verified with a mud balance prior to placement. If water is present in the boring or the depth to the filter pack seal is greater than thirty (30) feet, a tremie pipe shall be used to place the annular grout unless the well is being installed through a hollow stem auger.

7. Surface Completion

The final two (2) feet of the annular space shall be filled with concrete terminating with a flush-mounted manhole with a watertight, bolt-down loadbearing cover unless alternate construction is approved by the Division in writing. These manholes shall be concreted in place and sloped so that surface drainage will be diverted. A locking, watertight cap shall be used if surface completion is below grade. A locking cap shall be used on all wells completed above ground level. Above ground protective covers may be used if required by site conditions. All

monitoring wells shall be clearly marked as monitoring wells and numbered.

E. Double Cased Monitoring Well Installation Procedures

1. Casing and Screen Type

The outer casing shall be decontaminated black steel. If site specific conditions and drilling methods are compatible (i.e. hollow stem auger drilling) schedule 80 PVC may be used in lieu of black steel with prior approval by the Division. The inner casing and screen shall be constructed of pre-cleaned, flush threaded, Schedule 40 PVC. The screen shall have 0.01 inch factory milled slots. The screened section shall be terminated with a threaded end cap and the casing shall be terminated with a locking, watertight cap.

2. Outer Casing Placement

The outer casing shall be set at least two (2) feet into competent bedrock, the confining layer or five (5) feet below the last indication of soil contamination, if applicable. The casing shall then be grouted into place using a bentonite/cement grout. The grout shall consist of a mixture of Portland cement and 4%-6% powdered bentonite. A grout density of 13.5 to 14.1 lbs/gal shall be used. If water is present in the boring or the total depth of the borehole is greater than thirty (30) feet, a tremie pipe shall be used to place the grout unless the well is being installed through a hollow stem auger. The grout shall be allowed to set for a minimum of 24 hours before continuation of drilling activities.

3. Screen Length and Placement

The screen length and placement shall be such that the screen intersects the water table at all times. If the screen is placed so such that ground water does not enter the well, the cost for the installation of the monitoring well may not be reimbursed from the Petroleum Underground Storage Tank Fund. Typical placement is such that seven (7) feet of screen is in the water table with three (3) feet of screen above or ten (10) feet of screen in the water table and five (5) feet of screen above. Longer screen lengths may be necessary for areas with large seasonal ground water fluctuations. A centralizer shall be used in all

monitoring wells greater than twenty (20) feet in depth. The centralizer shall be placed below the screened interval at the bottom of the well.

If free product is encountered, greater screen lengths (i.e. 20 feet) may be warranted in order to allow for depression of the water table during free product removal operations provided the extra depth does not result in the breaching of a confining unit.

If a confined aquifer is encountered, the water bearing section of the aquifer shall be screened.

4. Minimum Borehole Diameter

The outer borehole diameter shall be a minimum of 4.0 inches larger than the outside diameter (O.D.) of the well casing. For example, a 8.0 inch O.D. casing would require a 12.0 inch diameter borehole. The annular space between the inner casing and the outer casing shall also be 4.0 inches. A waiver is granted in cases where a 5.5 inch O.D. or larger core barrel will be used to drill the bedrock portion of the hole.

5. Placement and Type of the Filter Pack

A minimum of 6.0 inches of the filter pack material shall be placed under the bottom of the well screen to provide a firm footing. The filter pack shall extend two (2) feet above the top of the screened section. A weighted tape shall be used to help prevent bridging and ensure the proper placement of the filter pack. If the total depth of the borehole exceeds thirty (30) feet, a tremie pipe shall be utilized to properly place the filter pack unless the well is being installed through a hollow stem auger. The filter pack shall consist of clean, washed, well sorted silica sand.

6. Placement and Type of the Filter Pack Seal

The filter pack seal shall be placed atop the filter pack and have a thickness of two (2) feet. The filter pack seal shall consist of a high solids, pure bentonite material. A weighted tape shall be used to help prevent bridging and ensure the proper placement of the filter pack seal. If the total depth to the filter pack exceeds thirty (30) feet, a tremie pipe

shall be utilized to place the filter pack seal unless the well is being installed through a hollow stem auger. If the bentonite seal is placed above the water table, two (2) gallons of potable water shall be used to hydrate the pellets. The hydration time for the bentonite pellets shall be a minimum of one (1) hour.

7. Placement and Type of the Inner Annular Grout

The inner annular grout shall extend from the top of the filter pack seal to within two (2) feet of the surface. The annular grout shall consist of a mixture of Portland cement and 4%-6% powdered bentonite. A grout density of 13.5 to 14.1 lbs/gal shall be used. If water is present in the boring above the filter pack seal or the depth to the filter pack seal is greater than thirty (30) feet, a tremie pipe shall be used to place the annular grout unless the well is being installed through a hollow stem auger.

8. Surface Completion

The final two feet of the annular space shall be filled with concrete terminating with a flush-mounted manhole with watertight, bolt-down loadbearing cover unless alternate construction is approved by the Division in writing. These manholes shall be concreted in place and sloped so that surface drainage will be diverted. A locking, watertight cap shall be used if surface completion is below grade. A locking cap shall be used on all wells completed above ground level. Above ground protective covers may be used if required by site conditions. All monitoring wells shall be clearly marked as monitoring wells and numbered.

F. Open-Hole Well Installation Procedures

Open hole monitoring wells may be used in areas where competent bedrock is encountered and geologic conditions (e.g. karst terrain) dictate their use.

In constructing an open hole monitoring well, the surface casing shall be set at least two (2) feet into competent bedrock. The surface casing shall be black steel in all cases. The casing shall be grouted into place using a bentonite/cement grout. The grout shall consist of a mixture of Portland cement

and 4%-6% powdered bentonite. A grout density of 13.5 to 14.1 lbs/gal shall be used. If water is present in the boring or the total depth of the borehole is greater than thirty (30) feet, a tremie pipe shall be used to place the grout. The grout shall be allowed to set for a minimum of 24 hours before continuation of drilling activities.

Upon setting the surface casing, a borehole with a minimum diameter of three and one-half (3.5) inches shall be advanced to the desired depth.

The final two (2) feet of the annular space shall be filled with concrete terminating with a flush-mounted manhole with a watertight, bolt-down loadbearing cover unless alternate construction is approved by the Division in writing. These manholes shall be concreted in place and sloped so that surface drainage will be diverted. A locking, watertight cap shall be used if surface completion is below grade. A locking cap shall be used on all wells completed above ground level. All monitoring wells shall be clearly marked as monitoring wells and numbered.

G. Well Development

Monitoring well development shall not begin until at least 24 hours following completion of the well and shall continue until such time as the water column is free of visible sediment. Should development procedures not produce a water column that is sediment free, development shall continue until pH, specific conductance, and temperature have stabilized.

The following methods shall be used individually or in combination for well development:

1. Bailing
2. Pumping
3. Surging

All down-hole equipment shall be new and disposable or shall be properly decontaminated.

MEMPHIS/SHELBY COUNTY
WATER WELL REGULATIONS

JUNE 1994

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

RULES AND REGULATIONS OF WELLS IN SHELBY COUNTY

PURSUANT TO THE AUTHORITY GIVEN IN THE ORDINANCES OF SHELBY COUNTY AND THE MUNICIPALITIES THEREIN WHICH ESTABLISHED THE GROUND WATER QUALITY CONTROL BOARD FOR SHELBY COUNTY; TO ESTABLISH INSPECTION AND PERMIT FEES; TO CONTROL AND REGULATE THE LOCATION, CONSTRUCTION, AND MODIFICATION OF ALL TYPES OF WELLS IN SHELBY COUNTY; AND TO PROVIDE PENALTIES FOR THE VIOLATION THEREOF.

SECTION 1 -- GENERAL PROVISIONS

1.01 -- Statutory Authority

The Ground Water Quality Control Board for Shelby County establishes and adopts the following regulations in accordance with the authority granted by the ordinances of Shelby County and the municipalities therein which established the Ground Water Quality Control Board for Shelby County:

1.02 -- Scope and Applicability

A. Minimum requirements are hereby prescribed in these Rules and Regulations governing the location, design, installation, use, disinfectation, modification, repair and abandonment of water wells and associated pumping equipment, or any other type of well. No person shall conduct any activity contrary to the provisions of these regulations, and all such activities which are contracted for shall be carried out only by those persons having a valid Tennessee License for Water Well Drillers, and Pump Installers and/or those engineers or geologists registered in the State of Tennessee. These regulations supersede all other well construction regulations.

B. These regulations apply to well construction activities from the initial penetration or excavation of the ground, through development, modification, equipment installation, repair and disinfection. Set up of construction equipment before actual penetration or excavation is not considered part of the construction.

C. The regulations apply to the construction activities of any and all types of wells.

D. The installation of all wells or other activities conducted for the purpose of obtaining geologic or hydrologic information shall receive prior approval from the Department in the form of a Well Construction Permit.

E. Amendments may be made to inspection and permit fees to reflect reasonable costs of services provided by the Memphis and Shelby County Health Department and to establish well water conservation fees as a means of controlling the usage of water or waste of groundwater by way of private wells.

1.03 -- Health Department Powers and Duties

The Department has general supervision and authority over water quality matters as they relate to the protection and conservation of the groundwater; over the location, construction, repair, and modification of water wells and all other types of wells and for the administration of these Rules and Regulations. The Board shall adopt and amend rules and regulations; establish policies declared by these Rules and Regulations and establish policies reasonably necessary to effectuate the statement of policy declared by these Rules and Regulations. Such rules, regulations and policies shall provide criteria for the proper location and construction of any type of well in Shelby County; to safeguard the public health against problems which pertain to water quality; and for the protection and conservation of groundwater. The Board shall conduct public hearings, upon not less than thirty (30) days prior notice, in connection with proposed rules and regulations and amendments thereto; and exercise such other powers as are practical and reasonably necessary to carry out and enforce the provisions of these Rules and Regulations.

Section 2 -- SHORT TITLE

Shelby County Well Construction Code

Section 3 -- DEFINITIONS

3.01 -- Abandoned Well: Any type of well that has been permanently discontinued for further use. A well shall be declared abandoned when the pump has been disconnected or removed for reasons other than repair or replacement; when the well is in such a state of disrepair that continued use for the purpose intended is impracticable; or when the well is not maintained in such a condition that allows for periodic sampling and testing by the Department.

3.02 -- Abandonment: The act of properly sealing an abandoned well.

3.03 -- Adequate Water Supply: A well which after installation will supply enough water in a capacity so that the well can be used for drinking, culinary, food processing and other purposes.

3.04 -- Agricultural Well: A well constructed for the primary purpose of providing a source of water for agriculture.

3.05 -- Agriculture: The term agriculture is defined as the art of being engaged in farming as the leading pursuit and includes cultivating the soil; producing crops; and/or raising livestock, poultry, or fish; and in varying degrees the preparation of these products for human use.

3.06 -- Aquifer: A geologic formation, group of formations or part of a formation capable of yielding a significant amount of groundwater to wells, springs, or surface water.

3.07 -- Auxiliary Intake: Any source of water system, piping, connection, or device whereby water may be secured other than that normally used.

3.08 -- Bentonite Grouts: A Bentonite grout shall consistr of a high solid sodium montmorillonite. The grout shall yield solids ranging from twenty to thirty (20-30%) percent, with a minimum density equal to or greater than 9.4 pounds per galion, and a permeability of

approximately 1x10-7 centimeters persecond or less. The manufacturers mixing instructions shall be followed and any polymer added to bentonite slurry mixes must be approved by the Department prior to use.

3.09 -- Board: The Ground Water Quality Control Board for Shelby County.

3.10 -- Commercial Well: A well constructed for the purpose of providing groundwater to a commercial business, facility, or premise for use as a potable water supply when public water is not available; for air conditioning, and other heat exchange systems; sprinkler systems for landscaping and other land beautification uses; nurseries; filling and retaining levels of lakes in subdivisions, apartment complexes, and similar multiple dwelling facilities; and any other such commercial uses.

3.11 -- Contaminated Well: Any type of well containing a foreign substance, either chemical, radiological, or biological, which tends to degrade the quality of the water so as to constitute a hazard or impair the usefulness of the water.

3.12 -- Contamination: Alteration of the physical, chemical, or biological quality of the water so that it is harmful or potentially injurious to the health of the users or for the intended use of the water, or to the extent it poses a danger of polluting the groundwater aquifers.

3.13 -- Cross Connection: An actual or potential connection, arrangement or condition by or through which a supply of potable water could be contaminated, polluted or infected.

3.14 -- Deep Well: Any type of well constructed to a depth that penetrates the stratum of clay known as the Jackson Formation, the water bearing formation known as the Memphis Sands, or the water bearing formation known as the Fort Pillow Sands. Any well is considered a deep well if the Jackson Formation is not found to exist at the construction site.

3.15 -- Delinquent: Unpaid or past due well fees that are subject to additional fees or penalties.

3.16 -- Department: The Memphis and Shelby County Health Department.

supply to the premise whether from a public source or from an existing well that can be modified to produce the needed volume of water.

3.29 -- Modification: Alteration, rework or repair involving a material change in the design or construction of a well including but not limited to deepening, reaming, casing, re-casing, perforating, re-perforating, installation of liner pipe, packers and seals, screen removal and replacement, or redeveloping a well by surging, chemical treatment, jetting, etc.

3.30 -- Monitoring Well: A well constructed for monitoring Groundwater quality and/or water level.

3.31 -- Municipality: A political unit having corporate status and powers of self-government and, includes any other form of government within the political jurisdiction of Shelby County.

3.32 -- Observation Well: A well constructed for the primary purpose of obtaining accurate, periodic measurements of groundwater.

3.33 -- Owner: Any person or his legal representative, agent, or assign who owns, leases, operates, or controls any parcel of land where a well is or may be located.

3.34 -- Permit: An official document issued by the Department granting the specific activity set forth in the document.

3.35 -- Person: Any individual, firm, association, organization, partnership, business, institution, enterprise, municipality, commission, political subdivision or duly established entity, trust, corporation, company, contractor, supplier, installer, user or owner, or any Federal, State or Local government agency or public district or any officer or employee thereof.

3.36 -- Potable Water Supply: Any source of water which is satisfactory for drinking, culinary, and domestic purposes, and meets the requirements of the Department.

3.37 -- Premise: A tract of land with the buildings thereon.

3.38 -- Private Water Supply: Any groundwater supply located on

3.17 -- Dewatering or Drainage Well: A well constructed for the primary purpose of lowering the water table for the construction of footings, sewer lines, building foundations, elevator shafts, etc.

3.18 -- Domestic Well: A well constructed for the primary purpose of providing a source of drinking water to a single family residence.

3.19 -- Emergency: Unforeseen circumstances that exist beyond the control of the applicant.

3.20 -- Geothermal Well: A well constructed for the primary purpose of adding or removing British Thermal Units (Btu) from groundwater for heating or cooling purposes.

3.21 -- Groundwater: Water occurring naturally in underground formations that are saturated with water and includes but is not limited to perched water tables and aquifers or zones that are seasonally, periodically or permanently saturated.

3.22 -- Groundwater Heat Pump: Any mechanical device used for heating or cooling, which adds or removes British Thermal Units (Btu) from groundwater.

3.23 -- Grout: A stable, impervious, minimum-shrinkage bonding material that is capable of producing a water tight seal required to protect against the intrusion of contamination.

3.24 -- Health Director: The Director of the Memphis and Shelby County Health Department.

3.25 -- Industrial Well: A well constructed for the purpose of providing water for use in processing, washing, packaging or manufacturing of a product.

3.26 -- Injection Well: A well used to inject fluid into the subsurface.

3.27 -- Irrigation Well: A well constructed for the primary purpose of providing a source of water by way of sprinklers, artificial ditches or channels, or by any other means for use in nurseries, golf courses, land beautification, silviculture, growing sod, greenhouses, and any other such uses.

3.28 -- Justifiable Need: A genuine need for a private water supply as determined by the Board and, which need is based upon the availability of an adequate water

a premise that is not obtained from a public water system.

3.39 -- Public Water Supply: Any publicly or privately owned water system operating as a public utility which operates fifteen (15) or more service connections or regularly serves twenty-five (25) people sixty (60) or more days per year.

3.40 -- Pump Installer: Any person who installs or repairs water well pumps or who installs filters and water treatment devices.

3.41 -- Quasi-Public Water Supply: A water supply used or made available by a person to his employees, tenants, members or guests for drinking; or in connection with the manufacturing or handling of ice, foods, or drinks, such as candy, ice cream, milk, ice bottled drinks, and any other food or drink products. The source of quasi-public water supply may be a private well, or the public water supply.

3.42 -- Reasonable Use: That use of water which is ordinarily required by industries, firms, and individuals in the usual operation of their business or residence.

3.43 -- Recovery Well: A well constructed for the purpose of recovering products which have intersected the water table by way of leaking underground storage tanks, surface spills, etc.

3.44 -- Repair: Any modification, replacement, or other alteration of any well, or pumping equipment which requires a breaking or opening of the well seal or any waterlines up to and including the pressure tank and any coupling appurtenant thereto.

3.45 -- Shallow Well: Any type of well constructed to a depth shallower than the stratum of clay known as the Jackson Formation which is found just above the water bearing sands known as the Memphis Sands.

3.46 -- Site: Any one legal unit of a subdivision, parcel of land, or location where drilling activities are to take place.

3.47 -- Soil Boring: Any hole that is drilled, cored, dug, washed, driven, jetted, redrilled, bored, or otherwise constructed, which exceeds thirty (30) feet, for the purpose of determining geological formations, water level, or for the purpose of founding structures.

3.48 -- Temporary Abandonment: Means any observation or monitoring well covered with a secure cap that is water tight and which is being used for the investigation or management of groundwater by a governmental agency.

3.49 -- Test Well : Any excavation, either cased or uncased, that is constructed for the purpose of determining the location or physical characteristics of underground formations or for evaluating or monitoring the characteristics or behavior of the formations or the water contained therein, or for obtaining the information needed to design a well prior to its construction.

3.50 -- Utilities: Any power lines or underground cables which supply electrical power, telephone lines, cable television lines, natural gas lines, water mains, water lines, or sewer lines.

3.51 -- Water Well: Wells which are constructed and so equipped with casings, screens, pumps, fittings, etc., and have been developed for the primary purpose of producing a supply of water regardless of the intended usage for said supply.

3.52 -- Water Well Contractor: Any person, firm, or corporation who has duly registered as such with the State of Tennessee and shall have paid the annual registration fee and obtained a permit to contract for construction of wells as therein provided and, who has obtained the necessary privilege license to construct, repair, and service wells in Shelby County.

3.53 -- Well: A well is any hole that is drilled, cored, dug, washed, driven, jetted, redrilled, bored, or otherwise constructed which intersects the water table for: the production of water; monitoring of contaminants; recovering product; dewatering or drainage purposes; determining water levels; lowering the water table; or any boring into the subsurface thirty (30) feet or deeper.

3.54 -- Well Construction: Any type of work that is performed on a well including but not limited to the installation of new wells; the modification, alteration, or repair of existing wells; or, their abandonment.

3.55 -- Well Driller: Any person who manages or supervises the digging, drilling or redrilling of well.

3.56 -- Well Logs: A record of geologic formations penetrated in drilling a water well, monitoring, recovery, dewatering, observation or any other type of well; or any boring into the subsurface thirty (30) feet or deeper.

Section 4 GENERAL REQUIREMENTS AND PROCEDURES

4.01 -- Applications

A. Any person requesting the installation, modification, repair, or abandonment of a water well or any other type well shall make application to the Department.

B. All applications requesting new well installation or the modification of an existing well shall be accompanied by a plot plan showing the location of all underground utilities within fifty (50) feet of the proposed well; grade elevations in relation to adjoining areas and drainage patterns of the area; location of the residence, business, etc.; locations of septic tanks and field lines when applicable; other existing and proposed buildings and structures; any water service lines that may exist on the premises; any drainage ditches, lakes, ponds, streams, etc., that may exist at the premise; any roads or dedicated right-of-ways or easements; and any other pertinent information deemed necessary by the Department. The application shall also include a sketch of how the well is to be constructed.

C. A water well cannot be sited or placed in service within a half-mile of the designated boundaries of a listed federal or State Superfund site or Resource Conservation and Recovery Act corrective action site, unless the well owner can make a demonstration that the well <u>will not</u> enhance the movement of contaminated groundwater or materials into the shallow or deep aquifer.

D. An application may be obtained from the Department, and if approved, such application shall be in force and in effect for ninety (90) days from the date of its issuance. If work has not commenced within ninety (90) days of issuance, an extension may be granted by the Department upon request by the applicant.

E. A processing fee shall be submitted with all

applications for new wells and said fee is not refundable, regardless of the status of approval.

F. The Department shall issue a notice of rejection whenever it determines that an application for a permit fails to meet the requirements of these Rules and Regulations, or any rules, order, regulation or standard adopted pursuant thereto; or that the proposed well will be harmful or potentially harmful to the water resources of Shelby County or, if it is determined by the Department that an adequate water supply is available to the premise without the need to construct a well. Said water supply may be from an existing water well or from a public system. Permits for wells to supply water for purely aesthetic purposes (i.e. waterfalls, landscaping enhancement, fountains, etc.) may be approved by the Department if conservation steps are taken to limit water usage as established by the Board.

4.02 -- Permits Required

A. A permit shall be obtained from the Department prior to beginning the installation, modification, repair, or abandonment of a water well or any other type of well, soil boring or pumping equipment within Shelby County.

B. The issuance of a construction permit is dependent upon:

1. the application being on the proper form and containing the required information, provided that the proposed construction or repair will not be contrary to applicable laws, rules, orders, or regulations of the Department or other government agencies;

2. additional information which may be required as the Department deems necessary such as geophysical logs, geologic samples and logs, and well pumping tests; and

3. the justifiable need for a well.

C. If a well application is approved by the Department, the well driller shall be issued a permit. Receipt of the permit shall constitute permission to begin well construction upon prior notification to the Department.

D. Permission to begin construction of a water well or any other type of well may be applied for by telephone when emergency conditions exist which would justify such a request. The Department may, at its discretion, grant such emergency permits with an additional fee of fifty ($50) dollars.

E. A written permit shall be obtained from the Department and renewed annually to operate or maintain a commercial or industrial well regardless of the intended usage of said well.

F. A written permit shall be obtained from the Department and renewed annually for wells constructed at residential premises where public water is available regardless of the intended usage of said supply.

G. A written permit shall be obtained from the Department and renewed annually to operate or maintain a quasi-public water supply.

H. All renewable permits shall be valid for one year, and, may be renewed at the expiration thereof upon payment of the fees hereinafter set forth. Such permits may be revoked by the Department upon the violation by the holder of any terms of the permit or these Rules and Regulations or in any emergency when, in the judgement of the Department, the continued operation of the quasi-public or private water supply or maintenance of a well for any reason shall constitute a health hazard. The holder of such permit, after such revocation, shall have the right of appeal.

4.03 -- Fees Required

A. All applications requesting a permit to construct water wells or any other wells shall require a processing fee of twenty-five ($25.00) dollars be paid to the Department when such applications are submitted. The processing fee is not refundable, regardless of the status of approval.

B. The yearly permit to operate or maintain a quasi-public or a private water supply or well, other than a domestic well shall not be issued until an inspection fee of one hundred ($100.00) dollars per well is paid each year to the Department.

C. An inspection fee of one hundred ($100.00) dollars

per site shall be paid to the Department for wells constructed for the primary purpose of monitoring, observation, testing, recovery, and/or any other usage which does not require the permanent installation of a pump within the well casing.

D. Dewatering or drainage wells require an inspection fee of one hundred ($100.00) dollars per site.

E. Owners of domestic wells shall not be liable for an annual inspection fee, except when public water becomes available to a residential premise, then the well being used at said premise shall be subject to applicable fees being paid.

F. Any new water wells constructed within the calendar year shall be subject to the inspection fee being paid at the time the well construction permit is issued. This fee will be prorated on a quarterly basis.

G. Any construction permits issued on an emergency basis require an additional processing fee of fifty ($50.00) dollars be paid to the Department.

H. All inspection fees are due upon notification by the Department and are delinquent thirty (30) days after said notification.

I. An annual fee of twenty ($20.00) dollars per well shall be assessed for all active monitoring, vent, air sparging and recovery wells, or any other type well related to the remediation of groundwater at a site located within Shelby County.

4.04 -- Well Driller

A. All water production wells to be constructed in Memphis and Shelby County shall be constructed only by persons having a valid license under the TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION, Division of Groundwater Protection.

B. A well driller shall have in his possession a valid well construction permit before any construction is to begin.

C. The well driller to whom a well construction permit is issued is responsible for the construction of the well in accordance with the permit and

applicable laws and regulations.

D. It shall be the well driller's duty to inform persons requesting the services of his company, to construct, repair, alter, modify, or to perform any other service related to a well of the requirements of these Rules and Regulations.

E. The well driller shall be held liable for any type of well work initiated prior to the Department issuing a written permit.

F. It shall be the duty of the well driller to notify the Department when construction on a well is to begin and when the work is completed so that proper inspections can be made during and after construction, and for the purpose of collecting samples from production wells.

G. The well driller shall notify the Department when repair or modification work, as directed within these Rules and Regulations, is done on a well.

H. Within thirty (30) days after a well has been constructed or modified, the well driller shall submit a report of construction (well log) to the Department on such forms as are prescribed or which may be furnished by the Department.

I. The well driller shall notify the Department prior to beginning abandonment procedures on a well.

Section 5 -- WELL CONSTRUCTION STANDARDS FOR WATER WELL

5.01 -- General

A. All wells shall be constructed in a manner that will guard against waste and contamination of the groundwater aquifers underlying Memphis and Shelby County. No person shall construct, repair, modify, or abandon or cause to be constructed, repaired, modified, or abandoned any well contrary to the provisions of these Rules and Regulations.

5.02 -- Siting Criteria

A proposed well location shall satisfy the following minimum horizontal separation distance requirements:

1. Fifty (50) feet from a property line, to allow access to the well without encroaching on adjoining properties; to provide adequate

distance from field lines and other sources of contamination that may exist or may be planned on adjacent properties; and, to reduce the potential for interfering with other wells drilled on other properties.

2. Twenty-five (25) feet from a road or dedicated right-of-way or easement.

3. Fifteen (15) feet from a building foundation for the purpose of protecting the well from a foundation of soil treated to control pests, insects, or vermin.

4. One hundred (100) feet from any subsurface sewage disposal system such as a septic tank and/or field lines.

5. One hundred (100) feet from any identifiable sources of contamination such as but not limited to disposal fields, seepage pits, manure piles, barns, underground fuel tanks, etc.

6. Fifty (50) feet from any storm drain or sanitary sewer that flows by gravity.

7. One hundred (100) feet from any sewage force main.

8. Fifty (50) feet from any drainage canal, ditch, stream, lake, or similar body of water.

9. Fifteen (15) feet from power lines and underground cables for electrical power.

10. Twenty-five (25) feet from natural gas lines

11. Twenty-five (25) feet from any water main as defined by the utility owner.

B. The well site shall not be subject to flooding and shall be at least two (2) feet above the 100-year recurrence flood level for the area. If necessary, the area shall be filled with material approved by the Department, properly graded and maintained to prevent the accumulation or retention of surface water.

C. Lots requiring a well for a potable water supply and a septic tank system for sewage disposal shall be a minimum of four (4) acres in size.

D. All parcels of land requiring a well for a source of potable water shall be self-supporting in that sharing a water supply shall not be allowed. A water line shall not cross property boundaries for the purpose of providing potable water to a premise on a permanent basis.

E. A well cannot be sited or placed in service within a half-mile of the designated boundaries of a listed federal or State Superfund site or Resource Conservation and Recovery Act corrective action site, unless the well owner can make a demonstration that the well <u>will not</u> enhance the movement of contaminated groundwater or materials into the shallow or deep aquifer.

5.03 -- <u>Sanitary Protection of Wells</u>

A. All water used in the construction of a well shall be from an approved potable water supply. Water obtained from lakes, ponds, streams, and other such surface water sources is not approved and shall not be used in the well construction process.

B. It shall be the responsibility of the well driller to protect the opening made in drilling the well against any foreign material or any other type of contamination from entering the opening.

C. In the event a well becomes contaminated or obstructed, the well driller shall take whatever measures necessary to clear the well of contamination or obstruction. Should he decide to abandon the well for any reason, the well shall be filled in a manner prescribed by Section 9 of these Rules and Regulations.

D. Whenever construction stops before the well is grouted and pumping equipment is installed, the open annular space shall be covered and the well casing capped. The cap shall be either threaded onto the casing secured by a friction type device which locks onto the casing, welded, or secured by such other device or method as may be approved by the Department. It shall be the responsibility of the owner to maintain the integrity of the protective device placed on the well opening by the well driller.

E. A well shall be drilled to a size that will permit the outer casing to be surrounded by a water tight seal a minimum of two (2) inches thick. All wells

shall be grouted as soon as possible but not later than twenty-four (24) hours after the well casing has been set in place and all drilling has been completed.

F. The well driller shall notify the Department at least twenty-four (24) hours in advance of grouting wells to provide the Department the opportunity to observe the procedure. Such a condition shall be specified on the well construction permit. The grout material shall consist of a mixture of neat Portland Class A Cement or quick setting cement in a ratio of not over six (6.0) gallons of water per ninety-four (94) pound sack of cement, or a coarse grained high solids non drilling mud grade bentonite slurry, such as Baroid Benseal, American Colloid or equal. The bentonite slurry shall be mixed in accordance with the manufacturers recommendations. Bentonite alone is not an acceptable grouting material. The relative proportion by weight for each component shall meet the following requirements:

Portland Cement:	92%		Portland Cement:	74%
Bentonite:	8%	or	Bentonite:	6%
			Sand:	20%

For each two (2) percent addition of bentonite an additional (1.3) gallons of water should be added to the slurry mixture. A maximum of two (2) percent by weight of calcium chloride may be added. Other grouting materials or methods or any special conditions for grouting a well may be made by the Department within the well construction permit.The use of bentonite drilling clay as a grouting material is prohibited, execpt as an additive to neat cement grout. Only bentonite grout approved by the National Sanitation Foundation (NSF) shall be approved by the Department as appropriate grouting material.

G. The method of grouting the annular space of a well shall be throughout the entire length of the casing from the bottom of the casing to the ground surface and shall be pressure grouted through a tremmie pipe from the bottom to the top in one continuous operation in order to avoid gapping or dilution of grout material. The return at the top shall be of the same consistency as the material that is pumped

into the tremmie pipe. During the grouting procedure any proposed changes to the approved grouting material will not be allowed by the Department.

H. Upon completion, the well shall be treated with a sufficient dosage of chlorine so that a concentration of at least fifty (50 ppm) parts per million free chlorine shall be obtained in all parts of the well for a period of twenty-four (24) hours. The well is then to be pumped free of chlorine and a water sample collected for bacteriological analysis. The result shall be required to be negative for E. coliform bacteria prior to putting the well into service.

5.04 -- Construction Materials And Other Requirements

All materials, components, parts, etc., used in the installation of a water well or any other type of well, such as the casing, screen, pumping equipment, pressure tank, wiring, pipe, and any other such components, must comply with the standards as established in the ,RULES OF THE TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION, DIVISION OF WATER SUPPLY, CHAPTER 1200-4-9, entitled WATER WELL LICENSING REGULATIONS AND WELL CONSTRUCTION STANDARDS. When deemed necessary, the Department may require standards and specifications to be more stringent than those required by the State of Tennessee.

5.05 -- Sanitary Protection Of The Well Pumping Facilities

A. A sanitary well seal that is water tight shall be provided at the terminal of any well casing in order to prevent any contamination from entering the well casing. The well casing shall terminate no less than one (1) inch above the foundation of the well.

B. If the well is to be vented, it shall be required to have an inverted screened vent.

C. The pump base foundation shall be reinforced, if the forces exerted are such that reinforcement is required, and shall be a minimum of two (2) inches larger than the base plate. The concrete used shall be of a strength suitable to withstand any vibrations, etc., to which it may be subjected.

D. All water wells shall be provided with a readily accessible faucet or tap on the well discharge line at the well head for the collection of water samples.

E. Where pitless adapters are used, they shall be required to meet National Sanitation Foundation (NSF) specifications for subsurface installations and shall bear the NSF seal.

F. The water tight casing or curbing of any well shall extend not less than six (6) inches above the established ground surface or twenty-four (24) inches above the maximum high water level where flooding occurs.

G. Any oil-lubricated pump installed in a well shall utilize oil or grease lubricants which carry a USDA H-1 rating. The installer must supply the Department documentation to verify that the lubricant used has an H-1 rating.

5.06 -- Maintenance of Wells

A. Wells shall be maintained in an operative condition at all times in order for water samples to be collected for analytical purposes.

B. A source of power shall be made available to the well either by a permanent connection or by way of a temporary source such as a generator.

C. All wells shall be maintained in a condition whereby they are not a hazard to health or environment nor a source of potential contamination to the groundwater aquifers.

D. When a well is determined to be abandoned as defined by these Rules and Regulations, the owner shall be ordered to seal the well in accordance with the requirements of the Department.

5.07 -- Disinfection of Wells

Every newly constructed well, modified well, or well that has been repaired shall be assumed to be contaminated by microorganisms. Before initiation of use each well must be thoroughly and carefully cleaned and treated to ensure that all pathogenic organisms are eliminated. Care shall be exercised to make certain that all areas of a well come in

full contact with a solution containing enough available chlorine to completely destroy all pathogenic microorganisms. An initial chlorine concentration of fifty (50 ppm) parts per million with a residual chlorine requirement of twenty-five (25 ppm) parts per million after twenty-four (24) hours is considered adequate for this purpose. Domestic laundry bleaches containing sodium hypochlorite either in powder or tablet from may be used. The well shall be allowed to remain undisturbed after the treatment for a period of twenty-four (24) hours and then tested for residual chlorine of at least twenty-five (25 ppm) parts per million must remain. After successful treatment all water remaining in the well and supply system shall be pumped free of residual chlorine and a sample of fresh water from the well shall be collected by and tested by the Department for bacteriological purity.

5.08 -- Sampling of a Well

A. After a well has been drilled, modified, or repaired, a negative bacteriological sample shall be obtained prior to placing the well into service.

B. A well shall not be connected into a premise until a sample has been collected which produces negative bacteriological results.

C. If a sample collected from a newly constructed well is positive for E. coliform bacteria, it shall be the well driller's responsibility to take whatever steps are necessary to properly disinfect the well. Two (2) consecutive bacteriological samples producing negative results must be obtained prior to placing the well into service.

D. Whenever a well is repaired or modified, it shall be the responsibility of the well driller to notify the Department upon completion of work to sample the well for bacteriological purity. It shall be the well driller's responsibility to properly disinfect the well upon completion.

Section 6 -- MONITORING AND RECOVERY WELLS CONSTRUCTION STANDARDS

6.01 General

A. A construction permit is required for monitoring and recovery wells.

B. All wells shall be constructed in a manner that will guard against contamination of the groundwater aquifers underlying Shelby County. No person shall construct, repair, modify, or abandon or cause to be constructed, repaired, modified, or abandoned any well contrary to the provisions of these Rules and Regulations.

C. Within thirty (30) days after well construction the well driller or authorized contractor responsible for well installation shall submit a well drillers log for every well installed at a site. Any sample analysis results for a monitoring or recovery well shall be submitted with the logs of the well.

6.02 Siting Criteria

When a well site is subject to flooding it shall be cased to a point at least two (2) feet above the 100-year recurrence flood level for the area. In the case of a flush mount, the well shall have a waterproof seal with a lockable leakproof inner cap. If necessary, the area shall be filled with material approved by the Department, properly graded and maintained to prevent the accumulation or retention of surface water.

6.03 Sanitary Protection of Wells

A. All water used in the construction of a well shall be from an approved potable water supply. Water obtained from lakes, ponds, streams and other such surface water sources is not approved and shall not be used in the well construction process.

B. It shall be the responsibility of the well driller to protect the opening made during the drilling and to prevent any type of contamination from entering.

C. Should a well be abandoned for any reason, the well shall be filled in a manner prescribed by Section 9 of these Rules and Regulations.

D. Whenever construction stops before the well is grouted the open annular space shall be covered and the casing capped. The casing cap shall be either threaded onto the casing, secured by a friction type device which locks onto the casing welded or secured by such other device or method as may be approved by the Department. It shall be the responsibility of the owner to maintain the integrity of the protective device placed on the

well opening by the well driller.

E. A well shall be drilled to a size that will permit the outer casing to be surrounded by a water tight seal, a minimum of two (2) inches thick. All wells shall be grouted as soon as possible but not later than twenty-four (24) hours after the well casing has been set in place and all drilling has been completed.

F. The well driller shall notify the Department at least twenty-four (24) hours in advance of grouting wells to provide the Department the opportunity to observe the procedure. Such a condition shall be specified on the well construction permit. The grout material shall consist of a mixture of neat Portland Class A Cement or quick setting cement and water in a ratio of six (6.0) gallons of water per ninety-four pound sack of cement, or a coarse grained high solids non drilling mud grade bentonite slurry, such as Baroid Benseal, American Colloid or equal. The bentonite slurry shall be mixed in accordance with the manufacturers recommendations. A portland cement grout and bentonite combination is acceptable. The relative proportion by weight for each component of the cement grout bentonite combination shall meet the following requirements:

Portland Cement:	92%		Portland Cement:	74%
Bentonite:	8%	or	Bentonite:	6%
			Sand:	20%

For each two (2) percent addition of bentonite an additional 1.3 gallons of water should be added to the slurry mixture. A maximum of two (2) percent of calcium chloride may be added. Any special conditions for grouting a well may be made by the Department within the well construction permit. The use of bentonite drilling clay as a grouting material <u>is prohibited,</u> except as an additive to neat cement grout. Only bentonite grout approved by the Natioal Sanitation Foundation (NSF) shall be approved by the Department as appropriate grouting material.

G. The method of grouting the annular space of a well shall be throughout the entire length of the casing in one continuous operation from the top of the screen or bentonite seal to the ground surface.

The grout mixture may be pumped from the surface when:

(a) water will not be encountered, and
(b) the depth is less than twenty (20) feet.

Pressure grouting is required if the aforementioned conditions are not met. Pressure grouting will be accomplished using a tremmie pipe. When the tremmie pipe is encased in the grout, it must have the same protection as the casing. (refer to paragraph 6.03 D)

H. The borehole shall not hydraulically connect separate aquifers.

6.04 -- Construction Materials And Other Requirements

A. All materials, components, parts, etc., used in the installation of a monitoring or recovery well, such as the casing, screen, pumping equipment, pressure tank, wiring, pipe and other such components, must comply with the standards as established in the RULES OF THE TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION, DIVISION OF WATER SUPPLY, CHAPTER 1200-4-10, entitled WELL CONSTRUCTION AND ABANDONMENT STANDARDS. When deemed necessary, the Department may require standards and specifications to be more stringent than those required by the State of Tennessee.

B. The well shall be backfilled to a point, a minimum of two (2) feet above the top of the screen with filter sand, followed by a minimum of two (2) feet bentonite pellet seal above, which shall be grouted in accordance with Section 6.03.

C. All piping materials shall be flush joint and threaded pipe. No solvent weld cements or other components shall be allowed. End points shall have threaded ends or be riveted on. Slip on ends are not allowed. Top caps shall be threaded or have some type of locking feature.

D. Bentonite pellets shall have a maximum size of one quarter (1/4) inch to prevent bridging and shall then be activated with potable water.

6.05 -- Protection of the Well

A. When a well site is to be subject to flooding, it shall be cased to a point: 1. at least two (2)

feet above the 100-year recurrence flood level for the area, or, 2. in the case of flush mount, have a waterproof seal with a lockable leakproof inner cap. When necessary the area shall be filled with material approved by the Department, properly graded and maintained to prevent the accumulation of retention of surface water.

B. Until the well is abandoned and closed in accordance with these regulations, that portion of the well above the ground level shall be protected against tampering or destruction.

6.06 -- Maintenance of Wells

A. Wells shall be maintained in an operative condition at all times in order for water samples to be collected for analytical purposes and shall have at least one (1) keyed lock to prevent tampering. Because of the potential for surface runoff to enter the below grade protective structure and/or well, installation of a removable cover with a flexible o-ring or gasket attached at the point where the cover fits over the protective structure and/or well will be necessary to prevent surface runoff from entering the well.

B. All wells shall be maintained in a condition whereby they are not a hazard to health or environment nor a source of contamination to the groundwater aquifers.

C. When a well is determined to be abandoned, as defined by these rules and regulations, the owner shall be ordered to seal the well in accordance with the requirements of Section 9 of these regulations.

Section 7 -- SOIL BORINGS

7.01 -- Regulations

A. Any soil boring of thirty (30) feet or less shall not require a permit or require professional supervision for the purposes of this ordinance.

B. All borings to a depth greater than thirty (30) feet but less than one hundred (100) feet shall require a permit and must be under the supervision of a licensed water well driller or an engineer or geologist registered in the

into the hole. When the hole does not stand open it will be necessary to pressure grout from the top of the water bearing material as required in Section 7.03 C. below. In all cases the driller shall ascertain that the bentonite pellets are in fact filling the hole from the bottom up to the required elevation. When the borings are made using a drilling fluid to keep the hole open the boring shall be filled as specified in 7.03 C. below.

C. For deep borings, greater than one hundred (100) feet, the borehole shall be sealed by pressure grouting through a tremmie pipe from the bottom upward in one (1) continuous operation. The grouting materials shall be neat Portland Class A or quick setting cement in a ratio of not over seven (7) gallons of water per ninety-four pounds of cement; or a coarse grained high solids non drilling mud grade bentonite grout slurry, such as Baroid Benseal, American Colloid, or equal. The bentonite grout shall be mixed in accordance with the manufacturers recommendations. A Portland cement grout and bentonite combination is acceptable. The relative proportion or each component shall meet the following requirement:

	Portland cement	=	92%
	Bentonite	=	8%
or:	Portland cement	=	74%
	Bentonite	=	6%
	Sand	=	24%

For each two (2) percent addition of bentonite an additional 1.3 gallons of water should be added to the slurry mixture. A maximum of two (2) percent by weight of calcium chloride may be added. The use of bentonite drilling clay as a grouting material is prohibited except as an additive to neat cement grout. Only bentonite grout approved by the National Santation Foundation (NSF) shall be approved by the Department as appropriate grouting material.

Section 8 -- INSPECTIONS

A. During the construction, modification, repair, or abandonment of any well the Department may conduct such periodic inspections as it deems

necessary to insure conformity with applicable standards. Duly authorized representatives of the Department may, at reasonable times, enter upon and shall be given access to any premise for the purpose of such inspection.

B. When during construction, modification, repair, or abandonment of any well the Department finds the work is not being done in accordance with rules, regulations and standards as required the Department shall give the owner and well driller written notice stating which rules, regulations or standards are being violated. At such time the Department may order that necessary corrective action be taken within a reasonable time to be prescribed in such order. Any such order shall become final unless the person or persons named therein requests, by written petition, a hearing before the Board no later than fourteen (14) days after the date such order is served. Failure to act in accordance with the order of the Department after receipt of written notice shall be grounds for revocation of the permit.

C. All private water supplies shall be subject to inspection by the Department and when deemed necessary, said supplies shall be made available for the collection of samples in order to determine the purity of the supply. When a water sample is found to have contamination the owner shall be required to take whatever steps necessary to correct the contamination problem.

D. All wells shall be subject to inspection by the Department and shall be made available for the collection of samples in order to determine the purity of the supply.

Section 9 -- ABANDONMENT OF WELLS

9.01 -- General Requirements

The objective of the requirements described in this Section is to restore as nearly as possible those subsurface conditions which existed before the well was constructed. A well penetrating several aquifers or formations, must be filled and sealed in such a way as to prevent the vertical movement of water from one aquifer to another. The

Department shall require that certain abandonment procedures be followed in order to avoid or reduce water quality and/or water quantity problems.

A. All abandoned wells shall be filled with Portland cement grout, a high solids bentonite grout, or a Portland cement grout and bentonite combination in such a way that they do not produce water or act as a conduit for the interchange of waters of undesirable quality with those whose quality is desirable, or present a hazard to the safety and well being of people and/or animals.

B. The owner shall submit a plan to fill at the owners expense any abandoned or condemned well within thirty (30) days after receipt of notice from the Department.

C. All abandoned wells shall be filled only by a person having a valid drillers license from the Tennessee Department of Environment and Conservation, or be an engineer or geologist registered with the State of Tennessee.

D. Within thirty (30) days of filling an abandoned well, the driller, engineer or geologist responsible for the well abandonment shall submit to the Department a well abandonment report. The report must be completely filled out and signed by the authorized contractor responsible for well abandonment.

E. The Department may require any well owner to have an abandoned well sealed when the well:

1. is contaminated;

2. is a potential source of contamination to the groundwater aquifers underlying Shelby County;

3. is not maintained in an operative condition for the purpose of collecting samples.

F. Observation and monitoring wells being actively used for the investigation or management of groundwater by federal, state or local governmental agencies or research

organizations may be classified as temporarily abandoned and shall be covered with a secure cap such that the cover is water tight and cannot be removed except with the aid of equipment or the use of tools.

G. All wells for which a replacement well construction permit has been issued, must be abandoned as set forth in these regulations unless specific written approval for maintaining the replaced well is granted by the Department.

9.02 -- Sealing And Fill Materials

A. Portland Class A cement grout, a high solids bentonite grout, or a Portland cement grout and bentonite combination are considered sealing material and may be used to fill an abandoned well.

B. The grouting materials shall be neat Portland Class A or quick setting cement in a ratio of not over seven (7.0) gallons of water per ninety-four (94) pounds of cement; or a coarse grained high solids non drilling mud grade bentonite slurry such as Baroid Benseal, American Colloid or equal. The bentonite grout shall be mixed in accordance with the manufacturers recommendations. Bentonite alone is not an acceptable grouting material. A Portland cement grout and bentonite combination is also acceptable. The relative proportion for each component shall meet the following requirements:

	Portland cement	=	92%
	Bentonite	=	8%
or:	Portland cement	=	74%
	Bentonite	=	6%
	Sand	=	20%

For each two (2) percent addition of bentonite an additional 1.3 gallons of water should be added to the slurry mixture. A maximum two (2) percent by weight of calcium chloride may be added.The use of bentonite drilling clay as a grouting material is prohibited except as an additive to neat cement grout. Only bentonite grout approved by the National Sanitation Foundation (NSF) shall be approved by the

Department as appropriate grouting material.

C. Other grouting materials and methods may be used, if approved by the Department.

9.03 -- Abandonment Procedures

A. Prior to filling the well, a plan shall be submitted within thirty (30) days containing a description of the general condition of the well. All available information about the construction of the well or information that any obstructions exist which would interfere with the filling and sealing process of the well shall be submitted with the application. Should any obstructions exist they shall, if practical as determined by the Department, be removed by cleaning out the hole or redrilling.

B. All wells shall be filled with the required sealing or fill materials from the bottom of the well up, by methods that avoid separation or dilution of the seal material.

C. The grout shall be pumped into the well through a tremmie pipe in one continuous operation.

D. The tremmie pipe may be moved upward as the well is filled from the bottom up, if the pipe extends at least one (1) foot into the seal material.

E. Before abandonment procedures begin an abandoned well shall have all pumping or plumbing equipment removed to insure freedom from obstructions that may interfere with the sealing operation.

F. The well shall be chlorinated prior to sealing by addition of sufficient quantities of liquid bleach or dry hypochlorite granules.

Section 10 -- CROSS CONNECTION CONTROL

All groundwater in Shelby County is deemed potable and shall be protected against contamination by way of backflow through private water supplies.

A. All cross connection requirements for private

water supplies, quasi-public water supplies, public water supplies, and all other potable water supplies shall fall within the guidelines of the Memphis and Shelby County Cross Connection Board, as established by City and County Resolution in October 1980, or as later modified.

Section 11 -- LIMITATION ON USE OF WATER

A. Water pumped by private and/or quasi-public water supplies for residential, commercial and industrial purposes shall be limited to reasonable use.

B. The waste of groundwater from water wells by way of continual discharges or from any type of equipment utilizing well water shall not be permitted.

1. Any person requesting a permit to construct a water well for use in an underground heat pump system; in retaining levels of lakes, ponds, or similar bodies of water; in commercial and industrial processes; irrigation; or in any other uses whereby a continual groundwater discharge may occur shall limit such discharges by taking conservation steps established by the Department. Failure to comply with this section shall result in the rejection of the permit application.

2. Any person having an existing well whereby a continual discharge occurs shall be required to take whatever conservation steps the Department may deem necessary to prevent such discharges. Failure to comply with this section is a misdemeanor and upon conviction the violator shall be fined a minimum of twenty-five ($25.00) dollars per day up to a maximum of five hundred ($500.00) dollars per day with each day such violation of this section occurs constituting a separate offense.

C. The Department shall take whatever steps it deems necessary to conserve groundwater obtained by way of private water supplies for cooling, refrigeration and air conditioning

systems. The Department shall require the reuse of water for cooling through the use of cooling towers, evaporative condensers, or some other such device or method approved by the applicable code.

D. All residential, commercial and industrial heat pump systems, shall be a horizontal closed loop system with no discharge. The design of such heat pump systems, shall be approved by the applicable code, and the owner shall have a valid mechanical permit.

E. Non-aqueous heat pump systems shall be prohibited.

Section 12 -- AVAILABILITY OF PUBLIC WATER

12.01 -- Public Water Available To A Premise

A. Public water shall be deemed available to a premise other than a subdivision when it is located within three hundred (300) feet of said premise.

B. When proposed subdivisions are comprised of premises used or intended for human habitation or other establishments where a water supply is or may be used for human consumption and where such subdivision is located within one quarter (1/4) mile of public water distribution facilities in existence in a dedicated right-of-way, the developer of such subdivision shall extend the water supply mains and connect all lots thereto.

C. The distance between an existing water main in a dedicated right-of-way and a premise or proposed subdivision shall be measured by an actual or imaginary straight line upon the ground or in the air between the point within the premise or subdivision nearest to the existing water main in dedicated right-of-way and the point where the existing water main in a dedicated right-of-way comes into closest proximity with the premise or proposed subdivision.

D. The connection to a public water supply shall be made in accordance with the requirements of all applicable rules and regulations of any

county, state, or municipal agency having jurisdiction thereof.

E. The provisions of this section relate to single-family, multi-family, commercial and industrial-zoned lots and are applicable to new subdivisions, and existing subdivisions which are unplatted or unrecorded.

F. The provisions of this section shall not apply when a utility cannot provide a public water distribution system due to the utility's franchise limitation or the inability or unwillingness of a city to extend its public water distribution system.

G. The construction of a well shall not be permitted at a premise where public water is available and which said water supply has a yield and pump capacity to provide the quantity of water which the user has stated is necessary for purposes for which the water is intended to be used unless otherwise provided by this code.

H. When a public water system (pws) is available to a residential premise the potable water shall be obtained from the public water system. A well may be approved by the Department for construction on a residential premise where public water is available under the following circumstances:

1. For filling a lake, providing such lake, pond or similar continuous body of water is not less than one (1) acre in size, with the total parcel of land being no less than four (4) acres in size.

2. For irrigation, provided such parcel of land is no less than four (4) acres in size.

3. For watering livestock, provided the parcel of land to be served is no less than four (4) acres in size.

I. A well may be approved by the Department for construction on a commercial and/or industrially zoned premise where public water is available, provided the owner demonstrates to the Department that no reasonable

alternative water supply to the proposed well exists. The potable water supply shall be obtained from the public water system.

J. The construction of a water well or any other type of well regardless of use on a lot or premise less than four (4) acres in size utilizing a septic tank system for sewage disposal, shall not be permitted by the Department.

12.02 -- Public Water Not Available To A Premise

A. Public water shall be deemed not available to a premise if it is located a distance greater than three hundred (300) feet of said premise.

B. Public water may be deemed not available to a ppremise if the topography and land surface features are such that they economically or structurally prevent connecting to public water.

12.03 -- Auxiliary Intake

No auxiliary intake for a potable water supply shall be made or permitted unless the source and use of the auxiliary supply and the location and arrangement of the intake are approved by the Department in writing.

Section 13 -- INJECTION WELLS

No injection wells of any type shall be allowed in Memphis and Shelby County for the injection of surface or groundwater, or chemically or thermally altered water, or any other fluids into the underground formations. No well constructed shall be used for recharge, injection, or disposal purposes. Injection wells for the purpose of improving groundwater quality may be considered under Section 14.02, but approval of these wells will not release the appellant of any applicable requirements under state or federal law for the remediation of contaminated groundwater or materials at the site.

Section 14 -- VARIANCES

14.01 -- Existing Wells

Wells in existence on the effective date of this Act shall be required to conform to the provisions of these Rules and Regulations, or any rules or regulations

adopted pursuant thereto, where such provisions relate to assessment of fees, cross connection control, improperly maintained wells, abandoned wells, and wells constructed in such a way that create serious health hazards, and any other items deemed necessary by the Department.

14.02 -- Appeals -- Procedure

Any person who feels aggrieved by an order of the Department issued pursuant to these Rules and Regulations shall be entitled to a hearing before the Board upon request.

A. The Board shall have and exercise the power, duty and responsibility to hear and decide all matters concerning a variance to or an exception taken to any decision, ruling, requirement, rule, regulations or order of the Board or the Department. Such appeal shall be made within fifteen (15) days after receiving notice of such decision, ruling, requirement, rule, regulation, or order by filing a written notice of appeal directly to the Board specifying the grounds thereof and the relief requested. Such an appeal shall act as a stay of decision, ruling, requirement, rule, regulation, or order in question until the Board has taken final action on the appeal, except when the Department has determined that a health hazard exists. The Board shall, not less than thirty (30) days after the date of the receipt of the notice of appeal, set a date for the hearing and shall give notice thereof by certified mail to the interested parties.

B. Hearing before the Board shall be conducted in the following manner:

(1) The technical secretary of the Board or his/her representative shall act as the hearing officer to conduct such hearing.

(2) Any person making an appeal may appear in person or by agent or attorney and present evidence, both written and/or oral, pertinent to the issues involved and may examine and cross-examine witnesses.

(3) All testimony shall be presented under oath and recorded. The Board is

authorized to have all such testimony transcribed and a transcript of such testimony shall be made available to the appellant or any party to the hearing upon payment of the normal fee established by the Department.

(4) After due consideration of the written and oral statements and the testimony and arguments submitted at the hearing upon such appeal or upon default in appearance of the appealing party on the date specified in the formal notice of the hearing, the Board shall issue and enter such final order to make such final determination as it shall deem appropriate, within thirty (30) days of the hearing date and shall immediately notify all interested parties thereof in writing by certified mail.

C. An appeal from the Board shall be to a court of competent jurisdiction in Shelby County, Tennessee.

Section 15 -- RULES AND REGULATIONS OF THE DEPARTMENT

The Board shall adopt and amend rules and regulations reasonably necessary to effectuate the policy and standards and intent declared by these Rules and Regulations, not inconsistent with these Rules and Regulations or with the Constitution or laws of the State.

Section 16 -- CONSTITUTIONALITY OF ORDINANCE

If any part or parts of these Rules and Regulations shall be declared unconstitutional it shall not affect the validity of any other part of these Rules and Regulations.

Section 17 -- CONFLICT OF LAWS

All laws and parts of laws in conflict with the provisions of these Rules and Regulations shall be repealed upon adoption of these Rules and Regulations.

Section 18 -- ENFORCEMENT AND PENALTIES

18.01 -- Enforcement

A. If the Department determines that the holder

of any permit issued pursuant to these Rules and Regulations has violated any provisions of this act, or any rule or regulation adopted pursuant thereto, the Department may suspend or revoke any such permit. The Department may place on probation a person whose permit has been suspended. The Department may reprimand a permittee for a violation of this act or a rule or regulation adopted pursuant to these Rules and Regulations.

B. The Department may petition a court of competent jurisdiction for injunctions or other appropriate relief to enforce the provisions of these Rules and Regulations. The attorney of the appropriate jurisdiction shall represent the Department when requested to do so.

C. Any person who willfully violates any of the provisions of these Rules and Regulations is guilty of a misdemeanor.

D. Any well owner who knowingly causes or permits a hazardous or potentially hazardous condition to exist due to well construction or any other reasons as outlined in these Rules and Regulations which could cause deterioration of groundwater aquifers in the system shall forfeit his right to an approved, certified permit. He shall also be liable to enforcement action.

18.02 -- Penalties

The well driller or any other person who fails to comply with these Rules and Regulations or the rules and regulations promulgated hereunder shall be guilty of a misdemeanor, and upon conviction be fined a minimum of twenty-five dollars ($25) per day or a maximum of five hundred dollars ($500) per day and each day such violation of these Rules and Regulations occur shall constitute a separate offense.

Appendix C

NSA Mid-South Well Location

Overview Maps (Northern and Southern Sections)

Harris Well

Williams Well

0070501LF

0070503LF

0070504LF

0070505LF

0070506LF

0070507LF

0070508LF

0070509LF

0070510LF

0070511LF

0070512LF

0070513LF

0070514LF

0070515LF

0070516LF

0070517LF

0070518LF

0070519LF

0070520LF

0070521LF

0070522LF

0070523LF

0070524LF

0070525LF

0070526LF

0070527LF

0070528LF

0070529LF

0070530LF

0070531LF

0070532LF

0070533LF

0070534LF

0070535LF

0070536LF

0070537LF

0070538LF

0070539LF

0070540LF

0070541LF

0070542LF

NSA Mid-South Well Locations
Overview Map
Southern Section

NSA Mid-South
Millington, Tennessee
Groundwater Well Management Plan

August 2003

d:\projects\nsamidsouth\basemap\nsamidsouth.mxd

Appendix D

Well Construction Logs

NOTE: The following well logs are not available:

GC01	007G08LS
N76101	OPC01
PWN1	007GMCNA
PWN2	020GPZ01
RWY09	020GPZ02
RW-01	020GPZ03
S17201	039GPZ04
TW01	039GPZ05
005G04LS	005G05LS
757B2LD	005G08LS
757B3LD	757B4LD
005G09LS	0BGG03UC
Williams	Harris
JonesWell	

RCRA SITES
Well and Boring Logs

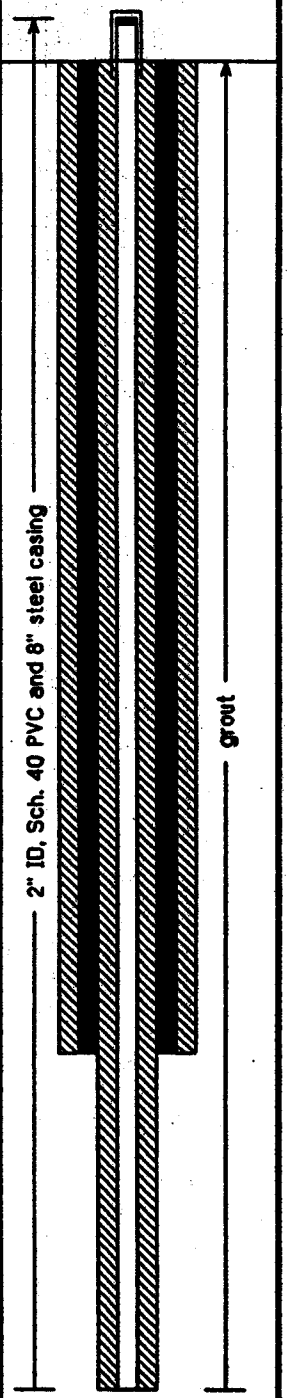
EnSafe/Allen & Hoshall

Monitoring Well BG1LF
(BGMW01LF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #1*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1545 on 1-09-95*	TOC Elevation: *286.57 feet msl*
Completed at *1645 on 1-09-95*	Depth to Groundwater: *30.53 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.04 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *68.0 feet*
Geologist: *BB, JC, JAK, RL, WP*	Well Screen: *54.8 to 64.8 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Silty loam with roots.	
								Silt, clayey, light brown, moist.	
5			1	80	8.1				
10			2	100	1.2			Silt, clayey, light brown, laminated, some organic inclusions, moist, low plasticity.	
15			3	125	BG		ML	Silt, clayey, brown to reddish brown, becoming more plastic.	
20			4	120	BG			Silt, trace clay, slightly plastic, moderate yellow brown.	
25			5	120	BG			Silt, some clay, yellowish brown to yellowish gray, traces of organics, staining, slightly plastic, moist.	
30			6	110	BG		SC	Sand, fine with silt and gravel, yellowish orange to reddish brown, moist to wet.	
35			7	82	BG			Sand, silty with clay, yellowish brown to brownish gray. Some light brown mottling, some gravel, stiff, slightly plastic, moist.	
							GP	Sand, fine to coarse grained with gravel, some silt, dark yellowish orange.	
40			8	60	BG				

WELL DIAGRAM



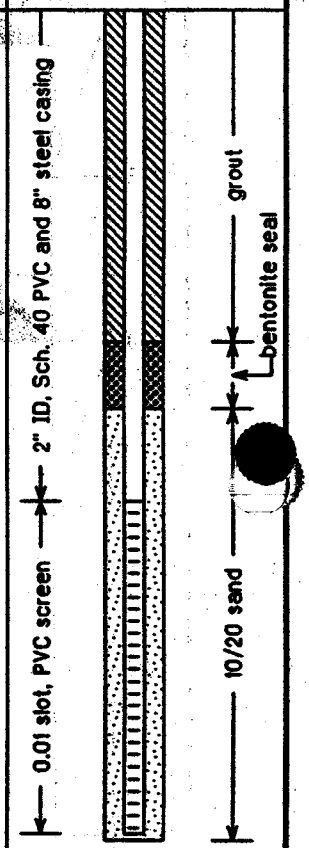
EnSafe/Allen & Hoshall

Monitoring Well BG1LF
(BGMW01LF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #1*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1545 on 1-09-95*	TOC Elevation: *286.57 feet msl*
Completed at *1645 on 1-09-95*	Depth to Groundwater: *30.53 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.04 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *68.0 feet*
Geologist: *BB, JC, JAK, RL, MP*	Well Screen: *54.8 to 64.8 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			9	100	BG		GP		
50			10	100	BG				
55									
60			11	95	BG				
65								Sand, fine, dark yellowish orange to yellowish gray, ferrigenous layers, wet.	
							SC	Clay, sandy and silty, medium gray to moderate dark gray.	
70			12	100	BG			End of boring at 68'.	
75									
80									

WELL DIAGRAM



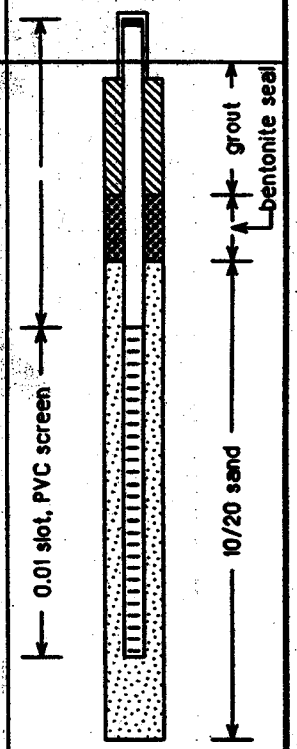
EnSafe/Allen & Hoshall

Monitoring Well BG1LS
(BGMW01LS)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #1*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1545 on 1-10-95*	TOC Elevation: *286.10 feet msl*
Completed at *1645 on 1-10-95*	Depth to Groundwater: *10.71 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *275.39 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *BB, JC, JAK, RL, WP*	Well Screen: *8 to 18 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Silty loam with roots.	
								Silt, clayey, light brown, moist.	
5			1	80	8.1				
10			2	100	1.2		ML	Silt, clayey, light brown, laminated, some organic inclusions, moist, low plasticity.	
15			3	125	BG			Silt, clayey, brown to reddish brown, becoming more plastic.	
20			4	120	BG			Log information taken from the boring for the lower fluvial at BG-1.	
25									
30									
35									
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

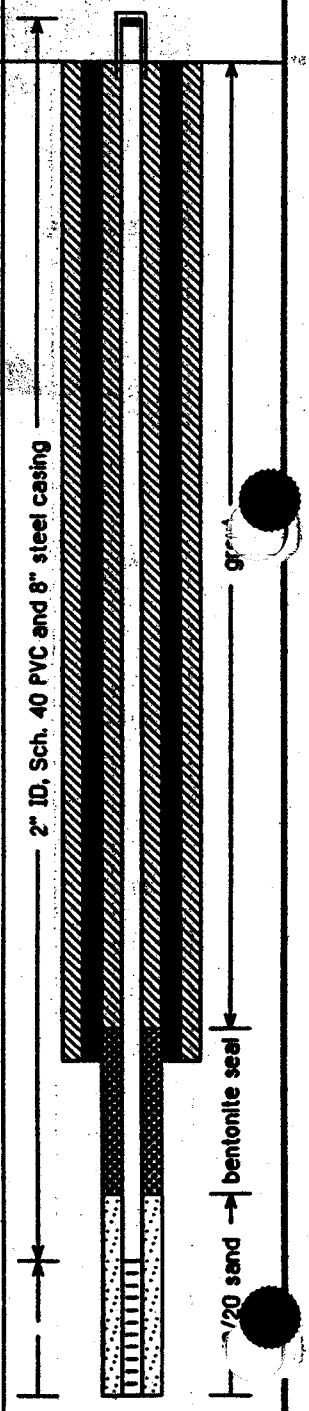
Monitoring Well BG1UF

(BGMW01UF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #1*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1115 on 1-14-95*	TOC Elevation: *286.68 feet msl*
Completed at *1645 on 1-14-95*	Depth to Groundwater: *30.62 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.06 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *46.0 feet*
Geologist: *BB, JC, JAK, RL, MP*	Well Screen: *36.0 to 46.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Silty loam with roots.	
								Silt, clayey, light brown, moist.	
5			1	80	8.1				
10			2	100	1.2			Silt, clayey, light brown, laminated, some organic inclusions, moist, low plasticity.	
15			3	125	BG		ML	Silt, clayey, brown to reddish brown, becoming more plastic.	
20			4	120	BG			Silt, trace clay, slightly plastic, moderate yellow brown.	
25			5	120	BG			Silt, some clay, yellowish brown to yellowish gray, traces of organics, staining, slightly plastic, moist.	
30			6	110	BG			Sand, fine with silt and gravel, yellowish orange to reddish brown, moist to wet.	
							SC		
35			7	82	BG			Sand, silty with clay, yellowish brown to brownish gray. Some light brown mottling, some gravel, stiff, slightly plastic, moist.	
							GP	Sand, fine to coarse grained with gravel, some silt, dark yellowish orange.	
40			8	60	BG				

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well BG1UF
(BGMW01UF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #1*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1115 on 1-14-95*	TOC Elevation: *286.68 feet msl*
Completed at *1645 on 1-14-95*	Depth to Groundwater: *30.62 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.06 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *46.0 feet*
Geologist: *BB, JC, JAK, RL, WP*	Well Screen: *36.0 to 46.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			9	100	BG		GP	Log information taken from the boring for the lower fluvial at BG-1.		10/20 sand
50										
55										
60										
65										
70										
75										
80										

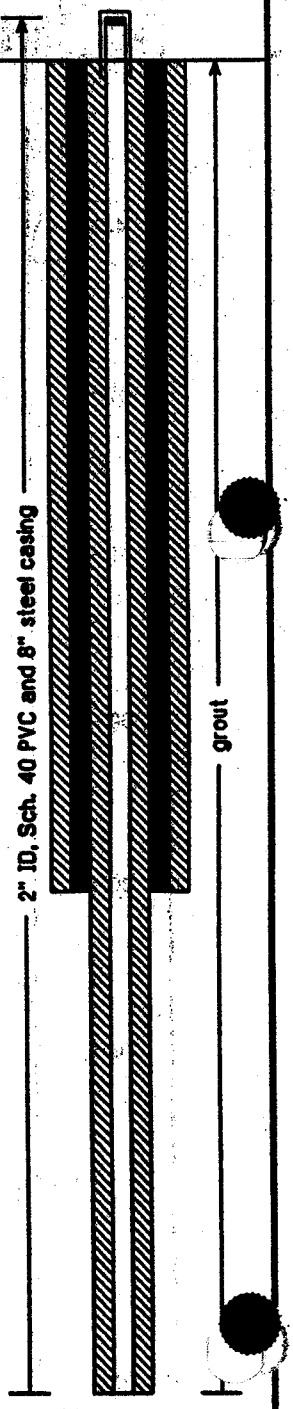
EnSafe/Allen & Hoshall

Monitoring Well BG2LF
(BGMW02LF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #2*
Project No: *N0094*	Surface Elevation: *272.68 feet msl*
Started at *0745 on 1-17-95*	TOC Elevation: *272.40 feet msl*
Completed at *0845 on 1-17-95*	Depth to Groundwater: *12.45 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *259.95 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *87.0 feet*
Geologist: *Jack Carmichael and William Parks*	Well Screen: *67 to 77 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					Fill and roots.	
5	1	75	BG	ML	Silt, clayey, yellow brown to gray brown, moist, soft.	
10	2	50	BG		Silt, clayey, yellow gray to olive gray, stained yellow orange, laminated with orange to brown thin striations.	
15	3	87.5	BG			
20	4	75	BG			
25	5	100	BG		Silt, clayey, light olive gray to yellow gray with iron staining, trace gravel.	
					Silt, clayey, light olive gray, less iron staining.	
30						243.7
				GP	Sand, silty, trace clay, some gravel, yellow brown to gray brown.	
					Sand, medium to coarse with gravel, orange brown to yellow.	
35	6	108	BG		Sand, fine, with trace gravel, grayish pink to grayish orange, some yellow orange mottling.	
40						

WELL DIAGRAM



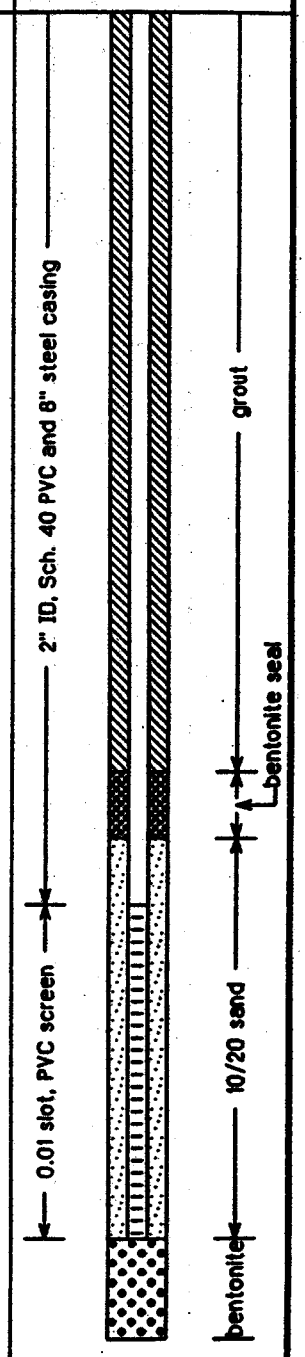
EnSafe/Allen & Hoshall

Monitoring Well BG2LF
(BGMW02LF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #2*
Project No.: *N0094*	Surface Elevation: *272.66 feet msl*
Started at *0745 on 1-17-95*	TOC Elevation: *272.40 feet msl*
Completed at *0845 on 1-17-95*	Depth to Groundwater: *12.45 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *259.95 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *87.0 feet*
Geologist: *Jack Carmichael and William Parks*	Well Screen: *67 to 77 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45	7	90	BG		Same as above but dark yellowish orange.	
					Sand, gravelly, silty, dark yellowish orange, wet.	
50						
55	8	100	BG	GP	Sand, very fine to fine, silty, traces of clay, yellowish gray to grayish orange.	
60						
65						
70	9	105	BG			
75						
	10	120	BG			195.7
80				SC	Sand, fine, clayey and silty, moderate gray to brownish gray, laminated, soft to stiff.	

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well BG2LF
(BGMW02LF)

Project: *NAS Memphis*
Project No.: *N0094*
Started at *0745 on 1-17-95*
Completed at *0845 on 1-17-95*
Drilling Method: *Rotasonic*
Drilling Company: *North Star Drilling*
Geologist: *Jack Carmichael and William Parks*

Location: *Millington, TN. Background Site #2*
Surface Elevation: *272.66 feet msl*
TOC Elevation: *272.40 feet msl*
Depth to Groundwater: *12.45 feet* Measured: *3/31/95*
Groundwater Elevation: *259.95 feet msl*
Total Depth: *87.0 feet*
Well Screen: *67 to 77 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			11	100	BG		SC			bentonite
									185.7	
								End of boring at 87'.		
90										
95										
100										
105										
110										
115										
120										

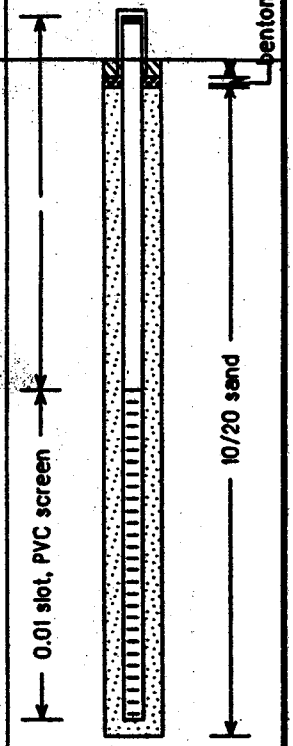
EnSafe/Allen & Hoshall

Monitoring Well BG2LS
(BGMW02LS)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #2*
Project No.: *N0094*	Surface Elevation: *271.82 feet msl*
Started at *0745 on 1-12-95*	TOC Elevation: *272.11 feet msl*
Completed at *0845 on 1-12-95*	Depth to Groundwater: *8.32 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *263.79 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Jack Carmichael and William Parks*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Fill and roots.	
5			1	75	BG			Silt, clayey, yellow brown to gray brown, moist, soft.	
10			2	50	BG		ML	Silt, clayey, yellow gray to olive gray, stained yellow orange, laminated with orange to brown thin striations.	
15			3	87.5	BG				
20			4	75	BG			Log information taken form the boring for the lower fluvial well BG-2.	2518
25									
30									
35									
40									

WELL DIAGRAM



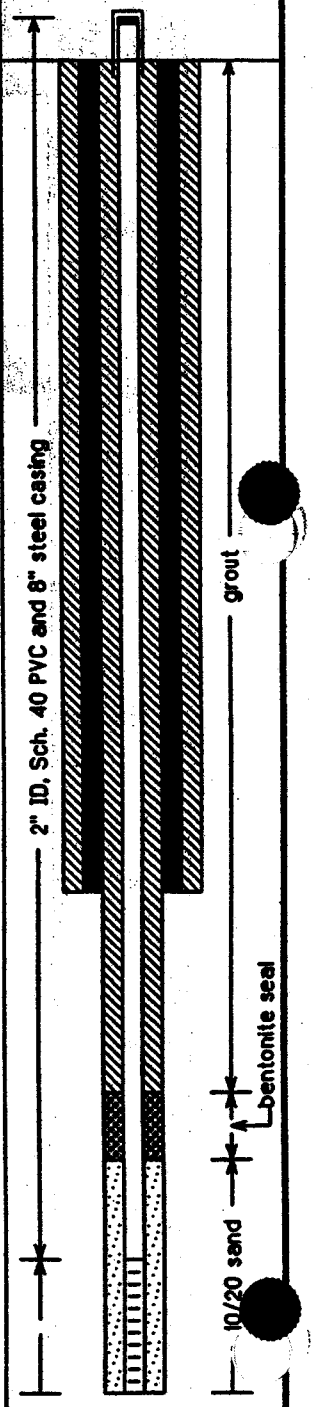
EnSafe/Allen & Hoshall

Monitoring Well BG2UF
(BGMW02UF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #2*
Project No.: *N0094*	Surface Elevation: *271.76 feet msl*
Started at *0745 on 1-17-95*	TOC Elevation: *274.74 feet msl*
Completed at *0845 on 1-17-95*	Depth to Groundwater: *12.31 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *262.43 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *46.0 feet*
Geologist: *Jack Carmichael and William Parks*	Well Screen: *36 to 46 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Fill and roots.	
5			1	75	BG			Silt, clayey, yellow brown to gray brown, moist, soft.	
10			2	50	BG			Silt, clayey, yellow gray to olive gray, stained yellow orange, laminated with orange to brown thin striations.	
15			3	87.5	BG		ML		
20			4	75	BG				
25			5	100	BG			Silt, clayey, light olive gray to yellow gray with iron staining, trace gravel. Silt, clayey, light olive gray, less iron staining.	
30								Sand, silty, trace clay, some gravel, yellow brown to gray brown. Sand, medium to coarse with gravel, orange brown to yellow.	242.8
35			6	108	BG		GP	Sand, fine, with trace gravel, grayish pink to grayish orange, some yellow orange mottling.	
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well BG2UF
(BGMW02UF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #2*
Project No.: *N0094*	Surface Elevation: *271.76 feet msl*
Started at *0745 on 1-17-95*	TOC Elevation: *274.74 feet msl*
Completed at *0845 on 1-17-95*	Depth to Groundwater: *12.31 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *262.43 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *46.0 feet*
Geologist: *Jack Carmichael and William Parks*	Well Screen: *36 to 46 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			7	90	BG		GP	Same as above but dark yellowish orange.	225.8	10/20 sand
								Log information taken form the boring for the lower fluvial well BG-2.		
50										
55										
60										
65										
70										
75										
80										

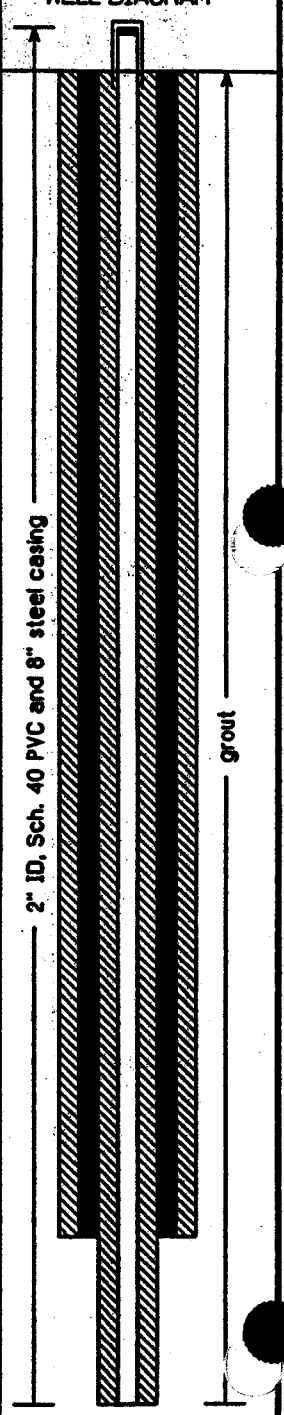
EnSafe/Allen & Hoshall

Monitoring Well BG4LF
(BGMW04LF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #4*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1000 on 1-11-95*	TOC Elevation: *feet msl*
Completed at *1115 on 1-11-95*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *76.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *60 to 70 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Fill and debris.	
5			1	100	BG			Silty clay, pale olive with reddish brown mottling, stiff.	
10								Clayey silt, yellow gray to yellow brown, mottled with reddish brown.	
			2	100	BG			Clayey silt, yellow gray to yellow brown mottled yellowish orange, laminated, low plasticity.	
15									
20			3	100	BG		ML	Silt, medium gray, massive, low plasticity, traces of iron inclusions.	
25								Silt, clayey, medium gray stained yellowish orange, plastic.	
			4	100	BG				
30								Silt, clayey, yellow gray to olive gray.	
35			5	100	BG				
40							GP	Sand, silty, with gravel, yellowish gray to yellowish brown, mottled yellow orange, moist to wet	

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well BG4LF

(BGMW04LF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #4*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1000 on 1-11-95*	TOC Elevation: *feet msl*
Completed at *1115 on 1-11-95*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *76.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *60 to 70 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			6	108	BG			Gravel, sandy, fine to very coarse sand, traces of silt, wet, yellow gray.	
			7	100	BG				
50									
55			8	90	BG		GP	Same as above with color changing to dark yellowish orange to moderate yellowish brown.	
60									
65			9	85	BG				
70								Sand with clay, sand is yellow gray stained yellowish orange, clay light brownish gray, moist to wet.	
							SC	Sand, very fine, clay, medium dark gray, olive black laminations.	
75			10	100	BG			End of boring at 76'	
80									

WELL DIAGRAM

- 2" ID, Sch. 40 PVC and 8" steel casing
- 0.01 slot, PVC screen
- grout
- bentonite seal
- 10/20 sand
- bentonite

EnSafe/Allen & Hoshall

Monitoring Well BG4S
(BGMW04LS)

Project: *NAS Memphis*	Location: *Memphis, TN*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1000 on 1-11-95*	TOC Elevation: *feet msl*
Completed at *1115 on 1-11-95*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0								Fill and debris.		
5			1	100	BG			Silty clay, pale olive with reddish brown mottling, stiff.		
10			2	100	BG		ML	Clayey silt, yellow gray to yellow brown, mottled with reddish brown. Clayey silt, yellow gray to yellow brown mottled yellowish orange, laminated, low plasticity.		
15										
20			3	100	BG			Log information taken from the boring for the lower fluvial well bg-4.		
25										
30										
35										
40										

WELL DIAGRAM: grout; bentonite seal; 0.01 slot, PVC screen; 10' sand

EnSafe/Allen & Hoshall

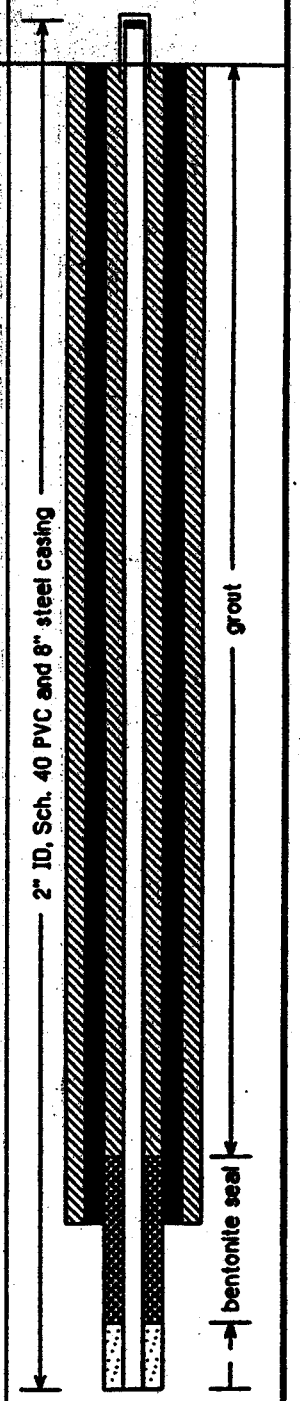
Monitoring Well BG4UF

(BGMW04UF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #4*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1000 on 1-16-95*	TOC Elevation: *feet msl*
Completed at *1115 on 1-16-95*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *50.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Fill and debris.	
			1	100	BG			Silty clay, pale olive with reddish brown mottling, stiff.	
5									
10								Clayey silt, yellow gray to yellow brown, mottled with reddish brown.	
			2	100	BG			Clayey silt, yellow gray to yellow brown mottled yellowish orange, laminated, low plasticity.	
15									
20			3	100	BG		ML	Silt, medium gray, massive, low plasticity, traces of iron inclusions.	
25								Silt, clayey, medium gray stained yellowish orange, plastic.	
			4	100	BG				
30								Silt, clayey, yellow gray to olive gray.	
35									
			5	100	BG				
40							GP	Sand, silty, with gravel, yellowish gray to yellowish brown, mottled yellow orange, moist to wet	

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well BG4UF

(BGMW04UF)

Project: *NAS Memphis*	Location: *Millington, TN Background Site #4*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1000 on 1-16-95*	TOC Elevation: *feet msl*
Completed at *1115 on 1-16-95*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *50.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			6	108	BG		GP	Gravel, sandy, fine to very coarse sand, traces of silt, wet, yellow gray.		0.01 slot, PVC screen; 10/20 sand
			7	100	BG					
50								Log information taken from the boring for the lower fluvial well bg-4.		
55			8	90	BG					
60										
65										
70										
75										
80										

ENSAFE

BORING LOG OF 0BGG04UC

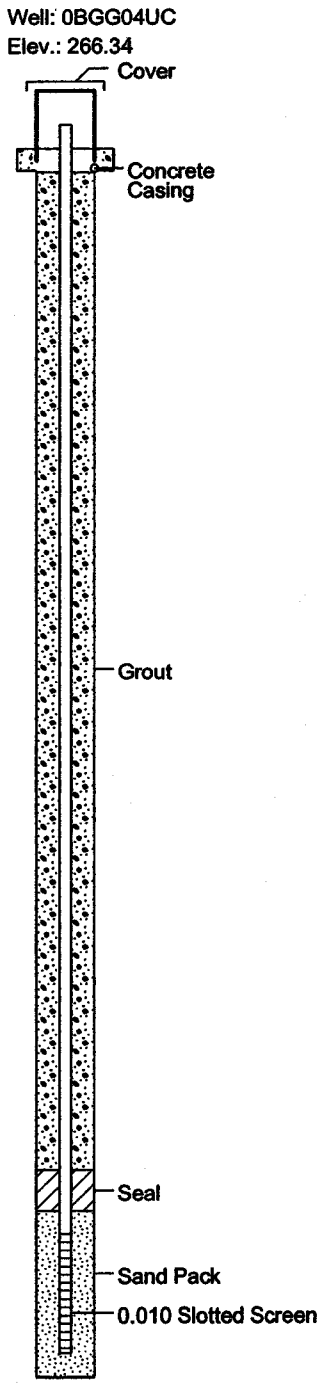
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1420 7/27/98	Northing	: 387054.40 (estimated)
Finished	: 0830 7/28/98	Easting	: 811514.20 (estimated)
Drilling Method	: Rotasonic	TOC Elevation	: 266.34 (estimated)
Drilling Company	: Alliance Drilling	Total Depth	: 105 feet
Geologist	: D. Ladd	Well Screen	: 93 to 103 feet

Depth in Feet	Surf. Elev. 264.30	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	264						Fill and debris
5	259						Silty clay, pale olive w/ reddish brown mottling, stiff
10	254						Clayey silt, yell gray to yellow brown, mottled w/ reddish brown
15	249						Clayey silt, yellow gray to yellow brown mottled w/ yellowish orange, laminated, low plasticity
20	244					ML	Silt, med. gray, massive, low plasticity, traces of iron inclusions
25	239						Silt, clayey, med. gray stained yellowish orange, plastic
30	234						Silt, clayey, yellow gray to olive gray
35	229						
40	224						Sand, silty, w/ gravel, yellowish gray to yellowish brown, mottled yellow orange, moist to wet
45	219						Gravel, sandy, fine to very coarse sand, traces of silt, wet, yellow gray
50	214						
55	209					GP	Same above with color changing to dark yellowish orange to moderate yellowish brown
60	204						
65	199						Lithology above 69 was taken from boring log of BGMW04LF
70	194	1	100				(69 - 71) Sand, very fine, and clay, med. Lt. gray mottled w/ dark yellowish orange, contains gravel at very top, wet
75	189						(71 - 75) Sand, very fine, and clay, med. Lt. gray, micaceous
80	184	2	110				(75 - 85) Sand, very fine and clay, med. Lt. gray to olive gray, almost no clay from 76 to 79, clay content increases below 79 and contains scattered clay seams, micaceous, lignitic, especially from 83 to 85, wet
85	179					SC	
90	174	3	110				(85 - 95) Same as above, very lignitic, wet
95	169						(95 - 103) Same as above, clay seam from 99 to 100, lignitic
100	164	4	100				(103 - 105) Clay, sandy, med. light gray to olive gray, lignitic, hard and stiff
105	159						
110							



07-28-2003 N:\well logs\NSAMidsouth\0BGG04UC.BOR

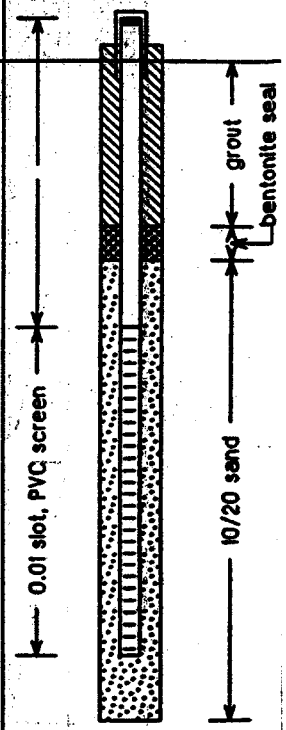
EnSafe/Allen & Hoshall

Monitoring Well BG5S
Boring BG5S (BGMW05LS)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #5*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1440 on 1-12-95*	TOC Elevation: *feet msl*
Completed at *1540 on 1-12-95*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Jack Carmichael and William Parks*	Well Screen: *8 to 18 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Silty loam with roots.	
5			1	75	BG			Silt, clayey, yellowish brown to yellowish gray, with orange brown mottling, moist, plastic.	
10			2	75	BG		ML		
15								Silt, clayey, medium gray, massive, moist.	
20			3	125	BG			Log information taken from the boring for the lower fluvial at BG-5.	
25									
30									
35									
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

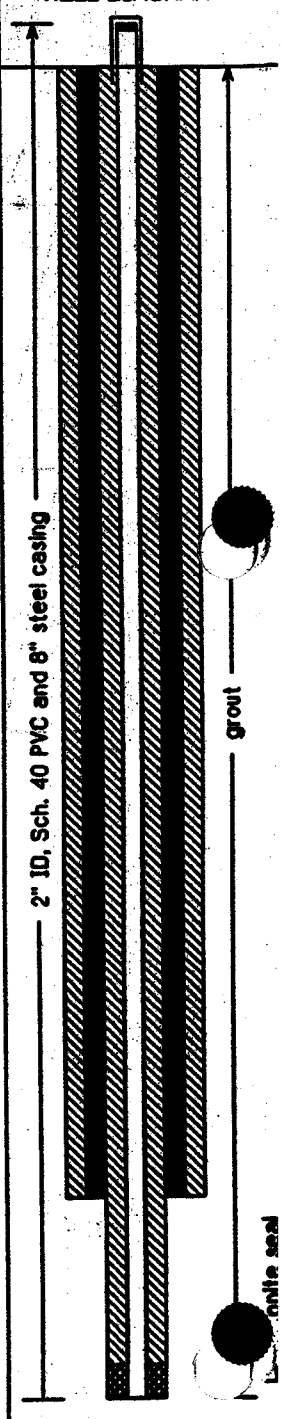
Monitoring Well BG5UF
Boring BG5UF (BGMW05UF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #5*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1440 on 1-12-95*	TOC Elevation: *feet msl*
Completed at *1540 on 1-12-95*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *53.0 feet*
Geologist: *Jack Carmichael and William Parks*	Well Screen: *43.0 to 53.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
0								Silty loam with roots.
5			1	75	BG			Silt, clayey, yellowish brown to yellowish gray, with orange brown mottling, moist, plastic.
10			2	75	BG			
15							ML	Silt, clayey, medium gray, massive, moist.
20			3	125	BG			Silt, clayey, medium gray to blue gray with orange brown mottling.
25								
30			4	105	BG			Silt, clayey, light brown gray to orangish brown, mottled, gravel.
35								
40							GP	Sand, silty and clayey, moderate brown to brownish orange, trace gravel.

ELEV. (ft-msl)

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well BG5UF
Boring BG5UF (BGMW05UF)

Project: *NAS Memphis*	Location: *Millington, TN Background Site #5*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1440 on 1-12-95*	TOC Elevation: *feet msl*
Completed at *1540 on 1-12-95*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *53.0 feet*
Geologist: *Jack Carmichael and William Parks*	Well Screen: *43.0 to 53.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			5	108	BG		GP	Sand, silty and gravelly, brownish gray to orangish brown, moist. Sand, fine to coarse grained with gravel, yellowish gray to grayish orange.		0.01 slot, PVC screen; 10/20 sand; bentonite seal
50										
55			6	100	BG			Log information taken from the boring for the lower fluvial at BG-5.		
60										
65										
70										
75										
80										

EnSafe/Allen & Hoshall

Monitoring Well BG5LF

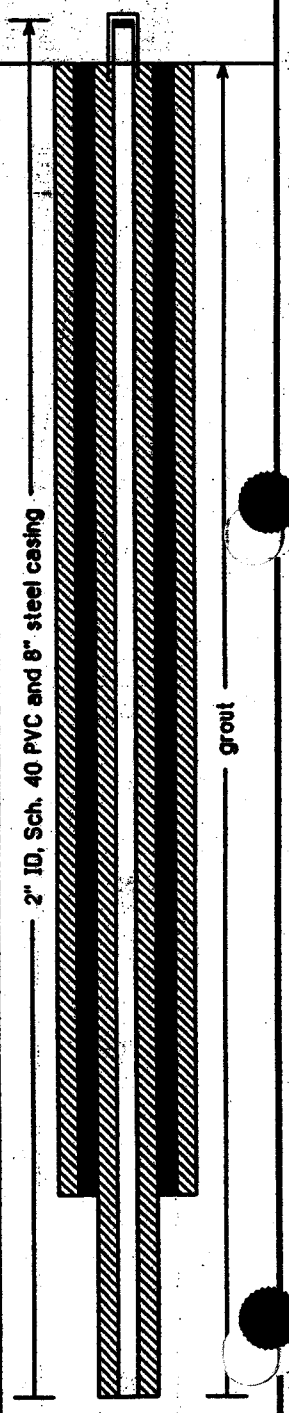
(BGMW05LF)

Project: *NAS Memphis*
Project No.: *N0094*
Started at *1440 on 1-12-95*
Completed at *1540 on 1-12-95*
Drilling Method: *Rotasonic*
Drilling Company: *North Star Drilling*
Geologist: *Jack Carmichael and William Parks*

Location: *Millington, TN. Background Site #5*
Surface Elevation: *feet msl*
TOC Elevation: *feet msl*
Depth to Groundwater: *feet* Measured:
Groundwater Elevation: *feet msl*
Total Depth: *86.0 feet*
Well Screen: *66.0 to 76.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Silty loam with roots.	
5			1	75	BG			Silt, clayey, yellowish brown to yellowish gray, with orange brown mottling, moist, plastic.	
10			2	75	BG				
15							ML	Silt, clayey, medium gray, massive, moist.	
20			3	125	BG			Silt, clayey, medium gray to blue gray with orange brown mottling.	
25									
30			4	105	BG			Silt, clayey, light brown gray to orangish brown, mottled, gravel.	
35									
40							GP	Sand, silty and clayey, moderate brown to brownish orange, trace gravel.	

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well BG5LF

(BGMW05LF)

Project: *NAS Memphis*	Location: *Millington, TN. Background Site #5*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1440 on 1-12-95*	TOC Elevation: *feet msl*
Completed at *1540 on 1-12-95*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *86.0 feet*
Geologist: *Jack Carmichael and William Parks*	Well Screen: *66.0 to 76.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			5	108	BG		GP	Sand, silty and gravelly, brownish gray to orangish brown, moist.	
50								Sand, fine to coarse grained with gravel, yellowish gray to grayish orange.	
55			6	100	BG				
60									
65			7	90	BG				
70									
75			8	110	BG		SC	Sand, very fine, silty, yellowish gray to yellowish orange, occassional clay casts, very wet.	
80									

WELL DIAGRAM

- 2" ID, Sch. 40 PVC and 8" steel casing
- 0.01 slot, PVC screen
- grout
- bentonite seal
- 10/20 sand

EnSafe/Allen & Hoshall

Monitoring Well BG5LF

(BGMW05LF)

Project: *NAS Memphis*
Project No.: *N0094*
Started at *1440 on 1-12-95*
Completed at *1540 on 1-12-95*
Drilling Method: *Rotasonic*
Drilling Company: *North Star Drilling*
Geologist: *Jack Carmichael and William Parks*

Location: *Millington, TN. Background Site #5*
Surface Elevation: *feet msl*
TOC Elevation: *feet msl*
Depth to Groundwater: *feet* Measured:
Groundwater Elevation: *feet msl*
Total Depth: *86.0 feet*
Well Screen: *86.0 to 76.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			9	90	BG		SC	End of boring at 86'.		
90										
95										
100										
105										
110										
115										
120										

EnSafe/Allen & Hoshall

Monitoring Well OBGG06UC

(BGMW06UC)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #6*
Project No.: *0106-08420*	Surface Elevation: *320.25 feet msl*
Started at *0850 on 2-29-96*	TOC Elevation: *320.02 feet msl*
Completed at *1010 on 2-29-96*	Depth to Groundwater: *36.46 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *283.56 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *66.0 feet*
Geologist: *J.C., W.P., D.L.*	Well Screen: *52 to 62 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0	1	66	BG	ML	Silt, mottled light brown and pale yellowish-brown, roots 0' to 5', dry to slightly moist	
5					Silt with a trace of clay, moderate yellowish-brown to dark yellowish- orange, fairly uniform, dry	
10	2	100	BG		With iron/manganese inclusions and pale yellowish-brown striations from 10' to 13', slightly moist	
15					Silt with a trace of clay, moderate yellowish-brown, iron/manganese staining present but less than above	
					Top of Fluvial Deposits estimated at 18'.	303.2
20	3	110	BG	SM	Silty sand with a trace of gravel, moderate yellowish-brown to dark yellowish orange, gravel up to 1" diameter, moist	299.2
				SC SM	Gravelly sand with silt and clay, dark yellowish-orange stained moderate reddish-brown, dense	297.2
25				SW	Gravelly sand, dark yellowish-orange with light brownish-gray sand seams, gravel up to 3" diameter, moist, loose	
						291.2
30	4	110	BG	SP SM	(29-44') Cockfield Formation: sandy, very fine (see descriptions below).	
35					(25-36') Silty sand, very fine-grained, dark yellowish- orange mottled with small amounts of light olive gray and light brown material, very clayey from 28' to 31'.	
					(36-44') Sand, very fine, dark yellowish-orange mottled with light olive gray, very wet	
40						

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

EnSafe/Allen & Hoshall

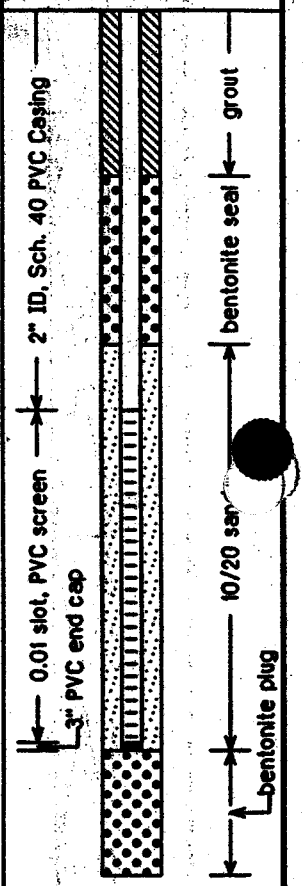
Monitoring Well OBGG06UC

(BGMW06UC)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #6*
Project No.: *0106-08420*	Surface Elevation: *320.25 feet msl*
Started at *0850 on 2-29-96*	TOC Elevation: *320.02 feet msl*
Completed at *1010 on 2-29-96*	Depth to Groundwater: *36.46 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *283.56 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *66.0 feet*
Geologist: *J.C., W.P., D.L.*	Well Screen: *52 to 62 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			5	95	BG		SP SM		
45							SM	(44-48.5') Silty sand, very fine, dusky yellowish-brown to dark yellowish-brown, contains some lignitic material	276.2
									271.7
50			6	110	BG		CL	Clay, slightly sandy and micaceous, olive gray, with some lignitic material. More sandy near 48.5' than below.	
									268.2
55							SP	(52-63') Sand, very fine to fine, light olive gray to olive gray with traces of lignitic material, slightly micaceous, wet	
60			7	110	BG			Slightly clayey from 59' to 62'	
									257.2
65							CL ML SP	(63-64') Sandy silt and clay, dusky yellowish-brown mottled with dark yellowish-brown, contains lignitic material	258.2
								(64-66') Sand, very fine, light olive gray to olive gray, micaceous, contains lignitic material, with dark yellowish-brown silt near top	254.2
70								Soil boring terminated at 66'.	
75									
80									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well OBGG07UC

(BGMW07UC)

Project: NSA Memphis	Location: Millington, TN. Background Location #7
Project No.: 0106-08420	Surface Elevation: 321.08 feet msl
Started at 1306 on 3-2-96	TOC Elevation: 323.23 feet msl
Completed at 1435 on 3-2-96	Depth to Groundwater: 37.05 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 286.18 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 86.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 50 to 60 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							OL	(0-2') Soil, grass, and roots.	
									319.1
			1	66	BG			(2-23') Silt and clayey silt (see descriptions below).	
								(2-6') Silt, moderate yellowish-brown sparsely mottled with light olive gray, some iron-manganese nodules.	
5								(6-16') Silt, moderate yellowish-brown.	
10			2	70	BG		ML		
								Very clayey and moist from 14' to 16'.	
15									
								(16-23') Silt, very clayey, moderate yellowish-brown, very wet at 18' with iron-manganese nodules.	
20			3	80	BG				
									298.1
25							ML	(23-27') Silt, moderate yellowish-brown mottled with light olive gray and dark yellowish-orange, containing many large iron-manganese nodules, dry.	

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

EnSafe/Allen & Hoshall

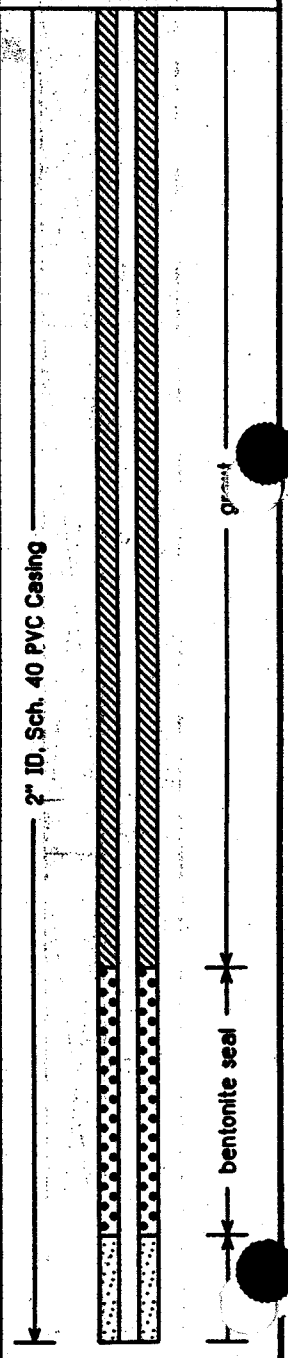
Monitoring Well OBGG07UC

(BGMW07UC)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #7*
Project No.: *0106-08420*	Surface Elevation: *321.08 feet msl*
Started at *1306 on 3-2-96*	TOC Elevation: *323.23 feet msl*
Completed at *1435 on 3-2-96*	Depth to Groundwater: *37.05 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *286.18 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *86.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *50 to 60 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML		
									294.1
							ML	(27-34') Fluvial Deposits (see descriptions below).	
								(27-29.5') Silt, moderate yellowish-brown, locally stained dark yellowish-orange contains gravel up to 1" in longest dimension, contains some sand near 29.5'.	291.8
30			4	125	BG		SM GP	(29.5-35') Silty fine-grained sand and gravel up to 2" in longest dimension, dark yellowish-orange mottled with light brown, light olive gray, and locally with moderate reddish brown, contains some iron concretions.	
								Top of Cockfield Formation estimated at 34'.	
35									286.1
								(35-45') Sand, fine and silty (see descriptions below).	
								(35-36') Silty sand, fine-grained, dark yellowish-orange, mottled with light brown and light olive gray, containing splotches of moderate reddish-brown, wet.	
40			5	110	BG		SM	(36-45') Sand, fine, silty, dark yellowish-orange mottled with light brown and light olive gray to 40', mottled with only light olive gray from 40-42', wet.	
45									276.1
							SP	(45-48') Sand, fine-grained, very light gray, mottled with dark yellowish-orange at 45', micaceous, wet.	
									273.1
							SP	(48-60') Sand, fine-grained, very light gray mottled with dark yellowish-orange, slightly micaceous, wet.	
50									

WELL DIAGRAM



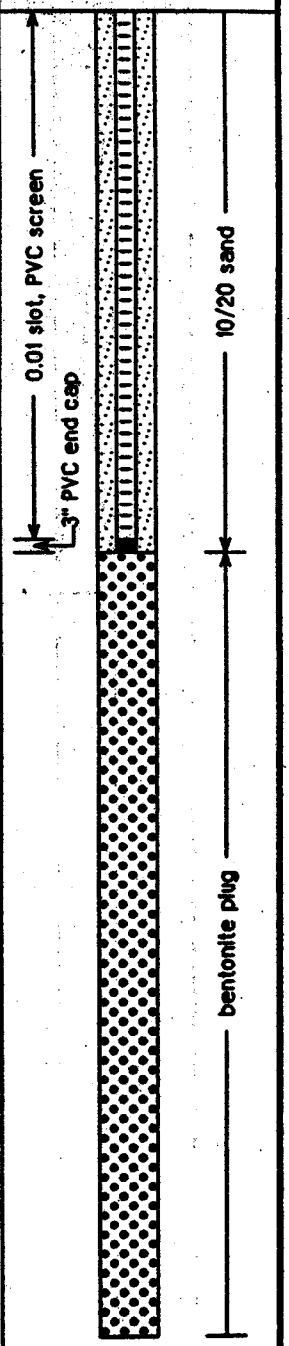
EnSafe/Allen & Hoshall

Monitoring Well OBGG07UC
(BGMW07UC)

Project: NSA Memphis	Location: Millington, TN. Background Location #7
Project No.: 0106-08420	Surface Elevation: 321.08 feet msl
Started at 1306 on 3-2-96	TOC Elevation: 323.23 feet msl
Completed at 1435 on 3-2-96	Depth to Groundwater: 37.05 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 286.18 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 86.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 50 to 60 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
55			6	100	BG		SP	3" clay seam near 50', very wet below 50'. Less yellowish-orange mottling from 58' to 60' Pale red material near 59'	
60			7	100	BG		SM	(60-63.5') Silty sand, fine-grained, dark yellowish-orange mottled with very light gray, contains dark yellowish-orange and moderate reddish-brown iron staining, wet.	261.1
							SP	(63.5-65') Sand, fine-grained, very light gray, wet.	257.8
65							SM	(65-72') Slightly silty sand, fine-grained, very light gray mottled with dark yellowish-orange, contains some dark yellowish-orange and moderate reddish-brown iron staining, wet.	256.1
70			8	70	BG				
							SP	(72-73.5') Sand, fine-grained, very light gray, wet.	249.1
							SP	(73.5-76') Sand, fine, very light gray mottled with dark yellowish- orange, with dark yellowish-orange and moderate reddish-brown staining, contains iron concretions, wet	247.8
75									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well OBGG07UC
(BGMW07UC)

Project: NSA Memphis	Location: Millington, TN Background Location #7
Project No.: 0106-08420	Surface Elevation: 321.08 feet msl
Started at 1306 on 3-2-96	TOC Elevation: 323.23 feet msl
Completed at 1435 on 3-2-96	Depth to Groundwater: 37.05 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 286.18 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 86.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 50 to 60 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							SP		245.1	
								No sample recovered from 76' to 86'		
80			9	0				No sample recovered from 76' to 86'		bentonite plug
85								Soil boring terminated at 86'.		
90										
95										
100										

EnSafe/Allen & Hoshall

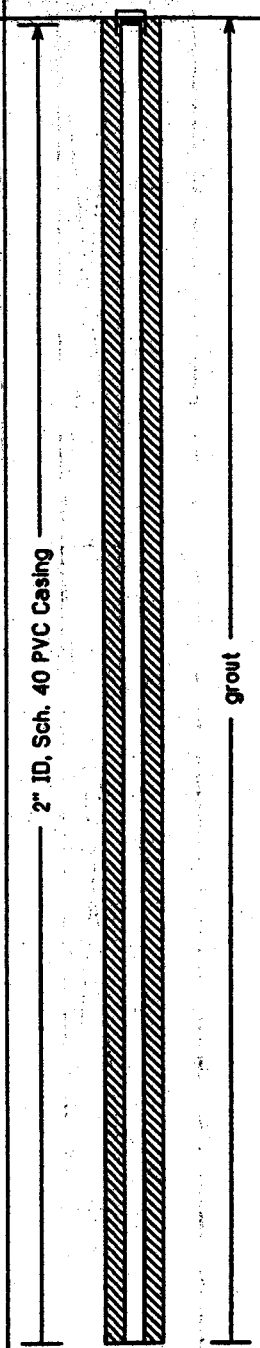
Monitoring Well OBGG08UF

(BGMW08UF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #8*
Project No.: *0106-08420*	Surface Elevation: *299.88 feet msl*
Started at *0750 on 3-3-96*	TOC Elevation: *299.68 feet msl*
Completed at *1100 on 3-17-96*	Depth to Groundwater: *45.82 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *253.86 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *76.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *50 to 60 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0				OL	(0-2') Soil, grass, and roots.	297.9
5	1	75	BG		(2-6') Silt, moderate yellowish-brown mottled with light olive gray, traces of iron-manganese nodules. Moist from 4' to 6'. (6-16') Clayey silt, moderate yellowish-brown sparsely mottled with light olive gray, wet from 6' to 13'.	
10	2	75	BG		Moist from 13' to 16'.	
15						
20				ML	Clayey silt with a trace of fine sand, yellowish-orange mottled with brown silt. Silt, with clay and sand, dark yellowish orange mottled with very light gray silt, micaceous.	
25	3	80	BG			
30						
35					Silt, with clay and sand, yellowish-brown to very light gray with some dark yellowish-orange mottling.	
40						

WELL DIAGRAM



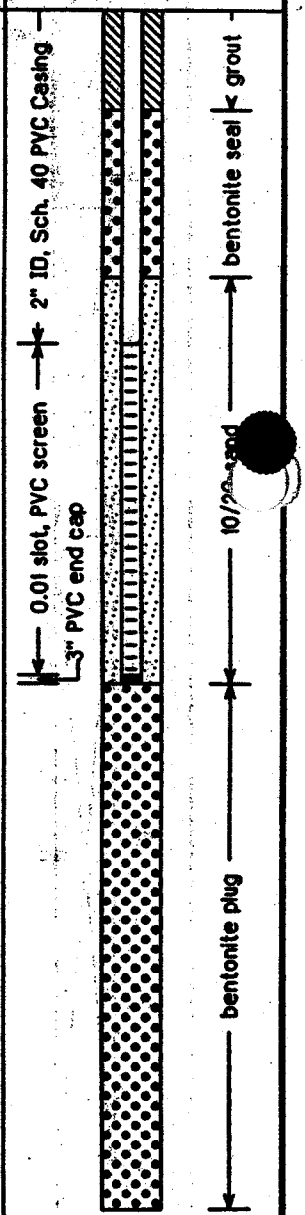
EnSafe/Allen & Hoshall

Monitoring Well OBGG08UF

(BGMW08UF)

Project: NSA Memphis	Location: Millington, TN. Background Location #8
Project No.: 0106-08420	Surface Elevation: 299.88 feet msl
Started at 0750 on 3-3-96	TOC Elevation: 299.68 feet msl
Completed at 1100 on 3-17-96	Depth to Groundwater: 45.82 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 253.86 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 76.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 50 to 60 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML		
									255.9
45			4	110	BG		SC	Clayey sand, fine to medium-grained, yellowish brown, micaceous, wet. Top of Fluvial Deposits estimated at 46'.	
									249.9
50							SW	Sand, fine to medium grained, yellowish brown to orangish-gray, with a few clay seams up to 3" thick from 50 to 52'. Sand, fine to coarse-grained, yellowish-brown to orangish-gray, with gravel up to 0.5" in longest dimension. Becoming reddish-brown to dusky yellow with gravel up to 0.5" in longest dimension. Sand, fine to very coarse-grained, with abundant gravel up to 1" in longest dimension. With minor clay lenses up to 3" thick from 58' to 63'. Sand, fine to very coarse-grained, reddish-brown to dusky yellow with gravel up to 1" in longest dimension.	
55									
60									
65			5	95	BG				
									231.9
70							SW GW	Sand, medium to very coarse-grained, and gravel up to 0.5" in longest dimension, dusky yellow to yellowish-gray.	
75									223.9
								Soil boring terminated at 76'. Attempted to sample the 76' to 86' interval; however, no sample could be retrieved. Cockfield Formation not encountered.	
80									



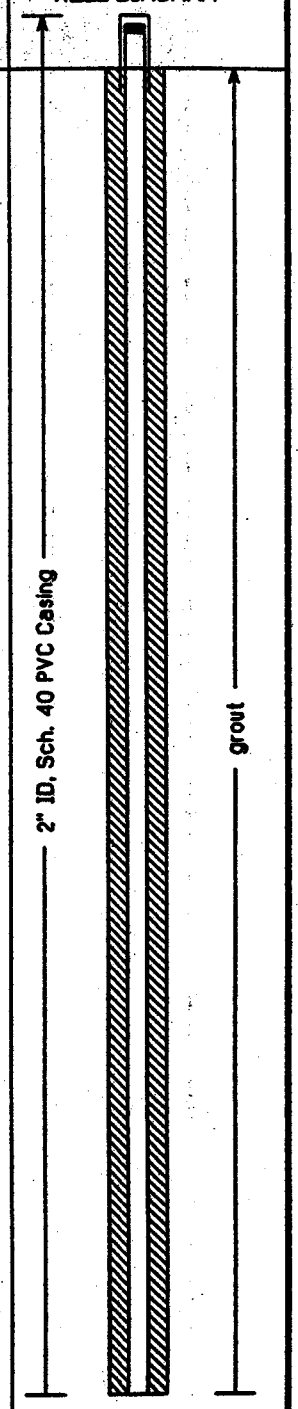
EnSafe/Allen & Hoshall

Monitoring Well OBGG09MF
(B6MW09MF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #9*
Project No.: *0106-08420*	Surface Elevation: *312.70 feet msl*
Started at *1230 on 4-3-96*	TOC Elevation: *314.82 feet msl*
Completed at *1720 on 4-3-96*	Depth to Groundwater: *55.6 feet* Measured: *4/8/96*
Drilling Method: *4 1/4" ID Hollow-Stem Auger with 5' Flights*	Groundwater Elevation: *259.22 feet msl*
Drilling Company: *Alliance Environmental/Midwest Engineering*	Total Depth: *72.0 feet*
Geologist: *R. Smith*	Well Screen: *62 to 72 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							OL	(0-1') Soil, roots, gravel, and organic material.	311.7
							ML	(1-8') Silt, moderate yellowish-brown, mottled with olive gray from 5-6', with organic material and roots near 5'.	
5									
									304.7
								(8-20') Silty clay, moderate yellowish-brown, moist to wet.	
10									
							CL		
15									
								Becoming very silty and less moist near 20'.	
20									292.7
								(20-30') Silt (see descriptions below).	
								(20-26') Silt, moderate yellowish-brown, mottled with dark yellowish- orange and mottled with very light gray from 23' to 26', contains iron-manganese nodules and sparse iron concretions, hard and dry.	
25							ML	(26-30') Silt, moderate yellowish-brown, sparsely mottled with light olive gray, clayey in some areas, and contains iron-manganese nodules.	
30							ML/CL		282.7

WELL DIAGRAM



EnSafe/Allen & Hoshall

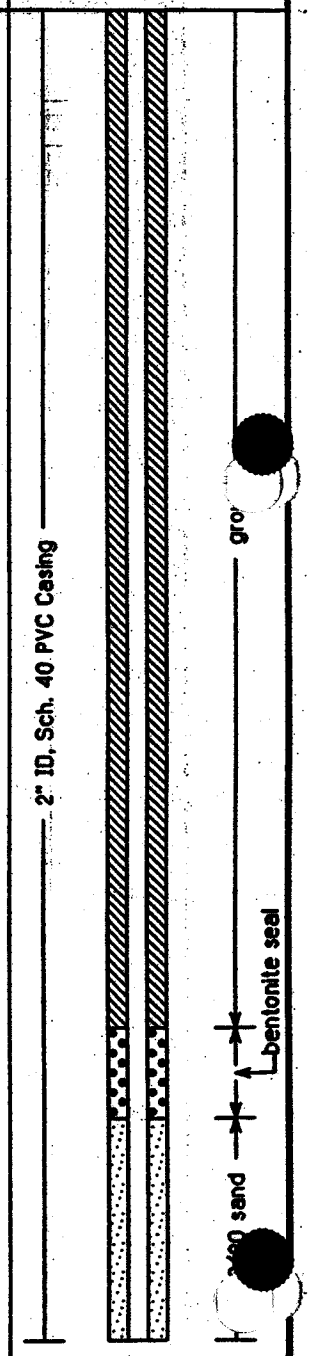
Monitoring Well OBGG09MF

(BGMW09MF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #9*
Project No: *0106-08420*	Surface Elevation: *312.70 feet msl*
Started at *1230 on 4-3-96*	TOC Elevation: *314.82 feet msl*
Completed at *1720 on 4-3-96*	Depth to Groundwater: *55.6 feet* Measured: *4/8/96*
Drilling Method: *4 1/4" ID Hollow-Stem Auger with 5' Flights*	Groundwater Elevation: *259.22 feet msl*
Drilling Company: *Alliance Environmental/Midwest Engineering*	Total Depth: *72.0 feet*
Geologist: *R. Smith*	Well Screen: *62 to 72 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
									282.7
							ML CL	(30-35') Silt and clay, dark yellowish-orange mottled with light brown, very light gray, and some moderate reddish-brown, very hard, containing moderate reddish-brown iron concretions. Contains some very fine-grained sand near 35'.	
35									277.7
							SC	(35-43') Sand, silt, and clay (see descriptions below). (35-36') Clayey sand with silt, very fine-grained, moderate yellow mottled with dark yellowish-orange, light brown, and very light gray. (36-43') Fine-grained sand with clay and silt, dark yellowish-orange with light brown, very light gray, and moderate reddish-brown mottling, hard. Contains some iron concretions.	
40								Top of Fluvial Deposits estimated at 42'.	269.7
							SP	(43-44') Sand, fine-grained, dark yellowish-orange to light brown, wet.	268.7
							SC SM	(44-45') Sand, very fine-grained, clay, and silt (same color as 35-43').	267.7
45							SW GW	(45-50.5') Sand and gravel (see descriptions below). (45-46') Sand and gravel; sand is fine to very coarse-grained, gravel is small and composed of quartz and chert; dark yellowish-orange, wet.	
50							SC	(46-50.5') Silty sand and gravel; sand is fine to very coarse-grained, grayish-orange to dark yellowish-orange mottled with light olive gray; gravel is up to .75" in longest dimension, wet.	262.2 261.2
							SM GW	(50.5-51.5') Sand, very fine-grained, and clay, pale red mottled with very light gray and dark yellowish-orange material.	
55							SM	(51.5-56') Silty sand, fine to coarse-grained, dark yellowish-orange to light brown and gravel up to 2" in longest dimension, gravel is composed mostly of chert.	258.7 258.2
							CL	(56-56.5') Silty sand, fine-grained, dark yellowish-orange, becoming cemented.	
60									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well OBGG09MF

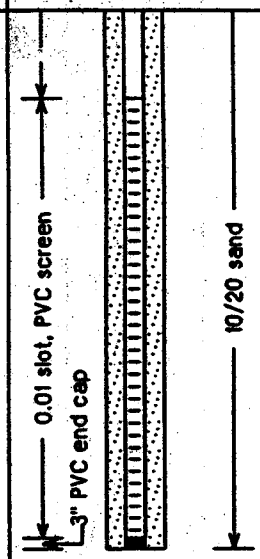
(BGMW09MF)

Project: *NSA Memphis*
Project No.: *0106-08420*
Started at *1230 on 4-3-96*
Completed at *1720 on 4-3-96*
Drilling Method: *4 1/4" ID Hollow-Stem Auger with 5' Flights*
Drilling Company: *Alliance Environmental/Midwest Engineering*
Geologist: *R. Smith*

Location: *Millington, TN. Background Location #9*
Surface Elevation: *312.70 feet msl*
TOC Elevation: *314.82 feet msl*
Depth to Groundwater: *55.6 feet* Measured: *4/8/96*
Groundwater Elevation: *259.22 feet msl*
Total Depth: *72.0 feet*
Well Screen: *62 to 72 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							CL	(58.5-62') Clay, yellowish-gray mottled with dark yellowish-orange, hard.	250.7
							SW	(62-63') Sand, fine to coarse-grained, dark yellowish-orange to light brown, with gravel up to 0.5" in longest dimension, wet.	249.7
65							SW GW	(63-66') Sand, fine to coarse-grained, very pale orange to grayish- orange, and gravel up to 1" in longest dimension, gravel is composed mainly of chert, wet.	246.7
70							SW	(66-72') From 66' to 69', sand, fine to very coarse-grained, yellowish-gray to grayish-orange, with scattered gravel, wet. From 69' to 70', has iron-stained zones and black iron concretions. Contains clayey zones from 71' to 72'.	240.7
75								Note: Soil boring terminated at 72' and monitoring well installed in hollow-stem auger annulus. No samples were collected for lithologic description. Lithology based on continuous sampling of the adjacent borehole for the installation of OBGG09UF (refer to previous log).	
80									
85									
90									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well OBGG09UF

(BGMW09UF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #9*
Project No.: *0106-08420*	Surface Elevation: *312.39 feet msl*
Started at *1210 on 3-14-96*	TOC Elevation: *315.20 feet msl*
Completed at *1405 on 3-14-96*	Depth to Groundwater: *dry feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *dry feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96.0 feet*
Geologist: *D. Ladd*	Well Screen: *45 to 55 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							OL	(0-1') Soil, roots, gravel, and organic material.	311.4
			1	92	BG		ML	(1-8') Silt, moderate yellowish-brown, mottled with olive gray from 5-6', with organic material and roots near 5'.	
5									
									304.4
10			2	60	BG		CL	(8-20') Silty clay, moderate yellowish-brown, moist to wet.	
15									
								Becoming very silty and less moist near 20'	292.4
20			3	90	BG		ML	(20-30') Silt (see descriptions below). (20-26') Silt, moderate yellowish-brown, mottled with dark yellowish- orange and mottled with very light gray from 23' to 26', contains iron-manganese nodules and sparse iron concretions, hard and dry. sparsely mottled with light olive gray and (26-30') Silt, moderate yellowish-brown, sparsely mottled with light olive gray, clayey in some areas, and contains iron-manganese nodules.	
25									
30							ML CL		282.4

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

EnSafe/Allen & Hoshall

Monitoring Well OBGG09UF

(BGMW09UF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #9*
Project No.: *0106-08420*	Surface Elevation: *312.39 feet msl*
Started at *1210 on 3-14-96*	TOC Elevation: *315.20 feet msl*
Completed at *1405 on 3-14-96*	Depth to Groundwater: *dry feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *dry feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96.0 feet*
Geologist: *D. Ladd*	Well Screen: *45 to 55 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			4	130	BG		ML CL	(30-35') Silt and clay, dark yellowish-orange mottled with light brown, very light gray, and some moderate reddish-brown, very hard, containing moderate reddish-brown iron concretions. Contains some very fine-grained sand near 35'.	282.4
35									277.4
							SC	(35-43') Sand, silt, and clay (see descriptions below). (35-36') Clayey sand with silt, very fine-grained, moderate yellow mottled with dark yellowish-orange, light brown, and very light gray material. (36-43') Fine-grained sand with clay and silt, dark yellowish-orange with light brown, very light gray, and moderate reddish-brown mottling, hard. Contains some iron concretions.	
40			5	100	BG			Top of Fluvial Deposits estimated at 42'.	269.4
							SP	(43-44') Sand, fine-grained, dark yellowish-orange to light brown, wet.	268.4
45							SP CL	(44-45') Sand, very fine-grained, clay, and silt (same color as 35-43').	267.4
							SW GW	(45-50.5') Sand and gravel (see descriptions below). (45-46') Sand and gravel; sand is fine to very coarse-grained, gravel is small quartz and chert; dark yellowish orange, wet.	
50			6	85	BG		SC	(46-50.5') Silty sand and gravel; sand is fine to very coarse-grained, grayish-orange to dark yellowish-orange mottled with light olive gray; gravel is up to .75" in longest dimension, wet.	261.9
							SM GW	(50.5-51.5') Sand, very fine-grained, and clay, pale red mottled with very light gray and dark yellowish-orange.	260.9
55							SM	(51.5-56') Silty sand, fine to coarse-grained, dark yellowish orange to light brown, and gravel up to 2" in longest dimension, gravel is composed mostly of chert.	258.4
							CL	(56-56.5') Silty sand, fine-grained, dark yellowish-orange, becoming cemented.	255.9
60									

WELL DIAGRAM

- 2" ID, Sch. 40 PVC Casing
- 0.01 slot, PVC screen
- 3" PVC end cap
- grout
- bentonite seal
- 10/20 sand
- bentonite plug

EnSafe/Allen & Hoshall

Monitoring Well OBGG09UF

(BGMW09UF)

Project: NSA Memphis	Location: Millington, TN. Background Location #9
Project No.: 0106-08420	Surface Elevation: 312.39 feet msl
Started at 1210 on 3-14-96	TOC Elevation: 315.20 feet msl
Completed at 1405 on 3-14-96	Depth to Groundwater: dry feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: dry feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 98.0 feet
Geologist: D. Ladd	Well Screen: 45 to 55 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
			7	110	BG		CL	(56.5-62') Clay, yellowish-gray mottled with dark yellowish-orange material, hard.	250.4	
							SW	(62-63') Sand, fine to coarse-grained, dark yellowish-orange to light brown, with gravel up to 0.5" in longest dimension, wet.	249.4	
65							SW GW	(63-66') Sand, fine to coarse-grained, very pale orange to grayish- orange, and gravel up to 1" in longest dimension, gravel is composed mainly of chert, wet.	246.4	
							SW	(66-73.5') From 66' to 69', sand, fine to very coarse-grained, yellowish-gray to grayish-orange, with scattered gravel, wet. From 69' to 70', has iron-stained zones and black iron concretions. Contains clayey zones from 71' to 73.5', and iron staining near 73.5'.		
70			8	110	BG					
							CL	(73.5-74.5') Clay, pale red mottled with dark yellowish-orange and very light gray material, contains iron concretions.	238.9 237.9	
75							SP	(74.5-85') Sand, fine (see descriptions below). (74.5-76') Sand, fine-grained, yellowish-gray locally stained dark yellowish-orange, becoming wet. (76-85') Sand, fine, yellowish-gray to grayish-orange, wet.		
80			9	80	BG					
85							SW GW	(85-94') Sand and gravel (see descriptions below). (85-86') Sand, fine, and scattered gravel, grayish-orange, wet.	227.4	
90										bentonite plug

EnSafe/Allen & Hoshall

Monitoring Well OBGG09UF
(BGMW09UF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #9*
Project No: *0106-08420*	Surface Elevation: *312.39 feet msl*
Started at *1210 on 3-14-96*	TOC Elevation: *315.20 feet msl*
Completed at *1405 on 3-14-96*	Depth to Groundwater: *dry feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *dry feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96.0 feet*
Geologist: *D. Ladd*	Well Screen: *45 to 55 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
95			10	130	BG		SW GW	(86-94') Sand, fine- to coarse-grained, and gravel up to 2.5" in longest dimension (mostly chert), grayish-orange to dark yellowish-orange, wet. Contains a very light gray clay seam with lignitic material at 86.5'.		bentonite plug
							SC	Very large gravel near 91.5'.	218.4	
							SC	Dark yellowish orange with one large iron concretion from 93.5-94'.	217.9	
								(94-94.5') Cockfield Formation: clayey sand, very fine-grained, stained dark yellowish-orange mottled with sparse light olive-gray	216.4	
100								(94.5-96') Sand, very fine, clayey, dusky yellowish-brown to olive black with light olive gray very fine-grained sandy seams.		
								Soil boring terminated at 96'.		
105										
110										
115										
120										

EnSafe/Allen & Hoshall

Monitoring Well OBGG10UF

(BGMW10UF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #10*
Project No: *0106-08420*	Surface Elevation: *273.58 feet msl*
Started at *0823 on 3-1-96*	TOC Elevation: *275.50 feet msl*
Completed at *1024 on 3-1-96*	Depth to Groundwater: *30.58 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *244.92 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *56 to 66 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							OL	(0-3') Soil, grass, and roots.	
			1	75	BG		ML	(3-4') Silt, moderate yellowish-brown, mottled with light olive gray.	270.6
5							CL ML	(4-6') Silty clay, moderate yellowish-brown mottled with light olive gray, hard.	269.6
								(6-16') Clayey silt, moderate yellowish-brown mottled with light olive gray and sparse dark yellowish-orange, contains traces of organic material, very moist.	267.6
10			2	60	BG		ML		
15									257.6
								(16-28.5') Silt (see descriptions below).	
								(16-26') Clayey silt, olive gray with sparse moderate yellowish-brown material, very moist from 16' to 21', very dry near 26', with sparse iron-manganese nodules.	
20			3	65	BG		ML		
25								(26-28.5') Silt, light gray mottled with sparse moderate yellowish- brown, wet and clayey from 26' to 27', dry below.	
									245.1
30							ML		

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

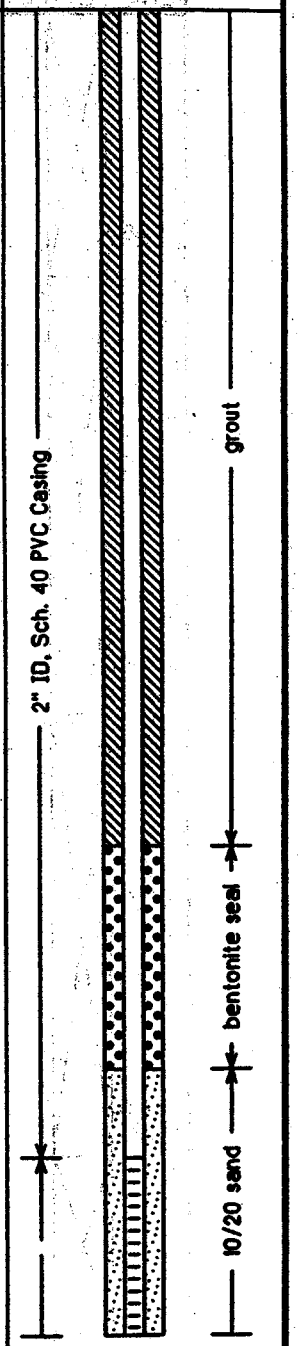
EnSafe/Allen & Hoshall

Monitoring Well OBGG10UF
(BGMW10UF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #10*
Project No.: *0106-08420*	Surface Elevation: *273.58 feet msl*
Started at *0823 on 3-1-96*	TOC Elevation: *275.50 feet msl*
Completed at *1024 on 3-1-96*	Depth to Groundwater: *30.58 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *244.92 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *56 to 66 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
35			4	105	BG		ML	(28.5–37') Silt, moderate yellowish-brown mottled with light gray to light olive gray, with dusky yellow material from 28.5'to 31', contains iron-manganese nodules, predominately near 36'.	
									236.6
40			5	120	BG		ML	(37–43') Sandy silt with scattered gravel, dark yellowish-orange mottled with some light olive-gray, moist. Top of Fluvial Deposits estimated at 41'.	
									230.6
45							SW GM	(43–52') Silty sand, medium to very coarse-grained, and gravel, dark yellowish-orange mottled with sparse light olive gray, wet. Less gravel from 45' to 46'. Gravel looks weathered from 46–52'.	
50			6	100	BG			Clay seam near 50'.	
									221.6
55							SW	(52–62') Sand (see descriptions below). (52–56') Sand, fine to medium-grained, dark yellowish-orange, with scattered rounded to angular gravel, wet.	
60								(56–62') Sand, fine to very coarse-grained, dark yellowish-orange to grayish-orange, with scattered angular to rounded gravel up to 1.5" in longest dimension, wet.	

WELL DIAGRAM



EnSafe/Allen & Hoshall

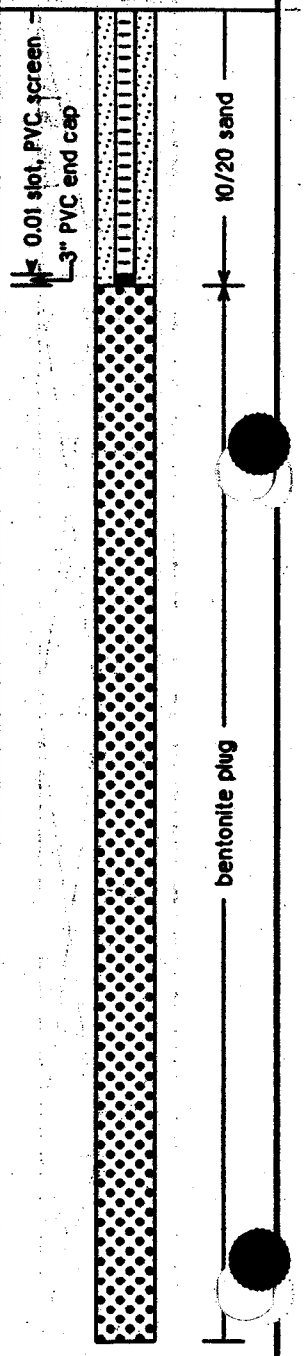
Monitoring Well OBGG10UF

(BGMW10UF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #10*
Project No.: *0106-08420*	Surface Elevation: *273.58 feet msl*
Started at *0823 on 3-1-96*	TOC Elevation: *275.50 feet msl*
Completed at *1024 on 3-1-96*	Depth to Groundwater: *30.58 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *244.92 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *56 to 66 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			7	110	BG		SW		
							SW GW	(62-64') Sand, fine to very coarse-grained, and gravel up to 2.5" in longest dimension, dark yellowish-orange, wet	211.6
65							SW	(64-69') Sand, medium to very coarse-grained, dark yellowish-orange to moderate yellowish-brown, with scattered gravel, wet.	209.6
							SW GW	(69-70') Sand, medium to very coarse-grained, and gravel up to 1.5" in longest dimension, dark yellowish-orange to moderate yellowish- brown, wet.	204.6
70			8	105	BG		SW	(70-78') Sand, medium to very coarse-grained, with scattered gravel, dark yellowish-orange to moderate yellowish-brown, wet.	203.6
75									
							SW GW	(78-79') Sand, medium to very coarse-grained, and rounded to angular gravel up to 2" in longest dimension, dark yellowish-orange to moderate yellowish-brown, wet.	195.6
80			9	95	BG		SW	(79-82') Sand, medium to very coarse-grained, with scattered gravel, dark yellowish-orange to moderate yellowish-brown, wet	194.6
							SW GW	(82-82.5') Sand, medium to very coarse-grained, and gravel up to 3 1/2" in longest dimension, dark yellowish-orange to moderate yellowish-brown, wet.	191.6
85							SM	(85.5-91.5') Silty sand, fine-grained, dark yellowish-orange mottled with light olive gray from 85.5 to 86', with gravel up to 3" in longest dimension at 91.5', wet.	188.1
90									

WELL DIAGRAM



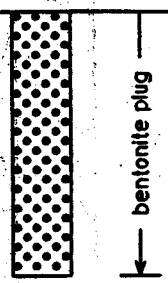
EnSafe/Allen & Hoshall

Monitoring Well OBGG10UF
(BGMW10UF)

Project: NSA Memphis	Location: Millington, TN. Background Location #10
Project No: 0106-08420	Surface Elevation: 273.58 feet msl
Started at 0823 on 3-1-96	TOC Elevation: 275.50 feet msl
Completed at 1024 on 3-1-96	Depth to Groundwater: 30.58 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 244.92 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 96.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 56 to 66 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
95			10	100	BG		SM		181.6
							CL	(92-94') Cockfield Formation: Sandy clay, olive gray.	179.6
							SC	(94-96') Clayey sand, fine-grained, olive gray.	177.6
								Soil boring terminated at 96'.	
100									
105									
110									
115									
120									

WELL DIAGRAM



EnSafe/Allen & Hoshall

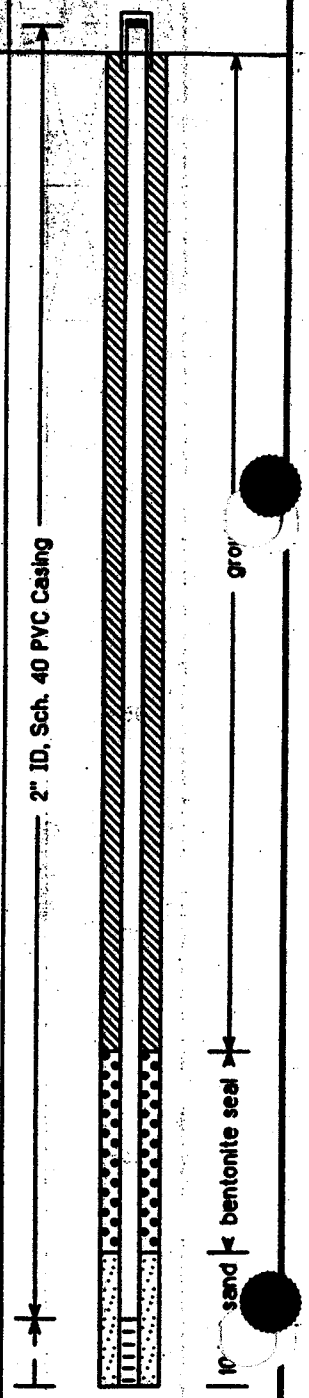
Monitoring Well OBGG11UA

(BGMW11UA)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #11*
Project No.: *0106-08420*	Surface Elevation: *261.81 feet msl*
Started at *0800 on 3-18-96*	TOC Elevation: *263.84 feet msl*
Completed at *1300 on 3-18-96*	Depth to Groundwater: *16.42 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *247.42 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *76.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *38 to 48 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							GP GM	Gravel and silt (fill).	
									259.8
			1	100	BG			Brown silt with some dark yellowish-orange staining and organic flecks	
5								Silt, yellowish brown mottled with yellowish gray, moist.	
10			2	90	BG			Silt, olive gray to greenish-gray, wet.	
15								Silt, brownish-gray to greenish-gray, wet.	
								Large wood fragment.	
20							ML		
								With sand streaks between 22' and 26', wet.	
25			3	105	BG				
30								With sand streaks between 30' and 36', wet.	
35								(36-69') Fluvial Deposits (see descriptions below).	
									224.8
							SW GW	Silt and sand, olive gray.	
40								Sand and gravel, reddish-brown to orangish-yellow.	

WELL DIAGRAM



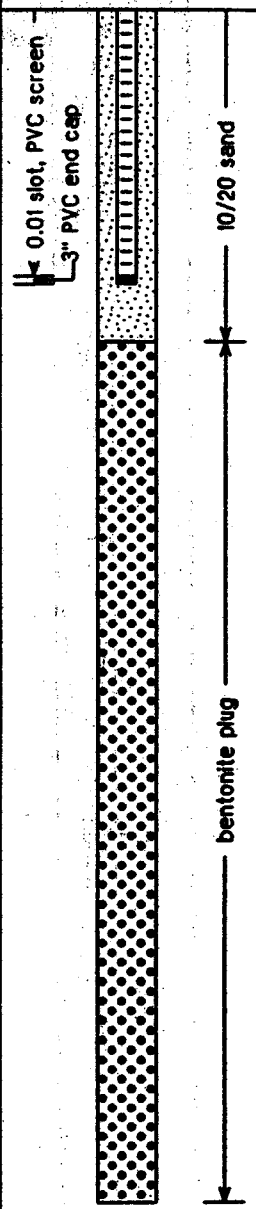
EnSafe/Allen & Hoshall

Monitoring Well OBGG11UA
(BGMW11UA)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #11*
Project No.: *0106-08420*	Surface Elevation: *261.81 feet msl*
Started at *0800 on 3-18-96*	TOC Elevation: *263.84 feet msl*
Completed at *1300 on 3-18-96*	Depth to Groundwater: *16.42 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *247.42 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *76.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *38 to 48 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SW GW		
									217.8
45			4	100	BG		SW	Sand, coarse-grained, with some gravel, grayish-yellow to dusky yellow	
50									209.8
							GW GC	Gravel with some sand and clay in the matrix, grayish-yellow to 54' turning to reddish-brown at 56'.	
55									205.8
							SW GW	Sand and gravel, reddish-brown to yellowish-orange.	
									202.8
60							GW	Gravel lense between 59' and 61'.	
			5	100	BG				200.8
							SW GW	Predominantly sand with several layers of iron-cemented gravel 1" to 2" thick, gravel is up to 2" in longest dimension.	
65									
									192.8
70			6	120	BG		SP CL	Cockfield Formation: sand, fine-grained and olive-gray, with some seams of brown clay and organic material.	
75									185.8
								Soil boring terminated at 76'.	
80									

WELL DIAGRAM



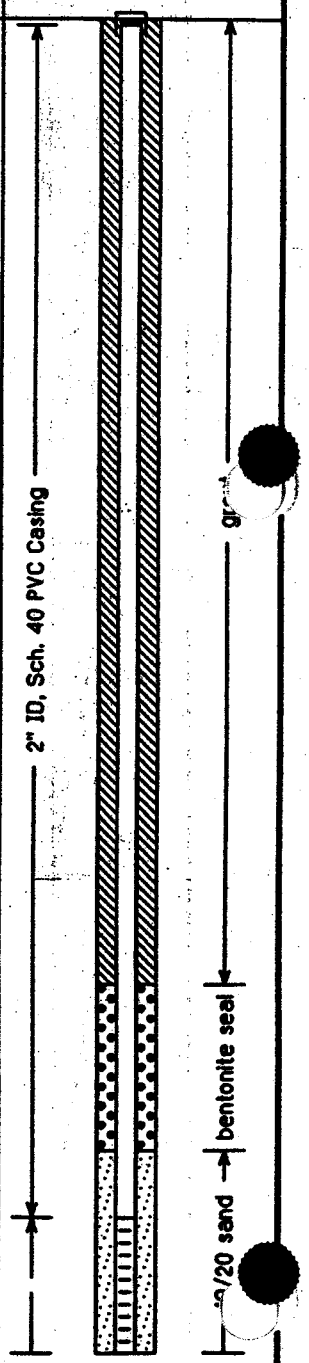
EnSafe/Allen & Hoshall

Monitoring Well OBGG12UF
(BGMW12UF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #12*
Project No.: *0106-08420*	Surface Elevation: *268.90 feet msl*
Started at *1415 on 2-18-96*	TOC Elevation: *268.71 feet msl*
Completed at *1530 on 2-18-96*	Depth to Groundwater: *9.09 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *259.62 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *66.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *36 to 46 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0				SP/SC	Asphalt, sand, and clay (fill).	
5	1	100	BG	CL/ML	Clay and silt, gray.	265.9
					Silt, yellowish-brown to yellowish-gray with organic specks and iron staining, moist.	262.9
10	2	90	BG	ML		
15					Color change to greenish-gray to olive gray, some snail shells.	
				CL	Clay with some silt, brownish-gray, stiff.	252.9
20					Silt, light olive gray with some reddish-brown staining and mottling.	248.9
25	3	75	BG	ML		
30				SP	(30-47') Fluvial Deposits (see descriptions below). (30-34') Fine sand, tan to yellowish-brown.	238.9
35				SW	Sand, medium to coarse-grained, reddish-brown to light brown.	234.9
				SW/GW	Sand and gravel, reddish-brown, majority of gravel from 40' to 47', with gravel up to 2" in longest dimension.	232.9
40						

WELL DIAGRAM



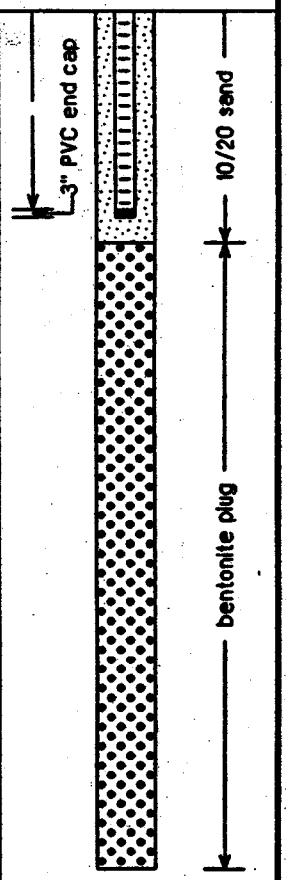
EnSafe/Allen & Hoshall

Monitoring Well OBGG12UF
(BGMW12UF)

Project: NSA Memphis	Location: Millington, TN. Background Location #12
Project No.: 0106-08420	Surface Elevation: 268.90 feet msl
Started at 1415 on 2-18-96	TOC Elevation: 268.71 feet msl
Completed at 1530 on 2-18-96	Depth to Groundwater: 9.09 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 259.62 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 66.0 feet
Geologist: J. Kingsbury	Well Screen: 36 to 46 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			4	100	BG		SW GW		
								Cockfield Formation: sand, silt, and clay, light olive gray to light yellowish-brown, micaceous, finely lignitic, with streaks of clay throughout.	221.9
50									
55							SC SM		
60			5	80	BG				
65								Soil boring terminated at 66.0'.	202.9
70									
75									
80									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well OBGG13UF

(BGMW13UF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #13*
Project No.: *0106-08420*	Surface Elevation: *289.70 feet msl*
Started at *1235 on 3-5-96*	TOC Elevation: *292.28 feet msl*
Completed at *1500 on 3-5-96*	Depth to Groundwater: *36.91 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *255.37 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96.0 feet*
Geologist: *D.L., W.P.*	Well Screen: *45 to 55 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	100	BG		OL	(0-1') Soil, silt, moderate yellowish-brown, with roots and organic material.	288.7
							ML	(1-5') Silt, moderate yellowish-brown mottled with light olive gray, with roots and organic material, moist.	
5			2	100	BG				284.7
							CL ML	(5-7') Silty clay, dark yellowish-brown mottled with light olive gray, with organic material.	282.7
10			3	55	BG		ML	(7-19') Silt, moderate yellowish-brown mottled with light olive gray and olive gray, with dark yellowish-orange iron staining, contains iron-manganese nodules, moist.	
15								Prevalent iron staining near 16'.	
								Becoming mottled with olive-gray to dark greenish-gray near 19'.	270.7
20			4	70	BG		CL ML	(19-26.5') Silty clay, olive gray to dark greenish-gray, with moderate yellowish-brown to dark yellowish-orange iron staining and iron-manganese nodules.	
25								Very silty near 22'.	263.2
30			5	130	BG		ML	(26.5-32.5') Clayey silt, moderate yellowish-brown mottled with olive gray, with dark yellowish-orange iron staining, contains iron- manganese nodules and iron concretions, moist.	257.2
35							CL	(32.5-43') Clay, yellowish-gray to light olive gray, stained dark yellowish-orange, contains iron concretions, very hard and stiff. Silty near 32.5'.	
40									

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

tonite seal

EnSafe/Allen & Hoshall

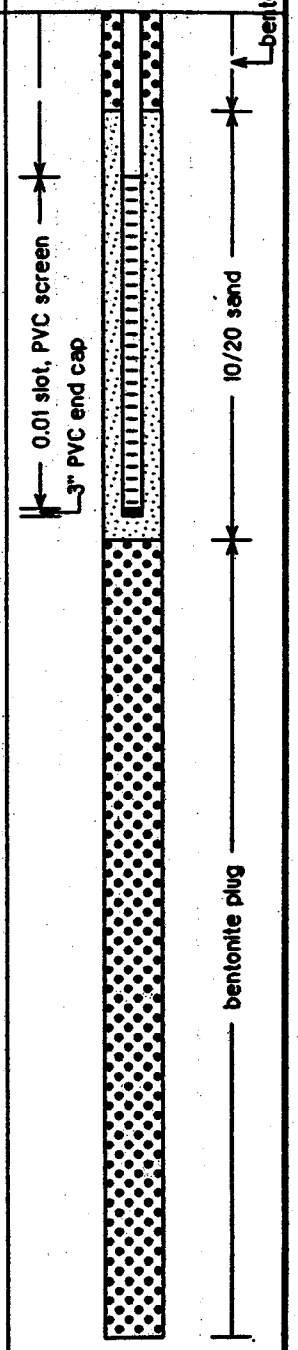
Monitoring Well OBGG13UF

(BGMW13UF)

Project: NSA Memphis	Location: Millington, TN. Background Location #13
Project No.: 0106-08420	Surface Elevation: 289.70 feet msl
Started at 1235 on 3-5-96	TOC Elevation: 292.28 feet msl
Completed at 1500 on 3-5-96	Depth to Groundwater: 36.91 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 255.37 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 96.0 feet
Geologist: D.L., W.P.	Well Screen: 45 to 55 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			6	125	BG		CL		
									248.7
							SC	(43-94') Fluvial Deposits (see descriptions below).	245.7
45							SP	(43-44') Clayey sand, fine-grained, very light gray mottled with dark yellowish-orange, wet.	
								(44-48') Sand, fine (see descriptions below).	241.7
50			7	130	BG		SP	(44-46') Sand, fine-grained, yellowish-gray to dusky yellow, wet from 44-45', becoming very light gray near 46'. Some organic material and a clay seam present near 45'.	
								(46-48') Sand, fine-grained, yellowish-gray to dark yellowish-orange, micaceous, wet, with a clay seam near 47'.	236.7
55							SP	(48-53') Sand, fine-grained, yellowish-gray to pinkish-gray, micaceous, wet.	
								(53-60') Sand, fine-grained, yellowish-gray stained dark yellowish- orange, wet.	
60								With sparse oraganic material near 55'.	229.7
			9	90	BG			(60-76') Sand and gravel (see descriptions below).	
65								(60-66') Sand, fine to very coarse-grained, and gravel up to 2.5" in longest dimension, dark yellowish-orange to moderate yellowish-brown, wet, gravel is mostly angular to rounded quartz and chert.	
							GW SW	(66-76') Sand, fine to very coarse-grained, and gravel up to 3" in longest dimension, moderate yellowish-brown to grayish-orange, wet.	
70			10	65	BG				
75									213.7
							SW GW	(76-77') Gravel up to 1" in longest dimension, and sand, very coarse, moderate yellowish-brown to dark yellowish-orange, wet.	212.7
							SP		
80									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well OBGG13UF
(BGMW13UF)

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #13*
Project No.: *0106-08420*	Surface Elevation: *289.70 feet msl*
Started at *1235 on 3-5-96*	TOC Elevation: *292.28 feet msl*
Completed at *1500 on 3-5-96*	Depth to Groundwater: *36.91 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *255.37 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96.0 feet*
Geologist: *D.L., W.P.*	Well Screen: *45 to 55 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			11	100	BG		SP	(77-85') Sand, fine-grained, and scattered gravel up to 3" in longest dimension, grayish-orange, wet.		
							SW GW	(85-88.5') Sand, fine to very coarse-grained, and gravel up to 1.5" in longest dimension, grayish-orange to dark yellowish orange, wet.	204.7 203.2	
90							SW	(88.5-91.5') Sand, fine to medium-grained, with mostly scattered gravel up to 2" in longest dimension, grayish-orange, wet.		
			12	100	BG		SW GW SC GC SC SP	(91.5-92.5') Sand, coarse to very coarse-grained, and gravel up to 2" in longest dimension, moderate yellowish-brown to dark yellowish- orange, wet.	198.2 197.2 195.7 194.2 193.7	bentonite plug
95								(92.5-94.5') Very clayey sand, fine to very coarse-grained, and gravel up to 2.5" in longest dimension, dark yellowish-orange, wet.		
100								(94-95.5') Cockfield Formation: Very clayey sand, very fine to fine-grained, dark yellowish-orange mottled with sparse very light gray.		
								(95.5-96') Sand, very fine to fine-grained, medium light gray, slightly micaceous, wet.		
105								Soil boring terminated at 96'.		
110										
115										
120										

EnSafe/Allen & Hoshall

Monitoring Well OBGG14UF
Boring

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #14*
Project No.: *0106-08420*	Surface Elevation: *feet msl*
Started at *on 3-5-96*	TOC Elevation: *feet msl*
Completed at *on 3-5-96*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Hollow Stem Auger*	Groundwater Elevation: *feet msl*
Drilling Company: *TriState Drilling*	Total Depth: *57.8 feet*
Geologist: *C. Ivey*	Well Screen: *to feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0										2" ID, Sch. 40 PVC Casing; grout
5										
10										
15										
20										
25										
30										
35										
40										

EnSafe/Allen & Hoshall

Monitoring Well OBGG14UF
Boring

Project: *NSA Memphis*	Location: *Millington, TN. Background Location #14*
Project No.: *0108-08420*	Surface Elevation: *feet msl*
Started at *on 3-5-96*	TOC Elevation: *feet msl*
Completed at *on 3-5-96*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Hollow Stem Auger*	Groundwater Elevation: *feet msl*
Drilling Company: *TriState Drilling*	Total Depth: *57.8 feet*
Geologist: *C. Ivey*	Well Screen: *to feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45										grout, bentonite sea
50										0.01 slot, PVC screen
55										3" PVC end cap
60										10/20 sand
65										
70										
75										
80										

SWMU 2

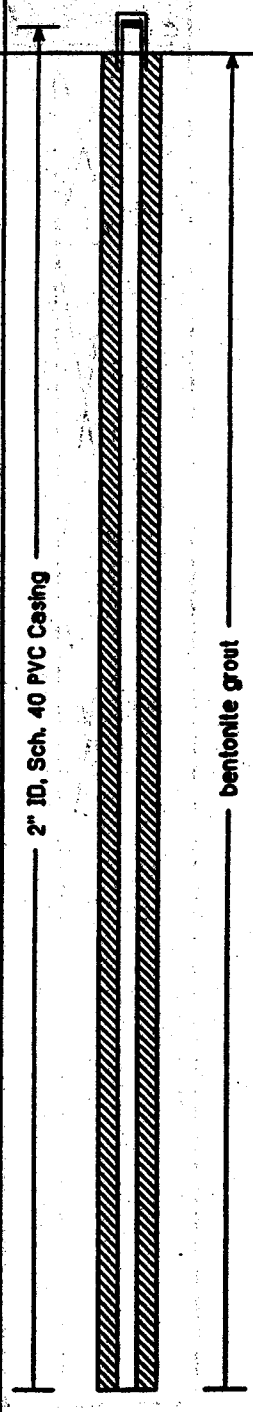
EnSafe/Allen & Hoshall

Monitoring Well 002G01DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 – Southside Landfill
Project No.: 106-08420	Surface Elevation: 266.90 feet msl
Started at 1400 on 2-12-96	TOC Elevation: 269.55 feet msl
Completed at 1645 on 2-12-96	Depth to Groundwater: 6.49 feet Measured: 4/10/96
Drilling Method: Rotasonic – 4" core barrel inside 6" casing	Groundwater Elevation: 263.06 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 66.0 feet
Geologist: J. Kingsbury	Well Screen: 48 to 58 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								(0–39') Upper Alluvium (see descriptions below).	
5			1	66	BG			Clayey silt, moderate yellowish-brown to light brown.	
								Some organics and iron staining (5'–6').	
								Clayey silt, moderate yellowish brown, moist, abundant organic and iron specks from 6' to 10' becoming less frequent from 10' to 16'.	
10			2	90	BG				
15								Clayey silt, olive green with dark yellowish-orange mottling.	
								Silt, light olive gray to greenish-gray, wet at 20', some minor sand 25' to 26', sulfur-like odor.	
20			3	100	BG		ML		
25								Same as above, shell and small snail fragments, organic debris, wood at 28'.	
30			4	100	BG				
35		1'							
									227.9
40							SW GW	(39–59') Deeper Alluvium (see descriptions below).	

WELL DIAGRAM



EnSafe/Allen & Hoshall

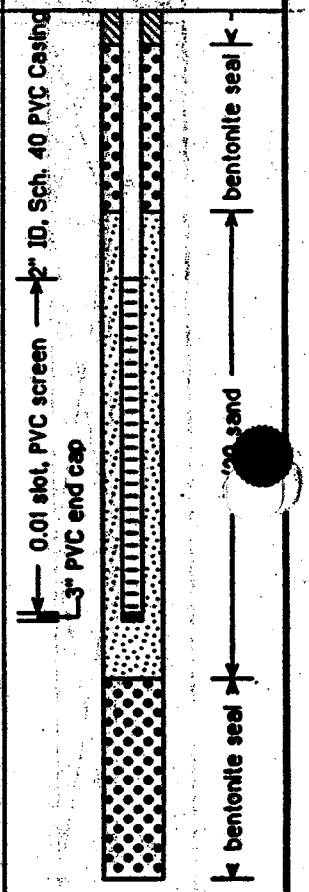
Monitoring Well 002G01DA

Project: NSA Memphis
Project No.: 106-08420
Started at 1400 on 2-12-96
Completed at 1645 on 2-12-96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing
Drilling Company: Alliance Environmental, Inc.
Geologist: J. Kingsbury

Location: Millington, TN SWMU#2 - Southside Landfill
Surface Elevation: 268.90 feet msl
TOC Elevation: 269.55 feet msl
Depth to Groundwater: 6.49 feet Measured: 4/10/96
Groundwater Elevation: 263.06 feet msl
Total Depth: 66.0 feet
Well Screen: 48 to 58 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			5	30	BG		SW GW	(39-48') Sand and gravel, light yellowish-brown. Contact is approximate; location unceratin due to poor return in the core barrel.	
									218.9
50			6	120	BG		SW	Sand, light yellowish-brown, gravel from 48' to 56'.	
55									210.9
							SW GW	Sand and gravel, light yellowish brown.	
								Gravel is up to 3" diameter.	207.9
60			7	100	BG		SC	Cockfield Formation: Silty fine-grained sand, tan to light brown at contact. Changes to medium-gray, silty and clayey fine-grained sand below, micaceous, mottled with light brown silt and fine sand.	
65									200.9
								Soil boring terminated at 66'.	
70									
75									
80									

WELL DIAGRAM



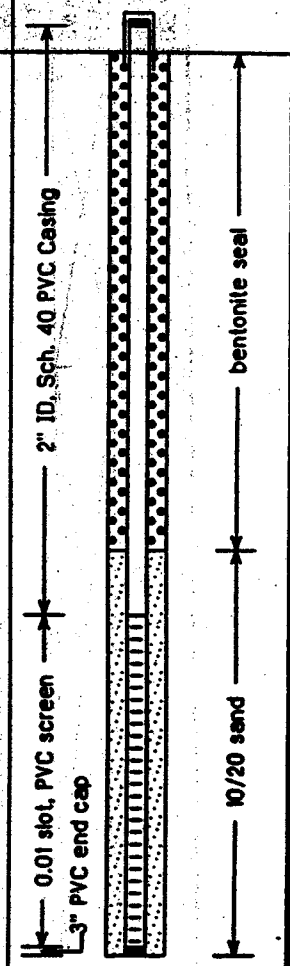
EnSafe/Allen & Hoshall

Monitoring Well 002G01UA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No: 106-08420	Surface Elevation: 266.72 feet msl
Started at 0800 on 2-13-96	TOC Elevation: 269.30 feet msl
Completed at 0900 on 2-13-96	Depth to Groundwater: 11.52 feet Measured: 4/9/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 257.78 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 27.0 feet
Geologist: J. Kingsbury	Well Screen: 17 to 27 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1					(0-27') Upper Alluvium (see descriptions below). Clayey silt, moderate yellowish brown to light brown.	
5								Some organics and iron staining (5'-6').	
			2					Clayey silt, moderate yellowish brown, moist, abundant organic and iron specks from 6' to 10' becoming less frequent from 10' to 16'. speckles.	
10									
							ML		
15			3					Clayey silt, olive green with dark yellowish orange mottling. Silt, light olive gray to greeenish-gray, wet at 20', some minor sand 25' to 26', sulfur-like odor.	
20									
25								Same as above, shell and small snail fragments, organic debris	239.7
								Boring terminated at 27'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 002G01DA.	
30									
35									
40									

WELL DIAGRAM



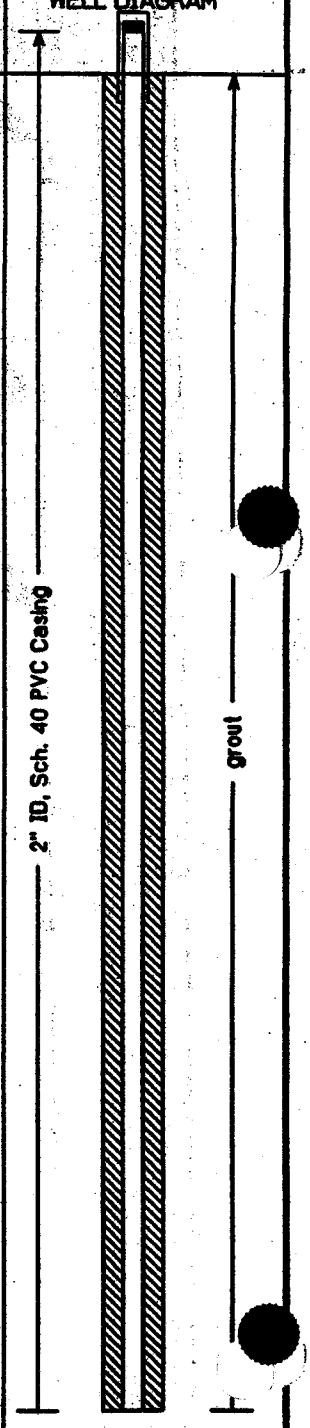
EnSafe/Allen & Hoshall

Monitoring Well 002G02DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#2 - Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *267.09 feet msl*
Started at *0745 on 2-7-96*	TOC Elevation: *269.56 feet msl*
Completed at *0843 on 2-7-96*	Depth to Groundwater: *9.74 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *259.82 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *56.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *41 to 51 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							OL	(0-38') Upper Alluvium (see descriptions below).	268.1
								(0-1') Soil.	
								(1-15') Silt (see descriptions below).	
			1	90	BG			(1-4') Silt, very clayey, moderate yellowish-brown.	
5								(4-6') Silt, moderate yellowish-brown, very dry from 4' to 5'.	
								(6-15') Silt, moderate yellowish-brown mottled with some light olive gray, with considerable iron staining and manganese nodules, especially from 14 to 15'.	
							ML		
10			2	46	BG				
								(14-15') Becoming moist.	
15									252.1
								(15-27') Silt, clayey, dark greenish-gray (see descriptions below).	
								(15-16') Silt, very clayey, dark greenish-gray, moist.	
								(16-26') Same as above, with some snail shell fragments.	
20							ML		
			3	89	BG				
								Slightly sandy from 23' to 26'.	
25									

WELL DIAGRAM



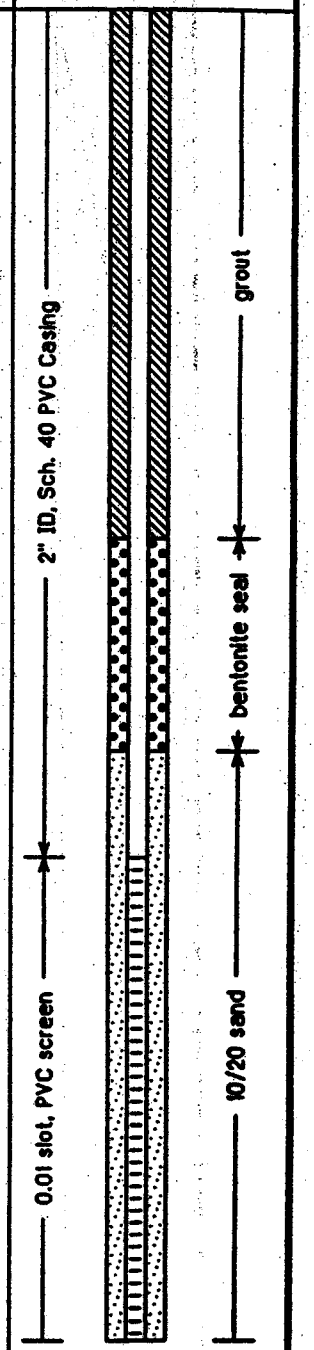
EnSafe/Allen & Hoshall

Monitoring Well 002G02DA

Project: *NSA Memphis*	Location: *Millington, TN SWMU#2 – Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *267.09 feet msl*
Started at *0745 on 2-7-96*	TOC Elevation: *269.56 feet msl*
Completed at *0843 on 2-7-96*	Depth to Groundwater: *9.74 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing*	Groundwater Elevation: *259.82 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *56.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *41 to 51 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	(26–27') Same as above, becoming mottled with olive gray.	240.1
							ML	(27–30') Sandy silt, olive gray, moist.	237.1
30			4	100	BG		SM	(30–31') Silty sand; medium to coarse-grained, olive gray, wet, wood at 30'.	236.1
							ML	(31–32') Sandy silt; olive gray, moist.	235.1
							SM	(32–33') Silty sand; medium to coarse-grained with small diameter gravel, olive gray, wet, wood at 33'.	234.1
35							ML	(33–37.5') Silt (see descriptions below). (33–36') Clayey silt, olive gray with some snail shell fragments, moist. Some greenish-gray color material at 33.5'. (36–37.5') Same as above, becoming slightly sandy.	229.1
							SW GW	(38–53') Deeper Alluvium (see descriptions below). (38–40.5') Sand and gravel; sand is fine to coarse-grained, gravel is up to 0.5" in longest dimension, light olive gray to olive gray, with olive gray clay seams, wet. Wood at 38.5' and 40'.	226.6
40			5	100	BG		SM GW	(40.5–45') Silty sand and gravel; sand is coarse to very coarse- grained, gravel is up to 1.5" in longest dimension; mostly olive gray at 40.5' becoming moderate yellowish-brown mottled with light gray below, wet.	
45							SW	Becoming lighter in color near 45'.	222.1
							SW GW	(45–46') Sand, medium to coarse-grained, dark yellowish-orange, with a few small pieces of gravel. (46–50') Gravel and sand; gravel is up to 3.5" in longest dimension; moderate yellowish-brown to dark yellowish-orange, wet.	221.1
50							SW GW		217.1

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 002G02DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#2 - Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *267.09 feet msl*
Started at *0745 on 2-7-96*	TOC Elevation: *269.56 feet msl*
Completed at *0843 on 2-7-96*	Depth to Groundwater: *9.74 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *259.82 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *56.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *41 to 51 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
									217	3" PVC end cap
			6	95	BG		SW GW	(50-51') Sand, medium to very coarse-grained and gravel up to 2" in longest dimension. Moderate yellowish-brown mottled with light gray material, wet.	215.6	
							CL ML	(51.5-53') Silty and sandy clay with gravel up to 2.5" in longest dimension. Very light gray mottled with moderate yellowish-brown and dark yellowish-orange material. Wet.	214.1	
55							SP SC	Cockfield Formation: Sand, fine-grained, very light gray mottled with moderate yellowish-brown and dark yellowish-orange material, slightly clayey, wet from 53' to 54'. With splotches of light brownish-gray material at 55', becoming very fine dark yellowish-orange sand below 55'.	211.1	bentonite seal
								Terminated soil boring at 56'.		
60										
65										
70										
75										

EnSafe/Allen & Hoshall

Monitoring Well 002G02UA

Project: NSA Memphis	Location: Millington, TN SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.43 feet msl
Started at 1150 on 2-12-96	TOC Elevation: 269.57 feet msl
Completed at 1230 on 2-12-96	Depth to Groundwater: 10.64 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 258.93 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 27.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 17 to 27 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1				OL	(0-27') Upper Alluvium (see descriptions below).	266.4
								(0-1') Soil.	
								(1-15') Silt (see descriptions below).	
								(1-4') Silt, very clayey, moderate yellowish-brown.	
5								(4-6') Silt, moderate yellowish-brown, very dry from 4' to 5'.	
								(6-15') Silt, moderate yellowish-brown mottled with some light olive gray, with considerable iron staining and iron-manganese nodules, especially from 14' to 15'.	
			2				ML		
10									
								(14-15') Becoming moist.	
15			3						252.4
								(15-27') Silt, clayey, dark greenish-gray (see descriptions below).	
								(15-16') Silt, very clayey, dark greenish-gray, moist.	
								(16-26') Same as above with some snail shell fragments.	
20							ML		
								Slightly sandy from 23' to 26'.	
25									

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

0.01 slot, PVC screen

bentonite seal

10/20 sand

EnSafe/Allen & Hoshall

Monitoring Well 002G02UA

Project: NSA Memphis	Location: Millington, TN SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.43 feet msl
Started at 1150 on 2-12-96	TOC Elevation: 269.57 feet msl
Completed at 1230 on 2-12-96	Depth to Groundwater: 10.64 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 258.93 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 27.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 17 to 27 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							ML	(26-27') Same as above, becoming mottled with olive gray material.	240.4	10/20 sand
								Soil boring terminated at 27'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 002G02DA.		
30										
35										
40										
45										
50										

EnSafe/Allen & Hoshall

Monitoring Well 002G03DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#2 – Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *267.16 feet msl*
Started at *1015 on 2-6-96*	TOC Elevation: *269.62 feet msl*
Completed at *1150 on 2-6-96*	Depth to Groundwater: *10.91 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing*	Groundwater Elevation: *258.71 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *80.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *38 to 48 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								(0–29') Upper Alluvium (see descriptions below).	
							GP	(0–2') Soil, gravel, and asphalt.	
									265.2
			1	42	1.5		ML	(2–6') Clayey silt; olive gray to light olive gray to greenish-gray. Contains some iron-manganese nodules.	
5									261.2
							ML	(6–13.5') Silt, moderate yellowish-brown mottled with light olive gray material.	
10			2	83	BG			(11.5–13.5') Becoming moist with iron staining and iron-manganese nodules.	
									253.7
							ML	(13.5–30') Silt (see descriptions below).	
15								(13.5–26') Silt, olive gray to greenish-gray. Moist.	

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

EnSafe/Allen & Hoshall

Monitoring Well 002G03DA

Project: NSA Memphis	Location: Millington, TN SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.16 feet msl
Started at 1015 on 2-6-96	TOC Elevation: 269.62 feet msl
Completed at 1150 on 2-6-96	Depth to Groundwater: 10.91 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 258.71 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 60.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 38 to 48 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
20			3	65	BG		ML	Iron-manganese nodules below 20', becoming more moist with scattered shell fragments.		2" ID, Sch. 40 PVC Casing; grout
								Becoming slightly sandy below 22'.		
25								Wood fragment at 25.5'.		
								(26-30') Sandy and clayey silt with iron-manganese nodules. Wood fragments from 28' to 29'.		
									238.2	
30							SW	(29-48') Deeper Alluvium (see descriptions below).		

EnSafe/Allen & Hoshall	Monitoring Well 002G03DA
Project: NSA Memphis	Location: Millington, TN SWMU#2 – Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.16 feet msl
Started at 1015 on 2-6-96	TOC Elevation: 269.62 feet msl
Completed at 1150 on 2-6-96	Depth to Groundwater: 10.91 feet Measured: 4/8/96
Drilling Method: Rotasonic – 4" core barrel inside 6" casing	Groundwater Elevation: 258.71 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 60.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 38 to 48 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
			4	66	BG		SW	(29–35') Sand, fine to medium-grained, olive gray in color. Coarsens downward. Moist. Contains few snail shell fragments.		
35							SW	(35–38') Sand, medium to coarse (see descriptions below). (35–36') Sand, medium to coarse-grained, olive gray, wet. (36–38') Sand, medium to coarse, olive gray to light olive gray color. Coarser with gravel near 38'.	232.2	
			5	95	BG		SW SC	(38–39.5') Sand, slightly clayey with gravel, medium to very coarse- grained, moderate yellowish-brown, wet.	229.2	
40			6				SW SC	Clay and sand with gravel, light gray mottled with moderate yellowish- brown.	227.7 227.2	
								Shelby tube sample collected from 40' to 43', no lithologic description available.		
							SW GW	(43–45.5') Sand, medium to very coarse-grained, and gravel up to 1.5" in longest dimension. Moderate yellowish-brown color mottled with some light gray material. Less gravel near 45.5'. Wet.	224.2	
45										

WELL DIAGRAM: 2" ID, Sch. 40 PVC Casing; 0.01 slot, PVC screen; grout; bentonite seal; 10/20 sand

EnSafe/Allen & Hoshall

Monitoring Well 002G03DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No: 106-08420	Surface Elevation: 267.16 feet msl
Started at 1015 on 2-6-96	TOC Elevation: 269.62 feet msl
Completed at 1150 on 2-6-96	Depth to Groundwater: 10.91 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 258.71 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 60.0 feet.
Geologist: D. Ladd, W. Parks	Well Screen: 38 to 48 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							SW GW		221.7	0.01 slot, PVC screen; 3" PVC end cap; 10/20 sand; bentonite seal
			7	121	BG		SP	(45.5-46') Sand: fine to medium-grained, light gray with some pinkish-gray.	221.2	
							SW GW	(46-46.5') Sand, medium to coarse-grained, and gravel: moderate yellowish-brown, wet.	220.7	
							SW GW	(46.5-48') Sand, medium to very coarse-grained, and gravel: olive-gray color, wet. Bottom 3" is moderate yellowish-brown sand and gravel, with gravel piece up to 3" in longest dimension.	219.2	
								(48-54') Cockfield Formation: Sand; fine-grained.		
50								(48-49.5') Light gray.		
								(49.5-50') Dusky yellow.		
							SP	(50-54') Light gray.		
								(54-60') Clay (see descriptions below).	213.2	
55			8	110	BG		CL	(54-58') Silty and sandy clay; olive gray with sand seams, olive gray, dark yellowish-orange sand at top. Lignite seam near 58'.		
								(58-60') Clay; olive gray in color.		
60								Terminated soil boring at 60'.	207.2	

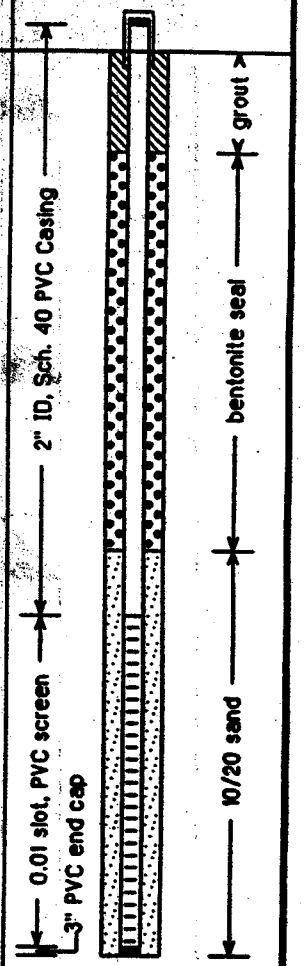
EnSafe/Allen & Hoshall

Monitoring Well 002G03UA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No: 106-08420	Surface Elevation: 267.28 feet msl
Started at 1400 on 2-6-96	TOC Elevation: 269.73 feet msl
Completed at 1500 on 2-6-96	Depth to Groundwater: 13.09 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 256.64 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 27.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 17 to 27 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1				OL GP	(0-27') Upper Alluvium (see descriptions below).	
								(0-2') Soil, gravel and asphalt.	265.3
5							ML	(2-6') Clayey silt; olive gray to light olive gray to greenish-gray. Contains some iron-manganese nodules.	261.3
								(6-13.5') Silt, moderate yellowish-brown and mottled with light olive gray material.	
10			2				ML	(11.5-13.5') Becoming moist with iron staining and iron-manganese nodules.	
								(13.5-27') Silt (see descriptions below).	253.8
15			3					(13.5-26') Silt, olive gray to greenish-gray. Moist.	
20							ML	Iron-manganese nodules below 20', becoming more moist with scattered shell fragments.	
								Becoming slightly sandy below 22'.	
25								Wood fragment at 25.5'.	
								(26-27') Sandy and clayey silt with iron-manganese nodules.	240.3
30								Terminated soil boring at 27'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 002G03DA.	
35									
40									

WELL DIAGRAM



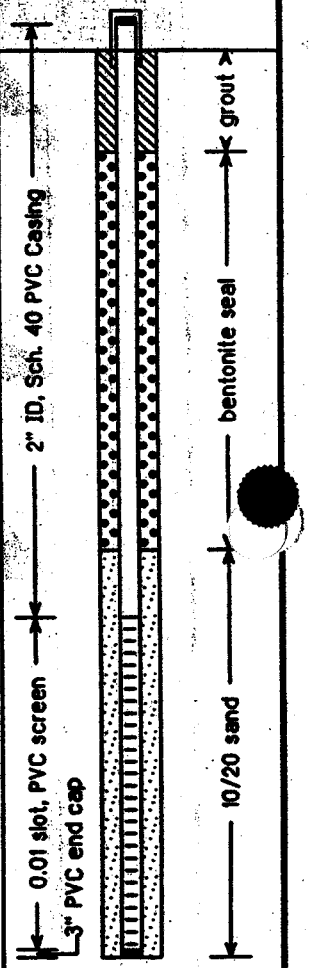
EnSafe/Allen & Hoshall

Monitoring Well 002G04UA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 266.53 feet msl
Started at 1455 on 2-5-96	TOC Elevation: 268.76 feet msl
Completed at 1515 on 2-5-96	Depth to Groundwater: 8.91 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 259.85 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 27.25 feet
Geologist: D. Ladd, W. Parks	Well Screen: 17 to 27 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1				OL	(0-3.5') Soil and roots.	
									263
5							ML	(3.5-16') Silt (see descriptions below). (3.5-6') Silt, moderate yellowish-brown mottled with light olive gray, with considerable iron staining. (6-16') Silt, olive gray to light olive gray mottled with moderate yellowish-brown.	
10			2					Moist from 12' to 16'. Contains iron-manganese nodules from 13' to 16'.	
15			3					Mottled with dark yellowish-orange near 16'.	
									250.5
								No description available, collected Shelby tube from 16' to 19' for geotechnical analysis.	
									247.5
20							ML	(19-27') Silt (see descriptions below). (19-26') Silt, olive gray to greenish-gray, with a very few snail shell fragments, moist. With very fine sand below 22'. Contains roots below 23'. Contains iron-manganese nodules from 24' to 26'.	
25								(26-27') Silt, sandy (very fine-grained), olive gray to greenish-gray, contains snail shell fragments, moist.	239.5
30								Terminated soil boring at 27'. Note: No samples were collected for lithologic description; these descriptions were transferred from the log of adjacent soil boring 002S0029DA.	
35									
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 002G05DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#2 - Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *267.16 feet msl*
Started at *0850 on 2-5-96*	TOC Elevation: *269.33 feet msl*
Completed at *1030 on 2-5-96*	Depth to Groundwater: *12.99 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *256.34 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *55.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *40.5 to 50.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
					BG			(0-15.5') Silt (see descriptions below).
					BG			Moderate yellowish-brown and mottled with some light olive gray Contains scattered iron-manganese nodules.
			1	88	BG			
5					BG			
					BG		ML	
					BG			
10								
			2	80	BG			Slightly moist near 11'.
					BG			
					BG			Becoming mottled with some dark greenish-gray material near 14'.
15					BG			

ELEV. (ft-msl)

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

EnSafe/Allen & Hoshall

Monitoring Well 002G05DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.16 feet msl
Started at 0850 on 2-5-96	TOC Elevation: 269.33 feet msl
Completed at 1030 on 2-5-96	Depth to Groundwater: 12.99 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 256.34 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 55.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 40.5 to 50.5 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
								Increase in percentage of iron-manganese nodules near 15.5'.	251.7	
								(15.5-26') Silt (see descriptions below).		
								Dark greenish-gray, slightly moist.		
					BG			Becoming light olive gray to greenish-gray with depth.		
					BG					
20								Snail shell fragments near 20'.		
			3	75	BG		ML			
					BG					
25					BG					
				0			ML	No description available due to no sample recovery.	241.2	
									239.2	
					BG		ML SP	(28-34') Silt and very-fine grained sand with rare snail shell fragments, moist.		
30										

2" ID, Sch. 40 PVC Casing

grout

EnSafe/Allen & Hoshall

Monitoring Well 002G05DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.16 feet msl
Started at 0850 on 2-5-96	TOC Elevation: 269.33 feet msl
Completed at 1030 on 2-5-96	Depth to Groundwater: 12.99 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 256.34 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 55.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 40.5 to 50.5 feet

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	4	71	BG	ML SP		
			BG			233.2
				SM	(34-50') Fluvial Deposits (see descriptions below). (34-34.5') Sand, fine to	232.7
35			BG	ML	coarse-grained, mixed with silt, olive gray to greenish-gray with snail shell fragments, moist.	232.2
				ML	(34.5-35') Silt; olive gray to greenish-gray. Dry.	
			BG		(35-37') Clayey silt with some fine to medium-grained sand and a few pieces of dark-colored gravel, olive-gray, moist. Wood at 35.5'.	230.2
				SM	(37-39') Silty sand, fine to very coarse-grained, with quartz and chert gravel, olive gray, wet.	
			BG			228.2
				ML	(39-39.5') Silt; olive gray to light brownish-gray. Dry.	227.7
40	5	100		SW GW	(39.5-41') Sand, coarse to very coarse-grained, and gravel up to 2.5" in longest dimension, olive gray near 39.5', then very light gray mottled	
			BG		with moderate yellowish-brown, wet.	226.2
				SP GW	(41-43') Sand and gravel; sand is very coarse-grained, some gravel appears weathered; moderate yellowish-brown mottled with some light olive gray material, wet.	
			BG			224.2
				SP GW	(43-43.5') Sand and gravel, dark yellowish-orange in color, wet.	223.7
				GW SW	(43.5-44') Gravel and sand, wet; gravel is gray and red in color and up to 1.5" in longest dimension, sand is light gray.	223.2
				GW SW		
45			BG			

WELL DIAGRAM: 2" ID, Sch. 40 PVC Casing; 0.01 slot, PVC screen; grout; bentonite seal; 10/20 sand

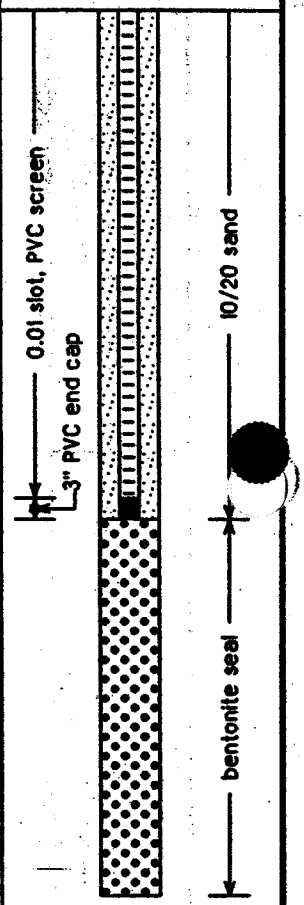
EnSafe/Allen & Hoshall

Monitoring Well 002G05DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.16 feet msl
Started at 0850 on 2-5-96	TOC Elevation: 269.33 feet msl
Completed at 1030 on 2-5-96	Depth to Groundwater: 12.99 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 256.34 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 55.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 40.5 to 50.5 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							GW SW	(44-46') Gravel and sand; gravel is up to 3" in longest dimension and dark gray, sand is moderate yellowish-brown to dark yellowish-orange, wet.	221.2
							GW SW		220.7
					BG			(46-46.5') Gravel and sand; gravel is up to .75" in longest dimension, sand is coarse-grained and moderate yellowish-brown to dark yellowish-orange, wet.	
							GW SW	(46.5-50.5') Gravel and sand; gravel is up to 3" in longest dimension, sand is very coarse-grained and moderate yellowish-brown to dark yellowish-orange, wet.	
					BG				
50			6	93	BG				217.2
					BG		SC	(50.5-52.5') Cockfield Formation: clayey sand; fine-grained, stained moderate yellowish-brown to dark yellowish-orange with some very light gray seams of material.	
									214.7
					BG			(52.5-55') Sand, fine-grained, very light gray color mottled with some dark yellowish-orange material.	
					BG		SP		
55								Soil boring terminated at 55'.	212.2
60									

WELL DIAGRAM



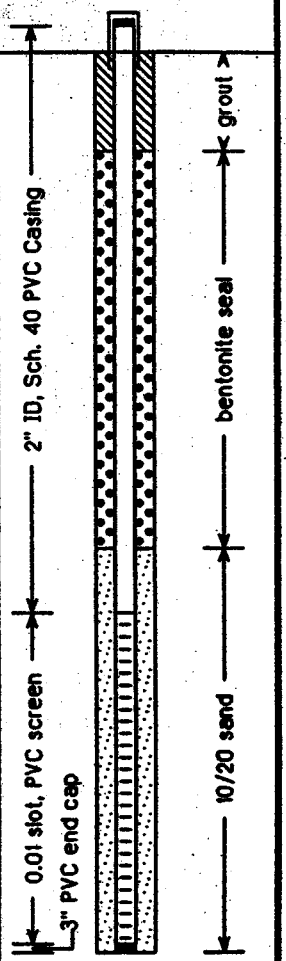
EnSafe/Allen & Hoshall

Monitoring Well 002G05UA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 – Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.14 feet msl
Started at 1315 on 2-5-96	TOC Elevation: 269.39 feet msl
Completed at 1400 on 2-5-96	Depth to Groundwater: 11.45 feet Measured: 4/8/96
Drilling Method: Rotasonic – 4" core barrel inside 6" casing	Groundwater Elevation: 257.94 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 27.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 17 to 27 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1				ML	(0–15.5') Silt; moderate yellowish-brown mottled with some light olive gray material. Contains sattered iron-manganese nodules.	
5									
10			2					Slightly moist near 11'.	
15			3					Becoming mottled with some dark greenish-gray material near 14'.	
								Increase in percentage of iron-manganese nodules near 15.5'.	251.6
								(15.5–26') Silt, dark greenish-gray, slightly moist.	
20							ML	Becoming light olive gray to greenish gray with depth.	
								Snail shell fragments near 20'.	
25									241.1
								No description available due to no sample recovery from 26' to 27'.	240.1
30								Terminated soil boring at 27'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 002G05DA.	
35									
40									

WELL DIAGRAM



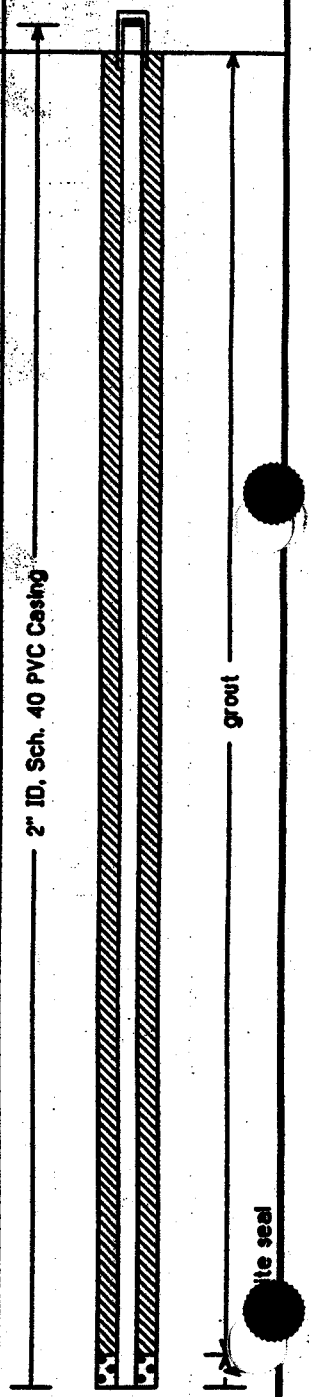
EnSafe/Allen & Hoshall

Monitoring Well 002G06DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 – Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.86 feet msl
Started at 0925 on 2-2-96	TOC Elevation: 269.69 feet msl
Completed at 1030 on 2-2-96	Depth to Groundwater: 16.52 feet Measured: 4/8/96
Drilling Method: Rotasonic – 4" core barrel inside 6" casing	Groundwater Elevation: 253.17 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 55.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 44.5 to 54.5 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							QL GP	(0-32') Upper Alluvium (see descriptions below).	
			1	75	8			(0-.5') Soil, gravel, and asphalt.	
5								(.5-15') Silt, mostly moderate yellowish-brown to light olive gray.	
							ML	(.5-6') Silt; moderate yellowish-brown mottled with light olive gray material. Some iron staining and rare iron-manganese nodules.	
10			2	53	5			(6-14') Percentage of light olive gray-colored material decreases down to 14'.	
								(14-15') Becoming mostly light olive gray to greenish-gray mottled with moderate yellowish-brown. Abundant iron staining and iron- manganese nodules just above 15'.	252.9
15							ML	(15-19') Silt, olive gray to dark greenish-gray. Wet from 16-19'.	248.9
20			3	50	5		ML	(19-25') Silt, dark greenish-gray mottled with brownish-gray material. Some snail shell fragments present.	
25								Some iron-manganese nodules at 24'. Wood at 25'.	242.9
							ML	(25-29') Silt, olive gray to greenish-gray in color. Rare snail shell fragments and wet from 28-29'.	238.9
30			4	78	4		SM ML	(29-32') Sand, very fine-grained, and silt; greenish-gray, rare snail shell fragments, wet. Becoming olive gray in color near 32'.	235.9
							SW SC	(32-54') Deeper Alluvium (see descriptions below).	
35								(32-36') Sand, fine to coarse-grained, with clay seams. Olive-gray in color with rare snail shell fragments, wet. Wood near 34'.	231.9
							SW	(36-39') Sand, fine to coarse-grained, olive gray, with scattered gravel and snail shell fragments, wet.	228.9
40							SW		

WELL DIAGRAM



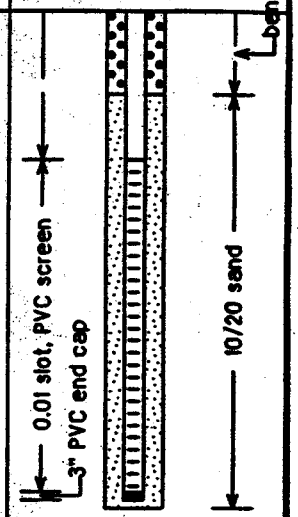
EnSafe/Allen & Hoshall

Monitoring Well 002G06DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#2 – Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *267.86 feet msl*
Started at *0925 on 2-2-96*	TOC Elevation: *269.69 feet msl*
Completed at *1030 on 2-2-96*	Depth to Groundwater: *18.52 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing*	Groundwater Elevation: *253.17 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *55.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *44.5 to 54.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			5	90	4		SW	(39–44') Sand, fine to coarse, olive gray with gravel up to 1" in longest dimension. Rare snail shell fragments, wet.	
								Clay seams (3" to 5" thick) at 40', 41', 42', and 43.5'.	223.9
							SW GW	(44–46.5') Sand, very coarse-grained, and gravel up to 2.5" in longest dimension. Moderate yellowish-brown mottled with light olive gray material, wet.	221.4
							ML	(46.5–48') Sandy silt; light olive gray to light gray in color. A 2" thick sand and gravel seam occurs at 47'. Wet.	219.9
50			6	106	4		SP GW	(48–51') Sand and gravel; sand is very coarse-grained and gravel is up to 3" in longest dimension. Moderate yellowish-brown mottled with light gray, wet.	218.9
							SW GW	Clay seams near 51'.	213.9
55							CL SP	(51–54.5') Sand is now medium to coarse-grained and gravel is up to 2.5" in longest dimension. Moderate yellowish brown, wet.	212.9
								(54–55') Cockfield Formation: Silty clay with very fine-grained sand. Dusky yellowish-brown to moderate yellowish-brown. Lignitic material at top.	
60								Terminated soil boring at 55'.	
65									
70									
75									
80									

WELL DIAGRAM



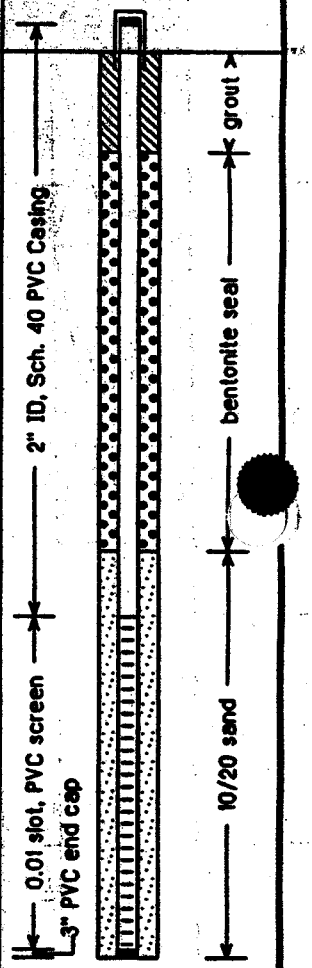
EnSafe/Allen & Hoshall

Monitoring Well 002G06UA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#2 – Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *267.82 feet msl*
Started at *1350 on 2-2-96*	TOC Elevation: *269.61 feet msl*
Completed at *1515 on 2-2-96*	Depth to Groundwater: *16.74 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing*	Groundwater Elevation: *252.87 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *27.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *17 to 27 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1				OL GP	(0–27') Upper Alluvium (see descriptions below).	
								(0–.5) Soil, gravel, and asphalt.	
5								(.5–15') Silt, mostly moderate yellowish-brown to light olive gray.	
							ML	(.5–6') Silt; moderate yellowish-brown mottled with light olive gray material. Some iron staining and rare iron-manganese nodules.	
10			2					(6–14') Percentage of light olive gray-colored material decreases down to 14'.	
								(14–15') Becoming mostly light olive gray to greenish-gray mottled with moderate yellowish-brown. Abundant iron staining and iron- manganese nodules just above 15'.	252.8
15			3				ML	(15–19') Silt, olive gray to dark greenish-gray. Wet from 16–19'.	
									248.8
20							ML	(19–25') Silt, dark greenish-gray mottled with brownish-gray material. Some snail shell fragments present.	
								Some iron/manganese nodules at 24'. Wood at 25'.	242.8
25							ML	(25–27') Silt, olive gray to greenish-gray in color.	240.8
								Rare snail shell fragments and wet below 26'.	
30								Soil boring terminated at 27'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 002G06DA.	
35									
40									

WELL DIAGRAM



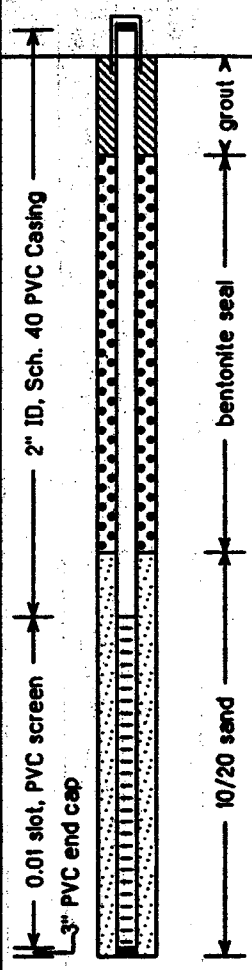
EnSafe/Allen & Hoshall

Monitoring Well 002G07UA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#2 – Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *266.10 feet msl*
Started at *1405 on 2-1-96*	TOC Elevation: *268.21 feet msl*
Completed at *1530 on 2-1-96*	Depth to Groundwater: *15.56 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing*	Groundwater Elevation: *252.65 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *27.0 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *17 to 27 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1				OL GP	(0–4') Soil, gravel, and asphalt.	262.1
5							ML	(4–15') Silt, moderate yellowish-brown mottled with light olive gray and olive gray. (4–10') Silt, moderate yellowish-brown mottled with light olive gray, with iron-manganese nodules. (10–15') Clayey silt, moderate yellowish-brown mottled with olive gray, becoming moist near 15'.	
10			2						
15			3					No recovery from 15' to 16'. No description available; collected a Shelby tube sample from 16' to 19'.	251.1
20							CL ML	(19–24') Clay and silt, olive gray to greenish-gray, wet.	247.1
25							SW ML	(24–27') Fluvial Deposits (see descriptions below).	242.1
							ML SP	(24–25') Sand, fine to medium-grained, and silt, olive gray to greenish-gray, with snail shell fragments, wet.	241.1
30								(25–27') Silt and sand, very fine-grained, olive-gray to greenish- gray, with snail shell fragments, moist.	239.1
35								Terminated soil boring at 27'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent soil boring 002S0030DA.	
40									

WELL DIAGRAM



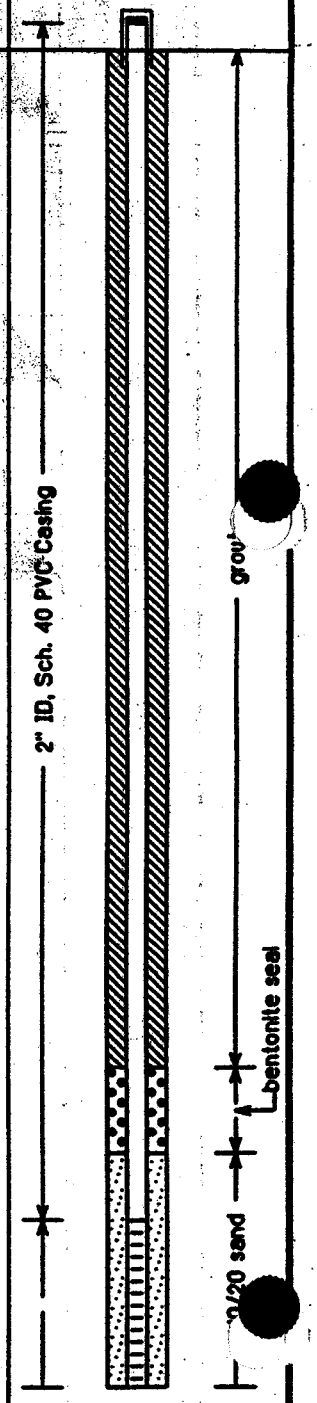
EnSafe/Allen & Hoshall

Monitoring Well 002G08DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.10 feet msl
Started at 0930 on 1-31-96	TOC Elevation: 269.33 feet msl
Completed at 1425 on 1-31-96	Depth to Groundwater: 17.54 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 251.79 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 515 feet
Geologist: D. Ladd, W. Parks	Well Screen: 35 to 45 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
					BG		OL GP	(0-22') Upper Alluvium (see descriptions below).	268.1
			1	100	BG		CL ML	(0-.5') Concrete.	
								(.5-1') Soil and gravel.	263.1
5					BG			(1-4') Silt and clay.	
					BG			(1-2') Clayey silt, light olive gray to greenish-gray and mottled with moderate yellowish-brown material.	
					BG			(2-4') Silty clay; dark greenish-gray.	
10			2	53	BG		ML	(4-18') Silt, clayey. (see descriptions below).	
					BG			(4-5') Clayey silt, light olive gray mottled with moderate yellowish- brown material.	
15					BG			(5-15') Moderate yellowish-brown mottled with olive gray material. Contains iron-manganese nodules from 5' to 18'.	
					BG			Becoming moist; more clay-rich with less olive gray-colored material from 14-18'.	249.1
					BG			(18-29') Silt and very fine-grained sand. Olive gray to greenish-gray in color. Contains snail shell fragments. Top of Deeper Alluvium deposits estimated at 22'.	
20			3	90	BG				
					BG		ML SP	Sand, jelly-like, lighter in color, wet at 22'.	
					BG			Wood fragments scattered throughout from 24' to 41'.	
25					BG				
			4	96	BG				
					BG				238.1
30					BG		SW ML	(29-33') Silt and sand; sand is fine to coarse-grained.	
			4	96				Olive gray to greenish-gray with snail shell fragments, wood scattered throughout, wet.	
					BG				234.1
35					BG		SW ML	(33-39') Sand, fine to very coarse-grained, and silt, olive gray to greenish-gray, with snail shell fragments, wood scattered throughout, wet.	
					BG				
					BG				228.1
40			5	100			SW ML		

WELL DIAGRAM



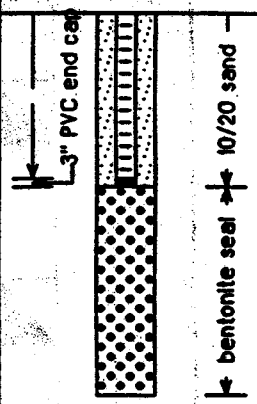
EnSafe/Allen & Hoshall

Monitoring Well 002G08DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.10 feet msl
Started at 0930 on 1-31-96	TOC Elevation: 269.33 feet msl
Completed at 1425 on 1-31-96	Depth to Groundwater: 17.54 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 251.79 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 51.5 feet
Geologist: D. Ladd, W. Parks	Well Screen: 35 to 45 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45					BG		SW, ML	(39-41') Sand, fine to coarse-grained, and silt, olive gray to greenish-gray, with shell shell fragments, with wood scattered throughout, wet.	228.1
					BG		SM		225.1
							SP, GW	(41-42') Sand, fine to coarse-grained, and silt with gravel up to 2.5" in longest dimension. Olive gray to greenish-gray, wet.	224.1
					BG		SP, GW		222.1
					BG			(42-43') Very coarse-grained sand and gravel up to 2"in longest dimension. Moderate yellowish-brown, wet.	
					BG		CL		
50			6	75	BG			(43-45') Gravel up to 2" in longest dimension, and sand, very coarse, very light gray mottled with moderate yellowish-brown, wet.	215.6
								(45-51.5') Cockfield Formation: Clay, dusky to dark yellowish-brown with light olive gray fine-grained sand laminations.	
55								Becoming very sandy near base of soil boring; sand is fine to medium-grained and light olive gray in color.	
								Terminated soil boring at 51.5'.	
60									
65									
70									
75									
80									

WELL DIAGRAM



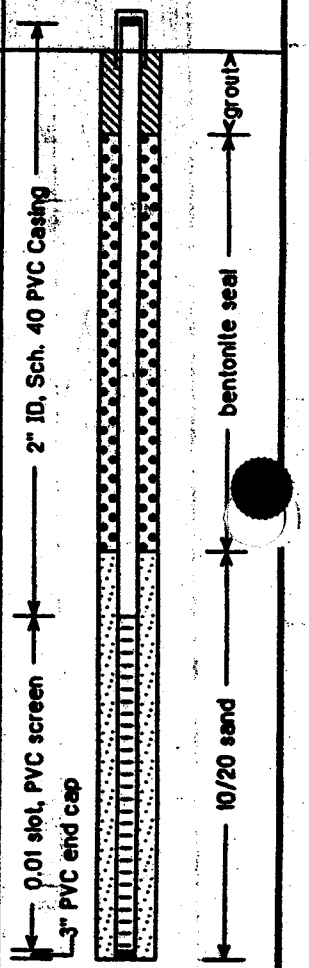
EnSafe/Allen & Hoshall

Monitoring Well 002G08UA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.05 feet msl
Started at 0800 on 2-1-96	TOC Elevation: 269.37 feet msl
Completed at 1010 on 2-1-96	Depth to Groundwater: 17.34 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 252.03 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 27 feet
Geologist: D. Ladd, W. Parks	Well Screen: 17 to 27 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							OL GP	(0-27') Upper Alluvium (see descriptions below).	266
			1				CL ML	(0-.5') Concrete.	
5								(.5-1') Soil and gravel.	263
								(1-4') Silt and clay.	
								(1-2') Clayey silt; light olive gray to greenish-gray and mottled with moderate yellowish-brown material.	
			2					(2-4') Silty clay; dark greenish-gray.	
10							ML	(4-18') Silt, clayey (see descriptions below).	
								(4-5') Clayey silt, light olive gray mottled with moderate yellowish- brown material.	
15			3					(5-15') Moderate yellowish-brown mottled with olive gray material, contains iron-manganese nodules.	
								Becoming moist; more clay-rich with less olive gray-colored material from 14-18'.	249
20							ML SP	(18-27') Silt and very fine-grained sand. Olive gray to greenish-gray in color. Contains snail shell fragments. Top of Fluvial Deposits estimated at 22'.	
								Sand, jelly-like, lighter in color, wet at 27'.	
25								Wood fragments scattered throughout from 24' to 27'.	
								Terminated soil boring at 27'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 002G08DA.	240
30									
35									
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 002G09DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No: 106-08420	Surface Elevation: 265.51 feet msl
Started at 0830 on 1-30-96	TOC Elevation: 267.86 feet msl
Completed at 0945 on 1-30-96	Depth to Groundwater: 17.15 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 250.81 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 55.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 36 to 46 feet

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	1	75	8	GW	(0-26') Upper Alluvium (see descriptions below).	
			6		(0-3.5') Soil and gravel (fill).	
						262
5			5	ML	(3.5-8') Clayey silt; moderate yellowish-brown mottled with light olive gray material containing iron-manganese nodules.	
			6			
						257.5
			5		(8-19') Silt, very clayey, moderate yellowish-brown to dark yellowish- brown mottled with medium gray material.	
10	2	98	6		Abundant iron-manganese nodules from 9' to 11'.	
			6	ML	Moist with some iron-manganese nodules from 13' to 15'.	
15			4		Less iron-manganese nodules, becoming more dark yellowish-orange from 15-19'.	
			5			
			2			246.5
20	3	90	5	ML	(19-23') Silt, clayey (see descriptions below).	
					(19-22') Silt, clayey, olive gray to greenish-gray, containing snail shell fragments.	
			6		(22-23') Same as above, but olive gray in color.	
						242.5
25			6	SM SW	(23-27.5') Sand, fine to medium, silty, olive gray in color, with snail shell fragments, moist to wet, wet below 25'. Top of Deeper Alluvium deposits estimated at 26'.	
	4	100	5		(27.5-28') Sand, fine to very coarse-grained, olive gray, with snail shell fragments, wet.	237.5
			5	ML	(28-31') Silt; olive gray in color with snail shell fragments. Wet. Vegetation near 29'.	
30						

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

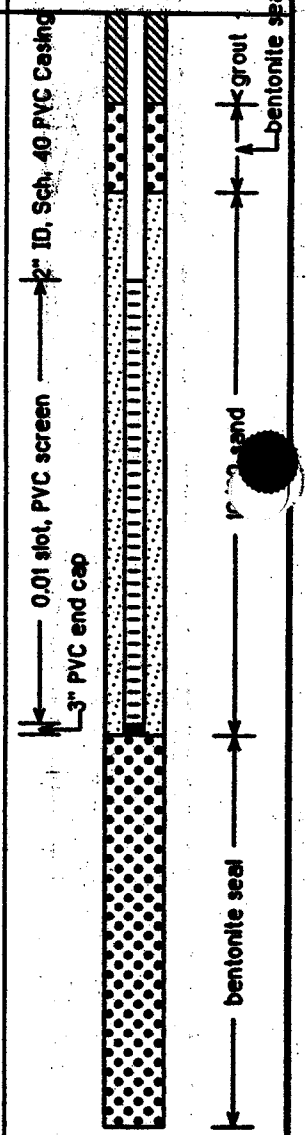
EnSafe/Allen & Hoshall

Monitoring Well 002G09DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 – Southside Landfill
Project No.: 106-08420	Surface Elevation: 265.51 feet msl
Started at 0830 on 1-30-96	TOC Elevation: 267.96 feet msl
Completed at 0945 on 1-30-96	Depth to Groundwater: 17.15 feet Measured: 4/8/96
Drilling Method: Rotasonic – 4" core barrel inside 6" casing	Groundwater Elevation: 250.81 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 55.0 feet
Geologist: D. Ladd, W. Parks	Well Screen: 36 to 46 feet

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			3	ML		234.5
	4	100	8	SM	(31–34') Silty sand, very fine-grained becoming progressively coarser near 34', olive gray to light olive gray near 34', with snail shell fragments, wet.	231.5
35			6	SW	(34–34.5') Coarse to very coarse-grained sand with gravel. Light olive gray to greenish-gray, containing snail shell fragments, wet.	231
			6	SW		230.5
			6	SM	(34.5–35') Sand, very fine to medium-grained, light olive gray to greenish-gray, wet.	
			7	SP GW	(35–38') Silty sand, very fine to very coarse-grained, with quartz and chert gravel up to 1" in longest dimension, olive gray, wet.	227.5
40	5	390	5		(38–43') Sand and gravel; sand is fine to very coarse-grained, gravel is up to 1"in longest dimension; moderate yellowish-brown mottled with light gray material, wet.	
			6	SP	(43–44') Coarse-grained sand, moderate yellowish-brown mottled with medium light gray material, wet.	222.5
45			6	SW GW	(44–46') Sand and gravel, gravel and sand (see descriptions below).	221.5
			5	CL	(44–45') Sand and gravel; sand is very coarse-grained and gravel is up to 1.5" in longest dimension; moderate yellowish-brown mottled with medium light gray material, wet.	219.5
			5			
50	6	102	6		(45–46') Gravel up to 1.5" in longest dimension, and sand, dark yellowish-brown to moderate yellowish-brown; becoming clayey near 46'.	
			5		(46–55') Cockfield Formation: Clay, dusky yellowish-brown to dark yellowish-brown.	
			5		With light olive gray sandy seams below 52'.	
55					With some lignite seams below 53'.	210.5
					Terminated soil boring at 55'.	
60						

WELL DIAGRAM



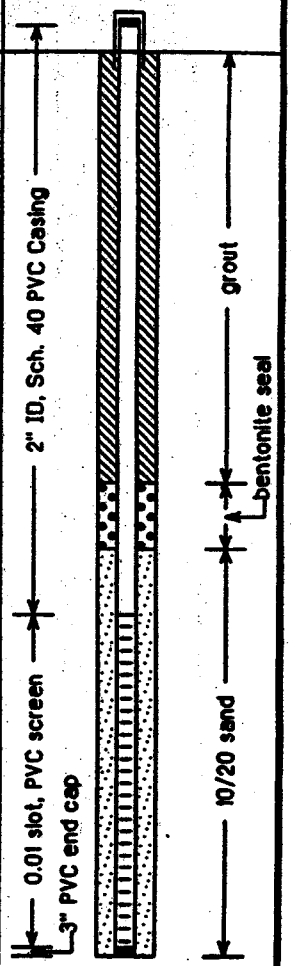
EnSafe/Allen & Hoshall

Monitoring Well 002G09UA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#2 – Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *265.68 feet msl*
Started at *1320 on 1-30-96*	TOC Elevation: *268.09 feet msl*
Completed at *1500 on 1-30-96*	Depth to Groundwater: *16.19 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing*	Groundwater Elevation: *251.90 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *27 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *17 to 27 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1				OL GW	(0-26') Upper Alluvium (see descriptions below). (0-3.5') Soil and gravel (fill).	
									262.2
5							ML	(3.5-8') Clayey silt; moderate yellowish-brown mottled with light olive gray material containing iron-manganese nodules.	
									257.7
			2				ML	(8-19') Silt, very clayey, moderate yellowish-brown to dark yellowish- brown mottled with medium gray material. Abundant iron-manganese nodules from 9' to 11'. Moist with some iron-manganese nodules from 13' to 15'. Less iron-manganese nodules, becoming more dark yellowish-orange from 15-19'.	
10									
15			3						
									248.7
20							ML	(19-23') Silt, clayey, olive gray to greenish-gray, becoming just olive gray from 22' to 23', containing snail shell fragments.	
									242.7
25							SM	(23-27') Silty sand; fine to medium-grained, olive gray in color, with snail shell fragments, moist to wet. Top of Deeper Alluvium deposits estimated at 26'. Wet below 25'.	238.7
30								Terminated soil boring at 27'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 002G09DA.	
35									
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 002G10DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 – Southside Landfill
Project No.: 106-08420	Surface Elevation: 270.36 feet msl
Started at 1220 on 2-12-96	TOC Elevation: 270.17 feet msl
Completed at 1400 on 2-12-96	Depth to Groundwater: 9.36 feet Measured: 4/8/96
Drilling Method: Rotasonic – 4" core barrel inside 6" casing	Groundwater Elevation: 260.81 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 56.0 feet
Geologist: J. Kingsbury	Well Screen: 40 to 50 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					4			(0–36') Upper Alluvium (see descriptions below).	
			1	67	4			Silt and clay (fill material) from 0' to 6', moderate brown to moderate gray in color.	
5					2				
					3			Moderate gray to light yellowish-brown, slightly moist.	264.4
					3				
10			2	35	3		ML CL		
					3			Mottling with dark yellowish-orange material with some organic material from 13' to 16'.	
15					3				
					4			Silt, moderate brown to light gray with dark orangish-yellow mottling from 16' to 25'. Organic material present. Moist.	254.4
					3				
20			3	90	3			Wet at 20'.	
					3				
25					3			Color change at 25' to light greenish-gray to olive gray. Shell fragments present. Wet.	
					2		ML	Silt with minor clay and sand. Moderate greenish-gray with common snail shells. Wet.	
			4	100	2				
30					2				
			4	100	2				
					2				
35					3				
					2				234.4
					2		SW SM	(36–50') Deeper Alluvium (see descriptions below).	
40					2				

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

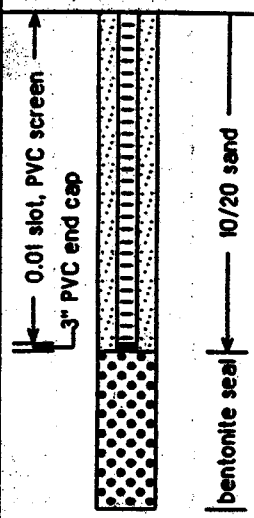
EnSafe/Allen & Hoshall

Monitoring Well 002G10DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#2 – Southside Landfill*
Project No: *106-08420*	Surface Elevation: *270.36 feet msl*
Started at *1220 on 2-12-96*	TOC Elevation: *270.17 feet msl*
Completed at *1400 on 2-12-96*	Depth to Groundwater: *9.36 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing*	Groundwater Elevation: *260.81 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *56.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			5	85	2		SW SM	(36–45') Sand with gravel. Silt seams from 38–42', with thicknesses ranging from 6 to 12 inches. Sand is brownish-gray to light yellowish-brown.	
					2				
					2		GC GM	Gravel in a silt and clay matrix with minor sand. Very hard, dry to moist.	225.4
					3		SW GW	Sand and gravel, light yellowish-brown to light yellowish gray.	224.4
50					2			Color change to dark orangish-yellow.	220.4
			6	120	2		CL ML	Cockfield Formation: Dark brownish-gray clay with interbeds of silt and fine sand. Fine to medium-grained sand lense at 55'.	
					2				
55					2				
								Terminated soil boring at 56'. Note: PID response likely due to moisture in samples.	214.4
60									
65									
70									
75									
80									

WELL DIAGRAM



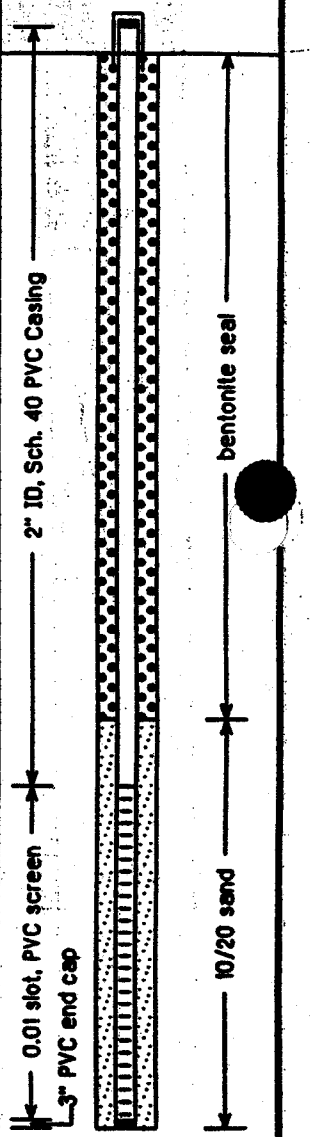
EnSafe/Allen & Hoshall

Monitoring Well 002G10UA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 – Southside Landfill
Project No.: 106-08420	Surface Elevation: 270.36 feet msl
Started at 1400 on 2-13-96	TOC Elevation: 270.19 feet msl
Completed at 1445 on 2-13-96	Depth to Groundwater: 8.79 feet Measured: 4/8/96
Drilling Method: Rotasonic – 4" core barrel inside 6" casing	Groundwater Elevation: 261.40 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 32.0 feet
Geologist: J. Kingsbury	Well Screen: 22 to 32 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1					(0-32') Upper Alluvium (see descriptions below). Silt and clay (fill material) from 0' to 6', moderate brown to moderate gray color.	
5									
								Moderate gray to light yellowish-brown, slightly moist.	264.4
10							ML CL		
			2					Mottling with dark yellowish-orange material with some organic material from 13' to 16'.	
15									254.4
								Silt, moderate brown to light gray with dark orangish-yellow mottling from 16' to 25'. Organic material present. Moist. Becomes wet at 20'.	
20			3						
25							ML	Color change at 25' to light greenish-gray and olive gray. Shell fragments present. Wet. Silt with minor clay and sand. Moderate greenish-gray with common snail shells. Wet.	
30									238.4
35								Terminated soil boring at 32'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 002G10DA.	
40									

WELL DIAGRAM



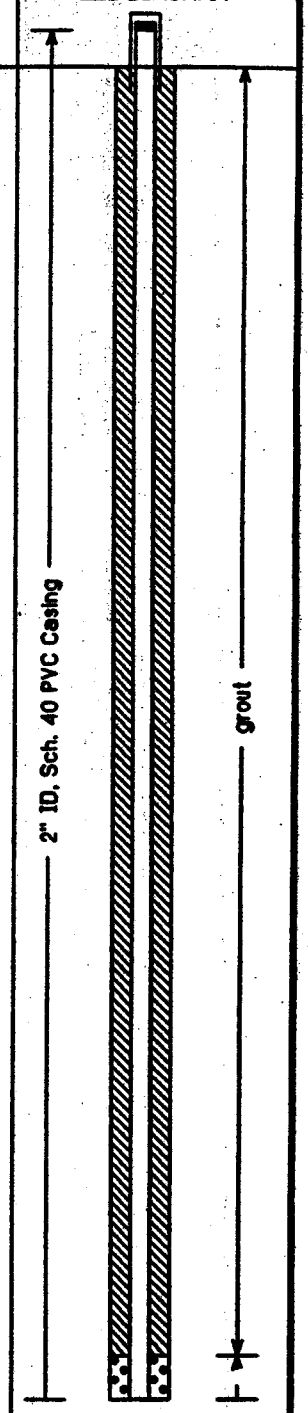
EnSafe/Allen & Hoshall

Monitoring Well 002G11DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 – Southside Landfill
Project No.: 106-08420	Surface Elevation: 265.17 feet msl
Started at 1010 on 1-16-96	TOC Elevation: 266.77 feet msl
Completed at 0915 on 1-17-96	Depth to Groundwater: 4.17 feet Measured: 4/8/96
Drilling Method: 4 1/4" ID Hollow-Stem Auger, 5' Flights	Groundwater Elevation: 262.60 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 46.0 feet
Geologist: J. Carmichael, W. Parks, D. Ladd	Well Screen: 32.2 to 42.2 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			1	42	BG			(0-33') Upper Alluvium (see descriptions below).	264.2
								(0-1') Fill and skeet fragments.	
			2	71	BG			(1-24') Silt, clayey (see descriptions below).	
5			3	73	BG			(1-2') Clayey silt, yellowish-brown to brownish-gray in color.	
			4	83	BG			(2-6') Silt, clayey, dark yellowish-brown with dark yellowish-orange staining. Trace of organic material.	
			5	96	BG			Finely laminated and contains small iron-manganese nodules from 4-6'.	
10			6	100	BG			(6-8') Silt, decreasing clay content and increasing iron-manganese nodule content. Yellowish-brown to light olive gray, moist.	
			7	100	BG		ML	(8-18') Silt, slightly clayey yellowish-gray to light olive gray color, moist.	
15			8	100	BG			Increase in dark yellowish-orange staining, moisture content, and iron-manganese content from 10-14'.	
			9	100	BG			Stained dark yellowish-orange in color from 14-16'. Very moist from 14-15'.	
			10	92	BG			Less staining from 16-18'. Very moist from 16' to 17' (water came up the borehole when auger was advanced).	
20			11	83	BG			(18-19') Silt, slightly clayey, medium gray in color. Moist.	
			12	100	BG			(19-20') Silt, slightly clayey, yellowish-gray to light olive gray, moist.	
			13	100	BG			(20-22') Silt, slightly clayey, medium light gray to light gray, stained moderate brown, moist.	
25								(22-24') Silt, clayey, pale yellowish-brown to pale brown color, moist.	241.2
			14	100	BG		ML	(24-28') Silt (see descriptions below).	
								(24-26') Silt; medium gray to brownish-gray with patches of dark yellowish-orange material. Moist.	
			15	100	BG		ML	(26-28') Silt; light olive gray to medium gray. Slightly moist.	237.2
30								(28-33') Silt, sandy (see descriptions below).	

WELL DIAGRAM



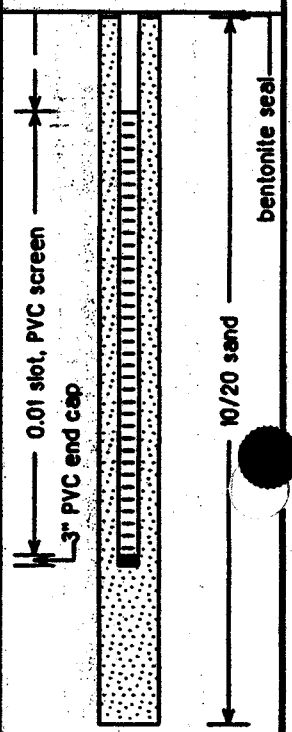
EnSafe/Allen & Hoshall

Monitoring Well 002G11DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 265.17 feet msl
Started at 1010 on 1-16-96	TOC Elevation: 266.77 feet msl
Completed at 0915 on 1-17-96	Depth to Groundwater: 4.17 feet Measured: 4/8/96
Drilling Method: 4 1/4" ID Hollow-Stem Auger, 5' Flights	Groundwater Elevation: 262.60 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 46.0 feet
Geologist: J. Carmichael, W. Parks, D. Ladd	Well Screen: 32.2 to 42.2 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			16	100	BG		ML	(28-30') Sandy silt; light olive gray to medium gray in color, slightly moist.	
			17	100	BG			(30-32') Silt, sandy, light olive gray, slightly moist, contains pockets of small red carbonaceous material.	232.2
35			18	71	BG			(32-33') Silt, sandy, medium light gray to medium gray, moist.	
			19	92	BG		SW GW	(33-43') Deeper Alluvium (see descriptions below).	
			20	58	BG			(33-34') Sand, fine to coarse-grained, light olive gray color, wet.	
40			21	88	BG			(34-36.25') Sand, fine to coarse-grained, with clay, silt, and gravel up to .5" in longest dimension. Light brownish-gray to pale red, moist. Coantains silt and clay from 34-35'.	
			22	92	BG			(36.25-38') Clayey sand with gravel up to 1" in longest dimension, olive gray to medium gray, moist.	222.2
45			23	83	BG		CL	(38-40') Sand and gravel, light olive gray to pale brown. Gravel content increases with depth.	
								(40-42') Sand and gravel, olive gray to brownish-gray stained dark yellowish-orange, wet.	219.2
								(42-43') Sand and gravel, light olive gray, wet.	
50								(43-46') Cockfield Formation: Clay, brownish-gray to dusky brown, finely micaceous, with fine-grained sand laminae from 44' to 46'.	
								Terminated soil boring at 46'.	
55									
60									

WELL DIAGRAM



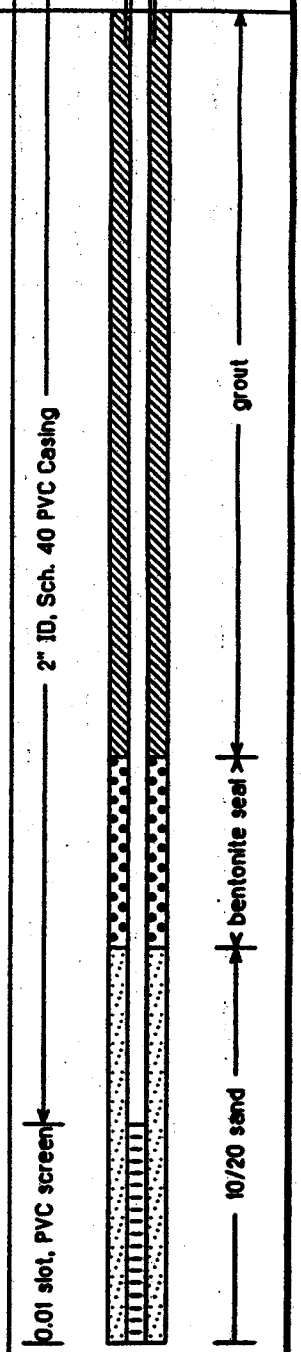
EnSafe/Allen & Hoshall

Monitoring Well 002G11UA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 – Southside Landfill
Project No.: 106-08420	Surface Elevation: 265.12 feet msl
Started at 1500 on 1-17-96	TOC Elevation: 266.91 feet msl
Completed at 1300 on 1-18-96	Depth to Groundwater: 3.92 feet Measured: 4/8/96
Drilling Method: 4 1/4" ID Hollow-Stem Auger with 5' Flights	Groundwater Elevation: 262.99 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 26.75 feet
Geologist: J. Carmichael, W. Parks, D. Ladd	Well Screen: 16.75 to 26.75 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1					(0-27') Upper Alluvium (see descriptions below).	264.1
								(0-1') Fill and skeet fragments.	
								(1-24') Silt, clayey (see descriptions below).	
								(1-2') Clayey silt; yellowish-brown to brownish-gray in color.	
								(2-6') Silt, clayey, dark yellowish-brown with dark yellowish-orange staining. Trace of organic material.	
5								Finely laminated and contains small iron-manganese nodules from 4-6'.	
								(6-8') Silt, decreasing clay content and increasing iron-manganese nodule content. Yellowish-brown to light olive gray color, moist.	
			2					(8-18') Silt, slightly clayey, yellowish-gray to light olive gray color, moist.	
10							ML	Increase in dark yellowish-orange staining, moisture content, and iron-manganese content from 10-14'.	
								Stained dark yellowish-orange in color from 14-16'. Very moist from 14-15'.	
15			3					Less staining from 16-18'. Very moist from 16-17' (water came up the borehole when auger was advanced).	
								(18-19') Silt, slightly clayey, medium gray in color. Moist.	
20								(19-20') Silt, slightly clayey, yellowish-gray to light olive gray, moist.	

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 002G11UA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 265.12 feet msl
Started at 1500 on 1-17-96	TOC Elevation: 268.91 feet msl
Completed at 1300 on 1-18-96	Depth to Groundwater: 3.92 feet Measured: 4/8/96
Drilling Method: 4 1/4" ID Hollow-Stem Auger with 5' Flights	Groundwater Elevation: 262.99 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 26.75 feet
Geologist: J. Carmichael, W. Parks, D. Ladd	Well Screen: 16.75 to 26.75 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
25							ML	(20-22') Silt, slightly clayey, medium light gray to light gray, stained moderate brown. Moist. (22-24') Clayey silt, pale yellowish-brown to pale brown in color. Moist.	241	0.01 slot, PVC screen 3" PVC end cap 10/20 sand
							ML	(24-27') Silt (see descriptions below). (24-26') Silt; medium gray to brownish-gray with patches of dark yellowish-orange material. Moist. (26-27') Silt, light olive gray to medium gray, slightly moist.	238	
30								Soil boring terminated at 27'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 002G11DA.		
35										
40										

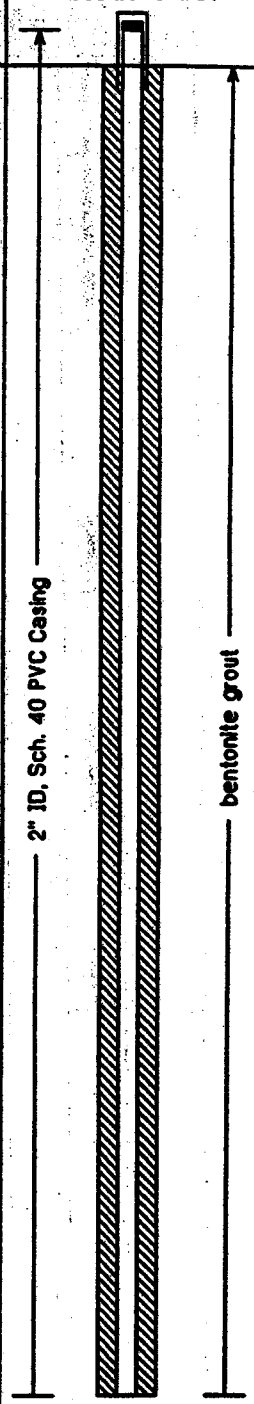
EnSafe/Allen & Hoshall

Monitoring Well 002G12DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#2 – Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *268.56 feet msl*
Started at *1300 on 1-29-96*	TOC Elevation: *268.63 feet msl*
Completed at *1400 on 1-30-96*	Depth to Groundwater: *6.02 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *262.61 feet msl*
Drilling Company: *Alliance Drilling*	Total Depth: *50.0 feet*
Geologist: *J. Kingsbury, R. Thomas*	Well Screen: *38.5 to 48.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								(0-35') Upper Alluvium (see descriptions below).	
								Silt and clay; light brown to dark yellowish-brown color from 0'-2'.	
								Light brown to yellowish-brown color. Many small iron-manganese nodules. Staining with orange rust-colored material. Dry.	
5								Grayish-brown to light brown color, stained dark orange to rust- colored. Iron-manganese nodules common. Dry.	
								Dry to slightly moist.	
10								Fewer iron-manganese nodules, very slightly moist.	
								Increase in percentage of iron-manganese nodules; increase in moisture content from 11.5' to 12.0'.	
							ML CL	Yellowish-brown to light olive gray color. Decreased staining and percentage of iron-manganese nodules. Moist.	
15								Medium yellowish-brown to light olive gray, moist.	
								Silt and clay, moist. Increased staining.	
								Light olive gray.	
20								Color change to medium gray at 18.5'. Some staining with black material (iron/manganese or organics).	
								Decreased moisture content.	
25								Clay and silt; greenish-gray, dry.	
									238.6
30			1	75	BG		ML	Clayey silt, light olive gray to medium gray color. Some orangish- brown staining. Mostly dry.	

WELL DIAGRAM



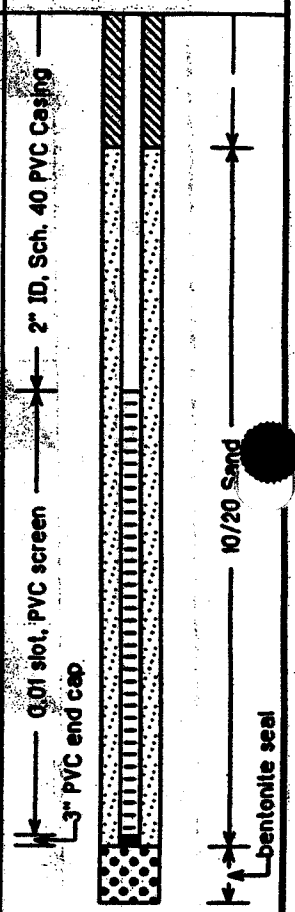
EnSafe/Allen & Hoshall

Monitoring Well 002G12DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#2 – Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *266.58 feet msl*
Started at *1300 on 1-29-96*	TOC Elevation: *268.63 feet msl*
Completed at *1400 on 1-30-96*	Depth to Groundwater: *6.02 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *262.61 feet msl*
Drilling Company: *Alliance Drilling*	Total Depth: *50.0 feet*
Geologist: *J. Kingsbury, R. Thomas*	Well Screen: *38.5 to 48.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			2	75	BG		ML	Contains streaks of fine to medium-grained sand approximately 1 to 2 inches thick, light olive-gray to medium gray.	
			3	83	BG				
35			4	100	BG		SC SM SW	Silt, sand, and clay, light olive gray. (35-51') Deeper Alluvium (see descriptions below). (35-36') Sand; fine to coarse-grained, yellowish-gray to yellowish- brown color. Start five-foot split-spoon intervals.	232.6 231.6 230.6
40			5	67	BG		SW GW	Sand and gravel; gravel up to 1" in diameter. Yellowish-gray to yellowish-brown in color.	226.6 224.6
45			6	83	BG		SW GW	Sand and gravel, yellowish-brown to yellowish-gray.	221.6 219.6
50			7	75	BG		SW SC SM	Sand with rare gravel, light olive gray, matrix resembles reworked Cockfield Formation from 50' to 51'. Cockfield Formation contact is at 51'. Sand, fine to medium-grained, finely lignitic and micaceous, is present from 51' to 51.5'. Sand with silt and clay. Terminated soil boring at 51.5'. Note: Sample lithology and PID readings from 0' to 28' obtained during the advancement of 002G12UA. Lithology and PID readings from 28' to 51.5' obtained during the advancement of 002G12DA.	216.6 215.9
55									
60									

WELL DIAGRAM



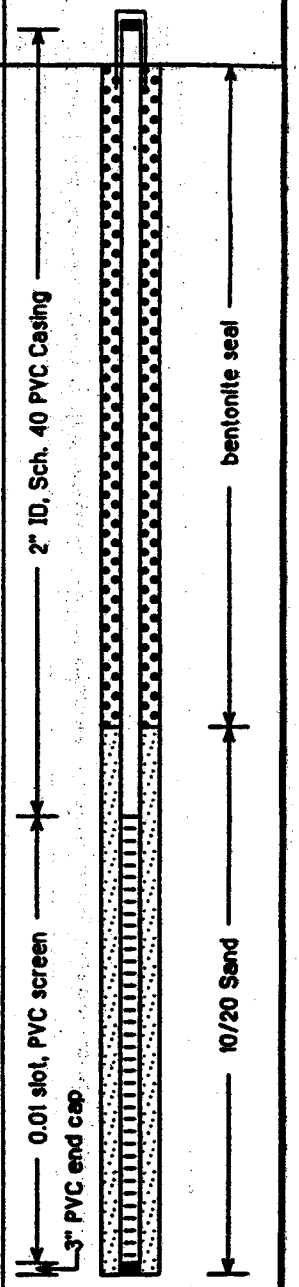
EnSafe/Allen & Hoshall

Monitoring Well 002G12UA

Project: NSA Memphis	Location: Millington, TN. SWMU #2 - Southside Landfill
Project No: 106-08420	Surface Elevation: 266.64 feet msl
Started at 1030 on 1-23-96	TOC Elevation: 268.63 feet msl
Completed at 1200 on 1-29-96	Depth to Groundwater: 12.87 feet Measured: 4/8/96
Drilling Method: 4 1/4" ID Hollow-Stem Auger with 5' Flights	Groundwater Elevation: 255.76 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 28.0 feet
Geologist: J. Kingsbury	Well Screen: 17 to 27 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			1	58	4			(0-28') Upper Alluvium (see descriptions below). Silt and clay; light brown to dark yellowish-brown color from 0'-2'.	
			2	75	6			Light brown to yellowish-brown color. Many small iron-manganese nodules. Staining with orange rust-colored material. Dry.	
5			3	50	5			Grayish-brown to light brown color, stained dark orange to rust- colored. Iron-manganese nodules common. Dry.	
			4	75	4			Slightly moist.	
			5	100	3			Fewer iron-manganese nodules, very slightly moist.	
10			6	92	3			Increase in percentage of iron-manganese nodules; increase in moisture content from 11.5' to 12'.	
			7	92	3		ML CL	Yellowish-brown to light olive gray color. Decreased staining and percentage of iron-manganese nodules. Moist.	
15			8	96	3			Medium yellowish-brown to light olive gray, moist.	
			9	92	3			Silt and clay, moist. Increased staining.	
								Light olive gray.	
20			10	100	4			Color change to medium gray at 18.5'. Some staining with black material (iron/manganese or organics).	
			11	100	4				
			12	100	3			Decreased moisture content.	
25			13	100	4			Clay and silt; greenish-gray, dry.	
			14	100	4				
30								Terminated soil boring at 28'. Note: PID response likely due to moisture content of soil.	238.6

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 002G13DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.05 feet msl
Started at 1110 on 1-19-96	TOC Elevation: 269.12 feet msl
Completed at 1130 on 1-20-96	Depth to Groundwater: 5.36 feet Measured: 4/8/96
Drilling Method: 4 1/4" ID Hollow-Stem Auger, 5' Flights	Groundwater Elevation: 263.76 feet msl
Drilling Company: Alliance Drilling	Total Depth: 67.0 feet
Geologist: D. Ladd, J. Kingsbury, A. Choate	Well Screen: 55 to 65 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			1	46	BG		OL	(0-34') Upper Alluvium (see descriptions below).	
			2	83	BG		CL ML	Clay and silt, dark yellowish-brown, moist, with organic material and roots.	265
5			3	88	3			Silty clay/clayey silt, greenish-gray and moderate yellowish-brown, slightly moist, soft to slightly firm, with some dark iron staining.	263
			4	79	2.5			Clayey silt, greenish-gray and moderate yellowish-brown, with iron/ manganese inclusions and organic material, slightly moist.	
			5	100	2			Iron-manganese nodules increasing in percentage and size (up to .5" in diameter).	
10			6	108	BG		ML	Some staining with a dark yellowish-orange material.	
			7	108	BG			Increase in clay percentage.	
			8	108	BG			Clayey silt, light olive gray color stained light brown to dark yellowish-orange. Moisture content increasing as iron/manganese nodules decrease in percentage.	
15			9	108	BG			Very moist at 14' becoming less moist near 16', rare iron/manganese nodules.	
			10	100	BG			Clayey silt, medium gray to light olive gray stained light brown to dark yellowish-orange, very moist.	248
20			11	92	BG			Silty clay, medium light to medium gray, wet.	
			12	100	BG		CL	Dark greenish-gray to grayish-olive green color, wet.	
25			13	96	BG			Very moist.	
			14	96	BG			Light olive gray to grayish-olive green color. Very moist and soft.	
30			15	96	BG		ML	Clayey silt, light olive gray to grayish-olive green color, slightly moist, soft.	239

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

bentonite grout

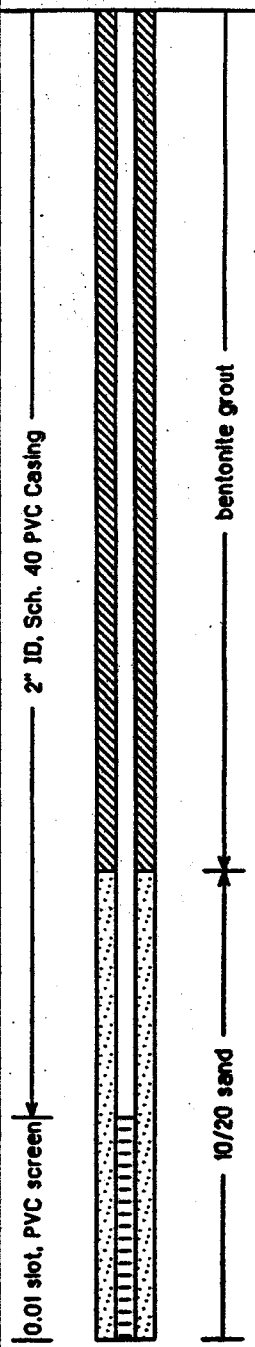
EnSafe/Allen & Hoshall

Monitoring Well 002G13DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.05 feet msl
Started at 1110 on 1-19-96	TOC Elevation: 269.12 feet msl
Completed at 1130 on 1-20-96	Depth to Groundwater: 5.36 feet Measured: 4/8/96
Drilling Method: 4 1/4" ID Hollow-Stem Auger, 5' Flights	Groundwater Elevation: 263.76 feet msl
Drilling Company: Alliance Drilling	Total Depth: 67.0 feet
Geologist: D. Ladd, J. Kingsbury, A. Choate	Well Screen: 55 to 65 feet

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	16	33	BG		Sandy silt with rare coarse subangular sand grains. Wet.	
					Olive gray color, wet, soft.	
	17	83	BG	ML	Sandy silt with fine to coarse sand between 34' and 35' fining downward to fine-grained sand between 35' and 36', soft. Top of Deeper Alluvium deposits estimated at 34'.	
35	18	79	BG			
						230.9
	19	100	BG	SW GW	Sand and gravel, gravel up to 1" in longest dimension, light olive gray.	229.5
					Silty sand, light olive gray.	
	20	100	BG	SW	Silty sand with some gravel, light olive gray to light gray.	227
40					No sample collected from 40' to 46' due to heaving sand.	
45						221
	21	96	BG	SW GW	Sand and gravel, light olive gray. Wet. Considerable iron-staining at 47.5'.	
					No sample collected from 48' to 51'.	219
50						216
	22	100	BG	SW GW	Sand and gravel, dark yellowish-orange changing to yellowish-gray color near 53'.	
					No sample collected from 53' to 56'.	214
55						211
	23	100	BG	SW GW	Sand and gravel, yellowish-gray to pale yellowish-brown. Gravel up to 1" in longest dimension. Locally stained dark yellowish-orange, wet.	209
					No sample collected from 58' to 61'.	
60						

WELL DIAGRAM



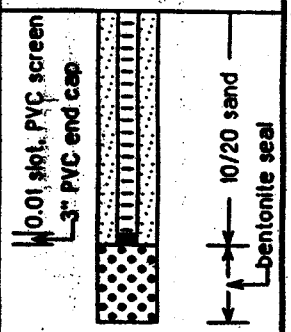
EnSafe/Allen & Hoshall

Monitoring Well 002G13DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.05 feet msl
Started at 1110 on 1-19-96	TOC Elevation: 269.12 feet msl
Completed at 1130 on 1-20-96	Depth to Groundwater: 5.36 feet Measured: 4/8/96
Drilling Method: 4 1/4" ID Hollow-Stem Auger, 5' Flights	Groundwater Elevation: 263.76 feet msl
Drilling Company: Alliance Drilling	Total Depth: 67.0 feet
Geologist: D. Ladd, J. Kingsbury, A. Choate	Well Screen: 55 to 65 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			24	141	BG		SW GW	Sand and gravel, moderate yellowish-brown to dark yellowish-brown color.	206
								Color change to dusky yellow brown. Wet.	204.6
								No sample collected from 62.5' to 65'.	
65			25	100	BG		SW GW SP	Fine to coarse-grained sand and gravel, olive-gray to light olive gray. Fining downward and turning dark yellowish-orange to light brown in color near 65.5'.	202.1' 201.1
								Cockfield Formation: Sand, fine-grained, dark yellowish-orange to light brown, wet. Terminated soil boring at 67'.	200.1
70									
75									
80									
85									
90									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 002G13MA

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#2 – Southside Landfill*
Project No.: *106-08420*	Surface Elevation: *267.23 feet msl*
Started at *1300 on 1-21-96*	TOC Elevation: *269.20 feet msl*
Completed at *1145 on 1-22-96*	Depth to Groundwater: *5.38 feet* Measured: *4/8/96*
Drilling Method: *4 1/4" ID Hollow-Stem Auger With 5' Flights*	Groundwater Elevation: *263.82 feet msl*
Drilling Company: *Alliance Drilling*	Total Depth: *46.0 feet*
Geologist: *D. Ladd, J. Kingsbury, A. Choate*	Well Screen: *36 to 46 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1		BG		OL	(0-34') Upper Alluvium (see descriptions below).	
							ML CL	Clay and silt, dark yellowish-brown, moist, with organic material and roots.	265.2
								Silty clay/clayey silt, greenish-gray and moderate yellowish-brown, slightly moist, soft to slightly firm, with some dark iron staining.	263.2
5								Clayey silt, greenish-gray and moderate yellowish-brown, with iron/manganese inclusions and organic material, slightly moist.	
			2		BG			Iron-manganese nodules increasing in percentage and size (up to .5" in diameter).	
10							ML	Some staining with a dark yellowish-orange material.	
								Increase in clay percentage.	
								Clayey silt, light olive gray color stained light brown to dark yellowish-orange. Moisture content increases and the percentage of iron/manganese nodules decreases.	
15			3		BG			Very moist at 14' becoming less moist near 16', rare iron/manganese nodules.	
								Clayey silt, medium gray to light olive gray stained light brown to dark yellowish-orange, very moist.	
									248.2
20								Silty clay, medium light to medium gray, wet.	
								Dark greenish-gray to grayish-olive green color, wet.	
								Very moist.	
							CL		
25								Light olive gray to grayish-olive green color. Very moist and soft.	
									239.2
30							ML	Clayey silt, light olive gray to grayish-olive green color, slightly moist, soft.	

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

bentonite grout

EnSafe/Allen & Hoshall

Monitoring Well 002G13MA

Project: NAS Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.23 feet msl
Started at 1300 on 1-21-96	TOC Elevation: 269.20 feet msl
Completed at 1145 on 1-22-96	Depth to Groundwater: 5.38 feet Measured: 4/8/96
Drilling Method: 4 1/4" ID Hollow-Stem Auger With 5' Flights	Groundwater Elevation: 263.82 feet msl
Drilling Company: Alliance Drilling	Total Depth: 46.0 feet
Geologist: D. Ladd, J. Kingsbury, A. Choate	Well Screen: 36 to 46 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
35							ML	Sandy silt with rare coarse subangular sand grains. Wet. Olive gray color, wet, soft. Sandy silt with fine to coarse-grained sand between 34' and 35' fining downward to fine-grained sand between 35' and 36', soft. Top of Deeper Alluvium deposits estimated at 34'.	231	2" ID, Sch. 40 PVC Casing
							SW GW	Sand and gravel, gravel up to 1" in diameter, light olive gray.	229.7	
40							SW SM	Silty sand, light olive gray Silty sand with some gravel, light olive gray to light gray. No sample collected from 40' to 46' due to heaving sand.	227.2	0.01 slot, PVC screen 3" PVC end cap 10/20 sand
45								Terminated soil boring at 46'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log for monitoring well 002G13DA.	221.2	
50										
55										
60										

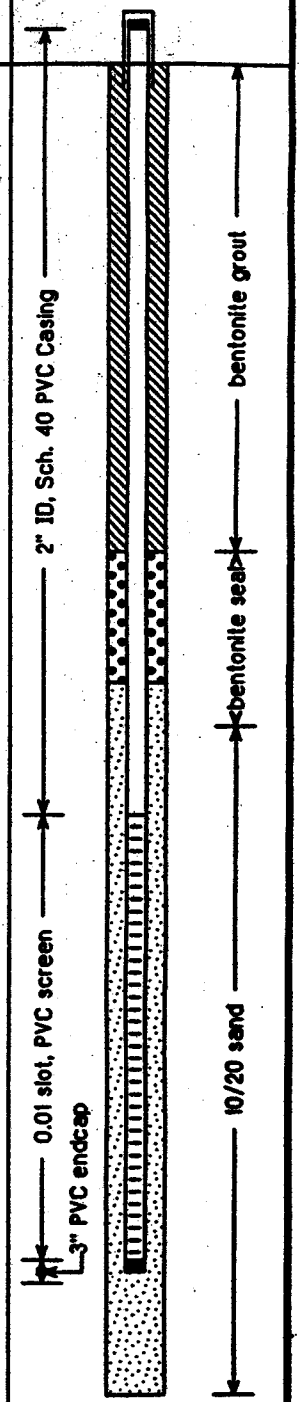
EnSafe/Allen & Hoshall

Monitoring Well 002G13UA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 267.13 feet msl
Started at 1400 on 1-22-96	TOC Elevation: 268.96 feet msl
Completed at 0845 on 1-23-96	Depth to Groundwater: 3.30 feet Measured: 4/8/96
Drilling Method: 4 1/4" ID Hollow-Stem Auger With 5" Flights	Groundwater Elevation: 265.66 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 30.0 feet
Geologist: D. Ladd, J. Kingsbury, A. Choate	Well Screen: 17 to 27 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							OL	(0-30') Upper Alluvium (see descriptions below).	
								Clay and silt, dark yellowish-brown, moist, with organic material and roots.	265.1
							CL ML	Silty clay/clayey silt, greenish-gray and moderate yellowish-brown, slightly moist, soft to slightly firm, with some dark iron staining.	263.1
5								Clayey silt, greenish-gray and moderate yellowish-brown, with iron/ manganese inclusions and organic material, slightly moist.	
								Iron-manganese nodules increasing in percentage and size (up to .5" in diameter).	
10								Some staining with a dark yellowish-orange material.	
							ML	Increase in clay percentage.	
								Clayey silt, light olive gray color stained light brown to dark yellowish-orange. Moisture content increasing as iron/manganese nodules decrease in percentage.	
15								Very moist at 14' becoming less moist near 16', rare iron/manganese nodules.	
								Clayey silt, medium gray to light olive gray stained light brown to dark yellowish-orange, very moist.	
									248.1
20								Silty clay, medium light to medium gray, wet.	
								Dark greenish-gray to grayish-olive green color, wet.	
								Very moist.	
							CL		
25								Light olive gray to grayish-olive green color. Very moist and soft.	
									239.1
							ML	Clayey silt, slightly moist, soft.	
30									237.1

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 002G14DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 269.00 feet msl
Started at 1213 on 2-14-96	TOC Elevation: 271.00 feet msl
Completed at 1400 on 2-14-96	Depth to Groundwater: 6.90 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 264.10 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 76.0 feet
Geologist: J. Kingsbury	Well Screen: 40 to 50 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								(0-32') Uper Alluvium (see descriptions below).	
			1	83	3			Clayey silt, dark yellowish-brown to brownish-gray	
5								Some organic material between 5' and 6'.	
10			2	80	BG		ML	Silt, light yellowish-brown to yellowish-gray mottled with dark orangish-yellow material. Organic material (specks) common from 10' to 16'. Very moist.	
15								Common iron staining from 16' to 20'.	
20			3	90	BG			Silt and clay, olive-gray to greenish-gray, wet.	249
25							ML CL	Slightly moist between 25' and 29'.	
30			4	90	BG			Light olive gray color; mottled with brown to reddish-brown material.	
								(32-66') Deeper Alluvium (see descriptions below).	237
35							ML SM	Light olive gray silt to fine sand. No mottling. Wet.	
								More sand from 36' to 39'.	233
							SM		
40							SP		230

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

bentonite seal

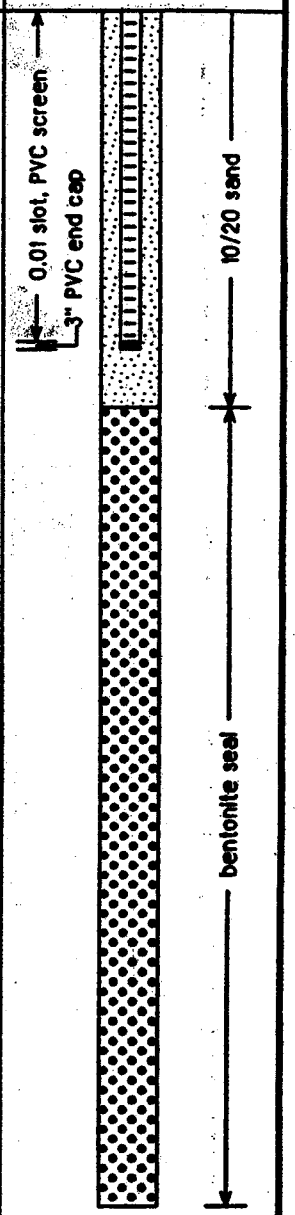
EnSafe/Allen & Hoshall

Monitoring Well 002G14DA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 – Southside Landfill
Project No.: 106-08420	Surface Elevation: 269.00 feet msl
Started at 1213 on 2-14-96	TOC Elevation: 271.00 feet msl
Completed at 1400 on 2-14-96	Depth to Groundwater: 6.90 feet Measured: 4/8/96
Drilling Method: Rotasonic – 4" core barrel inside 6" casing	Groundwater Elevation: 264.10 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 76.0 feet
Geologist: J. Kingsbury	Well Screen: 40 to 50 feet

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45	5	90	BG	SP	Coarse-grained sand with rare gravel. Dusky yellow color from 40' to 41' changing to olive gray in color from 42' to 43'.	226
				SP GW	Sand and gravel, reddish-brown to dark orangish-yellow.	223
50				SP	Coarse-grained sand with some gravel. Dark orangish-yellow to reddish-brown becoming dusky yellow around 49' to 50'.	219
55	6	110	BG	SP	Sand, fine-grained, yellowish-gray to very light yellowish-brown, finely micaceous, wet.	
60	7	90	BG			
65					Some ironstone and reddish-brown sand.	203
70	8	100	BG	CL ML	Cockfield Formation: clay and silt, dark gray.	
75					Terminated soil boring at 76'.	193
80						

WELL DIAGRAM



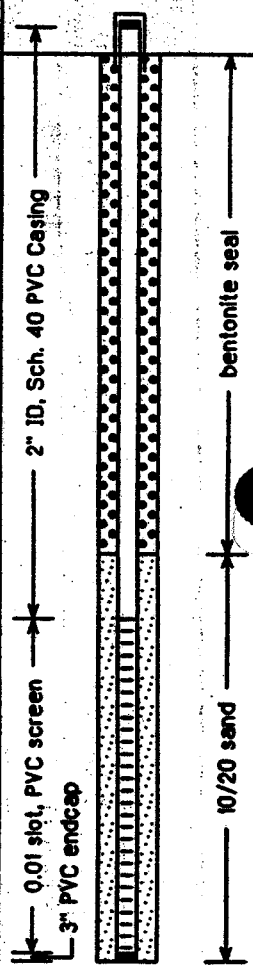
EnSafe/Allen & Hoshall

Monitoring Well 002G14UA

Project: NSA Memphis	Location: Millington, TN. SWMU#2 - Southside Landfill
Project No.: 106-08420	Surface Elevation: 269.17 feet msl
Started at 1455 on 2-14-96	TOC Elevation: 271.23 feet msl
Completed at 1530 on 2-14-96	Depth to Groundwater: 5.50 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 265.73 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 27.0 feet
Geologist: J. Kingsbury	Well Screen: 17 to 27 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1					(0-27') Upper Alluvium (see descriptions below). Clayey silt, dark yellowish-brown to brownish-gray.	
5								Some organic material between 5' and 6'.	
10			2				ML	Silt, light yellowish-brown to yellowish-gray mottled with dark orangish-yellow material. Organic material (specks) common from 10' to 16', very moist.	
15			3					Common iron staining from 16' to 20'.	
20								Silt and clay, olive gray to greenish-gray, wet.	249.2
25							ML/CL	Slightly moist between 25' and 27'.	242.2
30								Terminated soil boring at 27'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 002G14DA.	
35									
40									

WELL DIAGRAM

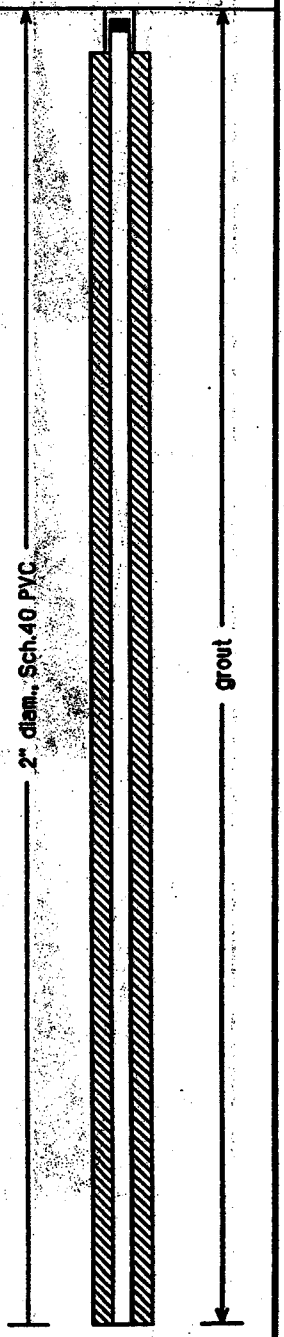


Monitoring Well 002G15DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *0800 on 6-19-98*	TOC Elevation: *feet msl*
Completed at *0930 on 6-19-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *57 feet*
Geologist: *David E. Ladd*	Well Screen: *37 to 47 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	100			ML	(0-1') Soil fill, then silt, olive gray mottled with dark yellowish brown to 2'. Contains a lot of roots and grass.	
5			2	50				Silt, dark greenish gray to greenish gray; mottling with some clay, dark yellowish orange considerable roots; grades to light olive gray and mottled with dark yellowish orange, rare iron-manganese nodules and carbonaceous materials.	
10								Same as above, with increasing clay fraction.	
15			3	90				Same as above, with increasing clay fraction.	
20								Same as above, with decreasing clay fraction, increasing percentage of iron-manganese nodules to 19'.	
25			4	90			ML	Silt, light olive gray, with minor clay fraction, homogeneous.	
30								Silt, olive gray, with increasing clay fraction, slightly micaceous and containing lignite specks.	

WELL DIAGRAM



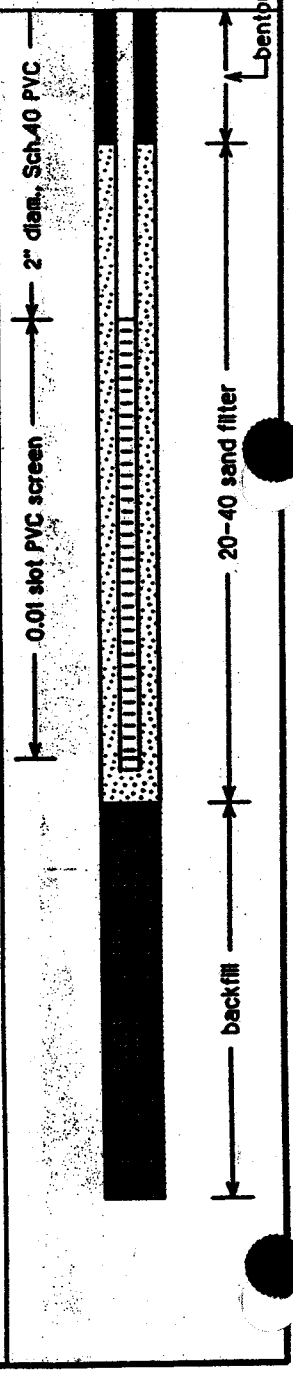
EnSafe (SM)

Monitoring Well 002G15DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *0800 on 6-19-98*	TOC Elevation: *feet msl*
Completed at *0930 on 6-19-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *57 feet*
Geologist: *David E. Ladd*	Well Screen: *37 to 47 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	Wood fragments at 33'.	
35							ML	Silt and clay, light olive gray; small fraction of very fine sand.	
			5	95			ML CL	Silt and clay, olive gray, with lignite specks; grades to silt with minor clay fraction and very fine to fine sands. Sand size and fraction increasing with depth.	
40							SW	Sand, light olive gray to yellowish gray, fine to medium grain size; with very fine gravel and very rare clay or silt fraction. Increasing grain size with depth toward very fine to fine gravels and coarse sands; grades to coarse gravels at 47'.	
45								Coarse gravel layer.	
			6	85			ML	Top of Cockfield Formation at 47'. Silt with minor clay and very fine to fine sand, micaceous, dark yellowish brown to dusky yellowish brown in color.	
50								(50-52.5') Silt, light olive gray, with increasing fraction of fine sands and very fine sands.	
							SP	Sand, light olive gray to light gray, fine to medium grain size, with rare clay and lignitic seams, micaceous.	
55			7	90				Sand, fine-grained, light brownish gray to very light gray in color.	
								End of boring @ 57' bgs	
60									

WELL DIAGRAM

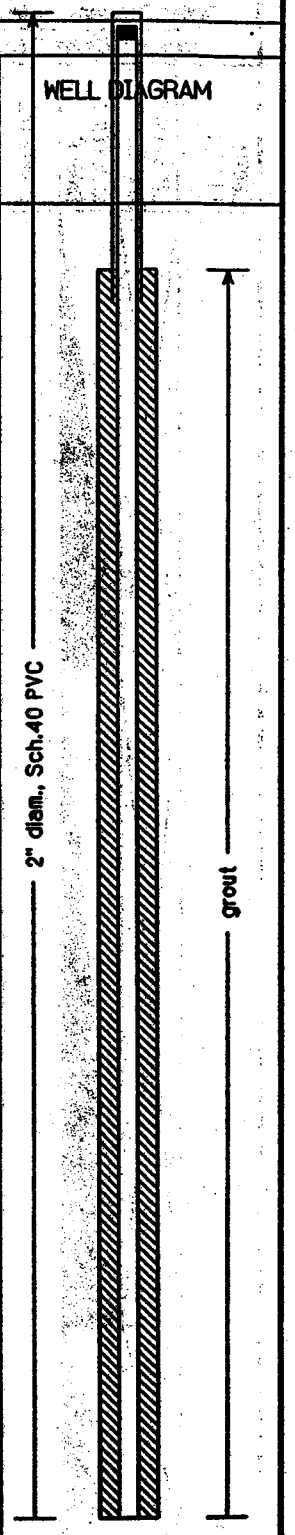


Monitoring Well 002G16DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1415 on 6-16-98*	TOC Elevation: *feet msl*
Completed at *1545 on 6-16-98*	Depth to Groundwater: *18.0 feet* Measured: *6/17/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *67 feet*
Geologist: *David E. Ladd*	Well Screen: *46 to 56 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							ML	(0-3') Silt, dark yellowish brown, contains roots and grass.	
			1	67				(3-7') Same as above, becoming clayey. Contains small fraction of olive gray clayey material; rare mica.	
5									
			2	75				(7-13') Same as above, clayey with more olive gray material.	
10									
								(13-17') Silt, olive gray to medium gray. An entire 4-foor section contains well-preserved, scattered wood pieces, mainly twigs; slightly micaceous, slightly moist.	
15							ML		
			3	75				(17-27') Silt, clayey, olive gray to dark greenish gray. Becoming more clayey below 18.5' Contains rare scattered wood and carbonaceous material throughout section. Very moist.	
20									

WELL DIAGRAM

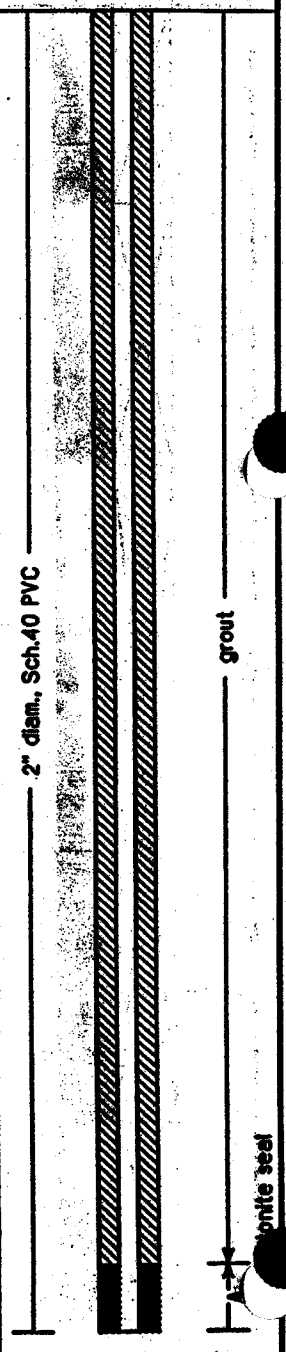


Monitoring Well 002G16DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1415 on 6-16-98*	TOC Elevation: *feet msl*
Completed at *1545 on 6-16-98*	Depth to Groundwater: *18.0 feet* Measured: *6/17/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *67 feet*
Geologist: *David E. Ladd*	Well Screen: *46 to 56 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
25							ML		
			4	100				(27-28.5') Same as above; contains some small shell fragments.	
30							SM SC	(28.5-34') Sand, silty and clayey, very fine to very coarse grain size. Contains abundant wood and shell fragments. Olive gray.	
35							ML	(34-36') Silt, slightly sandy with occasional sand lenses. Olive gray.	
			5	95			SW	(36-37') Sand, very fine to very coarse, and gravel up to .25" (long dimension); very silty and clayey. Olive gray, poorly sorted; wet.	
								(37-38') Same as above.	
40							SP	(38-42') Sand, medium to very coarse, and gravel. Gravel is mostly chert and quartz, rounded and angular, up to 1.5" (long dimension). Moderate yellowish brown; wet.	

WELL DIAGRAM

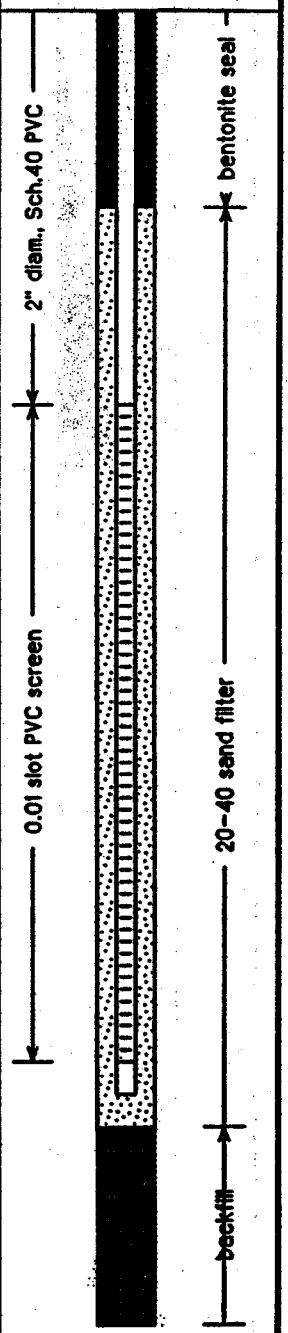


Monitoring Well 002G16DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1415 on 6-16-98*	TOC Elevation: *feet msl*
Completed at *1545 on 6-16-98*	Depth to Groundwater: *18.0 feet* Measured: *6/17/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *67 feet*
Geologist: *David E. Ladd*	Well Screen: *46 to 56 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SP		
							SP	(42–44') Sand, medium to very coarse, and gravel. Pinkish gray color, mixed with moderate yellowish brown. Gravel up to 1.5" (long dimension); wet.	
45							SW	(44–47') Gravel and sand, very coarse grain size. Pinkish gray mottling with dark yellowish orange. Gravel is up to 3.5" (long dimension); wet. From 44–45', iron-stained, dark yellowish orange. Poorly sorted.	
			6	85			SW	(47–48.5') Gravel and sand, very coarse-grained. Gravel is much smaller than above (up to 1.5" long dimension). Some well rounded, some angular gravels. Pinkish gray mottling with dark yellowish orange; wet.	
							GP		
50							GW	(48.5–49.5') Gravel. Contains some sand. Gravel up to 3" (long dimension). Grayish orange, wet.	
							SW	(49.5–51') Gravel and sand, very caorse-grained; pinkish gray mottled with dark yellowish orange. Gravel is up to 1" (long dimension).	
55								(51–57') Sand, coarse to very coarse, and gravel. Dark yellowish orange; gravel is up to 1.5" (long dimension); wet.	
			7	75				(57–57.5') Same as above; last 3" becoming light olive gray mottled with dusky yellowish brown.	
60							CL	(57.5–62.5') Clay, dusky yellowish brown, and sand, very fine, light olive gray. Clay and sand occur intermittently as bands. Contains abundant seams of lignitic material. Clay is very stiff; micaceous.	

WELL DIAGRAM



EnSafe

Monitoring Well 002G16DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1415 on 6-16-98*	TOC Elevation: *feet msl*
Completed at *1545 on 6-16-98*	Depth to Groundwater: *18.0 feet* Measured: *6/17/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *67 feet*
Geologist: *David E. Ladd*	Well Screen: *46 to 56 feet*

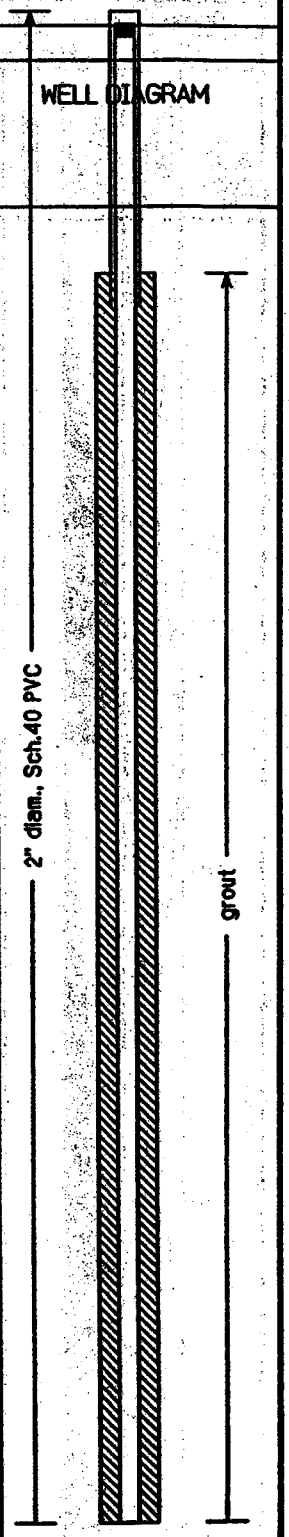
DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
65			8	100			CL	(62.5-65.5') Sand, very fine, olive gray to light olive gray. Wet. Contains abundant lignitic material near 65'.		backfill
							SP	(65.5-67') Sand, fine to very fine, light gray; wet. Very clean.		
								End of boring @ 67' bgs		
70								Remainder of this log is taken from boring 002G16UC, ~10' north of boring 002G16DA (6/19/98):		
								(67-68.5') Sand, light gray, very fine to fine, with mica and lignite specks.		
								(68.5-74') Silt, with some clay, olive gray; micaceous, grading to brownish gray silt and clay, and containing very fine sand, decreasing with depth.		
75								(75.5-77') Lignite layer ~1' thick grading to brownish gray to olive gray with very clayey silt.		
								Boring completed @77'; hole was filled in; no well completed here.		
80										

Monitoring Well 002G17DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1504 on 6-15-98*	TOC Elevation: *feet msl*
Completed at *1700 on 6-15-98*	Depth to Groundwater: *19.18 feet* Measured: *6/17/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *68 feet*
Geologist: *David E. Ladd*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							ML	(0-4') Silt, slightly clayey, moderate yellowish brown to dark yellowish brown.	
			1	50				(4-8') Same as above, mostly moderate yellowish brown with striations that are pale yellowish brown.	
5									
			2	62.5				(8-13') Silt, becoming progressively more clayey with depth. Moderate yellowish brown. Contains pale yellowish brown and olive gray striations, increasing with depth. Increasing fraction of carbonaceous material near 13'.	
10									
							ML	(13-18') Silt, very clayey; olive gray. Contains woody material from 15-17', with the majority near 15'. Contains small fraction of very light gray material near 18'.	
15									
			3	90				(18-25') Silt, less clayey. Olive gray to dark greenish gray, becoming increasingly dark greenish gray with depth. Wood material at 19', 20', 22'.	
20									

WELL DIAGRAM

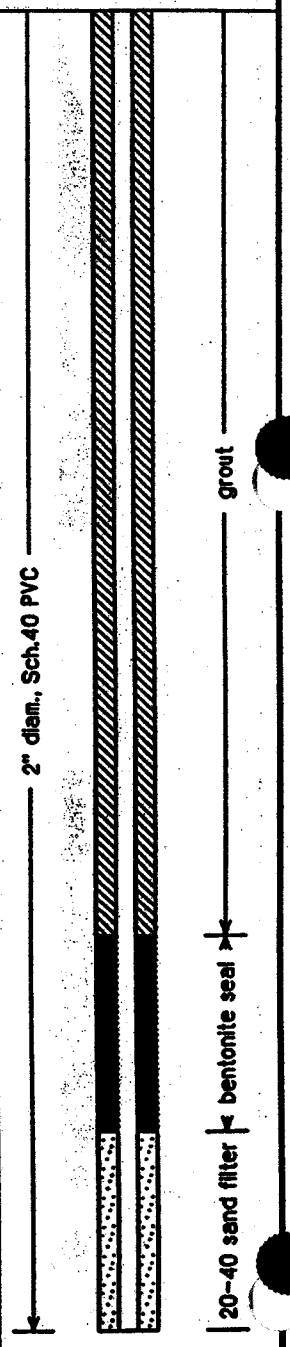


Monitoring Well 002G17DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1504 on 6-15-98*	TOC Elevation: *feet msl*
Completed at *1700 on 6-15-98*	Depth to Groundwater: *19.18 feet* Measured: *6/17/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *68 feet*
Geologist: *David E. Ladd*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
25								(25-28') Silt, dark greenish gray. Contains white shell snails and wood from ~26-28'. This area also contains some darker, carbonaceous material.	
			4	100			ML	(28-29') Same as 25-28'. Contains coarse-grained sand lens at ~28.75' (29-37.5') Silt, olive gray to light olive gray. Contains some very fine sand. Contains coarse-grained sand sand lens at 37'.	
30									
35									
			5	80			SW	(37.5-38') Sand, medium to very coarse, with mostly angular chert and quartz gravel up to .5" (long dimension). Contains small silt and clay fraction. Olive gray to light olive gray. (38-44.5) Grvael and sand, very coarse-grained. Light olive gray to olive gray. Gravel up to 2.5" (long dimension).	
40									

WELL DIAGRAM



Monitoring Well 002G17DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1504 on 6-15-98*	TOC Elevation: *feet msl*
Completed at *1700 on 6-15-98*	Depth to Groundwater: *19.18 feet* Measured: *6/17/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *68 feet*
Geologist: *David E. Ladd*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	SOIL CLASS	GEOLOGIC DESCRIPTION
45			SW	
			GW	(44.5-48') Gravel and sand, medium- to very coarse-grained. Mostly dark yellowish orange, mottled with olive gray. Small to large gravel, rounded to angular, 2.5" (long dimension). Coarse sand lens at ~47', pale grayish orange.
	6	100		(48-50.5') Same as above, no olive gray material.
50				
			SC	(50.5-58') Sand, fine to very fine, and clay; dark yellowish orange mottled with light gray. Light gray material is predominate from 53' to 56'. More light gray clayey material near 56'.
55				
	7	100		(58-60') Same as above; light gray mottled with dark yellowish orange.
60				

WELL DIAGRAM: 0.01 slot PVC screen; 20-40 sand filter; backfill

Monitoring Well 002G17DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1504 on 6-15-98*	TOC Elevation: *feet msl*
Completed at *1700 on 6-15-98*	Depth to Groundwater: *19.18 feet* Measured: *6/17/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *68 feet*
Geologist: *David E. Ladd*	Well Screen: *40 to 50 feet*

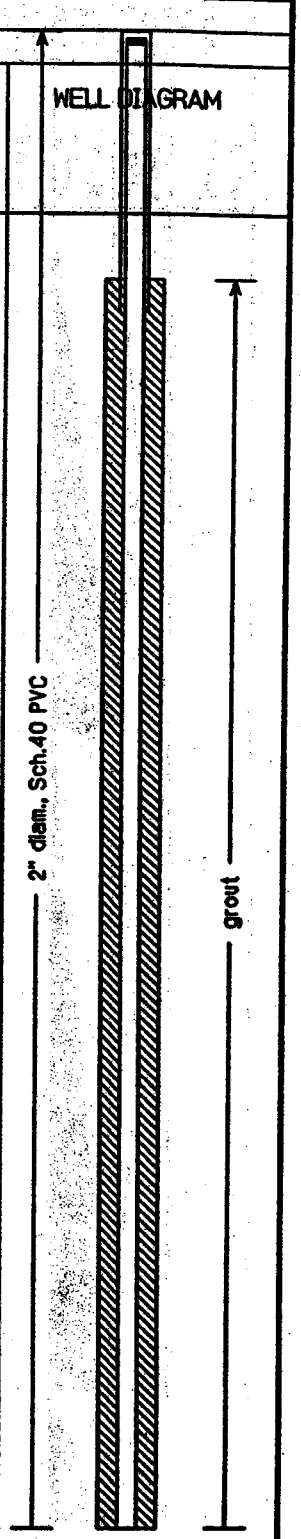
DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
65							SC	(60-68') Sand, very fine to fine. Light gray in color. Clay lenses at 63' and 66'. Very clean.		backfill
			8	100				***end of boring @ 68' bgs.***		
70								Remainder of log is taken from log of boring 002G17UC, ~10-15' south of 002G17DA (0930 on 6/20/98)		
								(67-72') Clay, sandy (very fine), dark yellowish brown. Micaceous, contains lignitic material.		
75								(72-75') Clay, sandy (very fine). Same as above, except becoming much sandier.. Abundant lignite material and seams from 74-75'.		
								(75-77') Clay, dusky yellowish brown to dark yellowish brown. Contains lignitic material; very stiff.		
80								***Bottom of boring 002G17UC @ 77' bgs.***		

Monitoring Well 002G17UC

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *on 6-20-98*	TOC Elevation: *feet msl*
Completed at *1230 on 6-20-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *77 feet*
Geologist: *David E. Ladd*	Well Screen: *57 to 67 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							ML	(0-4') Silt, slightly clayey, moderate yellowish brown to dark yellowish brown.	
			1	50				(4-8') Same as above, mostly moderate yellowish brown with striations that are pale yellowish brown.	
5									
			2	62.5				(8-13') Silt, becoming progressively more clayey with depth. Moderate yellowish brown. Contains pale yellowish brown and olive gray striations, increasing with depth. Increasing fraction of carbonaceous material near 13'.	
10									
							ML	(13-18') Silt, very clayey; olive gray. Contains woody material from 15-17', with the majority near 15'. Contains small fraction of very light gray material near 18'.	
15									
			3	90				(18-25') Silt, less clayey. Olive gray to dark greenish gray, becoming increasingly dark greenish gray with depth. Wood material at 19', 20', 22'.	
20									

WELL DIAGRAM



Monitoring Well 002G17UC

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *on 6-20-98*	TOC Elevation: *feet msl*
Completed at *1230 on 6-20-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *77 feet*
Geologist: *David E. Ladd*	Well Screen: *57 to 67 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
25								(25-28') Silt, dark greenish gray. Contains white shell snails and wood from ~26-28'. This area also contains some darker, carbonaceous material.		
			4	100			ML	(28-29') Same as 25-28'. Contains coarse-grained sand lens at ~28.75' (29-37.5') Silt, olive gray to light olive gray. Contains some very fine sand. Contains coarse-grained sand sand lens at 37'.		
30										
35			5	80			SW	(37.5-38') Sand, medium to very coarse, with mostly angular chert and quartz gravel up to .5" (long dimension). Contains small silt and clay fraction. Olive gray to light olive gray. (38-44.5) Grvael and sand, very coarse-grained. Light olive gray to olive gray. Gravel up to 2.5" (long dimension).		
40										

2" diam., Sch.40 PVC

grout

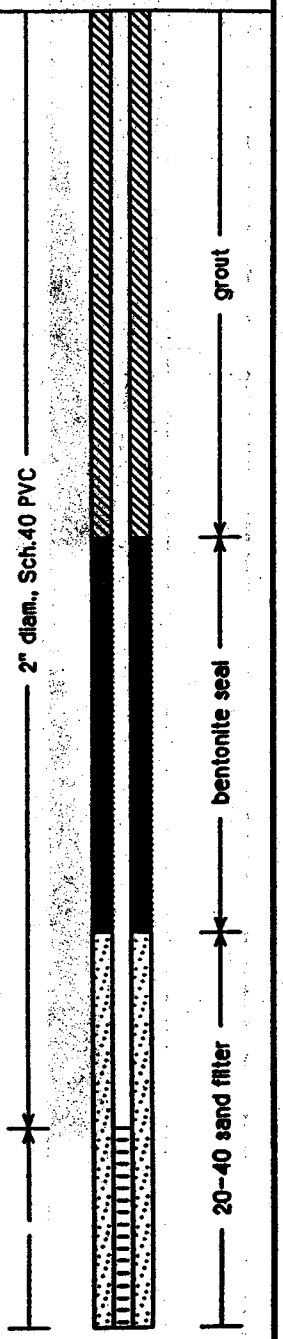
EnSafe (SM)

Monitoring Well 002G17UC

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *on 6-20-98*	TOC Elevation: *feet msl*
Completed at *1230 on 6-20-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *77 feet*
Geologist: *David E. Ladd*	Well Screen: *57 to 67 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SW		
45							GW	(44.5-48') Gravel and sand, medium- to very coarse-grained. Mostly dark yellowish orange, mottled with olive gray. Small to large gravel, rounded to angular, 2.5" (long dimension). Coarse sand lens at ~47', pale grayish orange.	
			6	100				(48-50.5') Same as above, no olive gray material.	
50							SC	(50.5-58') Sand, fine to very fine, and clay; dark yellowish orange mottled with light gray. Light gray material is predominate from 53' to 56'. More light gray clayey material near 56'.	
55			7	100				(58-60') Same as above; light gray mottled with dark yellowish orange.	
60									

WELL DIAGRAM



EnSafe (SM)

Monitoring Well 002G17UC

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *on 6-20-98*	TOC Elevation: *feet msl*
Completed at *1230 on 6-20-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *77 feet*
Geologist: *David E. Ladd*	Well Screen: *57 to 67 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
65							SC	(60-68') Sand, very fine to fine. Light gray in color. Clay lenses at 63' and 66'. Very clean.		0.01 slot PVC screen; 20-40 sand filter
			8	100				***end of boring 002G17DA @ 68' bgs.*** Remainder of log is taken from log of at location 002G17UC, ~10-15' south of 002G17DA (0930 on 6/20/98)		
70							CL	(67-72') Clay, sandy (very fine), dark yellowish brown. Micaceous, contains lignitic material.		backfill
75								(72-75') Clay, sandy (very fine). Same as above, except becoming much sandier. Abundant lignite material and seams from 74-75'.		
			9	100				(75-77') Clay, dusky yellowish brown to dark yellowish brown. Contains lignitic material; very stiff.		
80								***Bottom of boring 002G17UC @ 77' bgs.***		

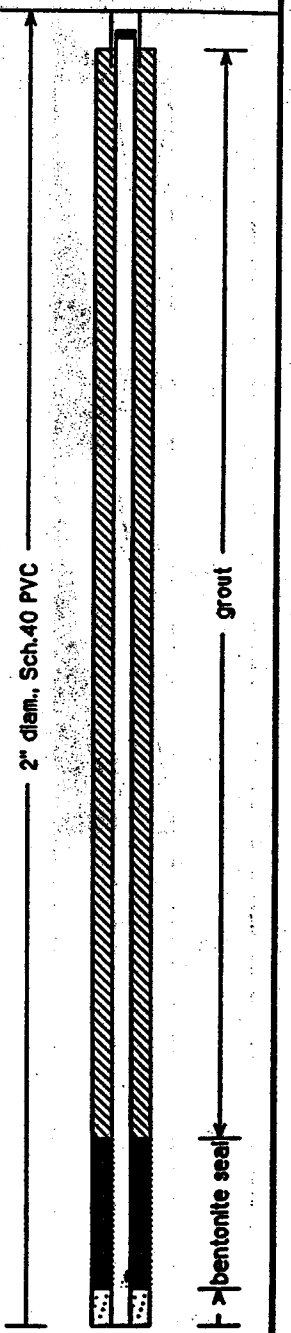
EnSafe (SM)

Monitoring Well 002G18DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1030 on 6-17-98*	TOC Elevation: *feet msl*
Completed at *1100 on 6-17-98*	Depth to Groundwater: *12.91 feet* Measured: *6/17/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *67 feet*
Geologist: *David E. Ladd*	Well Screen: *37 to 47 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	100			ML	(0-3') Silt, dark yellowish brown mottled with a small fraction of light olive gray material; contains some orgainc material. (3-7') Silt, light olive gray mottled with some dark yellowish orange. Contains abundant organic material and nodules.	
5			2	80				(7-10.5') Silt, dark yellowish brown mottled with light olive gray gray; clayey and containing iron-manganese nodules.	
10							CL	(10.5-17') Clay, stiff, dark yellowish brown mottled with light olive gray and dark yellowish orange. Contains iron-manganese nodules; mosit.	
15			3	75				(17-20') Same as above; not as stiff. Becomes greenish gray with depth.	
20							SM	(20-27') Silt and sand, very fine. Contains clayey areas. Light olive gray to greenish gray, and micaceous; continas rare iron- manganese nodules.	
25			4	90				(27-32') Same as above, becoming increasing sand fraction with depth.	
30							SC	(32-35') Sand, very fine to fine, olive gray to dark greenish gray, clay-rich. Wet. Rare iron-manganese nodules. Coarsening downward.	
35							SW		

WELL DIAGRAM



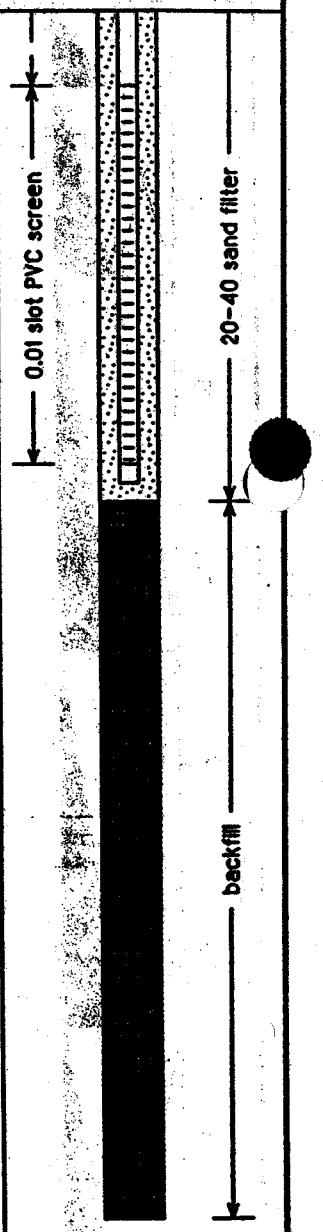
Monitoring Well 002G18DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1030 on 6-17-98*	TOC Elevation: *feet msl*
Completed at *1100 on 6-17-98*	Depth to Groundwater: *12.91 feet* Measured: *6/17/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *67 feet*
Geologist: *David E. Ladd*	Well Screen: *37 to 47 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	SOIL CLASS	GEOLOGIC DESCRIPTION
	5	80	SW	(35-37') Sand, fine to very coarse; rare small gravel. Olive gray. Contains clay seams and is generally clay-rich. Wood fragments at 36' and wet.
				(37-39') Same as above; gravels becoming larger with depth. Clay seam at 38'.
40			CL/SW	(39-42') Clay and sand, fine to medium grain size. Dark greenish gray to medium blue gray. Contains rare scattered gravel up to .25" (long dimension).
			SP/GP	(42-45.5') Sand, very coarse, and gravel, up to 1" (long dimension), rounded and angular. Olive gray to light olive gray mottled with dark yellowish brown; wet.
45			GP	
	6	90	SP/GP	(45.5-46') Grvael up to 2" (long dimension), mostly rounded quartz and chert; wet.
			SC	
50			SP/CL	(46-47') Sand, very coarse, and gravel up to 1.5" (long dimension), rounded and angular. Olive gray to light olive gray mottled with dark yellowish brown. Wet. Contains some oolitic chert gravel.
				(47-47.5') Clay and sand, fine with gravel. Very light gray to pinkish gray.
55	7	90		(47.5-57') Sand, fine to very fine, light gray with scattered lignite and mica grains. Scattered clay lenses, light gray to yellowish gray, wet. Sand seems to be "quick" at 47.5'.
				Bored to 67' but left 10' of core in the hole.
60				
65				
70				

ELEV. (ft-msl)

WELL DIAGRAM



EnSafe (SM)

Monitoring Well 002G19DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1300 on 6-18-98*	TOC Elevation: *feet msl*
Completed at *1415 on 6-18-98*	Depth to Groundwater: *feet* Measured: *6/18/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *57 feet*
Geologist: *David E. Ladd*	Well Screen: *40 to 50 feet*

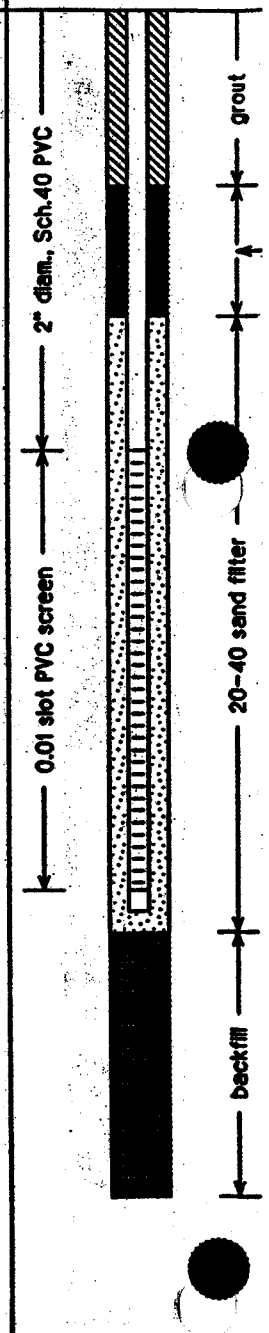
DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5			1	83			ML CL	(0-3') Silt, clayey, light olive gray, mottled with dark yellowish brown and dark yellowish orange. Contains roots and bark. (3-7') Similar to above with increased clay content, stiff. Also contains roots, iron-manganese nodules, and rare carbonaceous materials.		2" diam., Sch.40 PVC
10			2	100				(7-17') Similar to above with dominant clay fraction; stiff. Contains rare iron-manganese and carbonaceous nodules. Becoming very clay-rich at 13.5'.		grout
15										
20			3	75			ML	Dark greenish gray (at top mottled with yellowish brown material to about 23') - decreasing with depth. Silt with some clay Last of yellowish brown mottling.		
25			4	80				(27-37') Dark greenish gray clayey silt, slightly micaceous.		
30										

Monitoring Well 002G19DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1300 on 6-18-98*	TOC Elevation: *feet msl*
Completed at *1415 on 6-18-98*	Depth to Groundwater: *feet* Measured: *6/18/98*
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *57 feet*
Geologist: *David E. Ladd*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
35			5	90			ML	Clay seam ~.25" thick, grading to clayey silt; olive gray in color. (36-37') Wood fragments. (37-38') Similar to above, with small fraction very fine sand.	
40							SW GP	(38-39') Sand, fine to coarse, light olive gray silt in interstices. Sandy gravel with some cobbles (dimensions: 1" x 2.5"). Light olive gray silty clay seam (2.5 to 3" thick) with gravels grading to moderate yellowish brown to dark yellowish orange sands and gravels; iron-staining present. A 2 to 3.5" thick layer of mostly gravels (~.5 to 1" long dimension); iron-staining present. Iron-staining decreasing.	
45			6	95					
50							SM SC	Lignitic zone at 50'; transitional to 51.5', lignite seams, gravels, and silty/clayey sands (medium to coarse, brownish gray).	
55			7	100			SP CL	Sand, fine, dark to pale yellowish brown, with lignite inclusions and intermittent clay seams. A 3" thick sand layer, fine-grained and light gray in color; grades to to brownish gray clay and fine to very fine sands, micaceous. Dimension of mica flakes increases with depth to visible sheets ~ 1mm in size (appears to be muscovite); fraction of very fine sand increases with depth as well. ***End of boring @57' bgs.***	
60									

WELL DIAGRAM



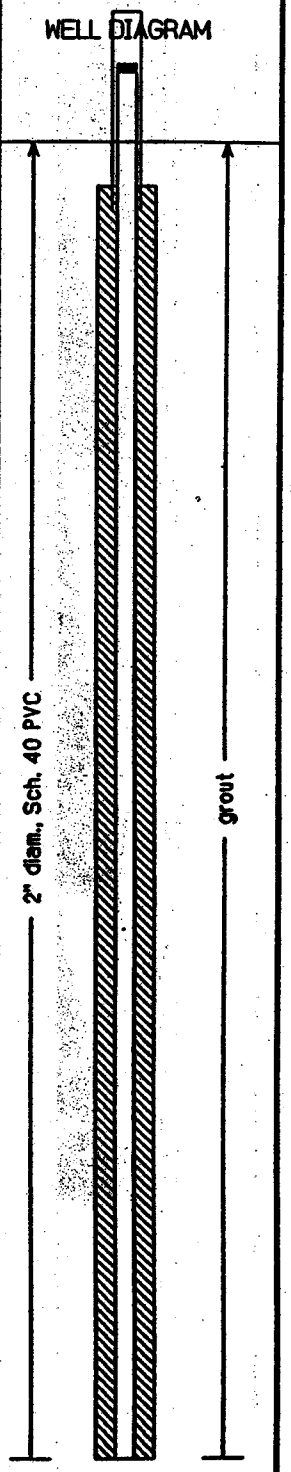
EnSafe (SM)

Monitoring Well 002G20DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1345 on 6-22-98*	TOC Elevation: *feet msl*
Completed at *1640 on 6-22-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *54 feet*
Geologist: *David E. Ladd*	Well Screen: *to feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							ML	(0-7') Silt, clayey, dark yellowish brown mottled with dark yellowish orange and a small fraction of olive gray material.	
5			1	71				(7-17') Same as above. Contains increased fraction of dark yellowish orange material; iron-manganese nodules present.	
10									
15			2	75				(17-20') Same as above.	
20							ML	(20-24') Silt, very clayey, light olive gray to medium gray, mottled with dark yellowish orange. Iron-manganese nodules present near 20'.	
25			3	95			ML	(24-27') Silt, dark yellowish orange mottled with rare light gray material. Contains carbonaceous material and/or iron-manganese nodules.	
30								(27-28') Same as above.	
							ML SP	(28-32') Silt and sand, very fine; pinkish gray to light olive gray.	

WELL DIAGRAM



EnSafe (SM)

Monitoring Well 002G20DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1345 on 6-22-98*	TOC Elevation: *feet msl*
Completed at *1640 on 6-22-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *54 feet*
Geologist: *David E. Ladd*	Well Screen: *to feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
35							ML SP			
							SP	(32-34.5') Sand, fine to medium, dark yellowish orange, becoming light olive gray near bottom portion of run. Contains scattered gravel. Clay seam at 34'.		
							SP GP	(34.5-37') Sand, medium to very coarse, and gravel up to .5" (long dimension); light to very light gray. Contains clay and abundant dark yellowish orange material from 34 to 34.5'.		
			4	95			SP	(37-38') Sand, fine-grained, light gray mottled woth dark yellowish orange.		
40							SC GP	(38-42') Sand, fine to very coarse, with abundant gravel up to 1" (long dimension). Very clayey material throughout. Dark yellowish orange becoming light gray near 42'; very poorly sorted, wet.		
								(42-47') Sand, medium to very coarse, and gravel up to 1.5" (long dimension) - one piece up to 3.5" - dark yellowish orange; wet.		
45										
			5	70			SP	(47-53') Same as above. Sand is dominantly very coarse, gravel smaller in size. Decreasing clay fraction. Pinkish gray in color around 51'; otherwise, appears iron-stained.		
50										
							SP	(53-57') Sand, very fine to fine, dark yellowish orange, containing seams of light gray, wet.		
			6	95				***Total depth = 54' bgs.***		
55								***Lithologic description is taken from log of boring 002B20UC.***		
60										

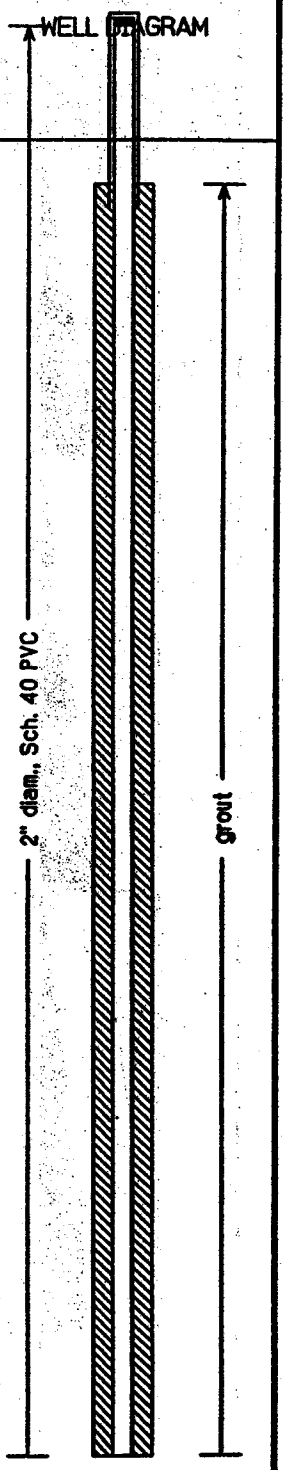
WELL DIAGRAM: 2" diam., Sch. 40 PVC; 0.01 slot PVC screen; grout; bentonite seal; 20-40 sand filter

Monitoring Well 002G22DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *0815 on 6-23-98*	TOC Elevation: *feet msl*
Completed at *0930 on 6-23-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *57 feet*
Geologist: *David E. Ladd*	Well Screen: *45 to 55 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							CL ML	(0-4') Silty clay, gray, with iron-staining; grading to clayey silt.	
			1	100				(4-7') Silt, gray to brown, with clay; large pieces of root matter; mottling with gray silt; iron-staining.	
5									
			2	83				(7-17') Same as above; olive gray to brownish gray with rare iron- manganese nodules, increasing in size and frequency with depth, mottled throughout. Iron-manganese nodules common around 11.5 to 12'.	
10							ML CL	Increase in moisture content.	
								Same as above; yellowish brown to dark yellowish brown with rare iron- manganese nodules; Increase in clay fraction with depth to a silty clay.	
15									
			3	100				Increasing mottling, iron-staining; but rare iron-manganese nodules.	
								Clay with rare silt, dark greenish gray.	
20									
								Decreasing silt; orgainc matter (wood pieces).	
							CL		
25								Organic matter to 26'.	
							SC	Clayey sand, fine to very fine, dark greenish gray.	
			4	100					
							CL	Clay with rare sand (very fine), medium bluish gray to greenish gray.	
30								Increasing sand with depth, very fine to fine.	

WELL DIAGRAM

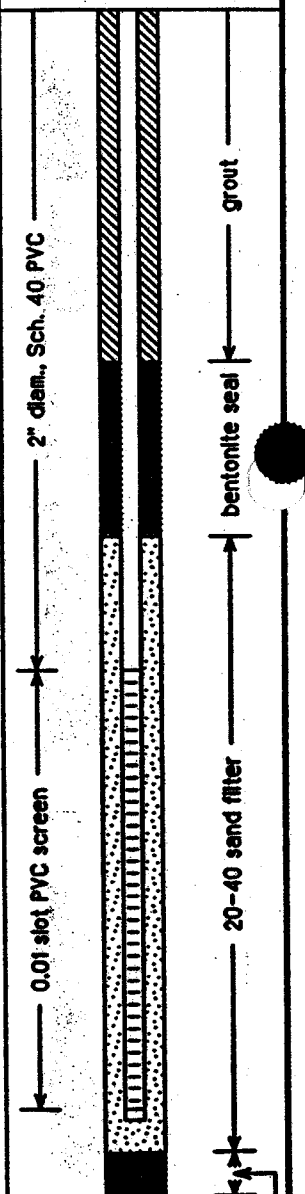


Monitoring Well 002G22DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *0815 on 6-23-98*	TOC Elevation: *feet msl*
Completed at *0930 on 6-23-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *57 feet*
Geologist: *David E. Ladd*	Well Screen: *45 to 55 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							CL		
							SP	Sand, fine to very fine, yellowish gray to very light gray. Sand, fine, and gravel, fine; iron-stained.	
35							CL	Iron-stained clay with some silt; mottled with moderate yellowish brown material. (36-37') Silty clay with rare fine to very fine sands, yellowish gray to light gray.	
			5	100					
40							SC	Clayey sand to sandy clay with very fine sands, dark to pale yellowish orange.	
							SP/GP	Sand fraction increasing with depth; increasing gravel fraction. Sands, very fine to medium, and gravels, fine to medium; decreased iron-staining.	
45							GP	Dominant gravels, fine to medium, iron-stained; decreased sand fraction.	
			6	100			SP/GP	Sands, medium to coarse, abundant iron-staining; and gravels, very fine, decreasing iron-staining to dominantly homogeneous lithics around 50.5'.	
50							SC/CL	Clayey sands with some very clayey layers (intermittent), grading to a sandy clay with cobbles. (54-55') Sand, fine to medium, abundant iron staining.	
55							CL	Top of Cockfield Formation (olive black clay). (56-56.75') Fine to medium to very fine, medium gray to light brownish gray layer; grades back to olive black clay around 57'.	
			7	100				***Total depth of well = 57' bgs.***	
60									

WELL DIAGRAM

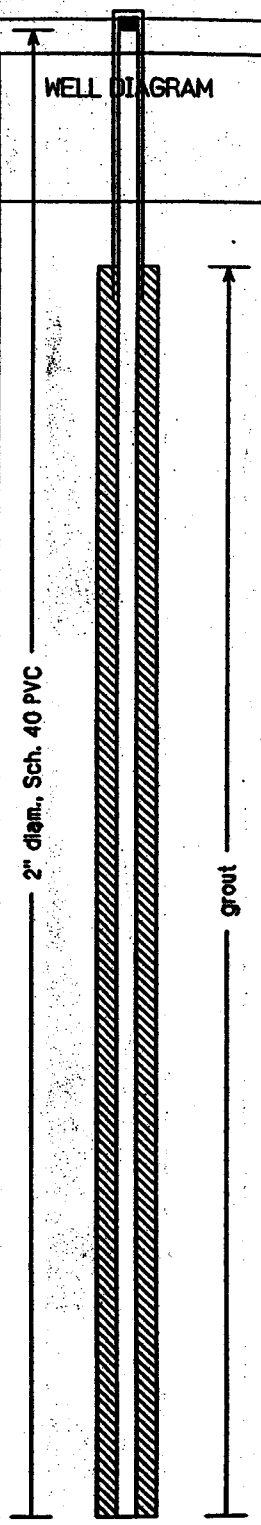


Monitoring Well 002G23DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1340 on 6-23-98*	TOC Elevation: *feet msl*
Completed at *1447 on 6-23-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *57 feet*
Geologist: *David E. Ladd*	Well Screen: *37 to 47 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								(0-3') Lost portion of core; mostly grassy soil.	
								(3-7') Silt, dark yellowish brown, and clay; grades to dusky yellowish brown to ~5.5' where mostly clay and rare silt.	
5								(5.5-7') Silt, dark yellowish brown, mottled with clay; iron-staining present.	
			1	57				Clayey silt, light olive gray to olive gray; silt increasing with depth.	
10							ML CL	Silt, pale yellowish brown, mottled with rare clay. Iron-staining and carbonaceous matter are present. Iron-manganese nodules present and increase in frequency with depth.	
								Same as above.	
15								Same as above.	
			2	85				Though partial recovery, same as above.	
20									

WELL DIAGRAM

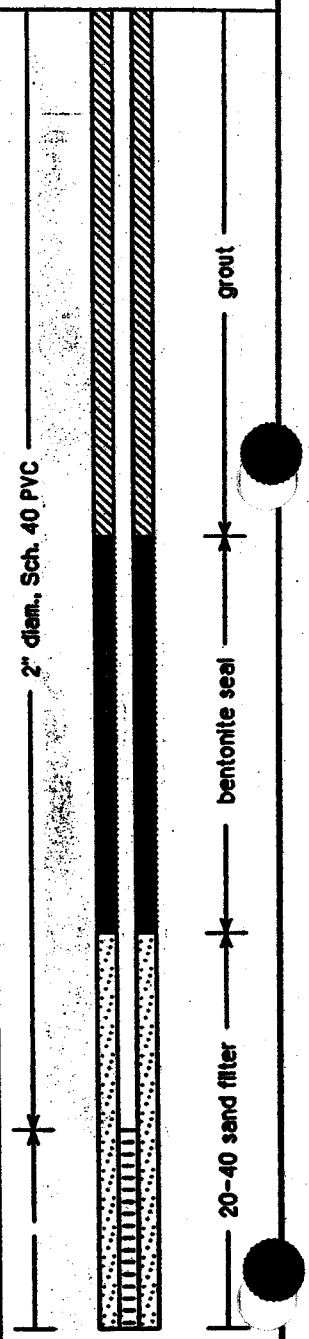


Monitoring Well 002G23DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1340 on 6-23-98*	TOC Elevation: *feet msl*
Completed at *1447 on 6-23-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *57 feet*
Geologist: *David E. Ladd*	Well Screen: *37 to 47 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Silt, light olive gray, with rare clay; iron-staining, mottling, but no iron-manganese nodules (20-24').	
25								Silt, pale yellowish brown, clayey and with increased iron-staining and mottling; iron-manganese nodules to 27'.	
			3	75			ML CL	Silt, pale yellowish brown to very pale orange, with rare clay (very dry).	
30								Silt is pale yellowish brown, clayey, with sandy clay stringers. Sand fraction increasing with depth; abundant iron-manganese nodules (up to .75" long dimension); iron staining and mottling throughout. Sand fraction increasing with depth to around 34'.	
35							SM SC	Sand and gravels mixed with light gray clayey silt to around 37'.	
			4	75			CL	Sandy clay, pale yellowish brown, with gravel (medium grain size), iron-stained, and carbonaceous matter. Sand fraction increasing with depth to a clayey sand and increasing gravel fraction.	
40									

WELL DIAGRAM

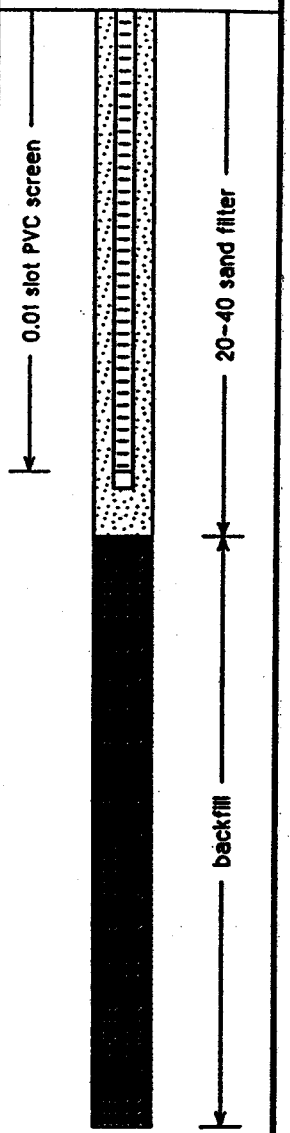


Monitoring Well 002G23DA

Project: *NSAMEM, SWMU 2*	Location: *NSA Memphis, Millington, TN*
Project No.: *0106-001*	Surface Elevation: *feet msl*
Started at *1340 on 6-23-98*	TOC Elevation: *feet msl*
Completed at *1447 on 6-23-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *57 feet*
Geologist: *David E. Ladd*	Well Screen: *37 to 47 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	SOIL CLASS	GEOLOGIC DESCRIPTION
45			CL	Gravel layer at 40.5', with abundant sand and clay to 41.5'.
			SC	Clayey sand, with gravel, iron-stained to around 42.5'. Sand, very fine to fine, shows abundant iron-staining, no gravel fraction present. Very abundant iron-staining (to a somewhat black color) ~ 2' thick. Clay fraction increases, mottled with some light gray clay and rare silt.
	5	100	ML	(47-50.5') Sandy silt, very fine, dark yellowish brown (iron-stained), mottled with aple yellowish brown clayey silt.
50			CL	Silt clay, dusky yellowish brown, micaceous, and rare sand, very fine. Top of Cockfield Formation @ 50.5'.
55	6	100		Clay, olive black in color; micaceous.
60				***Total depth of well = 57' bgs.***

WELL DIAGRAM



(002GM01DA)

LITHOLOGIC LOG FOR MONITOR WELL GM-1

Description	Depth (ft)	Thickness (ft)
Clay, road soil, brown.....	0 - 2.5	2.5
Clay, firm, green and yellow.....	2.5 - 8.5	6.0
Clay, pliable, brown.....	8.5 - 10.0	1.5
Clay, pliable, soft, marbled, brown, yellow, green.....	10.0 - 14.5	4.5
Clay, pliable, blue.....	14.5 - 35.0	20.5
Clay, slightly sandy, medium pack, blue...	35.0 - 37.0	2.0
Clay, slightly sandy, gravel, medium pack blue.....	37.0 - 44.0	7.0
Sand, coarse grain, gravel, loose pack, tan and brown.....	44.0 - 50.0	6.0

LITHOLOGIC LOG FOR MONITOR WELL GM-2

(002GM02DA)

Description	Depth (ft)	Thickness (ft)
Clay, pliable, brown and gray.....	0 - 12.5	12.5
Clay, pliable, blue.....	12.5 - 17.5	5.0
Clay, pliable, silty, blue.....	17.5 - 22.5	5.0
Clay, pliable, sandy, medium grain, gray..	22.5 - 27.5	5.0
Clay, soft, sandy, fine grain, dark gray..	27.5 - 30.0	2.5
Sand, medium grain, clayey, dark gray.....	30.0 - 38.0	8.0
Sand, medium to coarse grain, gravel, tan.	38.0 - 46.0	8.0
Clay, soft, tan.....	46.0 - 48.0	2.0

GERAGHTY & MILLER, INC.

plastic = bentonite

WELL LOG

PROJECT: NAS - Memphis DATE: 12-7-84 SHEET: 1 OF

LOCATION: Millington TN DRILLING CONTRACTOR: Gregory Drilling

WELL NUMBER: GM-1 (Landfill Upgradient) DRILLING METHOD: Solid To- Crawford Die Auger

SAMPLE DESCRIBED BY: DC SAMPLING METHOD: Sample off flights Split Spoon

SAMPLE DESCRIPTION	blow/ft	DEPTH INTERVAL (FEET)	THICKN (FEE
Clay road soil, plastic, brown		0 - 2.75'	
Clay, Firm, marbled greens and yellows		2.5 - 4.0	
Same as above		4.0 - 7.0	
"	-	7.0-8.5	
Clay, plastic, soft, brown	-	8.5-10	
Clay plastic, soft, moist, bmabled brown, yellow, grey		10 - 11.5	
Clay, same as above		11.5 - 13.0	
Clay, very plastic, slightly silty, moist, brown, yellow, grey		13. 14.5	
Clay, plastic, slightly silty, blue		14.5-16.0	
Same as above		16-17.5	
same as above		17.5 - 19.0	
same as above		19.0 - 20.5	
" " "		20.5 - 22	
"		22 - 24.5	
"		24.5 - 28.0	
Sim as above but very dry		24 - 35	
Slightly sandy clay, medium pack, moist, blw.		35 - 37	
Same as above but gravelly	—	37-42 42-44	
Gravel and Sand, course grain, loose pack, tan + brown		44. - 49.50	
Sand, course grain, gravelly, loose pack		49.5 -	

P-111-1

	Timing	actual
total depth -	50'	49'
Screen -	45-50	44-49'
sand	43-50	42-49
clay seal	42-43	40-42
grout	0-42	-40

GERAGHTY & MILLER, INC.

WELL LOG

PROJECT: Navy - Memphis T290ME1 DATE: 6-17-85 SHEET: 1 OF _____

LOCATION: Millington TN, landfill side DRILLING CONTRACTOR: Env. Drilling

WELL NUMBER: GM-2 DRILLING METHOD: solid stem auger

SAMPLE DESCRIBED BY: BJS SAMPLING METHOD: Sample off bucket

SAMPLE DESCRIPTION	blow/ft	DEPTH INTERVAL (FEET)	THICK (FE
Clay, pliable, brown and gray		0 - 2.5'	
same as above		2.5' - 7.5'	
same as above		7.5' - 12.5'	
Clay, pliable, blue; moist water level @ 13 ft. (Gravel)		12.5 - 17.5'	
Clay, plastic, silty, blue		17.5' - 22.5'	
Clay, sandy plastic, gray; sand, medium-grained, gray.		22.5 - 27.5'	
Clay, sandy (fine grained) soft, dark gray:		27.5 - 30'	
Sand, medium-grained clayey, dark gray.		30 - 32.5'	
same as above		32.5 - 36'	
Sand, medium to coarse-grained, tan; gravel.		36 - 38'	
same as above		38' - 46'	
Clay, soft cream to tan		46 - 48	

Screen 44 - 39'
Sand 44 - 36'
bentonite 36' - 35'
grout 35' - 0'

LITHOLOGIC LOG FOR MONITOR WELL GM-3
(002GM03DA)

Description	Depth (ft)	Thickness (ft)
Soil, organic, slightly clayey, brown.....	0.0 - 5.0	5.0
Clay, firm, green and yellow.....	5.0 - 10.0	5.0
Clay, firm, silty, green and yellow.....	10.0 - 13.0	3.0
Clay, very silty, slightly sandy, gray and yellow.....	13.0 - 15.0	2.0
Clay, pliable, blue-gray with yellow.....	15.0 - 20.0	5.0
Clay, pliable, blue-gray.....	20.0 - 30.0	10.0
Sand, silty, clayey, gray.....	30.0 - 32.0	2.0
No Sample.....	32.0 - 35.0	3.0
Sand, medium to coarse grain, tan.....	35.0 - 47.0	12.0

LITHOLOGIC LOG FOR MONITOR WELL GM-4
(002GM04UA)

Description	Depth (ft)	Thickness (ft)
Soil, organic, medium pack, brown.....	0. - 2.5	2.5
Soil, slightly clayey, pliable, brown-gray.....	2.5 - 4.0	1.5
Clay, pliable, brownish-gray with yellow..	4.0 - 7.5	3.5
Clay, pliable, medium to dense pack, green.....	7.5 - 12.5	5.0
Clay, pliable, silty, green and gray.....	12.5 - 17.5	5.0
Clay, pliable, silty, medium pack, blue-gray.....	17.5 - 22.5	5.0

GERAGHTY & MILLER, INC.

WELL LOG

PROJECT: NAS Memphis DATE: 12-14-84 SHEET: 1 OF

LOCATION: Millington Sandbank Ladder (GM-3) DRILLING CONTRACTOR:

WELL NUMBER: GM-3 DRILLING METHOD:

SAMPLE DESCRIBED BY: DG SAMPLING METHOD:

SAMPLE DESCRIPTION	blow/ft	DEPTH INTERVAL (FEET)	THICKN (FEE
* see log of GM-1 for details			
Soil, slightly clayey, brown		0-5'	
Clay, medium grain, green & yellow		5-10'	
loose sample clay, same as above but silty		10-13'	
shelby tube		recov 13-15	
clay, plastic, mottled blue gray w/ yellow streaks		15-20'	
blue gray clay		20-25	
same as above		25-30	
shelby tube - slightly sandy clay		30-32	
fine sand		32-35	
Sand, medium to coarse grain, traces of lignite, fine to		35-45	
same as above		40-45 47	

	Thick	Thick actual	actual
total depth	47	47	45
sand	40-45	42-47	40-45
silty	37-45	39-47	37-45
clayey	36-37	36-39	37-39
grout	0-36	0-36	0-37

GERAGHTY & MILLER, INC.

WELL LOG

PROJECT: NAS Memphis DATE: 12-15-87 SHEET: 1 OF

LOCATION: Southside landfill DRILLING CONTRACTOR: Geraghty

WELL NUMBER: GM-5 shallow DRILLING METHOD: Solid Auger

SAMPLE DESCRIBED BY: DG SAMPLING METHOD: off auger flight

SAMPLE DESCRIPTION	blow/ft	DEPTH INTERVAL (FEET)	THICKN (FEE
Soil, granular, medium pack, brown, (dirt)		0 - 2.5	
soil, slightly clay, pebble, brown - gray		2.5 - 4.0	
clay, pebble, fine grain, brownish-gray with yellow streak		4.0 - 7.5	
clay, fine grain, pebble, medium to dense pack, blue gray		7.5 - 12.5	
same as above but w/ gray leaves, silty and ↑ moisture		12.5 - 17.5	
same		12.5	
clay, fine grain, silty, pebble, medium pack, gray-blue		17.5 - 22.5	

	actual
total depth	22
screen	17 - 22
filter pack	12 - 22
clay seal	11 - 12
grout	0 - 11

LITHOLOGIC LOG FOR MONITOR WELL GM-5

(002GM05DA)

Description	Depth (ft)	Thickness (ft)
Soil, slightly clayey, medium pack, brown	0.0 - 5.0	5.0
Clay, pliable, marbled green, yellow, brown	5.0 - 20.0	15.0
Clay, silty, hard, gray and yellow	20.0 - 25.0	5.0
Clay, hard, blue-gray	25.0 - 40.0	15.0
Sand, course to fine-grained, brown-green	40.0 - 45.0	5.0
Sand, course to fine-grained, gravel, brown-green	45.0 - 50.0	5.0

GERAGHTY & MILLER, INC.

WELL LOG

PROJECT: NAS Memphis DATE: 12-15-84 SHEET: 1 OF ____

LOCATION: GM-5 at Scrubich Landfill DRILLING CONTRACTOR: Cascade Tech

WELL NUMBER: GM-5 DRILLING METHOD: Mud rotary

SAMPLE DESCRIBED BY: DG SAMPLING METHOD: Wash Samples

SAMPLE DESCRIPTION	blow/ft	DEPTH INTERVAL (FEET)	THI (I
Soil, slightly clayey, medium packed, brown		0-5	
Clay, of the green-yellow-brown ~~orange~~ type		5-10	
Clay, Firm packed same color as above		10-15	
same as above		15-20	
Clay, silty, dense packed, grey & yellow streaks		20-25	
clay - blue grey type		25-30	
same as above		30-35	
same as above		35-40	
Sand, fine to coarse, traces of lignite, brown-green		40-45	
same as above but w/ gravel		45-50	

mm

	Theory	actual
total depth	47'	57
screen	42-47	42-57
filter pack	36-47	48-57
clay seal	36-39	-48
grout	0-36	

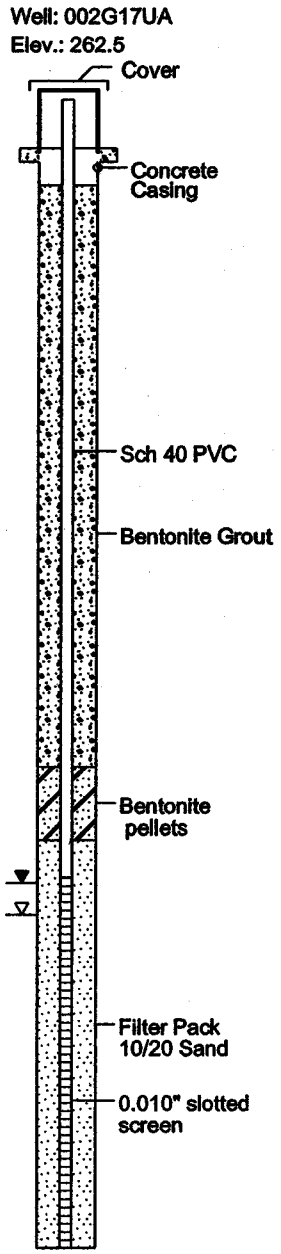
BORING LOG OF 002G17UA

NSA MID-SOUTH
Millington, TN.

Location: SWMU 2 Offsite
Project #: CTO 0106

Started	: 8/18/99@1000	Northing	: 382425
Finished	: 8/18/99@1130	Easting	: 816037
Drilling Method	: HSA	TOC Elevation	: 262.5
Drilling Company	: U.S.G.S.	Total Depth	: 30 feet
Geologist	: J. Carmichael	Well Screen	: 20 to 30 feet

Depth in Feet	Surf. Elev. 262	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	262	1					(0-15') Silt, trace clay, dark yellowish brown, moist
5	257	2					
10	252	3					Becoming more moist at ~13'
15	247	4				ML	(15-25') Silt, trace clay, olive gray, moist
20	242	5					(20-25') Trace calcareous nodules and wood fragments; possibly saturated at ~21'
25	237	6					(25-30') Becoming dusky brownish gray at ~28'; calcareous (snail) shell fragments; moist to wet (no water in augers)
30	232						
35							



07-28-2003 N:\well logs\NSAMidsouth\002G17UA.BOR

ENSAFE

BORING LOG OF 002G24DA

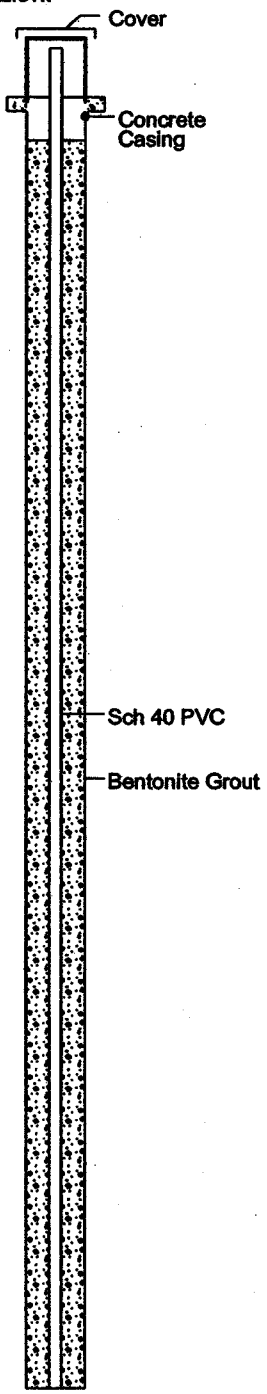
NSA MID-SOUTH
Millington, TN.

Location: SWMU 2
Project #: CTO 0106

Started	: 6/12/01@1605	Northing	: 382368.87
Finished	: 6/12/01@1630	Easting	: 816855.71
Drilling Method	: HSA	TOC Elevation	: 271.59
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 58 feet
Geologist	: J. Broughton	Well Screen	: 41.4 to 51.4 feet

Depth in Feet	Surf. Elev. 270	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	270	1	100			ML	(0-8') Clayey silt, medium gray with some minor gray mottling and root material, moist, friable (3-8') With some staining and iron maganese nodules
5	265	2	100				(5-8') Mottling decreasing down column
10	260	3	100			ML	(8-15') Silt, dark yellowish brown with gray mottling, with some staining, moist, friable (13-15') Increasing staining and iron and maganese nodules, some concretions
15	255	4	87				(15-18') Color is medium gray, very moist
20	250	5	80				(18-27.8') Color is medium gray/olive gray (21.5-27.8') With woody material (23-31.5') Very moist
25	245	6	90				(27-27.8') With some minor fine sand content (27.8-28') Silty fine sand, dark olive gray, very moist (28-31.5') Silt, medium olive gray, very moist, with some occasional shell matrerial
30		7	93				

Well: 002G24DA
Elev.:



07-28-2003 N:\well logs\NSAMidsouth\002G24DA.BOR

BORING LOG OF 002G24DA

ENSAFE

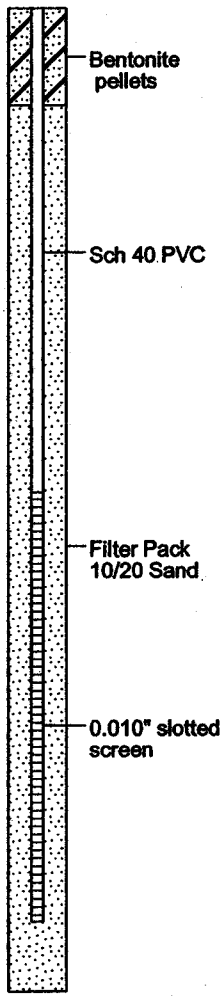
NSA MID-SOUTH
Millington, TN.

Location: SWMU 2
Project #: CTO 0106

Started	: 6/12/01@1005	Northing	: 382368.87
Finished	: 6/12/01@1630	Easting	: 816855.71
Drilling Method	: HSA	TOC Elevation	: 271.59
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 58 feet
Geologist	: J. Broughton	Well Screen	: 41.4 to 51.4 feet

Depth in Feet	Surf. Elev. 270	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
30	240	7	93			ML	(31.5-33') Becoming medium brown gray with some very fine sand content (33-42') Color is medium brownish olive gray, with some minor wood material and minor very fine sand content
35	235	8	93				
40	230	9	67				
45	225	10	50			SW-GW	(42-48') Sand, medium gray, fine to coarse grain with small to medium gravel, wet (43-48') With some large gravel (47-48') Occasional 2" fine to medium sand lenses
50	220	11	100			SW	(48-53') Sand, yellowish brown, fine to medium grain, wet (52-53') With occasional small to medium gravel
55	215	12	93			SP	(53-56.5') Sand, light gray, fine grain, wet (Cockfield Formation)
60						SC	(56.5-58') Sandy clay, medium gray, fine grain

Well: 002G24DA
Elev.:



07-28-2003 N:\well logs\NSAMidsouth\002G24DA.BOR

ENSAFE

BORING LOG OF 002G25DA

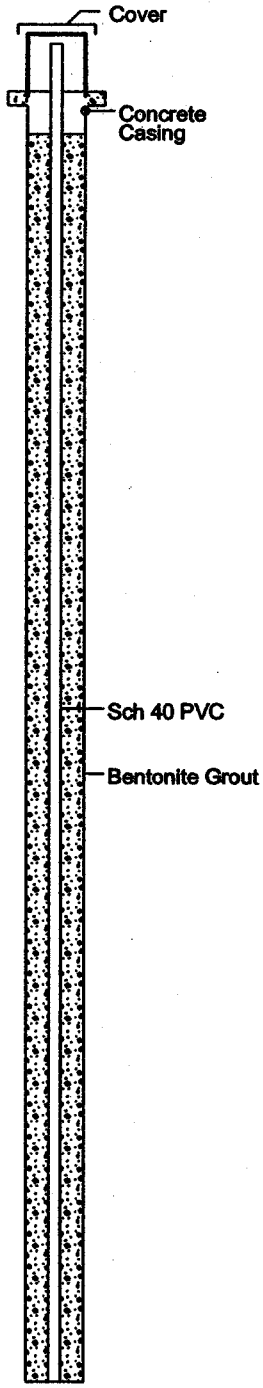
NSA MID-SOUTH
Millington, TN.

Location: SWMU 2
Project #: CTO 0106

Started	: 6/13/01@1250	Northing	: 382371.47
Finished	: 6/13/01@1505	Easting	: 816790.36
Drilling Method	: HSA	TOC Elevation	: 272.08
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 53 feet
Geologist	: J. Broughton	Well Screen	: 43 to 53 feet

Depth in Feet	Surf. Elev. 270.37	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	270	1	100			ML	(0-3') Clayey silt, yellowish brown with some gray mottling and staining, friable, with root material
5	265	2	93				(3-8') With no root material and increased gray mottling, friable, with occasioanl small iron concretions
10	260	3	80			ML	(8-16') Silt, light yellowish brown with gray mottling, dry and friable, with some iron staining and concretions
15	255	4	100				(13-16') With some occasional wood material
20	250	5	80				(16-23') Color is medium gray/olive gray, very
25	245	6	83				
30		7	80				

Well: 002G25DA
Elev.:



07-28-2003 N:\well logs\NSA\Midsouth\002G25DA.BOR

ENSAFE

BORING LOG OF 002G25DA

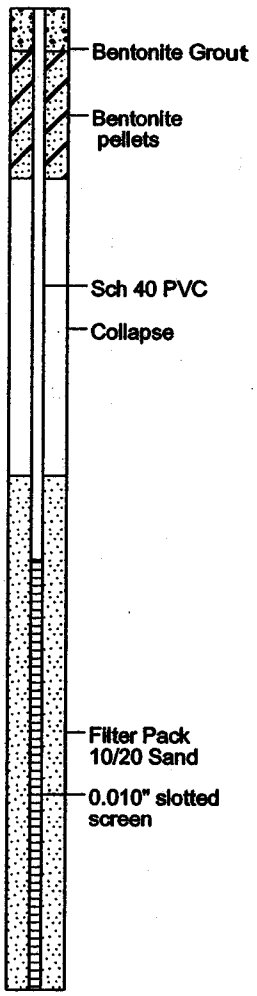
NSA MID-SOUTH
Millington, TN.

Location: SWMU 2
Project #: CTO 0106

Started	: 6/13/01@1250	Northing	: 382371.47
Finished	: 6/13/01@1505	Easting	: 816790.36
Drilling Method	: HSA	TOC Elevation	: 272.08
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 53 feet
Geologist	: J. Broughton	Well Screen	: 43 to 53 feet

Depth in Feet	Surf. Elev. 270.37	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
30	240	7	80			ML	
						SW	
35	235	8	80			ML	
40	230	9	20			SW-GW	
45	225	10	40			SM	
50	220	11	20			SW-GW	
						SP	
55	215						
60							

Well: 002G25DA
Elev.:



07-28-2003 N:\well logs\NSA\Mdsouth\002G25DA.BOR

ENSAFE

BORING LOG OF 002G26DA

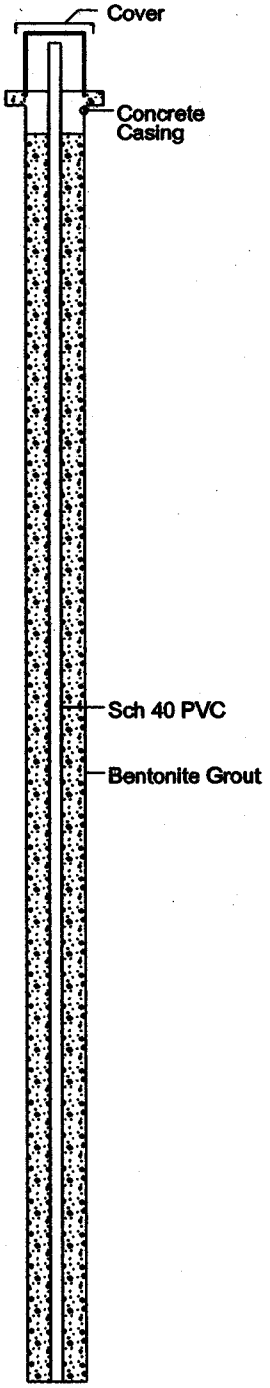
NSA MID-SOUTH
Millington, TN.

Location: SWMU 2
Project #: CTO 0106

Started	: 6/14/01@1240	Northing	: 382351.39
Finished	: 6/14/01@1555	Easting	: 816733.32
Drilling Method	: HSA	TOC Elevation	: 266.52
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 48 feet
Geologist	: J. Broughton	Well Screen	: 38 to 48 feet

Depth in Feet	Surf. Elev. 264.78	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	264	1	100			ML	(0-3') Clayey silt, dark yellowish brown with some minor staining and root material, moist, friable
5	259	2	90				(3-8') With no root material, w/ gray mottling + minor iron-manganese
10	254	3	100				(8-10') Same as above, light gray with staining and occasional concretions (10-12.5') Becoming silt, light gray, moist
15	249	4	80				(12.5-13') Color is medium gray(no staining)
20	244	5	100				(18-23') Same with occasional woody material and some minor sand content.
25	239	6	93				(23-29') Same as above, color is med olive gray w/ minor fine sand content
30		7	90				(29-37) Same as above, color is med gray w/ no woody material.

Well: 002G26DA
Elev.:



07-28-2003 N:\well logs\NSA\Mideouth\002G26DA.BOR

ENSAFE

BORING LOG OF 002G26DA

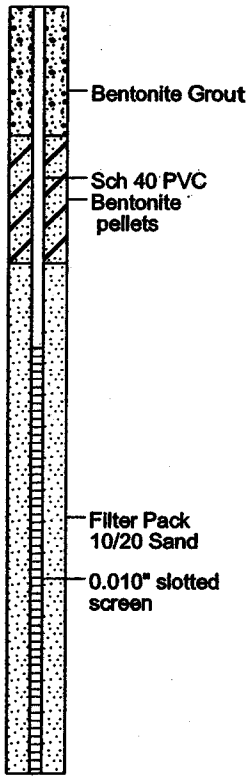
NSA MID-SOUTH
Millington, TN.

Location: SWMU 2
Project #: CTO 0106

Started	: 6/14/01@1240	Northing	: 382351.39
Finished	: 6/14/01@1555	Easting	: 816733.32
Drilling Method	: HSA	TOC Elevation	: 266.52
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 48 feet
Geologist	: J. Broughton	Well Screen	: 38 to 48 feet

Depth in Feet	Surf. Elev. 264.78	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
30	234	7	90			ML	
35	229	8	80				
						SM	Clayey Sand, med. gray, fine-medium grained w/ occasional gravel, wet (37-38')
40	224	9	30				Sand, light gray, fine-med with some coarse grained and some small-med gravel, wet (38-43')
						SW	No sample recovery (43-48')
45	219	10	0				TD @ 48'
50	214						
55	209						
60							

Well: 002G26DA
Elev.:



07-28-2003 N:\well logs\NSA Mid-south\002G26DA.BOR

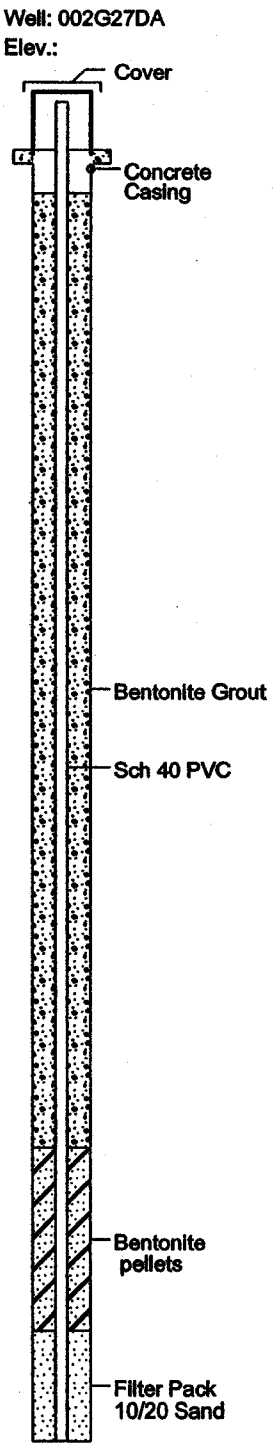
BORING LOG OF 002G27DA

NSA MID-SOUTH
Millington, TN.

Location: SWMU 2
Project #: CTO 0106

Started	: 6/14/01@ 950	Northing	: 382368.10
Finished	: 6/14/01@1320	Easting	: 816664.53
Drilling Method	: HSA	TOC Elevation	: 264.52
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 48 feet
Geologist	: J. Broughton	Well Screen	: 32.5 to 42.5 feet

Depth in Feet	Surf. Elev. 262.81	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0							
	262	1	100				(0-3') Clayey silt, dark yellowish brown, moist, friable, w/ some root material
						ML	(3-8') Same as above with staining and iron concretions, no root material, minor light gray mottling
5	257	2	100				
		3	100				(8-11.5') Same as above, light gray brown w/ more staining and iron-manganese nodules
10	252						(11.5- 16.5) Silt, light olve gray, v. moist, friable, w/ some woody material
		4	100				
15	247						(16.5-18) Same as above, med. olive gray, w/ minor woody material
		5	90			ML	
20	242						(23-28') Same as above w/ less woody material
		6	90				
25	237						(28-33') Same as above, color is med-dark olive gray/gray brown
		7	93				
30							



07-26-2003 N:\well logs\NSAMidsouth\002G27DA.BOR

ENSAFE

BORING LOG OF 002G27DA

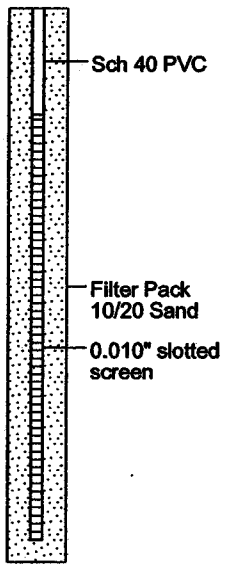
NSA MID-SOUTH
Millington, TN.

Location: SWMU 2
Project #: CTO 0106

Started	: 6/14/01@ 950	Northing	: 382368.10
Finished	: 6/14/01@1320	Easting	: 816664.53
Drilling Method	: HSA	TOC Elevation	: 264.52
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 48 feet
Geologist	: J. Broughton	Well Screen	: 32.5 to 42.5 feet

Depth in Feet	Surf. Elev. 262.81	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
30							
	232	7	93			ML	
35	227	8	40			SM	(33-37.5) Clayey Sand, dark gray and light olive gray, fine-med grained w/ small-med gravel, wet.
40	222	9	40			SW	(37.5-42) Sand, light olive brown gray, fine-med grain w/ some small-med gravel, wet.
45	217	10	40			SP/SM	(42-28') Sand, light gray, v. fine, wet w/ some minor clay stringers (possibly Cockfield)
50	212						
55	207						
60							

Well: 002G27DA
Elev.:



07-28-2003 N:\well logs\NSAMidsouth\002G27DA.BOR

ENSAFE

BORING LOG OF 002G28DA

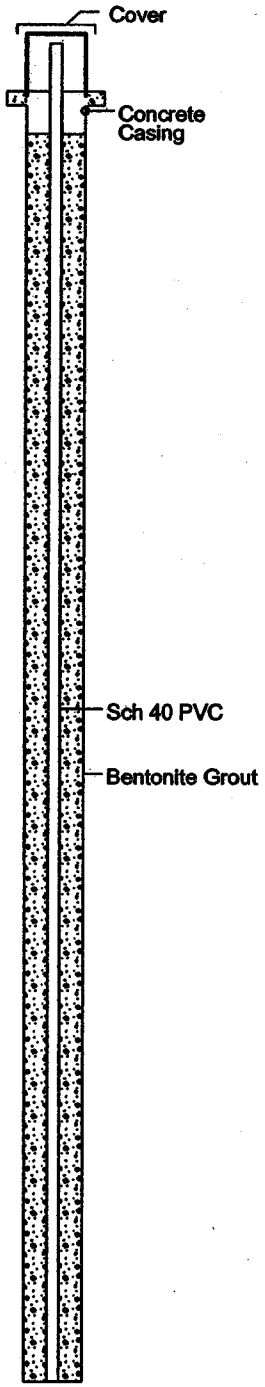
NSA MID-SOUTH
Millington, TN.

Location: SWMU 2
Project #: CTO 0106

Started	: 6/18/01@ 1020	Northing	: 382395.41
Finished	: 6/19/01@1130	Easting	: 816826.71
Drilling Method	: HSA	TOC Elevation	: 269.89
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 50 feet
Geologist	: J. Broughton	Well Screen	: 40 to 50 feet

Depth in Feet	Surf. Elev. 268.30	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	268	1	100			ML	(0-1.5') Clayey silt, dark yellowish brown w/ gray mottling, moist, friable, w/root material and some staining and iron-manganese nodules l
5	263	2	100				(3-8') Same as above w/ no root material, w/ some iron concretions
							Same as above, light olive gray, w/ odor.
10	258	3	100			ML	(14- 23) Silt, light olve gray, v. moist
							(10.5'- 14) Same as above, w/ yellow brownish mottling and increased concretions, no odor
15	253	4	80				
20	248	5	83				
							(23-27) Same as above w/ some woody material
25	243	6	90				
		7	83			SM	(27-30.5') Same as above w/ fine sand near bottom of sampler
30							

Well: 002G28DA
Elev.:



07-26-2003 N:\well logs\NSA\Midsouth\002G28DA.BOR

ENSAFE

BORING LOG OF 002G28DA

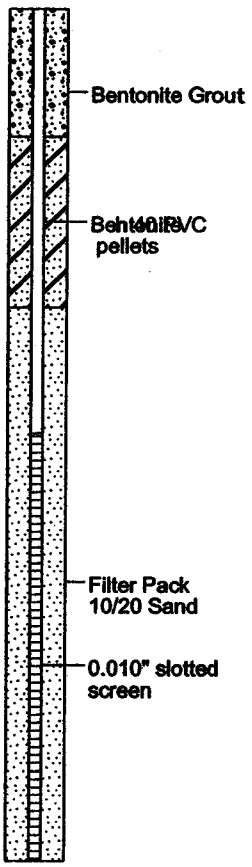
NSA MID-SOUTH
Millington, TN.

Location: SWMU 2
Project #: CTO 0106

Started	: 6/18/01@ 1020	Northing	: 382395.41
Finished	: 6/19/01@1130	Easting	: 816826.71
Drilling Method	: HSA	TOC Elevation	: 269.89
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 50 feet
Geologist	: J. Broughton	Well Screen	: 40 to 50 feet

Depth in Feet	Surf. Elev. 268.30	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
30	238	7	83			SM	(30.5- 36) med olive grey w/ increased fine sand content, no woody material
35	233	8	83				
40	228	9	0			SM/SP	(36-38) Silty Sand, med gray brown, fine grain, v. moist.
45	223	10	0				No recovery from 38-43'. Will run augers down to 50' to set well.
50	218						
55	213						
60							

Well: 002G28DA
Elev.:



07-28-2003 N:\well logs\NSA\Midsouth\002G28DA.BOR

SWMU 3

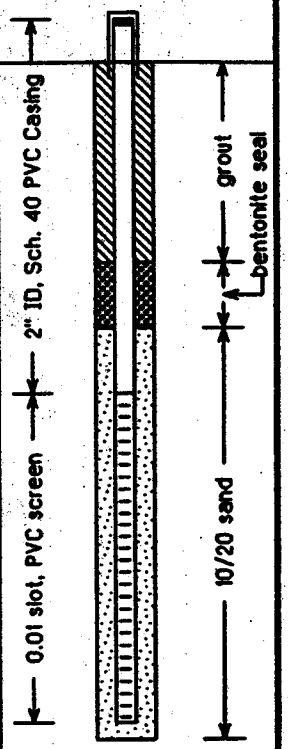
EnSafe/Allen & Hoshall

Monitoring Well 03MW01LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#3 – Building N-121*
Project No.: *N0094*	Surface Elevation: *286.43 feet msl*
Started at *0830 on 1-25-95*	TOC Elevation: *287.85 feet msl*
Completed at *0930 on 1-25-95*	Depth to Groundwater: *9.21 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *277.22 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *William Parks*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Silt, clayey, yellowish brown and moderate gray; mixed, moist.	
5			1	40	BG			Clay, silty, moderate gray to brownish gray, moist.	
10			2	22	BG		ML	Silt, yellowish brown with yellowish orange, moist.	
15			3	125	BG			Silt, yellowish brown with yellowish orange, contains small iron or manganese nodules associated with the staining.	
20			4	125	BG			Boring terminated at 20'. 6" sump at bottom of screen.	266.4
25								BG = Background	
30									
35									
40									

WELL DIAGRAM



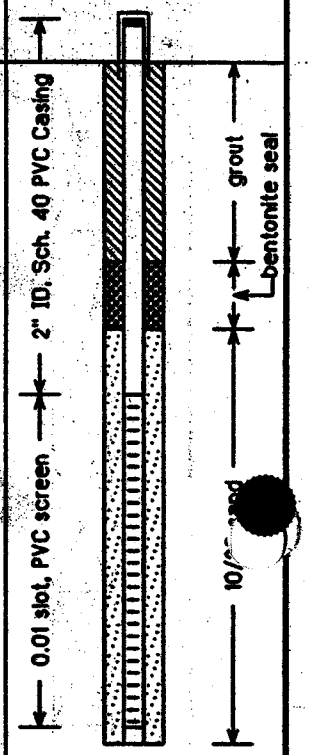
EnSafe/Allen & Hoshall

Monitoring Well 03MW02LS

Project: NAS Memphis	Location: Millington, TN. SWMU#3 - Building N-121
Project No.: N0094	Surface Elevation: 286.20 feet msl
Started at 1300 on 1-25-95	TOC Elevation: 289.37 feet msl
Completed at 1330 on 1-25-95	Depth to Groundwater: 9.60 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 279.77 feet msl
Drilling Company: North Star Drilling	Total Depth: 20.0 feet
Geologist: William Parks.	Well Screen: 10 to 20 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Soil and fill.	
								Silt , yellowish brown, moist.	
5			1	70	BG			Silt yellowish brown to yellowish gray, stained yellowish orange, moist to wet.	
10			2	60	BG		ML	Silt, yellow brown to yellow gray, moist; contains some small iron or maganese nodules.	
15			3	110	BG			Silt, yellowish brown to moderate gray (mottled). Wet at 15'-16' becoming uniformly moderate gray below 17'.	
20			4	100	BG			Boring terminated at 20'. 6" sump at bottom of screen.	266.2
								BG = Background	
25									
30									
35									
40									

WELL DIAGRAM



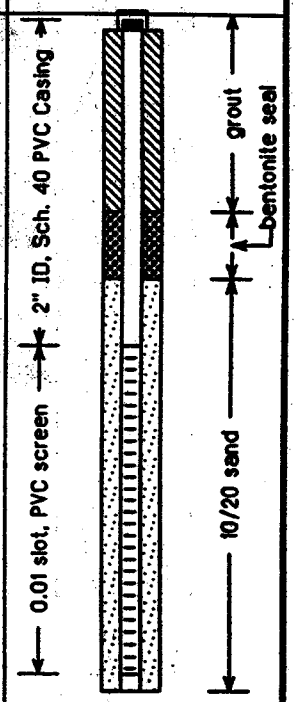
EnSafe/Allen & Hoshall

Monitoring Well 03MW03LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#3 – Building N-121*
Project No.: *N0094*	Surface Elevation: *285.23 feet msl*
Started at *1600 on 1-25-95*	TOC Elevation: *285.04 feet msl*
Completed at *1700 on 1-25-95*	Depth to Groundwater: *16.02 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *269.02 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *William Parks*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Asphalt, soil and fill.	
								Silt, yellowish brown mottled yellowish gray, moist.	
5			1	75	BG			Silt yellowish brown mottled yellowish gray, moist, contains some iron or manganese nodules.	
			2	75	BG			Silt, yellowish brown mottled yellowish gray; stained yellowish orange; contains scattered iron and maganese nodules. Wet at 11'.	
10							ML		
			3	150	BG			Silt, yellowish gray, stained yellowish orange to grayish orange. orange.	
15			4	75	BG			Silt, light olive gray, moist. Very uniform in texture to 20'.	
20			5	75	BG			Terminated Boring at 20'. 6" sump at bottom of screen.	265.2
								BG = Background	
25									
30									
35									
40									

WELL DIAGRAM



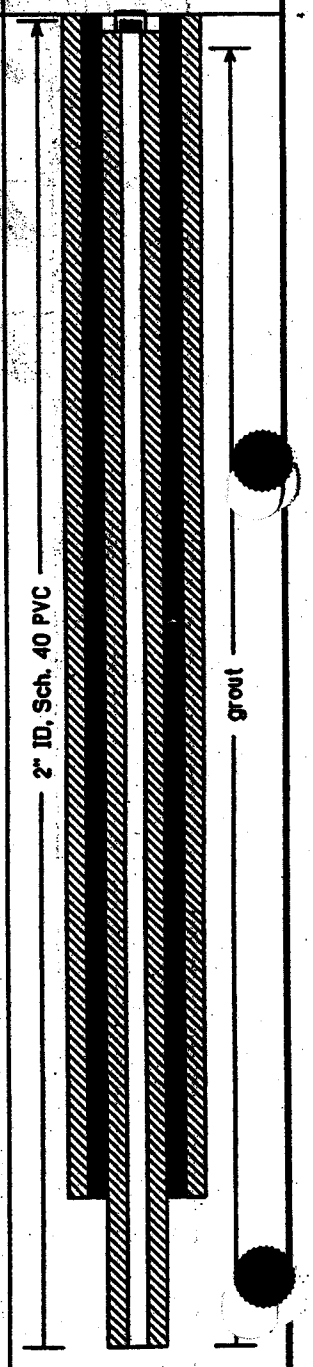
EnSafe/Allen & Hoshall

Monitoring Well 03MW03MF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#3 – Building N-121*
Project No.: *N0094*	Surface Elevation: *284.15 feet msl*
Started at *1020 on 1-26-95*	TOC Elevation: *286.28 feet msl*
Completed at *1430 on 1-26-95*	Depth to Groundwater: *26.17 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *260.09 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *85.0 feet*
Geologist: *David Ladd*	Well Screen: *50 to 60 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Asphalt and fill material.	
								Silt, yellowish brown to yellowish gray, locally stained dark yellowish orange. Contains iron – manganese nodules.	
5			1	62.5	BG				
			2	75	BG				
10			3	87.5	BG				
								Silt, medium dark gray to dark gray.	
15									
								Silt, light olive gray to greenish gray. (Wet from 20'–23').	
20			4	112.5	BG		ML		
25								Silt, light olive gray to pale yellowish brown, moist from 25'–30'.	
			5	100	BG				
30								Silt, light olive gray to greenish gray.	
								Silt, light olive gray to pale yellowish brown.	
35			6	100	BG			Silt, yellowish gray to light olive gray, rare iron inclusions, trace of clay, moist.	247.8
								Sand, very fine to fine, silty, grayish orange to dark yellowish orange, trace of clay, wet. Ironstone fragments 41'.	
40							SM		

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 03MW03MF

Project: NAS Memphis	Location: Millington, TN SWMU#3 - Building N-121
Project No: N0094	Surface Elevation: 284.15 feet msl
Started at 1020 on 1-26-95	TOC Elevation: 286.28 feet msl
Completed at 1430 on 1-26-95	Depth to Groundwater: 26.17 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 260.09 feet msl
Drilling Company: North Star Drilling	Total Depth: 85.0 feet
Geologist: David Ladd	Well Screen: 50 to 60 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			7	90	BG			Sand, pale to dark yellowish orange, silty, wet. Sand, fine, silty, brownish gray, wet. Sand, fine, predominantly grayish orange. Becomes mostly dark yellowish orange from 53'-55', wet. Some gravel to an inch LD at 53'.	
50									
55			8	100	BG		SM	Sand, fine, grayish orange color approaches dark yellowish orange as you go deeper in the sample, wet. Some gravel of various sizes, throughout sample. Section with the moist gravel ~57'-60'. Silty seam from ~63'-63.5'. Some mottled gray clay ~60.5'.	
60									
65			9	95	BG			Sand, silty with gravel (same as above). Sand, fine, silty, rare gravel, very light gray to yellowish gray, mottled dark yellowish orange, wet.	218.1
70							ML	Silt, sandy, some clay, soft to stiff, yellowish gray to very pale orange, mottled with dark yellowish orange, moist.	212.1
75			10	95	BG		SP	Sand, silty, with gravel, grayish orange to dark yellowish orange, wet. Sand, medium to coarse, with gravel, grayish orange, wet. At 82.5 sand becomes dark yellowish orange, more gravel (predominantly chert and quartz).	
80									

WELL DIAGRAM: 0.01 slot, PVC screen — 2" ID, Sch. 40 PVC — grout — bentonite seal — 10/20 sand — bentonite plug

EnSafe/Allen & Hoshall

Monitoring Well 03MW03MF

Project: NAS Memphis	Location: Millington, TN SWMU#3 - Building M-121
Project No.: N0094	Surface Elevation: 284.15 feet msl
Started at 1020 on 1-26-95	TOC Elevation: 286.28 feet msl
Completed at 1430 on 1-26-95	Depth to Groundwater: 26.17 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 260.09 feet msl
Drilling Company: North Star Drilling	Total Depth: 85.0 feet
Geologist: David Ladd	Well Screen: 50 to 60 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85	X		11	95	BG		SP / ML	Silt, sandy, grayish orange to dark yellowish orange, wet.	200.1 / 199.1	bentonite plug

Boring terminated at 85', and backfilled with bentonite chips to 60'.

BG = Background

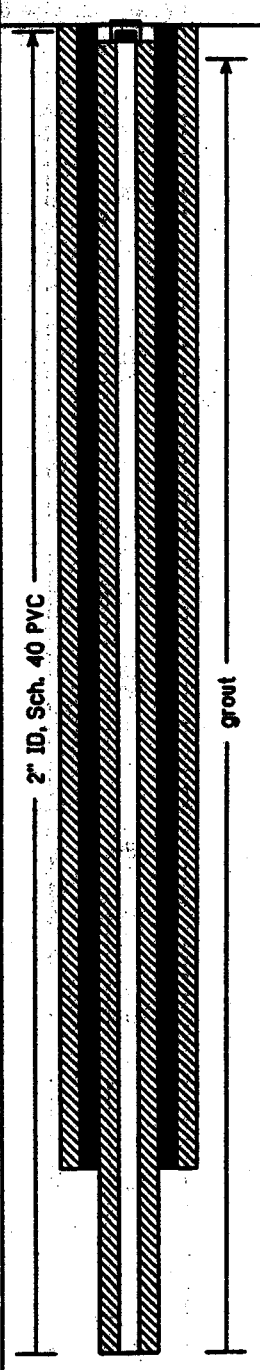
EnSafe/Allen & Hoshall

Monitoring Well 03MW04LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#3 - Building N-121*
Project No.: *N0094*	Surface Elevation: *284.54 feet msl*
Started at *1300 on 1-27-95*	TOC Elevation: *284.21 feet msl*
Completed at *1550 on 1-27-95*	Depth to Groundwater: *25.43 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.78 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *86.0 feet*
Geologist: *David Ladd*	Well Screen: *75 to 85 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Asphalt and fill material.	
								Silt, light olive gray.	
5			1	87.5	BG			Clay, silty, dusky brown.	
			2	87.5	BG				
10								Silt, pale yellowish brown to brownish gray, iron manganese nodules.	
			3	112.5	BG			Silt, clayey, medium light gray to brownish gray, stained locally; dark yellowish orange (12'-16' is wet).	
15									
20							ML		
			4	70	BG			Silt, clayey, brownish gray to medium light gray, stained locally; dark yellowish orange.	
25								Silt, clayey, light olive gray to greenish gray, stained locally; dark yellowish orange.	
30									
								Silt, clayey, light olive gray to moderate olive brown, stained; dark yellowish orange near 36'.	
35			5	104	BG				
								Silt, sandy, moderate olive brown to moderate yellowish brown, contains alternating layers of sand, fine to medium (1.5' layers), with a significant amount of ferruginous and manganese nodules (up to .25' in size).	
40									

WELL DIAGRAM



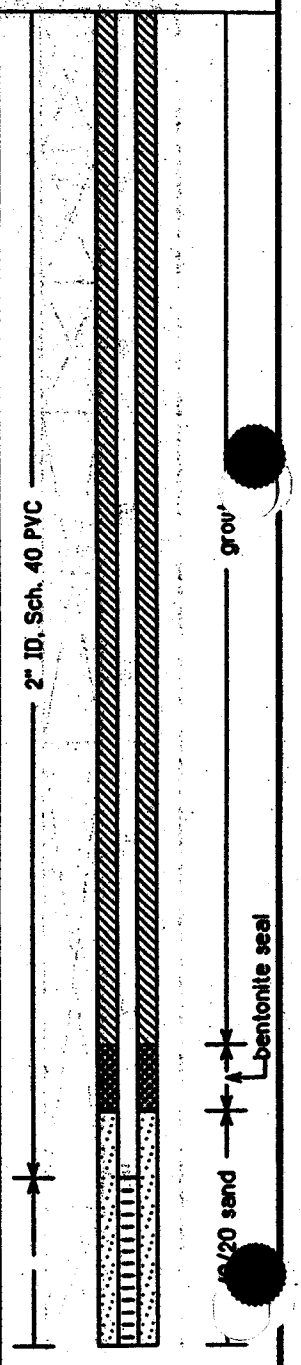
EnSafe/Allen & Hoshall

Monitoring Well 03MW04LF

Project: NAS Memphis	Location: Millington, TN. SWMU#3 - Building N-121
Project No.: N0094	Surface Elevation: 284.54 feet msl
Started at 1300 on 1-27-95	TOC Elevation: 284.21 feet msl
Completed at 1550 on 1-27-95	Depth to Groundwater: 25.43 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 258.78 feet msl
Drilling Company: North Star Drilling	Total Depth: 86.0 feet
Geologist: David Ladd	Well Screen: 75 to 85 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	(38-43') Silt, clayey, sandy, firm, light gray to light brownish gray. Silt, sandy, light gray to medium light gray, stiff.	240
45			6	95.5	BG			Sand, fine, silty, light to yellowish gray, wet. More clay from 45.5' -46.5'. Sand, fine to medium, dark yellowish gray, wet. At 47.5' color turns olive gray to light olive gray for about 2.5".	
50								Sand, fine, grayish orange to yellowish orange, wet. Rare mica and rare chert gravel. Gravel becomes scattered below 56' and abundant below 58' (Alternating layers of sandy gravel and gravelly sand).	
55			7	100	BG				
60							SP		
65			8	115	BG			Sand, clayey, fine yellowish gray becoming stained dark yellowish orange, with disseminated lignitic particles and chert gravel, moist. Sand, fine, grayish orange to yellowish gray, with chert gravel and some lignitic clay streaks, wet; ~72'- about 4" of sandy silt.	
70									
75			9	80	BG			Sand, fine to very coarse, yellowish orange to yellowish brown, abundant chert and quartz gravel, wet. Gravel decreases in abundance below 78'. Then alternating layers of sandy gravel and gravelly sand. Turns dark yellowish orange at ~81.5'. Abundant gravel below 82.5'. At 83' color turns to olive gray to light olive gray for ~2".	
80									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 03MW04LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#3 - Building N-121*
Project No.: *N0094*	Surface Elevation: *284.54 feet msl*
Started at *1300 on 1-27-95*	TOC Elevation: *284.21 feet msl*
Completed at *1550 on 1-27-95*	Depth to Groundwater: *25.43 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.78 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *86.0 feet*
Geologist: *David Ladd*	Well Screen: *75 to 85 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			10	100	B6		SP	Boring terminated at 86', then backfilled with bentonite chips to 85'.	199.5	10/20 sand
90										
95										
100										
105										
110										
115										
120										

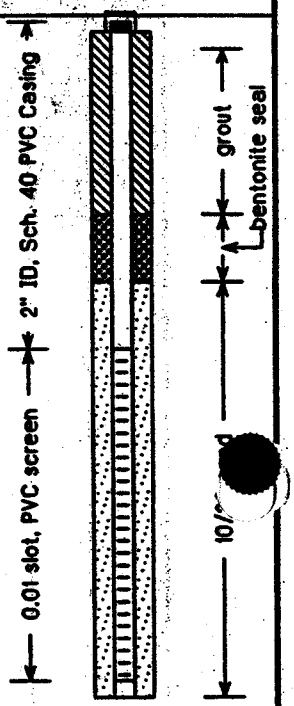
EnSafe/Allen & Hoshall

Monitoring Well 03MW04LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#3 – Building N-121*
Project No.: *N0094*	Surface Elevation: *284.45 feet msl*
Started at *0815 on 1-27-95*	TOC Elevation: *284.26 feet msl*
Completed at *0940 on 1-27-95*	Depth to Groundwater: *8.42 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *275.84 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Asphalt and fill.	
								Silt, slightly clayey, olive gray; small black inclusions in lower ~1' of sample; moist, crumbly to sl. stiff.	
5			1	50	BG			Silt, clayey, soft to stiff, brownish gray, some iron & orange (black) inclusions; inclusions increasing in number at ~9'.	
10			2	100	BG		ML	Silt, clayey, brownish gray to light brownish gray mottled yellowish orange grayish brown (inclusions), soft, moist.	
15								Silt, clayey, light olive gray to dark yellowish brown mottled yellowish orange (inclusions as above gone); soft to slightly stiff; wet zone soft and "goopy" from ~ 15'–16'.	
			3	113	BG			Shelby tube collected from 18'–20'.	
20			4	100	BG			Terminated Boring at 20'. 6' sump at bottom of screen.	264.5
25								BG = Background	
30									
35									
40									

WELL DIAGRAM



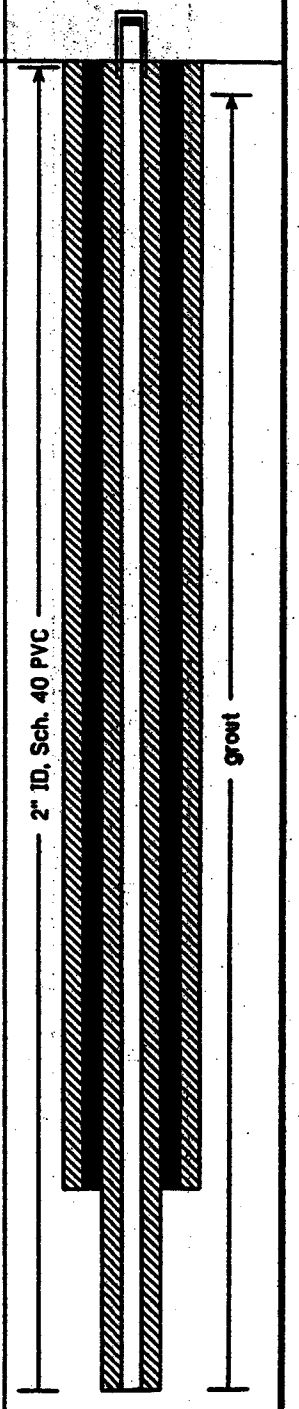
EnSafe/Allen & Hoshall

Monitoring Well 03MW05MF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#3 – Building N-121*
Project No.: *N0094*	Surface Elevation: *284.15 feet msl*
Started at *1145 on 1-30-95*	TOC Elevation: *286.26 feet msl*
Completed at *1440 on 1-30-95*	Depth to Groundwater: *27.38 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.88 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *65.0 feet*
Geologist: *William Parks*	Well Screen: *53 to 63 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							ML	Soil and Grass.	
								Fill, Silt yellowish brown mixed with chunks of moderate gray clay.	
5									278.1
							CL	Clay, olive gray to moderate gray ; contains scattered small iron and manganese nodules.	
10			1	95	BG				274.1
								Silt, yellowish-gray, stained yellowish orange. Some scattered small manganese or iron nodules present.	
15			2	92	BG				
20							ML	Silt, clayey, brownish gray, stained yellowish orange.	
25			3	95	BG			Silt, clayey, olive gray to greenish gray, stained yellowish orange.	
30								Silt, clayey, yellowish gray to yellowish brown, mottled light gray.	
35			4	80	BG				248.1
							SM	Sand, very fine, silty, yellowish brown mottled yellowish gray; contains scattered iron or manganese nodules up to one-quarter inch.	
40									

WELL DIAGRAM



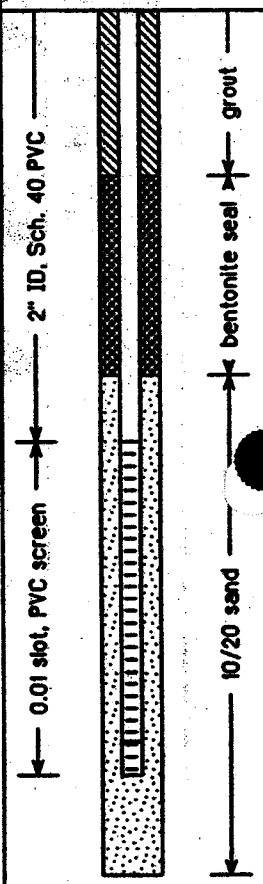
EnSafe/Allen & Hoshall

Monitoring Well 03MW05MF

Project: *NAS Memphis*	Location: *Millington, TN. ShMU#3 - Building N-121*
Project No.: *N0094*	Surface Elevation: *284.15 feet msl*
Started at *1145 on 1-30-95*	TOC Elevation: *286.26 feet msl*
Completed at *1440 on 1-30-95*	Depth to Groundwater: *27.38 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.88 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *65.0 feet*
Geologist: *William Parks*	Well Screen: *53 to 63 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			5	39	BG		SM	Sand, very fine, light gray locally, stained yellowish gray to grayish yellow, moist.	239.1
50							SW	Sand, fine, yellowish gray; locally stained yellowish orange, in upper one and a half feet; contains some fine mica.	
55			6	105	BG				
60							SP	Sand and gravel, grayish yellow, stained yellowish orange, fine to coarse grained; chert and quartz gravel up to one and a half inches in diameter in longest dimension.	225.1
65			7	120	BG			Boring terminated at 66'.	218.1
70								BG = Background	
75									
80									

WELL DIAGRAM



LITHOLOGIC LOG FOR MONITOR WELL GM-6

(003GM06UF)

Description	Depth (ft)	Thickness (ft)
Soil, granular, medium to firm pack, brown.....	0 - 2.5	2.5
Soil, slightly clayey, medium pack, brown.....	2.5 - 5.0	2.5
Clay, hard, dense pack, light brown.....	5.0 - 7.0	2.0
Clay, pliable, marbled brown, yellow and gray.....	7.0 - 17.0	10.0
Clay, pliable, blue-gray.....	17.0 - 21.0	4.0
Clay, pliable, marbled yellow and green...	21.0 - 22.0	1.0
Clay, hard, dense pack, amber.....	22.0 - 30.0	8.0
Clay, pliable, silty, blue-gray.....	30.0 - 32.0	2.0
Clay, dense, brittle, amber.....	32.0 - 35.0	3.0
Clay, very sandy, course grain, amber.....	35.0 - 42.0	7.0
nd, medium grain, loose pack, light ber.....	42.0 - 52.0	10.0

: GERAGHTY & MILLER, INC.

WELL LOG

plastic pliable

PROJECT: NAS Memphis DATE: 12-9-84 SHEET: 1 OF ____

LOCATION: Millington TN DRILLING CONTRACTOR: Brown Jenny

WELL NUMBER: GM-6 opposite of N-121 DRILLING METHOD: Solid Stem Auger

SAMPLE DESCRIBED BY: DC SAMPLING METHOD: off auger flight

SAMPLE DESCRIPTION	blow/ft	DEPTH INTERVAL (FEET)	THICKNESS (FEET)
Soil, granular, medium to firm packy brown (dirt)		0 - 2.5	
Slightly clayey soil, medium pack, brown		2.5-5.0	
clay, dense pack, flaky, light brown		5.0 - 7.0	
clay, desiccated, plastic, marbled, brown, yellow & grey		7.0 - 10 ±	
clay, medium pack, pliable, marbled brown yellow & grey		10 - 12.5	
same as above (moisture ↑)		12.5 - 15.0	2
same as above but softer		15 - 17.0	2 (pocket)
clay, soft, dense pack, blue (grey)		17.0 - 21	dry
clay, softer, dense pack, marbled - yellow-green		21 - 22	
clay, dense pack, brittle, amber (yellow)		22 - 27	
same as above		27 - 30	
clay, soft, pliable, blue-grey (silty)		30 - 32	
Clay, dense pack, brittle, amber		32 - 35	
Sandy clay, course grain, medium pack, amber		35 - 37	
same as above but wet		37 - 40.5	3
sandy, clay, course grain, firm pack, marbled white & amber		40.5 - 42	
Sand, medium coarse grain, loose pack, light amber (light brown)		42 - 52	

Item	Actual
Total Depth	50	50
screen	45-50	45-50
Sand	42-50	42-50
Cement	41-42	40-42
grout	0-42	0-40

1 inner ring
1 outer slightly ring
1 cool mold

LITHOLOGIC LOG FOR MONITOR WELL GM-7

(003GM07UF)

Description	Depth (ft)	Thickness (ft)
Soil, clayey, granular, brown.....	0.0 - 10.0	10.0
Clay, pliable, marbled yellow, green and brown.....	10.0 - 25.0	15.0
Clay, dense, blue-gray.....	25.0 - 45.0	20.0
Clay, silty, light gray.....	45.0 - 50.0	5.0
Sand, medium to fine grain, tan.....	50.0 - 65.0	15.0

LITHOLOGIC LOG OF MONITOR WELL GM-8

(003GM08LS)

Description	Depth (ft)	Thickness (ft)
Soil, granular, medium to dense pack, brown.....	0 - 3.5	3.5
Clay, hard, dense dark green.....	3.5 - 7.5	4.0
Clay, pliable, marbled yellow and gray....	7.5 - 15.0	7.5
Clay, pliable, medium pack, gray.....	15.0 - 20.0	5.0

GERAGHTY & MILLER, INC.

WELL LOG

PROJECT: NAS - Memphis DATE: 12-11-84 SHEET: 1 OF ____

LOCATION: Millington TN DRILLING CONTRACTOR: Aaron Testing

WELL NUMBER: GM-7 (designated N-131) DRILLING METHOD: Mud rotary

SAMPLE DESCRIBED BY: DC SAMPLING METHOD: Split spoon

SAMPLE DESCRIPTION	blow/ft	DEPTH INTERVAL (FEET)	THICKN (FEE
** see log of GM-6 for details & GM-8		0-5	
Shelby tube from 10' to 15' 33' Soil,		5-10	
Clayey soil, brown		10-12	
same as above		12-15'	
Clay mottled yellow-brown		15-20	
Clay		25-35	
Shelby tube		35-37	
clay of blue-gray type		37-40	
same as above		40-45	
clay, silty, light gray		45-50	
sand, medium to fine grained, tan		50-55	
same as above		55-65	

	Theory	actual
Teki depth	65'	60
sirein	60-65'	55-60
Filter pack	57-65	52-60
Clay seal	56-57	51-52
Grout	0-57	

GERAGHTY & MILLER, INC.

WELL LOG

PROJECT: AVX - Memphis DATE: 12-13 SHEET: 1 OF

LOCATION: Millington TN DRILLING CONTRACTOR: American Drilling

WELL NUMBER: GM-8 (N-121) DRILLING METHOD: Solid Stem Auger

SAMPLE DESCRIBED BY: DG SAMPLING METHOD: Sample of auger fault

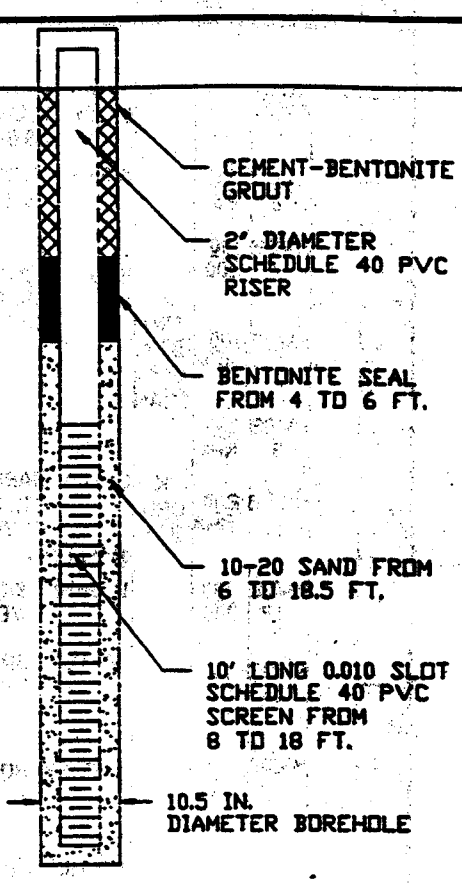
SAMPLE DESCRIPTION	Blow/ft	DEPTH INTERVAL (FEET)	THICKNESS (FEET)
Soil, granular, medium to dense pack, brown (dirt)		0 - 2.5 - 3.5	
Clay, [illegible], very dense pack, dark green - brown		2.5 - 3.5 - 7.5	
clay, dense pack, plastic, mottled yellow & grey		7.5 - 12.5	
Clay, fine grain, medium plastic pack, moist, grey & yellow		12.5 - 15.0	
Clay, fine grain, medium plastic pack, moist, grey		15. - 17.5	
same as above (very moist)		17.5 - 20.0	

total depth 20'
screen 15-20
filter pack 10-20
clay seal 9-10

SWMU 5

DEPTH (FEET)	SAMPLE INTERVAL	SAMPLE NUMBER	PID (PPM) (INITIAL/15 MIN.)	LABORATORY ANALYSIS	DESCRIPTION OF SUBSURFACE MATERIALS
		MW01 0	1/2		0-0.5 LIGHT BROWM SAND AND SILT WITH ORGANICS AND ROOTS.
		MW01 2	1/2		0.5-2 DARK BROWN SILT AND CLAY WITH LAYERED TEXTURE. TIGHT,DRY.
		MW01 4	1/2		2-4 MOTTLED BROWN,LIGHT-BROWN,ORANGE-BROWN SILT AND CLAY WITH DARK ORGANIC SPECKS. TIGHT,DRY.
5		MW01 6	1/2		4-12 MOTTLED CLAY,SOME SILT BECOMING LIGHT GRAY/BROWN. TIGHT,MOIST.
		MW01 8	1/3	GRO, BTX	
10		MW01 10	1/3		● WATER AT 10-12 FT.
		MW01 12	1/3		12-18 HOMOGENOUS GRAY SILT. FIRM TO SOFT,WET
		MW01 14	1/5		
15		MW01 16	1/3		
					18-18.5 NO SAMPLE END OF BORING AT 18.5 FT.
20					
25					
30					

WELL CONSTRUCTION DETAILS



DRILLER: PROFESSIONAL SERVICE INDUSTRIES, INC.
4161 RIDGEMOOR AVENUE
MEMPHIS, TN. 38118

DRILLING AND SAMPLING METHOD:
6.25-INCH ID HOLLOW STEM AUGERS
2 FT. LONG, 2 IN. OD SPLIT BARREL SAMPLER

DATE OF COMPLETION: 06/22/92

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
AIRCRAFT FIRFIGHTING TRAINING FACILITY
NAS MEMPHIS, TN.

BORING B-01
MW-01
(FF01LS)

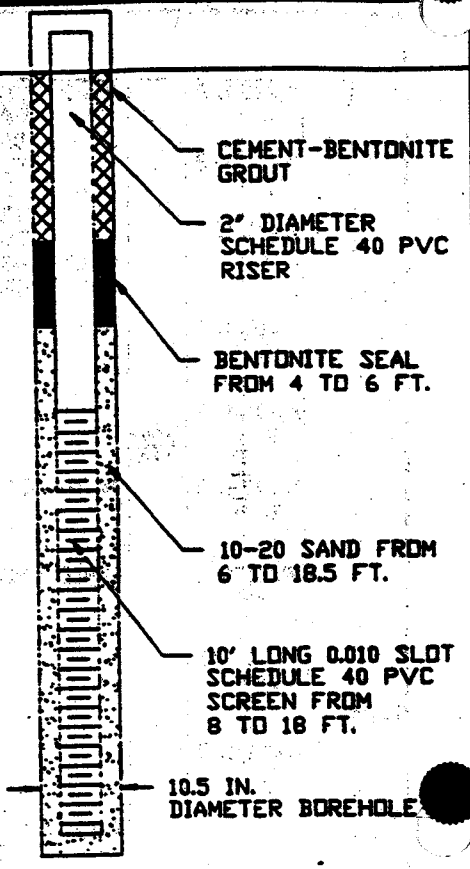
DATE: 08/08/92

DWG NAME: 026MW-01

DEPTH (FEET)	SAMPLE INTERVAL	SAMPLE NUMBER	PID (PPM) (INITIAL/15 MIN.)	LABORATORY ANALYSIS	DESCRIPTION OF SUBSURFACE MATERIALS
		MW02 0	1 / 11		0-0.5 LIGHT BROWN SAND AND SILT WITH ORGANICS AND ROOTS.
		MW02 2	28 / 25		0.5-2 MOTTLED BROWN, ORANGE-BROWN SILT AND CLAY. TIGHT,DRY.
5		MW02 4	100 / 200	K, GRO, BTX	2-5 MOTTLED BROWN, ORANGE-BROWN, GREEN-GRAY SILT AND CLAY WITH FEW BLACK ORGANIC SPECKS. TIGHT,MOIST,WITH HYDROCARBON ODOR.
		MW02 6	100 / NH*	RFI-SCAN	
		MW02 8	100 / NH*		
10		MW02 10	200 / NH*	K, GRO, BTX	5-11.5 DARK GRAY HYDROCARBON-STAINED. SILT AND CLAY. TIGHT,SOFT,WET TO MOIST. STRONG HYDROCARBON ODOR.
					● WATER AT 11.5 FT.
		MW02 12	200 / 200		11.5-12 BROWN SAND,SOME GRAVEL AND SILT. WET,LOOSE,NO APPARENT ODOR.
					12-12.5 GRAY, BROWN, ORANGE-BROWN SILT AND CLAY TIGHT,MOIST TO WET.
		MW02 14	10 / 14		
15		MW02 16	20 / 11		12.5-18 HOMOGENOUS GRAY SILT. FIRM, WET. -WITH A GRAVEL ISOLATE AT 15 FT.
					18-18.5 NO SAMPLE END OF BORING AT 18.5 FT.
20					
25					
30					

* NH-NO 15 MINUTE HEADSPACE ANALYSIS.

WELL CONSTRUCTION DETAILS



DRILLER:

DRILLING AND SAMPLING METHOD:
6.25-INCH ID HOLLOW-STEM AUGERS.
2 FT. LONG, 2 IN. OD SPLIT BARREL SAMPLER.
SHELBY TUBE FOR PERMEABILITY SAMPLES.

DATE OF COMPLETION: 06/22/92 MONITORING WELL
06/27/92 SHELBY TUBE

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
AIRCRAFT FIRFIGHTING TRAINING FACILITY
NAS MEMPHIS, TN.

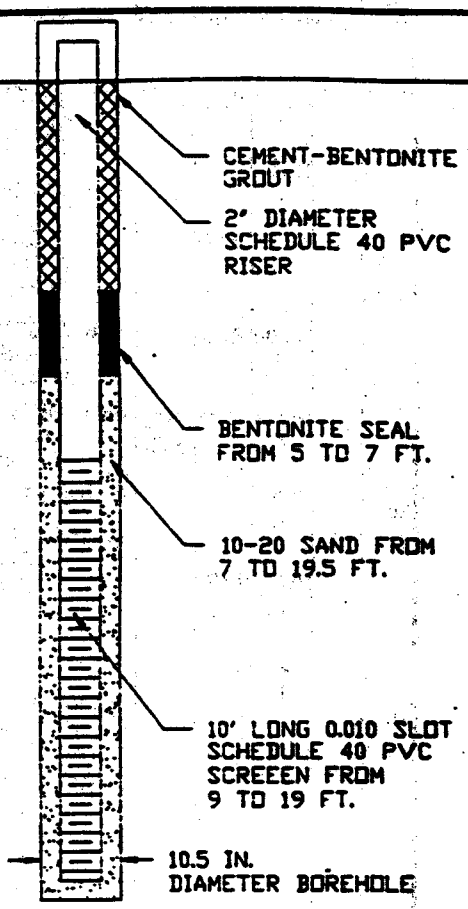
BORING B-02
MW-02
(FF02LS)

DATE: 08/08/92

DWG NAME: 026MW-02

DEPTH (FEET)	SAMPLE INTERVAL	SAMPLE NUMBER	PID (PPM) (INITIAL/15 MIN.)	LABORATORY ANALYSIS	DESCRIPTION OF SUBSURFACE MATERIALS
		MW03 0	3/2		0-1 BROWN SAND,SILT AND ORGANICS,SOME GRAVEL. LOOSE,DRY.
		MW03 2	2/2		1-4 BROWN, ORANGE-BROWN SILT,SOME GRAVEL AND CLAY,BECOMING (AT 4 FT.) MOTTLED BROWN, ORANGE-BROWN SILT,LITTLE CLAY.
		MW03 4	1/2		4-7 GRAY-BROWN SILT,LITTLE CLAY,BECOMING (AT 4.5 FT.) GRAY SILT AND CLAY WITH ORANGE-BROWN MOTTLING AND BLACK ORGANIC SPECKS.
5		MW03 6	1/2		
		MW03 8	1/2		7-10 GRADING TO DARK-GRAY CLAY, LITTLE SILT, WITH ORANGE-BROWN MOTTLES AND BLACK ORGANIC SPECKS. VERY TIGHT,MOIST.
10		MW03 10	1/2	GRO, BTX	10-12 LIGHT GRAY SILT AND CLAY WITH ORANGE-BROWN MOTTLES AND BLACK ORGANIC SPECKS. TIGHT,MOIST TO WET.
		MW03 12	1/2		● WATER AT 12 FT. 12-17 MOTTLED GRAY,BROWN,ORANGE-BROWN SILT AND CLAY,WITH BLACK ORGANIC SPECKS. SOFT,WET.
		MW03 14	1/3		
15		MW03 16	1/4		
					17- 19 BECOMING MOTTLED LIGHT-GRAY, ORANGE-BROWN SILT,WITH SCATTERED BLACK ORGANIC SPECKS.
					19-19.5 NO SAMPLE END OF BORING AT 19.5 FT.
20					
25					
30					

WELL CONSTRUCTION DETAILS



DRILLER: PROFESSIONAL SERVICE INDUSTRIES, INC.
4161 RIDGEMOOR AVENUE
MEMPHIS, TN. 38118

DRILLING AND SAMPLING METHOD:
6.25-INCH ID HOLLOW-STEM AUGERS.
2 FT. LONG, 2 IN. OD SPLIT BARREL SAMPLER.

DATE OF COMPLETION: 06/23/92

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
AIRCRAFT FIRFIGHTING TRAINING FACILITY
NAS MEMPHIS, TN.

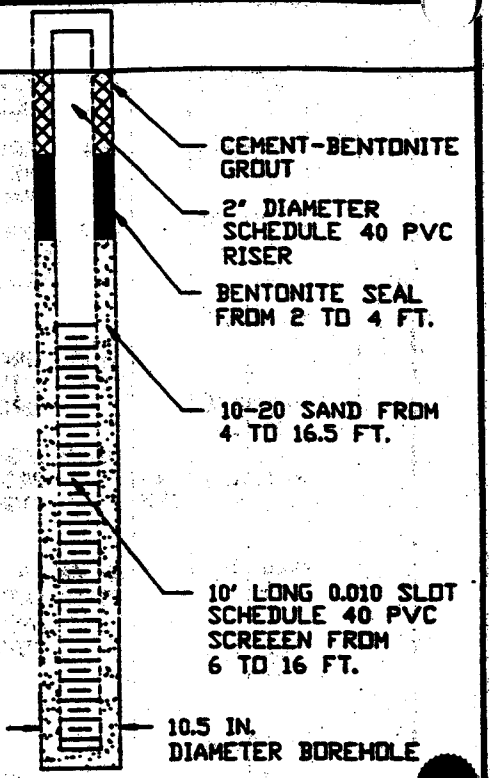
BORING B-05
MW-03
(FF03LS)

DATE: 08/08/92

DWG NAME: 026MW-03

DEPTH (FEET)	SAMPLE INTERVAL	SAMPLE NUMBER	PID (PPM) (INITIAL/15 MIN.)	LABORATORY ANALYSIS	DESCRIPTION OF SUBSURFACE MATERIALS
0	MW04 0	3/3			0-2 BROWN SAND, SILT AND ORGANICS; BECOMING (AT 1 FT.) BROWN, ORANGE SAND AND SILT, SOME GRAVEL. LOOSE TO TIGHT, DRY TO MOIST.
	MW04 2	2/4			2-4 LAYERED BROWN, LIGHT-BROWN SILT, SOME CLAY, WITH MINOR ORANGE-BROWN MOTTLES AND BLACK ORGANIC SPECKS; BECOMING (AT 3 FT.) LIGHT-BROWN, ORANGE-BROWN SILT AND CLAY. TIGHT, MOIST.
	MW04 4	2/4			
5	MW04 6	2/3			4-6 BECOMING LIGHT-BROWN TO GRAY CLAY, WITH ORANGE-BROWN MOTTLED ZONES AND BLACK TO BROWN-DARK RED ORGANIC SPECKS.
	MW04 8	1/3		GRO, BTX	6-10 BECOMING LIGHT BROWN TO GRAY SILT AND CLAY, WITH ORANGE-BROWN MOTTLING AND DARK BROWN TO DARK RED ORGANIC NODULES.
10	MW04 10	1/2			● WATER AT 10 FT.
	MW04 12	1/3			10-15.5 BECOMING GRAY SILT, SOME CLAY, WITH ORANGE-BROWN MOTTLING AND DARK BROWN TO DARK RED ORGANIC NODULES. TIGHT, WET.
	MW04 14	1/3			
15					15.5-16.5 BECOMING MOTTLED GRAY AND ORANGE-BROWN SILT AND CLAY. TIGHT, WET.
					16-16.5 NO SAMPLE END OF BORING AT 16.5 FT.
20					
25					
30					

WELL CONSTRUCTION DETAILS



DRILLER: PROFESSIONAL SERVICE INDUSTRIES, INC.
4161 RIDGEMOOR AVENUE
MEMPHIS, TN. 38118

DRILLING AND SAMPLING METHOD:
6.25-INCH ID HOLLOW-STEM AUGERS.
2 FT. LONG, 2 IN. OD SPLIT BARREL SAMPLER.

DATE OF COMPLETION: 06/23/92

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
AIRCRAFT FIRFIGHTING TRAINING FACILITY
NAS MEMPHIS, TN.

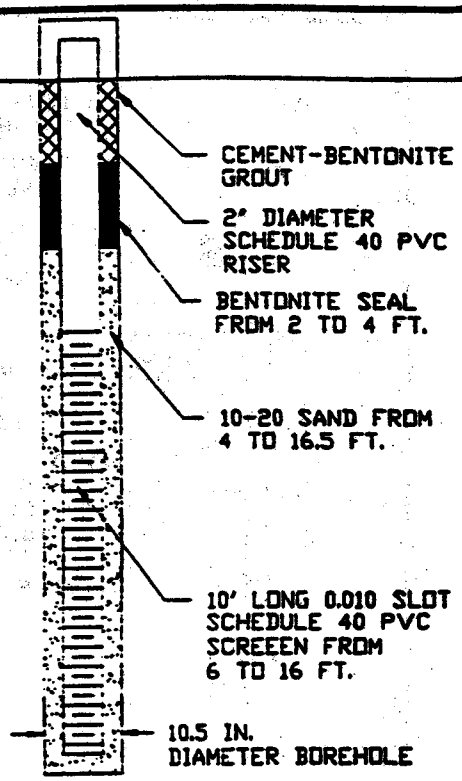
BORING B-06
MW-04
(FF04LS)

DATE: 08/08/92

DWG NAME: 026MW-04

DEPTH (FEET)	SAMPLE INTERVAL	SAMPLE NUMBER	PID (PPM) (INITIAL/15 MIN.)	LABORATORY ANALYSIS	DESCRIPTION OF SUBSURFACE MATERIALS
		MW05 0	1/4		0-2 DARK BROWN SILT AND ORGANICS. 2-6 DARK BROWN CLAY,WITH INTERSPERSED ORANGE-BROWN NODULES. VERY TIGHT TO MOIST.
		MW05 2	2/2		
		MW05 4	1/3		
5		MW05 6	1/2		6-13 BECOMING MOTTLED BROWN-GRAY,ORANGE-BROWN SILT AND CLAY. TIGHT,MOIST TO WET.
		MW05 8	1/2	RFI-SCAN, BTX GRD, BTX	
10		MW05 10	1 / NH*		● WATER AT 10 FT.
		MW05 12	0/2		13-14.5 BECOMING DARK BROWN CLAY,LITTLE SILT, BECOMING DARK BROWN TO BLACK CLAY WITH ROOTS AND ORGANICS. VERY TIGHT.
		MW05 14	1/1		14.5-16.5 NO SAMPLE END OF BORING AT 16.5 FT.
15					
20					
25					
30					* NH-NO 15 MINUTE HEADSPACE ANALYSIS.

WELL CONSTRUCTION DETAILS



DRILLER: PROFESSIONAL SERVICE INDUSTRIES, INC.
4161 RIDGEMOOR AVENUE
MEMPHIS, TN. 38118

DRILLING AND SAMPLING METHOD:
6.25-INCH ID HOLLOW-STEM AUGERS.
2 FT. LONG, 2 IN. OD SPLIT BARREL SAMPLER.

DATE OF COMPLETION: 06/24/92

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
AIRCRAFT FIRFIGHTING TRAINING FACILITY
NAS MEMPHIS, TN.

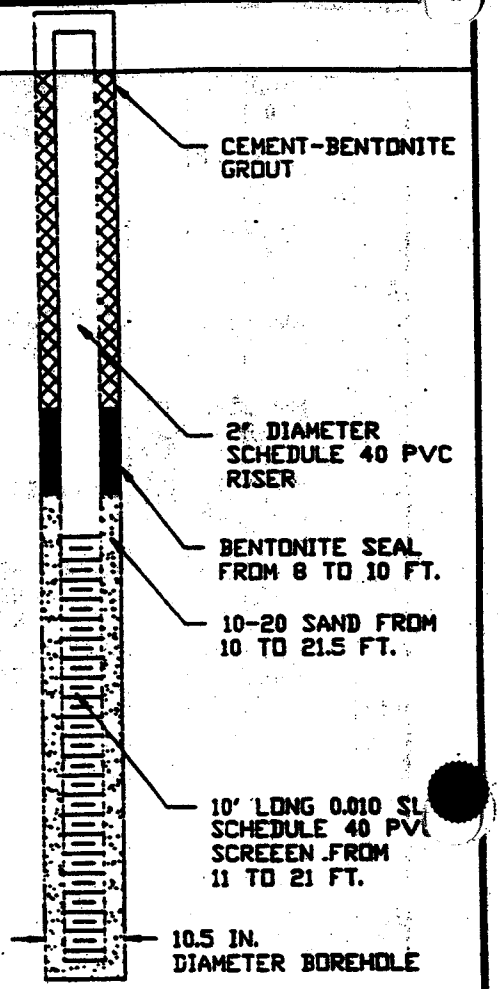
BORING B-10
MW-05
(FF05LS)

DATE: 08/08/92

DWG NAME: 026MW-05

DEPTH (FEET)	SAMPLE INTERVAL	SAMPLE NUMBER	PID (PPM) (INITIAL/15 MIN.)	LABORATORY ANALYSIS	DESCRIPTION OF SUBSURFACE MATERIALS
		MW06 0	1/3		0-2 BROWN SILT AND SAND, SOME GRAVEL AND ORGANICS. LOOSE, DRY.
		MW06 2	1/5		2-3.5 BROWN-GRAY SILT AND CLAY, SOME ORGANICS AND ROOTS. TIGHT, MOIST.
		MW06 4	200 400		3.5-7.5 BECOMING DARK GRAY, BLACK CLAY. PLIABLE TO HARD, MOIST TO WET TO MOIST. HYDROCARBON ODOR.
5		MW06 6	1500 NH*	RFI-SCAN, GRO, BTX	7.5-10.5 BECOMING DULL GREEN-GRAY, HYDROCARBON STAINED SILT AND CLAY WITH ORANGE-BROWN MOTTLING AND MINOR DARK BROWN-RED NODULES.
		MW06 8	400 500		10.5-11 DARK BROWN-GRAY CLAY, LITTLE SILT. PLIABLE, MOIST.
10		MW06 10	3/7	GRO, BTX	11-20 MOTTLED LIGHT-BROWN-GRAY AND ORANGE-BROWN SILT, SOME CLAY, WITH BLACK ORGANIC PATCHES. WET.
		MW06 12	3/1		● WATER AT 12 FT.
		MW06 14	1/1		
15		MW06 16	0/2		
		MW06 18	1/1		
20					20-21.5 NO SAMPLE. END OF BORING AT 21.5 FT.
25					
30					* NH-NO 15 MINUTE HEADSPACE ANALYSIS.

WELL CONSTRUCTION DETAILS



DRILLER: PROFESSIONAL SERVICE INDUSTRIES, INC.
4161 RIDGEMOOR AVENUE
MEMPHIS, TN. 38118

DRILLING AND SAMPLING METHOD:
6.25-INCH ID HOLLOW-STEM AUGERS.
2 FT. LONG, 2 IN. OD SPLIT BARREL SAMPLER.

DATE OF COMPLETION: 06/24/92

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
AIRCRAFT FIRFIGHTING TRAINING FACILITY
NAS MEMPHIS, TN.

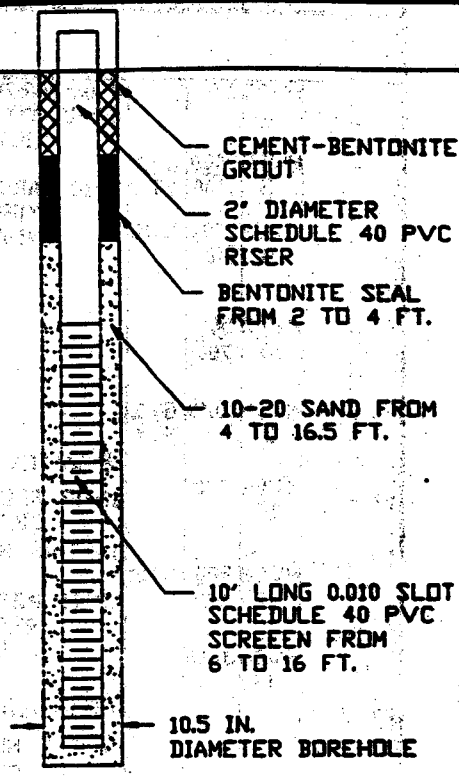
BORING B-11
MW-06
(FF06LS)

DATE: 07/29/92

DWG NAME: 026MW-06

DEPTH (FEET)	SAMPLE INTERVAL	SAMPLE NUMBER	PID (PPM) (INITIAL/15 MIN.)	LABORATORY ANALYSIS	DESCRIPTION OF SUBSURFACE MATERIALS
0		MW07 0	2/2		0-1 BROWN SILT AND ORGANICS, SOME CLAY AND ROOTS.
		MW07 2	200 / 700		1-3 DARK BROWN SILT AND CLAY WITH FAINT GRAY AND ORANGE-BROWN MOTTLING, AND BLACK ORGANIC SPECKS TO RUST-BROWN NODULES. TIGHT, MOIST.
		MW07 4	250 / 850	GRO, BTX	3-6 BECOMING GRAY-GREEN HYDROCARBON STAINED CLAY, WITH SUBDUED ORANGE-BROWN MOTTLING AND RUST-BROWN NODULES. VERY TIGHT, MOIST, HYDROCARBON ODOR.
5		MW07 6	50 / 400	GRO, BTX	6-9.5 BECOMING DARK GREEN-GRAY SILT AND CLAY. TIGHT, MOIST.
		MW07 8	1/5	GRO, BTX	9.5 BECOMING DARK BROWN CLAY. WET, VERY PLIABLE.
					● WATER AT 9.5 FT.
10		MW07 10	2/5		
		MW07 12	2/2		10-16 MOTTLED LIGHT-BROWN, GRAY, ORANGE-BROWN SILT, WITH DARK-BROWN, RED-BLACK NODULES. FIRM, WET.
		MW07 14	1/2		
15					16-16.5 NO SAMPLE. END OF BORING AT 16.5 FT.
20					
25					
30					

WELL CONSTRUCTION DETAILS



DRILLER: PROFESSIONAL SERVICE INDUSTRIES, INC.
4161 RIDGEMOOR AVENUE
MEMPHIS, TN. 38118

DRILLING AND SAMPLING METHOD:
6.25-INCH ID HOLLOW-STEM AUGERS.
2 FT. LONG, 2 IN. OD SPLIT BARREL SAMPLER.

DATE OF COMPLETION: 06/25/92

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
AIRCRAFT FIRFIGHTING TRAINING FACILITY
NAS MEMPHIS, TN.

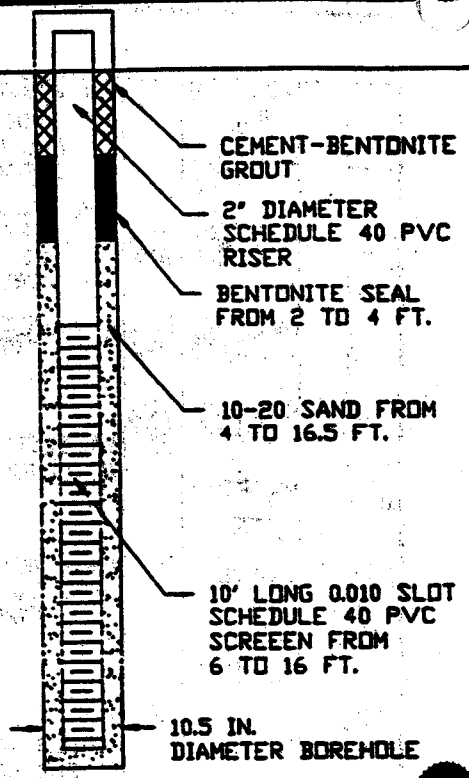
BORING B-13
MW-07
(PFOALS)

DATE: 08/08/92

DWG NAME: 026MW-07

DEPTH (FEET)	SAMPLE INTERVAL	SAMPLE NUMBER	PID (PPM) (INITIAL/15 MIN.)	LABORATORY ANALYSIS	DESCRIPTION OF SUBSURFACE MATERIALS
		MW08 0	1/0		0-0.5 BROWN SILT, ORGANICS AND ROOTS 0.5-2 MOTTLED LIGHT-BROWN-GRAY, ORANGE-BROWN SILT, SOME CLAY AND ROOTS. DRY.
		MW08 2	1000 / 1100	GRO, BTX	2-10 DARK GREEN-GRAY SILT AND CLAY. HYDROCARBON-STAINED. TIGHT, MOIST TO WET. UNIDENTIFIED ODOR.
		MW08 4	1000 / 1100	VOC	
5		MW08 6	500 / 700		
		MW08 8	10/8	GRO, BTX	
					● WATER AT 9-10 FT.
10		MW08 10	7/0		10-13 BECOMING MOTTLED GRAY, ORANGE-BROWN SILT, FIRM, WET.
					13 THIN HORIZON (3") OF BLACK SILT, PASTE-LIKE, WET.
		MW08 12	200 / 20	VOC	13-15 MOTTLED GRAY, ORANGE-BROWN SILT; BECOMING RED-BROWN SILT WITH MINOR ORANGE-BROWN STREAKS.
		MW08 14	3/16		
15					15-16 UNIFORM GRAY SILT.
					16-16.5 NO SAMPLE. END OF BORING AT 16.5 FT.
20					
25					
30					

WELL CONSTRUCTION DETAILS



DRILLER: PROFESSIONAL SERVICE INDUSTRIES, INC.
4161 RIDGEMOOR AVENUE
MEMPHIS, TN. 38118

DRILLING AND SAMPLING METHOD:
6.25-INCH ID HOLLOW-STEM AUGERS.
2 FT. LONG, 2 IN. OD SPLIT BARREL SAMPLER.

DATE OF COMPLETION: 06/25/92

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
AIRCRAFT FIRFIGHTING TRAINING FACILITY
NAS MEMPHIS, TN.

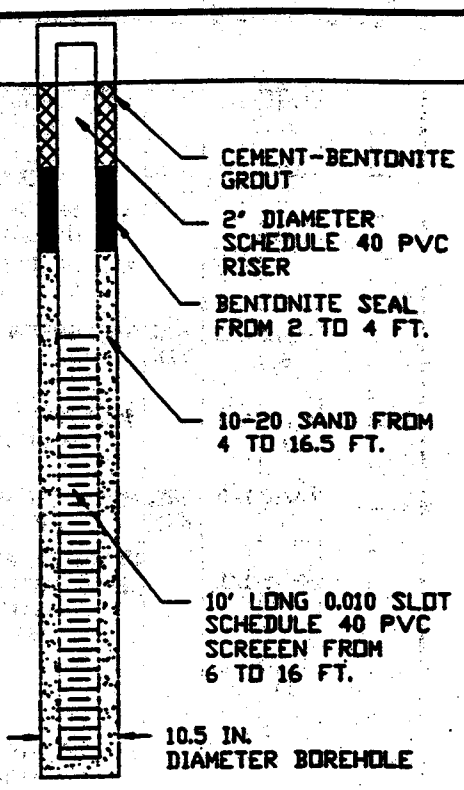
BORING B-14
MW-08
(FF08LS)

DATE: 08/08/92

DWG NAME: 026MW-08

DEPTH (FEET)	SAMPLE INTERVAL	SAMPLE NUMBER	PID (PPM) (INITIAL/15 MIN.)	LABORATORY ANALYSIS	DESCRIPTION OF SUBSURFACE MATERIALS
		MW09 0	0/0		0-1.5 BROWN SILT,CLAY,ORGANICS AND ROOTS; BECOMING MOTTLED BROWN,ORANGE-BROWN SILT, CLAY AND ROOTS.
		MW09 2	0/0		1.5-4 BECOMING DARK BROWN CLAY,TURNING DARK BROWN-BLACK ORGANIC-RICH CLAY WITH SOME ROOTS,TIGHT,MOIST.
		MW09 4	0/0		4-6 BECOMING GRAY SILT AND CLAY WITH FAINT ORANGE-BROWN INTERBEDS. TIGHT,MOIST.
5		MW09 6	0/0		6-10 MOTTLED GRAY-BROWN,BLUE-GRAY SILT AND CLAY. BECOMING (AT 8 FT.) MOTTLED LIGHT-BROWN AND BLUE-GRAY. TIGHT,MOIST.
		MW09 8	0/0	GRO, BTX	
		MW09 10	0/0		● WATER AT 9.5 FT.
10					10-12 GRAY-BROWN SILT.
		MW09 12	0/0		12-16 MOTTLED GRAY,ORANGE-BROWN SILT,WITH MINOR BLACK TO DARK-RED NODULES OR PATCHES. FIRM,WET.
		MW09 14	0/0		
15					16-16.5 NO SAMPLE END OF BORING AT 16.5 FT.
20					
25					
30					

WELL CONSTRUCTION DETAILS



DRILLER: PROFESSIONAL SERVICE INDUSTRIES, INC.
4161 RIDGEMOOR AVENUE
MEMPHIS, TN. 38118

DRILLING AND SAMPLING METHOD:
6.25-INCH ID HOLLOW-STEM AUGERS.
2 FT. LONG, 2 IN. OD SPLIT BARREL SAMPLER.

DATE OF COMPLETION: 06/26/92

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
AIRCRAFT FIRFIGHTING TRAINING FACILITY
NAS MEMPHIS, TN.

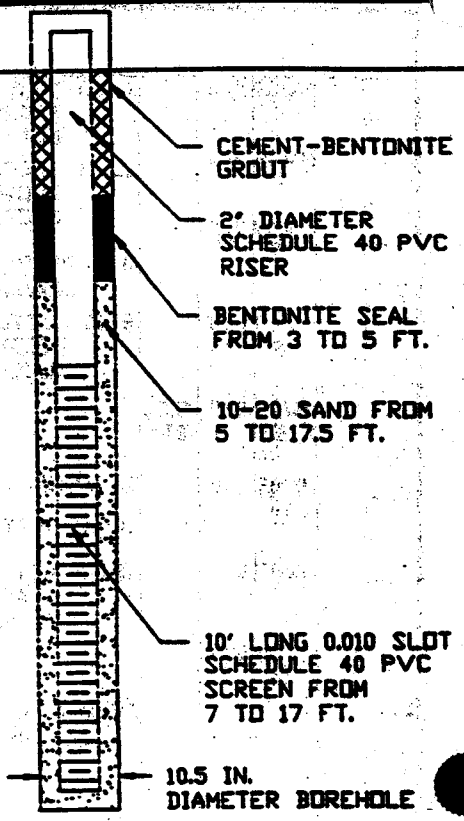
BORING B-17
MW-09
(FF09LS)

DATE: 08/08/92

DWG NAME: 026MW-09

DEPTH (FEET)	SAMPLE INTERVAL	SAMPLE NUMBER	PID (PPM) (INITIAL/15 MIN.)	LABORATORY ANALYSIS	DESCRIPTION OF SUBSURFACE MATERIALS
		MW10 0	0/0		0-0.5 BROWN SILT,CLAY ,AND ORGANICS
					0.5-2 MOTTLED BROWN,GRAY-BROWN,ORANGE-BROWN SILT AND CLAY WITH MINOR BLACK ORGANIC NODULES. FIRM,MOIST.
		MW10 2	12/600	GRO, BTX	2-4 BECOMING DARK GRAY CLAY. TIGHT,MOIST, HYDORCARBON ODOR.
		MW10 4	14/600		4-6 BECOMING DARK-GREEN-GRAY,HYDROCARBON STAINED SILT AND CLAY. TIGHT,MOIST,HYDROCARBON ODOR.
5		MW10 6	1/5	GRO, BTX	6-8 GREEN-GRAY SILT AND CLAY.
		MW10 8	1/0		8-10 MOTTLED GREEN-GRAY ORANGE-BROWN SILT AND CLAY.
10		MW10 10	1/0	GRO, BTX	10-12 BECOMING GREEN-GRAY SILT. FIRM,MOIST.
					● WATER AT 12 FT.
		MW10 12	1/1		12-16 MOTTLED GRAY-BROWN,ORANGE-BROWN SILT WITH BLACK TO RED NODULES OR PATCHES FIRM,WET.
		MW10 14	1/1		
15					16-17.5 NO SAMPLE. END OF BORING AT 17.5 FT.
20					
25					
30					

WELL CONSTRUCTION DETAILS



DRILLER: PROFESSIONAL SERVICE INDUSTRIES, INC.
4161 RIDGEMOOR AVENUE
MEMPHIS, TN. 38118

DRILLING AND SAMPLING METHOD:
6.25-INCH ID HOLLOW-STEM AUGERS.
2 FT. LONG, 2 IN. OD SPLIT BARREL SAMPLER.

DATE OF COMPLETION: 06/26/92

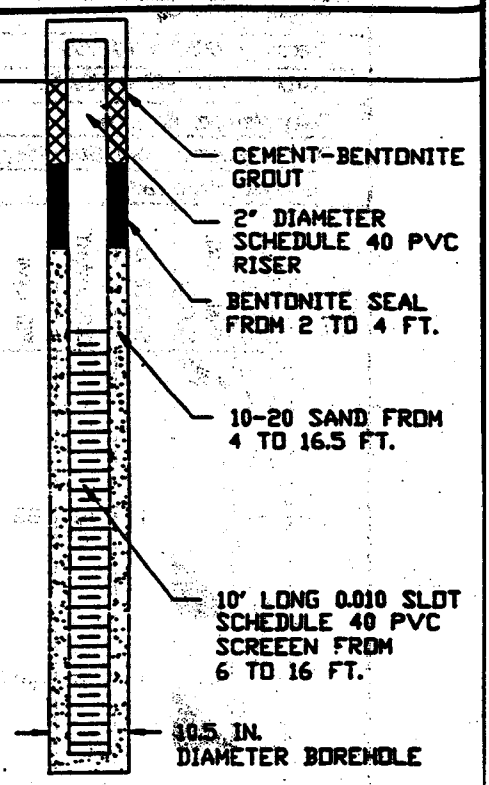
ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
AIRCRAFT FIRFIGHTING TRAINING FACILITY
NAS MEMPHIS, TN.

BORING B-18
MW-10
(FF10LS)

DATE: 07/29/92 | DWG NAME: 026MW-10

DEPTH (FEET)	SAMPLE INTERVAL	SAMPLE NUMBER	PID (PPM) (INITIAL/15 MIN.)	LABORATORY ANALYSIS	DESCRIPTION OF SUBSURFACE MATERIALS
		MW11 0	13 / 10		0-1 SILT AND ORGANICS,SOME CLAY.
					1-2 INTERLAYERED BROWN,GRAY-BROWN,ORANGE-BROWN SILT AND CLAY,MINOR GRAVEL. TIGHT,MOIST.
		MW11 2	300 / 500		2-9 BECOMING DARK GREEN-GRAY,HYDROCARBON-STAINED SILT AND CLAY. TIGHT,MOIST,HYDROCARBON ODOR.
		MW11 4	1300 / NH*	K GRO, BTX,	
5		MW11 6	500 / 1100	RFI-SCAN	
					● PERCHED WATER AT 7 FT.
		MW11 8	150 / 300		-WITH FAINT GRAY,ORANGE-BROWN MOTTLING FROM 7 TO 10 FT.
					9-11 MOTTLED GRAY,ORANGE-BROWN SILT. FIRM,MOIST.
10		MW11 10	20 / 80	K, GRO, BTX	11 THIN (3" THICK) HORIZON OF ORANGE-BROWN SILT AND CLAY. EXTREMELY TIGHT AND COMPACT, DRY.
					● WATER AT ~ 11.5 FT.
		MW11 12	1 / 1		11-16 GRAY UNIFORM SILT. FIRM,WET.
		MW11 14	0 / 0		
15					16-16.5 NO SAMPLE. END OF BORING AT 16.5 FT.
20					
25					
30					* NH-NO 15 MINUTE HEADSPACE ANALYSIS.

WELL CONSTRUCTION DETAILS



DRILLER: PROFESSIONAL SERVICE INDUSTRIES, INC.
4161 RIDGEMOOR AVENUE
MEMPHIS, TN. 38118

DRILLING AND SAMPLING METHOD:
6.25-INCH ID HOLLOW-STEM AUGERS.
2 FT. LONG, 2 IN. OD SPLIT BARREL SAMPLER.

DATE OF COMPLETION: 06/26/92-MONITORING WELL
06/27/92-SHELBY TUBE

ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
AIRCRAFT FIRFIGHTING TRAINING FACILITY
NAS MEMPHIS, TN.

BORING B-19
MW-11
(FF11LS)

DATE: 08/08/92

DWG NAME: 026MW-11

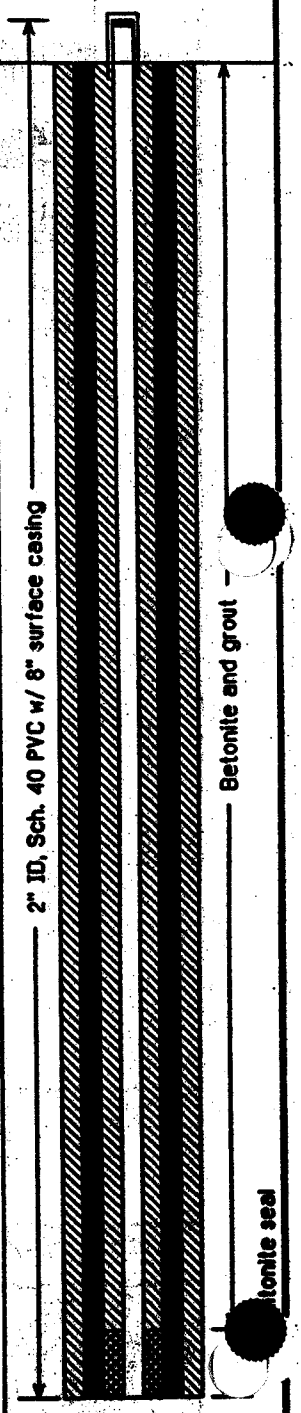
EnSafe/Allen & Hoshall

Monitoring Well 05MW01UF

Project: NAS Memphis	Location: Millington, TN SWMU#5 - F.F.T.A.
Project No.: 0094	Surface Elevation: 268.64 feet msl
Started at 0850 on 1/28/95	TOC Elevation: 271.03 feet msl
Completed at 0945 on 1/29/95	Depth to Groundwater: 14.52 feet Measured: 3/31/95.
Drilling Method: Rotasonic	Groundwater Elevation: 256.51 feet msl
Drilling Company: North Star Drilling	Total Depth: 52 feet
Geologist: David Ladd	Well Screen: 42 to 52 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	70	BG			0' to 12' Clayey silt, moderate to dark yellowish-brown. Stiff, moist. Slightly wet around 11'.	
10			2	107	BG				
15			3	110	BG			12' to 25' Clayey fine silt. Medium gray to medium dark gray. Sample getting darker about 16.5'. By 18' color has become medium dark gray to brownish gray. Moist. Sample becomes firm at about 21'.	
20							ML		
25								25' to 40' Fine silt, clayey, grayish-orange very firm starting at 36'. 36' to 40' contains light gray silt seams. 25' to 31.5' transitional zone (gray silt mottled with yellowish- gray clayey silt).	
30									
35									
40			4	89	BG		SP		228.6

WELL DIAGRAM



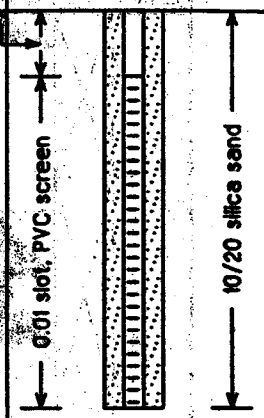
EnSafe/Allen & Hoshall

Monitoring Well 05MW01UF

Project: NAS Memphis	Location: Millington, TN SWMU#5 - F.F.T.A.
Project No: 0094	Surface Elevation: 268.64 feet msl
Started at 0850 on 1/28/95	TOC Elevation: 271.03 feet msl
Completed at 0945 on 1/29/95	Depth to Groundwater: 14.52 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 256.51 feet msl
Drilling Company: North Star Drilling	Total Depth: 52 feet
Geologist: David Ladd	Well Screen: 42 to 52 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45							SP	Sand, yellowish gray to pinkish gray, wet. Some gravels, increasing around 45'. Clay, fine with gravel, light gray (46'-47'), turning dark yellowish orange to moderate yellowish brown, abundant.	223.6
50							GP		221.6
								End of soil boring at 52'. BG = Background (1.0 ppm) Set well through 8" casing and 6" boring to 52'.	216.6
55									
60									
65									
70									
75									
80									

WELL DIAGRAM



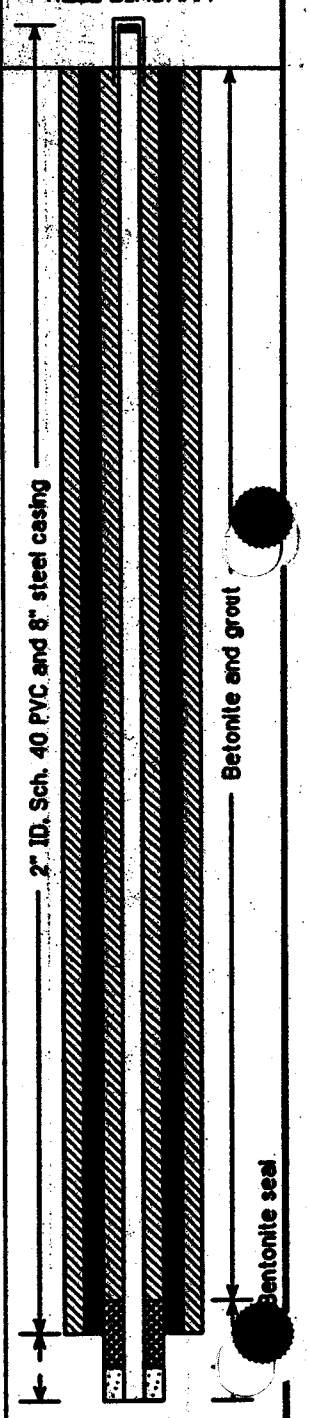
EnSafe/Allen & Hoshall

Monitoring Well 05MW02UF

Project: NAS Memphis	Location: Millington, TN SWMU#5 - F.F.T.A.
Project No.: 0094	Surface Elevation: 267.74 feet msl
Started at 1030 on 1/28/95	TOC Elevation: 270.06 feet msl
Completed at 1505 on 2/11/95	Depth to Groundwater: 14.11 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 255.95 feet msl
Drilling Company: North Star Drilling	Total Depth: 50 feet
Geologist: David Ladd/Jack Carmichael	Well Screen: 40 to 50 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	70	BG			Clayey silt, moderate yellowish brown to grayish-orange, firm. (0'-10')	
10			2	100	BG			(10'-30') Silt, clayey, most turns medium gray to medium dark gray. Sample loses brown at 13'. Gets increasingly darker (dark gray to brownish gray).	
15			3	110	BG				
20							ML		
25									
30								(30'-38) Clayey silt; grayish-orange to moderate yellowish-brown. Stiff. Still contains some gray silt. Silt mottled with yellowish- gray silt (30'-35').	
35			4	94	BG				
40							SP	Boring stopped at 1150 on 1/28/95. Boring completed and drilling resumed at 1430 on 2/11/95.	229.7

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 05MW02UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#5 - F.F.T.A.*
Project No.: *0094*	Surface Elevation: *267.74 feet msl*
Started at *1030 on 1/28/95*	TOC Elevation: *270.06 feet msl*
Completed at *1505 on 2/11/95*	Depth to Groundwater: *14.11 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *255.95 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *50 feet*
Geologist: *David Ladd/Jack Carmichael*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			5	71	BG		SP	No recovery from 38'-40'. 40'to 45' Same as above. 45' to 47.5' Sand, fine, occasional gravel to 1", silty, dense, yellowish-gray stained yellowish-orange. Wet.	220.2	0.01 slot, PVC screen
50			6	110	BG		GP	47.5' to 50' Gravel, sandy, some silt; grayish-orange to dark yellowish-orange, wet. End of boring at 50'.	217.7	10/20 silica sand
55										
60										
65										
70										
75										
80										

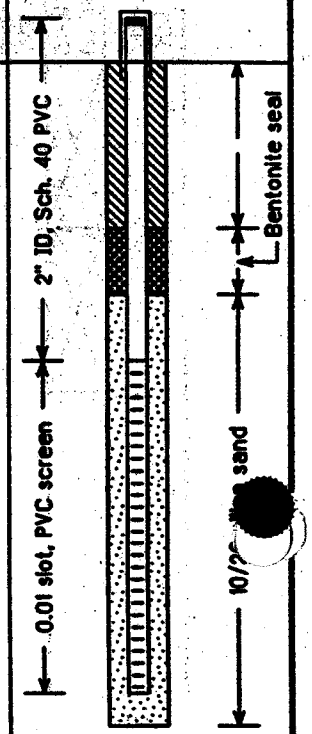
EnSafe/Allen & Hoshall

Monitoring Well 05MW03S
(005G03LS)

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#5 - F.F.T.A.*
Project No.: *0094*	Surface Elevation: *265.45 feet msl*
Started at *Unknown on 2/12/95*	TOC Elevation: *267.90 feet msl*
Completed at *Unknown on 2/12/95*	Depth to Groundwater: *6.88 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *261.02 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *19 feet*
Geologist: *David Ladd/Jack Carmichael*	Well Screen: *9 to 19 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	70	BG			**Boring information taken from 05-SB-03.** Silt, clayey, moderate yellowish-brown 0' to 3.5'. 3.5' to 12' Clay, silty, dark gray to brownish gray. Very hard, stiff material, getting softer near bottom of sample and lighter in color. Lost most of sample from 8'-12'.	
10			2	43	BG		ML		
15			3	130	BG			12' to 19.5' silt, clayey, dark to moderate yellowish-brown. Some dark gray silty clay about 16.5' to 18. 18' to 19.5' silt, dark to moderate yellowish-brown mixed with dark yellowish-brown silt, dry.	
20								19.5' to 26' silt, clayey, medium gray. End of boring at 20. Boring information taken from 05-SB-03.	245.4
25									
30									
35									
40									

WELL DIAGRAM

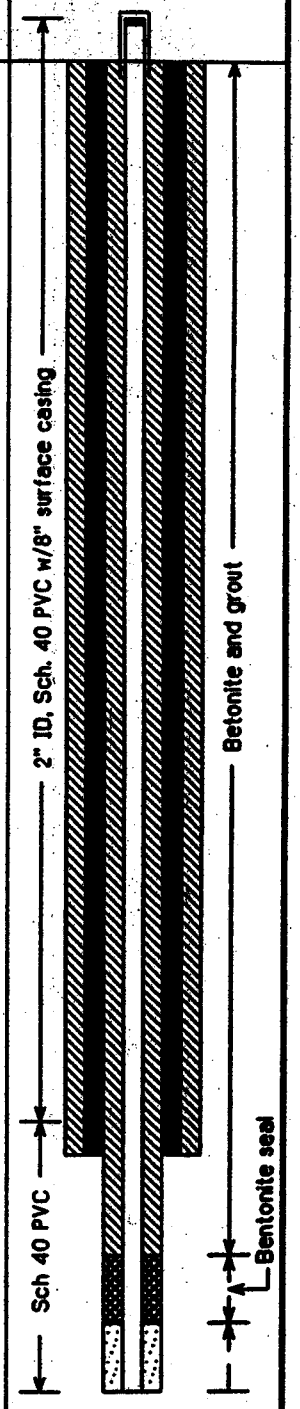


EnSafe/Allen & Hoshall

Monitoring Well 05MW03UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#5 - F.F.T.A.*
Project No.: *0094*	Surface Elevation: *265.45 feet msl*
Started at *1410 on 1/28/95*	TOC Elevation: *267.46 feet msl*
Completed at *0850 on 2/12/95*	Depth to Groundwater: *11.08 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.38 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *50 feet*
Geologist: *David Ladd/Jack Carmichael*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	70	BG			Silt, clayey, moderate yellowish-brown, 0' to 3.5'. 3.5' to 12' Clay, silty, dark gray to brownish gray. Very hard, stiff material, getting softer near bottom of sample and lighter in color. Lost most of the sample from 8'-12'.	
10			2	43	BG				
15			3	130	BG		ML	12' to 19.5' silt, clayey, dark to moderate yellowish-brown. Picks up some dark gray silt clay about 16.5' to 18. 18' to 19.5' silty, dark to moderate yellowish-brown mixed with dark yellowish-brown silt, dry.	
20								19.5' to 26' silt, clayey, medium gray.	
25									
30								26' to 36.5' Gray silt mottled with silt, dark yellowish-orange becoming much more orange at 34' to 36.5' and more clay rich.	
35									
			4	91	BG		SP		229.4
40									



EnSafe/Allen & Hoshall

Monitoring Well 05MW03UF

Project: NAS Memphis
Project No.: 0094
Started at 1410 on 1/28/95
Completed at 0850 on 2/12/95
Drilling Method: Rotasonic
Drilling Company: North Star Drilling
Geologist: David Ladd/Jack Carmichael

Location: Millington, TN. SWMU#5 - F.F.T.A.
Surface Elevation: 265.45 feet msl
TOC Elevation: 267.46 feet msl
Depth to Groundwater: 11.08 feet Measured: 3/31/95
Groundwater Elevation: 256.38 feet msl
Total Depth: 50 feet
Well Screen: 40 to 50 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45							SP	(36.5'-50') Sand, fine to coarse, with gravel and some silt. Very gravelly zone from about 43'-45', about 1 foot clayey zone with gravel (trace) from about 45'-46'; Color ranges from very pale orange to moderate reddish brown; wet.		0.01 slot, PVC screen; 10/20 silica sand
50			5	88	BG			End of boring at 50'.	215.4	
55										
60										
65										
70										
75										
80										

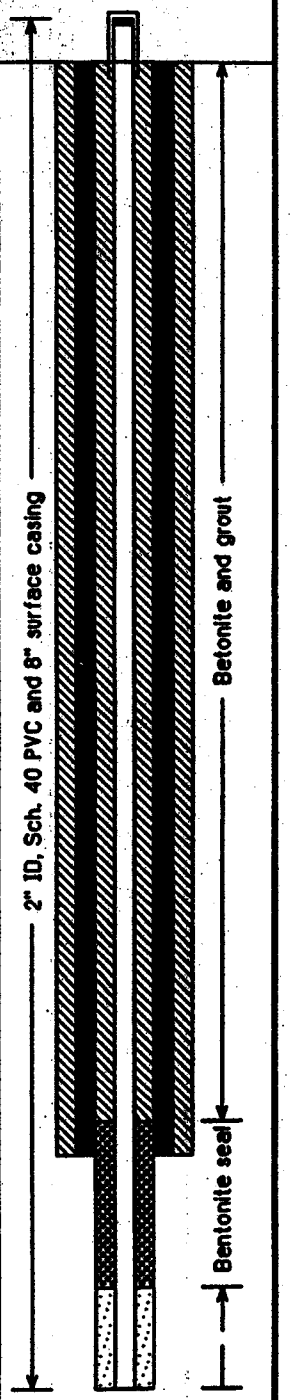
EnSafe/Allen & Hoshall

Monitoring Well 05MW04UF

Project: NAS Memphis	Location: Millington, TN. SWMU#5 - F.F.T.A.
Project No.: 0094	Surface Elevation: 266.72 feet msl
Started at 1605 on 1/28/95	TOC Elevation: 269.03 feet msl
Completed at 1100 on 2/11/95	Depth to Groundwater: 12.10 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 256.93 feet msl
Drilling Company: North Star Drilling	Total Depth: 50 feet
Geologist: David Ladd/Jack Carmichael	Well Screen: 40 to 50 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	100	100			0' to 3' Hand dug to 3'. 3' to 6' Silt, clayey, dark gray, firm, moist. (6'-12') Color change at 6', grayish-orange to moderate yellowish- brown.	
10			2	100	BG			Saturated 10' to 12'.	
15							ML	12' to 22' Gray clayey silt mottled with brown at 20', and becomes more clay rich and wet at 22'.	
20			3	105	BG			(22' to 27.5') Color turns medium gray.	
25									
30								27.5' to 35' Transitional. 27.5' to 31' gray clayey silt mottled with dark yellowish-orange silt. 31' to 35' Reworked material. Dark yellowish-orange silt, iron- stained. Becoming sandy near 35', very wet.	
35			4	?	BG				231.7
40							SW	35' to 45' Sand, fine to coarse silty with gravel; yellowish-gray to dark yellowish-orange; some 3" to 6" layers of sandy clay, light gray to yellowish-gray; wet.	

WELL DIAGRAM



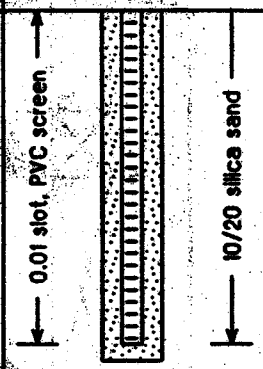
EnSafe/Allen & Hoshall

Monitoring Well 05MW04UF

Project: *NAS Memphis*	Location: *Millington, TN SWMU#5 - F.F.T.A.*
Project No.: *0094*	Surface Elevation: *268.72 feet msl*
Started at *1605 on 1/28/95*	TOC Elevation: *269.03 feet msl*
Completed at *1100 on 2/11/95*	Depth to Groundwater: *12.10 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.93 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *50 feet*
Geologist: *David Ladd/Jack Carmichael*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			5	85	BG		SW		223.2
							CL		221.7
							SW	45' to 50' Sand, fine to coarse with some gravel, trace silt; pale yellowish- to dark yellowish-orange, wet.	
50			6	110	BG				218.7
								End of boring at 50'.	
55								BG = Background (1 ppm)	
60									
65									
70									
75									
80									

WELL DIAGRAM



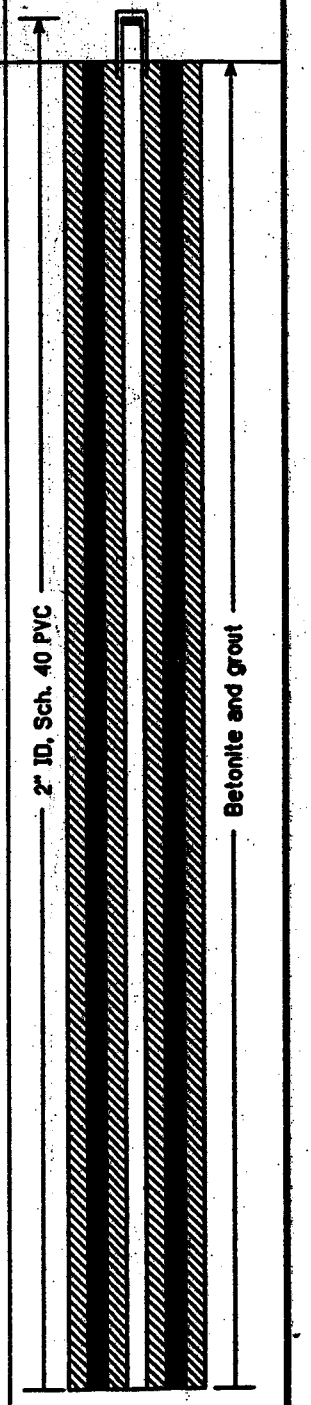
EnSafe/Allen & Hoshall

Monitoring Well 05MW05LF

Project: NAS Memphis	Location: Millington, TN SWMU#5 - F.F.T.A.
Project No.: 0094	Surface Elevation: 268.69 feet msl
Started at 0855 on 1/29/95	TOC Elevation: 271.21 feet msl
Completed at 1000 on 1/29/95	Depth to Groundwater: 14.73 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 256.48 feet msl
Drilling Company: North Star Drilling	Total Depth: 65.5 feet
Geologist: David Ladd	Well Screen: 55.5 to 65.5 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	70	BG			The first 40 feet of 5MW-5LF was logged from 05-SB-01 (05-MW-01UF). 0' to 12' Clayey silt, moderate to dark yellowish-brown. Stiff, moist. Slightly wet around 11'.	
10			2	107	BG				
15								12' to 25' Clayey fine silt. Medium gray to medium dark gray. Sample getting darker about 16.5'. By 18' color has become medium dark gray to brownish gray. Moist. Sample becomes firm at about 21'.	
20			3	110	BG		ML		
25								25' to 40' Fine silt, clayey, grayish-orange very firm starting at 36'. 36' to 40' contains light gray silt seams. 25' to 31.5' (gray silt mottled with yellowish- gray clayey silt).	
30									
35									
40			4	89	BG		SW		228.7

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 05MW05LF

Project: NAS Memphis	Location: Millington, TN. SWMU#5 - F.F.T.A.
Project No.: 0094	Surface Elevation: 268.69 feet msl
Started at 0855 on 1/29/95	TOC Elevation: 271.21 feet msl
Completed at 1000 on 1/29/95	Depth to Groundwater: 14.73 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 256.48 feet msl
Drilling Company: North Star Drilling	Total Depth: 65.5 feet
Geologist: David Ladd	Well Screen: 55.5 to 65.5 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			5	42	BG			40' to 65' Sand, yellowish gray to pinkish gray, wet. Some gravel, increasing at 45'. (46' to 47') Clay, fine, with gravel, light gray. (47' to 52') Turning dark yellowish-orange to moderate yellowish-brown with abundant gravel.	228.7	
50										
55			6	90	BG		SW	(52' to 53') Sand, dark yellowish-orange, amount of gravel diminishes. (53' to 56') Coarse sand, grayish-orange, little gravel. (56' to 61.5') Coarse sand, dark yellowish-orange, wet, abundant gravel.		2" ID, Sch. 40 PVC; 0.01 slot, PVC screen; Bentonite seal; Bentonite and grout; 10/20 silica sand
60								(61.5 to 63.5') Sand becoming lighter color.		
65			7	100	BG			(63.5' to 64.75') Coarse sand, yellowish-gray, no gravel. (64.75' to 65') Sand, moderate brown, iron-stained, large gravel.	203.7	
70								Top of Cockfield Formation Total depth of boring at 66'. First forty feet of log from MW-01-UF. Analytical samples collected from paired well MW-01-UF.		
75										
80										

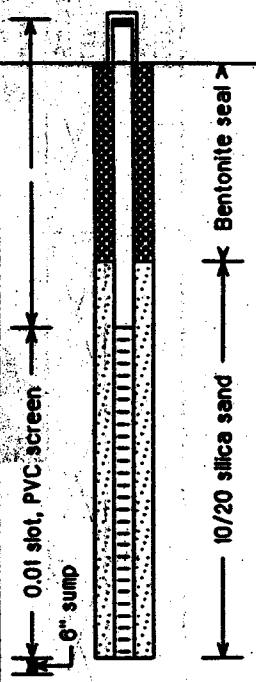
EnSafe/Allen & Hoshall

Monitoring Well 05MW06S
(005G06LS)

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#5 - F.F.T.A.*
Project No: *0094*	Surface Elevation: *264.53 feet msl*
Started at *0830 on 1/29/95*	TOC Elevation: *266.75 feet msl*
Completed at *Unknown on 1/29/95*	Depth to Groundwater: *6.73 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *260.02 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *18 feet*
Geologist: *Ben Brantley*	Well Screen: *8 to 18 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Dark yellowish-brown silt with organics (root zone 0' to 0.5').	
								0.5' to 4' Yellowish-brown clayey silt, medium stiff, moist to wet.	
5			1	100	BG			4' to 5' Olive black to brownish-black silty clay. Very hard and dry. Grading into olive gray to 6'.	
								6' to 8' Light olive gray stiff silty clay; hard.	
								8' to 15' Dusky yellow to yellowish-gray soft clayey silt (moist to wet).	
10							ML		
15			2	69	BG			15' to 20' Grayish-green medium stiff silt (moist); slightly clayey.	
								19' to 20' Darker gray in color.	
20			3	80	BG			Total depth of boring is 20'.	244.5
25								BG = Background	
30									
35									
40									

WELL DIAGRAM



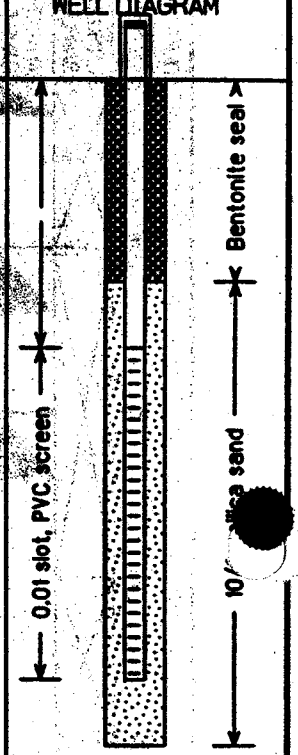
EnSafe/Allen & Hoshall

Monitoring Well 05MW07S
(005G07LS)

Project: *NAS Memphis*	Location: *Millington, TN*
Project No.: *0094*	Surface Elevation: *264.48 feet msl*
Started at *1050 on 1/29/95*	TOC Elevation: *266.87 feet msl*
Completed at *Unknown on 1/29/95*	Depth to Groundwater: *6.38 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *260.49 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *18 feet*
Geologist: *Ben Brantley*	Well Screen: *8 to 18 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	58			ML	0' to 4.5' Moderate to pale brown clayey silt, moist, medium stiff to soft with organics. 4.5' to 7' Dusky yellowish-brown silty clay. Very stiff and dry. 7' to 10.5' Light to dark olive gray silty clay with iron staining and organics. Very stiff and hard.	
10			2	100				10.5' to 13.5' Light olive gray to brown silt. Very moist to wet. Soft. 13.5' to 15' Grayish-green medium stiff silt. Moist to wet. 15' to 20' Grayish green medium stff silt. Moist to wet. Small snail shells present.	
15			3	96					
20			4	100				End of boring.	244.5
25									
30									
35									
40									

WELL DIAGRAM



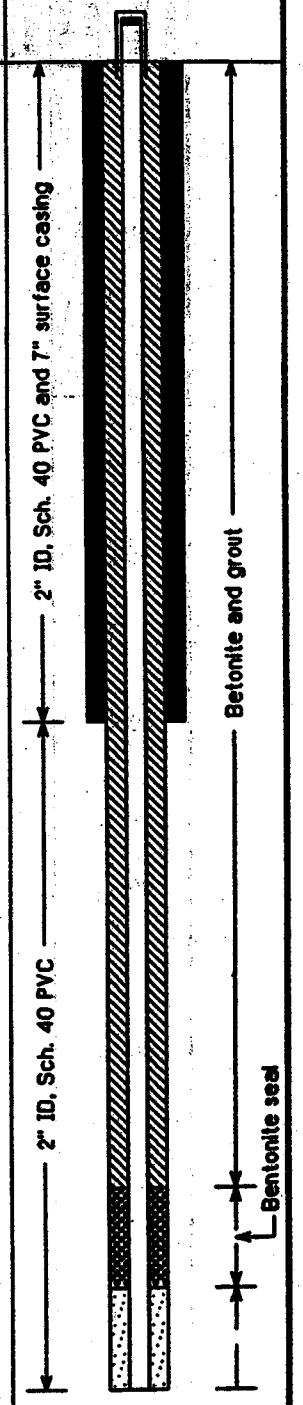
EnSafe/Allen & Hoshall

Monitoring Well 05MW04AUF

Project: NAS Memphis	Location: Millington, TN. SWMU#5 - F.F.T.A.
Project No: 0094	Surface Elevation: 268.93 feet msl
Started at 0840 on 2/26/95	TOC Elevation: 269.13 feet msl
Completed at Unknown on 2/26/95	Depth to Groundwater: 13.81 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 256.85 feet msl
Drilling Company: North Star Drilling	Total Depth: 50 feet
Geologist: Ben Brantley	Well Screen: 40 to 50 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								0' to 3.5' Brownish black stiff silty clay.	
5			1	100	5.8			3.5' to 8' Greenish gray silt clay. Fuel odor.	
10								8' to 13.5' Yellowish-brown to light olive grey with organics. Clayey silt. Medium stiff to soft; moist.	
15			7	93	BKG		ML	13.5' to 15' Dusky yellow with light olive gray and light gray clayey silt.	
20								15' to 21' Light olive gray with iron (orange streaks) clayey silt. Medium stiff to soft. Moist.	
25			11	120	BKG			21' to 25' Light olive gray silt with dusky yellow streaks. Dry and friable.	
30								25' to 33' Light olive gray to pale yellowish-brown clayey silt. Yellowish orange silt nodules at 25' to 25.5'. Medium stiff to stiff.	
35			12	80	BKG		SP	(33'-34') Fine sandy silt. (Same Color). Medium stiff to soft. Moist. 34' to 35' Yellowish-orange fine to medium silty clayey sand.	233.9
								35' to 39.5' Yellowish-orange to light brown medium sand.	
40							CL	39.5' to 40' Very light gray sandy stiff clay.	227.9
							SW		226.9

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 05MW04AUF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#5 - F.F.T.A.*
Project No: *0094*	Surface Elevation: *266.93 feet msl*
Started at *0840 on 2/26/95*	TOC Elevation: *269.13 feet msl*
Completed at *Unknown on 2/28/95*	Depth to Groundwater: *13.81 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.85 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *50 feet*
Geologist: *Ben Brantley*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft msl)	WELL DIAGRAM
45							SW	40' to 45' Yellowish-orange coarse to very coarse gravelly sand. Chert gravel up to 1".	228.0	0.01 slot PVC screen
							CL	45' to 45.5' Yellowish-gray sandy clay. Medium stiff to soft.	221.9	
							SW	45'.5 to 50' Grayish-orange and yellowish-gray and yellowish- orange medium sand.	221.4	10/20 silica sand
50			13	93	BKG			End of boring	216.9	
55								BG = Background		
60								*Steel surface casing was driven to a depth of 20' bgs.*		
65										
70										
75										
80										

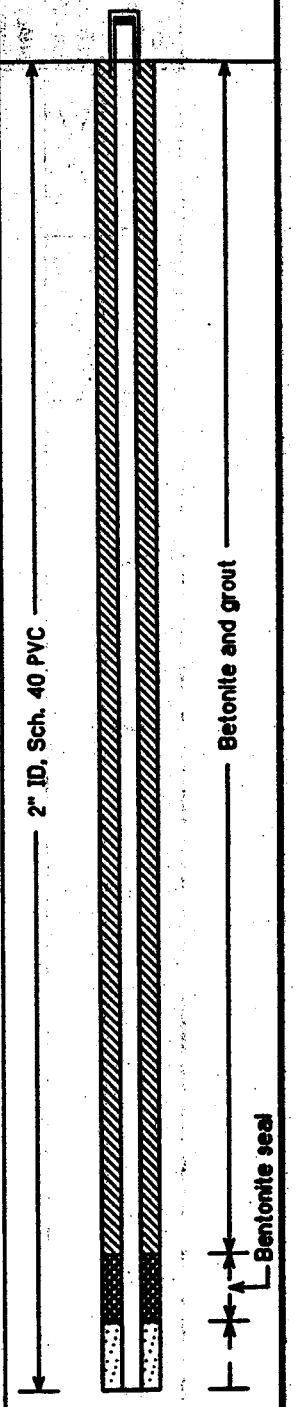
EnSafe/Allen & Hoshall

Monitoring Well 05MW04BUF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#5 - F.F.T.A.*
Project No.: *0094*	Surface Elevation: *266.74 feet msl*
Started at *1515 on 2/26/95*	TOC Elevation: *268.76 feet msl*
Completed at *Unknown on 2/26/95*	Depth to Groundwater: *11.80 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.96 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *50 feet*
Geologist: *Ben Brantley*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5	1	100	NR		0' to 6.5' Browninsh-black stiff silty clay with organics.	
					6.5' to 9' Greenish-gray moist silty clay.	
10	2	100	NR		9' to 15' Yellowish-brown to dusky yellow and light olive gray clayey silt; with organics. Faint traces of greenish-gray extending to 13.5'.	
15	3	80	NR	ML	Silt, medium dark gray, clayey silt from 15' to 17'.	
					Light olive gray with iron-staining and organics 17' to 25'. Clayey silt.	
20					Light olive gray silt with dusky yellow streaks to 25'.	
25	4	80	NR		Light olive gray to pale yellowish-brown clayey silt 25' to 31'.	
30					Pale yellowish-brown sandy silt 31' to 33'.	235.7
35				SP	Yellowish-orange to grayish-orange fine to medium sand 33' to 40'.	
40				CL		226.7

WELL DIAGRAM



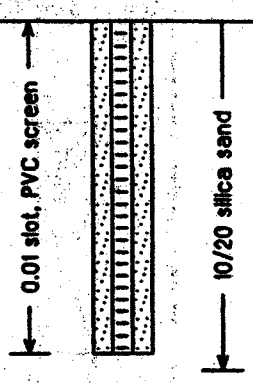
EnSafe/Allen & Hoshall

Monitoring Well 05MW04BUF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#5 - F.F.T.A.*
Project No.: *0094*	Surface Elevation: *268.74 feet msl*
Started at *1515 on 2/26/95*	TOC Elevation: *268.76 feet msl*
Completed at *Unknown on 2/26/95*	Depth to Groundwater: *11.80 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.96 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *50 feet*
Geologist: *Ben Brantley*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft msl)
45	X		5	80	NR		CL	6" clay lenses at 40' and 45'. Yellowish-orange to grayish-orange coarse to very coarse gravelly sand.	228.2
	X						SW		
	X						CL	Clay at 45' (6" thick); maroon mixed with gray.	221.7 221.2
	X						SW	Grayish-orange to yellowish-orange medium sand.	
50	X		6	80	NR			End of boring.	218.7
55									
60									
65									
70									
75									
80									

WELL DIAGRAM



BORING LOG OF 005G08LF

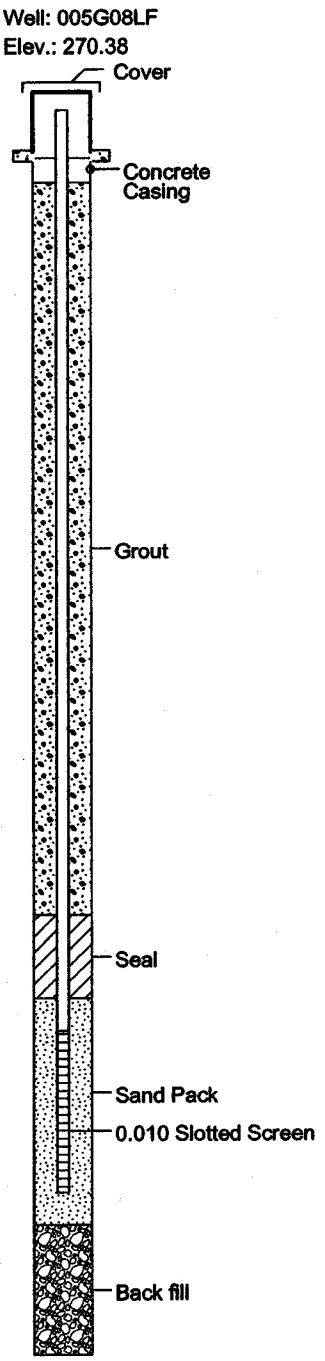
NSA MID-SOUTH
Millington, TN.

Location: SWMU 5

Project #: CTO 0094

Started	: 1015 8/5/98	Northing	: 390003.80
Finished	: 1530 8/5/98	Easting	: 811521.80
Drilling Method	: Rotasonic	TOC Elevation	: 270.38
Drilling Company	: Alliance Drilling	Total Depth	: 75 feet
Geologist	: B. Brantley	Well Screen	: 55 to 65 feet

Depth in Feet	Surf. Elev. 267.89	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	267	1	60	0.2		ML	(0 - 3) Med. yellowish brown silt mixed w/ Lt. olive gray silt, dry, med. stiff (3 - 11.5) no recovery (11.5 - 13.5) Grayish green silt, wet, med. stiff, petroleum odor
5	262						
10	257	2	35	78			(13.5 - 18.5) Med. yellowish brown w/ Lt. olive brown silt, moist to wet, med. stiff
15	252						
20	247	3	80				(18.5 - 23.5) Olive gray clayey silt, moist, stiff (23.5 - 26.5) Olive gray clayey silt mixed w/ Lt. olive brown, moist, stiff
25	242						(26.5 - 30.5) Med. yellowish brown streaked w/ dark yellowish brown and Lt. olive gray silt
30	237	4	80			CL	(30.5 - 35) Lt. gray to Lt. olive gray sandy clay, moist to wet, med. stiff to stiff (35 - 38) Lt. olive gray clay w/ dark yellowish orange sandy clay, very stiff to hard
35	232						
40	227	5	90	0.6		SM	(38 - 42.5) Dark yellowish orange and grayish orange fine sand, micaceous, (6" section of gravel between 40.5 and 41)
45	222					SW	(42.5 - 47) Grayish orange coarse sand w/ scattered gravel (up to 1" dia.)
50	217	6	100	0.2		SP	(47 - 51) Dark yellowish orange and grayish orange fine sand
55	212					SW	(51 - 55) Dark yellowish orange and grayish orange fine to med. gravelly sand (up to 3/4" dia.) (55 - 65) Grayish orange med. to corase gravelly sand (up to 1" dia.)
60	207	7	90	0.4			
65	202					GM	(65 - 65.5) Dark yellowish orange silty sandy gravel, wet
70	197	8	100			CL	(65.5 - 74.5) Dusky yellowish brown clay, stiff, hard (74.5 - 75) Lt. olive gray fine sand lenses within clay matrix
75	192						
80							



07-28-2003 N:\well logs\NSAMidsouth\005G08LF.BOR

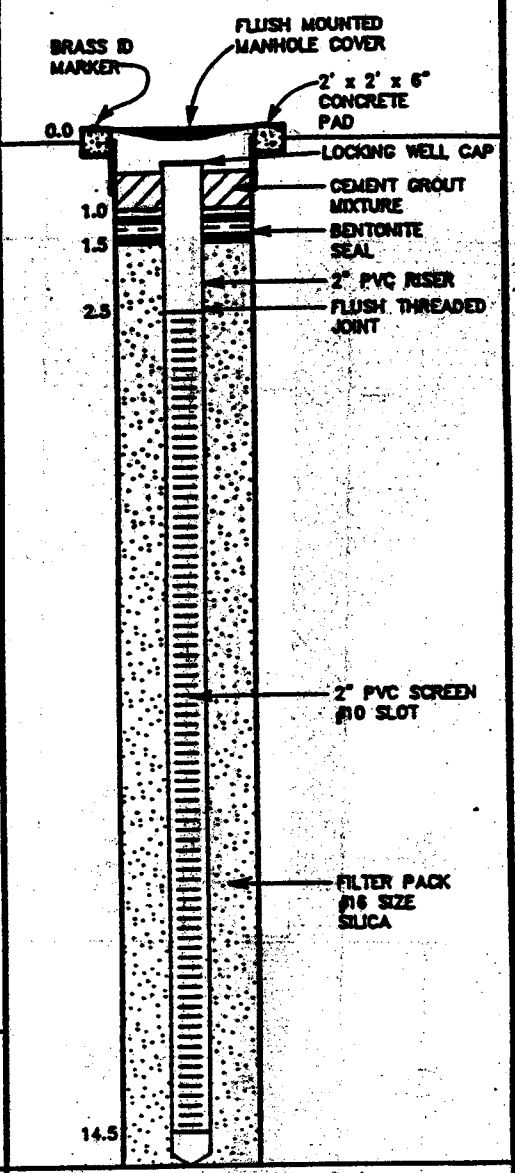
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEMS 1489, 1490, 1491, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T1489-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, LIGHT BROWN, WITH PEA GRAVEL MOIST
			3.0
5			SILT, CLAYEY, LIGHT BROWN
			6.0
			SILT, CLAYEY, GREEN, WET
			8.5
10			SILT, CLAYEY, LIGHT BROWN, WET MODERATE HYDROCARBON ODOR
			13.0
			13.1 24 HOUR WATER LEVEL
			SILT, CLAYEY, GRAY, WET MODERATE HYDROCARBON ODOR
15			15.0 TERMINATED @ 15.0



WELL CONSTRUCTION

Boring Completion Date: DEC. 28, 1989
Well Completion Date: DEC. 28, 1989
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 13.1'

Boring Diameter: 6.75"
Ground Elevation: 268.13'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

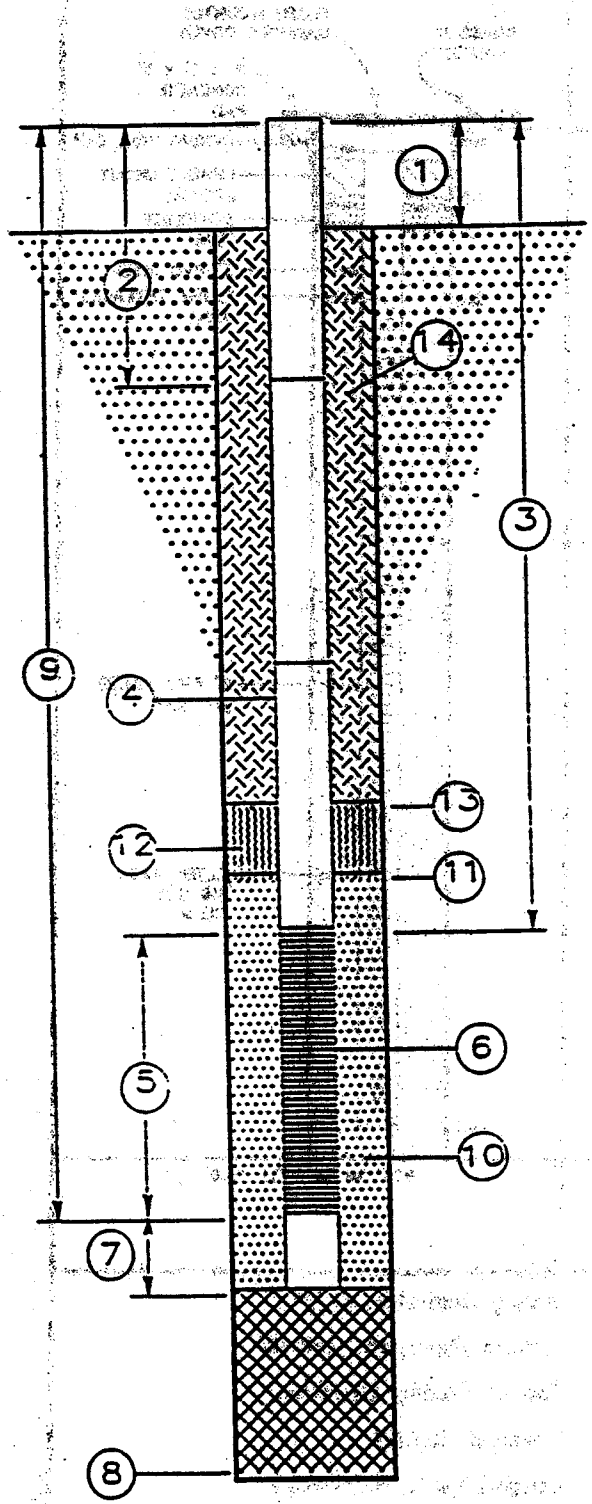
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1489-1

DATE OF INSTALLATION 12-28-89



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.

   Coupling Interval Depths 2.5 ft., 5.0 ft.

   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand

    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets

    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement

    Grout Mixture 100%

    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

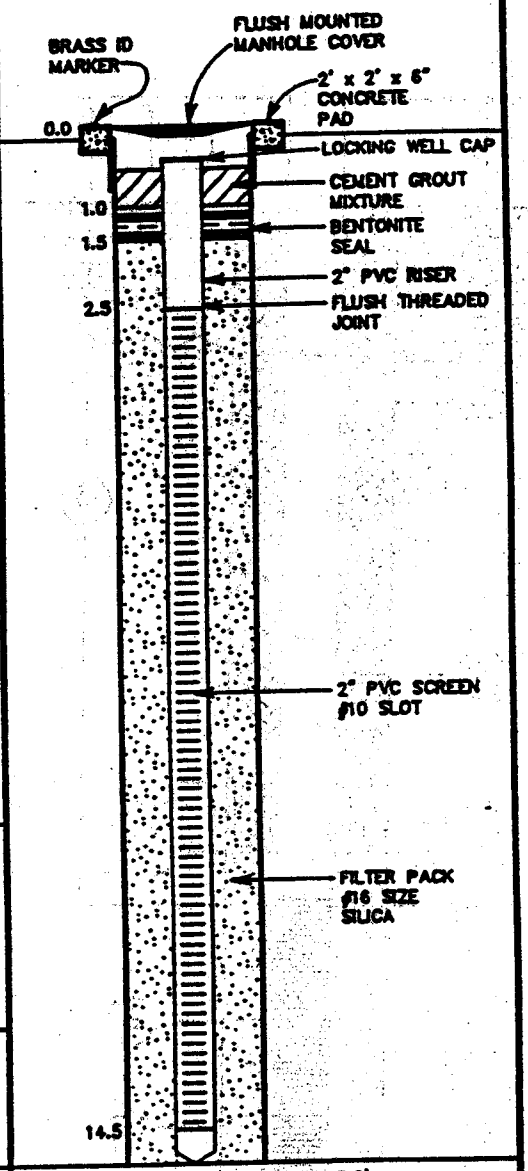
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEMS 1489, 1490, 1491, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T1489-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILTY, BROWN, MOIST
			3.0
			SILT, CLAYEY, GRAY SLIGHT HYDROCARBON ODOR
5			6.0
			SILT, CLAYEY, GREEN, WET MODERATE HYDROCARBON ODOR
			10.0
10			SILT, CLAYEY, LIGHT BROWN, WET MODERATE HYDROCARBON ODOR
			12.2 — 24 HOUR WATER LEVEL
			13.0
			SILT, CLAYEY, GRAY, WET MODERATE HYDROCARBON ODOR
15			15.0
			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: DEC. 28, 1989
Well Completion Date: DEC. 28, 1989
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 12.2'

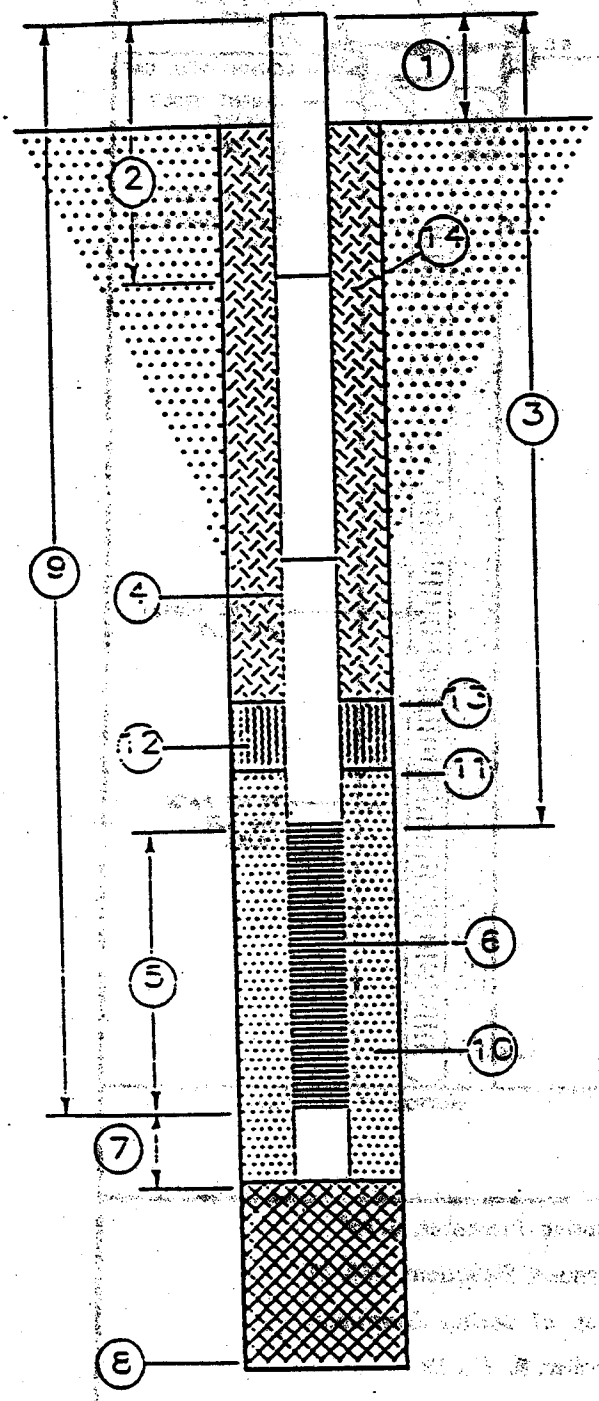
Boring Diameter: 6.75"
Ground Elevation: 268.22'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-1489-2

DATE OF INSTALLATION 12/28/89



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #12 C/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

Well Construction Details

Appendix III

Release Detection Manual
NAS Memphis, Tn
April, 1991

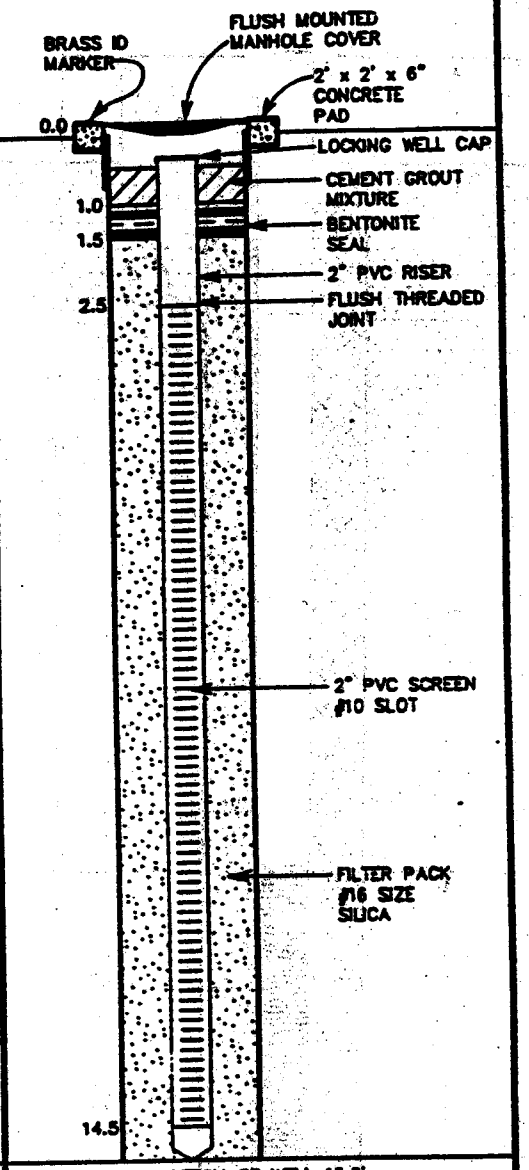
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEMS 1489, 1490, 1491, NAS, MEMPHIS, TN.

LOG OF BORING NO. A3 LOG OF WELL NO. MEM-T1489-3

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, LIGHT BROWN
			4.0
5			CLAY, SILTY, GRAY
			7.0
10			CLAY, SILTY, GRAY, MOIST SLIGHT HYDROCARBON ODOR
			13.8 24 HOUR WATER LEVEL
15			15.0 TERMINATED @ 15.0



WELL CONSTRUCTION

Boring Completion Date: DEC. 28, 1989
Well Completion Date: DEC. 28, 1989
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 13.8'

Boring Diameter: 6.75"
Ground Elevation: 267.51'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

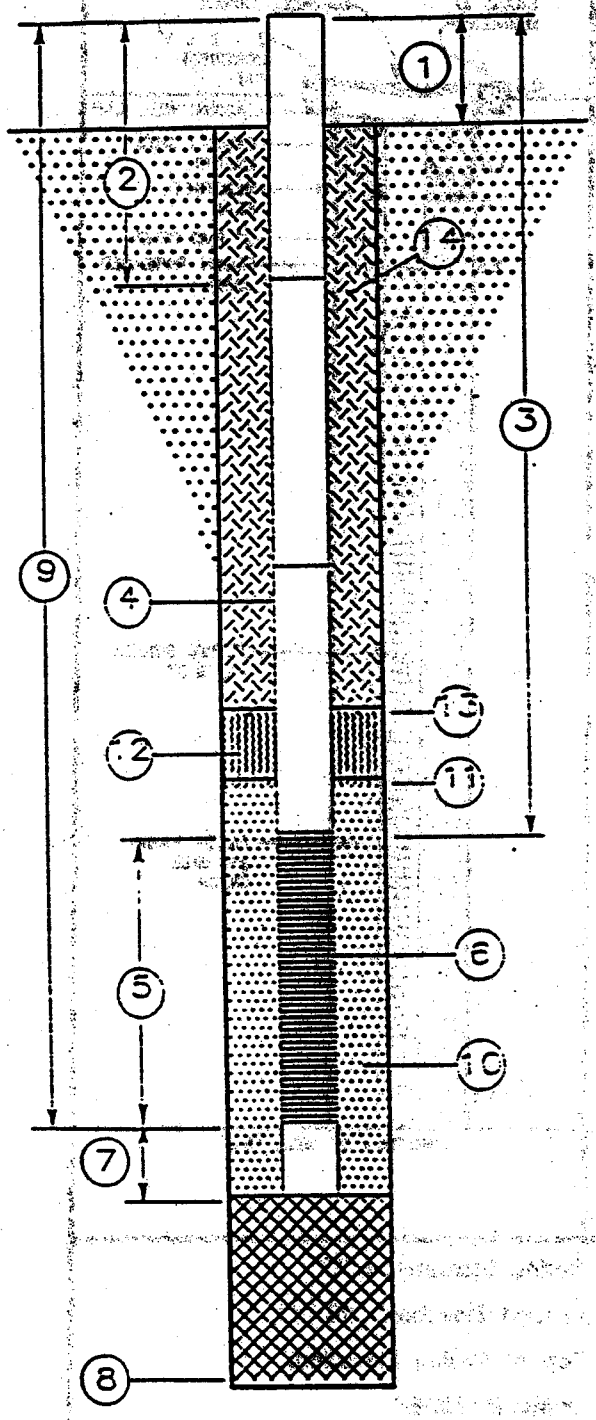
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T-1489-3

DATE OF INSTALLATION 12-28-89



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft.
   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 U/C ____
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

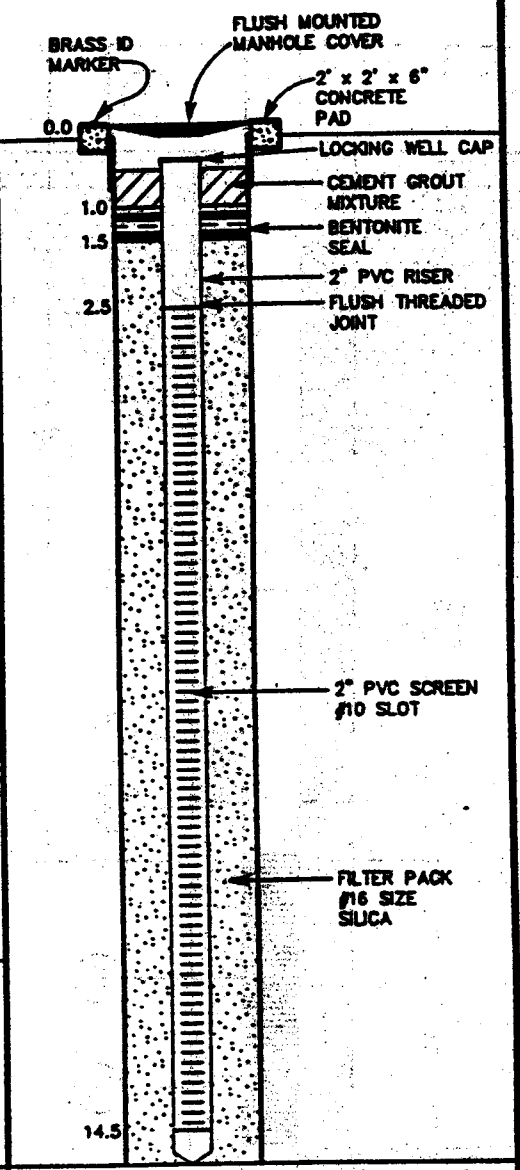
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEMS 1489, 1490, 1491, NAS, MEMPHIS, TN.

LOG OF BORING NO. A4 LOG OF WELL NO. MEM-T1489-4

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, LIGHT BROWN, MOIST
			2.0
			SILT, CLAYEY, GRAY SLIGHT HYDROCARBON ODOR
			4.0
5			SILT, CLAYEY, GREEN, MOIST SLIGHT HYDROCARBON ODOR
			7.0
10			SILT, CLAYEY, LIGHT BROWN, MOIST MODERATE HYDROCARBON ODOR
			12.0
			13.1 24 HOUR WATER LEVEL
			SILT, CLAYEY, GRAY
15			15.0
			TERMINATED @ 15.0

WELL CONSTRUCTION



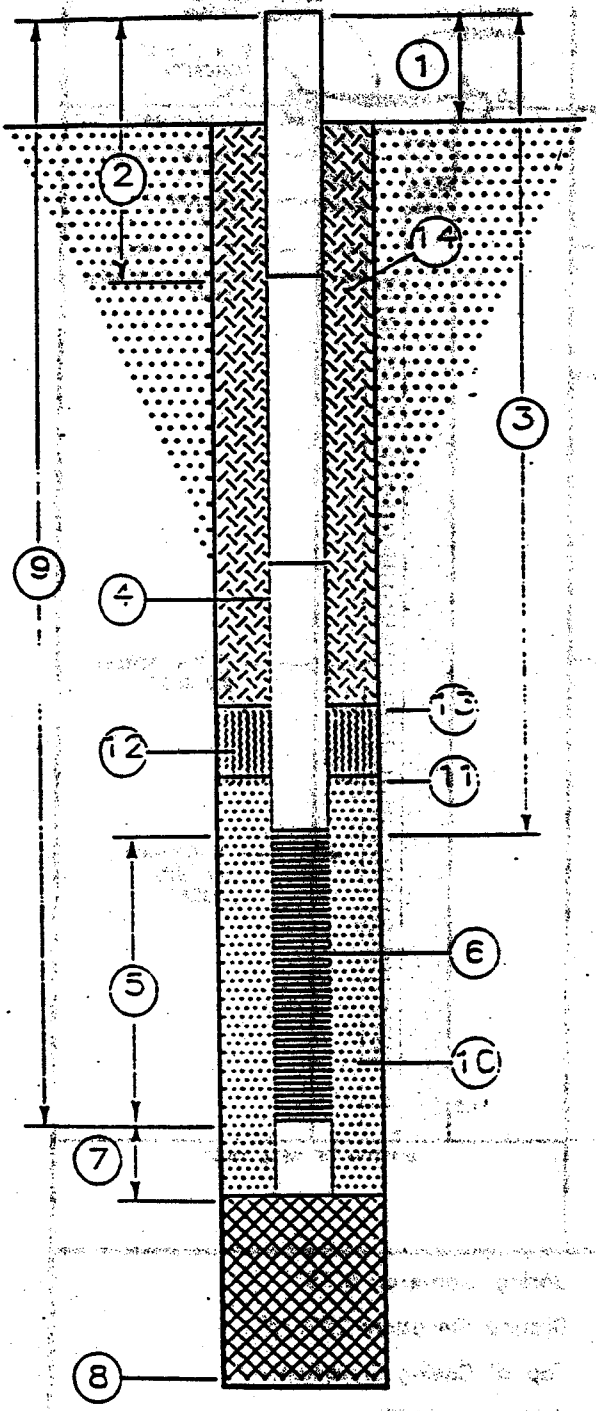
Boring Completion Date: NOV. 18, 1990
Well Completion Date: NOV. 28, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 13.1'

Boring Diameter: 6.75"
Ground Elevation: 267.75'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL NUMBER MEM-T1489-4

DATE OF INSTALLATION 12-28-89



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft.
   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #6 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

Well Construction Details

Appendix III

Release Detection Manual
NAS Memphis, Tn
April, 1991

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

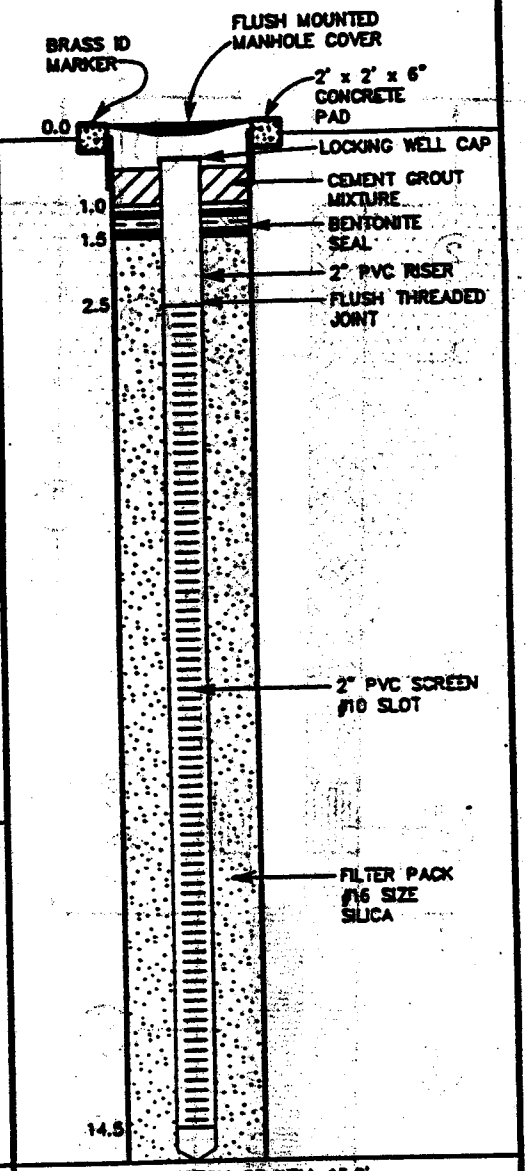
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1508, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T1508-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			GRAVEL
			1.0
			SILT, LIGHT BROWN, MOIST SLIGHT HYDROCARBON ODOR
			4.0
5			SILT, CLAYEY, GREEN, MOIST SLIGHT HYDROCARBON ODOR
			6.0
			SILT, CLAYEY, GRAY MODERATE HYDROCARBON ODOR
10			10.0
			SILTY, CLAYEY, LIGHT BROWN SLIGHT HYDROCARBON ODOR
			13.0 24 HOUR WATER LEVEL
15			15.0
			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: DEC. 29, 1990
Well Completion Date: DEC. 29, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 13.0'

Boring Diameter: 6.75"
Ground Elevation: 268.07'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

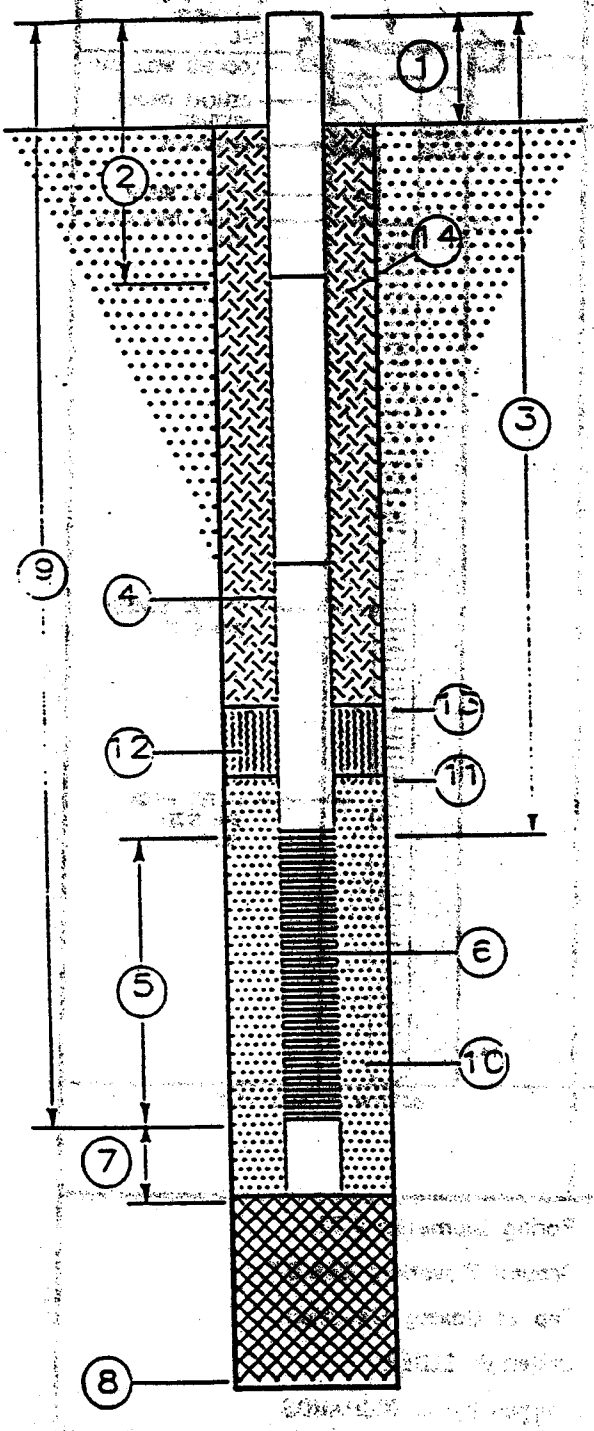
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1508-1

DATE OF INSTALLATION 12-29-89



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft. / 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 S/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

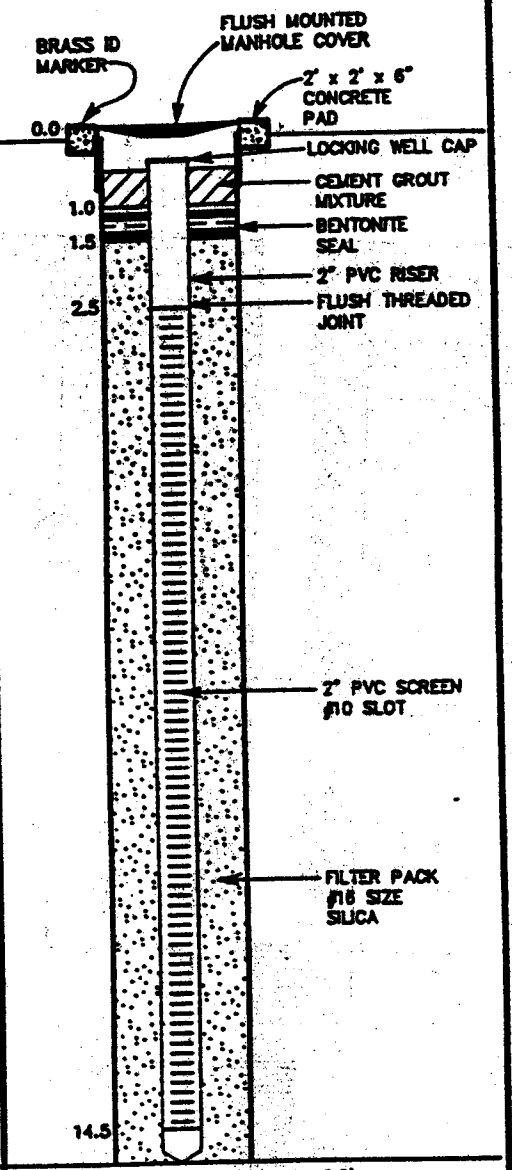
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1508, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T1508-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, LIGHT BROWN, WITH GRAVEL MOIST, SLIGHT HYDROCARBON ODOR
4.0			
5			SILT, CLAYEY, LIGHT GRAY SLIGHT HYDROCARBON ODOR
9.0			
10			SILT, CLAYEY, LIGHT BROWN, WET SLIGHT HYDROCARBON ODOR
12.9			24 HOUR WATER LEVEL
15			
15.0			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: DEC. 29, 1990
Well Completion Date: DEC. 29, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 12.9'

Boring Diameter: 6.75"
Ground Elevation: 267.74'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

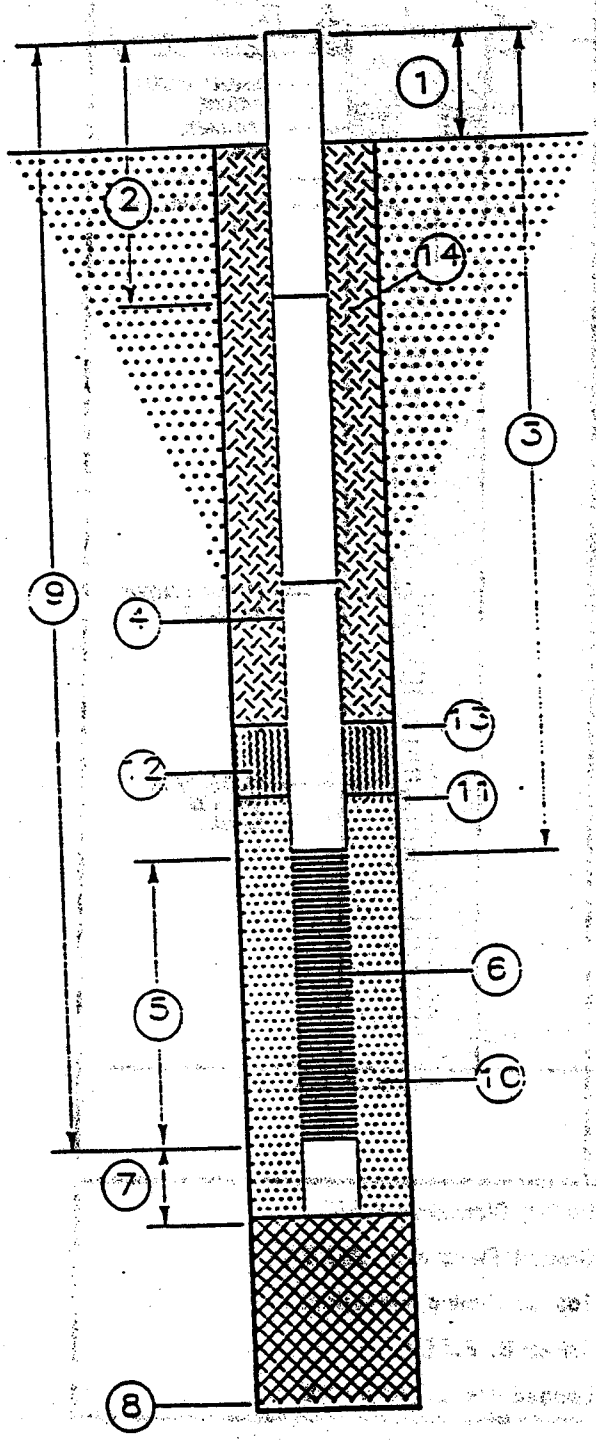
2155 EAGLE DR. P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1508-2

DATE OF INSTALLATION 12/29/89



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.

   Coupling Interval Depths 2.5 ft., 5.0 ft.

   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand

    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets

    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement

    Grout Mixture 100%

    Method of Placement Pour

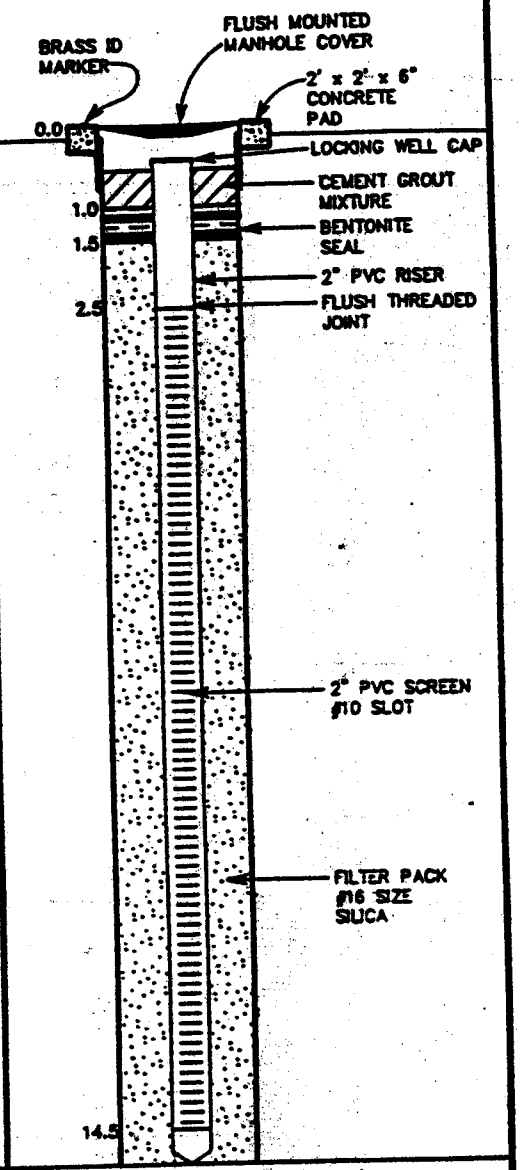
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1508, NAS, MEMPHIS, TN.

LOG OF BORING NO. A3 LOG OF WELL NO. MEM-T1508-3

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY, LIGHT BROWN WITH GRAVEL MOIST, SLIGHT HYDROCARBON ODOR
4.0			
5			SILT, CLAYEY, LIGHT GRAY WITH TRACES OF GRAVEL SLIGHT HYDROCARBON ODOR
9.0			
10			SILT, CLAYEY, LIGHT BROWN, MOIST SLIGHT HYDROCARBON ODOR
12.5			24 HOUR WATER LEVEL
15			
15.0			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: DEC. 29, 1990
Well Completion Date: DEC. 29, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 12.5'

Boring Diameter: 6.75"
Ground Elevation: 266.67'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

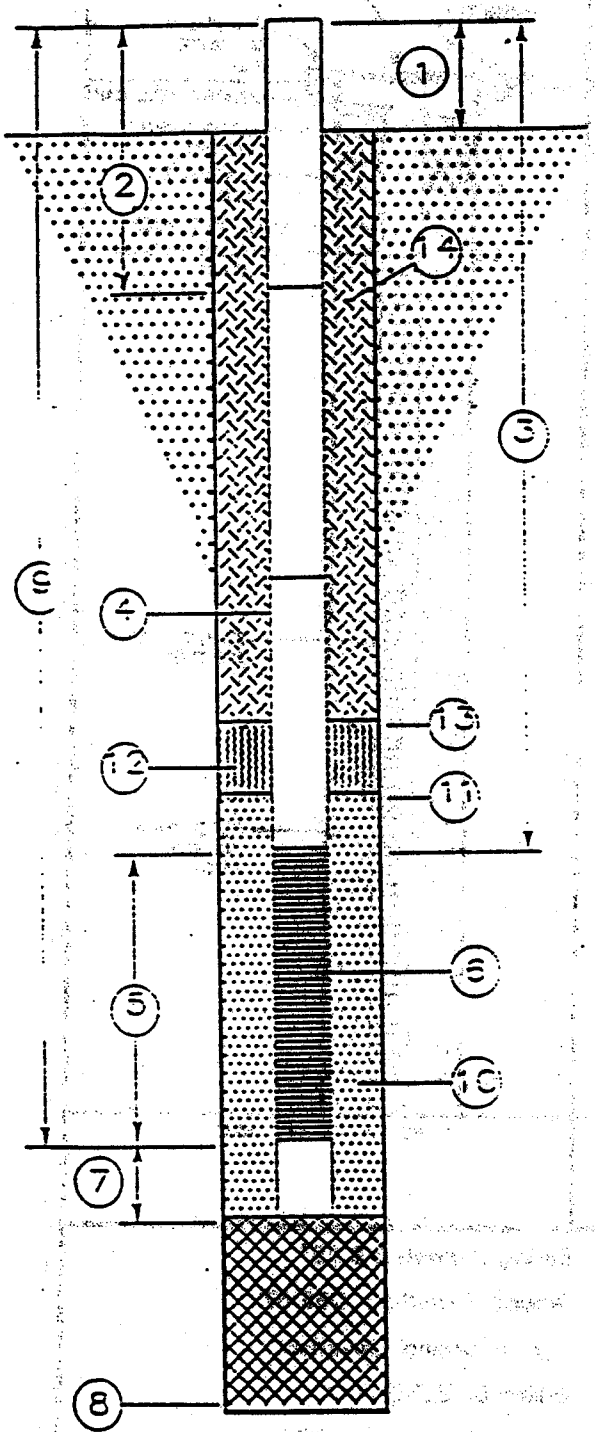
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1508-3

DATE OF INSTALLATION 12-29-89



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft.
   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC 0.02" slot
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inches
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand .
    Quantity Used 14.66 ft.^{3} Size #20 U/O
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.08 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SWMU 7

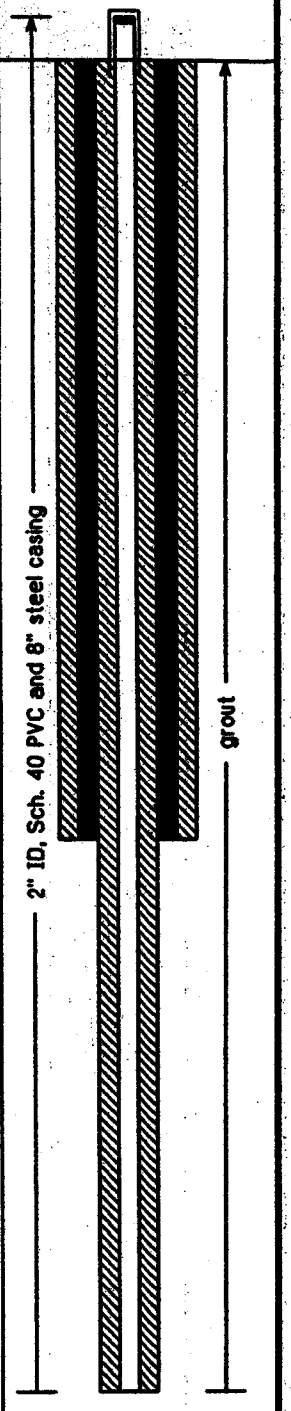
EnSafe/Allen & Hoshall

Monitoring Well 07MW01LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *283.50 feet msl*
Started at *1015 on 2-07-95*	TOC Elevation: *284.90 feet msl*
Completed at *on 2-07-95*	Depth to Groundwater: *27.03 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.87 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *70 feet*
Geologist: *Ben Brantley*	Well Screen: *59 to 69 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							ML	Clayey silt, grayish blue green, moist.	
5			1	80	BG				
								Clayey silt, moderate brown, medium stiff.	
10									
								Clayey silt, moderate brown to dark yellowish brown, mottled pale yellowish brown.	
15			2	100	BG				
								Clayey silt, light brown to reddish brown, stiff, dry.	
20									
								Clayey silt, moderate brown, stiff.	
25			3	100	BG				258.5
							SC	Clayey sand, fine to medium, dark yellowish brown to light brown.	
30									
35			4	95	BG				
40									

WELL DIAGRAM



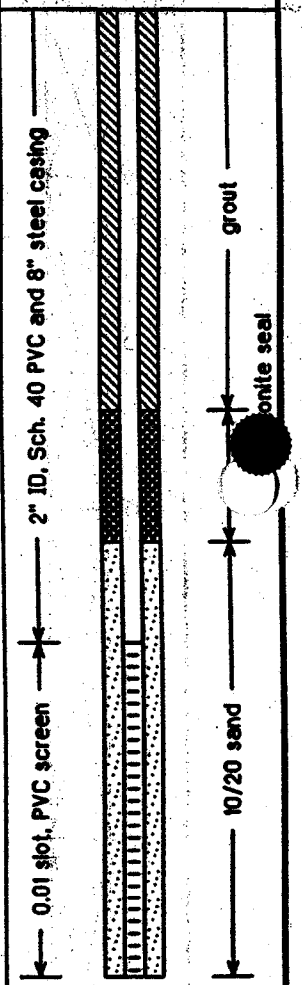
EnSafe/Allen & Hoshall

Monitoring Well 07MW01LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *283.50 feet msl*
Started at *1015 on 2-07-95*	TOC Elevation: *284.90 feet msl*
Completed at *on 2-07-95*	Depth to Groundwater: *27.03 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.87 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *70 feet*
Geologist: *Ben Brantley*	Well Screen: *59 to 69 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45							SC		
50									231.5
55			5	90	BG		GP	Gravelly sand, coarse, grayish orange to yellowish orange.	
60									
65									
70									214.5
75			6	87	BG			Log information taken from the boring for the Cockfield well at SWMU#7 site 1.	
80									

WELL DIAGRAM



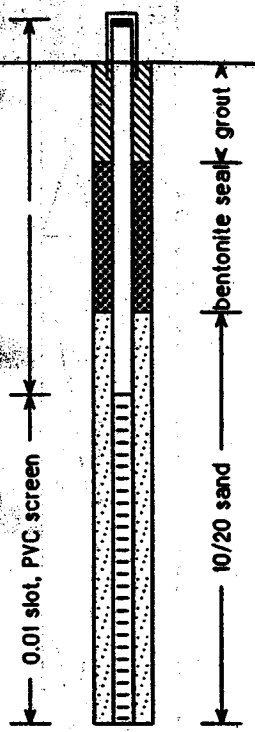
EnSafe/Allen & Hoshall

Monitoring Well 07MW01LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *283.15 feet msl*
Started at *1015 on 2-07-95*	TOC Elevation: *284.74 feet msl*
Completed at *on 2-07-95*	Depth to Groundwater: *21.10 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *263.64 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Ben Brantley*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	80	BG			Clayey silt, grayish blue green, moist.	
10								Clayey silt, moderate brown, medium stiff.	
15			2	100	BG		ML	Clayey silt, moderate brown to dark yellowish brown, mottled pale yellowish brown.	
20			3	100	BG			Clayey silt, light brown to reddish brown, stiff, dry.	
25								Clayey silt, moderate brown, stiff.	258.1
30								Log information taken from the boring for the Cockfield well at SWMU#7 site 1.	
35									
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

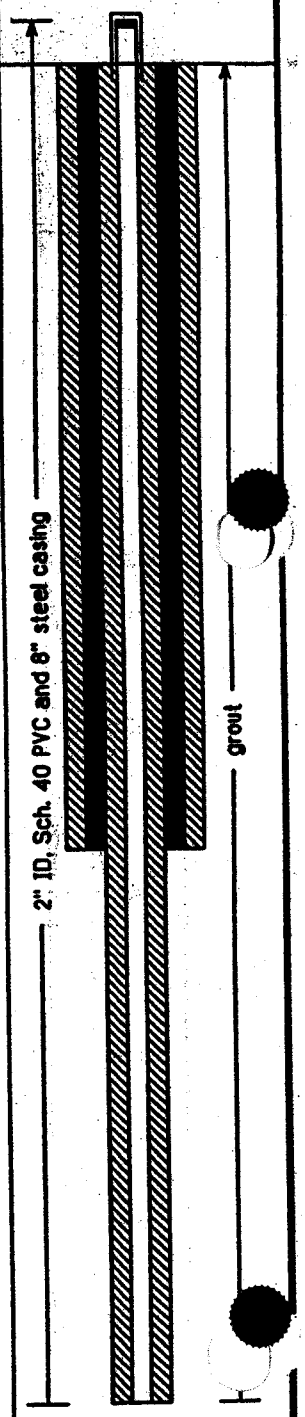
Monitoring Well 07MW01C

(007G01UC)

Project: *NAS Memphis*	Location: *Millington, TN. Building N-126*
Project No.: *N0094*	Surface Elevation: *282.75 feet msl*
Started at *1015 on 2-07-95*	TOC Elevation: *284.64 feet msl*
Completed at *on 2-07-95*	Depth to Groundwater: *29.48 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *255.16 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *110.0 feet*
Geologist: *Ben Brantley*	Well Screen: *97 to 107 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1		146			Clayey silt, grayish blue green, moist.	
			2	80	89.4				
5			3		55				
			4		9.1			Clayey silt, moderate brown, medium stiff.	
10			5		6.3				
			6		2.9		ML	Clayey silt, moderate brown to dark yellowish brown, mottled pale yellowish brown.	
			8		24.8				
15			9	100	12.3			Clayey silt, light brown to reddish brown, stiff, dry.	
			10		0.3				
20			11		BG			Clayey silt, moderate brown, stiff.	
			12		BG				
25			13	100	BG				257.7
			14		BG			Clayey sand, fine to medium, dark yellowish brown to light brown.	
			15		BG				
30			16		BG		SC		
			17		BG				
35			18	95	BG				246.7
			19		BG		GP		
			20		BG				
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

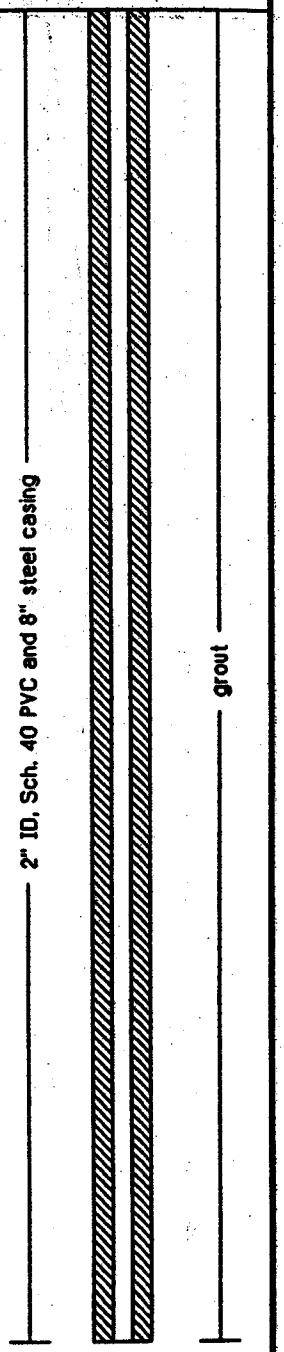
Monitoring Well 07MW01C

(007G01UC)

Project: *NAS Memphis*	Location: *Millington, TN. Building N-126*
Project No: *N0094*	Surface Elevation: *282.75 feet msl*
Started at *1015 on 2-07-95*	TOC Elevation: *284.64 feet msl*
Completed at *on 2-07-95*	Depth to Groundwater: *29.48 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *255.16 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *110.0 feet*
Geologist: *Ben Brantley*	Well Screen: *97 to 107 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45	21		BG	GP		
	22		BG			
	23		BG			
	24		BG			
	25		BG			
50	26		BG			
	27		BG			230.7
	28	90	BG		Gravelly sand, coarse, grayish orange to yellowish orange.	
55	29		0.8			
	30					
60	31		1.0			
	32		0.8			
	33		0.8			
65	34		0.8	SC		
	35		BG		Sand clayey, fine, pale yellowish orange to moderate orange.	
	36		BG		Silty clayey sand, fine, medium gray to olive gray, contains marcasite nodules.	
70	37		BG			
	38	87	BG		Sand, fine, yellowish gray to light gray, lignite at 79.5'.	
	39		BG			
75	40		BG			
80						

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW01C
(007G01UC)

Project: NAS Memphis
Project No.: N0094
Started at 1015 on 2-07-95
Completed at on 2-07-95
Drilling Method: Rotasonic
Drilling Company: North Star Drilling
Geologist: Ben Brantley

Location: Millington, TN. Building N-126
Surface Elevation: 282.75 feet msl
TOC Elevation: 284.64 feet msl
Depth to Groundwater: 29.48 feet Measured: 3/31/95
Groundwater Elevation: 255.16 feet msl
Total Depth: 110.0 feet
Well Screen: 97 to 107 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			41		BG			Sand, fine, medium gray to olive gray, micaceous.	
			42		BG				
85			43		BG			Sand, fine, light olive gray to gray with dusky brown clay lenses.	
			44		BG				
			45		BG				
90			46		BG				
			47		BG		SC		
95			48	110	BG				
			49		BG				
			50		BG			Same as above but increasing amounts of clay from 99' to 105'.	
100			51		BG				
			53		BG				
105			54		BG				177.7
			55		BG		CL	Clay, waxy, dusky brown, hard, has olive gray sand lenses.	
			56		BG				
110			57	100				End of boring at 110'.	172.7
115									
120									

WELL DIAGRAM

2" ID, Sch. 40 PVC and 8" steel casing
0.01 slot, PVC screen
grout
bentonite seal
10/20 sand

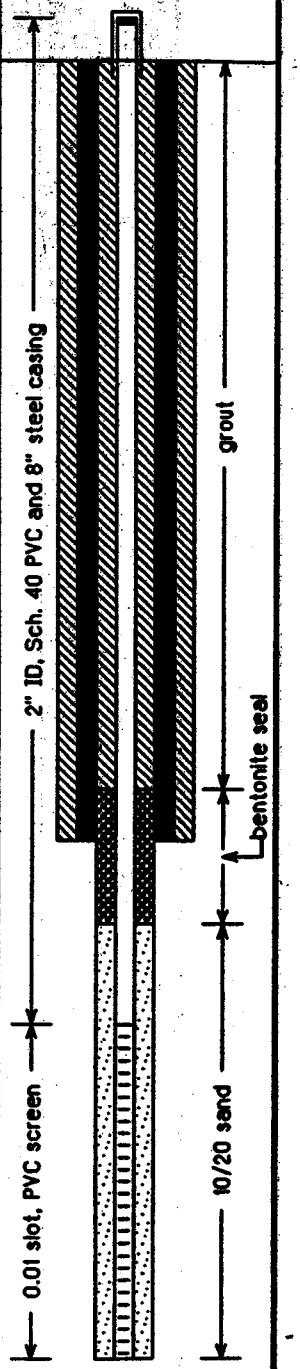
EnSafe/Allen & Hoshall

Monitoring Well 07MW01UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *283.60 feet msl*
Started at *1015 on 2-07-95*	TOC Elevation: *284.99 feet msl*
Completed at *on 2-07-95*	Depth to Groundwater: *27.93 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.06 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *40.0 feet*
Geologist: *Ben Brantley*	Well Screen: *29 to 39 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Clayey silt, grayish blue green, moist.	
5			1	80	BG				
								Clayey silt, moderate brown, medium stiff.	
10									
							ML	Clayey silt, moderate brown to dark yellowish brown, mottled pale yellowish brown.	
15			2	100	BG				
								Clayey silt, light brown to reddish brown, stiff, dry.	
20								Clayey silt, moderate brown, stiff.	
25			3	100	BG				258.6
								Clayey sand, fine to medium, dark yellowish brown to light brown.	
30							SC		
35			4	95	BG				
40									243.6

WELL DIAGRAM



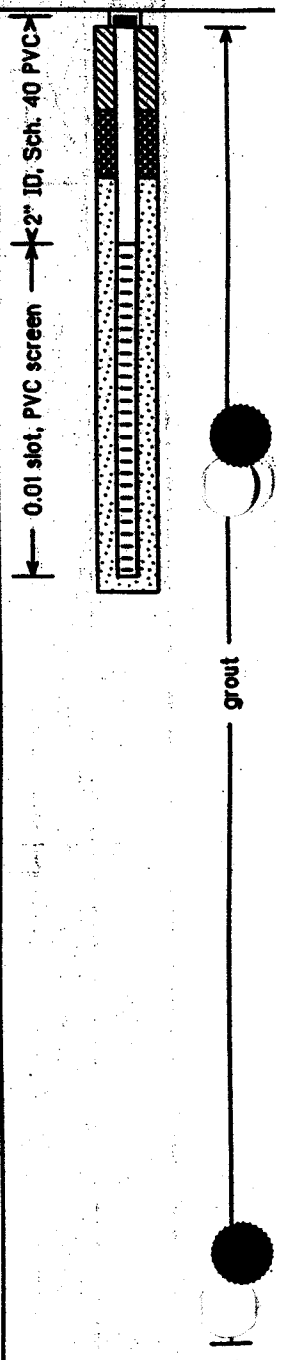
EnSafe/Allen & Hoshall

Monitoring Well 07MW02LS
Boring 07MW02LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No: *N0094*	Surface Elevation: *feet msl*
Started at *on 2-07-95*	TOC Elevation: *feet msl*
Completed at *on 2-07-95*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Ben Brantley*	Well Screen: *to feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	90	BG			Clayey silt, grayish green with dark yellow brown.	
10							ML	Clayey silt, dark yellowish brown to light olive gray.	
15			2	100	BG			Clayey silt, dark yellowish orange to light brown, medium stiff, dry.	
20			3	100	BG			End of boring at 20'. Mointoring well closed in place on 3/07/95 due to the absence of groundwater. Well was closed by drilling out the well and grouting up the remaining borehole.	
25									
30									
35									
40									

WELL DIAGRAM



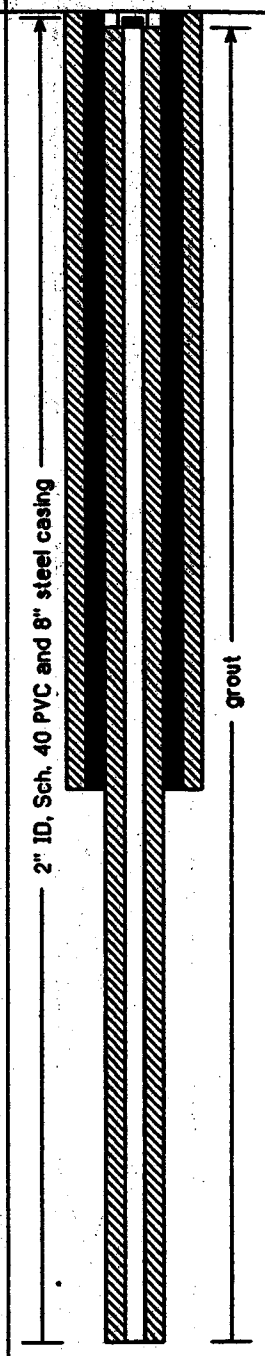
EnSafe/Allen & Hoshall

Monitoring Well 07MW02UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *283.61 feet msl*
Started at *1150 on 2-07-95*	TOC Elevation: *283.18 feet msl*
Completed at *on 2-07-95*	Depth to Groundwater: *26.99 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.19 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *125.0 feet*
Geologist: *Ben Brantley*	Well Screen: *106 to 116 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			1		BG			Clayey silt, grayish green with dark yellow brown.	
			2		BG				
5			3	90	BG				
			4		41.9				
10			5		20.0				
			6		BG		ML	Clayey silt, dark yellowish brown to light olive gray.	
15			7	100	BG				
			8		BG			Clayey silt, dark yellowish orange to light brown, medium stiff, dry.	
			9		BG				
20			10	100	BG			Clayey silt, moderate brown with organics.	
			11		BG				
			12		33.4				
25				100					258.6
			13		BG			Sandy clay, moderate reddish to light brown, medium stiff, fine.	
			14		BG				
30			15		BG		GM		
			16		BG			Silty clayey sand, medium, brown to yellowish orange, a few small gravels.	
35			17	80	BG				
			18		BG				
			19		BG		GP	Sand, medium, yellowish gray to grayish orange, micaceous.	245.6
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW02UC

Project: NAS Memphis	Location: Millington, TN. SWMU#7 – Building N-126
Project No: N0094	Surface Elevation: 283.61 feet msl
Started at 1150 on 2-07-95	TOC Elevation: 283.18 feet msl
Completed at on 2-07-95	Depth to Groundwater: 26.99 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 256.19 feet msl
Drilling Company: North Star Drilling	Total Depth: 125.0 feet
Geologist: Ben Brantley	Well Screen: 106 to 116 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			20		BG					
			21		BG					
			22		BG					
			23		BG					
50			24		BG			Sand, coarse, gravelly, grayish orange to dark yellowish orange, gravels up to 2" in diameter.		
			25		BG					
			26		BG					
55			27	87	BG					
			28		BG					
			29		BG					
60			30		BG		GP			
			31		BG					
			32		BG					
65			33		BG					
			34		BG					
			35		BG					
70			36		BG					
			37	90	BG			Sand, fine, light gray to pale yellowish orange, with light gray clay lenses.		
75										
80										

WELL DIAGRAM: 2" ID, Sch. 40 PVC and 8" steel casing; grout

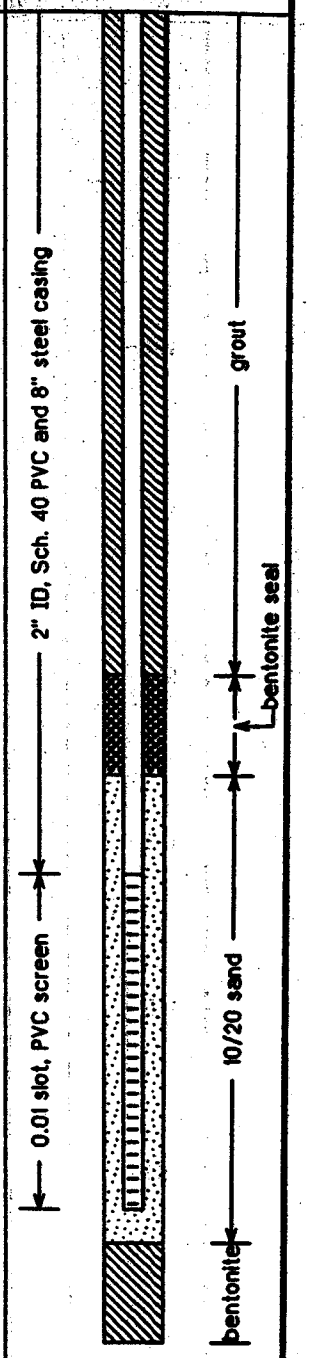
EnSafe/Allen & Hoshall

Monitoring Well 07MW02UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *283.61 feet msl*
Started at *1150 on 2-07-95*	TOC Elevation: *283.18 feet msl*
Completed at *on 2-07-95*	Depth to Groundwater: *26.99 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.19 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *125.0 feet*
Geologist: *Ben Brantley*	Well Screen: *106 to 116 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							GP		
								Silty sand, fine, light olive gray to grayish brown, conatains dusky brown clay lenses.	201.6
85									
90									
95			47	90	BG			Lignite laminations from 94'-95'.	
								Marcasite present at 98'.	
100							SM		
105									
110									
115			9	95	BG				167.6
							OL	Clay, dusky brown, hard, waxy, with thin sand laminations.	
120									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW02UC

Project: NAS Memphis	Location: Millington, TN. SWMU#7 - Building N-126
Project No.: N0094	Surface Elevation: 283.61 feet msl
Started at 1150 on 2-07-95	TOC Elevation: 283.18 feet msl
Completed at on 2-07-95	Depth to Groundwater: 26.99 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 256.19 feet msl
Drilling Company: North Star Drilling	Total Depth: 125.0 feet
Geologist: Ben Brantley	Well Screen: 106 to 116 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
125	X		10	90	BG		OL	End of boring at 125'.	158.6	bentonite
130										
135										
140										
145										
150										
155										
160										

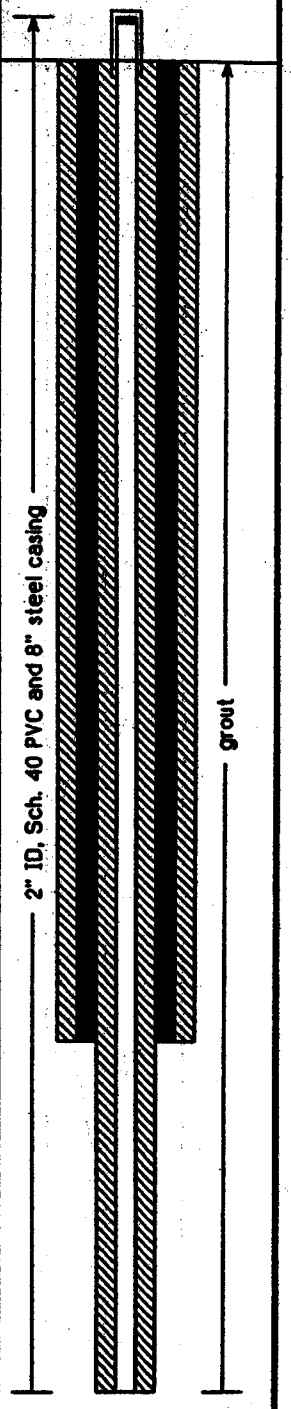
EnSafe/Allen & Hoshall

Monitoring Well 07MW03LF

Project: *NAS Memphis*	Location: *Millington, TN SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *283.82 feet msl*
Started at *1630 on 2-07-95*	TOC Elevation: *283.32 feet msl*
Completed at *1500 on 2-14-95*	Depth to Groundwater: *25.23 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.09 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *80.0 feet*
Geologist: *Ben Brantley*	Well Screen: *69.5 to 79.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	40	BG			Clayey silt, moderate brown to moderate yellowish brown, moist.	
10			2	120	BG				
15			3	100	BG		ML	Clayey silt, olive black, moist, soft.	
20			4	90	BG			Clayey silt, dark yellowish brown, medium stiff.	
25			5	90	BG			Clayey silt, moderate brown with yellow gray silt, organics.	
30			6	100	BG			Clayey silt with sand, moderate brown.	253.8
								Silty clayey sand, yellowish orange to yellowish brown.	
35			7	100	BG		SC	Silty sand, yellowish orange to reddish brown, fine to medium grained.	
40			8	120	BG				

WELL DIAGRAM



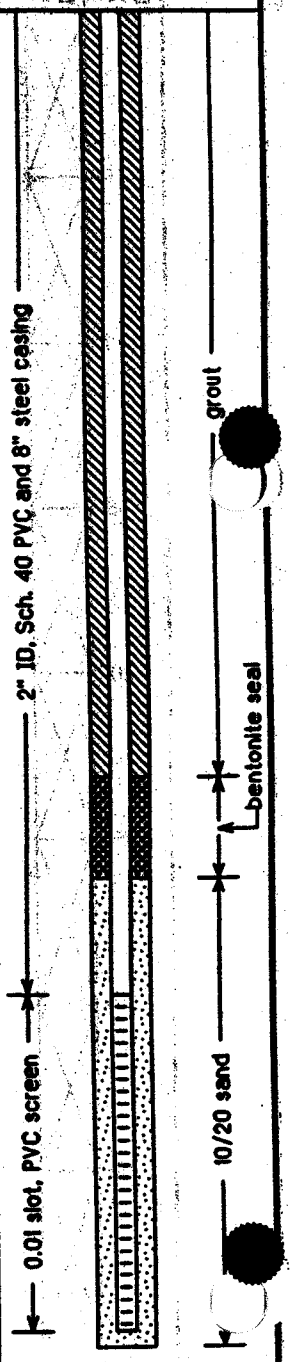
EnSafe/Allen & Hoshall

Monitoring Well 07MW03LF

Project: NAS Memphis	Location: Millington, TN. SWMU#7 - Building N-126
Project No: N0094	Surface Elevation: 283.82 feet msl
Started at 1630 on 2-07-95	TOC Elevation: 283.32 feet msl
Completed at 1500 on 2-14-95	Depth to Groundwater: 25.23 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 258.09 feet msl
Drilling Company: North Star Drilling	Total Depth: 80.0 feet
Geologist: Ben Brantley	Well Screen: 69.5 to 79.5 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SC		242.8
								Sand, yellowish gray, fine.	
								Sand, medium, yellowish orange to yellowish brown.	
45			9	120	BG			Sand, medium to coarse, grayish orange to yellow gray, with gravels.	
50									
55			10	75	BG				
60							GP		
65			11	80	BG				
70									
75			12	80	BG				
									205.8
							SC	Silty sand, fine, yellowish orange to yellow gray.	
80									203.8

WELL DIAGRAM



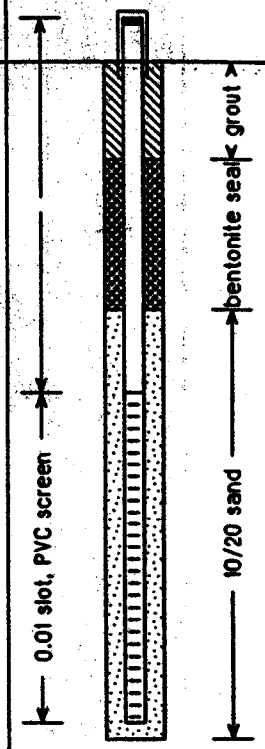
EnSafe/Allen & Hoshall

Monitoring Well 07MW03LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *283.81 feet msl*
Started at *1630 on 2-07-95*	TOC Elevation: *283.47 feet msl*
Completed at *1500 on 2-14-95*	Depth to Groundwater: *13.10 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *270.37 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Ben Brantley*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	40	BG			Clayey silt, moderate brown to moderate yellowish brown, moist.	
10			2	120	BG		ML		
15			3	100	BG			Clayey silt, olive black, moist, soft.	
20			4	90	BG				263.8
								Log information taken from the boring for the Cockfield well at SWMU#7 Site 3.	
25									
30									
35									
40									

WELL DIAGRAM



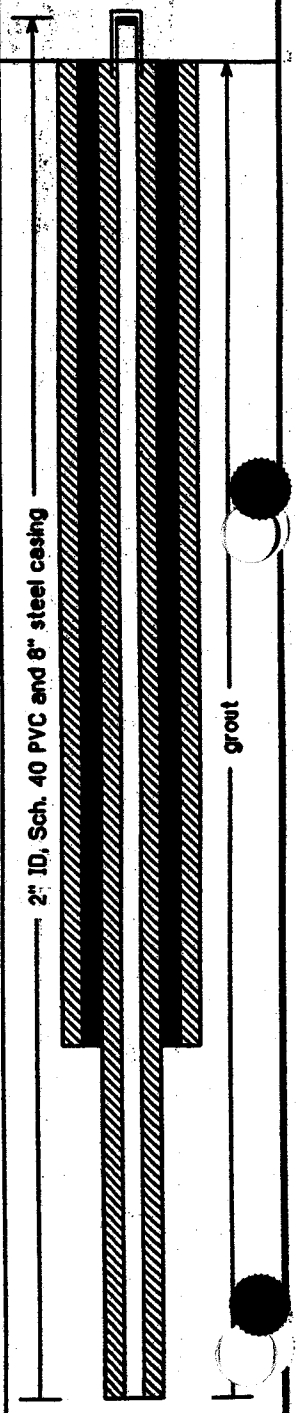
EnSafe/Allen & Hoshall

Monitoring Well 07MW03UC

Project: NAS Memphis	Location: Millington, TN. SWMU#7 - Building N-126
Project No.: N0094	Surface Elevation: 283.83 feet msl
Started at 1630 on 2-07-95	TOC Elevation: 283.47 feet msl
Completed at 1500 on 2-14-95	Depth to Groundwater: 26.48 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 256.99 feet msl
Drilling Company: North Star Drilling	Total Depth: 115.0 feet
Geologist: Ben Brantley	Well Screen: 97 to 107 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1		BG			Clayey silt, moderate brown to moderate yellowish brown, moist.	
			2	40	BG				
5			3		BG				
			4		BG				
10			5	120	BG				
			6		BG				
			7		BG				
15			8	100	BG		ML	Clayey silt, olive black, moist, soft.	
			9		BG				
			10		BG				
20			11	90	BG			Clayey silt, dark yellowish brown, medium stiff.	
			12		BG				
			13		BG				
25			14	90	BG			Clayey silt, moderate brown with yellow gray silt, organics.	
			15		BG				
30			16	100	BG				253.8
			17		BG			Clayey silt with sand, moderate brown.	
			18		BG			Silty clayey sand, yellowish orange to yellowish brown.	
35			19	100	BG		SC	Silty sand, yellowish orange to reddish brown, fine to medium grained.	
			20		BG				
40			21	120	BG				

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW03UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *283.83 feet msl*
Started at *1630 on 2-07-95*	TOC Elevation: *283.47 feet msl*
Completed at *1500 on 2-14-95*	Depth to Groundwater: *26.48 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.99 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *115.0 feet*
Geologist: *Ben Brantley*	Well Screen: *97 to 107 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	22		0.2	SC		242.8
	23		0.2		Sand, yellowish gray, fine. Sand, medium, yellowish orange to yellowish brown.	
45	24	120	BG		Sand, medium to coarse, grayish orange to yellow gray, with gravels.	
	25		0.2			
	26		0.2			
50	27		0.2			
	28		BG			
55	29	75	BG			
	30		BG			
	31		BG	GP		
60	32		BG			
	33		BG			
65	34	80	BG			
	35		BG			
	36		BG			
70	37		BG			
	38		0.2			
75	39	80	0.2			
	40		BG			
	41		BG	SC	Silty sand, fine, yellowish orange to yellow gray.	205.8
80				CL		203.8

WELL DIAGRAM: 2" ID, Sch. 40 PVC and 8" steel casing; grout

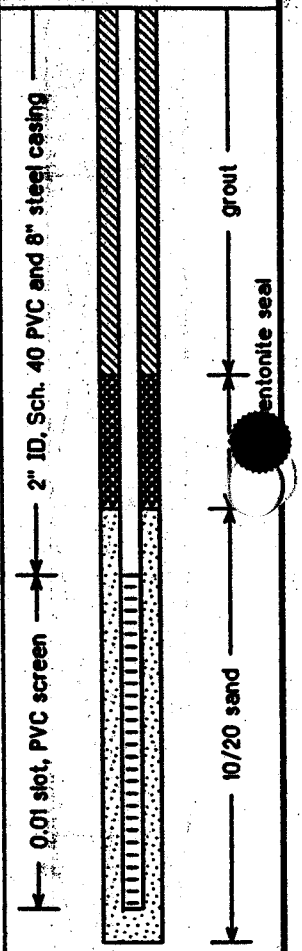
EnSafe/Allen & Hoshall

Monitoring Well 07MW03UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *283.83 feet msl*
Started at *1630 on 2-07-95*	TOC Elevation: *283.47 feet msl*
Completed at *1500 on 2-14-95*	Depth to Groundwater: *26.48 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.99 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *115.0 feet*
Geologist: *Ben Brantley*	Well Screen: *97 to 107 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
									283.8
			42		BG			Clay, dusky brown to olive gray, with light gray sand.	
			43		BG				
85			44	105	BG				
			45		BG				
			46		BG				
90			47		BG			Lignitic from 91'-93'.	
			48		BG				
95			49	105	BG				
			50		BG		CL		
			51		BG				
100			52		BG				
			53		BG				
105			54	100	BG			Clay, dusky brown, waxy, contains less sand.	
			55		BG				
			56		BG				
110			57		BG				
			58		BG				
115			59	110	BG			End of boring at 115'.	168.8
120									

WELL DIAGRAM



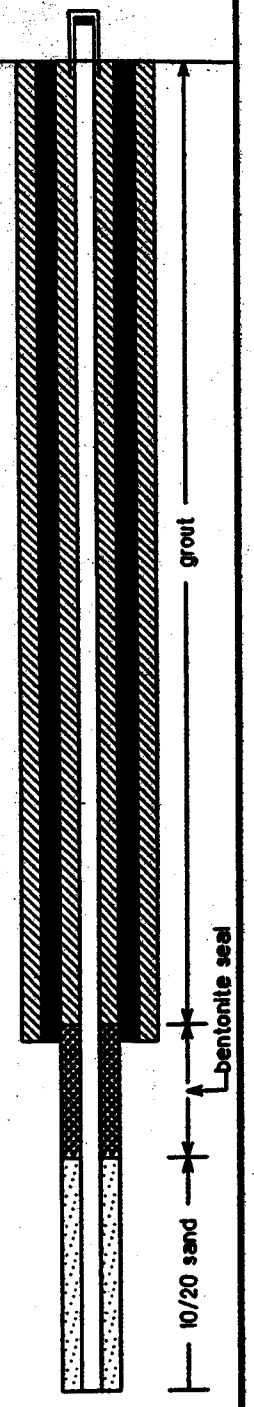
EnSafe/Allen & Hoshall

Monitoring Well 07MW03UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *283.72 feet msl*
Started at *1630 on 2-07-95*	TOC Elevation: *283.25 feet msl*
Completed at *1500 on 2-14-95*	Depth to Groundwater: *25.25 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.00 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *45.0 feet*
Geologist: *Ben Brantley*	Well Screen: *69.5 to 79.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5	X		1	40	BG			Clayey silt, moderate brown to moderate yellowish brown, moist.	
10	X		2	120	BG				
15	X		3	100	BG		ML	Clayey silt, olive black, moist, soft.	
20	X		4	90	BG			Clayey silt, dark yellowish brown, medium stiff.	
25	X		5	90	BG			Clayey silt, moderate brown with yellow gray silt, organics.	
30	X		6	100	BG			Clayey silt with sand, moderate brown.	253.7
								Silty clayey sand, yellowish orange to yellowish brown.	
35	X		7	100	BG		SC	Silty sand, yellowish orange to reddish brown, fine to medium grained.	
40	X		8	120	BG				

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW03UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *283.72 feet msl*
Started at *1630 on 2-07-95*	TOC Elevation: *283.25 feet msl*
Completed at *1500 on 2-14-95*	Depth to Groundwater: *25.25 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.00 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *45.0 feet*
Geologist: *Ben Brantley*	Well Screen: *69.5 to 79.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45	X		9	120	BG		SC	Sand, yellowish gray, fine. Sand, medium, yellowish orange to yellowish brown. Log information taken from the boring for the Cockfield well at SWMU#7 Site 3.	242.7	10/20 sand
50										
55										
60										
65										
70										
75										
80										

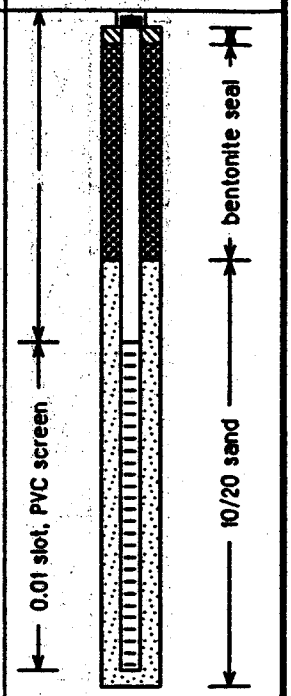
EnSafe/Allen & Hoshall

Monitoring Well 07MW04LS
Boring 07MW04LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *0900 on 1-09-95*	TOC Elevation: *feet msl*
Completed at *0910 on 2-16-95*	Depth to Groundwater: *feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5	X		1	62.5	BG			Clayey silt, moderate brown, stiff.	
10	X		2	50	BG		ML		
15	X		3	60	BG			Clayey silt, dark yellow brown, medium stiff, moist.	
20	X		4	80	BG			Clayey silt, moderate yellow with reddish brown, hard.	
25								Log information taken from the boring for the Cockfield well at SWMU#7 Site 4. Monitoring well closed in place on 3/07/95 due to the absence of groundwater. Well was closed by drilling out the well and grouting up the remaining borehole.	
30									
35									
40									

WELL DIAGRAM



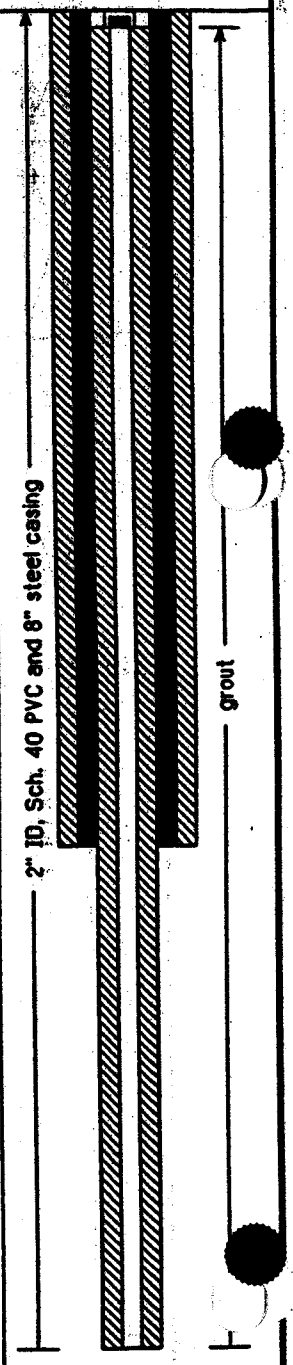
EnSafe/Allen & Hoshall

Monitoring Well 07MW04LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *283.81 feet msl*
Started at *0900 on 1-09-95*	TOC Elevation: *283.20 feet msl*
Completed at *0910 on 2-16-95*	Depth to Groundwater: *25.28 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.92 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *70.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *60 to 70 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							ML	Clayey silt, moderate brown, stiff.	
5			1	62.5	BG				
10			2	50	BG				
15			3	60	BG			Clayey silt, dark yellow brown, medium stiff, moist..	
20			4	80	BG			Clayey silt, moderate yellow with reddish brown, hard.	
25			5	80	BG			Clay, silty, trace sand, very fine, moderate reddish brown, stiff.	
30							SC	Sand, clayey, silty, finely micaceous, moderate reddish orange to moderate reddish brown.	258.8
35			6	110	BG			Sand, very fine to fine, silty, clayey, laminated, small clay casts, pale orange to moderate red.	
40									

WELL DIAGRAM



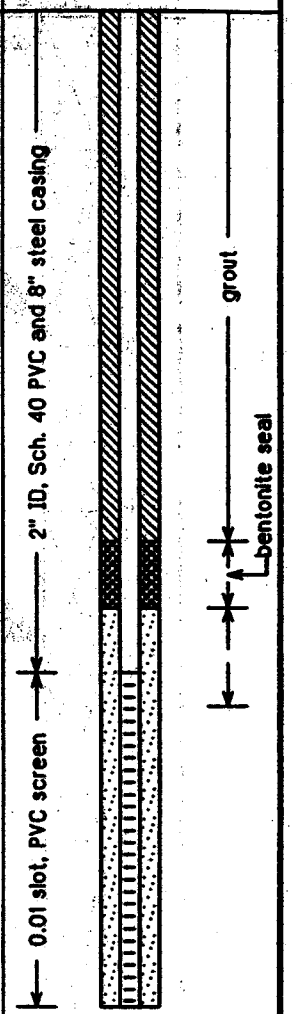
EnSafe/Allen & Hoshall

Monitoring Well 07MW04LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *283.81 feet msl*
Started at *0900 on 1-09-95*	TOC Elevation: *283.20 feet msl*
Completed at *0910 on 2-16-95*	Depth to Groundwater: *25.28 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.92 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *70.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *60 to 70 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			7	105	BG		SC	Sand, very fine to fine, silty, some clay, dark yellowish orange to grayish orange, wet.	238.8
								Sand, gravelly, clay balls, grayish orange to moderate yellowish brown.	
50									
55			8	100	BG		GP	Sand with gravel, fine to coarse, grayish orange to moderate yellowish brown, wet.	
60									
65			9	100	BG			Gravel, sandy, moderate yellowish brown to dark yellowish orange.	
70									213.8
								Log information taken from the boring for the Cockfield well at SWMU#7 Site 4.	
75			10	100	BG				
80									

WELL DIAGRAM



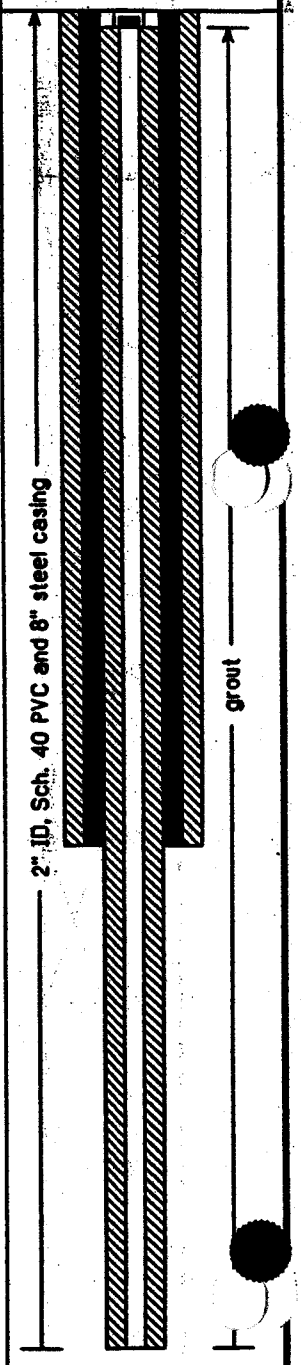
EnSafe/Allen & Hoshall

Monitoring Well 07MW04C
(007G04UC)

Project: NAS Memphis	Location: Millington, TN. SWMU#7 - Building N-126
Project No.: N0094	Surface Elevation: 283.89 feet msl
Started at 0900 on 1-09-95	TOC Elevation: 283.59 feet msl
Completed at 0910 on 2-16-95	Depth to Groundwater: 29.67 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 253.92 feet msl
Drilling Company: North Star Drilling	Total Depth: 145.0 feet
Geologist: Jack Carmichael	Well Screen: 128 to 138 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1		BG			Clayey silt, moderate brown, stiff.	
			2		BG				
5			3	62.5	BG				
			4		BG				
			5		BG				
10			6	50	BG				
			7		BG				
			8		BG		ML		
15			9	60	BG			Clayey silt, dark yellow brown, medium stiff, moist..	
			10		BG			Clayey silt, moderate yellow with reddish brown, hard.	
20			11	80	BG				
			12		BG				
25			13	80	BG			Clay, silty, trace sand, very fine, moderate reddish brown, stiff.	
			14		BG				256.9
			15		BG			Sand, clayey, silty, finely micaceous, moderate reddish orange to moderate reddish brown.	
30			16		BG				
			17		BG		SC		
35			18	110	BG			Sand, very fine to fine, silty, clayey, laminated, small clay casts, pale orange to moderate red.	
			19		BG				
			20		BG				
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW04C

(007G04UC)

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *283.89 feet msl*
Started at *0900 on 1-09-95*	TOC Elevation: *283.59 feet msl*
Completed at *0910 on 2-16-95*	Depth to Groundwater: *29.67 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *253.92 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *145.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *128 to 138 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45	21		BG	SC	Sand, very fine to fine, silty, some clay, dark yellowish orange to grayish orange, wet.	
	22		BG			
	23	105	BG			238.9
	24		BG		Sand, gravelly, clay balls, grayish orange to moderate yellowish brown.	
	25		BG			
50	26		BG			
	27		BG			
55	28	100	BG	GP	Sand with gravel, fine to coarse, grayish orange to moderate yellowish brown, wet.	
	29		BG			
	30		BG			
60	31		BG			
	32		BG			
65	33	100	BG		Gravel, sandy, moderate yellowish brown to dark yellowish orange.	
	34		BG			
	35		BG			
70	36		BG		Sand, very fine to fine, silty, clayey, laminated, light brownish gray to grayish brown, stiff, micaceous, moist.	213.9
	37		BG			
75	38	100	BG	SC	Sand, very fine to fine with clay streaks, pale orange to yellowish gray stained dark yellowish orange.	
	39		BG			
	40		BG			
80						

WELL DIAGRAM: 2" ID, Sch. 40 PVC and 8" steel casing; grout

EnSafe/Allen & Hoshall

Monitoring Well 07MW04C

(007G04UC)

Project: NAS Memphis
Project No.: N0094
Started at 0900 on 1-09-95
Completed at 0910 on 2-18-95
Drilling Method: Rotasonic
Drilling Company: North Star Drilling
Geologist: Jack Carmichael

Location: Millington, TN. SWMU#7 - Building N-126
Surface Elevation: 283.89 feet msl
TOC Elevation: 283.59 feet msl
Depth to Groundwater: 29.67 feet Measured: 3/31/95
Groundwater Elevation: 253.92 feet msl
Total Depth: 145.0 feet
Well Screen: 128 to 138 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			41		BG			Sand, very fine to fine, with clay streaks, yellowish gray to very pale orange, stained dark yellowish orange, very wet.		2" ID, Sch. 40 PVC and 8" steel casing
			42		BG					
			43	100	BG					
			44		BG			Sand, very fine to fine, clayey, laminated, pale brown to moderate brown, wet.		
90			45		BG					
			46		BG					
			47		BG			Sand, very fine to fine, laminated, medium gray to grayish brown, with occassional lignite chips.		
95			48	100	BG					
			49		BG					
			50		BG					
100			51		BG		SC			
			52		BG					
			53		BG					
105			54	109	BG					
			55		BG					
			56		BG					
110			57		BG					
			58	100	BG					
			59		BG					
115			60		BG					grout
120										

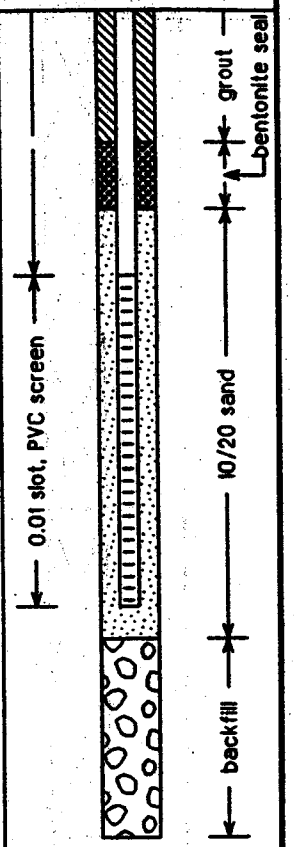
EnSafe/Allen & Hoshall

Monitoring Well 07MW04C
(007G04UC)

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *283.89 feet msl*
Started at *0900 on 1-09-95*	TOC Elevation: *283.59 feet msl*
Completed at *0910 on 2-16-95*	Depth to Groundwater: *29.67 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *253.92 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *145.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *128 to 138 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
125	61		BG	SC	Sand, very fine to fine, clayey with lignitic chips, light brownish gray to grayish brown, clayey zones are stiff, wet.	
	62		BG			
	63	100	BG			
	64		BG			
	65		BG			
130	66		BG			
	67		BG			
	68	120	BG		Sand, very fine to fine, lignitic, light brownish gray to grayish brown, cohesive in clayey zones, wet.	
135	69		BG			
	70		BG		Lignitic, dusky brown, hard.	
	71		BG	CL	Clay, silty, traces of sand, laminated dark brownish gray, color changes below 141', stiff.	143.9
140	72		BG			
	73	100	BG		End of boring at 145'.	138.9
145						
150						
155						
160						

WELL DIAGRAM



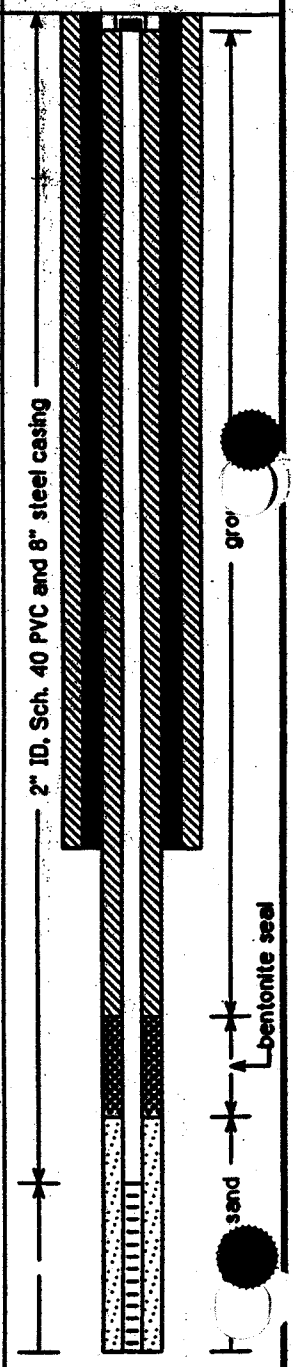
EnSafe/Allen & Hoshall

Monitoring Well 07MW04UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *283.80 feet msl*
Started at *0900 on 1-09-95*	TOC Elevation: *283.29 feet msl*
Completed at *0910 on 2-16-95*	Depth to Groundwater: *25.38 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.91 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *45.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *35 to 45 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Clayey silt, moderate brown, stiff.	
5			1	62.5	BG				
10			2	50	BG		ML		
15			3	60	BG			Clayey silt, dark yellow brown, medium stiff, moist..	
20			4	80	BG			Clayey silt, moderate yellow with reddish brown, hard.	
25			5	80	BG			Clay, silty, trace sand, very fine, moderate reddish brown, stiff.	
30							SC	Sand, clayey, silty, finely micaceous, moderate reddish orange to moderate reddish brown.	258.8
35			6	110	BG			Sand, very fine to fine, silty, clayey, laminated, small clay casts, pale orange to moderate red.	
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW04UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *283.80 feet msl*
Started at *0900 on 1-09-95*	TOC Elevation: *283.29 feet msl*
Completed at *0910 on 2-16-95*	Depth to Groundwater: *25.38 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.91 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *45.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *35 to 45 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45	X		7	105	BG		SC	Sand, very fine to fine, silty, some clay, dark yellowish orange to grayish orange, wet.	238.8	10/20 sand
								Log information taken from the boring for the Cockfield well at SWMU#7 Site 4.		
50										
55										
60										
65										
70										
75										
80										

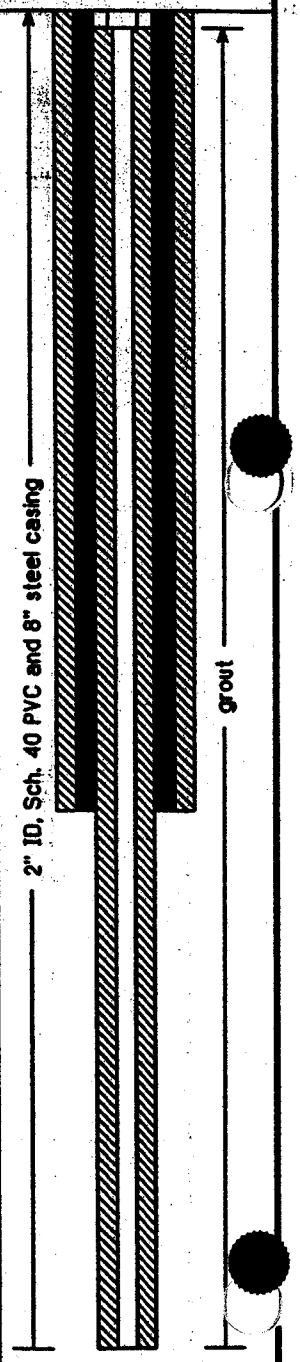
EnSafe/Allen & Hoshall

Monitoring Well 07MW05LF

Project: *NAS Memphis*	Location: *Millington, TN SWMU#7 - Building*
Project No.: *N0094*	Surface Elevation: *282.792 feet msl*
Started at *on 1-09-95*	TOC Elevation: *282.281 feet msl*
Completed at *on 2-21-95*	Depth to Groundwater: *26.00 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.28 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *76.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *66 to 76 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Clayey silt, moderate brown to yellowish brown, trace of organics.	
5			1	75	BG				
10			2	60	BG				
15			3	100	BG		ML	Clayey silt, dark yellowish brown, stiff, hard.	
20			4	90	BG				
25									
30			5	90	BG				
									250.3
35			6	90	BG		SC	Sandy clay, fine, medium light brown, soft, wet. Silty sand, medium, light brown, grayish orange to yellow gray.	
40									

WELL DIAGRAM



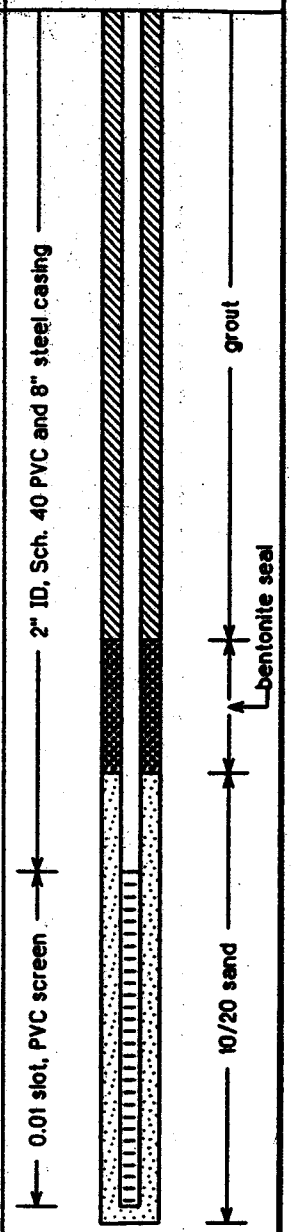
EnSafe/Allen & Hoshall

Monitoring Well 07MW05LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building*
Project No.: *N0094*	Surface Elevation: *282.792 feet msl*
Started at *on 1-09-95*	TOC Elevation: *282.281 feet msl*
Completed at *on 2-21-95*	Depth to Groundwater: *26.00 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.28 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *76.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *66 to 76 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45							SC	Silty sand, medium, yellowish orange to light brown.	237.8
								Sand, medium, micaceous, yellowish orange to light brown.	
50								Sand, medium, grayish orange, micaceous.	
55			7	60	BG				
60							GP		
65								Gravelly sand, coarse to very coarse, dark yellowish orange.	
70									
75			8	87.5	BG				206.8
80								Log information taken from the boring for the Cockfield well at SWMU#7 Site 5.	

WELL DIAGRAM



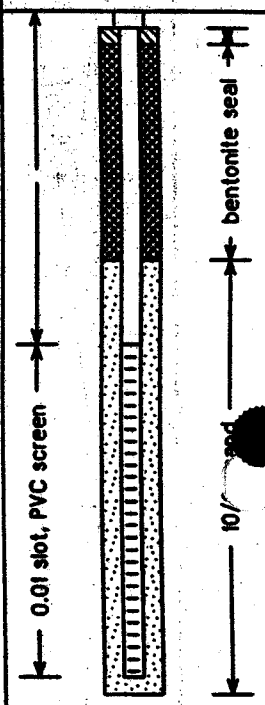
EnSafe/Allen & Hoshall

Monitoring Well 07MW05LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *282.65 feet msl*
Started at *on 1-09-95*	TOC Elevation: *282.43 feet msl*
Completed at *on 2-21-95*	Depth to Groundwater: *feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	75	BG			Clayey silt, moderate brown to yellowish brown, trace of organics.	
10			2	60	BG		ML		
15			3	100	BG			Clayey silt, dark yellowish brown, stiff, hard.	
20			4	90	BG			Log information taken from the boring for the Cockfield well at SWMU#7 Site 5.	262.6
25									
30									
35									
40									

WELL DIAGRAM



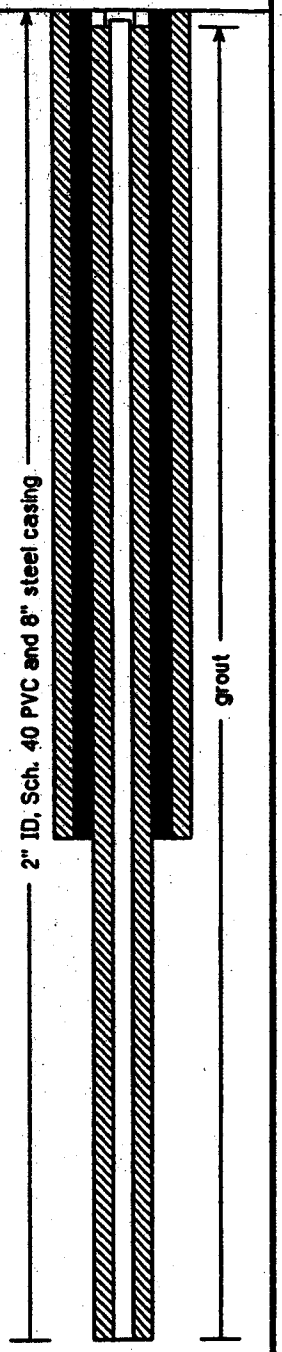
EnSafe/Allen & Hoshall

Monitoring Well 07MW05UC

Project: *NAS Memphis*	Location: *Memphis, TN*
Project No.: *N0094*	Surface Elevation: *282.67 feet msl*
Started at *on 1-09-95*	TOC Elevation: *282.39 feet msl*
Completed at *on 2-21-95*	Depth to Groundwater: *N/A feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *N/A feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *135.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *122 to 132 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5	1		BG		Clayey silt, moderate brown to yellowish brown, trace of organics.	
	2		BG			
	3	75	BG			
	4		BG			
10	5	60	BG			
	6		BG			
	7		BG			
15	8	100	BG	ML	Clayey silt, dark yellowish brown, stiff, hard.	
	9		BG			
20	10	90	BG			
	11		BG			
	12		BG			
25	13		BG			
	14		BG			
30	15	90	BG			
	16		BG			250.2
	17		BG		Sandy clay, fine, medium light brown, soft, wet.	
35	18	90	BG	SC	Silty sand, medium, light brown, grayish orange to yellow gray.	
	19		BG			
40	20		BG			

WELL DIAGRAM



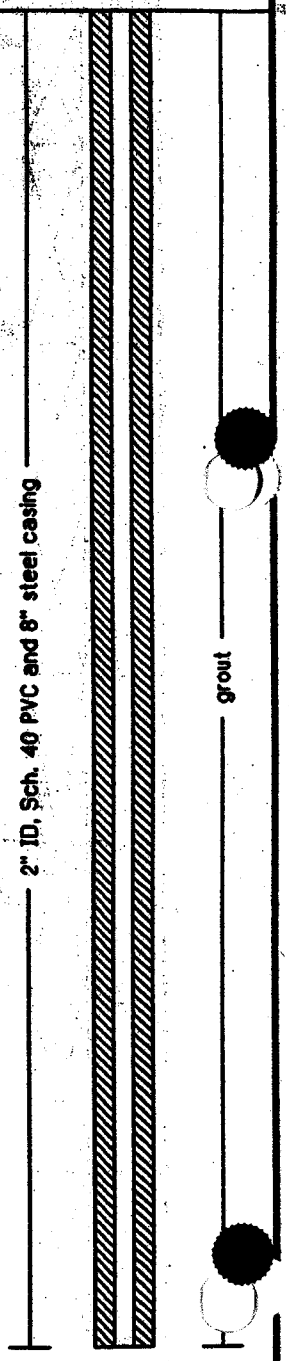
EnSafe/Allen & Hoshall

Monitoring Well 07MW05UC

Project: *NAS Memphis*	Location: *Memphis, TN*
Project No.: *N0094*	Surface Elevation: *282.67 feet msl*
Started at *on 1-09-95*	TOC Elevation: *282.39 feet msl*
Completed at *on 2-21-95*	Depth to Groundwater: *N/A feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *N/A feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *135.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *122 to 132 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			21		BG		SC	Silty sand, medium, yellowish orange to light brown.	
			22		BG				
45			23		BG				237.7
			24		BG			Sand, medium, micaceous, yellowish orange to light brown.	
			25		BG			Sand, medium, grayish orange, micaceous.	
50			26		BG				
			27		BG				
55			28	60	BG				
			29		BG				
60			30		BG		GP		
			31		BG				
			32		BG				
65			33		BG			Gravelly sand, coarse to very coarse, dark yellowish orange.	
			34		BG				
			35		BG				
70			36		BG				
			38		BG				
			38	87.5	BG				
75			39		BG				206.7
			40		BG		SC	Silty sand, fine, brownish gray, with thin dark yellow clay lenses.	
80			41		BG				

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW05UC

Project: *NAS Memphis*	Location: *Memphis, TN*
Project No.: *N0094*	Surface Elevation: *282.67 feet msl*
Started at *on 1-09-95*	TOC Elevation: *282.39 feet msl*
Completed at *on 2-21-95*	Depth to Groundwater: *N/A feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *N/A feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *135.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *122 to 132 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			42		BG					2" ID, Sch. 40 PVC and 8" steel casing
			43		BG					
			44		BG					
			45		BG					
90			46		BG					
			47		BG					
			48		BG					
95				80						
			49		BG					
			50		BG					
100			51		BG		SC	Sand, fine, brownish gray with dark yellow brown clay lenses.		
			52		BG					
			53		BG					
105			54		BG					
			56		BG					
110			57		BG					
			58		BG					
			59		BG					
115				90						
			60		BG					
			61		BG					
120			62		BG					grout / bentonite seal

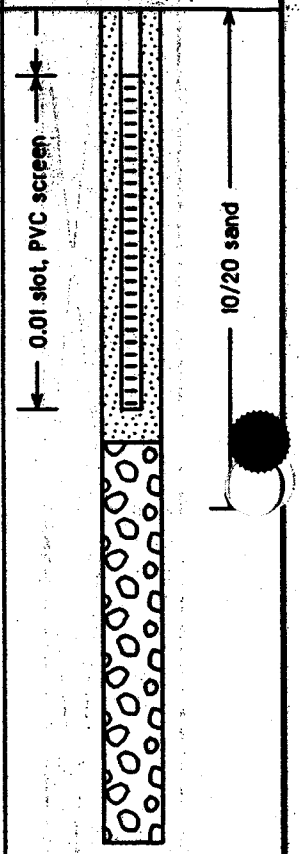
EnSafe/Allen & Hoshall

Monitoring Well 07MW05UC

Project: *NAS Memphis*	Location: *Memphis, TN*
Project No.: *N0094*	Surface Elevation: *282.67 feet msl*
Started at *on 1-09-95*	TOC Elevation: *282.39 feet msl*
Completed at *on 2-21-95*	Depth to Groundwater: *N/A feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *N/A feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *135.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *122 to 132 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
125			63		BG		SC	Clay, dusky brown, waxy, from 119' to 119.5'. Sand, fine, brownish gray with clay lenses described above.	
			64		BG				
			65		BG				
			66		BG				154.7
130			67		BG		CL	Clay, dusky brown, waxy, mixed with lignitic sand.	
			68		BG				
			69		BG				
135				90				End of boring at 135'.	147.7
140									
145									
150									
155									
160									

WELL DIAGRAM



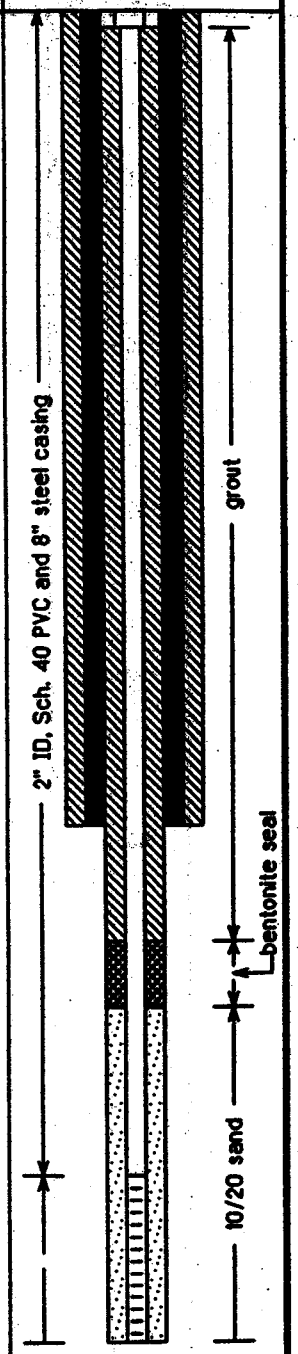
EnSafe/Allen & Hoshall

Monitoring Well 07MW05UF

Project: *NAS Memphis*	Location: *Millington, TN SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *282.81 feet msl*
Started at *on 1-09-95*	TOC Elevation: *282.43 feet msl*
Completed at *on 2-21-95*	Depth to Groundwater: *24.95 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.48 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *45.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *35 to 45 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Clayey silt, moderate brown to yellowish brown, trace of organics.	
5			1	75	BG				
10			2	80	BG				
15			3	100	BG		ML	Clayey silt, dark yellowish brown, stiff, hard.	
20			4	90	BG				
25									
30			5	90	BG				
35			6	90	BG		SC	Sandy clay, fine, medium light brown, soft, wet. Silty sand, medium, light brown, grayish orange to yellow gray.	250.3
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW05UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0084*	Surface Elevation: *282.81 feet msl*
Started at *on 1-09-95*	TOC Elevation: *282.43 feet msl*
Completed at *on 2-21-95*	Depth to Groundwater: *24.95 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.48 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *45.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *35 to 45 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45							SC	Silty sand, medium, yellowish orange to light brown.	237.8	10/20 sand
								Log information taken from the boring for the Cockfield well at SWMU#7 Site 5.		
50										
55			7	60	BG					
60										
65										
70										
75										
80										

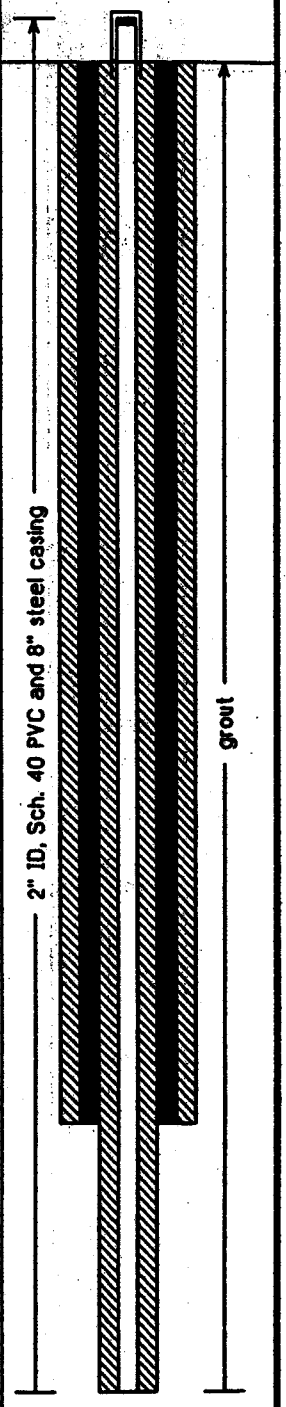
EnSafe/Allen & Hoshall

Monitoring Well 07MW06LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *284.12 feet msl*
Started at *0820 on 2-10-95*	TOC Elevation: *286.52 feet msl*
Completed at *1010 on 2-14-95*	Depth to Groundwater: *28.32 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.20 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *78.0 feet*
Geologist: *Ben Brantley*	Well Screen: *67 to 77 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					Fill and brick.	
5	1	66	BG	ML	Clayey silt, moderate yellowish brown, mottled with yellow gray.	
10	2	70	BG			
15	3	70	BG			
20						
25	4	60	BG		Clayey silt, olive brown to olive gray, hard, stiff.	
30					Clayey silt, light brown to yellowish brown, medium stiff.	
35	5	85	BG	SC	Silty clayey sand, fine to very fine, yellowish orange to reddish brown.	250.1
40						

WELL DIAGRAM



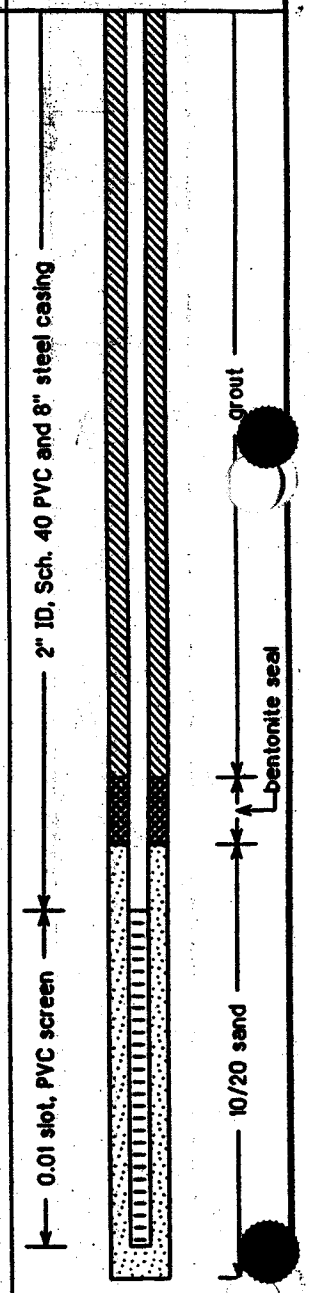
EnSafe/Allen & Hoshall

Monitoring Well 07MW06LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *284.12 feet msl*
Started at *0820 on 2-10-95*	TOC Elevation: *286.52 feet msl*
Completed at *1010 on 2-14-95*	Depth to Groundwater: *28.32 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.20 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *78.0 feet*
Geologist: *Ben Brantley*	Well Screen: *67 to 77 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45	6	54	BG	SC	Silty sand, very fine to fine, traces of clay casts, grayish orange to pale yellowish orange.	
50						
55	7	100	BG			229.1
60				GP	Sand, fine to coarse, pale yellowish brown to moderate yellowish brown.	
65	8	70	BG			
70						
75	9	100	BG			206.6
80					Log information taken from the boring for the Cockfield well at SWMU#7 site 6.	

WELL DIAGRAM



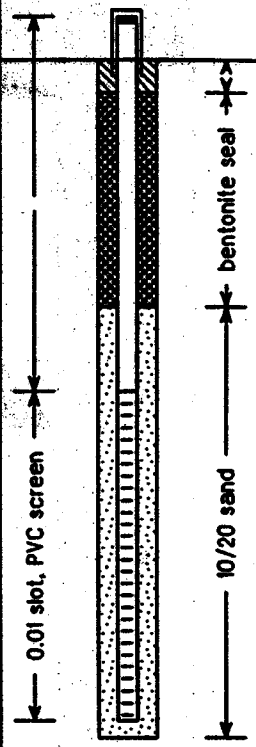
EnSafe/Allen & Hoshall

Monitoring Well 07MW06LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *284.33 feet msl*
Started at *0820 on 2-10-95*	TOC Elevation: *286.37 feet msl*
Completed at *1010 on 2-14-95*	Depth to Groundwater: *12.49 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *273.88 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Ben Brantley*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Fill and brick.	
5			1	66	BG			Clayey silt, moderate yellowish brown, mottled with yellow gray.	
10			2	70	BG		ML		
15			3	70	BG				
20									264.3
								Log information taken from the boring for the Cockfield well at SWMU#7 site 6.	
25			4	60	BG				
30									
35									
40									

WELL DIAGRAM



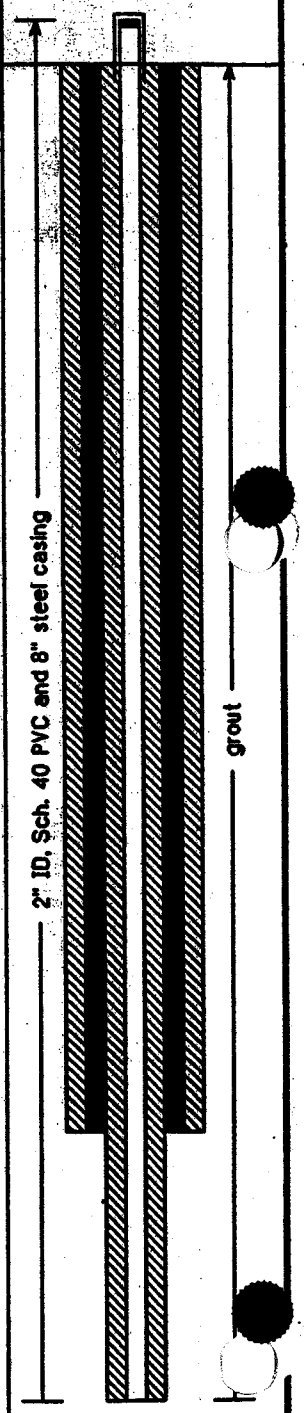
EnSafe/Allen & Hoshall

Monitoring Well 07MW06UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No: *N0094*	Surface Elevation: *284.17 feet msl*
Started at *0820 on 2-10-95*	TOC Elevation: *286.49 feet msl*
Completed at *1010 on 2-14-95*	Depth to Groundwater: *28.25 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.24 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *101.0 feet*
Geologist: *Ben Brantley*	Well Screen: *84.5 to 94.5 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					Fill and brick.	
5		66			Clayey silt, moderate yellowish brown, mottled with yellow gray.	
	1		BG			
	2		BG			
	3		BG			
10	4	70	BG			
	5		BG			
15	6	70	BG			
	7		BG	ML		
	8		BG			
20	9		BG			
	10		BG			
25	11	60	BG		Clayey silt, olive brown to olive gray, hard, stiff.	
	12		BG			
	13		BG		Clayey silt, light brown to yellowish brown, medium stiff.	
30	14		BG			
	15	85	BG			
	16		BG		Silty clayey sand, fine to very fine, yellowish orange to reddish brown.	250.2
35	17		BG	SC		
	18		BG			
40						

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW06UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *284.17 feet msl*
Started at *0820 on 2-10-95*	TOC Elevation: *286.49 feet msl*
Completed at *1010 on 2-14-95*	Depth to Groundwater: *28.25 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.24 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *101.0 feet*
Geologist: *Ben Brantley*	Well Screen: *84.5 to 94.5 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45	19		BG	SC	Silty sand, very fine to fine, traces of clay casts, grayish orange to pale yellowish orange.	
	20		BG			
	21	54	BG			
	22		BG			
	23		BG			
50	24		BG			
	25		BG			
55	26	100	BG			229.2
	27		BG	GP	Sand, fine to coarse, pale yellowish brown to moderate yellowish brown.	
	28		BG			
60	29		BG			
	30		BG			
65	31	70	BG			
	32		BG			
	33		BG			
70	34		BG			
	35		BG			
75	36	100	BG			
	37		BG	SC	Silt clayey, finely laminated, pale yellowish orange to dark yellowish orange.	206.7
80	38		BG			

WELL DIAGRAM: 2" ID, Sch. 40 PVC and 8" steel casing; grout

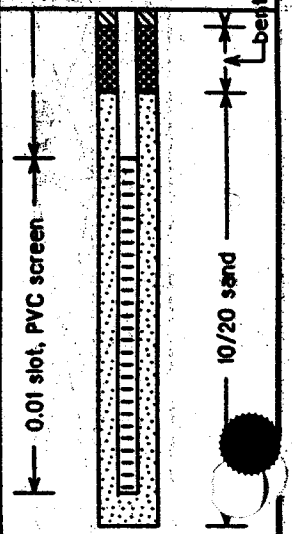
EnSafe/Allen & Hoshall

Monitoring Well 07MW06UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No: *N0094*	Surface Elevation: *284.17 feet msl*
Started at *0820 on 2-10-95*	TOC Elevation: *286.49 feet msl*
Completed at *1010 on 2-14-95*	Depth to Groundwater: *28.25 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.24 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *101.0 feet*
Geologist: *Ben Brantley*	Well Screen: *84.5 to 94.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85			39		BG			Silty clay with fine sand, light brownish gray to grayish brown, micaceous, soft to stiff, moist.	
			40		BG				
			41	109	BG				
			42		BG		SC		
90			43		BG				
			44		BG				
			45		BG				
			46		BG				190.2
95			47	120	BG			Clay, interbedded very fine sand with silt, becoming more waxy.	
			48		BG		CL		
100			49	120	BG				183.2
								End of boring	
105									
110									
115									
120									

WELL DIAGRAM



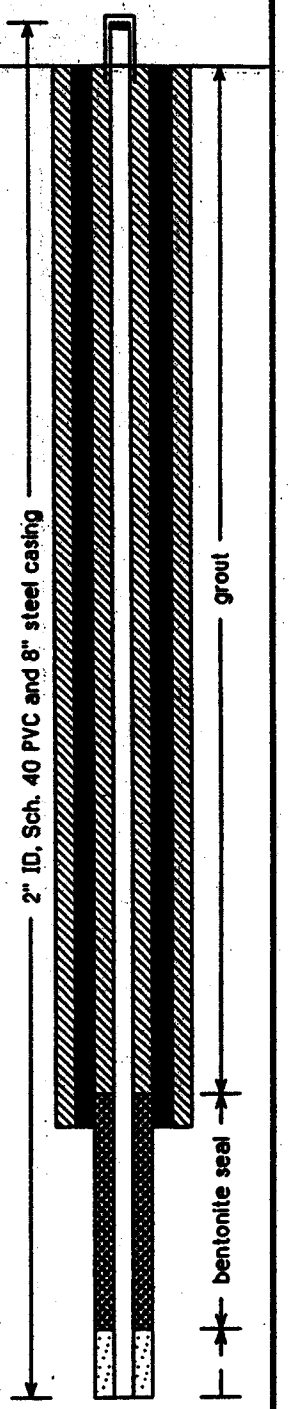
EnSafe/Allen & Hoshall

Monitoring Well 07MW06UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *284.39 feet msl*
Started at *0820 on 2-10-95*	TOC Elevation: *286.48 feet msl*
Completed at *1010 on 2-14-95*	Depth to Groundwater: *37.00 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *249.48 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *55.0 feet*
Geologist: *Ben Brantley*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					Fill and brick.	
5	1	66	BG	ML	Clayey silt, moderate yellowish brown, mottled with yellow gray.	
10	2	70	BG			
15	3	70	BG			
20						
25	4	60	BG		Clayey silt, olive brown to olive gray, hard, stiff.	
30					Clayey silt, light brown to yellowish brown, medium stiff.	
35	5	85	BG	SC	Silty clayey sand, fine to very fine, yellowish orange to reddish brown.	250.4
40						

WELL DIAGRAM



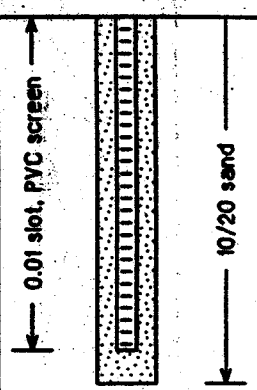
EnSafe/Allen & Hoshall

Monitoring Well 07MW06UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *284.39 feet msl*
Started at *0820 on 2-10-95*	TOC Elevation: *286.48 feet msl*
Completed at *1010 on 2-14-95*	Depth to Groundwater: *37.00 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *249.48 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *55.0 feet*
Geologist: *Ben Brantley*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			6	54	BG		SC	Silty sand, very fine to fine, traces of clay casts, grayish orange to pale yellowish orange.	
50									234.4
55			7	100	BG			Log information taken from the boring for the Cockfield well at SWMU#7 site 6.	
60									
65									
70									
75									
80									

WELL DIAGRAM



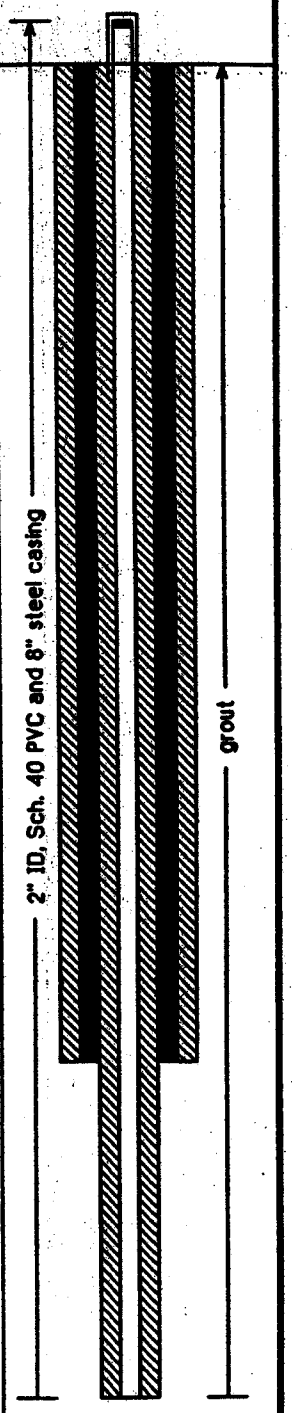
EnSafe/Allen & Hoshall

Monitoring Well 07MW07LF

Project: *NAS Memphis*	Location: *Millington, TN SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *282.35 feet msl*
Started at *1750 on 2-10-95*	TOC Elevation: *283.68 feet msl*
Completed at *on 2-14-95*	Depth to Groundwater: *25.86 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.82 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *77.0 feet*
Geologist: *Ben Brantley*	Well Screen: *68.0 to 78.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	125	BG			Clayey silt, moderate yellowish brown, organics, mottled with yellowish gray silt.	
10			2	70	BG				
15			3	80	BG		ML	Clayey silt, light olive gray to olive brown, soft, moist.	
20									
25			4	65	BG				
30								Silty clay, light brown to moderate yellowish brown.	
35			5	90	BG				246.9
							SC	Silty sand, moderate yellowish brown to dark yellowish orange, stained reddish brown.	243.4
40							GP		

WELL DIAGRAM



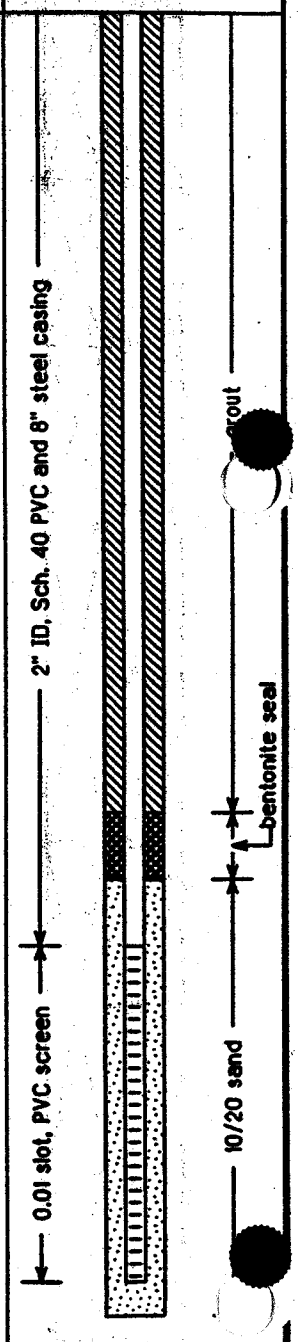
EnSafe/Allen & Hoshall

Monitoring Well 07MW07LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *282.35 feet msl*
Started at *1750 on 2-10-95*	TOC Elevation: *283.68 feet msl*
Completed at *on 2-14-95*	Depth to Groundwater: *25.86 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.82 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *77.0 feet*
Geologist: *Ben Brantley*	Well Screen: *68.0 to 78.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			6	110	BG			Sand, fine to medium, silty, grayish orange to dark yellowish orange, at 39' there is some gray sand.	
50									
55			7	90	BG				
60							GP	Sand and gravel, fine to very coarse grained, grayish orange to dark yellowish orange.	
65			8	110	BG				
70								Sand with interdisbursed clay, fine to medium grained. Clay is pinkish gray, moist.	
75			9	95	BG				203.9
80								Log information taken from the boring for the Cockfield well at SWMU#7 site 7.	

WELL DIAGRAM



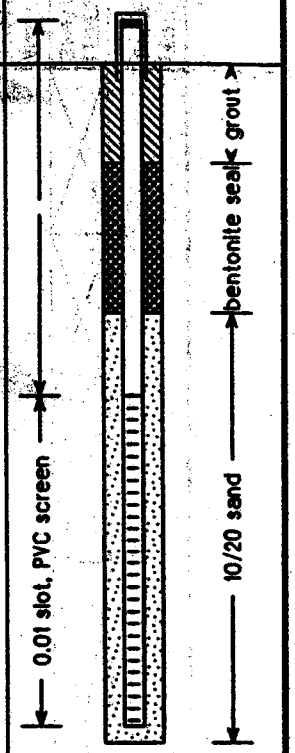
EnSafe/Allen & Hoshall

Monitoring Well 07MW07LS

Project: NAS Memphis	Location: Millington, TN. SWMU#7 – Building N-126
Project No.: N0094	Surface Elevation: 282.47 feet msl
Started at 1750 on 2-10-95	TOC Elevation: 284.44 feet msl
Completed at on 2-14-95	Depth to Groundwater: 11.0 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 273.44 feet msl
Drilling Company: North Star Drilling	Total Depth: 20.0 feet
Geologist: Ben Brantley	Well Screen: 10.0 to 20.0 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	125	BG		ML	Clayey silt, moderate yellowish brown, organics, mottled with yellowish gray silt.	
10			2	70	BG				
15			3	80	BG			Clayey silt, light olive gray to olive brown, soft, moist.	
20									262
								Log information taken from the boring for the Cockfield well at SWMU#7 site 7.	
25			4	65	BG				
30									
35									
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW07C

(007G07UC)

Project: NAS Memphis	Location: Millington, TN. SWMU#7 - Building N-126
Project No.: N0094	Surface Elevation: 281.83 feet msl
Started at 1750 on 2-10-95	TOC Elevation: 283.94 feet msl
Completed at on 2-14-95	Depth to Groundwater: 27.99 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 255.95 feet msl
Drilling Company: North Star Drilling	Total Depth: 105.0 feet
Geologist: Ben Brantley	Well Screen: 82.5 to 102.5 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1		0.4			Clayey silt, moderate yellowish brown, organics, mottled with yellowish gray silt.	
			2		BG				
5			3	125	BG				
			4		BG				
10			5	70	BG				
			6		BG				
			7		BG				
15			8	80	BG			Clayey silt, light olive gray to olive brown, soft, moist.	
			9		BG		ML		
20			10		BG				
			11		BG				
			12		BG				
25			13	65	BG				
			14		BG			Silty clay, light brown to moderate yellowish brown.	
30			15		BG				
			16		BG				
			17		BG				
35			18	90	BG				246.3
			19		BG		SC	Silty sand, moderate yellowish brown to dark yellowish orange, stained reddish brown.	242.8
40							GP		

WELL DIAGRAM

2" ID, Sch. 40 PVC and 8" steel casing

grout

EnSafe/Allen & Hoshall

Monitoring Well 07MW07C

(007G07UC)

Project: NAS Memphis	Location: Millington, TN. SWMU#7 - Building N-126
Project No.: N0094	Surface Elevation: 281.83 feet msl
Started at 1750 on 2-10-95	TOC Elevation: 283.94 feet msl
Completed at on 2-14-95	Depth to Groundwater: 27.99 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 255.95 feet msl
Drilling Company: North Star Drilling	Total Depth: 105.0 feet
Geologist: Ben Brantley	Well Screen: 92.5 to 102.5 feet

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45	20		BG		Sand, fine to medium, silty, grayish orange to dark yellowish orange, at 39' there is some gray sand.	
	21		BG			
	22	110	BG			
	23		BG			
50	24		BG			
	25		BG			
	26		BG			
55	27	90	BG			
	28		BG			
	29		BG	GP		
60	30		BG		Sand and gravel, fine to very coarse grained, grayish orange to dark yellowish orange.	
	31		BG			
65	32	110	BG			
	33		BG			
	34		BG			
70	35		BG		Sand with interdisbursed clay, fine to medium grained. Clay is pinkish gray, moist.	
	36		BG			
75	37	95	BG			
	38		BG			
	39		BG	SC		203.3
80						

WELL DIAGRAM: 2" ID, Sch. 40 PVC and 8" steel casing; grout

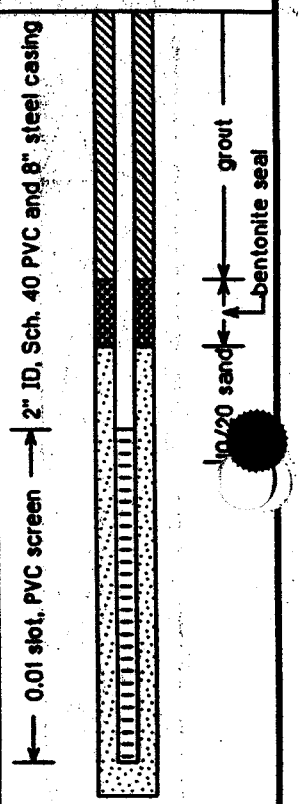
EnSafe/Allen & Hoshall

Monitoring Well 07MW07C
(007G07UC)

Project: NAS Memphis	Location: Millington, TN SWMU#7 – Building N-126
Project No: N0094	Surface Elevation: 281.83 feet msl
Started at 1750 on 2-10-95	TOC Elevation: 283.94 feet msl
Completed at on 2-14-95	Depth to Groundwater: 27.99 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 255.95 feet msl
Drilling Company: North Star Drilling	Total Depth: 105.0 feet
Geologist: Ben Brantley	Well Screen: 82.5 to 102.5 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			40		BG			Sand, interbedded with clay, grayish orange, then becomes silty sand, very fine grained, clay is dark yellowish orange.	
			41		BG				
85			42	100	BG			Silty sand, with interbedded clay, very fine sand, dusky yellowish brown clay to moderate brown, mottled with light olive to olive gray sand.	
			43		BG				
			44		BG				
90			45		BG		SC		
			46		BG				
95			47	120	BG				
			48		BG				
			49		BG				
100			50		BG				
			51		BG		CL	Clay, laminations of sand, dusky yellowish brown to moderate brown clay, light olive to olive gray sand, waxy.	179.8
105			52	115	BG			End of boring at 105'.	176.8
110									
115									
120									

WELL DIAGRAM



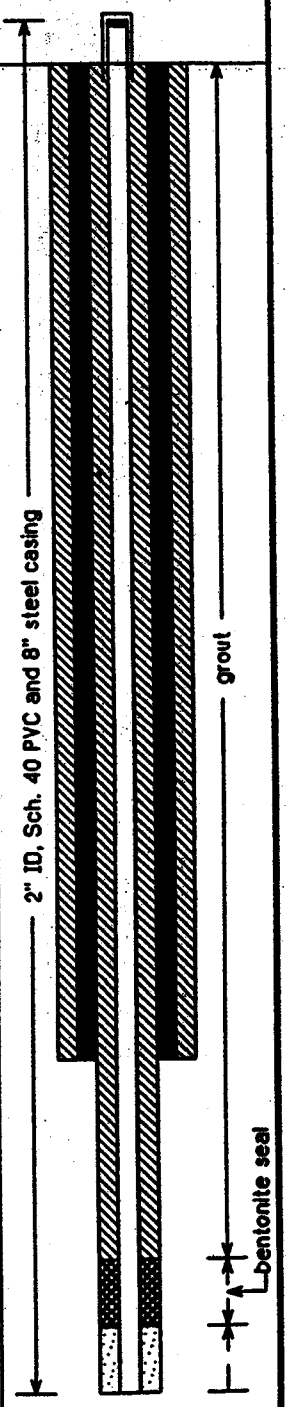
EnSafe/Allen & Hoshall

Monitoring Well 07MW07UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *282.35 feet msl*
Started at *1750 on 2-10-95*	TOC Elevation: *283.97 feet msl*
Completed at *on 2-14-95*	Depth to Groundwater: *26.16 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.81 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *50.0 feet*
Geologist: *Ben Brantley*	Well Screen: *40.0 to 50.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	125	BG			Clayey silt, moderate yellowish brown, organics, mottled with yellowish gray silt.	
10			2	70	BG				
15			3	80	BG		ML	Clayey silt, light olive gray to olive brown, soft, moist.	
20									
25			4	65	BG			Silty clay, light brown to moderate yellowish brown.	
30									
35			5	90	BG				246.9
							SC	Silty sand, moderate yellowish brown to dark yellowish orange, stained reddish brown.	
									243.4
40							GP		

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW07UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No: *N0094*	Surface Elevation: *282.35 feet msl*
Started at *1750 on 2-10-95*	TOC Elevation: *283.97 feet msl*
Completed at *on 2-14-95*	Depth to Groundwater: *26.16 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.81 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *50.0 feet*
Geologist: *Ben Brantley*	Well Screen: *40.0 to 50.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45	X		6	110	BG		GP	Sand, fine to medium, silty, grayish orange to dark yellowish orange, at 39' there is some gray sand.		0.01 slot, PVC screen; 10/20 sand
50	X							Log information taken from the boring for the Cockfield well at SWMU#7 site 7.	231.9	
55	X		7	90	BG					
60										
65										
70										
75										
80										

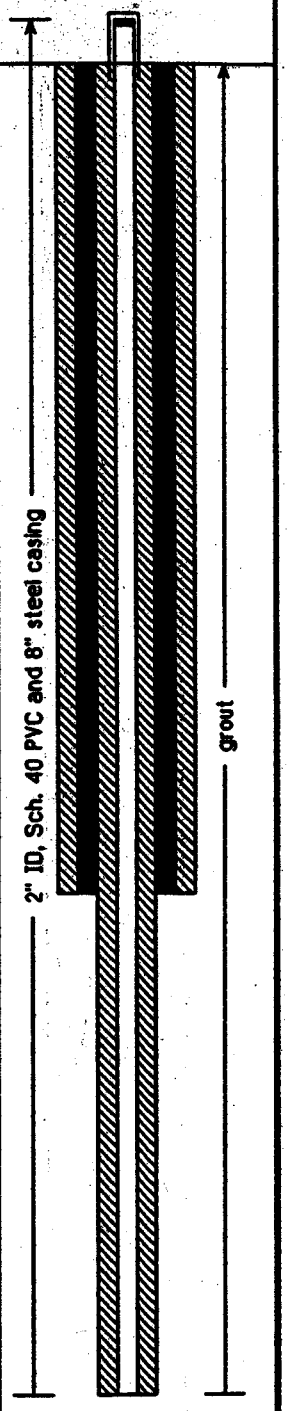
EnSafe/Allen & Hoshall

Monitoring Well 07MW08LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *280.86 feet msl*
Started at *0900 on 2-11-95*	TOC Elevation: *282.95 feet msl*
Completed at *1210 on 2-24-95*	Depth to Groundwater: *25.86 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.59 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *76 feet*
Geologist: *David Ladd*	Well Screen: *66.0 to 76.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Clayey silt, yellowish brown, mottled yellowish gray.	
5			1	140	BG			Clayey silt, moderate brown, moist, soft.	
10			2	98	BG				
15			3	98	BG		ML	Clayey silt, olive gray, medium stiff to soft.	
20								Silt, light olive gray with brown mottling.	
25			4	85	BG			Silt, moderate to light brown, hard.	
30			5	80	BG			Sandy silt, moderate yellowish brown.	
									247.9
35			6	120	BG		GP	Sand, fine, dark yellowish orange mottled with grayish orange, silty. Sand, pale yellowish brown.	
40									

WELL DIAGRAM



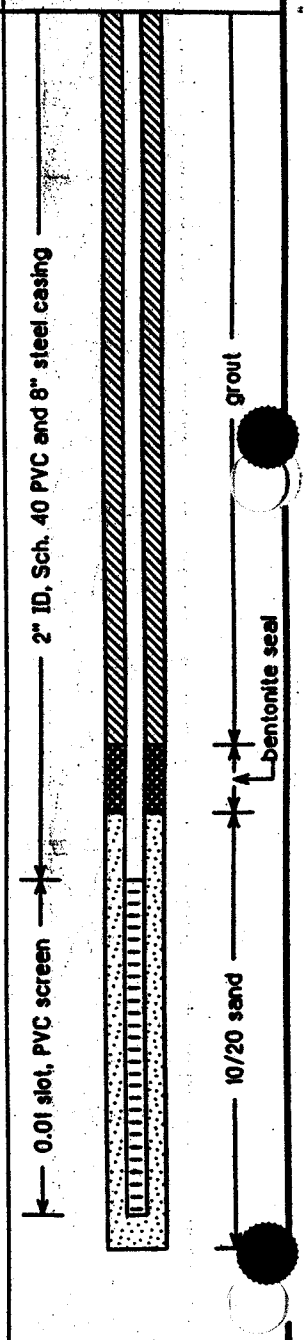
EnSafe/Allen & Hoshall

Monitoring Well 07MW08LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *280.86 feet msl*
Started at *0900 on 2-11-95*	TOC Elevation: *282.95 feet msl*
Completed at *1210 on 2-24-95*	Depth to Groundwater: *25.86 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.59 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *76 feet*
Geologist: *David Ladd*	Well Screen: *66.0 to 76.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			7	80	BG			Sand, fine, grayish orange to dark yellowish orange, wet, scattered gravel.	
50									
55			8	95	BG		GP		
60									
65			9	90	BG			Sand and gravel, fine to very coarse grained, grayish orange to dark yellowish orange, gravel.	
70									
75			10	90	BG				204.9
80								Log information taken form the boring for the Cockfield well at SWMU#7 site 8.	

WELL DIAGRAM



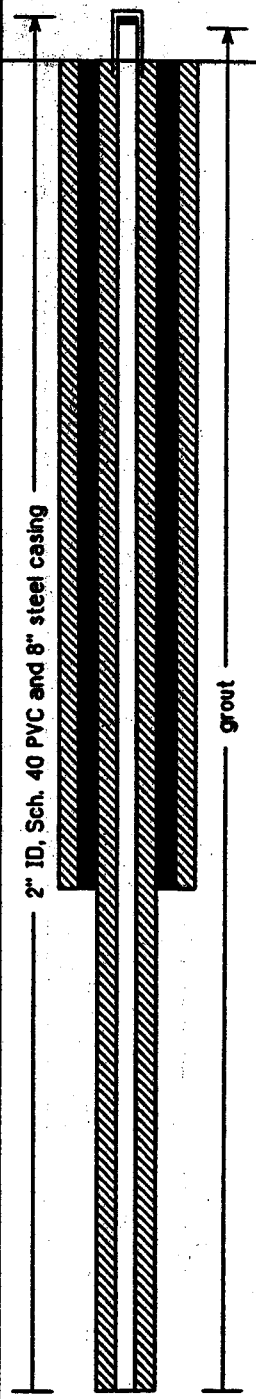
EnSafe/Allen & Hoshall

Monitoring Well 07MW08UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *280.86 feet msl*
Started at *0900 on 2-11-95*	TOC Elevation: *283.15 feet msl*
Completed at *1210 on 2-24-95*	Depth to Groundwater: *26.00 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.15 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *125 feet*
Geologist: *David Ladd*	Well Screen: *113.5 below grade to 123.5 below grade feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	1		BG		Clayey silt, yellowish brown, mottled yellowish gray.	
	2		BG			
5	3	140	BG		Clayey silt, moderate brown, moist, soft.	
	4		BG			
10	5	98	BG			
	6		BG			
	7		BG			
15	8	98	BG	ML		
	9		BG		Clayey silt, olive gray, medium stiff to soft.	
20	10		BG			
	11		BG		Silt, light olive gray with brown mottling.	
25		85			Silt, moderate to light brown, hard.	
	13		BG			
	14		BG			
30	15	80	BG		Sandy silt, moderate yellowish brown.	
	16		BG			247.9
				SC	Sand, fine, dark yellowish orange mottled with grayish orange, silty.	
35	17	120	BG			245.9
	18		BG	GP	Sand, pale yellowish brown.	
	19		BG			
40						

WELL DIAGRAM



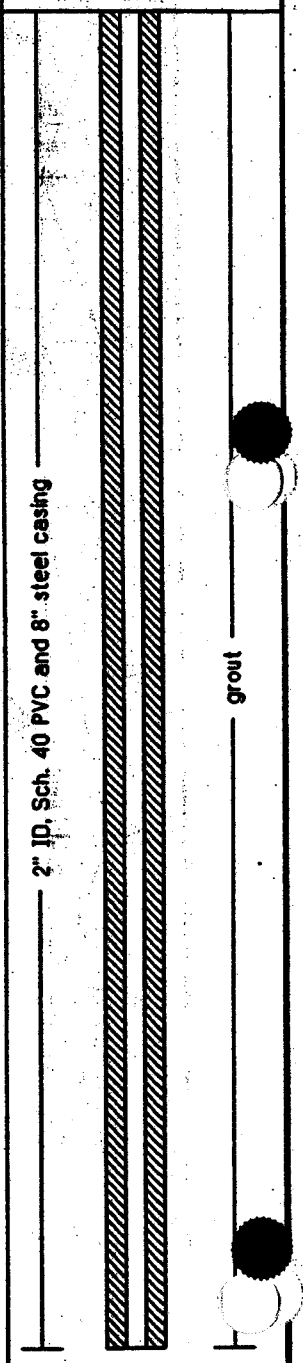
EnSafe/Allen & Hoshall

Monitoring Well 07MW08UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *280.86 feet msl*
Started at *0900 on 2-11-95*	TOC Elevation: *283.15 feet msl*
Completed at *1210 on 2-24-95*	Depth to Groundwater: *26.00 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.15 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *125 feet*
Geologist: *David Ladd*	Well Screen: *113.5 below grade to 123.5 below grade feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			20		BG				
			21		BG				
			22	80	BG			Sand, fine, grayish orange to dark yellowish orange, wet, scattered gravel.	
			23		BG				
50			24		BG				
			25		BG				
			26		BG				
55			27	95	BG				
			28		BG				
			29		BG		GP		
60			30		BG				
			31		BG			Sand and gravel, fine to very coarse grained, grayish orange to dark yellowish orange, gravel.	
65			32	90	BG				
			33		BG				
			34		BG				
70			35		BG				
			36		BG				
			37	90	BG				
75									204.9
			38		BG		SC	Sand, silty, very fine grained, dark yellowish orange mottled with light gray, wet.	
			39		BG				
80									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW08UC

Project: *NAS Memphis*	Location: *Millington, TN SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *280.86 feet msl*
Started at *0900 on 2-11-95*	TOC Elevation: *283.15 feet msl*
Completed at *1210 on 2-24-95*	Depth to Groundwater: *26.00 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.15 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *125 feet*
Geologist: *David Ladd*	Well Screen: *113.5 below grade to 123.5 below grade feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
			40		BG					
			41		BG			Sand, silty, very fine grained, dark yellowish orange to very pale orange.		
85			42	85	BG					
			43		BG			Sand, silty, very fine grained, dark yellowish orange mottled with light gray, interbedded with gray clay, wet from 94'-95'.		
			44		BG					
90			45		BG					
			46		BG					
95			47	100	BG			Sand with interbedded clay, very fine, dusky brown to moderate brown, mottled with light olive gray, rare marcasite nodules.		
			48		BG					
			49		BG					
100			50		BG		SC			
			51		BG					
105			52	110	BG					
			53		BG					
			54		BG					
110			55		BG					
			56		BG					
115			57	110	BG					
			58		BG					
			59		BG					
120										

WELL DIAGRAM: 2" ID, Sch. 40 PVC and 8" steel casing; 0.01 slot, PVC screen; grout; bentonite seal; 10/20 sand

EnSafe/Allen & Hoshall

Monitoring Well 07MW08UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *280.86 feet msl*
Started at *0900 on 2-11-95*	TOC Elevation: *283.15 feet msl*
Completed at *1210 on 2-24-95*	Depth to Groundwater: *26.00 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.15 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *125 feet*
Geologist: *David Ladd*	Well Screen: *113.5 below grade to 123.5 below grade feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
			60		BG		SC			
			61		BG		CL	Clay, laminations of sand, dusky yellowish brown to moderate brown clay, light olive to olive brown sand, waxy.	158.9	
125			62	105	BG			End of boring at 125'.	155.9	10/20 sand
130										
135										
140										
145										
150										
155										
160										

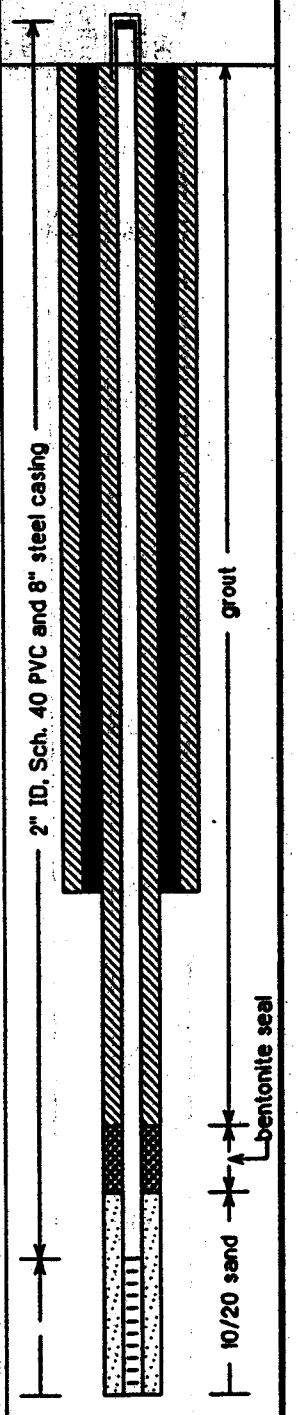
EnSafe/Allen & Hoshall

Monitoring Well 07MW08UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *281.03 feet msl*
Started at *0900 on 2-11-95*	TOC Elevation: *282.94 feet msl*
Completed at *1210 on 2-24-95*	Depth to Groundwater: *25.69 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.25 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *45 feet*
Geologist: *David Ladd*	Well Screen: *36.0 to 46.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Clayey silt, yellowish brown, mottled yellowish gray.	
5			1	140	BG			Clayey silt, moderate brown, moist, soft.	
10			2	98	BG				
15			3	98	BG		ML	Clayey silt, olive gray, medium stiff to soft.	
20								Silt, light olive gray with brown mottling.	
25			4	85	BG			Silt, moderate to light brown, hard.	
30			5	80	BG			Sandy silt, moderate yellowish brown.	
									248
35			6	120	BG		GP	Sand, fine, dark yellowish orange mottled with grayish orange, silty. Sand, pale yellowish brown.	
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW08UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *281.03 feet msl*
Started at *0900 on 2-11-95*	TOC Elevation: *282.94 feet msl*
Completed at *1210 on 2-24-95*	Depth to Groundwater: *25.69 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.25 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *45 feet*
Geologist: *David Ladd*	Well Screen: *36.0 to 46.0 feet*

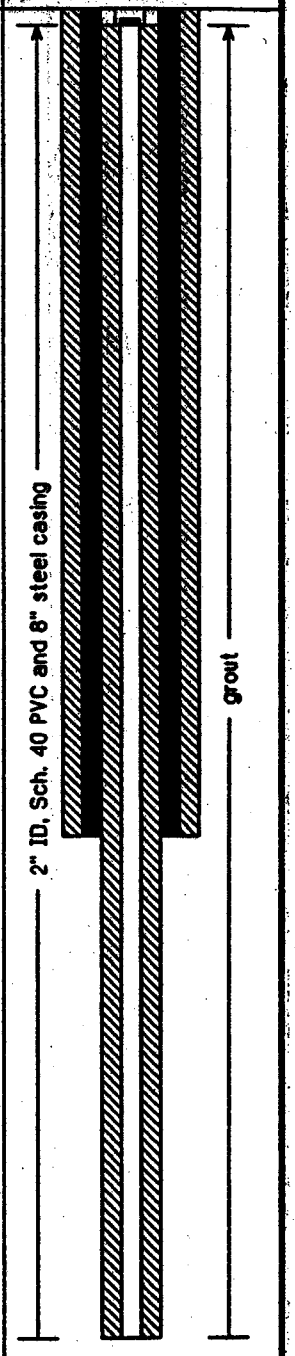
DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45	X		7	80	BG		GP	Log information taken form the boring for the Cockfield well at SWMU#7 site 8.	235	10/20 sand
50										
55										
60										
65										
70										
75										
80										

EnSafe/Allen & Hoshall

Monitoring Well 07MW09LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *282.89 feet msl*
Started at *1550 on 2-11-95*	TOC Elevation: *282.65 feet msl*
Completed at *on 2-25-95*	Depth to Groundwater: *25.47 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.42 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *77 feet*
Geologist: *Ben Brantley*	Well Screen: *67 to 77 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	100	BG			Clayey silt, moderate brown with yellow gray streaks, moist, soft.	
10			2	70	BG				
15			3	100	BG		ML	Silty clay, reddish brown, stiff and plastic.	
20								Clayey silt, light brown with clay inclusions.	
25			4	95	BG			Silty clay, moderate brown to reddish brown.	
30									
									250.4
35			5	80	BG		GP	Sand, fine, yellow orange to light brown.	
40								Sand, medium, yellowish gray, micaceous.	



WELL DIAGRAM

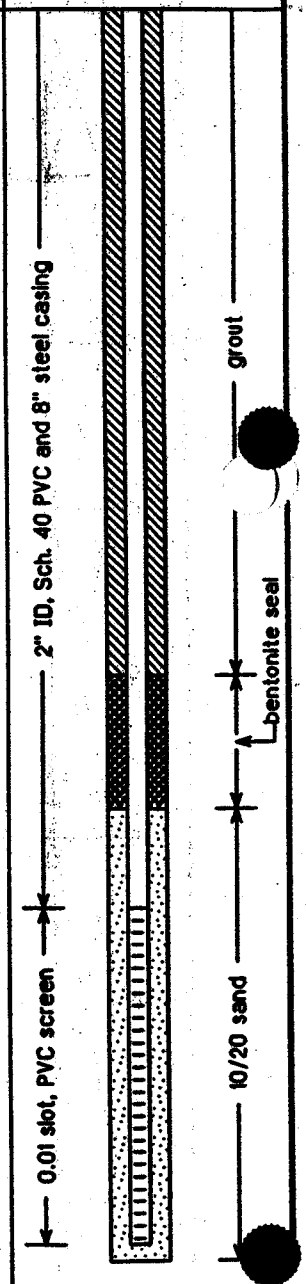
EnSafe/Allen & Hoshall

Monitoring Well 07MW09LF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *282.89 feet msl*
Started at *1550 on 2-11-95*	TOC Elevation: *282.65 feet msl*
Completed at *on 2-25-95*	Depth to Groundwater: *25.47 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.42 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *77 feet*
Geologist: *Ben Brantley*	Well Screen: *67 to 77 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			6	95	BG				
50									
55							GP		
60								Sand, Coarse to gravelly, grayish orange to yellowish orange.	
65			7	90	BG				
70									
75							SC	Silty sand, very fine, yellowish orange banded with yellowish gray.	209.9
80								Log information taken from the boring for the Cockfield well at SWMU#7 site 9.	205.9

WELL DIAGRAM

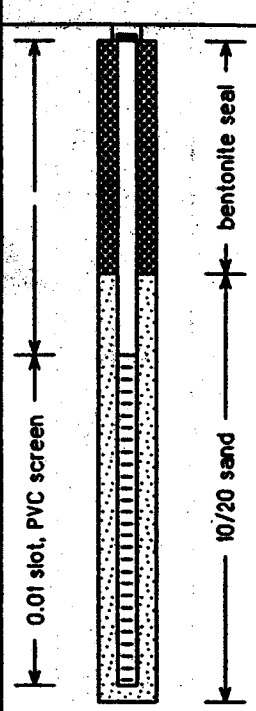


EnSafe/Allen & Hoshall

Monitoring Well 07MW09LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *282.89 feet msl*
Started at *1550 on 2-11-95*	TOC Elevation: *282.54 feet msl*
Completed at *on 2-25-95*	Depth to Groundwater: *13.30 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *269.24 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.5 feet*
Geologist: *Ben Brantley*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	100	BG			Clayey silt, moderate brown with yellow gray streaks, moist, soft.	
10			2	70	BG		ML		
15			3	100	BG			Silty clay, reddish brown, stiff and plastic.	
20								Clayey silt, light brown with clay inclusions.	262.4
								Log information taken from the boring for the Cockfield well at SWMU#7 site 9.	
25			4	95	BG				
30									
35									
40									



WELL DIAGRAM

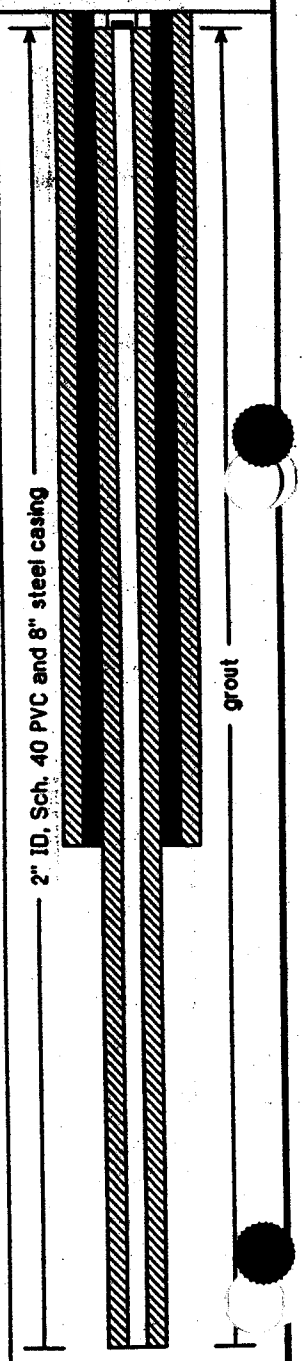
EnSafe/Allen & Hoshall

Monitoring Well 07MW09UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *282.89 feet msl*
Started at *1550 on 2-11-95*	TOC Elevation: *282.47 feet msl*
Completed at *on 2-25-95*	Depth to Groundwater: *26.38 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.09 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *115 feet*
Geologist: *Ben Brantley*	Well Screen: *102 to 112 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			1		BG			Clayey silt, moderate brown with yellow gray streaks, moist, soft.	
5			2	100	BG				
			3		BG				
			4		BG				
10			5	70	BG				
			6		BG				
15			7	100	BG				
			8		BG		ML	Silty clay, reddish brown, stiff and plastic.	
			9		BG				
20			10		BG			Clayey silt, light brown with clay inclusions.	
			11		BG				
			12	95	BG			Silty clay, moderate brown to reddish brown.	
25			13		BG				
			14		BG				
30			15		BG				
			16		BG			Sand, fine, yellow orange to light brown.	250.4
35			17	80	BG				
			18		BG		GP		
			19		BG			Sand, medium, yellowish gray, micaceous.	
40									

WELL DIAGRAM



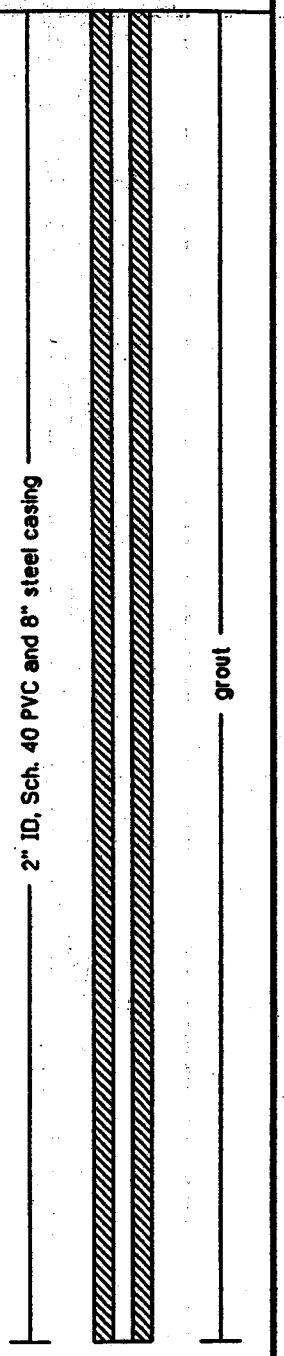
EnSafe/Allen & Hoshall

Monitoring Well 07MW09UC

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No: *N0094*	Surface Elevation: *282.89 feet msl*
Started at *1550 on 2-11-95*	TOC Elevation: *282.47 feet msl*
Completed at *on 2-25-95*	Depth to Groundwater: *26.38 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *256.09 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *115 feet*
Geologist: *Ben Brantley*	Well Screen: *102 to 112 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45	20		BG	GP	Sand, Coarse to gravelly, grayish orange to yellowish orange.	
	21		BG			
	22	95	BG			
	23		BG			
	24		BG			
50	25		BG			
	26		BG			
55	27		BG			
	28		BG			
	29		BG			
60	30		BG			
	31		BG			
65	32	90	BG			
	33		BG			
	34		BG			
70	35		BG			
	36		BG			209.9
75	37		BG	SC	Silty sand, very fine, yellowish orange banded with yellowish gray.	
	38		BG		Clayey silty sand, grayish brown, dusky brown layers of clay with light gray sand.	
80	39		BG			

WELL DIAGRAM



EnSafe/Allen & Hoshall

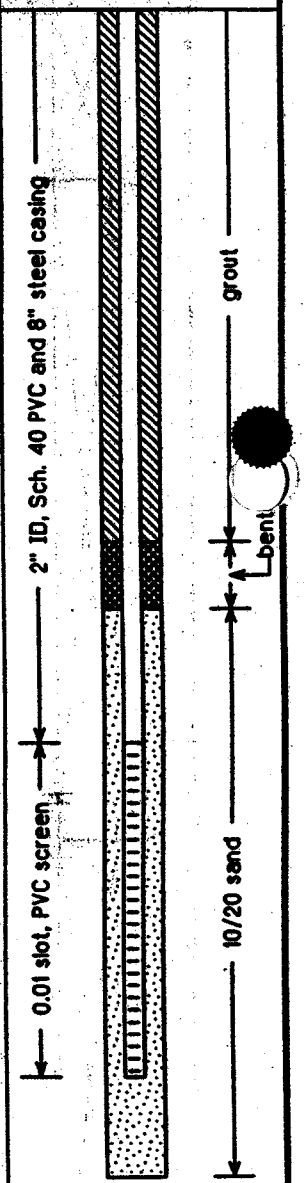
Monitoring Well 07MW09UC

Project: NAS Memphis
Project No.: N0094
Started at 1550 on 2-11-95
Completed at on 2-25-95
Drilling Method: Rotasonic
Drilling Company: North Star Drilling
Geologist: Ben Brantley

Location: Millington, TN. SWMU#7 - Building N-126
Surface Elevation: 282.89 feet msl
TOC Elevation: 282.47 feet msl
Depth to Groundwater: 26.38 feet Measured: 3/31/95
Groundwater Elevation: 256.09 feet msl
Total Depth: 115 feet
Well Screen: 102 to 112 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			40		BG				
			41		BG				
85			42	95	BG				
			43		BG				
			44		BG				
90			45		BG				
			46		BG				
95			47		BG				
			48		BG		SC		
			49		BG				
100			50		BG				
			51		BG				
105			52	90	BG				
			53		BG				
			54		BG				
110			55		BG				
			56		BG		CL	Clay, dusky brown, hard and waxy, with medium gray sand lenses.	170.9
115			57	110	BG			End of boring at 115'.	167.9
120									

WELL DIAGRAM



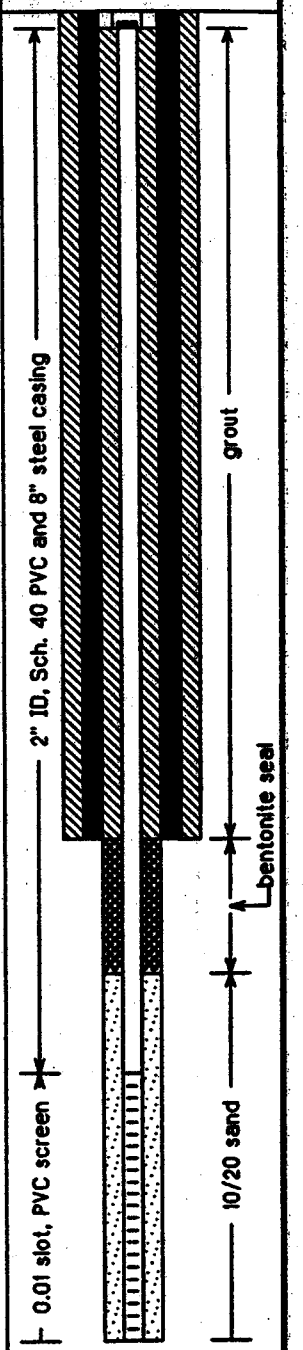
EnSafe/Allen & Hoshall

Monitoring Well 07MW09UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 – Building N-126*
Project No.: *N0094*	Surface Elevation: *282.89 feet msl*
Started at *1550 on 2-11-95*	TOC Elevation: *282.89 feet msl*
Completed at *on 2-25-95*	Depth to Groundwater: *25.11 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.78 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *42 feet*
Geologist: *Ben Brantley*	Well Screen: *32 to 42 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5	1	100	BG		Clayey silt, moderate brown with yellow gray streaks, moist, soft.	
10	2	70	BG			
15	3	100	BG	ML	Silty clay, reddish brown, stiff and plastic.	
20					Clayey silt, light brown with clay inclusions.	
25	4	95	BG		Silty clay, moderate brown to reddish brown.	
30						
						250.4
35	5	80	BG	GP	Sand, fine, yellow orange to light brown.	
40					Sand, medium, yellowish gray, micaceous.	

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 07MW09UF

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *N0094*	Surface Elevation: *282.89 feet msl*
Started at *1550 on 2-11-95*	TOC Elevation: *282.89 feet msl*
Completed at *on 2-25-95*	Depth to Groundwater: *25.11 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.78 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *42 feet*
Geologist: *Ben Brantley*	Well Screen: *32 to 42 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
	X						GP		240.9	
								Log information taken from the boring for the Cockfield well at SWMU#7 site 9.		
45			6	95	BG					
50										
55										
60										
65										
70										
75										
80										

EnSafe/Allen & Hoshall

Monitoring Well 007G10LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *282.22 feet msl*
Started at *0745 on 3-18-96*	TOC Elevation: *282.01 feet msl*
Completed at *0930 on 3-18-96*	Depth to Groundwater: *33.47 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *248.54 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *86.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *68 to 78 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5			1	46	.1 .1 .1 .1 .1		ML	(0-10') Silt, brown, with some clay and some organic material.		2" ID, Sch. 40 PVC
10							ML CL	(10-12') Silt and clay, olive gray, more organic material.	272.2	
15								(12-28') Silt, yellowish-grown to yellowish-gray with dark yellowish- orange mottling, minor clay and organics.	270.2	
20							ML			
25			2	75						
30								(28-48') Clay with some silt, brownish-gray.	254.2	
35							CL ML	Silt and clay, light gray to light brown, with some dark yellowish- orange mottling, moist.		
40								Silt with clay and a trace of sand, yellowish-brown to dark yellowish- gray, with organics from 37' to 38', moist.		grout

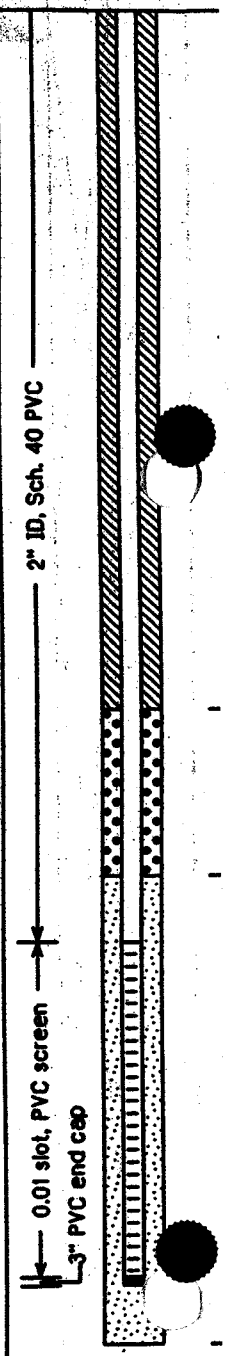
EnSafe/Allen & Hoshall

Monitoring Well 007G10LF

Project: *NSA Memphis*	Location: *Millington, TN. SHMU#7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *282.22 feet msl*
Started at *0745 on 3-18-96*	TOC Elevation: *282.01 feet msl*
Completed at *0930 on 3-18-96*	Depth to Groundwater: *33.47 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *248.54 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *86.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *68 to 78 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			3	110			CL ML	Silt with some clay and some sand. Orangish-gray with some dark yellowish-orange mottling. Contact with Fluvial Deposits (41-78') estimated at 41'.	
			4	100					234.2
50							SP SC	(48-52') Sand and sandy clay, dark yellowish-orange and orangish-gray.	230.2
55							SC GW	(52-56') Sand and gravel, some clay in matrix, reddish-brown with iron staining.	226.2
			5	111				(56-78') Sand and gravel, yellowish-brown to dusky yellow, with gravel (up to 2" in longest dimension).	
60									
65							SW GW	Color change to dark yellowish-orange to reddish-brown.	
70									
75			6	115					
							SP	(78-86') Cockfield Formation (see descriptions below).	204.2
80									

WELL DIAGRAM



EnSafe/Allen & Hoshall	Monitoring Well 007G10LF
Project: *NSA Memphis*	Location: *Millington, TN SWMU#7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *282.22 feet msl*
Started at *0745 on 3-18-96*	TOC Elevation: *282.01 feet msl*
Completed at *0930 on 3-18-96*	Depth to Groundwater: *33.47 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *248.54 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *86.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *68 to 78 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85							SP	(78-81') Fine sand, gray, with clay stringers.	201.2	10/20 sand
							CL	(81-86') Clay, brown, with fine sand interbeds.		
								Soil boring terminated at 86'.	196.2	
90										
95										
100										
105										
110										
115										
120										

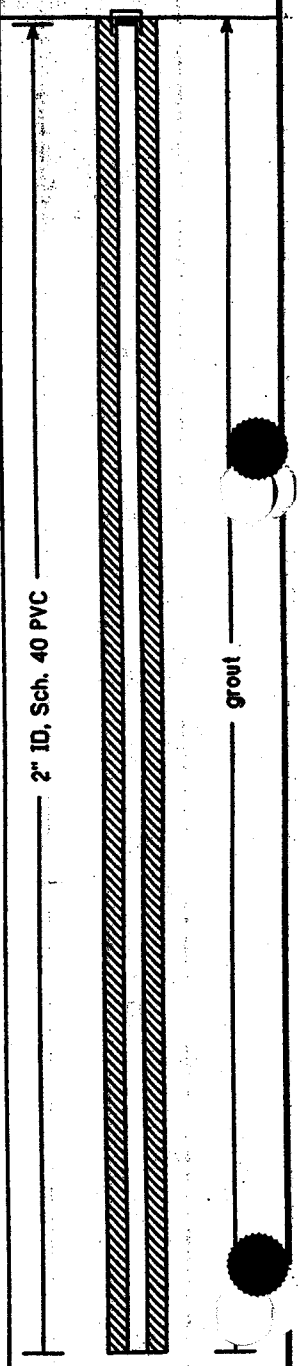
EnSafe/Allen & Hoshall

Monitoring Well 007G11LF

Project: NSA Memphis	Location: Millington, TN SWMU 7 - Building N-126
Project No.: 0094-08420	Surface Elevation: 283.15 feet msl
Started at 1200 on 3-18-96	TOC Elevation: 282.94 feet msl
Completed at 1500 on 3-18-96	Depth to Groundwater: 30.76 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 252.18 feet msl
Drilling Company: Alliance Environmental	Total Depth: 86.0 feet
Geologist: JKingsbury	Well Screen: 60 to 70 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					BG			(0-36') Silt with some clay and organic material, brown with some dark yellowish-orange mottling.	
			1	83	BG				
5					BG				
					BG			Abundant organic material, yellowish-brown to light brown.	
					BG				
10			2	80				Moist at 12'.	
15							ML CL	Silty, clayey greenish-gray to olive gray, moist to wet.	
20								Silty, clayey, with organic material, color change to brownish-gray.	
25			3	105					
30								Silty, clayey with organic material, yellowish-brown to yellowish- gray, only slightly moist.	
35									247.1
40							ML	(36-41') Silt, slightly clayey, yellowish-brown to yellowish- gray with some dark yellowish-orange staining, with organic material and iron concretions.	

WELL DIAGRAM



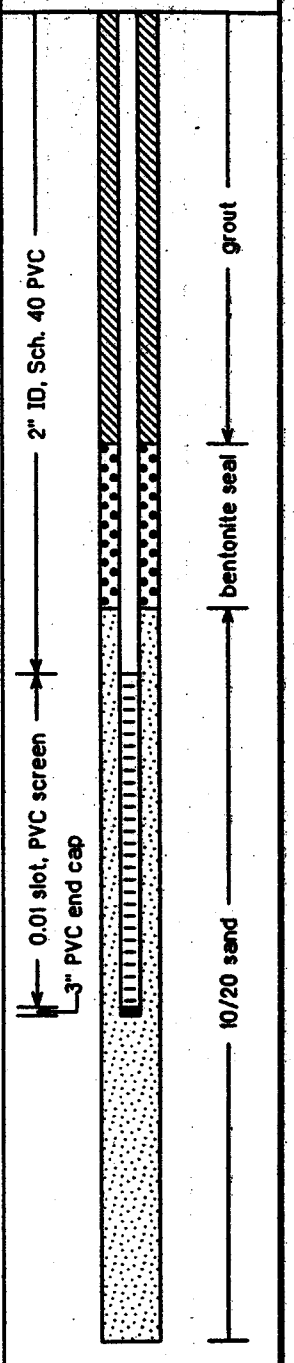
EnSafe/Allen & Hoshall

Monitoring Well 007G11LF

Project: NSA Memphis	Location: Millington, TN SWMU 7 - Building N-126
Project No.: 0094-08420	Surface Elevation: 283.15 feet msl
Started at 1200 on 3-18-96	TOC Elevation: 282.94 feet msl
Completed at 1500 on 3-18-96	Depth to Groundwater: 30.76 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 252.18 feet msl
Drilling Company: Alliance Environmental	Total Depth: 86.0 feet
Geologist: J.Kingsbury	Well Screen: 60 to 70 feet

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	4	120		ML		242.1
45				CL ML	(41-46') Clay and silt, dark yellowish-orange to orangish-gray, sandy, with a trace of small gravel. Contact with Fluvial Deposits (44-70') estimated at 44'.	237.1
50				SW SC	(46-51') Sand (fine to medium-grained) and clay lenses, orangish-gray to yellowish-gray.	232.1
55	5	110		SW GW	(51-70') Sand, coarse-grained to very coarse-grained, and gravel (up to 2" in longest dimension), yellowish-brown to dusky yellow.	
60						
65					Some minor clay in sand and gravel matrix from 66' to 70'.	
70						213.1
75	6	105		CL	Cockfield Formation: clay, dark brown, with thin interbeds of fine- grained sand, appears reworked from 70' to 72'.	
80						

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 007G11LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *283.15 feet msl*
Started at *1200 on 3-18-96*	TOC Elevation: *282.94 feet msl*
Completed at *1500 on 3-18-96*	Depth to Groundwater: *30.76 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *252.18 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *86.0 feet*
Geologist: *JKingsbury*	Well Screen: *60 to 70 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85	X						CL			10/20 sand
								Soil boring terminated at 86'.	197.1	
90										
95										
100										
105										
110										
115										
120										

EnSafe/Allen & Hoshall

Monitoring Well 007G12LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 – Building N-126*
Project No.: *0094-08420*	Surface Elevation: *289.10 feet msl*
Started at *0800 on 3-16-96*	TOC Elevation: *288.78 feet msl*
Completed at *1240 on 3-16-96*	Depth to Groundwater: *35.68 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *253.10 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *96.0 feet*
Geologist: *J.Kingsbury*	Well Screen: *80 to 90 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0					.1			(0-2') Concrete.		
									287.1	
			1		.1			(2-22') Silt, light brown to gray.		
5					.1			Silt, light brown to yellowish-brown, with some organic material, moist.		
					.1					
10			2	70	.1		ML			
								(14-16') With dark yellowish-orange mottling.		
15								Silt, yellowish-brown to yellowish-gray, wet.		
20			3	100						
									267.1	
								Clay and silt, brown, with some iron concretions.		
25								Silt and clay, yellowish-brown to light brown, with some dark yellowish-orange mottling.		
30							CL ML			
			4	86						
35								Contact with Fluvial Deposits (34-90') estimated at 34'.		
									252.1	
							SC SM	(37-43') Sand, clay, and silt, reddish-brown to dark yellowish-orange, moist.		
40										

2" ID, Sch. 40 PVC

grout

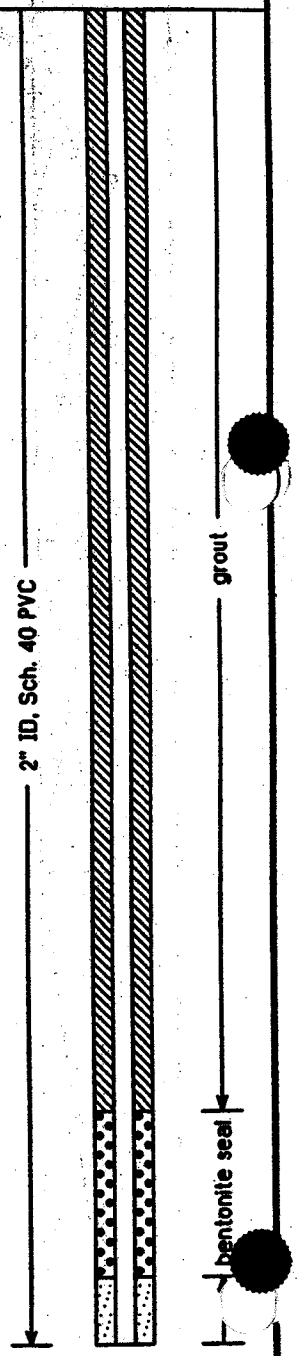
EnSafe/Allen & Hoshall

Monitoring Well 007G12LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *289.10 feet msl*
Started at *0800 on 3-16-96*	TOC Elevation: *288.78 feet msl*
Completed at *1240 on 3-16-96*	Depth to Groundwater: *35.68 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *253.10 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *96.0 feet*
Geologist: *J.Kingsbury*	Well Screen: *80 to 90 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			5	100			SC/SM		
									246.1
45							SW	(43-46') Sand, fine to medium-grained, reddish-brown, wet.	
									243.1
							SW/SC	(46-51') Sand, dark yellowish-brown to yellowish-gray, with very light gray clay seams up to 4" thick.	
50			6	92					
									238.1
							SW	Sand, fine to medium-grained. Dark yellowish-orange, micaceous, wet.	
55									
								3" thick clay lens.	229.1
60							CL	(60-60.5') Clay lens, light olive gray.	228.6
							SP	(60.5-63') Sand, medium-grained, grayish-brown, micaceous.	226.1
65			7	110				Sand, fine to coarse-grained, moderate yellowish brown to dusky yellow, with minor pea-size gravel.	
70							SW	With some clay lenses from 69' to 70'. Sand, fine to very coarse-grained, yellowish-gray, micaceous.	
75									
80									

WELL DIAGRAM



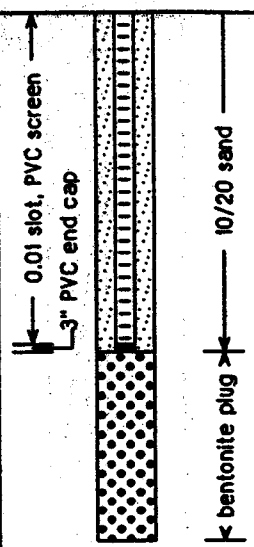
EnSafe/Allen & Hoshall

Monitoring Well 007G12LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *289.10 feet msl*
Started at *0800 on 3-16-96*	TOC Elevation: *288.78 feet msl*
Completed at *1240 on 3-16-96*	Depth to Groundwater: *35.88 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *253.10 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *96.0 feet*
Geologist: *J.Kingsbury*	Well Screen: *80 to 90 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85			8	120			SW		208.1
							SC	(81-82.5') Sand, fine to coarse-grained, dark yellowish-orange with clay lenses between 82' and 82.5', orangish-gray.	206.6
							SW		
									203.1
90							SC GC	(86-90') Sand and gravel with some clay in matrix, dark yellowish- orange.	199.1
			9	110			CL	Cockfield Formation: Clay, dark brown, with thin interbeds of fine- grained sand.	
95									193.1
								Soil boring terminated at 96'.	
100									
105									
110									
115									
120									

WELL DIAGRAM



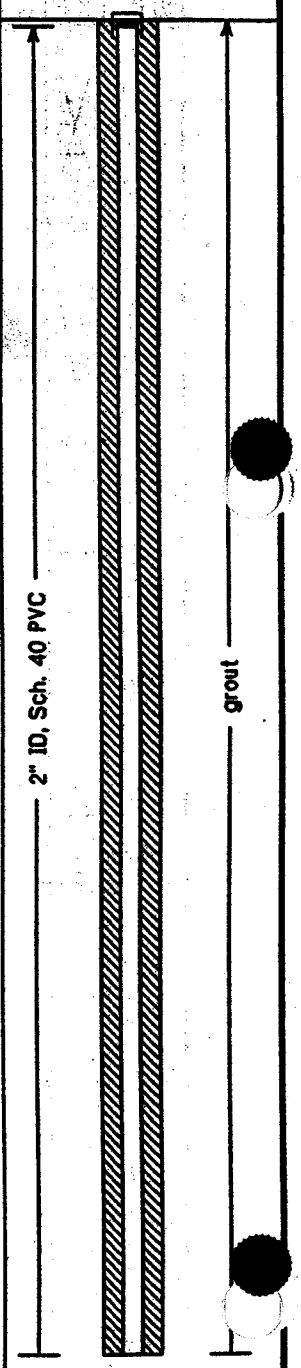
EnSafe/Allen & Hoshall

Monitoring Well 007G13LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *293.14 feet msl*
Started at *1430 on 3-17-96*	TOC Elevation: *292.96 feet msl*
Completed at *1600 on 3-17-96*	Depth to Groundwater: *34.91 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.05 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *86.0 feet*
Geologist: *JKingsbury*	Well Screen: *66 to 76 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	100	.3			Silt, brown, with some gravel; fill 0' to 2', native material 2' to 4.	
					.3				
5					.3			(4-15') Silt, light brown to reddish-brown, with some clay and organic material.	
					.3				
					.3				
10			2	50					
15							ML	(15-16') Silt, with some clay, moderate gray.	
								(16-30') Silt, yellowish-brown and olive gray, with some clay, with some organic material and clay throughout, wet.	
20									
25			3	70					
30									263.1
								(30-34') Silt and clay, greenish-gray to olive gray, moist to wet.	
							CL ML	(34-36') Increasing clay content.	
35									
			4	150					255.1
40							ML CL	(38-44') Clay, silty and sandy, with scattered gravel, gray to light brown.	

WELL DIAGRAM



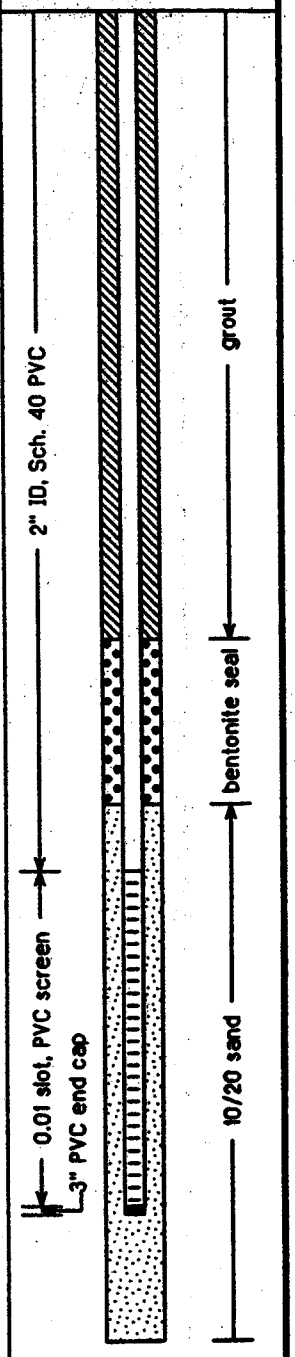
EnSafe/Allen & Hoshall

Monitoring Well 007G13LF

Project: NSA Memphis	Location: Millington, TN. SWMU 7 - Building N-126
Project No.: 0094-08420	Surface Elevation: 293.14 feet msl
Started at 1430 on 3-17-96	TOC Elevation: 292.96 feet msl
Completed at 1600 on 3-17-96	Depth to Groundwater: 34.91 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 258.05 feet msl
Drilling Company: Alliance Environmental	Total Depth: 86.0 feet
Geologist: J.Kingsbury	Well Screen: 66 to 76 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML CL	Color change to very light gray.	
								Contact with Fluvial Deposits (43-78') estimated at 43'.	249.1
45								Sand and clayey sand, very light gray to very light brown.	
			5	100					
								Sand and sandy clay, very light gray, micaceous.	
50							SP SC		
								Sand, very light gray to light brown, with a few lenses of clay and sandy clay, micaceous.	
55									
			6	117					
								(59-60') With some gravel (3" thick lense).	233.1
60							SW	(60-64') Sand, fine to medium-grained, light yellowish-brown to yellowish-gray, micaceous.	
									229.1
65							SC	(64-65') With some clay (interstitial).	228.1
							SW	(65-70') Sand, fine to medium-grained, light yellowish-brown to yellowish-gray, micaceous.	
70									223.1
							CL	(70-71') Clay, very light gray.	222.1
							SP SC	(71-75') Sand, dark yellowish-orange to yellowish-brown, and clay, very light yellowish gray.	
75									218.1
			7	115			SP GP	(75-76') Sand and gravel, sand is very coarse-grained, dark yellowish- orange.	217.1
							CL	(76-77') Clay.	216.1
							GC		215.1
80							CL	(77-78') Clayey gravel.	

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 007G13LF

Project: NSA Memphis	Location: Millington, TN. SWMU 7 - Building N-126
Project No.: 0094-08420	Surface Elevation: 293.14 feet msl
Started at 1430 on 3-17-96	TOC Elevation: 292.96 feet msl
Completed at 1600 on 3-17-96	Depth to Groundwater: 34.91 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 258.05 feet msl
Drilling Company: Alliance Environmental	Total Depth: 86.0 feet
Geologist: J.Kingsbury	Well Screen: 66 to 76 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85							CL	(78-86') Cockfield Formation (see descriptions below).	211.1	10/20 sand
								(78-79') Clay and sandy clay, grayish-orange.		
							SC	(79-79.5') Dark brown, moderate brown to 80'.		
								(82-86') Sand, fine to medium-grained, light olive gray to light yellowish-brown, with clay stringers, light gray to grayish-orange.	207.1	
								Terminated soil boring at 86'.		
90										
95										
100										
105										
110										
115										
120										

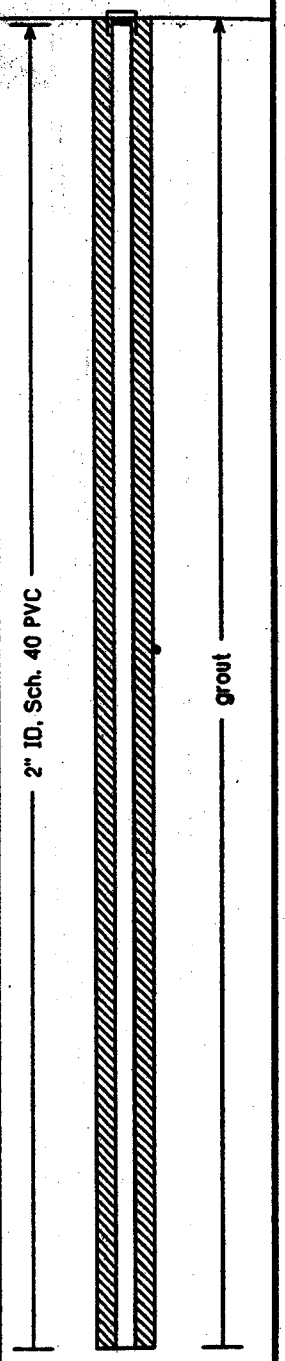
EnSafe/Allen & Hoshall

Monitoring Well 007G14LF

Project: NSA Memphis	Location: Millington, TN. SWMU 7 – Building N-126
Project No: 0094-08420	Surface Elevation: 296.65 feet msl
Started at 1330 on 3-16-96	TOC Elevation: 296.43 feet msl
Completed at 1700 on 3-16-96	Depth to Groundwater: 37.99 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 258.44 feet msl
Drilling Company: Alliance Environmental	Total Depth: 126.0 feet
Geologist: J. Kingsbury	Well Screen: 84 to 94 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					.3			(0'-2) Concrete	
					.3			(2'-21') Silt, brown, with some clay	294.6
5					.3				
					.3				
10			1	71	.3		ML	Moist at 10'	
15									
20									275.6
								(21'-30') Brown clay with some sand and silt. Sand is fine-grained and dark yellowish-orange.	
25			2	85			CL ML		
30									266.6
							ML	(30'-34') Silt with fine sand and minor clay, very light gray with some dark yellowish-orange mottling, dry.	
									262.6
35							SW SC	(34'-94') Fluvial Deposits (see descriptions below).	
									260.6
							CL	(34'-36') Fine to medium-grained sand, dark yellowish-orange to reddish-brown color, some clay present.	
			3	100					258.6
							SW		
40								(36'-38') Clay, light brown.	

WELL DIAGRAM



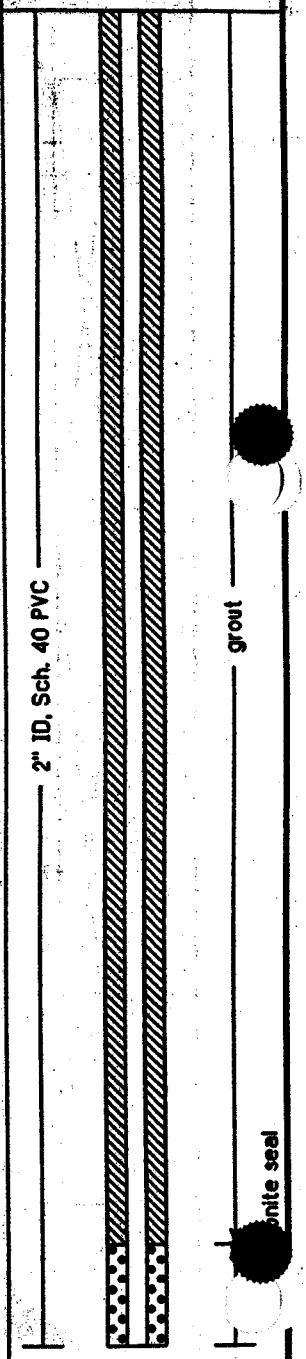
EnSafe/Allen & Hoshall

Monitoring Well 007G14LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *296.65 feet msl*
Started at *1330 on 3-16-96*	TOC Elevation: *296.43 feet msl*
Completed at *1700 on 3-18-96*	Depth to Groundwater: *37.99 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.44 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *126.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *84 to 94 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45								(38'-71') Sand (see descriptions below).	
								(38'-43') Sand, fine to medium-grained, dark yellowish-orange. Micaceous and wet at 40'	
								(43'-45') Sand, fine to medium-grained, brownish-gray to medium gray, micaceous.	
								(45'-48') Clay seam.	
50								(48'-54') Sand, fine to medium-grained, yellowish-gray and micaceous, with some minor clay.	
			4	88					
55							SW	(54'-63') Sand, medium to very coarse-grained, dusky yellow, and minor gravel.	
60									
65								(63'-66') Sand, fine to medium-grained, yellowish-gray to very light gray, with minor clay.	
								(66'-71') Sand, fine to very coarse-grained, yellowish-gray to dark yellowish-orange, with minor gravel.	
70									225.6
75			5				SW CL	(71'-84') Sand, sandy clay, and clay; alternating beds of sand and clay .5' to 1.0 feet thick; sand is fine to medium-grained, dark yellowish-orange to moderate yellowish-brown, clay is very light gray to yellowish-gray.	
80									

WELL DIAGRAM



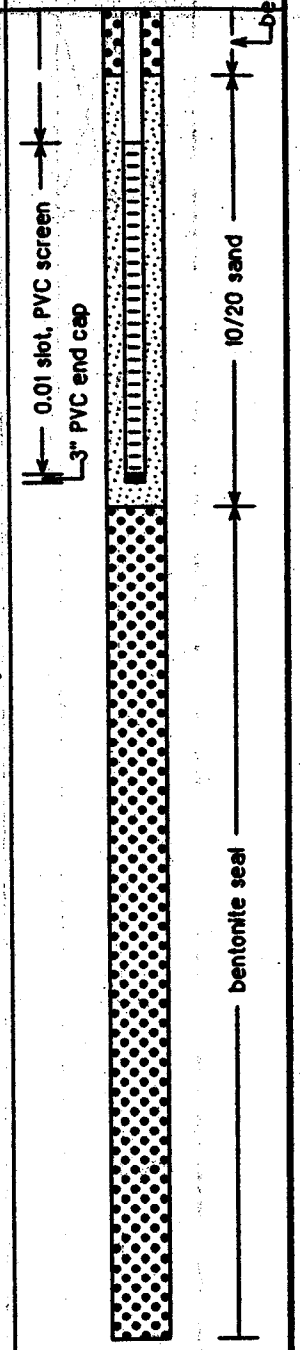
EnSafe/Allen & Hoshall

Monitoring Well 007G14LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 – Building N-126*
Project No.: *0094-08420*	Surface Elevation: *296.65 feet msl*
Started at *1330 on 3-16-96*	TOC Elevation: *296.43 feet msl*
Completed at *1700 on 3-16-96*	Depth to Groundwater: *37.99 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.44 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *126.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *84 to 94 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SW CL		
85							SW	(84'–86') Sand, fine to coarse-grained, dusky yellow to dark yellowish-orange.	212.6
								(86'–94') Sand, fine to very coarse-grained, dusky yellow to yellowish-brown and gravel (up to 1.5" in longest dimension).	210.6
90			6	100			SW GW		
									202.6
95								(94–126') Cockfield Formation (see descriptions below).	
								Fine to medium-grained sand, yellowish-brown to very light gray color, with a small amount of gravel near 96'.	
100			7	95				(96'–104') Sand, fine to medium-grained, medium yellowish-gray to dark yellowish-orange.	
								With a few thin stringers of clay at 104'	
105							SW		
								(106'–116') Sand, fine to medium-grained, yellowish-brown to yellowish-gray, with some dark yellowish-orange mottling, a few clay stringers throughout, and some sparse scattered gravel (up to 1" in longest dimension).	
110			8	120					
115									180.6
							SC	(116'–126') Sand, fine to medium-grained, grayish-orange to dark, yellowish-orange with streaks of clay throughout	
120									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 007G14LF

Project: NSA Memphis	Location: Millington, TN. SWMU 7 - Building N-126
Project No: 0094-08420	Surface Elevation: 296.65 feet msl
Started at 1330 on 3-16-96	TOC Elevation: 296.43 feet msl
Completed at 1700 on 3-16-96	Depth to Groundwater: 37.99 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 258.44 feet msl
Drilling Company: Alliance Environmental	Total Depth: 126.0 feet
Geologist: J. Kingsbury	Well Screen: 84 to 94 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
125			9	120			SC			bentonite seal
								Soil boring terminated at 126'.	170.6	
130										
135										
140										
145										
150										
155										
160										

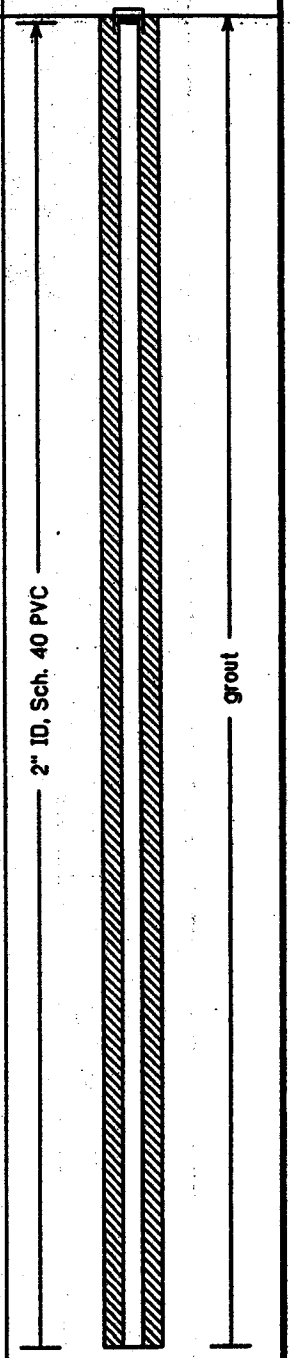
EnSafe/Allen & Hoshall

Monitoring Well 007G15LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *293.66 feet msl*
Started at *1315 on 3-19-96*	TOC Elevation: *293.36 feet msl*
Completed at *1530 on 3-19-96*	Depth to Groundwater: *35.65 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.71 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *106 feet*
Geologist: *JKingsbury*	Well Screen: *90 to 100 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					0			(0'-1') Concrete.	292.7
			1	83	0		CL ML	(1'-6') Silt and clay, brown to yellowish-brown.	
5					0				287.7
					0			(6'-35') Silt, see descriptions below.	
					0			(6'-10') Silt, brown to brownish-gray, some clay, hard.	
10								(10'-26') Silt, brown to dark yellowish-brown, with some clay, with organic material from 10' to 11', moist.	
15			2	85					
20							ML		
25								(26'-29') Silt with minor clay, brown, moist.	
30								(29'-35') Silt, brown mottled with dark yellowish-orange, with organic material, some clay, hard, slightly moist.	
35			3	100					258.7
							SC SM	(35'-40') Clayey and silty sand, light reddish-brown. Fluvial deposits contact estimated at 36' based on geophysical log interpretation.	
40							SW SC		253.7

WELL DIAGRAM



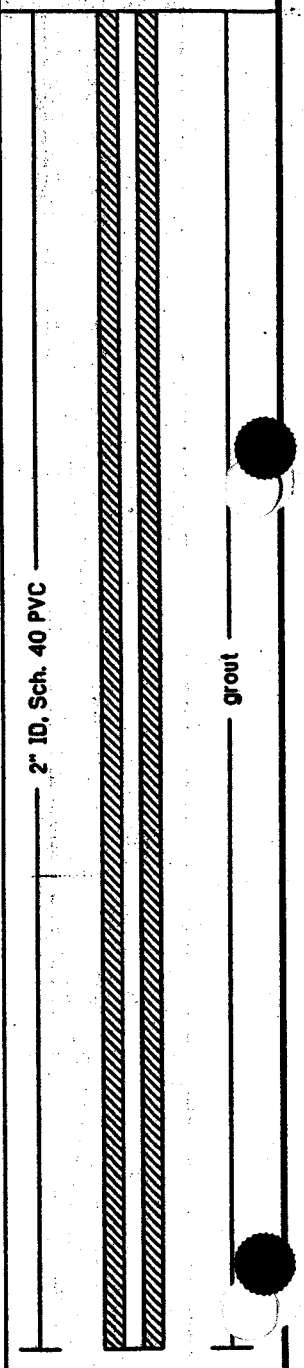
EnSafe/Allen & Hoshall

Monitoring Well 007G15LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *293.66 feet msl*
Started at *1315 on 3-19-96*	TOC Elevation: *293.36 feet msl*
Completed at *1530 on 3-19-96*	Depth to Groundwater: *35.65 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.71 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *106 feet*
Geologist: *J.Kingsbury*	Well Screen: *90 to 100 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45							SW SC	(40'-46') Sand, fine to medium-grained, slightly clayey, dark yellowish-orange to light reddish-brown, with scattered gravel (up to 2" in longest dimension).	253.7
									247.7
50							SW	(46'-51') Sand, fine to medium-grained, orangish-gray to dark yellowish-orange, micaceous.	
									242.7
55			4	110			SW GW	(51'-66') Sand and minor gravel, dusky yellow to dark yellowish- orange with a few clay lenses less than 6" thick.	
60								(58'-61') Increasing gravel content.	
65									227.7
70							SW	(66'-94') Sand, fine to coarse-grained, orangish-gray to dark yellowish-orange, micaceous, with a trace of gravel.	
75			5	105				Clay lens at 76'.	
								Clay lens at 78'.	
80									

WELL DIAGRAM



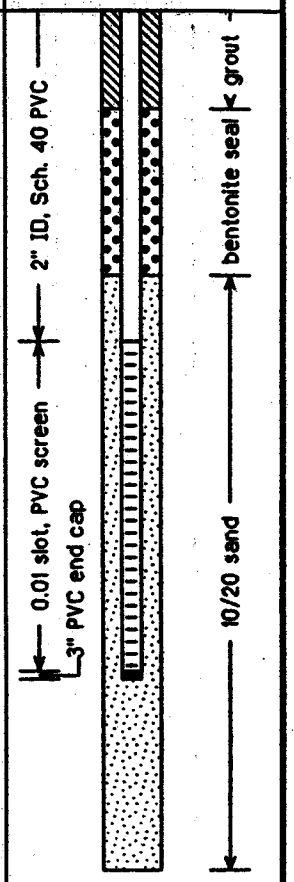
EnSafe/Allen & Hoshall

Monitoring Well 007G15LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *293.66 feet msl*
Started at *1315 on 3-19-96*	TOC Elevation: *293.36 feet msl*
Completed at *1530 on 3-19-96*	Depth to Groundwater: *35.65 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *257.71 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *106 feet*
Geologist: *J.Kingsbury*	Well Screen: *90 to 100 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85							SW		
90									
95			6	95			SW GW	(94'-100') Sand and gravel, dark yellowish-orange to dusky yellow; sand is fine to very coarse-grained, gravel is (up to 1.5" in longest dimension).	199.7
100							SP SC	Cockfield Formation: Sand, fine grained, with thin lenses of clay, yellowish-gray to light gray	193.7
105								Soil boring terminated at 106'.	187.7
110									
115									
120									

WELL DIAGRAM



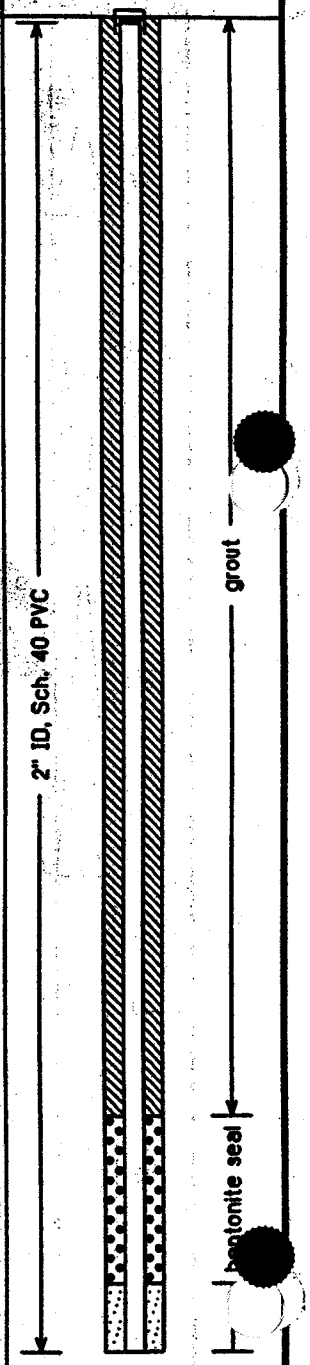
EnSafe/Allen & Hoshall

Monitoring Well 007G15UF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *293.79 feet msl*
Started at *1600 on 3-19-96*	TOC Elevation: *292.91 feet msl*
Completed at *1730 on 3-19-96*	Depth to Groundwater: *34.54 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.37 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *50 feet*
Geologist: *JKingsbury*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								(0'-1') Concrete.	292.8
							CL ML	(1'-6') Silt and clay, brown to yellowish-brown.	
5									287.8
								(6'-35') Silt (see descriptions below).	
								(6'-10') Silt, brown to brownish-gray, some clay, hard.	
10								(10'-26') Silt, brown to dark yellowish-brown, with some clay, with organic material from 10' to 11', moist.	
15									
20							ML		
25								(26'-29') Silt with minor clay, brown, moist.	
30								(29'-35') Silt, brown mottled with dark yellowish-orange, with organic material, some clay, hard, slightly moist.	
35									258.8
							SC SM	(35'-40') Clayey and silty sand, light reddish-brown. Fluvial deposits contact estimated at 36' based on geophysical log interpretation.	
40							SW SC		253.8

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 007G15UF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *293.79 feet msl*
Started at *1600 on 3-19-96*	TOC Elevation: *292.91 feet msl*
Completed at *1730 on 3-19-96*	Depth to Groundwater: *34.54 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.37 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *50 feet*
Geologist: *JKingsbury*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45							SW SC	(40'-46') Sand, fine to medium-grained, slightly clayey, dark yellowish-orange to light reddish-brown, with scattered gravel (up to 2" in longest dimension).	253.8	0.01 slot, PVC screen; 3" PVC end cap; 10/20 sand
50							SW	(46'-50') Sand, fine to medium-grained, orangish-gray to dark yellowish-orange, micaceous.	247.8	
55								Terminated soil boring at 50'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 007G15LF.	243.8	
60										
65										
70										
75										
80										

EnSafe/Allen & Hoshall

Monitoring Well 007G16LF

Project: NSA Memphis	Location: Millington, TN. SWMU 7 - Building N-126
Project No.: 0094-08420	Surface Elevation: 285.28 feet msl
Started at 1318 on 3-15-96	TOC Elevation: 287.63 feet msl
Completed at 1500 on 3-15-96	Depth to Groundwater: 29.29 feet Measured: 4/8/96
Drilling Method: Rotasonic	Groundwater Elevation: 258.34 feet msl
Drilling Company: Alliance Environmental	Total Depth: 86.0 feet
Geologist: D. Ladd	Well Screen: 70 to 80 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	100	BG		OL	(0-2') Soil, grass, and roots.	
					BG				283.3
			2	200	BG			Silt, moderate yellowish-brown mottled with light olive gray and a small amount of dark yellowish-orange, contains iron/manganese nodules.	
5					BG				
					BG			Silt, dark yellowish-brown mottled with a little light olive gray.	
					BG				
					BG			Clayey silt, moderate yellowish-brown mottled with a little light olive gray, contains iron/manganese nodules. Moist from 14' to 15', with an increasing amount of iron/manganese nodules with depth.	
10					BG				
			3	100					
15							ML	Moist.	
								Clayey silt, dark yellowish-brown, becoming moderate yellowish-brown near 24.5', with iron-manganese nodules near 24.5, moist.	
20			4	80					
								Silt, dark yellowish-orange mottled with moderate yellowish-brown and light olive gray, contains iron/manganese nodules.	
25								Becoming sandy.	258.8
							SC	(26.5-31') Sand, fine-grained, dark yellowish-orange, locally clayey, wet. Contact with Fluvial Deposits (30-80') estimated at 30'.	
30									

WELL DIAGRAM

2" ID, Sch. 40 PVC

grout

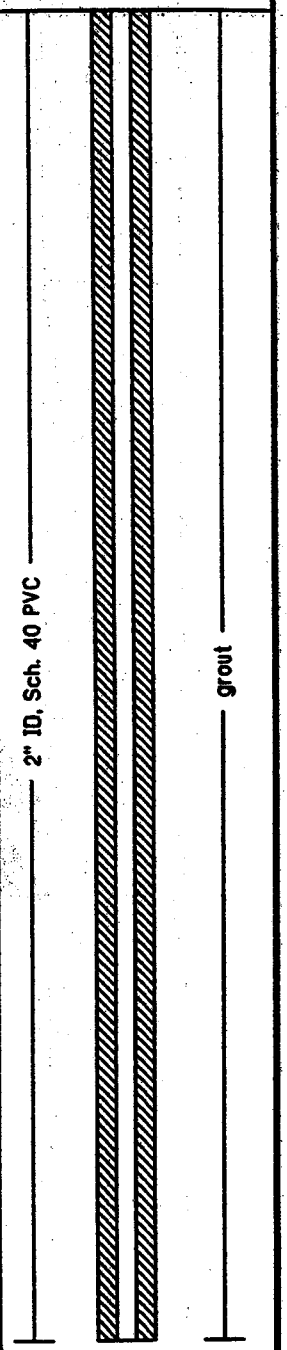
EnSafe/Allen & Hoshall

Monitoring Well 007G16LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 – Building N-126*
Project No.: *0094-08420*	Surface Elevation: *285.28 feet msl*
Started at *1318 on 3-15-96*	TOC Elevation: *287.63 feet msl*
Completed at *1500 on 3-15-96*	Depth to Groundwater: *29.29 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.34 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *86.0 feet*
Geologist: *D. Ladd*	Well Screen: *70 to 80 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
35	5	86	SC	(31–35') Clayey sand, fine-grained, dark yellowish-brown, wet.	250.3
40	6	100	SP	Sand, fine-grained, dark yellowish-brown, wet. Moderate yellowish-brown, micaceous, wet. Dark yellowish-brown. Moderate yellowish-brown to grayish-orange, mottled with sparse dark yellowish-brown. Shelby tube sample collected from 40' to 43' for geotechnical analysis, no sample collected for lithologic observation.	242.3
			SC	(43–44') Clayey sand, fine-grained, light brown mottled with dark yellowish-orange, wet.	241.3
45			SM	(44–45') Silty sand, fine-grained, light brown mottled with dark yellowish-orange and very light gray clayey sand, wet.	240.3
			SP	(45–48') Sand, fine-grained, grayish-orange mottled with light brown, wet. Very light gray clay seam near 48'.	237.3
50	7	100	SW	(48–53') Sand, medium to very coarse-grained, with some gravel (up to 1" in longest dimension), yellowish-gray mottled with dark yellowish-orange and grayish-orange, micaceous, wet.	232.3
55			SC	(53–57') Clayey sand, fine-grained, yellowish-gray mottled with dark yellowish-orange, with ron-manganese nodules, wet, rare gravel piece at 53.5'. Clay seam near 55', yellowish-gray mottled with pale red.	228.3
60			SW	Sand, fine to very coarse-grained, with scattered gravel (up to 0.5" in longest dimension), olive gray to light olive gray, wet.	

WELL DIAGRAM

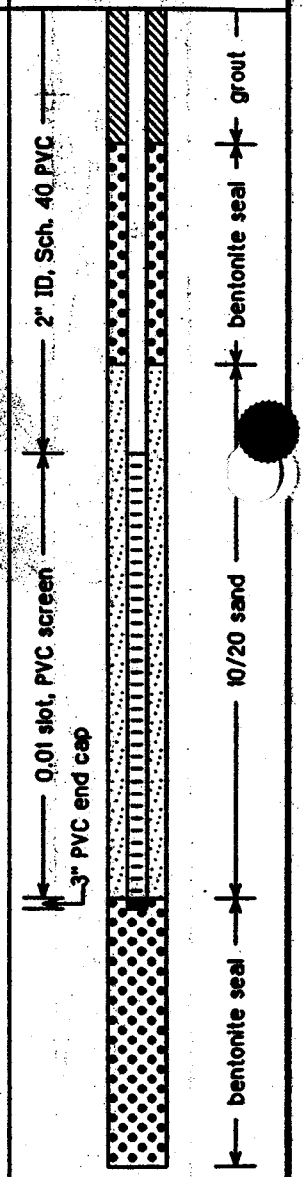


EnSafe/Allen & Hoshall

Monitoring Well 007G16LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 – Building N-126*
Project No.: *0094-08420*	Surface Elevation: *285.28 feet msl*
Started at *1318 on 3-15-96*	TOC Elevation: *287.63 feet msl*
Completed at *1500 on 3-15-96*	Depth to Groundwater: *29.29 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.34 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *86.0 feet*
Geologist: *D. Ladd*	Well Screen: *70 to 80 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
65			8	80			SW	Yellowish-gray to grayish-orange with scattered gravel.	
									219.3
70			9	80			SP GW	(66-77.5') Sand, very coarse-grained, and gravel; grayish-orange to dark yellowish-orange, wet. Gravel is mostly chert, increasing in size (up to 2" in longest dimension) and content near 76'.	
									207.8
75							SW GW	(77.5-80') Gravel (up to 2" in longest dimension) and sand, fine to very coarse-grained, dark yellowish-orange, wet. Gravel content decreases and sand content increases near 80', the estimated contact between the Fluvial Deposits and the Cockfield Formation.	205.3
80			10	120			SP		204.3
							SC	Cockfield Formation: Sand, very fine-grained, mostly lignitic, black micaceous, with a small amount of dark yellowish-brown and dark yellowish-orange clayey sand near 80'.	202.3
85							SP	(81-83') Clayey sand, very fine-grained, dark yellowish-brown.	199.8
							SC	(83-85.5') Sand, very fine-grained, light olive gray with lignitic streaks throughout, micaceous.	199.3
								(85.5-86') Clayey sand, very fine-grained, dark yellowish-brown with lignitic streaks throughout, micaceous.	
90								Terminated soil boring at 86'.	



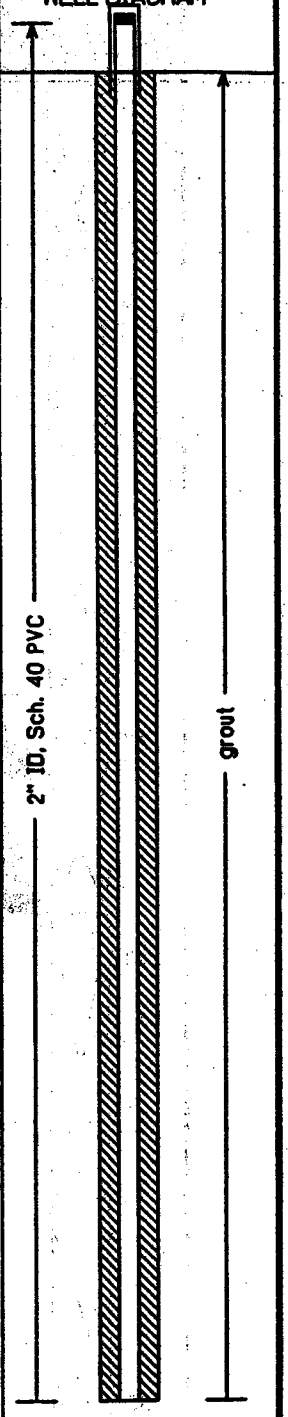
EnSafe/Allen & Hoshall

Monitoring Well 007G17LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 – Building N-126*
Project No.: *0094-08420*	Surface Elevation: *280.89 feet msl*
Started at *0750 on 3-15-96*	TOC Elevation: *283.20 feet msl*
Completed at *0956 on 3-15-96*	Depth to Groundwater: *25.19 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.01 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *86.0 feet*
Geologist: *D. Ladd*	Well Screen: *62 to 72 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	100	BG		OL	(0'–2') Soil, grass, and roots, brick fragments.	
					BG				278.9
					BG			(2'–34') Silt (see descriptions below).	
			2	120	BG			(2'–4') Moderate yellowish-brown mottled with dark yellowish-orange and olive gray.	
5					BG			(4'–6') Olive gray.	
					BG			(6'–16') Olive gray to medium bluish-gray, stained light olive brown in places, with iron/manganese nodules.	
					BG				
					BG				
10					BG				
			3	40					
15							ML	(16'–22') Moderate yellowish-brown mottled with dark yellowish-orange and olive gray, with a few iron/manganese nodules.	
20			4	70				(22'–33') Very moist.	
25								(25'–29') Olive gray. Scattered manganese nodules at 26'.	
30								(29'–34') Clayey and sandy, moderate yellowish-brown mottled with olive gray, moist.	

WELL DIAGRAM



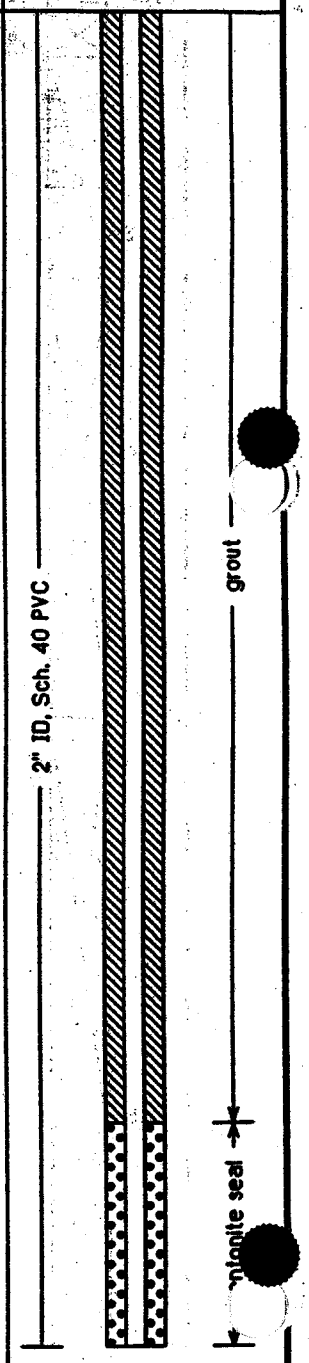
EnSafe/Allen & Hoshall

Monitoring Well 007G17LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 – Building N-126*
Project No.: *0094-08420*	Surface Elevation: *280.89 feet msl*
Started at *0750 on 3-15-96*	TOC Elevation: *283.20 feet msl*
Completed at *0956 on 3-15-96*	Depth to Groundwater: *25.19 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.01 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *86.0 feet*
Geologist: *D. Ladd*	Well Screen: *62 to 72 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			5	100			ML		
									248.9
35							SP CL	Contact with Fluvial Deposits (34–72') estimated at 34'.	
								(34'–36') Sand, very fine-grained, and silty clay, moderate yellowish-brown, moist.	244.9
								Clayey sand, fine-grained, moderate reddish-brown to light brown, mottled with light olive gray and moderate yellowish-brown near 42', hard, contains rare iron concretions	
40			6	90			SC		
								Clayey sand, fine-grained, very light gray mottled with moderate reddish-brown, light brown, moderate yellowish-brown, and grayish-orange, hard, with rare iron concretions	
45									235.4
								(45.5'–58.5') Sand (see descriptions below).	
			7	100				Shelby Tube from 46–49'.	
50							SP	Sand, fine-grained, dark yellowish-orange mottled with lt. brown from 51' to 53', becoming grayish-orange to dark yellowish-orange from 53' to 56'. Light gray clay seam at 51'. Thin gravel zone at 54'.	
			8	158					
55								(56'–58.5') Sand, fine-grained, grayish-orange, contains rare gravel pieces, wet.	
									222.4
60							SW		

WELL DIAGRAM



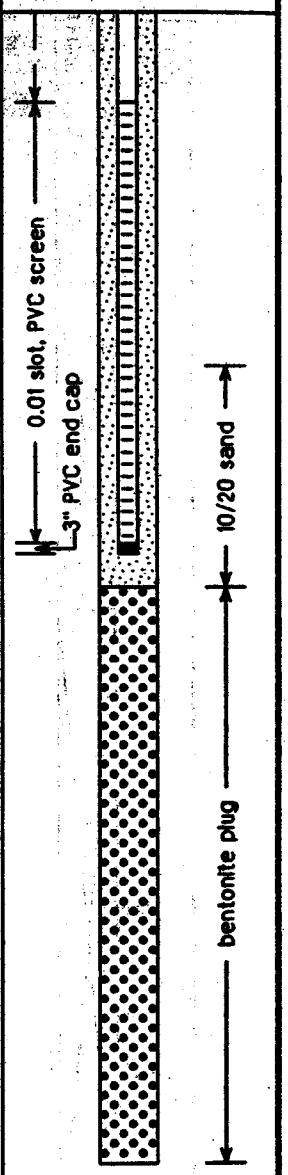
EnSafe/Allen & Hoshall

Monitoring Well 007G17LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 – Building N-126*
Project No.: *0094-08420*	Surface Elevation: *280.89 feet msl*
Started at *0750 on 3-15-96*	TOC Elevation: *283.20 feet msl*
Completed at *0956 on 3-15-96*	Depth to Groundwater: *25.19 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *258.01 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *86.0 feet*
Geologist: *D. Ladd*	Well Screen: *62 to 72 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			9	100			SW	(58.5'–64') Sand, fine to coarse-grained, grayish-orange mottled with dark yellowish-orange, with gravel (up to 0.5" in longest dimension), wet.	
									216.9
65							SW/GW	(64'–72') Sand (see descriptions below). Fine to very coarse-grained, and gravel (up to 1.5" in longest dimension), grayish-orange mottled with dark yellowish orange and very light gray clayey fine sand, wet. Some of the light gray material is cemented. Fine to very coarse-grained, and gravel (up to 2" in longest dimension), dark yellowish-orange mottled with very light gray clayey material, wet.	
70			10	100					
									208.9
75							SC	(72–86') Cockfield Formation (see descriptions below). Clayey sand, very fine-grained, dark yellowish-orange mottled with very light gray and grayish-orange, wet. Contains a small amount of gravel near 72'. (77'–78') Very wet, very light gray clay seam at 77'.	
80			11	120				Clayey sand, very fine-grained, dark yellowish-brown to dusky yellowish-brown, with some light olive gray, very fine sandy seams, moist from 83' to 84'.	
									196.9
85							CL	(84'–86') Sandy clay, dark yellowish-brown to dusky yellowish-brown mottled with light olive gray sandy seams, hard.	194.9
								Terminated soil boring at 86.0'.	
90									

WELL DIAGRAM



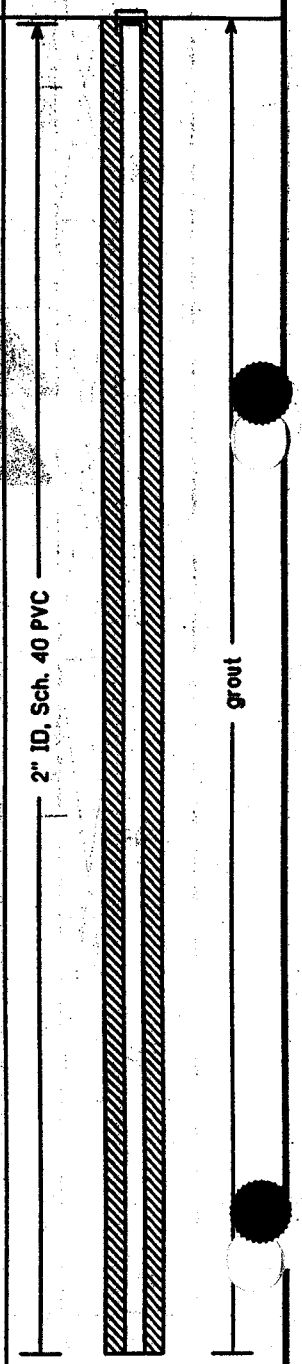
EnSafe/Allen & Hoshall

Monitoring Well 007G18LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *277.80 feet msl*
Started at *0745 on 3-19-96*	TOC Elevation: *277.58 feet msl*
Completed at *1000 on 3-19-96*	Depth to Groundwater: *23.50 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *254.08 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *118.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *90 to 100 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	100	BG			(0'-36') Silt, see descriptions below.	
								(1'-2') Brown, with some clay.	
			2	67	BG			(2'-6') Brown, with some clay and organic material.	
5					BG				
					BG			(6'-16') Brownish-gray to light brown with some dark yellowish-orange staining, with organic material to 16'.	
					BG				
10			3	80					
15								(16'-19') Yellowish-brown, moist.	
							ML		
20								(19'28') Olive gray to greenish-gray.	
25			4	70					
30								(28'-36') Yellowish-brown to yellowish-gray, with some clay.	
35									
									241.8
							CL ML	(36'-44') Clay and silt, with sandy zones and a few traces of gravel, orangish-gray to very light gray with some dark yellowish- orange staining. Fluvial deposits contact estimated at 43' based on geophysical log interpretation.	
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 007G18LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 – Building N-126*
Project No.: *0094-08420*	Surface Elevation: *277.80 feet msl*
Started at *0745 on 3-19-96*	TOC Elevation: *277.58 feet msl*
Completed at *1000 on 3-19-96*	Depth to Groundwater: *23.50 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *254.08 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *116.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *90 to 100 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	5	120	CL ML		
45			CL SP	(44'–46') Clay, sand, and gravel, very stiff and dense, dark yellowish-orange to orangish-gray.	233.8
					231.8
			SW	(46'–58') Sand, fine to coarse-grained, yellowish-gray to yellowish- brown, with a trace of gravel.	
50					
55					
	6	90			
					219.8
60			SW GW	(58'–66') Sand and gravel, reddish-brown to dark yellowish-orange. Gravel is (up to 1.5" in longest dimension), some interstitial clay present.	
65					211.8
			SW	(66'–72') Sand fine to very coarse-grained, dark yellowish-brown to light reddish-brown.	
70					
					205.8
			SC GW	(72'–79') Sand and gravel, brown to reddish-brown, gravel is (up to 2.5" in longest dimension), clayey from 72' to 79', iron cemented at 79'.	
75	7	85			
					198.8
80			SW GW	(79'–86') Sand and gravel, little or no clay, dark yellowish-orange to to reddish-brown.	

WELL DIAGRAM: 2" ID, Sch. 40 PVC; grout

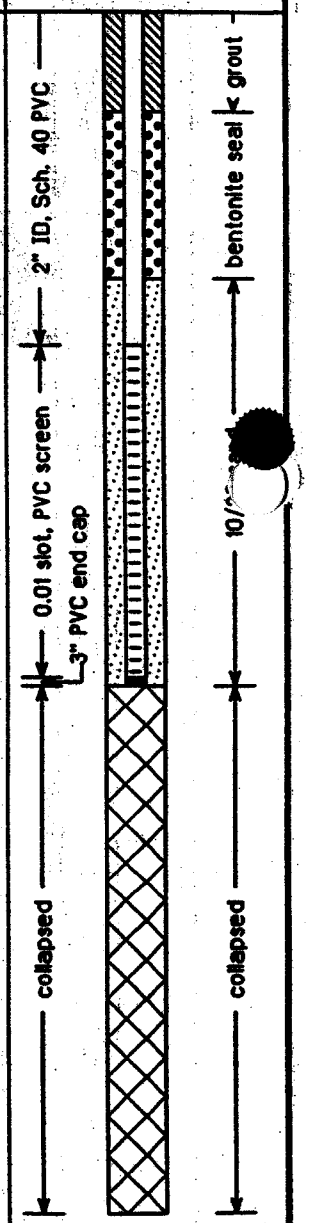
EnSafe/Allen & Hoshall

Monitoring Well 007G18LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 - Building N-126*
Project No.: *0094-08420*	Surface Elevation: *277.80 feet msl*
Started at *0745 on 3-19-96*	TOC Elevation: *277.58 feet msl*
Completed at *1000 on 3-19-96*	Depth to Groundwater: *233.50 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic*	Groundwater Elevation: *254.08 feet msl*
Drilling Company: *Alliance Environmental*	Total Depth: *116.0 feet*
Geologist: *J. Kingsbury*	Well Screen: *90 to 100 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85							SW GW		191.8
90			8	120			GW	(86'-93') Gravel (up to 2.5" in longest dimension), with some sand, very slightly clayey, yellowish in color.	184.8
95							SW GW	(93'-100') Sand and gravel, reddish-brown to dark yellowish-orange.	
100								Cobble approximately 4" diameter near 100'.	177.8
105			9	110			SP	Cockfield Formation: Predominately fine-grained sand, gray, finely lignitic, with some thin stringers of clay throughout.	
110									
115									161.8
120								Soil boring terminated at 116'.	

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 007G19LF
Boring

Project: *NSA Memphis*	Location: *Millington, TN. SWMU 7 – Building N-126*
Project No.: *0094-08420*	Surface Elevation: *feet msl*
Started at *1130 on 3-13-97*	TOC Elevation: *feet msl*
Completed at *1140 on 3-14-97*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Hollow Stem Auger*	Groundwater Elevation: *feet msl*
Drilling Company: *Tristate Drilling*	Total Depth: *69.0 feet*
Geologist: *C. Ivey*	Well Screen: *57 to 67 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5										2" ID, Sch. 40 PVC; grout
10										
15										
20										
25										
30										
35										
40										

EnSafe/Allen & Hoshall

Monitoring Well 007G19LF
Boring

Project: NSA Memphis	Location: Millington, TN SWMU 7 - Building N-126
Project No.: 0094-08420	Surface Elevation: feet msl
Started at 1130 on 3-13-97	TOC Elevation: feet msl
Completed at 1140 on 3-14-97	Depth to Groundwater: feet Measured:
Drilling Method: Hollow Stem Auger	Groundwater Elevation: feet msl
Drilling Company: Tristate Drilling	Total Depth: 68.0 feet
Geologist: C. Ivey	Well Screen: 57 to 67 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45										2" ID, Sch. 40 PVC
50										grout
55										tonite seal
60										0.01 slot, PVC screen
65										3" PVC end cap
70										collapsed
75										10/20 sand
80										

ENSAFE

BORING LOG of 007G20LF

NSA MIDSOUTH
Millington, TN.

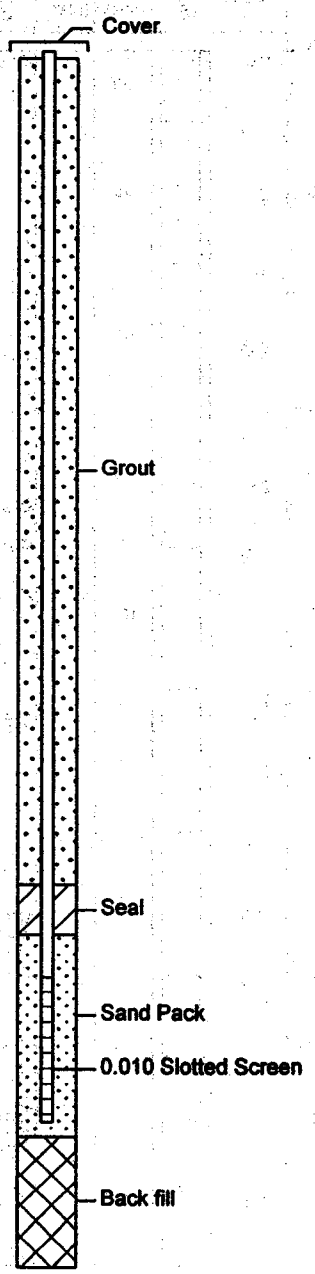
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1055 7/13/98	Northing	: 392485.90
Finished	: 1800 7/13/98	Easting	: 813486.00
Drilling Method	: Rotasonic	TOC Elevation	: 282.70
Drilling Company	: Allinance Drilling	Total Depth	: 85 feet
Geologist	: B. Brantley	Well Screen	: 65 to 75 feet

Geoprobe: 007G20LF
Elev.: 282.70

Depth in Feet	Surf. Elev. 282.82	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	282	1	60				(0 - 1) Concrete, Asphalt mixed w/ sand (subgrade)
5	277					ML	(1 - 5) Dark yellowish brown mottled w/ med. Lt. gray clayey silt, dry, diesel odor
10	272	2	80				(5 - 6) Med. brown to med. yellow brown silt, friable, hard
15	267	3	85				(6 - 9) Olive gray clayey silt, moist
20	262						(9 - 21) Med. yellowish brown mottled w/ Lt. gray silt, moist
25	257	4	70				Lignite grains scattered throughout
30	252						(21 - 25) Med. yellow brown w/ iron staining and Lt. olive gray mottles lenses silt, very moist
35	247	5	100				(25 - 42.5) Pale yellow brown to Lt. olive gray clayey silt w/ iron stains, moist, med. stiff
40	242						Slightly sandy (very fine) and iron-manganese partings between 36 and 41,
45	237	6	100			SC	(42.5) Lt. brown to med. brown clayey gravel sand mix w/ iron staining, very hard
50	232						(42.5 - 47) Dark yellowish orange mottled w/ Lt. gray clayey very fine to fine sand w/ scattered pebbles
55	227	7	80			SW	(47 - 48) Med. gray clayey sand
60	222						(48 - 52) Lt. brown to med yellow brown gravelly sand w/ clay, very stiff to hard, Gravels include both chert (up to 1/2") and Qtz. (up to 1")
65	217	8	80			GW	(52 - 55) Grayish orange med. sand w/ scattered gravel (up to 3/4")
70	212						(55 - 55.5) Chert gravel w/ coarse sand
75	207	9	110			SM	(55.5 - 65) Dark yellowish orange med. coarse sand w/ gravel, coarser sand w/ less fines between 63 and 65
80	202					SC	(65 - 74) Med. yellow brown coarse to med grained sandy gravel (up to 3" dia.)
85	197						(74 - 75) Gravelly silt w/ fine sand
90							(75 - 76) Dark yellowish orange clay with some gravel
							(76 - 77) Dark yellowish orange mottled w/ Lt. olive gray clay, some silt
							(77 - 85) Dusky brown to dusky yellow brown clay w/ some silty lenses, micaceous w/ some patches of very fine sand



N:\WELL LOGS\ NSAMIDSOUTH\007G20LF.BOR

ENSAFE

BORING LOG of 007G21LF

NSA MIDSOUTH
Millington, TN.

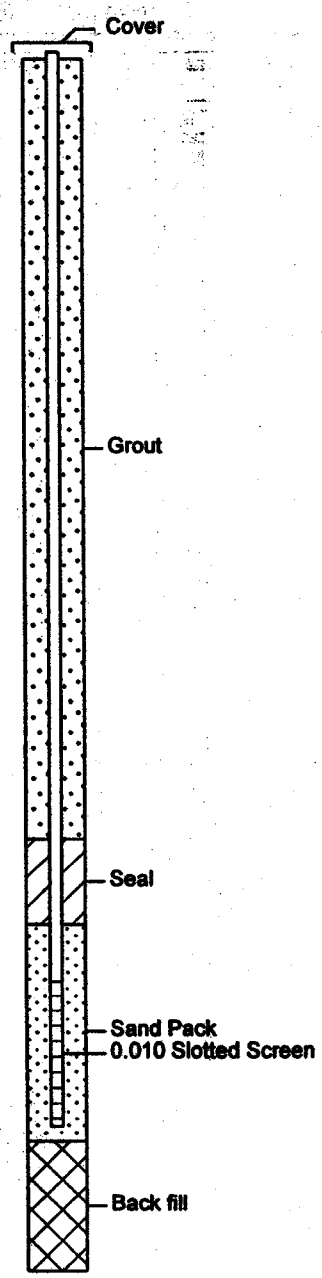
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0840 7/14/98	Northing	: 392560.30
Finished	: 1415 7/14/98	Easting	: 813673.00
Drilling Method	: Rotasonic	TOC Elevation	: 2283.66
Drilling Company	: Allinance Drilling	Total Depth	: 75 feet
Geologist	: B. Brantley	Well Screen	: 65 to 75 feet

Geoprobe: 007G21LF
Elev.: 283.66

Depth in Feet	Surf. Elev. 283.95	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	283	1	80				(0 -1) Concrete w/ sand gravel subgrade
5	278						(1 - 6) Med. to dark yellowbrown silt, dry, hard Greenish gray staining and diesel odor from 2.5 to 3
10	273	2	35				(6 - 8.5) Olive gray to med yellow brown clayey silt w/ manganese stains and streaks
15	268						(8.5 - 15) No recovery
20	263	3	85			ML	(15 - 28) Dark yellow orange streaked w/ med. yellow brown clayey silt, moist, med. stiff, manganese streaks scattered throughout
25	258						(28 - 32) Pale yellow brown clayey silt w/ iron stains/streaks, moist, med. stiff
30	253	4	75				(32 - 32.5) Olive gray clayey silt
35	248						(32.5 - 35) No recovery
40	243	5	100			CL	(35 - 37) Med. yellow brown silty clay w/ Lt. gray streaking, moist, med. stiff
45	238						(37 - 41.5) Med. brown to med yellow brown sandy clay w/ Lt. gray streaks, med. stiff
50	233	6	90			SM	(41.5 - 47) Med. yellow brown and Lt. gray sandy clay Streaks of organic material between 41.5 and 42.5
55	228						(47 - 48) Med. yellow brown and Lt. olive gray silty sand w/ scattered pebbles
60	223	7	100			SW	(48 - 55) Dark yellowish orange med. to corase gravelly sand w/ Lt. gray streaks and iron staining, Gravel up to 1 1/2" dia.
65	218						(55 - 61) Dark yellowish orange med. to coarse sandy gravel, wet
70	213	8	65			GM	(61 - 65) Med brown to dark yellow brown med. to coarse sand and silt w/ gravel (up to 3" dia.), wet
75	208						(65 - 70) No recovery
80	203	9	105			GM	(70 - 71) Gravel, chert, up to 2" dia., wet
85	198						(71 - 74.5) Dark yellowish orange sandy gravel w/ pale yellowish orange seam at 74, wet
90		10	100			GC	(74.5 - 75) Dusky yellow brown clay, micaceous
						CL	(75 - 77) Med. brown sandy clay mottled w/ dusky yellow brown, dark yellow brown and dark orange w/ gravel up to 2" dia.
							(77 - 85) Dusky yellowish brown clay mottled w/ Lt. gray very fine to fine sand seams, lignitic material scattered throughout, (more Lt. gray sand between 83 and 85)
							(85 - 87) No recovery (shelby tube broke off in hole)



09-17-1999 N:\WELL LOGS\ NSAMIDSOUTH\007G21LF.BOR

ENSAFE

BORING LOG of 007G22LF

NSA MIDSOUTH
Millington, TN.

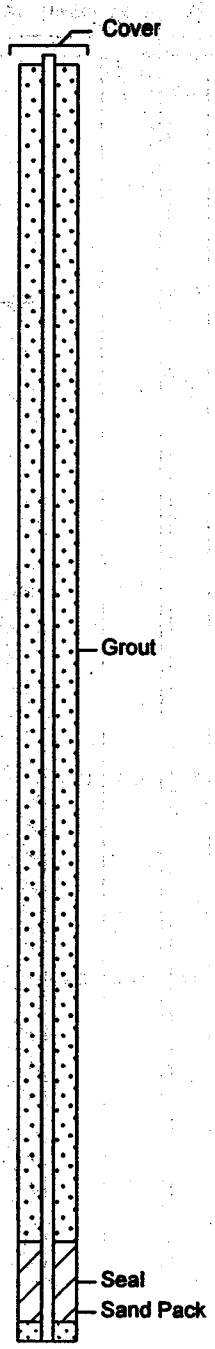
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1315 7/18/98	Northing	: 392658.10
Finished	: 0935 7/19/98	Easting	: 813905.90
Drilling Method	: Rotasonic	TOC Elevation	: 284.86
Drilling Company	: Allinance Drilling	Total Depth	: 77.5 feet
Geologist	: D. Ladd	Well Screen	: 67.5 to 77.5 feet

Depth in Feet	Surf. Elev. 285.15	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	285						(0 - 2.5) Concrete with sand and gravel subgrade
5	280	1	60	1500		ML	(2.5 - 7) Silt, clayey, moderate yellowish brown w/ olive gray material, asphalt near top, diesel odor (7 - 10.5) Silt, clayey, olive gray, hard and dry, contains some dark yellowish brown material (10.5 - 11.5) Silt, clayey, modertrate yellowish brown to dark yellowish orange, mottled w/ olive gray, contains iron-manganese concretions, very dry, hard
10	275	2	50	900			(11.5 - 17) No recovery (17 - 27) Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled w/ some dark yellowish orange, very moist
15	270						(27 - 29) Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled w/ some olive gray, very moist
20	265	3	100	5			(29 - 37.5) Silt, clayey, olive gray to med. dark gray, containing iron-manganese nodules and Lt. olive brown material below 31. Near 37, becoming mostly med. dark gray and dark yellowish brown, moist
25	260						(37.5 - 46) Silt and clay, moderate yellowish brown to dark yellowish orange w/ Lt. gray to olive gray material, scattered iron-manganese nodules, becoming slightly sandy w/ more Lt. gray material near 46
30	255	4	100	15			
35	250						
40	245	5	80				
45	240					CL	(46 - 49.5) Clay, sand, very fine, and silt, moderate yellowish brown mottled w/ Lt. gray to olive gray and dark yellowish orange, scattered gravel, moist, contains iron-manganese nodules between 47 and 49.5
50	235	6	120			SC	(49.5 - 52.5) Sand, very fine to fine, and clay w/ scattered gravel, dark yellowish orange to moderate yellowish brown mottled w/ Lt. gray, Gravel up to 1 1/2" dia.,wet
55	230						(52.5 - 57.5) Sand, very fine to fine, dark yellowish orange to moderate yellowish brown, mottled w/ Lt. gray, scattered clay seams, Lt. gray clay seam w/ organic streaks at 56.5, wet
60	225	7	120			SP	
65							

Geoprobe: 007G22LF
Elev.: 284.86



ENSAFE

BORING LOG of 007G22LF

NSA MIDSOUTH
Millington, TN.

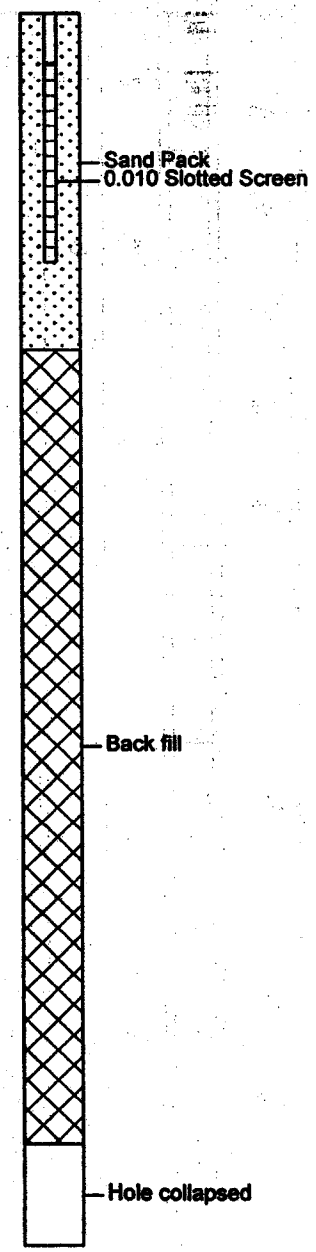
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1315 7/18/98	Northing	: 392658.10
Finished	: 0935 7/19/98	Easting	: 813905.90
Drilling Method	: Rotasonic	TOC Elevation	: 284.86
Drilling Company	: Allinance Drilling	Total Depth	: 77.5 feet
Geologist	: D. Ladd	Well Screen	: 67.5 to 77.5 feet

Depth in Feet	Surf. Elev. 285.15	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
65	220	7	120				(57.5 - 67) Sand, corase to very coarse, and gravel, dark yellowish orange to very pale orange, gravel is chert and qtz, up to 2" dia. angular to rounded, wet, upper 1" is clayey
70	215	8	110	0.4		SP	(67 - 77.5) Sand, coarse to very coarse, and gravel, dark yellowish orange to very pale orange, gravel is chert and qtz, up to 2" dia. angular to rounded, wet, 67.5 to 70 is darker in color, containing lignitic sand grains, Red iron staining near 76, silt and smaller gravel from 76 to 77
75	210						
80	205	9	110				(77.5 - 92.55) Clay, sandy, dusky yellowish brown to dark yellowish brown mottled w/ Lt. gray sand seams, scattered lignite,some gravel, very micacreous, more sand between 87 and 92.5
85	200					CL	
90	195	10	110				
95	190						(92.5 - 97) Sand, very fine to fine, Lt. gray w/ dark yellowish brown clay seams, abundant lignite and mica, wet
100	185	11	120	1500			(97 - 107) Sand, very fine to fine, color becoming olive gray to Lt. gray, less lignite and mica, wet
105	180						(107 - 117) Sand, very fine to fine, olive gray to Lt. gray, abuntant lignite, especially near 112, wet
110	175	12	120	0.4		SC	(117 - 127) Sand, very fine to fine, olive gray to Lt. gray, abuntant lignite at 119 and 123, piece of marcasite nodule at 118, clay sean (7" thick) at 126, wet
115	170						
120	165	13	100				
125	160						
130							

Geoprobe: 007G22LF
Elev.: 284.86



09-17-1999 N:\WELL LOGS\ NSAMIDSOUTH\007G22LF.BOR

ENSAFE

BORING LOG of 007G22UC

NSA MIDSOUTH
Millington, TN.

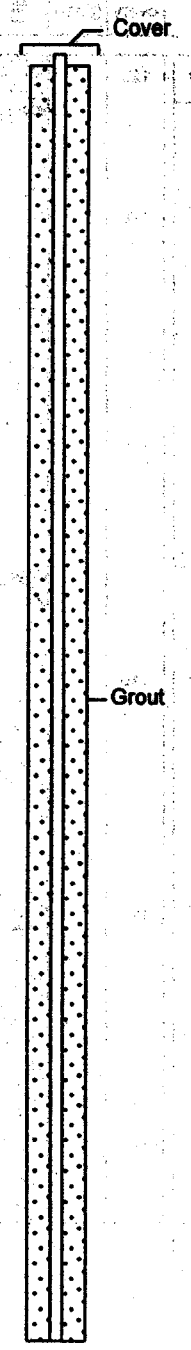
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 7/19/98	Northing	: 392674.60
Finished	: 7/19/98	Easting	: 813899.00
Drilling Method	: Rotasonic	TOC Elevation	: 284.83
Drilling Company	: Allinance Drilling	Total Depth	: 103 feet
Geologist	: D. Ladd	Well Screen	: 93 to 103 feet

Depth in Feet	Surf. Elev. 285.05	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	285						(0 - 2.5) Concrete with sand and gravel subgrade
5	280	1	60			ML	(2.5 - 7) Silt, clayey, moderate yellowish brown w/ olive gray material, asphalt near top, diesel odor (7 - 10.5) Silt, clayey, olive gray, hard and dry, contains some dark yellowish brown material (10.5 - 11.5) Silt, clayey, modertrate yellowish brown to dark yellowish orange, mottled w/ olive gray, contains iron-manganese concretions, very dry, hard
10	275	2	50				(11.5 - 17) No recovery (17 - 27) Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled w/ some dark yellowish orange, very moist
15	270						(27 - 29) Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled w/ some olive gray, very moist (29 - 37.5) Silt, clayey, olive gray to med. dark gray, containing iron-manganese nodules and Lt. olive brown material below 31. Near 37, becoming mostly med. dark gray and dark yellowish brown, moist
20	265	3	100				(37.5 - 46) Silt and clay, moderate yellowish brown to dark yellowish orange w/ Lt. gray to olive gray material, scattered iron-manganese nodules, becoming slightly sandy w/ more Lt. gray material near 46
25	260						
30	255	4	100				
35	250						
40	245	5	100				
45	240					CL	(46 - 49.5) Clay, sand, very fine, and silt, moderate yellowish brown mottled w/ Lt. gray to olive gray and dark yellowish orange, scattered gravel, moist, contains iron-manganese nodules between 47 and 49.5
50	235	6	120			SC	
55							

Geoprobe: 007G22UC
Elev.: 284.83



ENSAFE

BORING LOG of 007G22UC

NSA MIDSOUTH
Millington, TN.

Location: AOCA/SWMU 7
Project #: CTO 0094

Started	: —— 7/19/98	Northing	: 392671.60
Finished	: —— 7/19/98	Easting	: 813899.00
Drilling Method	: Rotasonic	TOC Elevation	: 284.83
Drilling Company	: Allinance Drilling	Total Depth	: 103 feet
Geologist	: D. Ladd	Well Screen	: 93 to 103 feet

Geoprobe: 007G22UC
Elev.: 284.83

Depth in Feet	Surf. Elev. 285.05	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
55	230	6	120			SC	(49.5 - 52.5) Sand, very fine to fine, and clay w/ scattered gravel, dark yellowish orange to moderate yellowish brown mottled w/ Lt. gray, Gravel up to 1 1/2" dia.,wet
60	225	7	120				(52.5 - 57.5) Sand, very fine to fine, dark yellowish orange to moderate yellowish brown, mottled w/ Lt. gray, scattered clay seams, Lt. gray clay seam w/ organic streaks at 56.5, wet
65	220					SP	(57.5 - 67) Sand, coarse to very coarse, and gravel, dark yellowish orange to very pale orange, gravel is chert and qtz, up to 2" dia. angular to rounded, wet, upper 1" is clayey
70	215	8	110				(67 - 77.5) Sand, coarse to very coarse, and gravel, dark yellowish orange to very pale orange, gravel is chert and qtz, up to 2" dia. angular to rounded, wet, 67.5 to 70 is darker in color, containing lignitic sand grains, Red iron staining near 76, silt and smaller gravel from 76 to 77
75	210						
80	205	9	110			CL	(77.5 - 92.55) Clay, sandy, dusky yellowish brown to dark yellowish brown mottled w/ Lt. gray sand seams, scattered lignite,some gravel, very micacreous, more sand between 87 and 92.5
85	200						
90	195	10	110				
95	190						(92.5 - 97) Sand, very fine to fine, Lt. gray w/ dark yellowish brown clay seams, abundant lignite and mica, wet
100	185	11	120			SC	(97 - 105) Sand, very fine to fine, color becoming olive gray to Lt. gray, less lignite and mica, wet
105	180						
110							

Grout
Seal
Sand Pack
0.010 Slotted Screen

09-17-1999 N:\WELL LOGS\ NSAMIDSOUTH\007G22UC.BOR

ENSAFE

BORING LOG of 007G23LF

NSA MIDSOUTH
Millington, TN.

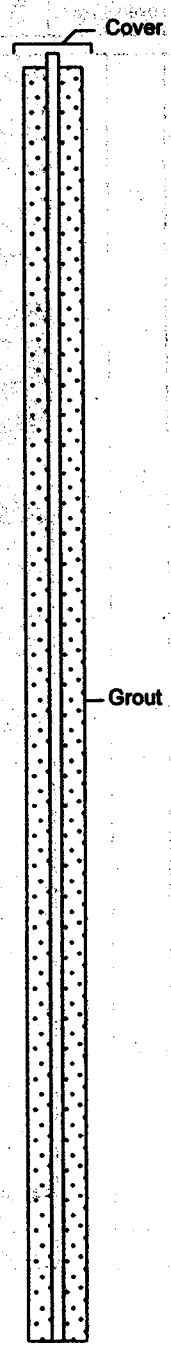
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0915 7/31/98	Northing	: 392728.40
Finished	: 1200 7/31/98	Easting	: 814087.30
Drilling Method	: Rotasonic	TOC Elevation	: 285.89
Drilling Company	: Allinance Drilling	Total Depth	: 85 feet
Geologist	: D. Ladd	Well Screen	: 72 to 82 feet

Depth in Feet	Surf. Elev. 286.15	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	286						(0 - 1.5) Concrete and asphalt
		1	40			CL	(1.5 - 2.5) Clay and silt, olive gray to greenish gray, moist
							(2.5 - 9.5) Silt, moderate yellowish brown mottled w/ olive gray, decrease in olive gray material w/ depth
5	281					ML	
10	276	2	45				(9.5 - 10) Silt, olive gray to greenish gray (10 - 15) No recovery (15 - 19) Clayey silt,olive gray to greenish gray, becoming mottled w/ moderate yellowish brown material near 19, contains roof material at 17, moist
15	271					CL	
20	266	3	85				(19 - 25) Silt, moderate yellowish brown, mottled w/ dark yellowish orange and olive gray, contains organic material, especially near 25
						ML	
25	261						(25 - 36) Clay, silty, olive gray becoming mottled w/ dark yellowish orange and light olive brown material below 31, contains iron-manganese nodules below 31, some Lt. gray material at 36, moist
30	256	4	85				(36 - 42.5) Clay, sandy, moderate yellowish brown to dark yellowish orange mottled w/ Lt. gray, scattered gravel near 42.5, iron-manganese nodules and organic material
35	251					CL	
40	246	5	90				
						SC	
45							

Geoprobe: 007G23LF
Elev.: 285.89



K:\WELL LOGS\ NSAMIDSOUTH\007G23LF.BOR

09

ENSAFE

BORING LOG of 007G23LF

NSA MIDSOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0915 7/31/98	Northing	: 392728.40
Finished	: 1200 7/31/98	Easting	: 814087.30
Drilling Method	: Rotasonic	TOC Elevation	: 285.89
Drilling Company	: Allinance Drilling	Total Depth	: 85 feet
Geologist	: D. Ladd	Well Screen	: 72 to 82 feet

Geoprobe: 007G23LF
Elev.: 285.89

Depth in Feet	Surf. Elev. 286.15	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
45	241						
		6	95			SC	(42.5 - 52) Sand, clay, and gravel, dark yellowish orange, traces of Lt. gray material, higher clay contents and less gravel near top, moist, hard, gravel mostly rounded chert (up to 3/4" dia., iron concretions, less gravel from 46 - 49, poorly sorted, moderate brown to dark reddish brown material from 50 to 52, moist to wet
50	236					CL	(52 - 54) Clay, grayish orange mottled w/ moderate orange pink and grayish orange pink, moist, soft
55	231	7	95			SC	(54 - 55) Sand, very fine to fine, dark yellowish orange, grayish orange clay seams, wet
						CL	(55 - 56) Sand, very fine to fine, dark yellowish orange, micaceous, lignitic, wet
						SC	(56 - 56.5) Clay, grayish orange mottled w/ moderate orange pink and grayish orange pink, moist, soft
						CL	(56.5 - 57.5) Sand, very fine to fine, dark yellowish orange, micaceous, lignitic, wet
60	226					SC	(57.5 - 58) Sand, very fine to fine, dusky yellowish brown mottled w/ dark yellowish orange and Lt. gray, micaceous, highly lignitic, wet
						CL	(58 - 58.5) Clay, grayish orange mottled w/ moderate orange pink and grayish orange pink, moist, soft
65	221	8	90			SC	(58.5 - 61) Sand, very fine to fine, dark yellowish orange, micaceous, lignitic, wet
							(61 - 61.5) Clay, grayish orange to Lt. gray, moist, soft
70	216						(61.5 - 65)Sand, very fine to fine, dark yellowish orange, micaceous, lignitic, wet
							(65 - 66.5) Sand, very fine to fine, w/ scattered gravel, grayish orange to Lt. gray, scattered Lt. gray seams, wet
							(66.5 - 68.5) Sand, gravel and clay, olive gray to very Lt. gray, gravel up to 1" dia., poorly sorted, lignitic, wet
75	211	9	85			SW	(68.5 - 75) Sand, coarse to very coarse,and gravel (mostly chert, up to 2"), dark yellowish orange becoming grayish orange from 71 to 73 w/ less gravel, poorly sorted, highly lignitic, wet
80	206						(75 - 83.5) Sand med. to very coarse, and gravel, dark yellowish orange, gravel up to 3" dia. , mostly rounded qtz and rounded to angular chert, becoming angular near bottom w/ less sand, wet
							(83.5 - 85) Clay, dusky yellowish brown mottled w/ Lt. gray sand seams, highly lignitic, moist
85	201	10	100			CL	Shelby tube sample from 85 to 87.5
90							

09-17-1999 N:\WELL LOGS\ NSAMIDSOUTH\007G23LF.BOR

ENSAFE

BORING LOG of 007G24MF

NSA MIDSOUTH
Millington, TN.

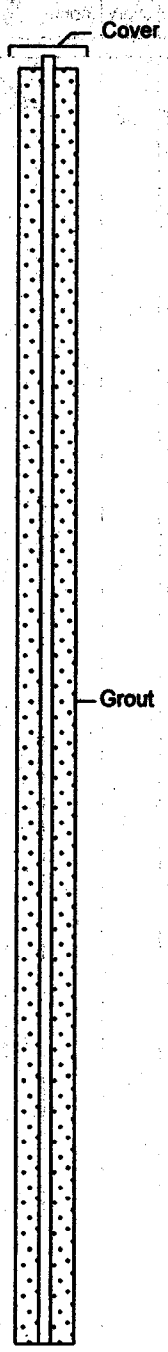
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0915 7/31/98	Northing	: 392815.60
Finished	: 1200 7/31/98	Easting	: 814610.90
Drilling Method	: Rotasonic	TOC Elevation	: 289.06
Drilling Company	: Allinance Drilling	Total Depth	: 95 feet
Geologist	: D. Ladd	Well Screen	: 60 to 70 feet

Depth in Feet	Surf. Elev. 289.31	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	289						(0 -2.5) Asphalt and concrete
		1	60				(2.5 - 9) Silt, moderate yellowish brown mottled w/ some olive gray near top, contains some asphalt at top, dry, hard (9 - 20) No recovery (20 - 25) Silt, dark yellowish orange mottled w/ olive gray, contains organic nodules, micaceous, soft (25 - 35.5) Silt and clay, olive gray to greenish gray, contains abuntant iron-manganese nodules, mottled w/ dark yellowish orange near top, moist (35.5 - 41) Silt and clay, moderate yellowish brown to dark yellowish orange, mottled w/ olive gray to greenish gray, contains organic material and abundant lignite near 41, moist
5	284						
		2	35				
10	279						
15	274						
		3	25			ML	
20	269						
25	264						
		4	95				
30	259						
35	254						
		5	110				
40	249						
						CL	(41 - 46) Clay, silty, w/ scattered gravel, moderate yellowish brown to dark yellowish orange mottled w/ a trace of Lt. gray material, gravel is small rounded chert and qtz., abundant iron concretions, becoming sandy near 45
45	244						
		6	100			SC	
50							

Geoprobe: 007G24MF
Elev.: 289.06



N:\WELL LOGS\ NSA\MIDSOUTH\007G24MF.BOR

ENSAFE

BORING LOG of 007G24MF

NSA MIDSOUTH
Millington, TN.

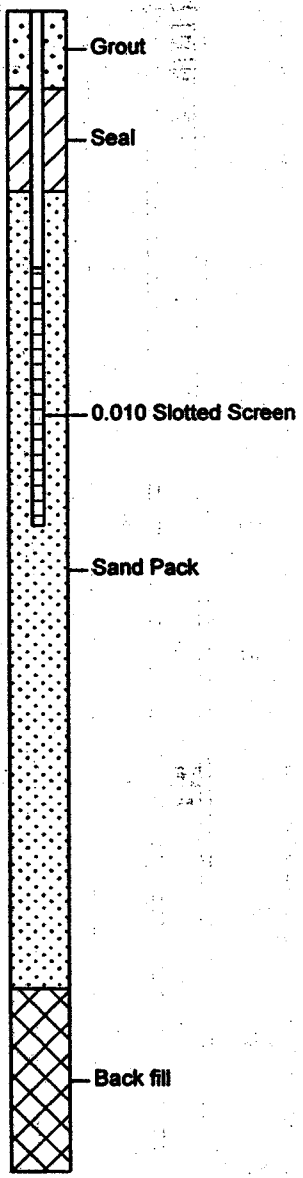
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0915 7/31/98	Northing	: 392815.60
Finished	: 1200 7/31/98	Easting	: 814610.90
Drilling Method	: Rotasonic	TOC Elevation	: 289.06
Drilling Company	: Allinance Drilling	Total Depth	: 95 feet
Geologist	: D. Ladd	Well Screen	: 60 to 70 feet

Geoprobe: 007G24MF
Elev.: 289.06

Depth in Feet	Surf. Elev. 289.31	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
50	239	6	100			SC	(46 - 46.5) Sand, very fine, and clay w/ gravel, moderate brown to reddish brown, very cohesive (46.5 - 52) Sand, fine to med. and clay w/ gravel, dark yellowish orange w/ some Lt. gray material, Gravel up to 2" dia., poorly sorted, abundant iron concretions, mostly Lt. gray near 52
55	234	7	100				(52 - 55) Sand, very coarse and gravel (up to 1 1/2"), dark yellowish orange, some clay content, wet (55 - 65) Sand, very fine to fine, grayish orange to dark yellowish orange, upper 3' of section is mostly grayish orange and contains some Lt. gray, micaceous, lignitic, wet
60	229						
65	224	8	95			SP	(65 - 75) Sand, very fine to fine, grayish orange to dark yellowish orange, mostly grayish orange pink at 66, contains Lt. gray clay seams at 72.5, contains more chert gravel at 74, wet (75 - 85)Sand, very fine to fine, grayish orange, micaceous, lignitic, wet, Several pieces of chert gravel (up to 3/4" dia.) at 84 and 85 (85 - 88.5) Sand, very coarse and gravel, dark yellowish orange, gravel mostly angular to rounded chert (up to 2 1/2" dia.), wet, poorly sorted
70	219						
75	214	9	95				
80	209						
85	204	10	100			CL	(88.5 - 95) Clay, sandy, dusky yellowish brown, becomes mottled w/ Lt. gray, very fine sand seams below 92, micaceous, lignitic
90	199						
95	194						
100							



09-17-1999 N:\WELL LOGS\ NSAMIDSOUTH\007G24MF.BOR

ENSAFE

BORING LOG of 007G25MF

NSA MIDSOUTH
Millington, TN.

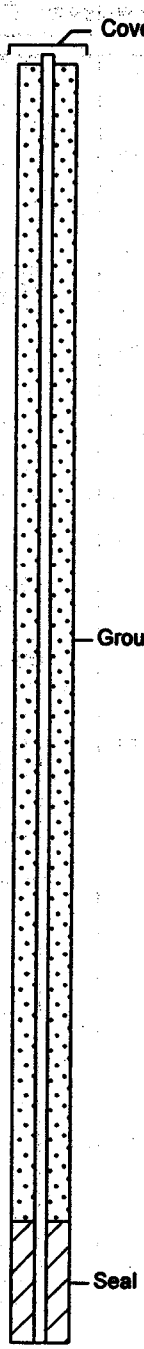
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0945 8/3/98	Northing	: 392888.00
Finished	: ------ 8/3/98	Easting	: 814789.90
Drilling Method	: Rotasonic	TOC Elevation	: 289.97
Drilling Company	: Allinance Drilling	Total Depth	: 81.50 feet
Geologist	: B. Brantley	Well Screen	: 71.5 to 81.5 feet

Depth in Feet	Surf. Elev. 290.30	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	290	1	70				(0 - 1.5) Concrete (1.5 - 2) Sand, gravel subgrade
5	285						(2 - 3) Lt. olive gray silt mixed w/ greenish gray silt, dry, hard (3 - 7.5) Dark yellowish brown to moderate yellowish brown silt, dry, hard
10	280	2	40				(7.5 - 9) Lt. olive gray and moderate yellowish brown silt, dry, hard, manganese inclusions from 8.5 to 9 (9 - 15) No recovery
15	275						(15 - 19) Dark yellowish orange w/ Lt. olive grey and yellowish grey silt, manganese and iron streaks throughout, moist, med. stiff (19 - 25) No recovery (25 - 29) Pale yellowish to dark yellowish brown silt w/ scattered manganese and iron staining
20	270	3	40			ML	(29 - 35) No recovery Driller uncertain whether loss of recovery at top or bottom of each run w/ loss. Loss has been assumed to be at bottom of run (35 - 38.5) Moderate yellowish brown clayey silt w/ dark yellowish orange and med. Lt. gray clayey silt.
25	265						
30	260	4	40				
35	255						
40	250	5	105			CL ML	(38.5 - 40) Lt. bluish grey clay lenses streaked in moderate yellowish brown clayey silt w/ dark yellowish orange and med. Lt. gray clayey silt.
45	245					CL	(40 - 42) Moderate yellowish brown clayey silt w/ dark yellowish orange and med. Lt. gray clayey silt. (42 - 47.5) Moderate yellowish brown sandy clay w/ Lt. olive gray streaks and iron staining, dry, hard to stiff, scattered chert gravel from 42 to 45, increasingly sandy and greater gravel contents from 45 to 47.5
50	240	6	85			GC SM	(47.5 - 52.5) Lt. brown clay, sand, gravel mixture w/ abundant iron staining, cementicious in sections to very hard
55	235						(52.5 - 53.5) Dark yellowish orange silty fine sand, moderate red w/ yellowish gray clay at 53 (3" thick)
60	230	7	85			SP	(53.5 - 61) Lt. gray fine sand w/ Lt. gray clay lense 4" thick between 53.5 to 55, moderate red w/ yellowish gray clay at 55 (12" thick) and 1" thick Lt. gray seams at 56 and 58 (61 - 65) Dark yellowish orange to grayish orange fine sand w/ Lt. gray fine sand
65							

Geoprobe: 007G25MF
Elev.: 289.97



N:\WELL LOGS\ NSAMIDSOUTH\007G25MF.BOR

ENSAFE

BORING LOG of 007G25MF

NSA MIDSOUTH
Millington, TN.

Location: AOCA/SWMU 7
Project #: CTO 0094

Started	: 0945 8/3/98	Northing	: 392888.00
Finished	: ------ 8/3/98	Easting	: 814789.90
Drilling Method	: Rotasonic	TOC Elevation	: 289.97
Drilling Company	: Allinance Drilling	Total Depth	: 81.50 feet
Geologist	: B. Brantley	Well Screen	: 71.5 to 81.5 feet

Geoprobe: 007G25MF
Elev.: 289.97

Depth in Feet	Surf. Elev. 290.30	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
65	225					CL	(65.5 - 69) Dark yellowish orange to grayish orange fine sand w/ Lt. gray fine sand (69 - 76) Grayish orange fine micaceous sand w/ scattered chert gravel, lignite grains within sand
70	220	8	85			SP	
75	215					CL	(76 - 77) Yellowish grey to grayish orange clay seam (77 - 92) Grayish orange fine micaceous sand w/ scattered chert gravel, lignite grains within sand
80	210	9	80			SP	
85	205						
90	200	10	90			GW	(92 - 96) Lt. brown and dark yellowish orange sandy gravel (up to 2" dia.), poorly sorted, sand fine to very corase
95	195					SM	(96 - 101) Yellowish gray to olive gray fine silty sand (101 - 105) Lt. gray to grayish orange fine sand, lignitic and micaceous, few scattered chert gravel at 103
100	190	11	80				
105	185					SP	(105 - 107) Yellowish gray fine sand w/ dark yellowish orange sand seam at 107
110	180	12	85				(107 - 109) Grayish orange fine sand w/ Lt. gray clay seams 1/8" to 1/4" thick (109 - 115) Lt. gray fine sand w/ Lt. gray clay seams (115 - 124) Lt. gray fine sand w/ grayish orange fine sand
115	175						
120	170	13	90				
125	165					SM	(124 - 125) Pale brown and dark yellowish brown silty sand, lignite at bottom of run
		14	100			SC	(125 - 127) Shelby tube pushed from 125 to 127, bottom contains lignite within a clay matrix
130							

Seal
Sand Pack
0.010 Slotted Screen
Hole collapsed

09-17-1999 N:\WELL LOGS\ NSAMIDSOUTH\007G25MF.BOR

ENSAFE

BORING LOG of 007G26MF

NSA MIDSOUTH
Millington, TN.

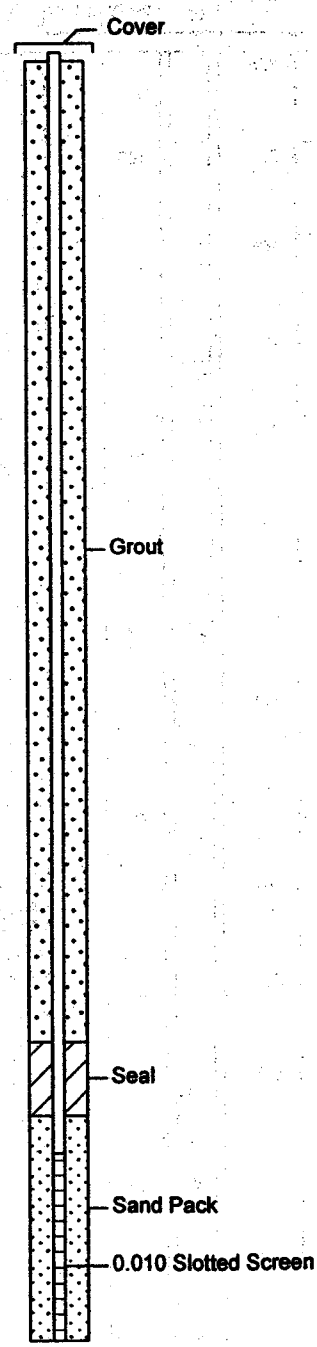
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1455 8/2/98	Northing	: 392954.10
Finished	: 1645 8/2/98	Easting	: 814922.50
Drilling Method	: Rotasonic	TOC Elevation	: 290.13
Drilling Company	: Allinance Drilling	Total Depth	: 70 feet
Geologist	: B. Brantley	Well Screen	: 60 to 70 feet

Depth in Feet	Surf. Elev. 290.40	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	290						(0 - 2) Concrete w/ sand and gravel subgrade
		1	100	Bkg			(2 - 5) Moderate yellowish brown silt, very stiff to hard (5 - 7) Moderate yellowish brown silt mixed w/ olive gray silt, contains wood fragments, very stiff to hard (7 - 15) Dark yellowish orange silt mixed w/ olive gray silt w/ iron and manganese inclusions (15 - 19.5) Lt. olive gray clayey silt w/ iron streaks, moist to wet, med. stiff (19.5 - 20.5) Moderate yellowish brown clayey silt w/ Lt. gray clayey silt w/ manganese (20.5 - 25) Dark yellowish orange clayey silt w/ Lt. olive gray clayey silt, iron streaks throughout, slightly moist, more stiffer (25 - 33) Moderate yellowish brown clayey silt, moist, stiff (33 - 35) Moderate yellowish brown and Lt. olive gray clayey silt w/ iron staining, moist, stiff (35 - 42) Moderate yellowish brown and Lt. olive gray clayey silt w/ iron staining, moist, stiff to hard, manganese inclusions from 35 to 37, pebbles scattered from 40 to 42
5	285						
		2	40	Bkg			
10	280						
15	275						
		3	90	0.4		ML	
20	270						
25	265						
		4	75	0.2			
30	260						
35	255						
		5	100	0.2			
40	250						
						CL	(42 - 44) Dark yellowish orange sandy silty clay steaked w/ Lt. gray, pebbles scattered throughtout (1/4" to 1/2" dia.), dry, stiff
45	245					SC	
							(44 - 45) Dark yellowish orange clayey sand w/ pebbles scattered throughout, moist, med. stiff (45 - 46) Dark yellowish orange clayey sand w/ gravel scattered throughout, moist, med. stiff (46 - 47) Moderate reddish brown cemented mixture of clay, sand, pebbles and gravel
50	240	6	95	Bkg		SM	
55	235					CL	(47 - 54) Grayish orange to dark yellowish orange silty fine sand
							(54 - 55) Moderate red clay mixed w/ dark yellowish orange and yellowish gray silty fine sand
60	230	7	85	0.2		SP	(55 - 70) Grayish orange fine sand mixed w/ dark yellowish orange and yellowish gray fine sand (micaceous), moderate red to Lt. red w/ pinkish gray clay seams at 56.5, 57.5, 58, 60, 61, and 63, seams range between 1" and 4" thick, few scattered gravel (up to 1/2" dia.) near 66
65	225						
		8	60	Bkg			
70							

Geoprobe: 007G26MF
Elev.: 290.13



ENSAFE

BORING LOG of 007G27LF

NSA MIDSOUTH
Millington, TN.

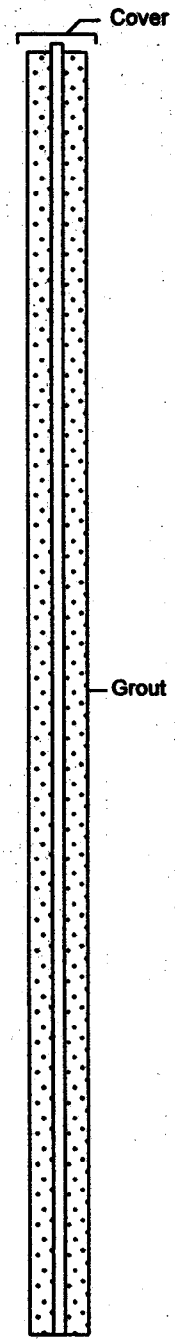
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0800 7/20/98	Northing	: 392553.50
Finished	: 1600 7/20/98	Easting	: 812680.90
Drilling Method	: Rotasonic	TOC Elevation	: 276.77
Drilling Company	: Allinance Drilling	Total Depth	: 117 feet
Geologist	: D. Ladd	Well Screen	: 107 to 117 feet

Geoprobe: 007G27LF
Elev.: 276.77

Depth in Feet	Surf. Elev. 276.86	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	276	1	90			ML	(0 - 5) Silt, clayey, moderate yellowish brown mottled w/ a little Lt. olive gray, especially at 4, contains roots and organic material
5	271	2	100				(5 - 7) Silt, clayey, moderate yellowish brown mottled w/ a little Lt. olive gray, contains roots and organic material, iron-manganese nodules
10	266	3	80				(7 - 17) Silt, very clayey, moderate yellowish brown mottled w/ less Lt. olive gray, abundant organic material
15	261						(17 - 23) Silt, very clayey, moderate yellowish brown mottled w/ Lt. olive gray, abundant organic material
20	256	4	65				(23 - 27) Silt, olive gray w/ iron-manganese nodules
25	251						(27 - 36) Silt, olive gray to Lt. olive gray w/ abundant iron-manganese nodules below 30, becoming mottled w/ moderate yellowish brown and Lt. olive brown material from 32 to 36, very dry and hard near 36
30	246	5	100				(36 - 41) Silt, moderate yellowish brown to dark yellowish orange, containing iron-manganese nodules, dark yellowish brown and olive gray material becoming slightly sandy from 37 to 41
35	241						
40	236	6	80			CL	(41 - 46) Clay, silt and sand, very fine, moderate yellowish brown mottled w/ dark yellowish orange and Lt. gray, Lt. gray is mostly clay, contains iron-manganese nodules, moist
45	231					SC / CL	(46 - 47) Sandy, very fine, and clay, Lt. gray, moist
50	226	7	90	0.2		SW / SP / SC	(47 - 48) Clay, silt, sand, very fine, and gravel (up to 1/2" dia.), moderate yellowish brown mottled w/ Lt. gray and dark yellowish orange
55	221						(48 - 49.5) Sand, fine to med., and gravel (up to 1/4"), very pale orange, some moderate yellowish brown clay, wet
60	216	8	85			SP	(49.5 - 50.5) Sand , fine, dark yellowish orange mottled w/ Lt. gray, some gravel at 50.5, wet
65	211	9	65				(50.5 - 55) Sand, very fine, clayey, Lt. brownish gray, becoming mottled w/ dark yellowish orange and sand becoming coarser near 55
70							



09-17-1999 N:\WELL LOGS\ NSA\MIDSOUTH\007G27LF.BOR

ENSAFE

BORING LOG of 007G27LF

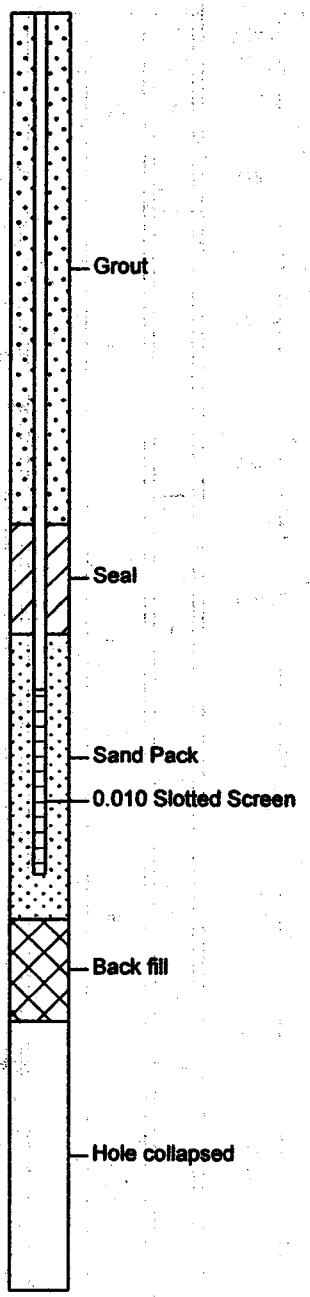
NSA MIDSOUTH
Millington, TN.

Location: AOCA/SWMU 7
Project #: CTO 0094

Started	: 0800 7/20/98	Northing	: 392553.50
Finished	: 1600 7/20/98	Easting	: 812680.90
Drilling Method	: Rotasonic	TOC Elevation	: 276.77
Drilling Company	: Allinance Drilling	Total Depth	: 117 feet
Geologist	: D. Ladd	Well Screen	: 107 to 117 feet

Geoprobe: 007G27LF
Elev.: 276.77

Depth in Feet	Surf. Elev. 276.86	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
70	206	9	65			SW	(70 -77) Sand, very fine to fine, dark yellowish orange, contains gravel seams w/ coarse to very coarse sands at 74 and 75, otherwise contains trace of gravel throughout, trace of clay seams, ferrigenous sand zone at 74, wet
75	201						(77 - 82) Sand, very fine to fine, mostly grayish orange w/ a corase dark yellowish orange gravelly zone at 79, traces of scattered gravel throughout
80	196	10	90			SP	(82 - 86.5) Sand, coarse to very coarse and gravelly, (up to 2"), dark yellowish orange to grayish orange, ferrigenous sandy zone near 85, gravel is chert and qtz, wet
85	191					GP	
						SP	(86.5 - 87) Gravel (up to 3" dia.), contains a little sand
90	186	11	70			GP	(87 - 88) Sand, very coarse and gravelly, dark yellowish orange, gravel is fine (up to 1/8"), wet
						SP	
						GP	(88 - 91) Gravel (up to 2 1/2") and sand, very coarse, dark yellowish orange, little sand content, poorly sorted, wet
95	181					SP	(91 - 92) Sand, very coarse and gravel (up to 1/2"), dark yellowish orange, rounded to angular qtz and chert, wet
100	176	12	75	0.4			(92 - 92.5) Gravel up to 2 1/2" dia., scattered sand, rounded to angular qtz and chert, wet
							(92.5 - 93) Sand, very fine, dark yellowish orange, one piece of chert gravel 2" dia.
105	171					SC	(93 - 97) Gravel and sand, very coarse, dark yellowish brown to dark yellowish orange, chert and qtz, rounded to angular, up to 1 1/2", wet
110	166	13	85				(97 - 98) Sand, very coarse, and gravel (up to 1") , dark yellowish orange, poorly sorted, wet
							(98 - 107) Sand, very coarse, and gravel (up to 3"),clayey, dark yellowish orange to grayish orange, color becoming darker near 107
115	161						(107 - 117) Sand, very coarse, and gravel (up to 2"),clayey, dark yellowish orange to grayish orange, Lt gray clay seam at 111, traces of red iron staining, becomes darker in color and silty from 115 to 117
120	156	14	85			CL	(117 - 125) Clay, sand, fine to very coarse, gravel (up to 1 1/2"), dusky yellowish brown to dark yellowish brown, clay seams throughout, very lignitic, slightly micaceous, wet
125	151					GW	(125 - 127) Gravel (up to 1 1/2") and sand, very coarse, dark yellowish orange silty, dusky yellowish brown to dark yellowish brown clay near 127, wet
130	146	15	100				(127 - 128) Gravel and sand, dusky yellowish brown to dark yellowish brown,wet
135	141					CL	(128 - 139.5) Clay, dusky yellowish brown to dark yellowish brown w/ some Lt. gray sand seams scattered through upper 5 feet, abundant lignite, especially near 128, micaceous, stiff to very hard
140		16	100				



N:\WELL LOGS\ NSAMIDSOUTH\007G27LF.BOR
09-17-1

ENSAFE

BORING LOG of 007G28LF

NSA MIDSOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1345 7/17/98	Northing	: 393309.60
Finished	: 1630 7/17/98	Easting	: 813467.30
Drilling Method	: Rotasonic	TOC Elevation	: 281.91
Drilling Company	: Allinance Drilling	Total Depth	: 80.5 feet
Geologist	: D. Ladd	Well Screen	: 70.5 to 80.5 feet

Depth in Feet	Surf. Elev. 281.87	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	281					FILL	(0 - 3) Asphalt, clay, red sand, pebbles, lost first 1 - 2 feet
5	276	1	50			CL	(3 - 7,5) Clay and silt, moderate yellowish brown, some olive gray material, stiff
10	271	2	75			ML	(7.5 - 12) Silt, olive gray to greenish gray, traces of root material
						CL	(12 - 14) Clay, dark yellowish brown to dusky yellowish brown, stiff
15	266					ML	(14 - 17) Silt, olive gray to greenish gray, iron-manganese nodules (17 - 27) Silt, clayey, moderate yellowish brown mottled w/ dark yellowish orange and olive gray, iron-manganese nodules
20	261	3	95				(27 - 36) Silt, clayey, moderate yellowish brown mottled w/ dark yellowish orange and olive gray, iron-manganese nodules, becoming more clayey w/ more olive gray material, Lt. olive brown and Lt. gray material near bottom
25	256						(36 - 37) Slightly silt, clayey, Lt. olive brown w/ traces of Lt. gray, dry, hard
30	251	4	85				
35	246						
40	241	5	100			CL	(37 - 50.5) Clay, silt, and sand, very fine, dark yellowish orange, becomes progressively sandier w/ depth, becomes mottled w/ Lt. gray sand below 41, and contains olive gray clay from 41 to 41.5, moist
45							

Geoprobe: 007G28LF
Elev.: 281.91
Cover

Grout

09-17-1999 N:\WELL LOGS\ NSAMIDSOUTH\007G28LF.BOR

ENSAFE

BORING LOG of 007G28LF

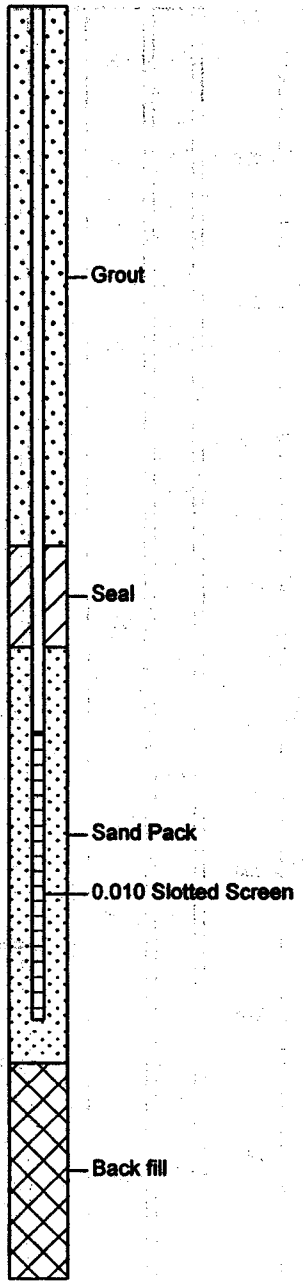
NSA MIDSOUTH
Millington, TN.

Location: AOCA/SWMU 7
Project #: CTO 0094

Started	: 1345 7/17/98	Northing	: 393309.60
Finished	: 1630 7/17/98	Easting	: 813467.30
Drilling Method	: Rotasonic	TOC Elevation	: 281.91
Drilling Company	: Allinance Drilling	Total Depth	: 80.5 feet
Geologist	: D. Ladd	Well Screen	: 70.5 to 80.5 feet

Depth in Feet	Surf. Elev. 281.87	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
45	236	5	100			CL	
50	231	6	100			SW	(50.5 - 53) Sand, med to coarse and gravel (up to 1" dia.), grayish orange, poorly sorted, rounded to angular, wet, Lt. gray material at top
55	226					SP	(53 - 56) Sand, coarse to very coarse, w/ scattered small gravel, very pale orange to grayish orange, wet (56 - 57.5) Sand, coarse to very coarse, moderate yellowish brown to dark yellowish orange, w/ some Lt. gray clayey material, gravel up to 3/4" dia from 56 to 57 and 3" dia. from 57 to 57.5, wet
60	221	7	100			GP	(57.5 - 59) Gravel w/ scattered sand, gravel 1/2" dia. at top and increasing to 2 1/2" dia. near 59
65	216					SP	(59 - 72) Sand, coarse to very coarse, dark yellowish orange, gravel up to 2" dia. (72 - 77) No recovery (77 - 81) Sand, coarse to very coarse, dark yellowish orange, gravel up to 2" dia., lignitic sand grains
70	211	8	50				
75	206						
80	201	9	100			CL	(81 - 89.5) Clay, slightly sandy, dusky yellowish brown to dark yellowish brown mottled w/ Lt. gray sandy seams, micaceous, slightly lignitic, stiff Bottom of boring at 87, shelby tube sample taken from 87 to 89.5
85	196						
90		10	90				

Geoprobe: 007G28LF
Elev.: 281.91



ENSAFE

BORING LOG of 007G29LF

NSA MIDSOUTH
Millington, TN.

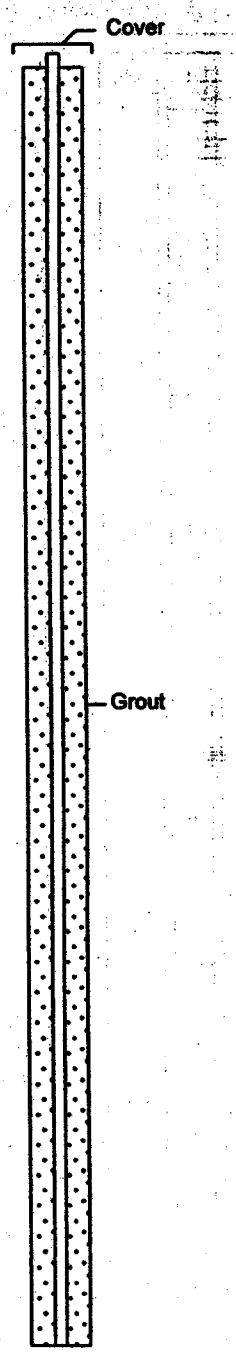
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1050 7/16/98	Northing	: 393384.30
Finished	: 1615 7/16/98	Easting	: 813584.00
Drilling Method	: Rotasonic	TOC Elevation	: 282.29
Drilling Company	: Allinance Drilling	Total Depth	: 80 feet
Geologist	: D. Ladd	Well Screen	: 70 to 80 feet

Geoprobe: 007G29LF
Elev.: 282.29

Depth In Feet	Surf. Elev. 283.37	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	283	1	100				(0 - 1) Asphalt (1 - 4) Silt, clayey, moderate yellowish brown, organic material and roots, stiff (4 - 5) Silt, clayey, moderate yellowish brown, organic material and roots, stiff, contains asphalt from 4 to 4.5
5	278	2	100				(5 - 9.5) Silt, olive gray, dry, becoming clayey between 7 and 9.5 (9.5 - 17) Silt, clayey, moderate yellowish brown mottled w/ olive gray and dark yellowish orange, mostly olive gray material from 11 to 15, iron-manganese nodules and organic material (17 - 25) Silt, clayey, moderate yellowish brown mottled w/ olive gray and dark yellowish orange, becoming moist and containing less iron-manganese nodules and organic material, color becomes mostly olive gray near bottom
10	273	3	75				
15	268					ML	
20	263	4	85				
25	258						(25 - 27) Clay, olive gray, contains traces of organic material and iron-manganese nodules (27 - 33) Clay and silt, moderate yellowish brown mottled w/ olive gray, some drk yellowish orange staining, mostly olive gray near 33
30	253	5	100			CL	
35	248					ML	(33 - 35) Silt, moderate yellowish brown mottled w/ Lt. gray, numerous iron-manganese nodules (35 - 37) Silt, Lt. olive brown w/ traces of iron-manganese nodules
40	243	6	100			CL	(37 - 39) Clay, silty, moderate yellowish brown mottled w/ dark yellowish orange and abundant organic streaks, sandy near 39 (39 - 46) Clay, sand, fine, and silt, dark yellowish orange to moderate yellowish brown, Lt. gray to pale yellowish gray material from 44 to 46, pale yellowish gray seam at 46
45							



09-17-1999 N:\WELL LOGS\ NSA\MIDSOUTH\007G29LF.BOR

ENSAFE

BORING LOG of 007G29LF

NSA MIDSOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1050 7/16/98	Northing	: 393384.30
Finished	: 1615 7/16/98	Easting	: 813594.00
Drilling Method	: Rotasonic	TOC Elevation	: 282.29
Drilling Company	: Allinance Drilling	Total Depth	: 80 feet
Geologist	: D. Ladd	Well Screen	: 70 to 80 feet

Geoprobe: 007G29LF
Elev.: 282.29

Depth in Feet	Surf. Elev. 283.37	SAMPLES	% Rec-overy	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
45	238	6	100			CL	
						SC	(46 - 48) Sand, med. to coarse, and clay, dark yellowish orange mottled w/ Lt. gray, some organic streaks between 47 and 48
						SP	(48 - 50) Sand, coarse, and scattered gravel (up to 1/2" dia.), abundant iron staining
50	233	7	100			SC	(50 - 55) Sand, fine, clayey, Lt. olive gray (sand) and olive gray (clayey material), becomes mottled w/ pale orange material near 55, some iron staining near 55
55	228						(55 - 56.5) Sand, fine tovery fine, slightly clayey, Lt. gray becoming mottled w/ pale orange near 56.5, some iron staining, slightly lignitic and micaceous
						SW	(56.5 - 58) Sand, med to very coarse, dark yellowish orange, wet, gravel (up to 1 1/2" dia.) between 57 and 58, some iron staining
						SC	(58 - 59.5) Sand, very fine to fine, dark yellowish orange to very pale orange, slightly clayey, lignitic, wet
60	223	8	100			SP	(59.5 - 67) Sand, coarse to very coarse, and gravel (up to 2"), mostly chert, poorly sorted, dark yellowish orange, wet
65	218						(67 - 77) Sand, coarse to very coarse, and gravel (up to 2"), chert and qtz.,rounded to angular, poorly sorted, dark yellowish orange, wet, dark yellowish orange and black sand grains in a 3" zone at 69
70	213	9	100				(77 - 79.5) Sand, coarse to very coarse, and gravel (up to 2 1/2"), chert and qtz.,rounded to angular, poorly sorted, dark yellowish orange, wet, some dusky yellowish brown material near 79.5
75	208						
80	203	10	100				(79.5 - 89.5) Clay, slightly silty, dusky yellowish brown to dark yellowish brown mottled w/ Lt. gray very fine sand seams, predominate sand seams at 85 and 86, very micaceous, scattered lignite, stiff
85	198	11	0			CL	Bottom of boring at 87, shelby tube taken at 87 - 89.5, no recovery
90							

Grout
Seal
0.010 Slotted Screen
Sand Pack
Back fill

09-1...\WELL LOGS\ NSAMIDSOUTH\007G29LF.BOR

ENSAFE

BORING LOG of 007G30LF

NSA MIDSOUTH
Millington, TN.

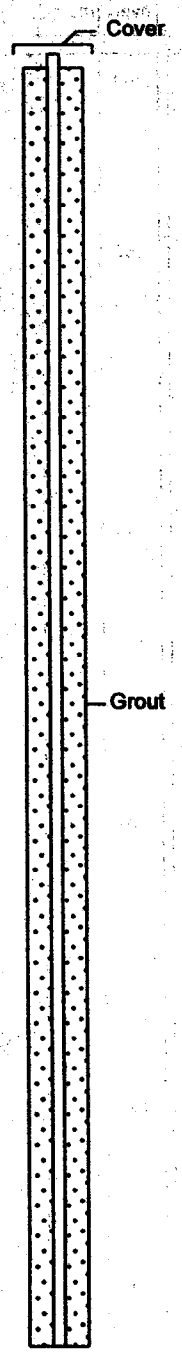
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1130 7/15/98	Northing	: 393468.20
Finished	: 1730 7/15/98	Easting	: 813714.30
Drilling Method	: Rotasonic	TOC Elevation	: 282.99
Drilling Company	: Allinance Drilling	Total Depth	: 80 feet
Geologist	: D. Ladd	Well Screen	: 70 to 80 feet

Depth in Feet	Surf. Elev. 283.07	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	283						(0 - 1) Asphalt
		1	60				(1 - 5) Silt, clayey, moderate yellowish brown, roots and some asphalt material (5 - 10) no recovery (10 - 12.5) Silt, clay, Lt. olive gray mottled w/ some moderate brown, moist (12.5 - 15) Silt, clayey, moderate yellowish brown mottled w/ dark yellowish orange and Lt. olive gray, some organic material, traces of iron-manganese nodules (15 - 19) No recovery (19 - 22) Silt, very clayey, moderate yellowish brown mottled w/ very little dark yellowish orange, very moist (22 - 28) Silt, clayey, olive gray to greenish gray mottled w/ moderate yellowish brown from 25 to 28, moist (28 - 33) Silt, slightly clay, moderate yellowish brown w/ dark yellowish orange streaks, some reddish brown streaks at 33 (33 - 37.5) Clay, silty, olive gray mottled w/ moderate yellowish brown and dark yellowish orange, stiff, slightly sandy and lignitic near bottom
5	278						
10	273	2	40				
15	268						
20	263	3	40			CL	
25	258						
30	253	4	50				
35	248						
40	243	5	110			ML	(37.5 - 42.5) Silt, sand, fine to very fine, and clay, moderate yellowish brown mottled w/ dark yellowish orange and olive gray, some organic material
						SC	
45							

Geoprobe: 007G30LF
Elev.: 282.99



09-17-1999 N:\WELL LOGS\ NSAMIDSOUTH\007G30LF.BOR

BORING LOG OF 007G20LF

NSA MID-SOUTH
Millington, TN.

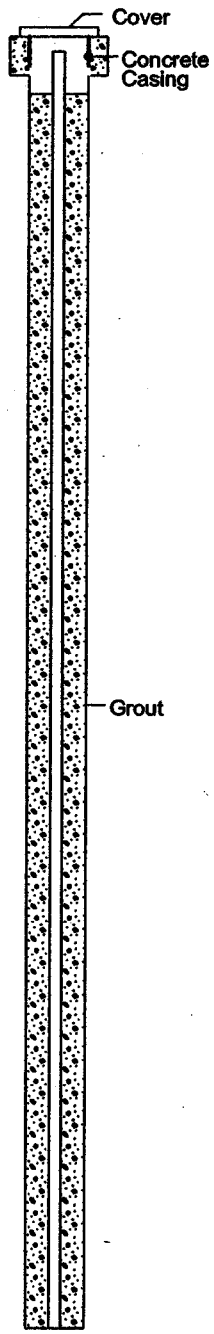
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1055 7/13/98	Northing	: 392485.90
Finished	: 1800 7/13/98	Easting	: 813486.00
Drilling Method	: Rotasonic	TOC Elevation	: 282.70
Drilling Company	: Alliance Drilling	Total Depth	: 85 feet
Geologist	: B. Brantley	Well Screen	: 65 to 75 feet

Depth in Feet	Surf. Elev. 282.82	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	282						(0 - 1) Concrete, Asphalt mixed w/ sand (subgrade)
		1	60				(1 - 5) Dark yellowish brown mottled w/ med. Lt. gray clayey silt, dry, diesel odor (5 - 6) Med. brown to med. yellow brown silt, friable, hard
5	277						(6 - 9) Olive gray clayey silt, moist
10	272	2	80				(9 - 21) Med. yellowish brown mottled w/ Lt. gray silt, moist Lignite grains scattered throughout
15	267						
20	262	3	85			ML	(21 - 25) Med. yellow brown w/ iron staining and Lt. olive gray mottles lenses silt, very moist
25	257						(25 - 42.5) Pale yellow brown to Lt. olive gray clayey silt w/ iron stains, moist, med. stiff Slightly sandy (very fine) and iron-manganese partings between 36 and 41,
30	252	4	70				
35	247						
40	242	5	100			SC	
45							

Well: 007G20LF
Elev.: 282.70



ENSAFE

BORING LOG OF 007G20LF

NSA MID-SOUTH
Millington, TN.

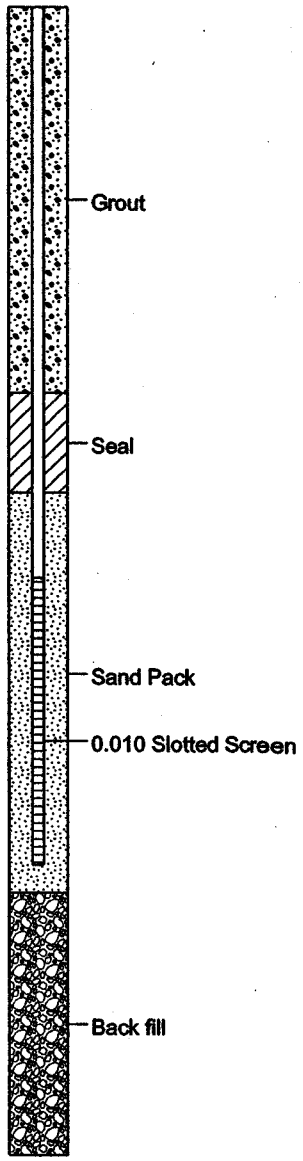
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1055 7/13/98	Northing	: 392485.90
Finished	: 1800 7/13/98	Easting	: 813486.00
Drilling Method	: Rotasonic	TOC Elevation	: 282.70
Drilling Company	: Alliance Drilling	Total Depth	: 85 feet
Geologist	: B. Brantley	Well Screen	: 65 to 75 feet

Depth in Feet	Surf. Elev. 282.82	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
45	237						
50	232	6	100			SC	(42.5) Lt. brown to med. brown clayey gravel sand mix w/ iron staining, very hard (42.5 - 47) Dark yellowish orange mottled w/ Lt. gray clayey very fine to fine sand w/ scattered pebbles (47 - 48) Med. gray clayey sand (48 - 52) Lt. brown to med yellow brown gravelly sand w/ clay, very stiff to hard, Gravels include both chert (up to 1/2") and Qtz. (up to 1")
55	227	7	80			SW	(52 - 55) Grayish orange med. sand w/ scattered gravel (up to 3/4") (55 - 55.5) Chert gravel w/ coarse sand (55.5 - 65) Dark yellowish orange med. coarse sand w/ gravel, coarser sand w/ less fines between 63 and 65
60	222						
65	217	8	80			GW	(65 - 74) Med. yellow brown coarse to med grained sandy gravel (up to 3" dia.)
70	212						
75	207					SM	(74 - 75) Gravelly silt w/ fine sand (75 - 76) Dark yellowish orange clay with some gravel
80	202	9	110			SC	(76 - 77) Dark yellowish orange mottled w/ Lt. olive gray clay, some silt (77 - 85) Dusky brown to dusky yellow brown clay w/ some silty lenses, micaceous w/ some patches of very fine sand
85	197						
90							

Well: 007G20LF
Elev.: 282.70



07-28-2003 N:\well logs\NSA\Midsouth\007G20LF.BOR

ENSAFE

BORING LOG OF 007G21LF

NSA MID-SOUTH
Millington, TN.

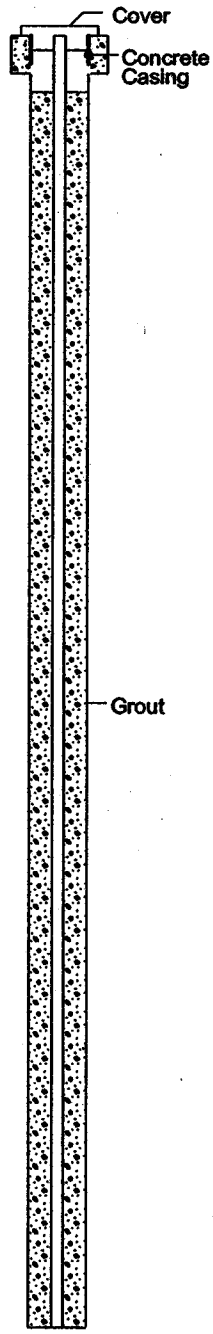
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0840 7/14/98	Northing	: 392560.30
Finished	: 1415 7/14/98	Easting	: 813673.00
Drilling Method	: Rotasonic	TOC Elevation	: 2283.66
Drilling Company	: Alliance Drilling	Total Depth	: 75 feet
Geologist	: B. Brantley	Well Screen	: 65 to 75 feet

Depth in Feet	Surf. Elev. 283.95	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	283						(0 -1) Concrete w/ sand gravel subgrade
		1	80				(1 - 6) Med. to dark yellowbrown silt, dry, hard Greenish gray staining and diesel odor from 2.5 to 3
5	278						(6 - 8.5) Olive gray to med yellow brown clayey silt w/ manganese stains and streaks
		2	35				(8.5 - 15) No recovery
10	273						
15	268					ML	(15 - 28) Dark yellow orange streaked w/ med. yellow brown clayey silt, moist, med. stiff, manganese streaks scattered throughout
20	263	3	85				
25	258						
30	253	4	75				(28 - 32) Pale yellow brown clayey silt w/ iron stains/streaks, moist, med. stiff
							(32 - 32.5) Olive gray clayey silt
							(32.5 - 35) No recovery
35	248						(35 - 37) Med. yellow brown silty clay w/ Lt. gray streaking, moist, med. stiff (37 - 41.5) Med. brown to med yellow brown sandy clay w/ Lt. gray streaks, med. stiff
40	243	5	100			CL	
							(41.5 - 47) Med. yellow brown and Lt. gray sandy clay Streaks of organic material between 41.5 and 42.5
45							

Well: 007G21LF
Elev.: 283.66



ENSAFE

BORING LOG OF 007G21LF

NSA MID-SOUTH
Millington, TN.

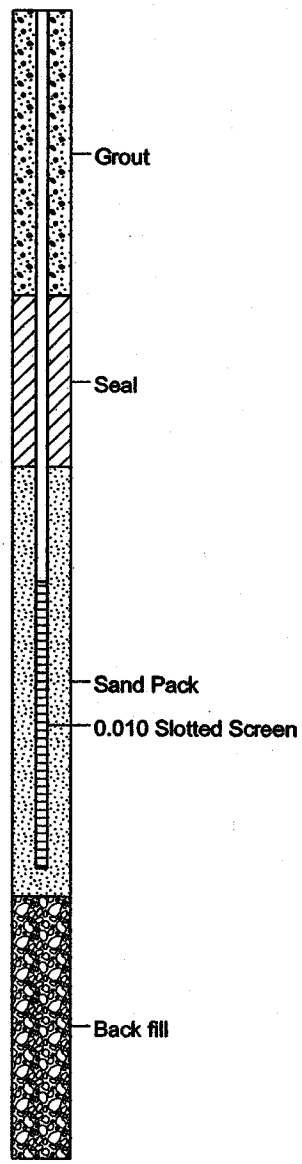
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0840 7/14/98	Northing	: 392560.30
Finished	: 1415 7/14/98	Easting	: 813673.00
Drilling Method	: Rotasonic	TOC Elevation	: 2283.66
Drilling Company	: Alliance Drilling	Total Depth	: 75 feet
Geologist	: B. Brantley	Well Screen	: 65 to 75 feet

Depth in Feet	Surf. Elev. 283.95	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
45	238					CL	
						SM	(47 - 48) Med. yellow brown and Lt. olive gray silty sand w/ scattered pebbles
50	233	6	90			SW	(48 - 55) Dark yellowish orange med. to corase gravelly sand w/ Lt. gray streaks and iron staining, Gravel up to 1 1/2" dia.
55	228						(55 - 61) Dark yellowish orange med. to coarse sandy gravel, wet
60	223	7	100			GM	(61 - 65) Med brown to dark yellow brown med. to coarse sand and silt w/ gravel (up to 3" dia.), wet
65	218						(65 - 70) No recovery
70	213	8	65			GM	(70 - 71) Gravel, chert, up to 2" dia., wet (71 - 74.5) Dark yellowish orange sandy gravel w/ pale yellowish orange seam at 74, wet
75	208					CL	(74.5 - 75) Dusky yellow brown clay, micaceous
						GC	(75 - 77) Med. brown sandy clay mottled w/ dusky yellow brown, dark yellow brown and dark orange w/ gravel up to 2" dia.
80	203	9	105			CL	(77 - 85) Dusky yellowish brown clay mottled w/ Lt. gray very fine to fine sand seams, lignitic material scattered throughout, (more Lt. gray sand between 83 and 85)
85	198	10	100				(85 - 87) No recovery (shelby tube broke off in hole)
90							

Well: 007G21LF
Elev.: 283.66



07-28-2003 N:\well logs\NSAMidsouth\007G21LF.BOR

ENSAFE

BORING LOG OF 007G22LF

NSA MID-SOUTH
Millington, TN.

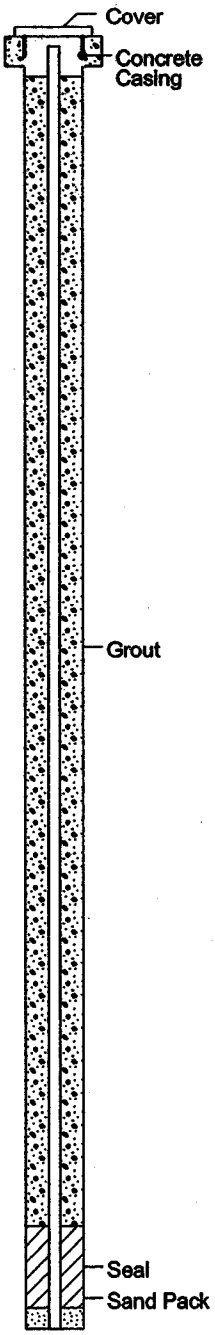
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1315 7/18/98	Northing	: 392658.10
Finished	: 0935 7/19/98	Easting	: 813905.90
Drilling Method	: Rotasonic	TOC Elevation	: 284.86
Drilling Company	: Alliance Drilling	Total Depth	: 77.5 feet
Geologist	: D. Ladd	Well Screen	: 67.5 to 77.5 feet

Depth in Feet	Surf. Elev. 285.15	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	285						(0 - 2.5) Concrete with sand and gravel subgrade
5	280	1	60	1500			(2.5 - 7) Silt, clayey, moderate yellowish brown w/ olive gray material, asphalt near top, diesel odor
10	275	2	50	900			(7 - 10.5) Silt, clayey, olive gray, hard and dry, contains some dark yellowish brown material (10.5 - 11.5) Silt, clayey, modertrate yellowish brown to dark yellowish orange, mottled w/ olive gray, contains iron-manganese concretions, very dry, hard (11.5 - 17) No recovery
15	270						
20	265	3	100	5		ML	(17 - 27) Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled w/ some dark yellowish orange, very moist
25	260						
30	255	4	100	15			(27 - 29) Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled w/ some olive gray, very moist (29 - 37.5) Silt, clayey, olive gray to med. dark gray, containing iron-manganese nodules and Lt. olive brown material below 31. Near 37, becoming mostly med. dark gray and dark yellowish brown, moist
35	250						
40	245	5	80				(37.5 - 46) Silt and clay, moderate yellowish brown to dark yellowish orange w/ Lt. gray to olive gray material, scattered iron-manganese nodules, becoming slightly sandy w/ more Lt. gray material near 46
45	240					CL	(46 - 49.5) Clay, sand, very fine, and silt, moderate yellowish brown mottled w/ Lt. gray to olive gray and dark yellowish orange, scattered gravel, moist, contains iron-manganese nodules between 47 and 49.5
50	235	6	120			SC	(49.5 - 52.5) Sand, very fine to fine, and clay w/ scattered gravel, dark yellowish orange to moderate yellowish brown mottled w/ Lt. gray, Gravel up to 1 1/2" dia.,wet (52.5 - 57.5) Sand, very fine to fine, dark yellowish orange to moderate yellowish brown, mottled w/ Lt. gray, scattered clay seams, Lt. gray clay seam w/ organic streaks at 56.5, wet
55	230						
60	225	7	120			SP	(57.5 - 67) Sand, corase to very coarse, and gravel, dark yellowish orange to very pale orange, gravel is chert and qtz, up to 2" dia. angular to rounded, wet, upper 1" is clayey
65							

Well: 007G22LF
Elev.: 284.86



07-28-2003 w:\well logs\NSAMidsouth\007G22LF.BOR

BORING LOG OF 007G22LF

NSA MID-SOUTH
Millington, TN.

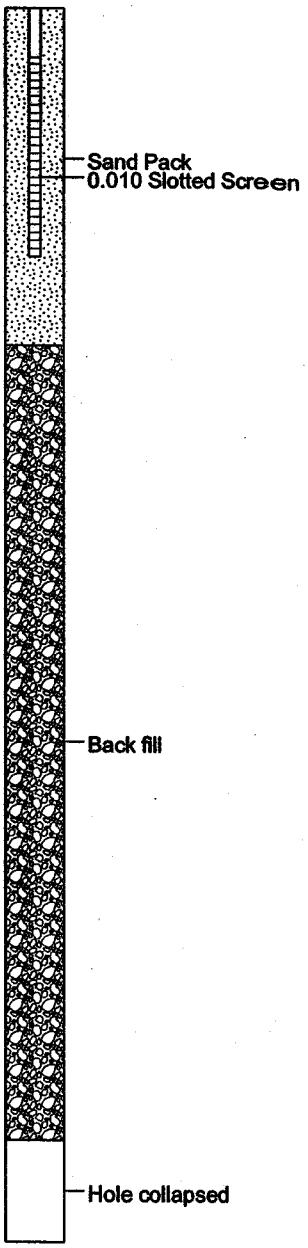
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1315 7/18/98	Northing	: 392658.10
Finished	: 0935 7/19/98	Easting	: 813905.90
Drilling Method	: Rotasonic	TOC Elevation	: 284.86
Drilling Company	: Alliance Drilling	Total Depth	: 77.5 feet
Geologist	: D. Ladd	Well Screen	: 67.5 to 77.5 feet

Depth in Feet	Surf. Elev. 285.15	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
65	220	7	120				(67 - 77.5) Sand, coarse to very coarse, and gravel, dark yellowish orange to very pale orange, gravel is chert and qtz, up to 2" dia. angular to rounded, wet, 67.5 to 70 is darker in color, containing lignitic sand grains, Red iron staining near 76, silt and smaller gravel from 76 to 77
70	215	8	110	0.4		SP	
75	210						
80	205	9	110			CL	(77.5 - 92.55) Clay, sandy, dusky yellowish brown to dark yellowish brown mottled w/ Lt. gray sand seams, scattered lignite,some gravel, very micacreous, more sand between 87 and 92.5
85	200						
90	195	10	110				(92.5 - 97) Sand, very fine to fine, Lt. gray w/ dark yellowish brown clay seams, abundant lignite and mica, wet
95	190						(97 - 107) Sand, very fine to fine, color becoming olive gray to Lt. gray, less lignite and mica, wet
100	185	11	120	1500			
105	180						(107 - 117) Sand, very fine to fine, olive gray to Lt. gray, abuntant lignite, especially near 112, wet
110	175	12	120	0.4		SC	
115	170						(117 - 127) Sand, very fine to fine, olive gray to Lt. gray, abuntant lignite at 119 and 123, piece of marcasite nodule at 118, clay sean (7" thick) at 126, wet
120	165	13	100				
125	160						
130							

Well: 007G22LF
Elev.: 284.86



07-28-2003 N:\well logs\NSA\Midsouth\007G22LF.BOR

ENSAFE

BORING LOG OF 007G22UC

NSA MID-SOUTH
Millington, TN.

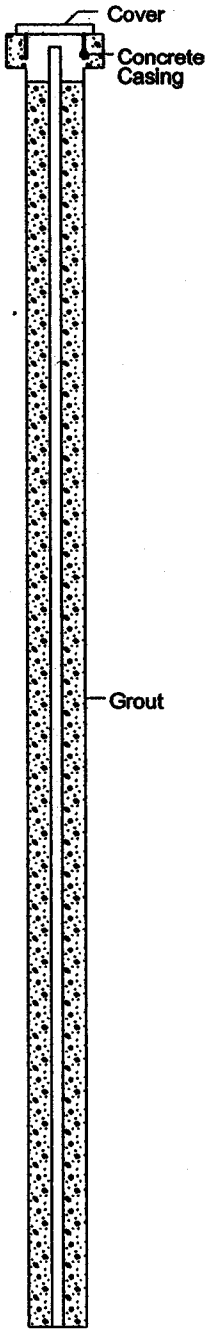
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: —— 7/19/98	Northing	: 392671.60
Finished	: —— 7/19/98	Easting	: 813899.00
Drilling Method	: Rotasonic	TOC Elevation	: 284.83
Drilling Company	: Alliance Drilling	Total Depth	: 103 feet
Geologist	: D. Ladd	Well Screen	: 93 to 103 feet

Depth in Feet	Surf. Elev. 285.05	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	285						(0 - 2.5) Concrete with sand and gravel subgrade
5	280	1	60			ML	(2.5 - 7) Sitl, clayey, moderate yellowish brown w/ olive gray material, asphalt near top, diesel odor
10	275	2	50				(7 - 10.5) Silt, clayey, olive gray, hard and dry, contains some dark yellowish brown material
15	270						(10.5 - 11.5) Silt, clayey, modertrate yellowish brown to dark yellowish orange, mottled w/ olive gray, contains iron-manganese concretions, very dry, hard (11.5 - 17) No recovery
20	265	3	100				(17 - 27) Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled w/ some dark yellowish orange, very moist
25	260						
30	255	4	100				(27 - 29) Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled w/ some olive gray, very moist (29 - 37.5) Silt, clayey, olive gray to med. dark gray, containing iron-manganese nodules and Lt. olive brown material below 31. Near 37, becoming mostly med. dark gray and dark yellowish brown, moist
35	250						
40	245	5	100				(37.5 - 46) Silt and clay, moderate yellowish brown to dark yellowish orange w/ Lt. gray to olive gray material, scattered iron-manganese nodules, becoming slightly sandy w/ more Lt. gray material near 46
45	240					CL	(46 - 49.5) Clay, sand, very fine, and silt, moderate yellowish brown mottled w/ Lt. gray to olive gray and dark yellowish orange, scattered gravel, moist, contains iron-manganese nodules between 47 and 49.5
50	235	6	120			SC	
55							

Well: 007G22UC
Elev.: 284.83



07-28-2003 \\nwcsf1\dgt\NSAMidsouth\007G22UC.BOR

ENSAFE

BORING LOG OF 007G22UC

NSA MID-SOUTH
Millington, TN.

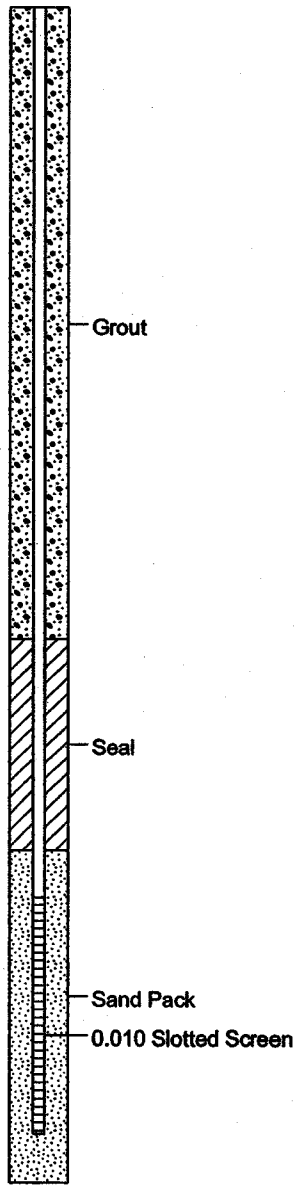
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: —— 7/19/98	Northing	: 392671.60
Finished	: —— 7/19/98	Easting	: 813899.00
Drilling Method	: Rotasonic	TOC Elevation	: 284.83
Drilling Company	: Alliance Drilling	Total Depth	: 103 feet
Geologist	: D. Ladd	Well Screen	: 93 to 103 feet

Depth in Feet	Surf. Elev. 285.05	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
55	230	6	120			SC	(49.5 - 52.5) Sand, very fine to fine, and clay w/ scattered gravel, dark yellowish orange to moderate yellowish brown mottled w/ Lt. gray, Gravel up to 1 1/2" dia.,wet
60	225	7	120				(52.5 - 57.5) Sand, very fine to fine, dark yellowish orange to moderate yellowish brown, mottled w/ Lt. gray, scattered clay seams, Lt. gray clay seam w/ organic streaks at 56.5, wet
65	220						(57.5 - 67) Sand, coarse to very coarse, and gravel, dark yellowish orange to very pale orange, gravel is chert and qtz, up to 2" dia. angular to rounded, wet, upper 1" is clayey
70	215	8	110			SP	(67 - 77.5) Sand, coarse to very coarse, and gravel, dark yellowish orange to very pale orange, gravel is chert and qtz, up to 2" dia. angular to rounded, wet, 67.5 to 70 is darker in color, containing lignitic sand grains, Red iron staining near 76, silt and smaller gravel from 76 to 77
75	210						
80	205	9	110				(77.5 - 92.55) Clay, sandy, dusky yellowish brown to dark yellowish brown mottled w/ Lt. gray sand seams, scattered lignite,some gravel, very micacreous, more sand between 87 and 92.5
85	200					CL	
90	195	10	110				(92.5 - 97) Sand, very fine to fine, Lt. gray w/ dark yellowish brown clay seams, abundant lignite and mica, wet
95	190						(97 - 105) Sand, very fine to fine, color becoming olive gray to Lt. gray, less lignite and mica, wet
100	185	11	120			SC	
105	180						
110							

Well: 007G22UC
Elev.: 284.83



07-28-2003 N:\well logs\NSAMidsouth\007G22UC.BOR

ENSAFE

BORING LOG OF 007G23LF

NSA MID-SOUTH
Millington, TN.

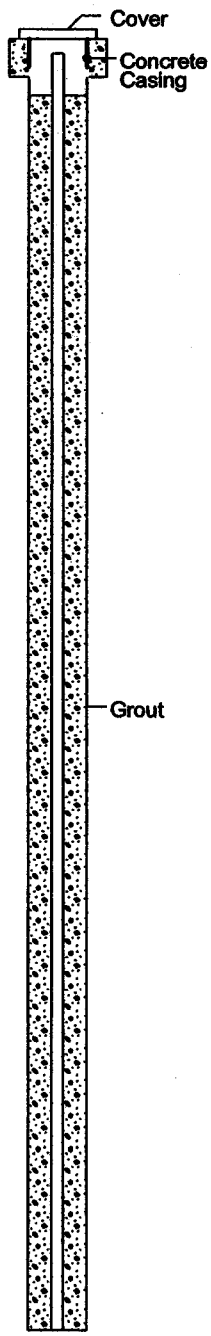
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0915 7/31/98	Northing	: 392728.40
Finished	: 1200 7/31/98	Easting	: 814087.30
Drilling Method	: Rotasonic	TOC Elevation	: 285.89
Drilling Company	: Alliance Drilling	Total Depth	: 85 feet
Geologist	: D. Ladd	Well Screen	: 72 to 82 feet

Depth in Feet	Surf. Elev. 286.15	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	286						(0 - 1.5) Concrete and asphalt
		1	40			CL	(1.5 - 2.5) Clay and silt, olive gray to greenish gray, moist
						ML	(2.5 - 9.5) Silt, moderate yellowish brown mottled w/ olive gray, decrease in olive gray material w/ depth
5	281						
10	276	2	45			CL	(9.5 - 10) Silt, olive gray to greenish gray (10 - 15) No recovery
15	271						(15 - 19) Clayey silt,olive gray to greenish gray, becoming mottled w/ moderate yellowish brown material near 19, contains roof material at 17, moist
20	266	3	85			ML	(19 - 25) Silt, moderate yellowish brown, mottled w/ dark yellowish orange and olive gray, contains organic material, especially near 25 .
25	261					CL	(25 - 36) Clay, silty, olive gray becoming mottled w/ dark yellowish orange and light olive brown material below 31, contains iron-manganese nodules below 31, some Lt. gray material at 36, moist
30	256	4	85				
35	251						(36 - 42.5) Clay, sandy, moderate yellowish brown to dark yellowish orange mottled w/ Lt. gray, scattered gravel near 42.5, iron-manganese nodules and organic material
40	246	5	90			SC	
45							

Well: 007G23LF
Elev.: 285.89



ENSAFE

BORING LOG OF 007G23LF

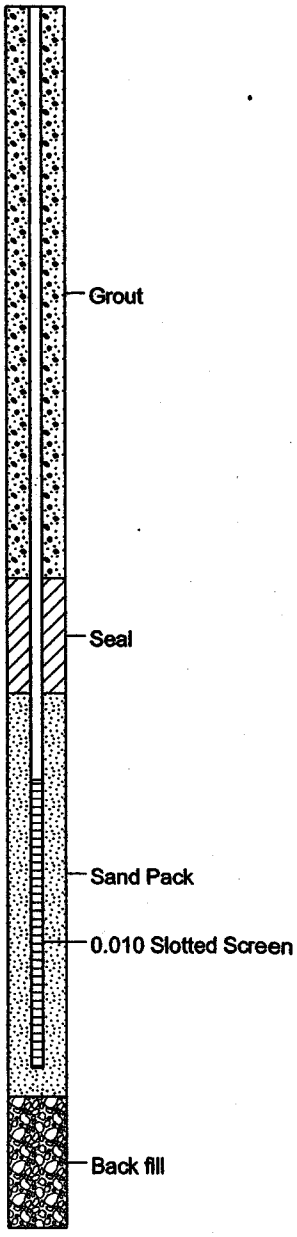
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7
Project #: CTO 0094

Started	: 0915 7/31/98	Northing	: 392728.40
Finished	: 1200 7/31/98	Easting	: 814087.30
Drilling Method	: Rotasonic	TOC Elevation	: 285.89
Drilling Company	: Alliance Drilling	Total Depth	: 85 feet
Geologist	: D. Ladd	Well Screen	: 72 to 82 feet

Well: 007G23LF
Elev.: 285.89

Depth in Feet	Surf. Elev. 286.15	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
45	241					SC	(42.5 - 52) Sand, clay, and gravel, dark yellowish orange, traces of Lt. gray material, higher clay contents and less gravel near top, moist, hard, gravel mostly rounded chert (up to 3/4" dia., iron concretions, less gravel from 46 - 49, poorly sorted, moderate brown to dark reddish brown material from 50 to 52, moist to wet
50	236	6	95			CL	(52 - 54) Clay, grayish orange mottled w/ moderate orange pink and grayish orange pink, moist, soft
55	231					SC	(54 - 55) Sand, very fine to fine, dark yellowish orange, grayish orange clay seams, wet
						CL	(55 - 56) Sand, very fine to fine, dark yellowish orange, micaceous, lignitic, wet
						SC	
						CL	(56 - 56.5) Clay, grayish orange mottled w/ moderate orange pink and grayish orange pink, moist, soft
60	226	7	95			SC	(56.5 - 57.5) Sand, very fine to fine, dark yellowish orange, micaceous, lignitic, wet
						CL	(57.5 - 58) Sand, very fine to fine, dusky yellowish brown mottled w/ dark yellowish orange and Lt. gray, micaceous, highly lignitic, wet
65	221					SC	(58 - 58.5) Clay, grayish orange mottled w/ moderate orange pink and grayish orange pink, moist, soft
							(58.5 - 61) Sand, very fine to fine, dark yellowish orange, micaceous, lignitic, wet
							(61 - 61.5) Clay, grayish orange to Lt. gray, moist, soft
70	216	8	90			SW	(61.5 - 65)Sand, very fine to fine, dark yellowish orange, micaceous, lignitic, wet (65 - 66.5) Sand, very fine to fine, w/ scattered gravel, grayish orange to Lt. gray, scattered Lt. gray seams, wet (66.5 - 68.5) Sand, gravel and clay, olive gray to very Lt. gray, gravel up to 1" dia., poorly sorted, lignitic, wet
75	211						(68.5 - 75) Sand, coarse to very coarse,and gravel (mostly chert, up to 2"), dark yellowish orange becoming grayish orange from 71 to 73 w/ less gravel, poorly sorted, highly lignitic, wet
80	206	9	85				(75 - 83.5) Sand med. to very coarse, and gravel, dark yellowish orange, gravel up to 3" dia. , mostly rounded qtz and rounded to angular chert, becoming angular near bottom w/ less sand, wet (83.5 - 85) Clay, dusky yellowish brown mottled w/ Lt. gray sand seams, highly lignitic, moist
85	201	10	100			CL	Shelby tube sample from 85 to 87.5
90							



BORING LOG OF 007G24MF

NSA MID-SOUTH
Millington, TN.

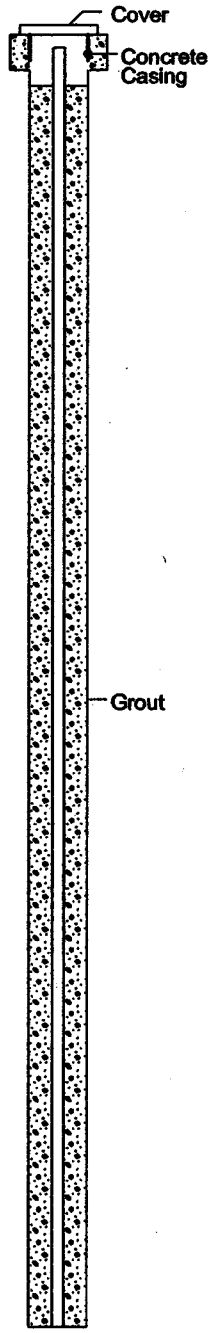
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0915 7/31/98	Northing	: 392815.60
Finished	: 1200 7/31/98	Easting	: 814610.90
Drilling Method	: Rotasonic	TOC Elevation	: 289.06
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: D. Ladd	Well Screen	: 60 to 70 feet

Depth in Feet	Surf. Elev. 289.31	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	289						(0 -2.5) Asphalt and concrete
		1	60				(2.5 - 9) Silt, moderate yellowish brown mottled w/ some olive gray near top, contains some asphalt at top, dry, hard
5	284						
							(9 - 20) No recovery
10	279	2	35				
15	274						
20	269	3	25			ML	(20 - 25) Silt, dark yellowish orange mottled w/ olive gray, contains organic nodules, micaceous, soft
25	264						(25 - 35.5) Silt and clay, olive gray to greenish gray, contains abuntant iron-manganese nodules, mottled w/ dark yellowish orange near top, moist
30	259	4	95				
35	254						(35.5 - 41) Silt and clay, moderate yellowish brown to dark yellowish orange, mottled w/ olive gray to greenish gray, contains organic material and abundant lignite near 41, moist
40	249	5	110			CL	(41 - 46) Clay, silty, w/ scattered gravel, moderate yellowish brown to dark yellowish orange mottled w/ a trace of Lt. gray material, gravel is small rounded chert and qtz., abundant iron concretions, becoming sandy near 45
45	244	6	100			SC	
50							

Well: 007G24MF
Elev.: 289.06



07-28-2003 n:\well logs\NSAMidsouth\007G24MF.BOR

BORING LOG OF 007G24MF

NSA MID-SOUTH
Millington, TN.

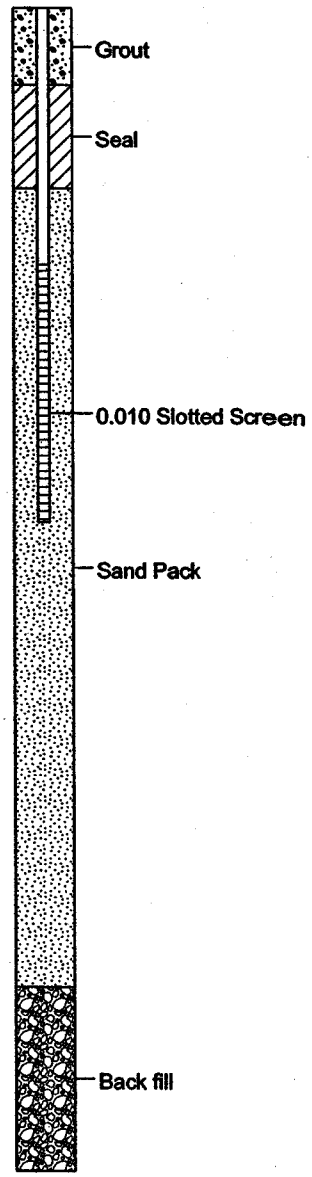
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0915 7/31/98	Northing	: 392815.60
Finished	: 1200 7/31/98	Easting	: 814610.90
Drilling Method	: Rotasonic	TOC Elevation	: 289.06
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: D. Ladd	Well Screen	: 60 to 70 feet

Depth in Feet	Surf. Elev. 289.31	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
50	239					SC	(46 - 46.5) Sand, very fine, and clay w/ gravel, moderate brown to reddish brown, very cohesive
		6	100				(46.5 - 52) Sand, fine to med. and clay w/ gravel, dark yellowish orange w/ some Lt. gray material, Gravel up to 2" dia., poorly sorted, abundant iron concretions, mostly Lt. gray near 52
55	234						(52 - 55) Sand, very coarse and gravel (up to 1 1/2"), dark yellowish orange, some clay content, wet
		7	100				(55 - 65) Sand, very fine to fine, grayish orange to dark yellowish orange, upper 3' of section is mostly grayish orange and contains some Lt. gray, micaceous, lignitic, wet
60	229						
65	224						(65 - 75) Sand, very fine to fine, grayish orange to dark yellowish orange, mostly grayish orange pink at 66, contains Lt. gray clay seams at 72.5, contains more chert gravel at 74, wet
70	219	8	95			SP	
75	214						(75 - 85)Sand, very fine to fine, grayish orange, micaceous, lignitic, wet, Several pieces of chert gravel (up to 3/4" dia.) at 84 and 85
80	209	9	95				
85	204						(85 - 88.5) Sand, very coarse and gravel, dark yellowish orange, gravel mostly angular to rounded chert (up to 2 1/2" dia.), wet, poorly sorted
90	199	10	100			CL	(88.5 - 95) Clay, sandy, dusky yellowish brown, becomes mottled w/ Lt. gray, very fine sand seams below 92, micaceous, lignitic
95	194						
100							

Well: 007G24MF
Elev.: 289.06



07-28-2003 N:\well logs\NSAMidsouth\007G24MF.BOR

ENSAFE

BORING LOG OF 007G25MF

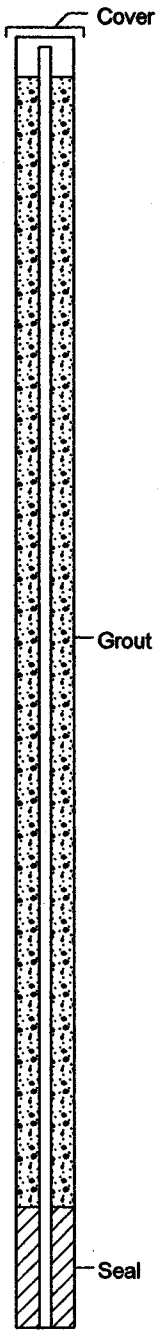
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0945 8/3/98	Northing	: 392888.00
Finished	: —— 8/3/98	Easting	: 814789.90
Drilling Method	: Rotasonic	TOC Elevation	: 289.97
Drilling Company	: Alliance Drilling	Total Depth	: 81.50 feet
Geologist	: B. Brantley	Well Screen	: 71.5 to 81.5 feet

Depth in Feet	Surf. Elev. 290.30	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	290	1	70				(0 - 1.5) Concrete (1.5 - 2) Sand, gravel subgrade
5	285						(2 - 3) Lt. olive gray silt mixed w/ greenish gray silt, dry, hard (3 - 7.5) Dark yellowish brown to moderate yellowish brown silt, dry, hard (7.5 - 9) Lt. olive gray and moderate yellowish brown silt, dry, hard, manganese inclusions from 8.5 to 9
10	280	2	40				(9 - 15) No recovery
15	275						(15 - 19) Dark yellowish orange w/ Lt. olive grey and yellowish grey silt, manganese and iron streaks throughout, moist, med. stiff
20	270	3	40			ML	(19 - 25) No recovery
25	265						(25 - 29) Pale yellowish to dark yellowish brown silt w/ scattered manganese and iron staining
30	260	4	40				(29 - 35) No recovery Driller uncertain whether loss of recovery at top or bottom of each run w/ loss. Loss has been assumed to be at bottom of run
35	255						(35 - 38.5) Moderate yellowish brown clayey silt w/ dark yellowish orange and med. Lt. gray clayey silt.
40	250	5	105			CL ML	(38.5 - 40) Lt. bluish grey clay lenses streaked in moderate yellowish brown clayey silt w/ dark yellowish orange and med. Lt. gray clayey silt.
45	245					CL	(40 - 42) Moderate yellowish brown clayey silt w/ dark yellowish orange and med. Lt. gray clayey silt.
50	240	6	85			GC	(42 - 47.5) Moderate yellowish brown sandy clay w/ Lt. olive gray streaks and iron staining, dry, hard to stiff, scattered chert gravel from 42 to 45, increasingly sandy and greater gravel contents from 45 to 47.5
55	235					SM	(47.5 - 52.5) Lt. brown clay, sand, gravel mixture w/ abundant iron staining, cementicious in sections to very hard
60	230	7	85			SP	(52.5 - 53.5) Dark yellowish orange silty fine sand, moderate red w/ yellowish gray clay at 53 (3" thick) (53.5 - 61) Lt. gray fine sand w/ Lt. gray clay lense 4" thick between 53.5 to 55, moderate red w/ yellowish gray clay at 55 (12" thick) and 1" thick Lt. gray seams at 56 and 58 (61 - 65) Dark yellowish orange to grayish orange fine sand w/ Lt. gray fine sand
65							



07-28-2003 \\nswell logs\NSAMidsouth\007G25MF.BOR

ENSAFE

BORING LOG OF 007G25MF

NSA MID-SOUTH
Millington, TN.

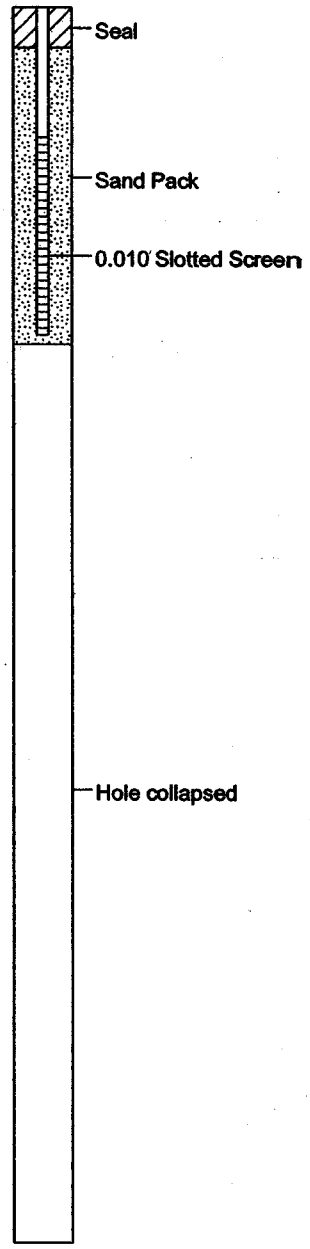
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0945 8/3/98	Northing	: 392888.00
Finished	: —— 8/3/98	Easting	: 814789.90
Drilling Method	: Rotasonic	TOC Elevation	: 289.97
Drilling Company	: Alliance Drilling	Total Depth	: 81.50 feet
Geologist	: B. Brantley	Well Screen	: 71.5 to 81.5 feet

Depth in Feet	Surf. Elev. 290.30	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
65	225					CL	(65 - 65.5) Yellowish grey to grayish orange clay (4" thick)
							(65.5 - 69) Dark yellowish orange to grayish orange fine sand w/ Lt. gray fine sand
70	220	8	85			SP	(69 - 76) Grayish orange fine micaceous sand w/ scattered chert gravel, lignite grains within sand
75	215					CL	(76 - 77) Yellowish grey to grayish orange clay seam
							(77 - 92) Grayish orange fine micaceous sand w/ scattered chert gravel, lignite grains within sand
80	210	9	80				
85	205					SP	
90	200	10	90				
95	195					GW	(92 - 96) Lt. brown and dark yellowish orange sandy gravel (up to 2" dia.), poorly sorted, sand fine to very corase
							(96 - 101) Yellowish gray to olive gray fine silty sand
100	190	11	80			SM	(101 - 105) Lt. gray to grayish orange fine sand, lignitic and micaceous, few scattered chert gravel at 103
105	185					SP	(105 - 107) Yellowish gray fine sand w/ dark yellowish orange sand seam at 107
							(107 - 109) Grayish orange fine sand w/ Lt. gray clay seams 1/8" to 1/4" thick
110	180	12	85				(109 - 115) Lt. gray fine sand w/ Lt. gray clay seams
115	175						(115 - 124) Lt. gray fine sand w/ grayish orange fine sand
120	170	13	90				
125	165					SM	(124 - 125) Pale brown and dark yellowish brown silty sand, lignite at bottom of run
		14	100			SC	(125 - 127) Shelby tube pushed from 125 to 127, bottom contains lignite within a clay matrix
130							

Well: 007G25MF
Elev.: 289.97



07-28-2003 N:\well logs\NSA\Midsouth\007G25MF.BOR

BORING LOG OF 007G26MF

NSA MID-SOUTH
Millington, TN.

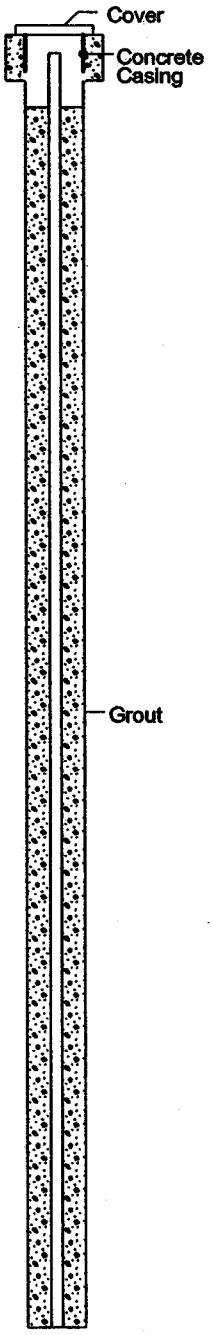
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1455 8/2/98	Northing	: 392954.10
Finished	: 1645 8/2/98	Easting	: 814922.50
Drilling Method	: Rotasonic	TOC Elevation	: 290.13
Drilling Company	: Alliance Drilling	Total Depth	: 70 feet
Geologist	: B. Brantley	Well Screen	: 60 to 70 feet

Depth in Feet	Surf. Elev. 290.40	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	290						(0 - 2) Concrete w/ sand and gravel subgrade
		1	100	Bkg			(2 - 5) Moderate yellowish brown silt, very stiff to hard
5	285						(5 - 7) Moderate yellowish brown silt mixed w/ olive gray silt, contains wood fragments, very stiff to hard (7 - 15) Dark yellowish orange silt mixed w/ olive gray silt w/ iron and manganese inclusions
10	280	2	40	Bkg			
15	275						(15 - 19.5) Lt. olive gray clayey silt w/ iron streaks, moist to wet, med. stiff
						ML	
20	270	3	90	0.4			(19.5 - 20.5) Moderate yellowish brown clayey silt w/ Lt. gray clayey silt w/ manganese (20.5 - 25) Dark yellowish orange clayey silt w/ Lt. olive gray clayey silt, iron streaks throughout, slightly moist, more stiffer
25	265						(25 - 33) Moderate yellowish brown clayey silt, moist, stiff
30	260	4	75	0.2			
35							(33 - 35) Moderate yellowish brown and Lt. olive gray clayey silt w/ iron staining, moist, stiff (35 - 42) Moderate yellowish brown and Lt. olive gray clayey silt w/ iron staining, moist, stiff to hard, manganese inclusions from 35 to 37, pebbles scattered from 40 to 42

Well: 007G26MF
Elev.: 290.13



07-28-2003 N:\well logs\NSAMidsouth\007G26MF.BOR

ENSAFE

BORING LOG OF 007G26MF

NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1455 8/2/98	Northing	: 392954.10
Finished	: 1645 8/2/98	Easting	: 814922.50
Drilling Method	: Rotasonic	TOC Elevation	: 290.13
Drilling Company	: Alliance Drilling	Total Depth	: 70 feet
Geologist	: B. Brantley	Well Screen	: 60 to 70 feet

Depth in Feet	Surf. Elev. 290.40	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
35	255					ML	
40	250	5	100	0.2		CL	(42 - 44) Dark yellowish orange sandy silty clay steaked w/ Lt. gray, pebbles scattered throughtout (1/4" to 1/2" dia.), dry, stiff
45	245					SC	(44 - 45) Dark yellowish orange clayey sand w/ pebbles scattered throughout, moist, med. stiff (45 - 46) Dark yellowish orange clayey sand w/ gravel scattered throughout, moist, med. stiff (46 - 47) Moderate reddish brown cemented mixture of clay, sand, pebbles and gravel
50	240	6	95	Bkg		SM	(47 - 54) Grayish orange to dark yellowish orange silty fine sand
55	235					CL	(54 - 55) Moderate red clay mixed w/ dark yellowish orange and yellowish gray silty fine sand
60	230	7	85	0.2		SP	(55 - 70) Grayish orange fine sand mixed w/ dark yellowish orange and yellowish gray fine sand (micaceous), moderate red to Lt. red w/ pinkish gray clay seams at 56.5, 57.5, 58, 60, 61, and 63, seams range between 1" and 4" thick, few scattered gravel (up to 1/2" dia.) near 66
65	225	8	60	Bkg			
70							

Well: 007G26MF
Elev.: 290.13

07-28-2003 N:\well logs\NSAMidsouth\007G26MF.BOR

BORING LOG OF 007G27LF

NSA MID-SOUTH
Millington, TN.

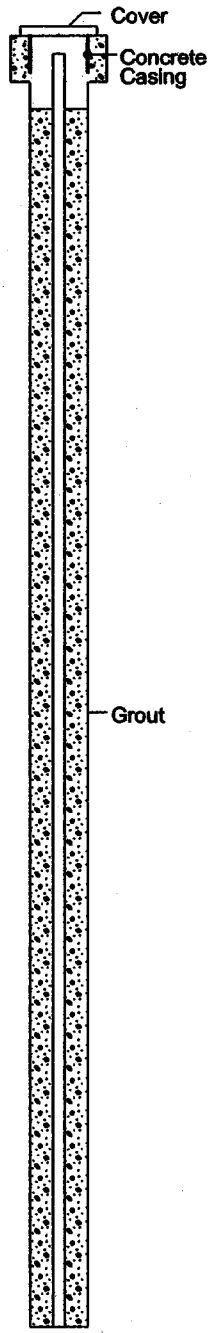
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0800 7/20/98	Northing	: 392553.50
Finished	: 1600 7/20/98	Easting	: 812680.90
Drilling Method	: Rotasonic	TOC Elevation	: 276.77
Drilling Company	: Alliance Drilling	Total Depth	: 117 feet
Geologist	: D. Ladd	Well Screen	: 107 to 117 feet

Depth in Feet	Surf. Elev. 276.86	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	276	1	90				(0 - 5) Silt, clayey, moderate yellowish brown mottled w/ a little Lt. olive gray, especially at 4, contains roots and organic material
5	271	2	100				(5 - 7) Silt, clayey, moderate yellowish brown mottled w/ a little Lt. olive gray, contains roots and organic material, iron-manganese nodules (7 - 17) Silt, very clayey, moderate yellowish brown mottled w/ less Lt. olive gray, abundant organic material
10	266	3	80				
15	261					ML	(17 - 23) Silt, very clayey, moderate yellowish brown mottled w/ Lt. olive gray, abundant organic material
20	256	4	65				(23 - 27) Silt, olive gray w/ iron-manganese nodules
25	251						(27 - 36) Silt, olive gray to Lt. olive gray w/ abundant iron-manganese nodules below 30, becoming mottled w/ moderate yellowish brown and Lt. olive brown material from 32 to 36, very dry and hard near 36
30	246	5	100				
35							

Well: 007G27LF
Elev.: 276.77



BORING LOG OF 007G27LF

NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0800 7/20/98	Northing	: 392553.50
Finished	: 1600 7/20/98	Easting	: 812680.90
Drilling Method	: Rotasonic	TOC Elevation	: 276.77
Drilling Company	: Alliance Drilling	Total Depth	: 117 feet
Geologist	: D. Ladd	Well Screen	: 107 to 117 feet

Depth in Feet	Surf. Elev. 276.86	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
35							
	241	5	100			ML	(36 - 41) Silt, moderate yellowish brown to dark yellowish orange, containing iron-manganese nodules, dark yellowish brown and olive gray material becoming slightly sandy from 37 to 41
40							
	236	6	80			CL	(41 - 46) Clay, silt and sand, very fine, moderate yellowish brown mottled w/ dark yellowish orange and Lt. gray, Lt. gray is mostly clay, contains iron-manganese nodules, moist
45							
	231					SC	(46 - 47) Sandy, very fine, and clay, Lt. gray, moist
						CL	(47 - 48) Clay, silt, sand, very fine, and gravel (up to 1/2" dia.), moderate yellowish brown mottled w/ Lt. gray and dark yellowish orange·
						SW	
50						SP	(48 - 49.5) Sand, fine to med., and gravel (up to 1/4"), very pale orange, some moderate yellowish brown clay, wet
	226	7	90	0.2			(49.5 - 50.5) Sand , fine, dark yellowish orange mottled w/ Lt. gray, some gravel at 50.5, wet
						SC	(50.5 - 55) Sand, very fine, clayey, Lt. brownish gray, becoming mottled w/ dark yellowish orange and sand becoming coarser near 55
55							
	221						(55 - 63.5) Sand, coarse to very coarse and gravel (up to 1"), dark yellowish orange, clayey near top, trace of gravel from 58 to 60, wet
60							
	216	8	85			SP	
65							(63.5 - 67) Sand, very fine to fine, grayish orange to dark yellowish orange, trace of gravel at 65 (up to 2" dia.), micaceous and lignitic, wet
	211						(67 - 70) Sand, coarse to very coarse, and gravel (up to 3/4"), very pale orange to dark yellowish orange, wet
		9	65				
70							

Well: 007G27LF
Elev.: 276.77

ENSAFE

BORING LOG OF 007G27LF

NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0800 7/20/98	Northing	: 392553.50
Finished	: 1600 7/20/98	Easting	: 812680.90
Drilling Method	: Rotasonic	TOC Elevation	: 276.77
Drilling Company	: Alliance Drilling	Total Depth	: 117 feet
Geologist	: D. Ladd	Well Screen	: 107 to 117 feet

Depth in Feet	Surf. Elev. 276.86	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
70	206	9	65			SW	(70 -77) Sand, very fine to fine, dark yellowish orange, contains gravel seams w/ coarse to very coarse sands at 74 and 75, otherwise contains trace of gravel throughout, trace of clay seams, ferrigenous sand zone at 74, wet
75	201						(77 - 82) Sand, very fine to fine, mostly grayish orange w/ a corase dark yellowish orange gravelly zone at 79, traces of scattered gravel throughout
80	196	10	90			SP	(82 - 86.5) Sand, coarse to very coarse and gravelly, (up to 2"), dark yellowish orange to grayish orange, ferrigenous sandy zone near 85, gravel is chert and qtz, wet
85	191					GP	(86.5 - 87) Gravel (up to 3" dia.), contains a little sand
						SP	(87 - 88) Sand, very coarse and gravelly, dark yellowish orange, gravel is fine (up to 1/8"), wet
90	186	11	70			GP	(88 - 91) Gravel (up to 2 1/2") and sand, very coarse, dark yellowish orange, little sand content, poorly sorted, wet
						SP	(91 - 92) Sand, very coarse and gravel (up to 1/2"), dark yellowish orange, rounded to angular qtz and chert, wet
						GP	
						SP	(92 - 92.5) Gravel up to 2 1/2" dia., scattered sand, rounded to angular qtz and chert, wet
95	181					GP	(92.5 - 93) Sand, very fine, dark yellowish orange, one piece of chert gravel 2" dia.
							(93 - 97) Gravel and sand, very coarse, dark yellowish brown to dark yellowish orange, chert and qtz, rounded to angular, up to 1 1/2", wet
						SP	(97 - 98) Sand, very coarse, and gravel (up to 1") , dark yellowish orange, poorly sorted, wet
100	176	12	75	0.4		SC	(98 - 107) Sand, very coarse, and gravel (up to 3"),clayey, dark yellowish orange to grayish orange, color becoming darker near 107
105							

Well: 007G27LF
Elev.: 276.77

07-28-2003 N:\Well Logs\NSAMidsouth\007G27LF.BOR

ENSAFE

BORING LOG OF 007G27LF

NSA MID-SOUTH
Millington, TN.

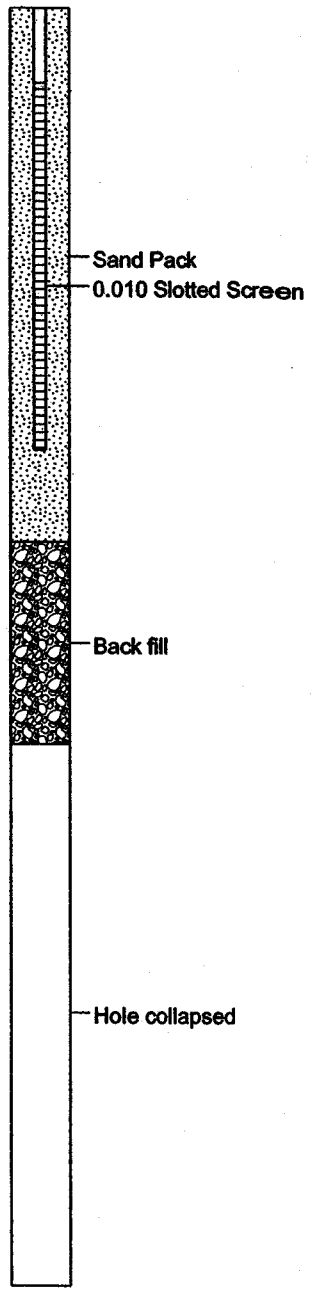
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0800 7/20/98	Northing	: 392553.50
Finished	: 1600 7/20/98	Easting	: 812680.90
Drilling Method	: Rotasonic	TOC Elevation	: 276.77
Drilling Company	: Alliance Drilling	Total Depth	: 117 feet
Geologist	: D. Ladd	Well Screen	: 107 to 117 feet

Depth in Feet	Surf. Elev. 276.86	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
105	171	12	75	0.4		SC	(107 - 117) Sand, very coarse, and gravel (up to 2"),clayey, dark yellowish orange to grayish orange, Lt gray clay seam at 111, traces of red iron staining, becomes darker in color and silty from 115 to 117
110	166	13	85				
115	161						
120	156	14	85			CL	(117 - 125) Clay, sand, fine to very coarse, gravel (up to 1 1/2"), dusky yellowish brown to dark yellowish brown, clay seams throughout, very lignitic, slightly micaceous, wet
125	151					GW	(125 - 127) Gravel (up to 1 1/2") and sand, very coarse, dark yellowish orange silty, dusky yellowish brown to dark yellowish brown clay near 127, wet
							(127 - 128) Gravel and sand, dusky yellowish brown to dark yellowish brown,wet
130	146	15	100			CL	(128 - 139.5) Clay, dusky yellowish brown to dark yellowish brown w/ some Lt. gray sand seams scattered through upper 5 feet, abundant lignite, especially near 128, micaceous, stiff to very hard
135	141						
140		16	100				

Well: 007G27LF
Elev.: 276.77



07-28-2003 N:\well logs\NSAMidsouth\007G27LF.BOR

BORING LOG OF 007G28LF

ENSAFE

NSA MID-SOUTH
Millington, TN.

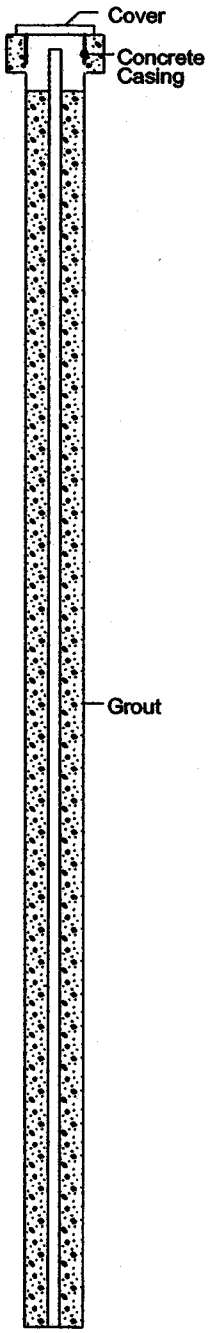
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1345 7/17/98	Northing	: 393309.60
Finished	: 1630 7/17/98	Easting	: 813467.30
Drilling Method	: Rotasonic	TOC Elevation	: 281.91
Drilling Company	: Alliance Drilling	Total Depth	: 80.5 feet
Geologist	: D. Ladd	Well Screen	: 70.5 to 80.5 feet

Depth in Feet	Surf. Elev. 281.87	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	281						(0 - 3) Asphalt, clay, red sand, pebbles, lost first 1 - 2 feet
		1	50			CL	(3 - 7,5) Clay and silt, moderate yellowish brown, some olive gray material, stiff
5	276						
						ML	(7.5 - 12) Silt, olive gray to greenish gray, traces of root material
10	271	2	75			CL	(12 - 14) Clay, dark yellowish brown to dusky yellowish brown, stiff
						ML	(14 - 17) Silt, olive gray to greenish gray, iron-manganese nodules
15	266						
							(17 - 27) Silt, clayey, moderate yellowish brown mottled w/ dark yellowish orange and olive gray, iron-manganese nodules
20	261	3	95				
25	256						
							(27 - 36) Silt, clayey, moderate yellowish brown mottled w/ dark yellowish orange and olive gray, iron-manganese nodules, becoming more clayey w/ more olive gray material, Lt. olive brown and Lt. gray material near bottom
30	251	4	85				
35	246						(36 - 37) Slightly silt, clayey, Lt. olive brown w/ traces of Lt. gray, dry, hard
						CL	(37 - 50.5) Clay, silt, and sand, very fine, dark yellowish orange, becomes progressively sandier w/ depth, becomes mottled w/ Lt. gray sand below 41, and contains olive gray clay from 41 to 41.5, moist
40	241	5	100				
45							

Well: 007G28LF
Elev.: 281.91



07-28-2003 N:\Well logs\NSAMdsouth\007G28LF.BOR

ENSAFE

BORING LOG OF 007G28LF

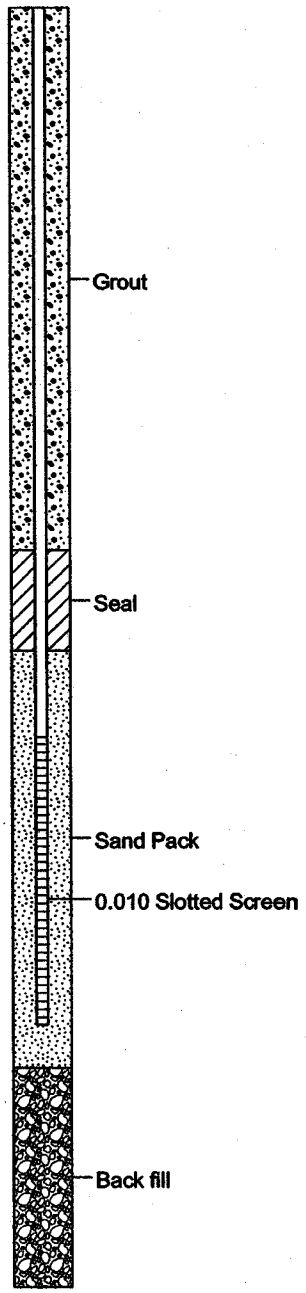
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7
Project #: CTO 0094

Started	: 1345 7/17/98	Northing	: 393309.60
Finished	: 1630 7/17/98	Easting	: 813467.30
Drilling Method	: Rotasonic	TOC Elevation	: 281.91
Drilling Company	: Alliance Drilling	Total Depth	: 80.5 feet
Geologist	: D. Ladd	Well Screen	: 70.5 to 80.5 feet

Depth in Feet	Surf. Elev. 281.87	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
45	236	5	100			CL	
50	231	6	100			SW	(50.5 - 53) Sand, med to coarse and gravel (up to 1" dia.), grayish orange, poorly sorted, rounded to angular, wet, Lt. gray material at top
55	226					SP	(53 - 56) Sand, coarse to very coarse, w/ scattered small gravel, very pale orange to grayish orange, wet (56 - 57.5) Sand, coarse to very coarse, moderate yellowish brown to dark yellowish orange, w/ some Lt. gray clayey material, gravel up to 3/4" dia from 56 to 57 and 3" dia. from 57 to 57.5, wet
60	221	7	100			GP	(57.5 - 59) Gravel w/ scattered sand, gravel 1/2" dia. at top and increasing to 2 1/2" dia. near 59
65	216					SP	(59 - 72) Sand, coarse to very coarse, dark yellowish orange, gravel up to 2" dia. (72 - 77) No recovery
70	211	8	50				
75	206						(77 - 81) Sand, coarse to very coarse, dark yellowish orange, gravel up to 2" dia., lignitic sand grains
80	201	9	100			CL	(81 - 89.5) Clay, slightly sandy, dusky yellowish brown to dark yellowish brown mottled w/ Lt. gray sandy seams, micaceous, slightly lignitic, stiff Bottom of boring at 87, shelby tube sample taken from 87 to 89.5
85	196	10	90				
90							

Well: 007G28LF
Elev.: 281.91



07-28-2003 N:\well logs\NSAMidsouth\007G28LF.BOR

ENSAFE

BORING LOG OF 007G29LF

NSA MID-SOUTH
Millington, TN.

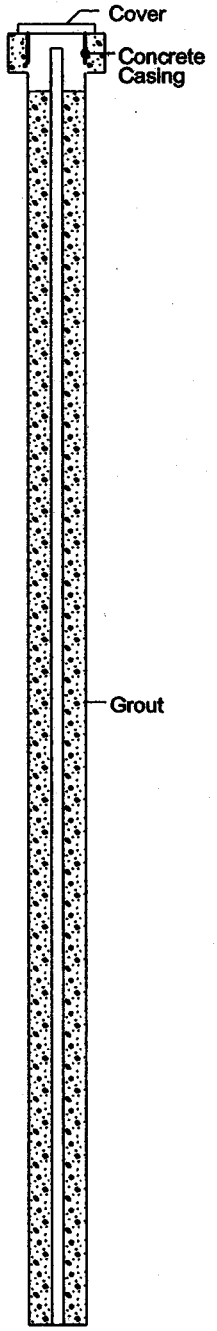
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1050 7/16/98	Northing	: 393384.30
Finished	: 1615 7/16/98	Easting	: 813594.00
Drilling Method	: Rotasonic	TOC Elevation	: 282.29
Drilling Company	: Alliance Drilling	Total Depth	: 80 feet
Geologist	: D. Ladd	Well Screen	: 70 to 80 feet

Depth in Feet	Surf. Elev. 283.37	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	283	1	100				(0 - 1) Asphalt (1 - 4) Silt, clayey, moderate yellowish brown, organic material and roots, stiff (4 - 5) Silt, clayey, moderate yellowish brown, organic material and roots, stiff, contains asphalt from 4 to 4.5
5	278	2	100				(5 - 9.5) Silt, olive gray, dry, becoming clayey between 7 and 9.5
10	273	3	75			ML	(9.5 - 17) Silt, clayey, moderate yellowish brown mottled w/ olive gray and dark yellowish orange, mostly olive gray material from 11 to 15, iron-manganese nodules and organic material
15	268						
20	263	4	85				(17 - 25) Silt, clayey, moderate yellowish brown mottled w/ olive gray and dark yellowish orange, becoming moist and containing less iron-manganese nodules and organic material, color becomes mostly olive gray near bottom
25	258						(25 - 27) Clay, olive gray, contains traces of organic material and iron-manganese nodules
30	253	5	100			CL	(27 - 33) Clay and silt, moderate yellowish brown mottled w/ olive gray, some drk yellowish orange staining, mostly olive gray near 33
35	248					ML	(33 - 35) Silt, moderate yellowish brown mottled w/ Lt. gray, numerous iron-manganese nodules (35 - 37) Silt, Lt. olive brown w/ traces of iron-manganese nodules
40	243	6	100			CL	(37 - 39) Clay, silty, moderate yellowish brown mottled w/ dark yellowish orange and abundant organic streaks, sandy near 39 (39 - 46) Clay, sand, fine, and silt, dark yellowish orange to moderate yellowish brown, Lt. gray to pale yellowish gray material from 44 to 46, pale yellowish gray seam at 46
45							

Well: 007G29LF
Elev.: 282.29



07-28-2003 N:\well logs\NSAMidsouth\007G29LF.BOR

BORING LOG OF 007G29LF

NSA MID-SOUTH
Millington, TN.

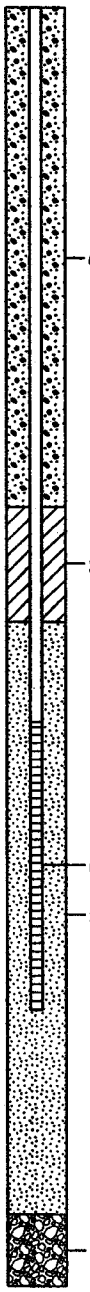
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1050 7/16/98	Northing	: 393384.30
Finished	: 1615 7/16/98	Easting	: 813594.00
Drilling Method	: Rotasonic	TOC Elevation	: 282.29
Drilling Company	: Alliance Drilling	Total Depth	: 80 feet
Geologist	: D. Ladd	Well Screen	: 70 to 80 feet

Well: 007G29LF
Elev.: 282.29

Depth in Feet	Surf. Elev. 283.37	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
45	238	6	100			CL	
						SC	(46 - 48) Sand, med. to coarse, and clay, dark yellowish orange mottled w/ Lt. gray, some organic streaks between 47 and 48
						SP	(48 - 50) Sand, coarse, and scattered gravel (up to 1/2" dia.), abundant iron staining
50	233	7	100			SC	(50 - 55) Sand, fine, clayey, Lt. olive gray (sand) and olive gray (clayey material), becomes mottled w/ pale orange material near 55, some iron staining near 55 (55 - 56.5) Sand, fine tovery fine, slightly clayey, Lt. gray becoming mottled w/ pale orange near 56.5, some iron staining, slightly lignitic and micaceous
55	228					SW	(56.5 - 58) Sand, med to very coarse, dark yellowish orange, wet, gravel (up to 1 1/2" dia.) between 57 and 58, some iron staining
						SC	(58 - 59.5) Sand, very fine to fine, dark yellowish orange to very pale orange, slightly clayey, lignitic, wet
60	223	8	100			SP	(59.5 - 67) Sand, coarse to very coarse, and gravel (up to 2"), mostly chert, poorly sorted, dark yellowish orange, wet
65	218						
70	213	9	100				(67 - 77) Sand, coarse to very coarse, and gravel (up to 2"), chert and qtz.,rounded to angular, poorly sorted, dark yellowish orange, wet, dark yellowish orange and black sand grains in a 3" zone at 69
75	208						(77 - 79.5) Sand, coarse to very coarse, and gravel (up to 2 1/2"), chert and qtz.,rounded to angular, poorly sorted, dark yellowish orange, wet, some dusky yellowish brown material near 79.5
80	203	10	100			CL	(79.5 - 89.5) Clay, slightly silty, dusky yellowish brown to dark yellowish brown mottled w/ Lt. gray very fine sand seams, predominate sand seams at 85 and 86, very micaceous, scattered lignite, stiff Bottom of boring at 87, shelby tube taken at 87 - 89.5, no recovery
85	198	11	0				
90							



ENSAFE

BORING LOG OF 007G30LF

NSA MID-SOUTH
Millington, TN.

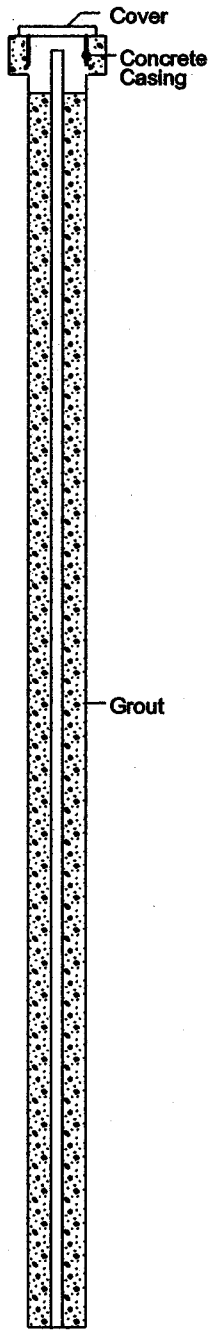
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1130 7/15/98	Northing	: 393468.20
Finished	: 1730 7/15/98	Easting	: 813714.30
Drilling Method	: Rotasonic	TOC Elevation	: 282.99
Drilling Company	: Alliance Drilling	Total Depth	: 80 feet
Geologist	: D. Ladd	Well Screen	: 70 to 80 feet

Depth in Feet	Surf. Elev. 283.07	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	283						(0 - 1) Asphalt
		1	60				(1 - 5) Silt, clayey, moderate yellowish brown, roots and some asphalt material (5 - 10) no recovery
5	278						
10	273	2	40				(10 - 12.5) Silt, clay, Lt. olive gray mottled w/ some moderate brown, moist (12.5 - 15) Silt, clayey, moderate yellowish brown mottled w/ dark yellowish orange and Lt. olive gray, some organic material, traces of iron-manganese nodules
15	268						(15 - 19) No recovery
20	263	3	40			CL	(19 - 22) Silt, very clayey, moderate yellowish brown mottled w/ very little dark yellowish orange, very moist (22 - 28) Silt, clayey, olive gray to greenish gray mottled w/ moderate yellowish brown from 25 to 28, moist
25	258						
30	253	4	50				(28 - 33) Silt, slightly clay, moderate yellowish brown w/ dark yellowish orange streaks, some reddish brown streaks at 33
35	248						(33 - 37.5) Clay, silty, olive gray mottled w/ moderate yellowish brown and dark yellowish orange, stiff, slightly sandy and lignitic near bottom
40	243	5	110			ML	(37.5 - 42.5) Silt, sand, fine to very fine, and clay, moderate yellowish brown mottled w/ dark yellowish orange and olive gray, some organic material
45						SC	

Well: 007G30LF
Elev.: 282.99



07-28-2003 N:\Waste\Logs\NSAMidsouth\007G30LF.BOR

ENSAFE

BORING LOG OF 007G30LF

NSA MID-SOUTH
Millington, TN.

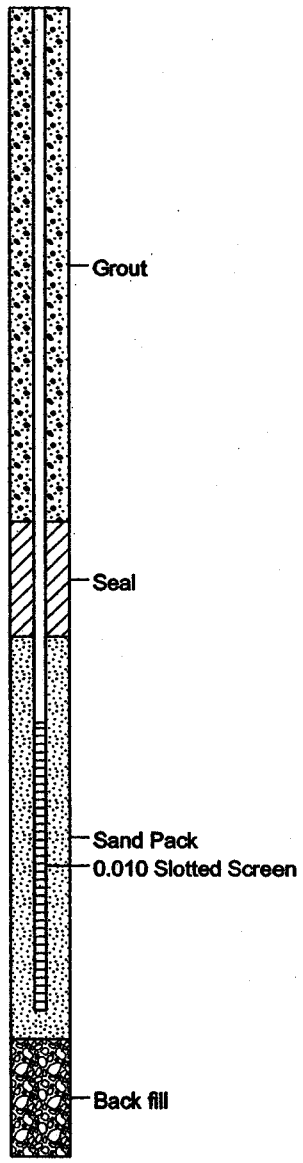
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1130 7/15/98	Northing	: 393468.20
Finished	: 1730 7/15/98	Easting	: 813714.30
Drilling Method	: Rotasonic	TOC Elevation	: 282.99
Drilling Company	: Alliance Drilling	Total Depth	: 80 feet
Geologist	: D. Ladd	Well Screen	: 70 to 80 feet

Depth in Feet	Surf. Elev. 283.07	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
45	238					SC	(42.5 - 46) Sand, very fine to med., clayey, moderate yellowish brown mottled w/ dark yellowish orange and Lt. gray, becoming olive gray from 45 to 46
						CL	(46 - 50.5) Clay, sandy, dusky yellowish brown, contains a pale yellowish brown to Lt. gray sand seam at 50, slightly micaceous
50	233	6	105			SC	(50.5 - 53) Sand, fine to med. Lt. gray w/ clayey seams, pale yellowish brown near top and bottom, micaceous, wet
						CL	(53 - 53.5) Clay, Lt. gray, and gravel (up to 1"), moist
55	228					SW	(53.5 - 55) Sand, fine to coarse, and gravel (up to 1 1/2" dia.), dark yellowish orange, some gravel is iron stained, iron concretions near top
							(55 - 65) Sand, coarse, and gravel, moderate yellowish brown to dark yellowish orange, contains dark yellowish brown to dusky yellowish brown sand from 57 to 58, qtz. and chert, up to 2" dia., rounded to angular, poorly sorted, wet
60	223	7	105				
65	218					SP	(65 - 74) Sand, coarse, and gravel, moderate yellowish brown to dark yellowish brown from 70 to 71.5, sand becoming dark yellowish orange and alittle silty at 74, qtz. and chert, up to 2" dia., rounded to angular, poorly sorted, wet
70	213	8	100	2.0			
75	208					GP	(74 - 76) Gravel and sand, coarse to very coarse, dark yellowish orange, gravel up to 3" dia., mostly chert, poorly sorted, micaceous, wet
						SP	(76 - 81) Sand, coarse to very coarse, and gravel, dark yellowish brown, gravel up to 3" dia. poorly sorted, wet, becoming lighter in color near 81
80	203	9	105				
						CL	(81 - 85) Clay, dusky yellowish brown, contains some Lt. gray sandy seams, stiff
85	198						Bottom of boring at 85
90							

Well: 007G30LF
Elev.: 282.99



07-28-2003 N:\well logs\NSA\Midsouth\007G30LF.BOR

EnSafe Inc.

Log of Monitoring Well 007G31LF

Project: *NSAMEN, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No: *0094-001*	Surface Elevation:
Started at *1045 on 11/18/98*	TOC Elevation: *feet msl*
Completed at *1500 on 11/18/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *85 feet*
Geologist: *Ben Brantley*	Well Screen: *68 to 78 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5			1	100				ML	Surface conditions: grassy area south of runway, west of 007G28LF. (0'-5') Clayey silt, yellow-brown, friable and dry. (5'-8') Clayey silt, gray-greenish gray, medium stiff and moist.		2" diam., Sch. 40 PVC
10								CL	(8'-9') Clay, dusky brown to dark gray, stiff to hard, and dry. (9'-14') Clayey silt, greenish gray with yellow-orange iron staining, medium stiff and moist. Manganese inclusions from 12'-14'.		hlg solids grout
15			2	90					Same as above to 16'. (16'-25') Clayey silt, yellow-gray and yellow-orange, soft and wet, with manganese inclusions throughout.		
20								ML			
25			3	85					Same as above to 29'.		
30									(29'-32.5') Clayey silt, olive gray and dark brown with iron staining, stiff and dry.		

EnSafe Inc.

Log of Monitoring Well 007G31LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *1045 on 11/18/98*	TOC Elevation: *feet msl*
Completed at *1600 on 11/18/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *85 feet*
Geologist: *Ben Brantley*	Well Screen: *68 to 78 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
								ML			
								CL	(32.5'-34.5') Silty clay, grayish green, stiff and moist near bottom foot of core.		
35			4	100				ML	(34.5'-35') Clayey silt, orange to brown, stiff to hard, and dry.		
40									Same as above, moist and soft from 36'-40'. (40'-43') Clayey silt, mottled gray and orange-brown, stiff and moist.		
45			5	100				ML	Clayey silt, as above, becoming sandy at 43'. Same as above to 51', increasingly sandy, stiff to soft, moist.		
50								SW	(51'-67') Gravelly sand, brownish orange, medium- to coarse-grained, well graded and wet, gravels up to 1.5" in diameter (LD).		
55											
60											

2" diam., Sch. 40 PVC

hig solids grout

EnSafe Inc.

Log of Monitoring Well 007G31LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *1045 on 11/18/98*	TOC Elevation: *feet msl*
Completed at *1600 on 11/18/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *85 feet*
Geologist: *Ben Brantley*	Well Screen: *68 to 78 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
65			6	80				SW			
								SP	(67'-69') Sand, tan, fine- to medium-grained.		
70								SW	(69'-79') Sand with gravels resuming at 69'.		
75								GW	(75'-79') Silty and sandy gravels, orange to brown, gravels up to 3" in diameter (LD).		
80								CL	(79'-85') Clay, dusky brown, with seams of fine gray sand, very stiff to hard, and dry.		
85			7	100					*End of boring at 85.*		
90											

EnSafe Inc.

Log of Monitoring Well 007G32LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *0840 on 11/19/98*	TOC Elevation: *feet msl*
Completed at *1530 on 11/19/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *90 feet*
Geologist: *Ben Brantley*	Well Screen: *68 to 78 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5			1	100				ML	Surface conditions: grassy area, approximately 5-10 yds. north of the taxiway, 300 ft. west of 007G11LF. (0'-7.5') Clayey silt, yellow-brown, stiff and dry.		2" diam., Sch. 40 PVC
10								No R	(7.5'-8.5') Clayey silt, greenish gray to yellowish orange to yellowish gray, moist and stiff, with manganese inclusions near bottom of extrusion. (8.5'-15') No Recovery.		hig solids grout
15			2	35					(15'-16') Clayey silt, greeenish gray, moist and stiff. (16'-26') Clayey silt, yellowish brown, moist and soft.		
20								ML			
25			3	100					(26'-28') Silt to clayey silt, gray, medium stiff and moist. (28'-35') Clayey silt, olive green to greenish gray, stiff to hrad, and dry.		
30											

EnSafe Inc.

Log of Monitoring Well 007G32LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *0840 on 11/19/98*	TOC Elevation: *feet msl*
Completed at *1530 on 11/19/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *90 feet*
Geologist: *Ben Brantley*	Well Screen: *68 to 78 feet*

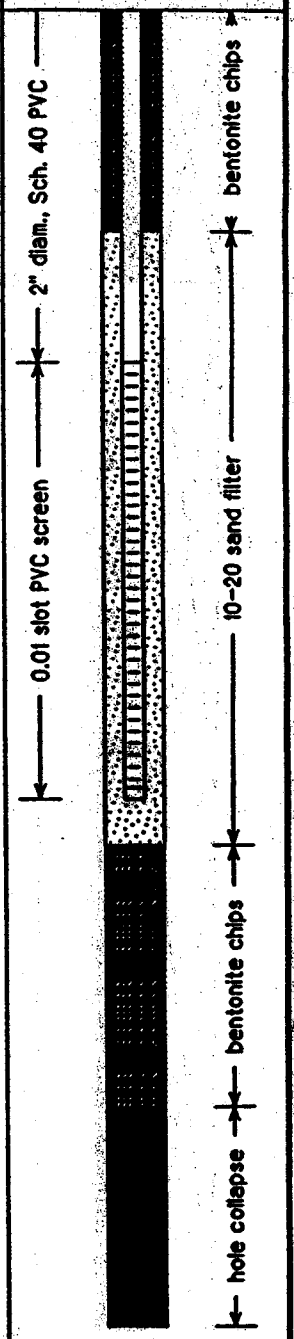
DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
35			4	100				ML	Same as above with iron staining from 32'-39'.		
40									(39'-45') Clayey silt, mottled yellowish brown and reddish orange, with gray streaks, stiff. Same as above, becoming sandy with scattered pebbles (~1/4" diam. LD) from 41'-45', medium stiff and moist.		
45								ML CL	(45'-47.5') Silt and clay, gravelly and sandy, yellowish brown and light gray, medium stiff.		
50								SW	(47.5'-55') Sand, silty, with gravel (up to 1" diam. LD, chert), yellowish brown. Same as above; sand ranges from fine- to coarse-grained, with gravels up to 2" diam. LD. Silt content decreasing past 51'.		
55			5	93					Same as above to 59'.		
60								GW	(59'-72') Sandy gravel, orange brown; gravels up to 2" diam. LD, with sand as fine- to coarse-grained.		2" diam., Sch. 40 PVC; hig solids grout

EnSafe Inc.

Log of Monitoring Well 007G32LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *0840 on 11/19/98*	TOC Elevation: *feet msl*
Completed at *1530 on 11/19/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *90 feet*
Geologist: *Ben Brantley*	Well Screen: *68 to 78 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
65								GW		
70								No R	(72'-75') No Recovery.	
75			6	85				GW	Same as above to 78'.	
80								CL	(78'-90') Clay, dusky brown with light gray sand seams, very stiff; thin (1mm) lignite seams intermittent throughout run.	
85									Increasing sand content from 84'-88'.	
90			7	113						



WELL DIAGRAM

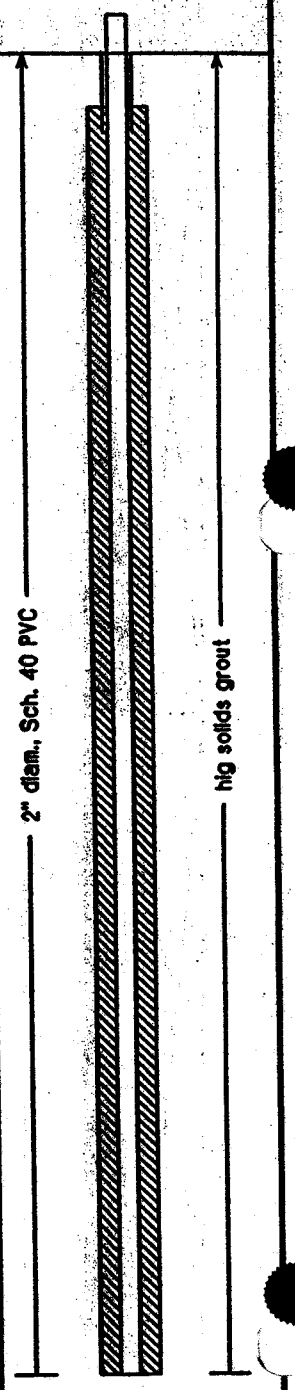
EnSafe Inc.

Log of Monitoring Well 007G33LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *1555 on 11/19/98*	TOC Elevation: *feet msl*
Completed at *1200 on 11/20/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *85 feet*
Geologist: *Ben Brantley*	Well Screen: *75 to 85 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	80				ML	Surface conditions: grassy area between taxiway and runway, approx. 100 ft. east of western access strip between taxiway and runway. (0'-4') Clayey silt, dark brown, hard and dry. Same as above to 7.5'. (7.5'-10') Clayey silt, yellowish brown and olive gray, stiff and moist. Manganese inclusions from 9'-10'.	
10								No R	No Recovery from 10'-15'.	
15			2	50				ML	(15'-28') Clayey silt, yellowish brown and olive gray, stiff, moist.	
20										
25			3	100						

WELL DIAGRAM



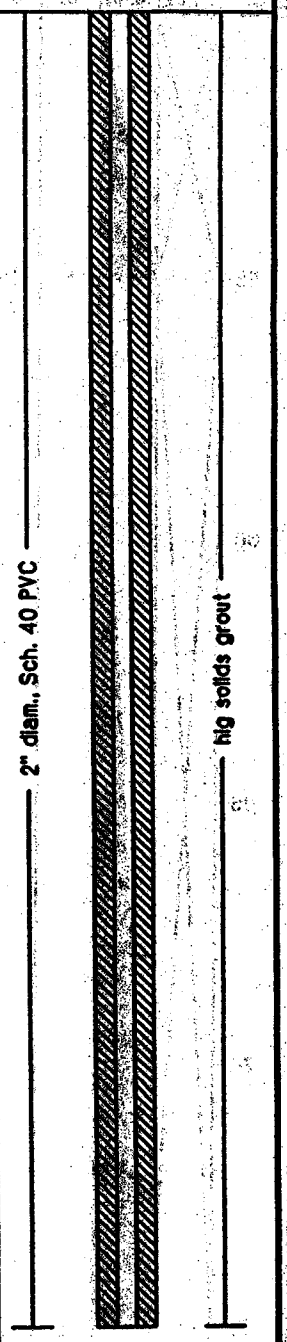
Log of Monitoring Well 007G33LF

EnSafe Inc.

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No: *0094-001*	Surface Elevation:
Started at *1555 on 11/19/98*	TOC Elevation: *feet msl*
Completed at *1200 on 11/20/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *95 feet*
Geologist: *Ben Brantley*	Well Screen: *75 to 85 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
30								ML	(28'-31') Clayey silt, greenish gray, stiff to hard and dry.	
									(31'-34') Clayey silt, yellowish brown with greenish gray and light gray mottling, stiff and dry.	
								No R	No Recovery.	
35			4	90					Same as above (clayey silt) to 48'.	
40								ML		
45									Becoming sandy at 44', increasingly sandy to 48'.	
								GW	(48'-49') Sandy gravel, orangish brown.	
50								No R	No Recovery from 49'-55'.	

WELL DIAGRAM



EnSafe Inc.

Log of Monitoring Well 007G33LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *1555 on 11/19/98*	TOC Elevation: *feet msl*
Completed at *1200 on 11/20/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *95 feet*
Geologist: *Ben Brantley*	Well Screen: *75 to 85 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
								No R			
55			5	70				GW	(55'-64') Sandy gravel, orangish brown, gravels up to 1" diam. LD, with well graded sand.		
65								SW	(64'-76') Sand, yellowish brown, fine- to medium-grained, with pebble- sized gravels throughout.		
75			6	100							

2" diam., Sch. 40 PVC

hg solids grout

bentonite chips

10-20 sand filter

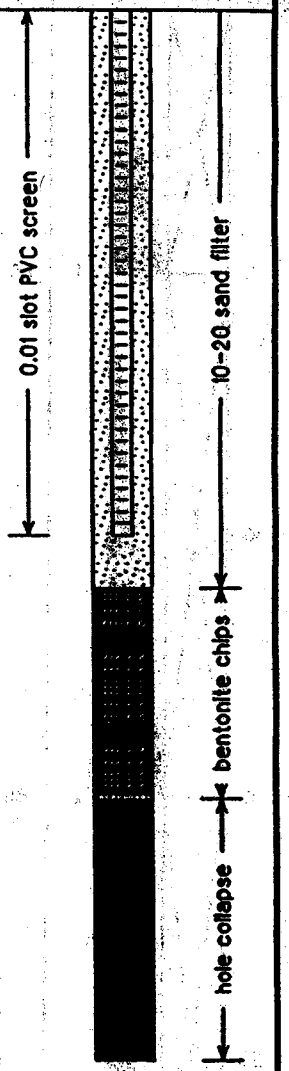
EnSafe Inc.

Log of Monitoring Well 007G33LF

Project: NSAMEM, SWMU 7	Location: NSA Memphis, Millington, TN
Project No.: 0094-001	Surface Elevation:
Started at 1555 on 11/19/98	TOC Elevation: feet msl
Completed at 1200 on 11/20/98	Depth to Groundwater: feet Measured:
Drilling Method: Rotasonic; 4" barrel through 6" casing	Groundwater Elevation: feet msl
Drilling Company: Boart-Longyear	Total Depth: 95 feet
Geologist: Ben Brantley	Well Screen: 75 to 85 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								SW		
									(76'-86') Sandy gravel, yellowish brown, with gravels ranging from pea size up to 2" diam. LD.	
80								GW		
85			7	100						
									(86'-95') Silty clay, dusky brown, hard and waxy with local thin seams of lignite throughout; minor sand (fine-grained and gray in color) lenses throughout as well.	
90								CL		
95			8	130					*End of boring at 95'.*	
100										

WELL DIAGRAM



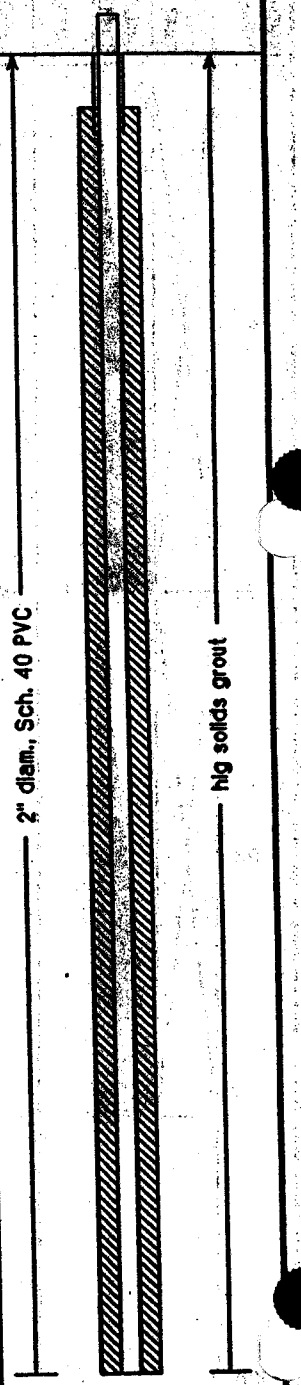
EnSafe Inc.

Log of Monitoring Well 007G34LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *0930 on 11/21/98*	TOC Elevation: *feet msl*
Completed at *1530 on 11/21/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *95 feet*
Geologist: *Ben Brantley*	Well Screen: *81 to 91 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	80				ML	Surface conditions: grassy area near northern fence, approx. 175 ft. north of the runway and approx. 200 ft. west of the old runway strip. (0'-4') Clayey silt, dark brown, friable and dry. Iron staining visible from 3'-4'. (5'-8') Clayey silt, greenish gray, soft and moist. (8'-11.5') Clayey silt, mottled yellowish brown and gray, stiff and moist, with manganese inclusions throughout.	
10										
15			2	65				No R	No Recovery from 11.5'-15'.	
20								ML	Same as above, increasingly soft and wet with depth toward 25'; iron staining and manganese inclusions throughout.	
25			3	100						

WELL DIAGRAM



EnSafe Inc.

Log of Monitoring Well 007G34LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *0930 on 11/21/98*	TOC Elevation: *feet msl*
Completed at *1530 on 11/21/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *95 feet*
Geologist: *Ben Brantley*	Well Screen: *81 to 91 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
30									(25'-32') Clayey silt, olive grayish brown, with iron staining, soft and wet.		
									(32'-37') Clayey silt, greenish gray mottled with olive green iron- stained clayey silt.		
35			4	100				ML			
									(37'-43') Clayey silt, mottled brown and light gray, stiff and moist.		
40											
									(43'-46') Sandy silt, mottled orangish brown and light gray, stiff and moist.		
45											
								SP	(46'-48') Sand, fine-grained, mottled light gray with orange and with yellowish brown, moist to wet and micaceous.		
								No R	No Recovery from 48'-55'.		
50											

2" diam., Sch. 40 PVC

hg solids grout

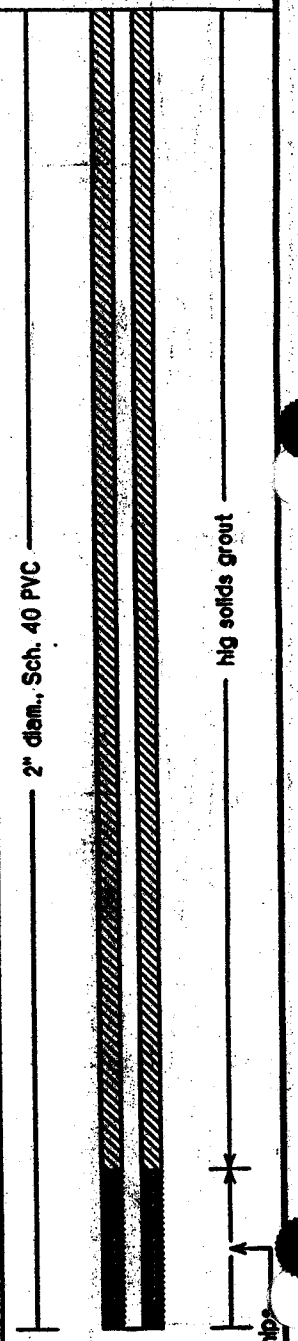
EnSafe Inc.

Log of Monitoring Well 007G34LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *0930 on 11/21/98*	TOC Elevation: *feet msl*
Completed at *1530 on 11/21/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *85 feet*
Geologist: *Ben Brantley*	Well Screen: *81 to 91 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								No R		
55			5	65				SW	(55'-58') Sand, brownish orange, well graded (fine- to coarse-grained) with scattered gravels (up to 1" diam. LD), micaceous.	
60								SP	(58'-60) Sand, yellowish brown to tan, poorly graded (well sorted, no gravels), micaceous. (60'-63') Same as above, with color change to orangish brown medium- grained sand. (63'-64') Same as above, with color change to mottled tan and light gray fine-grained sand.	
65								SW	(64'-67') Sand, brownish orange, well graded (with gravels up to 1" diam. LD).	
70								SP	(67'-73') Sand, tan to light gray, poorly graded (fine- to medium- grained, no gravels).	
75			6	90				No R SP	No Recovery from 73'-75'.	

WELL DIAGRAM



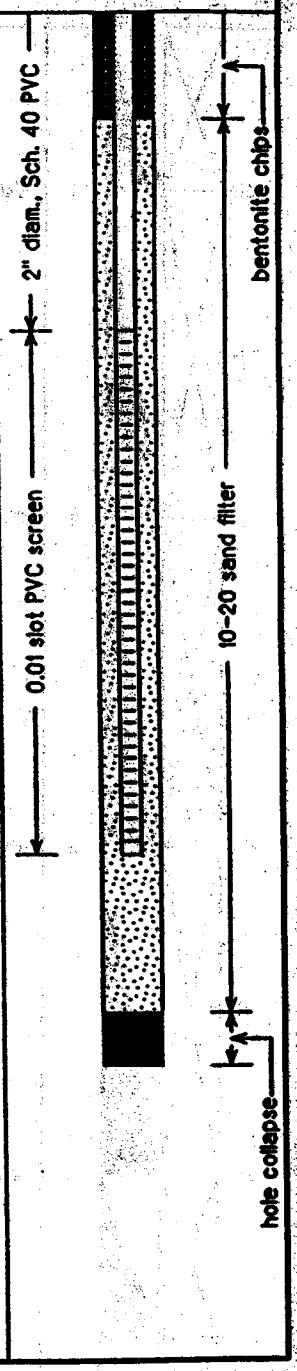
EnSafe Inc.

Log of Monitoring Well 007G34LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *0930 on 11/21/98*	TOC Elevation: *feet msl*
Completed at *1530 on 11/21/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *95 feet*
Geologist: *Ben Brantley*	Well Screen: *81 to 91 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								SP	Same as above to 78'.	
80								SW	(78'-79.5') Sand, dark orangish brown, well graded (fine- to medium- grained, with gravels up to 1.5" diam. LD). (79.5'-82') Sand, yellowish brown, well graded (fine- to medium- grained, with scattered pebbles up to 1/4" diam. LD). (82'-90') Sand, brownish orange, well graded (medium- to coarse- grained, with gravels).	
85										
90								ML	(90'-95') Sandy silt, dark gray, very stiff, with gray clay a clay lens (~1/8" thick) between 90'-91'.	
95			7	80					*End of boring at 95'.*	
100										

WELL DIAGRAM



EnSafe Inc.

Log of Monitoring Well 007G35LF

Project: NSAMEM, SWMU 7	Location: NSA Memphis, Millington, TN
Project No.: 0094-001	Surface Elevation:
Started at 0930 on 11/21/98	TOC Elevation: feet msl
Completed at 1600 on 11/22/98	Depth to Groundwater: feet Measured:
Drilling Method: Rotasonic; 4" barrel through 6" casing	Groundwater Elevation: feet msl
Drilling Company: Boart-Longyear	Total Depth: 85 feet
Geologist: Ben Brantley	Well Screen: 81 to 91 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5			1	100					Surface conditions: grassy area approx. 250 west of 007G34LF, wets of old runway, north of present runway. (0'–7') Clayey silt, dark brown, hard and friable, dry.		2" diam., Sch. 40 PVC
10									(7'–16') Clayey silt, greenish to olive gray mottled with yellowish brown clayey silt, manganese inclusions throughout, stiff and dry.		
15			2	95					(16'–26') Clayey silt, yellowish brown and olive gray, iron manganese inclusions throughout, medium stiff and moist.		
20								ML			
25			3	100					(26'–29') Clayey silt, dark gray, stiff and moist.		
30									(29'–35') Color change to dark greenish gray, with iron staining. Increasingly stiff and dry, with increased iron staining within the last 2 feet (33'–35') of run.		
35			4	95					Same as above to 38'.		Hg solids grout
40									(38'–40') Clayey silt, yellowish brown, stiff and moist.		

EnSafe Inc.

Log of Monitoring Well 007G35LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *0930 on 11/21/98*	TOC Elevation: *feet msl*
Completed at *1600 on 11/22/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *95 feet*
Geologist: *Ben Brantley*	Well Screen: *81 to 91 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45								ML	(40'-43') Sandy silt, yellowish brown and gray, stiff. (43'-45') Same as above with gravels up to 1" diam. LD.		2" diam., Sch. 40 PVC
50								SW	(45'-51') Gravelly sand, mottled gray, yellowish brown, and orangish brown; well graded (fine- to coarse-grained sand with gravels up to 3/4" diam. LD).		
55								No R	No Recovery from 51'-55'.		
			5	80				SW	(55'-60') Sand, well graded (medium-grained, well sorted sand with poorly sorted sandy gravels, coarsening downward to 60').		
60								SP	(60'-61') Sand, yellowish brown and orangish brown, very fine-grianed. (61'-72.5') Sand, yellowish brown and orangish brown, fairly well sorted (poorly graded), fine- to medium-grained; very few, rare pebbles in section.		
65											
70											
								SW	(72.5'-73') Sand, orangish brown, medium- to coarse-grained, with gravels.		
75			6	93				No R	No Recovery from 73'-75'.		bentonite chips
								SP	(75'-91') Sand, fine- to medium-grained, gravels very rare to none except near 90'-91'.		Nig solids grout
80											

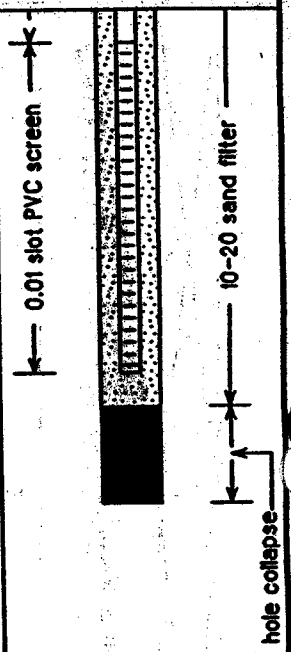
Log of Monitoring Well 007G35LF

EnSafe Inc.

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *0930 on 11/21/98*	TOC Elevation: *feet msl*
Completed at *1600 on 11/22/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *95 feet*
Geologist: *Ben Brantley*	Well Screen: *81 to 91 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85								SP		
90								ML	(91'-94') Sandy silt, dark gray, with thin (<1mm) lignite lenses.	
95			7	95					*End of boring at 95'.*	
100										
105										
110										
115										
120										

WELL DIAGRAM



EnSafe Inc.

Log of Monitoring Well 007G36LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No: *0094-001*	Surface Elevation:
Started at *1140 on 11/22/98*	TOC Elevation: *feet msl*
Completed at *1540 on 11/22/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *95 feet*
Geologist: *Ben Brantley*	Well Screen: *82 to 92 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5			1	90					Surface conditions: grassy area approx. 250 ft. west of 007G35LF, north of active runway and west of old runway. (0-4.5') Clayey silt, dark brown and yellowish brown, stiff and moist, manganese inclusions throughout. Same as above to 7'. (7'-17') Clayey silt, dark brown, hard and stiff, dry.		2" diam., Sch. 40 PVC hlg solids grout
10											
15			2	85				ML			
20									(17'-28') Clayey silt, greenish gray, with iron staining, stiff and dry.		
25			3	100					(25'-28') Same as above, soft and wet, without manganese inclusions. (28'-34.5') Clayey silt, mottled yellowish brown and olive gray, soft and moist.		
30											

EnSafe Inc.

Log of Monitoring Well 007G36LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *1140 on 11/22/98*	TOC Elevation: *feet msl*
Completed at *1540 on 11/22/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *95 feet*
Geologist: *Ben Brantley*	Well Screen: *82 to 92 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
35			4	95				ML	Same as above; stiff and dry throughout, with manganese inclusions, from 35'-43'.		2" diam., Sch. 40 PVC; hlg solids grout
40											
45								CL	(43'-48') Sandy clay, mottled yellowish brown, orangish brown, and gray, stiff and with a few scattered pebbles.		
50								SW	(48'-49') Sand, orangish brown with pebble-size gravels.		
								GW	(49'-51') Sandy gravel, orangish brown, gravels up to 1.5" diam. LD.		
								No R	No Recovery from 51'-55'.		
55			5	80				GW	Same as above to 56', gravels up to 2" diam. LD.		
								SP	(56'-66') Sand, mottled yellowish brown, orangish brown, and gray, fine- to medium-grained, well sorted (poorly graded) and micaceous.		
60											

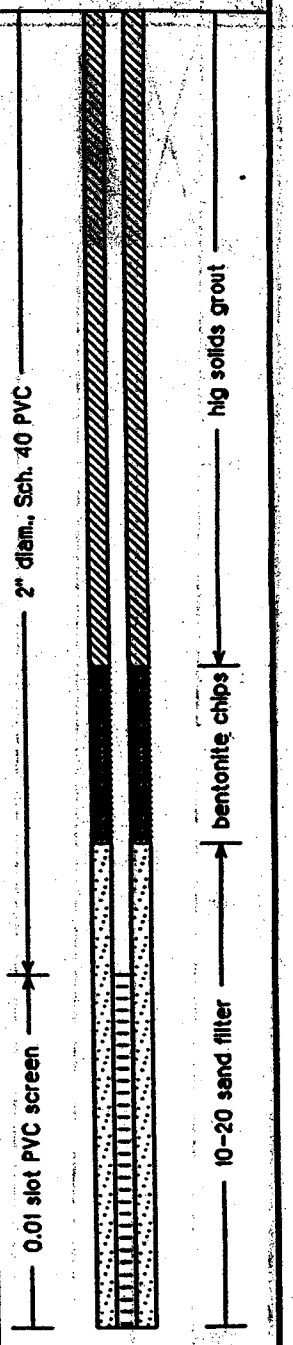
EnSafe Inc.

Log of Monitoring Well 007G36LF

Project: *NSAMEM, SWMU 7*	Location: *NSA Memphis, Millington, TN*
Project No.: *0094-001*	Surface Elevation:
Started at *1140 on 11/22/98*	TOC Elevation: *feet msl*
Completed at *1540 on 11/22/98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Boart-Longyear*	Total Depth: *95 feet*
Geologist: *Ben Brantley*	Well Screen: *82 to 92 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
65								SP		
								CL	(66'-67') Clay, mottled pink and light gray, plastic.	
								SP	(67'-68') Sand, mottled gray and orangish brown, very fine-grained.	
								CL	(68'-69.5') Clay, mottled ppink and light gray, very stiff and plastic.	
70								SC	(69.5'-71.5') Clayey sand, reddish orange, fine-grained.	
									(71.5'-82') Sand (mottled yellowish brown and reddish orange, medium- to coarse-grained, poorly sorted/well graded) with gravels.	
75			6	100				SW		
80										
								GW	(82'-92.5') Sand (orangish brown, coarse- to medium-grained) with gravels up to 2" diam. LD.	
85										
90										

WELL DIAGRAM



Log of Monitoring Well 007G36LF

EnSafe Inc.

Project: NSAMEM, SWMU 7	Location: NSA Memphis, Millington, TN
Project No.: 0094-001	Surface Elevation:
Started at 1140 on 11/22/98	TOC Elevation: feet msl
Completed at 1540 on 11/22/98	Depth to Groundwater: feet Measured:
Drilling Method: Rotasonic; 4" barrel through 6" casing	Groundwater Elevation: feet msl
Drilling Company: Boart-Longyear	Total Depth: 95 feet
Geologist: Ben Brantley	Well Screen: 82 to 92 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
								GW			
								ML	(92.5'-95') Sandy silt, dark gray, with liginitic laminations throughout section.		
95			7	100					*End of boring at 95'.*		hole collapse
100											
105											
110											
115											
120											

BORING LOG OF 007G37F1

NSA MID-SOUTH
Millington, TN.

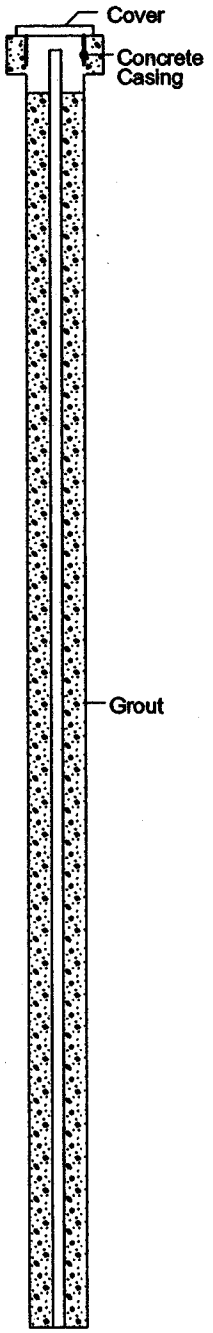
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 7/14/99	Northing	: 393729.29
Finished	: 7/14/99	Easting	: 812560.30
Drilling Method	: Rotasonic	TOC Elevation	: 280.29
Drilling Company	: Alliance Drilling	Total Depth	: 90 feet
Geologist	: B. Brantley	Well Screen	: 50 to 90 feet

Depth in Feet	Surf. Elev. 280.96	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	280	1					(0 - 2) Lt. brown clayey silt, moist (2 - 5) Lt. brown clayey silt, dry, hard
5	275	2					(5 - 7) Yellowish brown and greenish gray clayey silt, moist, soft to med. stiff (7 - 16) Yellowish brown and greenish gray clayey silt w/ manganese and iron stains, moist, soft to med. stiff
10	270						
15	265	3				ML	(16 - 21) Yellowish brown and greenish gray clayey silt, moist, soft to med. stiff
20	260						(21 - 25) Lt. olive gray clayey silt w/ iron sttaining, moist, med. stiff
25	255	4					(25 - 35) Olive gray silt w/ rusty brown streaks, moist, very stiff
30	250						
35	245	5					(35 - 37) Lt. brown yellowish orange greenish gray clayey silt, moist, very stiff manganese streaks at 36
40	240					CL	(37 - 41) Lt. brown silty clay w/ Lt. gray streaks, moist, very stiff
45						SC	(41 - 50) Lt. brown sandy clay w/ Lt. gray streaks (sand increases with depth), moist, very stiff

Well: 007G37F1
Elev.: 280.29



07-28-2003 N:\well logs\NSAMidsouth\007G37F1.BOR

BORING LOG OF 007G37F1

ENSAFE

NSA MID-SOUTH
Millington, TN.

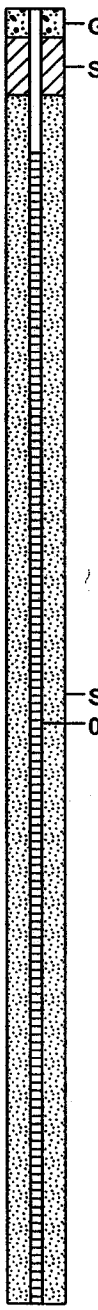
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 7/14/99	Northing	: 393729.29
Finished	: 7/14/99	Easting	: 812560.30
Drilling Method	: Rotasonic	TOC Elevation	: 280.29
Drilling Company	: Alliance Drilling	Total Depth	: 90 feet
Geologist	: B. Brantley	Well Screen	: 50 to 90 feet

Depth in Feet	Surf. Elev. 280.96	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
45	235					SC	
50	230	6				SC	(50 - 51.5) Lt. grayish tan clayey sand, wet
						SW	(51.5 - 55.5) Reddish brown to Lt. brown med. to coarse sand w/ gravel (up to 2" dia.)
55	225					SP	(55.5 - 57.5) Yellowish brown (tan) fine grained sand
60	220	7				SW	(57.5 - 65) Yellowish brown (tan) med. to coarse grained sand w/ gravel (up to 1/2" dia.)
65	215						(65 - 69) Yellowish brown (tan) med. to coarse grained sand w/ gravel (increases content and size with depth)
70	210	8				SP	(69 - 71) Tan fine sand
						SW	(71 - 75) Tan fine to coarse sand w/ gravel
75	205	9				GW	(75 - 85) Lt. brown sandy gravel (up to 2" dia.)
80	200						
85	195	10					(85 - 90) Lt. brown sandy gravel w/ increase in sand contents and less gravel (up to 2" dia.)
90							

Well: 007G37F1
Elev.: 280.29



07-28-2003 N:\well logs\NSAMidsouth\007G37F1.BOR

ENSAFE

BORING LOG OF 007G37L1

NSA MID-SOUTH
Millington, TN.

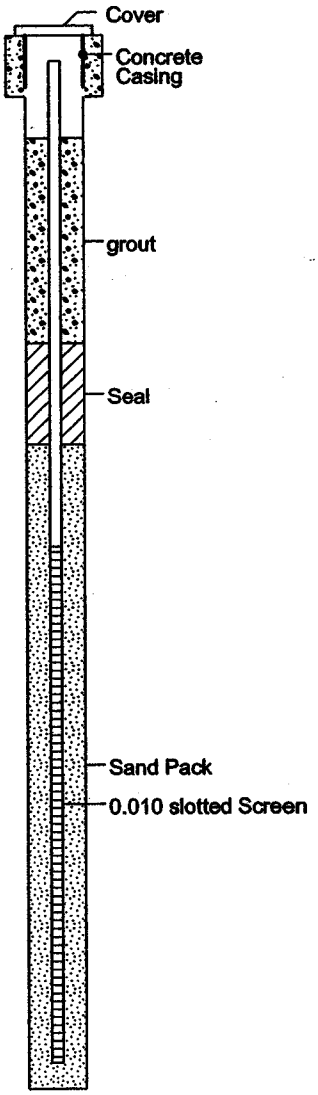
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1400 7/20/99	Northing	: 393722.68
Finished	: 1440 7/20/99	Easting	: 812553.28
Drilling Method	: Rotasonic	TOC Elevation	: 280.13
Drilling Company	: Alliance Drilling	Total Depth	: 20 feet
Geologist	: C. Davis	Well Screen	: 10 to 20 feet

Depth in Feet	Surf. Elev. 280.94	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	280	1	80			ML	(0 - 5) Lt. brown clayey (slightly) silt, slightly moist
5	275					ML	(5 - 8) Lt. gray clayey silt w/ mottled iron staining, slightly moist to moist, medium stiff
10	270	2	75			ML	(8 -15) Lt. brown to Lt. yellowish-orange brown clayey silt w/ some gray mottling and iron-mang. nodules, moist, slightly stiff
15	265	3	70			ML	(15 - 20) Lt. brown and Lt. gray mottled clayey silt w/ iron-mang. nodules and iron staining, moist, slightly stiff
20	260						
25							

Well: 007G37L1
Elev.: 280.94



07-28-2003 N:\well logs\NSA\Midsouth\007G37L1.BOR

BORING LOG OF 007G37L2

NSA MIDSOUTH
Millington, TN.

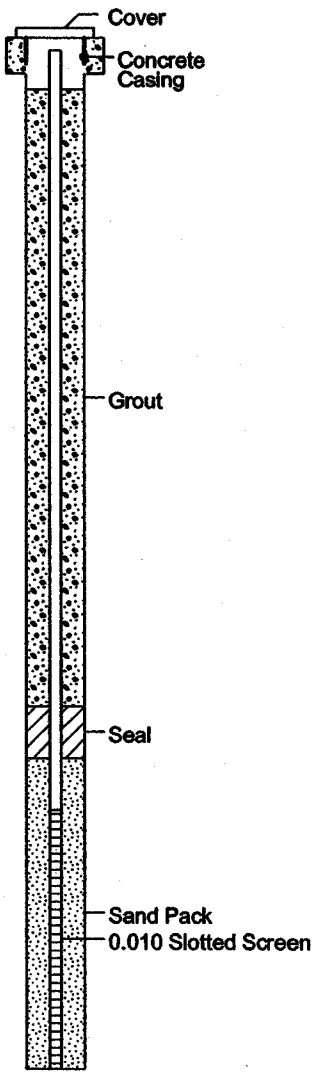
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1000 7/20/99	Northing	: 393715.55
Finished	: 1130 7/20/99	Easting	: 812546.55
Drilling Method	: Rotasonic	TOC Elevation	: 280.22
Drilling Company	: Allinance Drilling	Total Depth	: 40 feet
Geologist	: C. Davis	Well Screen	: 30 to 40 feet

Depth in Feet	Surf. Elev. 280.82	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	280	1	100			ML	(0 - 5) Lt. to med. brown slighty clayey silt w/ some mottled lt. gray silt and clay pebbles, slighty moist, stiff
5	275					ML	(5 - 8) Greenish gray to med. gray clayey silt w/ some iron staining, slighty moist to moist, stiff
10	270	2	80				(8 - 15) Lt. brown and greenish gray mottled clayey silt w/ some iron-manganese nodules, moist, sightly stiff
15	265	3	100			ML	(15 - 22.5) Lt. brown and greenish gray mottled clayey silt (increasing clay content) w/ some iron-manganese nodules, moist, sightly stiff
20	260						
25	255	4	100			ML	(22.5 - 25) Olive gray very clayey silt w/ some iron staining, moist, pliable (25 - 31.5) Olive gray clayey silt motted w/ iron staining (increasing with depth), slighty moist, stiff
30	250						
35	245	5	100			ML	(31.5 - 33) Lt. gray and yellowish orange mottled clayey silt, slighty moist, stiff (33 - 35) Lt. gray and yellowish orange mottled clayey silt, slighty moist, very stiff
						ML	(35 - 38) Olive gray and Lt. brown mottled clayey silt, slighty moist, stiff
40	240					ML	(38 - 40) Lt. gray clayey silt mottled w Lt/ brown clayey silt, slightly moist to moist, stiff
45	235						
50							

Well: 007G37L2
Elev.: 280.82



07-28-2003 N:\well logs\NSA\Midsouth\007G37L2.BOR

BORING LOG OF 007G37LF

NSA MID-SOUTH
Millington, TN.

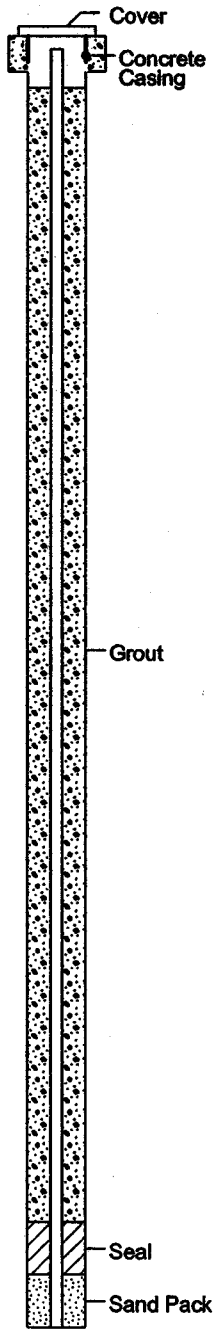
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1440 2/1/99	Northing	: 393714.18
Finished	: 1010 2/2/99	Easting	: 812575.75
Drilling Method	: Rotasonic	Grass Elevation	: 280.52
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 51 to 91 feet

Depth in Feet	Surf. Elev. 280.52	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	280	1	60			ML	(0 - 3) Lt. brown silt, wet 0" - 6", dry and hard 6"- 3'
5	275	2	110			ML	(5 - 8) Lt. brown and olive gray silt w/ manganese, moist, med. stiff (8 - 15) Lt. brown silt, moist, med. stiff
15	265	3	100			ML	(15 - 20) Lt. brown silt w/ trace of manganese, moist, med. stiff (20 - 25) Lt. gray and Lt. brown silty, moist, soft and med. stiff
25	255	4	100			CL	(25 - 32) Greenish gray silty clay,very moist, varies from soft to med. stiff (32 - 43) Lt. brown w/ orange brown and gray silty clay, dry, very stiff
40	240	5	100				(43 - 46) Lt. brown with gray sandy clay, moist, soft
45	235	6	100				(46 - 49) Gray w/ LT. brown sandy clay w/ trace of gravel, wet, very stiff
50						SW	

Well: 007G37LF
Elev.: 280.59



07-28-2003 N:\well logs\NSAMidsouth\007G37LF.BOR

ENSAFE

BORING LOG OF 007G37LF

NSA MID-SOUTH
Millington, TN.

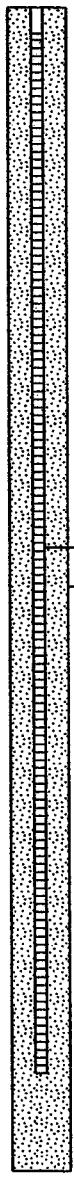
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1440 2/1/99	Northing	: 393714.18
Finished	: 1010 2/2/99	Easting	: 812575.75
Drilling Method	: Rotasonic	Grass Elevation	: 280.52
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 51 to 91 feet

Depth in Feet	Surf. Elev. 280.52	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
50	230	6	100			SW	(49 - 54) Orange brown med. coarse sand, w/ gravel (up to 2" in diameter
						SP	(54 - 55) Lt. brown (tan) fine sand
55	225					SW	(55 - 56) Orange brown fine to coarse sand w/ gravel (up to 1.5")
						SP	(56 -60) Tan brown fine sand
60	220	7	75				(60 - 74) Orange brown med. coarse sand w/ gravel (up to 1.5")
65	215					SW	
70	210	8	100				
75	205						(74 - 90) Orange brown sandy clay w/ gravel (up to 2")
80	200	9	95			GW	
85	195						
90	190	10	95			SW	(90 - 91.5) Lt. brown fine to coarse sand, clayey w/ trace of pebbles
						SP	(91.5 - 92) Tan brown fine sand, silty and clayey w/ trace of pebbles
95	185						(92 - 95) Greenish gray and dark brown silty sand, very lignitic, wet
100							

Well: 007G37LF
Elev.: 280.59



07-28-2003 N:\well logs\NSAMidsouth\007G37LF.BOR

ENSAFE

BORING LOG OF 007G37UC

NSA MID-SOUTH
Millington, TN.

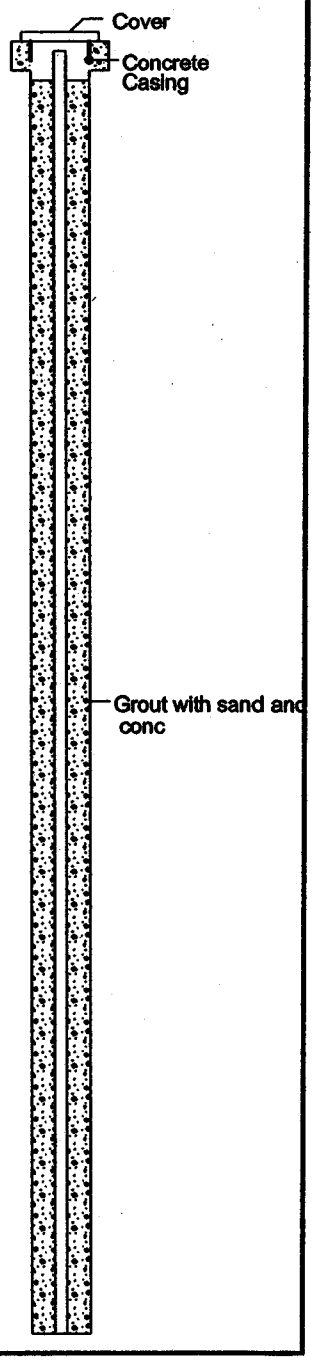
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1630 7/12/99	Northing	: 393736.90
Finished	: 1440 7/13/99	Easting	: 812568.19
Drilling Method	: Rotasonic	TOC Elevation	: 280.42
Drilling Company	: Alliance Drilling	Total Depth	: 125 feet
Geologist	: B. Brantley	Well Screen	: 115 to 125 feet

Depth in Feet	Surf. Elev. 281.07	Samples	Blow Count	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	281	1	1232	80			ML	(0 - 2) Lt. brown clayey silt, moist (2 - 5) Lt. brown clayey silt, dry, hard
5	276							(5 - 7) Yellowish brown and greenish gray clayey silt, moist, soft to med. stiff (7 - 16) Yellowish brown and greenish gray clayey silt w/ manganese and iron stains, moist, soft to med. stiff
10	271	2		80				
15	266							(16 - 21) Yellowish brown and greenish gray clayey silt, moist, soft to med. stiff
20	261	3		100				(21 - 25) Lt. olive gray clayey silt w/ iron sttaining, moist, med. stiff
25	256							(25 - 35) Olive gray silt w/ rusty brown streaks, moist, very stiff
30	251	4		100				
35	246							(35 - 37) Lt. brown yellowish orange greenish gray clayey silt, moist, very stiff manganese streaks at 36
40	241	5		100			CL	(37 - 41) Lt. brown silty clay w/ Lt. gray streaks, moist, very stiff (41 - 50) Lt. brown sandy clay w/ Lt. gray streaks (sand increases with depth), moist, very stiff
45	236							
50	231	6		100			SC	(50 - 51.5) Lt. grayish tan clayey sand, wet
55	226						SW	(51.5 - 55.5) Reddish brown to Lt. brown med. to coarse sand w/ gravel (up to 2" dia.)
							SP	(55.5 - 57.5) Yellowish brown (tan) fine grained sand
60	221	7		80			SW	(57.5 - 65) Yellowish brown (tan) med. to coarse grained sand w/ gravel (up to 1/2" dia.) (65 - 69) Yellowish brown (tan) med. to coarse grained sand w/ gravel (increases content and size with depth)
65								

Well: 007G37UC
Elev.: 281.07



07-28-2003 N:\well.log\NSAMidsouth\007G37UC.BOR

BORING LOG OF 007G37UC

ENSAFE

NSA MID-SOUTH
Millington, TN.

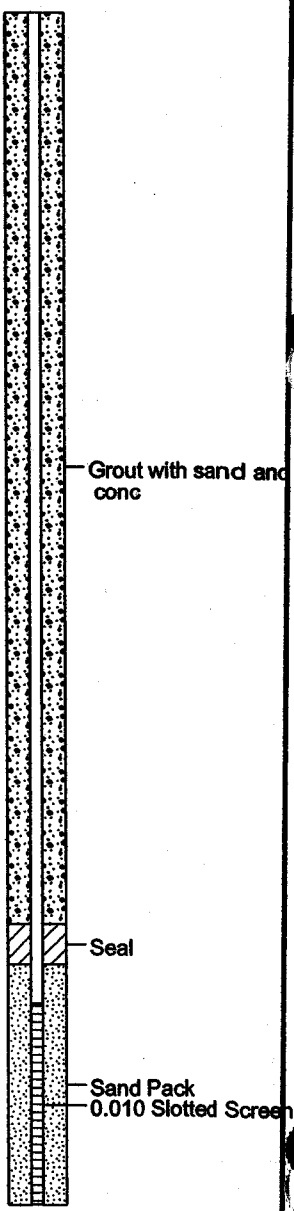
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1630 7/12/99	Northing	: 393736.90
Finished	: 1440 7/13/99	Easting	: 812568.19
Drilling Method	: Rotasonic	TOC Elevation	: 280.42
Drilling Company	: Alliance Drilling	Total Depth	: 125 feet
Geologist	: B. Brantley	Well Screen	: 115 to 125 feet

Depth in Feet	Surf. Elev. 281.07	Samples	Blow Count	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
65	216						SW	
70	211	8		90			SP	(69 - 71) Tan fine sand
							SW	(71 - 75) Tan fine to coarse sand w/ gravel
75	206							(75 - 85) Lt. brown sandy gravel (up to 2" dia.)
80	201	9		80				
85	196						GW	(85 - 90) Lt. brown sandy gravel w/ increase in sand contents and less gravel (up to 2" dia.)
90	191	10		100				(90 - 94) Lt. brown sandy gravel (up to 2" dia.)
95	186						SC	(94 - 95) Drak gray olive gray clayey fine sand w/ lignite lenses throughout, moist
							CL	(95 - 99) Olive gray sandy clay, moist, very stiff to hard (thin lignitite laminations (< 1mm)
100	181	11		100			SC	(99 -102) Olive gray clayey sand, stiff
105	176						CL	(102 - 107) Olive gray greenish gray clay w/ sand laminations (up to 1/2" thick), dry, very hard
							SC	(107 - 109) Olive gray sandy lignitic clay, moist, stiff to hard
110	171	12		100			CL	(109 - 114) Olive gray clay, dry, hard
115	166						SP	(114 - 114.5) Lt. gray fine sand
							CL	(114.5 - 116) Olive gray clay, dry, hard Lignite layer (4" thick) at 115
120	161	13		100			SP	(116 - 125) Lt. gray very fine sand w/ clayey zones (1 - 3" thick) at 119 and 120
125	156							
130								

Well: 007G37UC
Elev.: 281.07



07-28-2003 N:\well logs\NSAMidsouth\007G37UC.BOR

BORING LOG OF 007G38LF

ENSAFE

NSA MID-SOUTH
Millington, TN.

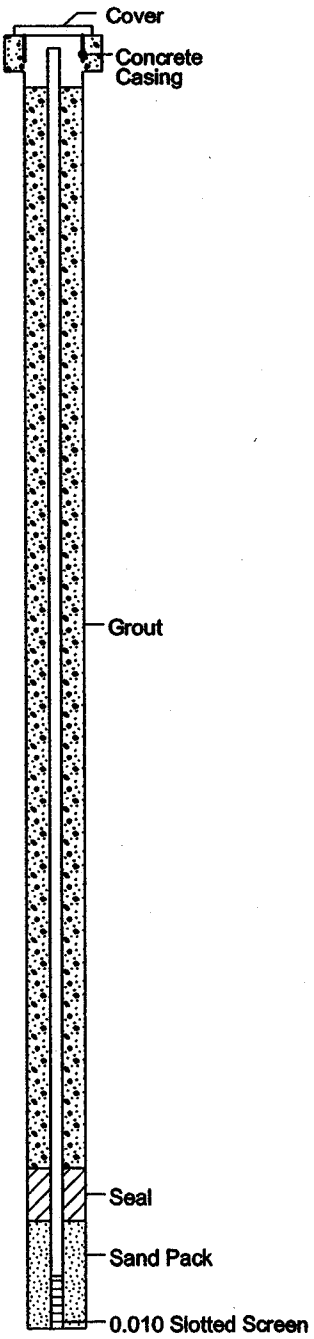
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1030 2/3/99	Northing	: 393399.15
Finished	: 1600 2/3/99	Easting	: 812593.25
Drilling Method	: Rotasonic	TOC Elevation	: 279.96
Drilling Company	: Alliance Drilling	Total Depth	: 88 feet
Geologist	: B. Brantley	Well Screen	: 48 to 88 feet

Depth in Feet	Surf. Elev. 280.12	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	280						
		1	100				(0 - 5) Brown clayey silt, moist, very stiff
5	275						(5 - 13) Lt. brown clayey silt, moist, med. stiff
10	270	2	100				
							(13 - 15) Lt. brown clayey silt w/ greenish gray mottling and trace of manganese grains, moist, med. stiff
15	265						
							(13 - 21) Lt. brown clayey silt w/ greenish gray mottling and trace of manganese grains, wet at 18 feet, med. stiff
20	260	3	100			ML	(21 - 27) Drak gaey clayey silt, wet, soft
25	255						
							(27 - 33) Greenish gray w/ olive gray clayey silt, moist, med. stiff
30	250	4	100				
							(33 - 35) Tan brown w/ greenish gray clayey silt, dry, stiff
35	245						(35 - 41) Dark brown w/ gray clayey silt, dry, stiff
40	240	5	100				
						CL	(41 - 45) Orange brown w/ grey silty clay, trace of pebbles (1/8" to 1/4"), moist, stiff
45	235						
		6	90			SW	(45 - 51) Yellow brown clayey med. coarse sand w/ gravel (up to 2"), wet
50							

Well: 007G38LF
Elev.: 280.12



07-28-2003 N:\well logs\NSAMidsouth\007G38LF.BOR

BORING LOG OF 007G38LF

NSA MID-SOUTH
Millington, TN.

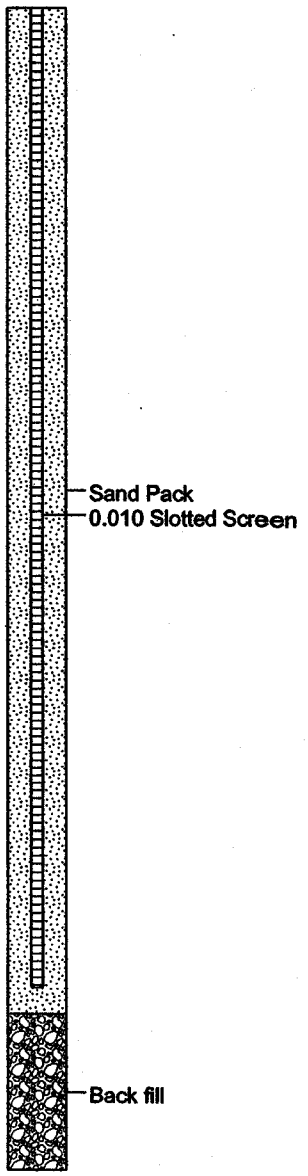
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1030 2/3/99	Northing	: 393399.15
Finished	: 1600 2/3/99	Easting	: 812593.25
Drilling Method	: Rotasonic	TOC Elevation	: 279.96
Drilling Company	: Alliance Drilling	Total Depth	: 88 feet
Geologist	: B. Brantley	Well Screen	: 48 to 88 feet

Depth in Feet	Surf. Elev. 280.12	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
50	230	6	90			SW	(51 - 53) Yellow brown fine coarse sand w/ gravel, wet
						SP	(53 - 54) Tan brown w/ pink streaks silty fine sand
55	225					CH	(54 - 54.5) Pink fat clay, moist, soft
						SP	(54.5 - 58) Orange brown fine to med. sand, wet
						CH	(58 - 59) Pink fat clay, moist, med. stiff
60	220	7	100			SP	(59 - 62) Yellow brown w/ Lt. gray and pink clayey fine sand
							(62 - 65) Yellow brown and tan brown fine coarse sand w/ gravel (up to 3/4"), wet
65	215					SW	(65 - 74) Tan med coarse sand w/ gravel (up to 3/4"), wet
70	210	8	100				
75	205						(74 - 85) Orange brown med. coarse sandy gravel (up to 2")
80	200	9	100			GW	
85	195					SW	(85 - 88) Orange brown med coarse sand w/ gravel
90	190	10	90			OL	(88 - 95) Dark brown clayey silt w/ fine sand stringers and lignite throughout, moist, very stiff
95	185						
100							

Well: 007G38LF
Elev.: 280.12



07-28-2003 N:\well logs\NSA\Midsouth\007G38LF.BOR

BORING LOG OF 007G39LF

ENSAFE

NSA MID-SOUTH
Millington, TN.

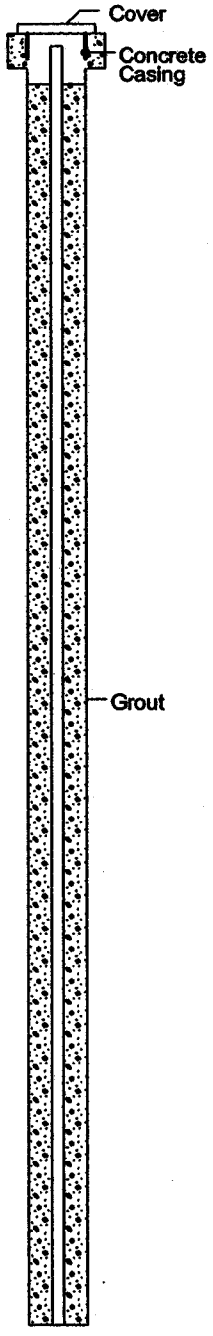
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1030 2/4/99	Northing	: 394136.80
Finished	: 1030 2/5/99	Easting	: 813257.86
Drilling Method	: Rotasonic	TOC Elevation	: 284.91
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 54 to 94 feet

Depth in Feet	Surf. Elev. 285.23	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	285	1	80			ML	(0 - 12) Dark brown clayey silt, moist, med. stiff
5	280						
10	275	2	100				(12 - 17) Dark brown and greenish gray clayey silt w/ manganese scattered throughout, moist, med. stiff
15	270						(17 - 21) Dark brown clayey silt, moist, stiff
20	265	3	100				(21 - 25) Lt. brown and greenish gray clayey silt, wet (moist from 23 - 25), soft
25	260						(25 - 30) Lt. brown and greenish gray clayey silt w/ trace of manganese, moist, med. stiff
30	255	4	100				(30 - 33) Dark brown clayey silt, moist, soft
35	250					SP	(33 - 37) Lt. brown (tan) silty sand, moist, soft
40	245	5	100				(37 - 45) Orange brown w/ gray silty sand, moist
45	240	6	90				(45 - 51) Tan and orange brown fine sand, wet, micaceous
50							

Well: 007G39LF
Elev.: 285.23



07-28-2003 N:\well logs\NSAMidsouth\007G39LF.BOR

ENSAFE

BORING LOG OF 007G39LF

NSA MID-SOUTH
Millington, TN.

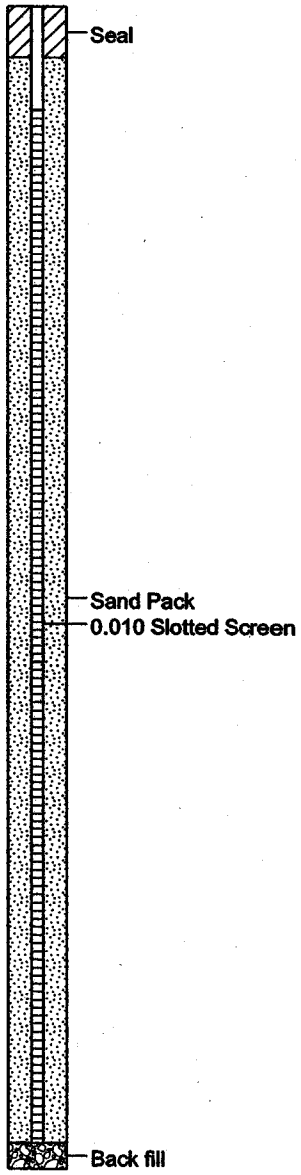
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1030 2/4/99	Northing	: 394136.80
Finished	: 1030 2/5/99	Easting	: 813257.86
Drilling Method	: Rotasonic	TOC Elevation	: 284.91
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 54 to 94 feet

Depth in Feet	Surf. Elev. 285.23	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
50	235					SP	
		6	90			SW	(51 - 53) Lt. gray fine and med. sand w/ gravel scattered (up to 1/2"), wet
55	230						(53 - 57) Orange brown fine to med sand w/ few gravel
		7	100			SP	(57 - 61) Orange brown fine sand
60	225						(61 - 65) Tan orange brown gravelly fine coarse sand
65	220					SW	(65 -71) Tan orange brown gravelly fine coarse sand w/ traces of thin (1/2") clay lenses and gravel (up to 2")
70	215	8	100				
						SP	(71 - 77) Orange brown med. sand w/ trace of gravel
75	210						
		9	100			GW	(77 - 80) Tan and orange brown sandy gravel
80	205					SW	(80 - 86) Orange brown fine and coarse sand w/ trace of gravel
85	200						(86 - 94) Tan med and coarse sandy gravel (gravel up to 2")
90	195	10	100			GW	
95	190					SC	(94 - 95) Drak brown clayey fine sand
100							

Well: 007G39LF
Elev.: 285.23



07-28-2003 N:\well logs\NSAMidsouth\007G39LF.BOR

ENSAFE

BORING LOG OF 007G40LF

NSA MID-SOUTH
Millington, TN.

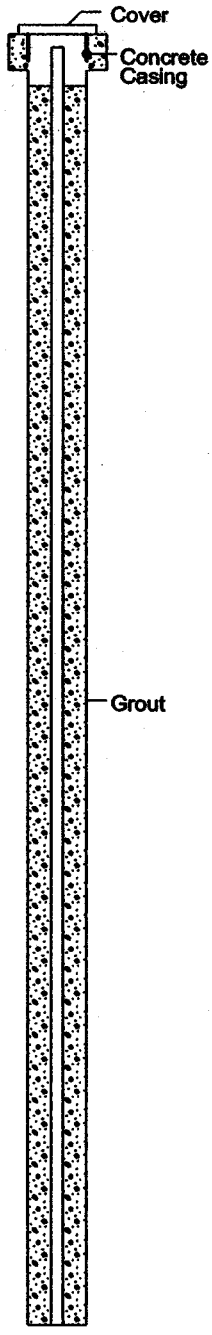
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1030 2/3/99	Northing	: 393203.88
Finished	: 1600 2/3/99	Easting	: 812442.18
Drilling Method	: Rotasonic	TOC Elevation	: 279.03
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 57 to 87 feet

Depth in Feet	Surf. Elev. 279.21	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	279						
		1	100				(0 - 6) Brown clayey silt, dry, very stiff
5	274						
							(6 - 22) Olive gray w/ brown clayey silt, moist, stiff At 18 becomes wet and soft
10	269	2	100			ML	
15	264						
20	259	3	100				
							(22 - 25) Olive to dark gray clayey silt, wet, soft
25	254						
						CL	(25 - 29) Greenish gray silty clay, moist, stiff
30	249	4	90				(29 - 35) Brown w/ gray clayey silt, dry, very stiff
35	244					ML	(35 - 40) Brown w/ gray clayey silt w/ trace of sand, moist, med. stiff
40	239	5	100				(40 - 45) Orange brown w/ gray sandy clay, moist, med. stiff
						SC	
45	234						(45 - 47) Orange brown w/ gray sandy clay, dry, very stiff
		6	90			SP	(47 - 49) Orange brown fine sand w/ trace of gravel, moist
50						CL	

Well: 007G40LF
Elev.: 279.21



07-28-2003 N:\well logs\NSAMidsouth\007G40LF.BOR

ENSAFE

BORING LOG OF 007G40LF

NSA MID-SOUTH
Millington, TN.

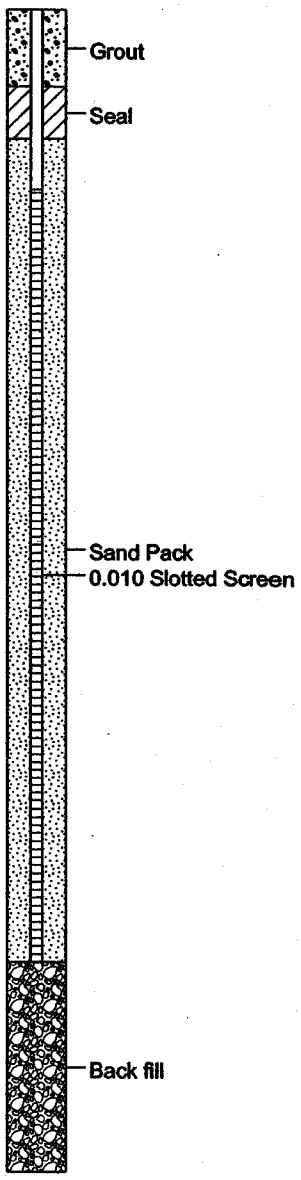
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1030 2/3/99	Northing	: 393203.88
Finished	: 1600 2/3/99	Easting	: 812442.18
Drilling Method	: Rotasonic	TOC Elevation	: 279.03
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 57 to 87 feet

Depth in Feet	Surf. Elev. 279.21	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
50	229	6	90			CL	(49 - 55.5) Orange brown w/ Lt. gray sandy clay, moist, med. stiff
55	224					SC	(55.5 - 56) Pink clay lense
						SP	(56 - 57) Tan fine sand, moist
60	219	7	100			SC	(57 - 58) Pink and Lt. gray clay, moist, soft (58 - 61) Pink and Lt. gray and orange brown sandy clay
						SP	(61 - 64) Tan and Lt. brown fine sand, moist
65	214					GP	(64 - 66) Tan brown med. to coarse sandy gravel (gravel up to 1")
70	209	8	100			SW	(66 - 75) Tan brown med. to coarse sand w/ gravel (up to 1") (73 - 75) increasingly coarser sands and gravelly
75	204					GW	(75 - 84) Orange brown coarse sandy gravel (gravel up to 2")
80	199	9	100				
85	194					GP	(84 - 87) Chert gravel (avg. size between 1/4" and 1/2"), poorly graded
90	189	10	100			OL	(87 - 95) Dark brown clay w/ fine sand (contents varies from stringers to none, predominately clay) , moist, stiff to very stiff
95	184						
100							

Well: 007G40LF
Elev.: 279.21



07-28-2003 N:\well logs\NSAMidsouth\007G40LF.BOR

BORING LOG OF 007G41LF

ENSAFE

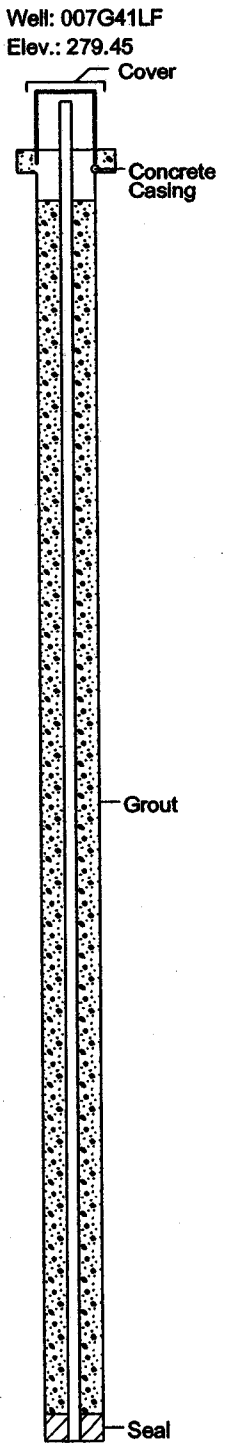
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0915 2/7/99	Northing	: 393876.47
Finished	: 1200 2/7/99	Easting	: 812367.69
Drilling Method	: Rotasonic	TOC Elevation	: 281.89
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 53 to 93 feet

Depth in Feet	Surf. Elev. 279.45	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	279	1	80				(0 - 4) Lt. brown clayey silt, dry, very stiff
5	274						(4 - 15) Orange brown and Lt. gray clayey silt w/ manganese scattered througout, moist, stiff
10	269	2	85				
15	264	3	100			ML	(15 - 18) Orange brown and Lt. gray clayey silt w/ manganese scattered througout, wet, stiff (18 - 24) Tan brown clayey silt w/ iron stains throughout, wet, med. stiff.
20	259						
25	254	4	85				(24 - 31) Dark olive gray clayey silt, moist, med. stiff
30	249						(31 - 34) Brown gray and olive gray clayey silt, dry, very stiff
35	244	5	100			CL ML	(34 - 34.5) Greenish gray fat clay lense, moist, soft (34.5 - 35) Brown gray and olive gray clayey silt, dry, very stiff
40	239					SC	(35 - 42) Lt. brown and Lt. gray sandy clay, moist, soft (42 -47) Orange brown clayey sand w/ gravel, moist
45	234	6	100			SP	(47 - 52) Orange brown med. coarse sand, wet
50							(52 - 54) Tan brown med. coarse sand, wet



07-28-2003 N:\well logs\NSA\Mdsouth\007G41LF.BOR

BORING LOG OF 007G41LF

NSA MID-SOUTH
Millington, TN.

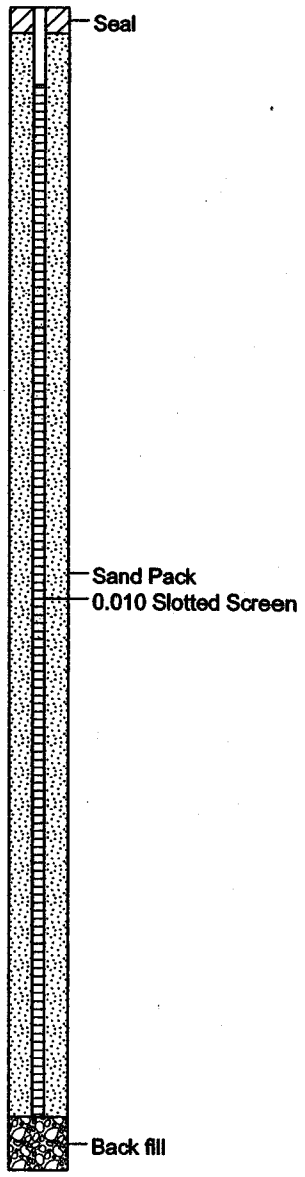
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0915 2/7/99	Northing	: 393876.47
Finished	: 1200 2/7/99	Easting	: 812367.69
Drilling Method	: Rotasonic	TOC Elevation	: 281.89
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 53 to 93 feet

Depth in Feet	Surf. Elev. 279.45	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
50	229	6	100			SP	
55	224						(54 - 63) Tan brown med. and coarse sand w/ small gravel (1/4" dia.)
60	219	7	100			SW	(63 - 73) Tan brown med. and coarse sand w/ increasing gravel contents (up to 1" dia.)
65	214						
70	209	8	85				
75	204					SP	(73 - 75) Orange brown coarse sand w/ gravel (up to 1/2" dia.)
80	199	9	100			GW	(75 - 86) Orange brown med. and coarse sandy gravel (1/4" to 1" dia. gravel), wet
85	194					SW	(86 - 89) Orange brown med. and coarse sand
90	189	10	100			GP	(89 -90.5) Orange brown chest gravel (little to no fines and gravel up to 1" dia.)
						GW	(90.5 - 92.5) Orange brown med. to coarse sandy gravel
95	184					CH	(92.5 - 94) Lt. brown clay (lean), very stiff (94 - 95) Dark gray clay, very stiff
100							

Well: 007G41LF
Elev.: 279.45



07-28-2003 N:\well logs\NSAMidsouth\007G41LF.BOR

ENSAFE

BORING LOG OF 007G42LF

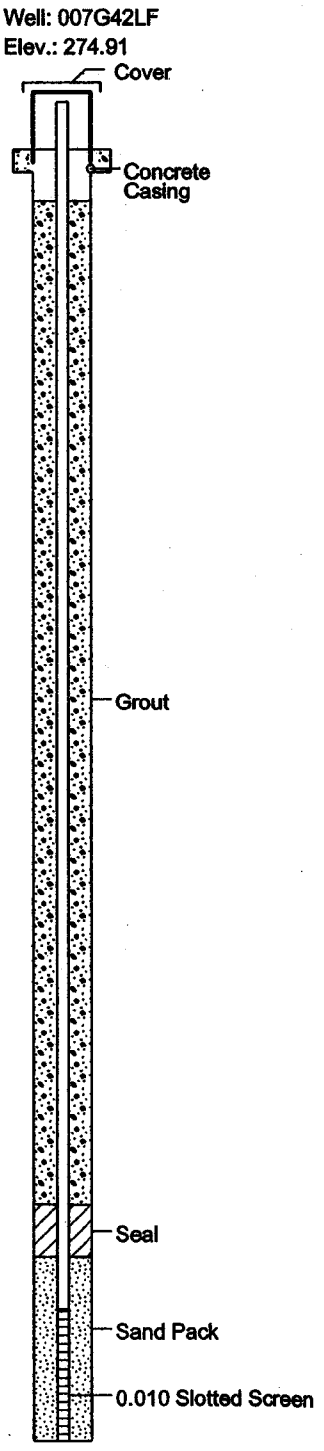
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1500 2/9/99	Northing	: 394573.25
Finished	: 1800 2/9/99	Easting	: 811564.88
Drilling Method	: Rotasonic	TOC Elevation	: 277.01
Drilling Company	: Allinance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 45 to 85 feet

Depth in Feet	Surf. Elev. 274.91	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	274	1	80				(0 - 2) Dark brown clayey silt, moist, stiff (2 - 9) Lt. gray w/ orange brown clayey silt w/ manganese inclusions throughout, moist, very stiff
5	269						
10	264	2	100				(9- 15) Tan brown w/ orange brown streaks clayey silt, wet, med. stiff (fewer manganese inclusions)
15	259	3	80			ML	(15 - 19) Dark brown clayey silt, wet, soft (19 - 25) Olive grey and greenish gray clayey silt, moist, stiff (increasingly stiff and dry with depth)
20	254						
25	249	4	100				(25 - 28) Olive gray and greenish gray clayey silt, dry, stiff (28 - 33) Lt. brown clayey silt, moist,soft
30	244						
35	239	5	100			SC	(33 - 36) Lt. brown clayey silt w/ clay (gray and soft) stringers, moist, soft (36 - 43) Lt. brown w/ orange brown and Lt. gray sandy clay, moist, stiff to soft (varies)
40	234					SP	(43 - 44.5) Gray and orange brown silty fine sand w/ gravel (up to 1/2" dia.), wet
45	229	6	85			SW	(44.5 - 45) Orange brown fine to coarse sand w/ gravel
50						GW	(45 - 51) Orange brown coarse sandy gravel (gravel between 1/4" - 1"), wet



07-28-2003 N:\work\gis\NSAMidsouth\007G42LF.BOR

ENSAFE

BORING LOG OF 007G42LF

NSA MID-SOUTH
Millington, TN.

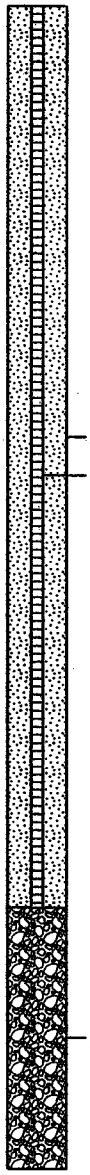
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1500 2/9/99	Northing	: 394573.25
Finished	: 1800 2/9/99	Easting	: 811564.88
Drilling Method	: Rotasonic	TOC Elevation	: 277.01
Drilling Company	: Allinance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 45 to 85 feet

Depth in Feet	Surf. Elev. 274.91	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
50	224	6	85			GW	(51 - 58) Orange brown fine sand, moist
55	219					SP	
						SW	(58 - 59) Orange brownmed. to coarse sand w/ gravel (up to 1" dia.), wet
60	214	7	100			SP	(59 - 60) Orange brown fine sand w/ gravel, wet
							(60 - 65) Orange brown med. coarse sand w/ gravel (up to 2" dia.), wet
65	209						(65 - 77) Reddish brown med. coarse sand w/ gravel, wet
						SW	
70	204	8	90				
75	199						
		9	100			GW	(77 - 86) Orange reddish brown sandy gravel (up to 2"),wet
80	194						
85	189					SC	(86 - 91) Olive gray sandy clay, moist to wet, very stiff (lignitic between 90-91)
90	184	10	100			CH	Olive gray lean clay, dry, hard
95	179						
100							

Well: 007G42LF
Elev.: 274.91



07-28-2003 N:\well logs\NSA\fidsouth\007G42LF.BOR

ENSAFE

BORING LOG OF 007G43LF

NSA MID-SOUTH
Millington, TN.

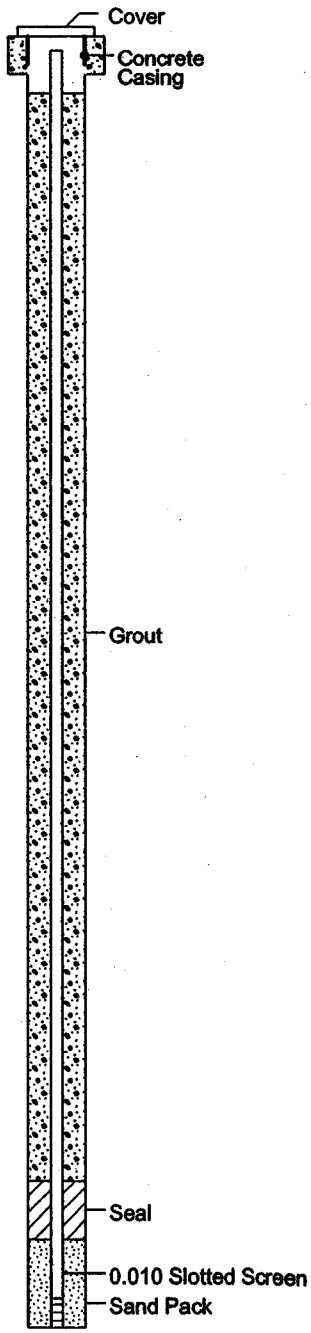
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1020 2/16/99	Northing	: 393011.20
Finished	: 1500 2/16/99	Easting	: 812282.54
Drilling Method	: Rotasonic	TOC Elevation	: 277.25
Drilling Company	: Alliance Drilling	Total Depth	: 85 feet
Geologist	: B. Brantley	Well Screen	: 44 to 84 feet

Depth in Feet	Surf. Elev. 277.51	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	277	1	100			ML	(0 - 5) Lt. brown clayey silt, moist, very stiff
5	272						(5 - 7) Lt. brown clayey silt, increasingly moist, med. stiff
							(7 - 10) Dark brown and olive gray clayey silt, dry, very stiff
10	267	2	90				(10 - 12) Dark brown mixed w/ greenish gray clayey silt, dry, stiff
							(12 - 15) Greenish gray w/ yellowish brown clayey silt
15	262						(15 - 22) Yellow brown w/ Lt. gray clayey silt w/ manganese and iron staining from 20 - 22, wet, soft
20	257	3	100				(22 - 25) Dark brown clayey silt, moist, soft
25	252		—				(25 - 27) Olive gray clayey silt, moist, med. stiff
							(27 - 33) Lt. gray w/ greenish gray and yellowish brown clayey silt, moist, med. stiff, manganese inclusions from 32
30	247	4	100				
35	242					CL	(33 -35) Lt. brown w/ Lt. gray silty clay w/ manganese, dry, hard (35 - 44) Yellowish brown w/ Lt. gray silty clay, moist, med. stiff
40	237	5	100				
45						SC	

Well: 007G43LF
Elev.: 277.51



07-28-2003 N:\well logs\NSAMidsouth\007G43LF.BOR

BORING LOG OF 007G43LF

NSA MID-SOUTH
Millington, TN.

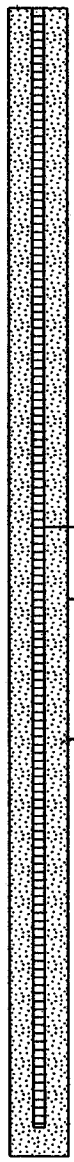
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1020 2/16/99	Northing	: 393011.20
Finished	: 1500 2/16/99	Easting	: 812282.54
Drilling Method	: Rotasonic	TOC Elevation	: 277.25
Drilling Company	: Alliance Drilling	Total Depth	: 85 feet
Geologist	: B. Brantley	Well Screen	: 44 to 84 feet

Depth in Feet	Surf. Elev. 277.51	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
45	232					SC	(44 - 47) Yellowish brown and Lt. gray sandy clay, moist, med. stiff clay, moist (47 - 49) Yellowish brown and Lt. gray sandy clay, wet, soft
50	227	6	100			SP	(49 - 51) Lt.gray fine sand w/ trace of gravel (1/4" dia.), wet
						GW	(51 - 56) Orange brown and tan med to coarse sandy gravel (1/4" - 1 1/2" dia.), wet
55	222					CH	(56 - 57) Pinkish gray fat clay, moist , soft
60	217	7	100			SP	(57 - 64) Tan brown fine sand, wet
65	212					SW	(64 - 70) Orange brown gravelly med. to coarse sand, wet
70	207	8	100				(70 - 75) Tan brown gravelly med. to coarse sand, wet
75	202					GW	(75 - 84) Lt. brown (tan) sandy gravel
80	197	9	100				
85	192					OH	(84 - 85) Dark brown clayw/ Lt. gray lenses and fine sand, moist, med. stiff
90							

Well: 007G43LF
Elev.: 277.51



07-28-2003 N:\well logs\NSAMidsouth\007G43LF.BOR

BORING LOG OF 007G44LF

NSA MID-SOUTH
Millington, TN.

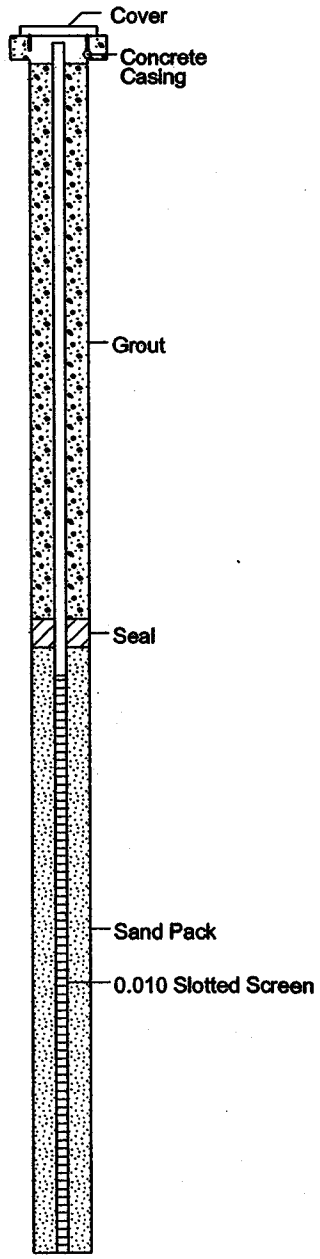
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1100 2/17/99	Northing	: 394206.64
Finished	: 1600 2/17/99	Easting	: 811223.45
Drilling Method	: Rotasonic	TOC Elevation	: 274.37
Drilling Company	: Alliance Drilling	Total Depth	: 85 feet
Geologist	: B. Brantley	Well Screen	: 45 to 85 feet

Depth in Feet	Surf. Elev. 274.37	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	274	1	60			ML	(0 - 5) Lt. brown w/ greenish gray clayey silt, wet, stiff
5	269	2	65				(5 - 15) Lt. brown w/ greenish gray clayey silt w/ manganese inclusions throughout, wet, med. stiff
10	264	3	75				(15 - 22) Lt. brown w/ greenish gray clayey silt w/ manganese inclusions throughout, wet, soft
15	259	4	100				(22 - 28) Greenish gray clayey silt, moist, soft (increasingly stiff with depth)
20	254	5	85				(28 - 33) Olive gray, greenish gray w/ Lt. brown clayey silt, moist, very stiff
25	249	6	100				(33 - 35) Lt. brown clayey silt, wet, med. stiff
30	244	7	100			SC	(35 - 46.5) Lt. brown w/ Lt. gray clay streaked sandy clay, moist, med. stiff Trace of gravel (1/4" dia.) at 38
35	239	8	85				Gravelly clay at 43 - 44
40	234	9	100			SW	(46.5 - 51) Lt. brown med. to coarse sand w/ gravel (up to 1/2"), wet
45	229					SP	(51 - 59) Lt. brown and tan fine sand, micaceous, wet
50	224					SW	(59 -65) Orange brown gravelly fine to coarse sand, (up to 2" dia. gravel), wet
55	219						(65 - 83) Orange brown gravelly coarse sand, (up to 2" dia. gravel), wet
60	214					GW SP	(83 - 84) Orange brown sandy gravel (1/2" to 2" dia.)
65	209						(84 - 85) Dark gray, olive gray silty fine sand w/ lignite
70	204						
75	199						
80	194						
85	189						
90							

Well: 007G44LF
Elev.: 274.41



07-28-2003 N:\well logs\NSA\Midsouth\007G44LF.BOR

BORING LOG OF 007G45LF

ENSAFE

NSA MID-SOUTH
Millington, TN.

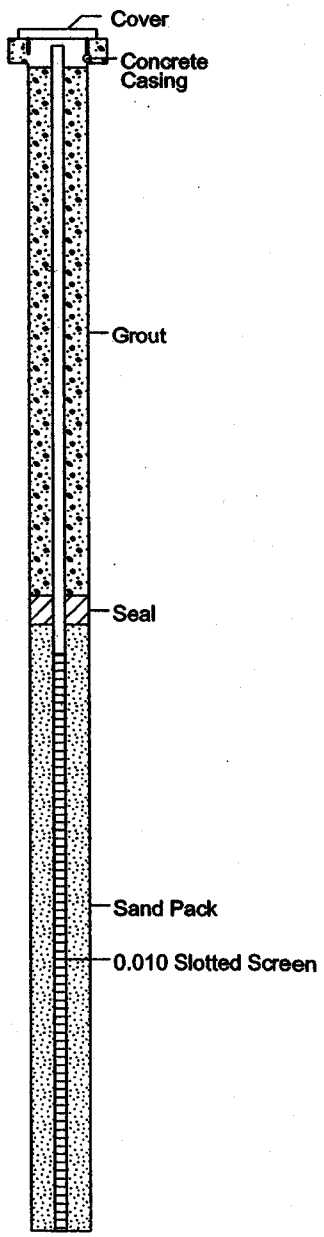
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0020 2/18/99	Northing	: 394931.50
Finished	: 1530 2/18/99	Easting	: 811901.36
Drilling Method	: Rotasonic	TOC Elevation	: 276.90
Drilling Company	: Alliance Drilling	Total Depth	: 85 feet
Geologist	: B. Brantley	Well Screen	: 43 to 83 feet

Depth in Feet	Surf. Elev. 277.07	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	277	1	80			ML	(0 - 5) Lt. brown clayey silt, moist, soft to very stiff
5	272						(5 - 10) Yellow brown w/ Lt. gray streaks clayey silt w/ manganese inclusions, dry, stiff
10	267	2	100				(10 - 15) Yellow brown w/ Lt. gray streaks clayey silt w/ manganese inclusions, wet, soft
15	262						(15 - 20) Lt. gray and yellow brown clayey silt, wet, med. stiff
20	257	3	90				(20 - 22) Grayish brown clayey silt, moist, soft (22 - 29) Greenish gray silt, moist, med. stiff
25	252						
30	247	4	100				(29 - 35) Yellow brown w/ orange brown and Lt. gray streaks clayey silt, moist, med. stiff
35	242					SC	(35 - 40) Yellow brown w/ orange brown and Lt. gray streaks sandy clay w/ trace of gravel, moist, med. stiff to soft
40	237	5	90			GW	(40 - 42) Yellow brown w/ orange brown and Lt. gray streaks sandy clay w/ coarse gravel (2 1/2" dia.), moist, med. stiff to soft
45	232					SW	(42 - 46.5) Orange brown sandy gravel, wet, slightly cemented
50	227	6	85				(46.5 - 47.5) Lt. gray med coarse sand w/ small gravel (< 1/2" dia.), wet
55	222					SP	(47.5 - 56) Tan brown fine sand, wet (56 - 63) Tan brown med. sand w/ trace of chert pebbles, wet
60	217	7	100				
65	212					SW	(63 - 75) Orange brown fine coarse sand w/ trace of gravel (increase in gravel contents with depth), wet
70	207	8	100				
75	202						3" thick layer of cemented sands between 74 and 75
80	197	9	90			GW	(75 - 82) Yellow orange brown sandy gravel (up to 2" dia.), wet. Gravels cemented within a reddish brown iron stone in several places approx. 3" thick
85	192					SC	(82 - 85) Med. gray sandy clay, moist, very stiff
90							

Well: 007G45LF
Elev.: 277.07



07-28-2003 N:\well logs\NSA\Midsouth\007G45LF.BOR

BORING LOG OF 007G46LF

NSA MID-SOUTH
Millington, TN.

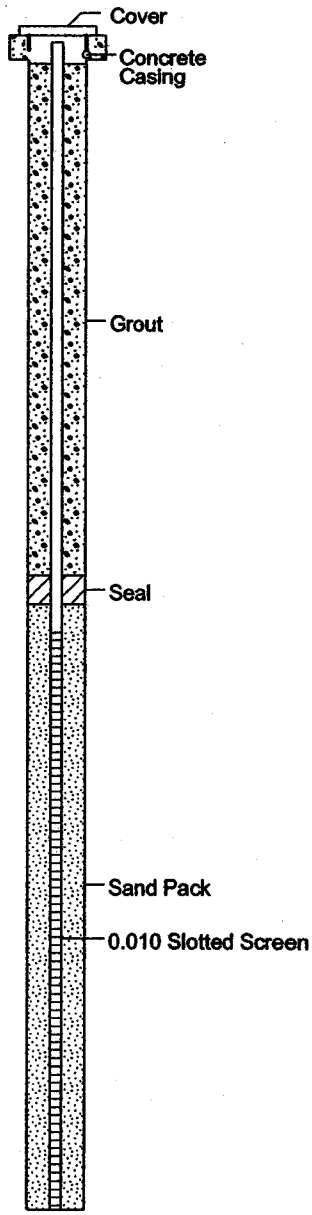
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0915 2/21/99	Northing	: 392830.60
Finished	: 1500 2/21/99	Easting	: 812114.61
Drilling Method	: Rotasonic	TOC Elevation	: 275.92
Drilling Company	: Alliance Drilling	Total Depth	: 85 feet
Geologist	: B. Brantley	Well Screen	: 42 to 82 feet

Depth in Feet	Surf. Elev. 276.21	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	276	1	80			ML	(0 - 6) Lt. brown clayey silt, dry, hard (friable)
5	271						(6 - 10) Greenish gray silt, moist, soft
10	266	2	100				(10 - 16) Olive brown clayey silt w/ orange brown streaks, moist, stiff
15	261						(16 - 22) Greenish gray and orange brown streak clayey silt, wet, med. stiff to stiff
20	256	3	100				(22 - 27) Dark brown clayey silt, moist, soft to med. stiff
25	251					CL	(27 - 35) Yellow brown and Lt. gray silt clay, moist, med. stiff and stiff
30	246	4	100				
35	241						(35 - 41) Lt. brown w/ Lt. gray silt clay
40	236	5	100			SC	(41 - 46) Yellowish brown sandy clay
45	231						
50	226	6	100			SW	(46 - 54)Orange brown gravelly poorly sorted sand, wet
55	221					GW SP	(54 - 54.5) Orange brown sandy gravel (up to 2" dia.), wet
							(54.5 - 55) Orange brown med. sand.
60	216	7	100				(55 - 57) Lt. gray fine sand, wet
							(57 - 62) Orange brown med. sand, wet
65	211						(62 - 65) Orange brown med. sand w/ gravel (up to 1" dia.), wet
							(65 - 68) Orange brown med. sand w/ small gravel (up to 1/4"- 1/2" dia.)
70	206	8	90			SW	(68 - 82) Tan brown coarse sand w/ gravel (up to 2 1/2" dia.)
75	201						
80	196	9	90				
85	191					OL	(82 - 85) Dark brown clay w/ thin sand lenses scattered at 6" intervals, moist, very stiff
90							

Well: 007G46LF
Elev.: 276.21



07-28-2003 N:\well logs\NSA Midsouth\007G46LF.BOR

ENSAFE

BORING LOG OF 007G47LF

NSA MID-SOUTH
Millington, TN.

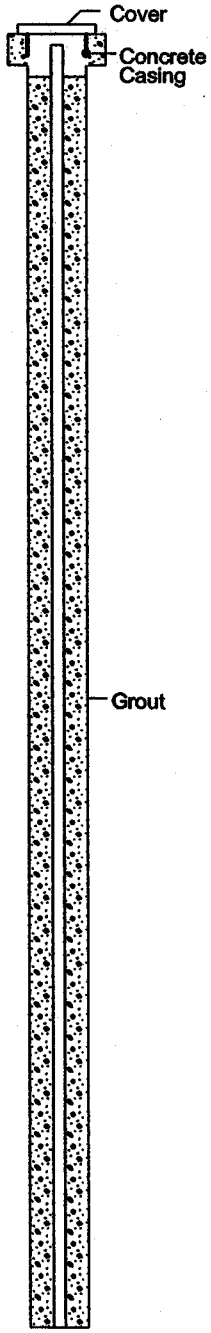
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1100 2/19/99	Northing	: 397855.14
Finished	: 1400 2/20/99	Easting	: 814805.31
Drilling Method	: Rotasonic	TOC Elevation	: 302.04
Drilling Company	: Alliance Drilling	Total Depth	: 115 feet
Geologist	: B. Brantley	Well Screen	: 72 to 82 feet

Depth in Feet	Surf. Elev. 302.22	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	302	1	80				(0 - 12) Lt. brown silt, dry hard
5	297						
10	292	2	80			ML	(12 - 15) Lt. brown silt, moist, soft
15	287						(15 - 20) Lt. brown silt, dry, hard
20	282	3	100				(20 - 23) Lt. brown silt, dry, hard (friable)
							(23 - 25) Lt. brown silt, moist, med. stiff, trace of sand between 24 and 25
25	277	4	100			SC	(25 - 30) Orange brown sandy clay, moist, very stiff scattered pebbles (< 5%) between 28 - 30
30	272					SP	(30 - 35) Reddish brown silty fine sand, wet, no gravel
35	267	5	100			SC	(35 - 41) Yellow brown w/ pink and Lt. gray sandy clay, moist, stiff
40	262					CL	(41 - 53) Pink w/ Lt. gray clay, moist, soft to med. stiff
45	257						
50	252	6	100				
55	247					SC	(53 - 54) Yellow brown sandy clay, moist, med. stiff
						SP	(54 -55) Yellow brown clayey sand w/ iron stones approx. 3" wide and 1/2" thick, wet
		7	100			CH	(55 - 69) Yellow brown w/ pink clay, moist, soft (very plastic)
60							

Well: 007G47LF
Elev.: 302.22



ENSAFE

BORING LOG OF 007G47LF

NSA MID-SOUTH
Millington, TN.

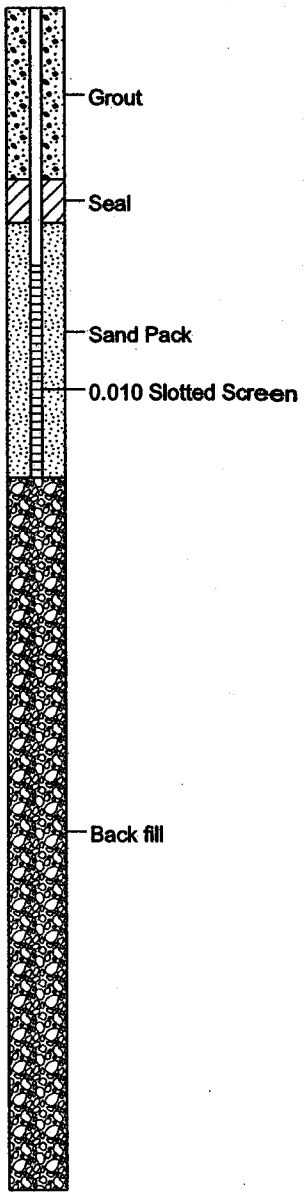
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1100 2/19/99	Northing	: 397855.14
Finished	: 1400 2/20/99	Easting	: 814805.31
Drilling Method	: Rotasonic	TOC Elevation	: 302.04
Drilling Company	: Alliance Drilling	Total Depth	: 115 feet
Geologist	: B. Brantley	Well Screen	: 72 to 82 feet

Depth in Feet	Surf. Elev. 302.22	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
60	242	7	100			CH	
65	237						
70	232	8	100			SC	(69 - 72) Pink w/ Lt. gray sandy clay, moist, soft
						SP	(72 - 74.5) Lt. gray clayey sand w/ gravel (1/4" to 1/2"), wet
75	227					GW	(74.5 - 80) Yellow brown sandy gravel (up to 1") w/ clay, moist to wet
80	222	9	100			CL	(80 - 84) Yellow brown silty clay, moist, med. stiff
85	217						(84 - 85) Gray sandy clay, moist, soft (cockfield)
						SC	(85 - 98) Gray sandy clay, moist to wet, med. stiff to stiff
90	212	10	100				
95	207						
100	202	11	100				(98 - 115) Gray fine sand, wet Lignite lense at 104 (2" thick) and 105 (i/2" thick)
105	197					SP	
110	192	12	100				
115	187						Lignite seam at 113 (4" thick)
120							

Well: 007G47LF
Elev.: 302.22



07-28-2003 N:\wellogs\NSAMidsouth\007G47LF.BOR

BORING LOG OF 007G48LF

ENSAFE

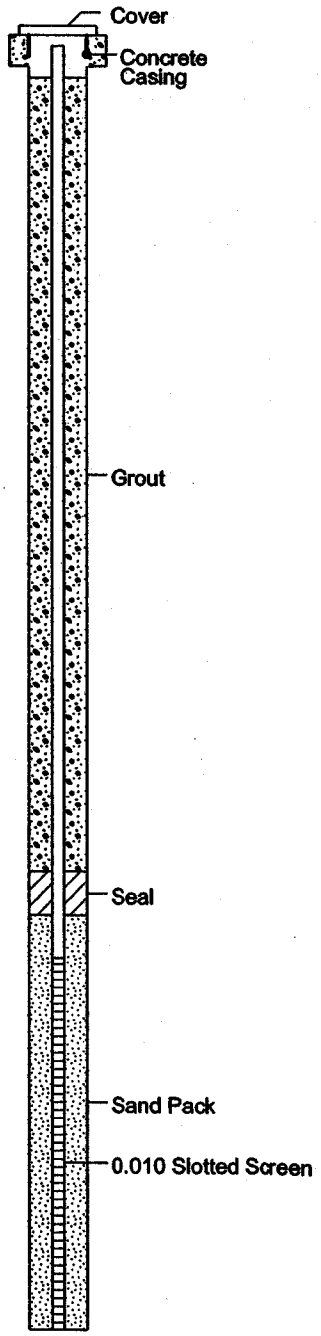
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7
Project #: CTO 0094

Started	: 1615 2/22/99	Northing	: 396174.74
Finished	: 1300 2/23/99	Easting	: 812942.06
Drilling Method	: Rotasonic	TOC Elevation	: 279.71
Drilling Company	: Alliance Drilling	Total Depth	: 115 feet
Geologist	: B. Brantley	Well Screen	: 43 to 113 feet

Depth in Feet	Surf. Elev. 279.89	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	279	1	100			ML	(0 - 3) Lt. brown clayey silt, dry, hard (3 - 5) Lt. brown clayey silt, wet, soft (5 - 9) Gray clayey silt, wet, very soft
5	274						
10	269	2	95				(9 - 16) Olive grey yellowish brown w/ minor orange brown clayey silt, wet, soft
15	264						(16 - 26) Dark gray to olive gray clayey silt, wet, soft
20	259	3	80				
25	254	4	90			CL	(26 - 29) Greenish gray silty clay, moist, very stiff trace of pebbles at 25 (29 - 36) Olive gray silty clay w/ scattered pebbles, moist, very stiff
30	249						
35	244					SC	(36 - 40) Olive green and greenish gray sandy clay w/ few gravel (< 1/2"), moist, med. stiff
40	239	5	100			GC	(40 - 42) Greenish gray and olive gray clayey gravel w/ sand, moist, very hard (42 - 45) Orange brown clayey gravel w/ sand, moist, very hard
45	234					SP	(45 - 49) Tan brown fine sand, wet 4" thick hard pink clay at 45.5, moist
50	229	6	100			SW	(49 - 65) Orange brown fine coarse sand w/ gravel (up to 1" dia.)
55	224	7	100				
60							

Well: 007G48LF
Elev.: 279.89



07-28-2003 N:\well logs\NSA\Midsouth\007G48LF.BOR

ENSAFE

BORING LOG OF 007G48LF

NSA MID-SOUTH
Millington, TN.

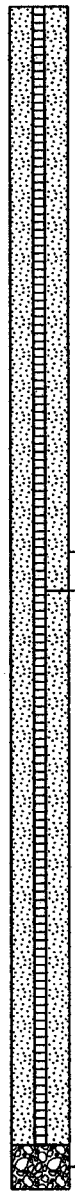
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1615 2/22/99	Northing	: 396174.74
Finished	: 1300 2/23/99	Easting	: 812942.06
Drilling Method	: Rotasonic	TOC Elevation	: 279.71
Drilling Company	: Alliance Drilling	Total Depth	: 115 feet
Geologist	: B. Brantley	Well Screen	: 43 to 113 feet

Depth in Feet	Surf. Elev. 279.89	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
60	219	7	100			SW	
65	214					GW	(65 - 71) Orange brown sandy gravel (most gravel < 1" dia.)
70	209	8	100			SP	(71 - 77) Tan brown med. sand w/ gravel
75	204					SW	(77 - 85) Orange brown med. to very coarse sand w/ trace of gravel
80	199	9	100				
85	194					SP	(85 - 87) Orange brown med. sand
90	189	10	100			SW	(87 - 95) Orange brown med. to coarse sand w/ trace of gravel Silty at 94 to 95
95	184						(95 - 98) Orange brown med. to coarse sand w/ increase of gravel content
100	179	11	100				(98 - 105) Orange brown gravelly sand
105	174						(105 - 111) Tan brown gravelly sand
110	169	12	100			GW	(111 - 113) Orange brown sandy gravel (up to 2" dia.), wet
115	164					OL	(113 - 115) Dark gray clay, moist, very stiff
120							

Well: 007G48LF
Elev.: 279.89



07-28-2003 N:\well logs\NSAMidsouth\007G48LF.BOR

ENSAFE

BORING LOG OF 007G49LF

NSA MID-SOUTH
Millington, TN.

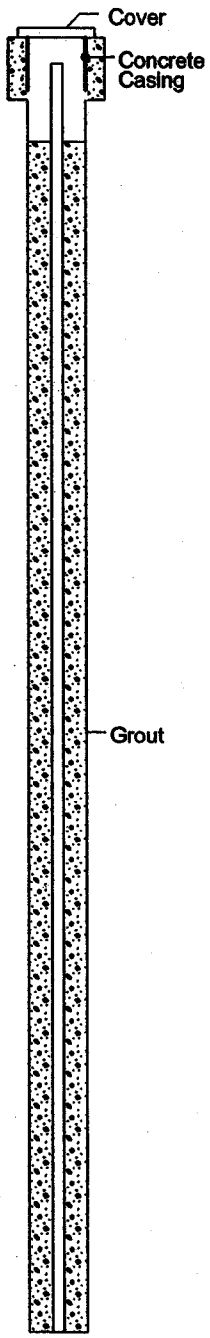
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0950 4/13/99	Northing	: 392931.02
Finished	: 1421 4/13/99	Easting	: 814783.22
Drilling Method	: Rotasonic	TOC Elevation	: 289.68
Drilling Company	: Alliance Drilling	Total Depth	: 98 feet
Geologist	: C. Davis	Well Screen	: 56.5 to 96.5 feet

Depth in Feet	Surf. Elev. 289.98	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	289						(0 - .5) Concrete and gravel
						ML	(.5 - 4) Dark, orangish brown silt mottled w/ Lt. olive gray silt, some iron staining, moist
		1	40				
5	284						(4 - 8) No recovery
							(8 - 16) Lt. olive gray silt and clayey silt, mottled w/ orangish brown silt and clayey silt w/ iron staining and nodules, moist
10	279					ML	
		2	80				
15	274						(16 - 18) No recovery
							(18 - 24) Same as above, but little to no iron nodules, lots of iron staining and more clay content
20	269	3	100			ML	
25							(24 - 27) Pale orangish Lt. brown to gray clayey silt, moist

Well: 007G49LF
Elev.: 289.98



07-28-2003 N:\well logs\NSAMidsouth\007G49LF.BOR

ENSAFE

BORING LOG OF 007G49LF

NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0950 4/13/99	Northing	: 392931.02
Finished	: 1421 4/13/99	Easting	: 814783.22
Drilling Method	: Rotasonic	TOC Elevation	: 289.68
Drilling Company	: Alliance Drilling	Total Depth	: 98 feet
Geologist	: C. Davis	Well Screen	: 56.5 to 96.5 feet

Depth in Feet	Surf. Elev. 289.98	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
25	264	3	100				(27 - 28) Lt. olive gray silt and clayey silt, mottled w/ orangish brown silt and clayey silt w/ iron staining and nodules, moist (28 - 35) Dusky orangish brown clayey to very clayey silt w/ iron staining, moist
30	259	4	100				
35	254					ML	(35 - 45) Orangish brownand Lt. olive gray mottled clayey to very clayey silt w/ iron staining, moist
40	249	5	100				
45	244						(45 - 47) Orangish brownand Lt. olive gray mottled clayey to very clayey silt w/ iron staining and minor amounts of very fine sand, moist
50		6	100			SW	(47 -48) same mottled colors w/ very fine to fine sand and subangular gravel (up to 1 1/2" dia.) (48 - 51) Same as above, very moist, sand grain to med.

Well: 007G49LF
Elev.: 289.98

Grout

07-28-2003 N:\well logs\NSAMidsouth\007G49LF.BOR

ENSAFE

BORING LOG OF 007G49LF

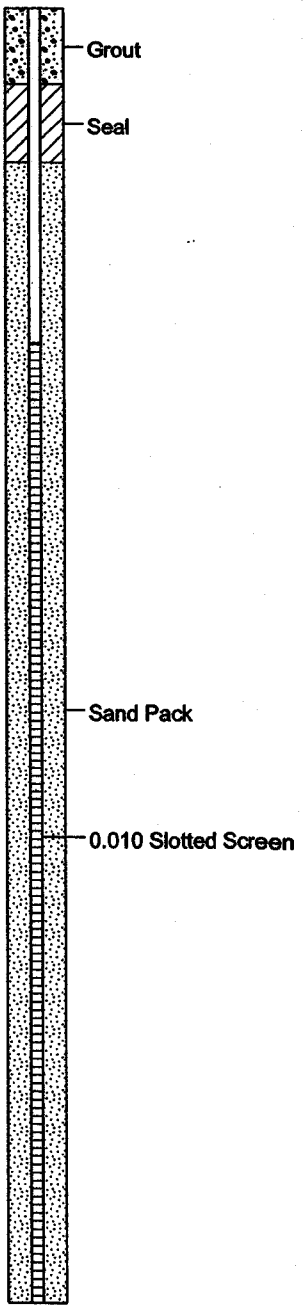
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7
Project #: CTO 0094

Started	: 0950 4/13/99	Northing	: 392931.02
Finished	: 1421 4/13/99	Easting	: 814783.22
Drilling Method	: Rotasonic	TOC Elevation	: 289.68
Drilling Company	: Alliance Drilling	Total Depth	: 98 feet
Geologist	: C. Davis	Well Screen	: 56.5 to 96.5 feet

Depth in Feet	Surf. Elev. 289.98	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
50						SW	
	239						(51 - 56.5) Alternating Lt. gray and bright orangish brown fine to med. clayey to clean sands, clay lense 2" thick at 54, 3" thick at 55.5, 6" thick from 56 to 56.5, very moist
		6	100			SC	
55							
	234					SW	(56.5 - 58) Pale orangish to pale yellowish gray fine to med. sand, wet
						SP	(58 - 62) Pale orangish brown fine sand, wet
60							
	229						
		7	100			SC	(62 - 62.5) Red and gray banded to mottled clay, moist (62.5 - 68) Repeat pattern of sand and clay as follows: 62.5-63 is sand, 63- 63.75 is clay, 63.75- 64.5 is sand, 64.5-64.75 is clay, 64.75-66 is sand, 66-66.25 is clay, 66.25-66.5 is sand 66.5-67 is clay, 67-68 is sand
65							
	224						
70							
	219						
		8	80			SW	(68 - 78) Yellowish gray to Lt. orangish brown fine to med sand w/ occassional very fine gravel, wet, Lt. gray clay, very moist
75							

Well: 007G49LF
Elev.: 289.98



07-28-2003 N:\well logs\NSAMidsouth\007G49LF.BOR

BORING LOG OF 007G49LF

ENSAFE

NSA MID-SOUTH
Millington, TN.

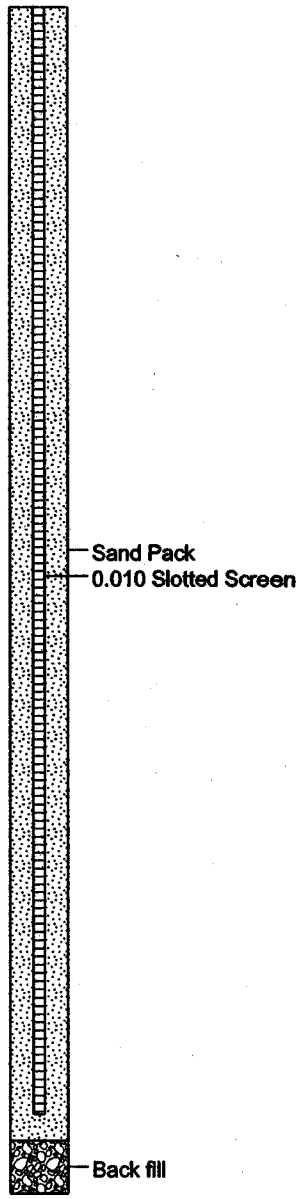
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0950 4/13/99	Northing	: 392931.02
Finished	: 1421 4/13/99	Easting	: 814783.22
Drilling Method	: Rotasonic	TOC Elevation	: 289.68
Drilling Company	: Alliance Drilling	Total Depth	: 98 feet
Geologist	: C. Davis	Well Screen	: 56.5 to 96.5 feet

Depth in Feet	Surf. Elev. 289.98	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
75							
	214	8	80				(78 - 86) Same, clay lense at 78.5 (2" thick)
80						SW	
	209	9	100				
85							
	204						(86 - 88) No recovery
							(88 - 91) Pale orangish gray med. sand, wet (91 - 92) Pale orangish gray med. sand w/ gravel (up to 1 1/2")
90						SP	
	199	10	100				
						SW	(92 - 93) Very pale orangish brown med. to very coarse sand w/ gravel
						SP	(93 - 94) Pale orangish gray med. sand w/ gravel (up to 1 1/2"), wet
						SW	(94 - 94.5) Orangish yellow brown med. to very coarse sand w/ gravel (up to 3")
95							(94.5 - 95) Gray to Lt. gray clay moist, some yellowish and orangish gray mottling
	194					CL	(95 - 98) Very dark brown silty clay, w/ clayey silt bands, micaceous, moist
100							

Well: 007G49LF
Elev.: 289.98



07-28-2003 N:\well logs\NSAMidsouth\007G49LF.BOR

BORING LOG OF 007G50LF

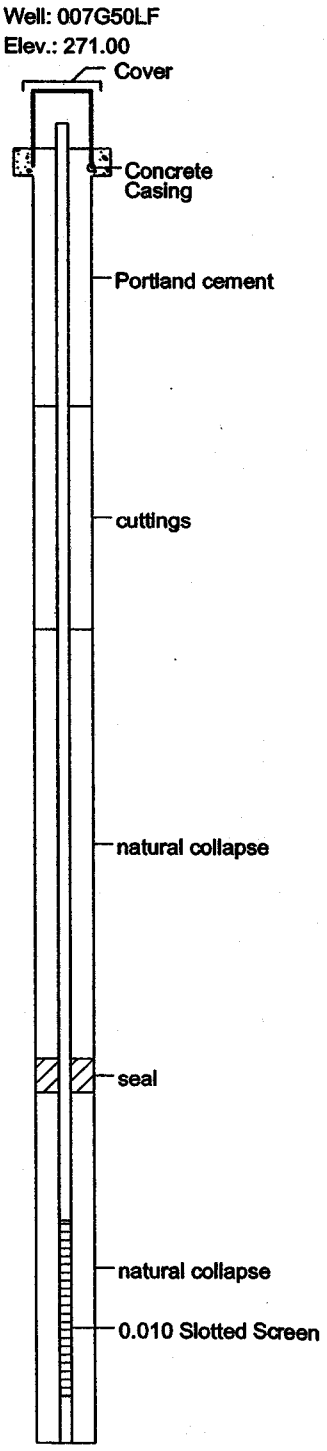
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0915 6/8/98	Northing	: 393883.00
Finished	:	Easting	: 809492.00
Drilling Method	: 3 1/4" ID HSA	TOC Elevation	: 271.00
Drilling Company	: USGS	Total Depth	: 75 feet
Geologist	: V. Carmichael	Well Screen	: 62.3 to 72.3 feet

Depth in Feet	Surf. Elev. 262.00	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	262						(0-5) Clayey silt, brown, dry
5	257						(5-10) Silt, yellowish brown, dry, hard silt layer @ 7' bls
10	252						(10-15) Silt, yellowish brown, dry, some light colored silt (layered) w/ trace iron oxidation
15	247						(15-20) Silt, grey-yellow brown (clay to greyish color @ 17' bls)
20	242						(20-25) Clayey silt, brownish-gray, moist (color change @ 22' bls
						ML	
25	237						(25-30) Clayey silt, light brownish gray (gray color @ 27' bls), moist
30	232						(30-35) Clayey silt, gray, moist
		1					
35	227						(35-40) Clayey silty, grayish-yellow, clay and moisture content increasing
40	222						(40-45) Clayey silt, yellowish-brown, moist
45	217						
						SC	(45-49) Clayey silt w/ occasional gravel 1/2" round to anguler, clay silt is yellowish brown, moist
50	212						(49-55) No returns, could hear gravel falling back into hole as auger spun @ 55'
55	207						(55-60) No returns, drilling like sand and gravel
						SP	
60	202						(60-65) No returns
65	197						(65-70) No returns
						GW	
70	192						(70-75) No returns
75							



07-28-2003 N:\well logs\NSAMidsouth\007G50LF.BOR

BORING LOG OF 007G51LF

NSA MID-SOUTH
Millington, TN.

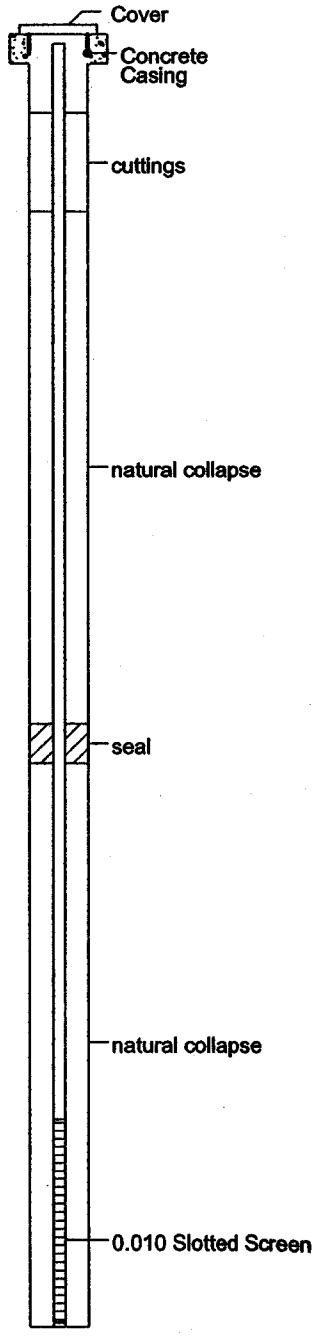
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1600 6/10/98	Northing	: 397085.00
Finished	: 1030 6/11/98	Easting	: 808736.00
Drilling Method	: 3 1/4" ID HSA	TOC Elevation	: 279.00
Drilling Company	: USGS	Total Depth	: 65 feet
Geologist	: V. Carmichael	Well Screen	: 54.8 to 64.8 feet

Depth in Feet	Surf. Elev. 279.00	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	279						(0-5) Silt, yellowish brown, moist (gravel from parking area to 6" bls)
5	274						(5-10) Silt, slightly clayey, yellowish brown moist
10	269						(10-15) Silt, slighty clayey, dusky yellowish brown, moist
15	264						(15-20) Same as above, saturated @ 17'-18' bls
20	259						(20-25) Same as 15' - 20'
25	254	1				ML	(25-30) Same as above. Larry said hard layer @ 26 1/2' BLS
30	249						(30-35) Very soupy returns. Saturated zone is causing cuttings to come up in a slurry.
35	244						(35-40) Same as above
40	239						(40-45) Same as above
45	234						(45-50) Same as above. Larry felt change to sand @ 47' bls
50	229						(50-55) Same as above
55	224					SP	(55-60) Same as above
60	219						(60-65) Same as above
65							

Well: 007G51LF
Elev.: 279.00



07-28-2003 N:\well logs\NSAMidsouth\007G51LF.BOR

ENSAFE

BORING LOG OF 007G52LF

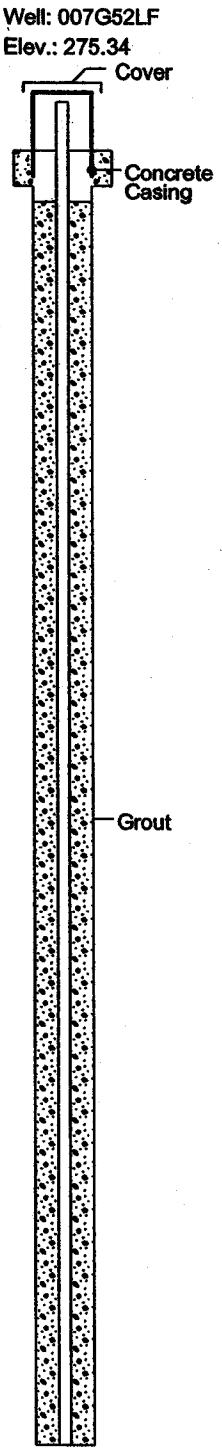
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0805 7/9/99	Northing	: 395738.31
Finished	: 1730 7/9/99	Easting	: 812022.10
Drilling Method	: Rotasonic	TOC Elevation	: 278.20
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 75 to 85 feet

Depth in Feet	Surf. Elev. 275.34	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	275	-					(0 - 14) Lt. brown w/ Lt. gray clayey silt, dry, med. stiff
		1	100				(14 - 15) Lt. gray silt, dry, friable
5	270						(15 - 16.5) Yellowish orange to Lt. brown clayey silt w/ trace of fine sand, moist, med. stiff
10	265	2	95				
15	260					ML	
		3	100				(16.5 - 28) Olive gray and dark gray clayey silt, wet, med. stiff Small gastropods (1mm) between 16.5 and 25 Traces of wood
20	255						
25	250						
		4	100			SM	(28 - 31.5) Olive gray silty sand, wet, med. stiff
30	245					SW	(31.5 - 33.5) Lt. gray to greenish gray fine sand grading to a coarse yellow brown sand, wet
35	240					CL	(33.5 - 35) Olive gray to dark gray sandy clay, wet, soft (35 - 37) Olive gray to dark gray sandy clayw/ trace of gravel (up to 1/4" dia.), wet, med. stiff
						GC	(37 - 41) Olive gray to Lt. brown clayey sand gravel mixture, wet
40	235	5	100			SW	(41 - 44) Lt. grey fine to coarse sand w/ gravel (up to 1/2" dia.), wet (44 - 45) Yellow brown fine to coarse sand w/ gravel (up to 1/2" dia.), wet
45	230						(45 - 55) Yellow brown fine and med. grained sand w/ trace of gravel (up to 1/2" dia.)
		6	85			SP	(55 - 64) Orange brown fine and med. grained sand w/ trace of gravel (up to 1/2" dia.) Iron stone 1/2" thick at 62
50							



07-28-2003 N:\well logs\NSAM\dsouth\007G52LF.BOR

ENSAFE

BORING LOG OF 007G52LF

NSA MID-SOUTH
Millington, TN.

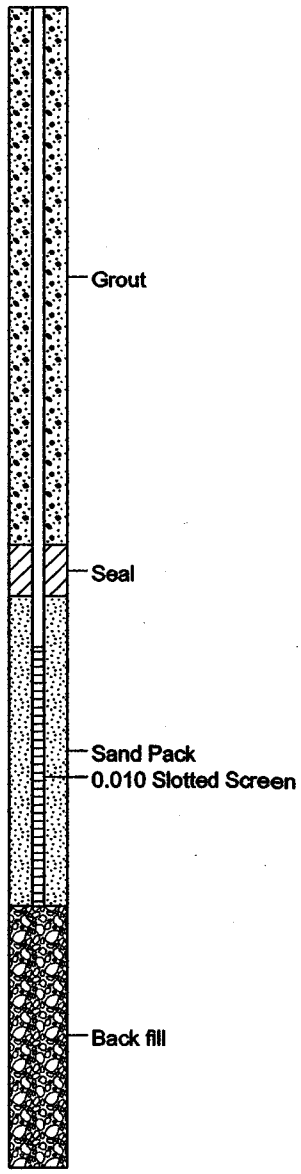
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0805 7/9/99	Northing	: 395738.31
Finished	: 1730 7/9/99	Easting	: 812022.10
Drilling Method	: Rotasonic	TOC Elevation	: 278.20
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 75 to 85 feet

Depth in Feet	Surf. Elev. 275.34	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
50	225	6	85			SP	
55	220						
60	215	7	100				
65	210					CH	(64 - 64.5) Tan brown fat clay lense (4" thick), moist, soft
						SP	(64.5 - 67) Orange brown fine and med. grained sand w/ trace of gravel (up to 1/2" dia.)
						GW	(67 -71) Orange brown med. to coarse sandy gravel (up to 2" dia.), wet
70	205	8	100				
						SW	(71 - 75) Orange reddish brown gravelly med. coarse sand, wet
75	200						
						GW	(75 - 84) Orange brown med. coarse sandy gravel (1/4" to 2" dia.)
80	195	9	100				
85	190					SP	(84 - 85) Yellowish orange brown fine sand
						SC	(85 - 86) Lt. gray clayey fine sand, wet
						SP	(86 - 89) Lt. gray fine sand
90	185	10	100			SC	(89 - 93) Lt. gray clayey sand
95	180					CL	(93 - 95) Olive grey clay, moist, very stiff
100							

Well: 007G52LF
Elev.: 275.34



07-28-2003 N:\well logs\NSAMidsouth\007G52LF.BOR

ENSAFE

BORING LOG OF 007G53LF

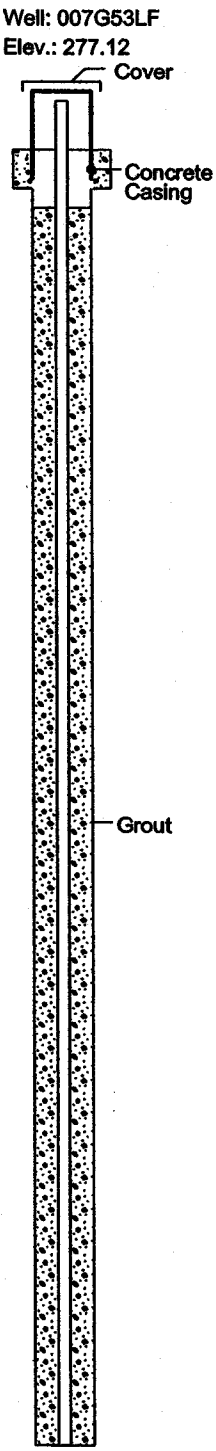
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0820 7/10/99	Northing	: 3961955.38
Finished	: 1400 7/10/99	Easting	: 812124.48
Drilling Method	: Rotasonic	TOC Elevation	: 280.16
Drilling Company	: Alliance Drilling	Total Depth	: 85 feet
Geologist	: B. Brantley	Well Screen	: 68 to 78 feet

Depth in Feet	Surf. Elev. 277.12	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	277	1	90			ML	(0 - 8) Lt. brown clayey silt w/ iron and manganese striations, wet, med. stiff (moist from 3 to 6 and wet from 6 to 8)
5	272						(8 - 15) Lt. gray and yellowish orange brown clayey silt, wet, med. stiff
10	267	2	100				
15	262	3	55				(15 - 20.5) Dark gray clayey silt w/ lignitic lenses/seams between 15 and 18, wet, soft
20	257						(20.5 - 26) Dark gray clayey silt, wet, soft
25	252					CL	(26 - 28) Greenish gray and dark gray silty clay, moist, stiff (28 - 30) Greenish gray and dark gray sandy clay, moist
30	247	4	100			SC	(30 - 33) Olive gray clayey sand w/ trace of pebbles, wet, soft (33 - 35) Greenish gray clayey sand, wet, hard
35	242						(35 - 37) Lt. gray, olive gray, yellowish brown, clayey sand (37 -39) Lt. gray, olive gray, yellowish brown, clayey sand w/ trace of gravel
40	237	5	100			GC	(39 - 40) Greenish gray and Lt. brown gravelly sand clay
						SC	(40 - 45) Greenish gray, yellowish orange, Lt. gray sandy clay w/ trace of gravel (up to 1/2" dia.), wet, soft to med. stiff
45							



07-28-2003 N:\well logs\NSAM\dsouth\007G53LF.BOR

BORING LOG OF 007G53LF

NSA MID-SOUTH
Millington, TN.

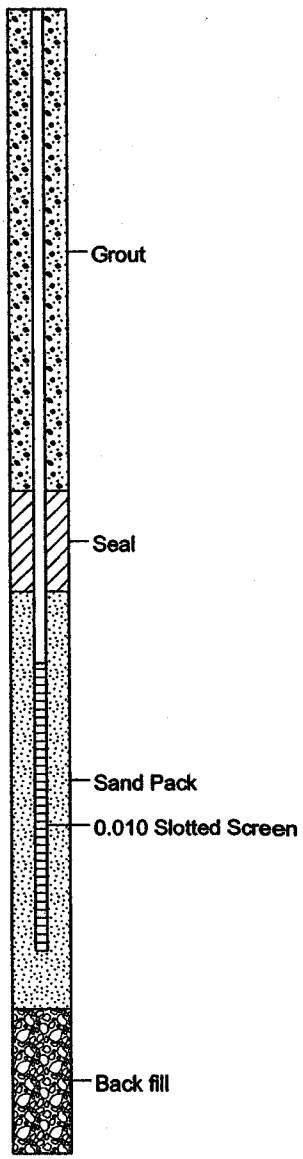
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 0820 7/10/99	Northing	: 3961955.38
Finished	: 1400 7/10/99	Easting	: 812124.48
Drilling Method	: Rotasonic	TOC Elevation	: 280.16
Drilling Company	: Alliance Drilling	Total Depth	: 85 feet
Geologist	: B. Brantley	Well Screen	: 68 to 78 feet

Depth in Feet	Surf. Elev. 277.12	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
45	232					SW	(45 - 47) Lt. gray mixed w/ yellowish brown fine to coarse sand, wet
50	227	6	100			SP	(47 - 65) Lt. brown to orange brown fine to med. sand (slightly silty and micaceous) w/ trace of pebbles (increase in gravel contents between 63 and 65)
55	222						
60	217	7	90				
65	212					SW	(65 - 76) Orange brown gravelly med. to coarse sand w/ fines (gravel up to 1" dia.)
70	207	8	80				
75	202					GW	(76 - 77) Orange brown sandy gravel (cherts up to 2" dia.)
						SC	(77 - 78) Orange brown and Lt. gray clayey sand
80	197	9	90			CL	(78 - 81) Dark gray sandy clay w/ wood fragments (78 - 79), moist, very stiff
						SP	(81 - 85) Lt. gray fine sand w/ Lt. olive gray clay lenses scattered throughout
85	192						
90							

Well: 007G53LF
Elev.: 277.12



07-28-2003 N:\well logs\NSAMidsouth\007G53LF.BOR

BORING LOG OF 007G54LF

NSA MID-SOUTH
Millington, TN.

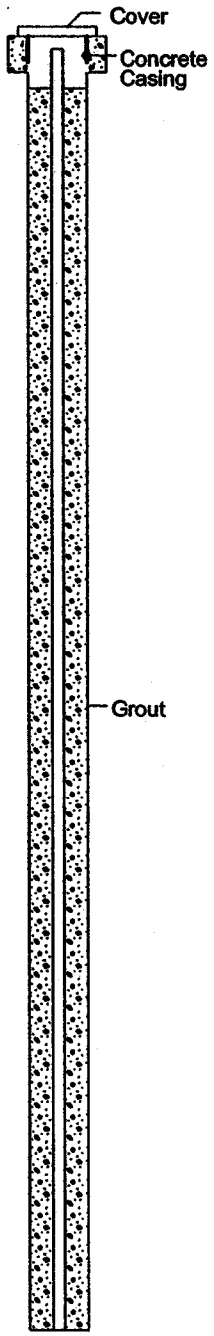
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1415 7/11/99	Northing	: 392837.38
Finished	: 0915 7/12/99	Easting	: 812878.255
Drilling Method	: Rotasonic	TOC Elevation	: 278.64
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 75 to 85 feet

Depth in Feet	Surf. Elev. 278.94	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	278	1	80			ML	(0 - 5) Lt. brown clayey silt w/ manganese inclusions throughout, dry, hard
5	273						(5 - 10) Lt. brown clayey silt w/ manganese inclusions throughout, moist, very stiff
10	268	2	100				(10 - 15) Lt. brown clayey silt w/ manganese inclusions throughout, wet, med. stiff to soft
15	263						(15 - 17) Yellowish orange and Lt. gray clayey silt, wet, med. stiff to soft (17 - 23) Olive gray to greenish gray clayey silt, wet, soft
20	258	3	95				
25	253					CL	(23 - 25) Dark olive gray silty clay, moist, soft (25 - 32) Greenish gray silty clay, dry, very stiff
30	248	4	100				(32 - 35) Yellowish brown and Lt. brown silty clay w/ manganese striations at 34 - 35, dry, hard
35	243						(35 - 38) Yellowish brown, Lt. brown and Lt. gray silty clay w/ manganese striations, dry, hard
40	238	5	100			SC	(38 - 41) Lt. brown sandy clay, moist, med. stiff (41 - 45) Lt. brown/orange brown and Lt. gray clayey sand, wet
45	233	6	100				(45 - 49) Lt. brown, orange brown and Lt. gray clayey sand w/ trace of gravel (up to 1/4" dia.), wet
50						GW	

Well: 007G54LF
Elev.: 278.94



07-28-2003 N:\well logs\NSAMid-south\007G54LF.BOR

ENSAFE

BORING LOG OF 007G54LF

NSA MID-SOUTH
Millington, TN.

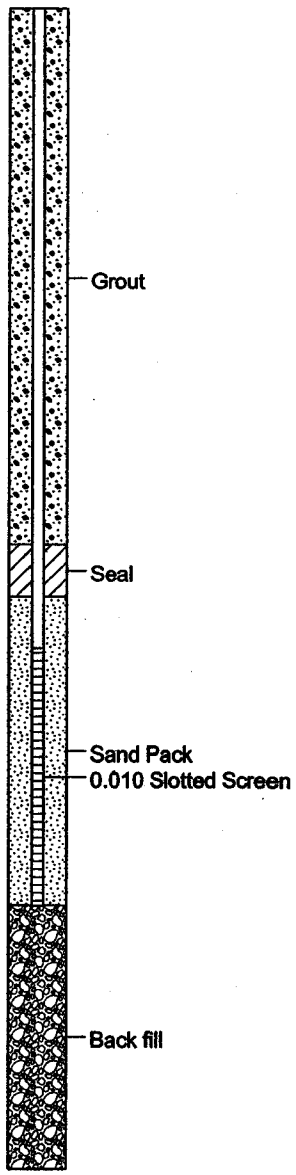
Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1415 7/11/99	Northing	: 392837.38
Finished	: 0915 7/12/99	Easting	: 812878.255
Drilling Method	: Rotasonic	TOC Elevation	: 278.64
Drilling Company	: Alliance Drilling	Total Depth	: 95 feet
Geologist	: B. Brantley	Well Screen	: 75 to 85 feet

Depth in Feet	Surf. Elev. 278.94	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
50	228	6	100			GW	(49 - 55) Lt. brown to orange brown sandy gravel
55	223	7	100			SW	(55 - 66.5) Yellowish brown fine to coarse sand w/ trace of gravel
60	218						
65	213	8	100			SP	(66.5 - 68.5) Tan and Lt. gray fine sand (68.5 - 70) Lt. brown med. sand w/ few gravel (70 - 71.5) Yellowish brown fine sand
70	208						
75	203	9	100			SW	(71.5 - 81) Yellow brown coarse gravelly sand w/ fines
80	198						
85	193					GW	(81 - 85) Yellowish orange to Lt. brown sandy gravel (up to 2" dia.)
90	188	10	100			CL	(85 - 95) Dark brown silty clay w/ Lt. gray sand stringers (5%), moist, hard
95	183						
100							

Well: 007G54LF
Elev.: 278.94



07-28-2003 N:\well logs\NSA Midsouth\007G54LF.BOR

ENSAFE

BORING LOG OF 007G55LF

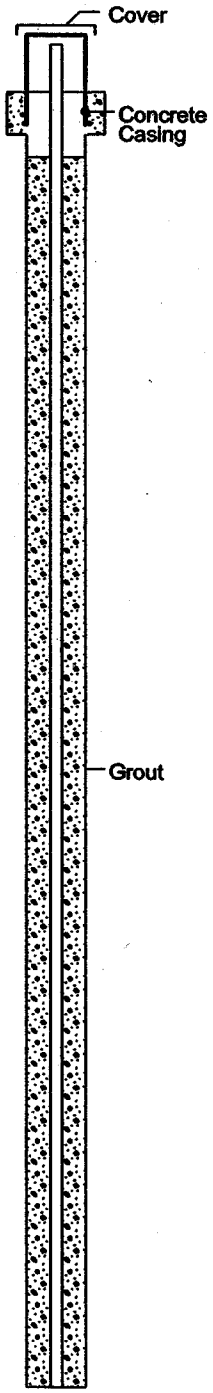
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7
Project #: CTO 0094

Started	: 15455 7/22/99	Northing	: 398359.55
Finished	: 1200 7/23/99	Easting	: 810649.43
Drilling Method	: Rotasonic	TOC Elevation	: 282.00
Drilling Company	: Alliance Drilling	Total Depth	: 115 feet
Geologist	: C. Davis	Well Screen	: 85 to 105 feet

Depth in Feet	Surf. Elev. 278.76	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	278	1	100				(0 - 5) Lt. brown to med. brown clayey silt, moist, stiff
5	273	2	110				(5 - 15) Lt. brown to med. brown clayey silt w/ less clay content, moist
10	268						
15	263	3				ML	(15 - 25) Lt. brown to med. brown clayey silt w/ iron staining, moist
20	258						
25	253	4	110				(25 - 29) Lt. brown and Lt. gray mottled very clayey silt w/ iron staining, moist, stiff
30	248					CL	(29 - 32.5) Orangish brown silty clay w/ iron-manganese nodules, moist
35	243	5	100			ML	
40							

Well: 007G55LF
Elev.: 278.76



07-28-2003 N:\well logs\NSA\Midsouth\007g55lf.bor

BORING LOG OF 007G55LF

NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 15455 7/22/99	Northing	: 398359.55
Finished	: 1200 7/23/99	Easting	: 810649.43
Drilling Method	: Rotasonic	TOC Elevation	: 282.00
Drilling Company	: Alliance Drilling	Total Depth	: 115 feet
Geologist	: C. Davis	Well Screen	: 85 to 105 feet

Well: 007G55LF
Elev.: 278.76

Depth in Feet	Surf. Elev. 278.76	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
40	238	5	100			ML	(32.5 - 35) Lt. brown and Lt. gray mottled slighty clayey silt w/ iron-manganese nodules, slighty moist, slighty stiff to friable
						SC	
45	233					SW	(35 - 39) Lt. brown and Lt. gray mottled slighty clayey silt w/ iron-manganese nodules, slighty moist, slighty stiff to friable (two areas - 36 and 37.5 are mostly iron nodules and very stained) (39 - 40) Lt. gray fine sandy and fine gravelly clayey silt, moist (40 - 41) Lt. gray and pale yellowish orange brown clayey silt, moist, med. stiff
50	228	6	100				(41 - 42.5) Yellowish orange clayey gravelly sand (up to 1" dia), very moist (42.5 - 45) Yellowish orange brown fine to very coarse sand and fine gravel w/ traces of clay, wet (45 -46) Yellowish orange brown med. to very coarse sand w/ traces of very fine gravel and clay, moist to wet
55	223					SP	(46 - 48) Lt. gray to pale yellowish gray med. sand w/ traces of fine to very fine gravel, wet (48 - 55) Heavily iron stained sand w/ traces of fine gravel, wet
60	218	7	100				(55 - 63.5) Yellowish orange brown med. sand w/ iron staining and traces of gravel (up to 3/4" dia.), wet (occasional patch of Lt. gray med. sand)
65	213						(63.5 - 65) Yellowish orange brown med. sand and fine gravel mix (up to 1" dia.), wet
70	208	8	100			SW	(65 - 85) Yellowish orange brown med. to very coarse sand and fine to coarse gravel w/ iron staining (gravel up to 3 1/2" dia.), wet
75	203	9	100				
80							

Grout

07-28-2003 N:\well logs\NSAMidsouth\007g55lf.bor

BORING LOG OF 007G55LF

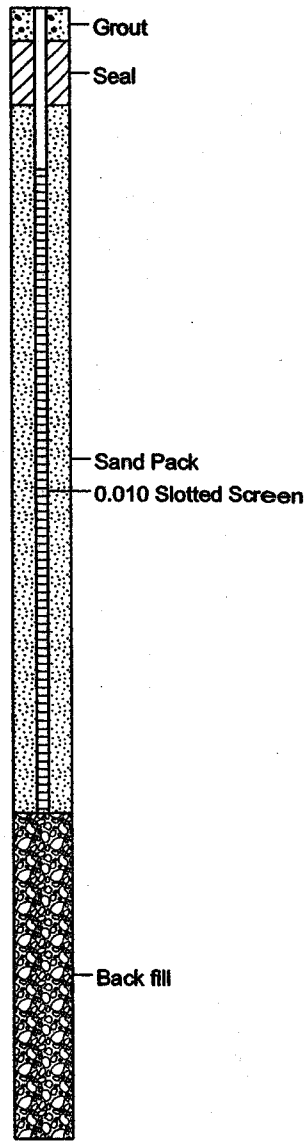
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7
Project #: CTO 0094

Started	: 15455 7/22/99	Northing	: 398359.55
Finished	: 1200 7/23/99	Easting	: 810649.43
Drilling Method	: Rotasonic	TOC Elevation	: 282.00
Drilling Company	: Alliance Drilling	Total Depth	: 115 feet
Geologist	: C. Davis	Well Screen	: 85 to 105 feet

Depth in Feet	Surf. Elev. 278.76	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
80	198	9	100			SW	
85	193						(85 - 95) Poor recovery Fine to coarse sand, wet 6" layer of gravel (from 1/2" to 2" dia.), wet 4" layer of very clayey med. to coarse sand w/ small gravel, wet. Mix of med. to coarse sand and fine to med. gravel w/ traces of clay, wet
90	188	10	20				
95	183						(95 - 105) No recovery Dark brown fine sandy clay w/ gravel (up to 2 1/2" dia.), grading to 2" layer of pale yellowish brown fine clayey sand, grading to 3-4" gray clayey sand, wet
100	178	11	0				
105	173					SP	(105 - 108.5) Gray clayey sand w/ mica, wet
110	168	12	100			CL	(108.5 - 113) Gray fine sandy clay, wet (113 - 115) Gray to olive gray clay, moist
115	163						
120							

Well: 007G55LF
Elev.: 278.76



07-28-2003 N:\well logs\NSA Mid-south\007g55lf.bor

BORING LOG OF 007G56LF

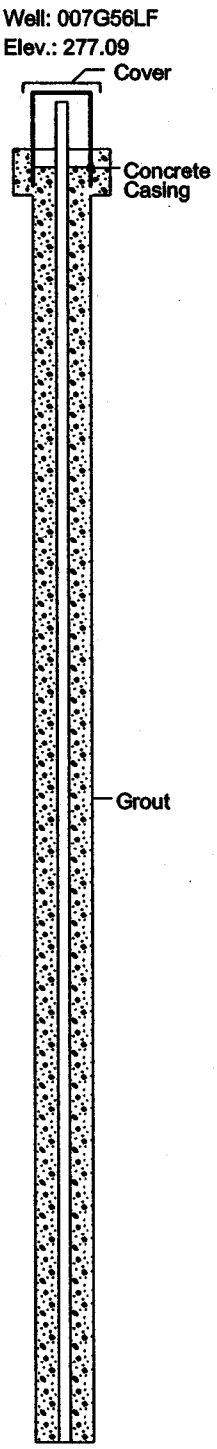
NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1020 7/21/99	Northing	: 398282.45
Finished	: 1015 7/22/99	Easting	: 811099.55
Drilling Method	: Rotasonic	TOC Elevation	: 280.63
Drilling Company	: Alliance Drilling	Total Depth	: 135 feet
Geologist	: C. Davis	Well Screen	: 105 to 115 feet

Depth in Feet	Surf. Elev. 277.09	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	277	1	80			ML	(0 - 5) Med. brown silt, dry to slightly moist, slightly stiff
5	272						(5 - 15) Lt. brown and Lt. grey mottled slightly clayey silt w/ iron staining and iron-manganese nodules, slightly moist, slightly stiff
10	267	2	55				
15	262						(15 - 15.5) Grayish brown clayey silt w/ iron staining, moist
						CL	(15.5 - 24) Grayish brown silty clay, moist
20	257	3	100				
						ML	(24 - 25) Grayish brown clayey silt w/ iron staining, moist
25	252					CH	(25 - 26) Brownish gray silty clay, very moist
						ML	(26 - 27) Lt. orangish yellowish brown clayey silt mottled w/ greenish gray lenses and iron staining, moist, stiff (27 - 35.5) Greenish gray clayey silt mottled w/ Lt. brown and greyish brown clayey silt w/ iron staining and iron-manganese nodules (35.5 - 40) Greenish gray clayey silt mottled w/ Lt. brown and greyish brown clayey silt w/ iron staining and iron-manganese nodules, contains traces of fine sand, moist, stiff
30	247	4	100				
35							



07-28-2003 N:\well logs\NSA\Mdsouth\007G56LF.BOR

ENSAFE

BORING LOG OF 007G56LF

NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1020 7/21/99	Northing	: 398282.45
Finished	: 1015 7/22/99	Easting	: 811099.55
Drilling Method	: Rotasonic	TOC Elevation	: 280.63
Drilling Company	: Alliance Drilling	Total Depth	: 135 feet
Geologist	: C. Davis	Well Screen	: 105 to 115 feet

Depth in Feet	Surf. Elev. 277.09	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
35	242					ML	
40	237	5	100			SM	(40 - 42) Lt. brown and Lt. gray fine sandy and gravelly clayey silt, moist
						SW	(42 - 43) Reddish orangish brown (iron stained) fine to coarse sand w/ traces of silt/clay and gravel (up to 2" dia.), moist
						ML	
						SW	(43 - 44) Lt. gray fine sandy and gravelly clayey silt, moist
45	232					SP	(44 - 45) Lt. brown to orangish yellowish brown silty clayey fine to coarse sand w/ gravel (up to 2" dia.) moist
						SW	(45 - 46) Yellowish orangish brown med. sand, wet
							(46 - 48) Yellowish orangish brown med. to very coarse sand w/ gravel (up to 1" dia.), wet
50	227	6	100			SP	(48 - 51.5) Yellowish orangish brown med. sand, wet
							(51.5 - 55) Yellowish orangish brown med. to very coarse sand w/ gravel (up to 1" dia.), wet
55	222						(55 - 75) Yellowish orangish brown med. to very coarse sand w/ gravel (up to 3" dia.), wet A sand and gravel concretion the size of core barrel at 58
60	217	7	100			SW	
65	212						
		8	100				
70							

Well: 007G56LF
Elev.: 277.09

Grout

07-28-2003 N:\well logs\NSA\Mdsouth\007G56LF.BOR

BORING LOG OF 007G56LF

NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7

Project #: CTO 0094

Started	: 1020 7/21/99	Northing	: 398282.45
Finished	: 1015 7/22/99	Easting	: 811099.55
Drilling Method	: Rotasonic	TOC Elevation	: 280.63
Drilling Company	: Alliance Drilling	Total Depth	: 135 feet
Geologist	: C. Davis	Well Screen	: 105 to 115 feet

Well: 007G56LF
Elev.: 277.09

Depth in Feet	Surf. Elev. 277.09	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
70	207	8	100			SW	(73 - 75) Yellowish orangish brown med. to very coarse sand w/ gravel (up to 3" dia.), slightly moist
75	202	9	100			GW	(75 - 76) Yellowish orangish brown fine to coarse gravel (upp to 2" dia.) w/ med. to very coarse sand, wet
						SW	(76 - 81) Fine to very coarse sand and fine to coarse gravel (up to 2" dia.) mix w/ iron staining, wet
80	197						
						SP	(81 - 87) Pale yellow to pale orange iron stained fine sand, wet
85	192	10	100			SW	(87 - 88) Fine to coarse sand and gravel (up to 1" dia.) w/ some gray clay, wet
						SP	
						SW	(88 - 89) Pale yellow to pale orange iron stained fine sand w/ some gravel (up to 1" dia.), wet
90	187					SP	(89 - 90) Fine to coarse sand and gravel (up to 1" dia.) w/ some gray clay, wet
						SW	(90 - 91) Pale yellow to pale orange iron stained fine sand w/ some gravel (up to 2 1/2" dia.), wet
						SP	
						SW	(91 - 92.5) Fine to coarse sand and gravel (up to 1" dia.) w/ some gray clay, wet
95	182	11	100				(92.5 - 93) Pale yellow to pale orange iron stained fine sand, wet
							(93 - 95) Fine to coarse sand and gravel (up to 4" dia.) w/ some gray clay, wet
						SC	(95 - 101) Fine to coarse sand and gravel (up to 5" dia.) w/ gray clay, wet
100	177						(101 - 104) Fine to coarse sand and gravel (up to 1" dia.) w/ increasing gray clay contents, wet
						SW	
105							

Grout

Seal

Sand Pack

07-28-2003 N:\well logs\NSAMidsouth\007G56LF.BOR

ENSAFE

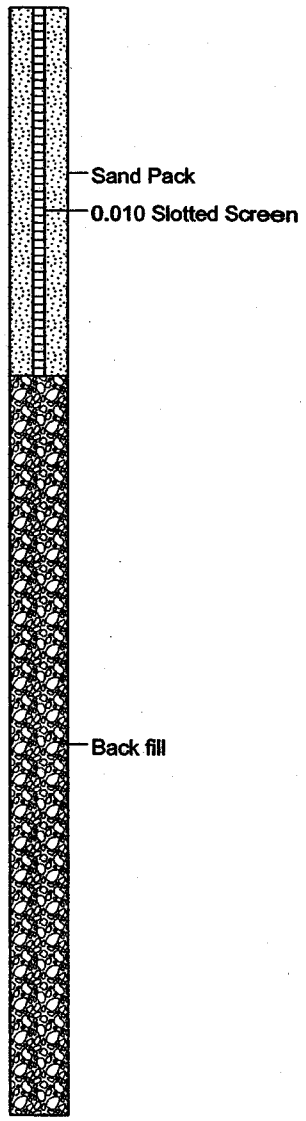
BORING LOG OF 007G56LF

NSA MID-SOUTH
Millington, TN.

Location: AOCA/SWMU 7
Project #: CTO 0094

Started	: 1020 7/21/99	Northing	: 398282.45
Finished	: 1015 7/22/99	Easting	: 811099.55
Drilling Method	: Rotasonic	TOC Elevation	: 280.63
Drilling Company	: Alliance Drilling	Total Depth	: 135 feet
Geologist	: C. Davis	Well Screen	: 105 to 115 feet

Depth in Feet	Surf. Elev. 277.09	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
105	172						(104 - 105) Fine to coarse sand and gravel (up to 1" dia.) w/ trace of gray clay, wet
							(105 - 115) Fine to coarse sand and gravel (up to 3 to 4" dia.), wet
110	167	12	30			SC	
115	162					CL	(115 - 118) Pale yellowish brown fine sandy clay w/ few gravel (up to 1 1/2" dia.), very moist to wet
						CH	(118 - 120) Pale yellowish brown to dark brown fat clay w/ iron staining, very moist
120	157	13	100			SC	(120 - 123) Lt. gray to pale yellowish brown clayey fine sand, very moist
						SP	(123 - 125) Lt. gray fine sand, very moist to wet
125	152						(125 - 131) Dark olive gray to dark olive brown clay, moist, stiff
							(131 - 134.5) Pale yellowish gray fine sandy clay, moist, some what stiff
130	147	14	100			CL	
135	142					SC	(134.5 - 135) Yellowish orange slightly clayey to very clayey sand, moist
140							



07-28-2003 N:\well logs\NSAMidsouth\007G56LF.BOR

ENSAFE

BORING LOG OF 007G57LF

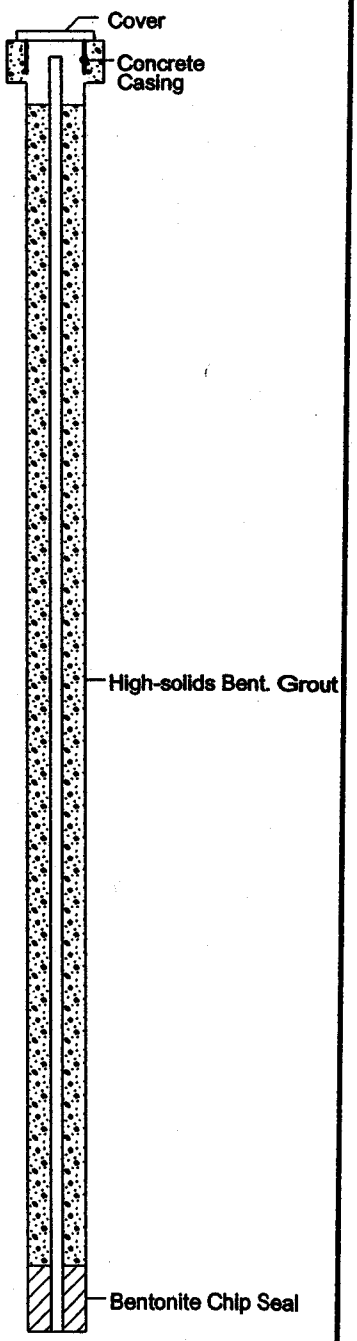
NSA MID-SOUTH
Millington, TN.

Location: Building N-126
Project #: CTO 0094

Started	: 0850 12/1/99	Northing	: 392231.80
Finished	: 0630 12/1/99	Easting	: 813751.34
Drilling Method	: Rotasonic	TOC Elevation	: 283.17
Drilling Company	: Boart-Longyear	Total Depth	: 75 feet
Geologist	: Bart Douglas	Well Screen	: 42 to 72 feet

Depth in Feet	Surf. Elev. 283.17	Samples	% Rec-overy	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	283						CONCRETE
		1	100	0			CLAYEY SILT (0.5-6) Dark-brown, moist, and stiff.
5	278						(6-15) Brown, medium to stiff, and wet.
10	273	2	100	0			
15	268					ML	(15-26) Dark-gray and medium.
20	263	3	100	0			
25	258						(26-29) Gray and soft.
30	253	4	100	0			(29-32) Mottled brown and gray with a trace of fine sand throughout.
35	248	5	100	0		SC	CLAYEY SAND (32-34) Mottled brown to gray and fine-grained. (34-42) Reddish-brown to orange and fine- to medium-grained with some clay.
40		6	100	0.9			

Well: 007G57LF
Elev.: 283.17



07-28-2003 N:\well log\SWSAMidsouth\007G57LF.BOR

ENSAFE

BORING LOG OF 007G57LF

NSA MID-SOUTH
Millington, TN.

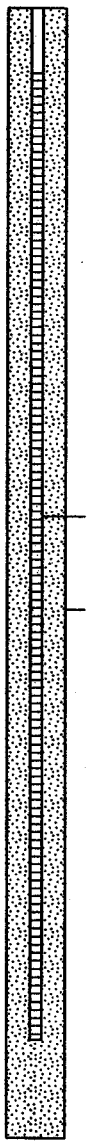
Location: Building N-126

Project #: CTO 0094

Started	: 0850 12/1/99	Northing	: 392231.80
Finished	: 0630 12/1/99	Easting	: 813751.34
Drilling Method	: Rotasonic	TOC Elevation	: 283.17
Drilling Company	: Boart-Longyear	Total Depth	: 75 feet
Geologist	: Bart Douglas	Well Screen	: 42 to 72 feet

Depth in Feet	Surf. Elev. 283.17	Samples	% Rec-overy	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
40	243	6	100	0.9		SC	
		7	100	1.4		SP	SAND, reddish-brown to tan and fine-grained.
45	238	8	100	1.1		GW	SANDY GRAVEL, well graded, reddish-brown with medium sand.
50	233	9	100	0.65			
		10	100	1			
55	228	11	100	1.3		SW	GRAVELLY SAND,well graded, tan, and medium- to coarse-grained with gravel content varying throughout.
60	223	12	100	0.96			
		13	100	1.2			
65	218	14	100	2.5			
		15	100	1.1			
70	213	16	100	0		GW	SANDY GRAVEL, well graded with coarse sand.
		17	100	0		ML	CLAYEY SILT, dark-brown to gray with mica and lignite specks throughout.
75	208						Cockfield contact at 72 feet.
80							

Well: 007G57LF
Elev.: 283.17



07-28-2003 N:\well logs\NSAMidsouth\007G57LF.BOR

ENSAFE

BORING LOG OF 007G58LF

NSA MID-SOUTH
Millington, TN.

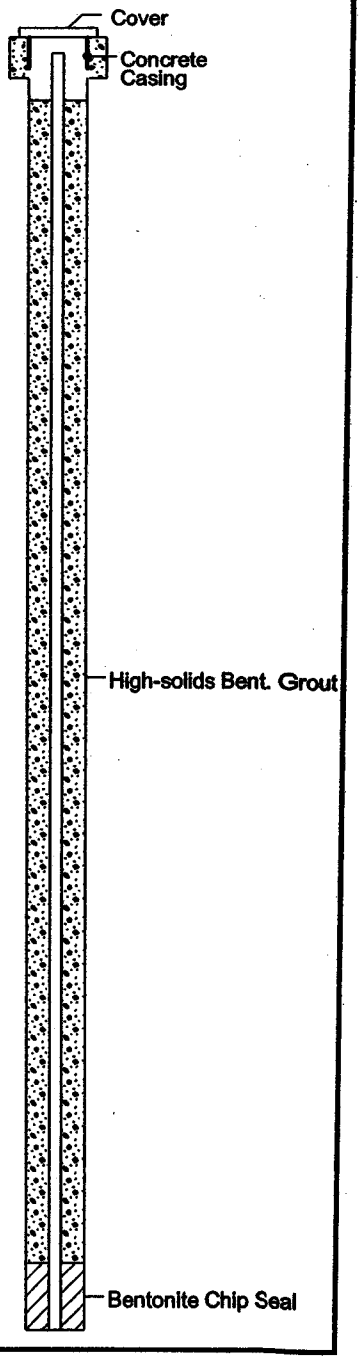
Location: Building N-126

Project #: CTO 0094

Started	: 0930 11/22/99	Northing	: 392157.47
Finished	: 0910 11/23/99	Easting	: 8137755.32
Drilling Method	: Rotasonic	TOC Elevation	: 283.22
Drilling Company	: Boart-Longyear	Total Depth	: 80 feet
Geologist	: Bart Douglas	Well Screen	: 42 to 72 feet

Depth in Feet	Surf. Elev. 283.22	Samples	% Rec-overy	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	283						CONCRETE
						GP	GRAVEL and SAND FILL
		1	100	0			CLAYEY SILT (2-5) Dark-brown, dry, and stiff.
5	278						(5-15) Brown, and medium to soft.
							Wet at 7'.
10	273	2	100	0			
						ML	
15	268						(15-25) Reddish-brown w/ trace fine sand, moist, and medium to stiff.
20	263	3	100	0			
25	258						
		4	100	0		CL	SANDY CLAY, reddish-brown, moist and stiff with fine sand.
30	253	5	100	2			CLAYEY SAND (29-35) Reddish-brown and fine-grained with silt.
		6	100	1.6			
		7	100	2		SC	
35	248						(35-39) Changing to tan and yellowish-brown.
		8	100	16.7			
		9	100	27			
40						SM	

Well: 007G58LF
Elev.: 283.22



07-28-2003 N:\well logs\NSAMidsouth\007G58LF.BOR

BORING LOG OF 007G58LF

ENSAFE

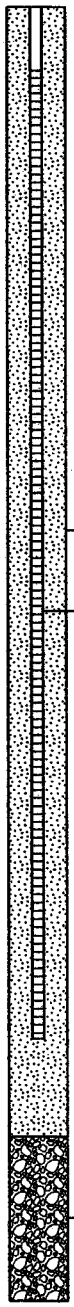
NSA MID-SOUTH
Millington, TN.

Location: Building N-126
Project #: CTO 0094

Started	: 0930 11/22/99	Northing	: 392157.47
Finished	: 0910 11/23/99	Easting	: 8137755.32
Drilling Method	: Rotasonic	TOC Elevation	: 283.22
Drilling Company	: Boart-Longyear	Total Depth	: 80 feet
Geologist	: Bart Douglas	Well Screen	: 42 to 72 feet

Depth in Feet	Surf. Elev. 283.22	Samples	% Rec-overy	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
40	243	9	100	27		SM	SILTY SAND, light-brown to tan and fine- to medium-grained with a trace of clay.
		10	100	102			
45	238	11	100	104		SW	GRAVELLY SAND,well graded. (45-49) Tan to gray and fine- to medium-grained with a trace of gravel. (49-55) Tan and medium-grained with gravel throughout.
50	233	12	100	100			
		13	100	136			
55	228	14	100	36			(55-65) Light-brown to tan, medium- to coarse-grained and gravelly
		15	100	47			
60	223	16	100	103			
		17	100	213			
65	218	18	100	13		GW	SANDY GRAVEL, well graded and brown with coarse sand.
		19	100	39			
70	213	20	100	35			
		21	0	NA		ML	
75	208	22	0	NA			
80							

Well: 007G58LF
Elev.: 283.22



07-28-2003 N:\well logs\NSA\Midsouth\007G58LF.BOR

BORING LOG OF 007G59LF

ENSAFE

NSA MID-SOUTH
Millington, TN.

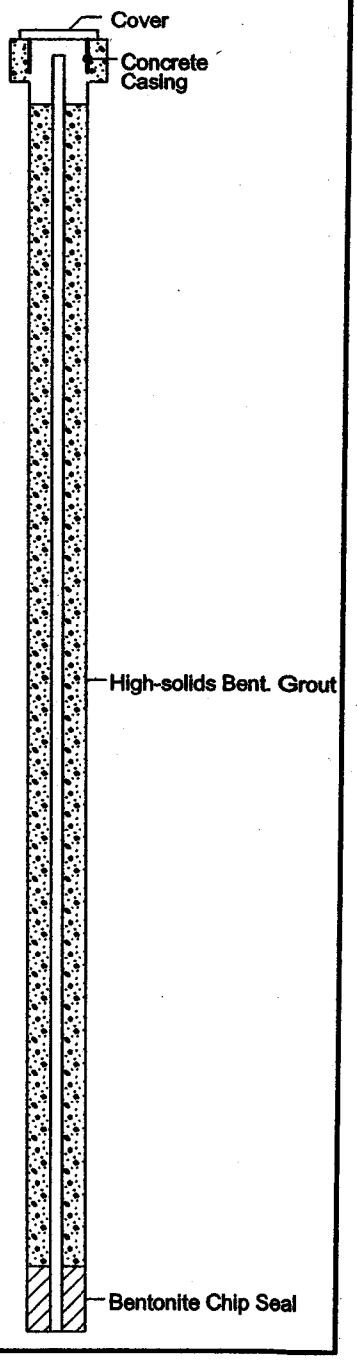
Location: Building N-126

Project #: CTO 0094

Started	: 0930 11/23/99	Northing	: 392163.98
Finished	: 1500 11/29/99	Easting	: 813790.26
Drilling Method	: Rotasonic	TOC Elevation	: 283.17
Drilling Company	: Boart-Longyear	Total Depth	: 75 feet
Geologist	: Bart Douglas	Well Screen	: 42 to 72 feet

Depth in Feet	Surf. Elev. 283.17	Samples	% Rec-overy	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	283						CONCRETE
						GP	GRAVEL and SAND FILL
		1	100	2.3			CLAYEY SILT (2-5) Dark-brown, dry, and very stiff.
5	278						(5-22) Medium to stiff.
10	273	2	35	0			
15	268	3	100	2.2		ML	
20	263	4	100	0			
		5	100	0.7			(22-25) Reddish-brown to orange-brown, moist, and medium.
25	258	6	100	4.4		CL	SANDY CLAY, reddish-brown and stiff with fine sand and silt.
30	253	7	100	4.9			CLAYEY SAND, reddish-brown. (28-32) Fine- to medium- grained.
		8	100	6.1		SC	(32-35) Medium-grained.
35	248	9	0	NA			(35-40) Fine-grained.
		10	100	34			
40							

Well: 007G59LF
Elev.: 283.17



07-28-2003 N:\well logs\NSA\Midsouth\007G59LF.BOR

ENSAFE

BORING LOG OF 007G59LF

NSA MID-SOUTH
Millington, TN.

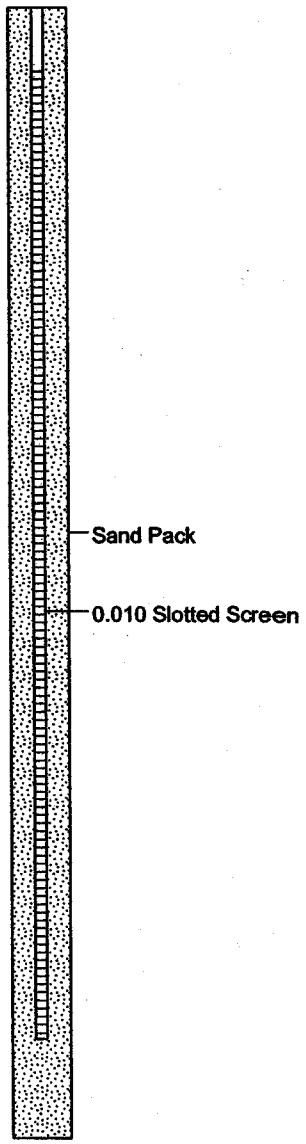
Location: Building N-126

Project #: CTO 0094

Started	: 0930 11/23/99	Northing	: 392163.98
Finished	: 1500 11/29/99	Easting	: 813790.26
Drilling Method	: Rotasonic	TOC Elevation	: 283.17
Drilling Company	: Boart-Longyear	Total Depth	: 75 feet
Geologist	: Bart Douglas	Well Screen	: 42 to 72 feet

Depth in Feet	Surf. Elev. 283.17	Samples	% Recovery	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
40	243	10	100	34		SC	(40-42) Reddish-brown to tan.
		11	100	44		SP	SAND, light-brown to tan and fine-grained.
45	238	12	100	50		SW	GRAVELLY SAND, well graded, light-brown to tan and medium-grained.
50	233	13	100	69		GW	SANDY GRAVEL, well graded with medium- to coarse-grained sand.
		14	100	130			
55	228	15	100	55			
		16	100	19			
60	223	17	100	42		SW	GRAVELLY SAND, well graded and medium-grained.
		18	100	117			
65	218	19	100	33		GW	SANDY GRAVEL, well graded with medium sand.
70	213	20	100	38			
75	208	21	100	3.4		ML	CLAYEY SILT, dark-gray to brown, micacius and soft with lignite throughout. Cockfield contact at 72 feet.
80							

Well: 007G59LF
Elev.: 283.17



07-28-2003 N:\well logs\NSAMidsouth\007G59LF.BOR

BORING LOG OF 007G60LF

NSA MID-SOUTH
Millington, TN.

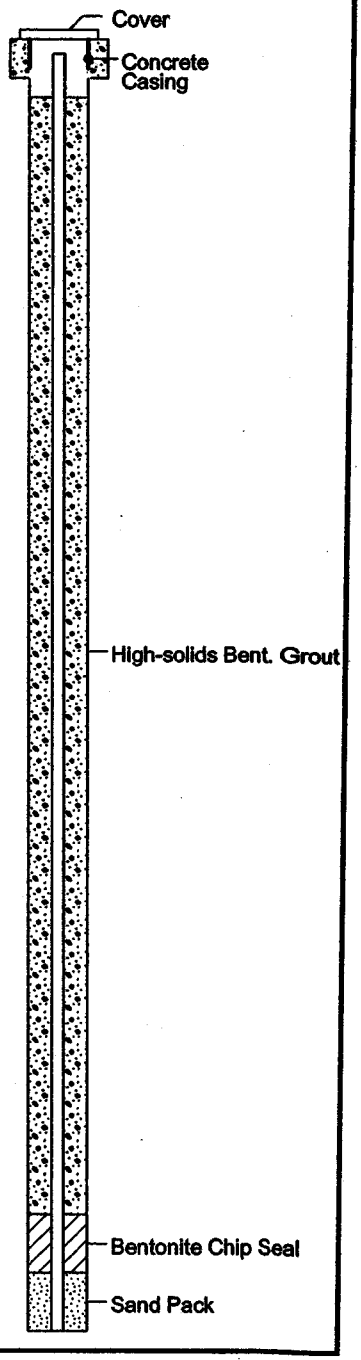
Location: Building N-126

Project #: CTO 0094

Started	: 0730 11/30/99	Northing	: 392114.00
Finished	: 2200 11/30/99	Easting	: 813797.36
Drilling Method	: Rotasonic	TOC Elevation	: 283.26
Drilling Company	: Boart-Longyear	Total Depth	: 85 feet
Geologist	: Bart Douglas	Well Screen	: 45 to 75 feet

Depth in Feet	Surf. Elev. 283.26	Samples	% Recovery	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	283						CONCRETE
		1	40	0		ML	CLAYEY SILT (1-6.5) Dark-brown, moist, and medium.
5	278	2	100	3.2			(6.5-19) Brown, soft and wet. Medium stiffness below 16 feet.
10	273	3	100	0.8			
		4	100	3.4			
15	268	5	100	2.2			
		6	100	6.8			(19-23) Reddish-brown and medium.
20	263	7	100	5			(23-25) With fine sand throughout.
25	258	8	100	9.9		CL	SANDY CLAY, reddish-brown to orange-brown and medium with fine sand.
		9	100	3.7		SC	CLAYEY SAND (28-39) Reddish-brown to orange-brown, fine- to medium-grained, and stiff.
30	253	10	100	9.3			
35	248	11	100	12			
40	243	12	100	24			(39-42) Orange-brown to tan and fine- to medium-grained with some clay.
		13	100	38		SP	SAND, light-brown to tan and fine- to medium-grained.
45							

Well: 007G60LF
Elev.: 283.26



07-28-2003 N:\well logs\NSA\Midsouth\007G60LF.BOR

ENSAFE

BORING LOG OF 007G60LF

NSA MID-SOUTH
Millington, TN.

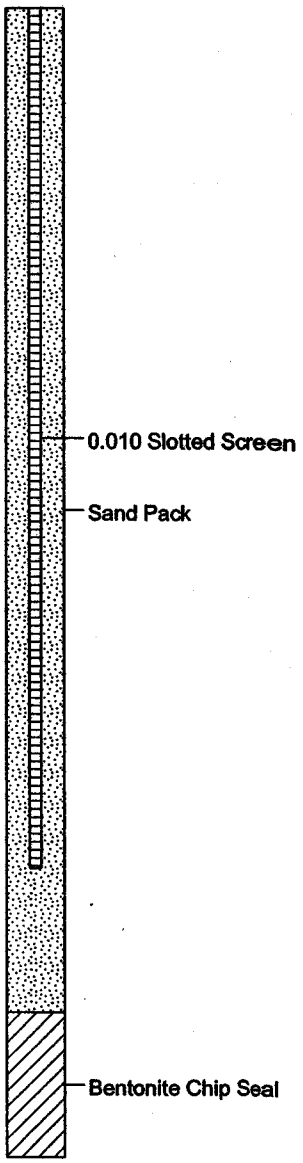
Location: Building N-126

Project #: CTO 0094

Started	: 0730 11/30/99	Northing	: 392114.00
Finished	: 2200 11/30/99	Easting	: 813797.36
Drilling Method	: Rotasonic	TOC Elevation	: 283.26
Drilling Company	: Boart-Longyear	Total Depth	: 85 feet
Geologist	: Bart Douglas	Well Screen	: 45 to 75 feet

Depth in Feet	Surf. Elev. 283.26	Samples	% Recovery	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
45	238	14	100	25		SP	GRAVELLY SAND,well graded. (46-50) Tan and medium-grained with a trace of gravel.
50	233	15	100	57			(50-65) Tan and medium- to coarse-grained with gravel content varying throughout.
		16	100	71			
55	228	17	100	37		SW	
		18	100	43			
60	223	19	100	55			
65	218	20	100	NA			(65-69) Brown to tan.
		21	100	NA			
70	213	22	100	NA		GW	SANDY GRAVEL, well graded with coarse sand.
		23	100	NA			
75	208	24	0	NA		ML	SANDY SILT, gray and clayey with fine sand, mica, and lignite specks throughout. One reddish-orange iron concreation at 74.5. Cockfield contact at 74.5 feet.
80	203						
85	198						
90							

Well: 007G60LF
Elev.: 283.26



07-28-2003 N:\well logs\NSAMidsouth\007G60LF.BOR

ENSAFE

BORING LOG OF 007G61LF

NSA MID-SOUTH
Millington, TN.

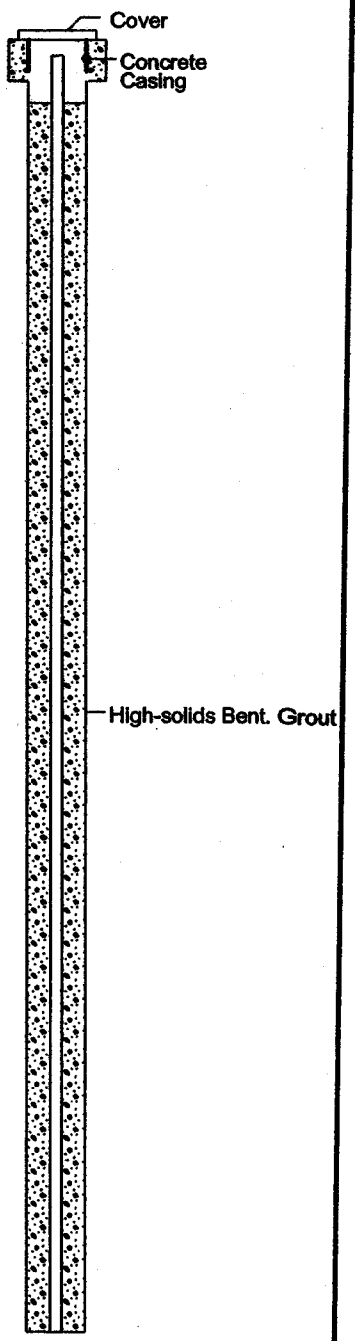
Location: Building N-126

Project #: CTO 0094

Started	: 1000 12/2/99	Northing	: 392122.48
Finished	: 1800 12/2/99	Easting	: 813813.14
Drilling Method	: Rotasonic	TOC Elevation	: 283.04
Drilling Company	: Boart-Longyear	Total Depth	: 75 feet
Geologist	: Bart Douglas	Well Screen	: 45 to 75 feet

Depth in Feet	Surf. Elev. 283.04	Samples	% Rec-overy	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	283						CONCRETE
		1	100	0		ML	(1-4) Dark brown. CLAYEY SILT (4-16) Brown.
5	278						
10	273	2	100	0			
15	268						(16-25) Reddish-brown.
20	263	3	100	0			
25	258					CL	SANDY CLAY, reddish-brown to orange-brown with fine sand.
30	253	4	100	0			
35	248	5	100	0		SC	CLAYEY SAND, reddish-brown to orange-brown and fine-grained.
		6	100	5.6		SP	SAND, yellowish-brown to tan and fine- to medium-grained.
40							

Well: 007G61LF
Elev.: 283.04



07-28-2003 N:\well logs\NSAMidsouth\007G61LF.BOR

ENSAFE

BORING LOG OF 007G61LF

NSA MID-SOUTH
Millington, TN.

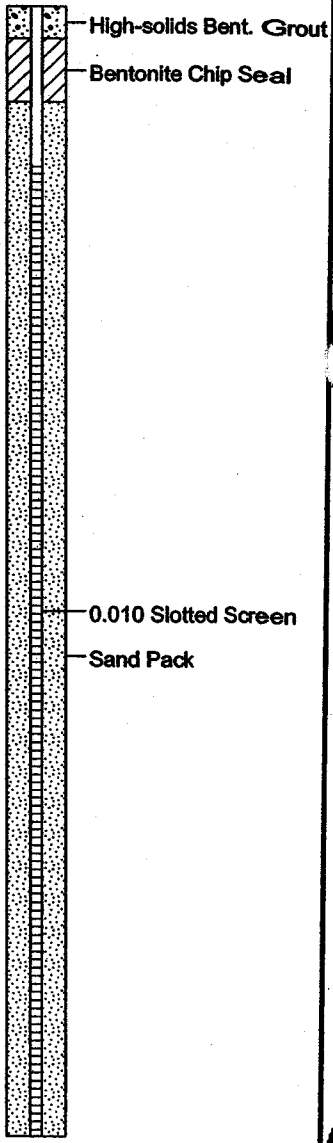
Location: Building N-126

Project #: CTO 0094

Started	: 1000 12/2/99	Northing	: 392122.48
Finished	: 1800 12/2/99	Easting	: 813813.14
Drilling Method	: Rotasonic	TOC Elevation	: 283.04
Drilling Company	: Boart-Longyear	Total Depth	: 75 feet
Geologist	: Bart Douglas	Well Screen	: 45 to 75 feet

Depth in Feet	Surf. Elev. 283.04	Samples	% Rec-overy	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
40	243	6	100	5.6		SP	
		7	100	182			
45	238	8	100	57		SW	GRAVELLY SAND, well graded and medium-grained.
		9	100	13			
50	233	10	100	93		GW	SANDY GRAVEL, well graded with medium to coarse sand.
		11	100	285			
55	228	12	100	85			
		13	100	78			
60	223	14	100	37			
		15	100	78			
65	218	16	100	27			
70	213	17	100	18			
75	208					ML	CLAYEY SILT, gray with mica throughout.
80							Cockfield contact at 74 feet.

Well: 007G61LF
Elev.: 283.04



07-28-2003 N:\well logs\NSAMidsouth\007G61LF.BOR

BORING LOG OF 007G62LF

NSA MID-SOUTH
Millington, TN.

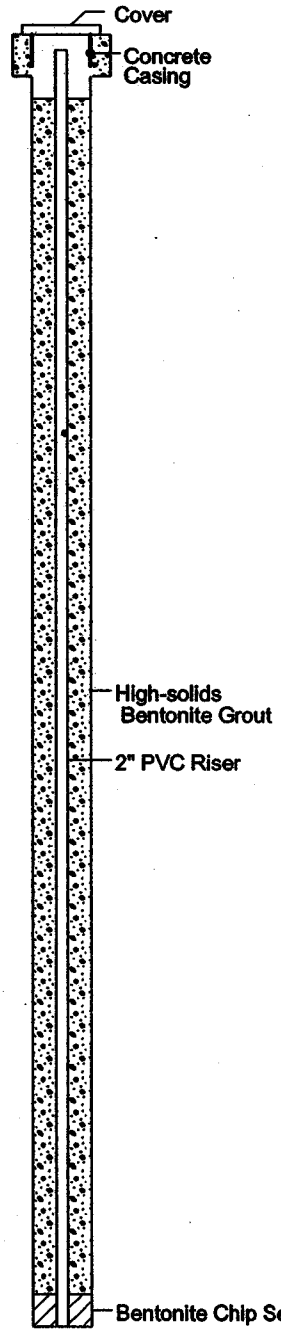
Location: Building N-126

Project #: CTO 0094

Started	: 1100 8/3/00	Northing	:
Finished	: 1500 8/3/00	Easting	:
Drilling Method	: Rotasonic	TOC Elevation	:
Drilling Company	: Alliance Environmental	Total Depth	: 75 feet
Geologist	: Bart Douglas	Well Screen	: 45 to 75 feet

Depth in Feet	Surf. Elev.	Samples	% Rec-overy	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
0							CONCRETE
		1	100	0		ML	(1.5-6.5) Dark brown, moist, and medium stiff. CLAYEY SILT
5		2	100	0			(6.5-19) Brown, soft, and wet. Medium stiffness below 16 feet.
10		3	100	0			
15							
20		4	100	0			(19-23) Reddish-brown and medium stiffness.
							(23-25) With fine-grained sand throughout.
25						CL	SANDY CLAY, brown to orange-brown and stiff with very-fine- to fine-grained sand.
30		5	100	0			
35						SC	CLAYEY SAND, (33-38) Orange-brown and fine-grained.
		6	100	NA			(38-42) Yellowish-brown to tan and very-fine- to fine-grained.
40							

Well: 007G62LF
Elev.:



07-28-2003 N:\well logs\NSA\Midsouth\007G62LF.BOR

ENSAFE

BORING LOG OF 007G62LF

NSA MID-SOUTH
Millington, TN.

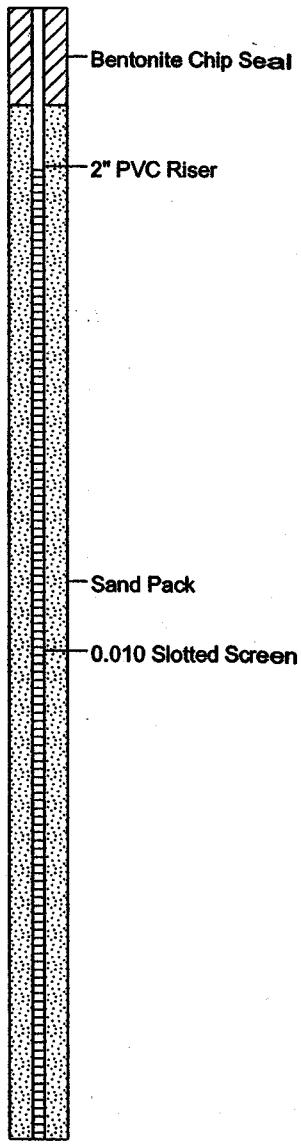
Location: Building N-126

Project #: CTO 0094

Started	: 1100 8/3/00	Northing	:
Finished	: 1500 8/3/00	Easting	:
Drilling Method	: Rotasonic	TOC Elevation	:
Drilling Company	: Alliance Environmental	Total Depth	: 75 feet
Geologist	: Bart Douglas	Well Screen	: 45 to 75 feet

Depth in Feet	Surf. Elev.	Samples	% Rec-overy	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
40						SC	
		6	100	NA		SP	SAND, Poorly Graded, tan, and fine- to medium-grained. At 42 is a 1/2-inch thick pinkish-gray clay seam.
45							
						SW	SAND, Well Graded, tan to light-brown and medium- to coarse-grained with gravel.
50		7	100	NA			
						GW	GRAVEL, Well Graded, and gray with medium- to coarse-grained sand.
55							
		8	100	NA			
60						SW	SAND, Well Graded, tan, gravely, and coarse-grained.
							GRAVEL, Well Graded, with coarse-grained sand. At 75 feet hit 1 inch of mottled light-gray, pinkish-mauve, and orange-brown clayey silt, with mica flakes. Top of Cockfield.
65							
		9	100	NA		GW	
70							
75							
80							

Well: 007G62LF
Elev.:



07-28-2003 N:\well logs\NSAMidsouth\007G62LF.BOR

BORING LOG OF 007G63LF

NSA MID-SOUTH
Millington, TN.

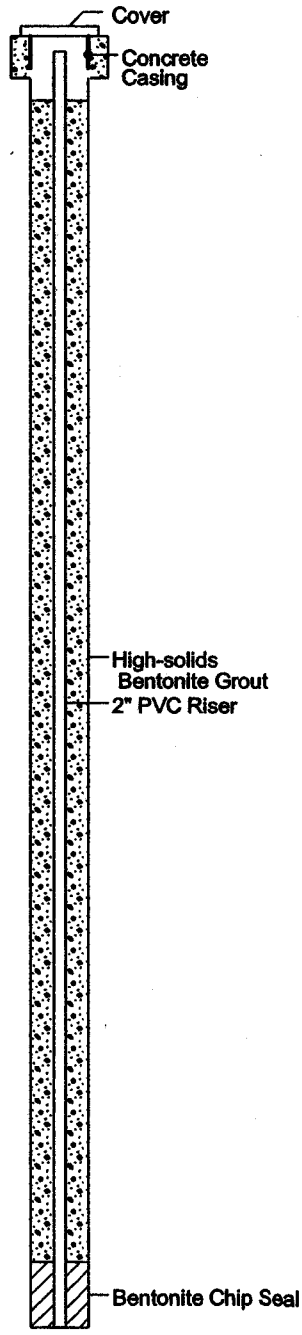
Location: Building N-126

Project #: CTO 0094

Started	: 1705 8/3/00	Northing	:
Finished	: 1830 8/3/00	Easting	:
Drilling Method	: Rotasonic	TOC Elevation	:
Drilling Company	: Alliance Environmental	Total Depth	: 75 feet
Geologist	: Bart Douglas	Well Screen	: 45 to 75 feet

Depth in Feet	Surf. Elev.	Samples	% Rec-overy	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
0							CONCRETE
		1	100			ML	CLAYEY SILT (1-7) Brown and medium to stiff.
5							(7-10) Dark-brown and medium to stiff.
10		2	100				(10-18) Brown and soft.
15							
20		3	100				(18-25) Brown to orange-brown and medium.
25							(25-26.5) With very-fine-grained sand and medium stiff.
		4	100			CL	SANDY CLAY, mottled red-brown and orange-brown and stiff with fine-grained sand.
30							
35		5	100			SC	CLAYEY SAND, reddish-brown, fine-grained, and stiff. At 36 feet becoming more yellowish to mustard-brown.
40							

Well: 007G63LF
Elev.:



07-28-2003 N:\well logs\NSAMidsouth\007G63LF.BOR

ENSAFE

BORING LOG OF 007G63LF

NSA MID-SOUTH
Millington, TN.

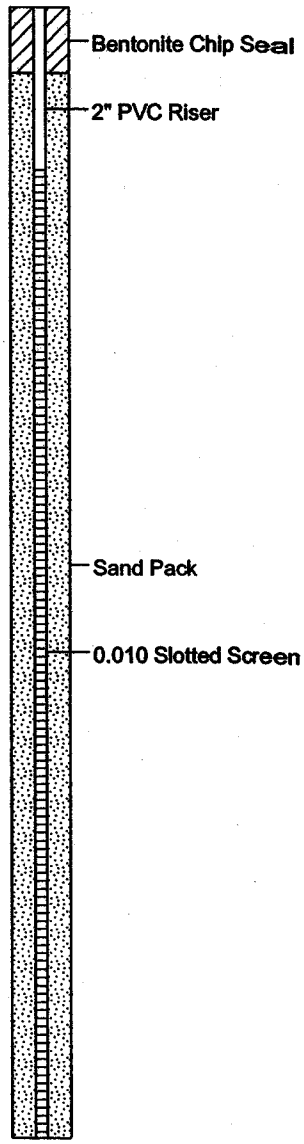
Location: Building N-126

Project #: CTO 0094

Started	: 1705 8/3/00	Northing	:
Finished	: 1830 8/3/00	Easting	:
Drilling Method	: Rotasonic	TOC Elevation	:
Drilling Company	: Alliance Environmental	Total Depth	: 75 feet
Geologist	: Bart Douglas	Well Screen	: 45 to 75 feet

Depth in Feet	Surf. Elev.	Samples	% Recovery	FID (ppm)	GRAPHIC	USCS	DESCRIPTION
40						SC	At 41 feet is a 1-inch thick, light-gray silty clay seam.
						SM	SILTY SAND, brown, and very-fine- to fine-grained.
		5	100			SP	SAND, Poorly Graded, tan to light-gray and very-fine- to fine-grained.
45						SW	SAND, Well Graded, tan, and medium- to coarse-grained with some gravel.
50		6	100			GW	GRAVEL, Well Graded, with medium-grained sand. At 52 feet is a 2-inch thick light-gray clay seam.
						SW	SAND, Well Graded, medium- to coarse-grained with gravel
55						GW	GRAVEL, Well Graded, with medium- to coarse-grained sand.
60		7	100			SW	SAND, Well Graded, tan, and medium-grained with gravel.
						GW	GRAVEL, Well Graded, with medium-grained sand.
						SW	SAND, Well Graded, tan, and medium-grained with gravel.
65						GW	GRAVEL, Well Graded, with medium- to coarse-grained sand.
70		8	100				
75						ML CL	CLAYEY SILT and SILTY CLAY, light-gray to light-tan interbedded thin layers of silty clay and clayey silt with mica flakes. Top of Cockfield.
80							

Well: 007G63LF
Elev.:



07-28-2003 N:\well logs\NSAMidsouth\007G63LF.BOR

EnSafe Inc.

Log of: 007GPZ01

Project: NSA MID-SOUTH RFI	Location: NSA Mid-South, Millington, Tennessee
CTO: 0094	Drilling Company: Boart-Longyear
Date Started: 11/16/98	Geologist: Ben Brantley
Date Completed: 11/16/98	Total Depth: 64 feet

Depth in feet	Soil Class	Geologic Description
	ML/CL	Loess. Silt. Light orange-brown and gray mottled. Some slighely clayey silt. Dry
10	ML/CL	Loess. Clayey silt. Loose. Wet.
20		
30	SP/SM	Fluvial Deposits. Fine sand with silt. Light orange-brown. Saturated.
40		
	SP/SM	Fluvial. Sand and gravel with silt. Light gray. Saturated.
50		
60		Fluvial. Fine silty sand. Light gray. Saturated.
	SP/SM	
70		TD= 64 feet bgs

Note: This is a generalized boring log describing the basic lithology typically encounted at NSA Mid-South and may or may not describe the specific lithology at this location.

EnSafe Inc.

Log of: 007GPZ02

Project: NSA MID-SOUTH RFI	Location: NSA Mid-South, Millington, Tennessee
CTO: 0094	Drilling Company: Boart-Longyear
Date Started: 11/17/98	Geologist: Ben Brantley
Date Completed: 11/17/98	Total Depth: 65 feet

Depth in feet	Soil Class	Geologic Description
10	ML/CL	Loess. Silt. Light orange-brown and gray mottled. Some slighely clayey silt. Dry
	ML/CL	Loess. Clayey silt. Loose. Wet.
20		
30	SP/SM	Fluvial Deposits. Fine sand with silt. Light orange-brown. Saturated.
40		
50	SP/SM	Fluvial. Sand and gravel with silt. Light gray. Saturated.
60		Fluvial. Fine silty sand. Light gray. Saturated.
70	SP/SM	TD= 65 feet bgs

Note: This is a generalized boring log describing the basic lithology typically encounted at NSA Mid-South and may or may not describe the specific lithology existing at this location.

EnSafe Inc.

Log of: 007GPZ03

Project: NSA MID-SOUTH RFI	Location: NSA Mid-South, Millington, Tennessee
CTO: 0094	Drilling Company: Boart-Longyear
Date Started: 11/18/98	Geologist: Ben Brantley
Date Completed: 11/18/98	Total Depth: 84 feet

Depth in feet	Soil Class	Geologic Description
10	ML/CL	Loess. Silt. Light orange-brown and gray mottled. Some slighely clayey silt. Dry
	ML/CL	Loess. Clayey silt. Loose. Wet.
20		
30	SP/SM	Fluvial Deposits. Fine sand with silt. Light orange-brown. Saturated.
40		
50	SP/SM	Fluvial. Sand and gravel with silt. Light gray. Saturated.
60		Fluvial. Fine silty sand. Light gray. Saturated.
70	SP/SM	
		TD= 84 feet bgs

Note: This is a generalized boring log describing the basic lithology typically encounted at NSA Mid-South and may or may not describe the specific lithology existing at this location.

EnSafe Inc.

Log of: 007GPZ04

Project: NSA MID-SOUTH RFI	Location: NSA Mid-South, Millington, Tennessee
CTO: 0094	Drilling Company: Boart-Longyear
Date Started: 11/19/98	Geologist: Ben Brantley
Date Completed: 11/19/98	Total Depth: 87 feet

Depth in feet	Soil Class	Geologic Description
	ML/CL	Loess. Silt. Light orange-brown and gray mottled. Some slighely clayey silt. Dry
10	ML/CL	Loess. Clayey silt. Loose. Wet.
20		
30	SP/SM	Fluvial Deposits. Fine sand with silt. Light orange-brown. Saturated.
40		
	SP/SM	Fluvial. Sand and gravel with silt. Light gray. Saturated.
50		
60		Fluvial. Fine silty sand. Light gray. Saturated.
	SP/SM	
70		TD= 87 feet bgs

Note: This is a generalized boring log describing the basic lithology typically encounted at NSA Mid-South and may or may not describe the specific lithology existing at this location.

EnSafe/Allen & Hoshall

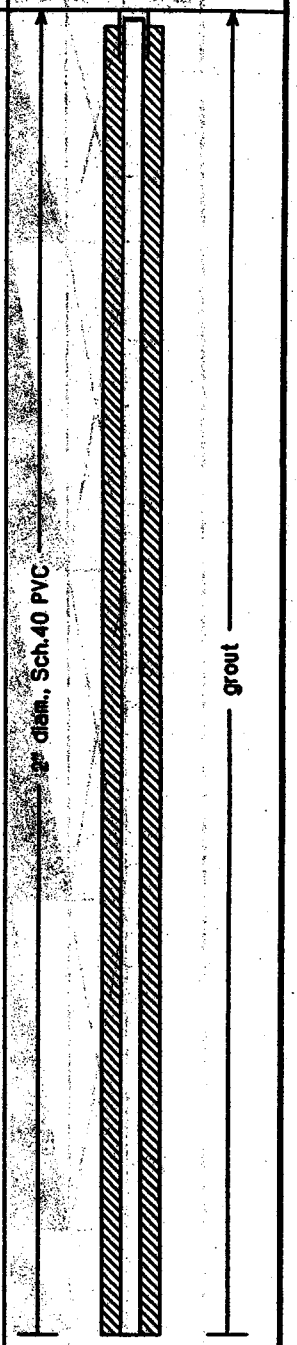
Log of Monitoring Well N12G01LF

Project: *NAS Memphis Millington, TN*	Location: *N-12 Site*
Project No.: *0094*	Surface Elevation: *feet msl*
Started at *1405 on 7-21-98*	TOC Elevation: *feet msl*
Completed at *1645 on 7-21-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" core barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *87 feet*
Geologist: *David E. Ladd*	Well Screen: *71.5 to 81.5 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION
0	s-1	100	na	Fill	(0-2') Gravel and fill.
	s-2	100	na	ML	(2-3') Silt, moderate yellowish brown mottled with olive gray. Contains organic material.
				Fill	
5				ML	(3-4') Fill - possibly sluff from core barrel.
	s-3	50	0.4	ML	(4-5') Silt, moderate yellowish brown mottled with olive gray.
					(5-7') Silt, olive gray.
10					(8-17') Silt, clayey, moderate yellowish brown mottled with olive gray and dark yellowish orange. Most mottling occurs from 8-10'. Abundant organic nodules and iron-manganese nodules, especially from 8-10'.
15					
	s-4	70	0.2		(17-20') Same as above.
20				ML	(19-27') silt, moderate yellowish brown. Contains a little dark yellowish orange material. Contains iron-manganese nodules, especially near 27'.
25					
	s-5	65	4.0		(27-30') Same as above.
30					(30-37') Silt, with clay, moderate yellowish brown mottled with greenish gray, light gray, and dark yellowish orange. Mostly greenish gray from 32-34'. Abundant oxidation. Contains iron-manganese nodules, especially near 37'. Very dry from 31-34'.
35				ML	
	s-6	105	0.4		(37-39.5') Same as above, becoming abundantly iron-stained and slightly sandy at 39.5'.
40				SC	(39.5-40.5') Sand, very fine, light gray,

ELEV. (ft-msl)

WELL DIAGRAM



EnSafe/Allen & Hoshall

Log of Monitoring Well N12G01LF

Project: *NAS Memphis Millington, TN*	Location: *N-12 Site*
Project No.: *0094*	Surface Elevation: *feet msl*
Started at *1405 on 7-21-98*	TOC Elevation: *feet msl*
Completed at *1845 on 7-21-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" core barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *87 feet*
Geologist: *David E. Ladd*	Well Screen: *71.5 to 81.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45							SC	becoming clayey, light olive gray near bottom.		
							SC	(40.5-42.5') Sand, very fine to fine, dusky yellowish brown, very micaceous. Wet.		
							SW	(42.5-44') Sand, very fine to medium, dark yellowish orange to grayish orange. Very oxidized near bottom. Wet.		
							SW			
			s-7	100	0.8			(44-44.5') Sand, very fine, light gray. Contains one piece of gravel.		
50							SC	(44.5-47') Sand, very fine to fine, grayish orange to dark yellowish orange. Wet.		
								(47-54') Same as above. Mostly grayish orange. Contains some pale yellowish brown from 47-49'. Micaceous.		
55								(54-57') Sand, fine to very coarse, and gravel, dark yellowish orange to grayish orange. Contains mostly chert gravels, angular, up to 2" long dimension, poorly sorted. Micaceous, wet.		
			s-8	95	0.4			(57-67') Same as above.		
60										
65										
			s-9	80	na		GC	(67-77') Same as above. Upper 5' is lighter in color. Gravels becoming coarser with depth (up to 2.5" long dimension). Many gravels look iron-stained or iron-rich. There is a clayey grayish orange to light gray sand seam at 76'.		
70										
75										
			s-10	90	na			(77-81.5') same as above, becoming sandy near bottom.		
80										

2" diam., Sch.40 PVC

0.01 slot PVC screen

EnSafe/Allen & Hoshall

Log of Monitoring Well N12G01LF

Project: *NAS Memphis Millington, TN*	Location: *N-12 Site*
Project No.: *0094*	Surface Elevation: *feet msl*
Started at *1405 on 7-21-98*	TOC Elevation: *feet msl*
Completed at *1645 on 7-21-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" core barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *87 feet*
Geologist: *David E. Ladd*	Well Screen: *71.5 to 81.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			s-11	100	na		GC			bentonite plug
							SC	(81.5-83.5') Tcf. Sand, very fine, dark yellowish orange mottled with light gray and olive gray.		
							CL	(83.5-87') Clay, and sand, very fine, dusky yellowish brown with light gray sand seams. Lignitic, especially at top. Micaceous. .I-87 **Bottom of boring at 87'bgs**		10-20 sand (filter pack type #2)
90										
95										
100										
105										
110										
115										
120										

EnSafe/Allen & Hoshall

Log of Monitoring Well N12G02LF

Project: *NAS Memphis Millington, TN*	Location: *Apron Area, near N-12 site*
Project No.: *0094*	Surface Elevation: *feet msl*
Started at *1445 on 8-4-98*	TOC Elevation: *feet msl*
Completed at *1630 on 8-4-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" core barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *85 feet*
Geologist: *Ben Brantley*	Well Screen: *67 to 77 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5			s-1	80	0.4			(0-6') Grass and roots. (0.5-5') Moderate brown streaked with yellowish gray silt, dry. (5-8.5') Same as above, without yellow gray streaks Wet from 7-8.5'.		2" diam., Sch.40 PVC grout
10							ML	NO RECOVERY from 8.5-15'.		
15			s-2	35	BG			(15-23') Dark yellowish brown clayey silt, moist and medium stiff.		
20										
25			s-3	80	BG		ML	(23-25') Moderate yellowish brown clayey silt, moist and medium stiff. (25-29') Dark yellowish orange mixed with yellowish gray clayey silt, moist and medium stiff. (27-29') Manganese and iron streaks.		
30							ML	(29-34') Moderate yellowish brown sandy silt with yellowish gray streaks.		
35			s-4	105	BG		SM	(34-35') Grayish orange to dark yellowish orange silty sand.		
							CL	(35-38.5') Light brown to moderate reddish brown (rust-colored) sandy clay, with grayish orange silt, stiff and moist.		
40							SC	Dark yellowish orange fine sand (micaceous)		

EnSafe/Allen & Hoshall

Log of Monitoring Well N12G02LF

Project: *NAS Memphis Millington, TN*	Location: *Apron Area, near N-12 site*
Project No.: *0094*	Surface Elevation: *feet msl*
Started at *1445 on 8-4-98*	TOC Elevation: *feet msl*
Completed at *1630 on 8-4-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" core barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *85 feet*
Geologist: *Ben Brantley*	Well Screen: *67 to 77 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			s-5	90	0.2		SC	(38.5-65.5') Light brown fine sand with grayish orange and yellowish gray fine sand.		2" diam., Sch.40 PVC; grout
								(45-55') Grayish orange fine sand, micaceous.		
50										
55			s-6	85	0.4			Same as above.		
60								(55-65.5') Grayish orange fine sand, micaceous.		
65			s-7	75	0.2					
							SW	Grayish orange gravelly sand, fine to coarse-grained.		
								(65.5-67.5') Pale brown sandy gravel.		
70								(67.5-68.5') Gravels up to 2" long dimension.		0.01 slot PVC screen; bentonite plug; bentonite seal; 10-20 sand (filter pack type #2)
							GM	(68.5-78') Grayish orange and dark yellowish orange sandy gravel.		
75			s-8	85	0.6					
							SM	(78-79.5') Grayish orange and light gray fine silty sand.		
80										

EnSafe/Allen & Hoshall

Log of Monitoring Well N12G02LF

Project: *NAS Memphis Millington, TN*	Location: *Apron Area, near N-12 site*
Project No.: *0094*	Surface Elevation: *feet msl*
Started at *1445 on 8-4-98*	TOC Elevation: *feet msl*
Completed at *1630 on 8-4-98*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" core barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *85 feet*
Geologist: *Ben Brantley*	Well Screen: *67 to 77 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			s-9	na	na		SM	(79.5-85') Dark yellowish orange and yellowish gray fine silty sand, moderately cohesive.		bentonite plug
								Boring completed at 85'bgs.		
90										
95										
100										
105										
110										
115										
120										

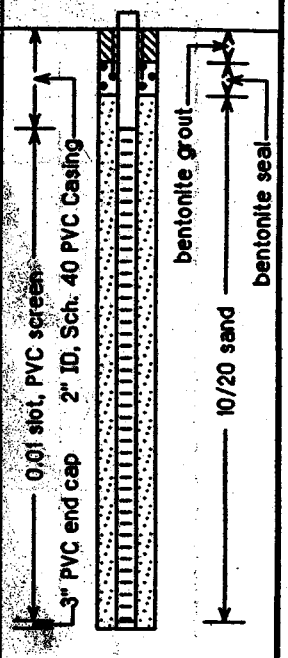
EnSafe/Allen & Hoshall

Log of Monitoring Well N12G01LS

Project: *NSA Memphis*	Location: *Millington, TN. N-12 UST Investigation*
Project No.: *0136-001*	Surface Elevation: *285.18 feet msl*
Started at *1000 on 1-6-98*	TOC Elevation: *284.90 feet msl*
Completed at *1200 on 1-6-98*	Depth to Groundwater: *7.45 feet* Measured:
Drilling Method: *4.25" HMS; 5" CSS*	Groundwater Elevation: *2-9-98 feet msl*
Drilling Company: *Tri-State Testing*	Total Depth: *18.0 feet*
Geologist: *Barb McGavern-Atkinson*	Well Screen: *3 to 18 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5							CL	Post hole the first 3 feet (2' of concrete, then 3' of silty clay). Save some soil for IDW characterization.	
								(3-4') Silty clay, medium brown.	
								(4-5') Silty clay with gravels.	
			1	50	33			(5-5.5') Silty clay, transition to mottled orange brown and light gray with brown iron concretions.	
10								Took Foc sample at 8'.	
								(8-9') Silty clay, light gray mottled with dark gray. Iron inclusions present.	
			2	83	41			(9-12') Silty clay, grades to mottled orange brown and light gray. Iron inclusions present.	272.2
15								Encoutered water at ~ 13.5-14'.	
							ML	Clayey silt, mottled light gray and orange brown. Dark red to brown iron concretions, partings throughout.	
			3	100	53				267.2
20								Well set @ 18'; screen 18-3'.	
25									
30									
35									
40									

WELL DIAGRAM



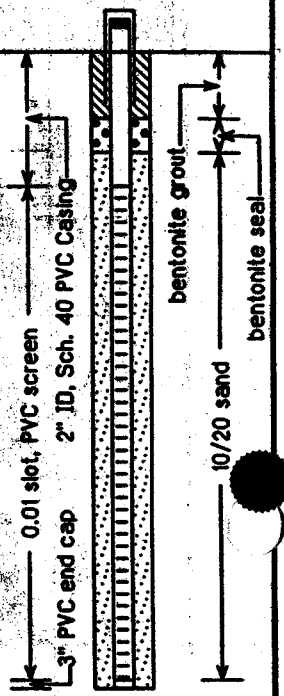
EnSafe/Allen & Hoshall

Log of Monitoring Well N12G02LS

Project: *NSA Memphis*	Location: *Millington, TN. N-12 UST Investigation*
Project No.: *0136-001*	Surface Elevation: *284.83 feet msl*
Started at *1440 on 1-6-98*	TOC Elevation: *287.06 feet msl*
Completed at *1640 on 1-6-98*	Depth to Groundwater: *9.32 feet* Measured:
Drilling Method: *4.25" HSA; 5" CSS*	Groundwater Elevation: *2-9-98 feet msl*
Drilling Company: *Tri-State Testing*	Total Depth: *19.0 feet*
Geologist: *Barb McGavern-Atkinson*	Well Screen: *4 to 19 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							ML	Surface conditions: grassy area; posthole the first ~4', save some soil for IDW characterization.	
								Clayey silt; medium brown with rootlets.	
			1		NA				280.8
5							CL	(4-8") Silty clay, medium brown with rootlets, quartz pebbles, and hematitic blebs throughout.	
								(8-9') Silty clay; mottled brown-orange and light gray; hematitic and (organic?) blebs throughout; some gravel to 4" diameter (long dim.).	275.8
10			2	50	49				
							SM	Silty sand, fine; mottled light gray and orange brown with hematitic blebs throughout, concentrated in some areas, increasing towards 14'. Moist	
15			3	100	51			Wet at ~14-14.5' Same as above with hematitic blebs throughout.	
								Water began rising within a half hour.	
			4	100	55				265.8
20								Well set @ 19.0'; screen 19-4'.	
25									
30									
35									
40									

WELL DIAGRAM



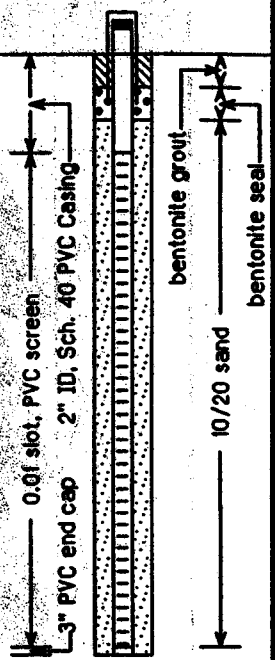
EnSafe/Allen & Hoshall

Log of Monitoring Well N12G03LS

Project: *NSA Memphis*	Location: *Millington, TN. N-12 UST Investigation*
Project No.: *0136-001*	Surface Elevation: *284.59 feet msl*
Started at *1215 on 1-7-98*	TOC Elevation: *286.69 feet msl*
Completed at *1415 on 1-7-98*	Depth to Groundwater: *9.40 feet* Measured:
Drilling Method: *4.25" HSA; 5' CSS*	Groundwater Elevation: *2-9-98 feet msl*
Drilling Company: *Tri-State Testing*	Total Depth: *19.0 feet*
Geologist: *Barb McGavern-Atkinson*	Well Screen: *3 to 18 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Surface conditions: grassy area. Post hole the first ~3 feet of soil. Save some soil for IDW characterization.	
			1	100	NA		ML	(3-5') Clayey silt; orange-brown with common gravels and wood chips. Dry.	
5									279.6
							CL	(5-6') Silty clay; dark gray to green with hematitic blebs.	
			2	100	32			(6-8') Silty clay; mottled tan/orange and gray; iron precipitation within rootlets, some iron nodules present. Moist.	276.6
10								(8-11') Clayey silt; mottled light gray and orange brown, with iron concretions and hematitic blebs. Moist	
			3	100	34		ML	(11-13') Same as above. At 11' there is a dark gray cross-bedded silty clay with iron blebs; mottled with light gray silty clay.	
15								Water at ~ 13'.	
			4	100	29			Clayey silt; mottled light gray and orange brown with black (organics?) and iron blebs throughout.	266.6
20								Well set @ ~18'; screen 18-3'.	
25									
30									
35									
40									

WELL DIAGRAM



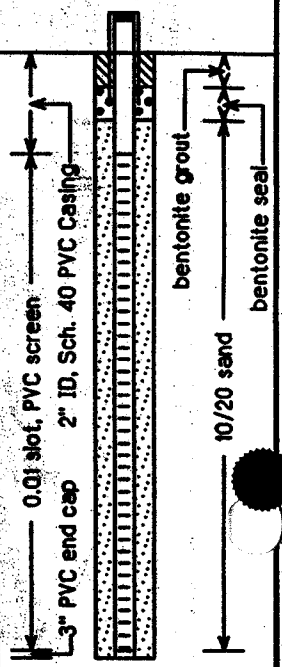
EnSafe/Allen & Hoshall

Log of Monitoring Well N12G04LS

Project: *NSA Memphis*	Location: *Millington, TN. N-12 UST Investigation*
Project No.: *0136-001*	Surface Elevation: *285.40 feet msl*
Started at *1000 on 1-8-98*	TOC Elevation: *287.41 feet msl*
Completed at *1200 on 1-8-98*	Depth to Groundwater: *9.57 feet* Measured:
Drilling Method: *4.25" HSA; 5" CSS*	Groundwater Elevation: *2-9-98 feet msl*
Drilling Company: *Tri-State Testing*	Total Depth: *18.0 feet*
Geologist: *Barb McGavern-Atkinson*	Well Screen: *3 to 18 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Post hole the first 3 feet (grassy) of soil. Save some soil for IDW characterization.	
5								(3.0-3.5') Clayey silt, medium gray to green gray.	
								(3.5-4.0') Clayey silt, medium brown mottled with light brown and iron stained silt. Iron precipitation cement within rootlet tubules. Some rootlets are preserved. Dry.	
10			1	66	33		ML	There is visual and olfactory indication of contamination present in the soil matrix. Odor is strong (petroleum/gasoline).	
			2	100	41			(4.5-5.5') Clayey silt, medium brown, with rare gravels. No iron or visual/olfactory indication of contamination in lower part of split spoon. Dry.	
15								(8.0-13.0') Clayey silt, medium gray stained green with contamination. Medium to strong odor present and obvious. Clayey silt is mottled with medium brown clayey silt and iron blebs throughout. Moist.	
			3	100	53				267.4
20								(13.0-18.0') Water encountered around 13.0'. Slight odor is apparent in split spoon sample. Soil is clayey silt mottled medium gray and brown, with iron/hematitic blebs throughout but rare.	
25								Well set at 18'; screen 18-3'.	
30									
35									
40									

WELL DIAGRAM



LITHOLOGIC LOG FOR MONITOR WELL GM-9

(007GM09M)

Description	Depth (ft)	Thickness (ft)
No Sample.....	0 - 14.0	14.0
Clay, pliable, green.....	14.0 - 17.0	3.0
Clay, dense, hard, green-brown.....	17.0 - 18.0	1.0
Clay, dense, hard, amber.....	18.0 - 19.0	1.0
Clay, dense, hard, marbled green and amber.....	19.0 - 24.0	5.0
Clay, medium pack, slightly sandy, amber..	24.0 - 34.0	10.0
Sand, medium grain, clayey, orange.....	34.0 - 39.0	5.0
Sand, medium to fine-grain, slightly clayey, orange-yellow.....	39.0 - 44.0	5.0
Sand, medium to fine-grain, tan to orange.....	44.0 - 49.0	5.0

GERAGHTY & MILLER, INC.

WELL LOG

PROJECT: T290ME1 DATE: 6-10-85 SHEET: 1 OF

LOCATION: Homer DRILLING CONTRACTOR: (Tom Cowper) American Drilling

WELL NUMBER: GM-9 DRILLING METHOD: Solid-stem auger

SAMPLE DESCRIBED BY: BTS/WDG SAMPLING METHOD: Sample from auger S

SAMPLE DESCRIPTION	Blow/ft	DEPTH INTERVAL (FEET)	THICKN (FEE
Clay, Fine, dense, green, pliable		14-15	
Same as above but dryer		15-16	
Same as above		16-17	
Clay, Fine, dense, green, stiff		17-18	
Clay, dense, & silt; amb,		18-19	
Clay, dense, mottled green & amber, dry		19-20	
Same as above		20-21	
Same as above		21-24	
Clay, slightly sandy, medium green, amber/orange		24-34	
Sand, clayey, loose, minium grain orange		35-39	
Sand, slightly clayey, loose, minium to Fine, orange yellow		39-44'	
Sand, medium to Fine, loose, tan to orange		44-49	

Screen 54' - 49'
Sand (1 bag) 45'-40' (bags at 45', added 1 bag, topped 40')
Bentonite

N-94 (North Fuel Farm)

UST Investigation
EnSafe/Allen & Hoshall

Leak Detection Wells
T301
T1242
T1243

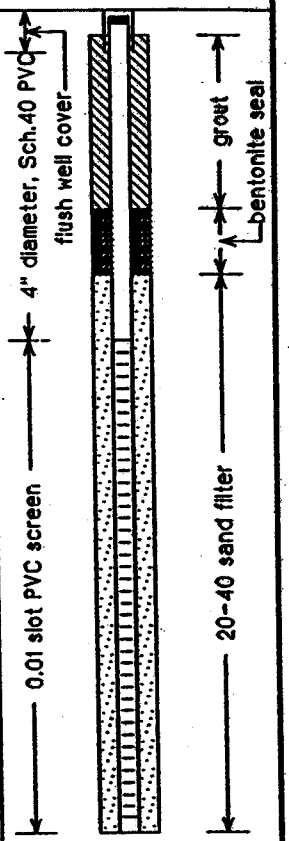
EnSafe Inc.

Log of Monitoring Well N-MW-5

Project: *North Fuel Farm*	Location: *NSA, Mid-South; Memphis, TN*
Project No.: *0134-001*	Surface Elevation: *flush grade*
Started at *0900 on 10-21-98*	TOC Elevation: *~4" bgs feet msl*
Completed at *1245 on 10-21-98*	Depth to Groundwater: *na feet* Measured: *na*
Drilling Method: *Hollow Stem Auger*	Groundwater Elevation: *na feet msl*
Drilling Company: *Tri-State Testing Services, Inc.*	Total Depth: *25 feet*
Geologist: *Barb McGavern-Atkinson*	Well Screen: *10 to 25 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Tps	(Surface-3.0') Surface conditions: Topsoil and allochthonous soil.	
			ss-1	33	na	na			(3.0-11.5') Poorly sorted gravel fill (cobbles and boulders); fill of UST cavity.	
5								GP		
			ss-2	0	na	na			Same as above (gravel fill).	
10										
			ss-3	35	na	na			(11.5-19.5') At 11.5' grades to clayey silt, dark brown mottled with common light to medium gray; dense, firm, and moist;some petroleum and/or hydrocarbon odor noticeable.	
15								ML		
			ss-4	100	na	na			(13.0'-18.0') Same as above run; petroleum and/or hydrocarbon odor is stronger throughout run.	
20								ML	(19.5'-20.0') At 19.5' grades to clayey silt, mottled dark brown with common reddish clayey silt; increased density and firmness; moist to wet.	
			ss-5	100	na	na		ML	(20.0'-23.0') At 20.0' grades to clayey silt with noticeable increase in clay fraction, reddish brown; firm, stiff, and moist; rare to common balck organic material.	
25			ss-6	100	na	na			(23.0'-25.0') Same as above, clayey silt, but with increase in silt fraction; friable, wet, with common black organic material.	
30										
35										
40										

WELL DIAGRAM



WELL CONSTRUCTION LOG. MEM-80-MW-1

NAS MEMPHIS

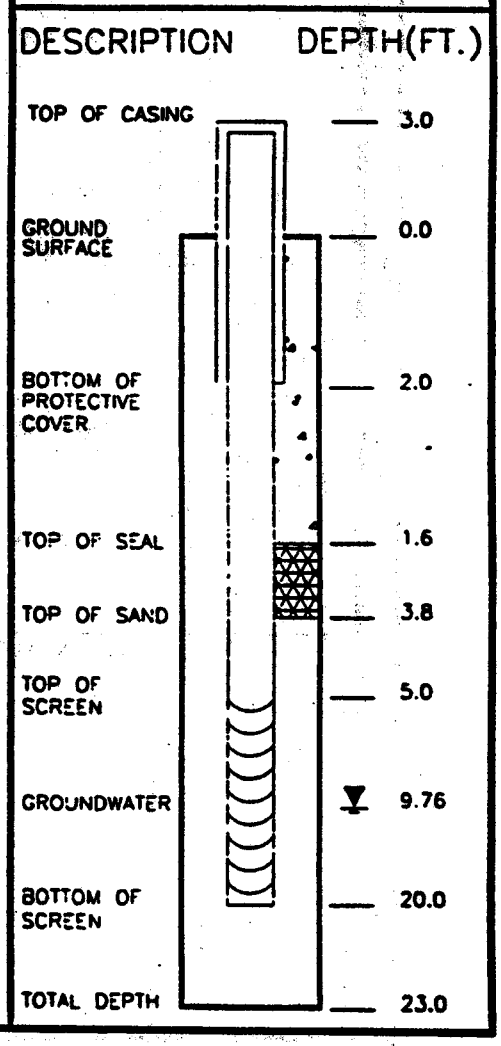
WELL LOCATION USTs 304 & 1239

DATE INSTALLED 11 JULY 94

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.8 FEET
2. WATER SURFACE ELEV. 274.90
   a) DEPTH TO SATURATED ZONE 9.76
3. TOP OF CASING ELEV. 284.66
4. PROTECTIVE CASING (YES) NO
   a) CASING LENGTH 5 FT
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP 3.0 FT
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8 INCH
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 350 lbs. SIZE 10/20 U/C
11. DEPTH TO TOP OF FILTER 3.8 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 1/2 BUCKET
13. DEPTH TO TOP OF SEAL 1.6 FEET
14. TYPE OF GROUT N/A
    GROUT MIXTURE
    METHOD OF PLACEMENT
15. COMMENTS ANNULUS ABOVE SEAL FILLED WITH CONCRETE DURING PAD CONSTRUCTION.

INSTALLATION DESCRIPTION



FACILITY I.D. 0-791709
JOB NUMBER CTO-0080

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-0080

(N001LS)
USTs 304 & 1239
MONITORING WELL MEM-80-MW-1
WELL CONSTRUCTION LOG

DATE: 8-16-94 | DWG NAME: -BOMW-1

DESCRIPTION OF SUBSURFACE MATERIALS

DEPTH (FEET)	SAMPLE TYPE / SAMPLE DEPTH	BLOWS/.5 FT.	ORGANIC VAPOR (ppm)	
SURFACE - Grass				
0		0	0	0.0–3.0' CLAYEY SILT, TAN TO TAN AND LIGHT BROWN, FIRM TO STIFF.
		3	400	3.0–8.0' CLAYEY SILT, GREYISH BROWN, MOIST, FIRM (WITH STRONG HYDROCARBON ODOR).
10		8	297	8.0–13.0' CLAYEY SILT, GREYISH BROWN, VERY MOIST, SOFT (WITH STRONG HYDROCARBON ODOR).
		13	26	13.0–14.0' CLAYEY SILT, GREYISH BROWN, SOFT.
				14.0–14.5' CLAYEY SILT, BROWN, STIFF.
15		14.8	328	14.5–15.4' CLAYEY SILT, GRAYISH BROWN, SOFT.
				15.4–18.4' SILTY CLAY, DARK BROWN, FIRM.
		18	35	18.0–20.5' CLAYEY SILT TO SILTY CLAY, BROWN, MOIST, FIRM.
21		20.5	13	20.5–23.0' SILTY CLAY, TAN MOTTLED YELLOW TAN, FIRM TO STIFF
				DISCONTINUED BORING AT 23.0 FEET.
25				
30				

Boring Number	B/MW-1
Facility Name	North Fuel Farm (Building N-94) Nas Memphis, Millington, TN
Facility I.D.	0-791709
E/H&H Geologist License #	Jeffery L. Albert TN 1083
Drilling Subcontractor	Tristate Testing Services, Inc. 6756 Buckles Cove Memphis, TN
Drilling Method	3.25-inch HSA
Sampler Type	CME 5-foot CS
Time/Date Start	1325/071194
Time/Date Finish	1425/07119[illegible]

ENVIRONMENTAL ASSESSMENT REPORT
NAS MEMPHIS
CTO-0080

SOIL BORING B/MW-1
UST's 304 & 1239
MILLINGTON, TN (N001[illegible])
DATE INSTALLED: 7/11/1994 PROJ. #: CT[illegible]

DATE: 8/4/1994 DWG NAME: CTOS[illegible]

WELL CONSTRUCTION LOG. MEM-80-MW-2

NAS MEMPHIS

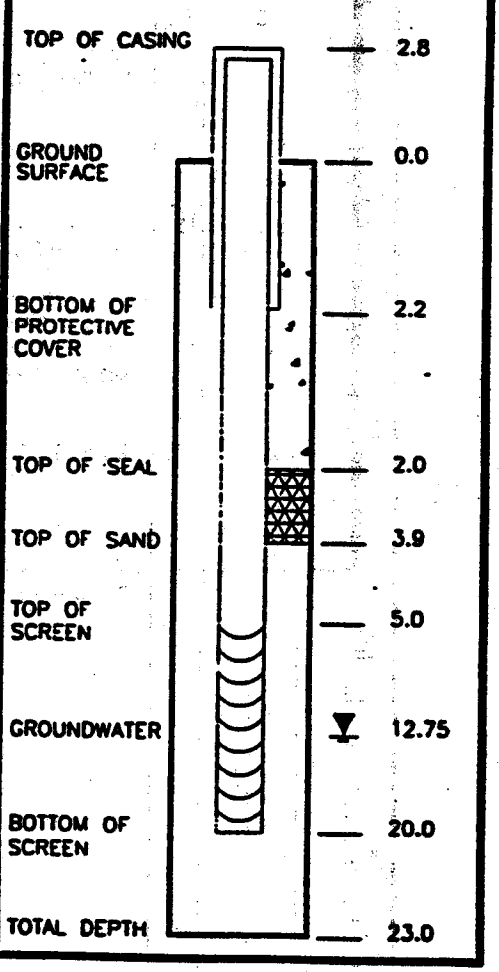
WELL LOCATION USTs 304 & 1239

DATE INSTALLED 11 JULY 94

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.45 FEET
2. WATER SURFACE ELEV. 272.19
   a) DEPTH TO SATURATED ZONE 12.75
3. TOP OF CASING ELEV. 284.94
4. PROTECTIVE CASING (YES) NO
   a) CASING LENGTH 5 FT
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP 3.0 FT
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8 INCH
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 417 lbs. SIZE 10/20 U/C
11. DEPTH TO TOP OF FILTER 3.9 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 1/2 BUCKET
13. DEPTH TO TOP OF SEAL 2.2 FEET
14. TYPE OF GROUT N/A
    GROUT MIXTURE
    METHOD OF PLACEMENT
15. COMMENTS ANNULUS ABOVE SEAL FILLED WITH CONCRETE DURING PAD CONSTRUCTION.

INSTALLATION DESCRIPTION



FACILITY I.D. 0-791709
JOB NUMBER CTO-0080

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-0080

(N002LS)
USTs 304 & 1239
MONITORING WELL MEM-80-MW-2
WELL CONSTRUCTION LOG

DATE: 08-16-94 | DWG NAME: -80MW-2

DESCRIPTION OF SUBSURFACE MATERIALS

DEPTH (FEET)	SAMPLE TYPE / SAMPLE DEPTH	BLOWS/.5 FT.	ORGANIC VAPOR (ppm)	
SURFACE - Grass				
5	0		4	0.0-1.0' CLAYEY SILT, TAN WITH CONCRETE FRAGMENTS (FILL). 1.0-3.4' CLAYEY SILT, TAN MOTTLED GREY AND BLACK, STIFF.
	3.4		421	3.4-5.8' CLAYEY SILT, GRAYISH BROWN, MOIST, FIRM (WITH HYDROCARBON ODOR).
	5.8		102	5.8-8.0' SILTY CLAY, GRAYISH BROWN, MOIST, SOFT (WITH SLIGHT HYDROCARBON ODOR).
	8		275	8.0-10.5' CLAYEY SILT, GREYISH BROWN, MOIST, SOFT.
10	10.5		92	10.5-15.2' SILTY CLAY, GREYISH BROWN TO TAN MOTTLED GREY, MOIST, SOFT.
	13		27	
15	15.5		120	15.2-16.0' SILTY CLAY, GREYISH BROWN, VERY MOIST, SOFT.
				16.0-18.0' SILTY CLAY, DARK BROWN, MOIST, FIRM.
	18		234	18.0-20.5' SILTY CLAY, DARK BROWN, MOIST, FIRM (WITH STRONG HYDROCARBON ODOR).
20	20.5		36	20.5-23.0' SILTY CLAY, BROWN, MOIST, FIRM (WITH HYDROCARBON ODOR).
25				DISCONTINUED BORING AT 23.0 FEET.
30				

Boring Number	B/MW-2
Facility Name	North Fuel Farm (Building N-94) Nas Memphis, Millington, TN
Facility I.D.	0-791709
E/H&H Geologist License #	Jeffery L. Albert TN 1083
Drilling Subcontractor	Tristate Testing Services, Inc. 6756 Buckles Cov Memphis, TN
Drilling Method	3.25-inch HSA
Sampler Type	CME 5-foot CS
Time/Date Start	1520/071194
Time/Date Finish	1615/0711[illegible]

ENVIRONMENTAL ASSESSMENT REPORT
NAS MEMPHIS
CTO-0080

SOIL BORING B/MW-2
UST's 304 & 239
MILLINGTON, TN (N002LS)
DATE INSTALLED: 7/11/1994 PROJ. #: CT[illegible]
DATE: 8/4/1994 DWG NAME: CTO[illegible]

WELL CONSTRUCTION LOG. MEM-80-MW-3

NAS MEMPHIS

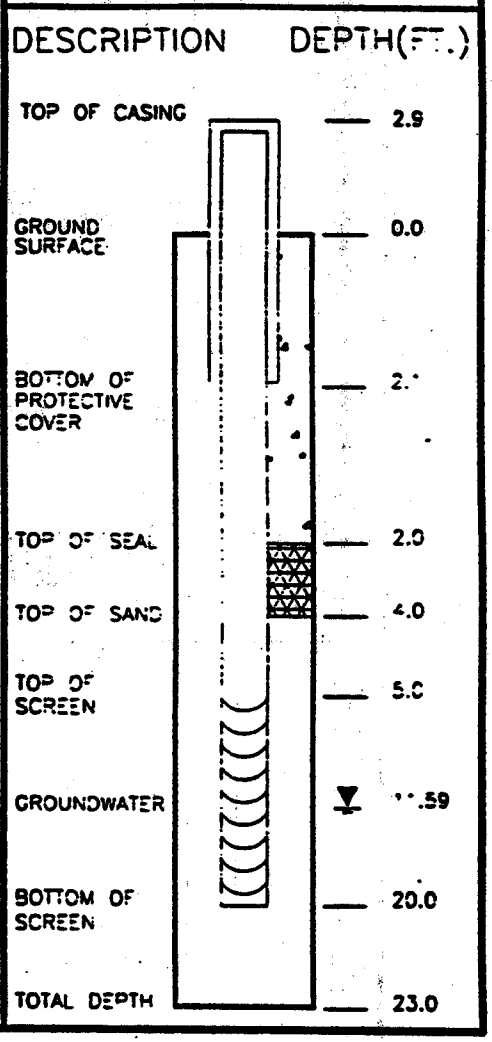
WELL LOCATION USTs 304 & 1239

DATE INSTALLED 12 JULY 94

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.6 FEET
2. WATER SURFACE ELEV. 274.34
   a) DEPTH TO SATURATED ZONE 11.59
3. TOP OF CASING ELEV. 285.93
4. PROTECTIVE CASING (YES) NO
   a) CASING LENGTH 5 FT
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE/TYPE OF SCREEN 0.010 INCH SLOTTED P.V.C
7. LENGTH OF SUMP 3.0 FT
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8 INCH
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 375 lbs. SIZE 10/20 U/G
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 1/2 BUCKET
13. DEPTH TO TOP OF SEAL 2.0 FEET
14. TYPE OF GROUT N/A
    GROUT MIXTURE
    METHOD OF PLACEMENT
15. COMMENTS ANNULUS ABOVE SEAL FILLED W/ CONCRETE DURING PAD CONSTRUCTION

INSTALLATION DESCRIPTION



FACILITY I.D. 0-791709
JOB NUMBER CTO-0080

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-0080

(N003LS)
USTs 304 & 1239
MONITORING WELL MEM-80-MW-3
WELL CONSTRUCTION LOG

DATE: 08-16-94 | DWG NAME: -80MW-3

DEPTH (FEET)	SAMPLE TYPE / SAMPLE DEPTH	BLOWS/.5 FT.	ORGANIC VAPOR (ppm)	DESCRIPTION OF SUBSURFACE MATERIALS
SURFACE – Grass				
	0		30	0.0–3.0' CLAYEY SILT, TAN GRADING TO TAN MOTTLED GREY, SLIGHTLY MOIST, STIFF.
	3		56	3.0–8.0' CLAYEY SILT, GREYISH BROWN, WITH BLACK STAINING, VERY MOIST, SOFT (WITH STRONG HYDROCARBON ODOR).
5				
	8		48	8.0–13.0' CLAYEY SILT, GREYISH BROWN, VERY MOIST, SOFT (WITH STRONG HYDROCARBON ODOR).
10				
	13		81	13.0–18.0' CLAYEY SILT, GREYISH BROWN, VERY MOIST, SOFT (WITH STRONG HYDROCARBON ODOR).
15				
	18		86	18.0–20.5' SILTY CLAY, DARK BROWN, MOIST, FIRM TO STIFF (WITH HYDROCARBON ODOR).
20	20.5		12	20.5–23.0' SILTY CLAY, BROWN GRADING TO TAN, MOIST, FIRM TO STIFF (WITH SLIGHT HYDROCARBON ODOR).
				DISCONTINUED BORING AT 23.0 FEET.
25				
30				

Boring Number	B/MW-3
Facility Name	North Fuel Farm (Building N-94) Nas Memphis, Millington, TN
Facility I.D.	0-791709
E/H&H Geologist License #	Jeffery L. Albert TN 1083
Drilling Subcontractor	Tristate Testing Services, Inc. 6756 Buckles Co Memphis, TN
Drilling Method	3.25-inch HSA
Sampler Type	CME 5-foot CS
Time/Date Start	0830/071294
Time/Date Finish	0915/071

ENVIRONMENTAL ASSESSMENT REPORT
NAS MEMPHIS
CTO-0080

SOIL BORING B/MW-3
UST's 304 & 1239
MILLINGTON, TN (N0028
DATE INSTALLED: 7/12/1994 PROJ. #: C

DATE: 8/4/1994 DWG NAME: CTO

WELL CONSTRUCTION LOG. N-MW-1

NAS MEMPHIS UST EAR

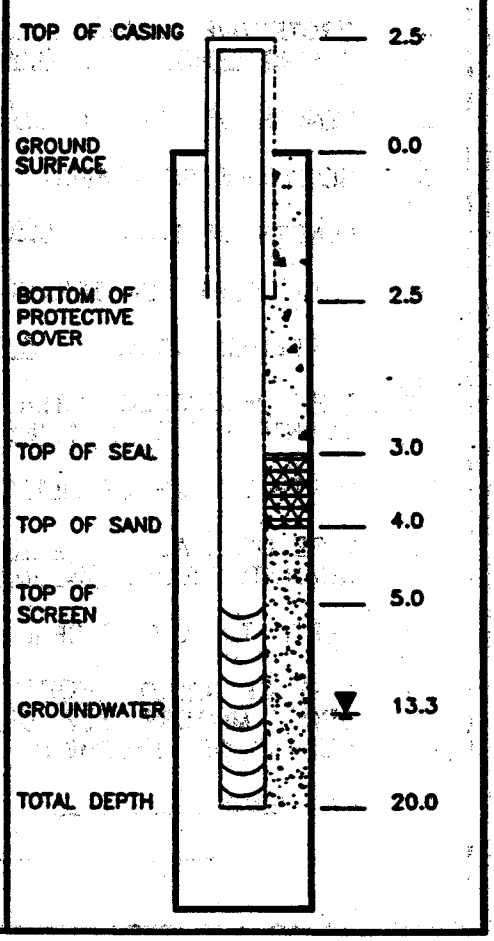
WELL LOCATION BLDG. N-126

DATE INSTALLED 13 MAY 93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.50 FEET
2. WATER SURFACE ELEV. 273.21 (7/20/93)
   a) DEPTH TO SATURATED ZONE 13.3 FEET
3. TOP OF CASING ELEV. 285.95
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 544 lbs SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS UPGRADIENT WELL

INSTALLATION DESCRIPTION



JOB NUMBER 067-C0109

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

BUILDING N-126
MONITORING WELL N-MW-1
WELL CONSTRUCTION LOG
(NF01LS)

DATE: 09/27/93 | DWG. NAME: 067NWC1

WELL CONSTRUCTION LOG. N-MW-2

NAS MEMPHIS UST EAR

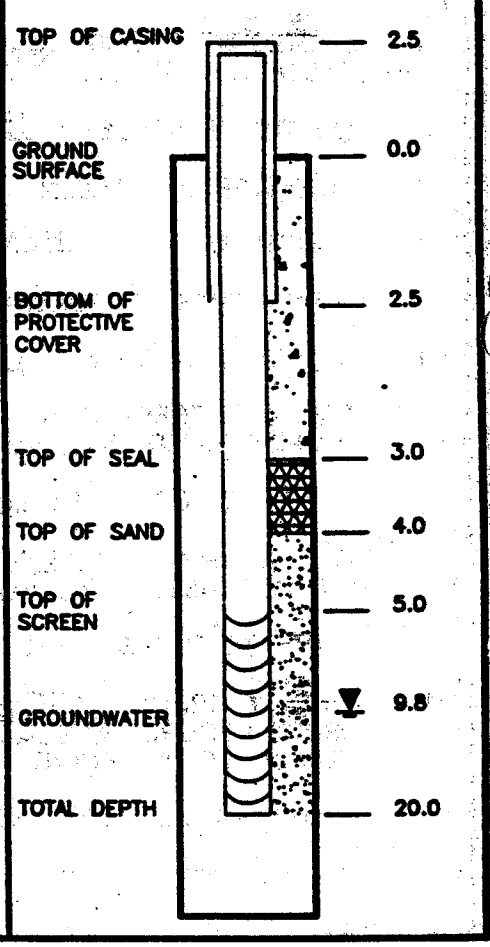
WELL LOCATION BLDG. N-126

DATE INSTALLED 14 MAY 93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.50 FEET
2. WATER SURFACE ELEV. 268.26 (7/20/93)
   a) DEPTH TO SATURATED ZONE 9.8 FEET
3. TOP OF CASING ELEV. 284.76
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 544 lbs. SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS

INSTALLATION DESCRIPTION



JOB NUMBER 067-C0109

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

BUILDING N-126
MONITORING WELL N-MW-2
WELL CONSTRUCTION LOG
(NF02LS)

DATE: 09/27/93 | DWG NAME: 067NWC2

WELL CONSTRUCTION LOG. N-MW-3

NAS MEMPHIS UST EAR

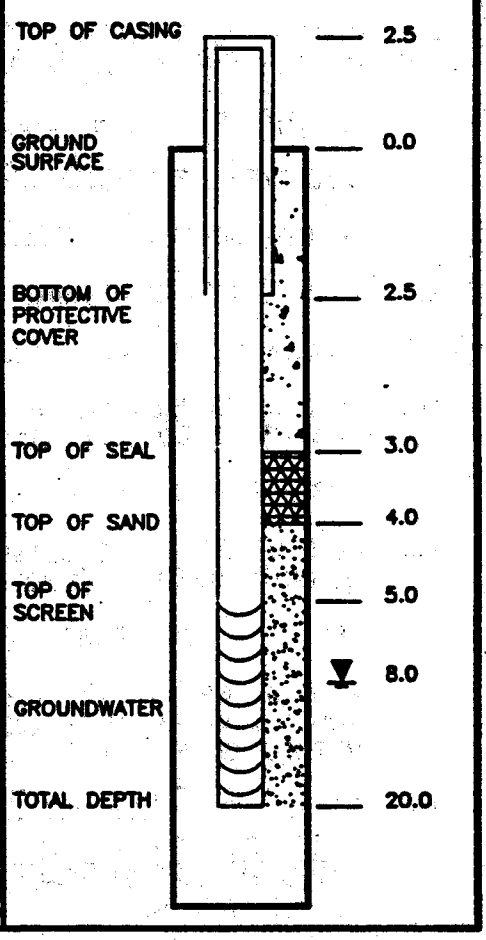
WELL LOCATION BLDG. N-126

DATE INSTALLED 13 MAY 93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.50 FEET
2. WATER SURFACE ELEV. 269.82 (7/20/93)
   a) DEPTH TO SATURATED ZONE 9.8 FEET
3. TOP OF CASING ELEV. 285.90
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 544 lbs. SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS

INSTALLATION DESCRIPTION



JOB NUMBER 067-C0109

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

BUILDING N-126
MONITORING WELL N-MW-3
WELL CONSTRUCTION LOG
(NF03LS)

DATE: 09/27/93 | DWG NAME: 067NWC3

WELL CONSTRUCTION LOG. N-MW-4

NAS MEMPHIS UST EAR

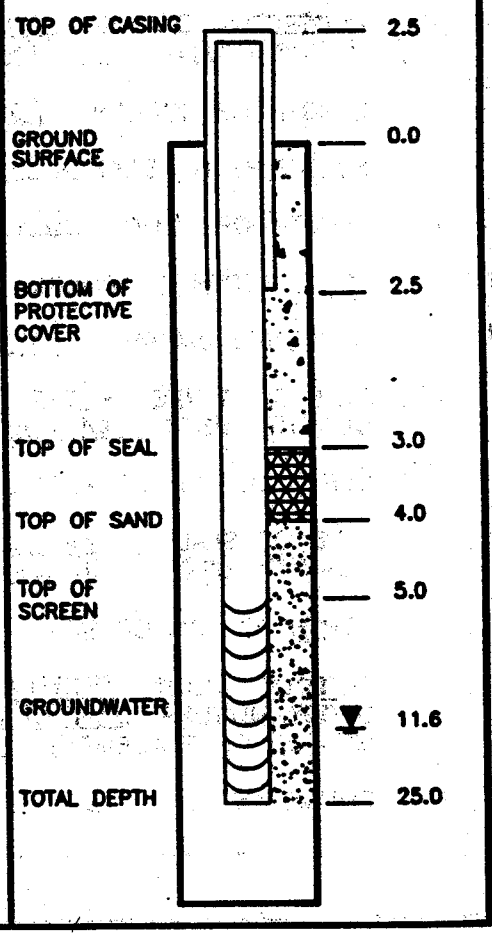
WELL LOCATION BLDG. N-126

DATE INSTALLED 14 MAY 93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.50 FEET
2. WATER SURFACE ELEV. 276.23 (7/20/93)
   a) DEPTH TO SATURATED ZONE 11.6 FEET
3. TOP OF CASING ELEV. 286.53
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 20.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 25.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 25.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 714 lbs. SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS TOTAL DEPTH DRILLED TO 25.0 FEET DUE TO APPROXIMATE 3 TO 4 FOOT INCREASE IN TOPOGRAPHIC SURFACE ELEVATION IN RELATION TO OTHER WELLS.

INSTALLATION DESCRIPTION



JOB NUMBER 067-C0109

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

BUILDING N-126
MONITORING WELL N-MW-4
WELL CONSTRUCTION LOG
(NF04LS)

DATE:11/17/93 | DWG NAME: 067NWC4

WELL CONSTRUCTION LOG. N-MW-5

NAS MEMPHIS UST EAR

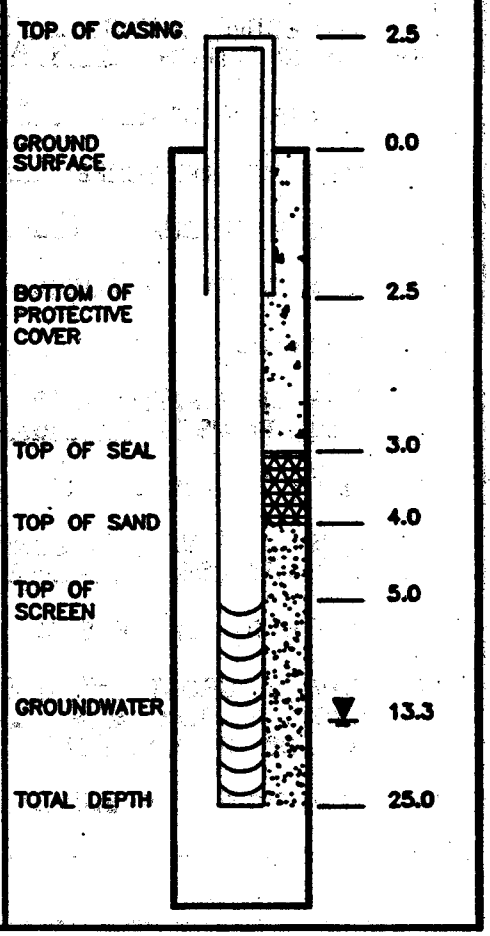
WELL LOCATION BLDG. N-126

DATE INSTALLED 13 MAY 93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.50 FEET
2. WATER SURFACE ELEV. 266.01 (7/20/93)
   a) DEPTH TO SATURATED ZONE 13.3 FEET
3. TOP OF CASING ELEV. 285.19
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 20.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 25.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 25.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 714 lbs. SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS EXTRA WELL PLACED IN CONTAMINATION PLUME NEXT TO TANK EXCAVATION

INSTALLATION DESCRIPTION



JOB NUMBER 067-C0109

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

BUILDING N-126
MONITORING WELL N-MW-5
WELL CONSTRUCTION LOG
(NF05LS)

DATE: 11/17/93 | DWG NAME: 067NW05

WELL CONSTRUCTION LOG. N-MW-6

NAS MEMPHIS UST EAR

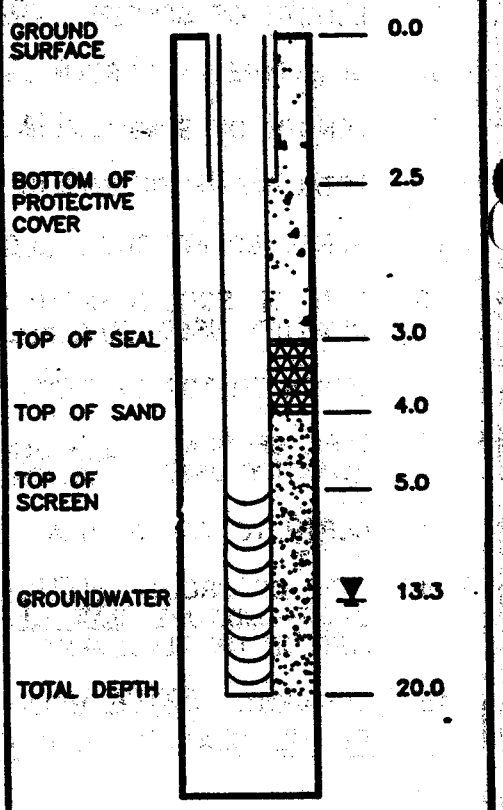
WELL LOCATION BLDG. N-126

DATE INSTALLED 15 JULY 93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 0 FEET
2. WATER SURFACE ELEV. 268.28 (7/20/93)
   a) DEPTH TO SATURATED ZONE 13.3 FEET
3. TOP OF CASING ELEV. 281.95
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 544 lbs. SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS ASSUMED DOWNGRADIENT WELL

INSTALLATION DESCRIPTION



JOB NUMBER 067-C0109

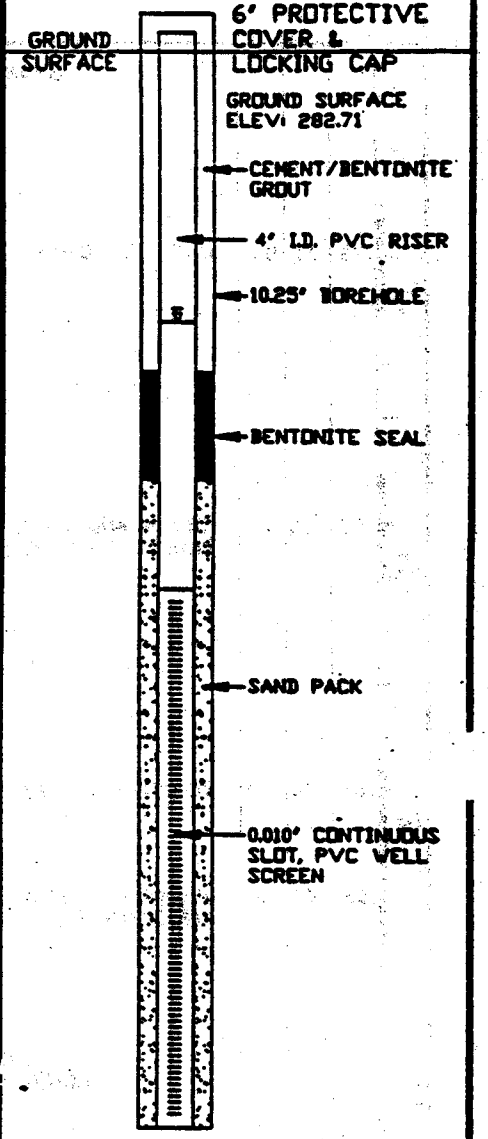
ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

BUILDING N-126
MONITORING WELL N-MW-6
WELL CONSTRUCTION LOG
(NF06LS)

DATE: 09/27/93 | DWG NAME: 067NWC6

DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	PID (PPM)	DESCRIPTION OF SUBSURFACE MATERIALS
				BROWN SILTY CLAYEY LOAM
5	SS	83	0.0	BROWN AND GRAY MOTTLED, PLASTIC SILTY CLAY
10	SS	92	0.0	BROWN AND GRAY MOTTLED, PLASTIC SILTY CLAY; SLIGHTLY MOIST
15	SS	100	0.0	BROWN AND GRAY MOTTLED, VERY PLASTIC SILTY CLAY; WET
20	SS	100	0.0	BROWN AND GRAY MOTTLED, VERY PLASTIC SILTY CLAY WITH DARK GRAY CLAY AT 19.5'; DRIPPING WET
25				BOREHOLE TERMINATED @ 20' MONITORING WELL INSTALLED 1/8/92

WELL CONSTRUCTION DETAILS



Environmental and Safety Designs, Inc.

ENSAFE

5724 SUMMERTREES DR. MEMPHIS, TN. 38134 ☎(901)372-7962

BORING LOG AND CONSTRUCTION DETAILS OF MW-5

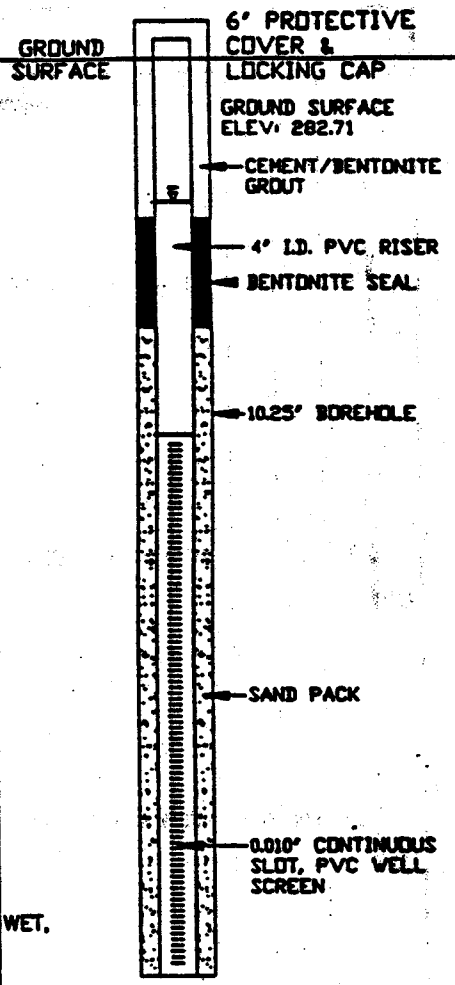
(N9405ES)

DATE: 02/10/92

DWG NAME: NASMEM5

DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	PID (PPM)	DESCRIPTION OF SUBSURFACE MATERIALS
				BROWN SILTY CLAYEY LOAM
5	SS	71	0.0	GRAY AND BROWN MOTTLED PLASTIC SILTY CLAY
10	SS	100	0.0	BROWN AND GRAY, SLIGHTLY SILTY AND SANDY, MOTTLED PLASTIC CLAY; WET; WATER IS RISING IN BOREHOLE
15	SS	100	0.0	BROWN AND GRAY, SILTY, LOOSE, MOTTLED SILTY CLAY; WET
	SS	100	0.0	BROWN AND GRAY, SILTY, MOTTLED SILTY CLAY; PARTS ARE VERY WET, PARTS ARE DRY
20				BOREHOLE TERMINATED @ 17' MONITORING WELL INSTALLED 1/8/92
25				

WELL CONSTRUCTION DETAILS



Environmental and Safety Designs, Inc.

ENSAFE®

5724 SUMMERTREES DR. MEMPHIS, TN. 38134 (901)372-7962

BORING LOG AND CONSTRUCTION DETAILS OF MW-6

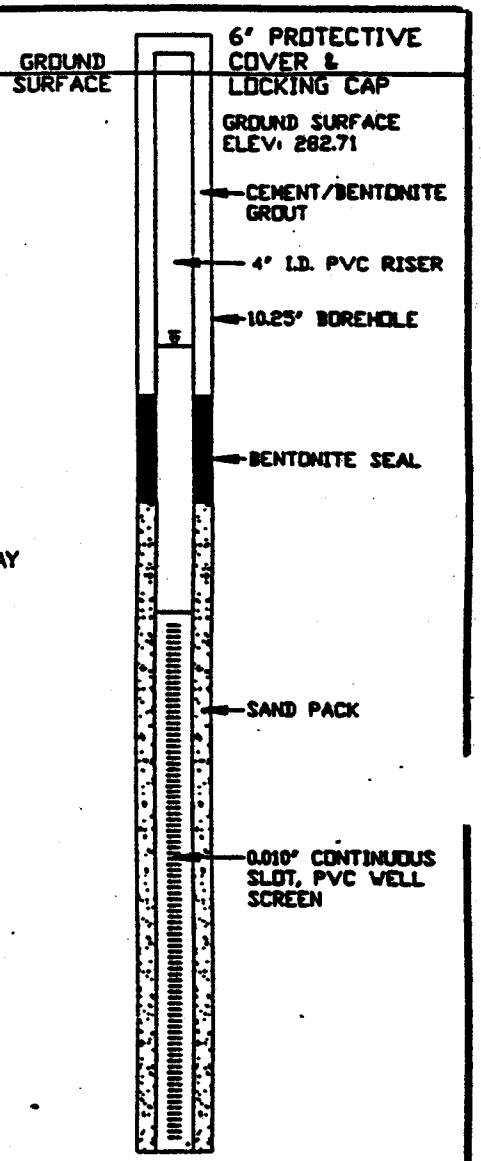
(n9406LS)

DATE: 02/10/92

DWG NAME: NASMEM6

DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	PID (PPM)	DESCRIPTION OF SUBSURFACE MATERIALS
				BROWN SILTY LOAM AND GRAVEL – CLEAN FILL
5	SS	83	0.0	BLACK, BROWN, AND GRAY MOTTLED SEMI-PLASTIC SILTY CLAY
10	SS	100	0.0	GRAY WITH SOME BLACK AND BROWN MOTTLED PLASTIC SILTY CLAY
15	SS	100	0.0	GRAY AND BROWN MOTTLED PLASTIC SILTY CLAY; MOIST TO WET
20	SS	100	0.0	TOP 12" ARE MUD-LIKE SILTY BROWN AND GRAY CLAY BOTTOM 12" ARE BROWN AND GRAY PLASTIC SILTY CLAY
25				BOREHOLE TERMINATED @ 20' MONITORING WELL INSTALLED 1/8/92

WELL CONSTRUCTION DETAILS



Environmental and Safety Designs, Inc.

ENSAFE®

5724 SUMMERTREES DR. MEMPHIS,TN. 38134 (901)372-7962

BORING LOG AND CONSTRUCTION DETAILS OF MW-7

(N9407LS)

DATE: 02/10/92

DWG NAME: NASMEM7

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

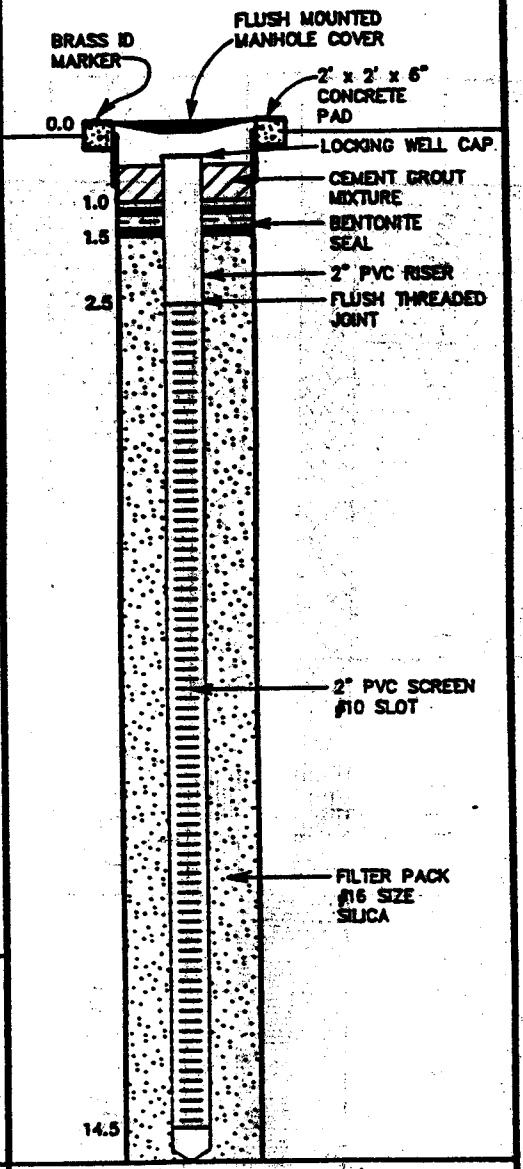
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1239, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T1239-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, BROWN
			2.0
			COARSE, GRAVEL
			3.0
			SILT, CLAYEY, BROWN, WITH GRAVEL
5			6.0
			SILTY, CLAYEY, GRAY, MOIST
10			12.0
			13.3' 24 HOUR WATER LEVEL
			SILT, CLAYEY, GRAY, WET
15			15.0
			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 3, 1990
Well Completion Date: JAN. 3, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 13.3'

Boring Diameter: 6.75"
Ground Elevation:
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

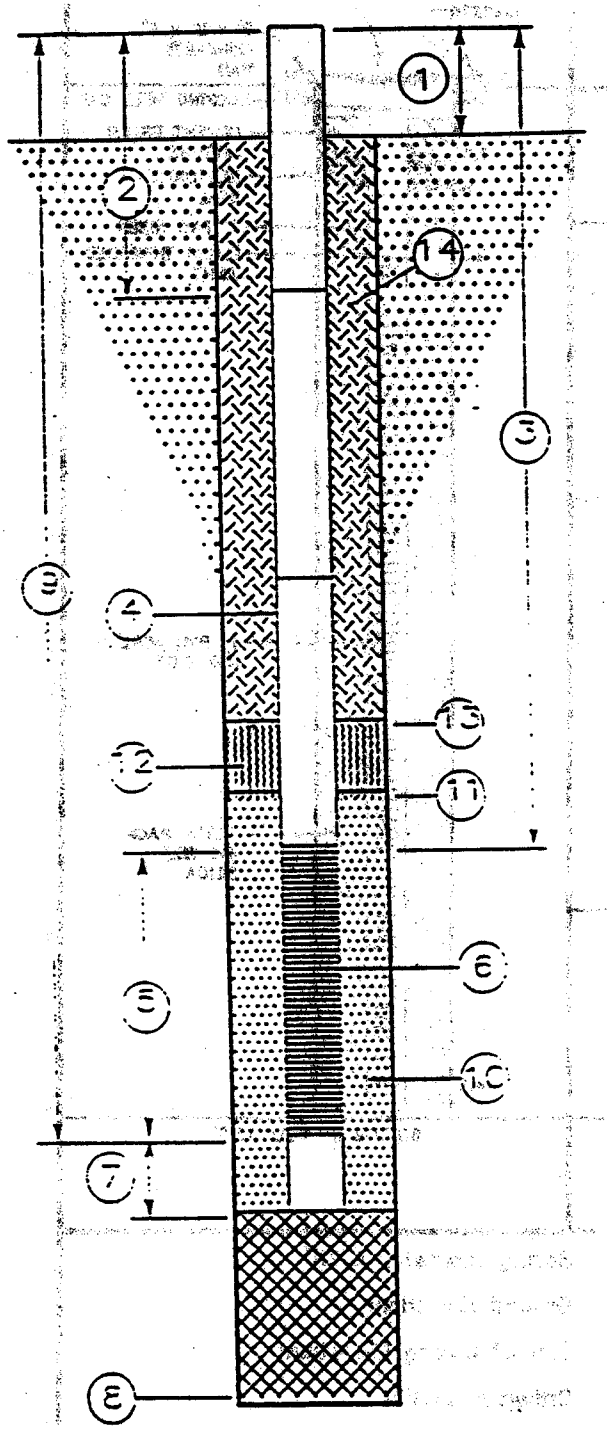
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1239-1

DATE OF INSTALLATION 1-3-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING [illegible]

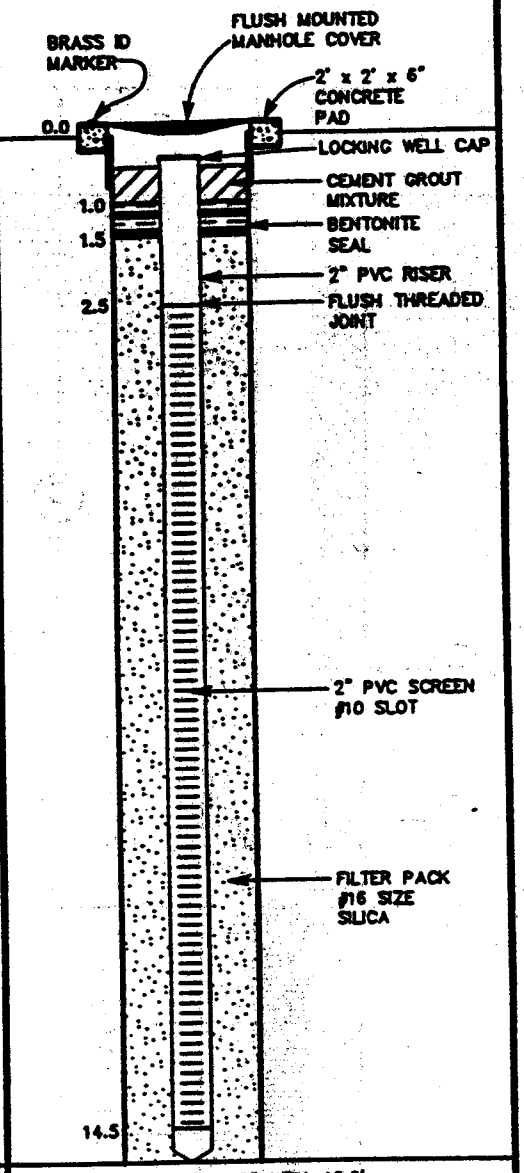
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION: TANK SYSTEM 1239, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T1239-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, BROWN
			2.0
			COARSE GRAVEL
			3.0
5			SILT, CLAYEY, BROWN
			9.0
10			SILT, CLAYEY, GRAY, MOIST. SLIGHT HYDROCARBON ODOR
			12.5' 24 HOUR WATER LEVEL
15			15.0 TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 9, 1990
Well Completion Date: JAN. 9, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 12.5'

Boring Diameter: 6.75"
Ground Elevation: 283.28'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

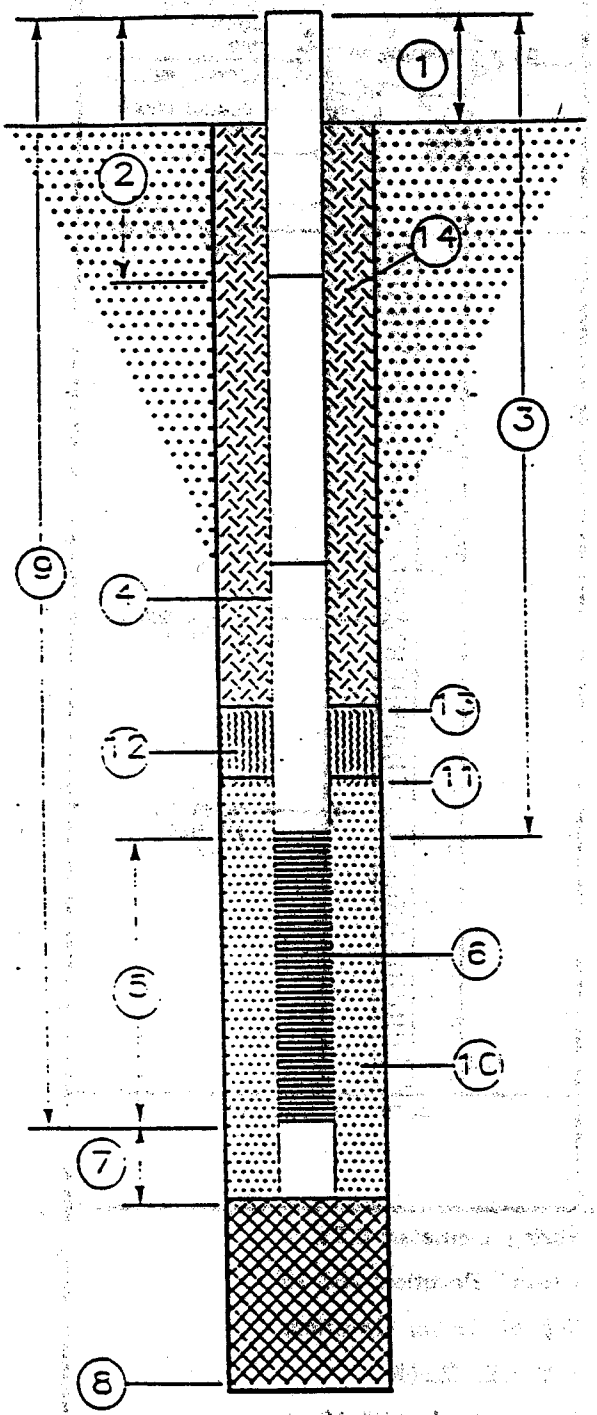
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1239-2

DATE OF INSTALLATION 1-9-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #2 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

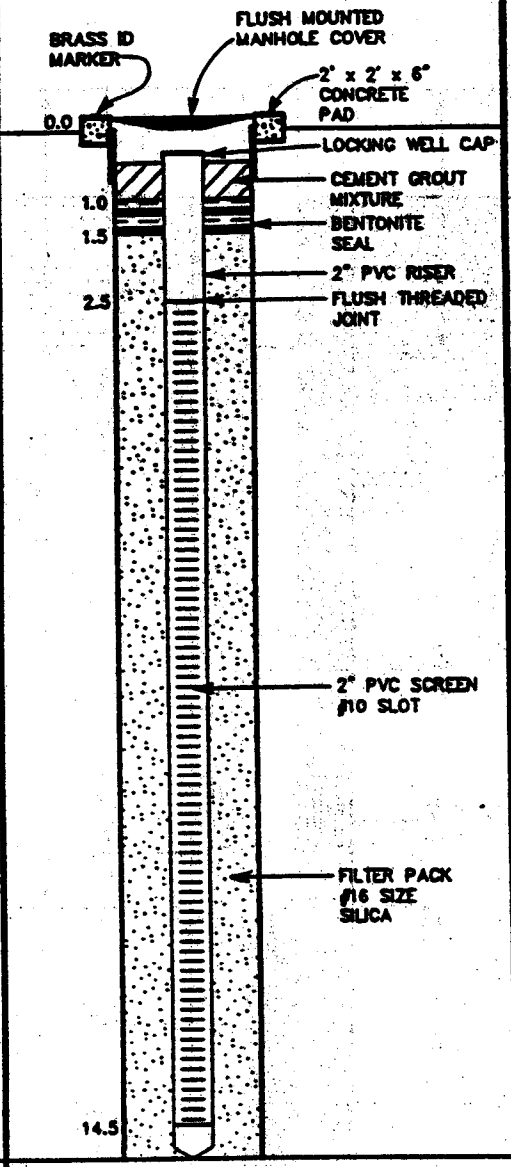
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1239, NAS, MEMPHIS, TN.

LOG OF BORING NO. A3 LOG OF WELL NO. MEM-T1239-3

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILTY BROWN
			2.0
			COARSE GRAVEL
			3.0
5			SILT, CLAYEY, BROWN
			9.0
10			SILT, CLAYEY, GRAY, MOIST SLIGHT HYDROCARBON ODOR
			13.8' 24 HOUR WATER LEVEL
15			15.0 TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 9, 1990
Well Completion Date: JAN. 9, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 13.8'

Boring Diameter: 6.75'
Ground Elevation: 283.64'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

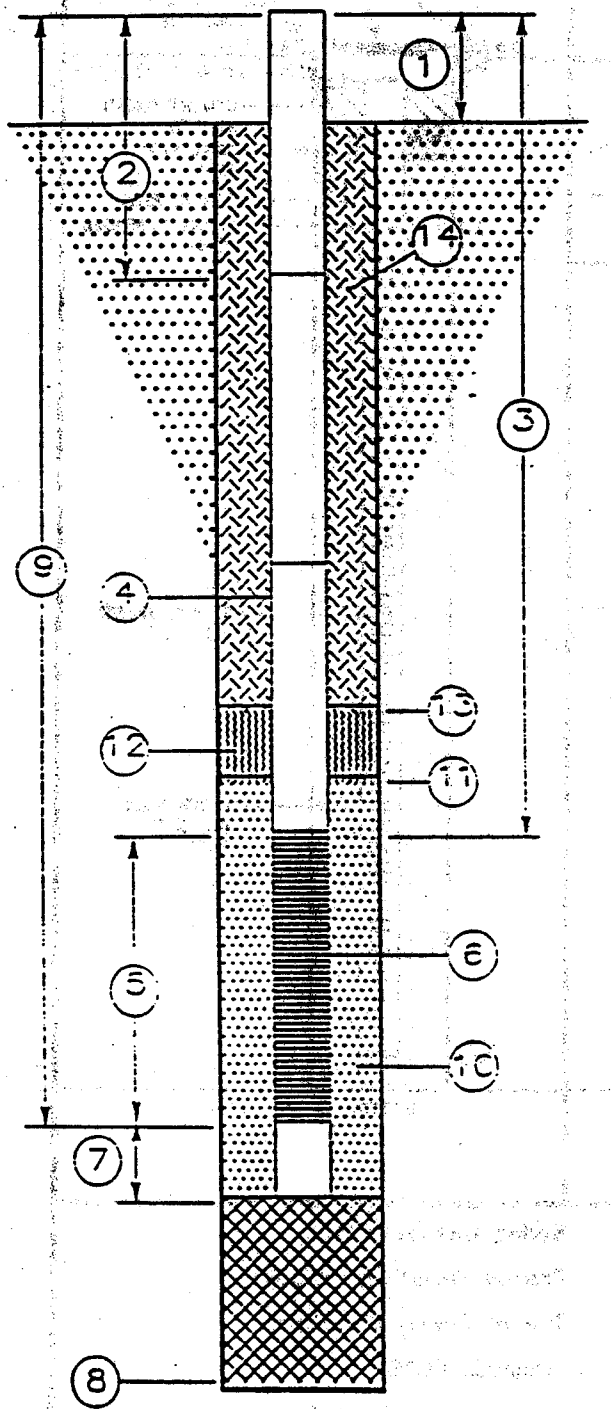
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1239-3

DATE OF INSTALLATION 1-9-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.

   Coupling Interval Depths 2.5 ft., 5.0 ft.

   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand

    Quantity Used 14.66 ft.^{3} Size #16 - #40
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets

    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement

    Grout Mixture 100%

    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

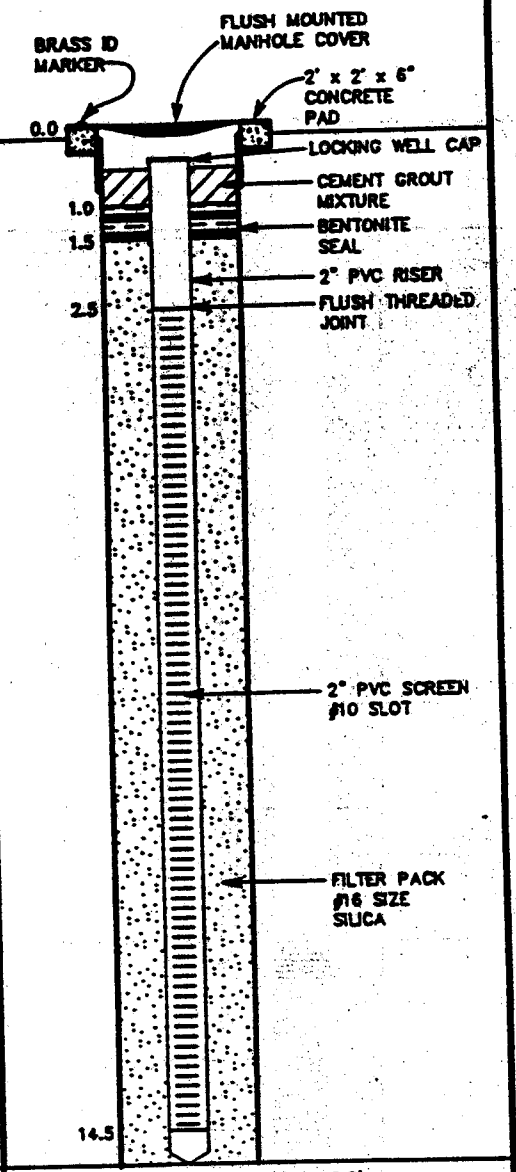
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1242, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T1242-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY, LIGHT BROWN
4.0			
5			CLAYEY, SILTY, BROWN, DRY MODERATE HYDROCARBON ODOR
7.0			
10			SILT, CLAYEY, MOIST MODERATE HYDROCARBON ODOR
15			
15.0			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 4, 1990
Well Completion Date: JAN. 4, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 14.6'

Boring Diameter: 6.75"
Ground Elevation: 283.90'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

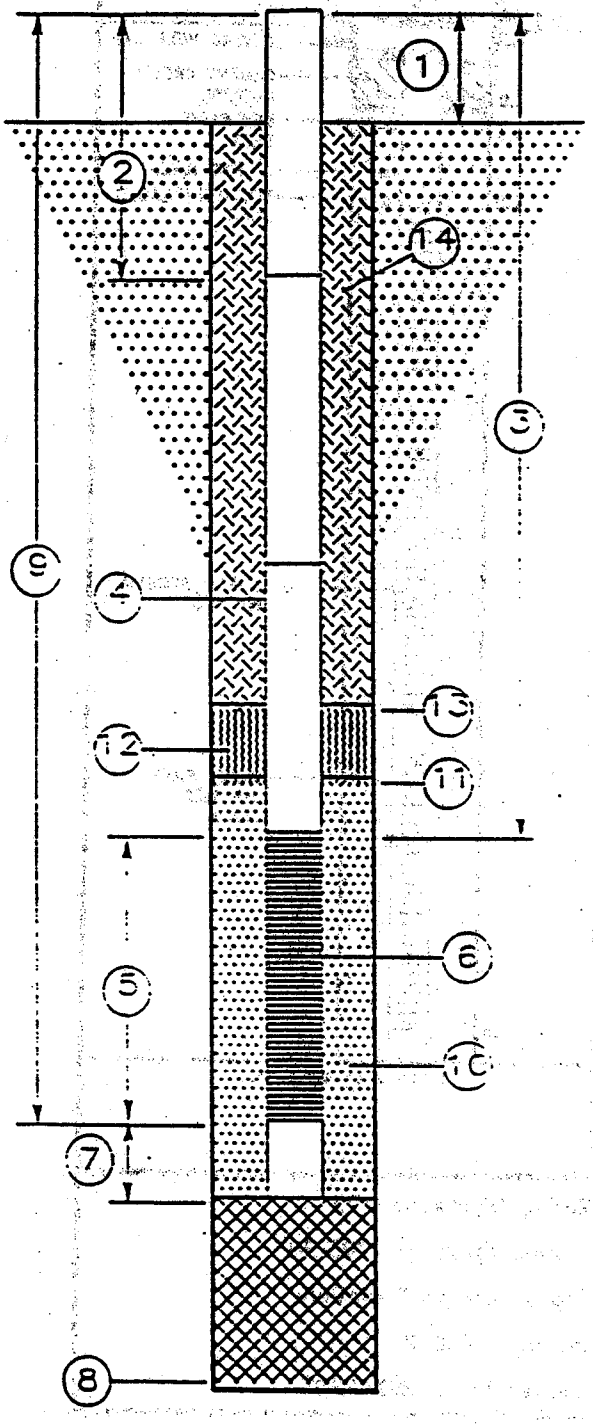
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1242-1

DATE OF INSTALLATION 1-4-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.

   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 in.
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand

    Quantity Used 14.66 ft.^{3} Size #16 U/G
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets

    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement

    Grout Mixture 100%

    Method of Placement Pour

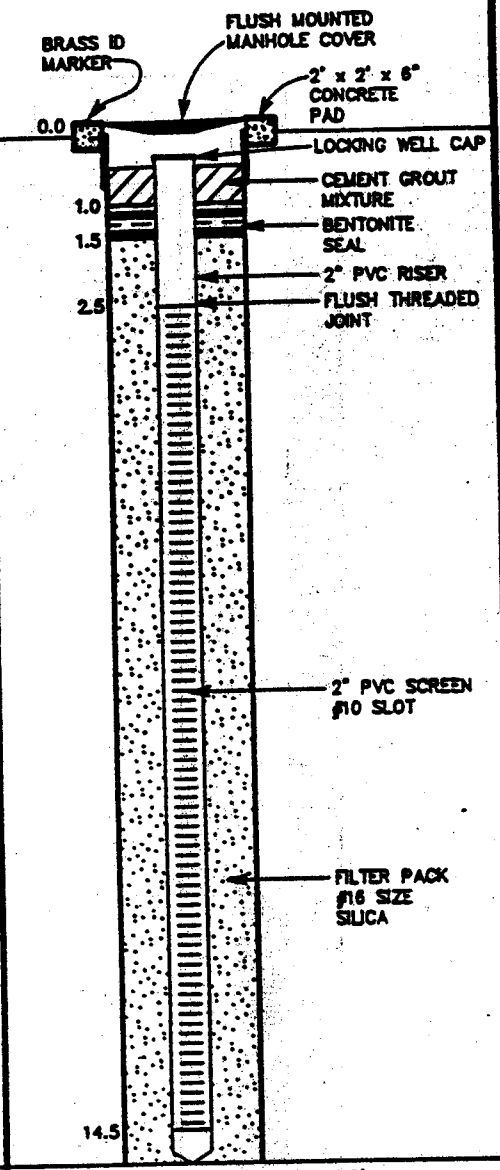
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1242, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T1242-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			CLAYEY, SILTY, LIGHT BROWN
4.0			
5			CLAYEY, SILTY, BROWN, MOIST SLIGHT HYDROCARBON ODOR
7.0			
10			SILT, CLAYEY, MOIST MODERATE HYDROCARBON ODOR
14.6'			24 HOUR WATER LEVEL
15			
15.0			TERMINATED @ 15.0



Boring Completion Date: JAN. 4, 1990
Well Completion Date: JAN. 4, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: N.A.

Boring Diameter: 8.00"
Ground Elevation:
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

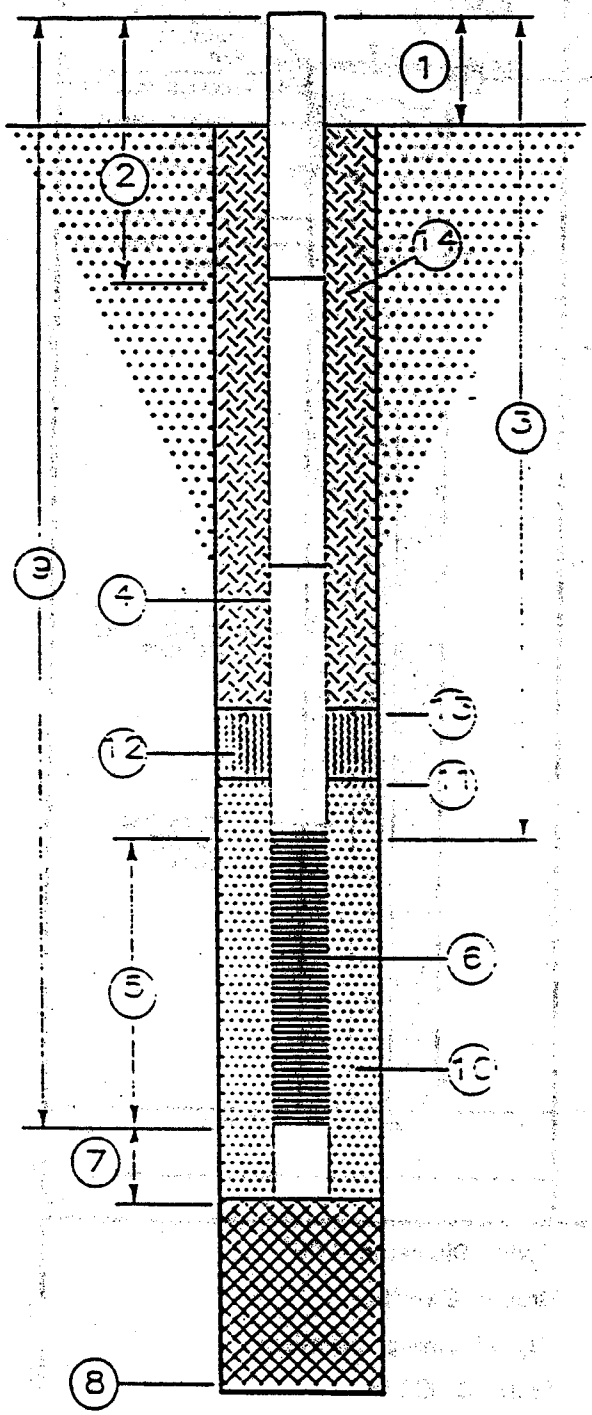
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-C068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1242-2

DATE OF INSTALLATION 1-4-90



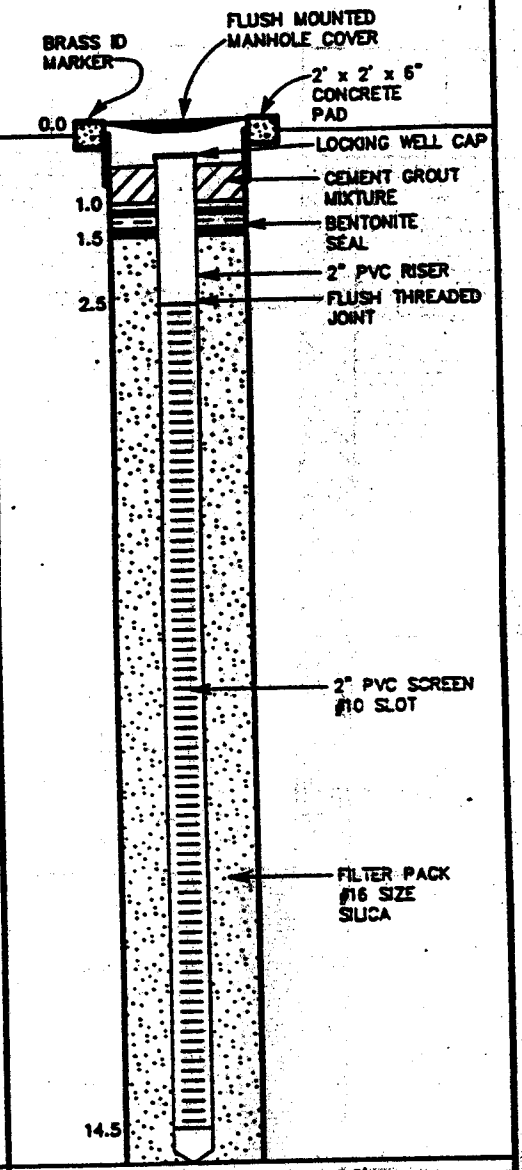
1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft.
   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM T1243, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T1243-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
0			
			SILT, CLAYEY, LIGHT BROWN
5			
8.0			
8.4			24 HOUR WATER LEVEL
10			SILT, CLAYEY, BROWN, MOIST SLIGHT HYDROCARBON ODOR
15.0			TERMINATED @ 15.0



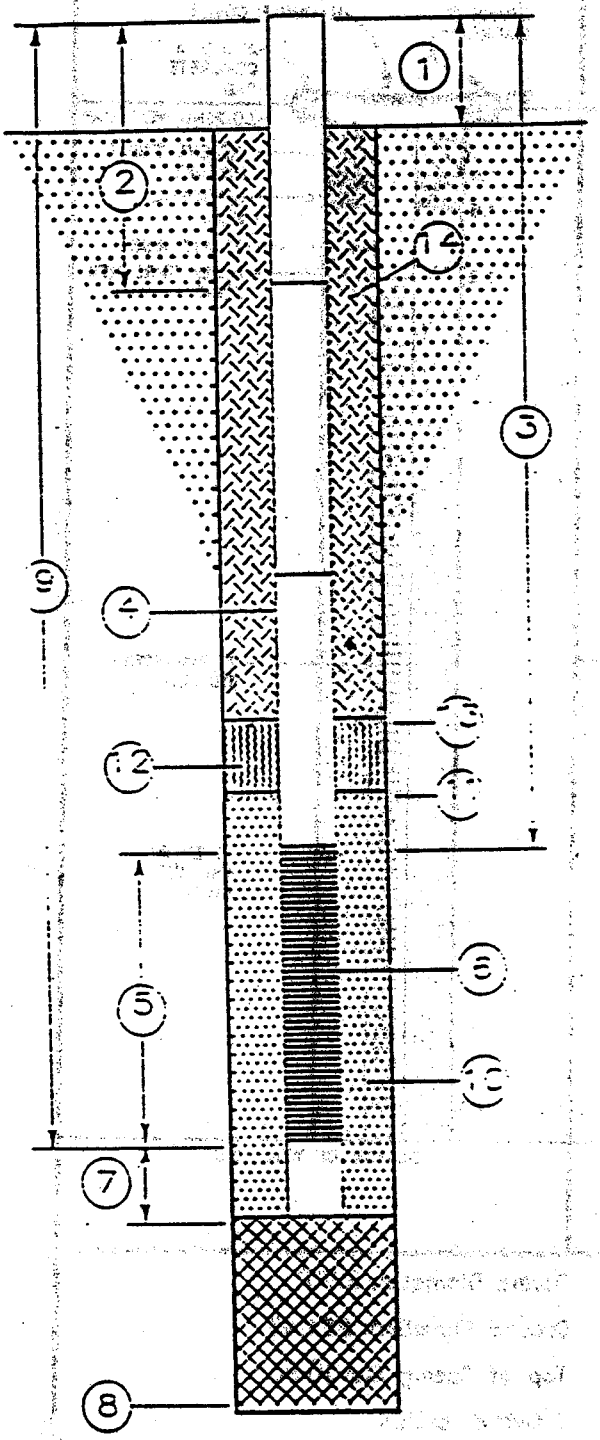
Boring Completion Date: JAN. 5, 1990
Well Completion Date: JAN. 5, 1990
Well Development Date:
Drilling Method: POWER AUGER
Depth to Water: 8.4'

Boring Diameter: 6.75"
Ground Elevation: 284.43'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL NUMBER MEM-T1243-1

DATE OF INSTALLATION 1-5-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inc
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #2 W/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

Well Construction Details

Release Detection Manual
MTMC New Orleans, La
April 1991

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

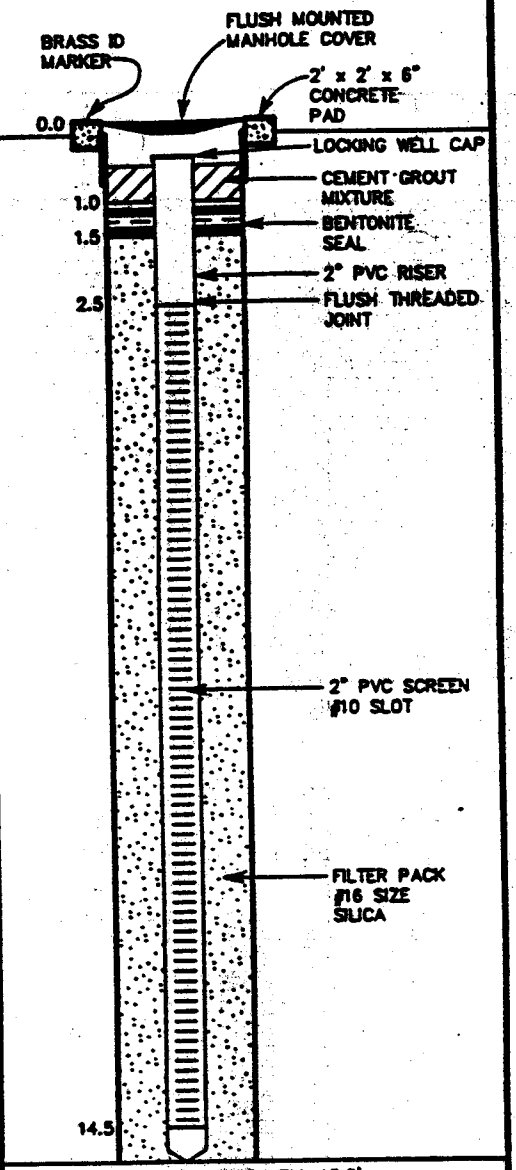
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM T1243, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T1243-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
5			SILT, CLAYEY, LIGHT BROWN
7.0			
8.5			24 HOUR WATER LEVEL
10			SILT, CLAYEY, GRAY, WET MODERATE HYDROCARBON ODOR
15.0			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 9, 1990
Boring Diameter: 6.75"
Well Completion Date: JAN. 9, 1990
Ground Elevation: 284.20'
Well Development Date:
Top of Casing Elevation:
Drilling Method: POWER AUGER
Driller: B. ELDER
Depth to Water: 8.5'
Logged by: L. RICHARDS

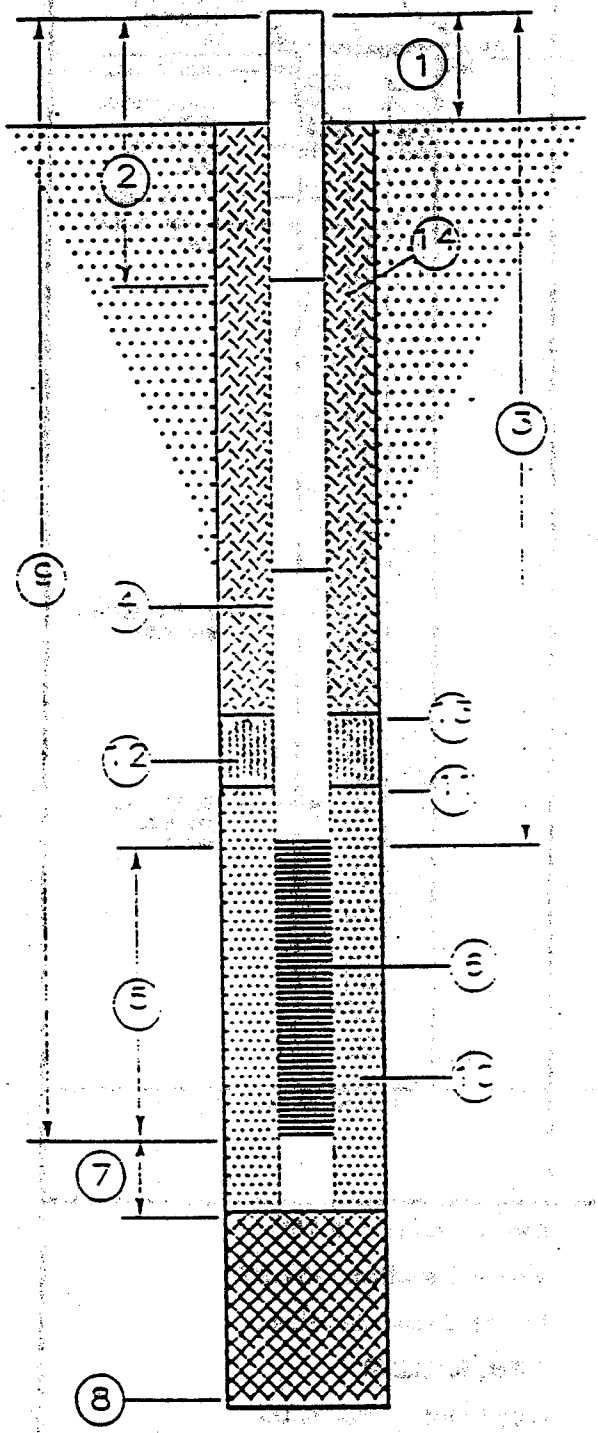
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MFM-T1243-2

DATE OF INSTALLATION 1/9/90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 in.
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 O/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

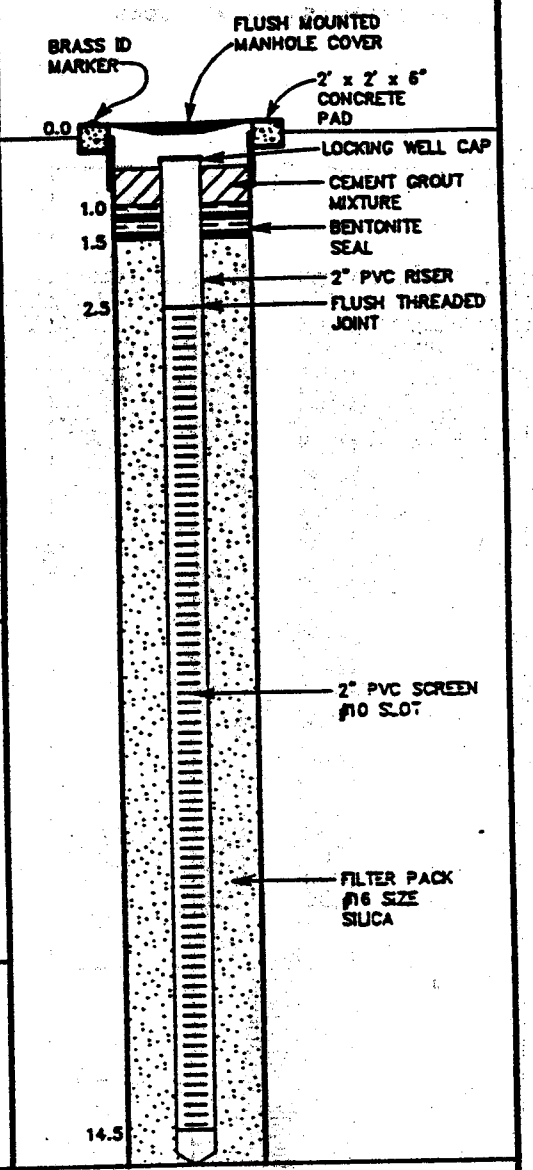
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 301, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T301-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY, WITH PEA GRAVEL
			3.0
5			SILT, CLAYEY, GRAY MODERATE HYDROCARBON ODOR
			7.0
10			SILTY, CLAYEY, GRAY, MOIST MODERATE HYDROCARBON ODOR
			12.0
			12.7' 24 HOUR WATER LEVEL
			SILT, CLAYEY, GREEN, WET STRONG HYDROCARBON ODOR
15			15.0 TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 5, 1990
Well Completion Date: JAN. 5, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 12.7'

Boring Diameter: 6.75"
Ground Elevation: 283.88'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

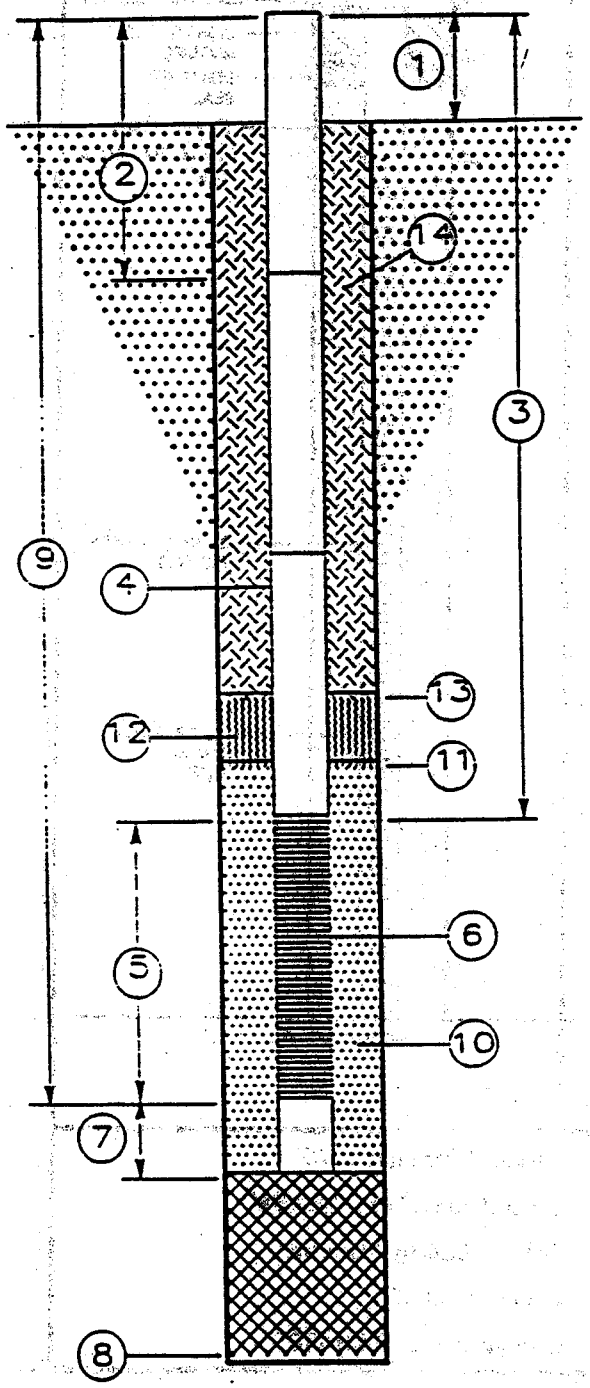
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T301-1

DATE OF INSTALLATION 1-15-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.

   Coupling Interval Depths 2.5 ft., 5.0 ft.

   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Totcl Depth of Boring 15 ft. Hole Dicmeter 8
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand

    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Fiter 1 ft.
12. Type of Seal Bentonite pellets

    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement

    Grout Mixture 100%

    Method of Placement Pour

SOUTHERN DIVISION NAVAL [illegible]

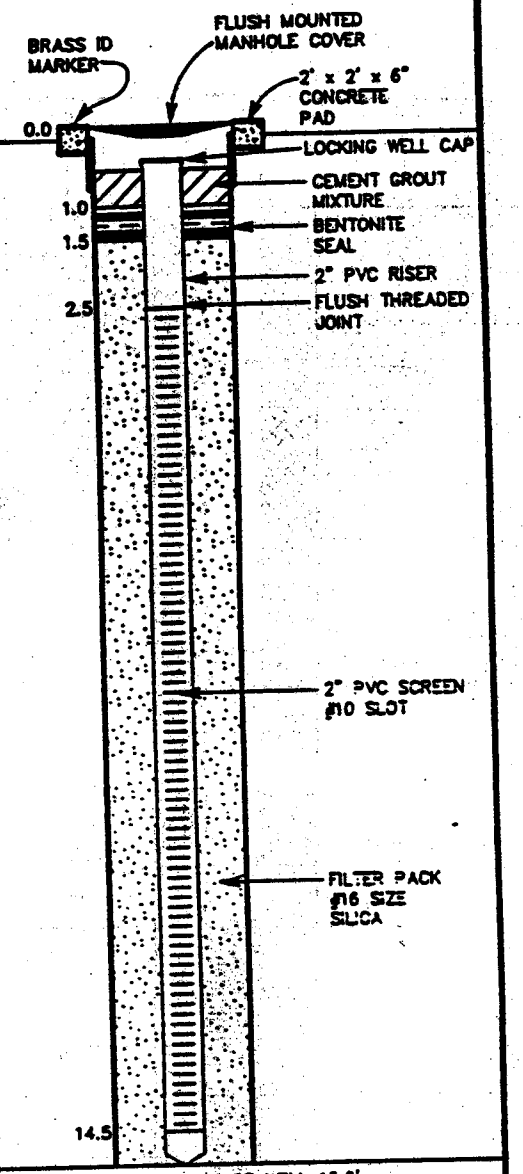
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 301, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T301-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, BROWN
			3.0
			SILT, CLAYEY, GRAY
5			6.0
			SILT, CLAYEY, GRAY, MOIST SLIGHT HYDROCARBON ODOR
10			13.0
			SILT, CLAYEY, GREEN WET SLIGHT HYDROCARBON ODOR
			14.8 24 HOUR WATER LEVEL
15			15.0 TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 9, 1990
Well Completion Date: JAN. 9, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 14.8'

Boring Diameter: 6.75"
Ground Elevation: 283.63'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

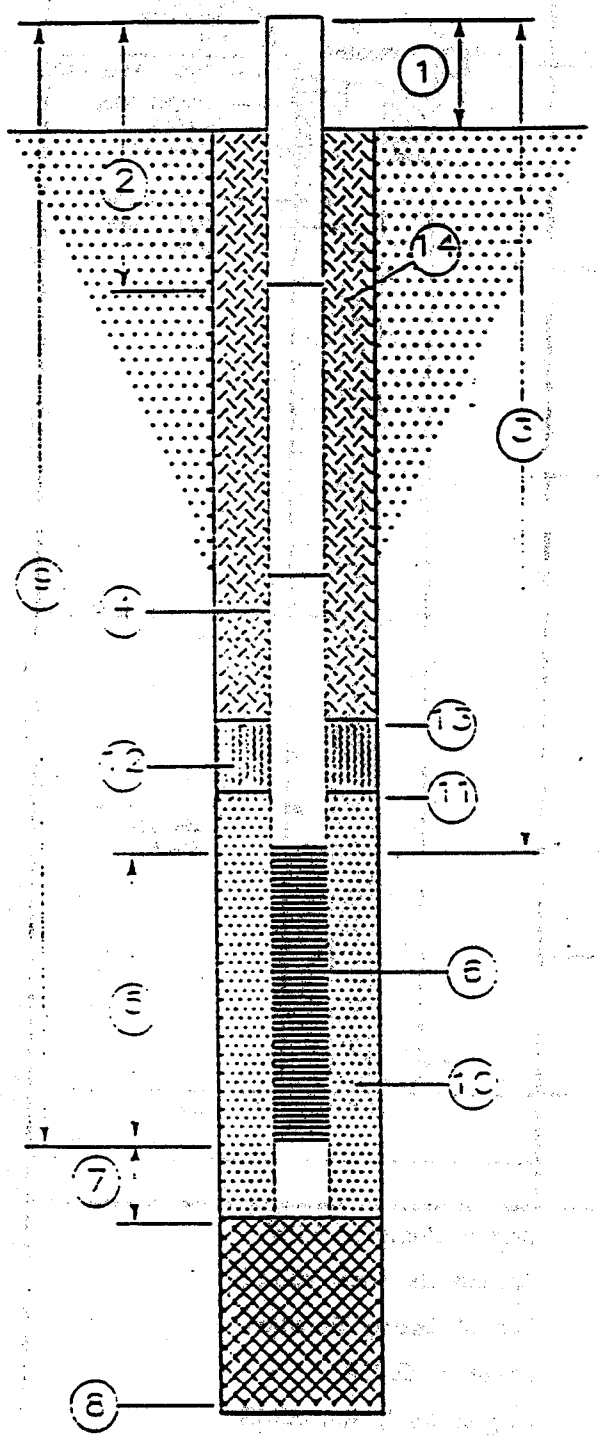
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T301-2

DATE OF INSTALLATION 1/9/90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inc
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand.
    Quantity Used 14.66 ft.^{3} Size #2 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

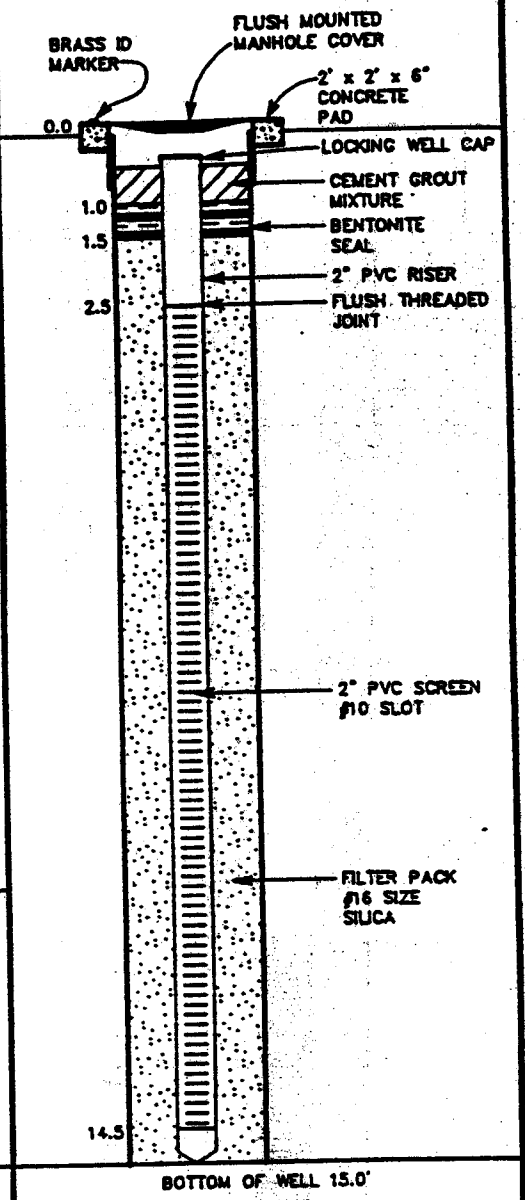
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 301, NAS, MEMPHIS, TN.

LOG OF BORING NO. A3 LOG OF WELL NO. MEM-T301-3

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT BROWN
			3.0
5			SILT, CLAYEY, GRAY
10			11.0
			SILT, CLAYEY, GREEN, WET
			13.6' 24 HOUR WATER LEVEL
15			15.0 TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 9, 1990
Well Completion Date: JAN. 9, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 13.6'

Boring Diameter: 6.75"
Ground Elevation: 283.55'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

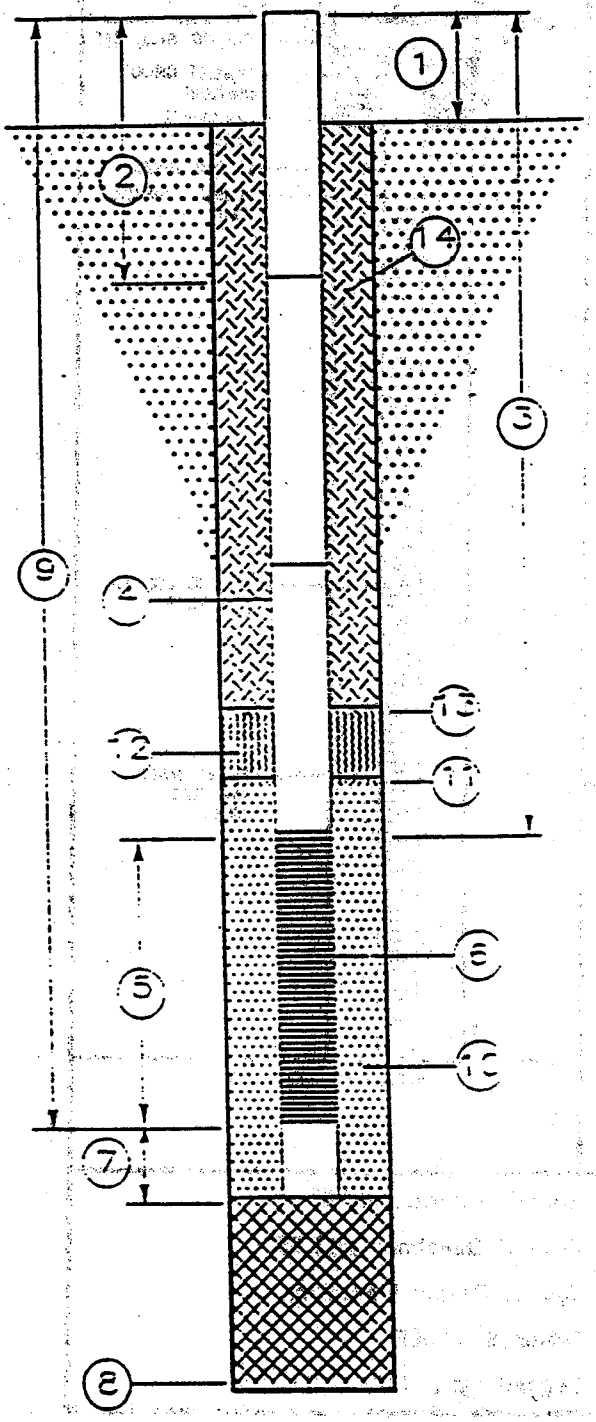
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T301-3

DATE OF INSTALLATION 1-9-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

Well Construction Details

Release Detection Manual
MTMC New Orleans, La
April 1991

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

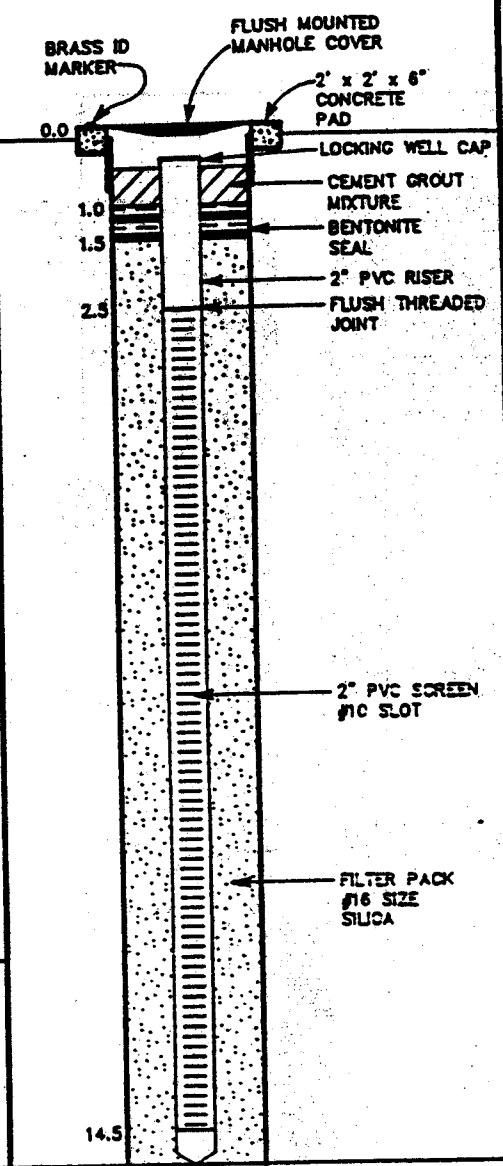
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 304, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T304-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILTY BROWN
			2.0
			COARSE GRAVEL
			3.5
5			SILT, CLAYEY, BROWN, WITH COARSE GRAVEL SLIGHT HYDROCARBON ODOR
			7.0
			SILT, CLAYEY, GRAY, MOIST MODERATE HYDROCARBON ODOR
10			11.9' 24 HOUR WATER LEVEL
			12.0
			SILT, CLAYEY, GRAY, MOIST STRONG HYDROCARBON ODOR
15			15.0 TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 9, 1990
Well Completion Date: JAN. 9, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 11.9'

Boring Diameter: 6.75"
Ground Elevation: 284.34'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

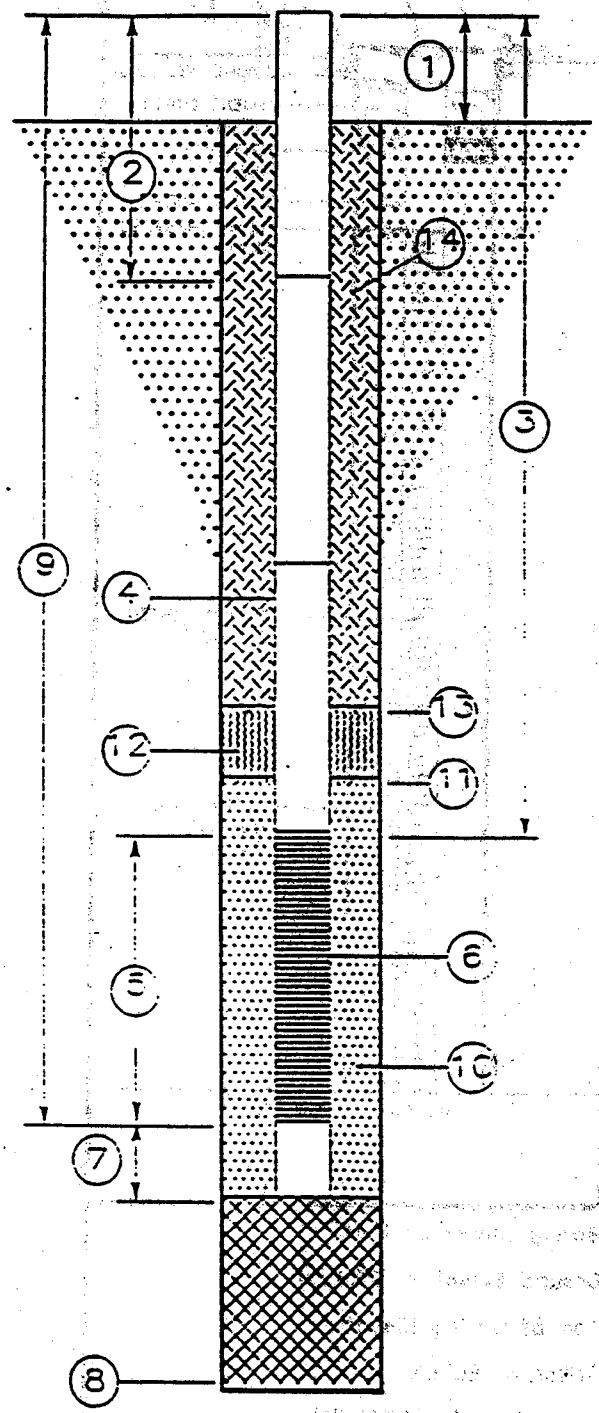
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T304-1

DATE OF INSTALLATION 1/9/90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft.
   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #2/12
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

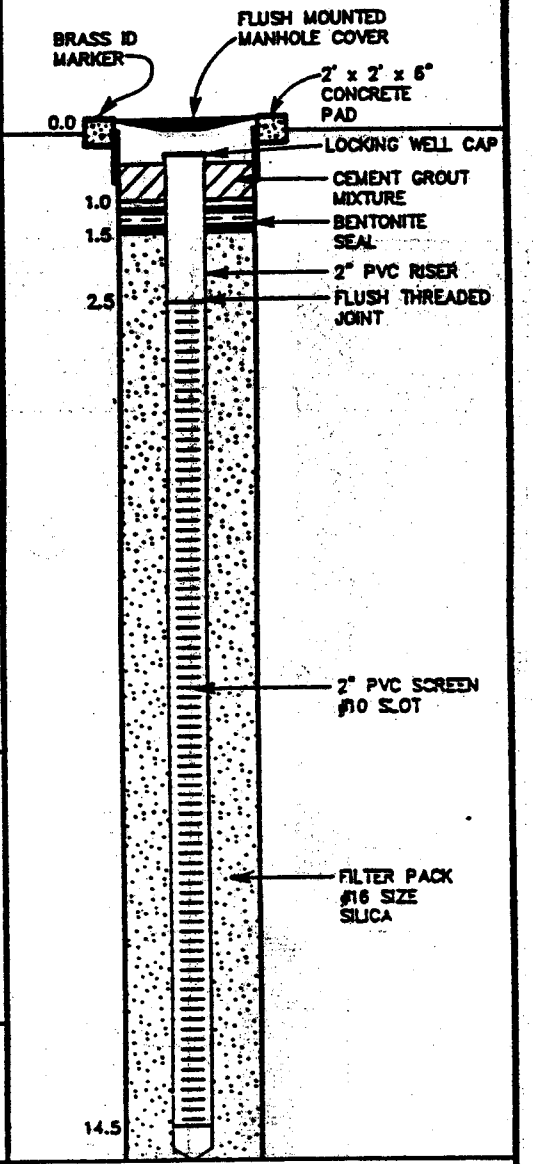
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 304, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T304-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILTY BROWN
			2.0
			COARSE GRAVEL
			3.5
5			SILT, CLAYEY, BROWN
			9.0
10			SILT, CLAYEY, GRAY, MOIST MODERATE HYDROCARSON ODOR
			12.3' 24 HOUR WATER LEVEL
			13.0
			SILT, CLAYEY, GRAY, WET STRONG HYDROCARBON ODOR
15			15.0
			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 9, 1990
Well Completion Date: JAN. 9, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 12.3'

Boring Diameter: 6.75"
Ground Elevation: 283.83'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

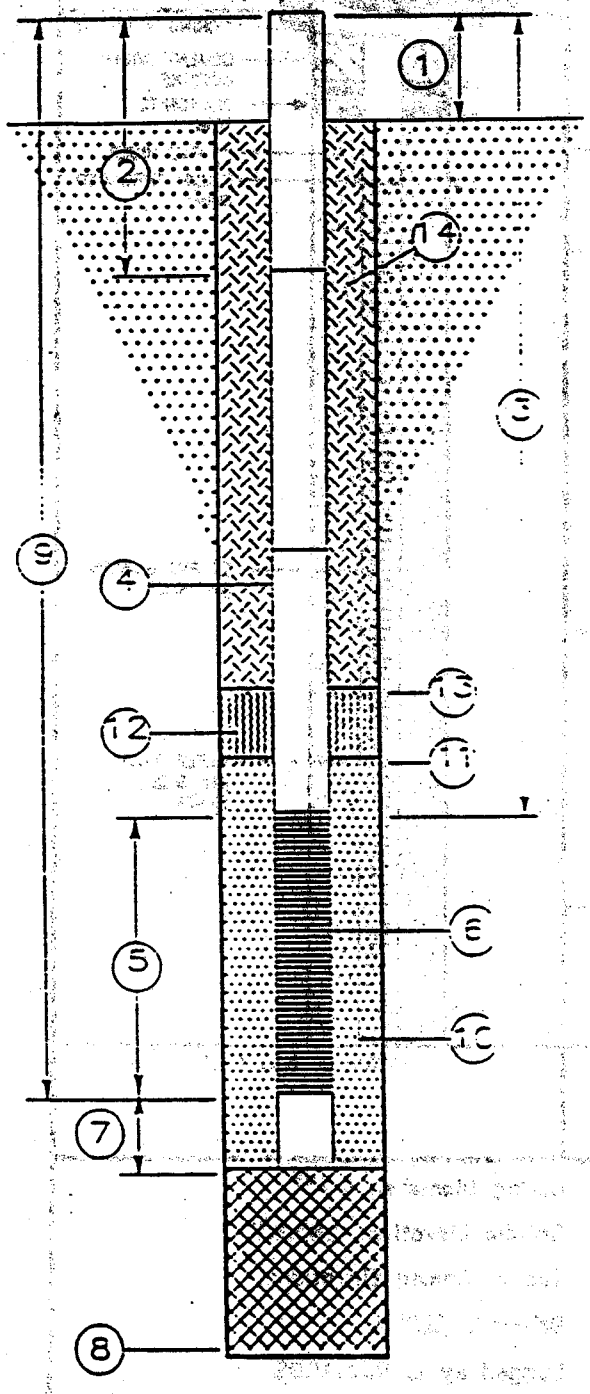
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T304-2

DATE OF INSTALLATION 1-9-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft., 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC "0.02" slot
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inches
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #2S O/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

TABLE 2.3
WELL CONSTRUCTION SUMMARY
NSA MID-SOUTH SITE N-6
MILLINGTON, TENNESSEE

Identification	Installation Date	Northing (State Plane)	Easting (State Plane)	Top of Casing Elevation (feet msl)[a/]	Screened Interval (feet bgs)[b/]	Well Diameter (inches)	Stratigraphic Interval[c/]
Injection Wells							
PES-INJ-1S	19-Jul-00	392214.45	815028.46	293.44	55.0 - 65.0	2.0	Upper-Fluvial
PES-INJ-1D	19-Jul-00	392214.45	815028.46	293.44	75.0 - 85.0	2.0	Lower-Fluvial
PES-INJ-2S	20-Jul-00	392219.89	815042.45	293.20	44.8 - 54.8	2.0	Upper-Fluvial
PES-INJ-2D	20-Jul-00	392219.89	815042.45	293.21	65.0 - 75.0	2.0	Lower-Fluvial
PES-INJ-3S	23-Jul-00	392224.65	815056.27	293.09	55.0 - 65.0	2.0	Upper-Fluvial
PES-INJ-3D	23-Jul-00	392224.65	815056.27	293.12	75.0 - 85.0	2.0	Lower-Fluvial
PES-INJ-4S	23-Jul-00	392230.14	815070.41	293.44	45.4 - 55.4	2.0	Upper-Fluvial
PES-INJ-4D	23-Jul-00	392230.14	815070.41	293.40	65.0 - 75.0	2.0	Lower-Fluvial
Monitoring Wells							
PES-MW-1S	18-Jul-00	392115.58	815062.15	293.37	45.3 - 55.3	2.0	Upper-Fluvial
PES-MW-1D	18-Jul-00	392115.58	815062.15	293.33	70.0 - 80.0	2.0	Lower-Fluvial
PES-MW-2S	1-Aug-00	392229.39	815038.32	293.38	55.0 - 65.0	2.0	Upper-Fluvial
PES-MW-2D	1-Aug-00	392229.39	815038.32	293.32	75.0 - 85.0	2.0	Lower-Fluvial
PES-MW-3S	24-Jul-00	392235.18	815052.39	293.39	45.0 - 55.0	2.0	Upper-Fluvial
PES-MW-3D	24-Jul-00	392235.18	815052.39	293.40	65.0 - 75.0	2.0	Lower-Fluvial
PES-MW-4S	21-Jul-00	392241.32	815036.00	293.34	55.0 - 65.0	2.0	Upper-Fluvial
PES-MW-4D	21-Jul-00	392241.32	815036.00	293.34	75.0 - 85.0	2.0	Lower-Fluvial
PES-MW-5S	20-Jul-00	392250.05	815029.07	293.27	45.4 - 55.4	2.0	Upper-Fluvial
PES-MW-5D	20-Jul-00	392250.05	815029.07	293.27	65.0 - 75.0	2.0	Lower-Fluvial
PES-MW-6S	22-Jul-00	392251.69	815045.97	293.28	55.0 - 65.0	2.0	Upper-Fluvial
PES-MW-6D	22-Jul-00	392251.69	815045.97	293.31	75.0 - 85.0	2.0	Lower-Fluvial
PES-MW-7S	21-Jul-00	392273.12	815033.08	293.10	45.0 - 55.0	2.0	Upper-Fluvial
PES-MW-7D	21-Jul-00	392273.12	815033.08	293.08	65.0 - 75.0	2.0	Lower-Fluvial
PES-MW-8S	22-Jul-00	392321.46	815011.22	292.94	55.0 - 65.0	2.0	Upper-Fluvial
PES-MW-8D	22-Jul-00	392321.46	815011.22	292.94	75.3 - 85.3	2.0	Lower-Fluvial
007G15UF	19-Mar-96	392229.59	814956.53	292.91	40.0 - 50.0	2.0	Upper-Fluvial
007G15LF	19-Mar-96	392221.04	814961.17	293.36	90.0 - 100.0	2.0	Lower-Fluvial

[a/] feet msl indicates elevation in feet mean sea level.

SWMU 8

EnSafe/Allen & Hoshall

Log of Monitoring Well 08MW01S

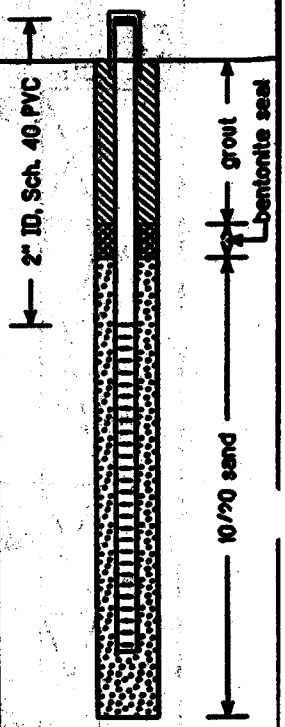
(008G01LS)

Project: NAS Memphis	Location: Millington, TN. SWMU#8 - Cemetery Disposal Area
Project No.: N0094	Surface Elevation: feet msl
Started at on 2-10-95	TOC Elevation: feet msl
Completed at on 2-10-95	Depth to Groundwater: feet Measured:
Drilling Method: Rotasonic	Groundwater Elevation: feet msl
Drilling Company: North Star Drilling	Total Depth: 18.0 (below grade) feet
Geologist: William Parks	Well Screen: 8 to 18 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
5			1	50	BG		ML	Silt, yellowish brown, mottled yellowish gray; contains small iron- manganese nodules, moist from 12'-15'.
10			2	110	BG			
15			3	70	BG			Silt, moderate yellowish brown; contains some gravels from 19'-20'.
20			4	140	BG		GM	End of boring at 20'. Monitoring well closed in place on 3/07/95 due to the absence of groundwater. Well was closed by drilling out the well and grouting up the remaining borehole.
25								
30								
35								
40								

ELEV. (ft-msl)

WELL DIAGRAM



EnSafe/Allen & Hoshall

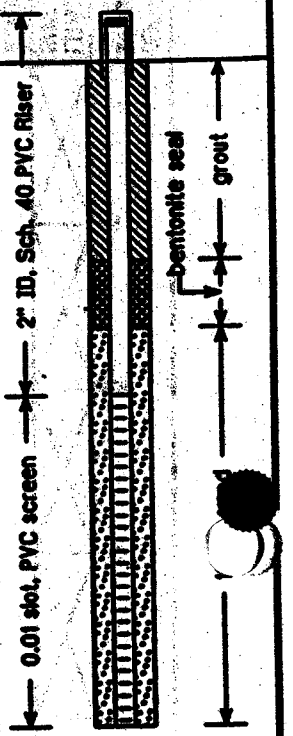
Log of Monitoring Well 08MW02S
(008G02LS)

Project: NAS Memphis
Project No.: N0094
Started at on 2-01-95
Completed at on 2-01-95
Drilling Method: Rotasonic
Drilling Company: North Star Drilling
Geologist: Willam Parks and Jack Carmichael

Location: Millington, TN SWMU#8-Cemetery Disposal Area
Surface Elevation: feet msl
TOC Elevation: feet msl
Depth to Groundwater: feet Measured:
Groundwater Elevation: feet msl
Total Depth: 20.0 feet
Well Screen: 10 to 20 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Silt, yellowish brown streaked w/ yellowish gray, moist at 14'.	
5			1	75	BG				
10			2	100	BG		ML		
15			3	100	BG			Silt, yellowish brown to moderate brown. (17'-22')	
20			4	100	BG			End of boring at 20'.	
25									
30									
35									
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Log of Monitoring Well 08MW03S
(008603LS)

Project: NAS Memphis	Location: Millington, TN. SWMU#8 - Cemetery Disposal Area
Project No.: N0094	Surface Elevation: feet msl
Started at on 2-01-95	TOC Elevation: feet msl
Completed at on 2-01-95	Depth to Groundwater: feet Measured:
Drilling Method: Rotasonic	Groundwater Elevation: feet msl
Drilling Company: North Star Drilling	Total Depth: 20.0 feet
Geologist: Hilliam Parks and Jack Carmichael	Well Screen: 10 to 20 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0			1	100	BG			Silt, yellowish brown streaked w/ yellowish gray. Moist at 12'.		2" ID, Sch. 40 PVC Riser; 0.01 slot, PVC screen; grout; Bentonite seal; 10/20 sand
5			2	125	BG					
			3	62.5	BG					
10							ML			
			4	100	BG					
15			5	100	BG			Silt, yellowish brown to moderate brown. (18'-22')		
20			6	100	BG			End of boring at 20'.		
25										
30										
35										
40										

EnSafe/Allen & Hoshall

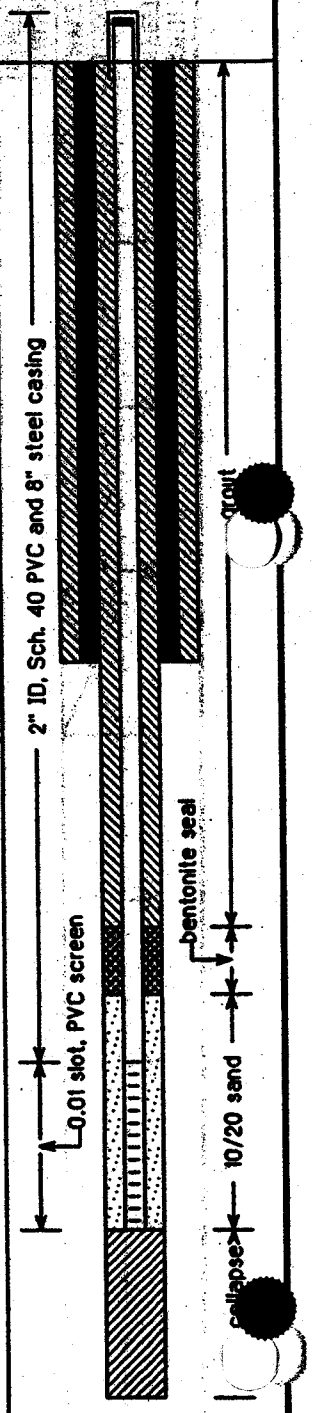
Monitoring Well 08MW01F

Project: NAS Memphis
Project No.: N0094
Started at 1415 on 1-31-95
Completed at 1515 on 1-31-95
Drilling Method: Rotasonic
Drilling Company: North Star Drilling
Geologist: William Parks and Jack Carmichael

Location: Millington, TN SWMU#8-Cemetery Disposal Area
Surface Elevation: 322.14 feet msl
TOC Elevation: 324.828 feet msl
Depth to Groundwater: 21.61 feet Measured: 3/31/95
Groundwater Elevation: 303.22 feet msl
Total Depth: 50.0 feet
Well Screen: 30 to 35 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	50	BG			Silt, yellowish brown, mottled yellowish gray; contains small iron- manganese nodules, moist from 12'-15'.	
10			2	110	BG		ML		
15			3	70	BG			Silt, moderate yellowish brown; contains some gravels from 19'-20'.	
20			4	140	BG				302.1
								Sand, silty with gravel; moderate reddish brown to dark yellowish orange, wet.	
25			5	22	BG				
30			6	150	BG		GM	Same as above with gravels increasing in size and slightly less silt and clay.	
35			7	100	BG				
40			8	110	BG				

WELL DIAGRAM



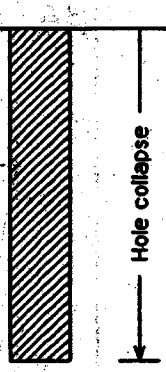
EnSafe/Allen & Hoshall

Monitoring Well 08MW01F

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#8-Cemetery Disposal Area*
Project No.: *N0094*	Surface Elevation: *322.14 feet msl*
Started at *1415 on 1-31-95*	TOC Elevation: *324.828 feet msl*
Completed at *1515 on 1-31-95*	Depth to Groundwater: *21.61 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *303.22 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *50.0 feet*
Geologist: *William Parks and Jack Carmichael*	Well Screen: *30 to 35 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							GM		281.1
							CL	Clay, silty, soft, mottled very pale orange to pale yellowish orange.	278.1
45							GM	Sand, laminated, mottled very pale orange to medium reddish orange. At 48.5', change to dusky yellowish orange fine sand with silt.	
50			9	100	BG			End of boring at 50'.	272.1
								BG = Background (1.1 ppm)	
55									
60									
65									
70									
75									
80									

WELL DIAGRAM



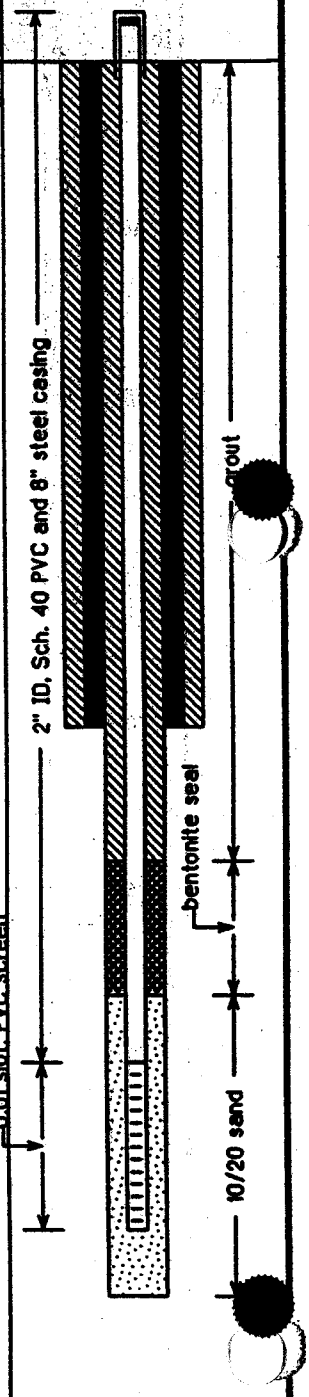
EnSafe/Allen & Hoshall

Monitoring Well 08MW02F

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#8-Cemetery Disposal Area*
Project No.: *N0094*	Surface Elevation: *325.21 feet msl*
Started at *0845 on 2-01-95*	TOC Elevation: *327.56 feet msl*
Completed at *0930 on 2-01-95*	Depth to Groundwater: *22.65 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *304.91 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *37.0 feet*
Geologist: *William Parks and Jack Carmichael*	Well Screen: *30 to 35 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5	1	75	BG	ML	Silt, yellowish brown streaked w/ yellowish gray, moist at 14'.	
10						
15	2	100	BG			
20	3	100	BG		Silt, yellowish brown to moderate brown. (17'-22')	
25	4	100	BG			303.2
30	5	87.5	BG	GM	Sand, silty with gravel; reddish brown to reddish orange, fine to coarse grained, chert and quartz gravels. (22'-35')	
35	6	100	BG			290.2
40	7	110	BG	SP	Sand, fine, silty with clay and ferruginous nodules or chips, laminated yellowish gray, olive gray, and dark yellowish orange.	288.2
					End of boring at 37'.	
					BG = Background (1.1 ppm)	

WELL DIAGRAM

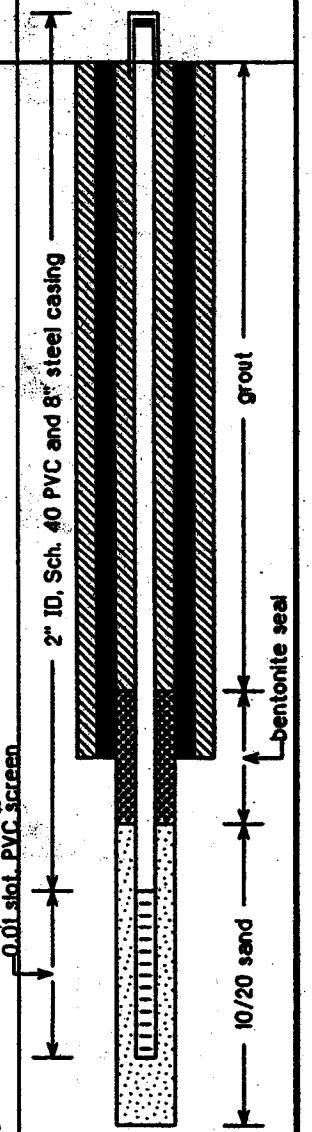


EnSafe/Allen & Hoshall

Monitoring Well 08MW03F

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#8 – Cemetery Disposal Area*
Project No.: *N0094*	Surface Elevation: *325.32 feet msl*
Started at *1015 on 2-01-95*	TOC Elevation: *327.46 feet msl*
Completed at *1120 on 2-01-95*	Depth to Groundwater: *22.89 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *304.57 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *32.0 feet*
Geologist: *William Parks and Jack Carmichael*	Well Screen: *25 to 30 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	1	100	BG	ML	Silt, yellowish brown streaked w/ yellowish gray. Moist at 12'.	
5	2	125	BG			
	3	62.5	BG			
10						
	4	100	BG			
15						
	5	100	BG		Silt, yellowish brown to moderate brown. (16'–22')	
20	6	100	BG			
						302.8
	7	100	BG	GM	Sand, silty with gravels at 24'; yellowish brown, very silty.	
25					Sand, fine to coarse, silty with clay, fine, gravel increasing towards the bottom, dark yellowish orange, wet. (25'–30')	
30	8	100	BG		Same as above except there is an increase in clay content with partial cementation. (30'–32')	
	9	100	BG			293.3
					End of boring at 32'.	
35						
					BG = Background (1.1 ppm)	
40						

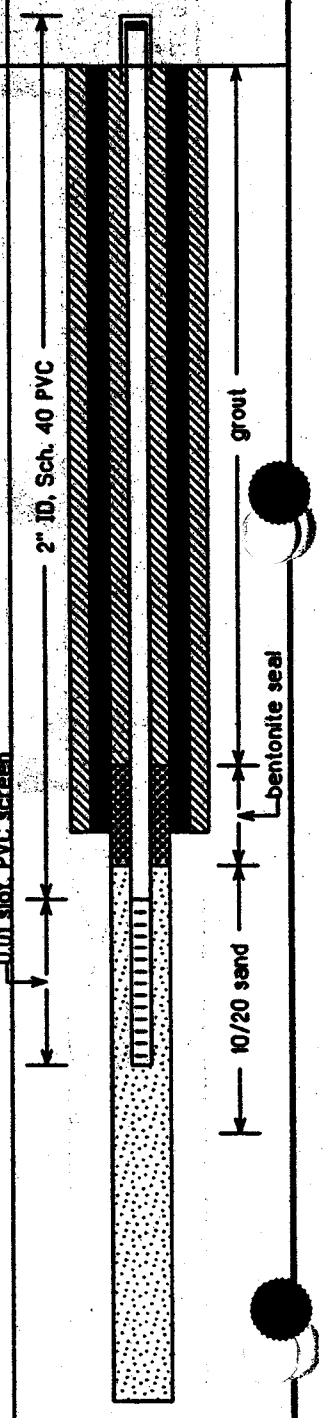


EnSafe/Allen & Hoshall

Monitoring Well 08MW04F

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#8 – Cemetery Disposal Area*
Project No.: *N0094*	Surface Elevation: *324.66 feet msl*
Started at *1315 on 2-01-95*	TOC Elevation: *327.37 feet msl*
Completed at *1430 on 2-01-95*	Depth to Groundwater: *22.65 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *304.72 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *40.0 feet*
Geologist: *William Parks and Jack Carmichael*	Well Screen: *25 to 30 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0	1	100	BG	ML	Silt, yellowish brown streaked w/ yellowish gray. Moist at 12'.	
	2	100	BG			
5	3	100	BG			
	4	100	BG			
10	5	125	BG			
15	6	100	BG		Silt, yellowish brown to yellowish gray, mottled.	
20	7	100	4.5		Silt, moderate brown.	
	8	125	BG			
25				GM	Sand, moderate brown to reddish brown, very silty, contains scattered gravel.	299.7
	9	100	2.5		Sand and gravel, reddish brown to yellowish brown, chert and quartz gravels up to 3" in longest dimension. (27'–29.5')	
30	10	100	BG	ML	Silt, clayey, with iron stones (flat, not gravel), dark yellowish orange, moist. (29.5'–34')	295.2
35	11	100	BG	SP	Sand, very fine with silt and clay, mottled yellowish gray to dark yellowish orange, moist. (34'–40')	290.7
40	12	90	BG			284.7



(008GM10LS)

LITHOLOGIC LOG FOR MONITOR WELL GM-10

Description	Depth (ft)	Thickness (ft)
Clay, pliable, medium pack, brown.....	0 - 10.0	10.0
Clay, pliable, loose pack, brown.....	10.0 - 20.0	10.0
Clay, pliable, loose pack, gravelly, brown.....	20.0 - 25.0	5.0
Sand, medium grain, clayey, gravelly, orange.....	25.0 - 30.0	5.0
Sand, medium grain, clayey, orange.....	30.0 - 33.0	3.0
Clay, firm, dense pack, orange-yellow.....	33.0 - 40.0	7.0
Clay, firm, dense pack, slightly gravelly, gray.....	40.0 - 43.0	3.0
Clay, sandy, fine-grain, dense pack, gray.	43.0 - 52.0	9.0
Clay, gravelly, medium pack, gray.....	52.0 - 53.0	1.0

GERAGHTY & MILLER, INC.

WELL LOG

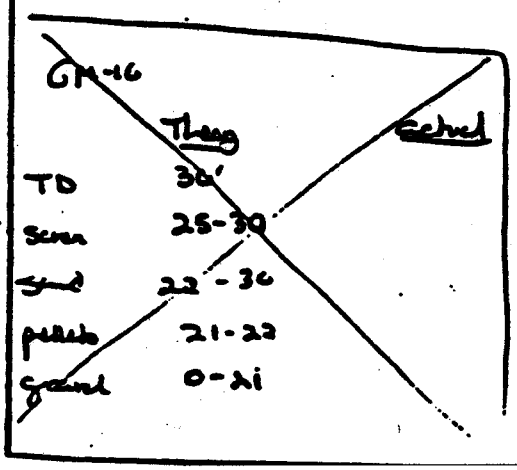
PROJECT: Navy - Memphis DATE: 6-13-85 SHEET: 1 OF

LOCATION: Millington's cemetery site DRILLING CONTRACTOR: Amer. Drill.

WELL NUMBER: GM-16 (boring) DRILLING METHOD: solid-stem auger

SAMPLE DESCRIBED BY: BSS/DG SAMPLING METHOD: sample & 22 blows

SAMPLE DESCRIPTION	blow/ft	DEPTH INTERVAL (FEET)	THICK (FE
Clay, pliable, medium peak, brown		0 - 10	
SAME AS ABOVE, BUT LOOSE AND WET AT 15 FT.		10 - 15	
"		15-20	
" . BUT W/ LARGE GRAVEL. [WATER-BEARING FORMATION.]		20-25	
Sand, clayey, medium-grained, orange; gravel. Very wet		25-30	
Sand, medium-grained, clayey, orange.		30- ~~35~~ 33	
Clay, firm, dense peak, orange-yellow.		33 - 40'	
Clay, fine-grained gravel, dense, light gray		40 - 43	
Clay, sandy, fine-sand, dense, dark gray		43- 45.	
Same as above		45 - ~~53~~ 52	
Clay, gravelly, medium peak, gray		52- 53	



(008GM11LS)

LITHOLOGIC LOG FOR MONITOR WELL GM-11

Description	Depth (ft)	Thickness (ft)
Clay, pliable, medium pack, brown.....	0 - 12.0	12.0
Clay, pliable, loose pack, brown.....	12.0 - 30.0	18.0

LITHOLOGIC LOG FOR MONITOR WELL GM-12

(008GM12LS)

Description	Depth (ft)	Thickness (ft)
Clay, pliable, medium pack, brown.....	0 - 17.0	17.0
Cl[illegible] pack, sli[illegible]	[illegible]	5.0
Clay, pliable, medium pack, very gravelly.	22.0 - 24.0	2.0
Clay, sandy, medium grain, gravelly, orange.....	24.0 - 28.0	4.0

GERAGHTY & MILLER, INC.

WELL LOG

PROJECT: NAS - Memphis DATE: 6-14-85 SHEET: 1 OF

LOCATION: Millington, TN - cemetery site DRILLING CONTRACTOR: Aware Drill. Co.

WELL NUMBER: GM-11 DRILLING METHOD: solid-stem auger

SAMPLE DESCRIBED BY: BJS SAMPLING METHOD: sample all Rights

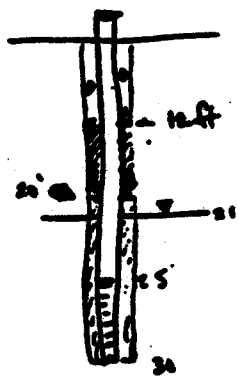
SAMPLE DESCRIPTION	BLOW/FT	DEPTH INTERVAL (FEET)	THICKN (FEE
Clay, pliable, medium yeak, brown		0-12	
SAME AS ABOVE, BUT LOOSE AND WET @ 10 FT		12-17	
" W.L @ 21.5 FT		17-22	
"		22-27.5	
"			
"		27.5-30'	

Theoretical

Screen 25'-30'
Sand 20'-20'
Bentonite 20'-19'
grout 19'-0'

Actual

Screen 25'-30
Sand 30'-12'
Bentonite 12'-11'
grout 11'-0'



GERAGHTY & MILLER, INC.

WELL LOG

PROJECT: NAS - Memphis DATE: 6-13-85 SHEET: 1 OF _____

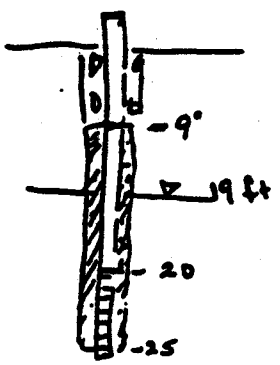
LOCATION: cemetery site DRILLING CONTRACTOR: Amer. Testing (Co

WELL NUMBER: GM - 12 DRILLING METHOD: solid stem auger

SAMPLE DESCRIBED BY: BSS/WDF SAMPLING METHOD: sample off flights

SAMPLE DESCRIPTION SHELBY TUBE	BLOWS/FT	DEPTH INTERVAL (FEET)	THICK (FE
Clay, pliable, medium packed, brown (Moist @ 7 ft)		0 - 7	
SAME AS ABOVE		7 - 12	
[redacted]		12 - 17	
" ; gravel, very wet		17 - 22	
" ; lot of gravel, large stones.		22 - 24	
(Two shelby tubes; no recovery)			
~~Clay~~, Sandy, wet. gravel / clayey; gravel w/ coal at 19 ft.		24 - 28	
		T.D. = 28 ft	

Theoretical		Actual
Screen	—	25' - 20
sand	—	25' - 9'
bentonite	—	9' - 7'
grout	—	grout 7' - 0'



SWMU 9

EnSafe/Allen & Hoshall

Monitoring Well 009G01DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #9 (Sewage Lagoons)*
Project No.: *0106-2211*	Surface Elevation: *269.69 feet msl*
Started at *1230 on 2-15-96*	TOC Elevation: *271.62 feet msl*
Completed at *1500 on 2-15-96*	Depth to Groundwater: *19.87 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" inner core barrel/6" OD casing*	Groundwater Elevation: *251.75 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *66 feet*
Geologist: *J.A. Kingsbury*	Well Screen: *46 to 56 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					BG			(0-39') Upper Alluvium (see descriptions below).	
			1	50	BG		ML CL	(0-6') Silt and clay, brown to dark yellowish-brown in color with some organic material.	
5					BG				
					BG				263.7
					BG			(6-39') Silt (see descriptions below).	
					BG			(6-16) Medium brown in color, with some iron, organic material and dark orangish-yellow staining, moist.	
10			2	40	BG				
					BG				
15					BG				
					BG			Shelby Tube sample collected from 16-18' for geotechnical analysis. (18-24') Mottled yellowish-brown and yellowish-gray in color with dark orangish-yellow to reddish-brown iron staining.	
					BG				
20			3	70	BG				
					BG		ML		
25					BG			(24-26') Light olive gray to greenish-gray in color. Wet.	
					BG			(26-29') Greenish-gray in color.	
30					BG			(29-39') Sandy silt with common snail shells. Greenish-gray to olive gray in color between 29' and 34'.	
			4	90	BG				
					BG			Brownish-gray in color between 34' and 39'. Some snail shells present.	
35					BG				
					BG				
					BG				230.7
40							SP	(39-56') Deeper Alluvium (see descriptions below).	

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

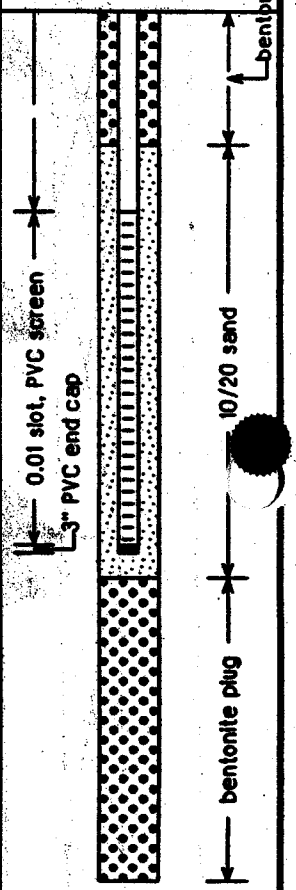
EnSafe/Allen & Hoshall

Monitoring Well 009G01DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #9 (Sewage Lagoons)*
Project No.: *0106-2211*	Surface Elevation: *269.69 feet msl*
Started at *1230 on 2-15-96*	TOC Elevation: *271.62 feet msl*
Completed at *1500 on 2-15-96*	Depth to Groundwater: *19.87 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *251.75 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *66 feet*
Geologist: *J.A. Kingsbury*	Well Screen: *46 to 56 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			5	90	BG		SP	(39-42') Coarse-grained sand, light olive gray in color.	227.7
					BG		GW		227.2
							SP	(42-42.5') Gravel lense.	226.7
							ML	(42.5-43') Coarse-grained sand.	
					BG			(43-45') Silt, very light gray to moderate gray in color.	224.7
							SW		
50					BG			(45-48') Sand with some gravel, yellowish-gray in color.	221.7
			6	70	BG		SW GW	(48-56') Sand and gravel. Gravel is up to 3" in longest dimension. Dusky yellow to yellowish-gray in color.	
55					BG				
					BG			Cockfield Formation: Fine-grained sand, light olive gray, finely lignitic and micaceous.	213.7
60			7	90	BG		SP		
					BG				
65					BG				
								Terminated soil boring at 66'.	203.7
70									
75									
80									

WELL DIAGRAM



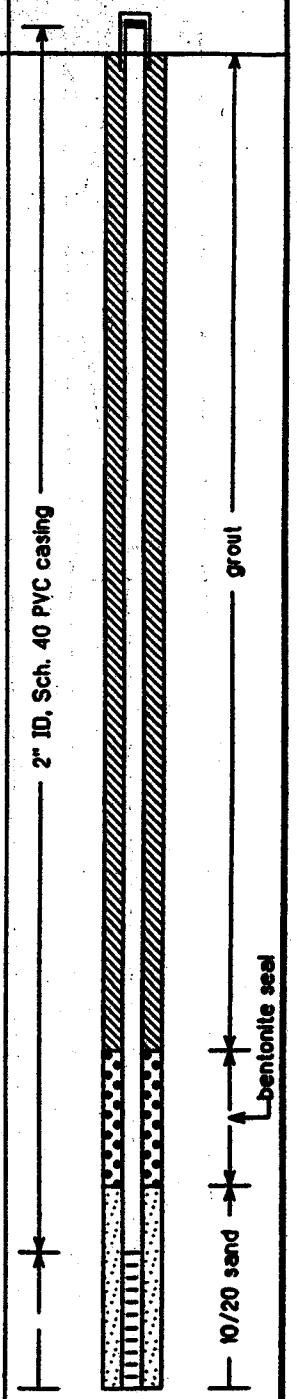
EnSafe/Allen & Hoshall

Monitoring Well 009G02DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #9 (Sewage Lagoons)*
Project No.: *0106-22III*	Surface Elevation: *268.85 feet msl*
Started at *0930 on 2-16-96*	TOC Elevation: *270.80 feet msl*
Completed at *1100 on 2-16-96*	Depth to Groundwater: *11.65 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *259.15 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *56 feet*
Geologist: *J.A. Kingsbury*	Well Screen: *36 to 46 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					BG			(0-40') Upper Alluvium (see descriptions below).	
			1	83	BG			(0-4') Fill material. Silt, moderate brown in color with some iron-staining. Wood fragments that appear to be burnt.	
5					BG			(4-40') Silt (see descriptions below).	
					BG			(4-6') Light olive gray to light brown in color. Dry.	
					BG			Clayey silt. Moderate yellowish-brown to light gray in color, mottled with some dark orangish-yellow-colored material. Moist. Organic material present from 6' to 18'.	
10			2	80	BG				
					BG				
15					BG			Increased iron staining from 15' to 16'.	
					BG				
					BG			Silt, greenish-gray to olive gray in color from 18' to 28'. Wet, with snail shells throughout.	
20			3	70	BG		ML		
					BG				
25					BG				
					BG			Color change to brownish-gray. Thin sand lenses, occasionally as thick as 6", are present from 28' to 40'.	
30			4	90	BG				
					BG				
35					BG			Shelby Tube collected from 36-38'.	
					BG				
40					BG		SP		228.9

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 009G02DA

Project: NSA Memphis	Location: Millington, TN. SWMU #9 (Sewage Lagoons)
Project No.: 0106-2211	Surface Elevation: 268.85 feet msl
Started at 0930 on 2-16-96	TOC Elevation: 270.80 feet msl
Completed at 1100 on 2-16-96	Depth to Groundwater: 11.65 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" inner core barrel/6" OD casing	Groundwater Elevation: 259.15 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 56 feet
Geologist: J.A. Kingsbury	Well Screen: 36 to 46 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
									228.9	
			5	100	BG			(40-46.5') Deeper Alluvium (see descriptions below).		
					BG		SP	(40-46') Coarse-grained sand, yellowish-gray to dusky yellow. Some gravel (< 1" in longest dimension) is present from 45' to 46.5.		
45					BG					
									222.9	
					BG		SM	(46-46.5') Silt and sand, olive-gray in color.	222.4	
					BG		CL	Cockfield Formation: Clay, dark brown in color, hard. Fine-grained sand streaks are present from 46.5' to 56'.		
50			6	110	BG					
					BG				218.9	
					BG		SC	The percentage of sand increases to greater than 50 percent from 52' to 56'.		
55					BG					
									212.9	
								Soil boring terminated at 56'.		
60										
65										
70										
75										
80										

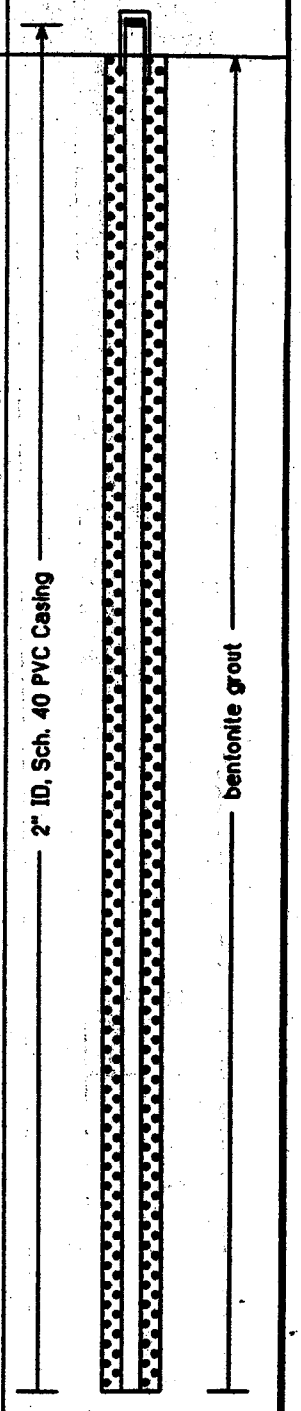
EnSafe/Allen & Hoshall

Monitoring Well 009G03DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #9 (Sewage Lagoons)*
Project No.: *0106-08420*	Surface Elevation: *267.18 feet msl*
Started at *1300 on 1-31-96*	TOC Elevation: *269.05 feet msl*
Completed at *1200 on 2-1-96*	Depth to Groundwater: *15.79 feet* Measured: *4/8/96*
Drilling Method: *Hollow-Stem Auger/3" diameter split spoon*	Groundwater Elevation: *253.26 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *62 feet*
Geologist: *J.A. Kingsbury*	Well Screen: *45 to 55 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	1	75	BG	ML	(0-34') Upper Alluvium (see descriptions below).	
	2	92	BG		(0-2') Clayey silt. Light brown to light yellowish-brown and brownish- orange in color.	
5	3	67	BG		(2-4') Silt, light brown in color. Some debris with burnt wood are also present. Appears to be fill.	263.2
	4	83	BG	ML CL	(4-6') Silt and clay, light gray to moderate gray color with black plant debris. Organic odor.	
	5	96	BG		From 6' to 10', silt and clay is light gray to greenish-gray in color with moderate brown specks of material. Slightly moist from 6' to 8', and moist from 8' to 10'.	257.2
10	6	79	BG			
	7	71	BG	ML	(10-14') Silt, greenish-gray to light gray/brown color. Moist.	
	8	92	BG		(14-34') Silt and clay, greenish-gray in color. Moist. Prevalent iron staining from 16' to 20'.	253.2
15	9	71	BG			
	10	100	BG		Abundant organic debris from 18' to 19'.	
20	11	71	BG		Greenish-gray to olive gray in color from 20' to 22'.	
	12	83	BG	ML CL	Light olive gray to light greenish-gray from 22' to 34'. Moist. Some organic specks of material present.	
25	13	67	BG			
	14	83	BG			
	15	100	BG			
30	16	92	BG			
	17	100	BG		With minor amount of sand near 34'.	
35	18	83	BG	SW	Contact with Deeper Alluvium deposits estimated at 34'.	233.2

WELL DIAGRAM



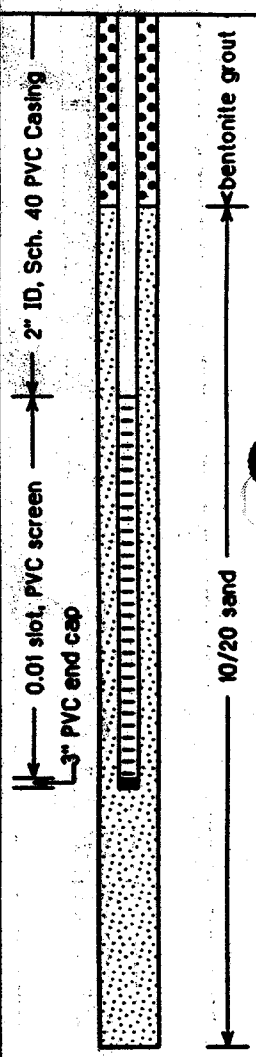
EnSafe/Allen & Hoshall

Monitoring Well 009G03DA

Project: NSA Memphis	Location: Millington, TN. SWMU #9 (Sewage Lagoons)
Project No.: 0106-08420	Surface Elevation: 267.18 feet msl
Started at 1300 on 1-31-96	TOC Elevation: 269.05 feet msl
Completed at 1200 on 2-1-96	Depth to Groundwater: 15.79 feet Measured: 4/8/96
Drilling Method: Hollow-Stem Auger/3" diameter split spoon	Groundwater Elevation: 253.26 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 62 feet
Geologist: J.A. Kingsbury	Well Screen: 45 to 55 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SW	(34-37') Sand, fine to coarse-grained, medium olive gray in color. Some silt lenses present.	
			19	100	BG				230.2
							ML	(37-38') Silt, light olive gray.	229.2
			20	100	BG		SW	(38-39.5') Sand.	
									227.7
40							ML	(39.5-40') Silt.	227.2
			21	100	BG		SW	(40-42') Sand, fine to coarse-grained, light olive gray in color at 40' changing to yellowish brown/gray near 42'.	
			22	100	BG		SW/GW		225.2
			23	92	BG		SP	(42-43') Sand and gravel, light olive gray to yellowish-gray.	224.2
45								(43-45') Coarse-grained sand, yellowish-gray.	222.2
			24	100	BG		SC/GC	(45-49') Sand and gravel in a clay matrix. Yellow gravel, light gray clay.	
			25	100	BG				
								Sand and gravel with some clay, light olive gray to yellowish-gray in color.	218.2
50			26	100	BG		SW/GW	(49-53') Sand and gravel. Yellowish-brown to reddish-brown.	
			27	100	BG				
									214.2
			28	0	BG			No sample recovery from 53' to 60'.	
55									
60									207.2
			29	100	BG		SP	Cockfield Formation: very fine-grained sand, light gray in color, finely lignitic.	
							ML/CL		206.2
								Silt and clay, light brown to light gray.	205.2
								Terminated soil boring at 62'.	
65									
70									

WELL DIAGRAM



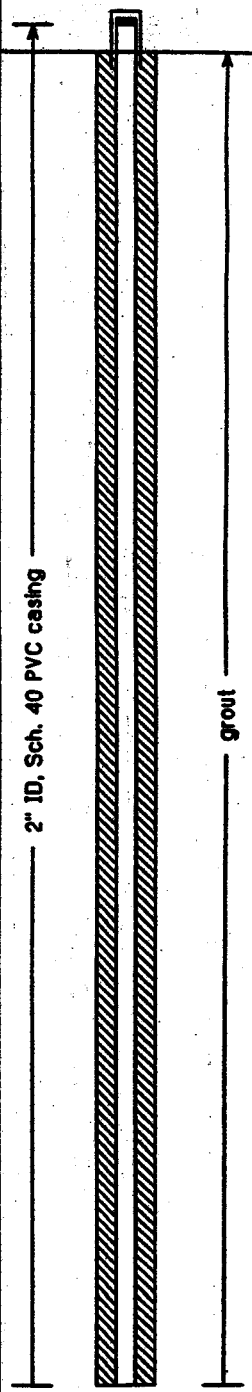
EnSafe/Allen & Hoshall

Monitoring Well 009G04DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #9 (Sewage Lagoons)*
Project No.: *0106-08420*	Surface Elevation: *268.15 feet msl*
Started at *0745 on 2-15-96*	TOC Elevation: *270.09 feet msl*
Completed at *1000 on 2-15-96*	Depth to Groundwater: *19.89 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *250.20 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *76 feet*
Geologist: *J.A. Kingsbury*	Well Screen: *62 to 72 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			BG	ML	(0-41') Upper Alluvium (see descriptions below). (0-6') Clayey silt, brown in color. Appears to be fill material used during levee construction.	
	1	50	BG			262.1
10	2	85	BG	CL	Slightly silty clay, brownish-gray in color. Very stiff. Increasing silt fraction. Mottling with olive gray-colored silt. Dark greenish-yellow staining is present with iron/organic specks.	
15			BG			252.1
20	3	100	BG	ML	(16-42') Silt (see descriptions below). (16-22') Yellowish-brown to yellowish-gray in color with dark orangish-yellow staining. Moist to wet.	
25			BG		(22-26') Color change to predominantly gray. Wet.	
30	4	120	BG		(26-34') Olive gray to greenish-gray in color, with common snail shells. Wet.	
35			BG		Increasing clay fraction from 34' to 36'. Brownish-gray in color. (36-38') Brownish-gray in color, dry.	
40			BG		(38-42') Contains some scattered gravel and a few sand lenses. Contact with Deeper Alluvium deposits (41-72') estimated at 4'.	

WELL DIAGRAM



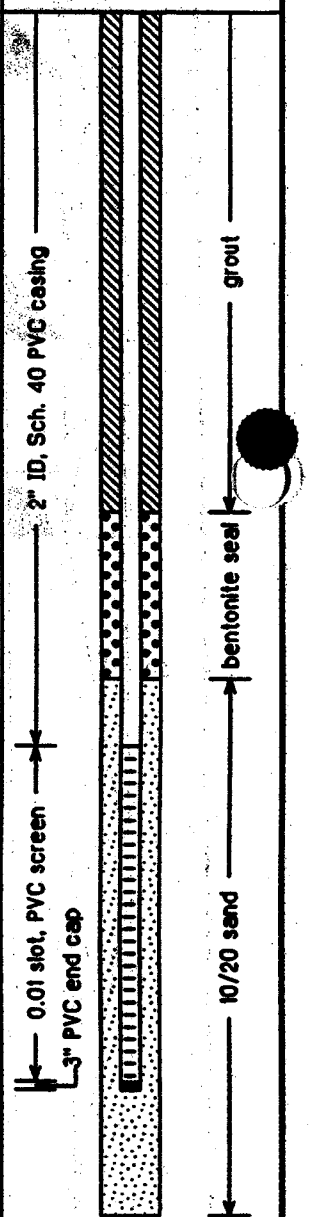
EnSafe/Allen & Hoshall

Monitoring Well 009G04DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU-#9 (Sewage Lagoons)*
Project No.: *0106-08420*	Surface Elevation: *268.15 feet msl*
Started at *0745 on 2-15-96*	TOC Elevation: *270.09 feet msl*
Completed at *1000 on 2-15-96*	Depth to Groundwater: *19.89 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *250.20 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *76 feet*
Geologist: *J.A. Kingsbury*	Well Screen: *62 to 72 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			5	60	BG		ML		228.1
					BG			(42-55') Sand and gravel; gravel is up to 2" in longest dimension. Yellowish-gray to light olive gray in color.	
45					BG				
					BG			Minor clay fraction in sand and gravel from 46' to 52'. Yellowish- gray to very light gray in color.	
					BG		SW GW		
50			6	90	BG				
					BG			Sand and gravel, yellowish-gray to light yellowish-brown from 52' to 56'.	
55					BG		SM GC		213.1
					BG			Sand and gravel with intersitial silt and clay. Dark orangish-yellow to reddish-brown from 55' to 56'.	212.1
					BG			Sand and gravel with minor clay, gravel is up to 3" in longest dimension, dark yellowish-brown to reddish-brown from 56' to 72'.	
60			7	90	BG				
					BG		SW GW		
65					BG				
					BG				
70			8	80	BG				
					BG				196.1
					BG		SP	Cockfield Formation: Fine to medium-grained sand, very light gray to very light olive gray, micaceous and finely lignitic.	
75					BG				192.1
								Soil boring terminated at 76'.	
80									

WELL DIAGRAM



SWMU 14

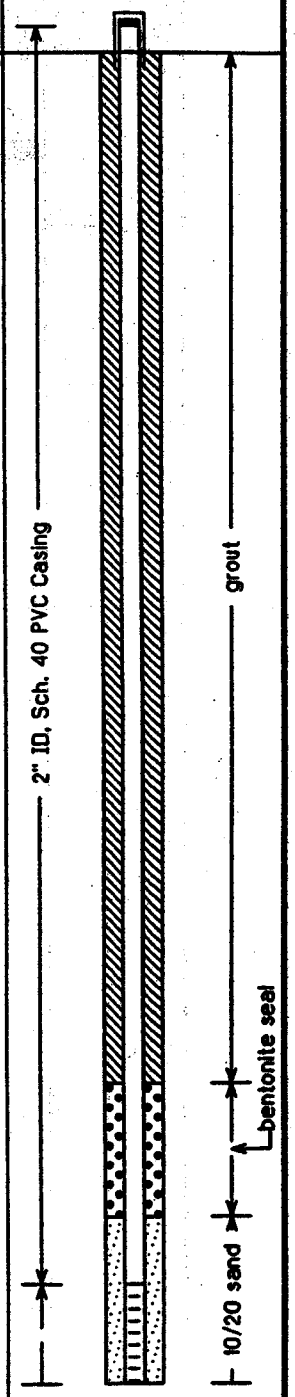
EnSafe/Allen & Hoshall

Monitoring Well 014G01LF

Project: NSA Memphis	Location: Millington, TN. SWMU #14 (S-140/7th Ave. Ditch)
Project No.: 0106-08420	Surface Elevation: 267.24 feet msl
Started at 1320 on 1-29-96	TOC Elevation: 269.11 feet msl
Completed at 1530 on 1-29-96	Depth to Groundwater: 7.46 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" inner core barrel/6" OD casing	Groundwater Elevation: 261.65 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 51 feet
Geologist: D. Ladd, W. Parks	Well Screen: 37 to 47 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
					BG		OL	(0-1') Soil and gravel.	266.2
							GW		
					BG		ML	(1-3.5') Silt and clay (see descriptions below).	
			1	100	BG			(1-2') Clayey silt. Dark yellowish-brown to dusky yellowish-brown in color.	263.7
5					5		CL	(2-3.5') Silty clay. Dark yellowish-brown to dusky yellowish-brown in color.	
					4			(3.5-7') Clay, silty, pale yellowish-brown, mottled with light olive gray-colored material.	260.2
			2	83	3			No description available; collected a Shelby tube sample from 7' to 10' for geotechnical analysis.	257.2
10					BG			(10-16') Clay and silt (see descriptions below).	
			3	155	BG		CL	(10-15.5') Clay, silty, moderate yellowish-brown in color, mottled with light olive gray-colored silt. Iron-staining and iron-manganese nodules present near 15'.	
15					4				
					BG			(15.5-16') Clayey silt, moderate yellowish-brown in color mottled with light olive gray to greenish-gray. Iron-manganese nodules and iron staining present.	251.2
					BG				
					BG				
20			4	97	BG		ML	(16-26) Clayey silt, greenish-gray mottled with moderate yellowish-brown material near 16'. Iron staining increases with depth.	
					BG				
					BG				
25					BG			Iron-manganese nodules present near 26'.	
					BG			(27-32') Silt, clayey, moderate yellowish-brown in color, mottled with light olive gray to very light gray-colored material, with some hard siliceous clayey material, contains a large siliceous clay concretion at 27'.	240.2
					BG				
30			5	135	BG		ML		
					BG			(32-35') Clayey silt, moderate yellowish-brown mottled slightly with light olive gray to very light gray-colored material.	235.2
					BG			(35-47') Fluvial Deposits (see descriptions below).	232.2
35					BG		ML SC		
			6	113	BG			(35-40') Silt, clay, and sand, with some scattered gravel, dusky yellow color mottled with light olive gray to very light gray material, moist.	
40									227.2

WELL DIAGRAM



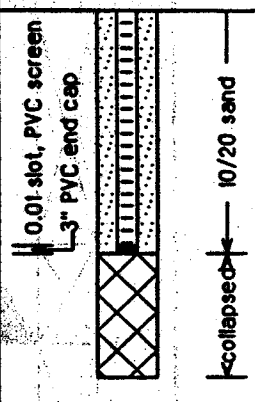
EnSafe/Allen & Hoshall

Monitoring Well 014G01LF

Project: NSA Memphis	Location: Millington, TN. SWMU #14. (S-140/7th Ave. Ditch)
Project No.: 0106-08420	Surface Elevation: 267.24 feet msl
Started at 1320 on 1-29-96	TOC Elevation: 269.11 feet msl
Completed at 1530 on 1-29-96	Depth to Groundwater: 7.46 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" inner core barrel/6" OD casing	Groundwater Elevation: 261.65 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 51 feet
Geologist: D. Ladd, W. Parks	Well Screen: 37 to 47 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			7	93				No description available; collected a Shelby tube sample from 40' to 43' for geotechnical analysis.	227.2
			8	125	BG		SM GW	(43-43.5') Silt, sand, and gravel (up to 1" in longesty dimension), very light gray, wet.	224.2 / 223.7
45					BG		SW GW	(43.5-47') Sand and gravel. Sand is fine to very coarse-grained, and gravel (up to 1.5" in longest dimension) from 44' to 45'. Moderate yellowish-brown to light gray, wet. Longest dimension of gravel increases to up to 3.5" at 47'.	220.2
					BG				
			9	142	BG		SP CL		
50					BG			(47-51') Cockfield Formation: Very fine-grained sand, silt, and clay. Dusky yellowish-brown mottled with light olive gray near 47'.	216.2
								Soil boring terminated at 51'.	
55									
60									
65									
70									
75									
80									

WELL DIAGRAM



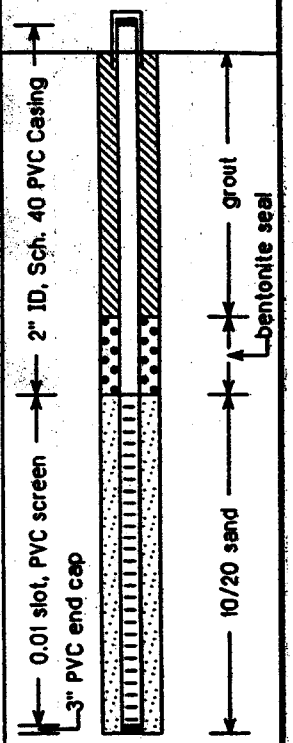
EnSafe/Allen & Hoshall

Monitoring Well 014G01LS

Project: NSA Memphis	Location: Millington, TN. SWMU #14 (S-140/7th Ave. Ditch)
Project No.: 0106-08420	Surface Elevation: 267.37 feet msl
Started at 1030 on 1-29-96	TOC Elevation: 269.17 feet msl
Completed at 1245 on 1-29-96	Depth to Groundwater: 6.79 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" inner core barrel/6" OD casing	Groundwater Elevation: 262.38 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 20.59 feet
Geologist: D. Ladd, W. Parks	Well Screen: 10.34 to 20.34 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1				GP GW	(0-1') Soil and gravel.	266.4
							ML	(1-3.5') Silt and clay (see descriptions below).	
								(1-2') Clayey silt. Dark yellowish-brown to dusky yellowish-brown in in color.	263.9
5			2				CL	(2-3.5') Silty clay. Dark yellowish-brown to dusky yellowish-brown in in color.	
								(3.5-7') Clay, silty, pale yellowish-brown, mottled with light olive gray-colored material.	260.4
			3					Collected Shelby Tube from 7' to 10'. No sample for description.	257.4
10								(10-16') Clay and silt (see descriptions below).	
							CL	(10-15.5') Clay, silty, moderate yellowish-brown in color, mottled with light olive gray-colored silt. Iron-staining and iron-manganese nodules present near 15'.	
15								(15.5-16') Clayey silt, moderate yellowish-brown in color mottled with light olive gray to greenish-gray. Iron-manganese nodules and iron staining present.	251.4
							ML	(16-20.5') Clayey silt, greenish-gray mottled with moderate yellowish-brown material near 16'. Iron staining increases with depth.	246.8
20								Soil boring terminated at approximately 20.5'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 014G01LF.	
25									
30									
35									
40									

WELL DIAGRAM



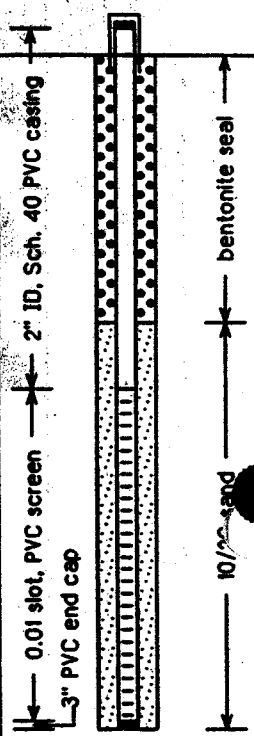
EnSafe/Allen & Hoshall

Monitoring Well 014G02LS

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #14 (S-140/7th Ave. Ditch)*
Project No.: *0106-08420*	Surface Elevation: *268.44 feet msl*
Started at *0850 on 2-14-96*	TOC Elevation: *270.12 feet msl*
Completed at *0915 on 2-14-96*	Depth to Groundwater: *7.61 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *262.51 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *20.25 feet*
Geologist: *A. Choate, C. Ivey*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							ML GC	(0-3') Gravel, silt, clay, and bricks from 0' to 3' (fill).	265.4
5			1	100	BG		CL	(3-6') Clay, brownish-gray in color	262.4
10							ML CL	Silt and clay, light olive gray to dark yellowish-brown in color from 6' to 9'. Silt and clay, yellowish-gray to yellowish-brown in color from 9' to 20'. Moist, with iron-staining and specks of organic material.	
15			2	120	BG				
20								Soil boring terminated at 20'. Note: This is a replacement well. The original well was installed a few feet away on 1/23/96 but was subsequently abandoned due to faulty construction. Analytical samples indicated on this boring log were collected from the soil boring associated with the original well.	248.4
25									
30									
35									
40									

WELL DIAGRAM



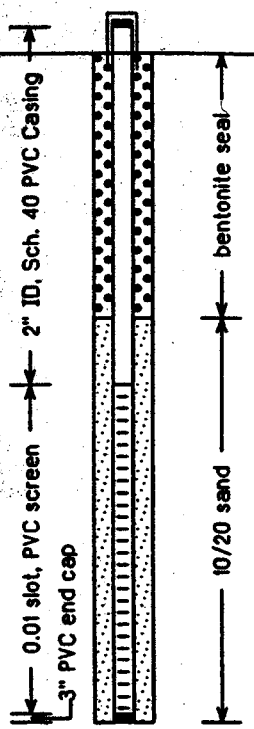
EnSafe/Allen & Hoshall

Monitoring Well 014G03LS

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #14 (S-140/7th Ave. Ditch)*
Project No.: *0106-08420*	Surface Elevation: *268.64 feet msl*
Started at *0745 on 2-14-96*	TOC Elevation: *271.09 feet msl*
Completed at *0815 on 2-14-96*	Depth to Groundwater: *8.39 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *262.70 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *20.25 feet*
Geologist: *J.A. Kingsbury*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					BG			(0-8') Clay with some silt, dark brown to brownish-gray in color.	
5			1	70	5		CL/ML		
					5				
					6				
									260.6
10					6			(8-20') Silt, light yellowish-brown to yellowish-gray in color with dark orangish-yellow mottling and specks of organic material. Moist.	
					6				
					5		ML		
15			2	90	5			Small concretion present at 15'.	
					5				
					5				
20									248.6
								Soil boring terminated at 20'.	
25									
30									
35									
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 014G04LF

Project: NSA Memphis	Location: Millington, TN. SWMU #14 (S-140/7th Ave. Ditch)
Project No: 0106-08420	Surface Elevation: 268.82 feet msl
Started at 1330 on 1-23-96	TOC Elevation: 270.88 feet msl
Completed at 1530 on 1-23-96	Depth to Groundwater: 8.79 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" inner core barrel/6" OD casing	Groundwater Elevation: 262.09 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 55 feet
Geologist: D. Ladd, W. Parks	Well Screen: 39 to 49 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	46	BG		GL/GW	(0-2.5') Soil, gravel, brick, grass and roots (fill material).	
					BG		CL	(2.5-5') Silty clay. Dark yellowish-brown in color.	266.3
5					BG		ML	(5-20.5') Clayey silt. Moderate yellowish-brown to light olive gray in color. Mottled with light olive gray and olive gray-colored material. Iron-manganese nodules near 5'.	263.8
					BG			Moist near 7.5'.	
					BG				
10			2	107	BG			(10-12') Very moist.	
					8			Iron-manganese nodules near 11'.	
					8				
15					6				
					6				
					6				
20			3	121	6		ML	(20.5-23') Clayey silt is light olive gray in color with considerable dark yellowish-orange to moderate yellowish-brown colored iron staining. Some iron/manganese nodules are present	248.3
					6.5				245.8
25					6.5		CL	(23-30') Silty clay, greenish-gray in color with some dark yellowish- orange to moderate yellowish-brown iron-staining near 23'. Iron-staining and mottled light olive brown in color near 30'.	
					6.5				
					5			Fluvial Deposits (30-50') contact estimated at 30'.	
30							SP		238.8

WELL DIAGRAM

2" ID, Sch. 40 PVC casing

grout

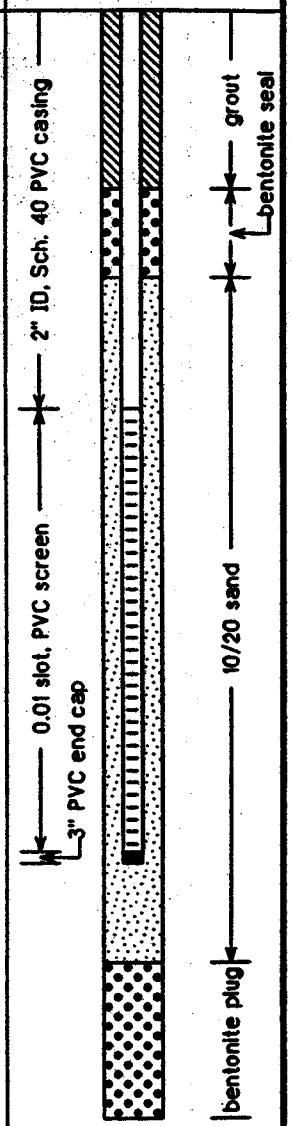
EnSafe/Allen & Hoshall

Monitoring Well 014G04LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #14 (S-140/7th Ave. Ditch)*
Project No.: *0106-08420*	Surface Elevation: *268.82 feet msl*
Started at *1330 on 1-23-96*	TOC Elevation: *270.88 feet msl*
Completed at *1530 on 1-23-96*	Depth to Groundwater: *8.79 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *262.09 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *55 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *39 to 49 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			4	127	5		SP	(30-32') Sand, very fine-grained, moderate yellowish-brown in color mottled light gray-colored material.	238.8
					5		SM SC	(32-35') Sand (very fine to coarse-grained), silt, and clay. Moderate yellowish-brown in color mottled with light gray material. Moist near 34'. Becomes mostly very fine-grained sand and silt near 35'.	236.8
35					5		ML CL	(35-37') Silt and clay, greenish-gray in color mottled with moderate yellowish-brown material.	233.8
					4.5		SM SC	(37-38') Sand, silt, and clay. Olive gray to light brownish-gray in color.	231.8
					5.5		SC GM	(38-39') Silty and clayey sand and gravel. Light olive gray to moderate yellowish-brown in color. Wet.	230.8
40			5	113	5		GW GC	(39-42.5') Gravel, sand, and clay. Light olive gray in color, mottled with moderate yellowish-brown and dark yellowish-orange-colored material. Very cohesive and moist.	229.8
					5				226.3
45					5		SW GW	(42.5-46.5') Sand (medium to coarse-grained) and gravel (up to 1" in longest dimension. Light gray in color mottled with moderate yellowish-brown material. Wet.	
			6	95	4				
					5		GW	(46.5-48') Sand is medium to very coarse-grained. Moderate yellowish-brown to dark yellowish-orange, wet.	220.8
50					5			(48-49.5') Gravel (up to 4" in longest dimension) with sand. Moderate yellowish-brown in color. Wet.	218.8
			7	163	4.5		SP SM	(50-55') Cockfield Formation (see description below).	
55					5			Very fine-grained silty sand, moderate yellowish-brown to dusky yellowish brown with light olive gray laminations.	213.8
60								Soil boring terminated at 55'.	

WELL DIAGRAM



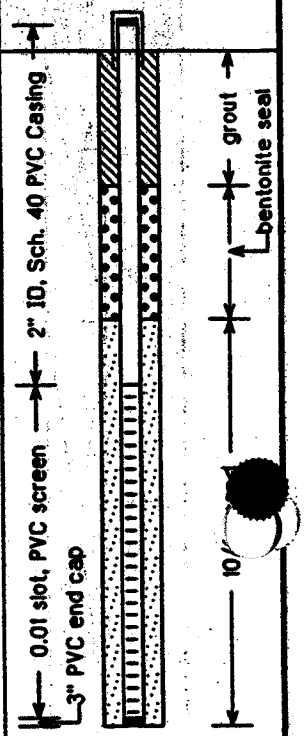
EnSafe/Allen & Hoshall

Monitoring Well 014G05LS

Project: NSA Memphis	Location: Millington, TN. SWMU #14 (S-140/7th Ave. Ditch)
Project No.: 0106-08420	Surface Elevation: 268.24 feet msl
Started at 1445 on 1-21-96	TOC Elevation: 270.12 feet msl
Completed at 1605 on 1-21-96	Depth to Groundwater: 9.84 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" inner core barrel/6" OD casing	Groundwater Elevation: 260.28 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 20.25 feet
Geologist: A. Choate, C. Ivey	Well Screen: 10 to 20 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							OL	(0-1.5') Soil and grass.	268.7
								(1.5-20') Silt and clay (see descriptions below).	
5			1	108	BG			(1.5-6') Silt and clay, dark yellowish-brown in color, becoming dark yellowish-brown to pale yellowish-brown in color near 6'. Dry.	
								Clayey silt, dark yellowish-brown to dark yellowish-orange in color mottled with medium light gray-colored material. Slightly moist. Contains iron-manganese nodules.	
10			2	118	BG		ML CL		
15								Wet from 15' to 16'. The percentage of iron-manganese nodules increases near 16'.	
			3	142	BG			(16-20') Very clayey silt, light olive gray in color mottled with dark yellowish-brown to dark yellowish-orange material. The percentage of mottled material decreases with depth. Very moist. Contains iron-manganese nodules.	248.2
20								Terminated soil boring at 20'.	
25									
30									
35									
40									

WELL DIAGRAM



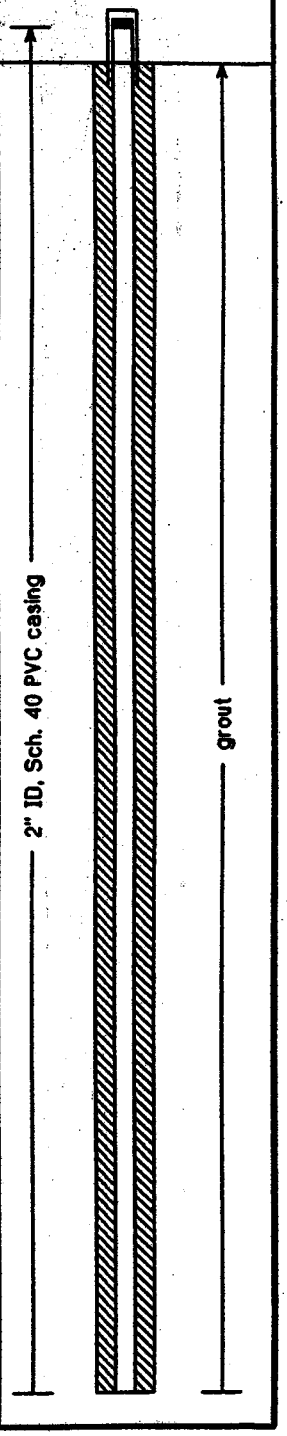
EnSafe/Allen & Hoshall

Monitoring Well 014G06LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #14 (S-140/7th Ave. Ditch)*
Project No.: *0106-08420*	Surface Elevation: *268.62 feet msl*
Started at *1450 on 1-20-96*	TOC Elevation: *270.57 feet msl*
Completed at *0850 on 1-21-96*	Depth to Groundwater: *10.32 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *260.25 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *56 feet*
Geologist: *A. Choate, C. Ivey*	Well Screen: *39 to 49 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					BG		OL	(0-2') Soil, roots, and brick fragments. Soil is dark yellowish-brown to moderate yellowish-brown.	268.6
			1	72	BG			(2-17') Clayey silt and silty clay (see descriptions below).	
5					BG			(2-6.5') Very clayey silt. Moderate yellowish-brown to dark yellowish- brown in color. Color becomes lighter near 6.5'.	
					BG			(6.5-17') Silty clay. Moderate yellowish-brown in color mottled with yellowish-gray-colored material. Contains iron-manganese nodules. Slightly moist, becoming more moist, oxidized, and stained dark yellowish-orange near 11'.	
10					BG		ML CL		
			2	89	BG				
15					BG				
					BG				251.8
					BG			(17-37') Silt, clayey (see descriptions below).	
20					BG			(17-26') Clayey silt. Light olive gray to greenish-gray in color. Slightly moist. Becoming stiff near 26'.	
			3	95	BG				
					BG		ML		
25					BG				
					BG			(26-32') Clayey silt, moderate yellowish-brown in color mottled with light olive-gray material. The percentage of light olive gray material progressively decreases from 26' to 32'. Iron concretions are present near 26'. Slightly moist at 26' becoming more moist near 32'.	
30					BG				

WELL DIAGRAM



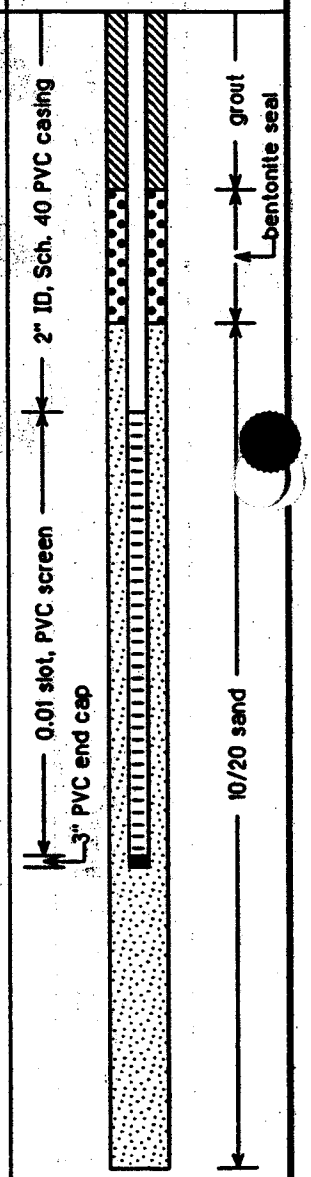
EnSafe/Allen & Hoshall

Monitoring Well 014G06LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #14 (S-140/7th Ave. Ditch)*
Project No.: *0106-08420*	Surface Elevation: *268.62 feet msl*
Started at *1450 on 1-20-96*	TOC Elevation: *270.57 feet msl*
Completed at *0850 on 1-21-96*	Depth to Groundwater: *10.32 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *260.25 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *56 feet*
Geologist: *A. Choate, C. Ivey*	Well Screen: *39 to 49 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
35			4	113	BG		ML	(32-36') Silt, clayey, moderate yellowish-brown in color and slightly moist.	
					BG				
					BG			(36-37') Clayey silt, moderate yellowish-brown in color mottled with light olive gray material, slightly moist.	231.6
40					BG			(37-49') Fluvial Deposits (see descriptions below). (37-49') Sand and gravel (see descriptions below).	
			5	97	BG			(37-38') Fine-grained sand and silt with gravel (up to 2" in longest dimension). Moderate yellowish-brown.	
					BG		SM GW	(38-42') Sand, fine, and gravel (up to 2" in longest dimension), silty, moderate brown mottled with pale yellowish-brown material.	
45					BG			(42-45') Sand (fine to coarse-grained) and gravel (up to 2" in longest dimension). Moderate brown to dark yellowish-orange in color. Wet.	
					BG			(45-49') Sand, medium to coarse, and gravel (up to 2" in longest dimension), moderate yellowish-brown to dark yellowish-orange. Wet.	
					BG			(49-56') Cockfield Formation (see description below).	219.6
50			6	114	BG			Silty, very fine-grained sand with silty clay laminations. Sand is dusky yellowish brown in color; clay laminations are light gray in color.	
					BG		SM CL		
55					BG			Becoming waxy near 56'.	
								Soil boring terminated at 56'.	212.6
60									

WELL DIAGRAM



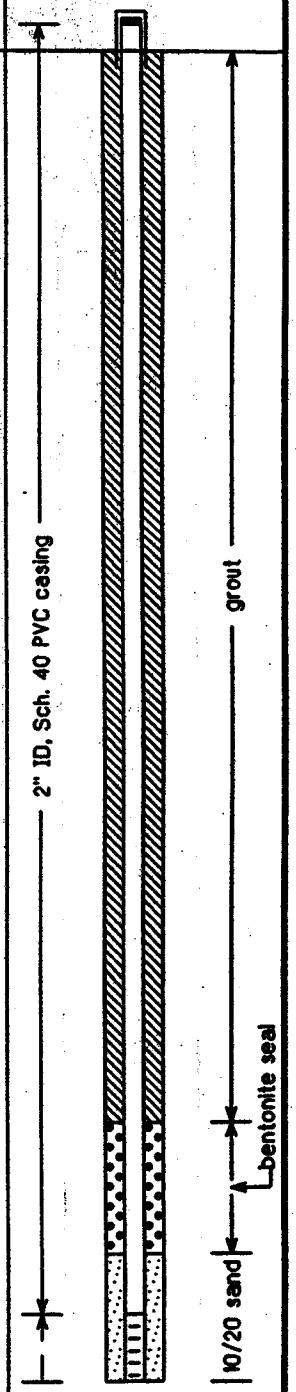
EnSafe/Allen & Hoshall

Monitoring Well 014G07LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #14 (S-140/7th Ave. Ditch)*
Project No.: *0106-08420*	Surface Elevation: *268.88 feet msl*
Started at *1000 on 1-22-96*	TOC Elevation: *270.63 feet msl*
Completed at *1145 on 1-22-96*	Depth to Groundwater: *9.30 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" inner core barrel/6" OD casing*	Groundwater Elevation: *261.33 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *50 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *38 to 48 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0	1	50	BG	OL	(0-5') Soil, concrete, and rubble (fill). Note: Concrete was encountered at 2' below ground surface.	
5			BG			263.9
			BG	CL/ML	(5-22') Clay and silt (see descriptions below). (5-12') Silty clay. Dark yellowish-brown in color mottled with moderate yellowish-brown to dark yellowish-orange-colored material. Mottling increases in content progressively near 12'. Hard from 4' to 7'. Silt content increases near 11'.	
10	2		BG			
			BG		(12-16') Silty clay, olive gray to light olive gray in color mottled with moderate yellowish-brown to dark yellowish-orange-colored material. Contains iron-manganese nodules, increasing in percentage around 16'.	
15			BG			
			BG		(16-22') Clayey silt. Moderate yellowish-brown in color mottled with light olive gray-colored material. Contains scattered iron- manganese nodules.	
20	3	139	BG		Dark yellowish-orange staining near 21'.	246.9
			BG	ML	(22-32.5') Silt (see descriptions below). (22-25') Silt, medium dark gray to medium gray, mottled with some moderate yellowish-brown material near 22' where a few scattered iron-manganese nodules are located.	
25			BG			
			BG		(25-31.5') Silt, olive gray to greenish-gray in color, mottled with moderate yellowish-brown near 32.5'. Contains iron staining and iron-manganese nodules mostly near 29'.	
30	4	118	BG		(31.5-32.5') Silt, moderate yellowish-brown mottled with light gray.	
			BG	ML	(32.5-36') Clayey silt, moderate yellowish-brown in color. Mottled with light gray material near 34'.	236.4
35			BG			232.9
			BG	SM/GW	(36-48') Fluvial Deposits (see descriptions below). (36-43.5') Sand, silty, with gravel (see descriptions below).	
40			BG		(36-37.5') Silty sand (very fine-grained) with gravel. Moderate yellowish-brown in color.	

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 014G07LF

Project: *NSA Memphis*	Location: *Millington, TN SWMU #14 (S-140/7th Ave. Ditch)*
Project No.: *0106-08420*	Surface Elevation: *268.88 feet msl*
Started at *1000 on 1-22-96*	TOC Elevation: *270.63 feet msl*
Completed at *1145 on 1-22-96*	Depth to Groundwater: *9.30 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *261.33 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *50 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *38 to 48 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			5	107	BG		SM GW	Very silty sand (fine to coarse-grained) and gravel (up to 2" in longest dimension) subangular to rounded. Moderate yellowish-brown in color mottled with light olive gray and some dark yellowish- orange-colored material. From 37.5' to 41.5', sample is very difficult to split.	225.4	0.01 slot, PVC screen 3" PVC end cap 10/20 sand
					BG					
					BG		SW GW	(43.5-48') Sand and gravel, gravel and sand (see descriptions below).		
					BG					
50			6	120	BG		SM	(43.5-46') Sand (medium to coarse-grained) and gravel (up to 2" in longest dimension). Dark yellowish-orange to moderate yellowish- brown in color. Wet.	220.9	
								(46-48') Gravel and sand, dark yellowish-orange to moderate yellowish- brown. Wet.	218.9	
55								(48-50') Cockfield Formation (see description below).		
60								Very fine-grained silty sand. Mottled with gray to light gray-colored very fine-grained sand, which decreases with depth. Becomes clayey near 50'.		
								Soil boring terminated at 50'.		
65										
70										
75										
80										

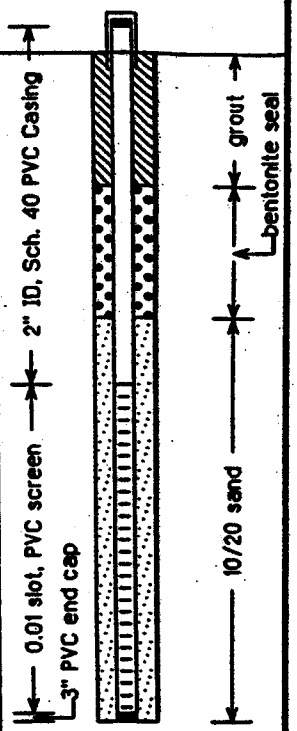
EnSafe/Allen & Hoshall

Monitoring Well 014G08LS

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #14 (S-140/7th Ave. Ditch)*
Project No.: *0106-08420*	Surface Elevation: *268.52 feet msl*
Started at *1500 on 1-22-96*	TOC Elevation: *268.14 feet msl*
Completed at *1530 on 1-22-96*	Depth to Groundwater: *6.48 feet* Measured: *4/18/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *261.66 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *20.25 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	40	1		OL	(0-5') Fill material: Soil, with bits of concrete and grass and roots.	
5					BG				263.5
					BG			(5-17') Clay and silt (see descriptions below).	
					BG			(5-7') Silty clay. Moderate yellowish-brown to dark yellowish-orange in color and mottled with light olive gray-colored material. Slightly moist.	
10			2	82	BG		CL ML	(7-16') Clayey silt. Moderate yellowish-brown to dark yellowish- orange in color mottled with light olive gray and some dark yellowish- orange material. Slightly moist.	
					BG				
15					BG			Moisture content increases near 16'. Sparse iron-manganese nodules are present near 16'.	252.5
			3	75	BG		ML	(16-17') Clayey silt moderate yellowish-brown to dark yellowish-orange in color and mottled with olive gray to light olive gray-colored material. Considerable iron staining. Contains iron-manganese nodules. Moist.	
20					BG				248.5
								(17-20') Silt, clayey, olive gray to light olive gray in color slightly mottled with dark yellowish-orange-colored material. Contains iron-manganese nodules, moist.	
25								Terminated soil boring at 20'.	
30									
35									
40									

WELL DIAGRAM



BORING LOG OF 014G09LS

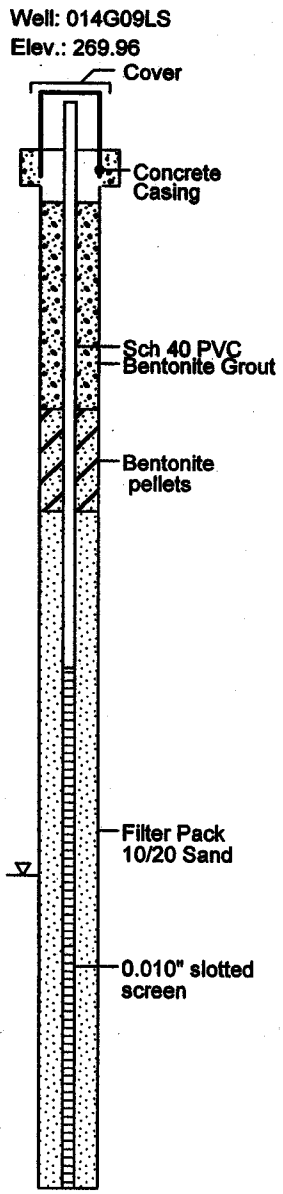
ENSAFE

NSA MID-SOUTH
Millington, TN.

Location: SWMU 14
Project #: CTO 0106

Started	: 4/22/02@1355	Northing	: 385885.946
Finished	: 4/22/02@1445	Easting	: 815202.089
Drilling Method	: HSA	TOC Elevation	: 269.96
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 20 feet
Geologist	: J. Broughton	Well Screen	: 10 to 20 feet

Depth in Feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	1	100	10		ML	(0-.5.5') Clayey Silt, dark yellowish brown, moist, friable
5	2	100	2			(5.5-13') Color is light greenish gray, with some iron staining
						(8-13') With increased staining, very moist, with some iron/manganese nodules
10	3	100	2			
						(13-20') With increased silt content, color is light gray with staining and iron/manganese nodules, wet at ~14'
15	4	100	11			
	5	100	10			
20						
25						



07-29-2003 N:\well logs\NSAMidsouth\SWMU 14\014G09LS.bor

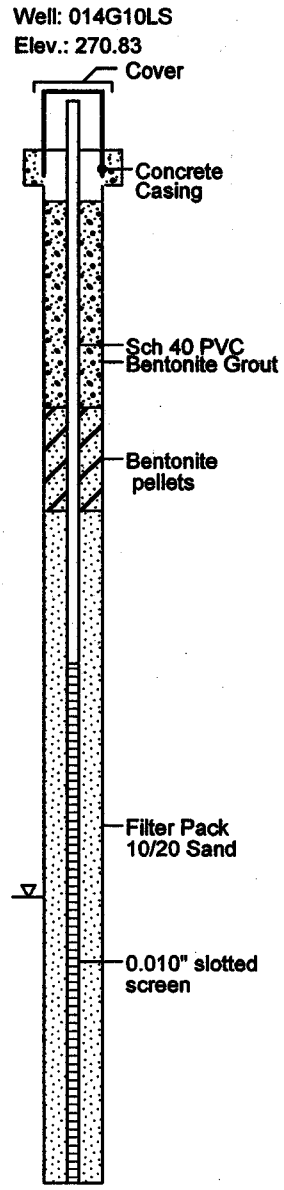
BORING LOG OF 014G10LS

NSA MID-SOUTH
Millington, TN.

Location: SWMU 14
Project #: CTO 0106

Started	: 4/22/02@1025	Northing	: 385960.104
Finished	: 4/22/02@1130	Easting	: 815084.053
Drilling Method	: HSA	TOC Elevation	: 270.83
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 20 feet
Geologist	: J. Broughton	Well Screen	: 10 to 20 feet

Depth in Feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0						
	1	100	50			(0-1.5') Clayey Silt, dark yellowish brown, moist, friable, with some iron staining (1.5-5.5') Color is dark brownish gray, little to no staining
5	2	100	33			(5.5-11.5') Color is light grayish green with minor iron staining (8-11.5') with increased staining
10	3	100	25		ML	(11.5-18') Color is medium grayish green with iron staining, very moist (13-20') With increased silt content, with iron/manganese nodules, wet at ~14.5
15	4	80	10			(18-20') Color is light brownish gray, wet
	5	100	7			
20						
25						



07-29-2003 g:\NSAMidsouth\SWMU 14\014G10LS.bor

BORING LOG OF 014G11LS

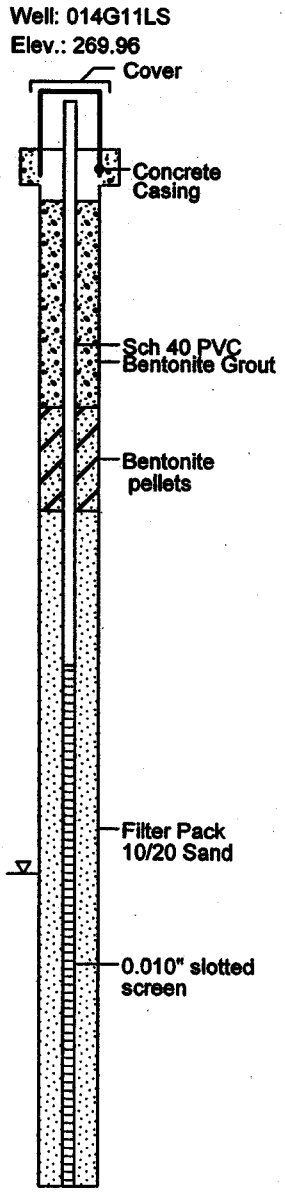
ENSAFE

NSA MID-SOUTH
Millington, TN.

Location: SWMU 14
Project #: CTO 0106

Started	: 4/22/02@1245	Northing	: 385970.746
Finished	: 4/22/02@1325	Easting	: 815199.135
Drilling Method	: HSA	TOC Elevation	: 269.96
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 20 feet
Geologist	: J. Broughton	Well Screen	: 10 to 20 feet

Depth in Feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	1	100	41		ML	(0-2.5') Clayey silt, dark grayish brown with minor iron staining, moist, friable
						(2.5-4.5') Color is very dark brownish gray, little to no staining
5	2	100	14			(4.5-6') Color is medium brownish gray
						(6-13') Color is light greenish gray with some iron staining
						(8-20') With increased iron staining, very moist, with occasional iron/manganese nodules
10	3	100	12			
						(13-20') With silt content increasing down column, color is light gray with staining, wet at ~14'
15	4	100	7			
	5	100	6			
20						
25						



07-29-2003 N:\well logs\NSAMidsouth\SWMU 14\014G11LS.bor

SWMU 15

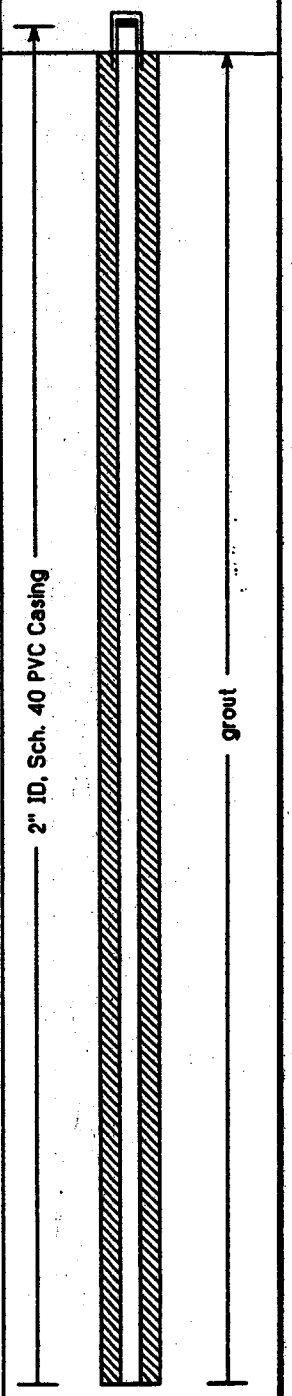
EnSafe/Allen & Hoshall

Monitoring Well 015G01LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #15*
Project No.: *0094-08420*	Surface Elevation: *279.47 feet msl*
Started at *1225 on 3-13-96*	TOC Elevation: *281.90 feet msl*
Completed at *1545 on 3-13-96*	Depth to Groundwater: *26.55 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing.*	Groundwater Elevation: *255.35 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96 feet*
Geologist: *J. Kingsbury*	Well Screen: *75 to 85 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0	1	100	.5		(0'-2') Hand-augered. Silt, light brown to yellowish-brown in color.	
			1.7		(2'-15') Clayey silt, yellowish-brown to yellowish-gray in color mottled with dark yellowish-orange stained material.	
5	2	75	.5		(5'-10') Abundant organic material.	
			1.2			
			.7			
10	3	95	1.0			
			1.7	ML	(12'-16') Moist.	
15			2.2		Color change to olive gray/greenish-gray near 15'.	
			1.0		(16'-23') Silt, moist.	
			6.5			
20	4	95	15.4			
			182.7		Increasing clay fraction, less moist, color changes to brownish-gray at 23'.	
25			193.9			
						253.5
			40.2		(26'-32') Silt and clay, greenish-gray to brownish-gray in color. Iron-stained inclusions/nodules present.	
			24			
30	5	120	12.6	ML CL		
			17.7		(32'-35') Greenish-gray to light brown color.	
35			12.8			
				SM	(35'-85') Fluvial Deposits.	244.5
			12.4			243.5
				SW	(35'-36') Silty sand with some clay, fine to mdeium-grained, reddish-brown to dark yellowish-orange and gray in color.	
			17			
40						

WELL DIAGRAM



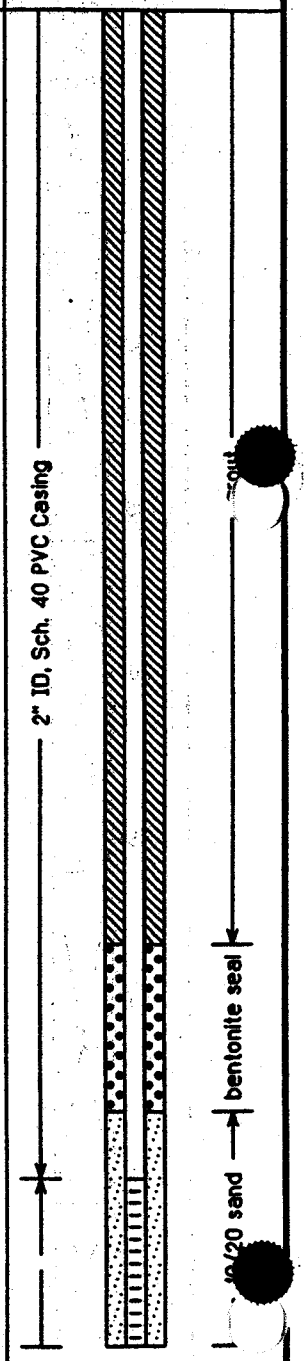
EnSafe/Allen & Hoshall

Monitoring Well 015G01LF

Project: *NSA Memphis*	Location: *Millington, TN SWMU #15*
Project No.: *0094-08420*	Surface Elevation: *279.47 feet msl*
Started at *1225 on 3-13-96*	TOC Elevation: *281.90 feet msl*
Completed at *1545 on 3-13-96*	Depth to Groundwater: *26.55 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *255.35 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96 feet*
Geologist: *J. Kingsbury*	Well Screen: *75 to 85 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			6	110	18.4			(36'-38') Sand, fine to medium-grained, light brown to dark yellowish- orange color mottled with light gray-colored material. Color changes to dark yellowish-orange from 43' to 46'.	
					37.1				
					59.4			(46'-53') Sand, medium to coarse-grained, with a trace of pea-size gravel dark yellowish-orange to pinkish-gray.	
					48.3				
					29.3				
50			7	100	8.6		SW		
					1.2			Color changes to very light gray/very light olive gray.	
55					1.0				
					1.0			Sand is fine to medium-grained and micaceous, very light gray to pinkish-gray.	
					0.5				
60			8	110	0.5		SW GW	(60'-62') Sand (fine to very coarse-grained) and gravel (up to 1" in longest dimension). Dusky yellow to yellowish-gray in color.	219.5
					0.5		SW	(62'-64') Sand lense present.	217.5
65					0.5		SW GW	(64'-69') Sand, fine to very coarse-grained, and gravel (up to 1" in longest dimension). Becomes more dark yellowish-orange to dusky yellow color from 66' to 69'.	215.5
					0.5		GW	(67'-68') Gravel lens.	212.5
					0.5			(68'-85') Sand, medium to very coarse-grained, and gravel, dusky yellow to yellowish-gray.	211.5
70			9	105	0.5			(70'-76') Gravel fraction decreasing.	
					0.5		SW GW		
75					0.5				
					0.5				
					0.5			(78'-85') Gravel fraction increasing, color changes to reddish- brown and dark yellowish-orange.	
80									

WELL DIAGRAM



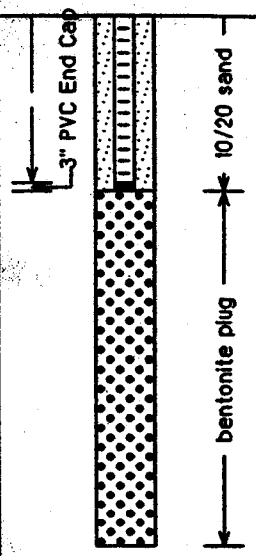
EnSafe/Allen & Hoshall

Monitoring Well 015G01LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #15*
Project No.: *0094-08420*	Surface Elevation: *279.47 feet msl*
Started at *1225 on 3-13-96*	TOC Elevation: *281.90 feet msl*
Completed at *1545 on 3-13-96*	Depth to Groundwater: *26.55 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing.*	Groundwater Elevation: *255.35 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96 feet*
Geologist: *J. Kingsbury*	Well Screen: *75 to 85 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85	10	100	0.5	SW GW		
			0.5			
			0.5			194.5
			0.5	SP	(85'-96') Cockfield Formation: Sand, fine-grained, very light gray in color.	
			0.5		Some clay streaks and yellowish-gray to light olive gray in color.	
90	11	80	0.5			
			0.5			
95			0.5			183.5
					Terminated soil boring at 96'.	
100						
105						
110						
115						
120						

WELL DIAGRAM



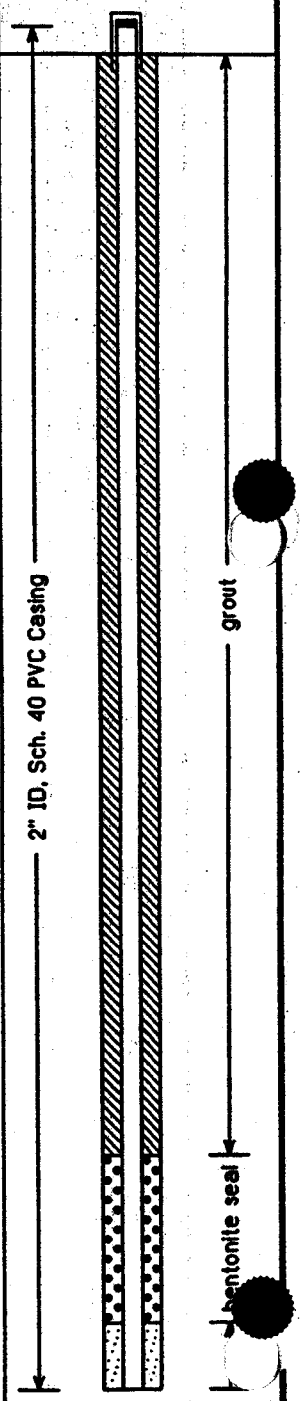
EnSafe/Allen & Hoshall

Monitoring Well 015G01UF

Project: *NSA Memphis*	Location: *Millington, TN* SWMU #15
Project No: *0094-08420*	Surface Elevation: *279.63 feet msl*
Started at *0755 on 3-14-96*	TOC Elevation: *282.06 feet msl*
Completed at *0935 on 3-14-96*	Depth to Groundwater: *26.13 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *255.93 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *50.25 feet*
Geologist: *J. Kingsbury*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1					(0'-2') Hand-augered. Silt, light brown to yellowish-brown in color.	
5								(2'-15') Clayey silt, yellowish-brown to yellowish-gray in color mottled with dark yellowish-orange stained material.	
								(5'-10') Abundant organic material.	
10			2						
							ML	(12'-16') Moist.	
15			3					Color change to olive gray/greenish-gray near 15'.	
								(16'-23') Silt, moist.	
20									
								Increasing clay fraction, less moist, color changes to brownish-gray at 23'.	
25									253.6
								(26'-32') Silt and clay, greenish-gray to brownish-gray in color. Iron-stained inclusions/nodules present.	
30							ML CL		
								(32'-35') Greenish-gray to light brown color.	
35							SM	(35'-50') Fluvial Deposits.	244.6
									243.6
							SW	(35'-36') Silty sand with some clay, fine to medium-grained, reddish-brown to dark yellowish-orange and gray in color.	
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 015G01UF

Project: *NSA Memphis*	Location: *Millington, TN. . SWMU #15*
Project No.: *0094-08420*	Surface Elevation: *279.63 feet msl*
Started at *0755 on 3-14-96*	TOC Elevation: *282.06 feet msl*
Completed at *0935 on 3-14-96*	Depth to Groundwater: *26.13 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing.*	Groundwater Elevation: *255.93 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *50.25 feet*
Geologist: *J. Kingsbury*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45							SW	(36'-38') Sand, fine to medium-grained, light brown to dark yellowish- orange color mottled with light gray-colored material. Color changes to dark yellowish-orange from 43' to 46'. (46'-50') Sand, medium to coarse-grained, with a trace of pea-size gravel, dark yellowish-orange to pinkish-gray.		0.01 Slot, PVC Screen 3" PVC End Cap 10/20 sand
50								Terminated soil boring at 50'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 015G01LF.	229.6	
55										
60										
65										
70										
75										
80										

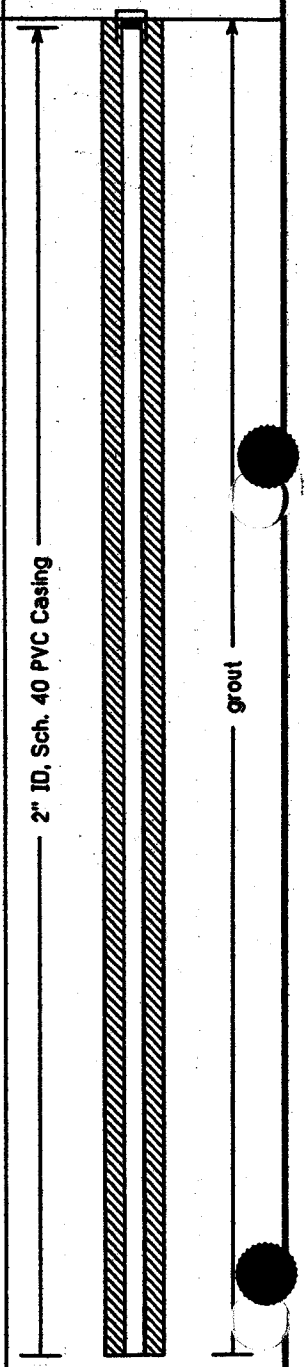
EnSafe/Allen & Hoshall

Monitoring Well 015G02LF

Project: *NSA Memphis*	Location: *Millington, TN. · SWMU#15*
Project No.: *0094-08420*	Surface Elevation: *283.36 feet msl*
Started at *0819 on 3-6-96*	TOC Elevation: *282.85 feet msl*
Completed at *1011 on 3-6-96*	Depth to Groundwater: *26.46 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing.*	Groundwater Elevation: *258.39 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *75 to 85 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			1	100				(0'-.5') Concrete.	
			2	100	BG		SW SC	(.5'-2') Hand-augered. Sand, gravel, and clay fill from 0.5' to 3.5'.	
					BG				279.9
			3	88			ML	(3.5'-6') Clayey silt, olive gray to moderate yellowish-brown in color. Mostly olive gray-colored near 3.5', locally stained dark yellowish-orange with some organic material.	
5					BG				277.4
					BG			(6'-18') Silt, moderate yellowish-brown mottled with light olive-gray material.	
					BG				
10			4	65	BG		ML	Moist below 11'.	
					BG				
					BG				
15								(16'-18') Very moist.	
					3.2				265.4
					31			(18'=25') Clayey silt, dark yellowish-brown in color, becoming dark yellowish-brown to moderate yellowish-brown near 25'.	
20			5	90	BG		ML		
					BG				
25					BG				258.4
					17		ML	(25'-30') Silt (see descriptions below) (25'-26') Dark yellowish-brown with dark yellowish-orange staining.	
					51			(26'-30') Moderate yellowish-brown mottled with light olive gray and dark yellowish-orange material.	
30							ML CL		253.4

WELL DIAGRAM



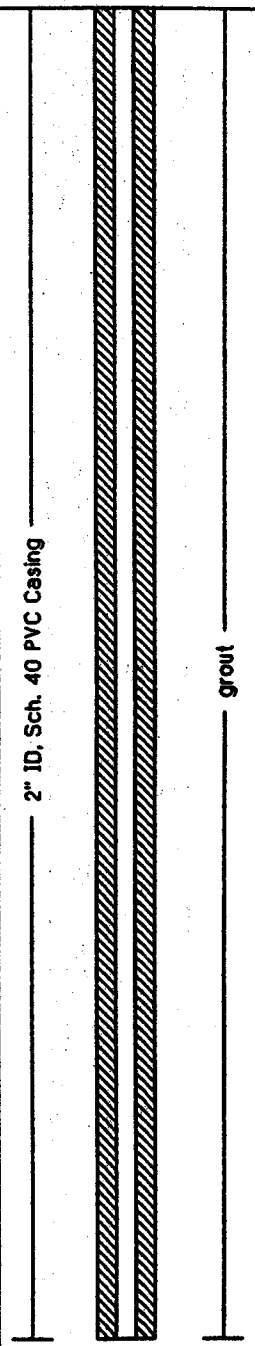
EnSafe/Allen & Hoshall

Monitoring Well 015G02LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#15*
Project No.: *0094-08420*	Surface Elevation: *283.36 feet msl*
Started at *0819 on 3-6-96*	TOC Elevation: *282.85 feet msl*
Completed at *1011 on 3-6-96*	Depth to Groundwater: *26.46 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing.*	Groundwater Elevation: *256.39 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *75 to 85 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
						253.4
	6	130	112	ML CL	(30'-33') Silt and clay, moderate yellowish-brown color mottled with sparse light olive-gray material. Progressively sandier near 33'.	
			131			250.4
				SC SM	(33'-86.5') Fluvial Deposits.	
35			17	SC	(33'-35') Silty and clayey sand, very fine to fine-grained, moderate yellowish-brown color mottled with sparse light olive gray material, contains iron-manganese nodules. Silt and clay content decrease near 35'.	248.4
			13	SP		247.4
			10		(35'-36') Clayey sand, very fine to fine-grained, light brown to moderate reddish-brown color mottled with light olive gray material, contains iron concretions.	244.4
40	7	100	2.2	SP	(36'-39') Sand, fine-grained, light brown to moderate reddish-brown color mottled with yellowish-gray material, wet.	
			BG		(39'-43') Sand, fine-grained olive gray mottled with sparse yellowish- gray material.	240.4
45			BG	SP	(43'-46') Sand, fine-grained, yellowish-gray in color, wet.	
						237.4
			BG		(46'-52') Sand, fine-grained with rare clay seams, light brown mottled with grayish-orange material, wet.	
			BG	SP		
50	8	100	BG			
						231.4
			BG		(52'-63') Sand, fine-grained, grayish-orange in color, wet.	
55			BG		Rare piece of gravel at 54', and a light gray clay seam at 55'.	
			BG	SP		
			BG			
60						

WELL DIAGRAM



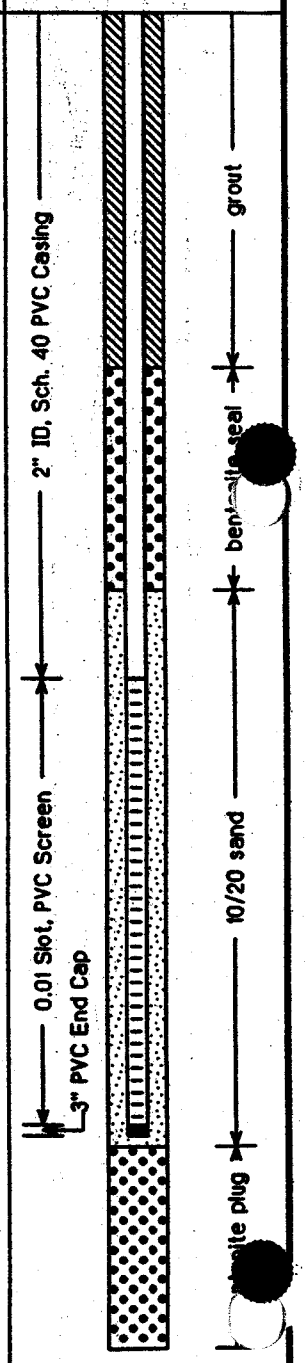
EnSafe/Allen & Hoshall

Monitoring Well 015G02LF

Project: NSA Memphis	Location: Millington, TN. ShMUM15
Project No.: 0094-08420	Surface Elevation: 283.36 feet msl
Started at 0819 on 3-6-96	TOC Elevation: 282.85 feet msl
Completed at 1011 on 3-6-96	Depth to Groundwater: 26.46 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing.	Groundwater Elevation: 256.39 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 96 feet
Geologist: D. Ladd, W. Parks	Well Screen: 75 to 85 feet

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	9	80	BG	SP		
			BG			220.4
			BG		(63'-75.5') Sand and gravel (see descriptions below).	
65			BG		(63'-66') Sand (fine to very coarse-grained) and gravel (up to 1" in longest dimension). Grayish-orange to dark yellowish-orange in color. Wet. Gravel is mostly composed of quartz and chert. Gravel is scattered near 63'.	
			BG	SW GW	(66'-75.5') Sand, medium to very coarse-grained, and gravel (up to 1.5" in longest dimension). Gravel is angular to rounded quartz and chert. Dark yellowish-orange to grayish-orange in color. Wet.	
70	10	80	BG		3" thick, fine-grained sand lense at 75', very little gravel content, and grayish-orange in color.	
			BG			
75			BG			207.9
				SP	(75.5'-76') Sand, fine-grained, grayish-orange, wet.	207.4
			BG		(76'-86.5') Sand (coarse to very coarse-grained) and gravel (up to 2" in longest dimension). Dark yellowish-orange to moderate yellowish- brown, mottled with finer-grained graysish-orange sand near 79', 80', 84', and 86'. Wet.	
80			BG			
	11	90	BG	SW GW		
			BG			
85			BG		(86'-86.5') Becoming clayey.	
			BG	SC		196.9
			BG	SM SC	(86.5'-87') Cockfield Formation: Very clayey sand, fine-grained, yellowish-gray mottled with very light gray and dark yellowish-orange material.	196.4
90						

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 015G02LF

Project: NSA Memphis	Location: Millington, TN. SWMU#15
Project No.: 0094-08420	Surface Elevation: 283.36 feet msl
Started at 0819 on 3-6-96	TOC Elevation: 282.85 feet msl
Completed at 1011 on 3-6-96	Depth to Groundwater: 26.46 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing.	Groundwater Elevation: 256.39 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 96 feet
Geologist: D. Ladd, W. Parks	Well Screen: 75 to 85 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
95			12	100	BG		SM/SC	(87'-93') Silty sand, fine-grained, with some light gray clay seams, yellowish-gray in color mottled with dark yellowish-orange material, very wet.	190.4	bentonite plug
					BG					
					BG		SP	(93'-96') Fine-grained sand with a few thin clay seams, yellowish-gray mottled with sparse dark yellowish-orange material, wet.	187.4	
								Terminated soil boring at 96'.		
100										
105										
110										
115										
120										

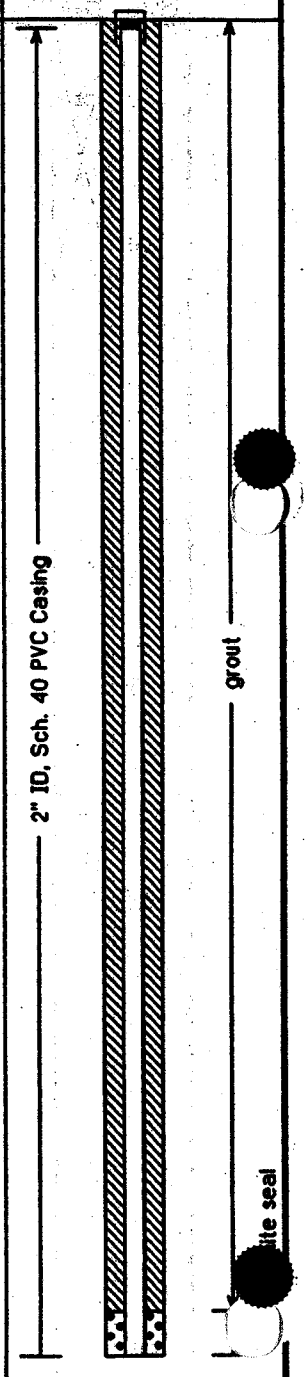
EnSafe/Allen & Hoshall

Monitoring Well 015G02UF

Project: *NSA Memphis*	Location: *Millington, TN* *SWMU#5*
Project No.: *0094-08420*	Surface Elevation: *283.20 feet msl*
Started at *0800 on 3-11-96*	TOC Elevation: *283.00 feet msl*
Completed at *1000 on 3-11-96*	Depth to Groundwater: *25.87 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *257.13 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *48.25 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *36 to 46 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1					(0'-.5') Concrete.	
							SW SC	(.5'-2') Hand-augered. Sand, gravel, and clay fill from .5' to 3.5'.	
									279.7
5							ML	(3.5'-6') Clayey silt, olive gray to moderate yellowish-brown in color. Mostly olive gray-colored near 3.5', locally stained dark yellowish-orange with some organic material.	277.2
			2					(6'-18') Silt, moderate yellowish-brown mottled with light olive-gray material.	
10								Moist below 11'.	
							ML		
15			3					(16'-18') Very moist.	
									265.2
20								(18'-25') Clayey silt, dark yellowish-brown in color. Becoming dark yellowish-brown to moderate yellowish-brown near 25'.	
							ML		
25									258.2
								(25'-30') Silt.	
							ML	Dark yellowish-brown with dark yellowish-orange staining from 25' to 26', becoming moderate yellowish-brown mottled with light olive gray and dark yellowish-orange material between 26' and 30'.	
30							ML CL		253.2

WELL DIAGRAM



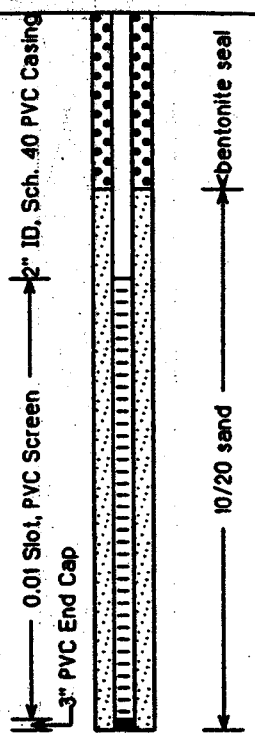
EnSafe/Allen & Hoshall

Monitoring Well 015G02UF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#15*
Project No.: *0094-08420*	Surface Elevation: *283.20 feet msl*
Started at *0800 on 3-11-96*	TOC Elevation: *283.00 feet msl*
Completed at *1000 on 3-11-96*	Depth to Groundwater: *25.87 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *257.13 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *46.25 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *36 to 46 feet*

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
				283.2
		ML CL	(30'-33') Silt and clay, moderate yellowish-brown color mottled with sparse light olive-gray material. Progressively sandier near 33'.	
				250.2
		SC SM	(33'-46') Fluvial Deposits.	
35			(33'-35') Silty and clayey sand, very fine to fine-grained, moderate yellowish-brown color mottled with sparse light olive gray material, contains iron-manganese nodules. Silt and clay decrease near 35'.	248.2
		SC		247.2
		SP	(35'-36') Clayey sand, very fine to fine-grained, light brown to moderate reddish-brown color mottled with light olive gray material, contains iron concretions.	
40	4	SP	(36'-39') Sand, fine-grained, light brown to moderate reddish-brown color mottled with yellowish-gray material, wet.	244.2
			Sand, fine-grained olive gray mottled with sparse yellowish-gray material.	240.2
	5	SP	(40'-42') Collected a Shelby tube sample.	
45			(43'-46') Sand, fine-grained, yellowish-gray in color, wet.	237.2
			Terminated soil boring at 46'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 015G02LF.	
50				
55				
60				

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 015G03LF

Project: NSA Memphis	Location: Millington, TN. SWMU #15
Project No.: 0094-08420	Surface Elevation: 280.29 feet msl
Started at 1215 on 3-11-96	TOC Elevation: 282.55 feet msl
Completed at 1600 on 3-11-96	Depth to Groundwater: 26.80 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing.	Groundwater Elevation: 256.35 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 98 feet
Geologist: J. Kingsbury	Well Screen: 78 to 88 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					4.2		SW GW	(0'-2') Sand and gravel (fill).	278.3
5			1	83	3.1		ML	(2'-6') Silt, reddish-brown to olive gray in color, with some gravel (fill).	
					2				274.3
					1.5			(6'-16') Clayey silt, olive gray to yellowish-brown, organic material present.	
10			2	50	1.1		ML		
					1.3				
					0.6				
15					0.4				264.3
					0.0			(16'-24') Silt, yellowish-brown to yellowish-gray in color and mottled with dark yellowish-orange-colored material. Moist.	
					0.4				
20			3	100	0.4		ML		
					0.4				
					0.4			(24'-26') Color changes to olive gray to greenish-gray.	
25					0.4				254.3
					0.4			(26'-36') Clayey silt (see descriptions below).	
					0.4			(26'-32') Greenish-gray to olive gray in color, organic material with iron staining present.	
30			4	80	0.4		ML		
					0.4			(32'-36') Mottled light olive gray and light brown in color.	
35					0.4				244.3
					0.4		CL ML	Clay, silt, and fine-grained sand, with a trace amount of gravel. Mottled reddish-brown to yellowish-brown/light olive gray in color, moist to wet. Fluvial deposits contact estimated at 42' based on geophysical log interpretation.	
40					0.4				

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

EnSafe/Allen & Hoshall

Monitoring Well 015G03LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #15*
Project No.: *0094-08420*	Surface Elevation: *280.29 feet msl*
Started at *1215 on 3-11-96*	TOC Elevation: *282.55 feet msl*
Completed at *1600 on 3-11-96*	Depth to Groundwater: *26.60 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing.*	Groundwater Elevation: *256.35 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96 feet*
Geologist: *J. Kingsbury*	Well Screen: *78 to 88 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45	5	110	0.4	CL ML		
			0.4			
			0.4			234.3
			0.4	SC	Clayey sand, fine to medium-grained, mottled olive gray to reddish- brown in color, dense, with some iron concretions near 50'.	
50			0.4			
	6	110	0.4			229.3
			0.4	SW	Sand, fine to coarse-grained, yellowish-brown to yellowish-gray in color. With gravel from 55' to 56'. Coarsening from 51'-56'.	
55			0.4			
			0.4			224.3
			0.4	SW GW	Sand and gravel, yellowish-gray in color.	
			0.4			222.3
			0.4	ML CL	Silt and clay, yellowish-brown in color.	221.3
60			0.4	SW	Sand, medium to coarse-grained, reddish-brown in color.	
	7	110	0.4			
			0.4			217.3
65			0.4		Sand and gravel; sand is medium to coarse-grained, reddish-brown.	
			0.4			
			0.4		(66'-67') Reddish-brown to dark yellowish-orange in color.	
70			0.4			
			0.4			
	8	100	0.4	SW GW		
			0.4			
75			0.4			
			1.0			
			0.8			
80						

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

10/20 sand | bentonite seal

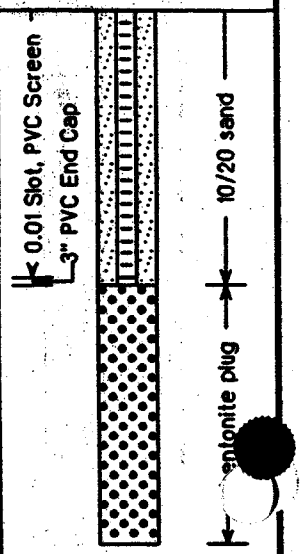
EnSafe/Allen & Hoshall

Monitoring Well 015G03LF

Project: NSA Memphis	Location: Millington, TN SWMU #15
Project No.: 0094-08420	Surface Elevation: 280.29 feet msl
Started at 1215 on 3-11-96	TOC Elevation: 282.55 feet msl
Completed at 1600 on 3-11-96	Depth to Groundwater: 26.60 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing.	Groundwater Elevation: 256.35 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 96 feet
Geologist: J. Kingsbury	Well Screen: 78 to 88 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			9	100	1.1		SW GW		198.3
85					1.1		SW	Estimated contact of sand and gravel unit with underlying sand unit is at 82'. Some fine-grained yellowish-gray to olive gray sand is present around 82'; however due to drilling/sampling problems, the lithology between 81' and 86' is somewhat uncertain. At 86', sand is fine to coarse-grained, with some gravel (up to 2" in longest dimension).	
					1.1				
					0.6				192.3
					0.4		SC	(88-96') Cockfield Formation: Clayey, fine-grained sand, dark yellowish-orange.	
90			10	100	0.4				189.3
					0.4		SP SC	Sand, fine-grained, olive-gray to moderate gray, with some clay stringers, wet.	
95					0.4				184.3
								Terminated soil boring at 96'.	
100									
105									
110									
115									
120									

WELL DIAGRAM



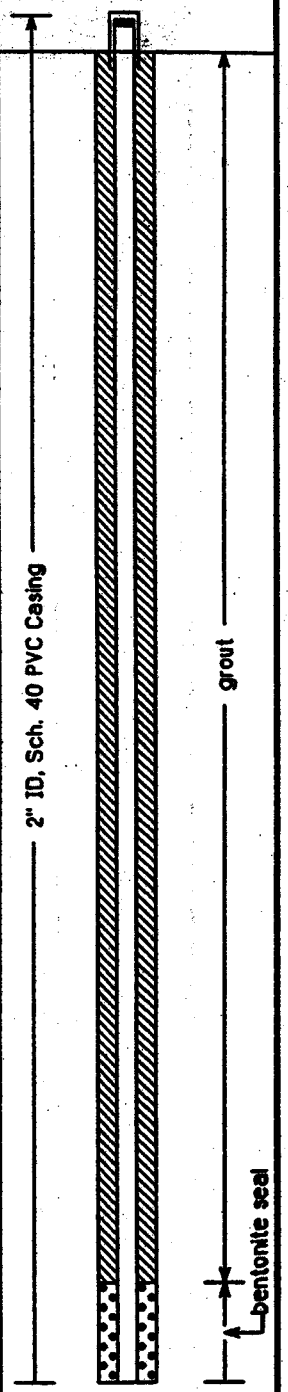
EnSafe/Allen & Hoshall

Monitoring Well 015G03UF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #15*
Project No.: *0094-08420*	Surface Elevation: *280.10 feet msl*
Started at *0950 on 3-12-96*	TOC Elevation: *282.36 feet msl*
Completed at *1230 on 3-12-96*	Depth to Groundwater: *25.35 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing.*	Groundwater Elevation: *257.01 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *55 feet*
Geologist: *J. Kingsbury*	Well Screen: *44 to 54 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1				SW GW	(0'-2') Sand and gravel (fill).	278.1
5							ML	(2'-6') Silt, reddish-brown to olive gray in color, with some gravel (fill).	274.1
			2				ML	(6'-16') Clayey silt, olive gray to yellowish-brown, organic material present.	
15			3				ML	(16'-24') Silt, yellowish-brown to yellowish-gray in color and mottled dark yellowish-orange-colored material. Moist.	264.1
25							ML	(24'-26') Olive gray to greenish-gray.	254.1
30							ML	(26'-36') Clayey silt (see descriptions below). (26'-32') Greenish-gray to olive gray in color, organic material with iron staining present from 26' to 32'. (32'-36') Mottled light olive gray and light brown in color.	
35							CL ML	Clay, silt, and fine-grained sand with a trace amount of gravel. Mottled reddish-brown to yellowish-brown/light olive gray in color, moist to wet. Fluvial deposits contact estimated at 42' based on geophysical log interpretation.	244.1
40									

WELL DIAGRAM



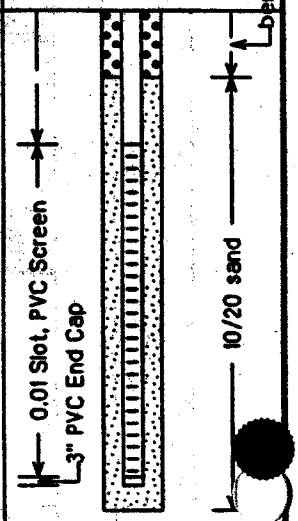
EnSafe/Allen & Hoshall

Monitoring Well 015G03UF

Project: NSA Memphis	Location: Millington, TN SWMU #15
Project No.: 0094-08420	Surface Elevation: 280.10 feet msl
Started at 0950 on 3-12-96	TOC Elevation: 282.36 feet msl
Completed at 1230 on 3-12-96	Depth to Groundwater: 25.35 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing.	Groundwater Elevation: 257.01 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 55 feet
Geologist: J. Kingsbury	Well Screen: 44 to 54 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45							CL ML		
								Clayey sand, fine to medium-grained, mottled olive gray to reddish- brown in color, dense, with some iron concretions near 50'.	234.1
50							SC		
								Sand, fine to coarse-grained, yellowish-brown to yellowish-gray in color.	229.1
55							SW		
								Terminated soil boring at 55'. Note: No samples were collected for lithologic description. Descriptions were transferred from the log of adjacent monitoring well 015G03LF.	225.1
60									
65									
70									
75									
80									

WELL DIAGRAM



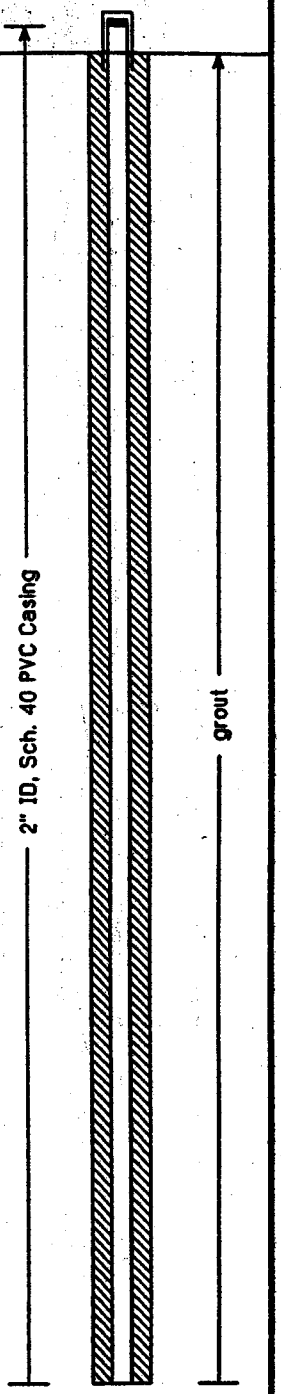
EnSafe/Allen & Hoshall

Monitoring Well 015G04LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #15*
Project No.: *0094-08420*	Surface Elevation: *278.00 feet msl*
Started at *1330 on 3-12-96*	TOC Elevation: *280.41 feet msl*
Completed at *1640 on 3-12-96*	Depth to Groundwater: *25.58 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *254.83 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *106 feet*
Geologist: *J. Kingsbury*	Well Screen: *86 to 96 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	100				(0'-4') Hand augered. Silt, moderate brown to reddish-brown in color.	
5					1.7			Slightly clayey silt, light brown to yellowish-brown in color and mottled with yellowish-gray clay, moist.	
					0.9				
					0.7				
10					0.4			(10'-16') Some organics and iron-staining.	
			2	125	0.7		ML		
15					0.7			(15'-16') Abundant iron-staining.	
					0.7			(16'-20') Reddish-brown to light brown in color.	
					0.4				
20			3	110	0.9			(20'-26') Silt, minor clay, yellowish-brown with some yellowish-gray and dark orangish-yellow mottling.	
					0.7				
25					0.7				
					0.2		ML SC	(26'-28') Silt, brown, with fine-grained sand and clay.	252
					1.2			(28'-96') Fluvial deposits: Sand, fine to medium-grained, with some silt and clay. Reddish-brown to light brown in color.	250
30			4	100	0.2		SM SC		
					0.9				245
35					1.2		SP	(33'-36') Sand, medium-grained. Yellowish-gray to dark yellowish- orange andpinkish-gray in color. Wet.	
					0.7				242
					0.6		SW	(36'-59') Sand, medium to coarse-grained, yellowish-gray to dark yellowish-orange and pinkish-gray in color.	
40									

WELL DIAGRAM



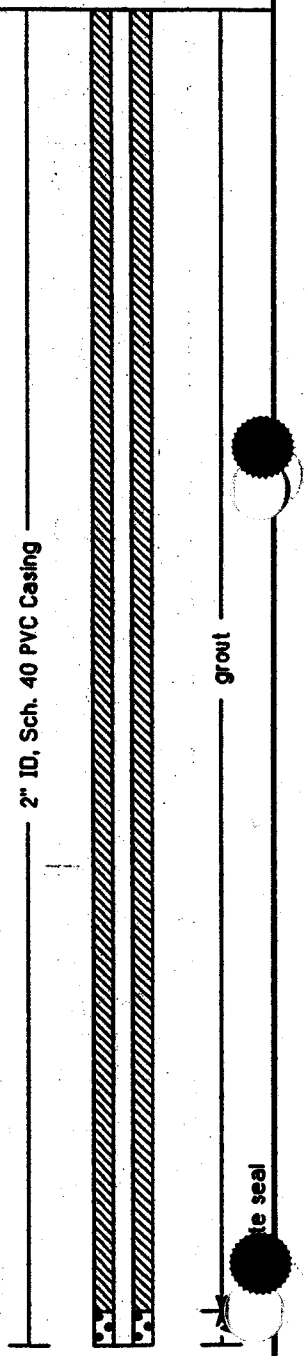
EnSafe/Allen & Hoshall

Monitoring Well 015G04LF

Project: NSA Memphis	Location: Millington, TN. SWMU #15
Project No.: 0094-08420	Surface Elevation: 278.00 feet msl
Started at 1330 on 3-12-96	TOC Elevation: 280.41 feet msl
Completed at 1640 on 3-12-96	Depth to Groundwater: 25.58 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing.	Groundwater Elevation: 254.83 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 106 feet
Geologist: J. Kingsbury	Well Screen: 86 to 96 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45			5	110	1.2				
					1.2				
					1.4				
					1.4			(46'-48') Sand is pinkish-gray to orangish-yellow in color and fine to medium-grained. Micaceous.	
					3.8				
50			6	110	5.3		SW	(48'-59') Yellowish-gray to light gray in color. Micaceous.	
					4.9				
55					0.4				
					5.6				
									219
60			7	100			SW GW	(59'-66') Sand and gravel (pea-size to 1" in longest dimension). Yellowish-gray to brownish-gray in color.	
					3.1			(64'-66') Increase in gravel fraction.	
65									212
							SP	(66'-69') Very coarse sand with some pea-size gravel. Dusky yellow in color.	
					0.4				209
70							CL	(69'-70') Clay. Very light yellowish-gray in color.	208
			8	100			SW	(70'-73') Sand, fine to medium-grained, pinkish-gray to yellowish-gray in color.	205
					0.2				
75							SP GW	(73'-86') Sand (very coarse-grained) and gravel (up to 1" in longest dimension). Yellowish-gray to dusky yellow in color.	
					0.2				
80									

WELL DIAGRAM



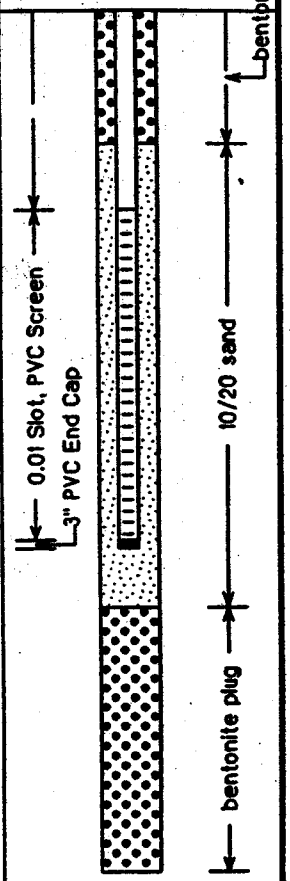
EnSafe/Allen & Hoshall

Monitoring Well 015G04LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #15*
Project No.: *0094-08420*	Surface Elevation: *278.00 feet msl*
Started at *1330 on 3-12-96*	TOC Elevation: *280.41 feet msl*
Completed at *1640 on 3-12-96*	Depth to Groundwater: *25.58 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing.*	Groundwater Elevation: *254.83 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *106 feet*
Geologist: *J. Kingsbury*	Well Screen: *86 to 96 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85			9	70	0.2		SP GW		
									192
					0.2		SP	(86'-95') Sand, very coarse-grained, with some gravel, yellowish-gray to dusky yellow.	
90			10	100					
					0.2			Sand becomes reddish-brown in color. Some gravel present.	
								(94'-95') Iron-cemented sand.	183
95							SP GW	(95'-96') Sand and gravel.	182
					0.2			(96-106') Cockfield Formation: Fine-grained sand, with a few thin lenses of brown stiff clay from 96' to 105'. Moderate gray. Between 105'and 106', color changes to reddish-brown and yellowish-orange with some gravel present (possibly carried down from above).	
100			11	100			SP		
105									172
								Terminated soil boring at 106'.	
110									
115									
120									

WELL DIAGRAM



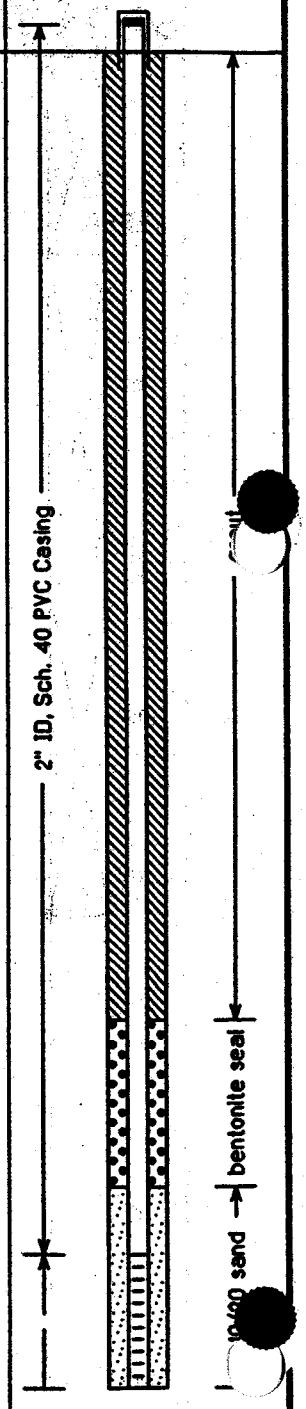
EnSafe/Allen & Hoshall

Monitoring Well 015G04UF

Project: NSA Memphis	Location: Millington, TN. SWMU #15
Project No.: 0094-08420	Surface Elevation: 278.14 feet msl
Started at 0930 on 3-13-96	TOC Elevation: 280.55 feet msl
Completed at 1115 on 3-13-96	Depth to Groundwater: 24.64 feet Measured: 4/8/96
Drilling Method: Rotasonic – 4" core barrel inside 6" casing.	Groundwater Elevation: 255.91 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 46.25 feet
Geologist: J. Kingsbury	Well Screen: 36 to 46 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1					(0'–4') Hand augered. Silt, moderate brown to reddish-brown in color.	
5								Slightly clayey silt, light brown to yellowish-brown in color and mottled with yellowish-gray clay, moist.	
			2						
10							ML	(10'–16') Some organics and iron-staining.	
15								(15'–16') Abundant iron-staining.	
			3					(16'–20') Reddish-brown to light brown in color.	
20								(20'–26') Silt, minor clay, yellowish-brown with some yellowish-gray and dark orangish-yellow mottling.	
25									252.1
							ML/SC	(26'–28') Silt, brown, with fine-grained sand and clay.	250.1
								(28'–46') Fluvial Deposits.	
30							SM/SC	(28'–33') Sand, fine to medium-grained, with some silt and clay.	
								(continued from previous page) Reddish-brown to light brown in color.	245.1
35							SP	(33'–36') Sand, medium-grained. Yellowish-gray to dark yellowish- orange and pinkish-gray in color. Wet.	242.1
							SW	(36'–46') Sand, medium to coarse-grained, yellowish-gray to dark yellowish-orange and pinkish-gray.	
40									

WELL DIAGRAM

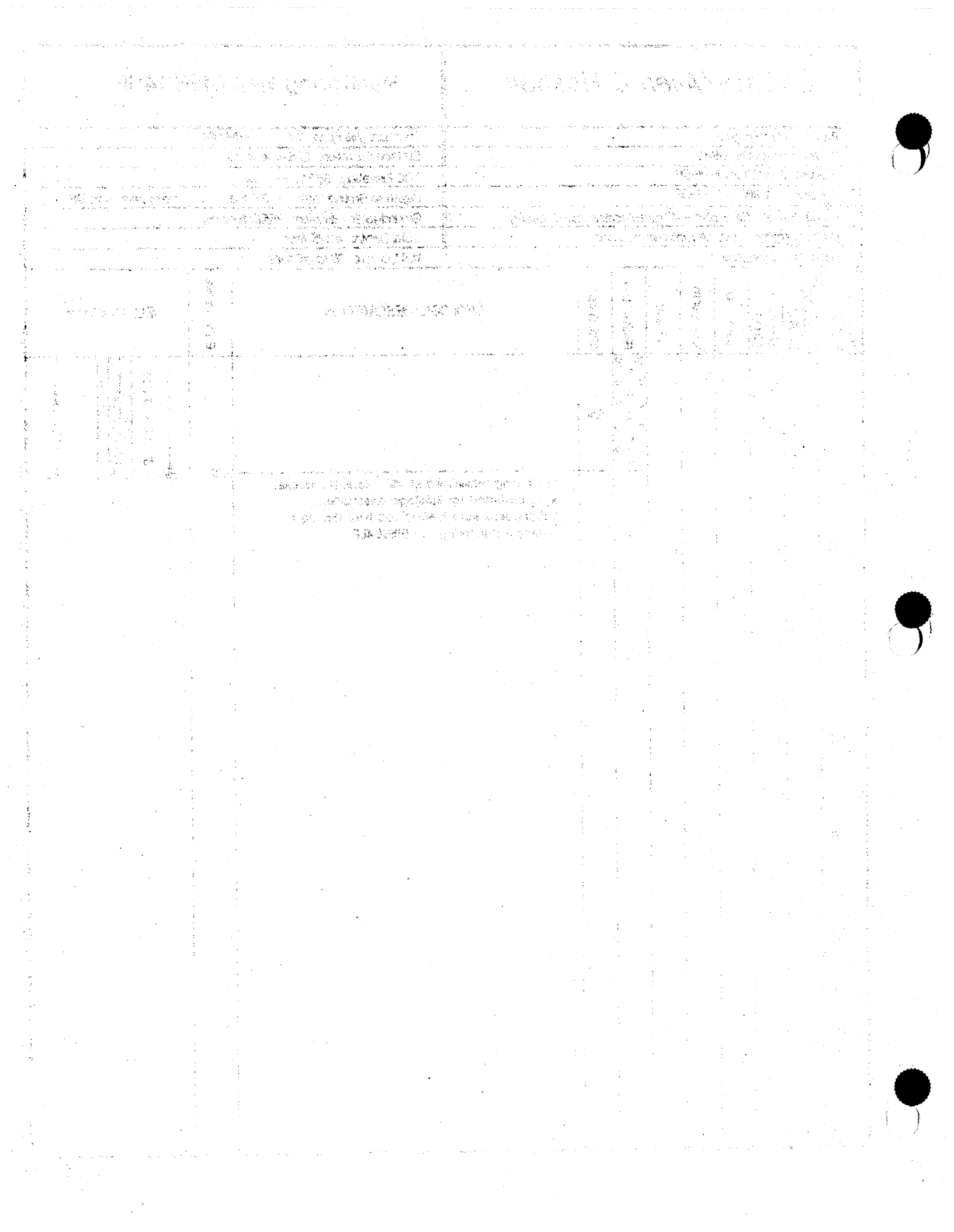


EnSafe/Allen & Hoshall

Monitoring Well 015G04UF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #15*
Project No.: *0094-08420*	Surface Elevation: *278.14 feet msl*
Started at *0930 on 3-13-96*	TOC Elevation: *280.55 feet msl*
Completed at *1115 on 3-13-96*	Depth to Groundwater: *24.64 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing.*	Groundwater Elevation: *255.91 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *46.25 feet*
Geologist: *J. Kingsbury*	Well Screen: *36 to 46 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45							SW			3" PVC End Cap; 10/20 sand
									232.1	
50								Soil boring terminated at 46'. Note: No samples were collected for lithologic description. Descriptions were transferred from the log for adjacent monitoring well 015G04LF.		
55										
60										
65										
70										
75										
80										



ENSAFE

BORING LOG OF 015G01LS

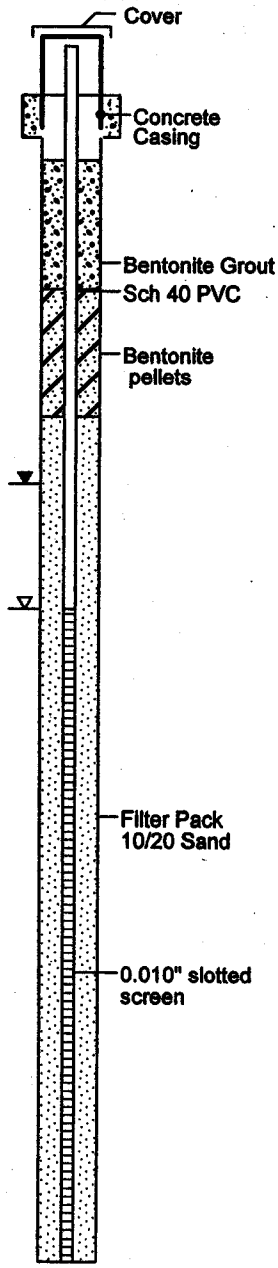
NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0106

Started	: 4/26/02@1530	Northing	: 391407.382
Finished	: 4/26/02@1605	Easting	: 812943.052
Drilling Method	: HSA	TOC Elevation	: 278.52
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 18 feet
Geologist	: J. Broughton	Well Screen	: 8 to 18 feet

Depth in feet	Samples	% Recovery	PID (ppm)	Soil Sample	GRAPHIC	USCS	DESCRIPTION
0		100	65				(0-7.5') Clayey silt, dark yellowish brown, moist, friable, with iron staining
5		60	12				
							(7.5-16.5') Color is medium olive gray
							(8-13') With odor, with brown mottling and iron staining, sampler wet
				01LS-09		ML	
10		100	1600				
							(13-18') With increased silt content down hole, no odor
				01LS-14			
15		100	221				
				Shelby Tube 16-18'			(16.5-18') Color is yellowish brown/medium gray
20							

Well: 015G01LS
Elev.: 278.52



ENSAFE

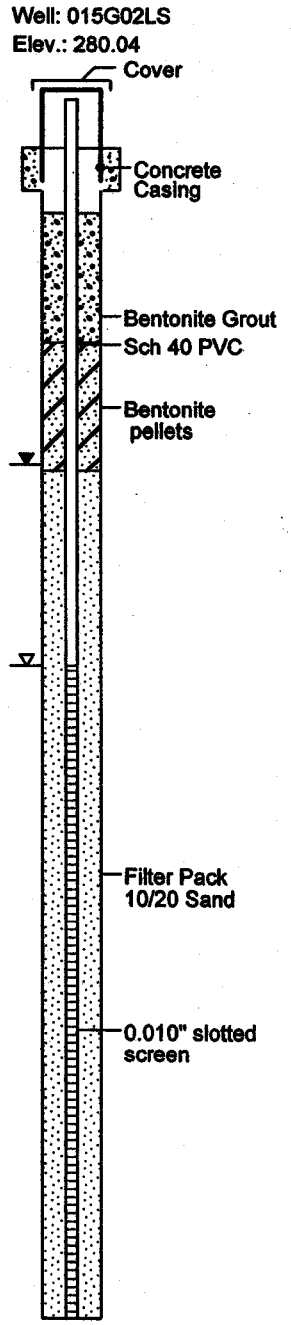
BORING LOG OF 015G02LS

NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0106

Started	: 4/26/02@1445	Northing	: 391467.425
Finished	: 4/26/02@1520	Easting	: 813041.736
Drilling Method	: HSA	TOC Elevation	: 280.04
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 18 feet
Geologist	: J. Broughton	Well Screen	: 8 to 18 feet

Depth in feet	Samples	% Recovery	PID (ppm)	Soil Sample	GRAPHIC	USCS	DESCRIPTION
0		100	10				(0-7.5') Clayey silt, dark yellowish brown, moist, friable, with gray mottling, iron staining and iron/manganese concretions
5		80	100				
				02LS-09		ML	(7.5-13') Color is medium olive gray with brown mottling (8-18') With increased silt content down hole, wet along sampler
10		100	415				
				Shelby Tube 13-15' 02LS-15			(13-18') Color is medium gray brown, with staining
15		80	480				
20							



07-29-2003 N:\well logs\NSAMidsouth\SWMU 15\015G02LS.bor

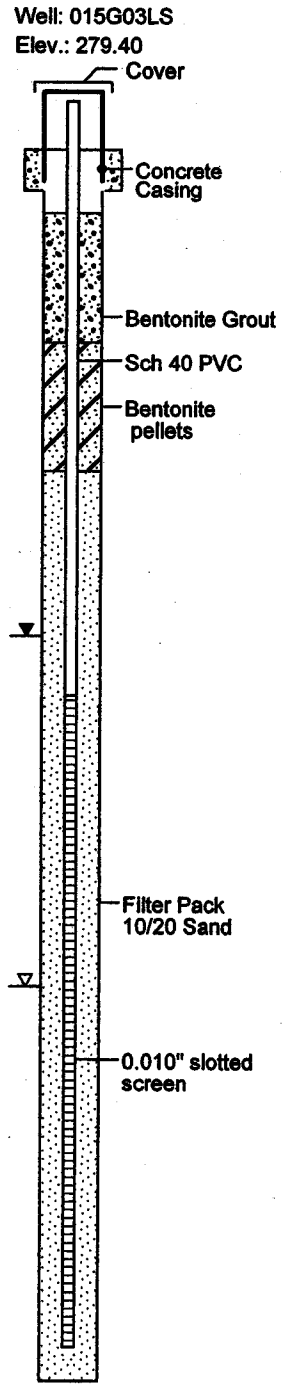
BORING LOG OF 015G03LS

NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0106

Started	: 4/25/02@1215	Northing	: 391514.760
Finished	: 4/25/02@1305	Easting	: 812862.069
Drilling Method	: HSA	TOC Elevation	: 279.40
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 19 feet
Geologist	: J. Broughton	Well Screen	: 8.5 to 18.5 feet

Depth in feet	Samples	% Recovery	PID (ppm)	Soil Sample	GRAPHIC	USCS	DESCRIPTION
0							
		100	12				(0-3') Clayey silt, dark yellowish brown, moist, friable, with some iron staining and iron/manganeseconcretions
							(3-9') With increased concretions and some gray mottling down column
5		100	12				
10		100	1300			ML	(9-15.5') color becoming medium olive gray with yellowish brown mottling, very moist, with silt content increasing down column
				03LS-12			Almost wet at bottom of sampler
							(13-15.5') wet, with odor
				03LS-14			
15		100	418				(15.5-18') Color is yellowish gray brown, with some staining
				Shelby Tube 16-18'			
		0	---				(18-19') No recovery
20							



07-29-2003 ...gs\NSA\Midsouth\SWMU 15\015G03LS.bor

ENSAFE

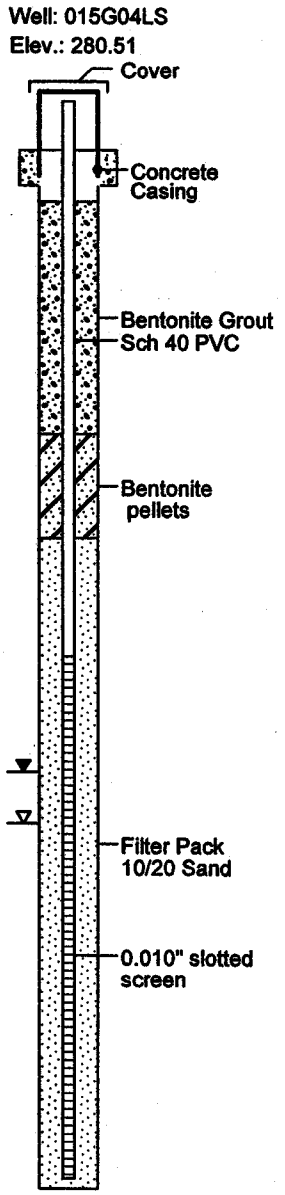
BORING LOG OF 015G04LS

NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0106

Started	: 4/26/02@1040	Northing	: 391539.190
Finished	: 4/26/02@1140	Easting	: 812951.216
Drilling Method	: HSA	TOC Elevation	: 280.51
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 20 feet
Geologist	: J. Broughton	Well Screen	: 9.8 to 19.8 feet

Depth in feet	Samples	% Recovery	PID (ppm)	Soil Sample	GRAPHIC	USCS	DESCRIPTION
0		100	48			ML	(0-4.5') Clayey silt, dark yellowish brown, with occasional gravel, moist, friable
5		100	250				(4.5-8') Color is medium olive gray, moist, with odor and occasional gravel
							(8-20') No gravel
10		60	380	04LS-12			(13-20') Silt content increasing down column, sampler wet
15		100	580	04LS-17			(15-16') Color is medium brown (16-18') Color is dark grayish brown
		0	—	Shelby Tube 18-20'			(18-20') No recovery
20							
25							



07-29-2003 N:\well logs\NSAMidsouth\SWMU 15\015G04LS.bor

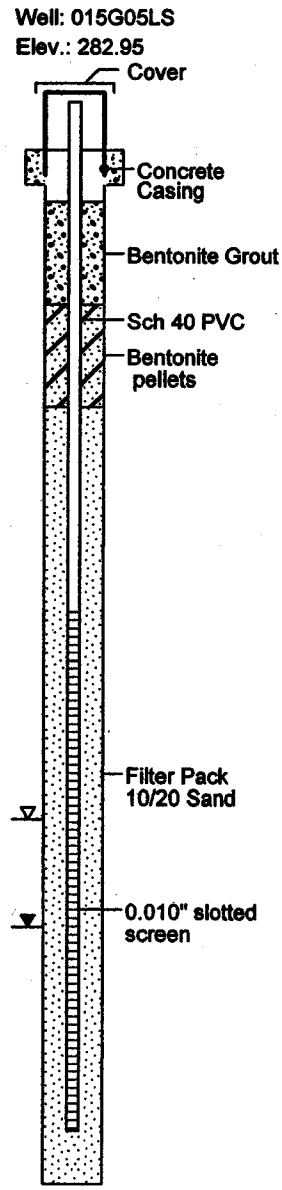
BORING LOG OF 015G05LS

NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0106

Started	: 4/25/02@0925	Northing	: 391577.065
Finished	: 4/25/02@1020	Easting	: 813050.266
Drilling Method	: HSA	TOC Elevation	: 282.95
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 20 feet
Geologist	: J. Broughton	Well Screen	: 9 to 19 feet

Depth in feet	Samples	% Recovery	PID (ppm)	Soil Sample	GRAPHIC	USCS	DESCRIPTION
0		100	0				(0-3') Clayey silt, dark yellowish brown, moist, friable
							(3-7.5') Clayey silt with gravel (fill), dark brown, moist
5		60	0.8				
							(7.5-8') Clayey silt, dark brown with olive gray mottling (8-14.5') Color is medium olive gray with brown mottling, very moist, firm
10		80	15	05LS-10		ML	
							(13-18') Very moist, sampler is wet
							(14.5-17') Color is dark brown
15		100	1500				
				05LS-17			(17-18') Color is dark gray brown, with odor
							(18-20') No recovery
		0	—	Shelby Tube 18-20'			
20							
25							



07-29-2003 ...ver\Logs\NSA\Mid-south\SWMU 15\015G05LS.bor

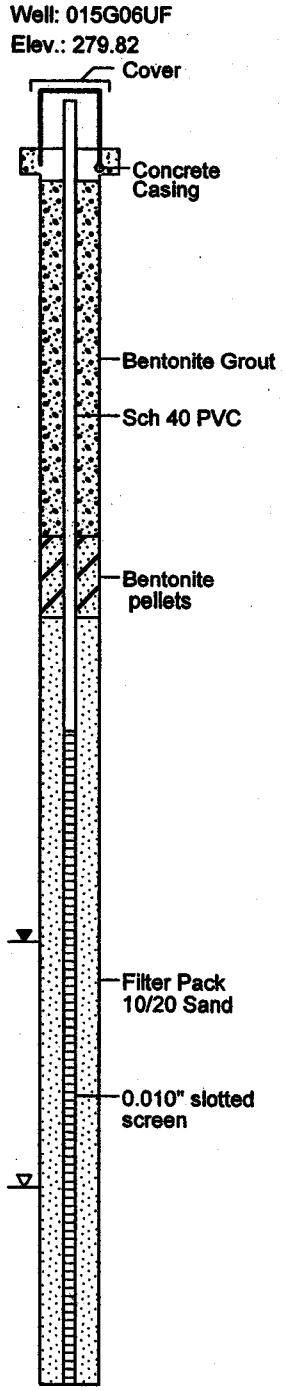
BORING LOG OF 015G06UF

NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0106

Started	: 4/24/02@1305	Northing	: 391649.152
Finished	: 4/24/02@1610	Easting	: 812865.268
Drilling Method	: HSA	TOC Elevation	: 279.82
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 38 feet
Geologist	: J. Broughton	Well Screen	: 28 to 38 feet

Depth in feet	Samples	% Recovery	PID (ppm)	Soil Sample	GRAPHIC	USCS	DESCRIPTION
0		100	15				(0-1.5') Clayey silt, dark yellowish brown, moist, friable, with some gravel (fill) (1.5-8') With no gravel, with some medium gray mottling
5		80	20				(3-8') With some iron staining
10		60	15	06UF-11			(8-13') Color is dark yellowish brown to medium olive gray, with littlie to no mottling
15		100	8	Shelby Tube 16-18'		ML	(13-15.5') Color is medium olive gray (15.5-18') Color is dark grayish brown
20		100	8				(18-20') Color is dark yellowish brown, moist, with iron staining, with increased silt content (20-21') Color is medium olive gray (21-26') Color is medium grayish brown, with little to no staining
25		100	—				(226-28') Clayey silt, reddish brown, moist, very stiff
30		100	—	06UF-30		CL	(28-32') Fine sandy clay, reddish brown, very moist, stiff
35		100	—			SP	(32-38') Fine sand, reddish brown, wet, firm
40							



07-29-2003 N:\well logs\NSA\Mideouth\SWMU 15\015G06UF.bor

ENSAFE

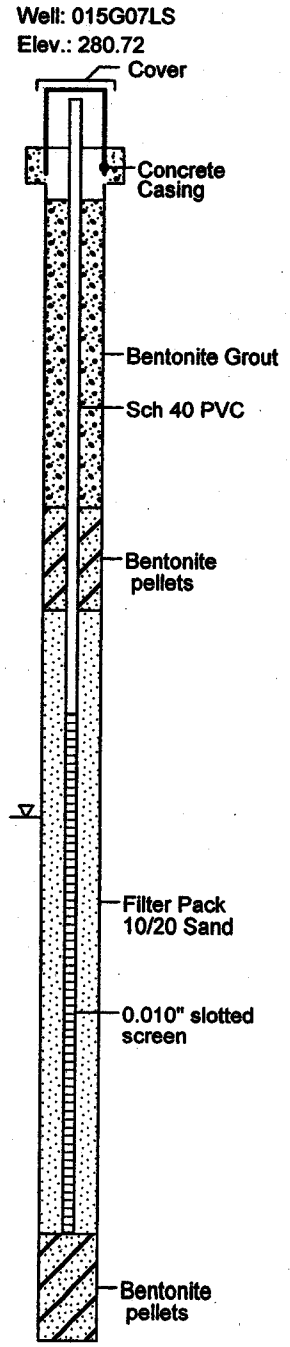
BORING LOG OF 015G07LS

NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0106

Started	: 4/24/02@0925	Northing	: 391656.513
Finished	: 4/24/02@1630	Easting	: 812956.526
Drilling Method	: HSA	TOC Elevation	: 280.72
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 23 feet
Geologist	: J. Broughton	Well Screen	: 11 to 21 feet

Depth in feet	Samples	% Recovery	PID (ppm)	Soil Sample	GRAPHIC	USCS	DESCRIPTION
0		100	48			ML	(0-8') Clayey silt, dark yellowish brown, moist, friable
							(3-13') With iron staining
5		100	12				(5.5-13') With light gray mottling
							(8-13') Very moist
10		100	7	07LS-10			
							(13-18') Color is dark grayish brown, with little to no mottling, very moist, sampler wet
15		100	7	07LS-16			
							~1' of water in hole
							(18-23') With silt content increasing, color is medium yellowish brown with some staining, very little mottling
20		80	---				
25							



07-29-2003 ...gs\NSAMidsouth\SWMU 15\015G07LS.bor

ENSAFE

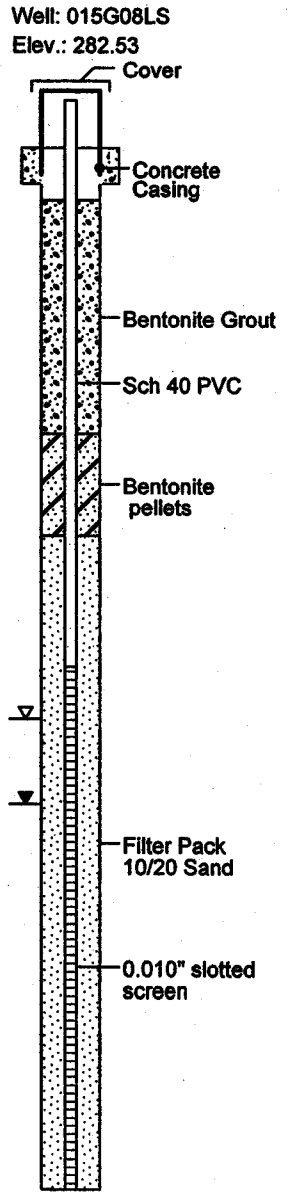
BORING LOG OF 015G08LS

NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0106

Started	: 6/12/02@0910	Northing	: 391786.140
Finished	: 6/12/02@1000	Easting	: 812949.732
Drilling Method	: HSA	TOC Elevation	: 282.53
Drilling Company	: Tri-State Testing Services, Inc.	Total Depth	: 20 feet
Geologist	: J. Broughton	Well Screen	: 10 to 20 feet

Depth in feet	Samples	% Recovery	PID (ppm)	Soil Sample	GRAPHIC	USCS	DESCRIPTION
0		100	—				(0-3') Clayey silt, dark yellowish brown, moist, friable
							(3-18') With gray mottling, iron staining, and some concretions
5		100	—				
							(8-11') Becoming very moist
						ML	
10		100	—	08LS-10			(11-20') Very moist to wet
15		100	—	08LS-16			
		100	—			ML	(18-19.5') Silt with some clay content, medium gray, very moist to wet
20							(19.5-20') Color is dark brown with some iron staining
25							



07-29-2003 N:\well logs\NSAMidsouth\SWMU 15\015G08LS.bor

SWMU 18

BORING LOG OF 018G01LS

ENSAFE

NSA MID-SOUTH
Millington, TN.

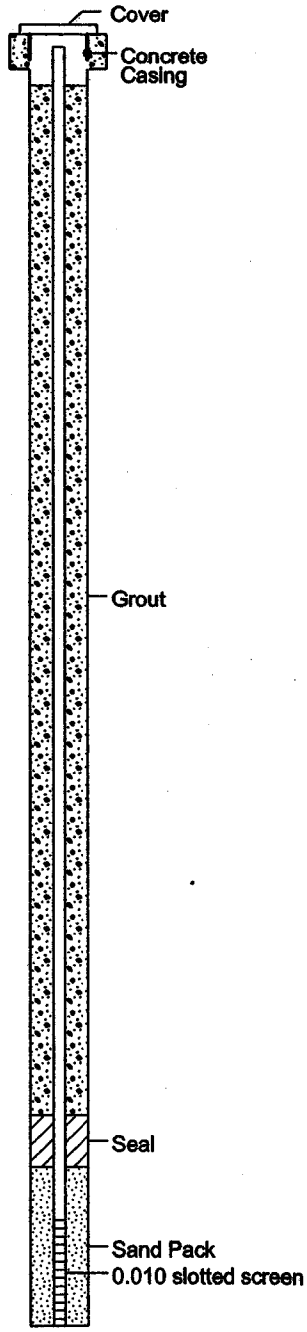
Location: SWMU 18

Project #: CTO 0094

Started	: 1400 4/12/99	Northing	: 391519.36
Finished	: 0900 4/13/99	Easting	: 814582.60
Drilling Method	: Rotosonic	TOC Elevation	: 289.07
Drilling Company	: Alliance	Total Depth	: 92.5 feet
Geologist	: C. Davis	Well Screen	: 46 to 86 feet

Depth in Feet	Surf. Elev. 289.31	Samples	% Rec-overy	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0	288	1	80			ML	(0-1) Concrete and fill material (1-7) Orangish brown silty clay, moist
5	283						
10	278	2	100			ML	(8-11) Orangish brown silt, moist (11-18) orangish brown silt w/ iron staining and concretions or nodules, moist
15	273						
20	268	3	100			SP	(18.5 - 20) Lt. orangish-brown fine sand, moist (20 - 24) Bright organgish-brown fine sand, moist
25	263					CL	(24-28) Pale orangish-brown to yellowish-gray slightly silty clay w/ minor portions of very fine sandy clay, moist
30	258	4	100			ML	(28 -32) Orangish-brown to yellowish-orange-gray very clayey silt w/ iron staining and concretions, moist (32 -34) Orangish-brown to yellowish-orange-gray, very fine sandy clayey silt, moist
35	253					MH	(34 -36) Pale orangish-brown, slightly silty, micaceous sand (very fine to fine), moist (36 - 38) Lt. gray, very fine to fine sand, very micaceous (muscovite), very moist
40	248	5	100			ML	(38 - 42) Lt. gray and pale orangish gray mottled silt w/ traces of very fine sand and iron staining, moist
45	243					ML	(42 - 43) Orangish brown fine sand layer 3" thick, then sandy clay layer 3" thick, then orangish gray clay layer 3" thick, then pale yellowish gray fine sand, moist
						SW	(43 - 48) Pale orangish to pale yellowish gray fine to med. sand, very moist to wet
50		6	100			SW	

Well: 018G01LS
Elev.: 289.07



07-28-2003 N:\well logs\NSAMidsouth\018G01LS.BOR

BORING LOG OF 018G01LS

NSA MID-SOUTH
Millington, TN.

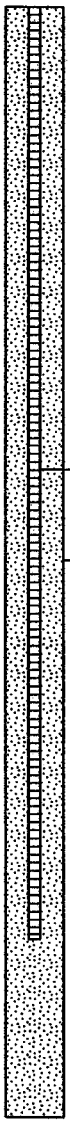
Location: SWMU 18

Project #: CTO 0094

Started	: 1400 4/12/99	Northing	: 391519.36
Finished	: 0900 4/13/99	Easting	: 814582.60
Drilling Method	: Rotosonic	TOC Elevation	: 289.07
Drilling Company	: Alliance	Total Depth	: 92.5 feet
Geologist	: C. Davis	Well Screen	: 46 to 86 feet

Depth in Feet	Surf. Elev. 289.31	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
50	238	6	100			SW	(48 - 50.5) Pale orangish gray med. to coarse sand, wet (50.5 - 65.5) Pale yellowish gray to Lt. gray med. to coarse sand w/ trace of gravel (up to 1" dia.), few very coarse sand pieces, few clay nodules (up to 2 1/2"), wet
55	233						
60	228	7	100				
65	223					SC	(65.5 - 68) Lt. olive gray clay w/ lignitic bands and pale yellowish gray to Lt. gray med. to coarse sand w/ trace of gravel (up to 1" dia.), moist to wet
70	218	8	80			SW	(68 - 80) Pale yellowish gray to Lt. gray med. to coarse sand w/ trace of gravel (up to 1" dia.) and clay lenses (gravel and clay content increases with depth), wet (80 - 84) Pale yellowish gray med. to coarse sand w/ gravel (up to 2 1/2" dia.) and a Lt. gray clay nodule (2 1/2" wide), wet
75	213						
80	208	9	100			ML	(84 - 86) Orangish brown and Lt. gray mottled very fine sandy silt, wet
85	203						
90	198	10	100			CL	(86 - 93) Dark brown w/ gray banding silty clay to clayey silt, moist
95	193						
100							

Well: 018G01LS
Elev.: 289.07



07-28-2003 N:\well logs\NSA\Midsouth\018G01LS.BOR

SWMU 20

Log of Monitoring Well 020G01LF

Environmental & Safety Designs, Inc.

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-148*	Surface Elevation: *266.23 feet msl*
Started at *0815 on 04-10-99*	TOC Elevation: *266.5 feet msl*
Completed at *1720 on 04-10-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *78 feet*
Geologist: *Carol Davis*	Well Screen: *48 to 78 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5									Surface Conditions: Asphalt. 020G01LF is located in the parking lot south of Building S-768.		
									Loess. Silt,very dense. Light orange-brown.		
									No recovery.		
			1	38					Loess. Silt. Light orange-brown and gray mottled. Some slightly clayey silt in the upper 3 feet. Iron staining throughout slightly decreasing with depth. Light orange-brown with gray mottles.		
10											
15											
			2	90							
20								ML CL	Loess. Clayey silt. Abundant iron staining and concretions.		
									More clay.		
25									Color change to light brown, olive gray at 24 feet.		
									Increased iron staining from 26 to 28 feet.		
			3	100					Loess. Silt. Light olive gray. Color grades to pale orange-gray.		
30											
			4	100					Collected Shelby tube sample		
35									Loess. Silt. Pale orange-gray.		
									Color change to orange-brown.		
			5	100					Color change to light olive gray.	2272	
40								SM	Fluvial. Intermittent medium to coarse sand (orange-brown) and silt (light olive gray) Sand bands 2 to 3 inches thick.		2-inch dia., Sch. 40 PVC; cement/bentonite grout

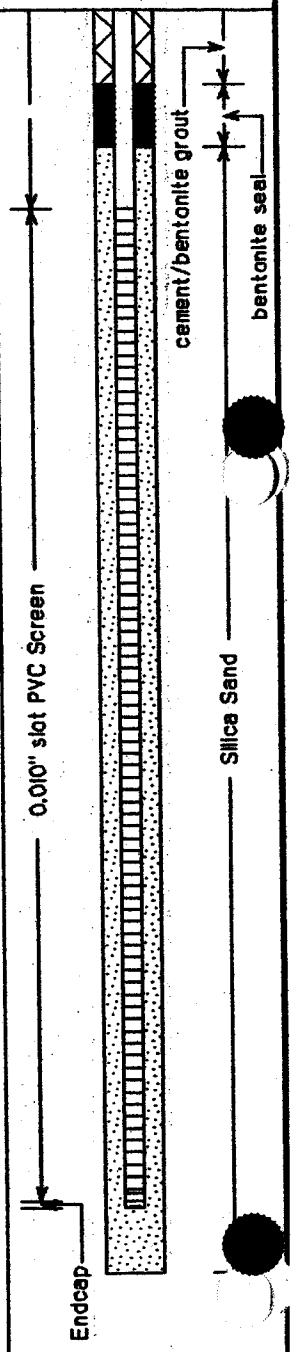
Environmental & Safety Designs, Inc.

Log of Monitoring Well 020G01LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *266.23 feet msl*
Started at *0815 on 04-10-99*	TOC Elevation: *266.5 feet msl*
Completed at *1720 on 04-10-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *78 feet*
Geologist: *Carol Davis*	Well Screen: *46 to 76 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45								SM		224.2
								SP SM	Fluvial. Gravelly sand. Sand coarse. Gravel up to 2 inches in diameter. Gravel increasing with depth. Light brownish gray.	
			6	100					Coarser sand. Color change to pale orange/yellow/brown.	
50									Gravel layer at 47.25 feet. 3 inches thick.	
									Sand and gravel. Gravel up to 3 inches in diameter.	215.7
									Fluvial. Sand, very fine to fine. Light gray. OUT OF GRAVEL.	
55										
									Fluvial. Clayey sand. Very fine to fine sand. Light gray to pale yellow-gray.	
			7	100					Fluvial. Sand, fine to medium grained. Light gray to pale, yellowish gray.	
60								SP	1.5-inch clay layer at 60 feet. Very light brown.	
65									Change to yellowish-gray fine sand at 67.5 to 68 feet.	
			8	100						
								CL	Orange-brown grading to brownish gray fine to medium grained sand	197.2
70										196.2
								SP	Fluvial. Clay, with lignite layers. Dark to very dark brown.	
									Fluvial. Sand, fine to very fine grained. Brownish gray grading to olive gray.	191.7
75								SC	Fluvial. Sand, fine to very fine. Alternating layers of brown and olive gray.	190.2
								CL		
			9	100					Cockfield. Clay, with lignite. Dense. Dark olive brown.	188.2
80									TD of borehole at 78 feet bgs.	

WELL DIAGRAM



SWMU 21

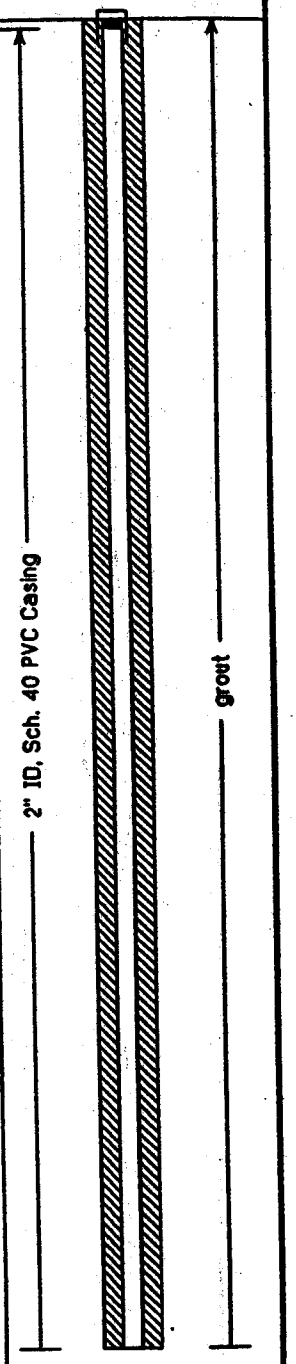
EnSafe/Allen & Hoshall

Monitoring Well 021G01LF

Project: NSA Memphis	Location: Millington, TN. SWMU#21 (Underground Waste Tank)
Project No.: 0094-08420	Surface Elevation: 293.82 feet msl
Started at 0730 on 2-20-96	TOC Elevation: 293.42 feet msl
Completed at 1405 on 2-20-96	Depth to Groundwater: 34.87 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 258.55 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 96 feet
Geologist: J.A. Kingsbury	Well Screen: 80 to 90 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	0	BG			(0'-6') No recovery: concrete clogged core barrel.	287.8
10			2	35	BG		ML	(6'-16') Clayey silt. Light brown to reddish-brown in color.	
15								(16'-18') Silt with some clay and sand, light brown.	275.8
20							SP	(18'-20') Sand, medium-grained, light brown in color.	273.8
			3	80	BG		ML	(20'26') Silt, light brown to yellowish-brown in color.	
25								(24'-26') Reddish-brown to yellowish-brown in color with minor sand and clay.	267.8
30							CL	Clay, light olive gray to dark yellowish-orange. Rare scattered gravel throughout. Some thin sand lenses from 26' to 30'. Clay becomes silty from 30' to 35'. Fluvial deposits contact estimated at 34' based on geophysical log interpretation.	

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 021G01LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#21 (Underground Waste Tank)*
Project No.: *0094-08420*	Surface Elevation: *293.82 feet msl*
Started at *0730 on 2-20-96*	TOC Elevation: *293.42 feet msl*
Completed at *1405 on 2-20-96*	Depth to Groundwater: *34.87 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *258.55 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96 feet*
Geologist: *J.A. Kingsbury*	Well Screen: *80 to 90 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			4	120	BG		CL		
35							ML	(35'-36') Silt, light olive gray in color, some iron staining.	258.8
							ML/SP	(36'-40') Silt and fine-grained sand with some clay. Light gray to light yellowish-gray.	257.8
40			5	80	BG			Sand, fine to medium-grained, light yellowish-gray to yellowish- brown.	253.8
45							SW	Medium to coarse-grained, micaceous, yellowish-gray color.	
50			6	100	BG				
55									
60							SP	(58'-60') Sand, coarse-grained, with some small gravel present, gray in color.	235.8
							SC/SM		233.8

WELL DIAGRAM

2" ID, Sch. 40 PVC Casing

grout

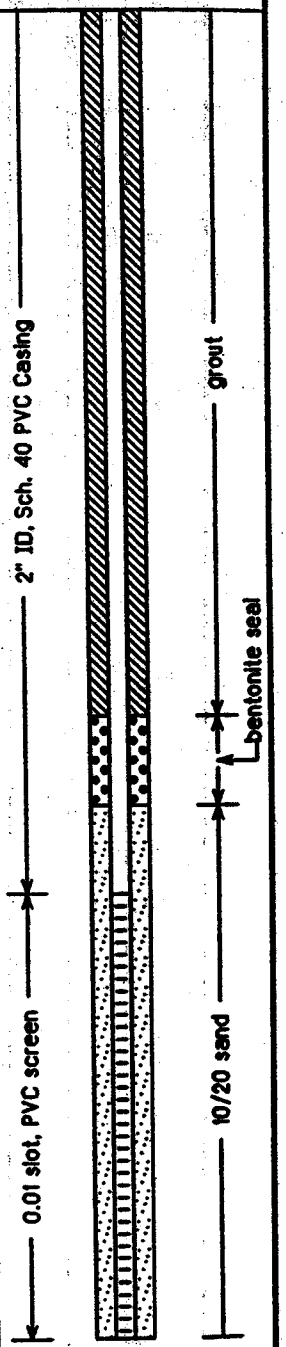
EnSafe/Allen & Hoshall

Monitoring Well 021G01LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#21 (Underground Waste Tank)*
Project No.: *0094-08420*	Surface Elevation: *283.82 feet msl*
Started at *0730 on 2-20-96*	TOC Elevation: *283.42 feet msl*
Completed at *1405 on 2-20-96*	Depth to Groundwater: *34.87 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *258.55 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96 feet*
Geologist: *J.A. Kingsbury*	Well Screen: *80 to 90 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
									283.8
			7	100	BG		SC SM	(60'-66') Sand, fine-grained, with clay and silt stringers, yellowish- gray.	
65									227.8
							CL ML	(66'-67') Silty and sandy clay. Yellowish-gray to yellowish-brown in color.	226.8
							SW SC	Sand, fine to medium-grained, yellowish-gray to very light yellowish- brown. Clay stringers between 67' and 70'.	
70									223.8
			8	115	BG		SW	(70'-80') Sand fine to medium-grained, yellowish-gray to very light yellowish-brown in color.	
75									
80									213.8
			9	90	BG		SW SC	(80'-86') Sand, fine to medium-grained, with thin layers of clay and gravel (1" to 2" thick). Yellowish-gray to very light yellow- brown in color.	
85									207.8
							SP	(86'-90') Sand, coarse-grained yellowish-gray in color. Contains some gravel from 88' to 89'. Color changes to reddish brown at 89' until 90'.	
90							ML CL		203.8

WELL DIAGRAM



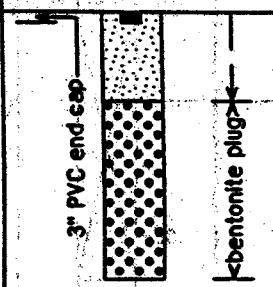
EnSafe/Allen & Hoshall

Monitoring Well 021G01LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#21 (Underground Waste Tank)*
Project No.: *0094-08420*	Surface Elevation: *293.82 feet msl*
Started at *0730 on 2-20-96*	TOC Elevation: *293.42 feet msl*
Completed at *1405 on 2-20-96*	Depth to Groundwater: *34.87 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing*	Groundwater Elevation: *258.55 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96 feet*
Geologist: *J.A. Kingsbury*	Well Screen: *80 to 90 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
									293.6
			10	110	BG		ML CL	(90-96') Cockfield Formation: Silt and clay; yellowish-gray to reddish-brown in color.	
									201.8
95							CL SP	Brown clay interstratified with fine sand.	
									197.8
								Soil boring terminated at 96'.	
100									
105									
110									
115									
120									

WELL DIAGRAM



EnSafe/Allen & Hoshall

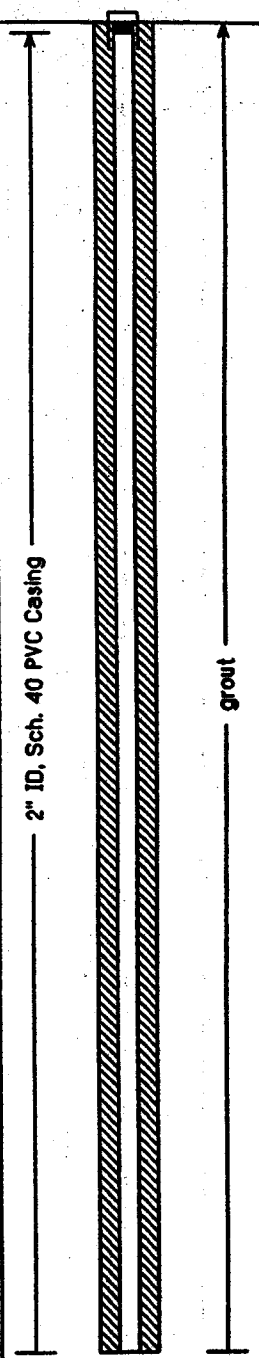
Monitoring Well 021G02LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #21 (Underground Waste Tank)*
Project No.: *0094-08420*	Surface Elevation: *293.82 feet msl*
Started at *1235 on 2-26-96*	TOC Elevation: *293.42 feet msl*
Completed at *1635 on 2-26-96*	Depth to Groundwater: *34.87 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *258.55 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *77 to 87 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								(0'-3') Concrete and gravel.	
			1	100	BG		ML	(3'-9') Clayey silt. Dark yellowish-brown to moderate brown in color. (4'-6') Moist.	290.8
							CL	(9'-11') Clay. Moderate brown in color, stained dark yellowish-orange and light brown. Very hard.	284.8
			2	110	BG		ML	(11'-16') Sandy silt. Moderate yellowish-brown to moderate brown in color. Moist with iron-manganese nodules and very light gray sandy patches from 14' to 15', becoming more sandy near 16'.	282.8
							SM	(16'-16.5') Silty sand, fine to medium-grained, moderate brown to light brown color, moist.	277.8 / 277.3
							SC	(16.5'-18.5') Sand, fine to coarse-grained, with clay seams. Moderate yellowish-brown to dark yellowish-orange, becoming light brown near 18'.	275.3
			3	105	BG		CL	(18.5'-26') Clay, slightly sandy. Moderate yellowish-brown to dark yellowish-orange color, mottled with light gray and moderate reddish-brown material. Reddish-brown iron concretions at 21'. Becoming more moderate reddish-brown overall and slightly sandier near 25'.	

5 10 15 20 25

WELL DIAGRAM



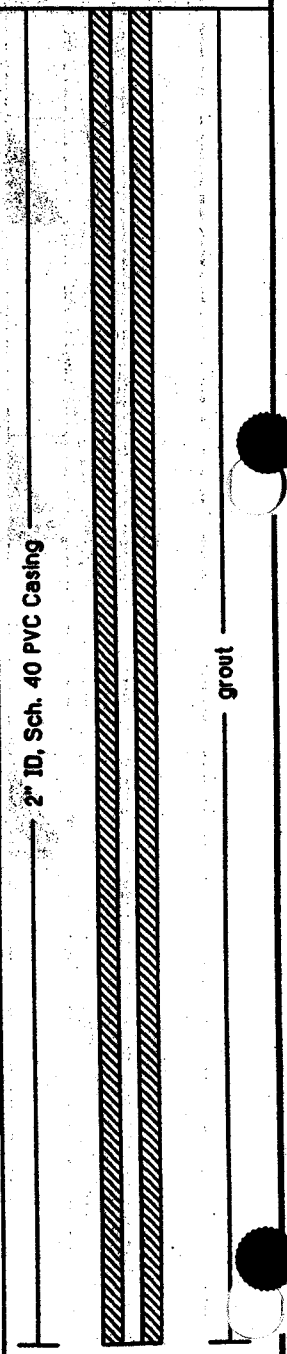
EnSafe/Allen & Hoshall

Monitoring Well 021G02LF

Project: NSA Memphis	Location: Millington, TN. SWMU #21 (Underground Waste Tank)
Project No.: 0094-08420	Surface Elevation: 293.82 feet msl
Started at 1235 on 2-26-96	TOC Elevation: 293.42 feet msl
Completed at 1635 on 2-26-96	Depth to Groundwater: 34.87 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 258.55 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 96 feet
Geologist: D. Ladd, W. Parks	Well Screen: 77 to 87 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
30			4	100	BG		CL	(26'-34') Sandy clay, moderate yellowish-brown to dark yellowish- orange, mottled with light gray and moderate reddish-brown material. Contains considerable iron staining. Increase in moderate reddish-brown material near 28'. Dark iron concretions and a small piece of gravel near 28.5'.	
									259.8
35							CL SC	(34'-88') Fluvial Deposits (see descriptions below). (34'-39.5') Clay and sand, contains some sand seams, moist.	
									254.3
40			5	110	BG		SW	Pale red mottled with light gray and moderate yellowish-brown material. (39.5'-46') Sand, fine to coarse-grained, yellowish-gray, wet. Contains some slightly clayey seams. Yellowish-gray to grayish-yellow color from 39.5' to 40.5'.	
45								(46'-52') Sand, fine to coarse, yellowish-gray to grayish-yellow, slightly clayey from 46' to 48.5', with a moderate yellowish-brown clay seam at 47', wet.	
50									

WELL DIAGRAM



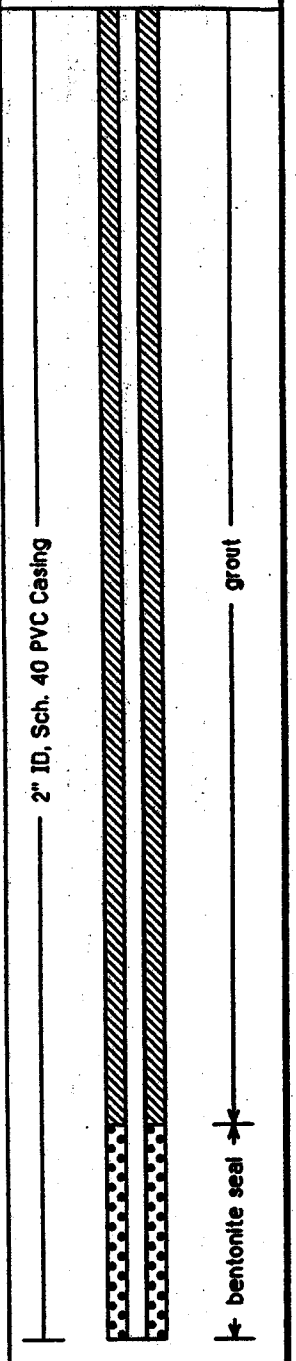
EnSafe/Allen & Hoshall

Monitoring Well 021G02LF

Project: NSA Memphis	Location: Millington, TN. SWMU #21 (Underground Waste Tank)
Project No.: 0094-08420	Surface Elevation: 293.82 feet msl
Started at 1235 on 2-26-96	TOC Elevation: 293.42 feet msl
Completed at 1635 on 2-26-96	Depth to Groundwater: 34.87 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 258.55 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 96 feet
Geologist: D. Ladd, W. Parks	Well Screen: 77 to 87 feet

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	6	95	BG	SW		
				SW	(52'-54.5') Sand, fine to coarse, with a few small clayey zones, light olive gray in color. Wet.	241.8
55				SW	(54.5'-56') Sand, fine to very coarse-grained, with some angular gravel (up to 0.75" in longest dimension). Sand is light olive gray to grayish-orange; gravel is moderate yellowish-brown. Wet.	239.3
					(56'-62') Sand, fine to very coarse, with scattered angular to rounded gravel. Wet. Same color as above. From 56.5' to 58', sand becomes olive gray to moderate yellowish-brown. Gravel content increases.	
60	7	160	BG			231.8
65				SC	(62'-86') Sand, fine to medium-grained, with clay seams. Sand is yellowish-gray, clay seams are yellowish-gray with some pale red material from 62' to 62.5' and 64' to 64.5'. Some reworked moderate yellowish-brown material at the top of the clay seam at 62'. With 3" thick clay seams at 67', 68', 69.5', 71', and 74'. Clay seams contain some dark yellowish-orange to moderate yellowish-brown material.	
70	8	100	BG			
75					Small piece of angular brown gravel at 73'.	

WELL DIAGRAM



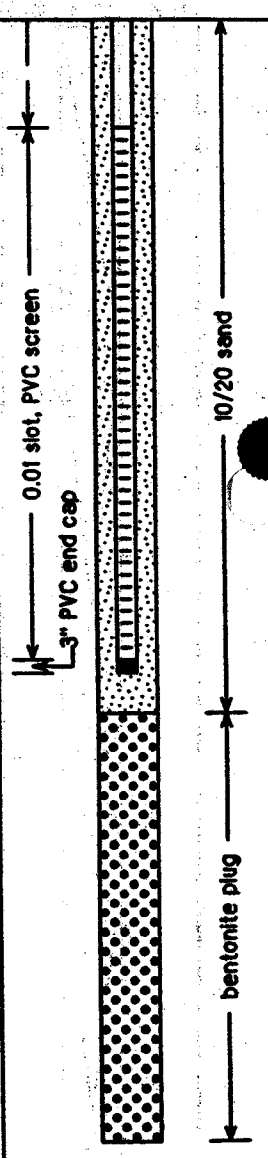
EnSafe/Allen & Hoshall

Monitoring Well 021G02LF

Project: NSA Memphis	Location: Millington, TN. SWMU #21 (Underground Waste Tank)
Project No.: 0094-08420	Surface Elevation: 293.82 feet msl
Started at 1235 on 2-26-96	TOC Elevation: 293.42 feet msl
Completed at 1635 on 2-26-96	Depth to Groundwater: 34.87 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 258.55 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 96 feet
Geologist: D. Ladd, W. Parks	Well Screen: 77 to 87 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
80			9	110	BG		SC	Clay seams present at 78', 80', and 81', with some moderate yellowish-brown material above and below clay seams and some iron staining within the seams. Small gravel at 76' and 85.5'; rare small rounded gravel at 84'.	
85							SC GC	(86'-87') Very clayey sand and gravel. Sand is fine to very coarse- grained, and gravel (up to 1.5" in longest dimension) and is angular to rounded. Iron concretion near 87' (1"wide).	207.8
							SW GW		206.8
90			10	130	BG		CL SP	(87'-88') Sand and gravel. Sand is fine to very coarse-grained, and gravel is angular (up to 3.5" in longest dimension). Moderate yellowish-brown to dark yellowish-orange. Becomes a very fine-grained sand near 88', banded dark yellowish-orange and light gray in color.	205.8
								(88'-96') Cockfield Formation. Silty clay and very fine-grained sand. Dark yellowish-brown to dusky yellowish-brown in color. Laminations of light olive gray-colored fine sand are present.	
95								Marcasite is present near 95'.	197.8
100								Terminated soil boring at 96'.	

WELL DIAGRAM



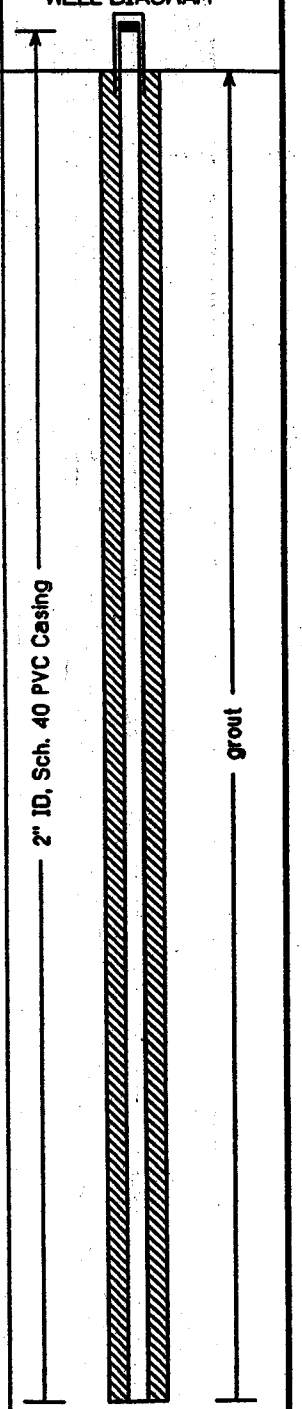
EnSafe/Allen & Hoshall

Monitoring Well 021G03LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#21 (Underground Waste Tank)*
Project No.: *0094-08420*	Surface Elevation: *292.23 feet msl*
Started at *1440 on 2-27-96*	TOC Elevation: *294.43 feet msl*
Completed at *1015 on 2-28-96*	Depth to Groundwater: *35.71 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *258.72 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *96 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *78 to 88 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							OL	(0'-2.5') Soil, roots/grass, organic material, and gravel.	289.7
5			1	83	BG		ML	(2.5'-13') Silt, clayey (see descriptions below). (2.5'-8') Clayey silt. Moderate yellowish-brown to moderate brown in color. (8'-11') Silt, clayey, light brown in color, mottled with dark yellowish-orange material below 9' and light olive gray material below 10'.	
10			2	110	BG			(11'-13') Silt, clayey, moderate yellowish-brown to light brown in color. Rare lignitic material, becomes sandy near 13'.	279.2
15							SM	(13'-15.5') Silty sand, fine-grained, moderate yellowish-brown to light brown in color. Wet, marked decrease in silt content from 14' to 15.5'.	276.7
20			3	95	BG		SM SC	(15.5'-25.5') Silty sand and sandy silt (see descriptions below). (15.5'-16') Silty and clayey fine-grained sand. Light brown in color, mottled with light olive gray material. (16'-21') Sandy silt. Dark yellowish-orange in color, mottled with moderate reddish-brown material and iron concretions of the same color. Very hard. (21'-24') Silty sand, very fine-grained, dark yellowish-orange mottled with moderate reddish-brown and light gray material.	
25							SC	(24'-25.5') Sandy silt. Dark yellowish-orange in color, mottled with moderate reddish-brown, light gray, and some pale red material.	268.7
30							ML	(25.5'-26.5') Sand. Dark yellowish-orange in color, mottled with light gray and pale red material. With clay at 26'.	265.7

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 021G03LF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#21 (Underground Waste Tank)*
Project No.: *0094-08420*	Surface Elevation: *292.23 feet msl*
Started at *1440 on 2-27-96*	TOC Elevation: *294.43 feet msl*
Completed at *1015 on 2-28-96*	Depth to Groundwater: *35.71 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic – 4" core barrel inside 6" casing*	Groundwater Elevation: *258.72 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *86 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *78 to 88 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
			4	90	BG		ML	(26.5'–34.5') Clayey and sandy silt. Dark yellowish-orange in color, mottled with light gray, moderate reddish-orange, and pale red material. Fluvial deposits contact estimated at 34'.	257.7	
35							SP		254.7	
40			5	100	BG			(34.5'–87.5') Sand with clay seams and some gravel (see descriptions below). (34.5'–36') Fine-grained sand, dark yellowish-orange mottled with pale red and very light gray material. Clay seams present at 35' and 36' are pale red in color mottled with very light gray to yellowish-gray material.		2" ID, Sch. 40 PVC Casing
45								(36'–39') Fine-grained sand, yellowish-gray mottled with pale red material; clayey from 36' to 37.5', very wet from 37.5 to 38', wet below. Contains some lignitic material.		
50			6	80	BG		SP	(39'–46') Sand, fine, mostly yellowish-gray in color with some patches of pinkish-gray material. Wet. (46'– 55') Sand, fine, yellowish-gray to very pale orange in color and mottled with some dark yellowish-orange material to 50'.		
55								Yellowish-gray clay seams at 48' and 53.5'. The clay seam at 53.5' contains some lignitic material. Rare gravel is present at 54'. (55'–56') Fine-grained sand, light olive gray in color.		grout
60										

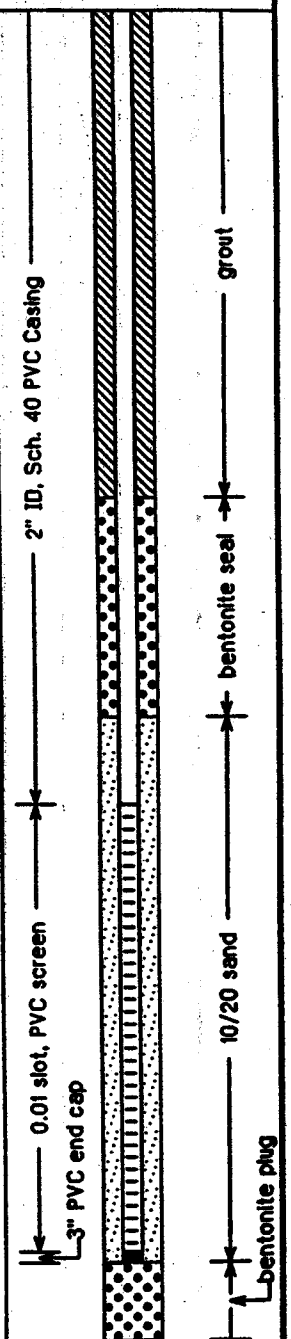
EnSafe/Allen & Hoshall

Monitoring Well 021G03LF

Project: NSA Memphis	Location: Millington, TN SWMU#21 (Underground Waste Tank)
Project No.: 0094-08420	Surface Elevation: 282.23 feet msl
Started at 1440 on 2-27-96	TOC Elevation: 294.43 feet msl
Completed at 1015 on 2-28-96	Depth to Groundwater: 35.71 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 258.72 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 96 feet
Geologist: D. Ladd, W. Parks	Well Screen: 78 to 88 feet

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
65	7	100	BG		(56'-66') Sand, fine, yellowish-gray to dark yellowish-orange, changing to mostly very pale orange below 62'. Sand is slightly micaceous with rare quartz and chert gravel, which decreases in content below 62'. Thin grayish-orange clay seams are present at 57' and 59', and thicker clay seams (3" to 4") are present at 63' and 66' with dark yellowish-orange material above and below the clay seams.	
70	8	100	BG	SP	(66'-76') Fine-grained sand, mostly very pale orange in color with very pale orange clay seams scattered throughout. 4" thick clay seams containing dark yellowish-orange material and iron-manganese nodules are present at 68', 71', and 75.5'. Color changes from very pale orange to dark yellowish orange between 71' and 73', then becomes yellowish-gray from 73' to 76'. Lignitic material present. Rare gravel at 75'.	
80	9	75	BG		Fine-grained sand, very pale orange to grayish-orange, clayey and wet from 76' to 77', with 3" to 4" thick clay seams at 81' and 84'. Clay seams are very pale orange with dark yellowish-orange material. Contains gravel from 79' to 81', and composed mostly of very pale orange sand below 82'. Rare gravel at 85'. (86'-87.5') Fine-grained, yellowish-gray sand with gravel (up to 1" in longest dimension), wet.	204.7
85				SP GW	(87.5'-88.5') Sand and gravel, gravel is (up to 2" in longest dimension), dark yellowish-orange.	203.7
90				CL	(88.5'-96') Cockfield Formation: Clay with some sand seams.	

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 021G03LF

Project: NSA Memphis
Project No.: 0094-08420
Started at 1440 on 2-27-96
Completed at 1015 on 2-28-96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing
Drilling Company: Alliance Environmental, Inc.
Geologist: D. Ladd, W. Parks

Location: Millington, TN. SWMU#21 (Underground Waste Tank)
Surface Elevation: 292.23 feet msl
TOC Elevation: 294.43 feet msl
Depth to Groundwater: 35.71 feet Measured: 4/8/96
Groundwater Elevation: 258.72 feet msl
Total Depth: 96 feet
Well Screen: 78 to 88 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
95	X		10	120	BG		CL	Clay is dark yellowish-brown to dusky yellowish-brown in color; sand seams are very fine-grained and light olive gray color. The top 2" of clay is dark yellowish-orange, mottled with light brown and light olive gray material.		bentonite plug
								Soil boring terminated at 96'.	196.2	
100										
105										
110										
115										
120										

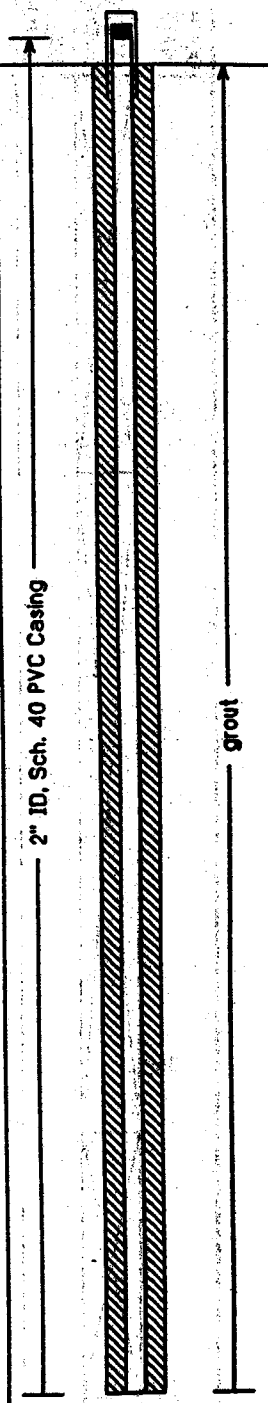
EnSafe/Allen & Hoshall

Monitoring Well 021G04UF

Project: NSA Memphis	Location: Millington, TN. SWMU#21 (Underground waste tank)
Project No: 0094-22133	Surface Elevation: 293.66 feet msl
Started at 1040 on 2-27-96	TOC Elevation: 295.71 feet msl
Completed at 1348 on 2-27-96	Depth to Groundwater: 37.03 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 258.68 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 50.25 feet
Geologist: D. Ladd, W. Parks	Well Screen: 40 to 50 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								(0'-6.5') Sand and gravel (backfill after underground waste tank was removed) is between 0' and 6.5'. Moderate yellowish-brown to dark yellowish-orange color.	
			1	100	BG		SW GW		
5								(6'-6.5') Gravel increases in size, and clay content increases.	287.2
								(6.5'-14.5') Clay and silt, becoming sandy near bottom (see descriptions below).	
								(6.5'-10') Silty clay. Moderate brown to moderate yellowish- brown in color, mottled with dark yellowish-orange and dark yellowish-brown material.	
10			2	85	BG		CL ML	(10.5'-14.5') Clayey silt, moderate brown to moderate yellowish- brown in color mottled with dark yellowish-orange and light olive gray material.	
								(12'-14.5') Sand content increase, along with an increasing amount of dark yellowish-brown material. Moist from 12' to 14'.	
									279.2
15								(14.5'-18.5') Silty and clayey sand (see descriptions below).	
							SC SM	(14.5'-16') Silty and clayey sand, very fine to fine-grained, moderate yellowish-brown to moderate brown color, very moist. Contains some lignitic material near 15'.	
								(16.5'-18.5') Becoming more clay-rich and moderate brown in color near 18.5'.	275.2
							CL	(18.5'-25') Silty clay with some very fine sand. Moderate yellowish- brown in color, mottled with some dark yellowish-orange material.	
20									

WELL DIAGRAM



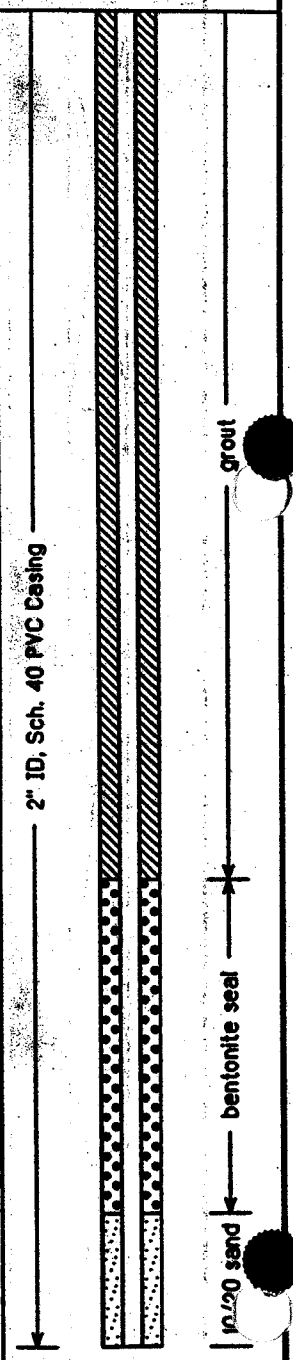
EnSafe/Allen & Hoshall

Monitoring Well 021G04UF

Project: NSA Memphis	Location: Millington, TN. SWMU#21 (Underground waste tank)
Project No.: 0094-22133	Surface Elevation: 293.66 feet msl
Started at 1040 on 2-27-96	TOC Elevation: 295.71 feet msl
Completed at 1348 on 2-27-96	Depth to Groundwater: 37.03 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" core barrel inside 6" casing	Groundwater Elevation: 258.68 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 50.25 feet
Geologist: D. Ladd, W. Parks	Well Screen: 40 to 50 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			3	105	BG		CL	Below 21', the silt content increases, and the sample is very hard. Sample is mottled with moderate reddish-brown and light gray to light olive gray material. Slightly micaceous. Sand content increases near 25'.	
25							SC SM	(25'-26.5') Silty and clayey sand, very fine to fine-grained, moderate brown to dark yellowish-orange color mottled with dark yellowish- orange and light gray material.	268.7
							ML	(26.5'-27.5') Sandy silt. Yellowish-gray and mottled with pale red and a small amount of dark yellowish-orange material, slightly micaceous. Reddish-brown iron concretions are present.	267.2
							SP	(27.5'-28.5') Sand, very fine to fine-grained, dark yellowish-orange color mottled with some pale red material, slightly micaceous.	266.2
30			4	121	BG		ML	(28.5'-34') Silt. Dark yellowish-orange to moderate yellowish- brown, mottled with very light gray and some dark yellowish-orange material, stiff. Some of the very light gray material is clayey.	265.2
							ML	(34'-35.5') Silt with very fine sand, pale red mottled with dark yellowish-orange to moderate reddish-brown material. Slightly micaceous.	259.7
35							SP	Fluvial deposits contact estimated near 36'. (35.5'-40') Silty fine-grained sand: Clayey near 35.5', yellowish- gray color mottled with pale red and dark yellowish-orange material between 35.5' and 37'. Becomes wet and mostly yellowish-gray in color between 37' and 40'.	258.2
			5	94	BG				
40									253.7

WELL DIAGRAM



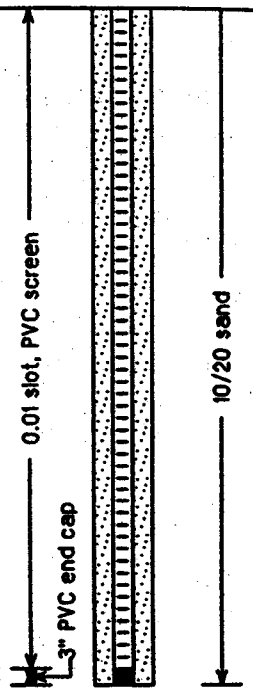
EnSafe/Allen & Hoshall

Monitoring Well 021G04UF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU#21 (Underground waste tank)*
Project No.: *0094-22133*	Surface Elevation: *293.66 feet msl*
Started at *1040 on 2-27-96*	TOC Elevation: *295.71 feet msl*
Completed at *1348 on 2-27-96*	Depth to Groundwater: *37.03 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" core barrel inside 6" casing*	Groundwater Elevation: *258.68 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *50.25 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *40 to 50 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			6	0	BG			No sample description available; attempted to collect a Shelby tube sample between 40' and 43', but no sample was recovered.	253.7
			7	30	BG			No sample description available; collected a Shelby tube sample from 43' to 46'.	250.7
45									
			8	100	BG		SM SC	(46'-50') Silty fine-grained sand, yellowish-gray, wet. Contains a 3.5" clay seam at 47.5' which is yellowish-gray in color, mottled with dark yellowish-orange to moderate yellowish-brown and very light gray with some pale red material. Mostly saturated.	247.7
50								Soil boring terminated at 50'.	243.7
55									
60									

WELL DIAGRAM



SWMU 39

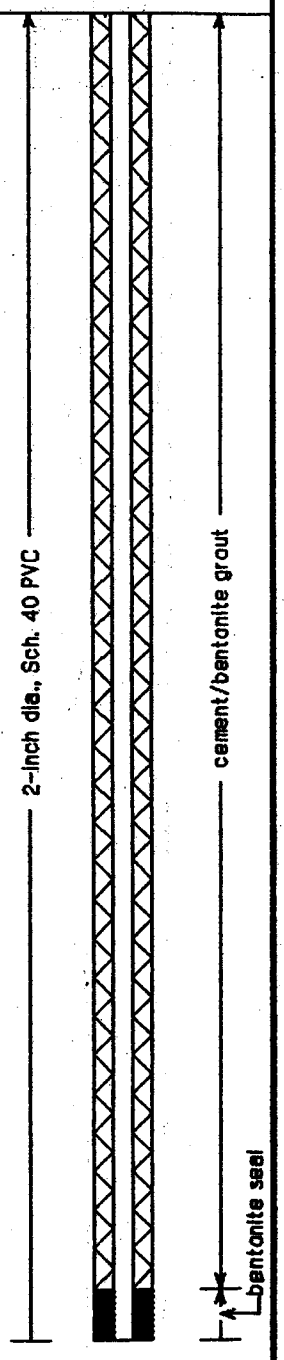
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G01LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-148*	Surface Elevation: *261.44 feet msl*
Started at *0930 on 03-23-99*	TOC Elevation: *261.13 feet msl*
Completed at *1700 on 03-23-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *78 feet*
Geologist: *G. Pierce*	Well Screen: *44 to 74 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
									Surface Conditions: Grass. 039G01LF is located in the grassy field, east of Building S-7, and Kittyhawk Avenue.	
									Hand augered from ground surface to 5 feet bgs to clear for utilities.	
5			1						Loess. Clayey silt, brown, stiff.	
			2							
10								ML CL		
									Loess. Clayey silt, loose to soft, light brown.	
15										
20										239.4
			3					NR	No Recovery	238.4
									Loess. Clayey silt, more stiff, light brown with gray mottling.	
25										
30								ML CL		
									Fluvial. Silty clay, loose, light brown, grading to silty fine sand, gray. Sand content increases the 31.5- to 36-foot section of core.	
35										225.4
								SM	Fluvial. Fine sand with silt. Light orange-brown.	223.4
			4					SP SM	Fluvial. Sand with poorly sorted gravel. Some silt. Gravel ranges from less than 0.25- to 1-inch in diameter. Light orange-brown.	
40										
									Fluvial. Sand with poorly sorted gravel. Gray, grading back to light orange brown	

WELL DIAGRAM



Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G01LF

Project: *Assembly F - RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *261.44 feet msl*
Started at *0930 on 03-23-99*	TOC Elevation: *261.13 feet msl*
Completed at *1700 on 03-23-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *78 feet*
Geologist: *G. Pierce*	Well Screen: *44 to 74 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45									Fluvial. Fine sand with trace gravel. Light orange-brown. Gravel increases with depth within the 44- to 48-foot length of core.	
			5						Fluvial. Fine sand and gravel. Gravel ranges from less than 0.25- to 2-inches in diameter. Varying amounts of sand and gravel throughtout. Light orange brown.	
50										
55								SP SM		
			6							
60										
65										
			7							
70										190.9
									Transition to Cockfield. Silt, firm/stiff, some very fine sand.	
75								CL	Cockfield. Silty clay with some very fine grained sand. Dark gray.	
			8						TD boring at 78 feet.	183.4
80										

WELL DIAGRAM

bentonite seal

0.010" slot PVC Screen

Endcap

silica sand

Log of Monitoring Well 039G02LF

Environmental & Safety Designs, Inc.

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *263.64 feet msl*
Started at *0930 on 03-24-99*	TOC Elevation: *263.47 feet msl*
Completed at *1815 on 03-24-99*	Depth to Groundwater: *feet* Measured
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *108 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 103 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Fill	Surface Conditions: Asphalt. East side of Building S-203.	262.6
5									Loess. Clayey silt, gray/brown	
10			1					ML CL	Loess. Clayey silt, brown, soft.	
15			2						Loess. Clayey silt, gray.	
20										
25			3						Increasing stiffness and lighter gray color with depth.	238.6
								NR	No Recovery	235.6
30								ML CL	Loess. Clayey silt, medium stiff, light gray and brown mottled.	
35									Quickly grades to silt with sand from 37- to 38-feet bgs.	226.6
			4					NR	No revcovery	225.6
40								SP SM	Fluvial. Silty fine sand, some small gravel (<0.25-inch), dark gray.	223.6
								ML CL		

WELL DIAGRAM

2-inch dia., Sch. 40 PVC

cement/bentonite grout

bentonite seal

Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G02LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *263.64 feet msl*
Started at *0930 on 03-24-99*	TOC Elevation: *263.47 feet msl*
Completed at *1815 on 03-24-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *108 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 103 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								ML CL	Fluvial. Silty clay with fine sand. Increasing sand and gravel with depth in the 40- to 44-foot section of core.	223.6
										219.6
45								SP SM	Fluvial. Sand and gravel with silt. Poorly sorted, very fine to medium grained, gravel up to 2 inches in diameter. Light gray.	
			5							
50										
									Fluvial. Sand and gravel with silt, sand coarsens and gravel larger with depth. Color grades to brown.	
55										
										205.6
								NR	No Recovery	204.6
			6						Fluvial. Sand and gravel, poorly sorted. Gravel from 0.25- to 2.5-inch diameter. Brown grading to orange-brown at 65 feet.	
60										
65								SP SM		
			7						Increasing silt	
70										
										180.6
									Fluvial. Silty fine sand grades from light brown to light gray. Grain size decreases with depth. OUT OF GRAVEL AT 74 FEET	
75								SM		
			8						Color change to light orange-brown.	
80										

WELL DIAGRAM

bentonite seal

0.010" slot PVC Screen

silica sand

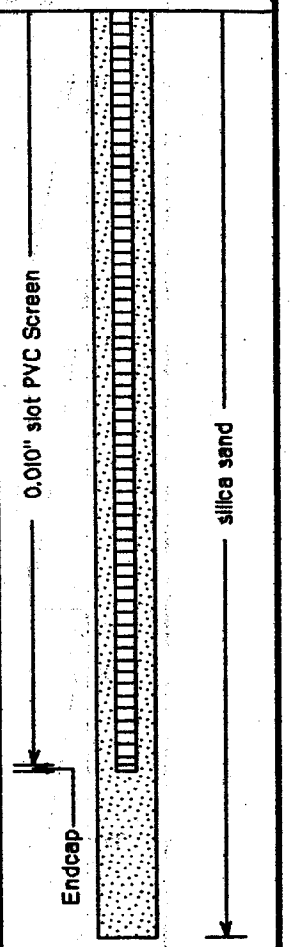
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G02LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *263.64 feet msl*
Started at *0930 on 03-24-99*	TOC Elevation: *263.47 feet msl*
Completed at *1815 on 03-24-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *108 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 103 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85			9					SM		
90										
95										165.6
								NR	No Recovery	
100			10							163.6
								SM	Fluvial. Silty fine sand, light orange-brown.	161.6
105								CL	Cockfield. Clayey silt, very stiff, very dense, dark gray to black.	
			11						TD Borehole at 108 feet bgs.	155.6
110										
115										
120										

WELL DIAGRAM



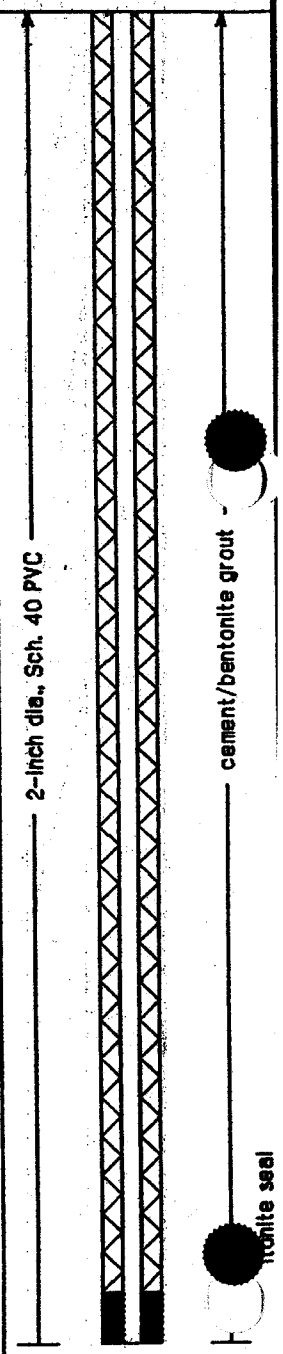
Log of Monitoring Well 039G03LF

Environmental & Safety Designs, Inc.

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-148*	Surface Elevation: *262.74 feet msl*
Started at *0945 on 03-23-99*	TOC Elevation: *262.33 feet msl*
Completed at *1755 on 03-23-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *108 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 103 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5									Surface Conditions: Grass. 039G03LF is located in the grassy field, east of Building S-1470, and south of Intrepid Avenue.	
									Hand augered from ground surface to 5 feet bgs to clear for utilities.	
									Loess. Clayey silt, brown, medium stiff	
10			1	100						
									Gray mottling at 13 feet	
15								ML CL	Grades to gray at 18 feet.	
20			2	100						
									Grades to increased silt at 24 feet.	
25									Gray and brown mottled.	
			3	100					Grades to orange-brown.	
30										230.7
									Loess grading to fluvial. Sandy silt, increasing sand with depth in the 32- to 36 foot section of core. Orange-brown.	
35								SP SM	Fluvial. Silty sand with gravel.	
			4	100					Fluvial. Silty clay/clayey silt with sand and gravel. Gravel ranges in size from 0.25- to 0.75-inch)	
40									Increased sand content.	

WELL DIAGRAM



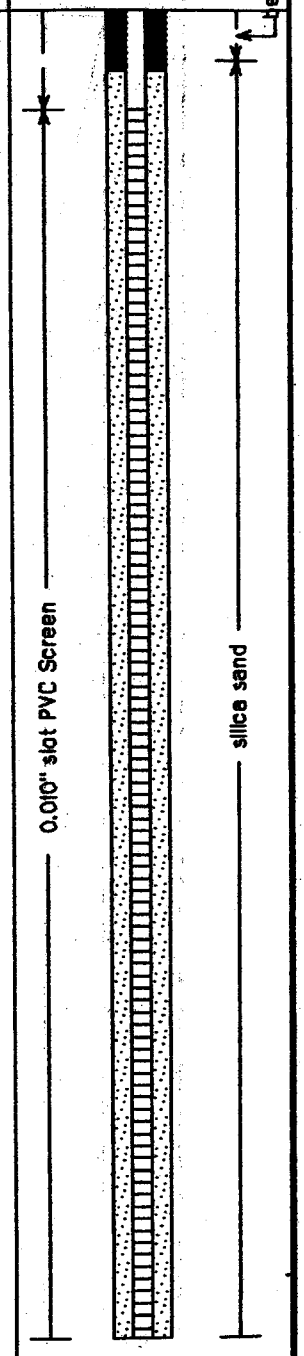
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G03LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *262.74 feet msl*
Started at *0945 on 03-23-99*	TOC Elevation: *262.33 feet msl*
Completed at *1755 on 03-23-99*	Depth to Groundwater: *feet* Measured
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *108 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 103 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45									Fluvial. Poorly sorted fine to coarse silty sand with gravel. Gravel up to 2 inches in diameter. Light gray.	
50			5	100						
55								SP SM	Fluvial. Sand with gravel, poorly sorted medium to coarse grained. Gravel from less than 0.25- to 1.5-inches in diameter. Light brown grading to light orange brown.	
60			6	100						
65										
70			7	100						
75			8	80				GP GM	Fluvial. Gravel, poorly sorted with sand. Light orange-brown.	189.7
								SM	Fluvial. Sand, very fine grained with silt. OUT OF GRAVEL 74 FEET	187.7
80										

WELL DIAGRAM



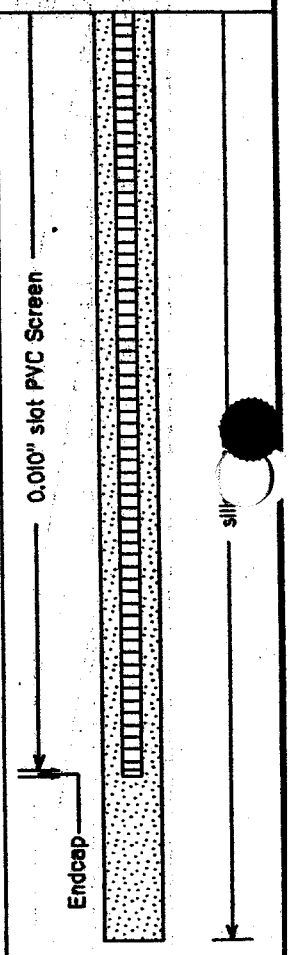
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G03LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *262.74 feet msl*
Started at *0945 on 03-23-99*	TOC Elevation: *262.33 feet msl*
Completed at *1755 on 03-23-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *108 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 103 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85			9	100				SM	Light orange brown, grading to gray at 80 feet then back to light orange brown at 82 feet.	
90										
95			10	100						
100										162.7
105			11	100				CL	Cockfield. Clay, silty and sandy, very fine grained sand. Dense, very stiff. Dark gray to black.	
110									TD boring at 108 feet bgs.	154.7
115										
120										

WELL DIAGRAM



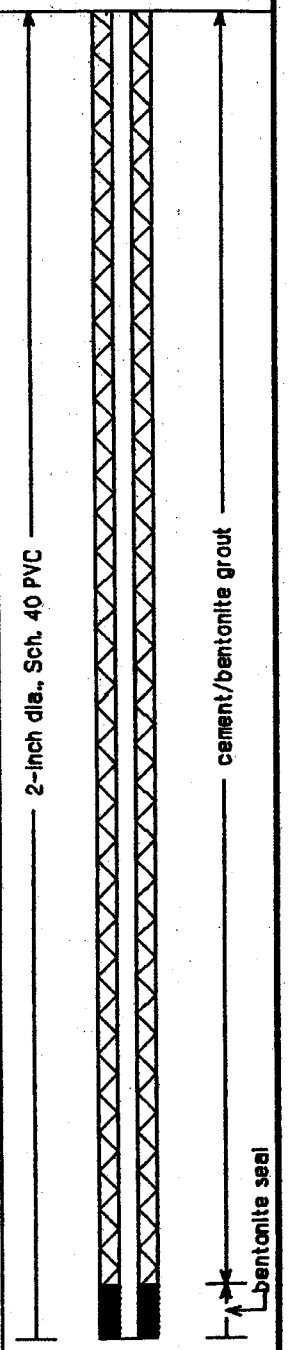
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G04LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-148*	Surface Elevation: *263.40 feet msl*
Started at *1030 on 03-26-99*	TOC Elevation: *263.17 feet msl*
Completed at *1755 on 03-26-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *103 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 103 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								ML CL	Surface Conditions: Grass. 039G04LF is located in the grassy field, at the southeast corner of Building S-203.	
5									Loess. Clayey silt, brown, medium stiff	258.4
								NR	No Recovery	
			1	50					Loess. Clayey silt, light brown.	255.4
10										
15									Grades to dark gray at 15 feet.	
			2	100						
20										
25								ML CL		
			3	100					Loess. Clayey silt with some very fine grained sand.	
30										
35									Gray mottling at 36 feet.	
			4	100						
40										

WELL DIAGRAM



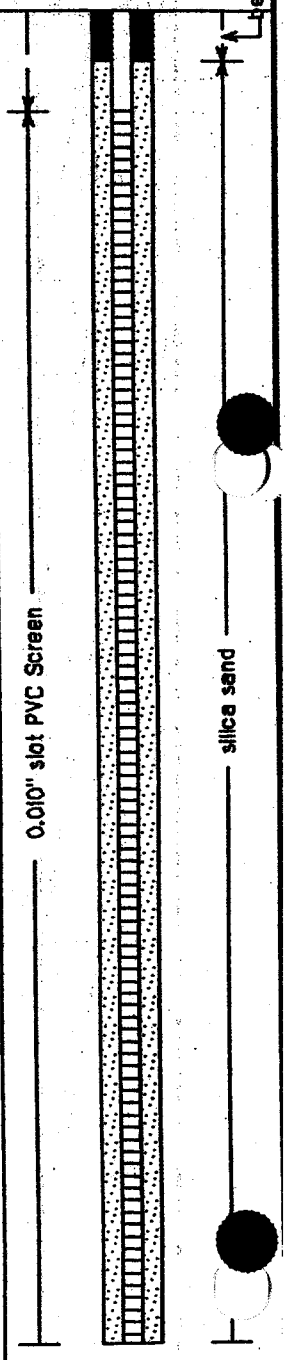
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G04LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *263.40 feet msl*
Started at *1030 on 03-26-99*	TOC Elevation: *263.17 feet msl*
Completed at *1755 on 03-26-99*	Depth to Groundwater: *feet* Measured
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *103 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 103 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								ML CL		221.9
									Fluvial. Silty sand with gravel. Fine to medium sand. Dark gray.	
45									Fluvial. Silty sand with gravel. Gravel poorly sorted, ranges in size from 0.25 to 2.0 inches in diameter. Light brownish gray.	
			5	100						
50									Fluvial. Sand with gravel. Sand fine grained with silt, poorly sorted. Gravel less than 0.25-inch.	
55									Fluvial. Silty sand with gravel. Gravel poorly sorted ranging in size from 0.25 to 2 inches in diameter. Light brownish gray.	
			6	100				SP SM	Fluvial. Silty sand with gravel. Poorly sorted medium to coarse sand.	
60										
65									Color change to orange brown.	
			7	100						
70										
75										187.9
			8	100				SM	Fluvial. Silty sand, very fine grained. Orange brown to 78.5, changes to light gray. OUT OF GRAVEL AT 75.5 FEET	
80										

WELL DIAGRAM



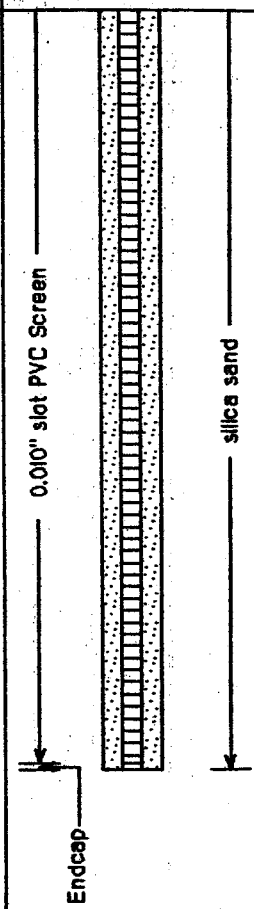
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G04LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *263.40 feet msl*
Started at *1030 on 03-26-99*	TOC Elevation: *263.17 feet msl*
Completed at *1755 on 03-26-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *103 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 103 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85			9	100				SM		
90										
95			10	100						
100										162.4
			11	100				CL	Cockfield. Clay, silty and sandy, very fine grained sand. Dense, very stiff. Dark gray to black.	160.4
105									TD boring at 103 feet bgs.	
110										
115										
120										

WELL DIAGRAM



EnSafe (SM)

Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G05LF

Project: *Assembly F - RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *262.70 feet msl*
Started at *0930 on 03-27-99*	TOC Elevation: *262.43 feet msl*
Completed at *1715 on 03-27-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 93 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5									Surface Conditions: Grass. 039G05LF is located in the grassy area south of the Building S-74 slab.		
									Loess. Clayey silt, brown		
10									Brown and gray mottled.		
15									Gray.		
20			1	100				ML CL			
25											
30			2	100							
35			3	100					Collected Shelby tube from 33 to 35 feet bgs.		
									Loess. Clayey silt with some very fine grained sand. Gray with brown mottling. Greenish gray from 37 to 38. No odor.		
40								SP SM	Loess grading to Fluvial. Silt with clay and very fine grained sand. Dark gray.	222.7	

2-inch dia., Sch. 40 PVC

cement/bentonite gro

ntonite seal

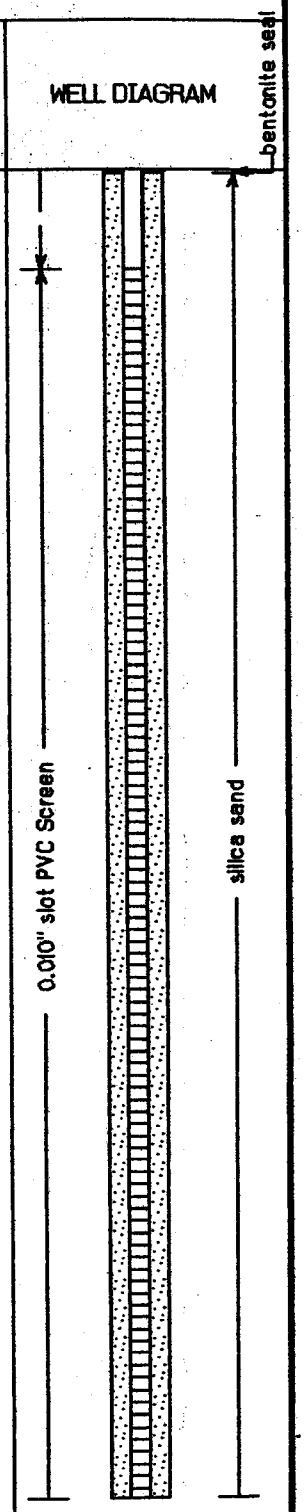
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G05LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-148*	Surface Elevation: *262.70 feet msl*
Started at *0930 on 03-27-99*	TOC Elevation: *262.43 feet msl*
Completed at *1715 on 03-27-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 93 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
									Fluvial. Silty sand, medium to coarse grained with small gravel. Dark gray.	222.7
									Fluvial. Sand and gravel, poorly sorted medium to coarse grained. Brown.	
45										
			4	100					Fluvial. Sand, very fine grained, with silt and trace gravel. Light gray.	
50									Fluvial. Sand, poorly sorted fine to medium grained with gravel. Gravel 0.25 to 1.5 inches in diameter. Light brown.	
55								SP SM		
			5	100					Gray and brown from 60 to 65 feet.	
60										
65									Light brown from 65 to 68.	
			6	100					Orange brown from 68 to 73.	
70										
									Fluvial. Silty sand, very fine grained, gravel, some clay stringers. Orange brown, grades out of gravel at 74 feet.	188.7
75								SM	Fluvial. Very fine silty sand OUT OF GRAVEL AT 74 FEET	
			7	100					Clay seam (0.5 to 1 inch thick) at 77.5 feet bgs.	
80									Light gray	

WELL DIAGRAM



Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G05LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *262.70 feet msl*
Started at *0930 on 03-27-99*	TOC Elevation: *262.43 feet msl*
Completed at *1715 on 03-27-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 93 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			8	100				SM	Light brown Light gray Light brown		0.010" slot PVC Screen
90									Fluvial. Silty sand, very fine grained, with some clay stringers. Orange brown.	170.7	Endcap
95			7	100				CL	Cockfield. Silty clay with some very fine grained sand. Very dark gray. Less silt with depth		silica sand
100									TD boring at 98 feet.	164.7	
105											
110											
115											
120											

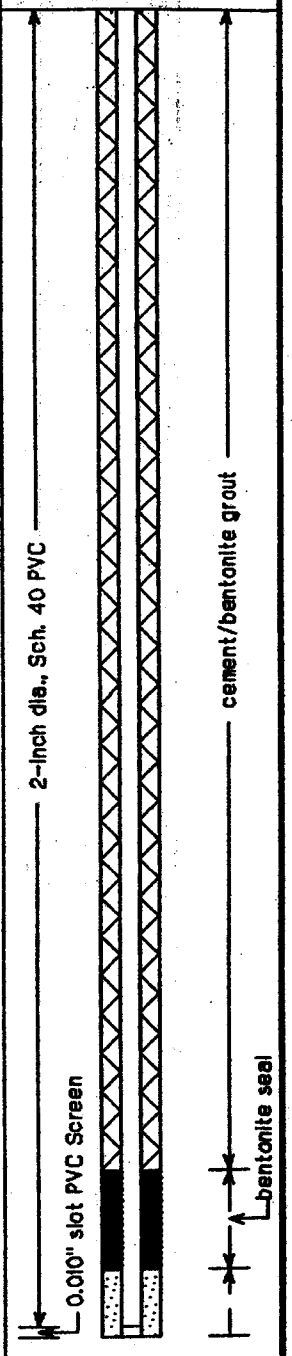
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G08LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *261.25 feet msl*
Started at *0950 on 03-28-99*	TOC Elevation: *260.96 feet msl*
Completed at *1645 on 03-29-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *78 feet*
Geologist: *G. Pierce*	Well Screen: *40 to 70 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0									Surface Conditions: Grass. 039G08LF is in a grassy area along the western property boundary fence, just south of Intrepid Ave.	
5									Loess. Clayey silt, brown	
10			1	100						
15									Brown and gray mottled.	
20			2	100				ML CL	Grades to gray brown.	
25										
30			3	100					Loess. Clayey silt, grades to sandy clayey silt. Sand is very fine grained. Light brown with some gray mottles.	
35			4	100					Loess grading to Fluvial. Sand increases toward bottom of 38-foot core. Grades to gray.	
								SM	Fluvial. Silty sand, poorly sorted fine to coarse. Gray brown.	224.2
40								ML CL	Fluvial. Clayey silt, gray.	222

WELL DIAGRAM



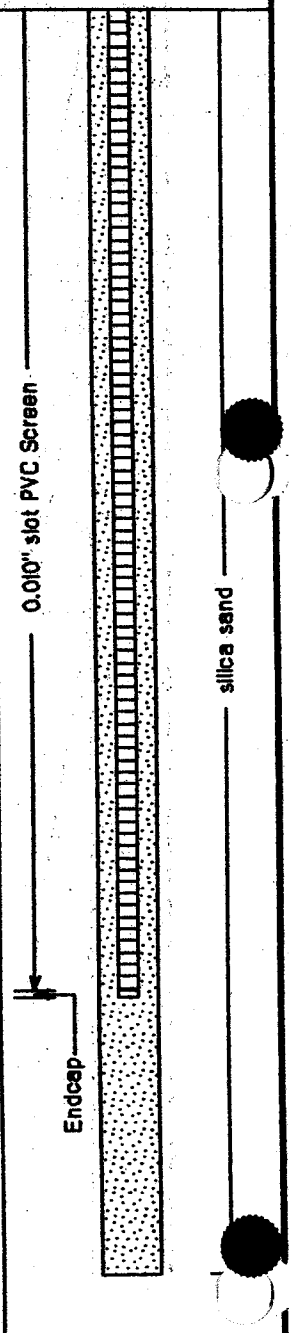
Log of Monitoring Well 039G06LF

Environmental & Safety Designs, Inc.

Project: *Assembly F - RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *261.25 feet msl*
Started at *0950 on 03-28-99*	TOC Elevation: *260.96 feet msl*
Completed at *1645 on 03-29-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *78 feet*
Geologist: *G. Pierce*	Well Screen: *40 to 70 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45								ML CL	Fluvial. Sand, very fine grained, some small gravel. Orange-brown.	220.7
								SP SM	Fluvial. Sandy gravel. Sand, fine to coarse, silty. Gravel ranges from 0.25- to 1.5-inch. Orange-brown.	
50			5	100						213.7
									Fluvial. Sand, fine grained. Orange-brown. OUT OF GRAVEL AT 47.5 FEET	
								SM	Fluvial. Silty sand, very fine grained, with trace gravel. Orange- brown.	
55										
60			6	100					Fluvial. Sand with some small gravel. Sand poorly sorted fine to coarse grained. Light brown.	
65								SP SM	Fluvial. Sandy gravel. Sand coarse with some fine. Light brown.	196.7 196.2
								SM	Fluvial. Sand, very fine grained with some gravel. Light brown.	194.2
			7	100				SP SM	Fluvial. Sand, very fine grained. No gravel. Light brown.	191.7
70									Fluvial. Gravelly sand. Sand is fine grained. Gravel up to 1.5 inches Light brown	
								CL	Cockfield. Silty clay. Dark gray.	
75										
			8	100					TD Boring at 78 feet bgs.	183.2
80										

WELL DIAGRAM



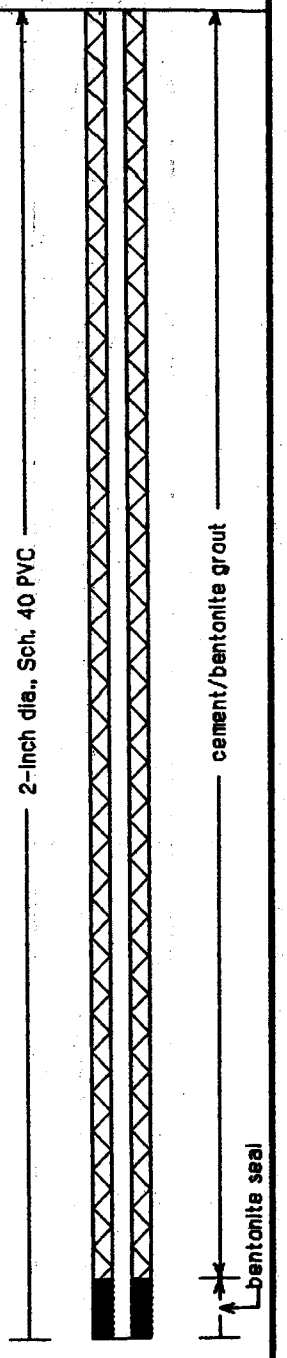
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G07LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *263.14 feet msl*
Started at *1015 on 03-30-99*	TOC Elevation: *262.79 feet msl*
Completed at *1845 on 03-30-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 93 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0									Surface Conditions: Grass. 039G07LF is located in a grassy area east of the wester property boundary fence, west of Building S-75.	
5									Loess. Clayey silt, brown	
10			1	100						
15										
20			2	60				ML CL	Brown and gray mottled grading to gray.	
25									Loess. Silty clay. Sticky. Gray Increased clay around 24 to 25.	
30			3	90					Loess. Clayey silt. Increasing silt with depth. Gray.	
35										228.1
40			4	100				SM	Loess grading to Fluvial. Clayey silt with fine grained sand. Trace gravel. Gray.	

WELL DIAGRAM



Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G07LF

Project: *Assembly F - RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-148*	Surface Elevation: *263.14 feet msl*
Started at *1015 on 03-30-99*	TOC Elevation: *262.79 feet msl*
Completed at *1645 on 03-30-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 93 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45								SM	Fluvial. Silty sand, Medium grained. Orange brown.	222.1
									Fluvial. Silty sand, gravelly.	
									Fluvial. Sand,medium grained,with silt, trace gravel. Orange brown.	
									Fluvial. Gravel with sand. Sand, fine to coarse. Orange brown.	
50			5	100					Fluvial. Sand and gravel. Sand poorly sorted, fine to coarse. Gravel ranges from 0.25 to 1 inch in diameter.	
55								SP SM		
60			6	100					Smaller gravel 58 to 68. One inch layer of fine grained silty sand. Gray.	
65										
70			7	100						
75								ML CL	Fluvial. Clayey silt. Orange brown, and gray mottled.	191.1 190.1
								NR	No recovery. Lost core from 73 to 78 feet.	
80			8	100				SM	Fluvial. Silty sand, very fine grained. Orange-brown. OUT OF GRAVEL AT 73 FEET?	185.1

WELL DIAGRAM: bentonite seal; 0.010" slot PVC Screen; silica sand

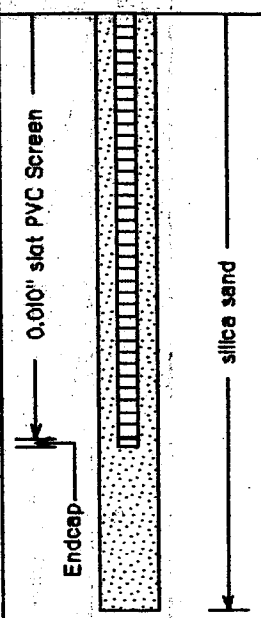
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G07LF

Project: *Assembly F – FFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *263.14 feet msl*
Started at *1015 on 03-30-99*	TOC Elevation: *262.79 feet msl*
Completed at *1645 on 03-30-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *43 to 93 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85								SM	Fluvial. Silty clay. Dark gray.	
									Fluvial. Silty sand, very fine grained. Dark gray.	
			9	100						174.6
90									Fluvial. Silty sand, very fine grained. Orange-brown.	
									Fluvial. Silty sand, very fine grained. Dark gray.	
95								CL	Cockfield. Silty clay. Medium gray.	
			10	100					TD Borehole at 98 feet.	165.1
100										
105										
110										
115										
120										

WELL DIAGRAM



Log of Monitoring Well 039G08LF

Environmental & Safety Designs, Inc.

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *262.84 feet msl*
Started at *0900 on 04-06-99*	TOC Elevation: *262.40 feet msl*
Completed at *1640 on 04-06-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *45 to 95 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								ML CL	Surface Conditions: Asphalt. 039G08LF is located in the middle of the road that borders the western property boundary of the base.	259.8
5								NR	Loess. Clayey silt, gray No recovery from 3 to 8 feet.	
			1	38						254.8
10								ML CL	Loess. Clayey silt. Brown with some orange and gray mottling from 16 to 17 feet.	
15										245.8
			2	90				NR	No recovery.	244.8
20									Loess. Clay with silt. Dark gray.	
25									Silt content increases with depth. Color grading to a light gray.	
			3	90				ML CL		
30									Graded to silty clay. Light gray.	
35									Loess grading to Fluvial. Silty clay, grading into silty clay with very fine grained sand.	
			4	90						
40								SP		222.8

WELL DIAGRAM

2-inch dia., Sch. 40 PVC

cement/bentonite grout

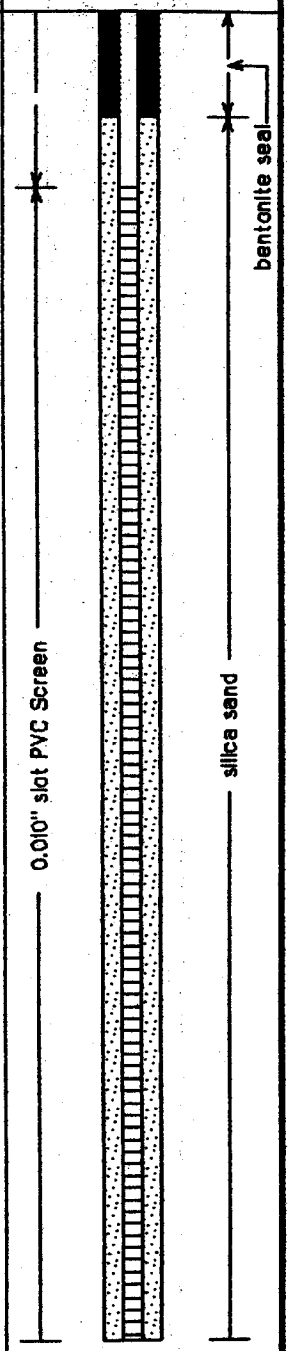
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G08LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *262.84 feet msl*
Started at *0900 on 04-06-99*	TOC Elevation: *262.40 feet msl*
Completed at *1640 on 04-06-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *45 to 95 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
										262.8
								SP	Fluvial. Sand, coarse grained. Gray.	221.8
								ML CL	Fluvial. Silty clay, with large gravel. Gray.	220.3
								SP SM	Fluvial. Sand and gravel. Sand coarse grained. Gray.	
45									Fluvial. Sand and gravel. Sand, coarse grained. Last 0.5 feet sandy gravel (0.25- to 1.5-inch).	216.8
								NR		
			5	80					No recovery.	214.8
50								SP SM	Fluvial. Gravel and sand. Sand coarse grained. Gravel up to 2 inches in diameter. Orange-brown.	
									Fluvial. Gravelly sand. Less and smaller gravel than above. Sand is poorly sorted fine to coarse with silt. Light brown.	
55								SM	Fluvial. Silty sand, poorly sorted, fine to coarse grained. Trace gravel. Orange brown.	208.3
			6	100					Fluvial. Silty sand, poorly sorted, fine to coarse grained. No gravel. Orange-brown.	204.8
60										
65								SP SM	Fluvial. Sand, fine to very coarse grained. Gravel througout (less than 0.25- to 2-inch). Orange-brown.	
			7	100						
70										
75								SM	Fluvial. Silty sand, very fine grained. Light orange-brown with gray and red laminae. Trace clay stringers, light gray. OUT OF GRAVEL AT 75 FEET	188.3
			8	100						
80										

WELL DIAGRAM



Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G08LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *262.84 feet msl*
Started at *0900 on 04-06-99*	TOC Elevation: *262.40 feet msl*
Completed at *1640 on 04-06-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *45 to 95 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			9	100				SM	Fluvial. Silty sand, very fine grained. Trace lignite. Dark gray to black.		0.010" slot PVC Screen
90										169.8	
95								CL	Cockfield. Clay with silt, some lignite. Very stiff. Dark gray to black.		Endcap
			10	100					TD of borehole at 98 feet.	164.8	silica sand
100											
105											
110											
115											
120											

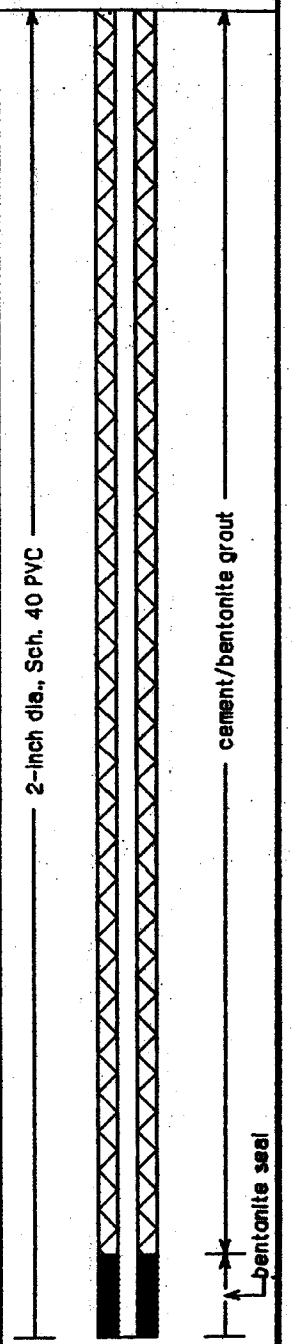
Log of Monitoring Well 039G09LF

Environmental & Safety Designs, Inc.

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *263.04 feet msl*
Started at *1336 on 04-07-99*	TOC Elevation: *262.85 feet msl*
Completed at *1900 on 04-07-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *43.5 to 93.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								ML CL	Surface Conditions: Grass. 039G09LF is located near the eastern boundary of the City of Millington's park, just west of the Navy's property line.	260
5								NR	Loess. Clayey silt, Medium gray to light brown. No recovery.	255
10			1	38					Loess. Clayey silt. Medium to light brown with gray and dark brown mottles.	
15								ML CL	Loess. Silt. Gray with black inclusions (Fe).	248
20			2	90				NR	No recovery.	245
25									Loess. Silt. Gray with black inclusions and iron staining. More mottling.	
30			3	100				ML CL	No mottling.	
35									Loess grading to Fluvial. Silt intermingled with find grained sand. Sand increases with depth. Gray.	225
40			4	100				SP ML CL	Fluvial. Sand, very fine to fine. Gray changing to light brownish gray at 38.5 feet.	223.5
									Fluvial. Sand and gravel. Sand fine to	

WELL DIAGRAM



Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G09LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *263.04 feet msl*
Started at *1338 on 04-07-99*	TOC Elevation: *262.85 feet msl*
Completed at *1900 on 04-07-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *43.5 to 93.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
45								ML CL		
								GW	Fluvial. Gravel. Well sorted, approximately 1.5-inch.	217
			5	100					Fluvial. Sand and gravel. Sand, coarse grained. Small gravel. Orange-brown.	216
50									Fluvial. Sand and Gravel. Sand coarse grained. Gravel up to 2 inches in diameter. Light gray.	
									Decreasing size and frequency of gravel from 52 to 55.5 feet.	
55									Sparse gravel (0.5-inch diameter) from 55.5 to 58 feet.	
			6	100				SP SM		
60									Increasing size and frequency of gravel (up to 1-inch diameter) from 58 to 61.5 feet. Size and frequency consistent to 68 feet.	
65										
			7	100					Fluvial. Sand, poorly sorted fine to coarse. Some gravel. Orange- brown.	
70										191
									Fluvial. Sandy silt. with lenses of clayey silt. Orange-brown and light gray to gray mottling.	
75								SM	OUT OF GRAVEL AT 72 FEET	
			8	100					Fluvial. Sand, very fine grained. Sandy clay lenses. Gray to medium dark gray. Some lignite layers up to 2 inches thick from 78 to 79.5 feet.	
80										

WELL DIAGRAM: bentonite seal; 0.010" slot PVC Screen; silica sand

Fluvial. Silty sand, very fine grained. Orange-brown and light gray mottled. Some clay stringers. Light gray.

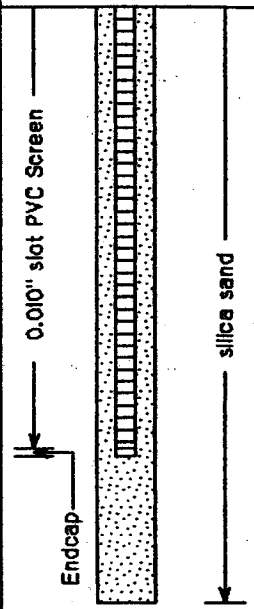
Environmental & Safety Designs, Inc.

Log of Monitoring Well 039G09LF

Project: *Assembly F – RFI*	Location: *NSA Mid-South, Millington, Tennessee*
Project No.: *CTO-146*	Surface Elevation: *263.04 feet msl*
Started at *1336 on 04-07-99*	TOC Elevation: *262.85 feet msl*
Completed at *1900 on 04-07-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance Environmental Inc.*	Total Depth: *98 feet*
Geologist: *G. Pierce*	Well Screen: *43.5 to 93.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85			9	100				SM	Fluvial. Silty sand, very fine grained. Gray to dark gray. With 0.25 inch bands of clay. Very dark gray.	
90									Fluvial. Sand, very fine to fine. Orange-brown. 2- to 3-inch clay layer at 91.5 feet.	
95								CL	Cockfield. Clay with silt, some lignite. Very stiff. Dark gray to black.	170
			10	100					TD of borehole at 98 feet.	165
100										
105										
110										
115										
120										

WELL DIAGRAM



ENSAFE

BORING LOG OF 039G10LF

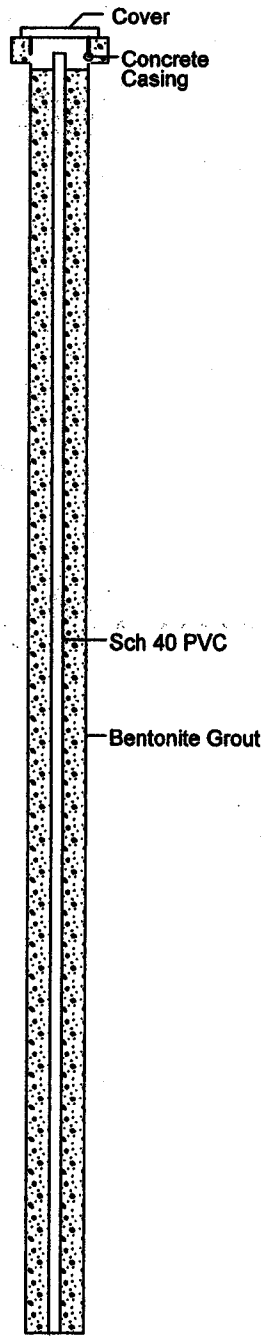
NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/21/02@1145	Northing	: 387477.969
Finished	: 5/22/02@0815	Easting	: 811133.448
Drilling Method	: RotaSonic	TOC Elevation	: 263.59
Drilling Company	: ProSonic	Total Depth	: 100 feet
Geologist	: J. Broughton	Well Screen	: 84 to 94 feet

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0		100	3.8		ML	(0-5') Clayey silt, dark yellowish brown with light gray mottling and iron staining, moist, friable
5						(5-14') With no mottling
10		100	0			
15						(14-20') Silt with some clay content, medium gray, very moist, stiff (15-25') Clay content decreasing down column
20		100	0			(20-29') Color is medium olive gray
25					ML	(25-43') Little to no clay content, with some iron staining
30		100	0			(29-33') Color is yellowish brown with some gray mottling and iron staining
35						(33-43') Color is medium gray with some iron staining
40		100	0			

Well: 039G10LF
Elev.: 263.59



BORING LOG OF 039G10LF

NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/21/02@1145	Northing	: 387477.969
Finished	: 5/22/02@0815	Easting	: 811133.448
Drilling Method	: RotaSonic	TOC Elevation	: 263.59
Drilling Company	: ProSonic	Total Depth	: 100 feet
Geologist	: J. Broughton	Well Screen	: 84 to 94 feet

Well: 039G10LF
Elev.: 263.59

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
40		100	0		ML	(41.5-43') With some fine sand content
45					SM	(43-47.5') Silty fine to coarse sand with small gravel, dark brownish gray, wet, loose
					SP	(47.5-50') Fine sand, light gray, wet, firm
50		100	—		SW	(50-53') Fine to medium sand with some small gravel, pale gray, wet, firm (53-55') Color is yellowish brown, with increased gravel content (55-66.5') With small to medium gravel and some minor silt content, with some iron staining
55						
60		100	—			
65						
70		100	—		SM	(66.5-78') Silty medium grain sand with small to medium gravel and some fine to coarse grain content, yellowish orange brown with iron staining,
75						
		100	—		SM	(78-80') Silty fine sand with occasional clay lamina, light gray with iron staining, firm
80						

Sch 40 PVC

Bentonite Grout

07-29-2003 N:\well logs\NSAMidsouth\SWMU 39\039G10LF.bor

BORING LOG OF 039G10LF

ENSAFE

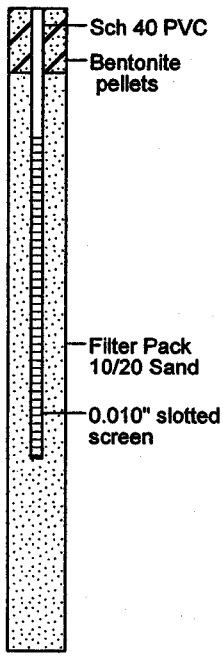
NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/21/02@1145	Northing	: 387477.969
Finished	: 5/22/02@0815	Easting	: 811133.448
Drilling Method	: RotaSonic	TOC Elevation	: 263.59
Drilling Company	: ProSonic	Total Depth	: 100 feet
Geologist	: J. Broughton	Well Screen	: 84 to 94 feet

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
80					SM	(80-81.5') Silty very fine sand with silt lamina, dark brown, with organic material, very moist, stiff
		100	—		SP	(81.5-82.5') Medium grain sand, light gray, with organic material, wet, firm
					SM	(82.5-83.5') Silty very fine sand with silt lamina, dark brown, with organic material, very moist, stiff
85					SP	(83.5-93.5') Very fine sand, light gray with iron staining, wet, firm (85-93.5') With occasional clay lamina
90		30	—			
95		100	—		CL	(93.5-100') Clay with some silt and very fine grain sand content, medium gray, very stiff
100						
105						
110						
115						
120						

Well: 039G10LF
Elev.: 263.59



07-29-2003 ...gs\NSAMidsouth\SWMU 39\039G10LF.bor

BORING LOG OF 039G11LF

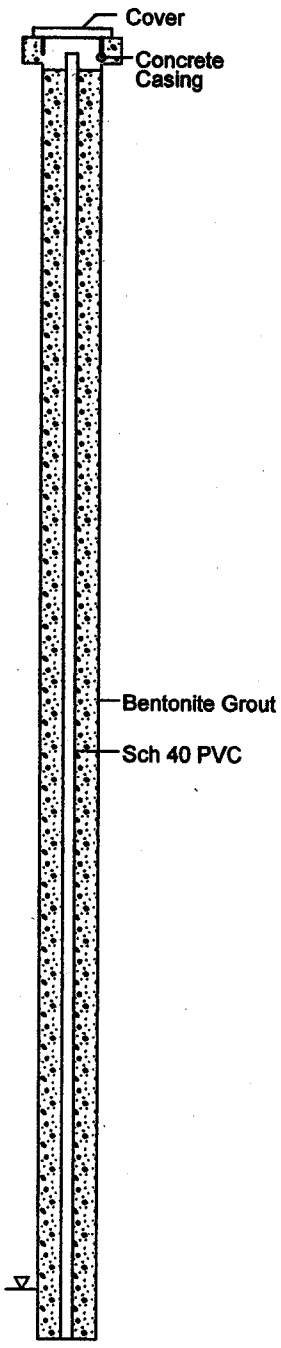
NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/20/02@1025	Northing	: 387572.192
Finished	: 5/20/02@1630	Easting	: 811095.753
Drilling Method	: RotaSonic	TOC Elevation	: 263.05
Drilling Company	: ProSonic	Total Depth	: 105 feet
Geologist	: J. Broughton	Well Screen	: 87 to 97 feet

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0		100	5.5		ML	(0-14') Clayey silt, dark yellowish brown with gray mottling, with iron staining and iron/manganese nodules, moist, friable
5						(5-14') With decreased mottling
10		100	0			
15						(14-20') Silt with some clay content, medium gray, very moist, soft (15-20') Clay content decreasing down column
20		100	0			(20-31.5') Color is medium olive gray, with some iron staining
25					ML	(25-31.5') With light gray mottling
30		100	0			(31.5-36.5') Color is medium yellowish brown, with staining and light gray mottling
35						(34.5-35') With fine sand content (35-36.5') With no sand content (36.5-38.5') Color is dark brownish gray with woody material
		100	0			
40					SW	(38.5-40') Fine to coarse sand with silt content and small gravel, dark gray, wet, firm

Well: 039G11LF
Elev.: 263.05



07-29-2003 N:\well logs\NSAMidsouth\SWMU 39\039G11LF.bor

BORING LOG OF 039G11LF

ENSAFE

NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/20/02@1025	Northing	: 387572.192
Finished	: 5/20/02@1630	Easting	: 811095.753
Drilling Method	: RotaSonic	TOC Elevation	: 263.05
Drilling Company	: ProSonic	Total Depth	: 105 feet
Geologist	: J. Broughton	Well Screen	: 87 to 97 feet

Well: 039G11LF
Elev.: 263.05

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
40					CL	(40-41') Fine sandy clay with minor gravel, dark gray
		100	0		SM	(41-51') Becoming fine to coarse silty sand with small to medium gravel, pinkish brown gray, wet, loose
45						(45-51') With increased small to large gravel content
50		100	—			~0.5" thick light gray clay lens
					SP	(51-52') Fine sand, light gray with little to no gravel, wet, firm
					SW	(52-61') Becoming fine to medium sand with small gravel (increasing down column), very pale yellowish brown (tan)
55						(55-61') With small to large gravel
60		100	—			(61-75') Color is light yellowish brown, with iron staining (increasing down column), with small to medium gravel
65						(65-75') With some coarse grain sand content
70		100	—			
75					SW	(75-77') Medium to coarse sand with small gravel, pale yellowish brown with heavy iron staining
		100	—		SW	(77-83') Fine to medium sand with some coarse grain sand and small to medium gravel, yellowish orange brown, with heavy iron staining
80						

07-29-2003 ...ver\logs\NSAMidsouth\SWMU 39\039G11LF.bor

ENSAFE

BORING LOG OF 039G11LF

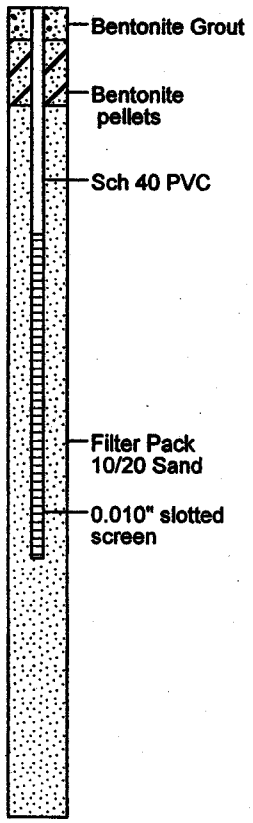
NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/20/02@1025	Northing	: 387572.192
Finished	: 5/20/02@1630	Easting	: 811095.753
Drilling Method	: RotaSonic	TOC Elevation	: 263.05
Drilling Company	: ProSonic	Total Depth	: 105 feet
Geologist	: J. Broughton	Well Screen	: 87 to 97 feet

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
80		100	—		SW	(81.5-82') Small to medium gravel with some fine to medium sand, dark brown
					GW	
					SP	(83-83.5') Small to medium gravel with some fine to medium sand, dark brown
85					SP	(83.5-85') Fine sand with minor fines content and some small gravel, yellowish brown, with heavy iron staining
						(85-87') Medium grain sand with some coarse grain and small gravel, yellowish orange brown, with heavy iron staining
90		100	—		SW	(87-92') Fine to medium sand with small gravel and some fines, yellowish orange brown, with heavy iron staining
					SW	(92-93') Becoming fine to very fine grain sand with little to no gravel, yellowish orange borwn, with heavy iron staining
					GW	(93-95') Small to medium gravel with some fine to coarse sand, yellowish orange brown, with iron staining, loose
95					CL	(95-96') Clay with some sand and gravel content, medium gray, very stiff
						(96-105') Clay with some minor silt content, medium gray, very stiff
100		100	—		CL	
105						
110						
115						
120						

Well: 039G11LF
Elev.: 263.05



07-29-2003 N:\well logs\NSAMidsouth\SWMU 39\039G11LF.bor

BORING LOG OF 039G12LF

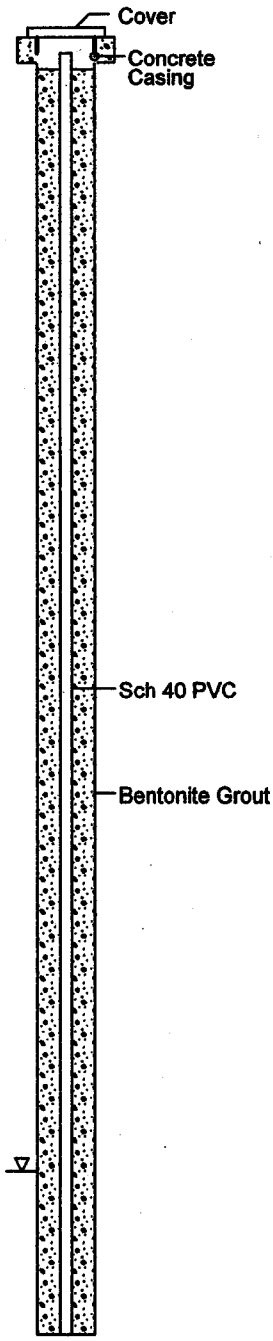
NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/20/02@1730	Northing	: 387690.516
Finished	: 5/22/02@1030	Easting	: 811122.469
Drilling Method	: RotaSonic	TOC Elevation	: 262.61
Drilling Company	: ProSonic	Total Depth	: 95 feet
Geologist	: J. Broughton	Well Screen	: 81 to 91 feet

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0		100	0		ML	(0-11') Clayey silt, dark yellowish brown with gray mottling and iron staining, with some iron/manganese nodules, moist, friable
5						(5-11') With less mottling
10		100	0			
						(11-20') Silt with some clay content, medium gray, moist, firm
15						(15-35') With clay content decreasing down column
20		100	0			(20-25') Color is medium olive gray with some iron staining
25					ML	(25-30') Color is medium grayish brown with iron staining
30		100	0			(30-35') Color is medium yellowish gray brown with increased staining and heavy iron oncretions
35					SC	(35-38') Fine sandy clay/clayey fine sand, medium gray, wet, firm, with some woody material and iron/manganese nodules
		100	0		SM	(38-39.5') Silty fine to coarse sand with some small gravel, yellowish orange brown with iron staining
40						(39.5-42.5') Color is medium gray

Well: 039G12LF
Elev.: 262.61



ENSAFE

BORING LOG OF 039G12LF

NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/20/02@1730	Northing	: 387690.516
Finished	: 5/22/02@1030	Easting	: 811122.469
Drilling Method	: RotaSonic	TOC Elevation	: 262.61
Drilling Company	: ProSonic	Total Depth	: 95 feet
Geologist	: J. Broughton	Well Screen	: 81 to 91 feet

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
40		100	0		SM	(42.5-44') Color is yellowish orange brown with staining
45					SW	(44-45') Fine to medium sand with little to no gravel, pale yellowish brown (tan), wet, firm
					SW	(45-47') Fine to coarse sand with some small gravel, pale brown, wet, loose
50		100	—		SW	(47-52') Fine to medium sand with occasional small gravel (fine grain content decreasing dowm column), pale brown, wet, firm
55					SW	(52-65') Fine to medium sand with gravel and some coarse grain content, light yellowish brown, wet, firm
60		100	—			
65					SW	(64-65') With small to large gravel and iron staining (65-68') Fine to Coarse sand with heavy small to large gravel (with some minor fines content), yellowish orange brown with iron staining, wet, loose (68-74') Color is yellowish brown with less iron staining
70		100	—			
75					SW	(75-75') Color is medium yellowish gray brown
					GW	(75-77') Small to medium gravel with medium to coarse sand, yellowish brown, loose
		100	—		SW	(77-79') Fine to medium sand with small to medium gravel with some fines content, yellowish brown
80					SP	

Well: 039G12LF
Elev.: 262.61

07-29-2003 N:\well logs\NSAMidsouth\SWMU 39\039G12LF.bor

ENSAFE

BORING LOG OF 039G12LF

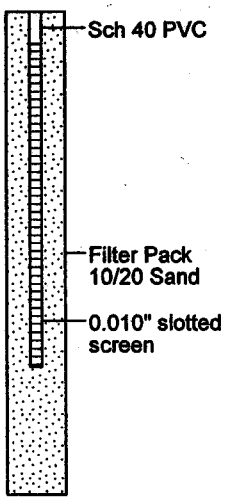
NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/20/02@1730	Northing	: 387690.516
Finished	: 5/22/02@1030	Easting	: 811122.469
Drilling Method	: RotaSonic	TOC Elevation	: 262.61
Drilling Company	: ProSonic	Total Depth	: 95 feet
Geologist	: J. Broughton	Well Screen	: 81 to 91 feet

Well: 039G12LF
Elev.: 262.61

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
80					SP	(79-82.5') Medium sand with some small gravel and fine grain sand content, light yellowish brown with some iron staining, firm
		100	—		SW	(82.5-85') Fine to medium sand with small to medium gravel and some coarse grain sand content, yellowish brown with iron staining, firm
85					SM	(85-87.5') Silty fine to medium sand with occasional small to medium gravel, yellowish orange brown with iron staining and occasional clay lamina
					GM	(87.5-89') Silty small to large gravel with fine to medium sand, yellowish orange brown with iron staining
90		100	—		CL	(89-90') Fine sandy clay, dark gray with heavy black organic staining, stiff
					SM	(90-91') Silty fine sand, medium gray, firm
95					CL	(91-95') Clay with some minor silt content, medium gray, very stiff (93-95') Silt content increasing down column with minor very fine sand content
100						
105						
110						
115						
120						



07-29-2003 ...well logs\NSAMidsouth\SWMU 39\039G12LF.bor

BORING LOG OF 039G13LF

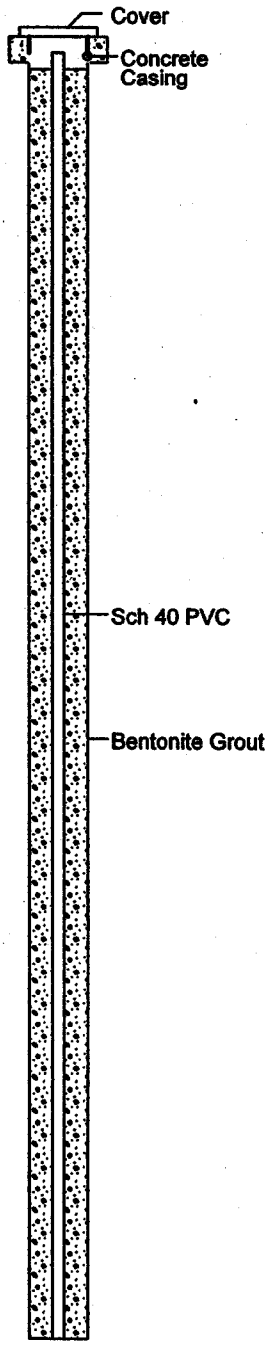
NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/22/02@0930	Northing	: 387918.430
Finished	: 5/22/02@1645	Easting	: 811279.843
Drilling Method	: RotaSonic	TOC Elevation	: 263.76
Drilling Company	: ProSonic	Total Depth	: 105 feet
Geologist	: J. Broughton	Well Screen	: 88 to 98 feet

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
0		100	2		ML	(0-14') Clayey silt, dark yellowish brown with some gray mottling and iron staining, with some iron/manganese concretions, moist, friable
5						(5-14') With less mottling
10		100	0			
15						(14-20') Silt with some clay content, medium gray with iron staining, very moist, firm (15-35') With clay content decreasing down column
20		100	0			(20-28.5') Color is medium olive gray
25						
30		100	0			(28.5-31') Color is yellowish brown with gray mottling, with some iron staining (31-35') With little to no mottling
35		100	0		CL	(33.5-35') With fine grain sand content (35-38') Fine sandy clay, yellowish brown with some staining, moist, stiff
40					SC	(38-43.5') Clayey fine to medium sand, yellowish orange brown with staining, moist, stiff

Well: 039G13LF
Elev.: 263.76



07-29-2003 N:\well logs\NSA\Midsouth\SWMU 39\039G13LF.bor

BORING LOG OF 039G13LF

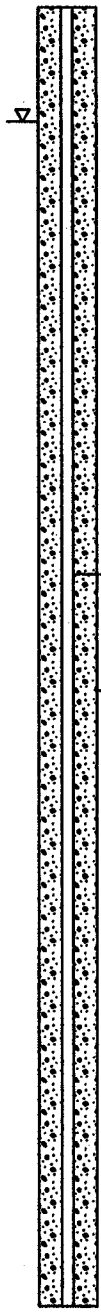
NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/22/02@0930	Northing	: 387918.430
Finished	: 5/22/02@1645	Easting	: 811279.843
Drilling Method	: RotaSonic	TOC Elevation	: 263.76
Drilling Company	: ProSonic	Total Depth	: 105 feet
Geologist	: J. Broughton	Well Screen	: 88 to 98 feet

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
40		100	0		SC	(41-43.5') With some gray mottling, sand content increasing with depth
					SM	(43.5-45') Silty fine to coarse sand with small gravel, light brownish gray, wet, firm
45					SM	(45-48.5') Silty fine to medium sand with small to medium gravel, light gray, wet, firm (47.5-48.5') With clay lamina/lenses
					SP	(48.5-51') Fine sand, yellowish brown, with some staining
50		100	—		SW	(51-55') Fine to coarse sand with small to medium gravel, light gray to yellowish brown, wet (53-55') With little coarse grain content
55					SW	(55-57.5') Fine to medium sand with small to medium gravel, some coarse grain content, light gray, wet, firm (57.5-75') Color is yellowish orange brown with iron staining
60		100	—			
65						
70		100	—			
75					GW	(75-77') Small to medium gravel with little to no sand, yellowish orange brown, loose
		100	—		SP	(77-85') Very fine grain sand, light yellowish brown with iron staining, firm
80						

Well: 039G13LF
Elev.: 263.76



07-29-2003 ...\Well Logs\NSAMidsouth\SWMU 39\039G13LF.bor

ENSAFE

BORING LOG OF 039G13LF

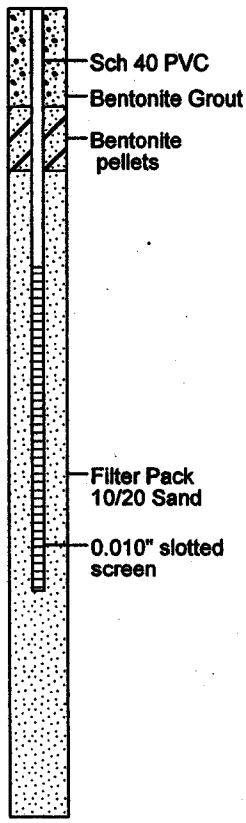
NSA MID-SOUTH
Millington, TN.

Location: SWMU 15
Project #: CTO 0146

Started	: 5/22/02@0930	Northing	: 387918.430
Finished	: 5/22/02@1645	Easting	: 811279.843
Drilling Method	: RotaSonic	TOC Elevation	: 263.76
Drilling Company	: ProSonic	Total Depth	: 105 feet
Geologist	: J. Broughton	Well Screen	: 88 to 98 feet

Depth in feet	Samples	% Recovery	PID (ppm)	GRAPHIC	USCS	DESCRIPTION
80		100	—		SP	
85						(85-98') Very fine to fine grain sand, light yellowish brown, firm
90		100	—		SW	
95						
100		100	—		CL	(98-105') Clay with silt and very fine sand content, dark gray to black, moist, very stiff, with occasional silty, very fine sand lenses
105						
110						
115						
120						

Well: 039G13LF
Elev.: 263.76



07-29-2003 N:\well logs\NSAMidsouth\SWMU 39\039G13LF.bor

SWMU 41

EnSafe/Allen & Hoshall

Monitoring Well 041G01DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *1144 on 4-8-99*	TOC Elevation: *feet msl*
Completed at *1615 on 4-8-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *88 feet*
Geologist: *Carol Davis*	Well Screen: *46 to 86 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5			1	25			ML	Loess consisting of brown to orange brown and greenish-gray silt and clayey silt, moist. Some gravel 0 to 1.5'.		2" diam., Sch.40 PVC
10								Lignitic specs from 0 to 17'		grout
15								Intermittant tree matter from 13 to 17'.		
20			2	100						
25										

EnSafe/Allen & Hoshall

Monitoring Well 041G01DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *1144 on 4-8-99*	TOC Elevation: *feet msl*
Completed at *1615 on 4-8-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *88 feet*
Geologist: *Carol Davis*	Well Screen: *46 to 86 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
30			3	90			ML	Lignitic specs from 25 to 27'.	
35			4	90			ML	Gray, clayey silt to very fine sandy silt, moist. Base of Loess.	
40							SW	Very fine to coarse silty sand with half-inch gravel. Top of Alluvium.	
							CL	6" Gravelly clay layer.	
45							SW	Lt. brownish-gray, very fine to fine sand with half-inch gravel. Coarsens to very fine to coarse sand.	
			5	100			ML	Lt. brownish-gray, fine sandy silt.	
50							SP	Lt. Gray, fine to coarse sand.	

WELL DIAGRAM

2" diam., Sch.40 PVC

0.01 slot PVC screen

grout

bentonite seal

20-40 sand filter

EnSafe/Allen & Hoshall

Monitoring Well 041G01DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *1144 on 4-8-99*	TOC Elevation: *feet msl*
Completed at *1615 on 4-8-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *88 feet*
Geologist: *Carol Davis*	Well Screen: *46 to 86 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							SP			
								Lt. gray to lt. brownish-gray, very fine to coarse sand, with some gravel to 58'.		
55										
			6	100						
								Lt. gray, medium to very coarse sand, with some gravel to 68'.		
60							SW			
65										
			7	100						
								Lt. gray, fine to very coarse sand, with some gravel to 70'.		
70								Lt. gray, fine sand with lignite from 74 to 75'. No gravel.		
							SP			
75							OL			

0.01 slot PVC screen

20-40 sand filter

EnSafe/Allen & Hoshall

Monitoring Well 041G01DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *1144 on 4-8-99*	TOC Elevation: *feet msl*
Completed at *1615 on 4-8-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *88 feet*
Geologist: *Carol Davis*	Well Screen: *46 to 86 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							OL	Black-brown, lignitic clay layer, moist to dry.		
							CL	Dk. olive-brown clay, moist.		
			8	100			SW	Gray to dk. gray, very fine to fine sand, moist.		
80							SC	Olive-gray, fine sand with some silt and clay, moist. Base of Alluvium.		
85							CL	Olive-gray clay mottled with lignite specs. Top of Cockfield.		
			9	100				*End of boring @ 88' bgs.*		
90										
95										
100										

0.01 slot PVC screen

20-40 sand filter

EnSafe/Allen & Hoshall

Monitoring Well 041G02DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *0839 on 4-9-99*	TOC Elevation: *feet msl*
Completed at *1202 on 4-9-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *88 feet*
Geologist: *Carol Davis*	Well Screen: *46.3 to 81.3 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5			1	50			ML	Loess consisting of brown to orange brown and greenish-gray silt and clayey silt, moist. Sporadic iron staining. Some gravel .5 to 1'. Lignitic specs from 1 to 3'.		2" diam. Sch.40 PVC; grout
10										
15			2	60				No recovery 12 to 18'.		
20										
25										

EnSafe/Allen & Hoshall

Monitoring Well 041G02DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *0839 on 4-9-99*	TOC Elevation: *feet msl*
Completed at *1202 on 4-9-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *88 feet*
Geologist: *Carol Davis*	Well Screen: *46.3 to 81.3 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	SOIL CLASS	GEOLOGIC DESCRIPTION
30	3	90	ML	No recovery 27 to 28'.
35			ML	Lt. olive brownish gray, fine sandy silt, moist.
			SP	Lt. olive brownish gray, silty fine sand, moist.
			SW	Lt brownish gray medium to coarse sand, moist to wet. Grades to medium to very coarse sand.
	4	90	ML	Lt. olive gray, slightly clayey silt. Base of Loess.
40			SW	Lt. brownish gray, medium to very coarse sand with gravel. About 2/3 sand and 1/3 gravel. Top of Alluvium.
			ML	Brownish gray, slightly sandy (very fine) silt. 2.5" silty gravel zone in center.
			SW	Brownish gray, medium to very coarse sand with gravel. Gravel content increases with depth.
45			GW	Gravel (1/8 to 1 1/2") with medium to very coarse sand.
	5	100	SW	Orange brown grading to pale yellow gray, medium to very coarse sand to 48.5'. Lt. gray, fine to medium sand to 53'.
50				

ELEV. (ft-msl)

WELL DIAGRAM: 2" diam., Sch.40 PVC; grout; bentonite seal; 20-40 sand filter

EnSafe/Allen & Hoshall

Monitoring Well 041G02DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *0839 on 4-9-99*	TOC Elevation: *feet msl*
Completed at *1202 on 4-9-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *88 feet*
Geologist: *Carol Davis*	Well Screen: *46.3 to 81.3 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
55										
			6	100			SW	Yellowish gray and orange brown, medium to coarse sand, with gravel intermittantly, to 65'.		
60										
65								Orange brown, fine to medium sand, with some lenses of yellowish fine to medium sand.		
			7	100			SP	Lt. gray grading to orange brown, medium sand, with some small lignite patches.		
70							OL	Lignite with some very dark brown, very dense, clayey silt. Clayey silt content increases with depth. More silt than lignite at depth.		
							OL ML			
							CL SC	Gray to olive gray, fine sandy clay to clayey sand. Some minor lignite patches.		
75							CL SP			

0.01 slot PVC screen

20-40 sand filter

EnSafe/Allen & Hoshall

Monitoring Well 041G02DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *0839 on 4-9-99*	TOC Elevation: *feet msl*
Completed at *1202 on 4-9-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *88 feet*
Geologist: *Carol Davis*	Well Screen: *46.3 to 81.3 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							CL SP	Olive gray clay with lignitic bands. Intermittant olive gray sand layers 2 to 3" apart.		0.01 slot PVC screen; 20-40 sand filter; backfill
			8	100			CL	Lt. olive gray clay with some lignitic banding.		
							SP	2" band of lt. olive gray very fine sand. Base of Alluvium.		
							CL	Olive gray, slightly silty clay. Top of Cockfield.		
80								Olive-gray to olive brown clay, wtih some lignitic specs.		
							CL			
85										
			9	100				*End of boring @ 88' bgs.*		
90										
95										
100										

EnSafe/Allen & Hoshall

Monitoring Well 041G03DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *0715 on 4-11-99*	TOC Elevation: *feet msl*
Completed at *1001 on 4-11-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *83 feet*
Geologist: *Carol Davis*	Well Screen: *44 to 79 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5								Loess consisting of brown to orange brown and olive gray silt and clayey silt, moist.		2" diam., Sch.40 PVC
								No recovery 4 to 8'.		
10			1	50				Occasional iron staining and concretions 8.5 to 13'.		
							ML	No recovery 13 to 18'.		
15										
			2	50				Shell fragments and iron concretions 18 to 24'.		
20										grout
25										

EnSafe/Allen & Hoshall

Monitoring Well 041G03DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *0715 on 4-11-99*	TOC Elevation: *feet msl*
Completed at *1001 on 4-11-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *83 feet*
Geologist: *Carol Davis*	Well Screen: *44 to 79 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	SOIL CLASS	GEOLOGIC DESCRIPTION
30	3	100	ML	Swampy odor 28 to 36'.
35	4	90	ML	Olive brownish gray, silt, with minor amounts of very fine grading to fine, sand. 3" very sandy silt @ 37'. 1" sand layer at base, wet. Base of Loess.
40			ML GM	Olive brownish gray, sandy silt and sandy silty gravel, wet. Top of Alluvium.
45			SW	Pale yellowish gray, medium to very coarse sand and fine to coarse gravel. 6" gravel layer @ 47'.
	5	100	SC	Lt. gray, clayey, very fine to fine sand.
50			SW	Lt. gray, fine to very coarse sand, with occassional gravel to 50'.

WELL DIAGRAM: 2" diam., Sch.40 PVC; 0.01 slot PVC screen; grout; bentonite seal; 20-40 sand filter

EnSafe/Allen & Hoshall

Monitoring Well 041G03DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *0715 on 4-11-99*	TOC Elevation: *feet msl*
Completed at *1001 on 4-11-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *83 feet*
Geologist: *Carol Davis*	Well Screen: *44 to 79 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
55							SW	2" clay lense at 50'. Pale yellowish gray, medium to very coarse sand, with gravel to 63.5'. Color changes to orangish brown at 59', and gravel gets larger, up t 3".		0.01 slot PVC screen
			6	100						
60										
65										
			7	100			SP	Lt. gray to lt. orangish brown, fine sand. Sporadic lignitic bands present.		
70										
							ML	Very dark brown, clayey silt, with lots of lignitic lenses and tree fragments, dense.		
75							ML	Gray to dark brown, fine sandy silt. About 2/3 silt and 1/3 sand.		20-40 sand filter

EnSafe/Allen & Hoshall

Monitoring Well 041G03DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *0715 on 4-11-99*	TOC Elevation: *feet msl*
Completed at *1001 on 4-11-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *83 feet*
Geologist: *Carol Davis*	Well Screen: *44 to 79 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							ML			
							CL	Dk. grayish brown, silty clay, with minor very fine sand.		
							SC			
			8	100			CL	Dk. brown, silty, clayey fine sand. Base of Alluvium.		
80								Olive brown to dk. olive gray, silty clay with lignitic banding. More like clayey silt in some places. Top of Cockfield.		
							CL	Grayish olive brown, silty to very silty clay.		
			9	100				*End of boring @ 83' bgs.*		
85										
90										
95										
100										

WELL DIAGRAM: 0.01 slot PVC screen; 20-40 sand filter

EnSafe/Allen & Hoshall

Monitoring Well 041G04DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *1515 on 4-11-99*	TOC Elevation: *feet msl*
Completed at *0910 on 4-12-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *88 feet*
Geologist: *Carol Davis*	Well Screen: *44.6 to 79.6 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
5			1	63			ML	Loess consisting of brown to orange brown and olive gray silt and clayey silt, moist. Sporadic iron staining and concretions.		2" diam., Sch.40 PVC
10								No recovery 5 to 8'.		grout
15								No recovery 16 to 18'.		
20			2	80						
25										

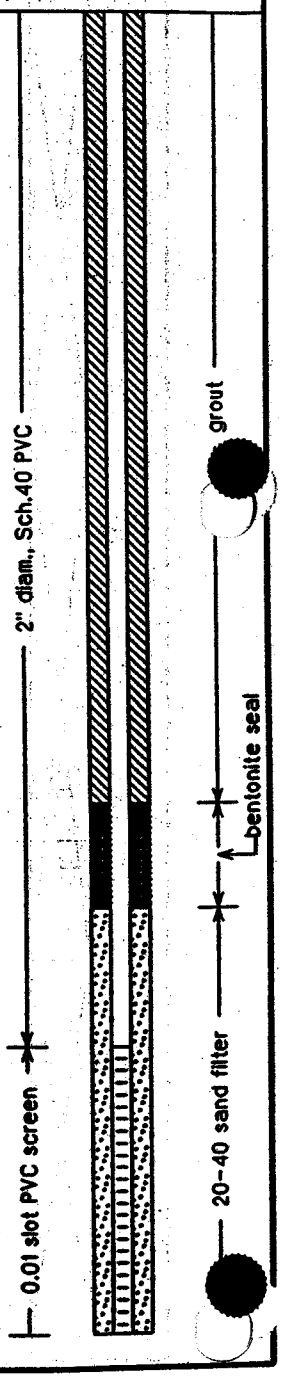
EnSafe/Allen & Hoshall

Monitoring Well 041G04DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *1515 on 4-11-99*	TOC Elevation: *feet msl*
Completed at *0910 on 4-12-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *88 feet*
Geologist: *Carol Davis*	Well Screen: *44.6 to 79.6 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
30			3	100			ML		
35							ML	Lt. olive gray to olive gray, very fine to fine sandy silt. Sand content increases with depth. Very moist. Last 1" is mostly fine to medium sand. Base of Loess	
			4	100			SW	Lt. brownish gray, fine to very coarse sand, with some very fine to fine gravel, wet. Top of Alluvium.	
40							ML	Lt. olive gray, silt.	
45							SW GW	Lt. brownish gray, grading to pale yellowish gray, medium to very coarse sand, with intermittant fine to medium gravel layers. Some coarse gravel.	
			5	100			SP	Yellowish gray, medium sand. Color changes to pale yellowish gray with depth.	
50							SW		

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 041G04DA

Project: *NSA-Midsouth SWMU 41*	Location: *NSA Mid-south, Millington, TN*
Project No.: *0146*	Surface Elevation: *feet msl*
Started at *1515 on 4-11-99*	TOC Elevation: *feet msl*
Completed at *0910 on 4-12-99*	Depth to Groundwater: *feet* Measured:
Drilling Method: *Rotasonic; 4" barrel through 6" casing*	Groundwater Elevation: *feet msl*
Drilling Company: *Alliance*	Total Depth: *88 feet*
Geologist: *Carol Davis*	Well Screen: *44.6 to 79.6 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
55							SW	Lt. gray, medium to coarse sand with occassional fine gravel. Gravel increases last 1'.		0.01 slot PVC screen; 20-40 sand filter
			6	100			SW GW	Very coarse sand to fine gravel.		
60							SW	Very coarse sand, with some fine gravel.		
							GW	Brown, fine to medium gravel, with some medium sand.		
							SW	Yellowish brownish gray, fine to medium sand, with some fine gravel.		
65							SP	Lt. gray and yellowish gray fine sand.		
			7	100			SP	Lt. to dk. gray, medium sand. Very lignitic, with dk. gray to very dk. gray, sandy, woody, lignitic layers.		
70							ML	Very dark brown, clayey silt with lignitic streaks and specks.		
75							SC			

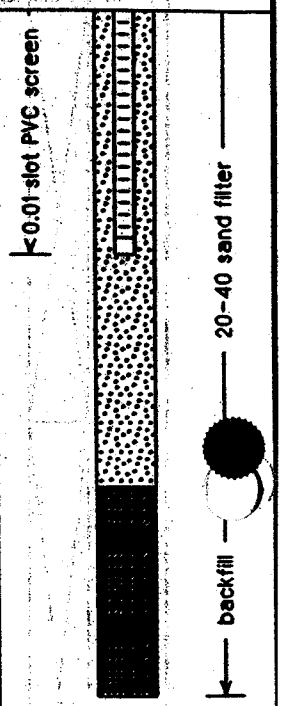
EnSafe/Allen & Hoshall

Monitoring Well 041G04DA

Project: NSA-Midsouth SWMU 41	Location: NSA Mid-south, Millington, TN
Project No.: 0146	Surface Elevation: feet msl
Started at 1515 on 4-11-99	TOC Elevation: feet msl
Completed at 0910 on 4-12-99	Depth to Groundwater: feet Measured:
Drilling Method: Rotasonic; 4" barrel through 6" casing	Groundwater Elevation: feet msl
Drilling Company: Alliance	Total Depth: 88 feet
Geologist: Carol Davis	Well Screen: 44.6 to 79.6 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SC	Olive gray, very fine to fine, very clayey sand. Base of Alluvium.	
			8	100			ML	Olive grayish brown, very clayey silt.	
80							CL	Olive grayish brown, clay, dense.	
85							ML	Very dk. brown, lignitic, clayey silt.	
			9	100			CL	Very dk., slightly reddish brown, silty clay, dense.	
								End of boring @ 88' bgs.	
90									
95									
100									

WELL DIAGRAM



SWMU 59

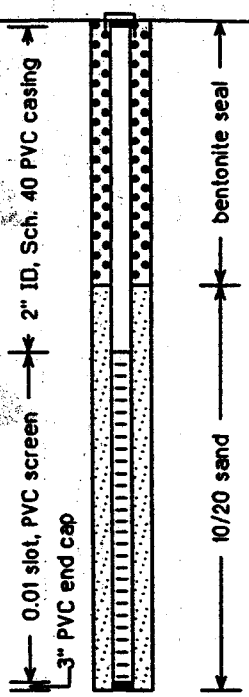
EnSafe/Allen & Hoshall

Monitoring Well 059G01LS

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #59 (Old Pesticide Shop)*
Project No.: *0106-08420*	Surface Elevation: *263.40 feet msl*
Started at *1000 on 3-4-96*	TOC Elevation: *263.24 feet msl*
Completed at *1046 on 3-4-96*	Depth to Groundwater: *7.55 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *255.69 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *20.25 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	100			GW	(0-1') Asphalt and gravel fill.	262.4
			2	100			GL GW	(1-2') Soil and gravel fill.	261.4
			3	100			ML	(2-7') Clayey silt, olive gray in color, moist, with a trace of organic material.	
5					1.6				
			4	83	1.8				256.4
					2.4		CL	(7-11') Silty clay, olive gray in color. Contains organic material. Iron-staining from 9' to 11'.	
10					2.0				252.4
					1.6			(11-20') Clay, olive gray to light olive gray in color with dark yellowish-orange iron-staining. Contains abundant iron-manganese nodules.	
15			5	120	1.6		CL		
					1.8			Less dark yellowish-orange iron-staining from 16' to 17'.	
					2.0				
20								Terminated soil boring at 20'.	243.4
25									
30									
35									
40									

WELL DIAGRAM



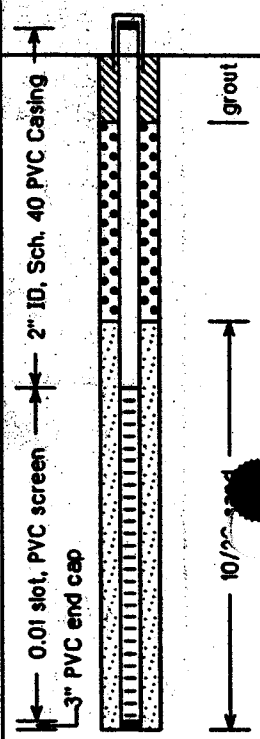
EnSafe/Allen & Hoshall

Monitoring Well 059G02LS

Project: NSA Memphis	Location: Millington, TN. SWMU #59 (Old Pesticide Shop)
Project No.: 0106-08420	Surface Elevation: 263.16 feet msl
Started at 0822 on 3-2-96	TOC Elevation: 265.18 feet msl
Completed at 0900 on 3-2-96	Depth to Groundwater: 10.14 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" inner core barrel/6" OD casing	Groundwater Elevation: 255.04 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 20.25 feet
Geologist: D. Ladd, C. Ivey	Well Screen: 10 to 20 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0							OL	(0-2') Soil, moderate yellowish-brown in color with roots.	261.2
							ML	(2-4.5') Silt, moderate yellowish-brown mottled with olive gray material, predominantly near 4.5'.	258.7
5			1	65			ML	(4.5-9') Clayey silt, olive gray in color. Contains iron-manganese nodules. Mottled with moderate yellowish-brown colored material near 9'. Moist from 5' to 6'. Dry and crumbly from 7' to 8'.	254.2
10							ML CL	(9-18.5') Silt and silty caly (see descriptions below). (9-10') Silt. Moderate yellowish-brown in color mottled with olive gray-colored material. Very common iron-manganese nodules.	
15			2	75				(10-18') Silty clay. Olive gray in color and mottled with moderate yellowish-brown-colored material, mostly moderate yellowish-brown near 10' and again at 18'. Very common iron-manganese nodules.	244.7
20							CL	(18-18.5') Silt. Moderate yellowish-brown in color mottled with olive gray-colored material. Dry. Contains common iron-manganese nodules.	243.2
								(18.5-20') Clay, olive gray in color, moist.	
25								Terminated soil boring at 20'. Note: Due to the potential for significant contamination in this soil boring, no samples were field screened for organic vapors so that the well could be completed in minimal time.	
30									
35									
40									

WELL DIAGRAM



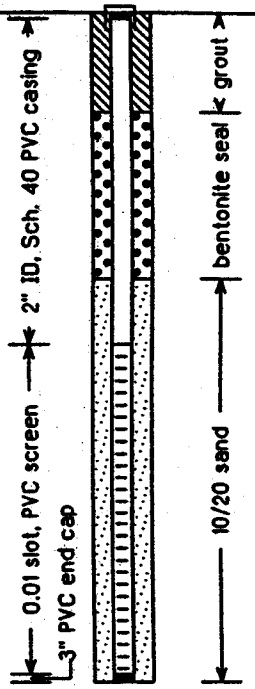
EnSafe/Allen & Hoshall

Monitoring Well 059G03LS

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #59 (Old Pesticide Shop)*
Project No.: *0106-08420*	Surface Elevation: *263.54 feet msl*
Started at *1237 on 3-4-96*	TOC Elevation: *263.35 feet msl*
Completed at *1330 on 3-4-96*	Depth to Groundwater: *9.50 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *253.85 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *20.25 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *10 to 10 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1				OL / GW	(0-1') Asphalt, soil, and gravel fill.	262.5
5			2				ML	(1-12') Silt. Moderate yellowish-brown in color mottled with light olive gray material. Organic material and less light olive gray material from 2' to 12'. Moist from 7' to 10'.	
10			3					Very moist from 10' to 12'.	251.5
15								No description available; collected a Shelby tube sample from 12' to 15'.	248.5
							ML	(15-16') Silt, moderate yellowish-brown in color mottled with light olive gray material.	247.5
20							ML	(16-20') Silt, light olive gray in color, mottled with a light moderate yellowish-brown material.	243.5
25								Terminated soil boring at 20'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log for adjacent monitoring well 059G03UF.	
30									
35									
40									

WELL DIAGRAM



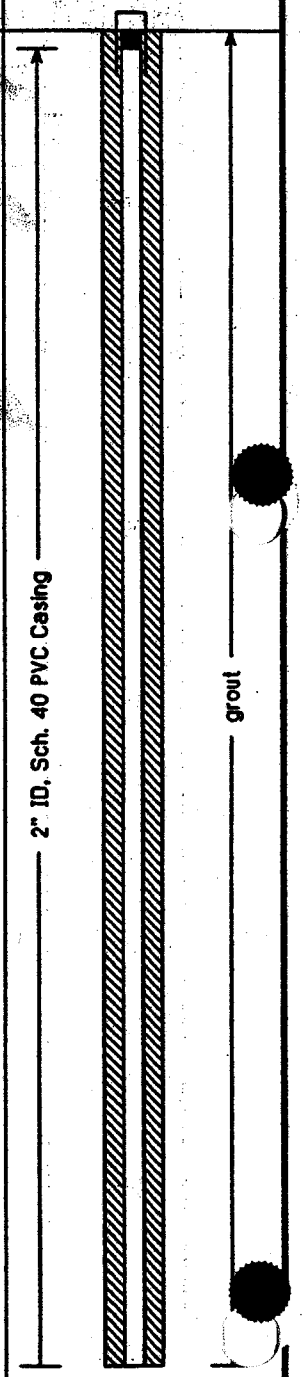
EnSafe/Allen & Hoshall

Monitoring Well 059G03UF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #59 (Old Pesticide Shop)*
Project No.: *0106-08420*	Surface Elevation: *263.51 feet msl*
Started at *1337 on 3-4-96*	TOC Elevation: *263.32 feet msl*
Completed at *1457 on 3-4-96*	Depth to Groundwater: *14.63 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - "4 inner core barrel/6" OD casing*	Groundwater Elevation: *248.69 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *58 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *44 to 54 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			1	100	.8		OL GW	(0-1') Asphalt, soil, and gravel fill.	262.5
			2	100				(1-12') Silt, moderate yellowish-brown in color mottled with light olive gray-colored material. Contains organic and less light olive gray material from 2' to 12'.	
					1.0				
5					1.0				
							ML		
			3	95	2.2			Moist from 7' to 10'.	
					1.0				
10								Very moist from 10' to 12'.	
					1.2				
								No description available; collected Shelby tube sample from 12' to 15'.	251.5
			4	83					
15					.6		ML		248.5

WELL DIAGRAM



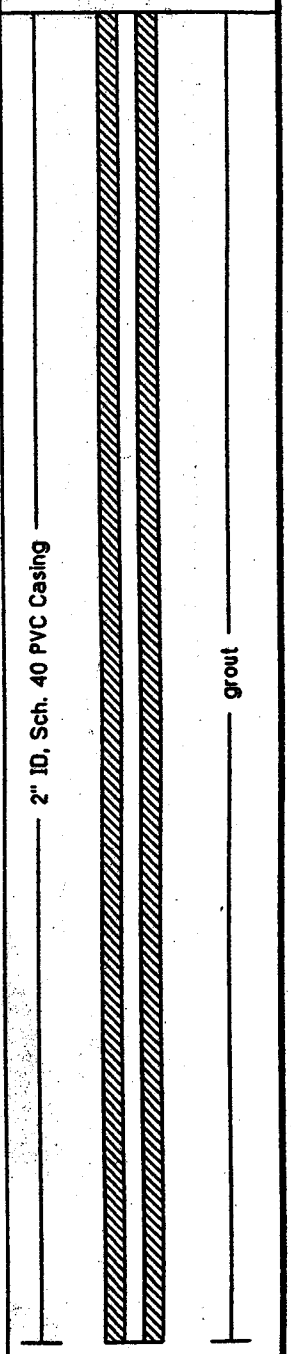
EnSafe/Allen & Hoshall

Monitoring Well 059G03UF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #59 (Old Pesticide Shop)*
Project No.: *0106-08420*	Surface Elevation: *263.51 feet msl*
Started at *1337 on 3-4-96*	TOC Elevation: *263.32 feet msl*
Completed at *1457 on 3-4-96*	Depth to Groundwater: *14.63 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - "4 inner core barrel/6" OD casing*	Groundwater Elevation: *248.69 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *56 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *44 to 54 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	(15-16') Silt, moderate yellowish-brown in color mottled with light olive gray-colored material.	248.5
					1.4			(16-22') Silt, light olive gray in color, mottled with a light moderate yellowish-brown-colored material from 16' to around 20'.	247.5
					1.6		ML		
20			5	82	2.0				
					1.4			(22-26') Silt, moderate yellowish-brown to dusky yellow in color. Contains iron-staining and iron-manganese nodules.	241.5
							ML		
25					0.8				237.5
					1.2			(26-31') Silt, moderate yellowish-brown to dark yellowish-orange in color mottled with dark yellowish-brown-colored material.	
							ML		
					1.4				
30									

WELL DIAGRAM



EnSafe/Allen & Hoshall

Monitoring Well 059G03UF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #59 (Old Pesticide Shop)*
Project No.: *0106-08420*	Surface Elevation: *263.51 feet msl*
Started at *1337 on 3-4-96*	TOC Elevation: *263.32 feet msl*
Completed at *1457 on 3-4-96*	Depth to Groundwater: *14.63 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - "4 inner core barrel/6" OD casing*	Groundwater Elevation: *248.69 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *56 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *44 to 54 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
	6	100	1.4	ML	(31-35') Silt, moderate yellowish-brown in color mottled with very fine, very light gray colored sand. Dark yellowish-orange staining and iron-manganese nodules are present near 35'.	232.5
			1.4	ML		
35			1.4	SW	(35-36.5') Sand, very fine-grained, very light gray in color mottled with dark yellowish-orange material. Wet.	228.5
				SW GW	Contains some coarse dark yellowish-orange sand from 36' to 36.5'.	227
	7	100	2.4	CL	(36.5-37') Sand (medium to very coarse-grained) and gravel. Moderate yellowish-brown to dark yellowish-orange in color.	226.5
			2.6	SM	(37-39') Sandy clay, moderate yellowish-brown to dark yellowish- orange in color mottled with very light gray-colored material. Becomes mostly pale yellowish-brown in color near 39'.	224.5
40					Top of Fluvial Deposits estimated at 39'.	223.5
	8	100			(39-40') Silty sand, medium to coarse-grained, with scattered gravel. Moderate yellowish-brown to dark yellowish-orange. Wet. No description available; collected a Shelby tube sample from 40' to 43'.	
			1.4	SW GW	(43-44.5') Sand, fine to very coarse-grained, moderate yellowish-brown to dark yellowish-orange, and gravel, up to .75" in longest dimension, angular to rounded, composed of quartz and chert, wet.	220.5
	9	125				219
45			1.2	SW GW		

WELL DIAGRAM: 2" ID, Sch. 40 PVC Casing; grout; bentonite seal; 10/20 sand

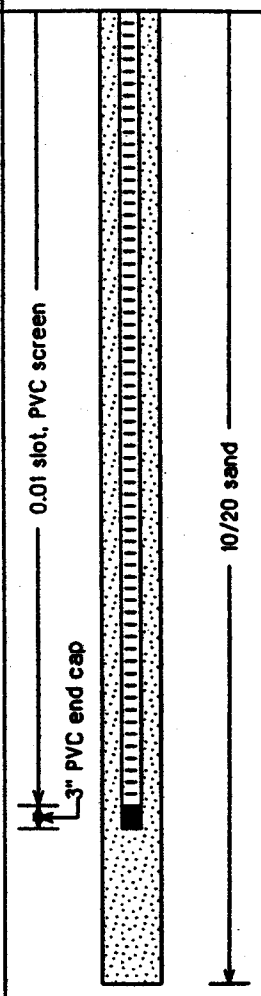
EnSafe/Allen & Hoshall

Monitoring Well 059G03UF

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #59 (Old Pesticide Shop)*
Project No.: *0106-08420*	Surface Elevation: *263.51 feet msl*
Started at *1337 on 3-4-96*	TOC Elevation: *263.32 feet msl*
Completed at *1457 on 3-4-96*	Depth to Groundwater: *14.63 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - "4 inner core barrel/6" OD casing*	Groundwater Elevation: *248.69 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *56 feet*
Geologist: *D. Ladd, W. Parks*	Well Screen: *44 to 54 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
					1.2		SW GW	(44.5-47.5') Sand, coarse to very coarse-grained, moderate yellowish- brown to dark yellowish-orange, and gravel, up to 2.5" in longest dimension, composed mostly of angular chert, wet.	218
							SW GW	(47.5-48') Sand, fine to coarse-grained, very light gray and mottled with dark yellowish-orange, and gravel, up to 1.5" in longest dimension, composed mostly of angular to rounded quartz and chert, wet.	215.5
					1.0		SW	(48-49') Sand, fine to medium-grained, with rare quartz gravel. Yellowish-gray in color mottled with dark yellowish-orange material, slightly micaceous, wet.	214.5
50							SW GW	(49-51.5') Sand (fine to coarse-grained) and gravel (mostly quartz and chert); dark yellowish-orange in color mottled with yellowish-gray material; micaceous; wet.	212
			10	130	1.6		SW GW	(51.5-53.5') Sand, fine to very coarse-grained, and gravel (quartz and chert) is up to .75" in longest dimension; yellowish-gray and wet.	
					1.6				210
							SW	(53.5-56') Sand, fine to medium-grained, with rare gravel. Yellowish- gray color, micacous, wet.	
55					0.8				
								Terminated soil boring at 56'.	207.5
60									

WELL DIAGRAM



SWMU 60

EnSafe/Allen & Hoshall

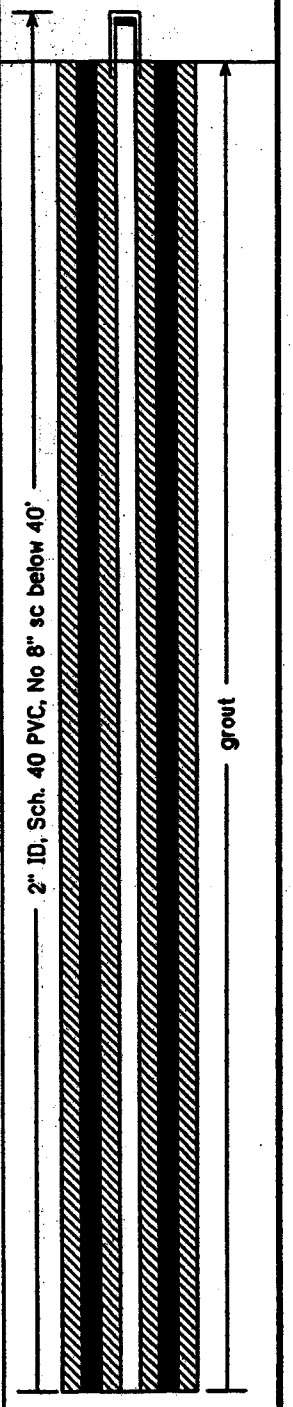
Monitoring Well 60MW01LF

Project: *NAS Memphis*	Location: *Millington TN. SWMU#60 North Landfill*
Project No.: *N0094*	Surface Elevation: *269.19 feet msl*
Started at *0700 on 1-31-95*	TOC Elevation: *271.44 feet msl*
Completed at *0845 on 2-02-95*	Depth to Groundwater: *20.49 feet* Measured: *03/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *250.95 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *75.0 feet*
Geologist: *David Ladd (40'-75'), Joe Matthews (0'-40')*	Well Screen: *65 to 75 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION
0					Silt, pale olive with heavy black staining at 0'-1' and 5'-7'.
5	1	80	468		
10	2	60	313		Silt, dark yellowish orange to moderate yellowish brown, has light olive gray silt inclusions and iron streaking.
15	3	100	3.4		Silt, olive gray to medium dark gray with moderate yellowish brown silt inclusions from 15'-20'. Black staining present at 15'-17'. No staining present from 20'-25'.
20			30.8	ML	
25					Silt, light olive gray to greenish gray, iron staining present (25'-30.5').
30					Silt, moderate yellowish brown and dry (30.5'-40'). Some light gray silt from 38'-40', but mostly moderate yellowish brown.
35	4	85	BG		
40	5	100	BG		

ELEV. (ft-msl)

WELL DIAGRAM



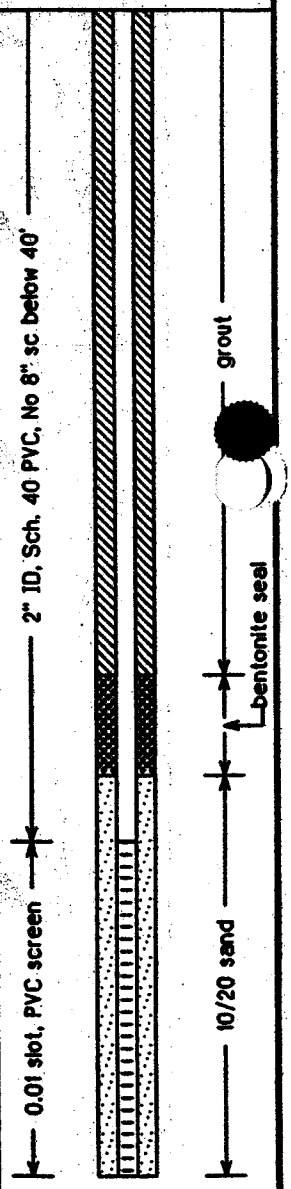
EnSafe/Allen & Hoshall

Monitoring Well 60MW01LF

Project: *NAS Memphis*	Location: *Millington TN. SWMU#60 North Landfill*
Project No.: *N0094*	Surface Elevation: *269.19 feet msl*
Started at *0700 on 1-31-95*	TOC Elevation: *271.44 feet msl*
Completed at *0845 on 2-02-95*	Depth to Groundwater: *20.49 feet* Measured: *03/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *250.95 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *75.0 feet*
Geologist: *David Ladd (40'-75'), Joe Matthews (0'-40')*	Well Screen: *65 to 75 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	Silt, dark yellowish brown.	228.7
45							GP	Gravel and sand, poorly sorted and silty, yellowish gray to dark yellowish orange. Gravel is chert and quartz with chert pebbles up to 2.5" LD.	
50							SP	Sand, fine to coarse grained, yellowish gray to dark yellowish orange, contains some scattered gravel.	219.7
55			6	90	BG				
60							SP	Sand and gravel, poorly sorted and silty, yellowish gray to dark yellowish orange. Gravel is chert and quartz.	212.2
65			7	90	BG		GP	Gravel and sand, dark yellowish orange to moderate brown, chert and quartz gravel up to 2.5" LD.	204.2
70							SP	Sand and gravel, dark yellowish orange to yellowish orange. Gravel content increasing from 72'-74.5'.	201.7
75			8	110	BG		CL	Clay, moderate gray to brownish gray, waxy, contains some very fine sand.	194.7 194.2
80								End of Boring. Boring terminated at 75'. BG = Background	

WELL DIAGRAM



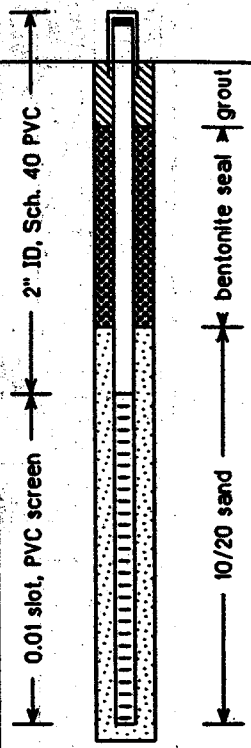
EnSafe/Allen & Hoshall

Monitoring Well 60MW01LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU 60 - North Landfill*
Project No.: *N0094*	Surface Elevation: *269.25 feet msl*
Started at *on 1-31-95*	TOC Elevation: *271.87 feet msl*
Completed at *on 1-31-95*	Depth to Groundwater: *3.30 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *268.57 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Ryan Lister*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5	X		1	80	46.8			Silt, pale olive with heavy black staining at 0'-1' and 5'-7'.	
10	X		2	60	313		ML	Silt, dark yellowish orange to moderate yellowish brown, has light olive gray silt inclusions and iron streaking.	
15	X		3	100	3.4			Silt, olive gray to medium dark gray with moderate yellowish brown silt inclusions from 15'-20'. Black staining present at 15'-17'. No staining present from 17'-20'.	
20	X		4	85	30.8			Geologic description and collected analytical samples are taken from paired well MW-01-LF.	249.2
25									
30									
35									
40									

WELL DIAGRAM



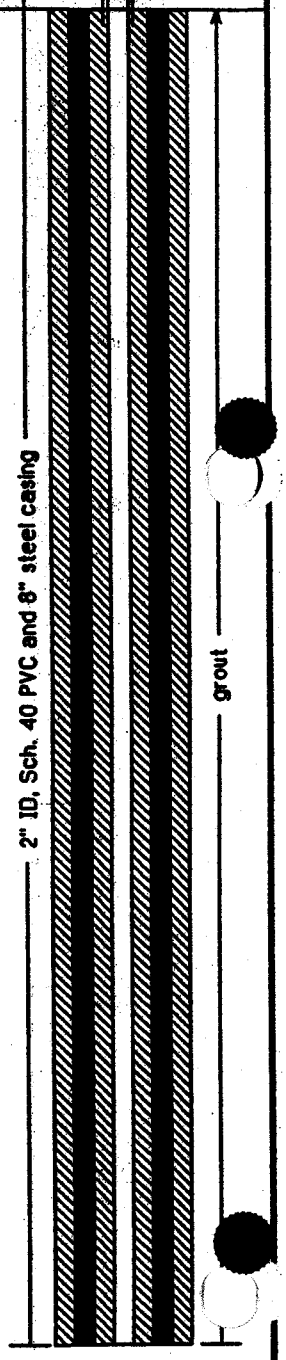
EnSafe/Allen & Hoshall

Monitoring Well 60MW02LF

Project: NAS Memphis	Location: Millington TN. SWMU#60 - North Landfill
Project No.: N0094	Surface Elevation: 268.43 feet msl
Started at 1120 on 2-01-95	TOC Elevation: 270.90 feet msl
Completed at on 2-07-95	Depth to Groundwater: 20.00 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 250.90 feet msl
Drilling Company: North Star Drilling	Total Depth: 95.0 feet
Geologist: Joe M. (0'-42'), David L. and Jack C. (42'-95')	Well Screen: 83 to 93 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	70	BG			Silt, moderate yellowish brown with organics. Roots occuring at .5' and 4'. 1" gravel section at 1' stained black.	
10			2	90	BG			Silt, moderate yellowish brown , with a greenish gray to light olive gray silt swirled throughout. Fe staining at 9.5'.	
15			3	100	BG			Silt, olive gray with iron nodules to one quarter of an inch.	
20							ML		
25			4	65	BG			Silt, olive gray to medium light gray, iron nodules present 25'-30'.	
30								Silt, dark yellowish orange with a light olive gray to light gray silt swirled througout.	
35									
40							GP	Silt, light gray, but making a transition to olive gray at 39.5'-40'.	228.4

WELL DIAGRAM



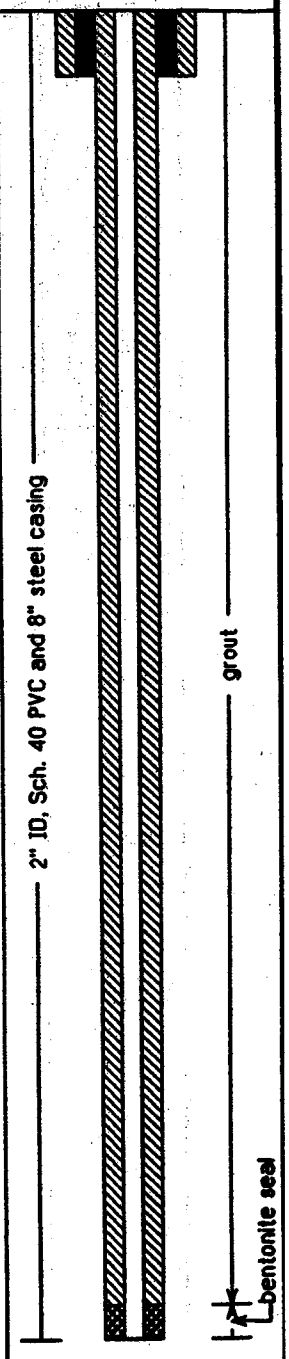
EnSafe/Allen & Hoshall

Monitoring Well 60MW02LF

Project: *NAS Memphis*	Location: *Millington TN. SWMU#60 – North Landfill*
Project No.: *N0094*	Surface Elevation: *268.43 feet msl*
Started at *1120 on 2-01-95*	TOC Elevation: *270.90 feet msl*
Completed at *on 2-07-95*	Depth to Groundwater: *20.00 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *250.90 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *95.0 feet*
Geologist: *Joe M. (0'–42'), David L. and Jack C. (42'–95')*	Well Screen: *83 to 93 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
									268.4
								Lost core from 40'–43'.	
							GP	Gravel, sandy but relatively clean, yellowish brown. Chert and quartz gravels up to 2.5" LD.	
45			5	93	BG				221.9
							SP	Sand and gravel, yellowish gray to yellowish brown, stained yellowish orange near 49'. Sand is fine to very coarse grained, silty.	219.4
50							SP	Sand with some gravel, yellowish gray, fine to very coarse grained, relatively clean.	
									214.4
55			6	100	BG		SP	Sand and gravel, yellowish gray to yellowish brown, locally stained yellowish orange. Gravel is chert and quartz, sand is fine to very coarse grained.	
60									
									204.4
65			7	90	BG		SP	Sand with some gravel, dark yellowish orange, fine to coarse grained.	
70									
									194.4
75			8	90	BG		GP	Gravel and sand, dark yellowish orange to yellowish brown, gravel up to 2.5" LD.	
									191.4
							SP	Sand with some gravel, dark yellowish orange, fine to coarse grained.	
80									

WELL DIAGRAM



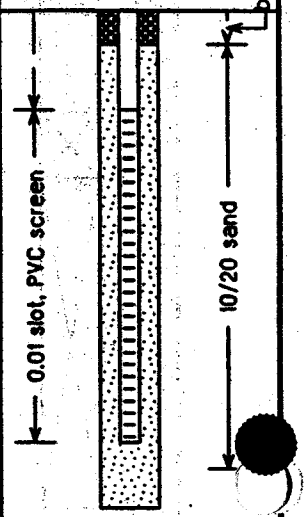
EnSafe/Allen & Hoshall

Monitoring Well 60MW02LF

Project: *NAS Memphis*	Location: *Millington TN. SWMU#60 - North Landfill*
Project No.: *N0094*	Surface Elevation: *268.43 feet msl*
Started at *1120 on 2-01-95*	TOC Elevation: *270.90 feet msl*
Completed at *on 2-07-95*	Depth to Groundwater: *20.00 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *250.90 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *95.0 feet*
Geologist: *Joe M. (0'-42'), David L. and Jack C. (42'-95')*	Well Screen: *83 to 93 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SP		
									186.4
							GP	Gravel and sand, dark yellowish orange to yellowish brown.	
85			9	90	BG				183.4
							GW	Gravel ("fairly clean"), sandy, dark yellowish orange to yellowish brown.	
									181.4
								Sand coarse with gravel, grayish brown to dark yellowish orange.	
90							SP		
									175.4
							ML	Silt, clayey, grayish brown, laminated (1/8" to 1/16"), stiff, finely micaceous, dry.	
95			10	100	BG				173.4
								End of boring. Boring terminated at 95', but bottom of well will be set at 93'.	
								BG = Background	
100									
105									
110									
115									
120									

WELL DIAGRAM



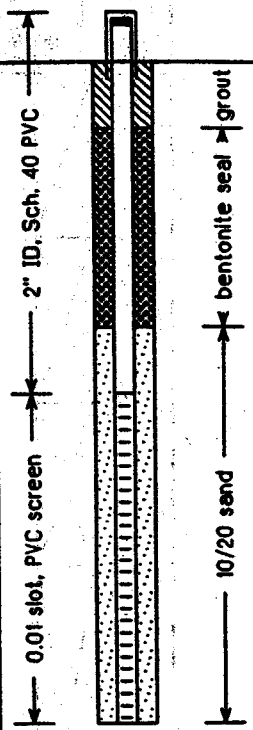
EnSafe/Allen & Hoshall

Monitoring Well 60MW02LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#60 - North Landfill*
Project No.: *N0094*	Surface Elevation: *268.85 feet msl*
Started at *0830 on 2-01-95*	TOC Elevation: *270.84 feet msl*
Completed at *1015 on 2-01-95*	Depth to Groundwater: *3.860 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *266.98 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Ryan Lister*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	70	BG			Silt, moserate yellowish brown with organics. Roots occuring at .5' and 4'. 1" gravel section at 1' stained black.	
10			2	90	BG		ML	Silt, moderate yellowish brown , with a greenish gray to light olive gray silt swirled throughout. Staining also at 9.5'.	
15			3	100	BG			Silt, olive gray with iron nodules to one quarter of an inch.	
20			4	85	BG			End of boring. Total depth of boring at 20'. Analytical and geologic description taken from paired well MW-02-LF. BG = Background	248.9
25									
30									
35									
40									

WELL DIAGRAM



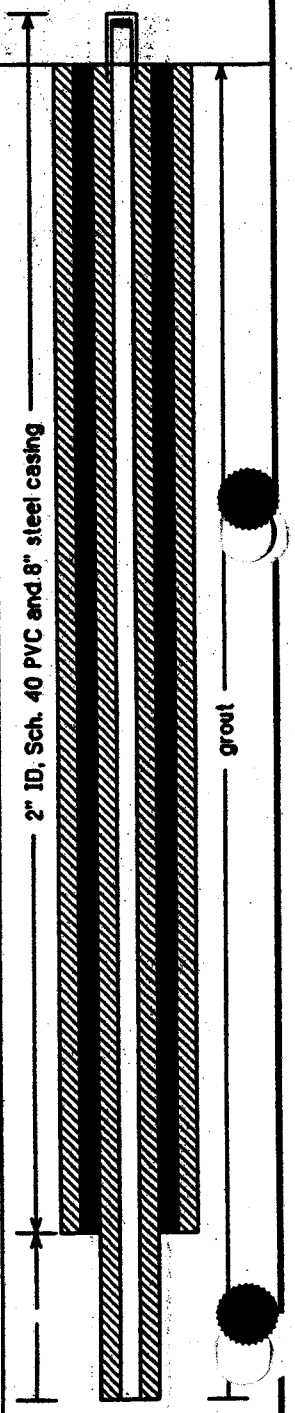
EnSafe/Allen & Hoshall

Monitoring Well 60MW03LF

Project: NAS Memphis	Location: Millington TN. SWMU#60 – North Landfill
Project No.: N0094	Surface Elevation: 268.90 feet msl
Started at 1330 on 2-01-95	TOC Elevation: 271.52 feet msl
Completed at 1630 on 2-07-95	Depth to Groundwater: 20.02 feet Measured: 3/31/95
Drilling Method: Rotasonic	Groundwater Elevation: 251.50 feet msl
Drilling Company: North Star Drilling	Total Depth: 85.0 feet
Geologist: Joe Matthews (0'-35'), Jack Carmichael (35'-85')	Well Screen: 77 to 87 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	100	BG			Silt, moderate yellowish brown with organics, very dry.	
10			2	80	BG				
15			3	100	BG			Silt, greenish gray to light gray.	
20			4		BG		ML		
25			5	80	BG			Silt, clayey, greenish gray.	
30			6		BG			Silt, calyey, greenish gray, iron staining and light gray silt swirling.	
35			7		BG			Silt, dark yellowish orange with a light olive gray to light gray silt swirled througout.	
40			8	93	BG		GM	Silt, light olive gray.	228.9

WELL DIAGRAM



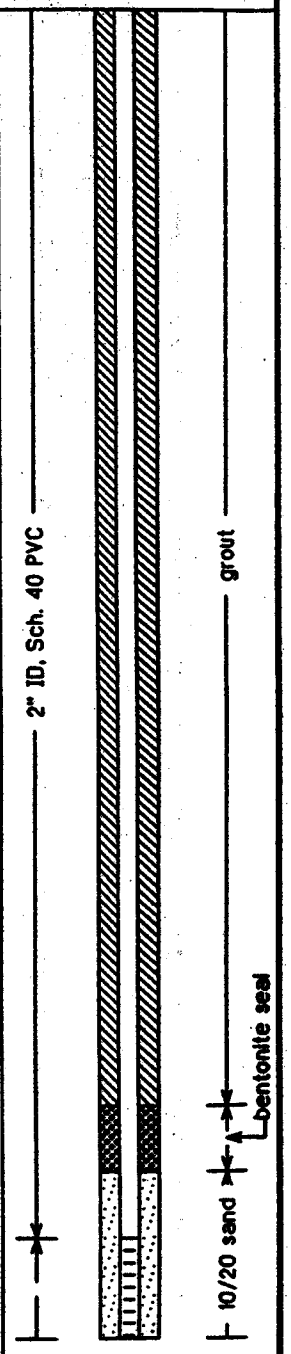
EnSafe/Allen & Hoshall

Monitoring Well 60MW03LF

Project: *NAS Memphis*	Location: *Millington TN. SWMU#60 - North Landfill*
Project No: *N0094*	Surface Elevation: *268.90 feet msl*
Started at *1330 on 2-01-95*	TOC Elevation: *271.52 feet msl*
Completed at *1630 on 2-07-95*	Depth to Groundwater: *20.02 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *251.50 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *85.0 feet*
Geologist: *Joe Matthews (0'-35'), Jack Carmichael (35'-95')*	Well Screen: *77 to 87 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
						268.9
45	9	70	BG	GM	Alternating sand w/ gravel and gravel w/ sand, silty, trace clay, some intervals of real clean gravel to 1/2" (~3"-6"), dark yellowish orange to grayish orange, pink, wet.	
						220.9
				ML	Silt, clayey, sandy, pale yellowish brown, moist, from 48'-55', alternating layers (from 6" to 2') of sandy gravel and gravelly sand, pinkish gray to dark yellowish orange, supersaturated interval from 49'-50.5'.	219.9
50	10		BG	SP/GP		
55	11	100	BG	SP	Sand, fine to coarse with gravel and siltvery pale to dark yellowish orange, wet.	213.9
60	12		BG			
65	13	100	BG	GM	Sand, fine to coarse, trace silt, gravelly, gravel increasing in size and number between 70'-75'. Color generally dark yellowish orange, wet.	203.9
70	14		BG			
75	15	95	BG	GW	Same as above, fairly clean gravelly layer from 75' to 77'.	193.9
80	16		BG	SP		188.9

WELL DIAGRAM



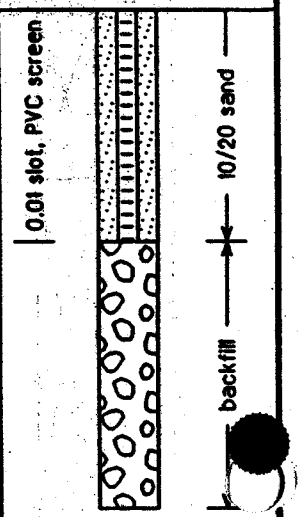
EnSafe/Allen & Hoshall

Monitoring Well 60MW03LF

Project: *NAS Memphis*	Location: *Millington TN. SWMU#60 – North Landfill*
Project No.: *N0094*	Surface Elevation: *268.90 feet msl*
Started at *1330 on 2-01-95*	TOC Elevation: *271.52 feet msl*
Completed at *1630 on 2-07-95*	Depth to Groundwater: *20.02 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *251.50 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *95.0 feet*
Geologist: *Joe Matthews (0'-35'), Jack Carmichael (35'-95')*	Well Screen: *77 to 87 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85			17	95	BG		SP		268.0
									181.4
90			18		BG		CL	Silt, clayey, grayish brown, stiff, mottled with laminations to to the end of the run at 95'.	
95			11	110	BG			End of Boring. Boring terminated at 95'.	173.9
100									
105									
110									
115									
120									

WELL DIAGRAM



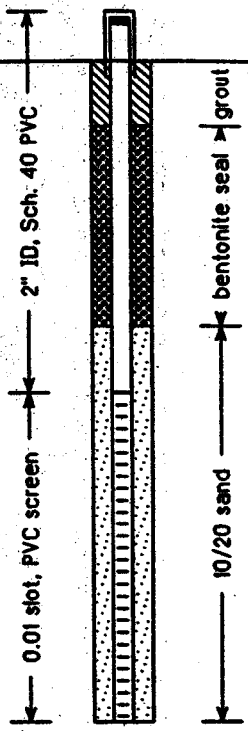
EnSafe/Allen & Hoshall

Monitoring Well 60MW03LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#60 – North Landfill*
Project No.: *N0094*	Surface Elevation: *269.60 feet msl*
Started at *on 2-01-95*	TOC Elevation: *271.40 feet msl*
Completed at *on 2-01-95*	Depth to Groundwater: *7.03 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *264.37 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Ryan Lister*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	100	BG			Silt, moderate yellowish brown with organics, very dry.	
10			2	80	BG		ML		
15			3	100	BG			Silt, greenish gray to light gray.	
20			4	80	BG			End of Boring. Boring terminated at 20'. Geologic description and analytical samples taken from MW-03-LF.	249.6
25									
30									
35									
40									

WELL DIAGRAM



EnSafe/Allen & Hoshall

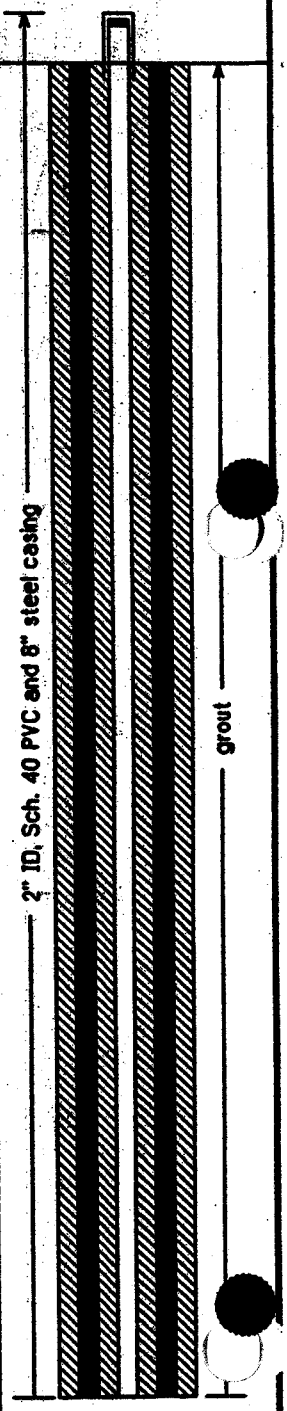
Monitoring Well 60MW04LF

Project: *NAS Memphis*	Location: *Memphis, TN*
Project No.: *N0094*	Surface Elevation: *269.67 feet msl*
Started at *0915 on 1-31-95*	TOC Elevation: *272.20 feet msl*
Completed at *1215 on 2-08-95*	Depth to Groundwater: *20.70 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *251.61 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *96.0 feet*
Geologist: *Joe Matthews (0'-40'), Jack Carmichael (40'-96')*	Well Screen: *86 to 96 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION
5	1	80	BG		Silt, moderate yellowish brown with organics, very dry.
10	2	80	BG		Silt, moderate yellowish brown with fewer organics. Wet from 5'-9', but becomes wet at 9'-10'.
15	3	100	80.1		Silt, medium light gray, moist down to 20.5 then becoming dry. Some iron staining at 27'.
20	4		3.4	ML	
25	4	90	BG		
30	5		2.9		
35	6		60.2		Silt, moderate yellowish brown, dry to slightly moist.
40	7	87	BG		

ELEV. (ft-msl)

WELL DIAGRAM



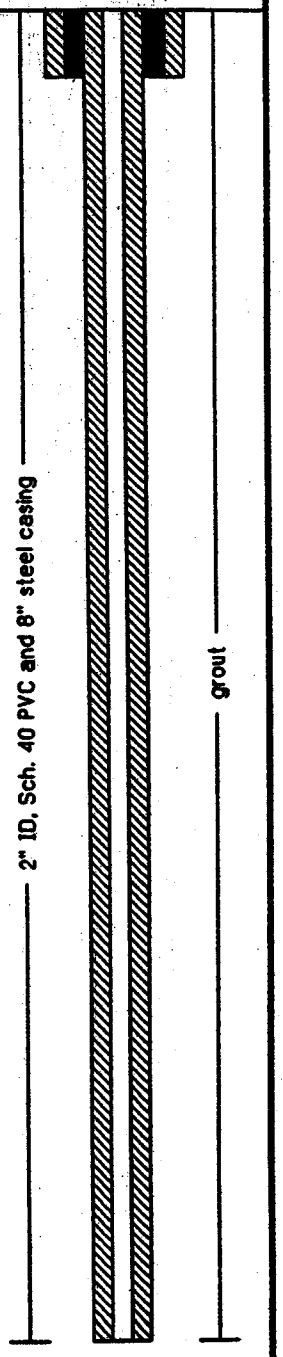
EnSafe/Allen & Hoshall

Monitoring Well 60MW04LF

Project: *NAS Memphis*	Location: *Memphis, TN*
Project No.: *N0094*	Surface Elevation: *269.67 feet msl*
Started at *0915 on 1-31-95*	TOC Elevation: *272.20 feet msl*
Completed at *1215 on 2-08-95*	Depth to Groundwater: *20.70 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *251.61 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *96.0 feet*
Geologist: *Joe Matthews (0'-40'), Jack Carmichael (40'-96')*	Well Screen: *86 to 96 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML		
45			8		BG			Sand, gravelly, silt and gravel (perticularly in the lower 3'), clayey gravel seam at 51.5'-52, colors range from grayish brown to dark yellowish orange, wet.	224.7
50			9		BG				
55			10	90	BG			Sand, gravelly, and silty. Same color as above, color change from 55' -58' turning pinkish gray then becoming yellowish gray to dark yellowish orange from 58'-65', wet.	
60			11		BG				
65			12	95	BG		SP		
70			13		BG			Same as above, sand coarsening and gravel increasing towards the bottom of run. Color becoming mostly dark yellowish orange below 68'.	
75			8	90	BG				
80			9	100	BG			Same as above, gravel increasing in number and size towards the bottom of run, generally grayish orange, wet.	

WELL DIAGRAM



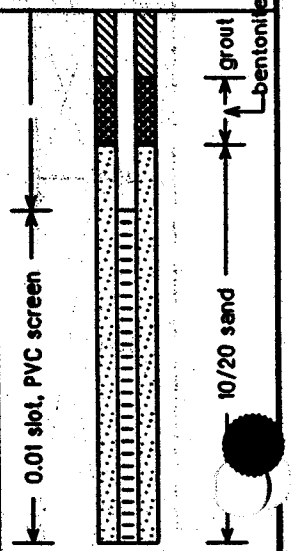
EnSafe/Allen & Hoshall

Monitoring Well 60MW04LF

Project: *NAS Memphis*	Location: *Memphis, TN*
Project No.: *N0094*	Surface Elevation: *269.67 feet msl*
Started at *0915 on 1-31-95*	TOC Elevation: *272.20 feet msl*
Completed at *1215 on 2-08-95*	Depth to Groundwater: *20.70 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *251.61 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *96.0 feet*
Geologist: *Joe Matthews (0'-40'), Jack Carmichael (40'-96')*	Well Screen: *86 to 96 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
85							SP	Sand, gravelly with silt, gravel up to 2" in LD towards bottom. Color mostly dark yellowish orange, wet.	
			10	87.5	BG				181.7
90							GM	Gravel, sandy, silty and clayey; Cobbles up to 3" in diameter, very dark yellowish orang, wet, (very tough drilling, 90'-94').	
95									174.2
			11	112.5	BG		SM	Sand, fine, upper 2" dark reddish brown iron stained, lower 3"-4" laminated pale brown, moist.	173.7
								End of boring at 96'.	
100								BG = Background (1.1 ppm)	
105									
110									
115									
120									

WELL DIAGRAM



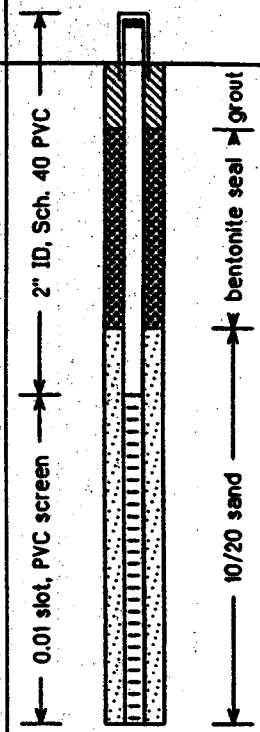
EnSafe/Allen & Hoshall

Monitoring Well 60MW04LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#60 – North Landfill*
Project No.: *N0094*	Surface Elevation: *269.57 feet msl*
Started at *0915 on 1-31-95*	TOC Elevation: *272.11 feet msl*
Completed at *1215 on 1-31-95*	Depth to Groundwater: *4.95 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *267.16 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Ryan Lister*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0								Silt, moderate yellowish brown with organics, very dry.	
5			1	80	BG			Silt, moderate yellowish brown with fewer organics. Wet from 5'-9', but becomes wet at 9'-10'.	
10			2	80	BG		ML		
15			3	100	80.1			Silt, medium light gray, moist down to 20.5 then becoming dry. Some iron staining at 27'.	
20			4		3.4			End of boring at 40'. Geologic description and analytical samples are taken from paired well MW-04-LF.	249.6
25									
30									
35									
40									

WELL DIAGRAM



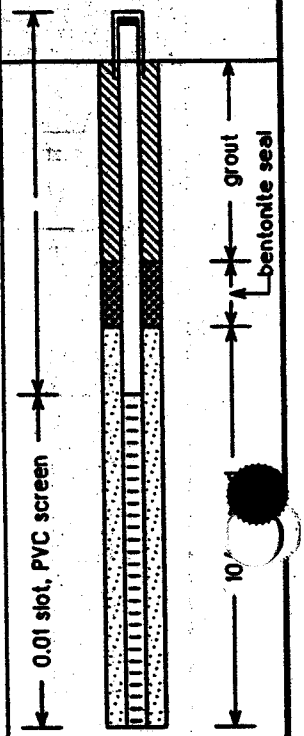
EnSafe/Allen & Hoshall

Monitoring Well 60MW05LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#60 – North Landfill*
Project No.: *N0094*	Surface Elevation: *269.75 feet msl*
Started at *0830 on 2-13-95*	TOC Elevation: *271.88 feet msl*
Completed at *0900 on 2-13-95*	Depth to Groundwater: *4.09 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *267.89 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
5			1	100	1.4			Fill, dark brown silt with scattered gravel.	
								Silt, clayey, soft, light olive gray to grayish orange, mottled, dark brown inclusions (organics?) throughout, moist, finely laminated.	
								Silt, some clay, greenish gray, mottled dark yellowish orange, laminated, soft, moist.	
10			2	80	BG		ML	Silt, some clay w/inclusions, finely mottled, yellowish orange, laminated, with dark inclusions (organics?), soft, moist.	
15			3	90	BG			Silt, clayey, pale yellowish brown, fewer laminations and inclusions than above, becoming stained dark yellowish orange from 18'–19', moist.	
20			4	80	BG			Silt, clayey, medium gray, massive, moist.	249.7
25								BG = Background (1.1 ppm)	
30									
35									
40									

WELL DIAGRAM



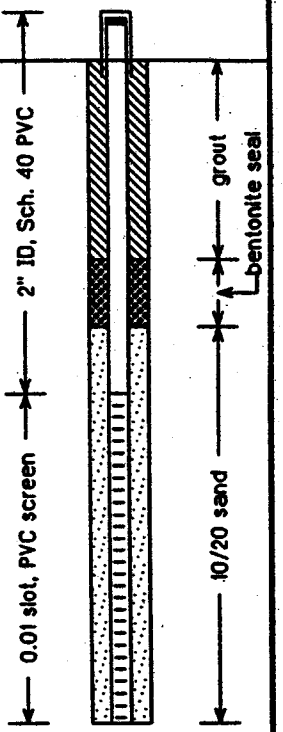
EnSafe/Allen & Hoshall

Monitoring Well 60MW06LS

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#60 – North Landfill*
Project No.: *N0094*	Surface Elevation: *269.58 feet msl*
Started at *1020 on 2-13-95*	TOC Elevation: *271.98 feet msl*
Completed at *1050 on 2-13-95*	Depth to Groundwater: *3.37 feet* Measured: *3/31/95*
Drilling Method: *Rotasonic*	Groundwater Elevation: *268.58 feet msl*
Drilling Company: *North Star Drilling*	Total Depth: *20.0 feet*
Geologist: *Jack Carmichael*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Fill, dark brown silt, clay, some gravel and pieces of burnt wood.	268.6
							ML	No sample description; poor recovery.	
5			1	40	BG			Silt, clayey, moderate yellowish brown to grayish orange, mottled dark brown inclusions (organics?), soft, moist.	264.6
10			2	133	BG			Silt, clayey moderate yellowish brown , mottled w/ 1/16"-1/8" dark inclusions (organics?), finely laminated, soft moist, becoming stained dark yellowish orange from 12.5'-13' becoming stained dark yellowish orange from 12.5'-13' then med. gray to dark yellowish orange from 13'-14'.	
15			3	130	BG			Silt, clayey, medium gray, massive, soft, moist.	
								Silt, clayey, medium gray, massive, moist, soft.	
20			4	100	BG				249.6
25								BG = Background (1.1 ppm)	
30									
35									
40									

WELL DIAGRAM



SWMU 65

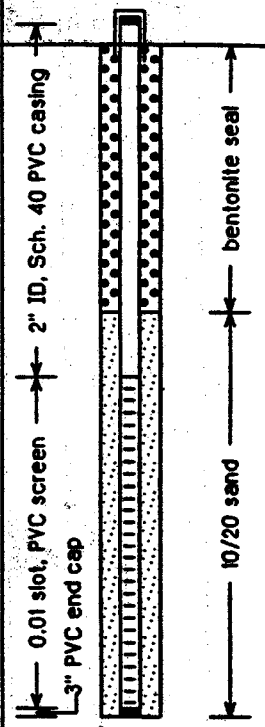
EnSafe/Allen & Hoshall

Monitoring Well 065G05UA

Project: *NSA Memphis*	Location: *Millington, TN. SHMU #65 (Training Mock-Up Site)*
Project No.: *0106-08420*	Surface Elevation: *264.10 feet msl*
Started at *1230 on 2-17-96*	TOC Elevation: *266.04 feet msl*
Completed at *1320 on 2-17-96*	Depth to Groundwater: *3.99 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *262.05 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *20.25 feet*
Geologist: *J. Kingsbury*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					BG		CL	(0-20') Upper Alluvium (see descriptions below). Clay, brownish-gray in color, hard and dry.	
5			1	100	BG				259.1
					BG		ML	Silt. From 5' to 8', is very light brown in color and moist. From 8' to 18', silt is yellowish-brown to yellowish-gray in color, with specks of organic material and some orangish-colored staining.	
10					BG				
					BG				
					BG				
15			2	70	BG				
					BG				
20					BG			At 18', color changes to greenish-gray/olive gray. Very moist to wet with some snail shells present.	244.1
								Terminated soil boring at 20'.	
25									
30									
35									
40									

WELL DIAGRAM



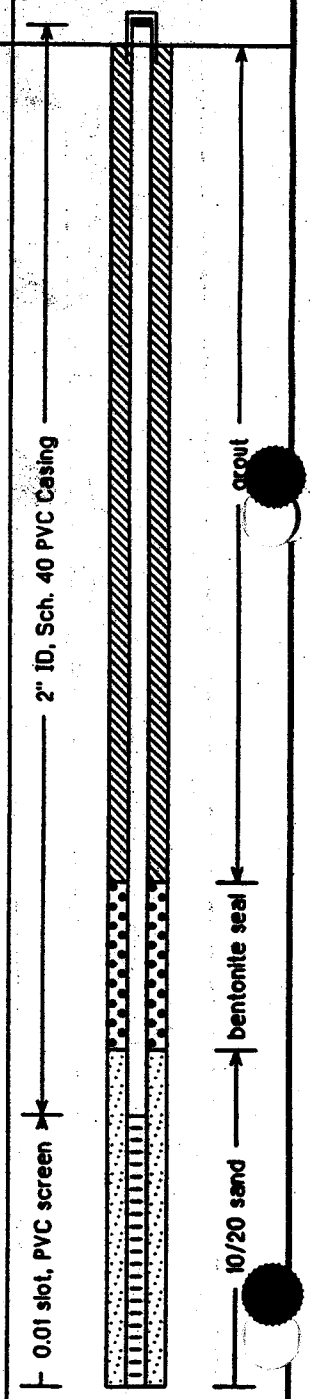
EnSafe/Allen & Hoshall

Monitoring Well 065G06DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #65 (Training Mock-Up Site)*
Project No.: *0106-08420*	Surface Elevation: *264.18 feet msl*
Started at *0815 on 2-17-96*	TOC Elevation: *266.12 feet msl*
Completed at *0930 on 2-17-96*	Depth to Groundwater: *9.62 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *256.50 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *46 feet*
Geologist: *J. Kingsbury*	Well Screen: *32 to 42 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					BG		ML	(0-29') Upper Alluvium (see descriptions below).	
			1	25	BG			Silt. Light brown to yellowish-brown in color.	262.2
5					BG		CL	Clay. Brownish-gray to light brown in color. Hard.	
					BG			Silt. Yellowish-gray to yellowish-brown in color. Rare organics with iron-stained haloes around them from 6' to 12'.	258.2
					BG				
10			2	120	BG		ML		
					BG			From 12' to 14', increase in orange-colored iron staining and mottling. Silt is yellowish-brown to with some gray, and moist.	250.2
15			3	100				No description available; collected Shelby tube sample from 14' to 16'.	248.2
					BG			Silt, yellowish-brown with some gray, with orange-colored iron staining and mottling, moist to wet.	
					BG			From 20' to 34', clayey silt, olive gray to brownish-gray, with some snail shells, moist.	
20			4	90	BG				
					BG				
25					BG		ML		
					BG			With lenses of sand from 28' to 34'.	
					BG			Top of Deeper Alluvium deposits estimated at 29'.	
30					BG				
			5	83	BG				
					BG				230.2
35					BG		SW	Sand, dusky yellow to olive gray, with gravel up to 1" in longest dimension. Percentage of gravel increases with depth to 38'.	
					BG				228.2
			6	100				No description available; collected Shelby tube sample from 38' to 40'.	
40							SW		224.2
							GW		

WELL DIAGRAM



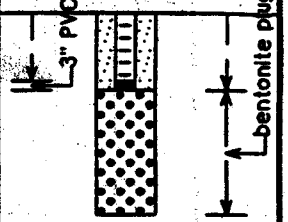
EnSafe/Allen & Hoshall

Monitoring Well 065G06DA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #65 (Training Mock-Up Site)*
Project No.: *0106-08420*	Surface Elevation: *264.18 feet msl*
Started at *0815 on 2-17-96*	TOC Elevation: *266.12 feet msl*
Completed at *0930 on 2-17-96*	Depth to Groundwater: *9.62 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *256.50 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *46 feet*
Geologist: *J. Kingsbury*	Well Screen: *32 to 42 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
					BG		SW GW	Sand and gravel.	264.2
			7	125	BG		CL	Cockfield Formation: Brown stiff clay with fine-grained sand interbeds.	222.2
45					BG				
								Terminated soil boring at 46'.	218.2
50									
55									
60									
65									
70									
75									
80									

WELL DIAGRAM



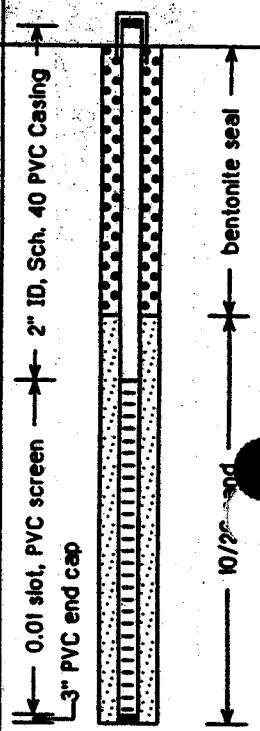
EnSafe/Allen & Hoshall

Monitoring Well 065G06UA

Project: *NSA Memphis*	Location: *Millington, TN. SWMU #65 (Training Mock-Up Site)*
Project No.: *0106-08420*	Surface Elevation: *264.25 feet msl*
Started at *0930 on 2-17-96*	TOC Elevation: *266.28 feet msl*
Completed at *1045 on 2-17-96*	Depth to Groundwater: *4.90 feet* Measured: *4/8/96*
Drilling Method: *Rotasonic - 4" inner core barrel/6" OD casing*	Groundwater Elevation: *261.38 feet msl*
Drilling Company: *Alliance Environmental, Inc.*	Total Depth: *20.25 feet*
Geologist: *J. Kingsbury*	Well Screen: *10 to 20 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1				ML	(0-20') Upper Alluvium (see descriptions below).	
								Silt. Light brown to yellowish-brown in color.	262.2
5							CL	Clay. Brownish-gray to light brown in color. Hard.	
									258.2
			2				ML	Silt. Yellowish-gray to yellowish-brown in color. Rare organics with iron-stained haloes around them from 6' to 12'.	
10									
			3					From 12' to 14', increase in orange-colored iron staining and mottling. Silt is yellowish-brown to with some gray, and moist.	250.2
15								No description available; collected Shelby tube sample from 14' to 16' in 65MW06DA.	248.2
							ML	Silt, yellowish-brown with some gray, with orange-colored iron staining and mottling, moist to wet.	
20								Terminated soil boring at 20'. Note: No samples were collected for lithologic description. These descriptions were transferred from the log of adjacent monitoring well 65MW06DA.	244.2
25									
30									
35									
40									

WELL DIAGRAM



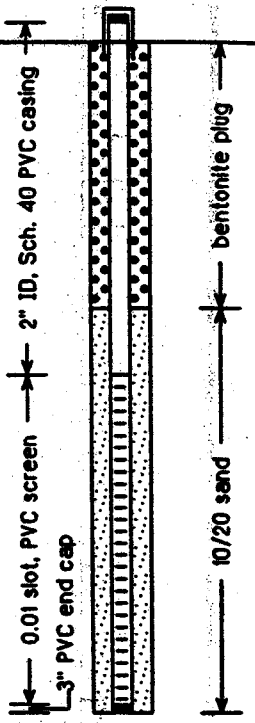
EnSafe/Allen & Hoshall

Monitoring Well 065G07UA

Project: NSA Memphis	Location: Millington, TN. SWMU #65 (Training Mock-Up Site)
Project No.: 0106-08420	Surface Elevation: 262.85 feet msl
Started at 1100 on 2-17-96	TOC Elevation: 264.86 feet msl
Completed at on 2-17-96	Depth to Groundwater: 4.13 feet Measured: 4/8/96
Drilling Method: Rotasonic - 4" inner core barrel/6" OD casing	Groundwater Elevation: 260.73 feet msl
Drilling Company: Alliance Environmental, Inc.	Total Depth: 20.25 feet
Geologist: J. Kingsbury	Well Screen: 10 to 20 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0					BG		ML	(0-20') Upper Alluvium (see descriptions below).	
					BG			Fill material is present from 0' to 2'. Silt with some gravel, brown in color.	260.9
5			1	100	BG		CL	Clay, brown in color, hard and dry.	
					BG				
					BG				253.9
10					BG		ML	Silt, yellowish-gray to yellowish-brown in color, moist.	
					BG			Some mottling with dark yellowish-orange stained material from 10' to 20'.	
15			2	70	BG				
					BG				
					BG			Silt exhibits a color change near 20' to olive gray/greenish-gray.	
20								Terminated soil boring at 20'.	242.9
25									
30									
35									
40									

WELL DIAGRAM



CASING ELEVATION: 263.74

DATUM: Mean Sea Level

WELL LOCATION:

MW-1

(065MW01UA)

DATE & TIME BEGAN: 10/29/92: 2:00pm

DESCRIPTION OF WEATHER: Cloudy 70°F

DRILLER: J. Rowland

INSPECTOR: M. Roberts

BORING TERMINATED AT:

DEPTH (ft): 15.0

DATE & TIME: 10/29/92 3:00pm

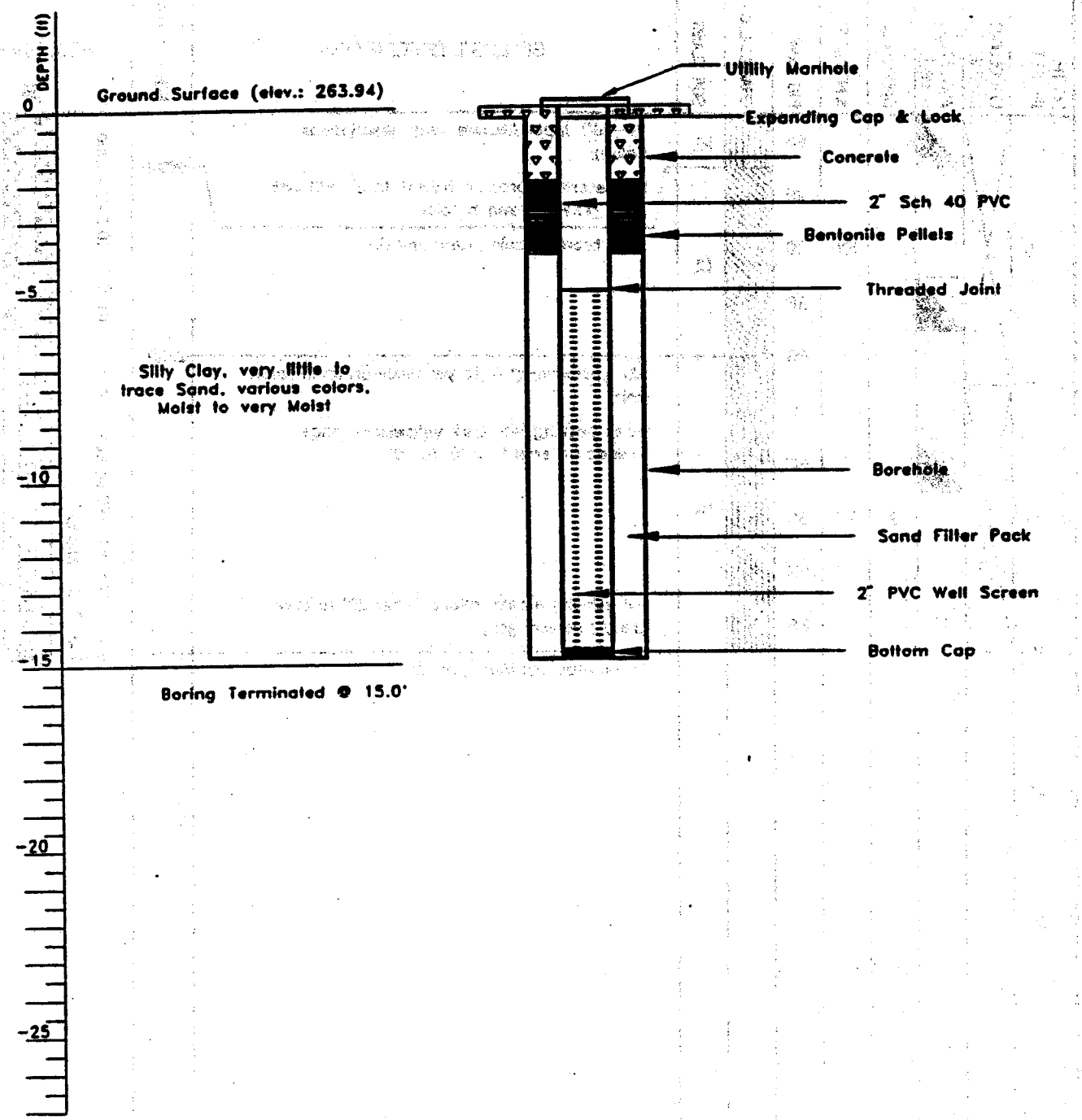
DRILLING TECHNIQUE:

Hollow Stem Auger

Split-Spoon Sampler

GROUND WATER ELEVATIONS

DATE	ELEVATION
11/04/92	258.83
11/23/92	259.54



MEMPHIS ENVIRONMENTAL CENTER, INC.

2903 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO. NASMW-2
DRAWN: DKD
DATE: NOVEMBER 23, 1992

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

CASING ELEVATION: 263.27

DATUM: Mean Sea Level

WELL LOCATION:

MW-2

(065MW02UA)

DATE & TIME BEGAN: 11/02/92; 9:30am

DESCRIPTION OF WEATHER: Sunny & Windy, 60°F

DRILLER: J. Rowland

INSPECTOR: M. Roberts

BORING TERMINATED AT:

DEPTH (ft): 14.0

DATE & TIME: 11/02/92 11:30am

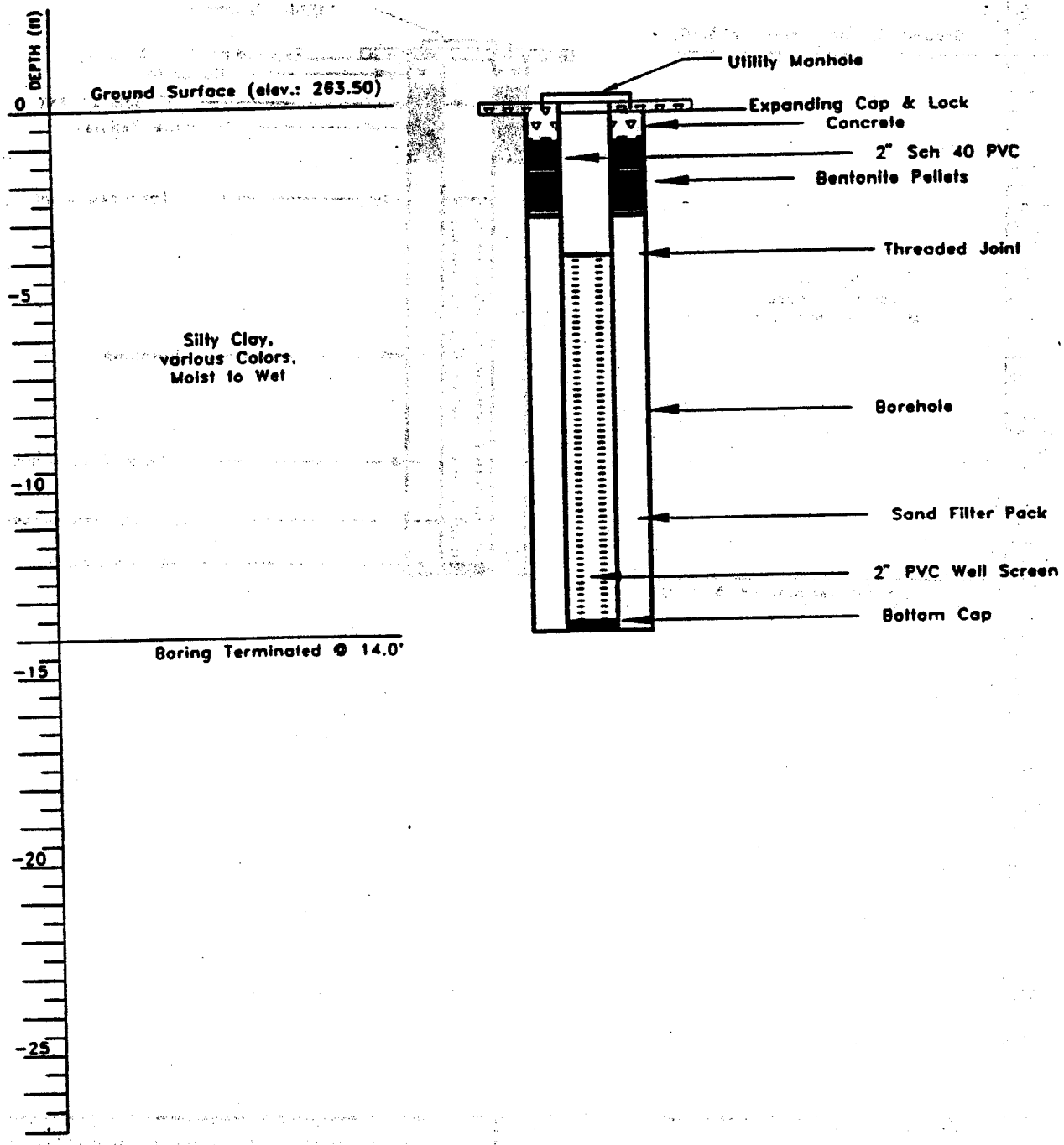
DRILLING TECHNIQUE:

Hollow Stem Auger

Split-Spoon Sampler

GROUND WATER ELEVATIONS

DATE	ELEVATION
11/04/92	259.08
11/23/92	259.90



MEMPHIS ENVIRONMENTAL CENTER, INC.

2003 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO.	NASMW-1
DRAWN:	DKD
DATE:	NOVEMBER 23, 1992

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

CASING ELEVATION: 263.17

DATUM: Mean Sea Level

WELL LOCATION: MW-3 (065MW03UA)

DATE & TIME BEGAN: 11/02/92; 12:30pm

DESCRIPTION OF WEATHER: Sunny & Windy 65°F

DRILLER: J. Rowland

INSPECTOR: M. Roberts

BORING TERMINATED AT:

DEPTH (ft): 14.0

DATE & TIME: 11/02/92 2:00 pm

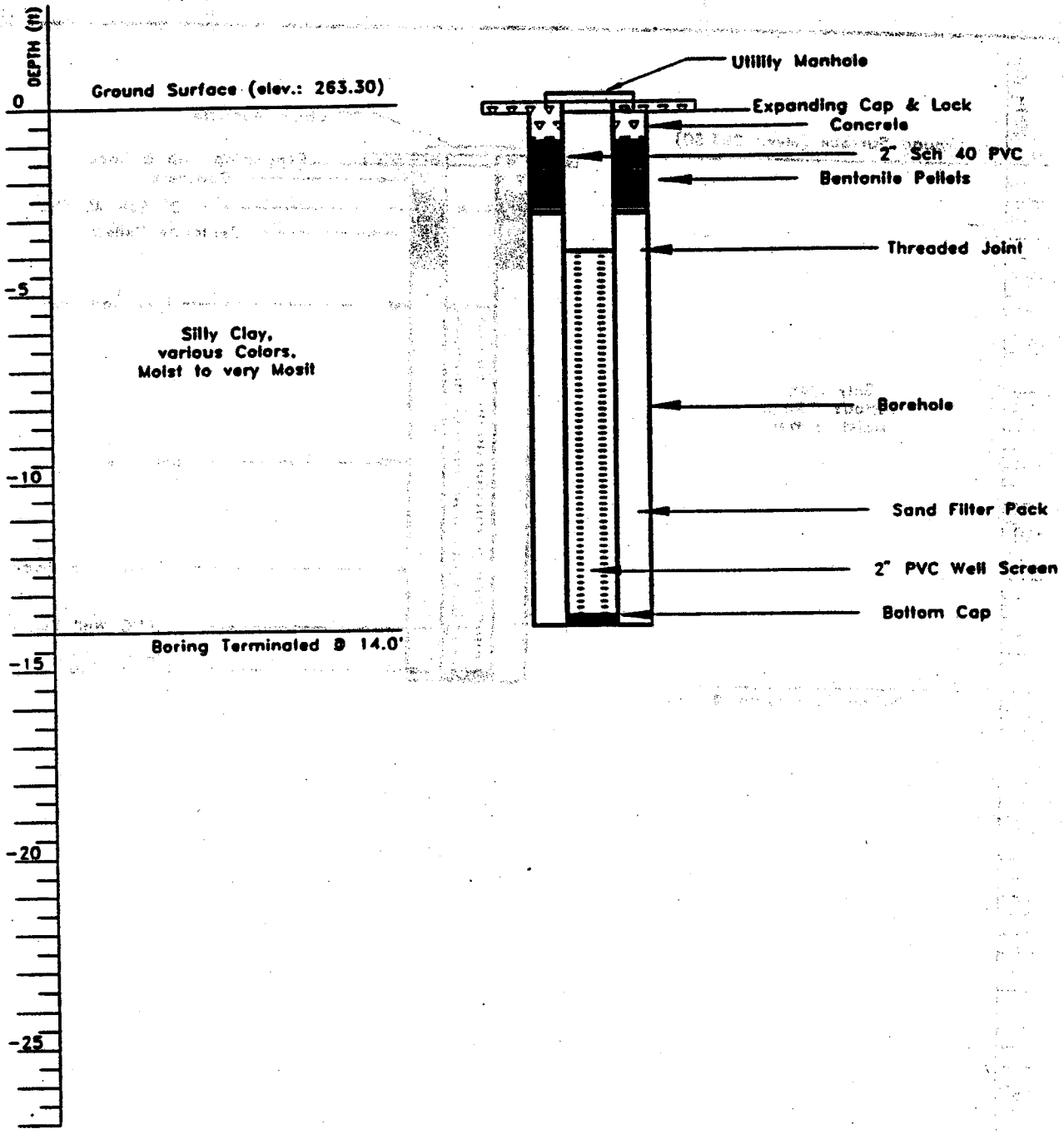
DRILLING TECHNIQUE:

Hollow Stem Auger

Split-Spoon Sampler

GROUND WATER ELEVATIONS

DATE	ELEVATION
11/04/92	259.23
11/23/92	259.86



MEMPHIS ENVIRONMENTAL CENTER, INC.

2003 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

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

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

CASING ELEVATION: 263.59

DATUM: Mean Sea Level

WELL LOCATION:

MW-4

(065MW04UA)

DATE & TIME BEGAN: 11/02/92; 2:30pm

DESCRIPTION OF WEATHER: Sunny & Windy 65°F

DRILLER: J. Rowland

INSPECTOR: M. Roberts

BORING TERMINATED AT:

DEPTH (ft): 14.0

DATE & TIME: 11/02/92 3:45pm

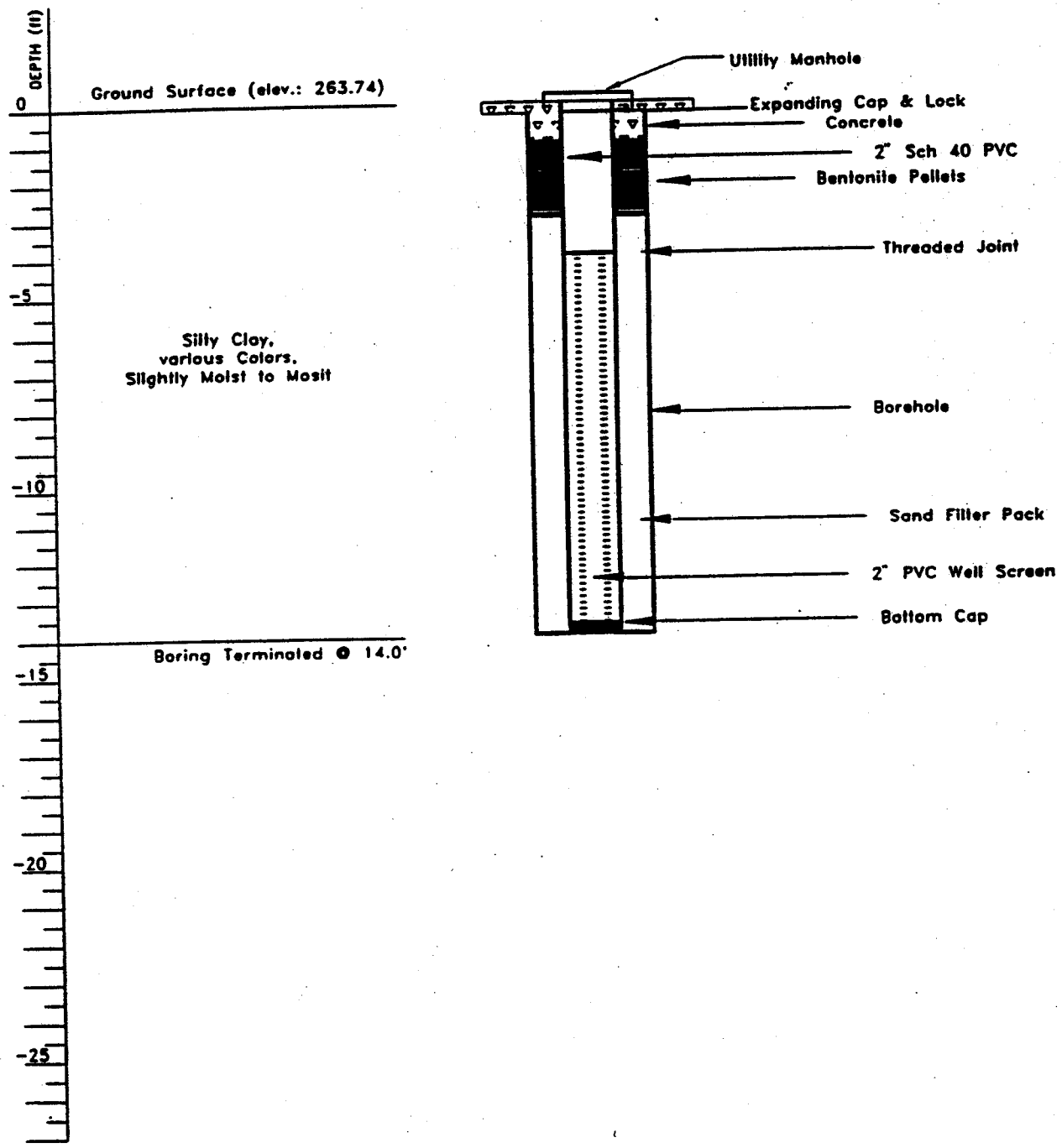
DRILLING TECHNIQUE:

Hollow Stem Auger

Split-Spoon Sampler

GROUND WATER ELEVATIONS

DATE	ELEVATION
11/04/92	259.13
11/23/92	259.61

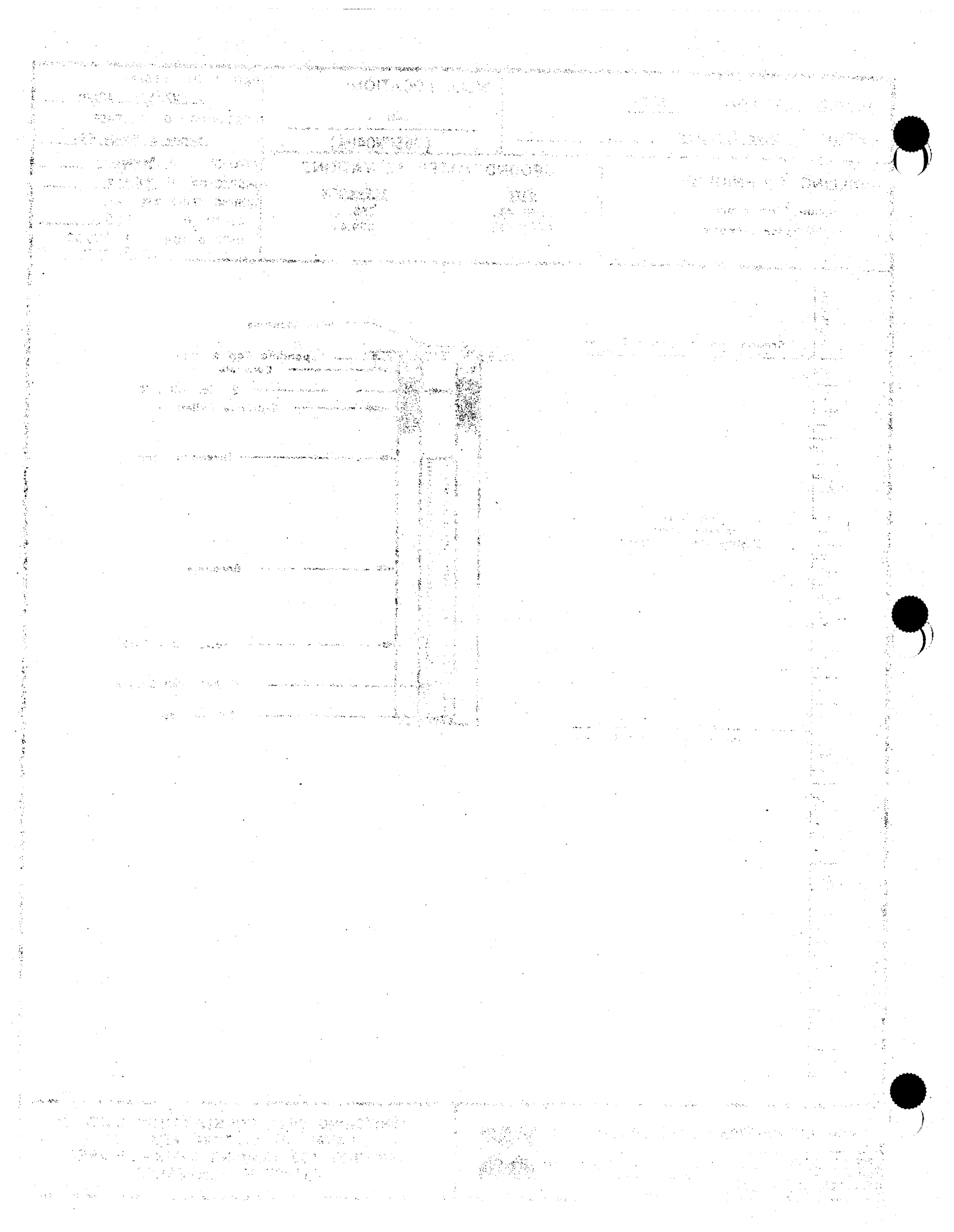


MEMPHIS ENVIRONMENTAL CENTER, INC.

2903 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

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

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



SWMU 66

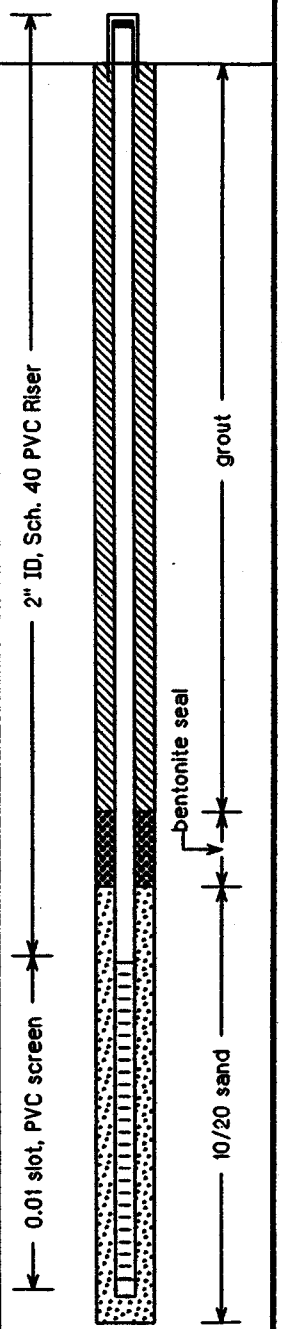
ENSAFE

Log of Monitoring Well 066G01F

Project: *NAS Memphis*	Location: *Millington, TN. SWMU#66*
Project No.: *N0094*	Surface Elevation: *feet msl*
Started at *1100 on 5-04-98*	TOC Elevation: *feet msl*
Completed at *1600 on 5-04-98*	Coordinates: Northing: Easting:
Drilling Method: *Hollow Stem Augers*	Groundwater Elevation:
Drilling Company: *Tri State Testing*	Total Depth: *37.2 feet*
Geologist: *Ben Brantley*	Well Screen: *27.2 to 37.2 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
0			1	100			ML	clayey Silt, light brown streaked w/ gray, moist	
5								same as above with scattered lignite grains and increased moisture	
			2	60				clayey Silt, yellowish brown streaked w/gray, stiffer and less moist, lignite grains scattered throughout sample	
10									
			3	100				same w/color change to gray with yellowish brown and orange (iron staining)	
15									
			4	100			CL	silty Clay, orange brown with 1/4 - 1/2 inch gravels scattered throughout sample, very stiff to hard.	
20								1/4 inch diameter iron-stained seam with water at 20 feet.	
			5	100					
25							GC	gravelly Sand and Clay, lignite from 25 to 27 feet.	
			6	100				clayey Sand and Gravel, yellow orange-tan, gravels up to 1 inch in diameter, with gray clay stringers (less than 1 inch in diameter), moist to wet between 23 and 28 feet, wet after 28 feet.	
30									
			7	75			SM	silty Sand, very fine, yellowish-orange, with 1/8 inch diameter clay stringers. Wet to 37 feet.	
35									
			8	90				sandy Silt, very fine, crimson red, and moist to dry (37.5 - 38 feet).	
40								End of boring at 38 feet.	

WELL DIAGRAM



PRODUCTION WELLS

PW-3

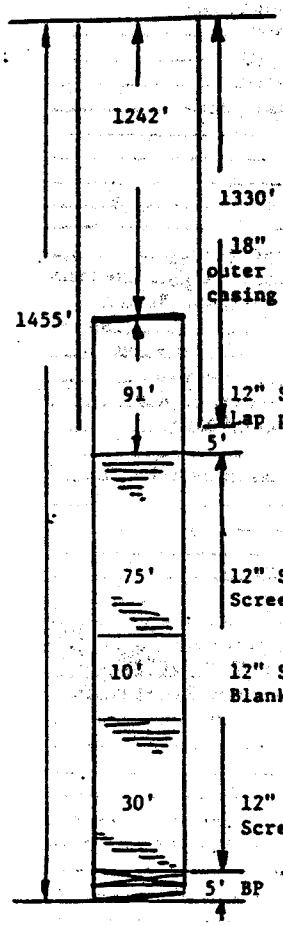
PW-4

PW-5

NOTE: LOGS FOR PWN-1 AND PWN-2 ARE NOT AVAILABLE.

ALL MEASUREMENTS TAKEN FROM (GROUND) (TOP OF FOUNDATION) (TOP OF CASING) (TOP BASE PLATE)

DRAWING OF THE WELL



WELL DATA

STARTED WELL 05/06 19 85 AND COMPLETED 07/19 19 85
TOTAL DEPTH 1455' ELEVATION STATIC WATER LEVEL 92'
LENGTH SURFACE CASING 108 SIZE 24" THICKNESS
CEMENTED WITH 100 SACKS CEMENT TYPE PACKER Welded
LENGTH WELL CASING 1330 SIZE 18" WEIGHT
CEMENTED WITH 1100 SACKS CEMENT TYPE PACKER Welded
INNER CASING LENGTH 90' SIZE 12" WEIGHT
WITH x GUIDES LOCATED TYPE BACKOFF LH-Std.
LEAD SEAL None BACKPRESSURE VALVE Size 12 GUIDE
WELL STRAINER MAKE Johnson SIZE 12" LENGTH 105 OPENING .030
TYPE MATERIAL Wire wrapped WITH SS CONNECTIONS
SIZE HOLE DRILLED FOR SURFACE CASING WITH
SIZE HOLE DRILLED FOR WELL CASING WITH
SIZE HOLE DRILLED FOR STRAINER WITH
YARDS OF GRAVEL USED 33 HOW PLACED Gravel 16-30
HOW WAS WELL DEVELOPED Air
NOTES: There is a 10' piece of SS blank from 1410 to 1420' between screen.
RIG USED G.D. DRILLER T. Lynwood Harhcock

PUMP RECORD

SERIAL NUMBER 103442 MAKE Layne FOUNDATION
LENGTH COLUMN 150' SIZE 10" x 2" x 1-3/16" TYPE O.L. @ 10 XRD LENGTHS
BOWL SIZE 12" TYPE RKBH STAGES 3 MATERIAL IMPELLER Bronze
MATERIAL BOWL Bronze WITH open PORTS AND SHAFT
SUCTION SIZE 10" LENGTH 20' SUCTION STRAINER No
IS PUMP SEALED HOW No. WHERE WITH WHAT
LUBRICATOR TYPE Essex #8 SIZE 2 Quart VOLTAGE 460
LENGTH OF AIRLINE 151 SIZE 1/4 TYPE MATERIAL Copper
AIR RELEASE VALVE TYPE Crispin SIZE 2" D-20
SIZE SURFACE DISCHARGE 10" TYPE flanged DAYTON COUPLING Yes
PRESSURE GUAGE SPEED
NOTES Total setting 174'5". Screwed column
Static Level 95'
RIG USED TO SET PUMP INSTALLER Garry Carter
DATE PUMP INSTALLED 02/07 1986 DATE IN OPERATION 19

MOTOR

MAKE U.S. HP 75 FRAME 365TP PHASE 3 CYCLE 60 VOLT 220/440 460V
SPEED 1770 MODEL RU SERIAL NUMBER 9600484-303
TOP BEARING BOTTOM BEARING RATCHET Non-reverse
STARTER PRESSURE SWITCH FLOAT

GEAR

MAKE Amarillo MODEL C80 SIZE RATIO 1 NO 1
SIZE PULLEY TYPE MOTOR FRAME Serial No. 155842

ENGINE

MAKE Rockford MODEL HP 80 SERIAL NUMBER 692629
SPEED SIZE PULLEY FOUNDATION
TYPE FUEL TANK Diesel MAKE MAG NO
MAKE STARTER NO TYPE FUEL
MAKE FLEXIBLE SHAFT SIZE LENGTH BELT LENGTH

GENERAL

PURPOSE FOR WHICH THIS WATER IS USED
TEMPERATURE IS WATER CLEAR CAPACITY
SAND HARDNESS PH IRON NaCl
TYPE TREATMENT USED
IS THERE A DERRICK OVER THE WELL HEIGHT TYPE
CAN TRUCK OR RIG EASILY GET TO WELL
PUMP HOUSE SIZE HATCH

CONTRACT NO. ME - 1917

OUR WELL NO. THEIR WELL NO. 3 IN TEST HOLE NO. 1

LOCATION OF THE WELL Naval Air Station, Millington, TN

INSTALLED FOR Naval Air Station

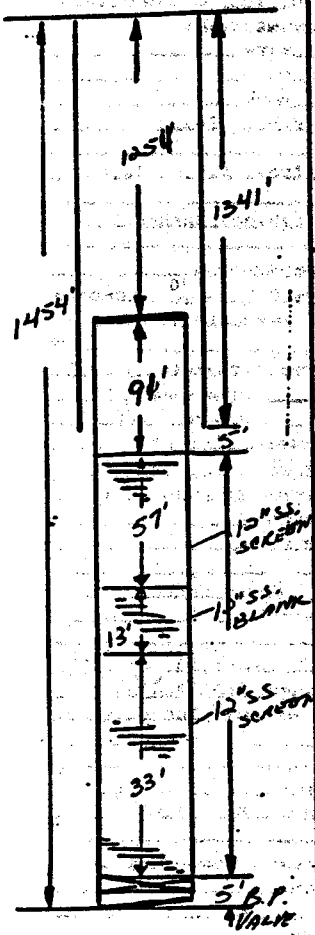
ADDRESS CITY Millington COUNTY Shelby STATE TN

YEAR 1985

Top of Casing.

ALL MEASUREMENTS TAKEN FROM ~~[illegible]~~

DRAWING OF THE WELL



WELL DATA

STARTED WELL 09/11 19 85 AND COMPLETED 10/18 19 85
TOTAL DEPTH 1454 ELEVATION _____ STATIC WATER LEVEL 68'
LENGTH SURFACE CASING 68' SIZE 24" THICKNESS _____
CEMENTED WITH 100 SACKS CEMENT TYPE PACKER _____
LENGTH WELL CASING 1341' SIZE 18" WEIGHT _____
CEMENTED WITH 1100 SACKS CEMENT TYPE PACKER Welded
INNER CASING LENGTH 90' SIZE 12" WEIGHT _____
WITH X GUIDES LOCATED top &bottom TYPE BACKOFF LH-STD
LEAD SEAL _____ BACKPRESSURE VALVE 12" GUIDE _____
WELL STRAINER MAKE Layne SIZE 12" LENGTH 90' OPENING .030
TYPE MATERIAL S.S. WITH wire wrapped CONNECTIONS
SIZE HOLE DRILLED FOR SURFACE CASING _____ WITH _____
SIZE HOLE DRILLED FOR WELL CASING _____ WITH _____
SIZE HOLE DRILLED FOR STRAINER _____ WITH _____
YARDS OF GRAVEL USED 31 HOW PLACED gravel line
HOW WAS WELL DEVELOPED Air
NOTES _____
RIG USED G.D. DRILLER T. Lynwood Barbcock

PUMP RECORD

SERIAL NUMBER 103443 MAKE Layne FOUNDATION _____
LENGTH COLUMN 140' SIZE 10x2x1-3/16" TYPE oil @ 10/200 LENGTHS
BOWL SIZE 12 TYPE RKBM STAGES 3 MATERIAL IMPELLER Bronze
MATERIAL BOWL Bronze WITH open PORTS AND _____ SHAFT
SUCTION SIZE 10" LENGTH 20' SUCTION STRAINER No
IS PUMP SEALED HOW No. WHERE _____ WITH WHAT _____
LUBRICATOR TYPE Essex SIZE #8 VOLTAGE 460
LENGTH OF AIRLINE 141 SIZE 1/4" TYPE MATERIAL Copper
AIR RELEASE VALVE TYPE Crispin D-20 SIZE 2"
SIZE SURFACE DISCHARGE 10" TYPE flanged DAYTON COUPLING Yes
PRESSURE GUAGE _____ SPEED _____
NOTES 900 GPM
Static Level 71'
RIG USED TO SET PUMP _____ INSTALLER Garry Correr
DATE PUMP INSTALLED 02 19 86 DATE IN OPERATION _____ 19 _____

MOTOR

MAKE U.S. HP 75 FRAME 365TP PHASE 3 CYCLE 60 VOLT 220/440
SPEED 1770 MODEL RU SERIAL NUMBER N02L1140089R-1
TOP BEARING _____ BOTTOM BEARING _____ RATCHET Non-reverse
STARTER _____ PRESSURE SWITCH _____ FLOAT _____

GEAR

MAKE _____ MODEL _____ SIZE _____ RATIO _____ NO _____
SIZE PULLEY _____ TYPE MOTOR FRAME _____

ENGINE

MAKE _____ MODEL _____ HP _____ SERIAL NUMBER _____
SPEED _____ SIZE PULLEY _____ FOUNDATION _____
TYPE FUEL TANK _____ MAKE MAG _____ NO _____
MAKE STARTER _____ NO _____ TYPE FUEL _____
MAKE FLEXIBLE SHAFT _____ SIZE _____ LENGTH _____ BELT LENGTH _____

GENERAL

PURPOSE FOR WHICH THIS WATER IS USED _____
TEMPERATURE _____ IS WATER CLEAR _____ CAPACITY _____
SAND _____ HARDNESS _____ PH _____ IRON _____ NaCl _____
TYPE TREATMENT USED _____
IS THERE A DERRICK OVER THE WELL _____ HEIGHT _____ TYPE _____
CAN TRUCK OR RIG EASILY GET TO WELL _____
PUMP HOUSE _____ SIZE HATCH _____

CONTRACT NO. ME 1917-____

OUR WELL NO _____ THEIR WELL NO. 4 IN TEST HOLE NO. _____

LOCATION OF THE WELL Naval Air Station, Millington, TN

INSTALLED FOR Naval Air Station

ADDRESS CITY Millington COUNTY Shelby STATE TN

YEAR 1985

FORMATION LOG OF THE WELL OR TEST HOLE

STARTED TEST HOLE 09/20 19 85 FINISHED _____ 19 ____ TEST HOLE NUMBER 4

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

TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION
0- 40		Clay
40- 66		Sand & Gravel
66- 137		Clay
137- 138		Rock
138- 174		Clay
174- 220		Sand & clay streaks
220- 250		Clay
250- 265		Sandy clay
265- 320		Fine sand & clay streaks
320- 336		Medium sand & clay streaks
336- 391		Sandy clay
391- 430		Sandy clay
430- 461		Hard clay
461- 537		Medium coarse sand & clay sts.
537- 564		Hard sandy clay
564- 725		Fine sand & clay streaks lignite
725- 837		Fine sand & clay streaks ⅓ lignite
837- 863		Hard sandy clay
863- 875		Hard clay & sand streaks
875- 961		Fine sand & clay streaks lignite.
961-1038		Med. sand & clay streaks lig.
1038-1051		Fine sand & clay streaks
1051-1069		Hard sandy clay & lignite
1069-1091		Hard sandy clay & lignite & rock streaks
1091-1092		Rock
1092-1132		Hard clay & rock streaks lig.
1132-1290		Hard sandy clay, lignite & rock streaks
1290-1365		Sandy clay
1365-1429		Fine sand & clay streaks ⅓
1429-1434		Sandy clay
1434-1454		Fine sand & clay streaks, lig.
1454-1460		Sand & clay streaks
1460-		Hard sandy clay

SAMPLES:

1)1365-1370 5)1385-1390 9)1405-1410
2)1370-1375 6)1390-1395 10)1410-1415
3)1375-1380 7)1395-1400 11)1415-1420
4)1380-1385 8)1400-1405 12)1420-1425

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

MUD PIT SIZE ____ FT. X ____ FT. X ____ FT. DEEP
TYPE BIT USED TO CUT SAND ____
SIZE OF TEST HOLE THROUGH SAND ____
TYPE OF BIT USED TO CUT UPPER FORMATIONS ____ SIZE ____
TYPE MUD PUMP USED ____
DRILLING PRESSURE IN SAND ____
TYPE OF MUD USED ____
NOTES: ____

TEST DATA

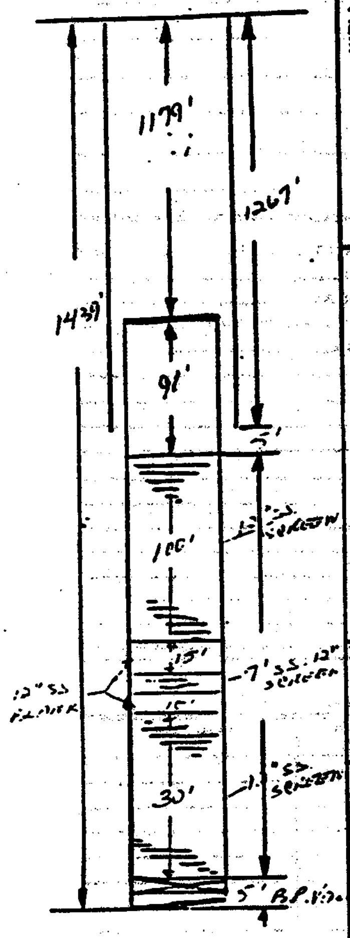
	PRELIMINARY TEST	FINAL TEST
STATIC WATER LEVEL	68	
PUMPED G. P. M.	330	
PRESSURE, POUNDS	0	
DRAWDOWN	11	
G. P. F. D.	30	
GUARANTEED G. P. M.		
GUARANTEED PRESSURE		
DATE OF TEST	10/18/85	

REMARKS

DRILLER T. Lynwood Hathcock
FIELD SUP'T Merrill Chrestman

ALL MEASUREMENTS TAKEN FROM ~~(GROUND) (TOP OF FOUNDATION)~~ (TOP OF CASING) ~~[illegible]~~

DRAWING OF THE WELL



WELL DATA

STARTED WELL 07/22 19 85 AND COMPLETED 09/06 19 85
TOTAL DEPTH 1439' ELEVATION ______ STATIC WATER LEVEL 65'
LENGTH SURFACE CASING 96' SIZE 24" THICKNESS ______
CEMENTED WITH 100 SACKS CEMENT TYPE PACKER ______
LENGTH WELL CASING 1267' SIZE 18" WEIGHT ______
CEMENTED WITH 1100 SACKS CEMENT TYPE PACKER ______
INNER CASING LENGTH 91' SIZE 12" WEIGHT ______
WITH x GUIDES LOCATED Topebottom Lap pipe TYPE BACKOFF LH-std
LEAD SEAL Yes BACKPRESSURE VALVE 12" GUIDE ______
WELL STRAINER MAKE Layne WW SIZE 12" LENGTH 137' OPENING .030
TYPE MATERIAL SS WITH ______ CONNECTIONS
SIZE HOLE DRILLED FOR SURFACE CASING ______ WITH ______
SIZE HOLE DRILLED FOR WELL CASING ______ WITH ______
SIZE HOLE DRILLED FOR STRAINER ______ WITH ______
YARDS OF GRAVEL USED 53 HOW PLACED Gravel line
HOW WAS WELL DEVELOPED Air
NOTES: ______
RIG USED G.D. DRILLER T. Lynwood Hathcock

PUMP RECORD

SERIAL NUMBER 103444 MAKE Layne FOUNDATION ______
LENGTH COLUMN ______ SIZE 10"x2"x1-3/16" TYPE TF1018 10 20 LENGTHS
BOWL SIZE 13 TYPE CL STAGES 3 MATERIAL IMPELLER Bronze
MATERIAL BOWL Bronze WITH open PORTS AND ______ SHAFT
SUCTION SIZE 10" LENGTH 20' SUCTION STRAINER No
IS PUMP SEALED, HOW No WHERE ______ WITH WHAT ______
LUBRICATOR TYPE Essex SIZE #8 VOLTAGE 460
LENGTH OF AIRLINE 131' SIZE 1/4 TYPE MATERIAL Copper
AIR RELEASE VALVE TYPE Crispin D-20 SIZE 2"
SIZE SURFACE DISCHARGE 10" TYPE flanged DAYTON COUPLING Yes
PRESSURE GUAGE ______ SPEED ______
NOTES 1400 GPM
RIG USED TO SET PUMP ______ INSTALLER Garry Correr
DATE PUMP INSTALLED 02/21/ 19 86 DATE IN OPERATION ______ 19 ___

MOTOR

MAKE U.S. HP 100 FRAME 404TP PHASE 3 CYCLE 60 VOLT 220/440 460
SPEED 1760 MODEL RU SERIAL NUMBER A121114009881
TOP BEARING ______ BOTTOM BEARING ______ RATCHET Non-reverse
STARTER ______ PRESSURE SWITCH ______ FLOAT ______

GEAR

MAKE Amarillo MODEL C-100 SIZE ______ RATIO 1 NO. 1
SIZE PULLEY ______ TYPE MOTOR FRAME Serial No. 155846

ENGINE

MAKE Rockford MODEL ______ HP 80 SERIAL NUMBER 692629
SPEED ______ SIZE PULLEY ______ FOUNDATION ______
TYPE FUEL TANK ______ MAKE MAG ______ NO. ______
MAKE STARTER ______ NO. ______ TYPE FUEL ______
MAKE FLEXIBLE SHAFT ______ SIZE ______ LENGTH ______ BELT LENGTH ______

GENERAL

PURPOSE FOR WHICH THIS WATER IS USED ______
TEMPERATURE ______ IS WATER CLEAR ______ CAPACITY ______
SAND ______ HARDNESS ______ PH ______ IRON ______ NaCL ______
TYPE TREATMENT USED ______
IS THERE A DERRICK OVER THE WELL ______ HEIGHT ______ TYPE ______
CAN TRUCK OR RIG EASILY GET TO WELL ______
PUMP HOUSE ______ SIZE HATCH ______

CONTRACT NO. ME 1917 - ______

OUR WELL NO. ______ THEIR WELL NO. 5 IN TEST HOLE NO. 1
LOCATION OF THE WELL Millington, TN
INSTALLED FOR Naval Air Station
ADDRESS CITY Memphis COUNTY Shelby STATE TN

YEAR 1985

FORMATION LOG OF THE WELL OR TEST HOLE

STARTED TEST HOLE 08/01 19 85 FINISHED ____ 19 ____ TEST HOLE NUMBER 5

LOCATION NAS Memphis SEC ____ TS ____ RANGE ____ ELEVATION ____

TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION
0- 35		Clay
35- 96		Sand gravel & rock streak
96- 140		Clay
140- 160		Sandy clay & sand streak
160- 206		Sand & clay streaks
206- 289		Hard clay & sandy clay streaks
289- 545		Med. sand & clay streak lignite
545- 550		Clay
550- 633		Med. sand & clay streak lignite
633- 817		Med. fine sand & clay streak
817- 893		Hard sandy clay
893- 945		Med. Coarse sand & clay streaks & lignite
945-1030		Fine sand & clay streak & lig.
1030-1154		Hard sandy clay & lignite
1154-1164		Sandy clay streaks
1164-1265		Hard sand clay & lignite
1265-1348		Fine sand & clay streaks & lignite
1348-1354		Clay & sand streaks
1354-1375		Fine sand & clay streaks lignite
1375-1380		Clay & sand streaks
1380-1385		Fine sand & clay streaks & lig.
1385-1423		Sand & clay streaks ½ x ½
1423-1440		Fine sand & clay streaks & lig.
1440-1453		Clay
1453-1473		Sandy clay & sand streaks
1473-1542		Clay
Samples:		
1-1265-1270		12-1320-1325
2-1270-1275		13-1325-1330
3-1275-1280		14-1330-1335
4-1280-1285		15-1335-1340
5-1285-1290		16-1340-1345
6-1290-1295		17-1345-1350
7-1295-1300		18-1350-1355
8-1300-1305		19-1355-1360
9-1305-1310		20-1360-1365
10-1310-1315		21-1365-1370
11-1315-1320		22-1370-1375
23-1375-1380		31-1415-1420
24-1380-1385		32-1420-1425
25-1385-1390		33-1425-1430
26-1390-1395		34-1430-1435
27-1395-1400		35-1435-1440
28-1400-1405		
29-1405-1410		
30-1410-1415		

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

TYPE BIT USED TO CUT SAND ____

SIZE OF TEST HOLE THROUGH SAND ____

TYPE OF BIT USED TO CUT UPPER FORMATIONS ____

____ SIZE ____

TYPE MUD PUMP USED ____

DRILLING PRESSURE IN SAND ____

TYPE OF MUD USED ____

NOTES: ____

TEST DATA

	PRELIMINARY TEST	FINAL TEST
STATIC WATER LEVEL	65	
PUMPED G. P. M.	300±	
PRESSURE. POUNDS	0	
DRAWDOWN	6	
G. P. F. D.	50	
GUARANTEED G. P. M		
GUARANTEED PRESSURE		
DATE OF TEST	09/06/85	

REMARKS

DRILLER T. Lynwood Hathcock

FIELD SUP'T Merrill Chrestman

Navy Flying Club
Well and Boring Logs

UST Investigation
EnSafe/Allen & Hoshall

Leak Detection Wells
T1205

WELL CONSTRUCTION LOG. FC-MW-1

NAS MEMPHIS UST EAR

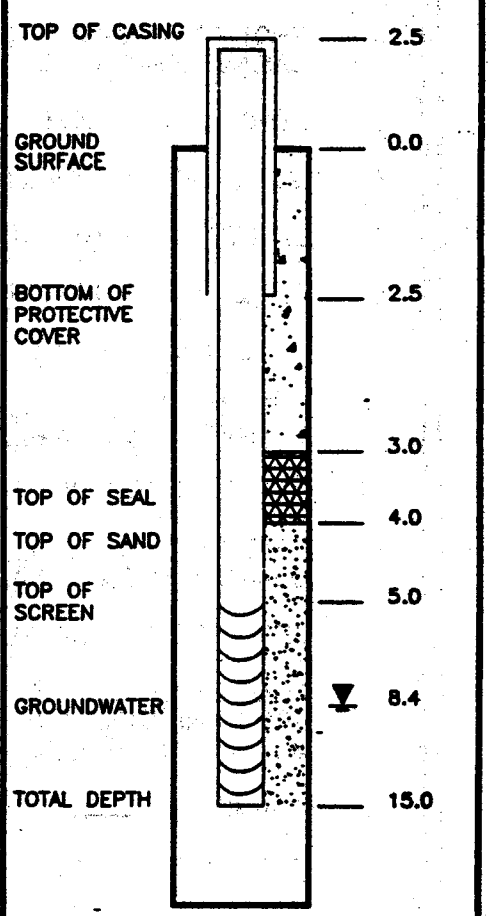
WELL LOCATION FLYING CLUB

DATE INSTALLED 11 MAY 93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.50 FEET
2. WATER SURFACE ELEV. 285.1
   a) DEPTH TO SATURATED ZONE 8.4 FEET
3. TOP OF CASING ELEV. 300.06
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 10.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 15.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 15.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 374 lbs. SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS UPGRADIENT WELL

INSTALLATION DESCRIPTION



JOB NUMBER 067-C01014

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

FIGURE
WELL CONSTRUCTION LOG

DATE: 08/05/93 | DWG NAME: 067FWC1

WELL CONSTRUCTION LOG. FC-MW-2

NAS MEMPHIS UST EAR

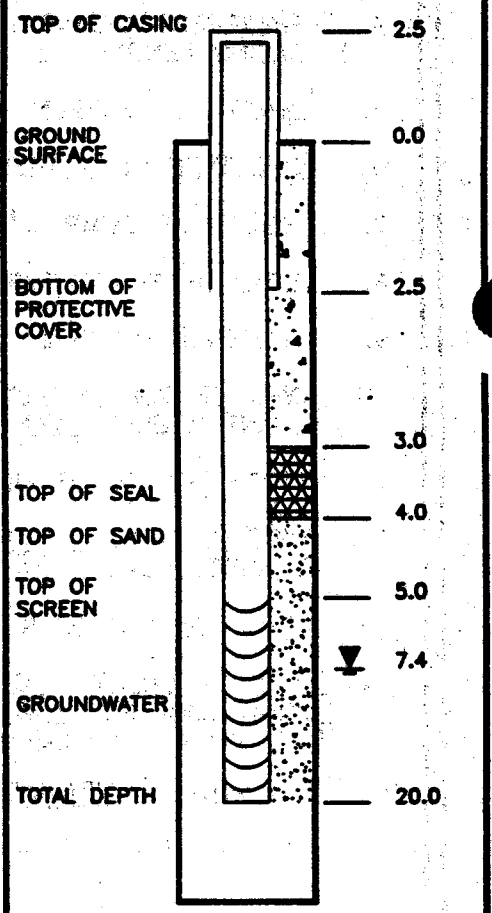
WELL LOCATION FLYING CLUB

DATE INSTALLED 12 MAY 93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.50 FEET
2. WATER SURFACE ELEV. 283.16
   a) DEPTH TO SATURATED ZONE 7.4 FEET
3. TOP OF CASING ELEV. 297.53
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 544 lbs. SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS

INSTALLATION DESCRIPTION



JOB NUMBER 067-C01014

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

FIGURE
WELL CONSTRUCTION LOG

DATE: 08/05/93 | DWG NAME: 067FWC2

WELL CONSTRUCTION LOG. FC-MW-3

NAS MEMPHIS UST EAR

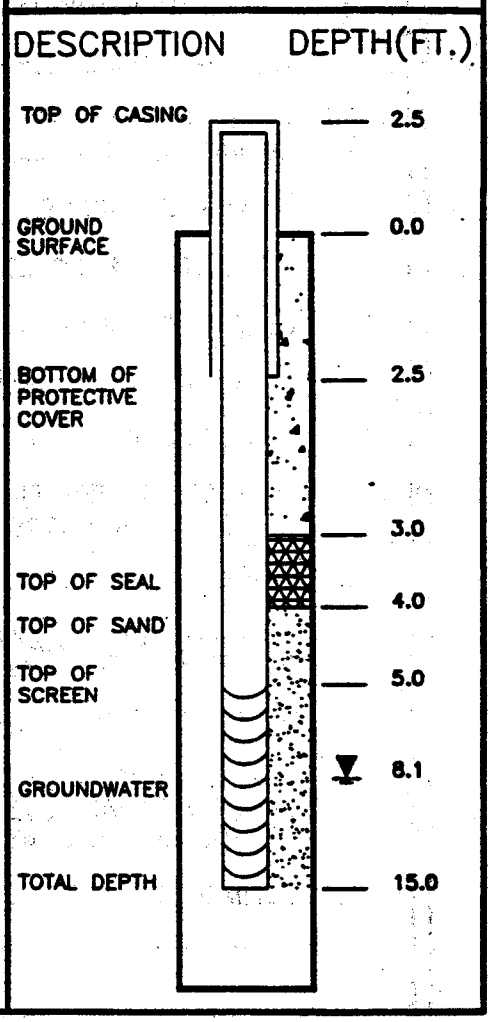
WELL LOCATION FLYING CLUB

DATE INSTALLED 12 MAY 93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.50 FEET
2. WATER SURFACE ELEV. 280.86
   a) DEPTH TO SATURATED ZONE 8.1 FEET
3. TOP OF CASING ELEV. 297.53
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 544 lbs. SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS

INSTALLATION DESCRIPTION



JOB NUMBER 067-C01014

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

FIGURE
WELL CONSTRUCTION LOG

DATE: 08/05/93 | DWG NAME: 067FWC3

WELL CONSTRUCTION LOG. FC-MW-4

NAS MEMPHIS UST EAR

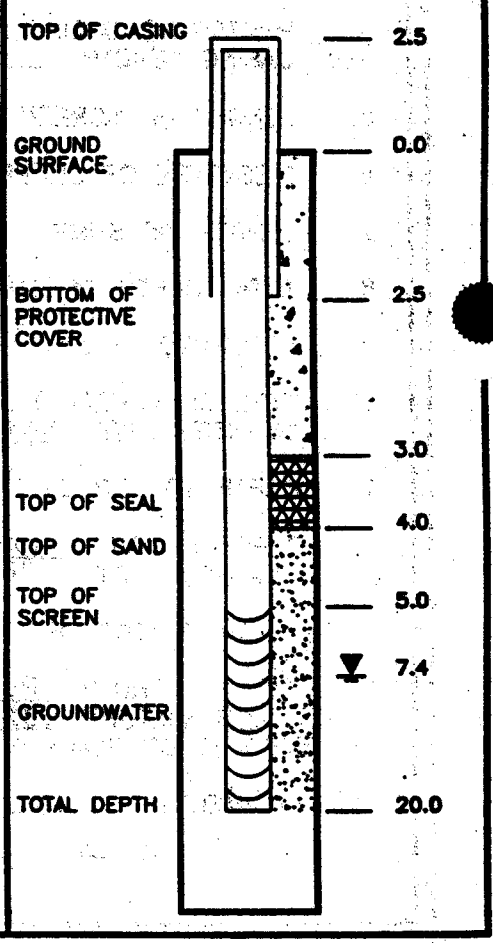
WELL LOCATION FLYING CLUB

DATE INSTALLED 12 MAY 93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.50 FEET
2. WATER SURFACE ELEV. 283.5
   a) DEPTH TO SATURATED ZONE 8.6 FEET
3. TOP OF CASING ELEV. 297.89
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 544 lbs. SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS

INSTALLATION DESCRIPTION



JOB NUMBER 067-C01014

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

FIGURE
WELL CONSTRUCTION LOG

DATE: 08/05/93 | DWG NAME: 067FWC4

WELL CONSTRUCTION LOG. FC-MW-5

NAS MEMPHIS UST EAR

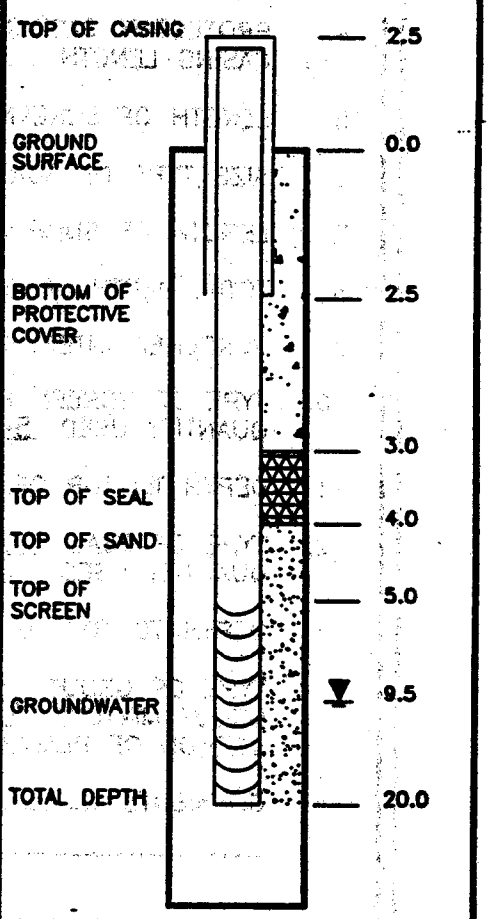
WELL LOCATION FLYING CLUB

DATE INSTALLED 11 MAY 93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.50 FEET
2. WATER SURFACE ELEV. 283.76
   a) DEPTH TO SATURATED ZONE 9.5 FEET
3. TOP OF CASING ELEV. 298.23
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 544 lbs. SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS

INSTALLATION DESCRIPTION



JOB NUMBER 067-C01014

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

FIGURE
WELL CONSTRUCTION LOG

DATE: 08/05/93 | DWG NAME: 067FWC5

WELL CONSTRUCTION LOG. FC-MW-6

NAS MEMPHIS UST EAR

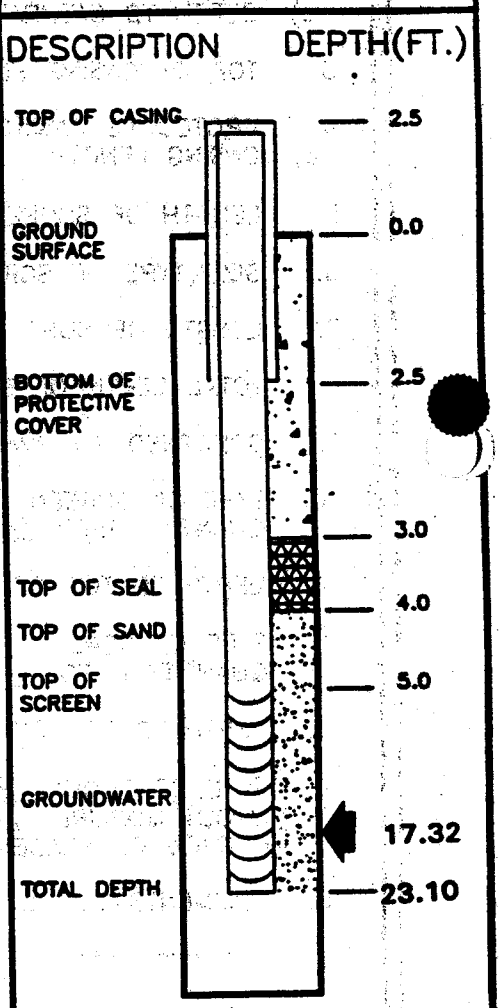
WELL LOCATION FLYING CLUB

DATE INSTALLED 7/15/93

TYPE OF WELL 2 INCH ID SCH 40 PVC

1. HEIGHT OF CASING ABOVE GROUND 2.50 FEET
2. WATER SURFACE ELEV. 278.33 (7/20/93)
   a) DEPTH TO SATURATED ZONE N/A
3. TOP OF CASING ELEV. 295.65
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0 FEET
6. SIZE\TYPE OF SCREEN 0.010 INCH SLOTTED PVC
7. LENGTH OF SUMP N/A
8. TOTAL DEPTH OF BORING 20.0 HOLE DIAMETER 8.25
9. SCREENED INTERVAL 5.0 FEET TO 20.0 FEET
10. TYPE OF SCREEN FILTER PACK SILICA SAND
    QUANTITY USED 544 lbs. SIZE 20/40 U/C
11. DEPTH TO TOP OF FILTER 4.0 FEET
12. TYPE OF SEAL 1/4 INCH BENTONITE PELLETS
    QUANTITY USED 26 lbs
13. DEPTH TO TOP OF SEAL 3.0 FEET
14. TYPE OF GROUT PORTLAND CEMENT
    GROUT MIXTURE 93% CEMENT 7% BENTONITE BY WT.
    METHOD OF PLACEMENT PRESSURIZED HOSE
15. COMMENTS

INSTALLATION DESCRIPTION



JOB NUMBER N0067C0104

ENVIRONMENTAL ASSESSMENT PLAN
NAS MEMPHIS
CTO-67

FIGURE
WELL CONSTRUCTION LOG

DATE: 08/05/93 | DWG NAME: 067FWC

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING

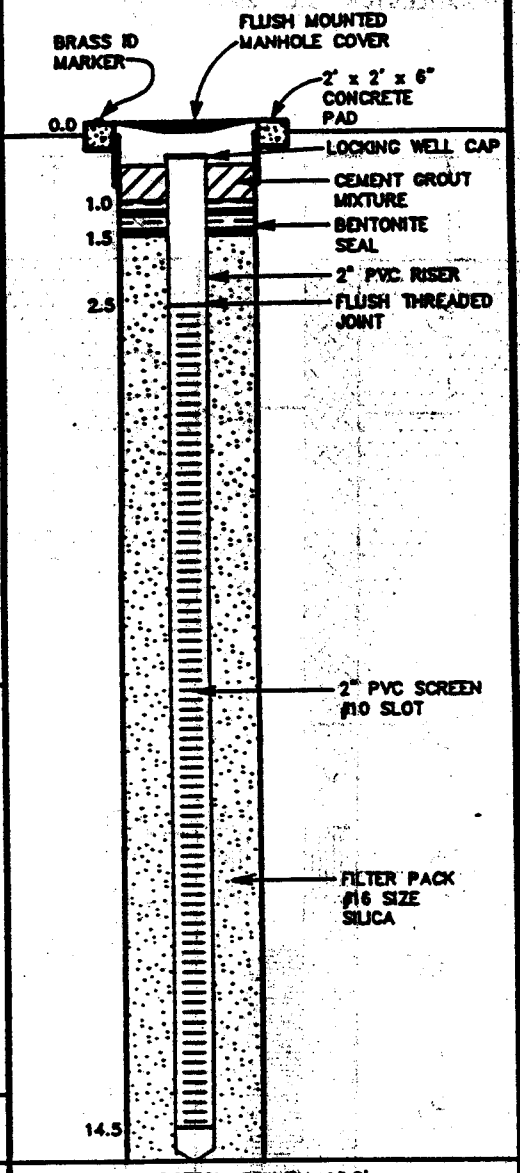
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1205N, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T1205N-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY, BROWN, MOIST
8.0			
9.3			24 HOUR WATER LEVEL
			SILT, CLAYEY, BROWN, WET
14.0			
			SILT, CLAYEY, BROWN, WET STRONG HYDROCARBON ODOR
15.0			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 4, 1990
Well Completion Date: JAN. 4, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 9.3'

Boring Diameter: 6.75"
Ground Elevation: 296.79'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

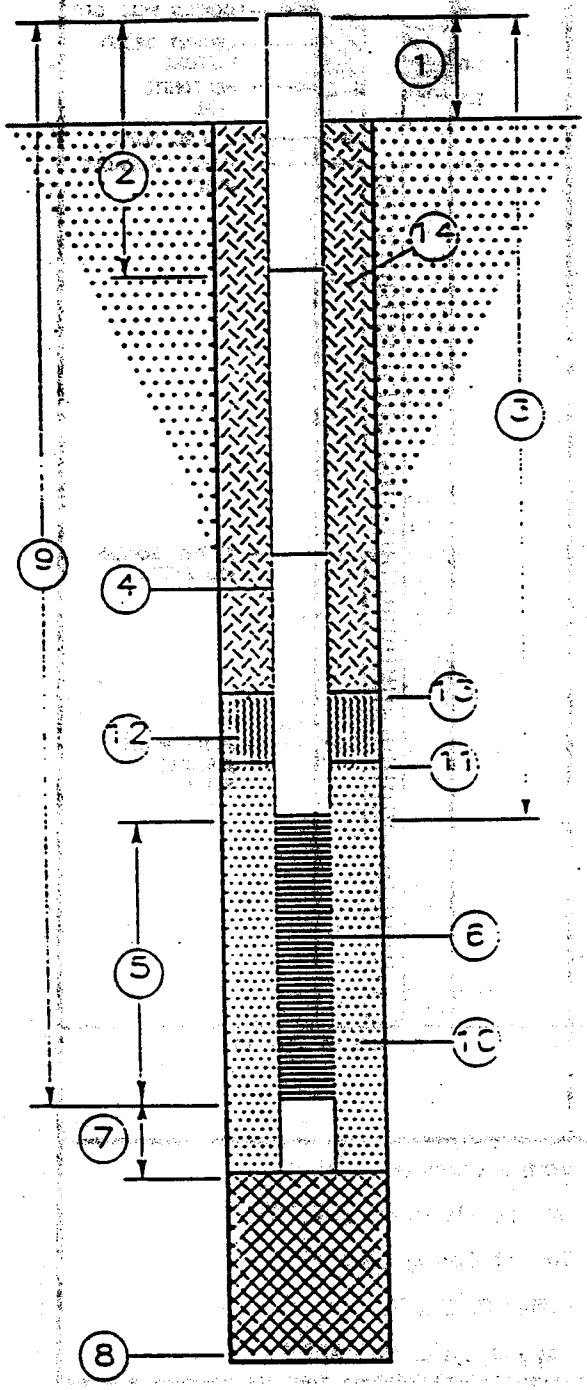
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR. P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1205N-1

DATE OF INSTALLATION 1-4-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC [illegible]" slot
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter [illegible]
9. Depth To Bottom of Screen [illegible] ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size [illegible] U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

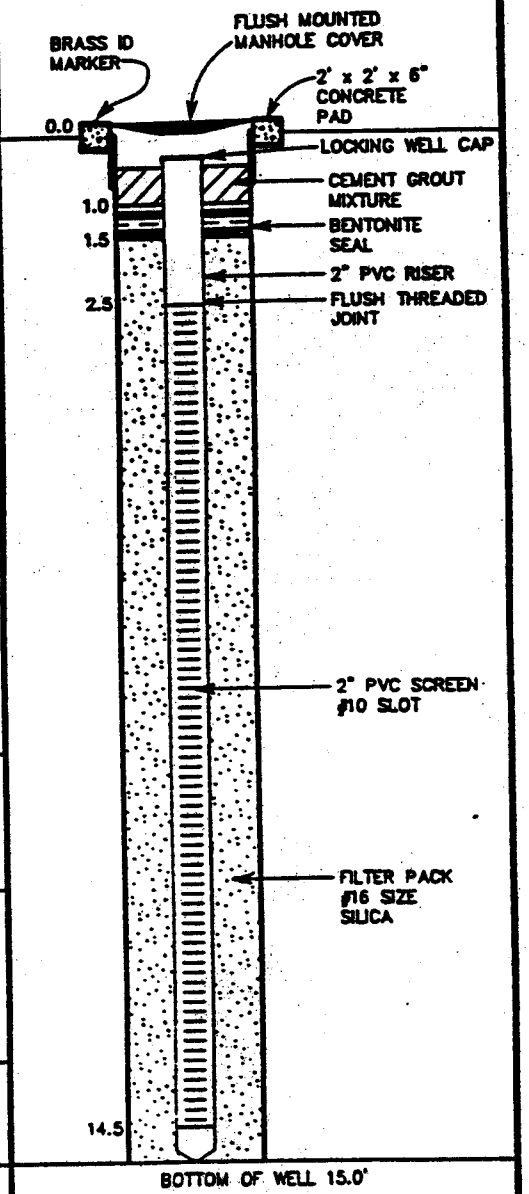
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1205N, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 - LOG OF WELL NO. MEM-T1205N-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY, BROWN, MOIST
			4.0
5			SILT, CLAYEY, BROWN, WET
			6.0
			SILT, CLAYEY, GRAY, WET
			9.0
10			SILT, CLAYEY, BROWN, WET
			10.5 24 HOUR WATER LEVEL
			11.0
			SILT, CLAYEY, BROWN, WET SLIGHT HYDROCARBON ODOR
			13.5
			SILT, CLAYEY, BROWN, WET MODERATE HYDROCARBON ODOR
15			15.0
			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 4, 1990
Well Completion Date: JAN. 4, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 10.5'

Boring Diameter: 6.75"
Ground Elevation: 297.20'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

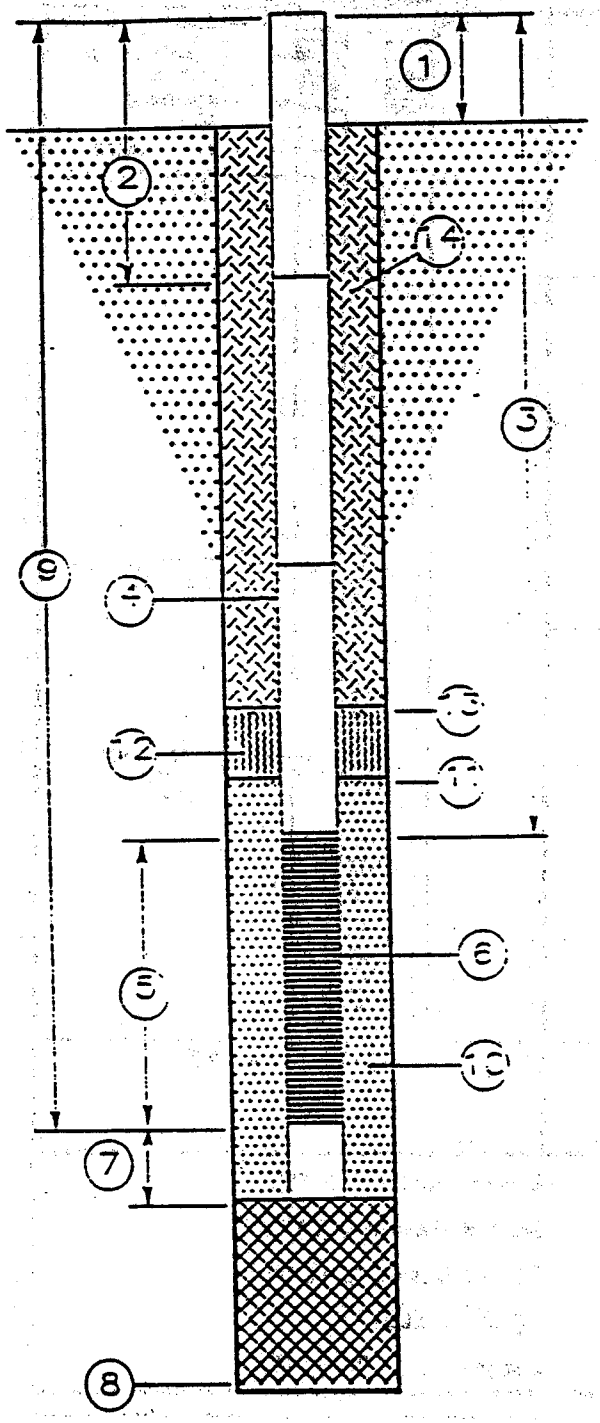
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-C068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1205N-2

DATE OF INSTALLATION 1-4-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC [illegible]" slot
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter [illegible]
9. Depth To Bottom of Screen [illegible] ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 [illegible]/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

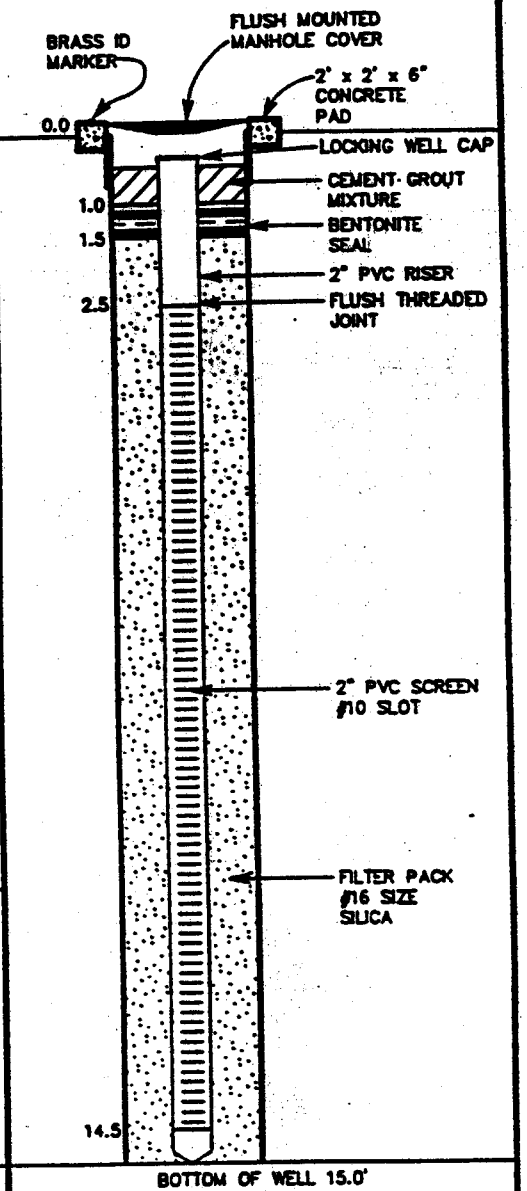
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1205S, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T1205S-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY, BROWN, MOIST
4.0			
5			SILT, CLAYEY, BROWN, WET
10			
10.7			24 HOUR WATER LEVEL
11.0			S..T, CLAYEY, BROWN, WET SLIGHT HYDROCARBON ODOR
15			
15.0			TERMINATED @ 15.0



WELL CONSTRUCTION

Boring Completion Date: JAN. 4, 1990
Well Completion Date: JAN. 4, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 10.7'

Boring Diameter: 6.75"
Ground Elevation: 296.13'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

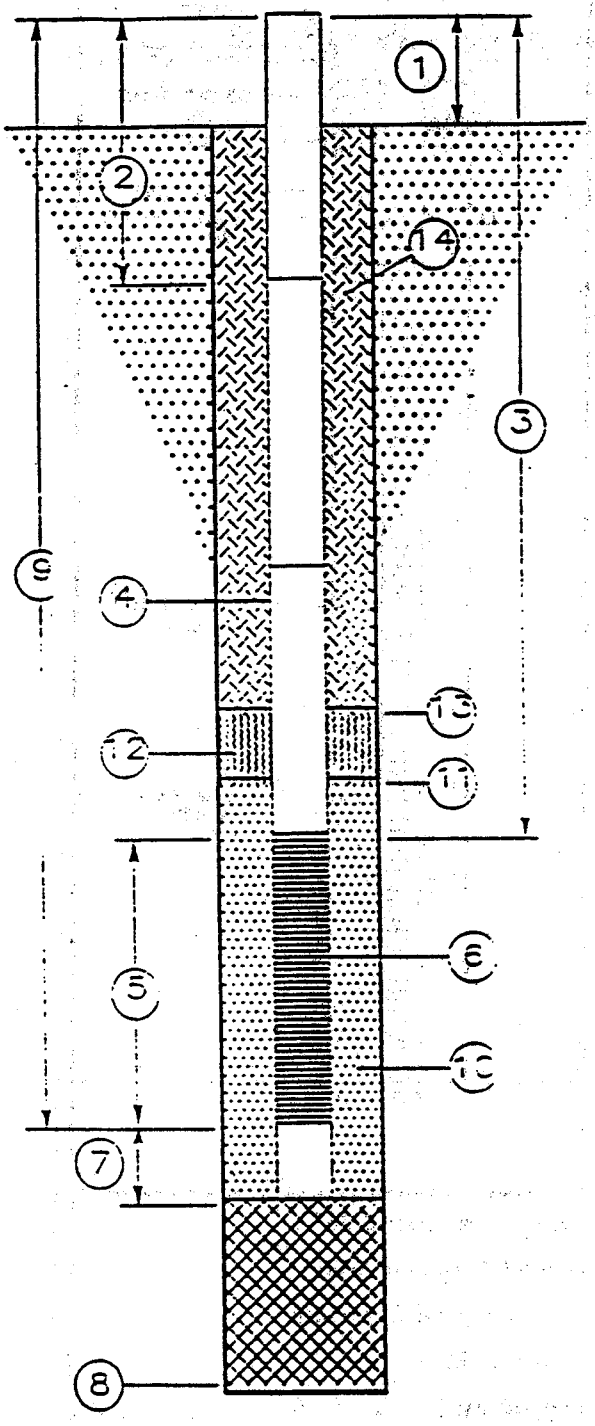
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1205S-1

DATE OF INSTALLATION 1/4/90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft.
   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #10 C/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SOUTHERN DIVISION NAVAL [illegible]

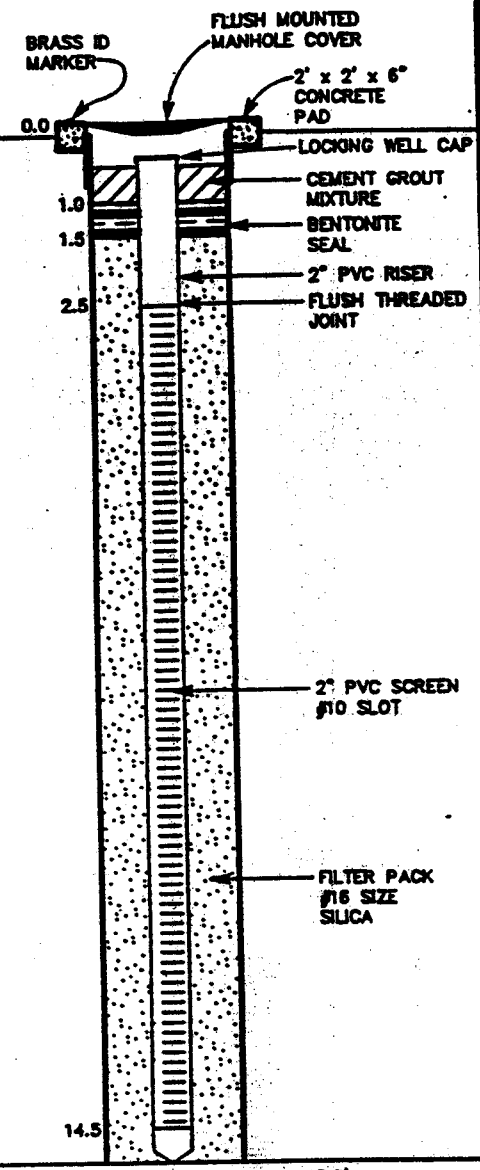
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1205 S2, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T1205S-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY BROWN, MOIST
4.0			
5			
			SILT, CLAYEY, BROWN, WET
10			
11.0			24 HOUR WATER LEVEL
15			
15.0			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 4, 1990
Well Completion Date: JAN. 4, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 11.0'

Boring Diameter: 6.75"
Ground Elevation: 296.86'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

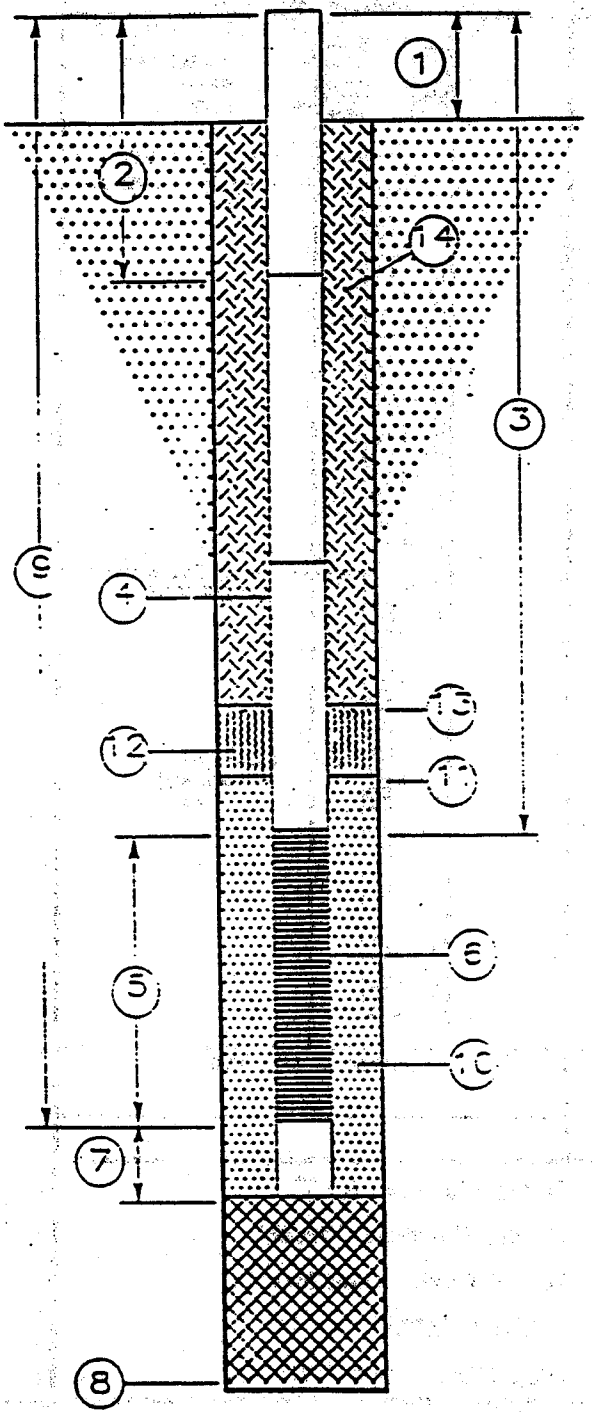
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1205s-2

DATE OF INSTALLATION 1-4-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.

   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand

    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets

    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement

    Grout Mixture 100%

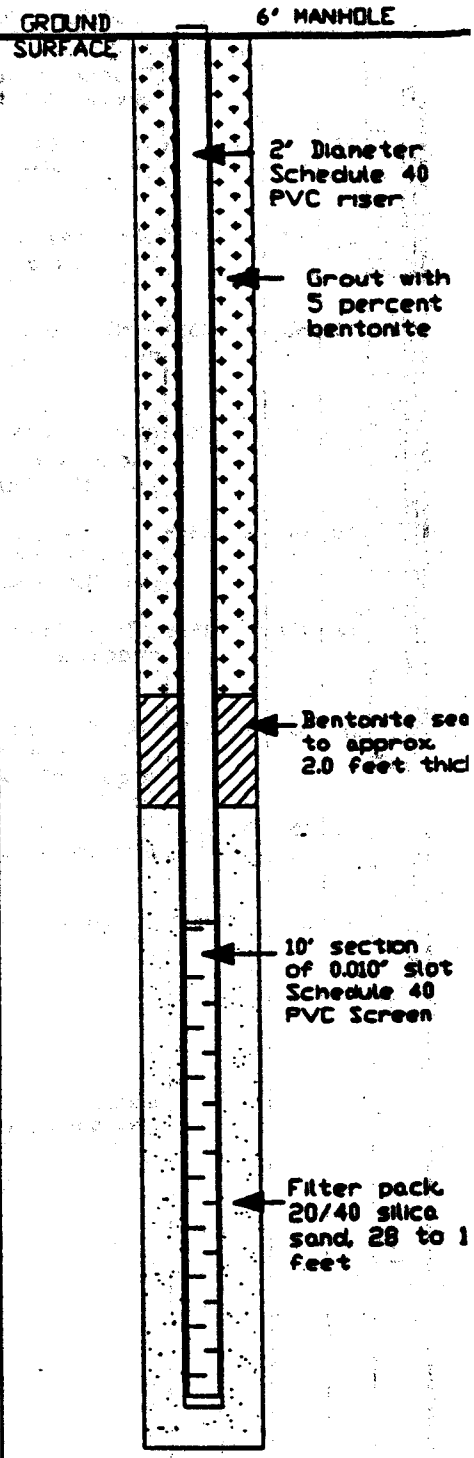
    Method of Placement Pour

Navy Hospital

UST Investigation
EnSafe/Allen & Hoshall

SAMPLE NUMBER (DEPTH OF SAMPLE)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
					BORING DATE 05/18/92
	SS	0		1018	(0-2 feet) No sample recovery.
	SS	50	13	1019	(2-4 feet) Reddish brown silty clay with organics.
	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.
	SS	92	10	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.
	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.
	SS	100	7	1124	(18-20 feet) Gray to brown clayey silt mottled with brown clay, moist.
	SS	100	8	1149	(24-26 feet) Dark gray clayey silt, wet. (note - resampled due to no recovery).
					Boring terminated at 28.5 feet.

WELL CONSTRUCTION DETAILS



CASING SET @ 28.0 FEET.

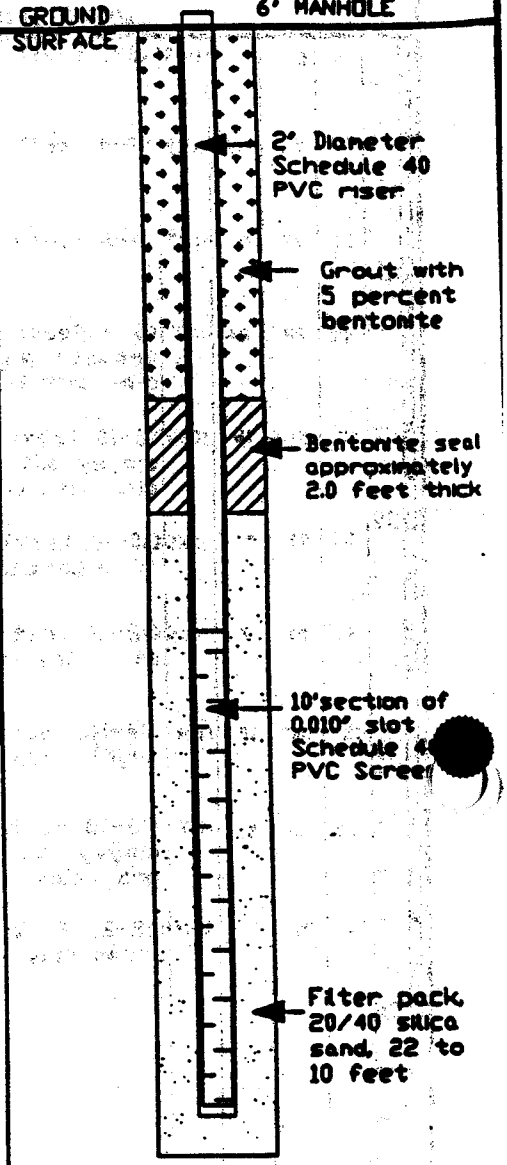
ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
NAVAL HOSPITAL
NAS MEMPHIS, TN.

BORING 1 / MONITORING WELL 1
BUILDING H-100
(NH01LS)

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	88	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.

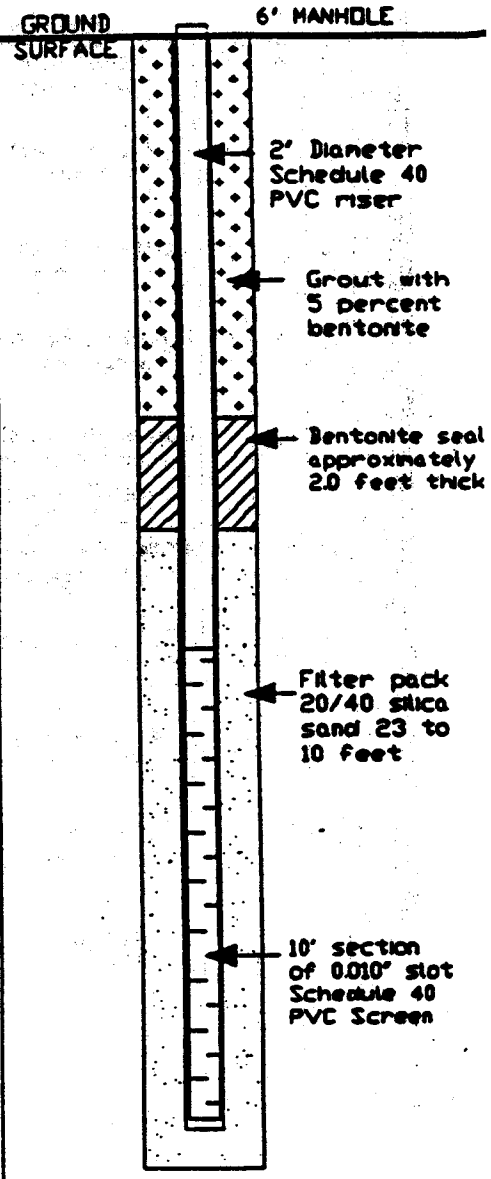
ENVIRONMENTAL ASSESSMENT
UNDERGROUND STORAGE TANKS
NAVAL HOSPITAL
NAS MEMPHIS, TN.

BORING 2 / MONITORING WELL 2
BUILDING H-100
(NH02LS)

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		1326	(0-2 feet) No sample recovery due to wooden supports beneath concrete surface.
	SS	0		1335	(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	8	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).
	SS	100	12	1501	(18-20 feet) Dark green clay, moist and soft, slightly plastic.
20					
					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.

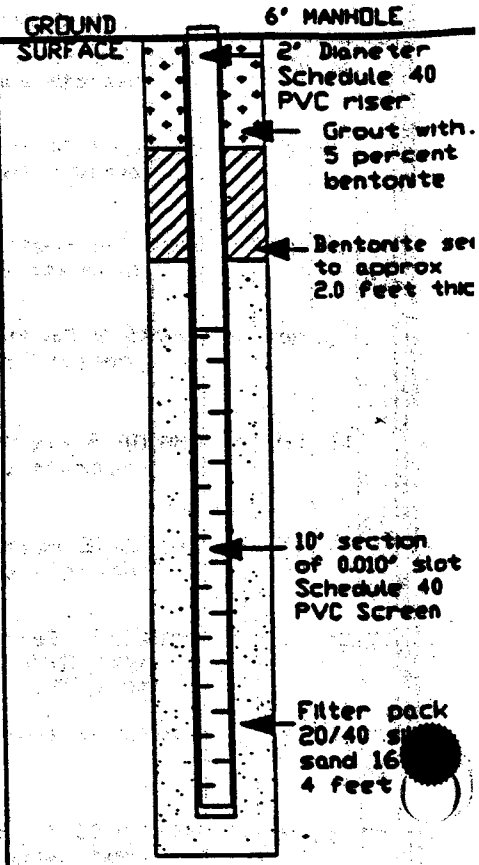
BORING 3 / MONITORING WELL 3
BUILDING H-100
(NH03LS)

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	1236	(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
BUILDING H-100
(NH04LS)

DATE: 06/17/92

DWG NAME: NMH-MW4

Navy Exchange

UST Investigations
Professional Services Industries
Hardin-Lawson
ERCE-Edge

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR P O BOX 10068
CHARLESTON, S C 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-751-1 AREA ____

DATE OF INSTALLATION 1/7/87

WELL HOLE DATA

Drill Date 1/7/87 Well Driller Hall, Blake and Associates (HBA)

Depth of Boring 21.0 ft Purpose of Boring Soil Sampling and Monitoring Well Installation

Drilling Method Hollow Stem Auger Mud Type -

WATER LEVEL DATA (All measurements from top of casing)

Water Level 6.65 Date of Measurement 1/10/87

DEVELOPMENT DATA

Development Method Hand Bailing

Length of Time Developed 15 minutes

LOCATION OF BOREHOLE INFORMATION

Drillers Log X Geophysical Log No

Physical Core X Cutting Samples X

Water Level Observations ____

DRILLED BY HBA SCCWD# Engineering Registration NO 7961

DEVELOPED BY HLA SCCWD# ____

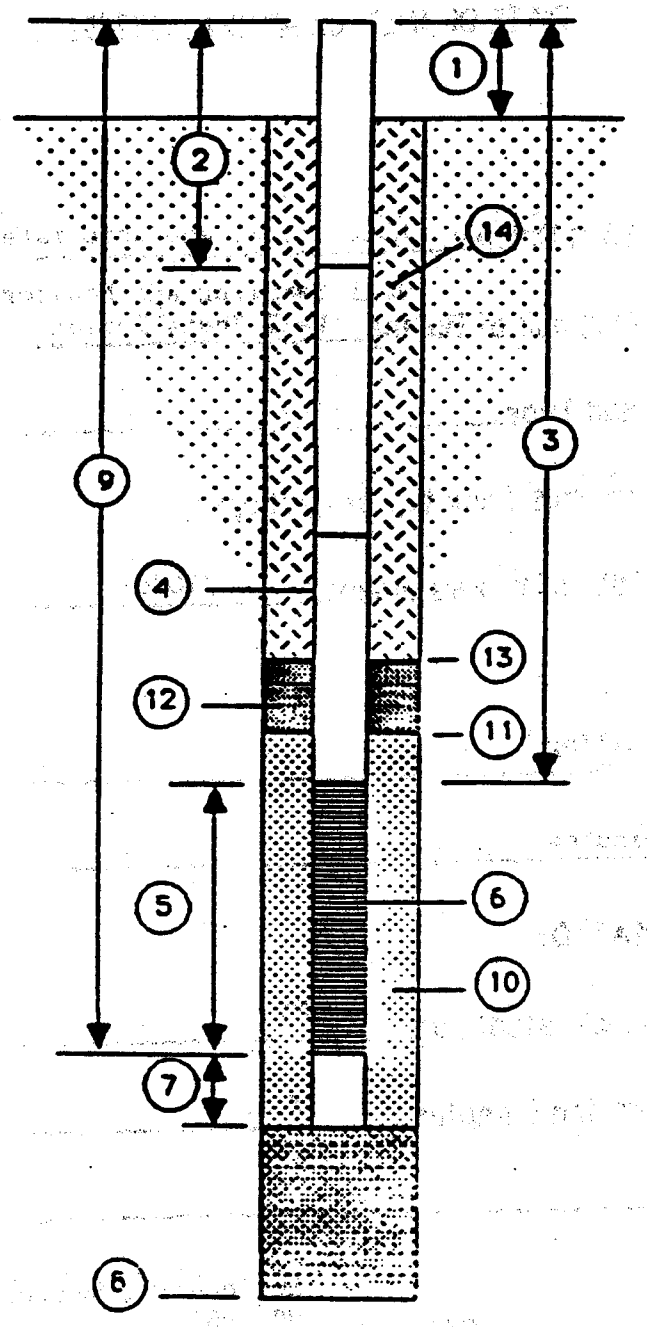
TECHNICAL OVERSIGHT BY HLA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON S C 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-757-1

DATE OF INSTALLATION 1/7/87



1. Height of Casing above ground -0.4 ft (S P
2. Depth to first Coupling N/A

   Coupling Interval Depths _____
3. Total Length of Blank Pipe 5.5 ft
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 14.8 ft
6. Type of Screen Schedule 40 PVC, .020 slott
7. Length of Sump 0.3 ft
8. Total Depth of Boring 21 ft Hole Diameter 6-3
9. Depth To Bottom of Screen 20.7 ft
10. Type of Screen Filter Sand and Pea Gravel

    Quantity Used 175 lbs Size _____ U/C
11. Depth To Top of Filter 3.8 ft
12. Type of Seal 1/2-inch bentonite pellets

    Quantity Used 37 pounds
13. Depth To Top of Seal 1.5 ft
14. Type of Grout cement-sand

    Grout Mixture 2:1

    Method of Placement poured

COMMENTS ON INSTALLATION

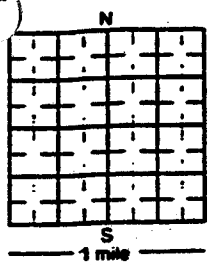
Location of Well: MEM-757-1

County	Township Number	Range Number	Section No.	Fraction	
Shelby	N or S	E or W			¼ ¼ ¼

Township

Street Address and City or Distance and Direction from Road Intersections
Exchange Service Station, Navy Road

Show exact location of well in section grid with an 'X'



Sketch map of well location

Addition Name	
Block Number	
Lot Number	

Property Owner's Name and Address
NAS Memphis
Millington, Tennessee

Remarks, Elevation, Source of Data, etc.
Elevation of Top of Casing (TOC): 270.38 ft (msl)

Borehole data

Formation Log	Color	Hardness	From	To
Asphalt	Black	-	0	.3
Gravel & Sand Fill	Orange	dense	.3	.8
Silty Clay	Med Gray	soft med stf	.8	7.5
V. Silty Clay	Tan & Gray	soft med stf	7.5	12.0
Clayey Silt	Bwn & Gray	med stf	12.0	18.0
Clayey Silt	Dk-Md Gray	med stf	18.0	21.0

Contractor Name and Address

Name of Driller: Hall, Blake and Associates
State License Number: Engineering Registration # 7961

Well depth: 21.0 ft
Datum point from which all measurements are taken: Ground Surface

Method of Drilling
[ ] Cable tool [ ] Hollow rod [ ] Driven [ ] Dug
[ ] Direct rotary [ ] Air rotary [ ] Bucket auger [ ] ____
[ ] Reverse rotary [ ] Jetted [X] Flight auger

Use
[ ] Domestic [ ] Public supply [ ] Industrial [ ] ____
[ ] Irrigation [ ] Municipal [ ] Commercial
[X] Test Well [ ] Heating or cooling [X] Monitoring

Casing Type
[ ] Steel [X] Threaded Height above/below surface -0.4
[ ] Galv [ ] Welded
[X] PVC [ ] Solvent welded Drive shoe? Yes ___ No -X-
[ ] SS

					Hole diameter
____ in to ____ ft	Wgt ____ lb/ft	Sch No 40	6.75	to
____ in to ____ ft	Wgt ____ lb/ft	Sch No ____	____	in to
____ in to ____ ft	Wgt ____ lb/ft	Sch No ____	____	in to

Intake Portion of Well
Screen type Schedule 40 or open hole from ____ ft to ____
Manufacturer ____
Material PVC Dia 4-inch
Fittings ____ Length 14.8 ft
Set between 5.9 ft and 20.7 ft Slot .020
____ ft and ____ ft Slot ____
____ ft and ____ ft Slot ____
Method of installation ____

Filter Pack
Source ____ Gradation sand & pea gra
Method of installation poured Composition silica
Volume used 175 lbs Depth to top of fp 3.8

Grout
Used? [X] Yes [ ] No Volume used 1.5 ft³
[ ] Neat Cement [ ] Bentonite [X] cement-sand
Method of installation poured
Depth from 0.0 ft to 1.5
from ____ ft to ____

Development
Method hand bailing Duration 15 min
Dates 1/10/87 Sand content after ½ hrs 0
Chemicals used None

Static Water Level
6.65 ft [X] below [ ] above grade TOC
Date measured 1/10/87

Pumping Water Level
N/A ft [ ] below [ ] above grade Date ____
After ____ hrs pumping at ____

Specific Capacity
N/A gpm/ft of drawdown at ____ hrs
Date ____

Pump
Date installed N/A Type ____
Manufacturer ____ Model No ____
HP ____ Volts ____ Capacity ____
Depth of pump intake setting ____ No of stages ____
[ ] Oil [ ] Water lubrication Power source ____
Material of drop pipe ____ bowls ____
shafting ____ impellers ____ Bowl dia ____
Column pipe dia ____ Length ____ Modifications ____

Well Head Completion
[ ] Pitless adaptor Basement offset Distance above grade ____

Nearest Sources of Possible Contamination
____ ft Direction ____ Type ____
Well disinfected upon completion? Yes No

Geophysical Logs Run
None

Water Quality
Sample taken? [X] Yes [ ] No Industrial & Environmental
Where analyzed Analysts, Inc.

Date well completed 1/7/87

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR P O BOX 10068
CHARLESTON, S C 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-757-2 AREA ____

DATE OF INSTALLATION 1/8/87

WELL HOLE DATA

Drill Date 1/8/87 Well Driller Hall, Blake and Associates (HBA)

Depth of Boring 22.0 ft Purpose of Boring Soil Sampling and Monitoring Well Installation

Drilling Method Hollow Stem Auger Mud Type -

WATER LEVEL DATA (All measurements from top of casing)

Water Level 7.22 Date of Measurement 1/10/87

DEVELOPMENT DATA

Development Method Hand Bailing

Length of Time Developed 15 min

LOCATION OF BOREHOLE INFORMATION

Drillers Log X Geophysical Log Nc

Physical Core X Cutting Samples X

Water Level Observations ____

DRILLED BY HBA SCCWD# Engineering Registration # 7961

DEVELOPED BY HLA SCCWD# ____

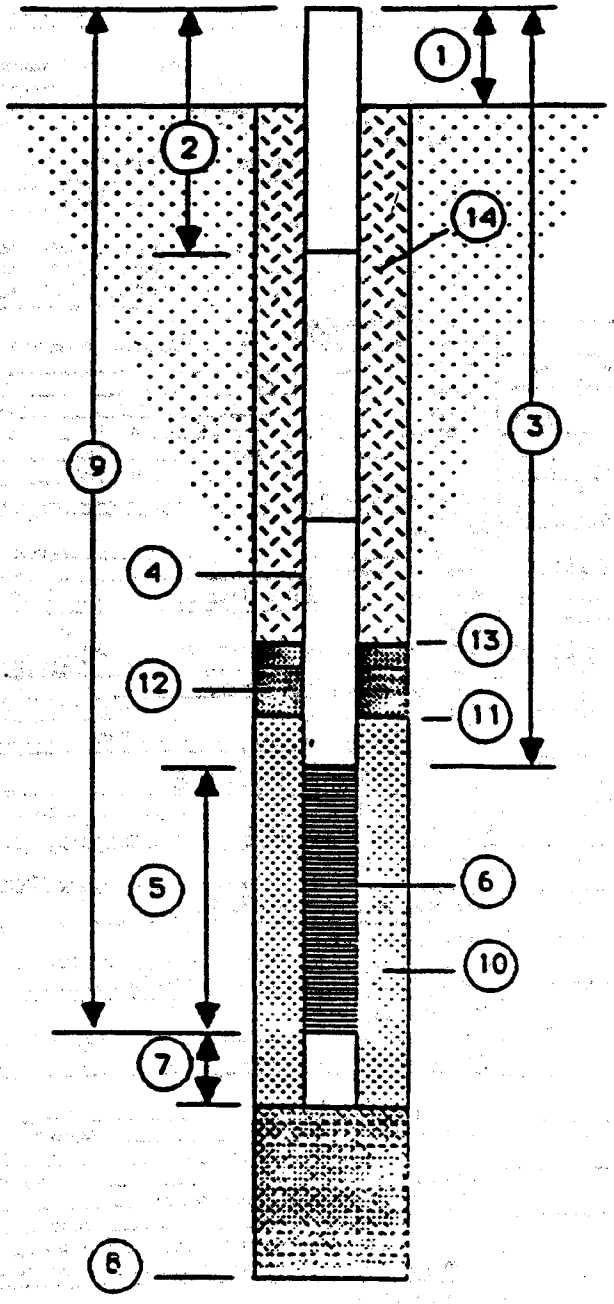
TECHNICAL OVERSIGHT BY HLA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-757-2

DATE OF INSTALLATION 1/8/87



1. Height of Casing above ground -0.3 (See Plate I
2. Depth to first Coupling N/A
   Coupling Interval Depths
3. Total Length of Blank Pipe 4.5 ft
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 14.8 ft
6. Type of Screen Schedule 40 PVC, .020 slott
7. Length of Sump 0.3 ft
8. Total Depth of Boring 22.0 ft Hole Diameter 6-3/
9. Depth To Bottom of Screen 19.6
10. Type of Screen Filter Sand and Pea Gravel
    Quantity Used 193 lbs Size U/C
11. Depth To Top of Filter 3.0 ft
12. Type of Seal 1/2-inch bentonite pellets
    Quantity Used 42 lbs
13. Depth To Top of Seal 1.0 ft
14. Type of Grout cement-sand
    Grout Mixture 2:1
    Method of Placement poured

COMMENTS ON INSTALLATION

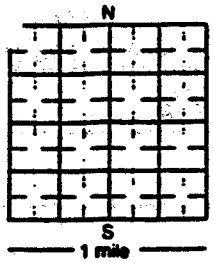
County: Shelby

Township | N or S | E or W | Section | Quarter | ¼ ¼ ¼

NAS Memphis
Millington, Tennessee

Street Address and City or Distance and Direction from Road Intersections
Exchange Service Station, Navy Road

Show exact location of well in section grid with an 'x' — Sketch map of well location



Addition Name

Block Number

Lot Number

Remarks, Elevation, Source of Data, etc.
Elevation of
Top of Casing (TOC): 270.68 ft (msl)

Well depth: 19.9 ft

Datum point from which all measurements are taken: Ground Surface

Method of Drilling
[ ] Cable tool [ ] Hollow rod [ ] Driven [ ]
[ ] Direct rotary [ ] Air rotary [ ] Bucket auger
[ ] Reverse rotary [ ] Jetted [X] Flight auger

Use
[ ] Domestic [ ] Public supply [ ] Industrial [ ]
[ ] Irrigation Municipal [ ] Commercial
[X] Test Well [ ] Heating or cooling [X] Monitoring

Casing Type
[ ] Steel [X] Threaded Height above/below surface -0.3
[ ] Galv [ ] Welded
[X] PVC [ ] Solvent welded Drive shoe? Yes ___ No X
[ ] SS 40 6.75 Hole diameter
___ in to ___ ft Wgt ___ lb/ft Sch No ___ ___ in to
___ in to ___ ft Wgt ___ lb/ft Sch No ___ ___ in to
___ in to ___ ft Wgt ___ lb/ft Sch No ___ ___ in to

Intake Portion of Well
Screen type Schedule 40 or open hole from ___ ft to ___
Manufacturer
Material PVC Dia 4-inch
Fittings Length 14.8
Set between 4.8 ft and 19.6 ft Slot .020
___ ft and ___ ft Slot
___ ft and ___ ft Slot
Method of installation

Filter Pack
Source Gradation Sand & Pea Gra
Method of installation Composition silica
Volume used 193 lbs Depth to top of p 3.0 ft

Grout
Used? X Yes [ ] No Volume used 1 ft³
[ ] Neat Cement [ ] Bentonite X cement-sand
Method of installation poured
Depth from 0.0 ft to 1.0
from ___ ft to ___

Development
Method Hand Bailing Duration 15 m
Dates 1/10/87 Sand content after ½ 0
Chemicals used none

Static Water Level
7.22 ft X below [ ] above grade X TOC
Date measured 1/10/87

Pumping Water Level
N/A ft below ___ above grade Date ___
After ___ hrs pumping at ___

Specific Capacity
N/A gpm/ft of drawdown at ___ hrs
Date

Pump N/A
Date installed Type
Manufacturer Model No
H P Volts Capacity
Depth of pump intake setting No of stages
[ ] Oil [ ] Water lubrication Power source
Material of drop pipe bowls
shafting impellers Bowl dia
Column pipe dia Length Modifications

Well Head Completion
[ ] Pitless adaptor Basement offset Distance above grade

Nearest Sources of Possible Contamination
___ ft Direction ___ Type
Well disinfected upon completion? Yes No

Geophysical Logs Run
None

Water Quality
Sample taken? X Yes No
Where analyzed Industrial & Environm Analysts, Inc.

Borehole data

Formation Log	Color	Hardness	From	To
Asphalt	Black	-	0	0.3
Gravel & Sand Fill	Orange	dense	0.3	1.0
Silty Clay	Md-Dk Gray	med stf	1.0	8.0
V. Silty Clay	Tan & Gray	med stf	8.0	14.0
Clayey Silt	Bwn & Gray	med stf	14.0	21.5
Clayey Silt	Md-Dk Gray	med stf	21.5	22.0

Contractor Name and Address

Name of Driller Hall, Blake and Associates

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR. P O BOX 10068
CHARLESTON, S C. 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-757-3 AREA ____

DATE OF INSTALLATION 1/8/87

WELL HOLE DATA

Drill Date 1/8/87 Well Driller Hall, Blake and Associates (HBA)

Depth of Boring 21.0 ft Purpose of Boring Soil Sampling and Monitoring Well Installation

Drilling Method Hollow Stem Auger Mud Type -

WATER LEVEL DATA (All measurements from top of casing)

Water Level 6.27 Date of Measurement 1/10/87

DEVELOPMENT DATA

Development Method Hand Bailing

Length of Time Developed 15 minutes

LOCATION OF BOREHOLE INFORMATION

Drillers Log X Geophysical Log No

Physical Core X Cutting Samples X

Water Level Observations ____

DRILLED BY HBA SCCWD# Engineering Registration # 7961

DEVELOPED BY HLA SCCWD# ____

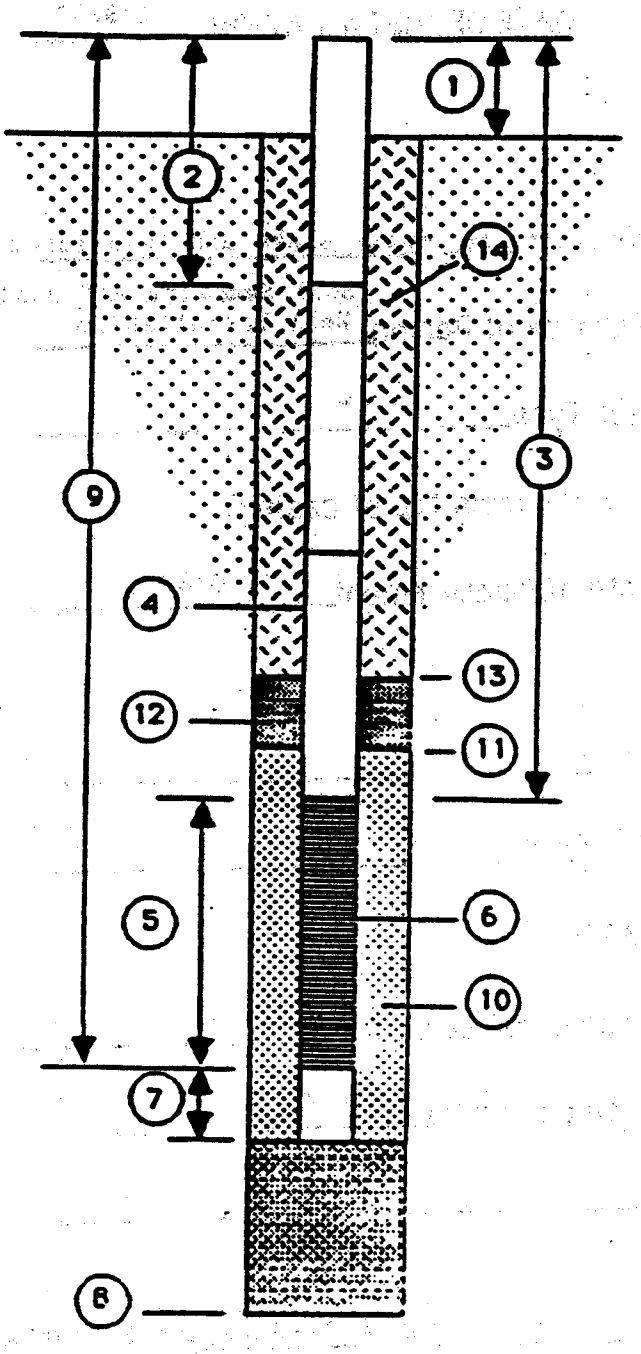
TECHNICAL OVERSIGHT BY HLA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR. P.O. BOX 10068
CHARLESTON S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-757-3

DATE OF INSTALLATION 1/8/87



1. Height of Casing above ground -0.4 ft (See Plate
2. Depth to first Coupling 5.0 ft

   Coupling Interval Depths one coupler
3. Total Length of Blank Pipe 4.7 ft
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 14.8 ft
6. Type of Screen Schedule 40 PVC, .020 slot
7. Length of Sump 0.3 ft
8. Total Depth of Boring 21.0 ft Hole Diameter 6-3/
9. Depth To Bottom of Screen 19.9 ft
10. Type of Screen Filter Sand & Pea Grave

    Quantity Used 75 lbs. Size U/C
11. Depth To Top of Filter 3.0 ft
12. Type of Seal 1/2-inch bentonite pellets

    Quantity Used 25 lbs.
13. Depth To Top of Seal 1.0 ft
14. Type of Grout cement-sand

    Grout Mixture 2:1

    Method of Placement poured

COMMENTS ON INSTALLATION.

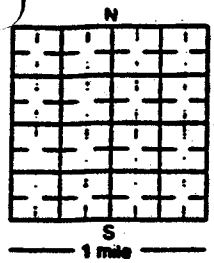
Location of Well: MEM-757-3

County	Township	Township Number	Range Number	Section No.	Fraction
Shelby		N or S	E or W		

Property owner's name and address: NAS Memphis, Millington, Tennessee

Street Address and City or Distance and Direction from Road Intersections: Exchange Service Station, Navy Road

Exact location of well in section grid with an 'x'



Sketch map of well location

Addition Name

Block Number

Lot Number

Remarks, Elevation, Source of Data, etc.

Elevation of Top of Casing (TOC): 270.26 ft (msl)

Borehole data

Formation Log	Color	Hardness	From	To
Asphalt	Black	--	0.0	0.3
Gravel & Sand Fill	Orange	dense	0.3	1.0
Silty Clay	Med. Gray	soft	1.0	8.0
Very Silty Clay	Tan & Gray	med stf	8.0	12.5
Clayey Silt	Bwn & Gary	med stf	12.5	20.5
Clayey Silt	Dk-Med Gray	med stf	20.5	21.0

Well depth: 20.2 ft

Datum point from which all measurements are taken: Ground Surface

Method of Drilling: [ ] Cable tool [ ] Hollow rod [ ] Driven [ ] Dug [ ] Direct rotary [ ] Air rotary [ ] Bucket auger [ ] _____ [ ] Reverse rotary [ ] Jetted [X] Flight auger

Use: [ ] Domestic [ ] Public supply [ ] Industrial [ ] _____ [ ] Irrigation [ ] Municipal [ ] Commercial [X] Test Well [ ] Heating or cooling [X] Monitoring

Casing Type: [ ] Steel [X] Threaded [ ] Galv [ ] Welded [X] PVC [ ] Solvent welded [ ] SS

Height above/below surface: -0.4 ft

Drive shoe? Yes ___ No X

				Hole diameter
___ in to ___ ft	Wgt ___ lb/ft	Sch No 40	6.75 in to	
___ in to ___ ft	Wgt ___ lb/ft	Sch No ___	___ in to	
___ in to ___ ft	Wgt ___ lb/ft	Sch No ___	___ in to	

Intake Portion of Well: Screen type Schedule 40 or open hole from ___ ft to ___

Manufacturer: ___

Material: PVC Dia 4-inch

Fittings: ___ Length 14.8 ft

Set between 5.1 ft and 19.9 ft Slot .020

___ ft and ___ ft Slot ___

___ ft and ___ ft Slot ___

Method of installation: ___

Filter Pack: Source ___ Gradation Sand & Pea Gr

Method of installation poured Composition silica

Volume used 175 lbs. Depth to top of p ___

Grout: Used? X Yes [ ] No Volume used 1.0 ft³

[ ] Neat Cement [ ] Bentonite X cement sand

Method of installation poured

Depth from 0.0 ft to 1.0

from ___ ft to ___

Development: Method hand bailing Duration 15 min.

Dates 1/10/87 Sand content after ___ hrs 0

Chemicals used none

Static Water Level: 6.27 ft X below [ ] above grade TOC

Date measured 1/10/87

Pumping Water Level: N/A ft below [ ] above grade Date ___

After ___ hrs pumping at ___

Specific Capacity: N/A gpm/ft of drawdown at ___ hrs

Date ___

Pump: Date installed N/A Type ___

Manufacturer ___ Model No ___

HP ___ Volts ___ Capacity ___

Depth of pump intake setting ___ No of stages ___

[ ] Oil [ ] Water lubrication Power source ___

Material of drop pipe ___ bowls ___

shafting ___ impellers ___ Bowl dia ___

Column pipe dia ___ Length ___ Modifications ___

Well Head Completion: Pitless adaptor Basement offset Distance above grade ___

Nearest Sources of Possible Contamination: ___ ft Direction ___ Type ___

Well disinfected upon completion? Yes No

Geophysical Logs Run: None

Water Quality: Sample taken? X Yes [ ] No Where analyzed Industrial & Environmental Analysts, Inc.

Driller Name and Address

Name of Driller: Hall Blake and Associates

State License Number: Engineering Registration # 7961

Date well completed: 1/8/87

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR. P O BOX 10068
CHARLESTON, S C. 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-757-4 AREA ____

DATE OF INSTALLATION 1/9/87

WELL HOLE DATA

Drill Date 1/9/87 Well Driller Hall Blake & Associates

Depth of Boring 21.0 ft Purpose of Boring Soil Sampling and Monitoring Well Installation

Drilling Method Hollow Stem Auger Mud Type ---

WATER LEVEL DATA (All measurements from top of casing)

Water Level 4.98 Date of Measurement 1/10/87

DEVELOPMENT DATA

Development Method Hand bailing

Length of Time Developed 15 minutes

LOCATION OF BOREHOLE INFORMATION

Drillers Log X Geophysical Log No

Physical Core X Cutting Samples X

Water Level Observations

DRILLED BY Hall Blake & Assoc. SCCWD# Engineering Registration # 7961

DEVELOPED BY HLA SCCWD# F

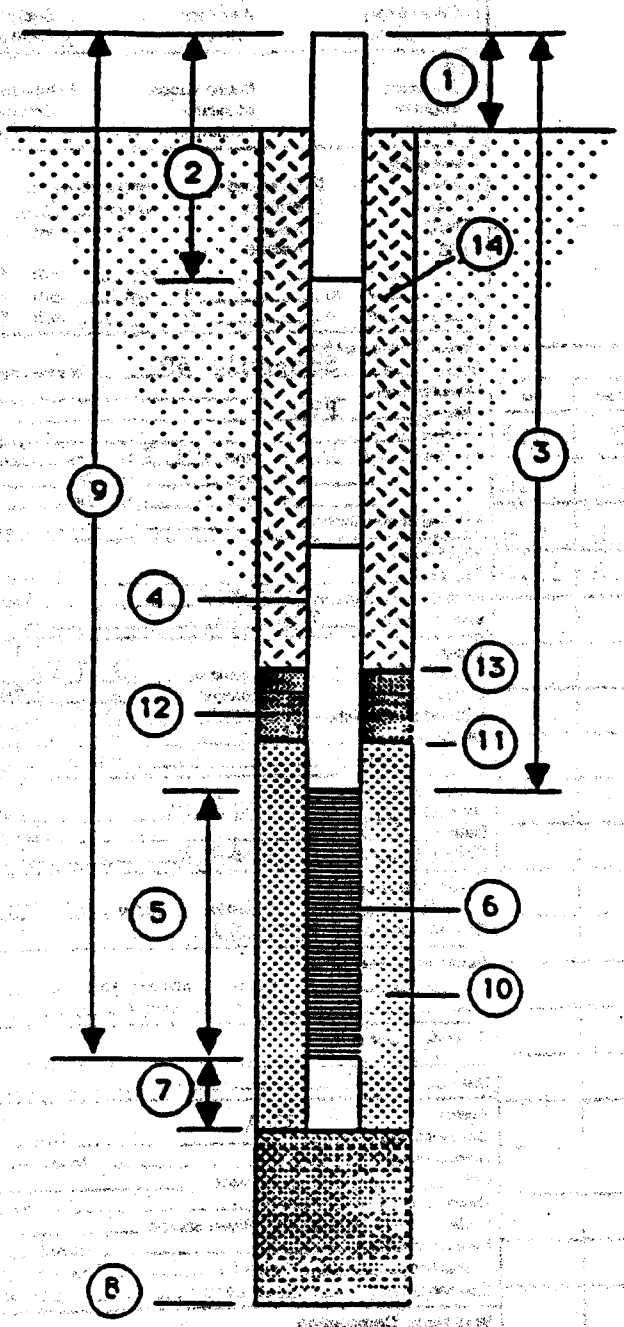
TECHNICAL OVERSIGHT BY HLA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-757-4

DATE OF INSTALLATION 1/9/87



1. Height of Casing above ground -0.4 ft (See Plat)
2. Depth to first Coupling 4.9 ft
   Coupling Interval Depths one coupler
3. Total Length of Blank Pipe 4.5 ft
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 14.8 ft
6. Type of Screen Schedule 40 PVC, .020 slot
7. Length of Sump 0.3 ft
8. Total Depth of Boring 21.0 ft Hole Diameter 6-3
9. Depth To Bottom of Screen 19.7 ft
10. Type of Screen Filter Sand & Pea Gravel
    Quantity Used 140 lbs Size ____ U/C ____
11. Depth To Top of Filter 3.3 ft
12. Type of Seal 1/2-inch bentonite pellets
    Quantity Used 17 lbs.
13. Depth To Top of Seal 1.0 ft
14. Type of Grout cement-sand
    Grout Mixture 2:1
    Method of Placement poured

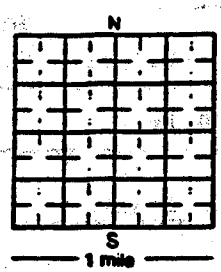
COMMENTS ON INSTALLATION

NAS Memphis
Millington, Tennessee

County	Township Number	Range Number	Section No.	Fraction
Shelby	N or S	E or W		

Street Address and City or Distance and Direction from Road Intersections
Exchange Service Station, Navy Road

Show exact location of well in section grid with an 'x'



Sketch map of well location

Addition Name	
Block Number	
Lot Number	

Remarks, Elevation, Source of Data, etc.

Elevation of
Top of Casing (TOC): 268.74 ft (msl)

Borehole data

Formation Log	Color	Hardness	From	To
Gravel & Topsoil	Brown	--	0	0.7
Silty Clay	Dk Gray	soft to med stf	0.7	7.0
Very Silty Clay	Tan & Gray	soft to med stf	7.0	9.8
Clayey Silt	Gray & Tan	med stf	9.8	21.0

Contractor Name and Address

Name of Driller: Hall Blake and Associates
State License Number: Engineering Registration # 7961

Well depth: 20.0 ft
Datum point from which all measurements are t: Ground Surface

Method of Drilling
[ ] Cable tool [ ] Hollow rod [ ] Driven [ ] Dug
[ ] Direct rotary [ ] Air rotary [ ] Bucket auger [ ] ____
[ ] Reverse rotary [ ] Jetted [X] Flight auger

Use
[ ] Domestic [ ] Public supply [ ] Industrial [ ] ____
[ ] Irrigation [ ] Municipal [ ] Commercial
[X] Test Well [ ] Heating or cooling [X] Monitoring

Casing Type
[ ] Steel [X] Threaded Height above/below surface -0.4
[ ] Galv [ ] Welded
[X] PVC [ ] Solvent welded Drive shoe? Yes ___ No X
[ ] SS

						Hole diame
____ in	to ____ ft	Wgt ____ lb/ft	Sch No 40	6.75 in
____ in	to ____ ft	Wgt ____ lb/ft	Sch No ____	____ in
____ in	to ____ ft	Wgt ____ lb/ft	Sch No ____	____ in

Intake Portion of Well
Screen type Schedule 40 or open hole from ____ ft to ____
Manufacturer ____
Material PVC Dia 4-inch
Fittings ____ Length 14.8 ft
Set between 4.9 ft and 19.7 ft Slot .020
____ ft and ____ ft Slot ____
____ ft and ____ ft Slot ____
Method of installation ____

Filter Pack
Source ____ Gradation Sand & Pea G:
Method of installation poured Composition silica
Volume used 140 lbs Depth to top of p 3.3 f

Grout
Used? [X] Yes [ ] No Volume used 1.0 ft³
[ ] Neat Cement [ ] Bentonite [X] cement-sand
Method of installation poured
Depth from 0.0 ft to 1.0
from ____ ft to ____

Development
Method hand bailing Duration 15 min.
Dates 1/10/87 Sand content after ½ hrs 0
Chemicals used --none

Static Water Level
4.98 ft [X] below [ ] above grade TOC
Date measured 1/10/87

Pumping Water Level
N/A ft below ___ above grade Date ____
After ____ hrs pumping at ____

Specific Capacity
N/A gpm/ft of drawdown at ____ h
Date ____

Pump
Date installed N/A Type ____
Manufacturer ____ Model No ____
HP ____ Volts ____ Capacity ____
Depth of pump intake setting ____ No of stages ____
[ ] Oil [ ] Water lubrication Power source ____
Material of drop pipe ____ bowls ____
shafting ____ impellers ____ Bowl dia ____
Column pipe dia ____ Length ____ Modifications ____

Well Head Completion
Press adaptor Basement offset Distance above grade ____

Nearest Sources of Possible Contamination
____ ft Direction ____ Type ____
Well disinfected upon completion? Yes No

Geophysical Logs Run
None

Water Quality
Sample taken? [X] Yes [ ] No Industrial & Environ
Where analyzed Analysts, Inc.

Date well completed 1/9/87

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR. P O BOX 10068
CHARLESTON, S C. 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-757-5 AREA ____

DATE OF INSTALLATION 1/9/87

WELL HOLE DATA

Drill Date 1/9/87 Well Driller Hall Blake and Associates

Depth of Boring 21.0 ft Purpose of Boring Soil Sampling and Monitoring Well Installation

Drilling Method Hollow Stem Auger Mud Type ---

WATER LEVEL DATA (All measurements from top of casing)

Water Level 6.44 Date of Measurement 1/10/87

DEVELOPMENT DATA

Development Method Hand Bailing

Length of Time Developed 15 minutes

LOCATION OF BOREHOLE INFORMATION

Drillers Log X Geophysical Log No

Physical Core X Cutting Samples X

Water Level Observations ____

DRILLED BY Hall Blake & Assoc. SCCWD# Engineering Registration # 7961

DEVELOPED BY HLA SCCWD# ____

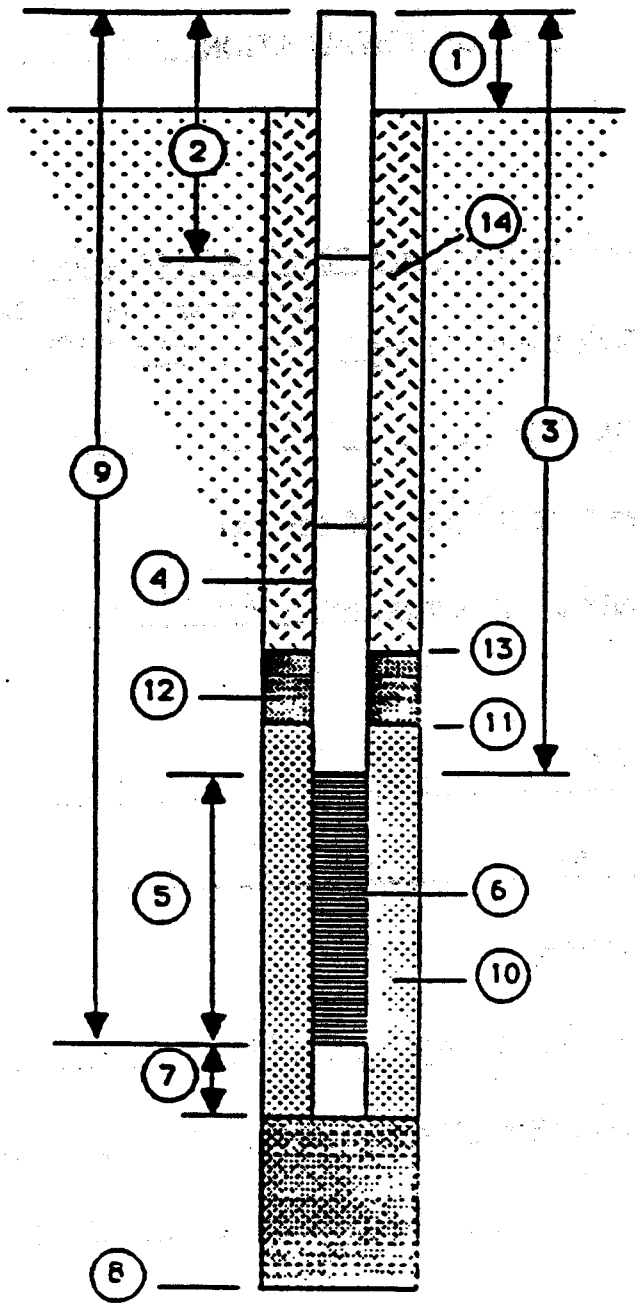
TECHNICAL OVERSIGHT BY HLA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P. O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-757-5

DATE OF INSTALLATION 1/9/87



1. Height of Casing above ground -0.4 (S... Plate
2. Depth to first Coupling N/A

   Coupling Interval Depths
3. Total Length of Blank Pipe 5.0 ft
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 14.8 ft
6. Type of Screen Schedule 40 PVC, .020 slot
7. Length of Sump 0.3 ft
8. Total Depth of Boring 21.0 ft Hole Diameter 6-3/
9. Depth To Bottom of Screen 20.2 ft
10. Type of Screen Filter Sand and Pea Gr...

    Quantity Used 210 lbs Size ... U/C
11. Depth To Top of Filter 3.5 ft
12. Type of Seal 1/2-inch bentonite pellets

    Quantity Used 17 lbs
13. Depth To Top of Seal 1.0 ft
14. Type of Grout cement-sand

    Grout Mixture 2:1

    Method of Placement poured

COMMENTS ON INSTALLATION

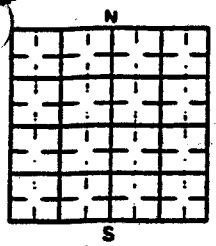
NAS Memphis
Millington, Tennessee

County	Township Number	Range Number	Section No.	Fraction
Shelby	N or S	E or W		

Township

Street Address and City or Distance and Direction from Road Intersections
Exchange Service Station, Navy Road

Exact location of well in section grid with an "x"



Sketch map of well location

Addition Name

Block Number

Lot Number

Remarks, Elevation, Source of Data, etc.
Elevation of
Top of Casing (TOC): 271.14 ft (msl)

Borehole data

Formation Log	Color	Hardness	From	To
Asphalt	Black	--	0.0	0.3
Gravel & Sand Fill	Orange	dense	0.3	0.6
Silty Clay	med to dk Gray	med stf	0.6	2.5
Very Silty Clay	Tan & Gray	med stf	2.5	11.3
Clayey Silt	Gary & Bwn	med stf	11.3	19.5
Clayey Silt	Dk Gray	med stf	19.5	21.0

Well depth: 20.5 ft

Datum point from which all measurements are taken: Ground Surface

Method of Drilling
[ ] Cable tool [ ] Hollow rod [ ] Driven [ ] Dug
[ ] Direct rotary [ ] Air rotary [ ] Bucket auger [ ] ____
[X] Reverse rotary [ ] Jetted [X] Hand auger

Use
[ ] Domestic [ ] Public supply [ ] Industrial [ ] ____
[ ] Irrigation [ ] Municipal [ ] Commercial
[X] Test Well [ ] Heating or cooling [X] Monitoring

Casing Type
[ ] Steel [X] Threaded Height above/below surface: -0.4
[ ] Galv [ ] Welded
[X] PVC [ ] Solvent welded Drive shoe? Yes ___ No X
[ ] SS

					Hole diam
____ in	to ____ ft	Wgt ____ lb/ft	Sch No 40	6.75 in	
____ in	to ____ ft	Wgt ____ lb/ft	Sch No ____	____ in	
____ in	to ____ ft	Wgt ____ lb/ft	Sch No ____	____ in	

Intake Portion of Well
Screen type: Schedule 40 or open hole from ____ ft to ____
Manufacturer: ____
Material: PVC Dia: 4-inches
Fittings: ____ Length: 14.8 ft
Set between: 5.4 ft and 20.2 ft Slot: 020
____ ft and ____ ft Slot: ____
____ ft and ____ ft Slot: ____
Method of installation: ____

Filter Pack
Source: ____ Gradation: Sand & Pea Gr
Method of installation: poured Composition: silica
Volume used: 210 lbs Depth to top of fp: 3.5 ft

Grout
Used? X Yes [ ] No Volume used: 1.0 ft³
[ ] Neat Cement [ ] Bentonite [X] cement-sand
Method of installation: poured
Depth from 0.0 ft to 1.0
from ____ ft to ____

Development
Method: hand bailing Duration: 15 min
Dates: 1/10/87 Sand content after ½ hrs: 0
Chemicals used: none

Static Water Level
6.44 ft [X] below [ ] above grade TOC
Date measured: 1/10/87

Pumping Water Level
N/A ft [ ] below [ ] above grade Date: ____
After ____ hrs pumping at ____

Specific Capacity
N/A gpm/ft of drawdown at ____ hrs
Date: ____

Pump
Date installed: N/A Type: ____
Manufacturer: ____ Model No: ____
HP: ____ Volts: ____ Capacity: ____
Depth of pump intake setting: ____ No of stages: ____
[ ] Oil [ ] Water lubrication Power source: ____
Material of drop pipe: ____ bowls: ____
shafting: ____ impellers: ____ Bowl dia: ____
Column pipe dia: ____ Length: ____ Modifications: ____

Well Head Completion
Pitless adaptor Basement offset Distance above grade: ____

Nearest Sources of Possible Contamination
____ ft Direction: ____ Type: ____
Well disinfected upon completion? Yes No

Geophysical Logs Run
None

Water Quality
Sample taken? [X] Yes [ ] No Industrial & Environmental
Where analyzed: Analysts, Inc.

Contractor Name and Address

Name of Driller: Hall Blake and Associates
State License Number: Engineering Registration # 7961

Date well completed: 1/9/87

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR. P O BOX 10068
CHARLESTON, S C. 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-757-6 AREA ____

DATE OF INSTALLATION 1/9/87

WELL HOLE DATA

Drill Date 1/9/87 Well Driller Hall Blake and Associates

Depth of Boring 21.0 ft Purpose of Boring Soil Sampling and Monitoring Well Installation

Drilling Method Hollow Stem Auger Mud Type —

WATER LEVEL DATA (All measurements from top of casing)

Water Level 7.69 Date of Measurement 1/10/87

DEVELOPMENT DATA

Development Method Hand Bailing

Length of Time Developed 15 minutes

LOCATION OF BOREHOLE INFORMATION

Drillers Log X Geophysical Log No

Physical Core X Cutting Samples X

Water Level Observations ____

DRILLED BY HBA SCCWD# Engineering Registration # 7961

DEVELOPED BY HLA SCCWD# ____

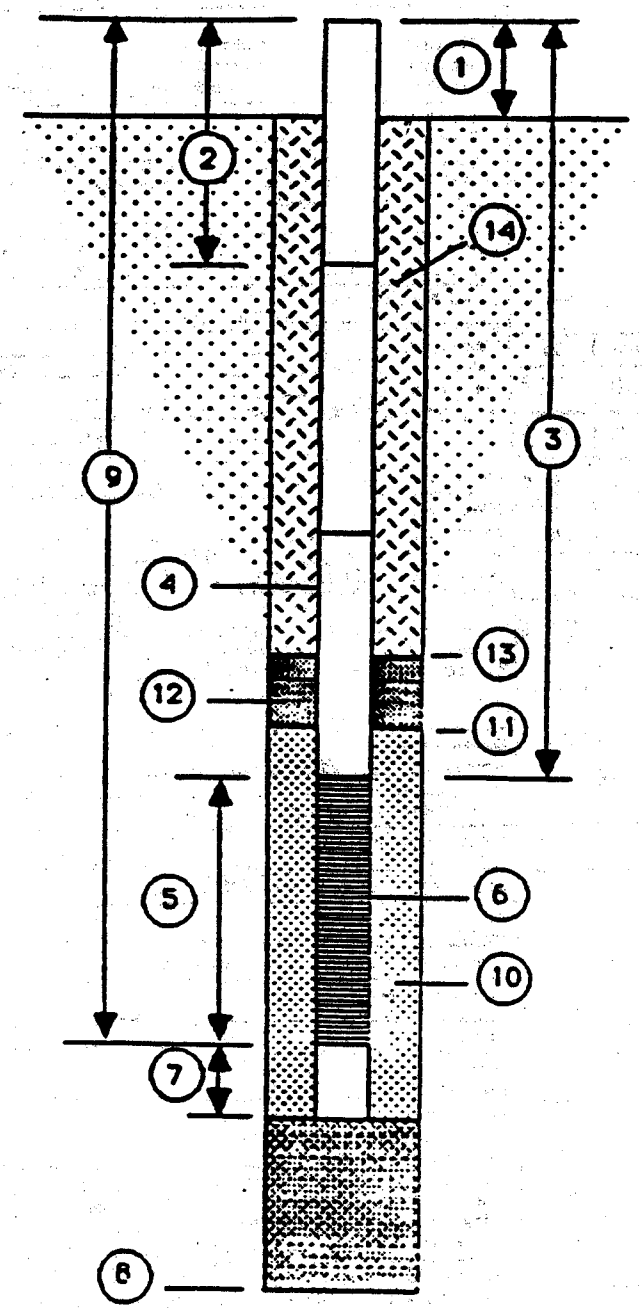
TECHNICAL OVERSIGHT BY HLA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON S C 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-757-6

DATE OF INSTALLATION 1/9/87



1. Height of Casing above ground -0.2 (See Plat
2. Depth to first Coupling 4.9 ft
   Coupling Interval Depths one coupler
3. Total Length of Blank Pipe 4.7 ft
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 14.8 ft
6. Type of Screen Schedule 40 PVC, .020 slot
7. Length of Sump 0.3 ft
8. Total Depth of Boring 21.0 ft Hole Diameter 6-3/
9. Depth To Bottom of Screen 19.7 ft
10. Type of Screen Filter Sand & Pea Gravel
    Quantity Used 140 lbs Size U/C
11. Depth To Top of Filter 3.0 ft
12. Type of Seal 1/2-inch bentonite pellets
    Quantity Used 25 lbs.
13. Depth To Top of Seal 1.0 ft
14. Type of Grout cement-sand
    Grout Mixture 2:1
    Method of Placement poured

COMMENTS ON INSTALLATION

Location of Well: MEM-757-6

County	Township	Township Number	Range Number	Section No.	Fraction
Shelby		N or S	E or W		

Street Address and City or Distance and Direction from Road Intersections
Exchange Service Station, Navy Road

exact location of well in section grid with an 'x'

N
S
1 mile

Sketch map of well location

Addition Name
Block Number
Lot Number

Property owner's name and address
NAS Memphis
Millington, Tennessee

Well depth: 20.0 ft
Datum point from which all measurements are to: Ground Surface

Method of Drilling
Cable tool; Direct rotary; Reverse rotary; Hollow rod; Air rotary; Jetted; Driven; Bucket auger; X Flight auger; Dug

Use
Domestic; Irrigation; X Test Well; Public supply; Municipal; Heating or cooling; Industrial; Commercial; X Monitoring

Casing Type
Steel; Galv; X PVC; SS; X Threaded; Welded; Solvent welded
Height above/below surface: -0.20
Drive shoe? Yes ___ No X
Hole diameter
___ in to ___ ft Wgt ___ lb/ft Sch No 40 — 6.75 in to
___ in to ___ ft Wgt ___ lb/ft Sch No ___ — ___ in to
___ in to ___ ft Wgt ___ lb/ft Sch No ___ — ___ in to

Remarks, Elevation, Source of Data, etc.
Elevation of
Top of Casing (TOC): 271.62 ft (msl)

Borehole data

Formation Log	Color	Hardness	From	To
Asphalt	Black	—	0.0	0.3
Gravel & Sand Fill	Orange	dense	0.3	0.8
Silty Clay	Dk-Med Gry	soft	0.8	3.0
Silty Clay	Gray & Tan	med stf	3.0	14.0
Clayey Silt	Bwn & Gray	stiff-med stf	14.0	20.5
Clayey Silt	Dk Gray	med stf	20.5	21.0

Intake Portion of Well
Screen type: Schedule 40 or open hole from ___ ft to ___
Manufacturer ___
Material: PVC Dia: 4-inches
Fittings ___ Length: 14.8 ft
Set between 4.9 ft and 19.7 ft Slot ___
___ ft and ___ ft Slot ___
___ ft and ___ ft Slot ___
Method of installation ___

Filter Pack
Source ___ Gradation: Sand & Pea Gr
Method of installation: poured Composition: silica
Volume used: 140 lbs Depth to top of fp: 3.0 f

Grout
Used? X Yes ___ No Volume used: 1.0 ft³
___ Neat Cement ___ Bentonite X cement-sand
Method of installation: poured
Depth from 0.0 ft to 1.0
from ___ ft to ___

Development
Method: hand bailing Duration: 15 min.
Dates: 1/10/87 Sand content after ___ hrs ___
Chemicals used: none

Static Water Level
7.69 ft X below ___ above TOC
Date measured: 1/10/87

Pumping Water Level
N/A ft below ___ above grade Date ___
After ___ hrs pumping at ___

Specific Capacity
N/A gpm/ft of drawdown at ___ hrs
Date ___

Pump
Date installed: N/A Type ___
Manufacturer ___ Model No ___
HP ___ Volts ___ Capacity ___
Depth of pump intake setting ___ No of stages ___
___ Oil ___ Water lubrication Power source ___
Material of drop pipe ___ bowls ___
shafting ___ impellers ___ Bowl dia ___
Column pipe dia ___ Length ___ Modifications ___

Well Head Completion
Pitless adaptor Basement offset Distance above grade ___

Nearest Sources of Possible Contamination
___ ft Direction ___ Type ___
Well disinfected upon completion? Yes No

Geophysical Logs Run
None

Water Quality
Sample taken? X Yes
Where analyzed: Industrial & Environmental Analysts, Inc.

Contractor Name and Address

Name of Driller: Hall Blake and Associates
State License Number: Engineering Registration # 7961

Date well completed: 1/9/87

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR. P O BOX 10068
CHARLESTON, S C. 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-757-7 AREA ____

DATE OF INSTALLATION 11-3-87

WELL HOLE DATA

Drill Date 11-3-87 Well Driller Professional Service Ind. (PSI)

Depth of Boring 26.0 ft Purpose of Boring Soil Sampling and Monitoring Well Installation

Drilling Method Hollow Stem Auger Mud Type N/A

WATER LEVEL DATA (All measurements from top of casing)

Water Level 7.10 ft Date of Measurement 11-6-87

DEVELOPMENT DATA

Development Method Hand Bailing

Length of Time Developed 55 minutes

LOCATION OF BOREHOLE INFORMATION

Drillers Log X Geophysical Log NO

Physical Core X Cutting Samples X

Water Level Observations ____

DRILLED BY PSI SCCWD# ____

DEVELOPED BY HLA SCCWD# ____

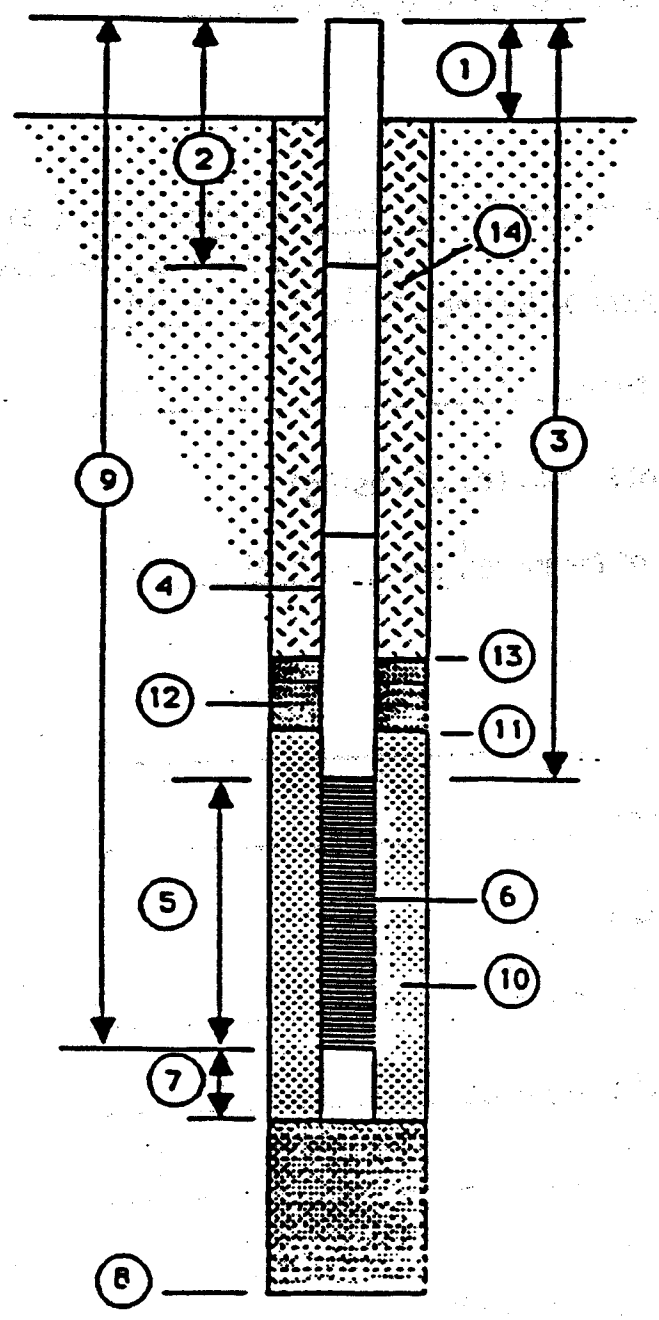
TECHNICAL OVERSIGHT BY HLA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-757-7

DATE OF INSTALLATION 11-3-87



1. Height of Casing above ground -0.43 ft (See Plate D
2. Depth to first Coupling N/A

   Coupling Interval Depths
3. Total Length of Blank Pipe 5.5 ft
4. Type of Blank Pipe Threaded Schedule 40 PVC
5. Length of Screen 20.0 ft
6. Type of Screen Threaded Schedule 40 PVC, 0.02(
7. Length of Sump 0.5 ft
8. Total Depth of Boring 26 ft Hole Diameter 6-5/8"
9. Depth To Bottom of Screen 25.5 ft
10. Type of Screen Filter sand

    Quantity Used 1.8 ft^3 Size____ U/C____
11. Depth To Top of Filter 2.5 ft
12. Type of Seal bentonite

    Quantity Used 0.688 ft^3
13. Depth To Top of Seal 1.0 ft
14. Type of Grout cement-bentonite

    Grout Mixture 10% bentonite

    Method of Placement poured

COMMENTS ON INSTALLATION

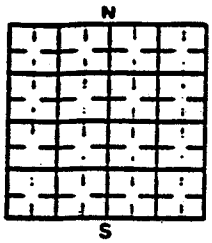
WELL AND PUMP DATA

Location of Well: MEM-757- 7

County: Shelby | Township | Township Number N or S | Range Number E or W | Section No. | Fraction | ¼ ¼ ¼

Local Address and City or Distance and Direction from Road Intersections: Exchange Service Station, Navy Road

Show exact location of well in section grid with an "X"



Addition Name

Block Number

Lot Number

Property owner's name and address: NAS Memphis
Millington, Tennessee

Well depth: 26.0'

Datum point from which all measurements are taken: Ground Surface

Method of Drilling: Cable tool; Direct rotary; Reverse rotary; Hollow rod; Air rotary; Jetted; Driven; Bucket auger; X Flight auger; Dug

Use: Domestic; Irrigation; X Test Well; Public supply; Municipal; Heating or cooling; Industrial; Commercial; X Monitoring

Casing Type: Steel; Galv; X PVC; LISS; Threaded; Welded; Solvent welded

Height above/below surface: 0.43

Drive shoe? Yes ___ No X

4 in to 5.5 ft Wgt 2.0 lb/ft Sch No 40 Hole diam 6-5/8 in

___ in to ___ ft Wgt ___ lb/ft Sch No ___ ___ in

___ in to ___ ft Wgt ___ lb/ft Sch No ___ ___ in

Remarks, Elevation, Source of Data, etc.

Elevation of
Top of Casing (TOC): 270.08 ft (msl)

Borehole data

Formation Log	Color	Hardness	From	To
ASPHALT	Black	--	0.0	0.4
CLAY & GRAVEL (FILL)	Orange	stiff	0.4	3.0
SILTY CLAY	Greenish Brown	soft to m stiff	3.0	8.5
SILTY CLAY	Green Gray	soft to m stiff	8.5	13.5
SILT	Lt Grav	stiff	13.5	18.0
LAYEY SILT	Brownish Green	soft	18.0	19.0
LAYEY SILT	Lt Gray	soft	19.0	26.0

Intake Portion of Well
Screen type: Schedule 40 or open hole from ___ ft to ___
Manufacturer: Brainard Kilman
Material: PVC Dia: 4" Length: 20.0'
Fittings
Set between 5.5 ft and 25.5 ft Slot 0.020
___ ft and ___ ft Slot ___
___ ft and ___ ft Slot ___
Method of installation

Filter Pack
Source ___ Gradation: Sand
Method of installation: Poured 3 Composition: Silic
Volume used: 1.8 ft³ Depth to top of fp: 2.5'

Grout
Used? X Yes ___ No Volume used: 1.0 ft³
Neat Cement ___ Bentonite X cement-bentonite
Method of installation: Poured
Depth from 0.5 ft to 1.0
from ___ ft to ___

Development
Method: Hand Bailing Duration ___
Dates: 11-4-87 Sand content after ___ hrs ___
Chemicals used: None

Static Water Level
7.10 ft X below ___ above TOC
Date measured: 11-6-87

Pumping Water Level
N/A ft. below ___ above grade Date ___
After ___ hrs pumping at ___

Specific Capacity
N/A gpm/ft of drawdown at ___ hrs
Date ___

Pump N/A
Date installed ___ Type ___
Manufacturer ___ Model No ___
HP ___ Volts ___ Capacity ___
Depth of pump intake setting ___ No of stages ___
___ Oil ___ Water lubrication Power source ___
Material of drop pipe ___ bowls ___
shafting ___ impellers ___ Bowl dia ___
Column pipe dia ___ Length ___ Modifications ___

Well Head Completion
Press adaptor Basement offset Distance above grade ___

Nearest Sources of Possible Contamination
___ ft Direction ___ Type ___
Well disinfected upon completion? Yes No

Geophysical Logs Run
None

Contractor Name and Address
Professional Services Industries, Inc.
4161 Ridgemoor Ave., Memphis, TN 38118

Name of Driller ___

State License Number: Engineering Registration #15430

Water Quality
Sample taken: X Yes
Report attached ___
Industrial & Environmental Analysts, Inc.

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR P O BOX 10068
CHARLESTON, S C. 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-757-8 AREA

DATE OF INSTALLATION 11-3-87

WELL HOLE DATA

Drill Date 11-3-87 Well Driller Professional Service Ind. (PSI)

Depth of Boring 25.0 ft Purpose of Boring Soil Sampling and Monitoring Well Installation

Drilling Method Hollow Stem Auger Mud Type N/A

WATER LEVEL DATA (All measurements from top of casing)

Water Level 8.56 ft Date of Measurement 11-6-87

DEVELOPMENT DATA

Development Method Hand Bailing

Length of Time Developed 30 minutes

LOCATION OF BOREHOLE INFORMATION

Drillers Log X Geophysical Log NO

Physical Core X Cutting Samples X

Water Level Observations

DRILLED BY PSI SCCWD# Engineering Registration #15430

DEVELOPED BY HLA SCCWD#

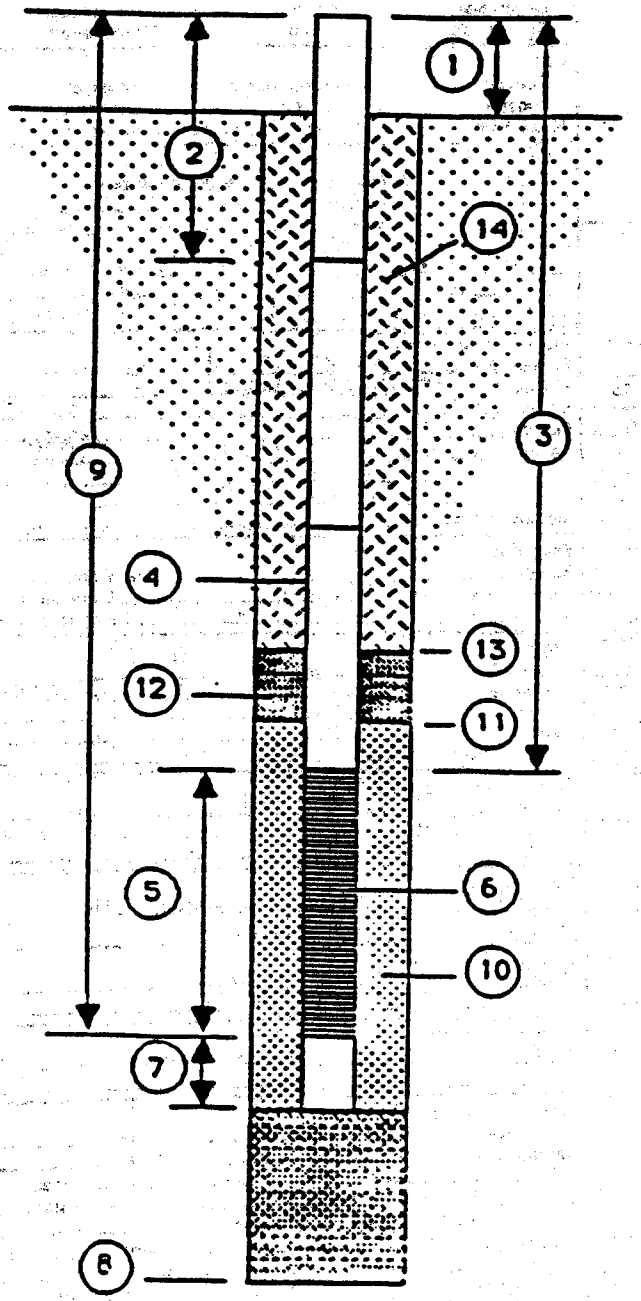
TECHNICAL OVERSIGHT BY HLA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-757-8

DATE OF INSTALLATION 11-3-87



1. Height of Casing above ground -0.25 ft (See Plate
2. Depth to first Coupling N/A

   Coupling Interval Depths
3. Total Length of Blank Pipe 5.0 ft
4. Type of Blank Pipe Threaded Schedule 40 PVC
5. Length of Screen 20.0'
6. Type of Screen Threaded Schedule 40 PVC, 0.02(
7. Length of Sump --
8. Total Depth of Boring 25.5 ft Hole Diameter 6-5/8"
9. Depth To Bottom of Screen 25.0 ft
10. Type of Screen Filter sand

    Quantity Used 1.5 ft^3 Size U/C
11. Depth To Top of Filter 2.5 ft
12. Type of Seal bentonite

    Quantity Used 0.668 ft^3
13. Depth To Top of Seal 1.0 ft
14. Type of Grout cement-bentonite

    Grout Mixture 10% bentonite

    Method of Placement poured

COMMENTS ON INSTALLATION

WELL AND PUMP DATA

Location of Well MEM-757-8

County	Township Number	Range Number	Section No.	Fraction	
Shelby	N or S	E or W			

Property owner's name and address

NAS Memphis
Millington, Tennessee

Street Address and City or Distance and Direction from Road Intersections

Exchange Service Station, Navy Road

Show exact location of well in section grid with an 'x' **Sketch map of well location**

N

S

1 mile

Addition Name	
Block Number	
Lot Number	

Well depth 25.5' **Datum point from which all measurements are taken** Ground Surface

Method of Drilling

Cable tool; Hollow rod; Driven; Dug
Direct rotary; Air rotary; Bucket auger; ____
Reverse rotary; Jetted; X Flight auger

Use

Domestic; Public supply; Industrial; ____
Irrigation; Municipal; Commercial
X Test Well; Heating or cooling; X Monitoring

Casing Type

Steel; X Threaded; Height above/below surface 0.26
Galv; Welded
X PVC; Solvent welded; Drive shoe? Yes ___ No X
SS

4 in to 5.5 ft Wgt 2.0 lb/ft Sch No 40 Hole dia 6-5/8 in
___ in to ___ ft Wgt ___ lb/ft Sch No ___ ___ in
___ in to ___ ft Wgt ___ lb/ft Sch No ___ ___ in

Remarks, Elevation, Source of Data, etc.

Elevation of
Top of Casing (TOC): 270.98 ft (msl)

Borehole data

Formation Log	Color	Hardness	From	To
ASPHALT	Black	--	0.0	0.4
CLAY	Orange	stiff	0.4	3.0
SILTY CLAY	Medium Gray	soft to stiff	3.0	8.5
SILTY CLAY	Gray	soft	8.5	14.0
CLAYEY SILT	Lt Brown	soft	14.0	18.5
CLAYEY SILT	Lt. Gray & Brown	soft	18.5	23.5
CLAYEY SILT	Lt. Brown	stiff	23.5	24.5
SILTY CLAY	Gray	stiff	24.5	25.5

Intake Portion of Well

Screen type Schedule 40 open hole from ___ ft to ___
Manufacturer Brainard Kilman
Material PVC Dia 4"
Fittings ___ Length 20.0'
Set between 5.5 ft and 25.0 ft Slot 0.020
___ ft and ___ ft Slot ___
___ ft and ___ ft Slot ___
Method of installation ___

Filter Pack

Source ___ Gradation Sand
Method of installation Poured Composition Silic
Volume used 1.5 ft3 Depth to top of fp 2.5

Grout

Used? X Yes ☐ No Volume used 1.0 ft3
☐ Neat Cement ☐ Bentonite X Cement-bentonite
Method of installation Poured
Depth from 0.5 ft to 1.0
from ___ ft to ___

Development

Method Hand Bailing Duration ___
Dates 11-4-87 Sand content after ___ hrs ___
Chemicals used None

Static Water Level

8.56 ft X below ☐ above grade: TOC
Date measured 11-6-87

Pumping Water Level

N/A ft below ___ above grade Date ___
After ___ hrs pumping at ___

Specific Capacity

N/A gpm/ft of drawdown at ___ ft
Date ___

Pump N/A

Date installed ___ Type ___
Manufacturer ___ Model No ___
HP ___ Volts ___ Capacity ___
Depth of pump intake setting ___ No of stages ___
☐ Oil ☐ Water lubrication Power source ___
Material of drop pipe ___ bowls ___
shafting ___ impellers ___ Bowl dia ___
Column pipe dia ___ Length ___ Modifications ___

Well Head Completion

Press adaptor Basement offset Distance above grade ___

Nearest Sources of Possible Contamination

___ ft Direction ___ Type ___
Well disinfected upon completion? Yes No

Geophysical Logs Run

None

Contractor Name and Address

Professional Services Industries, Inc.
4161 Ridgemoor Ave., Memphis, TN 38118

Name of Driller ___

State license number Engineering Registration #15430

Water Quality

Samples taken? X Yes
Where analyzed Industrial & Environmental Analysts, Inc.

11-2-87

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR. P O BOX 10068
CHARLESTON, S C. 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-757-9 AREA ____

DATE OF INSTALLATION 11-4-87

WELL HOLE DATA

Drill Date 11-4-87 Well Driller Professional Service Ind. (PSI)

Depth of Boring 26.0 ft. Purpose of Boring Soil Sampling and Monitoring Well Installation

Drilling Method Hollow Stem Auger Mud Type N/A

WATER LEVEL DATA (All measurements from top of casing)

Water Level 10.59 ft Date of Measurement 11-6-87

DEVELOPMENT DATA

Development Method Hand Bailing

Length of Time Developed 45 minutes

LOCATION OF BOREHOLE INFORMATION

Drillers Log X Geophysical Log NO

Physical Core X Cutting Samples X

Water Level Observations ____

DRILLED BY PSI SCCWD# Engineering Registration #15430

DEVELOPED BY HLA SCCWD# ____

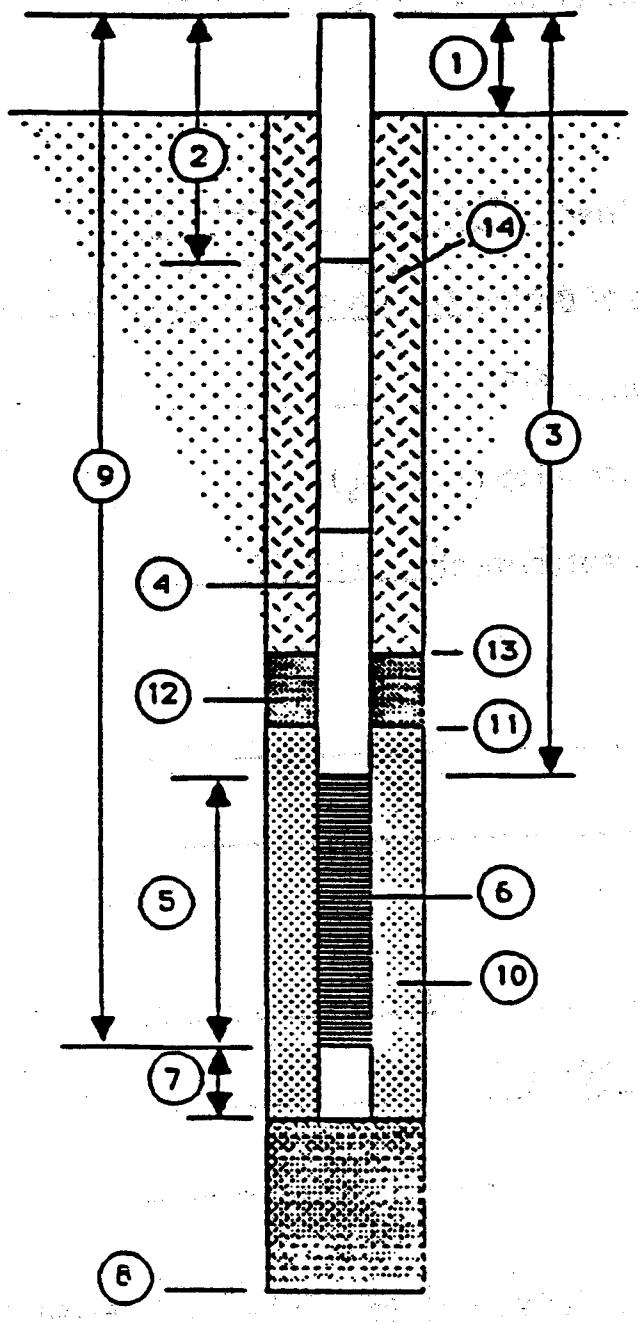
TECHNICAL OVERSIGHT BY HLA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O BOX 10068
CHARLESTON S.C 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-757-9

DATE OF INSTALLATION 11-4-87



1. Height of Casing above ground -0.30 ft (See Plate D1)
2. Depth to first Coupling N/A

   Coupling Interval Depths _____
3. Total Length of Blank Pipe 5.5 ft
4. Type of Blank Pipe Threaded Schedule 40 PVC
5. Length of Screen 20.0 ft
6. Type of Screen Threaded Schedule 40 PVC, 0.020
7. Length of Sump 0.5 ft
8. Total Depth of Boring 26 ft Hole Diameter 6-5/8"
9. Depth To Bottom of Screen 25.5 ft
10. Type of Screen Filter sand

    Quantity Used 2.2 ft^3 Size _____ U/C _____
11. Depth To Top of Filter 3.0 ft
12. Type of Seal bentonite

    Quantity Used 0.688 ft^3
13. Depth To Top of Seal 1.0 ft
14. Type of Grout cement-bentonite

    Grout Mixture 10% bentonite

    Method of Placement poured

COMMENTS ON INSTALLATION

WELL AND PUMP DATA

Location of Well: MEM-757- 9

County: Shelby | Township Number: N or S | Range Number: E or W | Section No. | Fraction | ¼ ¼ ¼

Property owner's name and address: NAS Memphis, Millington, Tennessee

Street Address and City or Distance and Direction from Road Intersections: Exchange Service Station, Navy Road

Show exact location of well in section grid with an "x" — Sketch map of well location

N / S — 1 mile

Addition Name | Block Number | Lot Number

Well depth: 26.0' | Datum point from which all measurements are taken: Ground Surface

Method of Drilling
[ ] Cable tool [ ] Hollow rod [ ] Driven [ ] Dug
[ ] Direct rotary [ ] Air rotary [ ] Bucket auger [ ] ____
[ ] Reverse rotary [ ] Jetted [X] Flight auger

Use
[ ] Domestic [ ] Public supply [ ] Industrial [ ] ____
[ ] Irrigation [ ] Municipal [ ] Commercial
[X] Test Well [ ] Heating or cooling [X] Monitoring

Casing Type
[ ] Steel [X] Threaded Height above/below surface 0.30
[ ] Galv [ ] Welded
[X] PVC [ ] Solvent welded Drive shoe? Yes ___ No X
[ ] SS

4 in to 5.5 ft Wgt 2.0 lb/ft Sch No 40 — Hole dia 6-5/8 in
___ in to ___ ft Wgt ___ lb/ft Sch No ___ — ___ in
___ in to ___ ft Wgt ___ lb/ft Sch No ___ — ___ in

Intake Portion of Well
Screen type Schedule 40 or open hole from ___ ft to ___
Manufacturer Brainard Kilman
Material PVC Dia ___
Fittings ___ Length ___
Set between 5.5 ft and 25.5 ft Slot 0.020
___ ft and ___ ft Slot ___
___ ft and ___ ft Slot ___
Method of installation ___

Filter Pack
Source ___ Gradation Sand
Method of installation Poured 3 Composition Silic
Volume used 2.2 ft Depth to top of FP 3.0'

Grout
Used? X Yes [ ] No Volume used 1.0 ft³
[ ] Neat Cement [ ] Bentonite X cement-bentonite
Method of installation Poured
Depth from 0.5 ft to 1.0
from ___ ft to ___

Development
Method Hand Bailing Duration ___
Dates 11-5-87 Sand content after ___ hrs ___
Chemicals used None

Static Water Level
10.59 ft X below [ ] above TOC
Date measured 11-6-87

Pumping Water Level
N/A ft below ___ above grade Date ___
After ___ hrs pumping at ___

Specific Capacity
N/A gpm/ft of drawdown at ___ hrs
Date ___

Pump N/A
Date installed ___ Type ___
Manufacturer ___ Model No ___
HP ___ Volts ___ Capacity ___
Depth of pump intake setting ___ No of stages ___
[ ] Oil [ ] Water lubrication Power source ___
Material of drop pipe ___ bowls ___
shafting ___ impellers ___ Bowl dia ___
Column pipe dia ___ Length ___ Applications ___

Well Head Completion
Pitless adaptor Basement offset Distance above grade ___

Nearest Sources of Possible Contamination
___ ft Direction ___ Type ___
Well disinfected upon completion? Yes No

Geophysical Logs Run
None

Remarks, Elevation, Source of Data, etc.
Elevation of Top of Casing (TOC): 271.06 ft (MSL)

Borehole data

Formation Log	Color	Hardness	From	To
CONCRETE	White	--	0.0	0.4
SILTY CLAY	Dk Green Gray	stiff	0.4	8.5
CLAYEY SILT	Gray	stiff	8.5	13.5
CLAYEY SILT	Lt Grayish Brown	stiff	13.5	18.5
CLAYEY SILT	Lt Brown	stiff	18.5	23.5
CLAYEY SILT	Gray	stiff	23.5	26.0

Contractor Name and Address: Professional Services Industries, Inc.
4161 Ridgemoor Ave., Memphis, TN 38118

Name of Driller ___

Engineering Registration ___

Water Quality Sample taken? X Yes — where analyzed Industrial & Environmental Analysts, Inc.

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR P O BOX 10068
CHARLESTON, S C. 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-757-10 AREA ____

DATE OF INSTALLATION 11-4-87

WELL HOLE DATA

Drill Date 11-4-87 Well Driller Professional Service Ind. (PSI)

Depth of Boring 26.0 ft Purpose of Boring Soil Sampling and Monitoring Well Installation

Drilling Method Hollow Stem Auger Mud Type N/A

WATER LEVEL DATA (All measurements from top of casing)

Water Level 8.30 ft Date of Measurement 11-6-87

DEVELOPMENT DATA

Development Method Hand Bailing

Length of Time Developed 20 minutes

LOCATION OF BOREHOLE INFORMATION

Drillers Log X Geophysical Log NO

Physical Core X Cutting Samples X

Water Level Observations ____

DRILLED BY PSI SCCWD# Engineering Registration #15430

DEVELOPED BY HLA SCCWD# ____

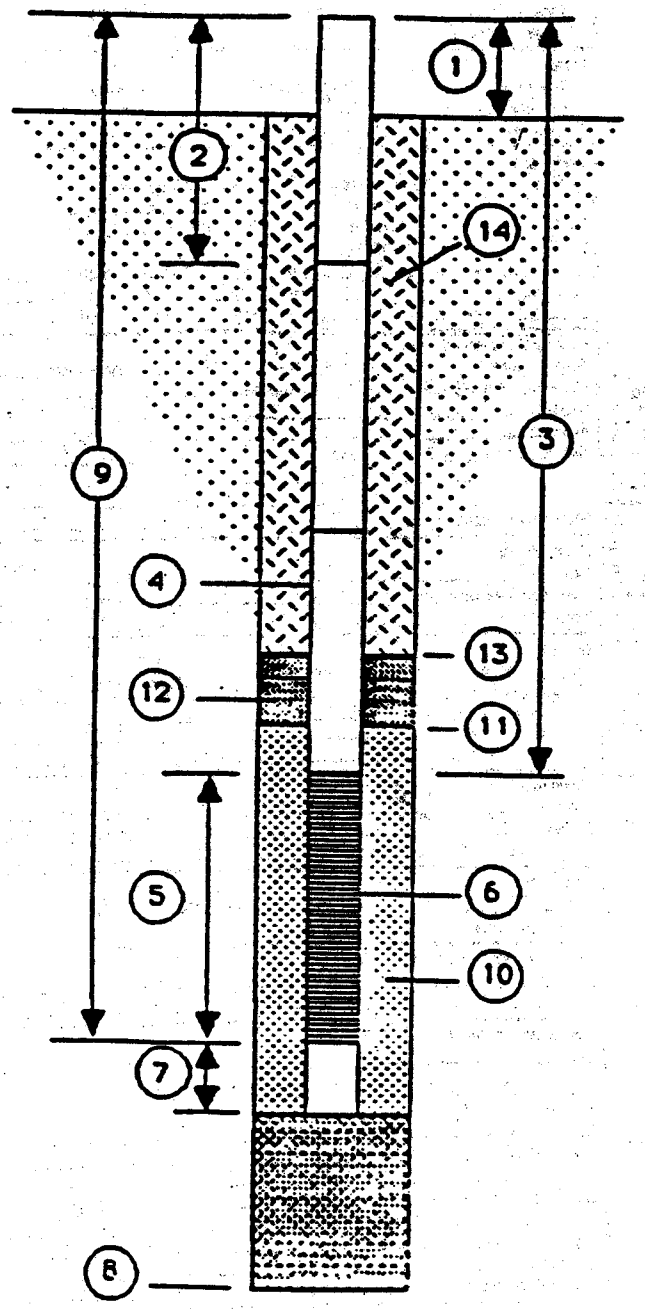
TECHNICAL OVERSIGHT BY HLA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O BOX 10068
CHARLESTON S.C 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-757-10

DATE OF INSTALLATION 11-4-87



1. Height of Casing above ground 0.44 ft (See Plate 1
2. Depth to first Coupling N/A
   Coupling Interval Depths
3. Total Length of Blank Pipe 5.5 ft
4. Type of Blank Pipe Threaded Schedule 40 PVC
5. Length of Screen 20.0 ft
6. Type of Screen Threaded Schedule 40 PVC, 0.020
7. Length of Sump 0.5 ft
8. Total Depth of Boring 26 ft Hole Diameter 6-5/8"
9. Depth To Bottom of Screen 25.5 ft
10. Type of Screen Filter sand
    Quantity Used 1.67 ft^3 Size U/C
11. Depth To Top of Filter 3.5 ft
12. Type of Seal bentonite
    Quantity Used 0.668 ft^3
13. Depth To Top of Seal 1.0 ft
14. Type of Grout cement-bentonite slurry
    Grout Mixture 10% bentonite
    Method of Placement poured

COMMENTS ON INSTALLATION

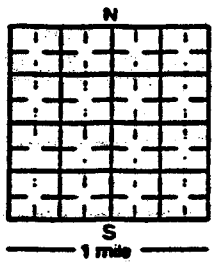
WELL AND PUMP DATA

Location of Well: MEM-757- 10

County: Shelby | Township | Township Number N or S | Range Number E or W | Section No. | Fraction | ¼ ¼ ¼

Street Address and City or Distance and Direction from Road Intersections
xchange Service Station, Navy Road

Show exact location of well in section grid with an "x"



Addition Name
Block Number
Lot Number

Sketch map of well location

Property owner's name and address
NAS Memphis
Millington, Tennessee

Well depth: 26.0' | Datum point from which all measurements are taken:

Method of Drilling
[ ] Cable tool [ ] Hollow rod [ ] Driven [ ] Dug
[ ] Direct rotary [ ] Air rotary [ ] Bucket auger [ ] ____
[ ] Reverse rotary [ ] Jetted [X] Flight auger

Use
[ ] Domestic [ ] Public supply [ ] Industrial [ ] ____
[ ] Irrigation [ ] Municipal [ ] Commercial
[X] Test Well [ ] Heating or cooling [X] Monitoring

Casing Type
[ ] Steel [X] Threaded Height above/below surface 0.44
[ ] Galv [ ] Welded
[X] PVC [ ] Solvent welded Drive shoe? Yes ___ No X
[ ] SS
4 in to 5.5 ft Wgt 2.0 lb/ft Sch No 40 6-578
___ in to ___ ft Wgt ___ lb/ft Sch No ___
___ in to ___ ft Wgt ___ lb/ft Sch No ___

Remarks, Elevation, Source of Data, etc.
Elevation of
Top of Casing (TOC): 271.16 ft (msl)

Borehole data

Formation Log	Color	Hardness	From	To
CONCRETE	White	--	0.0	0.4
SILTY CLAY	Brown	stiff	0.4	3.0
SILTY CLAY	Grayish Brn	stiff	3.0	8.5
SILTY CLAY	Brown	v. soft	8.5	13.5
CLAYEY SILT	Gray & Brn	soft to m stiff	13.5	18.5
CLAYEY SILT	Brown	soft to m stiff	18.5	23.5
CLAYEY SILT	Grav	soft to m stiff	23.5	26.0

Intake Portion of Well
Screen type Schedule 40 open hole from ___ ft to ___
Manufacturer Brainard Kilman
Material PVC Dia 4"
Fittings ___ Length 20'
Set between 5.5 ft and 25.5 ft Slot 0.020
___ ft and ___ ft Slot ___
___ ft and ___ ft Slot ___
Method of installation ___

Filter Pack
Source ___ Gradation Sand
Method of installation Poured Composition Silica
Volume used 1.67 ft³ Depth to top of f p 3.

Grout
Used? X Yes [ ] No Volume used 1.0 ft³
[ ] Neat Cement [ ] Bentonite X cement-bentonite
Method of installation Poured
Depth from 0.5 ft to 1.0
from ___ ft to ___

Development
Method Hand Bailing Duration ___
Dates 11-5-87 Sand content after ___ hrs ___
Chemicals used None

Static Water Level
8.30 ft, X below [ ] above TOC
Date measured 11-6-87

Pumping Water Level
N/A ft, below ___ above grade Date ___
After ___ hrs pumping at ___

Specific Capacity
N/A gpm/ft of drawdown at ___ hrs
Date ___

Pump N/A
Date installed ___ Type ___
Manufacturer ___ Model No ___
HP ___ Volts ___ Capacity ___
Depth of pump intake setting ___ No of stages ___
[ ] Oil [ ] Water lubrication Power source ___
Material of drop pipe ___ bowls ___
shafting ___ impellers ___ Bowl dia ___
Column pipe dia ___ Length ___ Modifications ___

Well Head Completion
Press adaptor Basement offset Distance above grade ___

Nearest Sources of Possible Contamination
___ ft Direction ___ Type ___
Well disinfected upon completion? Yes No

Geophysical Logs Run
None

Contractor Name and Address
Professional Services Industries, Inc.
4161 Ridgemoor Ave., Memphis, TN 38118
Name of Driver ___

Water Quality
Sample taken? X Yes
Where analyzed Industrial & Environmental Analysts, Inc.

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR. P O BOX 10068
CHARLESTON, S C. 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-757-11 AREA ____

DATE OF INSTALLATION 11-5-87

WELL HOLE DATA

Drill Date 11-5-87 Well Driller Professional Service Ind. (PSI)

Depth of Boring 26.0 ft Purpose of Boring Soil Sampling and Monitoring Well Installation

Drilling Method Hollow Stem Auger Mud Type N/A

WATER LEVEL DATA (All measurements from top of casing)

Water Level 11.61 ft. Date of Measurement 11-6-87

DEVELOPMENT DATA

Development Method Hand Bailing

Length of Time Developed 10 minutes

LOCATION OF BOREHOLE INFORMATION

Drillers Log X Geophysical Log NO

Physical Core X Cutting Samples X

Water Level Observations ____

DRILLED BY PSI SCCWD= Engineering Registration #15430

DEVELOPED BY HLA SCCWD= ____

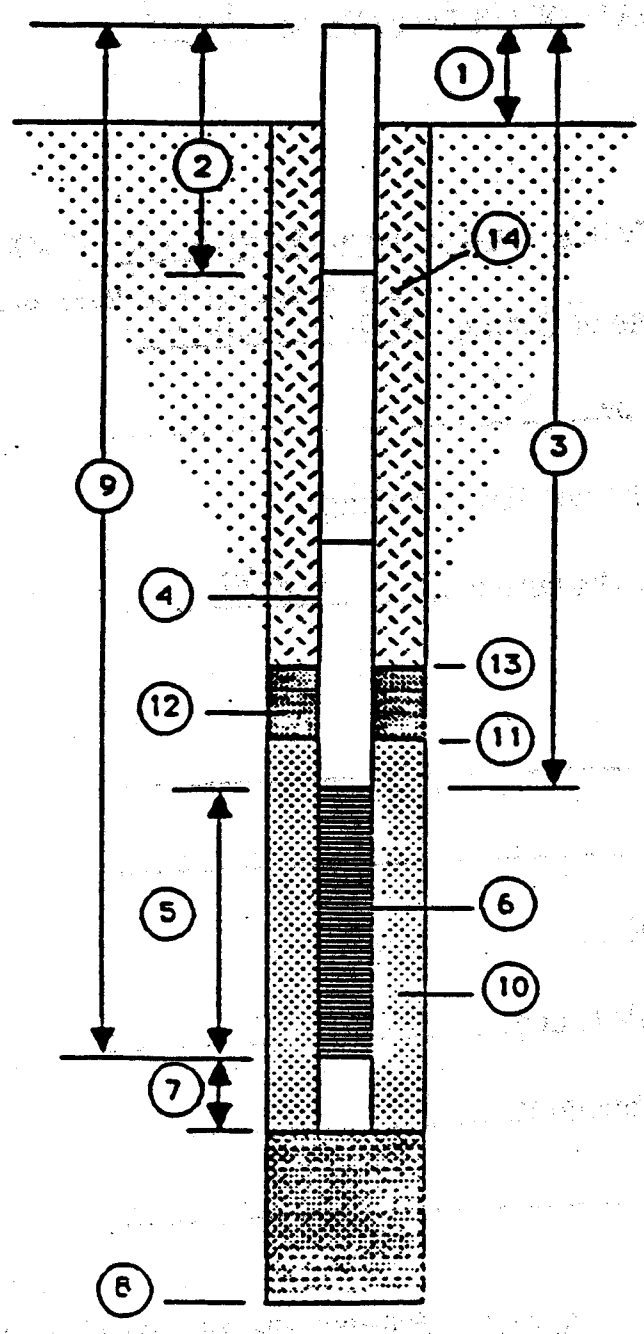
TECHNICAL OVERSIGHT BY HLA

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O BOX 10068
CHARLESTON S.C 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-757-11

DATE OF INSTALLATION 11-5-87



1. Height of Casing above ground -0.29 ft (See Plate D1
2. Depth to first Coupling N/A

   Coupling Interval Depths
3. Total Length of Blank Pipe 5.5 ft
4. Type of Blank Pipe Threaded Schedule 40 PVC
5. Length of Screen 20.0 ft
6. Type of Screen Threaded Schedule 40 PVC, 0.020
7. Length of Sump 0.5 ft
8. Total Depth of Boring 26 ft Hole Diameter 6-5/8"
9. Depth To Bottom of Screen 25.5 ft
10. Type of Screen Filter sand

    Quantity Used 2.0 ft^3 Size____ U/C____
11. Depth To Top of Filter 3.0 ft
12. Type of Seal bentonite

    Quantity Used 0.668 ft^3
13. Depth To Top of Seal 1.5 ft
14. Type of Grout cement-bentonite slurry

    Grout Mixture 10% bentonite

    Method of Placement poured

COMMENTS ON INSTALLATION

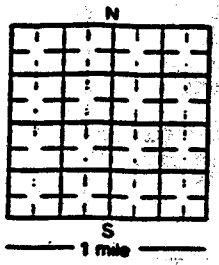
Location of Well: MEM-757-11

County	Township Number	Range Number	Section No.	Precision
Shelby	N or S	E or W		

Property owner's name and address: NAS Memphis, Millington, Tennessee

Street Address and City or Distance and Direction from Road Intersections: Exchange Service Station, Navy Road

Show exact location of well in section grid with an 'x'



Addition Name

Block Number

Lot Number

Sketch map of well location

Well depth: 26.0'

Datum point from which all measurements are taken: Ground Surface

Method of Drilling: [ ] Cable tool [ ] Hollow rod [ ] Driven [ ] Bucket auger [ ] Direct rotary [ ] Air rotary [ ] Bucket auger [X] Flight auger [ ] Reverse rotary [ ] Jetted

Use: [ ] Domestic [ ] Public supply [ ] Industrial [ ] Irrigation [ ] Municipal [ ] Commercial [X] Test Well [ ] Heating or cooling [X] Monitoring

Casing Type: [ ] Steel [X] Threaded [ ] Galv [ ] Welded [X] PVC [ ] Solvent welded [ ] SS

Height above/below surface: 0.29

Drive shoe? Yes ___ No X

4 in to 5.5 ft Wgt 2.0 lb/ft Sch No 40

___ in to ___ ft Wgt ___ lb/ft Sch No ___

___ in to ___ ft Wgt ___ lb/ft Sch No ___

Remarks, Elevation, Source of Data, etc.

Elevation of Top of Casing (TOC): 271.22 ft (msl)

Borehole data

Formation Log	Color	Hardness	From	To
ASPHALT	Black	--	0	0.4
SILTY CLAY	Gray	soft	0.4	9.0
SILTY CLAY	Gray & Brown	soft to m stiff	9.0	13.5
CLAYEY SILT	Lt Gray	soft to m stiff	13.5	18.5
CLAYEY SILT	Lt Brown	soft to m stiff	18.5	23.5
CLAYEY SILT	Med Gray	stiff	23.5	26.0

Intake Portion of Well: Screen type Schedule 40 or open hole from ___ ft to ___

Manufacturer Brainard Kilman

Material PVC Dia 4"

Fittings ___ Length 20.0'

Set between 5.5 ft and 25.5 ft Slot 0.020

___ ft and ___ ft Slot ___

___ ft and ___ ft Slot ___

Method of installation ___

Filter Pack: Source ___ Gradation Sand

Method of installation Poured Composition Sil

Volume used 2.0 ft3 Depth to top of FP 3

Grout: Used? X Yes [ ] No Volume used 1.0 ft3

[ ] Neat Cement [ ] Bentonite X cement-bentonite

Method of installation Poured

Depth from 0.5 ft to 1.5

from ___ ft to ___

Development: Method Hand Bailing Duration ___

Dates 11-5-87 Sand content after ___ hrs

Chemicals used None

Static Water Level: 11.61 ft X below [ ] above TOC

Date measured 11-6-87

Pumping Water Level: N/A ft [ ] below [ ] above grade Date ___

After ___ hrs pumping at ___

Specific Capacity: N/A gpm/ft of drawdown at ___

Date ___

Pump N/A

Date installed ___ Type ___

Manufacturer ___ Model No ___

H.P. ___ Volts ___ Capacity ___

Depth of pump intake setting ___ No of stages ___

[ ] Oil [ ] Water lubrication Power source ___

Material of drop pipe ___ bowls ___

shafting ___ impellers ___ Bowl dia ___

Column pipe dia ___ Length ___ Modifications ___

Well Head Completion: Pitless adaptor Basement offset Distance above grade ___

Nearest Sources of Possible Contamination: ___ ft Direction ___ Type ___

Well disinfected upon completion? Yes No

Geophysical Logs Run: None

Contractor Name and Address: Professional Services Industries, Inc., 4161 Ridgemoor Ave., Memphis, TN 38118

Name of Driller ___

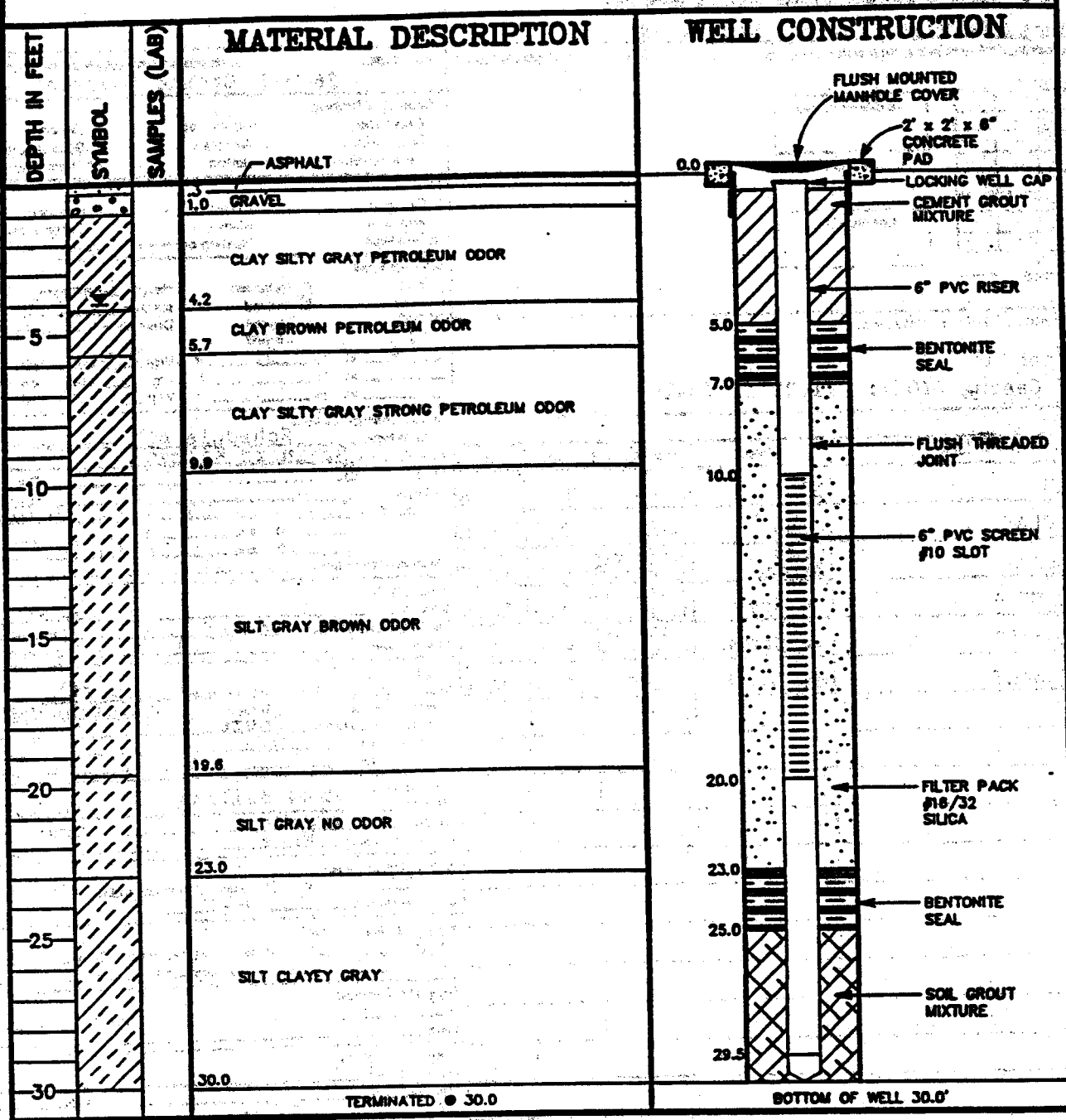
State license ___ Engineering ___

Water Quality: Sample taken? X Yes Where analyzed Industrial & Environmental Analysts, Inc.

GROUNDWATER MONITORING WELL INSTALLATION

LOCATION NAVY EXCHANGE SERVICE STATION

LOG OF BORING NO. A4 LOG OF WELL NO. MEM-757-12



Boring Completion Date: MAY 31, 1990
Well Completion Date: JUNE 1, 1990
Well Development Date: JUNE 2, 1990
Drilling Method: AUGER
Depth to Water: ≈ 4.0'

Boring Diameter: 6.25"
Ground Elevation:
Top of Casing Elevation:
Driller: A. DAVIS
Logged by: C. RUTHERFORD

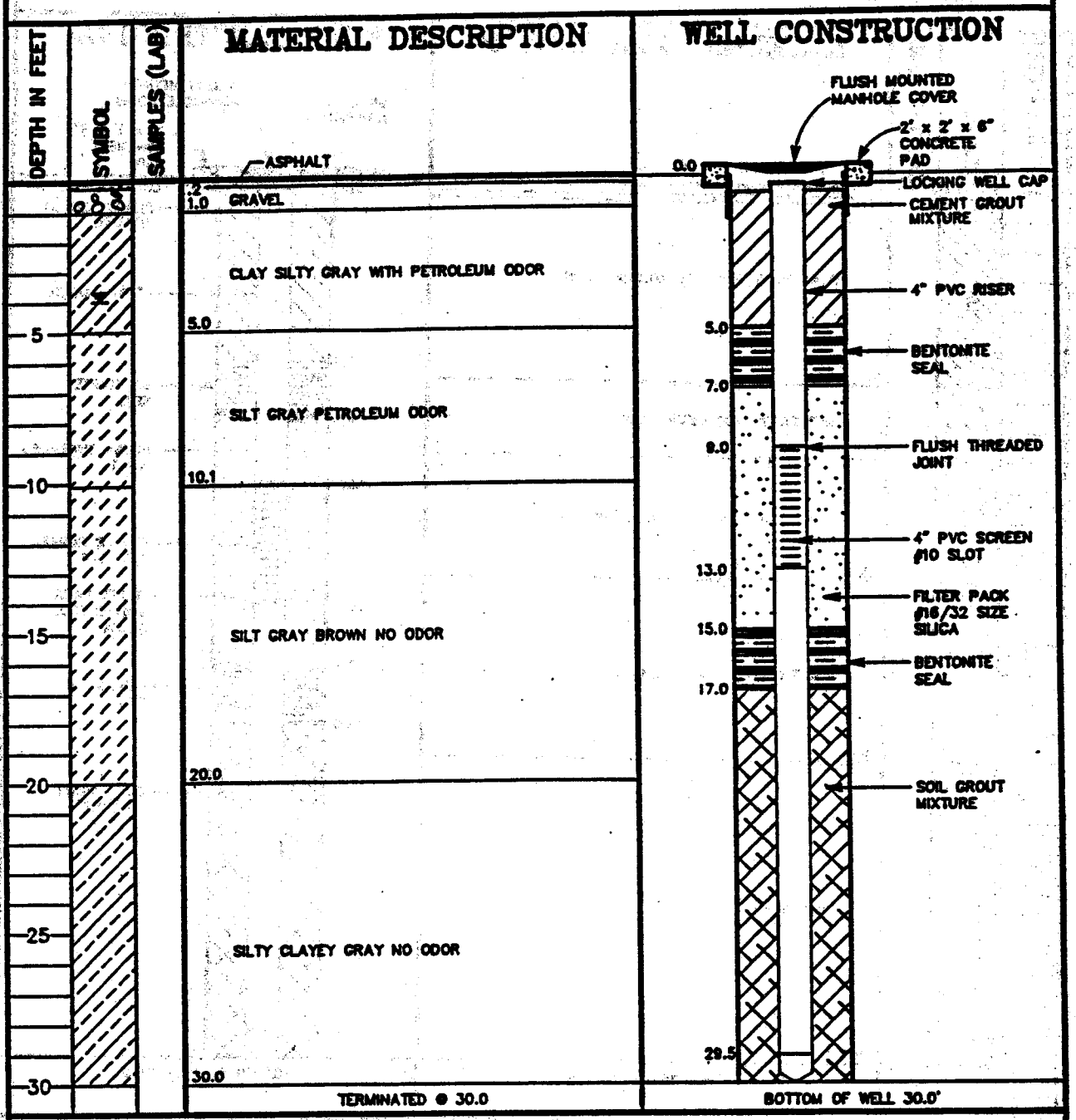
Soil Boring Log / Well Log

Vacuum Extraction Stu and Remedial Investig NAS Memphis, Tn November, 1990

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION NAVY EXCHANGE SERVICE STATION

LOG OF BORING NO. A5 LOG OF WELL NO. MEM-757-13



Boring Completion Date: JUNE 1, 1990
Well Completion Date: JUNE 1, 1990
Well Development Date: JUNE 2, 1990
Drilling Method: AUGER
Depth to Water: ≈4.0'

Boring Diameter: 6.25"
Ground Elevation:
Top of Casing Elevation:
Driller: A. DAVIS
Logged by: C. RUTHERFORD

Soil Boring / Well Log

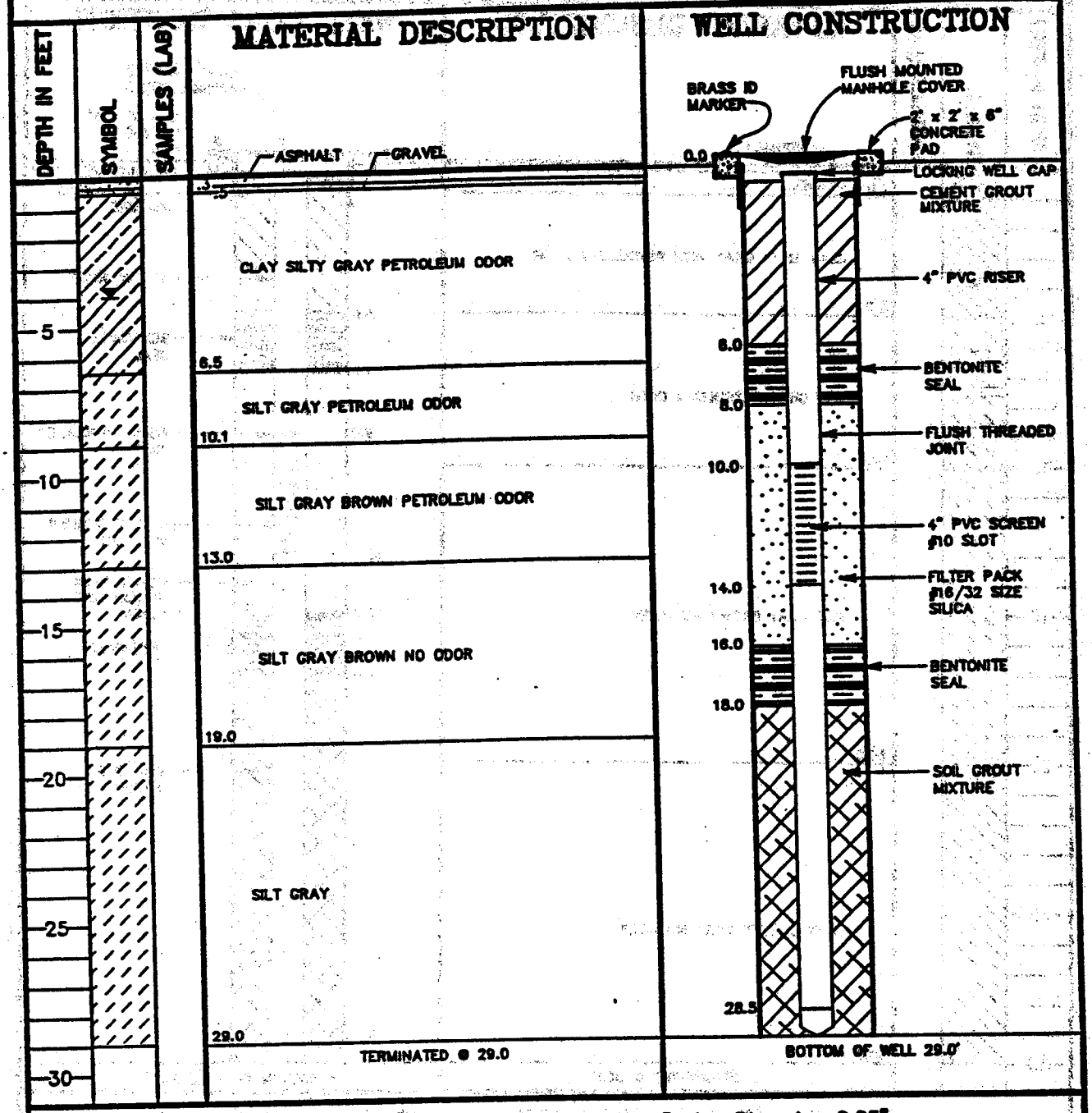
Vacuum Extraction Study and Remedial Investigatio
NAS Memphis, Tn
November, 1990

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION NAVY EXCHANGE SERVICE STATION

LOG OF BORING NO. A7 LOG OF WELL NO. MEM-757-14



Boring Completion Date: JUNE 4, 1990
Well Completion Date: JUNE 4, 1990
Well Development Date: JUNE 4, 1990
Drilling Method: AUGER
Depth to Water: ≈4.0'

Boring Diameter: 6.25"
Ground Elevation:
Top of Casing Elevation:
Driller: A. DAVIS
Logged by: C. RUTHERFORD

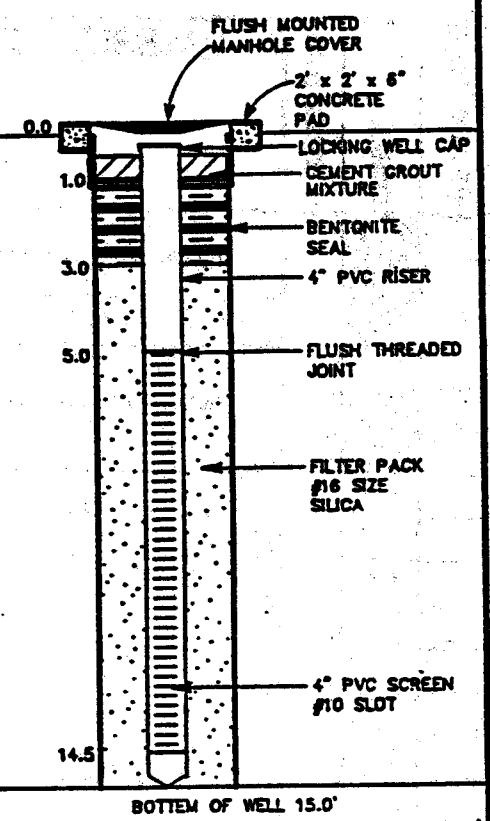
Soil Boring / Well Log

Vacuum Extraction St
and Remedial Investigatio
NAS Memphis, Tn
November, 1990

LOCATION NAVY EXCHANGE SERVICE STATION

LOG OF BORING NO. A16 LOG OF WELL NO. MEM 757-15

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			ASPHALT
			GRAVEL
1.0			SILT CLAYEY GRAY
5			SILT CLAYEY GRAY–BROWN
7.0			SILT CLAYEY GRAY–BROWN
9.0			SILT CLAYEY GRAY–BROWN
15.0			SILT GRAY
21.0			TERMINATED @ 21.0



Boring Completion Date: JUNE 5, 1990
Well Completion Date: JUNE 13, 1990
Well Development Date: JUNE 14, 1990
Drilling Method: AUGER
Depth to Water: ≈4.0

Boring Diameter: 6.25"
Ground Elevation:
Top of Casing Elevation:
Driller: A. DAVIS
Logged by: C. RUTHERFORD

Soil Boring / Well Log

Vacuum Extraction Study and Remedial Investigation
NAS Memphis, Tn
November, 1990

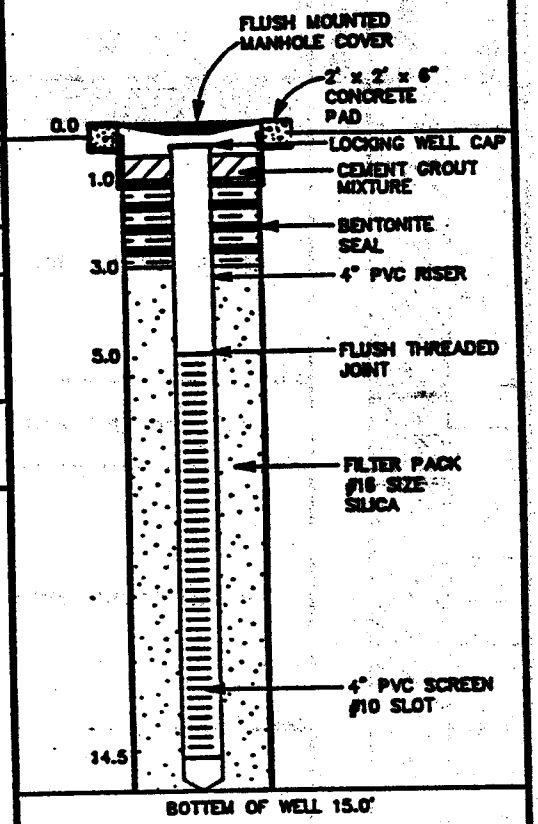
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION NAVY EXCHANGE SERVICE STATION

LOG OF BORING NO. A14 LOG OF WELL NO. MEM 757-16

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			TOPSOIL CLAY SILTY BROWN
			1.0 CLAY SILTY BROWN
			3.1 SILT CLAYEY BROWN–GRAY
5			6.0 SILT BROWN–GRAY
			8.0 SILT BROWN–GRAY
10			
15			18.2 SILT GRAY
20			21.0 TERMINATED @ 21.0
25			

WELL CONSTRUCTION



Boring Completion Date: JUNE 5, 1990
Well Completion Date: JUNE 13, 1990
Well Development Date: JUNE 14, 1990
Drilling Method: AUGER
Depth to Water: ≈4.0

Boring Diameter: 6.25"
Ground Elevation:
Top of Casing Elevation:
Driller: A. DAVIS
Logged by: C. RUTHERFORD

Soil Boring / Well Log

Vacuum Extraction St[illegible] and Remedial Investig[illegible]6
NAS Memphis, Tn
November, 1990

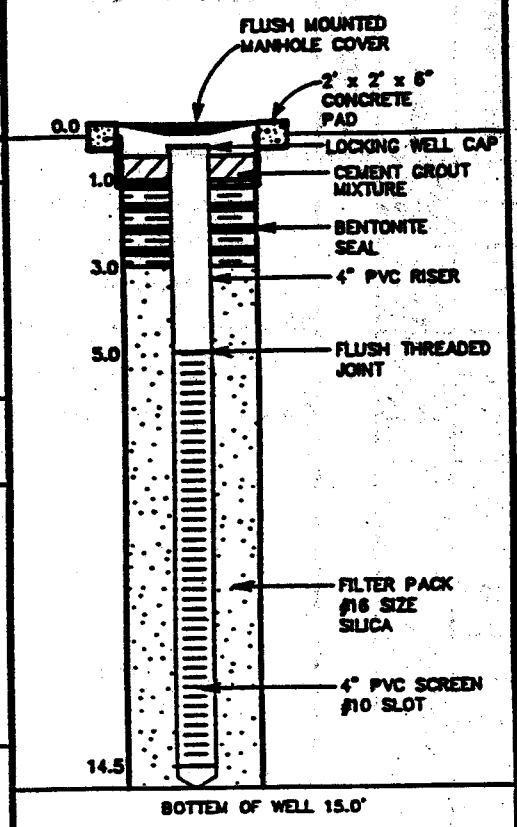
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION NAVY EXCHANGE SERVICE STATION

LOG OF BORING NO. A3 LOG OF WELL NO. MEM 757-17

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			1.0 TOPSOIL
			CLAY SILTY BROWN
5			6.0
			CLAY SILTY BROWN
			8.0
10			SILT GRAY BROWN
			14.0
15			SILT OCCASIONAL GRAVEL
			19.0
20			SILT GRAY
			21.0
			TERMINATED @ 21.0
25			

WELL CONSTRUCTION



Boring Completion Date: MAY 31, 1990
Well Completion Date: JUNE 13, 1990
Well Development Date: JUNE 14, 1990
Drilling Method: AUGER
Depth to Water: ≈ 4.0

Boring Diameter: 6.25"
Ground Elevation:
Top of Casing Elevation:
Driller: A. DAVIS
Logged by: C. RUTHERFORD

Soil Boring / Well Log

Vacuum Extraction Study and Remedial Investigation
NAS Memphis, Tn
November, 1990

SOUTHERN DIVISION [illegible]

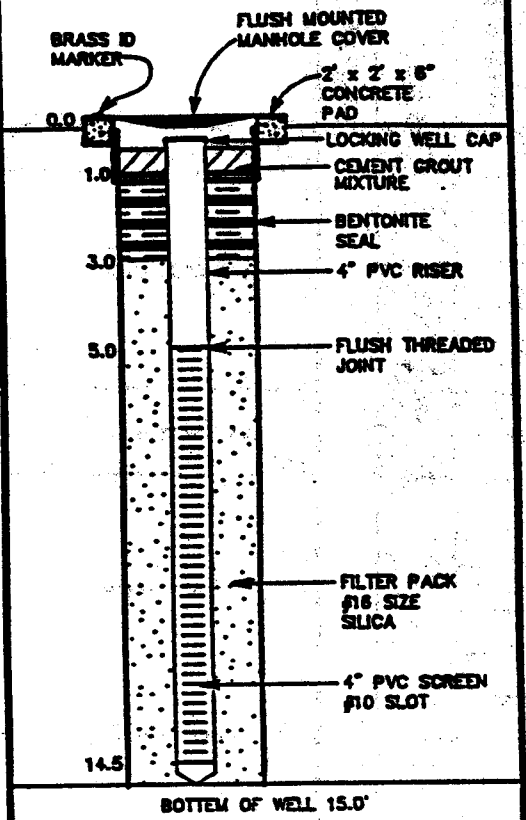
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION NAVY EXCHANGE SERVICE STATION

LOG OF BORING NO. A24 LOG OF WELL NO. MEM-757-18

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			TOPSOIL CLAY SILTY BROWN
			2.0
			SILT CLAYEY BROWN
			4.0
5			SILT CLAYEY GRAY WET
			6.0
10			SILT GRAY–BROWN
15			17.0
			TERMINATED @ 17.0
20			
25			

WELL CONSTRUCTION



Boring Completion Date: JUNE 8, 1990
Well Completion Date: JUNE 13, 1990
Well Development Date: JUNE 14, 1990
Drilling Method: AUGER
Depth to Water: ≈4.0

Boring Diameter: 6.25"
Ground Elevation:
Top of Casing Elevation:
Driller: A. DAVIS
Logged by: C. RUTHERFORD

Soil Boring Log

Vacuum Extraction St[illegible]
and Remedial Investigation
NAS Memphis, Tn
November, 1990

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

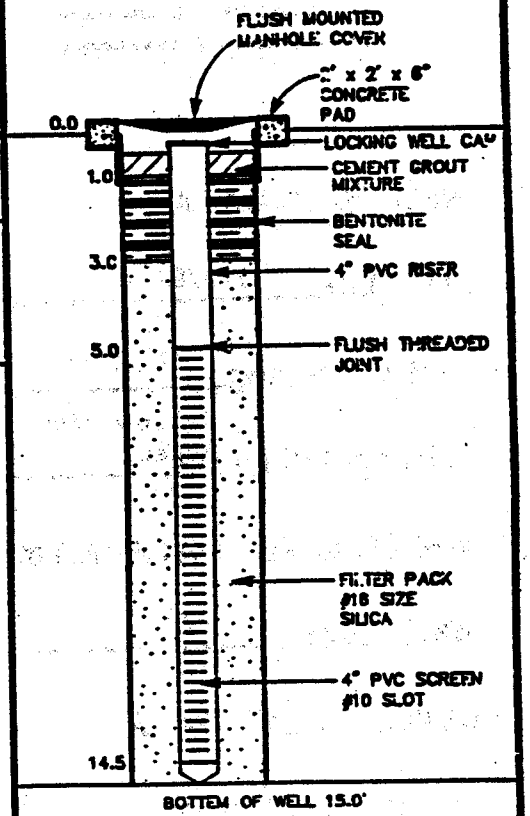
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION NAVY EXCHANGE SERVICE STATION

LOG OF BORING NO. A28 LOG OF WELL NO. MEM-757-19

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			TOPSOIL CLAY SILTY BROWN
2.0			SILT CLAYEY BROWN-GRAY
5.3			SILT BROWN-GRAY
17.0			TERMINATED @ 17.0

WELL CONSTRUCTION



Boring Completion Date: JUNE 11, 1990
Well Completion Date: JUNE 13, 1990
Well Development Date: JUNE 14, 1990
Drilling Method: AUGER
Depth to Water: ≈4.0

Boring Diameter: 6.25"
Ground Elevation:
Top of Casing Elevation:
Driller: A. DAVIS
Logged by: C. RUTHERFORD

Soil Boring / Well Log

Vacuum Extraction Study and Remedial Investigatic
NAS Memphis, Tn
November, 1990

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR P O BOX 10068
CHARLESTON, S C. 29411-0068

WELL DATA REPORT

WELL NUMBER MEM-757-SB1 AREA

DATE OF INSTALLATION 11/3/87

WELL HOLE DATA

Drill Date 11/3/87

Well Driller Professional Services Ind. (PSI)

Depth of Boring 15.0 ft.

Purpose of Boring Soil Sampling

Drilling Method Hollow Stem Auger

Mud Type N/A

WATER LEVEL DATA (All measurements from top of casing)

Water Level N/A

Date of Measurement N/A

DEVELOPMENT DATA

Development Method N/A

Length of Time Developed N/A

LOCATION OF BOREHOLE INFORMATION

Drillers Log X

Geophysical Log NO

Physical Core X

Cutting Samples X

Water Level Observations

DRILLED BY PSI SCCWD# Engineering Registration #15430

DEVELOPED BY N/A SCCWD#

TECHNICAL OVERSIGHT BY HLA

Location of well: MEM-757-SB1

County	Township Number N or S	Range Number E or W	Section No.	Fraction	¼ ¼ ¼
Shelby					

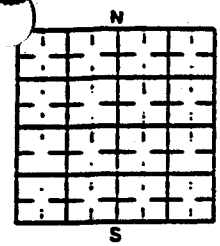
Township

Street Address and City or Distance and Direction from Road Intersections

Property Owner's Name and Address

MAS-Memphis
Millington, Tennessee

Exact location of well in section grid with an "x"



Sketch map of well location

Addition Name

Block Number

Lot Number

Remarks, Elevation, Source of Data, etc.

Well depth

Datum point from which all measurements are taken: Ground Surface

Method of Drilling
Cable tool; Hollow rod; Driven; Dug
Direct rotary; Air rotary; Bucket auger; ____
Reverse rotary; Jetted; X Flight auger

Use
Domestic; Public supply; Industrial; ____
Irrigation; Municipal; Commercial
Test Well; Heating or cooling; Monitoring

Casing Type
Steel; Threaded; Height above/below surface ____
Galv; Welded
PVC; Solvent welded; Drive shoe? Yes ___ No ___
Liner

						Hole diame
N/A	in to ____	ft	Wgt ____	lb/ft	Sch No ____	____ in
____	in to ____	ft	Wgt ____	lb/ft	Sch No ____	____ in
____	in to ____	ft	Wgt ____	lb/ft	Sch No ____	____ in

Borehole data

Formation Log	Color	Hardness	From	To
Asphalt	Black	--	0.0	0.4
Clay & Gravel (Fill)	Orange	Stiff	0.4	3.0
Silty Clay	Dk Grayish Brown	Soft to M.stiff	3.0	8.5
Silty Clay	Grayish Green	Soft to M. stiff	8.5	14.0
Clayey Silt	Gray & Bwn	Stiff	14.0	15.0

Intake Portion of Well
Screen type N/A or open hole from ____ ft to ____
Manufacturer ____
Material ____ Dia ____
Fittings ____ Length ____
Set between ____ ft and ____ ft Slot ____
____ ft and ____ ft Slot ____
____ ft and ____ ft Slot ____
Method of installation ____

Filter Pack
Source N/A Gradation ____
Method of installation ____ Composition ____
Volume used ____ Depth to top of p ____

Grout
Used? X Yes ☐ No Volume used 3.5 ft³
☐ Neat Cement ☐ Bentonite X cement-bentonite
Method of installation poured
Depth from ____ ft to ____
from ____ ft to ____

Development
Method N/A Duration ____
Dates ____ Sand content after ___ hrs ___
Chemicals used ____

Static Water Level
N/A ft ☐ below ☐ above grade
Date measured ____

Pumping Water Level
N/A ft below ___ above grade Date ____
After ____ hrs pumping at ____

Specific Capacity N/A
____ gpm/ft of drawdown at ____ hrs
Date ____

Pump
Date installed N/A Type ____
Manufacturer ____ Model No ____
H P ____ Volts ____ Capacity ____
Depth of pump intake setting ____ No of stages ____
Oil ___ Water lubrication Power source ____
Material of drop pipe ____ bowls ____
shafting ____ impellers ____ Bowl dia ____
Column pipe dia ____ Length ____ Modifications ____

Well Head Completion
Pitless adaptor Basement offset Distance above grade ____

Nearest Sources of Possible Contamination
____ ft Direction ____ Type ____
Well disinfected upon completion? Yes No

Geophysical Logs Run

None

Contractor Name and Address

Professional Services Industries, Inc.
4161 Ridgemont Ave. Memphis, TN 38118

Name of Driller ____

State License No.: Engineering Registration #15430

Water Quality
Sample taken? Yes X No
Where analyzed ____

Date well completed 11/3/87

WELL CONSTRUCTION LOG. S50-MW-1

WELL LOCATION BUILDING S-50, NAS MEMPHIS

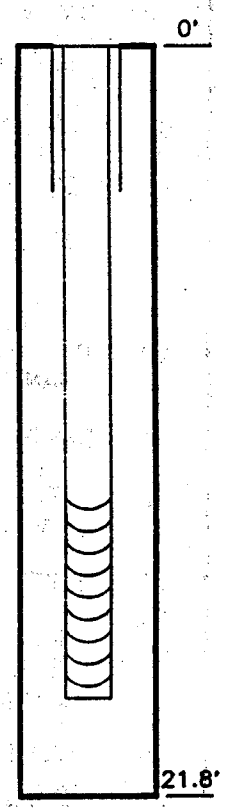
DATE INSTALLED 06/15/93

TYPE OF WELL 2 INCH O.D. SCHEDULE 40 PVC MONITORING WELL

1. HEIGHT OF CASING ABOVE GROUND FLUSH MOUNT
2. WATER SURFACE ELEV. 259.59 (06/28/93)
   a) DEPTH TO SATURATED ZONE N/A
3. TOP OF CASING ELEV. 266.35
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0'
6. SIZE\TYPE OF SCREEN .010" SLOT PVC
7. LENGTH OF SUMP 0
8. TOTAL DEPTH OF BORING 21.8 HOLE DIAMETER
   SCREENED INTERVAL 6.8' - 21.8'
10. TYPE OF SCREEN FILTER PACK 10/20 FILTER SAND
    QUANTITY USED 375lb. SIZE U/C
11. DEPTH TO TOP OF FILTER 5.0'
12. TYPE OF SEAL 1/4" BENTONITE PELLETS
    QUANTITY USED 2.5 GALLONS
13. DEPTH TO TOP OF SEAL 3.0'
14. TYPE OF GROUT PORTLAND TYPE I / BENTONITE
    GROUT MIXTURE 93/7
    METHOD OF PLACEMENT PRESSURE GROUT
15. COMMENTS COMPLETED WITH LOCKING EXPANSION - TYPE CAP

INSTALLATION DESCRIPTION

DESCRIPTION DEPTH(FT.)



ENVIRONMENTAL ASSESSMENT
REPORT
NAS MEMPHIS

S50-MW-1
WELL CONSTRUCTION LOG

DWG DATE:08/26/93 | DWG NAME: 68MWLOG1

WELL CONSTRUCTION LOG. S50-MW-2

WELL LOCATION BUILDING S-50, NAS MEMPHIS

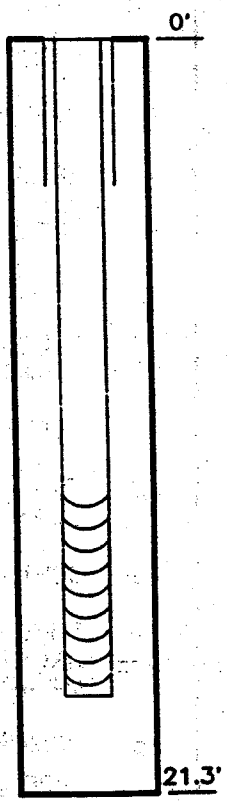
DATE INSTALLED 06/15/93

TYPE OF WELL 2 INCH O.D. SCHEDULE 40 PVC MONITORING WELL

1. HEIGHT OF CASING ABOVE GROUND FLUSH MOUNT
2. WATER SURFACE ELEV. 259.02 (06/28/93)
   a) DEPTH TO SATURATED ZONE N/A
3. TOP OF CASING ELEV. 265.82
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0'
6. SIZE\TYPE OF SCREEN .010" SLOT PVC
7. LENGTH OF SUMP 0
8. TOTAL DEPTH OF BORING 21.3 HOLE DIAMETER
9. SCREENED INTERVAL 16.3' - 21.3'
10. TYPE OF SCREEN FILTER PACK 10/20 FILTER SAND
    QUANTITY USED 375lb. SIZE U/C
11. DEPTH TO TOP OF FILTER 5.0'
12. TYPE OF SEAL 1/4" BENTONITE PELLETS
    QUANTITY USED 2.5 GALLONS
13. DEPTH TO TOP OF SEAL 3.0'
14. TYPE OF GROUT PORTLAND TYPE I / BENTONITE
    GROUT MIXTURE 93/7
    METHOD OF PLACEMENT PRESSURE GROUT
15. COMMENTS COMPLETED WITH LOCKING EXPANSION - TYPE CAP

INSTALLATION DESCRIPTION

DESCRIPTION DEPTH(FT.)



ENVIRONMENTAL ASSESSMENT REPORT
NAS MEMPHIS

S50-MW-2
WELL CONSTRUCTION LOG

DWG DATE:08/26/93 | DWG NAME: 68MWLOG2

WELL CONSTRUCTION LOG. S50-MW-3

WELL LOCATION BUILDING S-50, NAS MEMPHIS

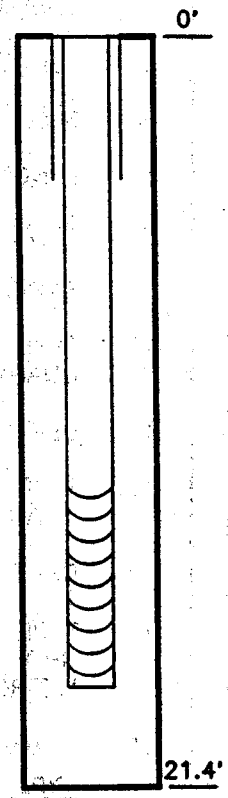
DATE INSTALLED 06/16/93

TYPE OF WELL 2 INCH O.D. SCHEDULE 40 PVC MONITORING WELL

1. HEIGHT OF CASING ABOVE GROUND FLUSH MOUNT
2. WATER SURFACE ELEV. 261.23 (06/28/93)
   a) DEPTH TO SATURATED ZONE N/A
3. TOP OF CASING ELEV. 266.58
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0'
6. SIZE\TYPE OF SCREEN .010" SLOT PVC
7. LENGTH OF SUMP 0
8. TOTAL DEPTH OF BORING 21.4 HOLE DIAMETER
9. SCREENED INTERVAL 6.4' - 21.4'
10. TYPE OF SCREEN FILTER PACK 10/20 FILTER SAND
    QUANTITY USED 375lb. SIZE U/C
11. DEPTH TO TOP OF FILTER 5.0'
12. TYPE OF SEAL 1/4" BENTONITE PELLETS
    QUANTITY USED 2.5 GALLONS
13. DEPTH TO TOP OF SEAL 3.0'
14. TYPE OF GROUT PORTLAND TYPE I / BENTONITE
    GROUT MIXTURE 93/7
    METHOD OF PLACEMENT PRESSURE GROUT
15. COMMENTS COMPLETED WITH LOCKING EXPANSION - TYPE CAP

INSTALLATION DESCRIPTION

DESCRIPTION DEPTH(FT.)



ENVIRONMENTAL ASSESSMENT REPORT
NAS MEMPHIS

S50-MW-3
WELL CONSTRUCTION LOG

DWG DATE:08/26/93 DWG NAME: 68NMLOG1

WELL CONSTRUCTION LOG. S50-MW-4

WELL LOCATION BUILDING S-50, NAS MEMPHIS

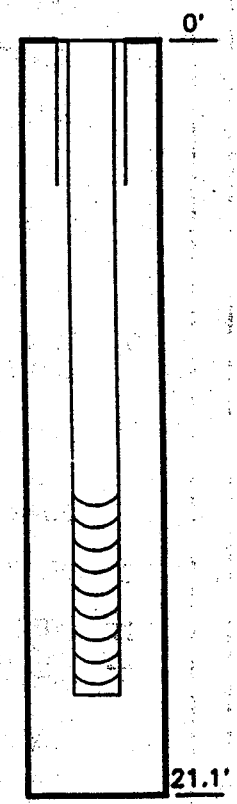
DATE INSTALLED 06/17/93

TYPE OF WELL 2 INCH O.D. SCHEDULE 40 PVC MONITORING WELL

1. HEIGHT OF CASING ABOVE GROUND FLUSH MOUNT
2. WATER SURFACE ELEV. 260.95 (06/28/93)
   a) DEPTH TO SATURATED ZONE N/A
3. TOP OF CASING ELEV. 266.24
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0'
6. SIZE\TYPE OF SCREEN .010" SLOT PVC
7. LENGTH OF SUMP 0
8. TOTAL DEPTH OF BORING 21.1 HOLE DIAMETER
   SCREENED INTERVAL 6.1' - 21.1'
10. TYPE OF SCREEN FILTER PACK 10/20 FILTER SAND
    QUANTITY USED 375lb. SIZE U/C
11. DEPTH TO TOP OF FILTER 5.0'
12. TYPE OF SEAL 1/4" BENTONITE PELLETS
    QUANTITY USED 2.5 GALLONS
13. DEPTH TO TOP OF SEAL 3.0'
14. TYPE OF GROUT PORTLAND TYPE I / BENTONITE
    GROUT MIXTURE 93/7
    METHOD OF PLACEMENT PRESSURE GROUT
15. COMMENTS COMPLETED WITH LOCKING EXPANSION - TYPE CAP

INSTALLATION DESCRIPTION

DESCRIPTION DEPTH(FT.)



ENVIRONMENTAL ASSESSMENT REPORT
NAS MEMPHIS

S50-MW-4
WELL CONSTRUCTION LOG

DWG DATE:08/26/93 | DWG NAME:68NMLOG4

WELL CONSTRUCTION LOG. S50-MW-5

WELL LOCATION BUILDING S-50, NAS MEMPHIS

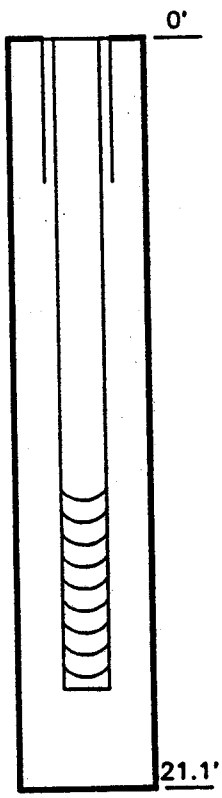
DATE INSTALLED 06/18/93

TYPE OF WELL 2 INCH O.D. SCHEDULE 40 PVC MONITORING WELL

1. HEIGHT OF CASING ABOVE GROUND FLUSH MOUNT
2. WATER SURFACE ELEV. 258.91 (06/28/93)
   a) DEPTH TO SATURATED ZONE N/A
3. TOP OF CASING ELEV. 266.55
4. PROTECTIVE CASING YES (NO)
   a) CASING LENGTH N/A
5. LENGTH OF SCREEN 15.0'
6. SIZE\TYPE OF SCREEN .010" SLOT PVC
7. LENGTH OF SUMP 0
8. TOTAL DEPTH OF BORING 21.1 HOLE DIAMETER
   SCREENED INTERVAL 6.1' - 21.1'
10. TYPE OF SCREEN FILTER PACK 10/20 FILTER SAND
    QUANTITY USED 375lb. SIZE U/C
11. DEPTH TO TOP OF FILTER 5.0'
12. TYPE OF SEAL 1/4" BENTONITE PELLETS
    QUANTITY USED 2.5 GALLONS
13. DEPTH TO TOP OF SEAL 3.0'
14. TYPE OF GROUT PORTLAND TYPE I / BENTONITE
    GROUT MIXTURE 93/7
    METHOD OF PLACEMENT PRESSURE GROUT
15. COMMENTS COMPLETED WITH LOCKING EXPANSION - TYPE CAP

INSTALLATION DESCRIPTION

DESCRIPTION DEPTH(FT.)



ENVIRONMENTAL ASSESSMENT REPORT
NAS MEMPHIS

S50-MW-5
WELL CONSTRUCTION LOG

DWG DATE:08/26/93 | DWG NAME: 68NMLOGS

S-376

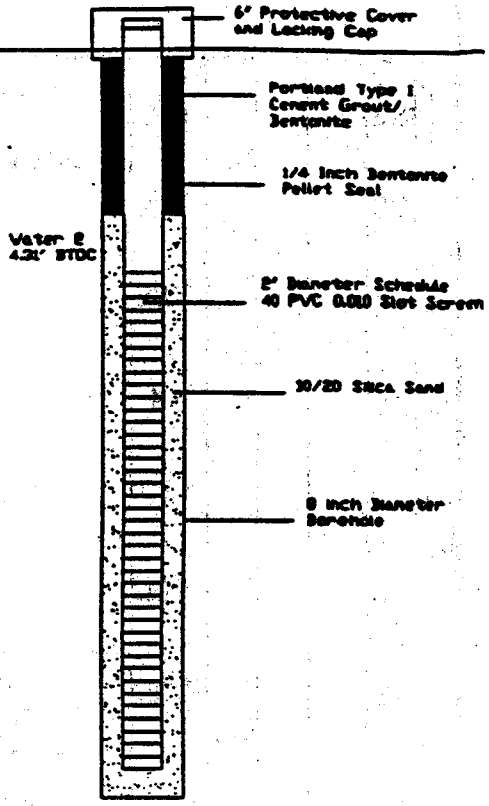
UST Investigation
EnSafe/Allen & Hoshall

Leak Detection Wells
T1249
T1482

DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	USCS SYMBOL	VAPOR CONCENTRATIONS (ppm)	DESCRIPTION OF SUBSURFACE MATERIALS
0	SS				BDL	3" Asphalt with Granular Base
2	SS			OL	BDL	Brown Silty Clay (stiff)
4	SS				BDL	Brown Clayey Silt (moist - medium stiff)
6	SS				BDL	
8	SS			ML	BDL	Spoon Wet @ 9 feet
10	SS				BDL	
12	SS				BDL	
14	SS			CL	BDL	Dark Gray Clay (soft)
16						Boring Terminated @ 16 feet
20						
25						
30						BDL: Below Detection Limit

Drilling Method: Hollow Stem Auger
Drilling Company: PSI

WELL CONSTRUCTION DETAILS



Environmental and Safety Designs, Inc.

EnSafe®

5724 SUMMER TREES DR. MEMPHIS, TN. 38134 (901)372-7962

NAS (F.I.D. 0-791673)
Building 376
"D" Street
Millington, Tennessee

B-1/ MW-1

Date Installed: 7/29/92
(S37601LS)

DATE: 08/18/92

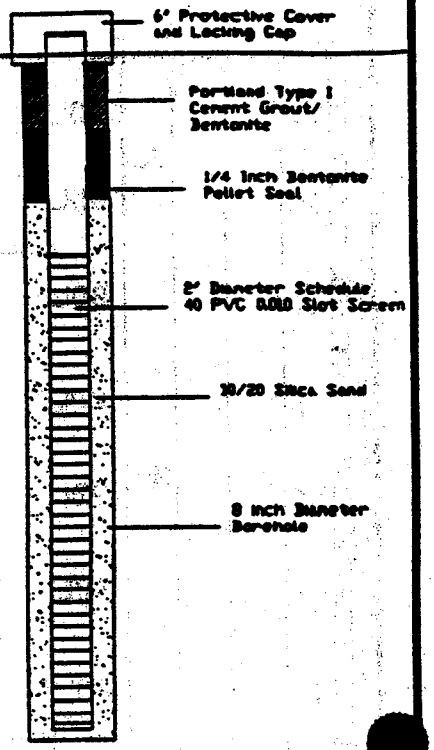
DRW NAME: BJBMW1

DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	USCS SYMBOL	VAPOR CONCENTRATIONS (ppm)	DESCRIPTION OF SUBSURFACE MATERIALS
0	SS			ML	BDL	3" Asphalt with Granular Base
2	SS				BDL	Brown Clayey Silt (stiff)
4	SS				BDL	
6	SS				0.4	
8	SS				1.8	Spoon Wet @ 9 feet
10	SS				BDL	
12	SS				BDL	Light Brown Clay (medium stiff)
14	SS			CL		Dark Gray Clay (soft)
16	SS					Boring Terminated @ 14 feet
18						
20						
22						
24						
26						
28						
30						

BDL: Below Detection Limit

Drilling Method: Hollow Stem Auger
Drilling Company: PSI

WELL CONSTRUCTION DETAILS



Environmental and Safety Designs, Inc.

ENSAFE®

5724 SUMMER TREES DR. MEMPHIS, TN. 38134 (901)372-7962

NAS (F.I.D. 0-791673)
Building 376
"D" Street
Millington, Tennessee

B-2/ MW-2

Date Installed: 7/29/92

(S37602LS)

DATE: 08/18/92

DRW NAME: BJBMW2

DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	USCS SYMBOL	VAPOR CONCENTRATIONS (ppm)	DESCRIPTION OF SUBSURFACE MATERIALS	WELL CONSTRUCTION DETAILS
0	SS				BDL	3" Asphalt with Granular Base	6' Protective Cover and Locking Cap
2	SS			OL	BDL	Brown Clayey Silt (stiff)	Portland Type I Cement Grout/ Bentonite
4	SS				BDL		1/4 inch Bentonite Pellet Seal
6	SS				BDL		2" Diameter Schedule 40 PVC 0.010 Slot Screen
8	SS			ML	BDL	Brown Clayey Silt (moist - medium stiff)	10/20 Silica Sand
10	SS				BDL		Water @ 9.08' BTOC
12	SS				BDL	Brown Silty Clay (medium stiff)	8 inch Diameter Borehole
14	SS			CL	BDL	Dark Gray Clay (soft)	
16						Boring Terminated @ 16 feet	
20							
25							
30						BDL: Below Detection Limit	
						Drilling Method: Hollow Stem Auger Drilling Company: PSI	

Environmental and Safety Designs, Inc.

EnSafe®

5724 SUMMER TREES DR. MEMPHIS, TN. 38134 (901)372-7962

NAS (F.I.D. 0-791673)
Building 376
"D" Street
Millington, Tennessee

B-3/ MW-3

Date Installed: 7/30/92

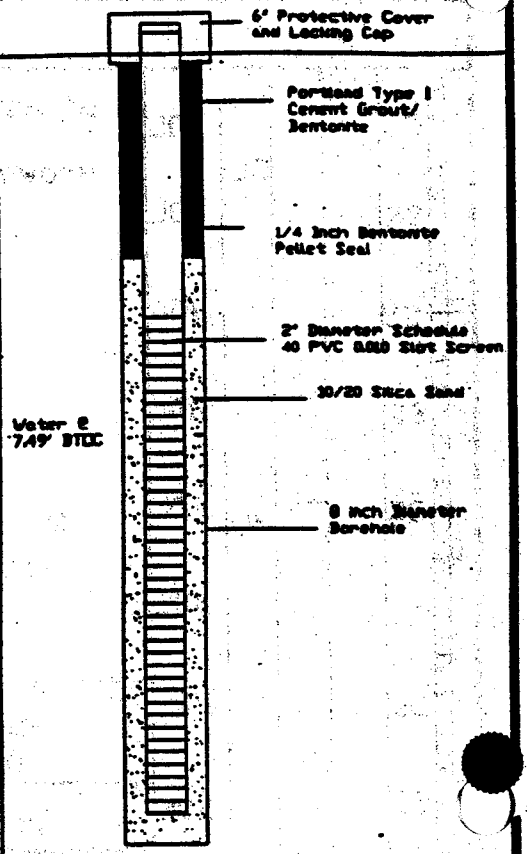
(S37603LS)

DATE: 08/18/92

DRW NAME: BJBMW3

DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	USCS SYMBOL	VAPOR CONCENTRATIONS (ppm)	DESCRIPTION OF SUBSURFACE MATERIALS
1	SS				1.2	4" Reinforced Concrete w/ Granular Base
2	SS			CL	2.4	Brown-Green Clayey Silt (stiff)
3	SS				1.8	
4	SS				3.2	Green Clayey Silt (soft/diesel odor)
5	SS			ML	1.8	
6	SS				1.4	Brown-Green Clayey Silt (soft/spoon wet)
7	SS				4.8	
8	SS				1.2	
9	SS			CL	0.4	Dark Gray Clay (soft)
10						Boring Terminated @ 18 feet
20						
25						BDL: Below Detection Limit
30						Drilling Method: Hollow Stem Auger Drilling Company: PSI

WELL CONSTRUCTION DETAILS



Environmental and Safety Designs, Inc.

EnSafe®

5724 SUMMER TREES DR. MEMPHIS, TN. 38134 (901)372-7962

NAS (F.I.D. 0-791673)
Building 376
"D" Street
Millington, Tennessee

B-4/ MW-4

Date Installed: 7/30/92
(S37604LS)

DATE: 08/18/92

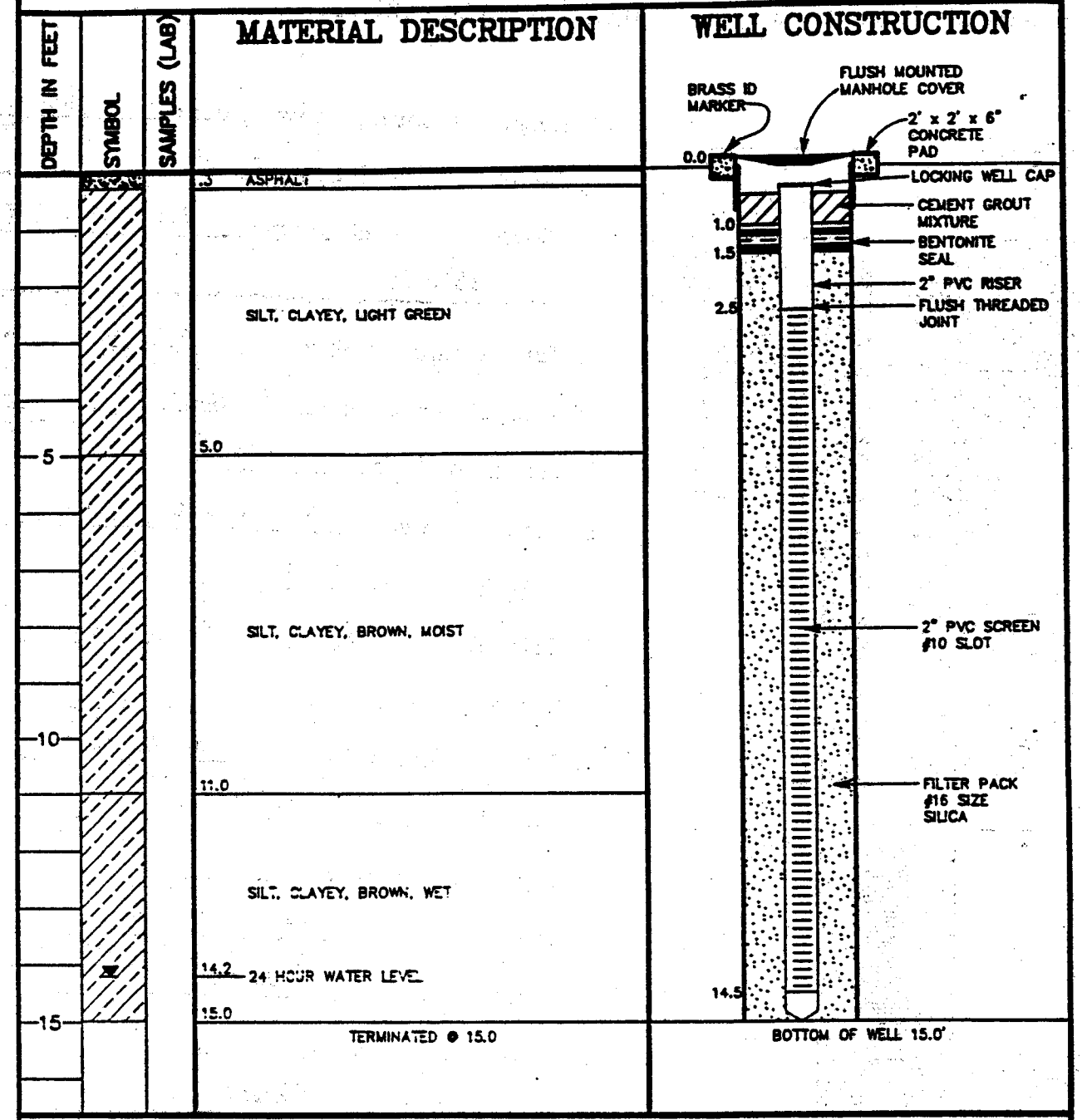
DRW NAME: BJBMW4

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEMS 1249 AND 1482, NAS, MEMPHIS

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T1249-1



Boring Completion Date: JAN. 6, 1990
Well Completion Date: JAN. 6, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 14.2'

Boring Diameter: 6.75"
Ground Elevation: 264.04'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

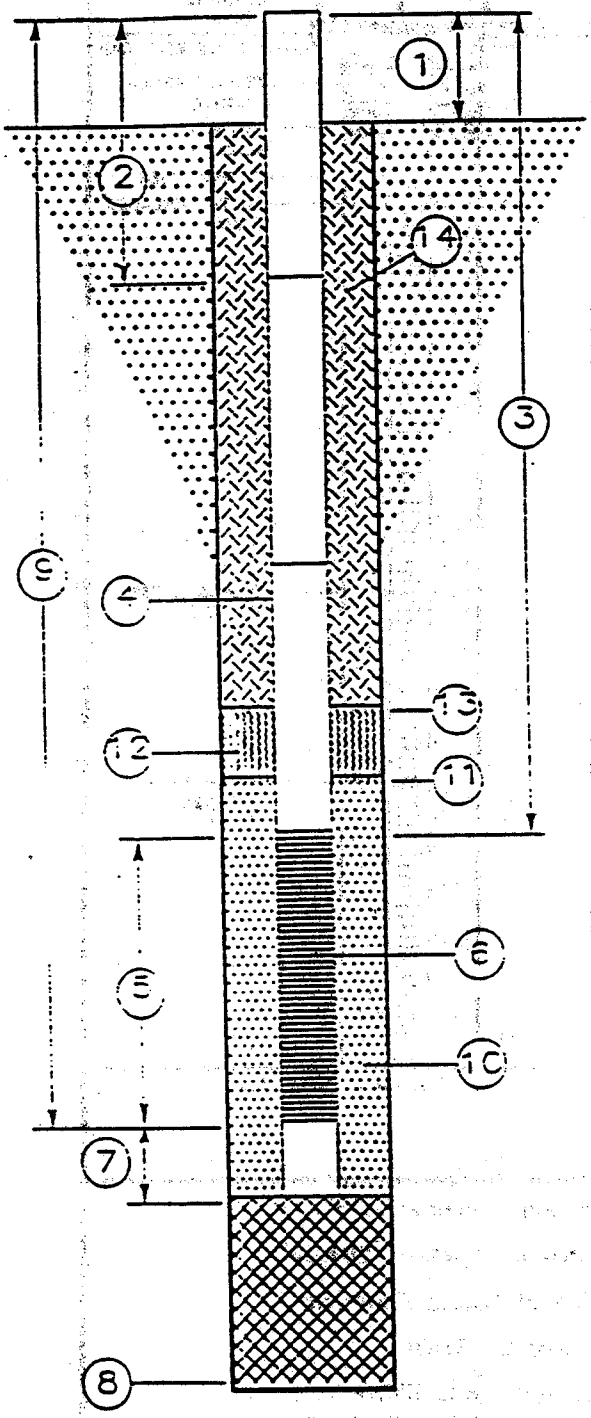
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-1249-1

DATE OF INSTALLATION 1-6-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

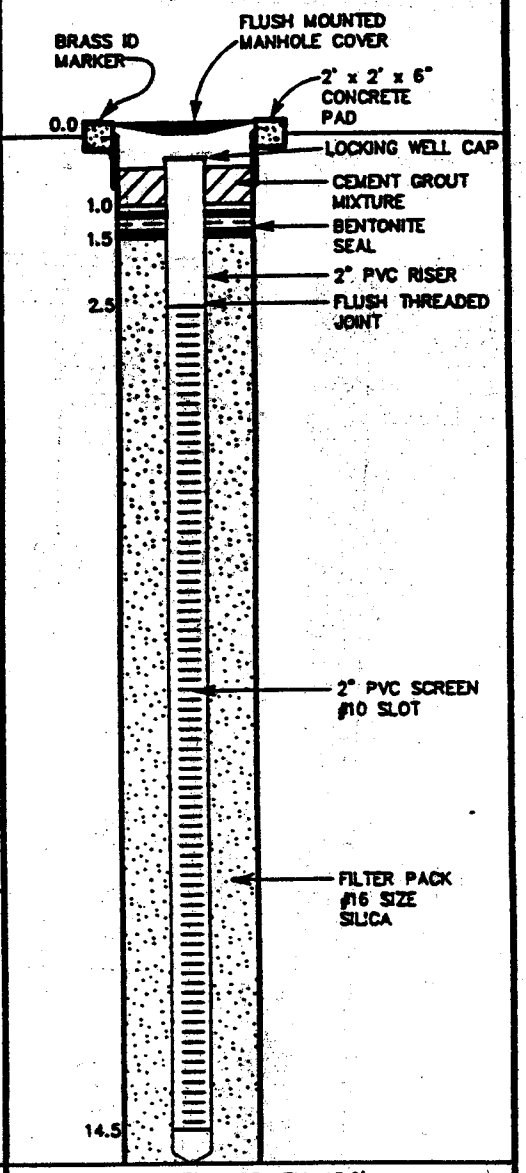
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1249 AND 1482, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T1249-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			.3 ASPHALT
			SILT, BROWN
			3.0
5			SILT, CLAYEY, GRAY SLIGHT HYDROCARBON ODOR
			7.0
			SILT, CLAYEY, GREEN
10			11.0
			SILT, CLAYEY, BROWN, WET
			14.0 24 HOUR WATER LEVEL
15			15.0
			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 6, 1990
Boring Diameter: 6.75"
Well Completion Date: JAN. 6, 1990
Ground Elevation: 264.06'
Well Development Date: N.A.
Top of Casing Elevation:
Drilling Method: POWER AUGER
Driller: B. ELDER
Depth to Water: 14.0'
Logged by: L. RICHARDS

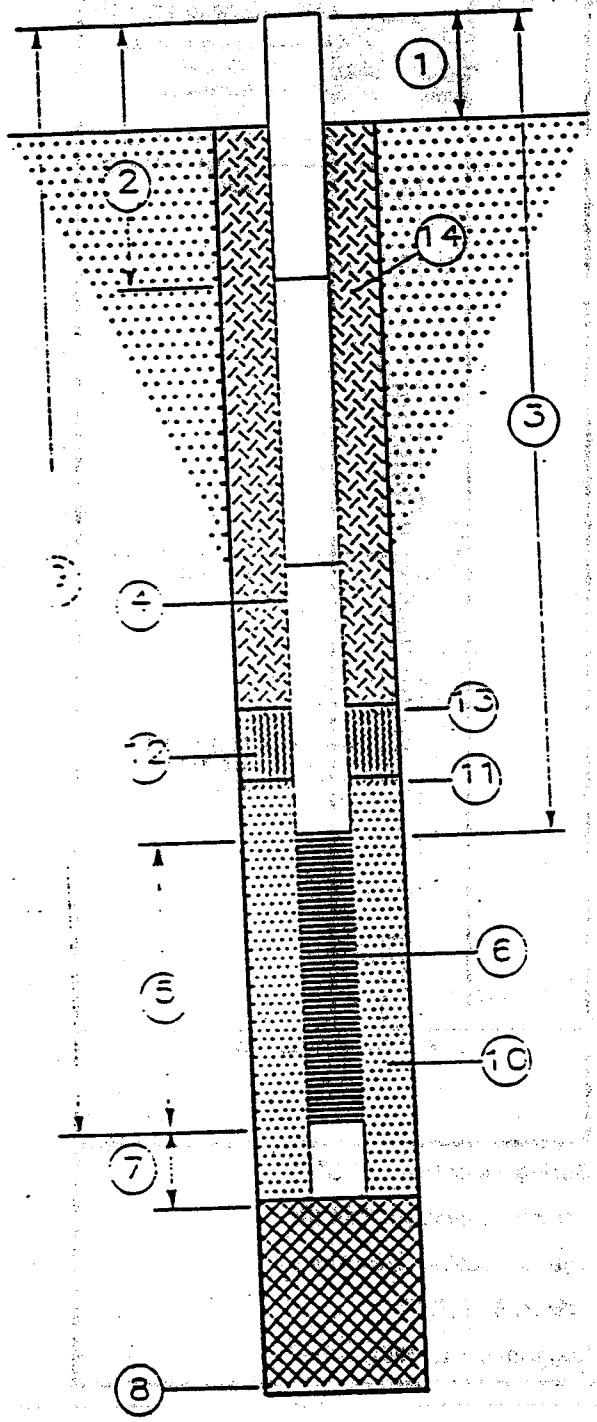
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR. P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-1249-2

DATE OF INSTALLATION 1-6-90



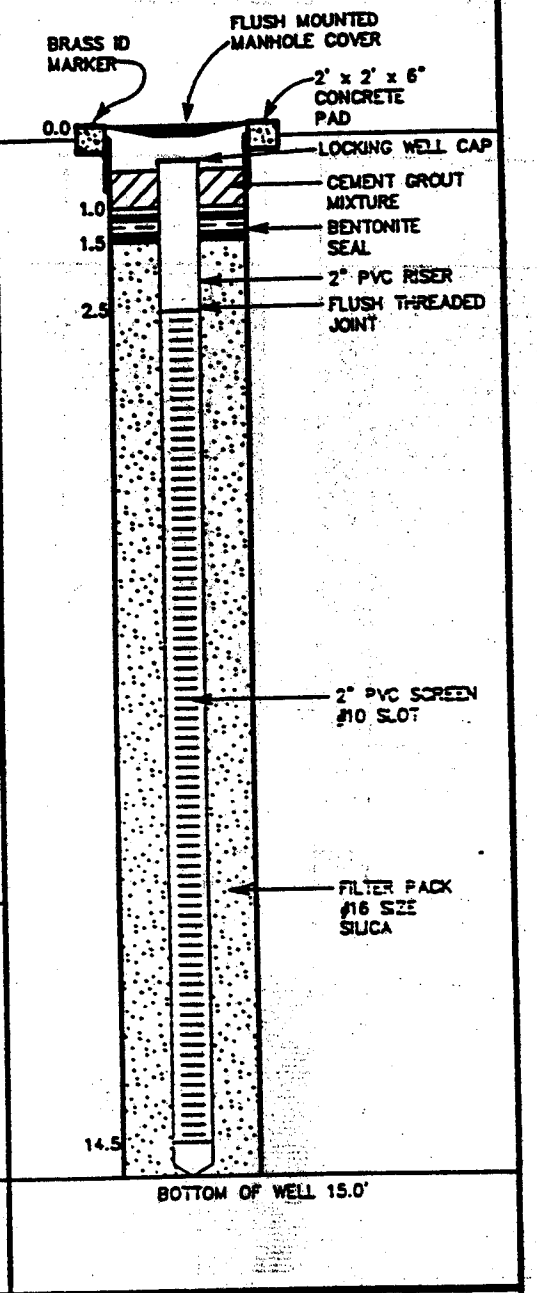
1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Totci Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump C
8. Totci Depth of Boring 15 ft. Hole Diameter 8
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #1F U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seci Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seci 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

GROUNDWATER MONITORING WELL INSTALLATION

LOCATION TANK SYSTEMS 1249 AND 1482, NAS, MEMPHIS

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T1482-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
0.0			.3 ASPHALT
			SILT, CLAYEY, LIGHT GREEN
5.0			
			SILT, CLAYEY, BROWN, MOIST
11.0			
			SILT, CLAYEY, BROWN, WET
14.2			24 HOUR WATER LEVEL
15.0			TERMINATED @ 15.0



WELL CONSTRUCTION

Boring Completion Date: JAN. 6, 1990
Well Completion Date: JAN. 6, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 14.2'

Boring Diameter: 6.75"
Ground Elevation: 264.04'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

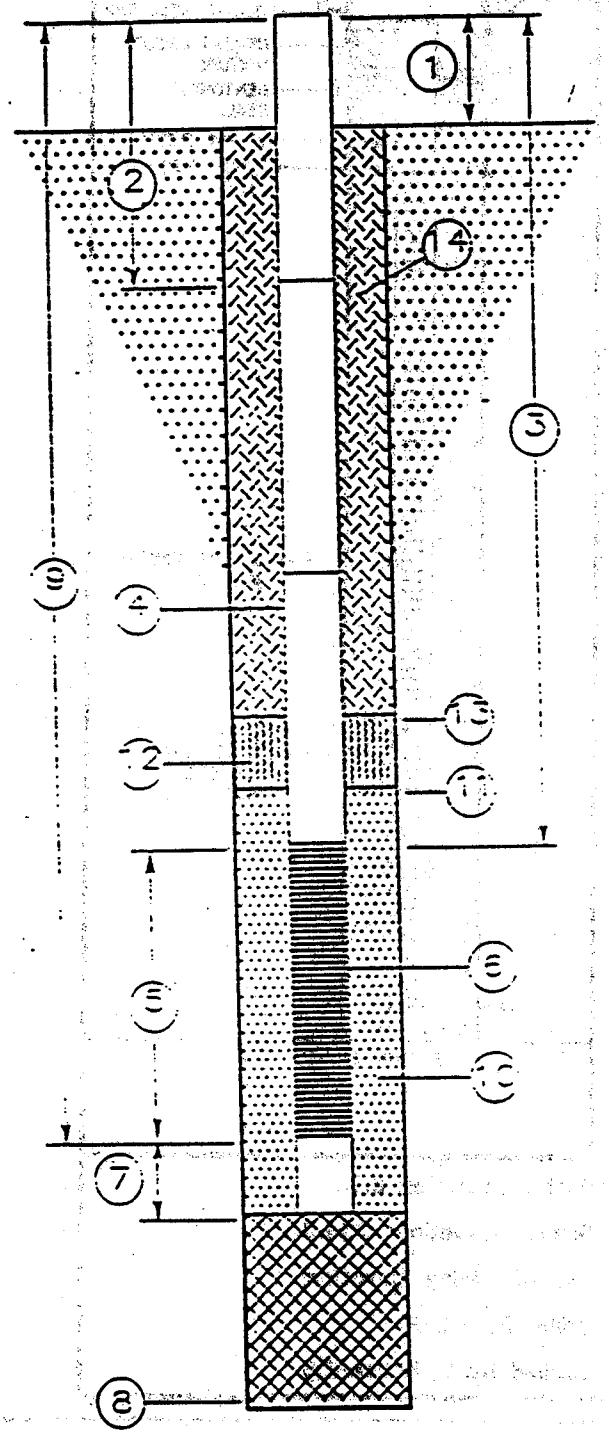
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM 1482-1

DATE OF INSTALLATION 1-6-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft.
   15.0 ft.
3. Totcl Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC [illegible]" slot
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter [illegible]
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 O/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

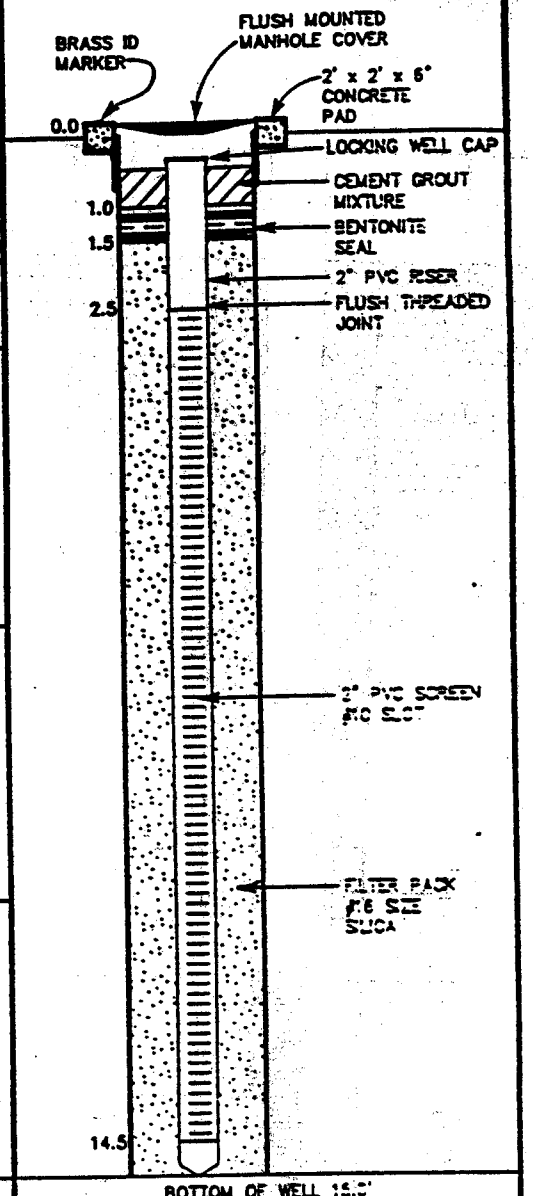
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1249 AND 1482, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T1482-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			.3 ASPHALT
			SILT, BROWN
			3.0
5			SILT, CLAYEY, GRAY SLIGHT HYDROCARBON ODOR
			7.0
			SILT, CLAYEY, GREEN
10			11.0
			SILT, CLAYEY, BROWN, WET
			14.0 24 HOUR WATER LEVEL
15			15.0
			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 6, 1990
Well Completion Date: JAN. 6, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 14.0'

Boring Diameter: 6.75"
Ground Elevation: 264.06'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

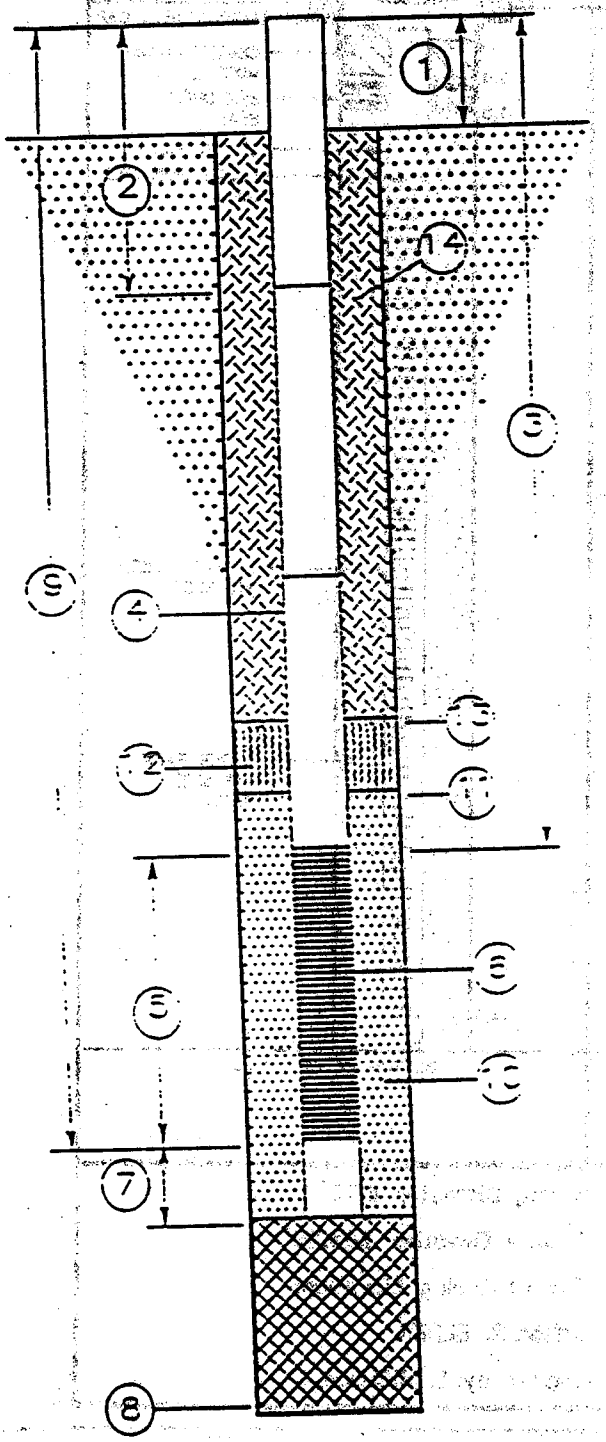
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM 1482-2

DATE OF INSTALLATION 1-6-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft.
   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC [illegible] slot
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen [illegible] ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.3 Size #16 - 30
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.3
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

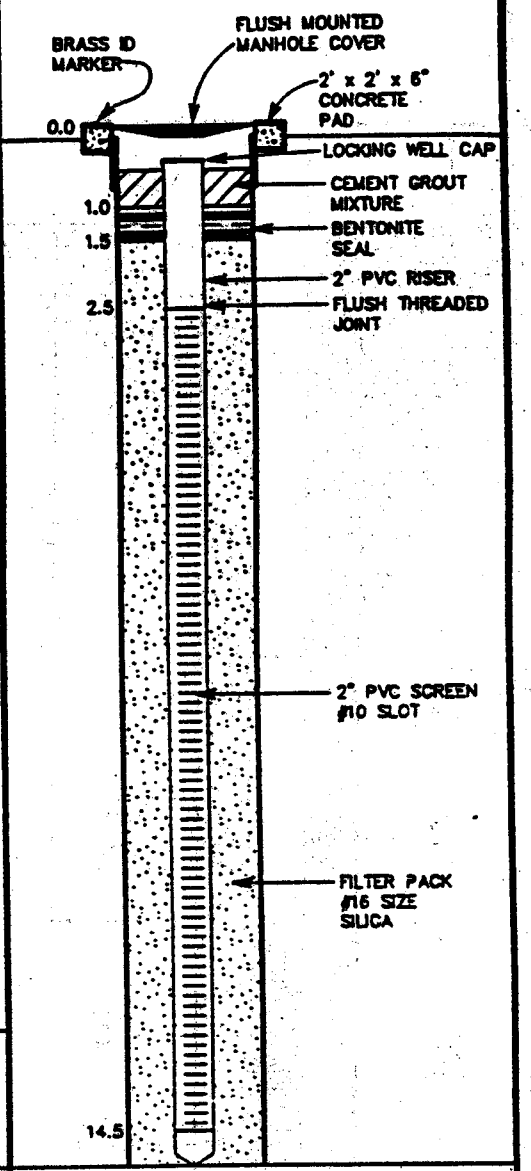
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1249 AND 1482, NAS, MEMPHIS, TN.

LOG OF BORING NO. A3 LOG OF WELL NO. MEM-T1482-3

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			.3 ASPHALT
			SILT, LIGHT BROWN STRONG HYDROCARBON ODOR
			3.0
5			SILT, CLAYEY, GRAY, MOIST
			7.0
10			SILT, CLAYEY, GREEN, MOIST
			11.0
			13.6 24 HOUR WATER LEVEL
			SILT, CLAYEY, BROWN, WET
15			15.0
			TERMINATED @ 15.0

WELL CONSTRUCTION



Boring Completion Date: JAN. 6, 1990
Well Completion Date: JAN. 6, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 13.6'

Boring Diameter: 8.00"
Ground Elevation: 263.75'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

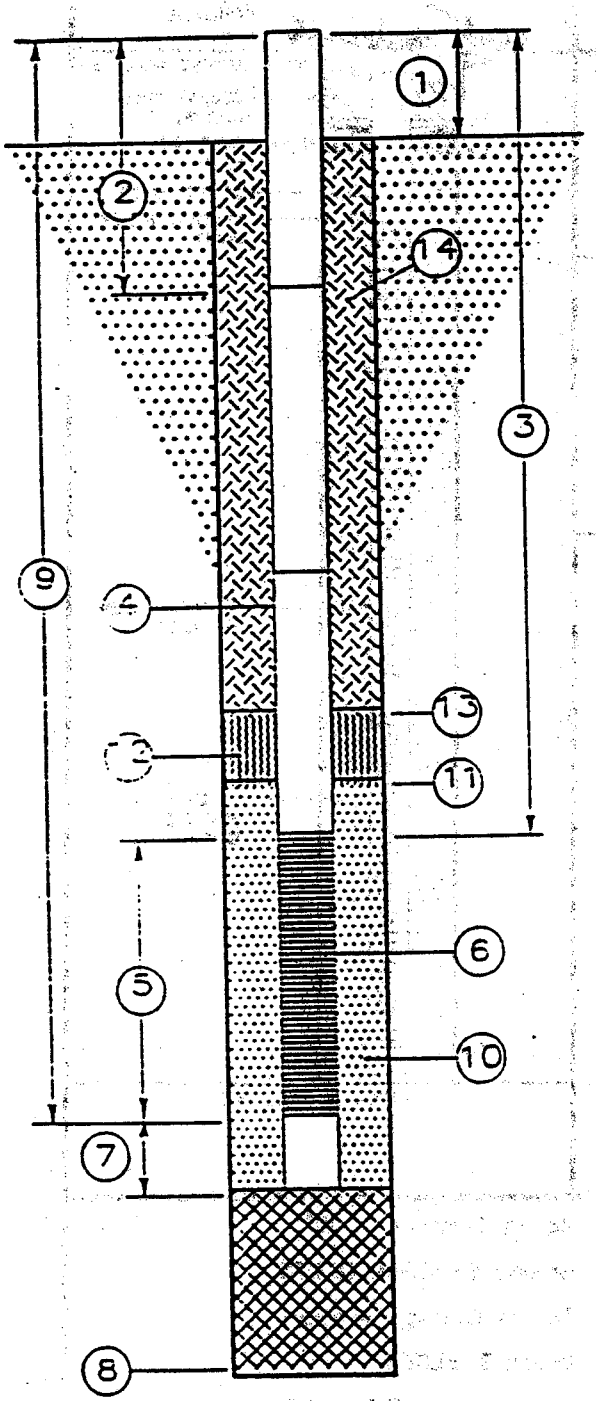
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1482-3

DATE OF INSTALLATION 1-6-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.

   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand

    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets

    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement

    Grout Mixture 100%

    Method of Placement Pour

CASING ELEVATION: 101.78

DATUM: SE Corner of Building

WELL LOCATION: MW-1 (S23701LS)

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

DESCRIPTION OF WEATHER: Sunny 75°F

DRILLER: L. Smith

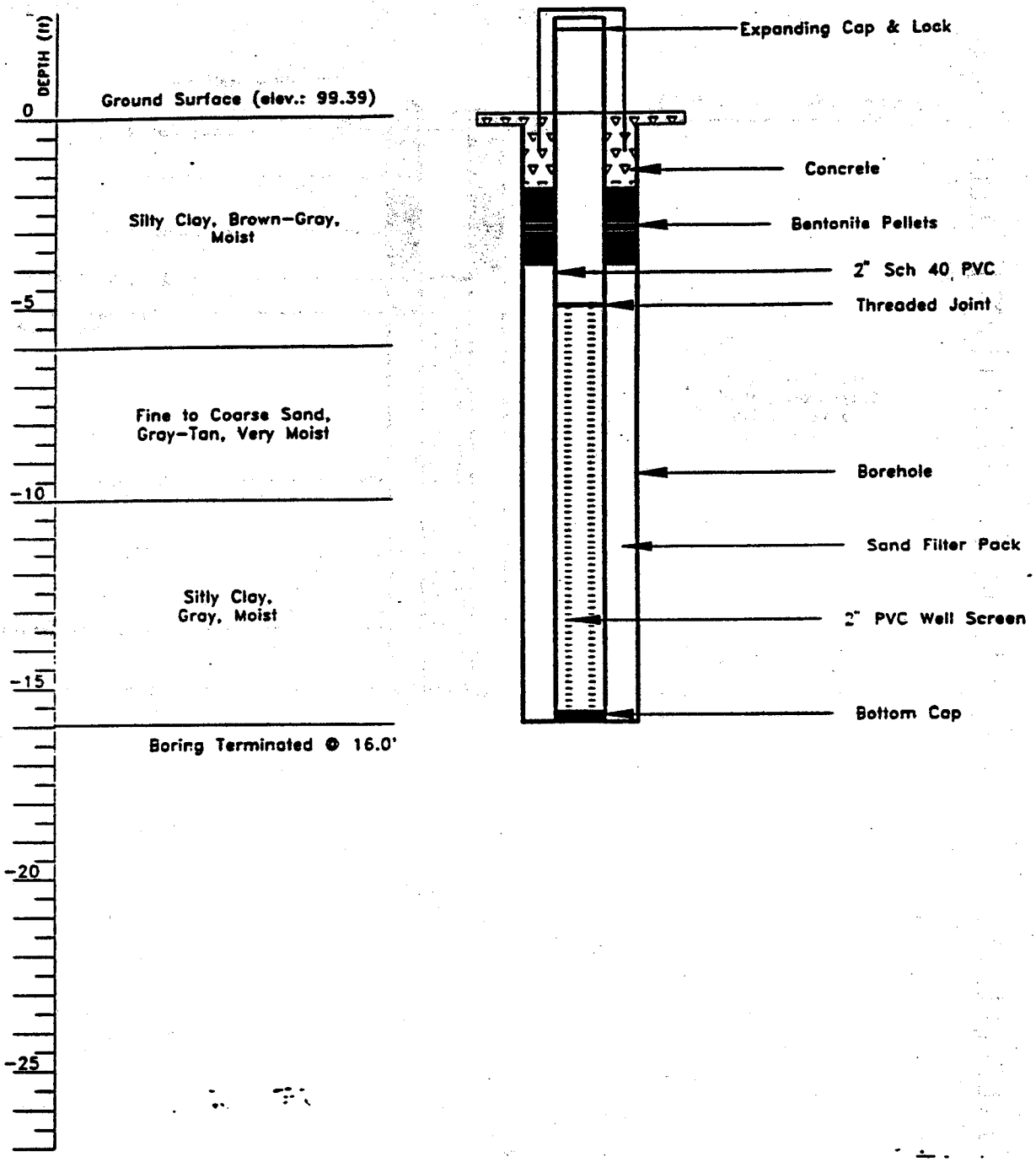
INSPECTOR: M. Roberts

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

DRILLING TECHNIQUE:
Hollow Stem Auger
Split-Spoon Sampler

GROUND WATER ELEVATIONS

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



MEMPHIS ENVIRONMENTAL CENTER, INC.

2003 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO. NAVALMW1
DRAWN: DKD
DATE: NOVEMBER 19, 1992

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

CASING ELEVATION: 96.39

DATUM: SE Corner of Building

WELL LOCATION:

MW-2

(S23702LS)

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

DESCRIPTION OF WEATHER: Light Rain 75°F

DRILLER: L. Smith

INSPECTOR: M. Roberts

BORING TERMINATED AT:

DEPTH (ft): 15.0

DATE & TIME: 09/22/92 1:50pm

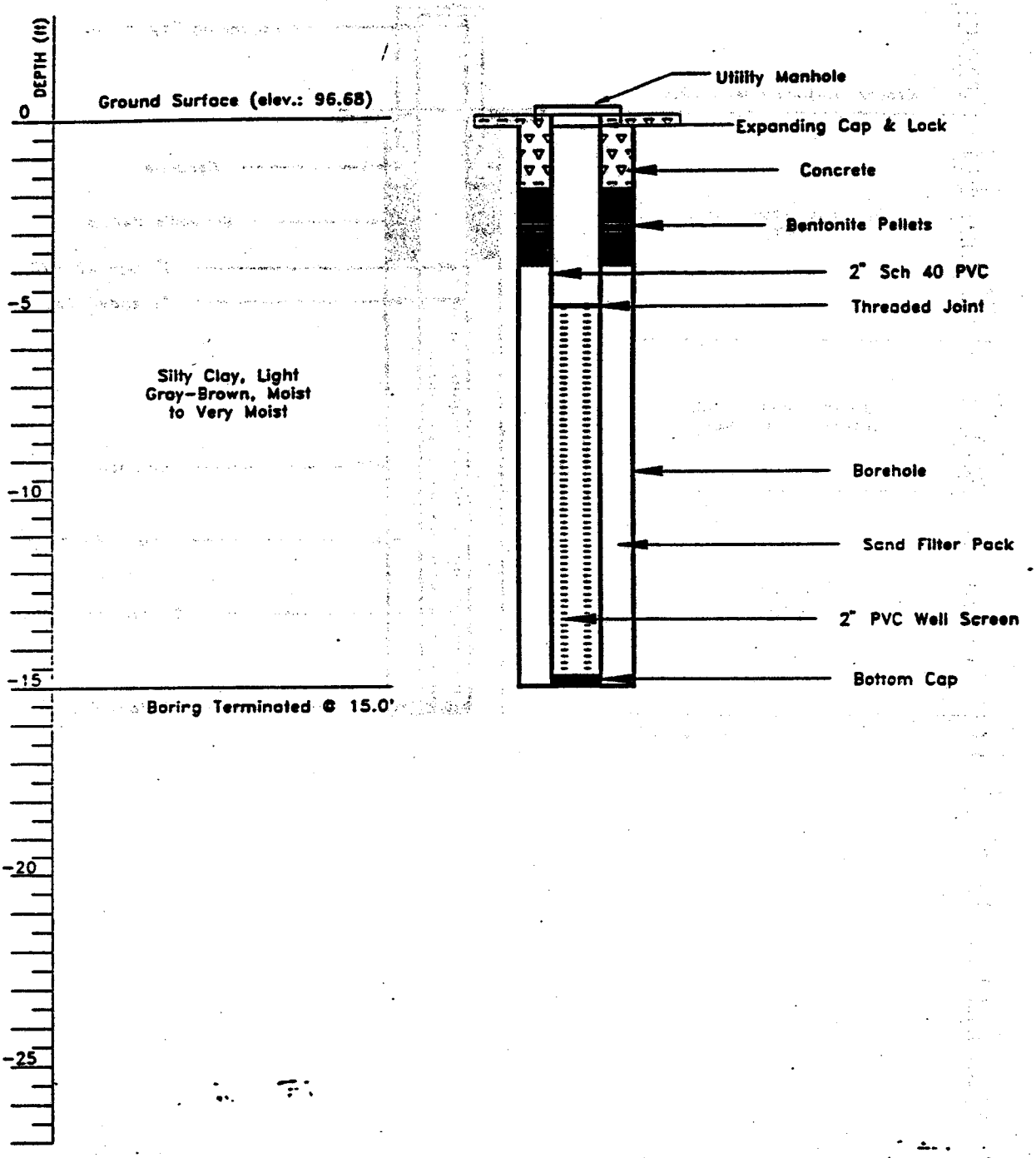
DRILLING TECHNIQUE:

Hollow Stem Auger

Split-Spoon Sampler

GROUND WATER ELEVATIONS

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



MEMPHIS ENVIRONMENTAL CENTER, INC.

DWG. NO. NAVALMW2

DRAWN: DKD

DATE: NOVEMBER 2, 1992

5903 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

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

CASING ELEVATION: 96.40

DATUM: SE Corner of Building

WELL LOCATION:

MW-3

(S23703LS)

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

DESCRIPTION OF WEATHER: Heavy Rain 70°F

DRILLER: L. Smith

INSPECTOR: M. Roberts

BORING TERMINATED AT:

DEPTH (ft): 15.0

DATE & TIME: 09/22/92 1:00pm

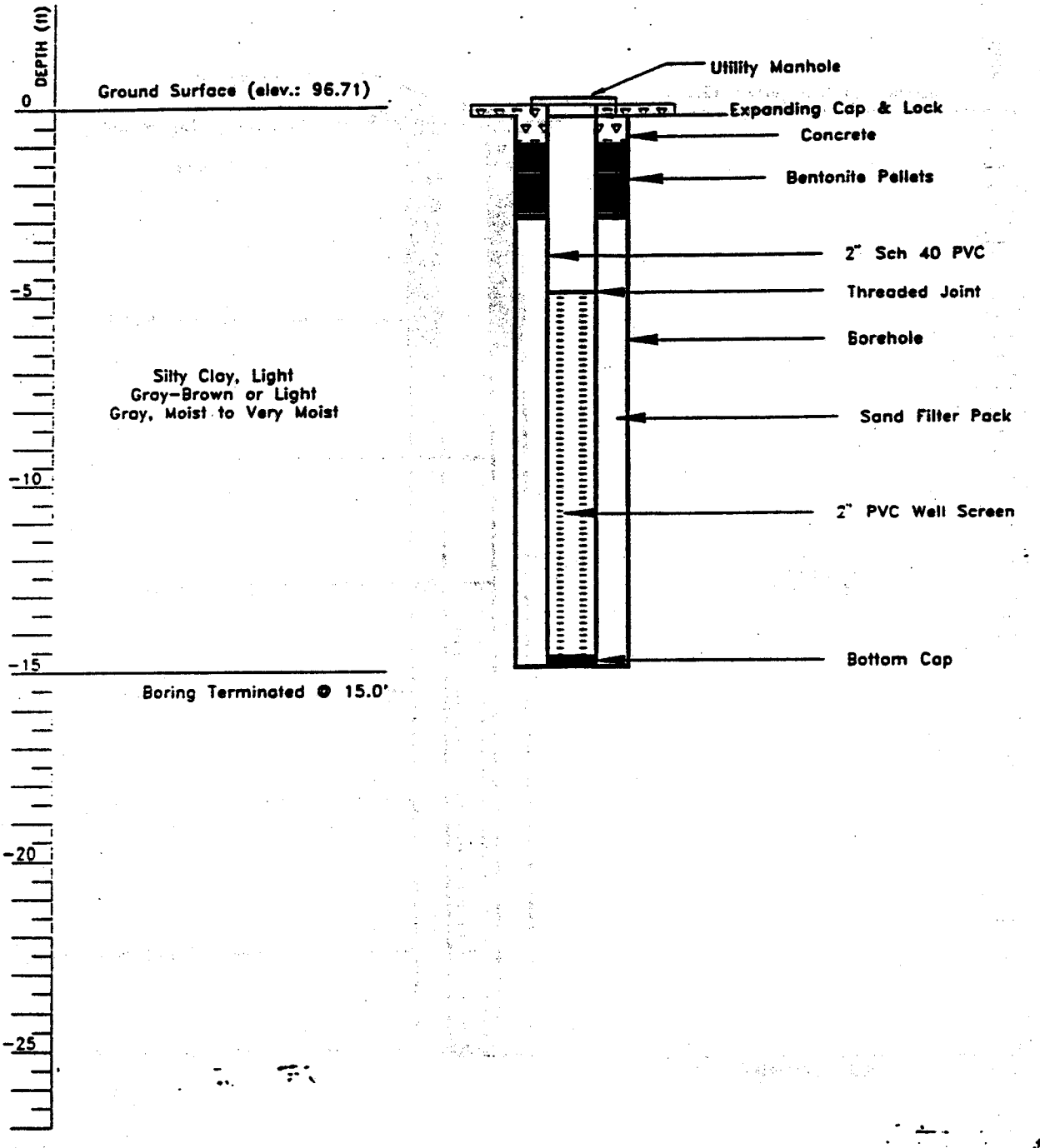
DRILLING TECHNIQUE:

Hollow Stem Auger

Split-Spoon Sampler

GROUND WATER ELEVATIONS

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



MEMPHIS ENVIRONMENTAL CENTER, INC.

2003 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

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

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

CASING ELEVATION: 99.41

DATUM: SE Corner of Building

WELL LOCATION:

MW-4

(S23704LS)

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

DESCRIPTION OF WEATHER: Sunny 75°F

DRILLER: J. Johnston

INSPECTOR: M. Roberts

BORING TERMINATED AT:

DEPTH (ft): 10.0

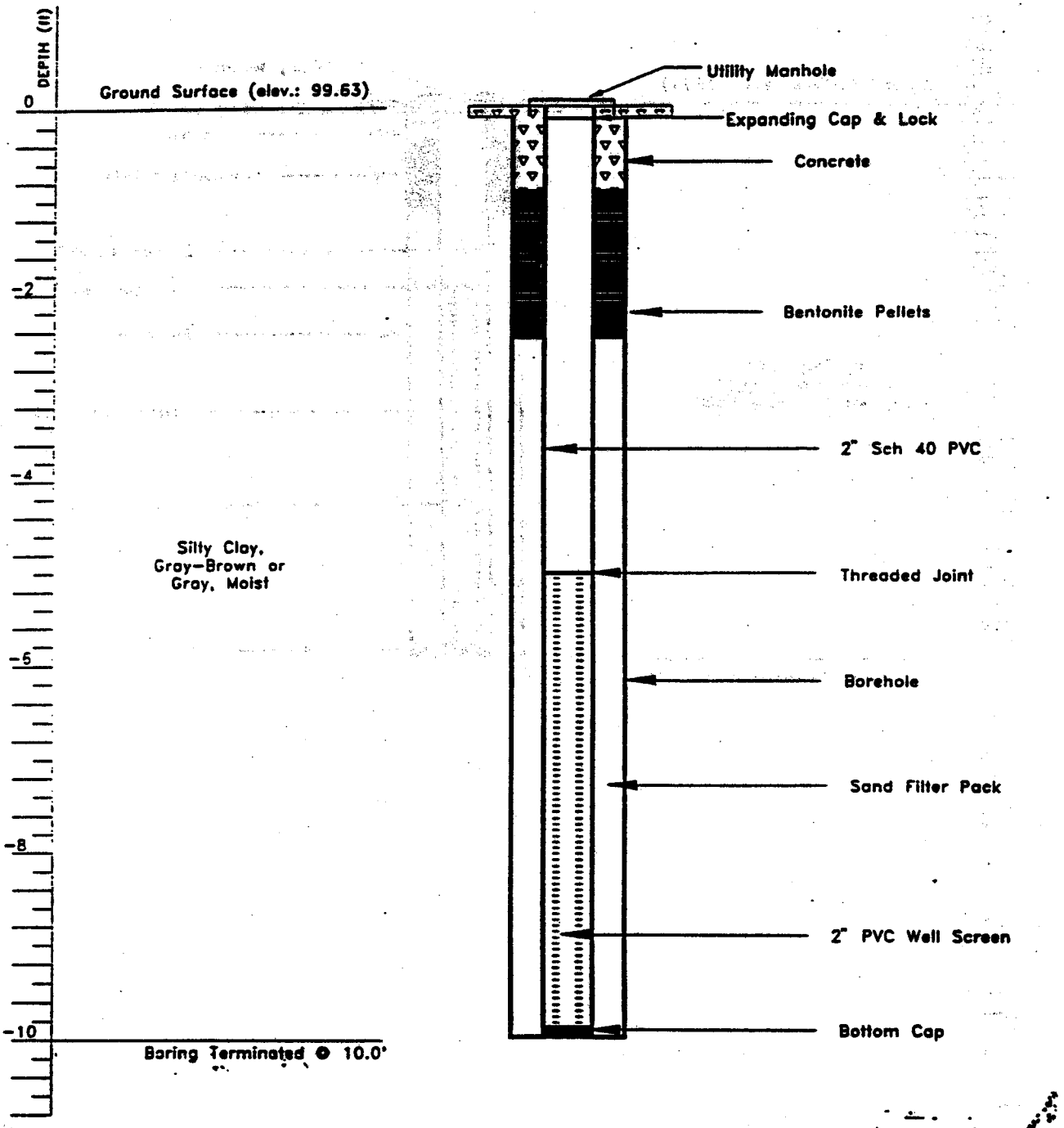
DATE & TIME: 09/24/92 10:00cm

DRILLING TECHNIQUE:

Stainless Steel Hand Auger

GROUND WATER ELEVATIONS

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



MEMPHIS ENVIRONMENTAL CENTER, INC.

2903 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

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

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

CASING ELEVATION: 101.28

DATUM: SE Corner of Building

WELL LOCATION:

MW-5

(S23705LS)

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

DESCRIPTION OF WEATHER: Sunny 75°F

DRILLER: J. Holcomb

INSPECTOR: M. Roberts

BORING TERMINATED AT:

DEPTH (ft): 15.0

DATE & TIME: 10/13/92 11:00am

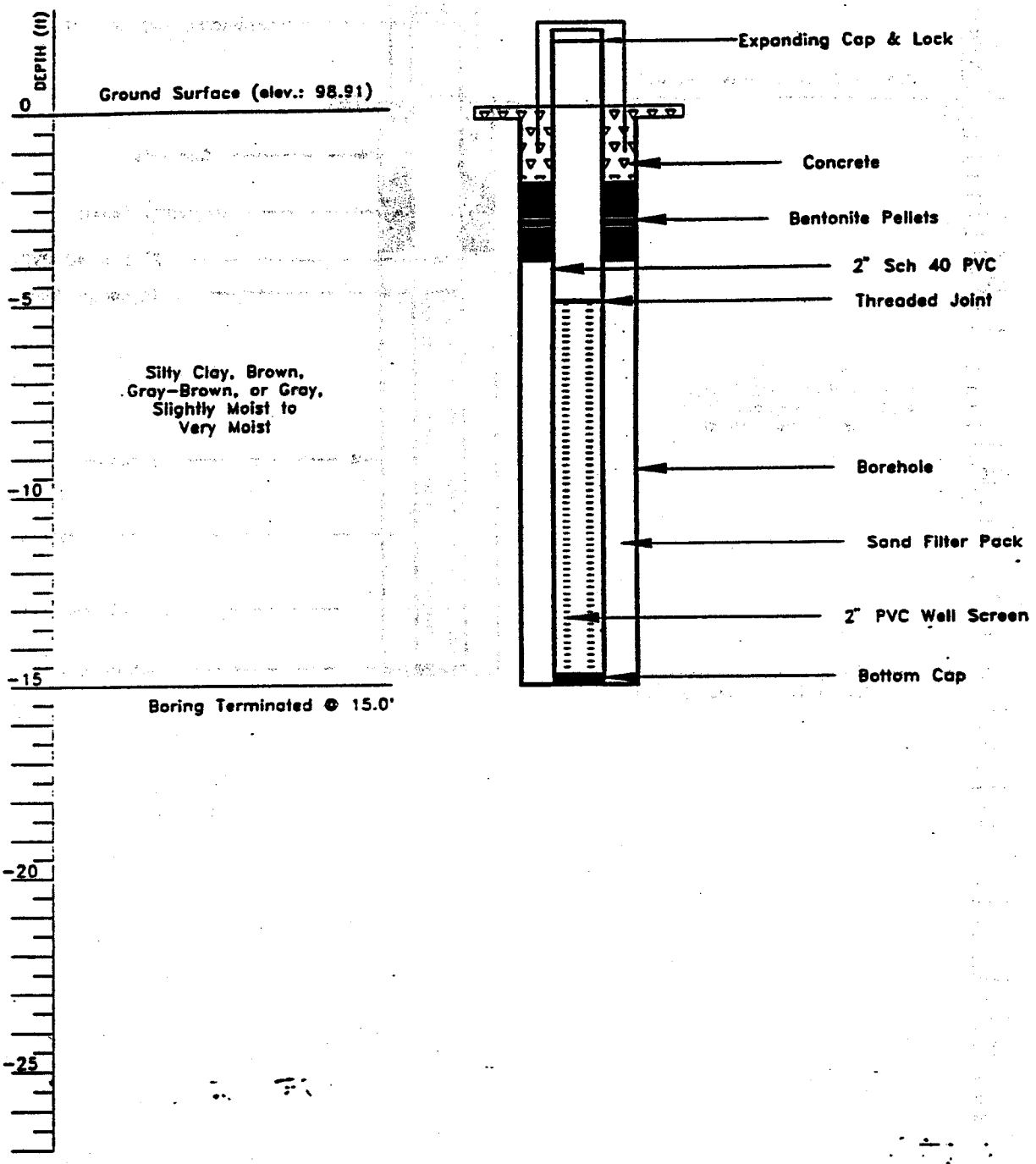
DRILLING TECHNIQUE:

Hollow Stem Auger

Split-Spoon Sampler

GROUND WATER ELEVATIONS

DATE	ELEVATION
10/15/92	92.25



MEMPHIS ENVIRONMENTAL CENTER, INC.

2803 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

DWG. NO. NAVALMWS
DRAWN: DKD
DATE: NOVEMBER 19, 1992

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

CASING ELEVATION: 102.10

DATUM: SE Corner of Building

WELL LOCATION: MW-6 (S23706LS)

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

DESCRIPTION OF WEATHER: Sunny 75°F

DRILLER: J. Holcomb

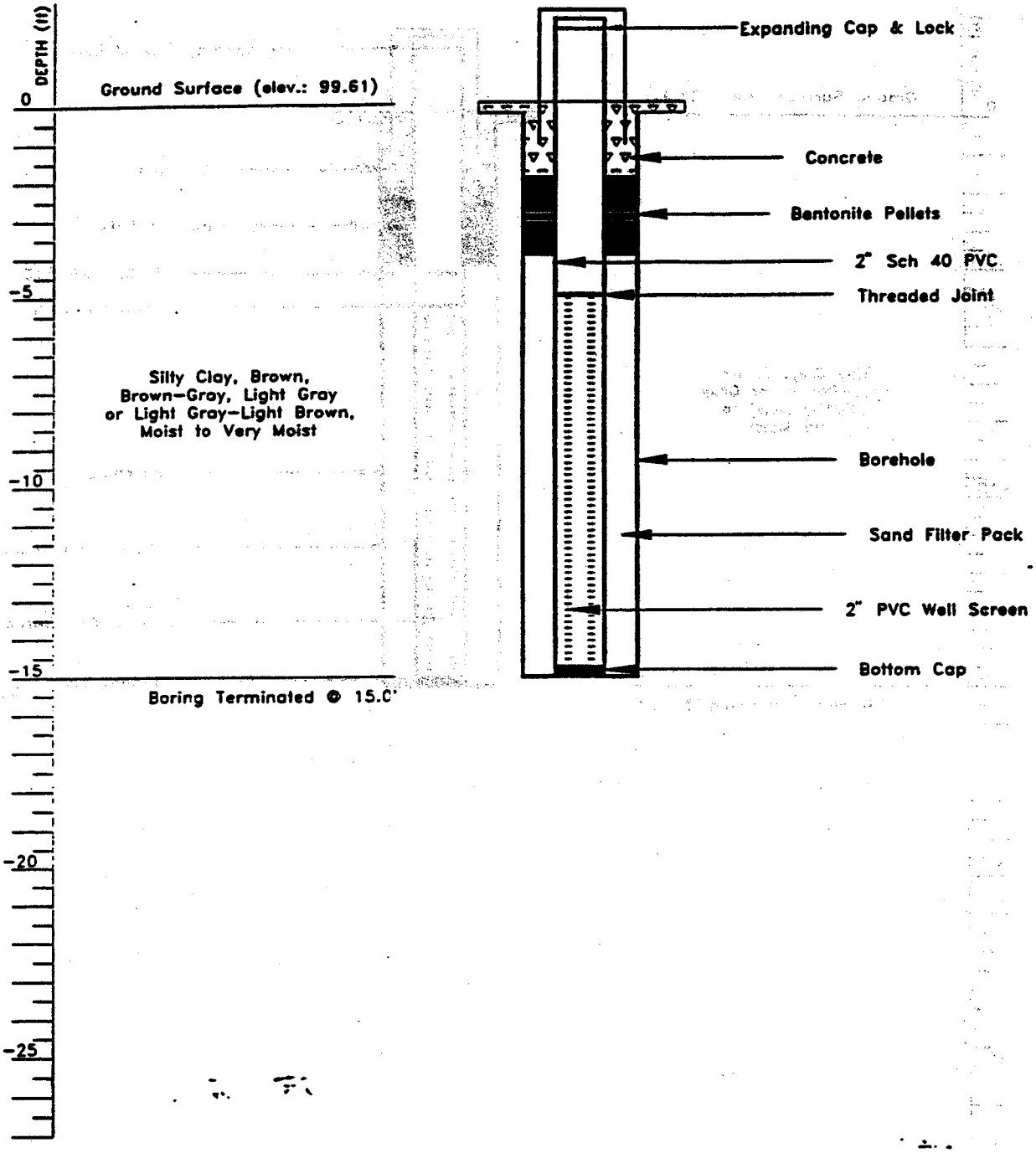
INSPECTOR: M. Roberts

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

DRILLING TECHNIQUE:
Hollow Stem Auger
Split-Spoon Sampler

GROUND WATER ELEVATIONS

DATE	ELEVATION
10/15/92	91.85



MEMPHIS ENVIRONMENTAL CENTER, INC.

DWG. NO. NAVALMW6
DRAWN: DKD
DATE: NOVEMBER 19, 1992

2003 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

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

Remaining Leak Detection Wells

T337 & T336 (JP-5 Fuel Farm)
T1637

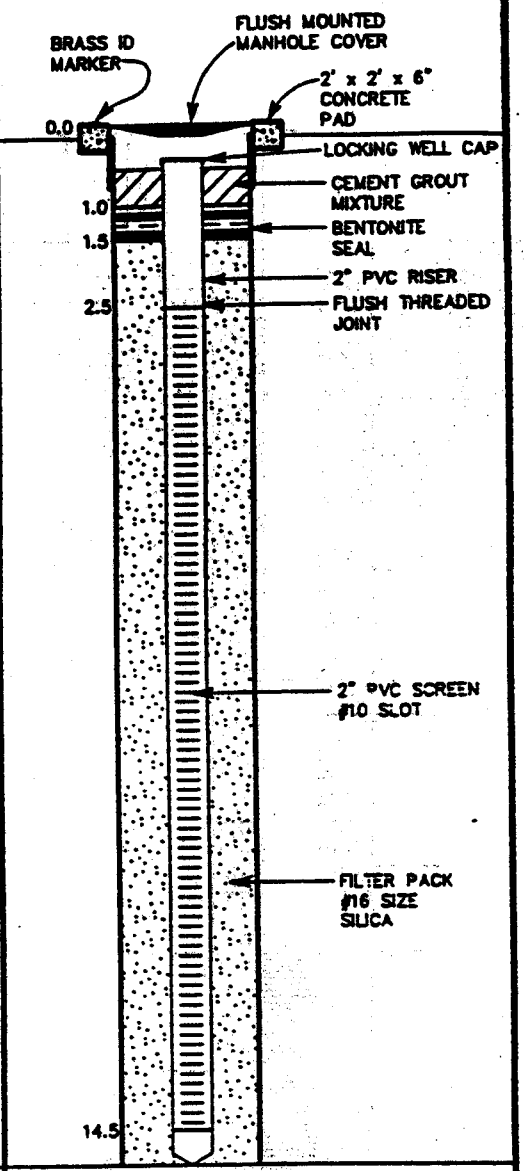
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 336, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T336-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY, LIGHT BROWN
4.5			
5			SILT, CLAYEY, GRAY
7.0			
10			SILT, CLAYEY, BROWN, MOIST
14.1			24 HOUR WATER LEVEL
15.0			TERMINATED @ 15.0



WELL CONSTRUCTION

Boring Completion Date: JAN. 3, 1990
Well Completion Date: JAN. 3, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 14.1'

Boring Diameter: 6.75"
Ground Elevation: 271.37'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

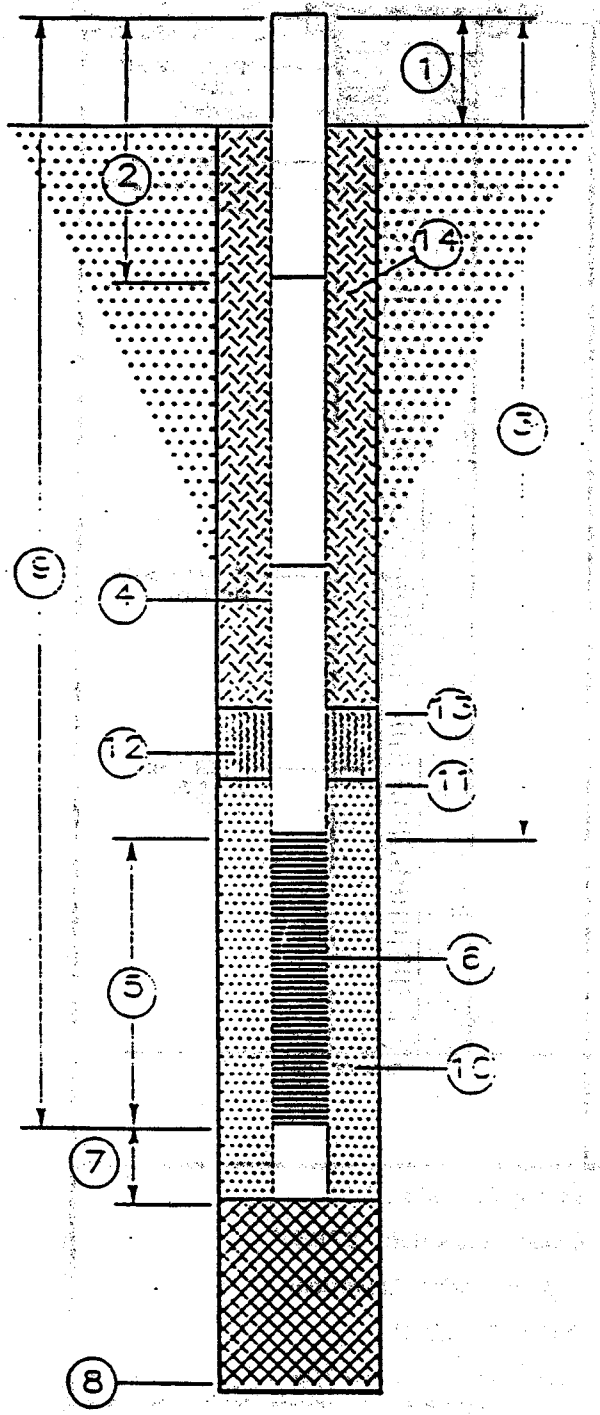
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T336-1

DATE OF INSTALLATION 1-3-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.

   Coupling Interval Depths 2.5 ft., 5.0 ft.

   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 in
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand

    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets

    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement

    Grout Mixture 100%

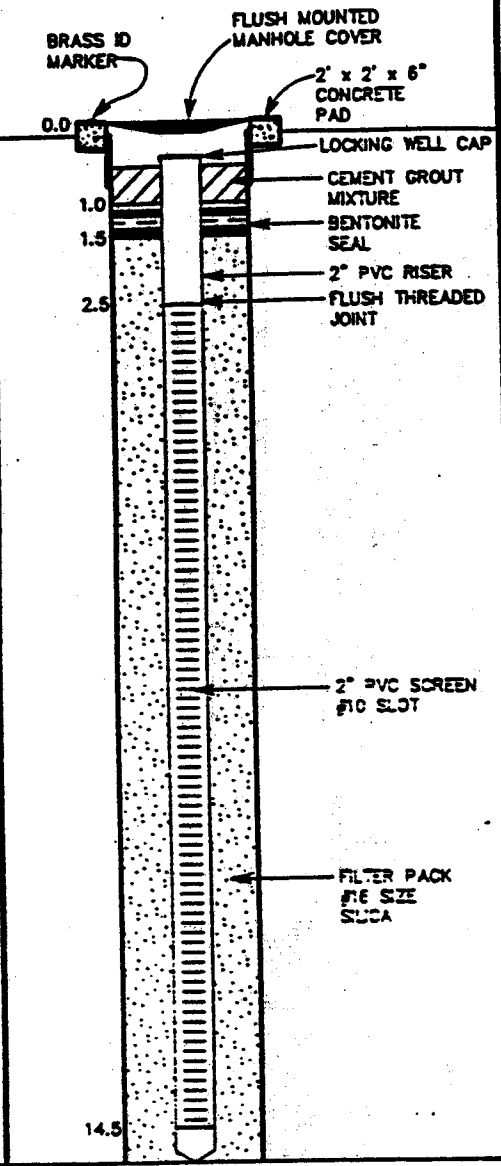
    Method of Placement Pour

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 336, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T336-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY, BROWN
6.0			
			SILT, CLAYEY, GRAY, MOIST
14.5'			24 HOUR WATER LEVEL
15.0			TERMINATED @ 15.0



Boring Completion Date: JAN. 3, 1990
Well Completion Date: JAN. 3, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 14.5'

Boring Diameter: 6.75"
Ground Elevation: 270.86'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

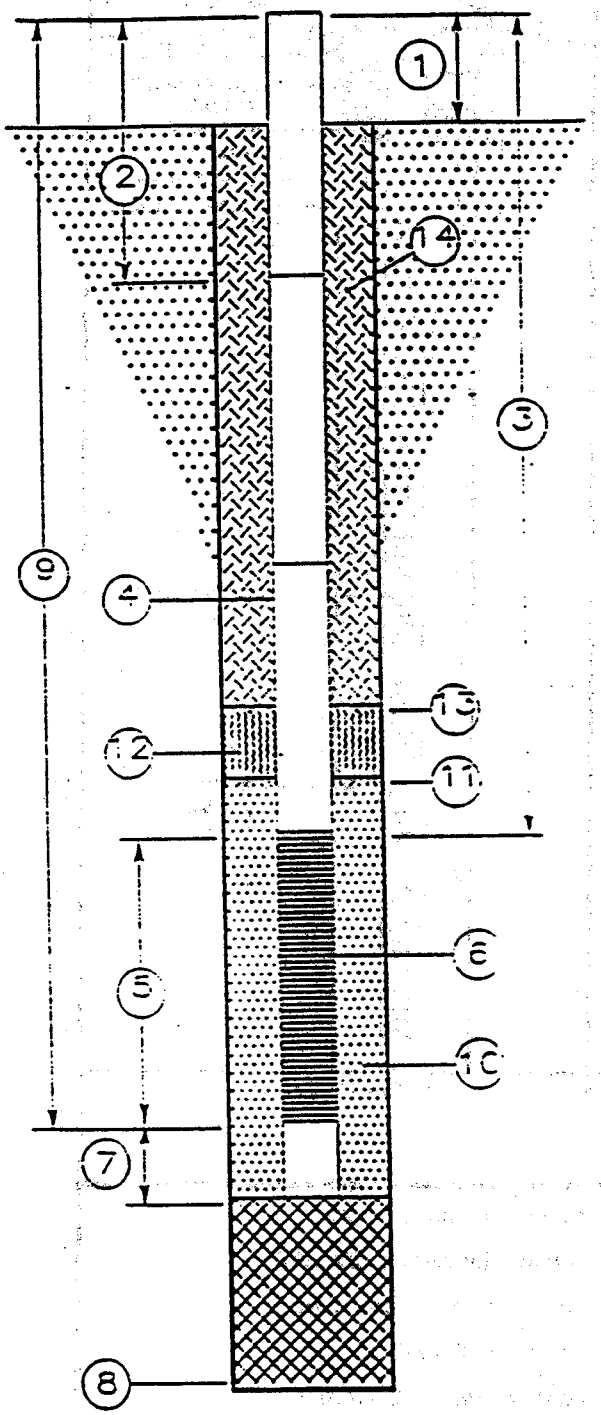
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T336-2

DATE OF INSTALLATION 1-3-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft.
   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.08 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

Well Construction Details

Release Detection Manual
MTMC New Orleans, La

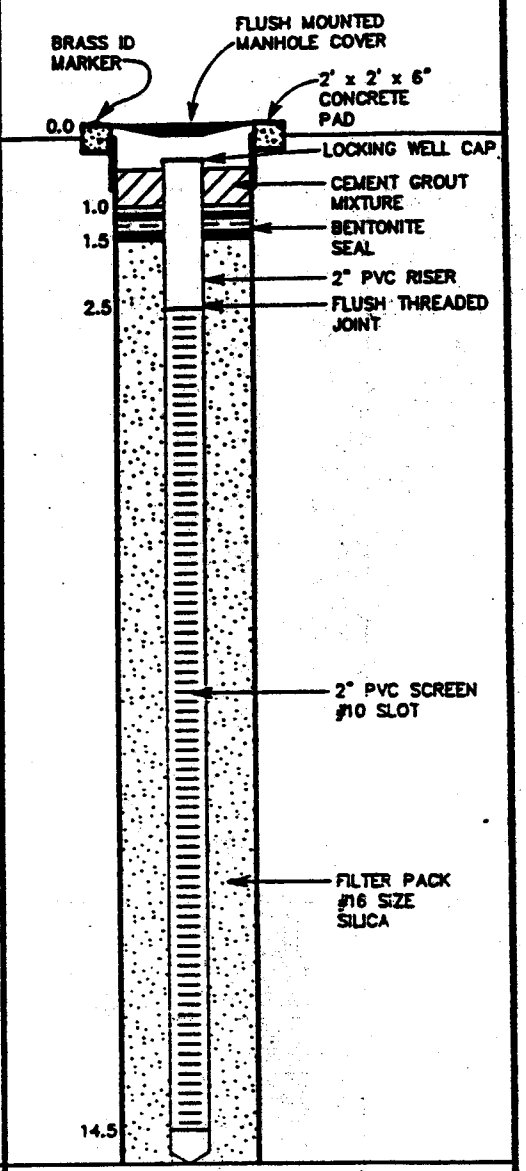
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 336, NAS, MEMPHIS, TN.

LOG OF BORING NO. A3 LOG OF WELL NO. MEM-T336-3

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
5			SILT, CLAYEY, BROWN
5.5			
10			SILT, CLAYEY, GRAY
11.0			
			SILT, CLAYEY, GRAY, MOIST
14.5'			24 HOUR WATER LEVEL
15.0			TERMINATED @ 15.0



WELL CONSTRUCTION

Boring Completion Date: JAN. 3, 1990
Well Completion Date: JAN. 3, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 14.5'

Boring Diameter: 6.75"
Ground Elevation: 271.17'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

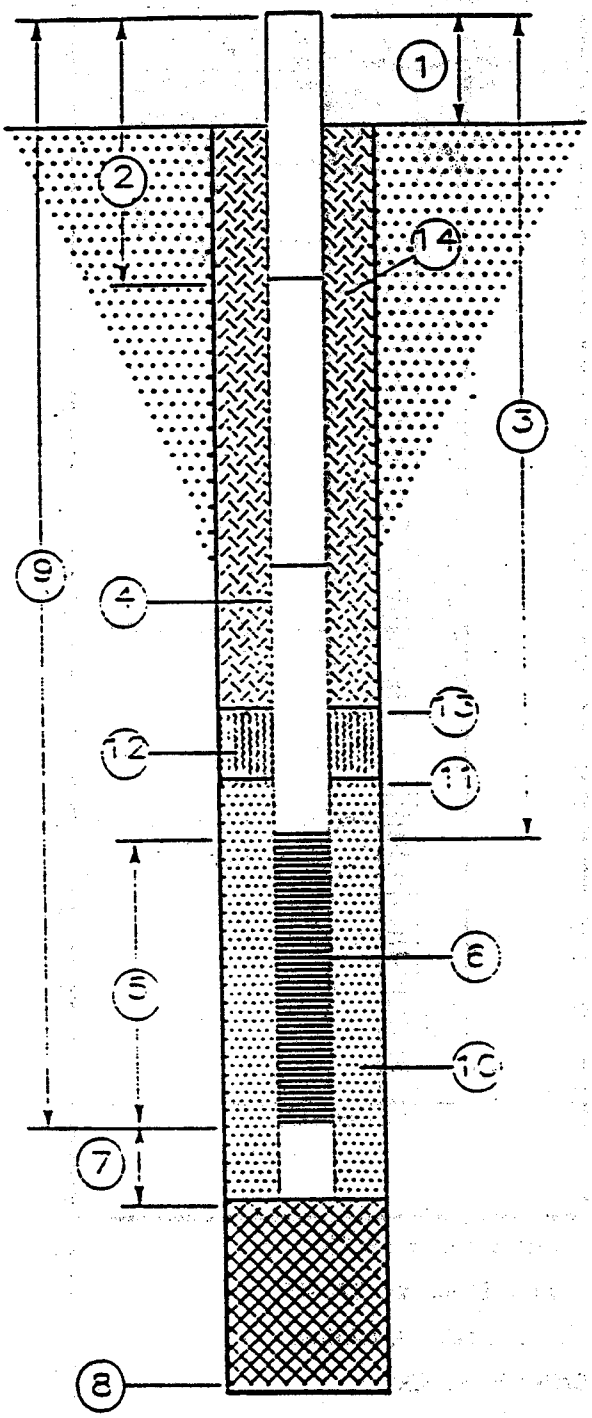
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T336-3

DATE OF INSTALLATION 1-3-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 U/C ____
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COM

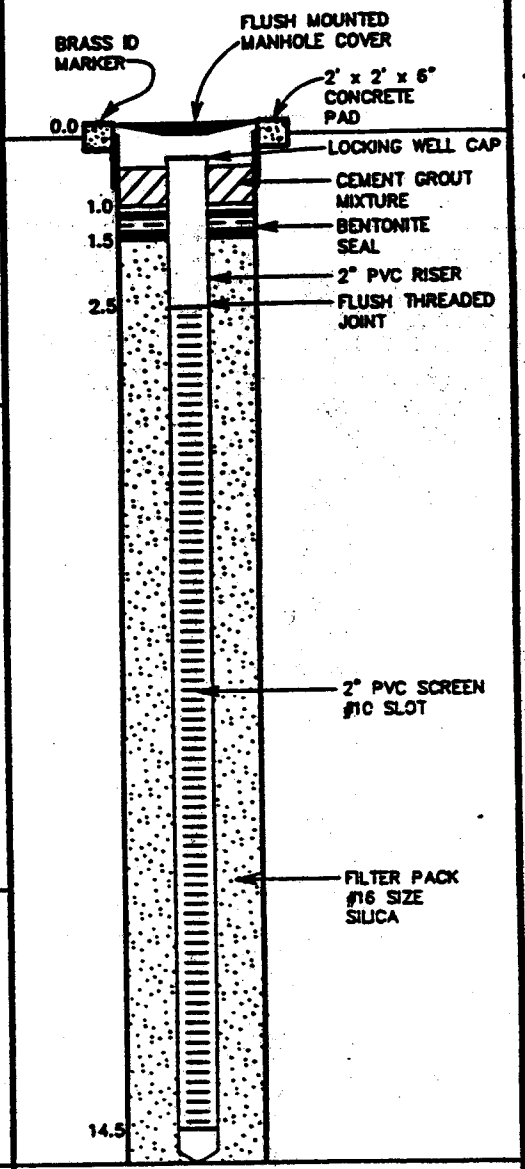
GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 337, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T337-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY, GRAY
4.0			
5			SILT, CLAYEY, GRAY
10			
11.0			
			SILT, CLAYEY, GRAY
14.5			24 HOUR WATER LEVEL
15.0			TERMINATED @ 15.0
15			

WELL CONSTRUCTION



Boring Completion Date: JAN. 3, 1990
Boring Diameter: 6.75"
Well Completion Date: JAN. 3, 1990
Ground Elevation: 271.01'
Well Development Date: N.A.
Top of Casing Elevation:
Drilling Method: POWER AUGER
Driller: B. ELDER
Depth to Water: 14.5'
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

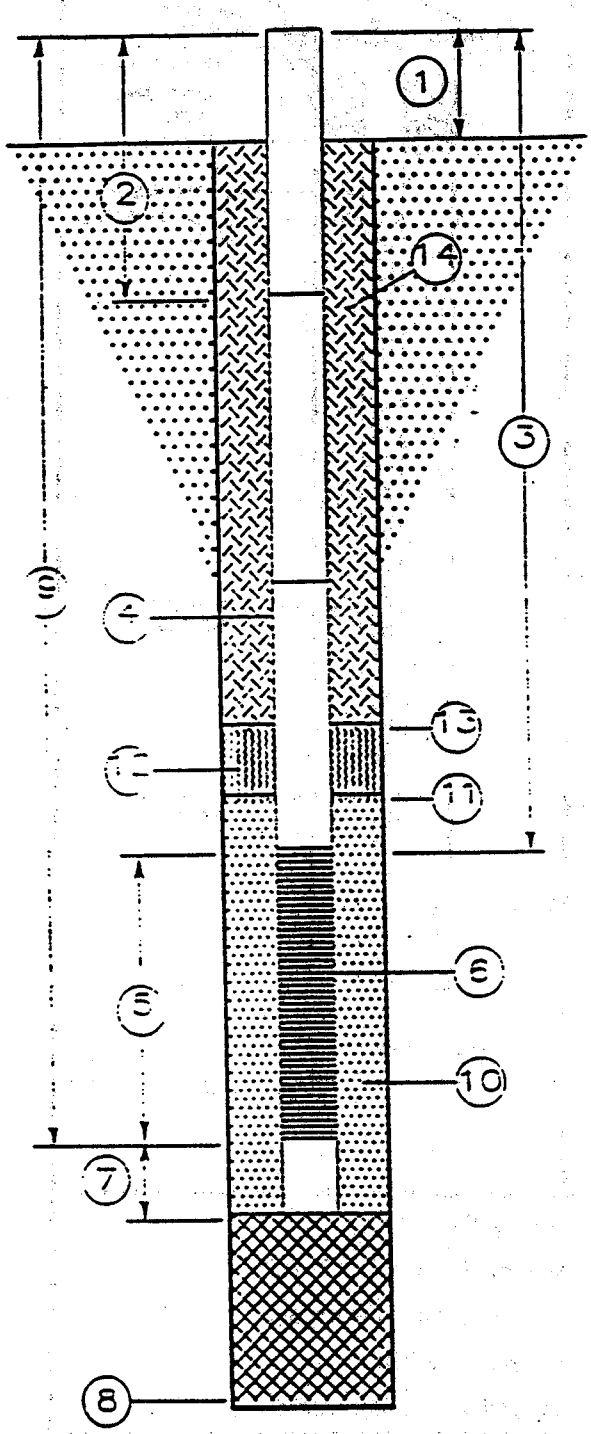
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T337-1

DATE OF INSTALLATION 1-3-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inc
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

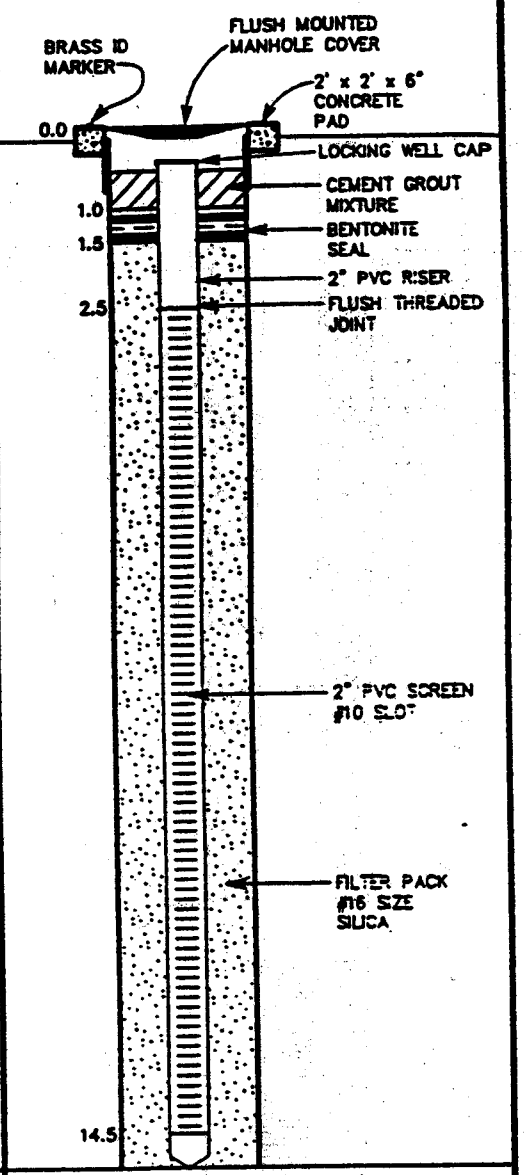
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 337, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T337-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY, BROWN
4.0			
5			SILT, CLAYEY, GRAY, MOIST SLIGHT HYDROCARBON ODOR
7.0			
			SILT, CLAYEY, BROWN, MOIST
10.0			
10			SILT, CLAYEY, GRAY
14.5			24 HOUR WATER LEVEL
15.0			TERMINATED @ 15.0
15			



Boring Completion Date: JAN. 3, 1990
Well Completion Date: JAN. 3, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 14.5'

Boring Diameter: 6.75"
Ground Elevation: 271.56'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

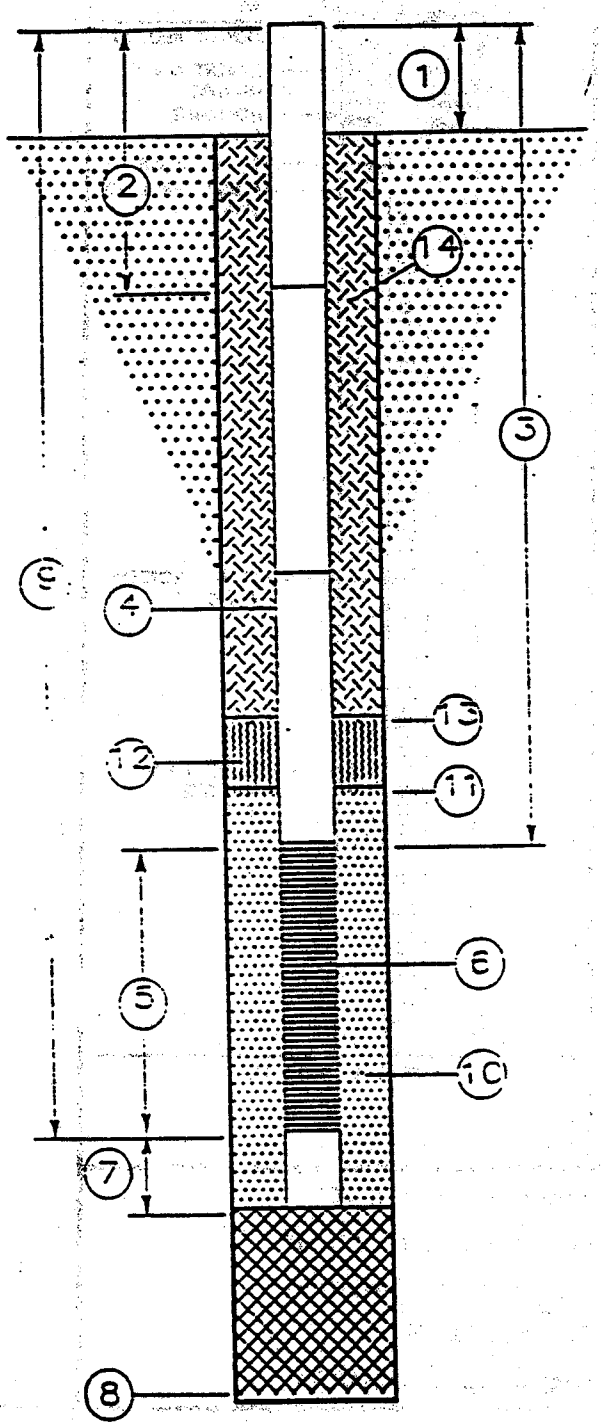
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T337-2

DATE OF INSTALLATION 1-3-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 in
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

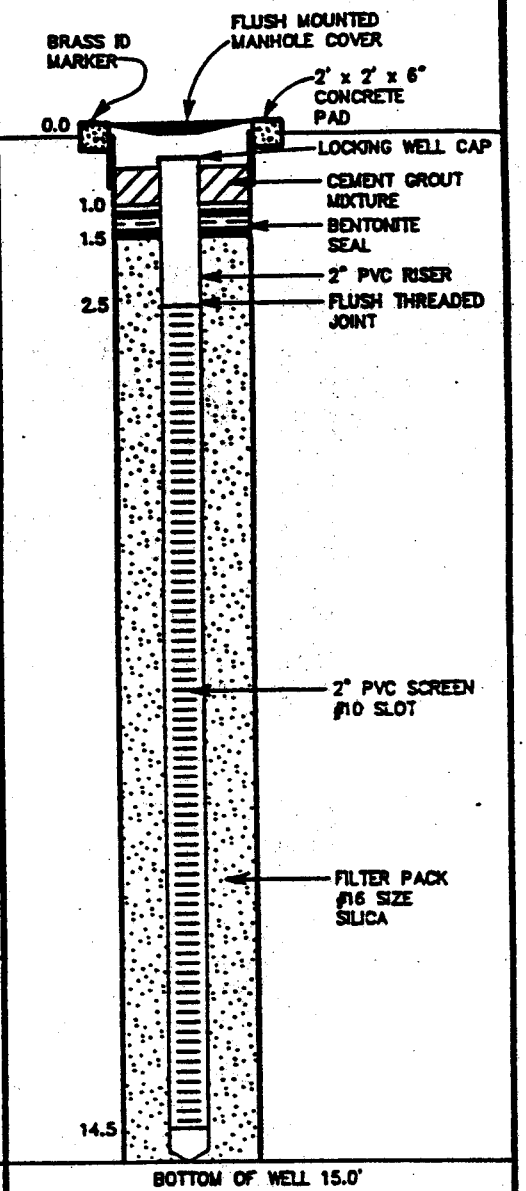
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 337, NAS, MEMPHIS, TN.

LOG OF BORING NO. A3 LOG OF WELL NO. MEM-T337-3

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			SILT, CLAYEY, BROWN
4.0			
			SILT, CLAYEY, GRAY, MOIST
7.0			
			SILT, CLAYEY, BROWN, MOIST
12.0			
			SILT, CLAYEY, GRAY, MOIST
13.8			24 HOUR WATER LEVEL
15.0			TERMINATED @ 15.0



Boring Completion Date: JAN. 3, 1990
Well Completion Date: JAN. 3, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 13.8'

Boring Diameter: 6.75"
Ground Elevation: 271.29'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

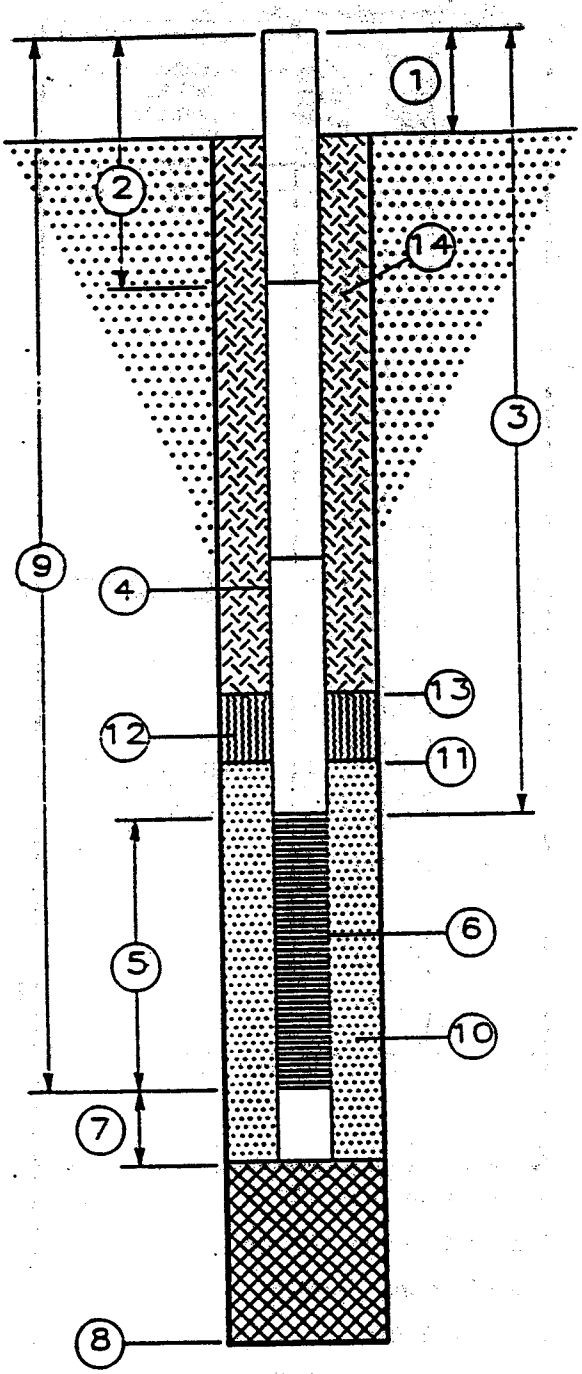
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T337-3

DATE OF INSTALLATION 1/3/90



1. Height of Casing above ground 0 ft.
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft.
   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 7.5 ft.
6. Type of Screen Schedule 40 PVC (0.01")
7. Length of Sump 0 ft.
8. Total Depth of Boring 10.0 ft Hole Diameter 6.25"
9. Depth To Bottom of Screen 10.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 1.7 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 2.0 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 0.2 ft.^{3}
13. Depth To Top of Seal 1.0 ft.
14. Type of Grout Cement
    Grout Mixture 1010%
    Method of Placement Pour

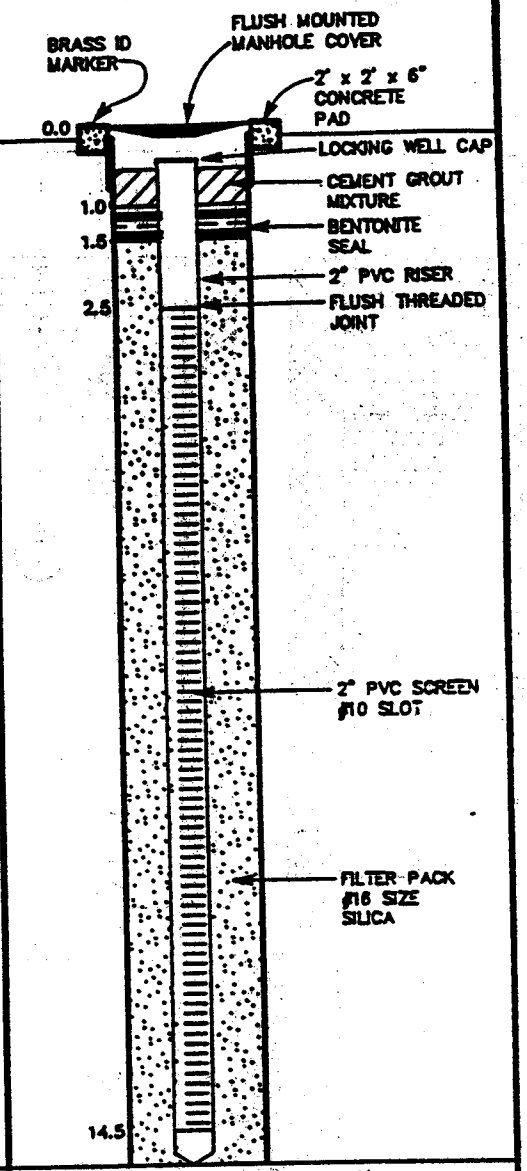
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1637, NAS, MEMPHIS, TN.

LOG OF BORING NO. A1 LOG OF WELL NO. MEM-T1637-1

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			.3 ASPHALT
			SILT, LIGHT RED, DRY
			3.0
5			SILT, CLAYEY, BROWN
			7.0
10			SILT, CLAYEY, RED, MOIST
			13.7 24 HOUR WATER LEVEL
15			15.0 TERMINATED @ 15.0



WELL CONSTRUCTION

Boring Completion Date: JAN. 5, 1990
Well Completion Date: JAN. 5, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 13.7'

Boring Diameter: 6.75"
Ground Elevation: 288.67'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

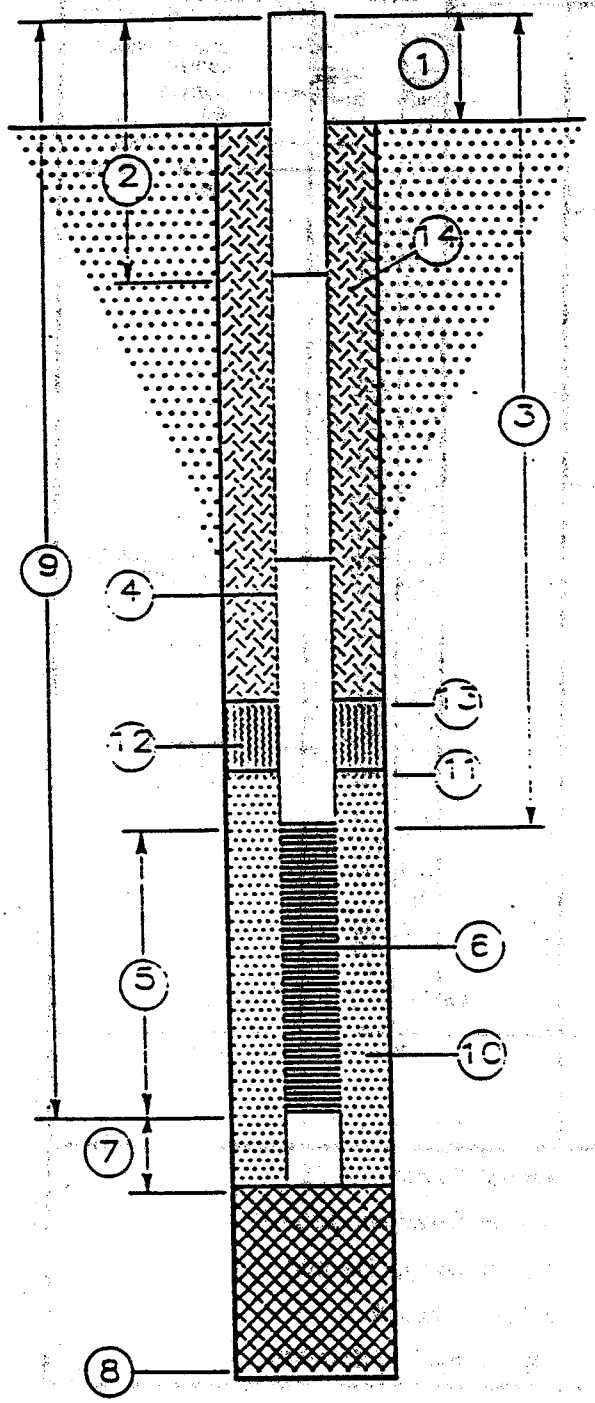
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1637-1

DATE OF INSTALLATION 1-5-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.

   Coupling Interval Depths 2.5 ft., 5.0 ft.

   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8"
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand

    Quantity Used 14.66 ft.^{3} Size #16 U/C ____
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets

    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement

    Grout Mixture 100%

    Method of Placement Pour

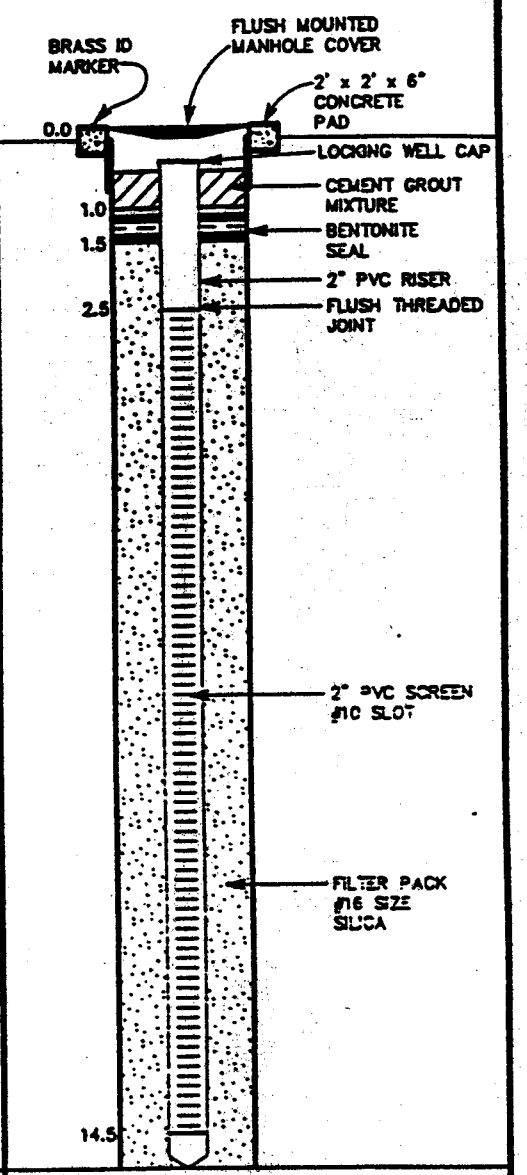
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1637, NAS, MEMPHIS, TN.

LOG OF BORING NO. A2 LOG OF WELL NO. MEM-T1637-2

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			.3 ASPHALT
			SILT, LIGHT RED
			4.0
5			SILT, LIGHT RED, WITH PEA GRAVEL
			9.3 24 HOUR WATER LEVEL
10			
			12.0
			SILT, RED, WET
15			15.0
			TERMINATED @ 15.0



WELL CONSTRUCTION

Boring Completion Date: JAN. 5, 1990
Well Completion Date: JAN. 5, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 9.3'

Boring Diameter: 6.75"
Ground Elevation: 288.49'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

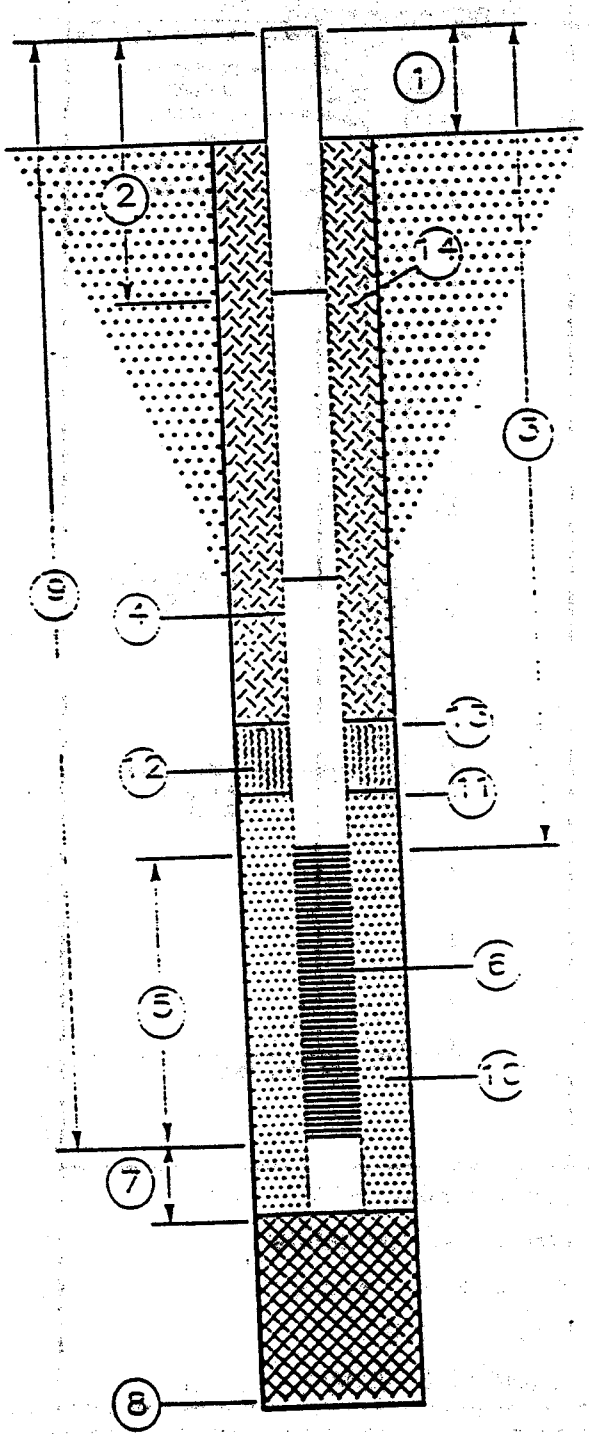
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1637-2

DATE OF INSTALLATION 1-5-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.
   Coupling Interval Depths 2.5 ft., 5.0 ft.
   15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand
    Quantity Used 14.66 ft.^{3} Size #16 U/C
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets
    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement
    Grout Mixture 100%
    Method of Placement Pour

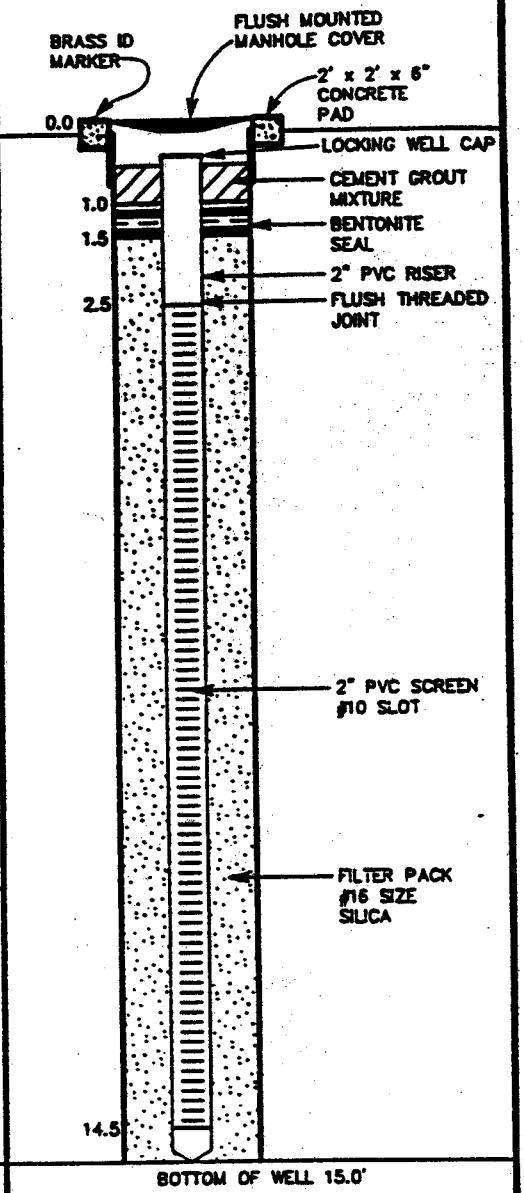
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING

GROUNDWATER MONITORING WELL INSTALLATION REPORT

LOCATION TANK SYSTEM 1637, NAS, MEMPHIS, TN.

LOG OF BORING NO. A3 LOG OF WELL NO. MEM-T1637-3

DEPTH IN FEET	SYMBOL	SAMPLES (LAB)	MATERIAL DESCRIPTION
			.3 ASPHALT
			SILT, LIGHT RED
			3.0
5			SILT, CLAYEY, BROWN, MOIST
			9.92 24 HOUR WATER LEVEL
10			11.0
			SILT, CLAYEY, BROWN, WET
			15.0
15			TERMINATED @ 15.0



Boring Completion Date: JAN. 5, 1990
Well Completion Date: JAN. 5, 1990
Well Development Date: N.A.
Drilling Method: POWER AUGER
Depth to Water: 9.9'

Boring Diameter: 6.75"
Ground Elevation: 288.59'
Top of Casing Elevation:
Driller: B. ELDER
Logged by: L. RICHARDS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

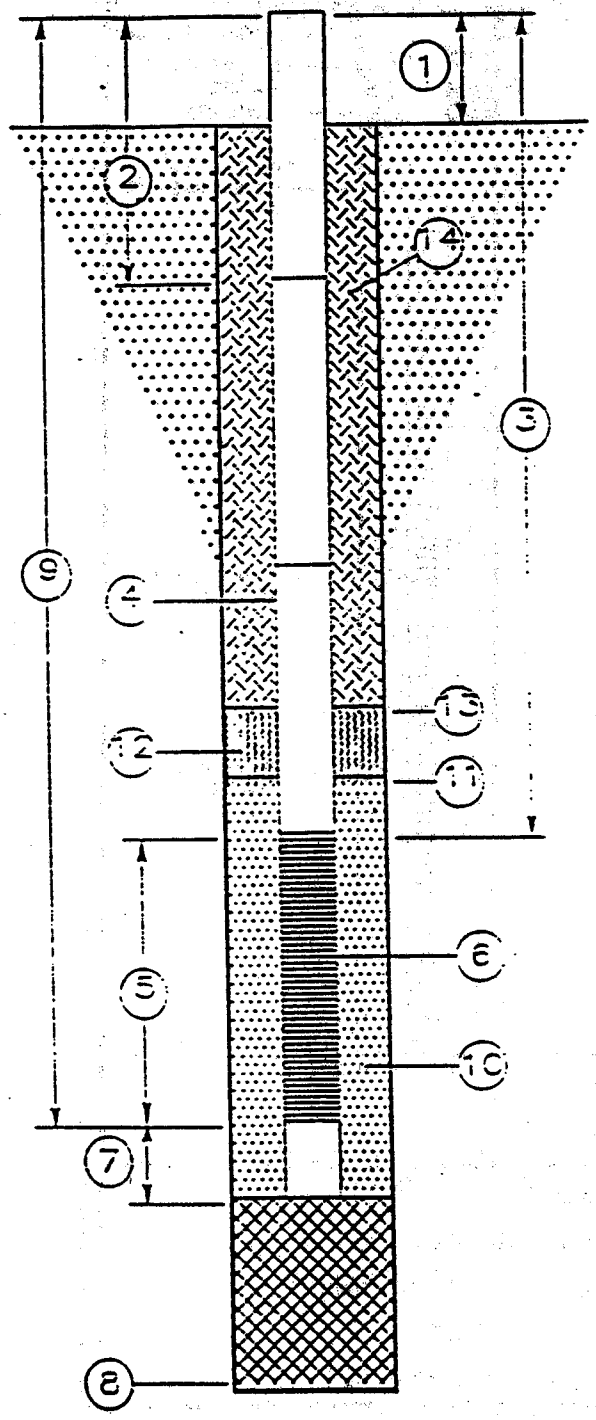
2155 EAGLE DR., P.O. BOX 10068

CHARLESTON, S.C. 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER MEM-T1637-3

DATE OF INSTALLATION 1-5-90



1. Height of Casing above ground 2 inches
2. Depth to first Coupling 2.5 ft.

   Coupling Interval Depths 2.5 ft., 5.0 ft. 15.0 ft.
3. Total Length of Blank Pipe 2.5 ft.
4. Type of Blank Pipe Schedule 40 PVC
5. Length of Screen 12.5 ft.
6. Type of Screen Schedule 40 PVC (0.01" slot)
7. Length of Sump 0
8. Total Depth of Boring 15 ft. Hole Diameter 8 inch
9. Depth To Bottom of Screen 15.0 ft.
10. Type of Screen Filter Quartz sand

    Quantity Used 14.65 ft.^{3} Size #16 U/C ____
11. Depth To Top of Filter 1 ft.
12. Type of Seal Bentonite pellets

    Quantity Used 1.05 ft.^{3}
13. Depth To Top of Seal 0 ft.
14. Type of Grout Cement

    Grout Mixture 100%

    Method of Placement Pour

USGS MONITORING WELLS

Sh: U-101

USGS02FL

WELL CONSTRUCTION LOG

installed by U.S. Army Corps of Engineers, Memphis District

WELL LOCATION observation well cluster W of N-1694, center well

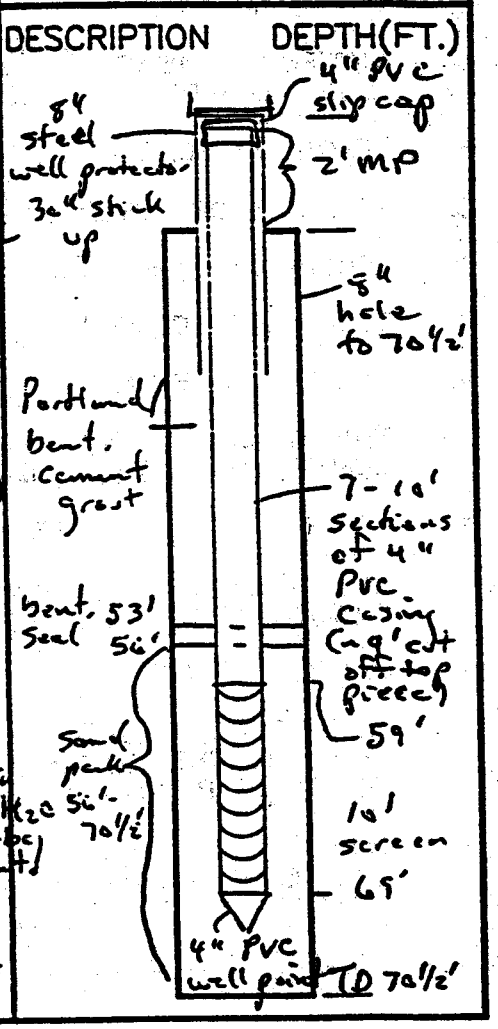
DATE INSTALLED 4/15/95 (grouted 4/15/95)

TYPE OF WELL 4" PVC observation well for water-level measurements in the fluvial deposits

1. HEIGHT OF CASING ABOVE GROUND 2'
2. WATER SURFACE ELEV. 4/26/95 18.00' BLS
   a) DEPTH TO SATURATED ZONE
3. TOP OF CASING ELEV. ~275' (land surface ~273')
4. PROTECTIVE CASING (YES) NO
   a) CASING LENGTH ~4'
5. LENGTH OF SCREEN 10'
6. SIZE\TYPE OF SCREEN 4" PVC Sch 40 #10 slot
7. LENGTH OF SUMP ~9"
8. TOTAL DEPTH OF BORING 70½' HOLE DIAMETER ~8"
9. SCREENED INTERVAL ~59'-69'
10. TYPE OF SCREEN FILTER PACK Silica Sand (10-20)
    QUANTITY USED 6 bags SIZE 50 lbs U/C
11. DEPTH TO TOP OF FILTER ~56'
12. TYPE OF SEAL bentonite pellets
    QUANTITY USED 1 50 lb bucket (~3 cu ft) ~3 gallons
13. DEPTH TO TOP OF SEAL ~53'
14. TYPE OF GROUT Portland cement w/ ~5% bent.
    GROUT MIXTURE 6 bags (100 lbs) w/ ~45 gallons H2O
    METHOD OF PLACEMENT 1" PVC tremie pipe 4 3/3 bent.
15. COMMENTS cuttings from hole placed in 9 drums; hole drilled to 13' w/ bar auger, hyd. rotary 13'-70½'; no WL measurements made because WL in well artificially high after installation

JOB NUMBER BRAC/DERA observation wells

INSTALLATION DESCRIPTION



RFI WORK PLAN
NAS MEMPHIS
MILLINGTON, TENNESSEE

FIGURE 4-7
WELL CONSTRUCTION LOG

DATE: 08/23/94 | DWG NAME: 016WLOG

USGSOILS

WELL CONSTRUCTION LOG WL-1L

Installed by U.S. Army Corps of Engineers, Memphis District

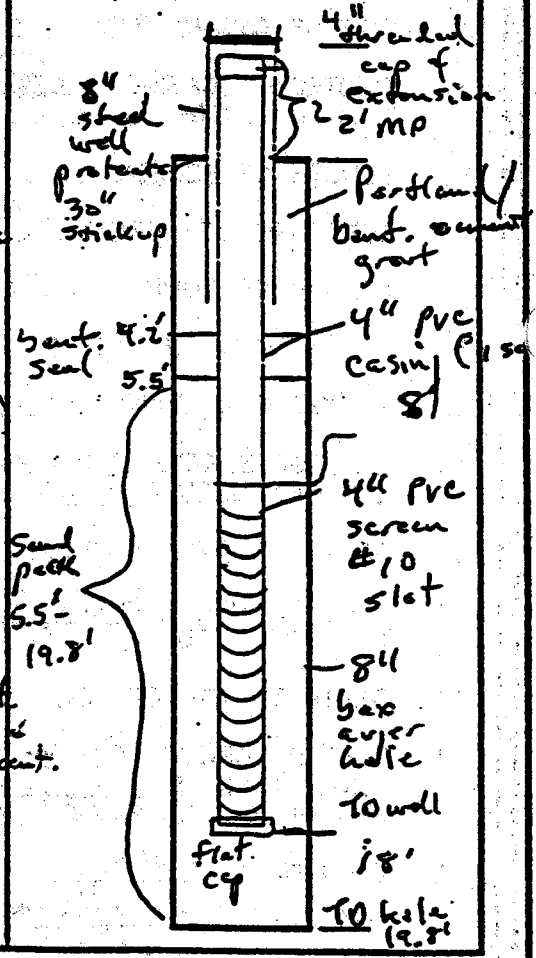
WELL LOCATION observation well cluster W of N-1694, SE well

DATE INSTALLED 4/12/95 (grouted 4/14/95)

TYPE OF WELL 4" PVC observation well for water-level measurements in the loess/alluvium

1. HEIGHT OF CASING ABOVE GROUND 2'
2. WATER SURFACE ELEV. 4/15/95: 5.7' BLS
   a) DEPTH TO SATURATED ZONE ~12' (4/12/95)
3. TOP OF CASING ELEV. ~275' (land surface ~273')
4. PROTECTIVE CASING (YES) NO
   a) CASING LENGTH ~4'
5. LENGTH OF SCREEN 10'
6. SIZE\TYPE OF SCREEN 4" PVC Sch 40 #10 slot
7. LENGTH OF SUMP ~3" 6" U/C
8. TOTAL DEPTH OF BORING 25' HOLE DIAMETER 8"
9. SCREENED INTERVAL 8'-18'
10. TYPE OF SCREEN FILTER PACK silica sand (20-40)
    QUANTITY USED 3 bags SIZE 100 lb U/C
11. DEPTH TO TOP OF FILTER ~5.5'
12. TYPE OF SEAL bentonite pellets
    QUANTITY USED 1/2 50 lb bucket (? cut) ~25 gallons
13. DEPTH TO TOP OF SEAL ~4.2'
14. TYPE OF GROUT Portland cement w/ ~5% bent.
    GROUT MIXTURE 2-100 lb bags w/ ~12½ gallons H_2O & ~16 oz bent.
    METHOD OF PLACEMENT pouring
15. COMMENTS cuttings from hole placed in one drum. hole drilled w/ 8" hollow auger; WL originally built to ~12' BLS, but frost to ~5'-6' BLS after ~24 hours

INSTALLATION DESCRIPTION



JOB NUMBER BRAC/DERA observation wells

RFI WORK PLAN
NAS MEMPHIS
MILLINGTON, TENNESSEE

FIGURE 4-7
WELL CONSTRUCTION LOG

DATE: 08/23/94 | DWG NAME: 016WLOG

DN: U-102

USGS@BHC

WELL CONSTRUCTION LOG. WL-1 Cluster

Installed by U.S. Army Corps of Engineers, Memphis District

WELL LOCATION observation well cluster w. of N-1624, NW well

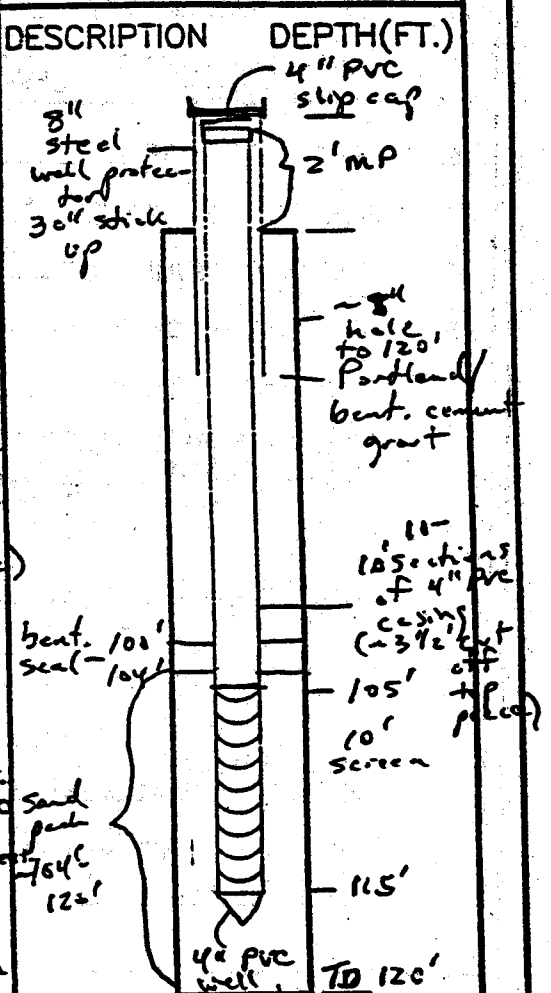
DATE INSTALLED 4/14/95 (grouted 4/15/95)

TYPE OF WELL 4" PVC observation well for water-level measurements in the Cockfield formation

1. HEIGHT OF CASING ABOVE GROUND 2'
2. WATER SURFACE ELEV. 4/26/95 14.78' BLS
   a) DEPTH TO SATURATED ZONE
3. TOP OF CASING ELEV. ~275' (land surface ~273')
4. PROTECTIVE CASING (YES) NO
   a) CASING LENGTH ~4'
5. LENGTH OF SCREEN 10'
6. SIZE\TYPE OF SCREEN 4" PVC Sch 40 #10 slot
7. LENGTH OF SUMP ~9"
8. TOTAL DEPTH OF BORING 120' HOLE DIAMETER ~8"
9. SCREENED INTERVAL ~105'-115'
10. TYPE OF SCREEN FILTER PACK silica sand (10-20 f, 20-40 f)
    QUANTITY USED 100 lbs each, 200 lbs total, + SIZE U/C natural gravel (collapse)
11. DEPTH TO TOP OF FILTER ~104'
12. TYPE OF SEAL bentonite pellets
    QUANTITY USED 1 1/2 50 lb bucket (~cu ft) ~7.5 gallons
13. DEPTH TO TOP OF SEAL ~100'
14. TYPE OF GROUT Portland cement w/ ~5% bent.
    GROUT MIXTURE 9 bags (100 lbs) w ~66 gallons H2O
    METHOD OF PLACEMENT 1" PVC tremie pipe 41 1/2 bags bent
15. COMMENTS cuttings from hole placed in 15 drums; hole drilled to 12' w/ bore auger. hyd. rotary 12'-120'; Shelby tube samples from 12'-14' & 120'-122.5'. no WL measurements made because WL in well artificially high after installation

JOB NUMBER BRAC/DERP observation wells

INSTALLATION DESCRIPTION



RFI WORK PLAN
NAS MEMPHIS
MILLINGTON, TENNESSEE

FIGURE 4-7
WELL CONSTRUCTION LOG

DATE: 08/23/94 | DWG NAME: 016WLOG

USGS04FL

WELL CONSTRUCTION LOG

installed by U.S. Geological Survey, Tennessee Dist.

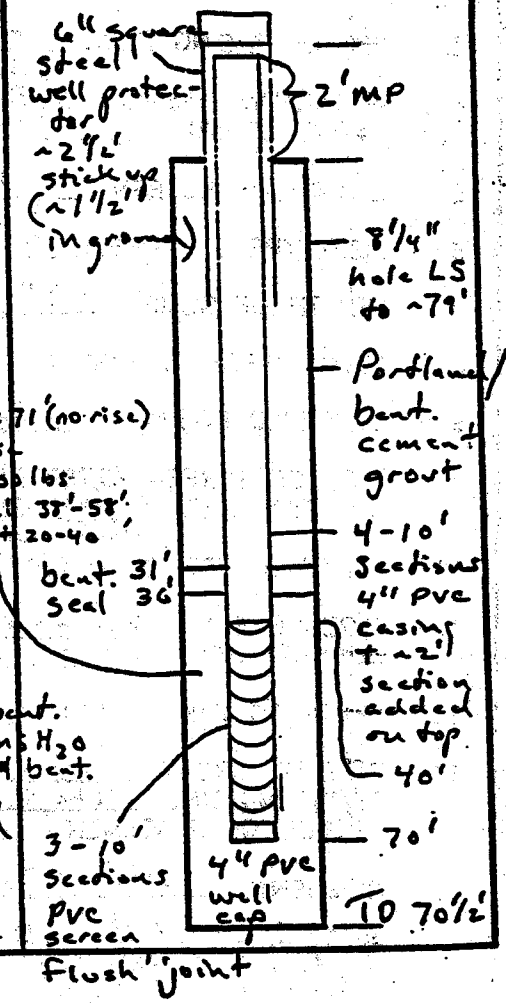
WELL LOCATION observation well ~75' ENE of observation well cluster WL-1, west of N-1694

DATE INSTALLED 8/19/95 (grout & ped completed)

TYPE OF WELL 4" PVC observation/production well for aquifer test in the fluvial deposits

1. HEIGHT OF CASING ABOVE GROUND ~2'
2. WATER SURFACE ELEV. 18.8' BLS 8/18/95
   a) DEPTH TO SATURATED ZONE
3. TOP OF CASING ELEV. ~275' (land surface ~273')
4. PROTECTIVE CASING (YES) NO
   a) CASING LENGTH ~4'
5. LENGTH OF SCREEN 30'
6. SIZE\TYPE OF SCREEN 4" PVC sch 40 #10 slot flush joint
7. LENGTH OF SUMP ~9"
8. TOTAL DEPTH OF BORING ~79' HOLE DIAMETER 8 1/4"
9. SCREENED INTERVAL ~40'-70'
10. TYPE OF SCREEN FILTER PACK 6 bags 10-20 sand ~71' (no rise)
    QUANTITY USED — SIZE — U/C natural collapse ~58'-70'; 3-40 lbs 1/4"-3/8" pea gravel 38'-58'; 1-5 gal bucket 20-40
11. DEPTH TO TOP OF FILTER ~36'
12. TYPE OF SEAL bentonite pellets, sand 36'-38'
    QUANTITY USED 1/2", 5 gallons
13. DEPTH TO TOP OF SEAL 31'
14. TYPE OF GROUT Portland cement w/ ~5% bent.
    GROUT MIXTURE 12 bags (100 lbs) w/ ~35 gallons H_2O & bent.
    METHOD OF PLACEMENT poured from 55 gal. drum
15. COMMENTS cuttings & mud from hole placed in 17 drums

INSTALLATION DESCRIPTION



JOB NUMBER BRAC/DERA observation wells

RFI WORK PLAN
NAS MEMPHIS
MILLINGTON, TENNESSEE

FIGURE 4-7
WELL CONSTRUCTION LOG

DATE: 08/23/94 | DWG NAME: 016WLOG

FIELD BORING LOG

HOLE NO.____
SHEET____ OF____

PROJECT 711 # 1C LOCATION Mph. NAVY BASE - NORTH
DRILL RIG F-1500 INSPECTOR HARP OPERATOR LYCE
DEPTH OF WATER 8.0' DATE 4/12/95 TABLE 5.9' DATE 4/13/95
ELEVATION OF GROUND____ MUD 15.0'

Sample Number	Date	Sample From	Sample To	Stratum From	Stratum To	Classification — Remarks	Type Sampler
	4/12/95	0.0	1.0	0.0	2.0	Br. silT w/clay moisT	Auger
		2.0	3.0	2.0		Br. lEAN clay w/silT, wES	↓
		5.0	6.0			Br. Fgr. silTy clay, ox, wES.	
		7.0	8.0		12.0	Br F Gr. lEAN clay, oganic, ox, wES	
		12.0	14.5	12.0	18.0	Gr. silT	3" Tube
		20.0	30.0	18.0	41.0	Gr. fAT clay, organic	JET
		50.0		41.0	52.0	Gr. clayey sand	↓
		52.0		52.0	76.0	Br. gravel	
		90.0		76.0	85.0	Gr. clayey sand w/gravel	
		90.0		85.0	97.0	Gr. silTy clay w/gravel	
		100.0		97.0	120.0	Br. silTy clay	
		120.0	122.0	120.0		BK. fAT clay w/fine sand - TERTIARY	3" Tube