

**RCRA FACILITY INVESTIGATION REPORT  
ADDENDUM  
NAVAL SUPPORT ACTIVITY MID-SOUTH**

**AREA OF CONCERN A  
NORTHSIDE FLUVIAL GROUNDWATER**

**Revision: 0**

**CTO-094**

**Prepared for:**

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

**Prepared by:**

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**February 17, 2000**

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February 18, 2000

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Subject: CTO-094; Document Transmittal — *RCRA Facility Investigation Report, AOC A — Northside Fluvial Groundwater (Revision 2) Millington, Tennessee; RCRA Facility Investigation Report Addendum, AOC A — Northside Fluvial Groundwater (Revision 0); Millington, Tennessee; February 17, 2000*

Reference: Contract N62467-89-D-0318 (CLEAN II)

Dear Sir:

Please find enclosed one copy of the *RCRA Facility Investigation Report, AOC A RFI Report (Revision 2)*. This document has been revised to address the BCT comments and includes green "final" covers. Also enclosed is the *RCRA Facility Investigation Report Addendum, AOC A RFI Report (Revision 0)*. As requested, copies have been distributed as shown on the attached NSA Mid-South RFI Distribution List.

If you have questions or comments of a technical nature, please contact me at 901/372-7962. Comments or questions of a contractual nature should be directed to Debra Blagg at 901/386-9344.

Sincerely,

EnSafe Inc.

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Enclosures: As Stated

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## Table of Contents

EXECUTIVE SUMMARY	vii
1.0 INTRODUCTION	1-1
2.0 GEOLOGY AND HYDROGEOLOGY	2-1
2.1 NSA Northside Geology and Hydrogeology	2-1
2.2 Structural Interpretations and Implications for Contaminant Transport	2-8
2.3 Site-Specific Geology	2-15
2.4 Geotechnical/Design Data	2-32
2.5 Site-Specific Hydrogeology	2-39
2.5.1 Aquifer Characterization	2-51
2.5.2 Groundwater Velocities	2-59
3.0 GEOLOGY AND HYDROGEOLOGY	3-1
3.1 Site-Specific Geology	3-1
3.2 Geotechnical/Design Data	3-14
3.3 Site-Specific Hydrogeology	3-19
4.0 NATURE AND EXTENT OF CONTAMINATION	4-1
4.1 VOCs in the Fluvial Deposits Groundwater	4-3
4.2 VOCs in the Cockfield Formation Groundwater	4-8
5.0 CHEMICAL CONCEPTUAL MODEL	5-1
5.1 Salient Features of the Model	5-2
5.1.1 Characteristics of the Original Releases	5-2
5.1.2 Presence of Numerous Plumes	5-4
5.1.3 Expected Plume Lengths	5-4
5.1.4 Expected Plume Widths	5-6
5.1.5 Short-Term Time Stability of Plumes	5-14
5.1.6 Chemical Fingerprinting	5-21
5.1.7 Biodegradation	5-28
5.1.8 Is DNAPL Present?	5-31
5.2 Proposed Contaminant Transport Mechanism	5-39
5.3 Spatial Interpretation	5-44
5.3.1 Interpretation Process	5-44
5.3.2 Results	5-45
5.3.3 Comments on Sources	5-46
5.4 Possible Implications to Cleanup	5-70
5.4.1 Selecting an Appropriate Cleanup Strategy	5-70
5.4.2 Is Natural Attenuation "Working"?	5-71
5.5 Conclusions	5-72

6.0	CONCLUSIONS AND RECOMMENDATIONS	6-1
7.0	REFERENCES	7-1

### List of Figures

Figure 2-1	General NSA Mid-South Geology (Sections A-A' and B-B')	2-3
Figure 2-2	Potentiometric Differences; Upper and Lower Fluvial Deposits Groundwater	2-9
Figure 2-3	Potentiometric Surface; Fluvial Deposits Groundwater	2-11
Figure 2-4	Hydrogeologic Section A-A'	2-17
Figure 2-5	Hydrogeologic Section B-B'	2-19
Figure 2-6	Hydrogeologic Section C-C'	2-21
Figure 2-7	Hydrogeologic Section D-D'	2-23
Figure 2-8	Top of Fluvial Deposits	2-27
Figure 2-9	Thickness of Fluvial Deposits	2-29
Figure 2-10	Top of Cockfield Formation	2-33
Figure 2-11	Measured Coefficients of Permeability	2-35
Figure 2-12	Median Grain Sizes	2-41
Figure 2-13	Potentiometric Map of Loess Groundwater	2-45
Figure 2-14	Potentiometric Map of Fluvial Deposits Groundwater	2-47
Figure 2-15	Potentiometric Map of Fluvial Deposits Groundwater	2-49
Figure 2-16	Potentiometric Map of Cockfield Formation Groundwater	2-53
Figure 2-17	Horizontal Hydraulic Conductivity of Loess, Fluvial Deposits and	
Figure 3-1	Transects A-A', B-B', C-C' and D-D'	3-3
Figure 3-2	Hydrogeologic Section A-A'	3-5
Figure 3-3	Hydrogeologic Section B-B'	3-7
Figure 3-4	Hydrogeologic Sections C-C' and D-D'	3-9
Figure 3-5	Top of Cockfield Formation	3-15
Figure 3-6	Potentiometric Map of Fluvial Deposits Groundwater Cockfield Formation	3-21 2-55
Figure 4-1	PCE in Fluvial Deposits Groundwater	4-23
Figure 4-2	TCE in Fluvial Deposits Groundwater	4-25
Figure 4-3	1,2-DCE (total) in Fluvial Deposits Groundwater	4-27
Figure 4-4	1,1-DCE in Fluvial Deposits Groundwater	4-29
Figure 4-5	1,1-DCA in Fluvial Deposits Groundwater	4-31
Figure 4-6	1,2-DCA in Fluvial Deposits Groundwater	4-33
Figure 4-7	Carbon Tetrachloride in Fluvial Deposits Groundwater	4-35
Figure 4-8	Chloroform in Fluvial Deposits Groundwater	4-37
Figure 4-9	Other VOCs in Fluvial Deposits Groundwater	4-39
Figure 5-1	N-126 Plume Transects — TCE and Carbon Tetrachloride	5-7
Figure 5-2	N-6 Plume Transects — TCE and Carbon Tetrachloride	5-9
Figure 5-3	North Apron Plume Transects — TCE and Carbon Tetrachloride	5-11

Figure 5-4	Groundwater Flow Changes, 1996 — 1999	5-15
Figure 5-5	Vertical Zonation of Contaminants	5-17
Figure 5-6	Chlorinated Solvent Concentration Trends	5-19
Figure 5-7	TCE/PCE Correlation Analysis	5-23
Figure 5-8	PCE-TCE Chemical Fingerprint Plot (specific wells)	5-25
Figure 5-9	PCE-TCE Chemical Fingerprint Plot (all data)	5-27
Figure 5-10	Ratio of TCE to PCE	5-29
Figure 5-11	Fraction of Daughter Products	5-33
Figure 5-12	Distribution Plot of Parent Concentrations	5-37
Figure 5-13	Geochemical Conceptual Model	5-41
Figure 5-14	PCE Conceptual Model	5-47
Figure 5-15	TCE Conceptual Model	5-49
Figure 5-16	1,2-DCA Conceptual Model	5-51
Figure 5-17	1,2-DCE Conceptual Model	5-53
Figure 5-18	1,1-DCA Conceptual Model	5-55
Figure 5-19	1,1-DCE Conceptual Model	5-57
Figure 5-20	Carbon Tetrachloride	5-59
Figure 5-21	Chloroform	5-61
Figure 5-22	Three-Dimensional Image of TCE Contamination	5-65

### List of Tables

Table 2-1	Relative Ages of Stratigraphic Units	2-2
Table 2-2	Geotechnical Samples Collected	2-37
Table 2-3	Ranges of Select Soil Properties from AOC A Soil Borings	2-38
Table 3-1	Total Organic Carbon in Cockfield Formation NSA Mid-South	3-17
Table 3-2	Geotechnical Samples Collected	3-18
Table 4-1	Groundwater Sampling Events in RFI Addendum AOC A — NSA Mid-South	4-1
Table 4-2	VOCs in Fluvial Deposits Groundwater NSA Mid-South AOC A	4-9
Table 4-3	VOCs in Cockfield Formation Groundwater	4-21
Table 5-1	Groundwater Level Changes Referenced to 4/96 Measurements	5-14

### List of Appendices

Appendix A	Analytical Data
Appendix B	Boring Logs
Appendix C	Geotechnical Data

## ACRONYM LIST

1,1-DCA	1,1-Dichloroethane
1,1-DCE	1,1-Dichloroethylene
1,2-DCA	1,2-Dichloroethane
1,2-DCP	1,2-Dichloropropane
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society of Testing and Materials
BCT	BRAC Cleanup Team
BOD	Biochemical Oxygen Demand
bls	below land surface
BRAC	Base Closure and Realignment Act
cis-1,2-DCE	cis-1,2-Dichloroethene
cm/sec	centimeters per second
CMS	Corrective Measures Study
CSI	Confirmatory Sampling Investigation
COD	Chemical Oxygen Demand
DNAPL	Dense Non-aqueous Phase Liquid
DPT	Direct Push Technology
DQO	Data Quality Objective
ETC	Environmental Testing and Consulting
FSA	Full Scan Analysis
ft btoc	feet below top of casing
ft/d	feet per day
gpm	gallon per minute
K	hydraulic conductivity
MCL	Maximum Contaminant Level
mg/L	milligram per liter
mg/kg	milligram per kilogram
msl	mean sea level
NAS	Naval Air Station
NSA	Naval Support Activity

PCE	Tetrachloroethylene or Perchloroethylene
PID	Photoionization detector
ppm	parts per million
PVC	Polyvinyl chloride
RBC	Risk-Based Concentration
RC	Reference Concentration
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SWMU	Solid Waste Management Unit
TOC	total organic carbon
TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene or Trichloroethene
TDEC	Tennessee Department of Environment and Conservation
USEPA	U. S. Environmental Protection Agency
USCS	Unified Soil Classification System
USGS	U. S. Geological Survey
VOCs	Volatile Organic Compounds
$\mu\text{g}/\text{kg}$	micrograms per kilogram
$\mu\text{g}/\text{L}$	micrograms per liter

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## EXECUTIVE SUMMARY

This addendum presents the remainder of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) data collected for *Area of Concern A (AOC A) – Northside Fluvial Groundwater* for Naval Support Activity (NAVSUPACT or NSA) Mid-South in Millington, Tennessee. Together, the original RFI report and this RFI addendum comprise the AOC A – Northside Fluvial Groundwater RFI.

The following conclusions and recommendations are based on the RFI activities reported in this addendum:

- The chlorinated solvents consisting of perchloroethylene (PCE), trichloroethylene (TCE) and carbon tetrachloride in the fluvial deposits groundwater exceeded their maximum contaminant levels (MCLs) beneath the airport's grassy infield and areas north of the runway to the base property boundary, approximately 2,900 feet downgradient from the suspected source areas. The following MCL exceedances were identified in the fluvial deposits groundwater at the base's perimeter road at PZ-3:

Constituent	Maximum Concentration ( $\mu\text{g/L}$ )	MCL ( $\mu\text{g/L}$ )
PCE	8	5
TCE	6.1	5
carbon tetrachloride	11	5

- Chlorinated solvents in groundwater attenuate as they leave the base property. Concentrations in monitoring wells 007G52LF and 007G53LF, approximately 450 feet downgradient of PZ-3 and off the base property, were below the MCLs and not detected, respectively.
- A long-term aquifer pump test was conducted north of the runway to: (1) further refine aquifer parameters in areas where chlorinated solvent contamination was identified

(2) evaluate optimum pumping rates and zones of influence, and (3) collect adequate data to further refine the corrective measures study (CMS) contaminant transport model. The mean hydraulic conductivity ( $K$ ) calculated by curve matching of drawdown and recovery curves from the aquifer test was 59.1 feet/day. A pumping rate of 42 gallons per minute was sustained during the test, which influenced the fluvial deposits aquifer roughly 2,200 radial feet from the pumping well.

- Aquifer properties vary significantly across the study area as evidenced by the contrasting  $K$  values calculated during the RFI addendum (59.1 feet/day) and the earlier RFI activities by the U.S. Geological Survey (5.6 feet/day) for locations 2,500 feet apart. The effect of higher  $K$  values upon the contaminant fate and transport model will be further evaluated during the CMS.
- Soil samples collected from the Cockfield Formation, the upper part of the lower confining unit that underlies the fluvial deposits, contained total organic carbon (TOC) concentrations ranging from 0.2% to 12%. High TOC, coupled with the low permeability of the Cockfield Formation ( $5.5 \times 10^{-5}$  cm/sec to  $1.6 \times 10^{-6}$  cm/sec), appears to be retarding any potential downward migration of chlorinated solvents in the fluvial deposits aquifer. Groundwater samples collected from the Cockfield Formation for this addendum did not contain chlorinated solvents.
- Chlorinated solvents identified in the Northside's fluvial deposits aquifer will be addressed in the CMS for AOC A.

## 1.0 INTRODUCTION

This addendum presents additional data from the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) activities that were not included in Revision 2 of the *Area of Concern (AOC) A — Northside Fluvial Groundwater RFI Report* (EnSafe, February 17, 2000)<sup>1</sup> for Naval Support Activity Mid-South in Millington, Tennessee. Together, the original RFI report and this RFI addendum comprise the AOC A — Northside Fluvial Groundwater RFI.

The RFI identified chlorinated solvents in the fluvial deposits aquifer at concentrations exceeding the maximum contaminant levels (MCLs). The chlorinated solvents were attributable to multiple small sources adjacent to the airfield, primarily near the former N-6 and N-126 hangars, although an actual source area was not identified in the loess soil or loess groundwater overlying the fluvial deposits. The maximum solvent concentration identified during the RFI's long-term monitoring was 1,100 micrograms per liter ( $\mu\text{g/L}$ ) of trichloroethylene (TCE) adjacent to the N-126 hangar (well 007G04LF). Earlier RFI data had shown that the vertical extent of contamination was limited to the fluvial deposits while the horizontal extent remained undefined. Based on this data, the Base Realignment and Closure Cleanup Team (BCT) decided in May 1997 to conclude the AOC A RFI, with the caveat that the groundwater contaminants' downgradient extent would be further evaluated during a corrective measures study (CMS).

The downgradient extent of groundwater contaminants was evaluated in multiple phases, during which contaminants were identified beyond the Navy property boundary and the distance predicted in the U.S. Geological Survey's (USGS) fate and transport models. In an effort to explain the transport distance of contaminants, an additional pump test was conducted north of the runway to calculate the aquifer properties there and to eventually refine the fate and transport model.

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<sup>1</sup> Includes comments received from the original RFI report (Revision 01) submitted in June 1998 (EnSafe June 1998).

Furthermore, several long-term monitoring events have also been conducted since submitting the RFI report, which warranted revising the hydrogeological interpretation and the conceptual model presented in the RFI report. Considering the need for these revisions and the voluminous amount of data generated since submitting the original RFI Report in June 1998, the BCT decided that an addendum to the RFI was warranted rather than including this information in the CMS report.

### **Report Organization**

Section 2 of this report presents the chronology of activities since submittal of the RFI report and the rationale and a brief summary of findings for each investigative phase. Section 3 presents the additional hydrogeologic data collected from areas north of the runway and results of the aquifer test conducted there. Section 4 presents the analytical results from the additional investigative activities between May 7 and July 1999, data that is not included in the RFI report (EnSafe, February 17, 2000). Section 5 presents the revised geochemical conceptual model for chlorinated solvents identified in the fluvial deposits groundwater and an evaluation of their fate and transport. Section 6 presents the conclusions and recommendations, and Section 7 lists references used in this report.

## 2.0 CHRONOLOGY OF AOC A RFI ADDENDUM

The RFI data gap to be completed in the CMS consisted of defining the horizontal extent of contamination. TCE concentrations reported in the RFI report (EnSafe, February 17, 2000) varied from 1,100  $\mu\text{g/L}$  near the suspected source area (007G04LF) to 45  $\mu\text{g/L}$  downgradient in the grassy infield (007G10LF); however, the point at which concentrations diminished to below the MCLs was not identified. After multiple investigative phases, the horizontal extent of chlorinated solvents in groundwater was defined to an area approximately 450 feet off the base property.

This section presents a chronology of investigative activities since May 1997 that are not included in the RFI report (EnSafe, February 17, 2000). Each individual phase or milestone outlined in Table 2-1, the overall findings, and why subsequent phases were warranted is discussed below.

**Table 2-1**  
**Chronology of RFI Addendum**  
**AOC A — NSA Mid-South**

Date(s)	Investigative Phase/Milestones	General Findings
April — May 1997	All Assembly A fluvial deposits and Cockfield Formation wells were sampled as part of Event 4 of long-term monitoring for VOCs.	Anomalous VOC detections were identified in the Cockfield Formation and the fluvial deposits at SWMU 60. VOCs in other fluvial deposits wells were consistent with historical concentrations.
November 1997	Assembly A fluvial deposit wells were again sampled as part of Event 5 of long-term monitoring for VOCs.	VOCs were not identified in the Cockfield Formation and fluvial deposits (SWMU 60) during resampling in July and November 1997. VOCs in other fluvial deposits wells were consistent with historical concentrations.

**Table 2-1**  
**Chronology of RFI Addendum**  
**AOC A — NSA Mid-South**

Date(s)	Investigative Phase/Milestones	General Findings
July 13 — Aug. 8, 1998 (Third Drilling Phase) <sup>a</sup>	Drilling of eight fluvial deposits monitoring wells northwest of the aircraft taxiway and the traffic control tower for downgradient definition of chlorinated solvents in groundwater. SWMU 5 was supplemented with an additional lower fluvial well and two lower fluvial wells were installed at Building N-12.	Chlorinated solvents identified in lower fluvial deposits groundwater up to the runway. Horizontal extent of N-6 hangar plume in middle fluvial deposits defined. VOCs were not identified in SWMU 5 well and Building N-12 wells contained VOCs similar to apron area concentrations.
September — Oct. 1998	Evaluated diffusion samplers in a pilot study as an alternative to monitoring VOCs in groundwater.	Analytical results were consistent with historical data. Diffusion samplers were approved for RFI monitoring of VOCs at NSA Mid-South.
Nov. 18 — 24, 1998 (Fourth Drilling Phase)	Drilling of six fluvial deposits monitoring wells for further evaluation of horizontal extent in lower fluvial deposits groundwater. Four piezometers installed for potentiometric control in distal areas.	Chlorinated solvents detected northwest of runway exceed the MCLs. Width and downgradient extent of contaminant plume remained undefined.
Feb. 1 — 23, 1999 (Fifth Drilling Phase)	Thirteen monitoring wells installed into the fluvial deposits for further downgradient evaluation of solvents in groundwater.	Width of plume defined, however, downgradient extent undefined; chlorinated solvent concentrations above the MCLs at base property boundary.
June 8 — June 11, 1999	Two piezometers/wells were installed off the base property by the USGS for potentiometric control in the fluvial deposits.	Potentiometric data used to locate downgradient offsite wells.
July 8 — 24, 1999 (Sixth Drilling Phase)	Four monitoring wells were installed off the base property to define chlorinated solvent concentrations in lower fluvial deposits groundwater.	Chlorinated solvents present 450-feet off the base property but below MCLs; however, they were not detected at the most distant downgradient wells (3,200 feet).
Aug. 2 — 13, 1999	Aquifer test performed north of runway to further refine the hydraulic properties of the fluvial deposits aquifer.	Confirmed heterogeneity of the aquifer properties. Transmissivity calculated to be an order of magnitude higher than earlier tested upgradient area.

**Note:**

- a — The first two drilling phases were conducted in February 1995 and March 1996 and are presented in the *AOC A RFI Report* (EnSafe, February 17, 2000).

## **2.1 Long-Term Groundwater Monitoring — Event 4 (April and May 1997)**

Event 4, part of AOC A's long-term monitoring (April and May 1997) was the sixth time the original nine RFI fluvial well clusters were sampled and the third time for the second-phase RFI wells (007G10LF to 007G18LF). The following monitoring wells were sampled during this event:

- *SWMU 3*: 003G04LF
  
- *SWMU 7*: all the fluvial wells/well clusters installed to date (007G01 to 007G18) and Cockfield formation wells 007G01UC to 007G05UC and 007G09UC).
  
- *SWMU 5*: 005G01UF, 005G02UF, 005G03UF, 005G04UF, and 005G05LF
  
- *SWMU 15*: 015G01UF to 015G04UF and 015G01LF to 015G04LF
  
- *SWMU 60*: 060G02LF and 060G04LF

Groundwater samples were analyzed for volatile organic compounds (VOCs) by Savannah Laboratory in Savannah, Georgia using USEPA Method 8260. Level III-equivalent data quality objectives (DQO) were provided for 95% of the samples and Level-IV equivalent DQO for the remaining 5%. Groundwater samples were also submitted from select wells for design parameters analyses, which included the following: alkalinity, 5-day biochemical oxygen demand (BODs), chemical oxygen demand (COD), chloride, iron, manganese, hardness, heterotrophic plate count, methane, nitrate-N, sulfate, and total Kjeldahl nitrogen (TKN). VOC analytical results are provided in Appendix A.

## **Findings**

In samples from three previously "clean" Cockfield formation wells (007G04UC, 007G05UC, and 007G09UC) and a lower fluvial deposits sample from SWMU 60 (060G02LF) VOCs exceeded applicable regulatory standards. To verify the results, these wells were resampled in July 1997 and found to be "clean." An evaluation of the anomalous VOCs detected during Event 4 did not identify the source of the contamination, suggesting that sample cross-contamination from a previously sampled contaminated well was the contaminant source (EnSafe, September 1997). VOCs in other fluvial deposits wells were consistent with historical concentrations.

### **2.2 Long-Term Groundwater Monitoring — Event 5 (November 1997)**

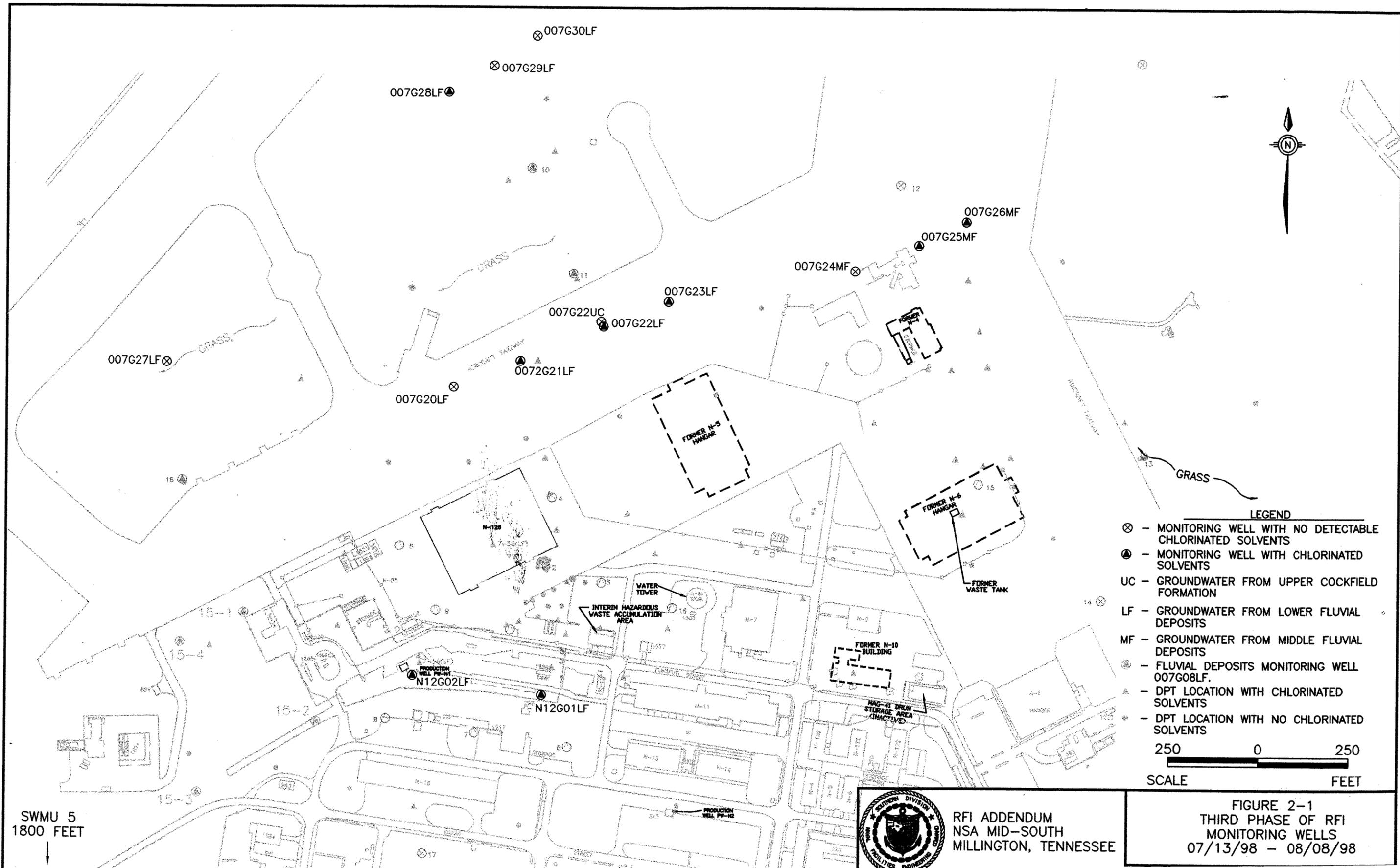
The wells sampled during Event 4, with exception of the SWMU 15 wells, were also sampled in Event 5.

## **Findings**

Analytical results were again relatively consistent with those from Event 4. VOCs detected in the Cockfield Formation and SWMU 60's lower fluvial deposits during Event 4 were not detected in Event 5, confirming that these earlier detections were anomalous and should be disregarded. A significant increase in TCE concentrations was identified at well 007G04LF. Concentrations increased from 870  $\mu\text{g/L}$  during Event 4 to 1,400  $\mu\text{g/L}$  during Event 5.

### **2.3 Third Well Construction Phase (July 13 — August 8, 1998)**

The third monitoring well construction phase consisted of installing 11 fluvial deposits monitoring wells and one upper Cockfield formation well in the grass infield and aircraft taxiway, two lower fluvial deposits wells at Building N-12, and one lower fluvial deposits well at SWMU 5. Drilling services were provided by Alliance Environmental services using rotary sonic drilling methods. New well locations are shown in Figure 2-1. Well completion data are provided in Table 2-2 and well-construction logs are provided in Appendix B.



**LEGEND**

- ⊗ - MONITORING WELL WITH NO DETECTABLE CHLORINATED SOLVENTS
- ⊙ - MONITORING WELL WITH CHLORINATED SOLVENTS
- UC - GROUNDWATER FROM UPPER COCKFIELD FORMATION
- LF - GROUNDWATER FROM LOWER FLUVIAL DEPOSITS
- MF - GROUNDWATER FROM MIDDLE FLUVIAL DEPOSITS
- ⊙ - FLUVIAL DEPOSITS MONITORING WELL 007G08LF.
- ▲ - DPT LOCATION WITH CHLORINATED SOLVENTS
- \* - DPT LOCATION WITH NO CHLORINATED SOLVENTS

250      0      250  
SCALE                      FEET

SWMU 5  
1800 FEET



RFI ADDENDUM  
NSA MID-SOUTH  
MILLINGTON, TENNESSEE

**FIGURE 2-1**  
THIRD PHASE OF RFI  
MONITORING WELLS  
07/13/98 - 08/08/98

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**Table 2-2**  
**Well Completion Data — Third Well Construction Phase**  
**AOC A — NSA Mid-South**

Monitoring Well Identification	Installation Date	Total Depth of Boring (ft bls)	Screened Interval (ft bls)	Ground Surface Elevation (msl)	Top of Casing Elevation (msl)
<b>Airfield Fluvial Deposits Wells</b>					
007G20LF	7-13-98	85	65 - 75	282.82	282.70
007G21LF	7-14-98	85	65 - 75	283.95	283.66
007G22LF	7-19-98	127	67.5 - 77.5	285.15	284.66
007G23LF	7-31-98	85	72 - 82	286.15	285.89
007G24MF	7-30-98	95	60 - 70	289.31	289.06
007G25MF	8-04-98	127	71.5 - 81.5	290.30	289.97
007G26MF	8-02-98	70	60 - 70	290.40	290.13
007G27LF	7-20-98	137	107 - 117	276.86	276.77
007G28LF	7-17-98	87	70.5 - 80.5	281.91	281.87
007G29LF	7-16-98	87	70 - 80	282.37	282.29
007G30LF	7-15-98	85	70 - 80	283.07	282.99
<b>SWMU 5</b>					
005G08LF	8-05-98	75	55 - 65	267.89	270.38
<b>Building N-12</b>					
N12G01LF	7-21-98	87	71.5 - 81.5	283.28	285.30
N12G02LF	8-04-98	85	67 - 77	283.48	285.84
<b>Airfield Upper Cockfield Wells</b>					
007G22UC	7-29-98	105	93 - 103	285.05	284.83

**Notes:**

All monitoring wells constructed with 2-inch diameter Schedule 40 PVC and completed with flush-mount manholes except wells 005G08LF, N12G01LF, and N12G02LF which were completed with stickup protective covers.

ft bls — feet below land surface  
msl — mean sea level

The objectives of the third well construction phase were to:

- Determine whether the plume originating from the aircraft taxiway's grass edge at 007G11LF was connected with the plume originating from the Building N-126 area. Wells 007G20LF to 007G23LF were installed for this purpose.
- Define the downgradient extent of TCE originating from the former N-6 hangar by installing wells 007G24MF to 007G26MF.
- Define the downgradient extent of chlorinated solvents in the grass infield, south of the runway, with wells 007G27LF to 007G30LF.
- Determine whether carbon tetrachloride detected in the upper fluvial deposits at SWMU 5 was present at the fluvial deposits base with well 005G08LF.
- Evaluate whether the former N12 area was a source area for chlorinated solvents with wells N12G01LF and N12G02LF. This area warranted investigation due to its former use for drum storage, and the detection of vinyl chloride in the loess groundwater ( $3 \mu\text{g/L}$ ). Production well PW-1 is also near this area, approximately 250 feet downgradient from Building N-12, where chlorinated solvents were identified in groundwater.
- Quantify the total organic carbon (TOC) content in the Cockfield formation and its potential to retard the downward migration of contaminants in the fluvial deposits by obtaining soil samples from multiple borings while installing monitoring wells.

Newly installed wells were sampled approximately two weeks after installation, in addition to select apron area wells including 007G04LF, 007G04UF, 007G10LF, 007G11LF, 007G12LF, 007G15LF, and 007G15UF. Elevated photo-ionization detector (PID) readings while drilling in

the Cockfield Formation at well 007G22LF resulted in an additional well screened in the Cockfield Formation (007G22UC). Groundwater samples were submitted to Savannah Laboratories for VOC analysis using USEPA Method 8260. Eleven soil samples were collected from six borings in the upper section of the Cockfield Formation and submitted to Savannah Laboratories for TOC analysis.

### **Findings**

- The TCE plume originating from the former N-6 hangar was delineated by the three-well transect 007G24MF to 007G26MF. TCE exceeded the 5  $\mu\text{g/L}$  MCL at well 007G25MF; however, it was absent or below its MCL in wells 007G12LF, 007G24MF, and 007G26MF.
  
- The extent of downgradient contamination in the grass infield was partially defined with wells 007G27LF, 007G29LF, and 007G30LF, which did not contain chlorinated solvents. However, PCE (17  $\mu\text{g/L}$ ) and TCE (35  $\mu\text{g/L}$ ) concentrations exceeded their MCLs (5  $\mu\text{g/L}$ ) in well 007G28LF and warranted additional downgradient evaluation north of the runway.
  
- Chlorinated solvents were detected in the lower fluvial deposits groundwater at Building N-12. However, concentrations were similar to those detected in the airfield area and did not indicate a source area there. Total chlorinated solvents were 53.7  $\mu\text{g/L}$  (well N12G01LF) and 26.2  $\mu\text{g/L}$  (well N12G02LF), respectively.
  
- Carbon tetrachloride concentrations were below the MCL in the lower fluvial deposits at monitoring well 005G08LF, indicating the absence of an upper fluvial deposits source to the detections identified during the SWMU 5 RFI.

- Analytical results from the existing monitoring wells were similar to historical VOC results except for monitoring well 007G04LF, where a TCE high of 3,300  $\mu\text{g/L}$  was detected. TCE concentrations had historically varied in this well, generally increasing over time. The previous high TCE concentration (1,400  $\mu\text{g/L}$ ) was detected during Event 5 of long-term monitoring.
- VOCs were absent in the upper Cockfield monitoring well 007G22UC.
- Total organic carbon in the upper Cockfield Formation ranged between 0.2% to 12% with a mean of 4% (discussed further in Section 3).

#### **2.4 Diffusion Pilot Study (September — October 1998)**

Based on a USEPA recommendation, diffusion samplers were evaluated in a pilot study as an alternative groundwater sampling technique for VOCs at NSA Mid-South. Diffusion samplers, which consist of polyethylene bags filled with deionized water, rely on ambient groundwater flow through the well screen and contaminants diffusing into the water-filled bag. They are based on a USGS study presented in *Ground Water Monitoring and Remediation* (Vroblesky and Hyde, 1997).

The pilot study indicated that the diffusion samplers' data were comparable to historical data collected with electric submersible pumps (EnSafe, October 13, 1998)<sup>1</sup>. The diffusion sampler's advantage over traditional sampling methods include elimination of purge waste-water, decontamination procedures, and variables associated with sampling wells with pumps (e.g., stripping VOCs due to high pump rates). The BCT reviewed the pilot study data during its

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<sup>1</sup> Chlorinated solvent concentrations from wells 007G01UF, 007G04LF, and 007G05LF were within the range of the historical concentrations identified in these wells. Exceptions were (1) carbon tetrachloride and chloroform, which exceeded their historical highs in well 007G04LF and (2) carbon tetrachloride (007G05LF) and PCE (007G01UF), which were below their historical lows.

October 1998 meeting and approved diffusion samplers for future long-term groundwater monitoring of VOCs at NSA Mid-South.

## **2.5 Fourth Well Construction Phase (November 18 — 24, 1998)**

The fourth drilling phase consisted of installing six additional monitoring wells in the grassy infield north and south of the runway to the fluvial deposits aquifer's base. New monitoring well locations are shown on Figure 2-2. The objectives of the fourth drilling phase were to:

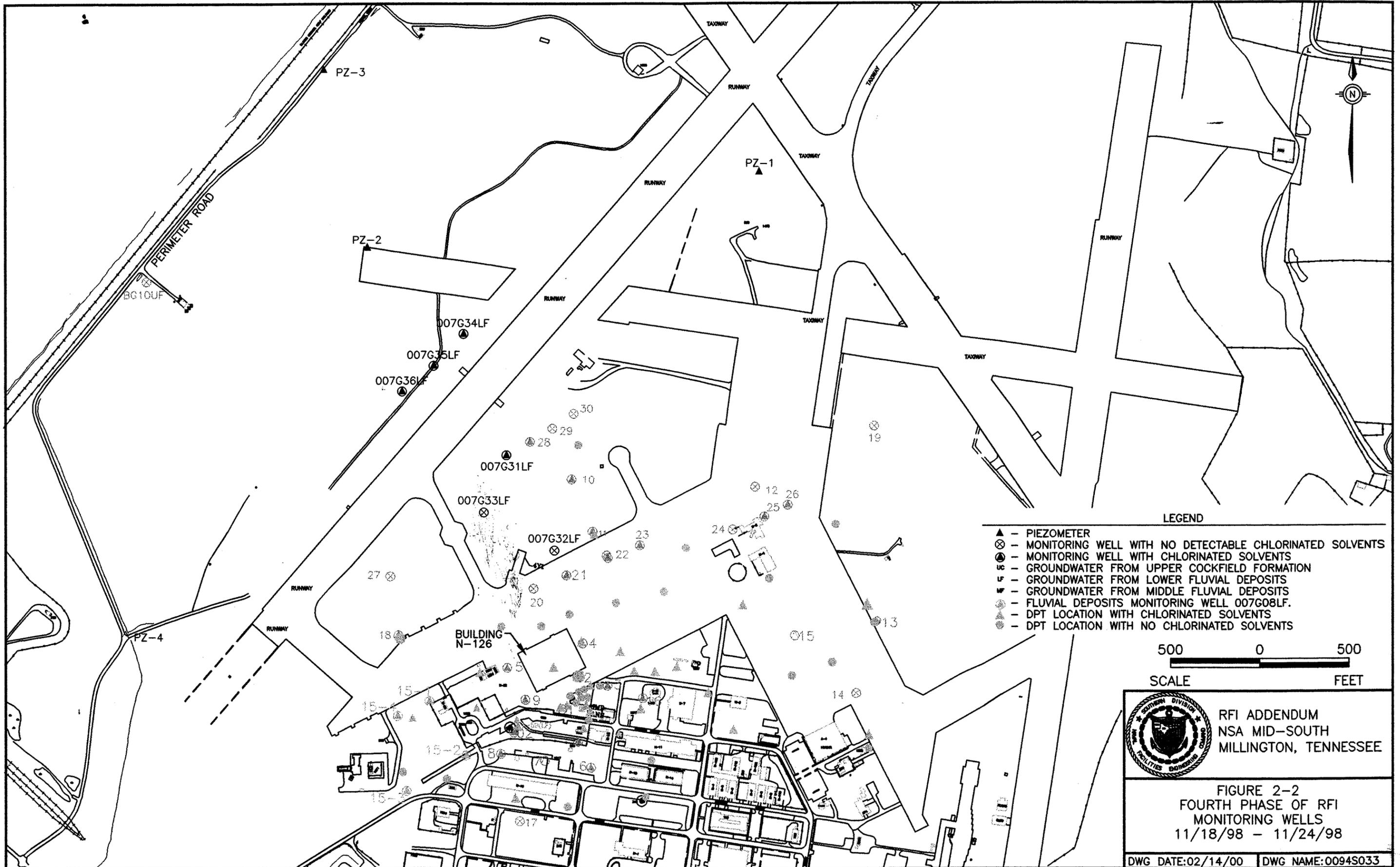
- Define the downgradient extent of contamination found in the grass infield by installing a three-well transect (007G34LF to 007G36LF) perpendicular to the contaminant plume's flow path north of the runway.
- Define the southwest edge of the contaminant plume in the grass infield south of the runway using wells 007G31LF and 007G33LF.
- Identify whether another source area existed at the edge of the aircraft taxiway and the grassy infield using monitoring well 007G32LF.
- Obtain additional potentiometric data using piezometers PZ-1 to PZ-4 to evaluate groundwater flow directions outside control areas and target locations for additional downgradient wells.

Drilling services were provided by Boart-Longyear using rotary sonic drilling. Well completion data are provided in Table 2-3 and well-construction logs are provided in Appendix B. Groundwater samples were collected immediately after well development and were analyzed onsite by Fibertec Environmental Services<sup>2</sup> of Holt, Michigan, for VOCs using USEPA Method 8260 and a Level II-equivalent DQO.

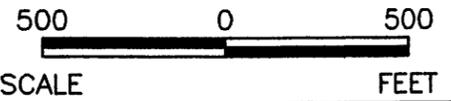
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<sup>2</sup> Fibertec provided analytical services in a field laboratory when the SWMU 39 RFI was being conducted.

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- LEGEND**
- ▲ - PIEZOMETER
  - ⊗ - MONITORING WELL WITH NO DETECTABLE CHLORINATED SOLVENTS
  - ⊙ - MONITORING WELL WITH CHLORINATED SOLVENTS
  - UC - GROUNDWATER FROM UPPER COCKFIELD FORMATION
  - LF - GROUNDWATER FROM LOWER FLUVIAL DEPOSITS
  - MF - GROUNDWATER FROM MIDDLE FLUVIAL DEPOSITS
  - ⊙ - FLUVIAL DEPOSITS MONITORING WELL 007G08LF.
  - - DPT LOCATION WITH CHLORINATED SOLVENTS
  - - DPT LOCATION WITH NO CHLORINATED SOLVENTS




 RFI ADDENDUM  
 NSA MID-SOUTH  
 MILLINGTON, TENNESSEE

FIGURE 2-2  
 FOURTH PHASE OF RFI  
 MONITORING WELLS  
 11/18/98 - 11/24/98

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**Table 2-3**  
**Well Completion Data — Fourth Well Construction Phase**  
**AOC A — NSA Mid-South**

Monitoring Well Identification	Installation Date	Total Depth of Boring (ft bls)	Screened Interval (ft bls)	Ground Surface Elevation (msl)	Top of Casing Elevation (msl)
<b>Airfield Lower Fluvial Deposits Wells and Piezometers</b>					
007G31LF	11-18-98	85	68 - 78	281.00	280.79
007G32LF	11-19-98	90	68 - 78	282.27	281.97
007G33LF	11-20-98	95	75 - 85	279.81	279.55
007G34LF	11-21-98	95	81 - 91	283.74	283.22
007G35LF	11-21-98	95	81 - 91	282.08	281.77
007G36LF	11-22-98	95	82 - 92	281.04	280.72
PZ-1	11-23-98	65	55 - 65	295.75	295.49
PZ-2	11-24-98	65	55 - 65	281.63	281.53
PZ-3	11-24-98	85	75 - 85	278.72	278.18
PZ-4	11-24-98	87	77 - 87	269.86	269.58

**Notes:**

All monitoring wells constructed with 2-inch diameter Schedule 40 PVC and completed with flush-mount manholes. Piezometers constructed with 1-inch diameter Schedule 40 PVC.

ft bls — feet below land surface

msl — mean sea level

**Findings**

Groundwater data collected after this drilling phase defined the plume width in the infield south of the runway; however, the chlorinated solvent detections in the well transect parallel to the runway resulted in the downgradient extent remaining undefined.

- The plume width in the grassy infield was defined to the southwest with monitoring wells 007G31LF and 007G33LF. TCE, which was detected at 17  $\mu\text{g/L}$  at 007G31LF was not

detected farther southwest at well 007G33LF. Chlorinated solvents were also not detected at the southwestern end of the grassy infield during earlier sampling of well 007G27LF. Upgradient to these wells, monitoring well 007G32LF was installed in the areas next to the airfield taxiway. In the sample from this well, TCE was slightly higher at 22  $\mu\text{g/L}$ . PCE and carbon tetrachloride (7 and 6  $\mu\text{g/L}$ ) also exceeded their MCLs of 5  $\mu\text{g/L}$  in this well.

- North of the runway, the chlorinated solvents TCE, PCE, and carbon tetrachloride were detected in two of the three wells in the transect. The highest concentrations were in well 007G36LF at the southwestern end of the transect, where 36  $\mu\text{g/L}$  TCE, 11  $\mu\text{g/L}$  carbon tetrachloride, and 6  $\mu\text{g/L}$  PCE were detected; all exceeded their 5  $\mu\text{g/L}$  MCLs. Monitoring well 007G35LF, centered in the transect, contained the least chlorinated solvents (6  $\mu\text{g/L}$  TCE), while well 007G34LF contained 10  $\mu\text{g/L}$  TCE, 4  $\mu\text{g/L}$  PCE and 10  $\mu\text{g/L}$  chloroform. The plume's width and downgradient extent north of the runway remained undefined.

## **2.6 Fifth Well Construction Phase (February 1 — 23, 1999)**

The objective of the fifth well construction phase was to define the width and horizontal extent of chlorinated solvents north of the runway. Clustered upgradient wells screened in the upper and lower fluvial deposits during the initial RFI identified higher contaminant concentrations in the lower fluvial deposits. To verify whether contaminants were similarly stratified at distant downgradient locations, the BCT decided that monitoring wells should screen the entire section of the fluvial deposits, then discrete samples should be collected from multiple-depth intervals with diffusion samplers.

Drilling services were provided by Alliance Environmental using rotary sonic drilling. Monitoring wells were developed and initially sampled the day after their installation with electric

submersible pumps from the bottom 5 feet of the well screen. When drilling was over, 13 monitoring wells had been installed (007G37LF to 007G49LF), each screening the entire thickness of the fluvial deposits, which ranged roughly from 30 to 70 feet thick. Well completion data are provided in Table 2-4 and well-construction logs are provided in Appendix B. Samples were submitted to Environmental Testing and Consulting (ETC) for a rush VOC analysis using Level II-equivalent DQO and USEPA Method 8260. VOC data were evaluated by the BCT during field activities to determine whether additional monitoring wells were needed. Analytical results are in Appendix A.

Diffusion samplers, deployed before drilling began in wells 007G31LF through 007G35LF, were also collected during the fifth drilling phase to verify the earlier VOC screening data collected from these wells. Additionally, five diffusion samplers, each 2 feet long, were deployed in well 007G36LF to determine whether contaminants were stratified within the well's 10-foot screen. Samples from piezometers PZ-1 to PZ-3, which were sampled with bailers, were also submitted with the samples and screening samples from the newly installed well and analyzed for VOCs using a Level II-equivalent DQO for VOCs and USEPA Method 8260.

Table 2-4  
 Well Completion Data — Fifth Well Construction Phase  
 AOC A — NSA Mid-South

Monitoring Well Identification	Installation Date	Total Depth of Boring (ft bls)	Screened Interval (ft bls)	Ground Surface Elevation (msl)	Top of Casing Elevation (msl)
<b>Airfield Fully-Screened Fluvial Deposits Wells</b>					
007G37LF	2-01-99	95	51 - 91	280.59	280.52
007G38LF	2-03-99	95	48 - 88	280.12	279.96
007G39LF	2-05-99	95	54 - 94	285.23	284.91
007G40LF	2-03-99	95	57 - 87	279.21	279.03
007G41LF	2-07-99	95	53 - 93	279.45	281.89
007G42LF	2-09-99	95	45 - 85	274.91	277.01
007G43LF	2-16-99	85	44 - 84	277.51	277.25
007G44LF	2-17-99	85	45 - 85	274.37	274.41
007G45LF	2-18-99	85	43 - 83	277.07	276.90
007G46LF	2-21-99	85	42 - 82	276.21	275.92
007G47LF	2-20-99	115	72 - 82	302.22	302.04
007G48LF	2-23-99	115	48 - 113	279.89	279.71
007G49LF	4-13-99	98	56.5 - 96.5	289.98	289.68

**Notes:**

All monitoring wells constructed with 2-inch diameter Schedule 40 PVC, except 007G37LF, which was constructed with 4-inch diameter Schedule 40 PVC. All wells completed with flush-mount manholes except 007G41LF, 007G42LF and 007G47LF which were completed with above grade protective covers.

ft bls — feet below land surface  
 msl — mean sea level

## **Findings**

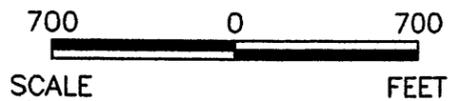
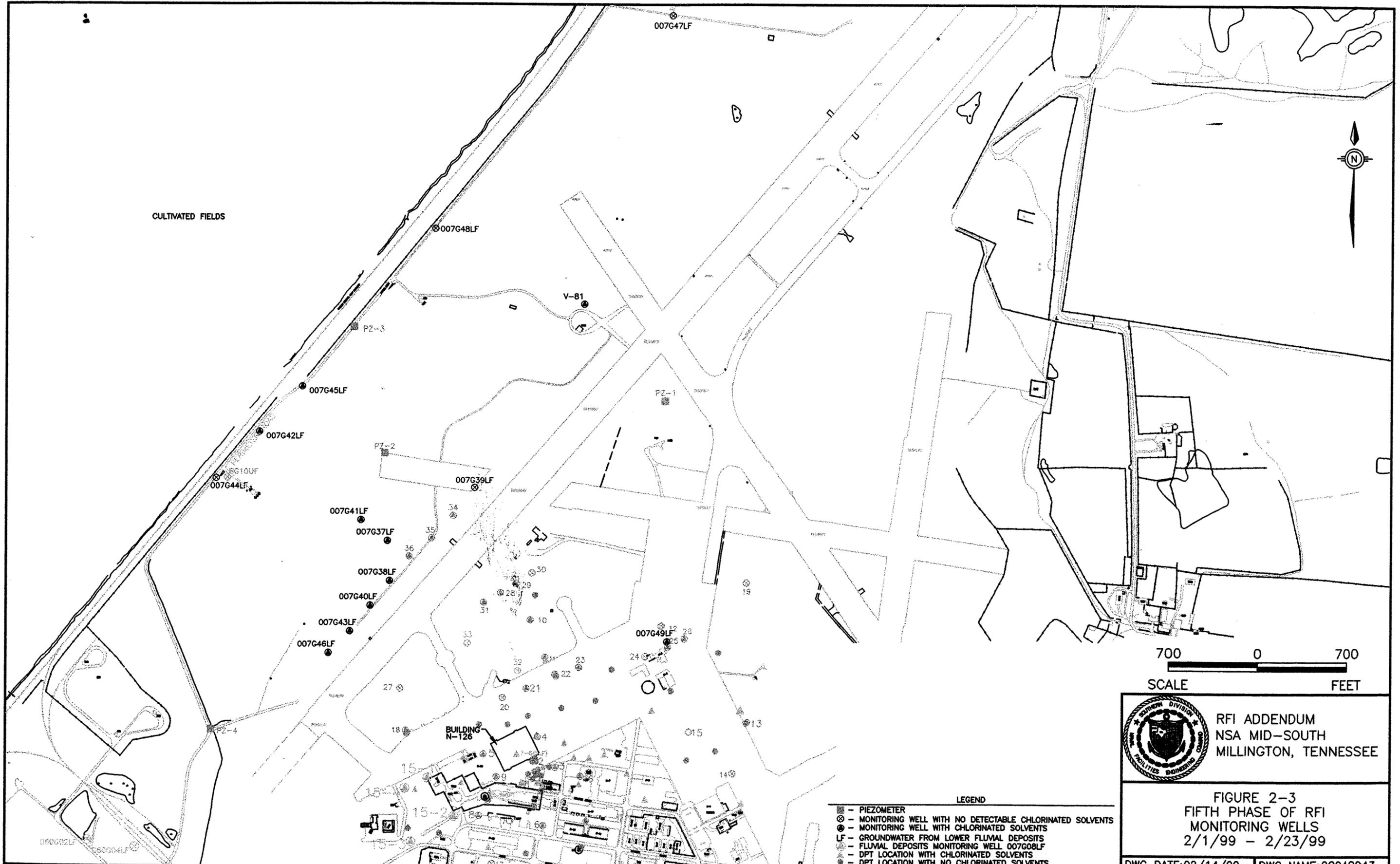
Figure 2-3 shows that the fifth well construction phase consisted primarily of expanding the three-well transect of earlier wells parallel to the runway and installing an additional transect downgradient along the perimeter road.

- TCE exceeded its MCL in five of the eight wells in the transect parallel to the runway, indicating a plume width of approximately 1,000 feet north of the runway. The contaminant plume's width was defined at the northeast end of the transect by well 007G39LF, where TCE was not detected and at the southwest end of the transect by well 007G46LF, where 1.8  $\mu\text{g/L}$  was detected.
- The downgradient extent of chlorinated solvents remained undefined. TCE concentrations of 5.8  $\mu\text{g/L}$  TCE (007G45LF) and 6  $\mu\text{g/L}$  TCE (PZ-3) were detected at the base's perimeter road. PCE also exceeded its 5  $\mu\text{g/L}$  MCL at PZ-3 with a concentration of 6  $\mu\text{g/L}$ .
- TCE concentrations remained preferentially stratified in the middle fluvial deposits downgradient from the former N-6 hangar. Monitoring well 007G49LF, screened at the base of the fluvial deposits contained 2  $\mu\text{g/L}$  TCE. This well was paired with middle fluvial deposits well 007G25MF, which contained 18  $\mu\text{g/L}$  TCE during earlier sampling events.
- Results of confirmation samples collected with diffusion samplers from existing monitoring wells were generally consistent with the screening results from the fourth well construction phase in November 1998. The five diffusion samples from well 007G36LF, the most contaminated well north of the runway, indicated higher contaminant concentrations in the bottom of the well's screen (30  $\mu\text{g/L}$  TCE at 92 feet) than in the upper section of the well's screen (1.7  $\mu\text{g/L}$  TCE at 84 feet).

*RFI Report Addendum*  
*NSA Mid-South*  
*AOC A — Northside Fluvial Groundwater*  
*Revision: 0; February 17, 2000*

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RFI ADDENDUM  
NSA MID-SOUTH  
MILLINGTON, TENNESSEE

FIGURE 2-3  
FIFTH PHASE OF RFI  
MONITORING WELLS  
2/1/99 - 2/23/99

- LEGEND**
- - PIEZOMETER
  - ⊗ - MONITORING WELL WITH NO DETECTABLE CHLORINATED SOLVENTS
  - ⊙ - MONITORING WELL WITH CHLORINATED SOLVENTS
  - LF - GROUNDWATER FROM LOWER FLUVIAL DEPOSITS
  - ⊕ - FLUVIAL DEPOSITS MONITORING WELL 007G08LF
  - ⊖ - DPT LOCATION WITH CHLORINATED SOLVENTS
  - ⊗ - DPT LOCATION WITH NO CHLORINATED SOLVENTS

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## 2.7 Sampling Event with Diffusion Samplers (March 24 and 25, 1999)

Thirty one wells were sampled with 112 diffusion samplers 2- to 5-feet in length, to verify the screening results from the earlier fifth well construction phase and to determine whether contaminants were preferentially stratified within discrete aquifer intervals. Wells installed during the fifth well construction phase typically contained 40-foot well screens and were sampled with two to 10 diffusion samplers, depending on the length of the well screen and the previously detected chlorinated solvent concentrations. Generally, wells with higher concentrations were sampled with multiple discrete samplers spaced over shorter distances to identify contaminant stratification in the aquifer. An abandoned water supply well screened in the fluvial deposits near the runway (labeled V-81 [runway well] in Figure 2-3) was also included in the monitoring network. Well identifications and the number of sampling intervals tested with diffusion samplers are listed in Table 2-5.

**Table 2-5**  
**Sampling Frequency during March 1999 Diffusion Sampling Event**

Well ID	Screen Length	No. of Diffusion Samplers
018G01LF	10 feet	2
V-81 (runway well)	10 feet	2
007G04LF, 007G04UF, 007G11LF, 007G18LF, 007G20LF, 007G21LF, 007G22LF, 007G23LF, 007G27LF, 007G28LF, 00G29LF, 007G30LF, 007G31LF, 007G32LF, 007G33LF, 007G34LF, 007G35LF	10 feet	2
007G36LF	10 feet	3
007G37LF, 007G49LF	40 feet	8
007G39LF, 007G41LF, 007G46LF	40 feet	10
007G38LF, 007G43LF	40 feet	2
007G40LF	30 feet	2

Table 2-5  
Sampling Frequency during March 1999 Diffusion Sampling Event

Well ID	Screen Length	No. of Diffusion Samplers
007G42LF, 007G44LF	40 feet	5
007G45LF	40 feet	4
007G48LF	70 feet	5

### Findings

Diffusion sampling analytical results were generally consistent with earlier sampling results. Additionally, using diffusion samplers did not identify significant concentration gradients. The following summarizes the findings of the diffusion sampling event:

- In wells with 10-foot screens chlorinated solvent concentrations in the lower 5 feet were similar to those in the upper 5 feet. The one exception was TCE in well 007G04LF, where the historical high TCE concentration (4,400  $\mu\text{g/L}$ ) was detected in the upper 5 feet of the well screen, while 2,400  $\mu\text{g/L}$  TCE was detected in the lower 5-feet of the well screen.
- In well 007G37LF's 40-foot well screen, which was sampled with eight diffusion samplers, chlorinated solvent concentrations in the upper fluvial deposits were very similar to those in the lower fluvial deposits. In samples from the well transect parallel to the runway, chlorinated solvent concentrations in the upper sections of the fluvial deposits were roughly similar to those in the lower. However, in samples from well 007G41LF, 500 feet downgradient from the transect, chlorinated solvents were not detected in the aquifer's upper 10 feet, while concentrations and the number of VOCs increased with depth in this well.

- The former water supply well (V-81) near the runway contained 5  $\mu\text{g/L}$  PCE in the two diffusion samplers collected from the bottom 10 feet of the well.
  
- Low concentrations of chlorinated solvents (between 1 and 5.8  $\mu\text{g/L/TCE}$ ) previously detected at the perimeter road at wells 007G42LF and 007G45LF were not detected in the diffusion samples collected from these wells. A later borehole velocity study conducted by the USGS at well 007G48LF identified a downward flow component between the upper and lower sections of the fluvial deposits. This well coincides with an anomalously deep section of fluvial deposits (basal elevation at 166 feet above msl versus 192 feet to 196 feet). A plausible explanation for the lack of detections with diffusion samplers was that "cleaner" upper fluvial groundwater flowing downward through the well was preventing middle and lower fluvial contaminated groundwater from entering the well under static, non pumping conditions. The BCT decided that the perimeter road wells should be sampled in the future with electric submersible pumps to overcome possible vertical flow.

## **2.8 Investigative Summary/BCT Meeting (May 6, 1999)**

During the May 1999 BCT meeting, Dr. Don Vroblesky (USGS) and Dr. Prabhaker Clement (Battelle Inc.) were asked to independently evaluate the RFI data and the planned CMS approach. After the meeting, the BCT concluded that the following data gaps should be addressed before proceeding with corrective measures:

- Contaminants identified beyond that predicted by the USGS's MYGRT two-dimensional solute transport model (EnSafe, May 6, 1999), indicated either another source area or higher groundwater velocities north of the runway. The BCT concluded that the conceptual model should be tested to confirm whether plumes north and south of the runway are separate or one single plume. The BCT decided that an additional well adjacent to the "birdbath" (plane-washing station) would address this data gap (discussed further in Section 2.9).

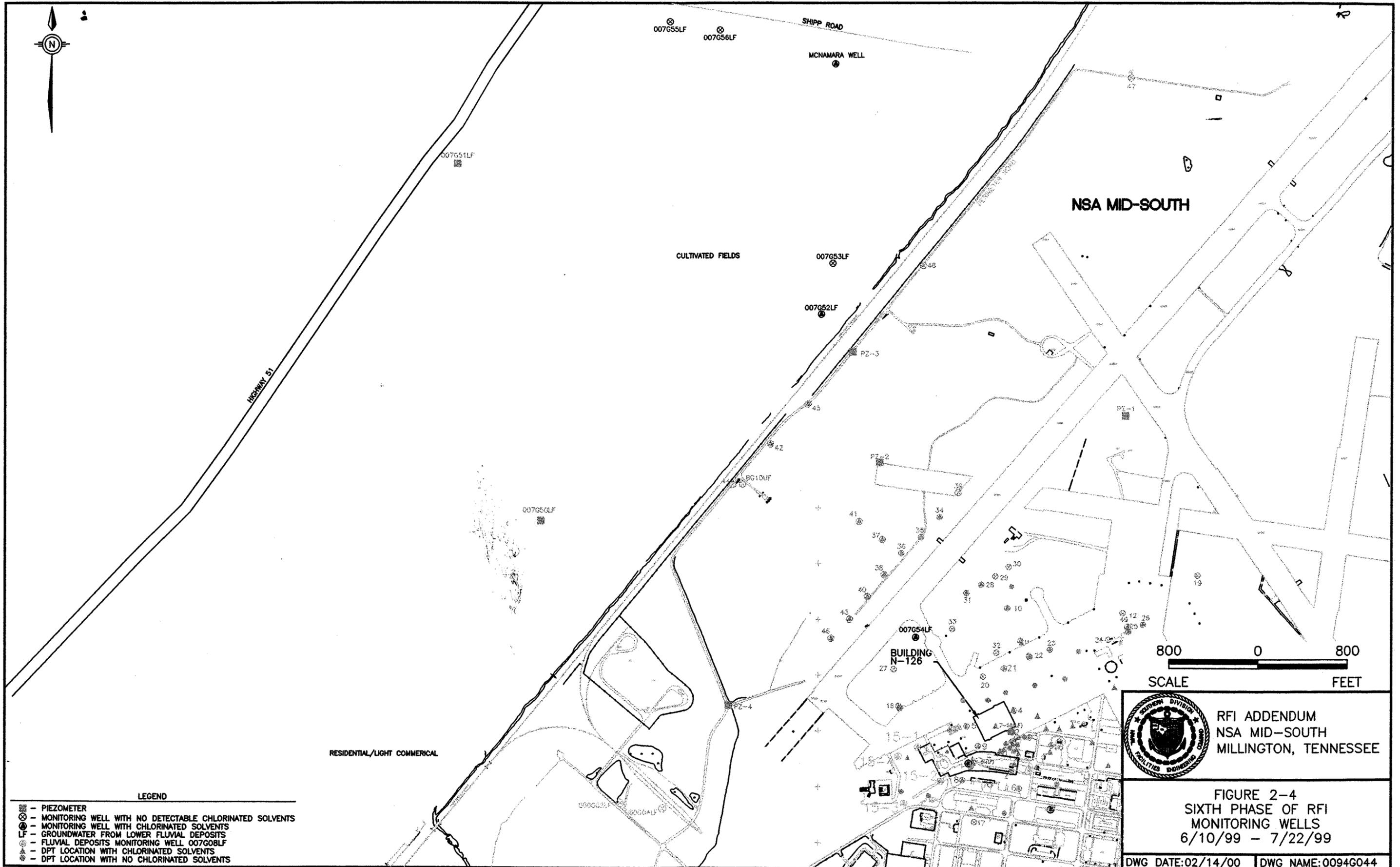
- If contaminants north and south of the runway were confirmed as one large plume, aquifer properties would require further refinement to fit the contaminant transport model. Additionally, if offsite wells were so contaminated that a containment system was warranted, aquifer properties would need to be further defined. The BCT decided that an additional pump test was warranted north of the runway to collect this data.
- MCL exceedances at the base property boundary warranted an offsite investigation to identify areas not impacted by chlorinated solvents and long-term points of groundwater monitoring to determine whether the plume is advancing or in steady state. The USGS was tasked to install piezometers west of the base property to determine the offsite groundwater flow direction and optimize offsite well locations.
- The highly variable TCE concentrations at well 007G04LF (160 to 4,400  $\mu\text{g/L}$ ) may be explained by: (1) the well's location near a source interface, (2) localized interfingering with the source area, and (3) seasonal water level fluctuations. The BCT decided that the source should be further evaluated in the 007G04LF area during the CMS pilot study.

## **2.9 Sixth Well Construction Phase (July 8 — 24, 1999)**

The objective of the sixth well construction phase was to determine the extent of chlorinated solvents extending off the base property. The USGS installed two piezometers/monitoring wells west of the base property (007G50LF and 007G51LF on Figure 2-4), which were tied with an out-of-service domestic water well (McNamara well<sup>3</sup> 007GMCNA) and the base's monitoring wells to determine the off site groundwater flow direction.

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<sup>3</sup>This well was reportedly constructed 35 years ago and taken out of service after one year of use when the residence was connected with municipal water (conversation between Mr. Jack Carmichael [USGS] and the Mr. Phil McNamara, the well owner).



NSA MID-SOUTH

CULTIVATED FIELDS

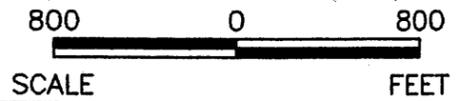
HIGHWAY 51

SHIPP ROAD

MCMAMARA WELL

BUILDING N-126

RESIDENTIAL/LIGHT COMMERCIAL



- LEGEND**
- PIEZOMETER
  - — MONITORING WELL WITH NO DETECTABLE CHLORINATED SOLVENTS
  - — MONITORING WELL WITH CHLORINATED SOLVENTS
  - LF — GROUNDWATER FROM LOWER FLUVIAL DEPOSITS
  - LF — FLUVIAL DEPOSITS MONITORING WELL 007G08LF
  - ⊙ — DPT LOCATION WITH CHLORINATED SOLVENTS
  - ⊙ — DPT LOCATION WITH NO CHLORINATED SOLVENTS



RFI ADDENDUM  
NSA MID-SOUTH  
MILLINGTON, TENNESSEE

FIGURE 2-4  
SIXTH PHASE OF RFI  
MONITORING WELLS  
6/10/99 - 7/22/99

DWG DATE:02/14/00 | DWG NAME:0094G044

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Potentiometric data indicate that groundwater flows northwest off the base property; therefore, monitoring wells 007G52LF and 007G53LF were installed approximately 450 feet downgradient of perimeter road well 007G42LF and piezometer PZ-3, where the highest chlorinated solvents concentrations were detected in this area. Monitoring well 007G54LF was installed in the airfield's infield, adjacent to the former birdbath, to determine whether the plume north of the runway was a separate plume or an extension of the plume south of the runway. The birdbath was formerly used to rinse salt residue off airplanes and was suggested as a possible source area for the chlorinated solvents detected in the groundwater north of the runway. Monitoring wells 007G55LF and 007G56LF were installed along Shipp Road, approximately 2,700 feet and 2,400 feet downgradient of well 007G53LF.

Monitoring wells were installed by Alliance Environmental using rotary sonic drilling methods. All wells were constructed with 10-foot well screens, except for well 007G55LF, which was constructed with a 20-foot well screen. Well construction details are provided in Table 2-6. Groundwater samples were again collected immediately following well development and submitted to ETC for VOC analysis (USEPA 8260) for the BCT to evaluate and decide whether and where additional wells were needed.

### **Findings**

- PCE (4.7  $\mu\text{g/L}$ ), TCE (3.7  $\mu\text{g/L}$ ), and carbon tetrachloride (3.3  $\mu\text{g/L}$ ) were detected in samples from offsite well 007G52LF at concentrations below their MCLs (5  $\mu\text{g/L}$ ). Chlorinated solvents were not detected in well 007G53LF nor in the two additional downgradient wells 007G55LF and 007G56LF along Shipp Road. The McNamara well contained 6.5  $\mu\text{g/L}$  vinyl chloride when first sampled in April 1999, which exceeded its 2  $\mu\text{g/L}$  MCL. However, resampling of this well at the same time as the newly installed wells identified vinyl chloride concentrations of 1.7  $\mu\text{g/L}$ . Vinyl chloride is believed unique to this well and possibly attributable to a well artifact because this compound was

not detected in AOC A groundwater, except for a single isolated hit. This well will continue to be monitored as part of the AOC A groundwater monitoring program.

- The birdbath well (007G54LF) contained 7.9  $\mu\text{g/L}$  TCE, which exceeded its 5  $\mu\text{g/L}$  MCL, and PCE (2.7  $\mu\text{g/L}$ ), carbon tetrachloride (1.6  $\mu\text{g/L}$ ), and cis1,2-DCE (2.3  $\mu\text{g/L}$ ). Concentrations did not indicate a source area in this area.

The BCT decided that the downgradient extent of chlorinated solvents in groundwater were adequately evaluated, concluding RFI plume delineation activities. Additional source characterization has since taken place as part of the CMS pilot study near well 007G04LF, adjacent to Building N-126. This data will be presented in the AOC A CMS Report.

Table 2-6  
 Well Completion Data — Sixth Well Construction Phase  
 AOC A — NSA Mid-South

Monitoring Well Identification	Installation Date	Total Depth of Boring (ft bgs)	Screened Interval (ft bgs)	Ground Surface Elevation (msl)	Top of Casing Elevation (msl)
<b>Fluvial Deposits Wells</b>					
007G50LF	6-10-99	75	62 - 72	269.71	271.40
007G51LF	6-11-99	65	55 - 65	279.17	279.02
007G52LF	7-9-99	95	75 - 85	275.34	278.20
007G53LF	7-10-99	85	68 - 78	277.12	280.16
007G54LF	7-12-99	95	75 - 85	278.94	278.64
007G55LF	7-23-99	115	85 - 105	278.76	282.00
007G56LF	7-22-99	135	105 - 115	277.09	280.63

**Notes:**

All monitoring wells constructed with 2-inch diameter Schedule 40 PVC. Wells 007G51LF, 007G53LF, and 007G54LF were completed with flush-mount manholes while wells 007G50LF, 007G52LF, 007G55LF, and 007G56LF were completed with above grade protective covers.

ft bgs — feet below ground surface  
 msl — mean sea level

### **2.10 Aquifer Pump Test (August 11 — 13, 1999)**

A USGS aquifer characterization test south of the airfield was presented in the AOC A RFI report. However, the subsequent groundwater investigations, described earlier, identified chlorinated solvents beyond those predicted, based on aquifer properties derived from the pump test, indicating that aquifer characteristics varied in distant downgradient areas. Therefore, an additional aquifer pump test was conducted in August 1999 to further refine the aquifer properties in downgradient areas and evaluate the optimum pumping rates for any needed groundwater extraction system.

The pump test concluded after 24 hours of pumping at 42 gallons per minute (gpm) and 24 hours of recovery monitoring. Drawdown effects were noted 2,200 feet away from the pumping well and a mean horizontal hydraulic conductivity (K) of 59 feet/day was calculated for the test area (EnSafe, November 16, 1999), an order of magnitude higher than the K value calculated upgradient near Building N-126. The BCT agreed that the RFI should conclude at this point.

*RFI Report Addendum*  
*NSA Mid-South*  
*AOC A — Northside Fluvial Groundwater*  
*Revision: 0; February 17, 2000*

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### 3.0 GEOLOGY AND HYDROGEOLOGY

The regional geology/hydrogeology and basewide geology are detailed in Section 2 of the AOC A RFI report (EnSafe, February 17, 2000). The hydrogeologic information in this section includes only what has been collected since then, primarily data from the area between the airfield taxiway and approximately 1 mile to the northwest, off the base property, to Shipp Road.

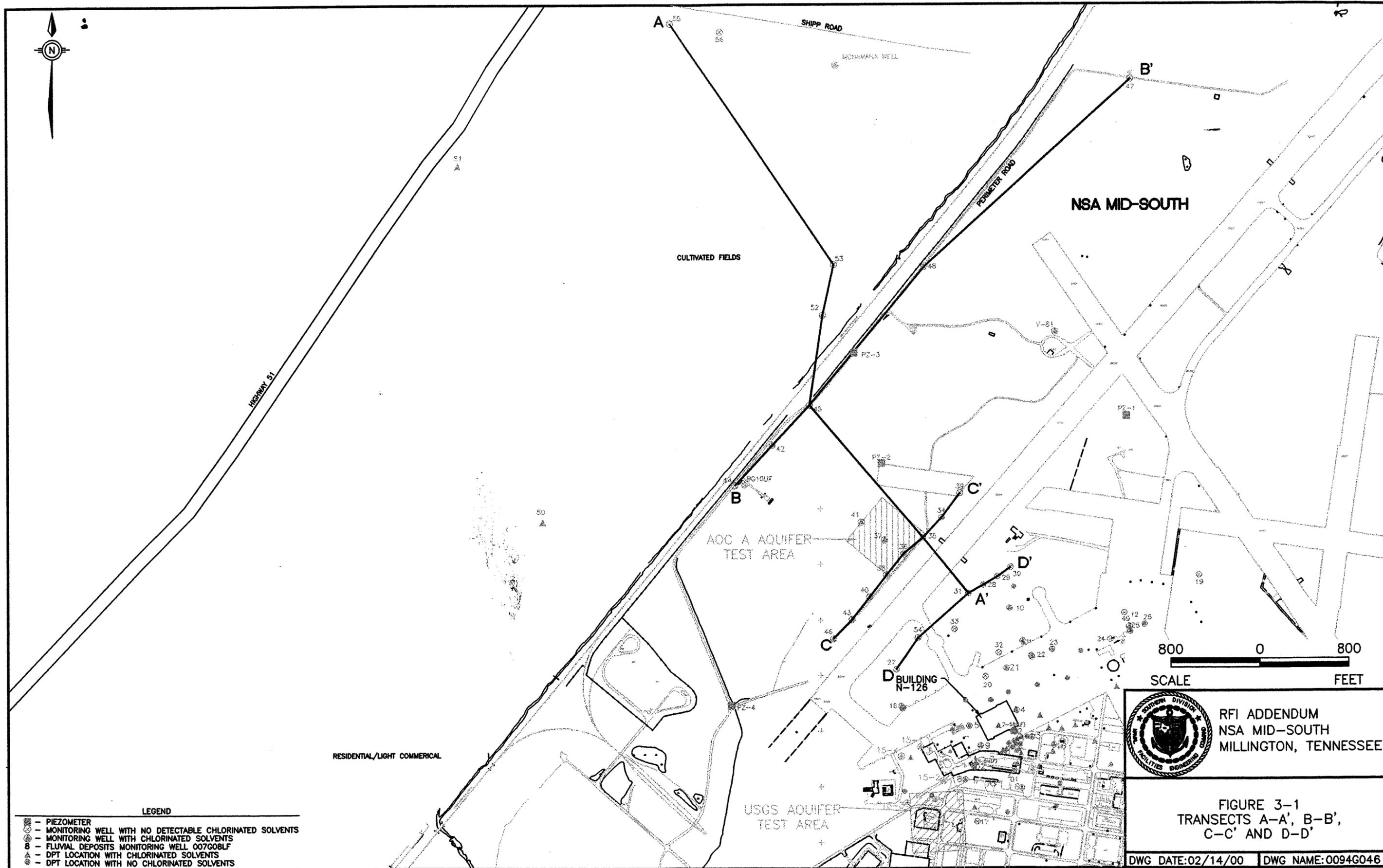
#### 3.1 Site-Specific Geology

Hydrogeologic cross sections have been constructed along four transects shown on Figure 3-1. Figure 3-2 (hydrogeologic section A-A') shows the hydrogeology in a general line with the contaminant flow path from the airfield's infield to Shipp Road while Figures 3-3 and 3-4 show the hydrogeology roughly perpendicular to the flow path, at the perimeter road (cross section B-B'), north of the runway (cross section C-C'), and airfield infield (cross section D-D'). Boring logs used to construct the cross sections are provided in Appendix B.

The *loess* is characterized as a silt with varying percentages of clay, which ranges from 25 to 45 feet thick. Its color varies locally from brown, yellowish-brown, or yellowish-orange to reddish-brown, yellowish-gray or olive gray. The loess, which is often mottled in texture and may contain trace amounts of organic material, typically becomes stiffer, less moist, and contains more clay content with depth.

A layer of reworked fluvial deposits, the *loess/fluvial deposits transition zone*, is locally present between the loess and fluvial deposits consisting of a sandy silt and fine- to medium-grained silty and clayey sand. In general, the transition zone's lithology grades downward from sandy silt to silty and clayey sand of the fluvial deposits. Clays and gravels may be present in the transition zone, but are not lithologically significant. Hydrogeologic sections A-A' through D-D' show that the transition zone, generally ranges from 4 to 10 feet thick. Cross section B-B' (Figure 3-3) shows an anomalously thick section (45 feet) of the transition zone below the upland area at well

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- LEGEND**
- PIEZOMETER
  - MONITORING WELL WITH NO DETECTABLE CHLORINATED SOLVENTS
  - ⊙ MONITORING WELL WITH CHLORINATED SOLVENTS
  - ⊗ FLUMIAL DEPOSITS MONITORING WELL 007G08LF
  - ▲ DPT LOCATION WITH CHLORINATED SOLVENTS
  - △ DPT LOCATION WITH NO CHLORINATED SOLVENTS

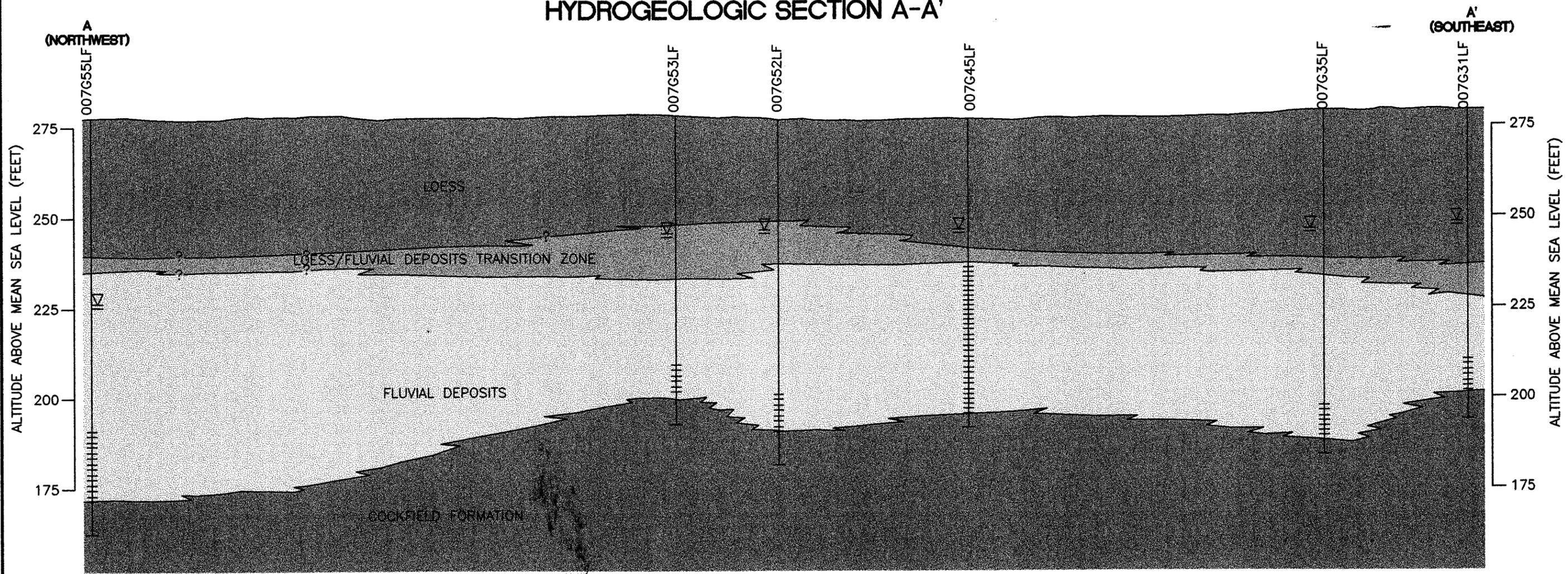

**RFI ADDENDUM  
NSA MID-SOUTH  
MILLINGTON, TENNESSEE**

**FIGURE 3-1  
TRANSECTS A-A', B-B',  
C-C' AND D-D'**

DWG DATE:02/14/00    DWG NAME:0094G046

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# HYDROGEOLOGIC SECTION A-A'

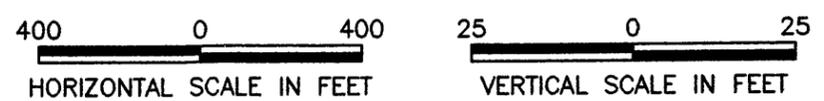


**LEGEND**

- LOESS: SILT, CLAYEY SILT, AND/OR SILTY CLAY; UPPER CONFINING UNIT TO THE FLUVIAL DEPOSITS AQUIFER.
- LOESS/FLUVIAL DEPOSITS TRANSITION ZONE: SANDY SILT AND/OR CLAY, CLAYEY SILT, CLAY, SAND, GRAVEL MIXTURES. PART OF UPPER CONFINING UNIT TO THE FLUVIAL DEPOSITS AQUIFER.
- FLUVIAL DEPOSITS: FINE TO COARSE SAND WITH GRAVELS AND/OR SANDY GRAVEL MIXTURES.

- COCKFIELD FORMATION: FINE SAND, CLAY, LIGNITE COMMONLY INTERBEDDED. LOWER CONFINING UNIT TO THE FLUVIAL DEPOSITS AQUIFER.

- WATER LEVEL MEASURED OCTOBER 1999
- WELL SCREEN

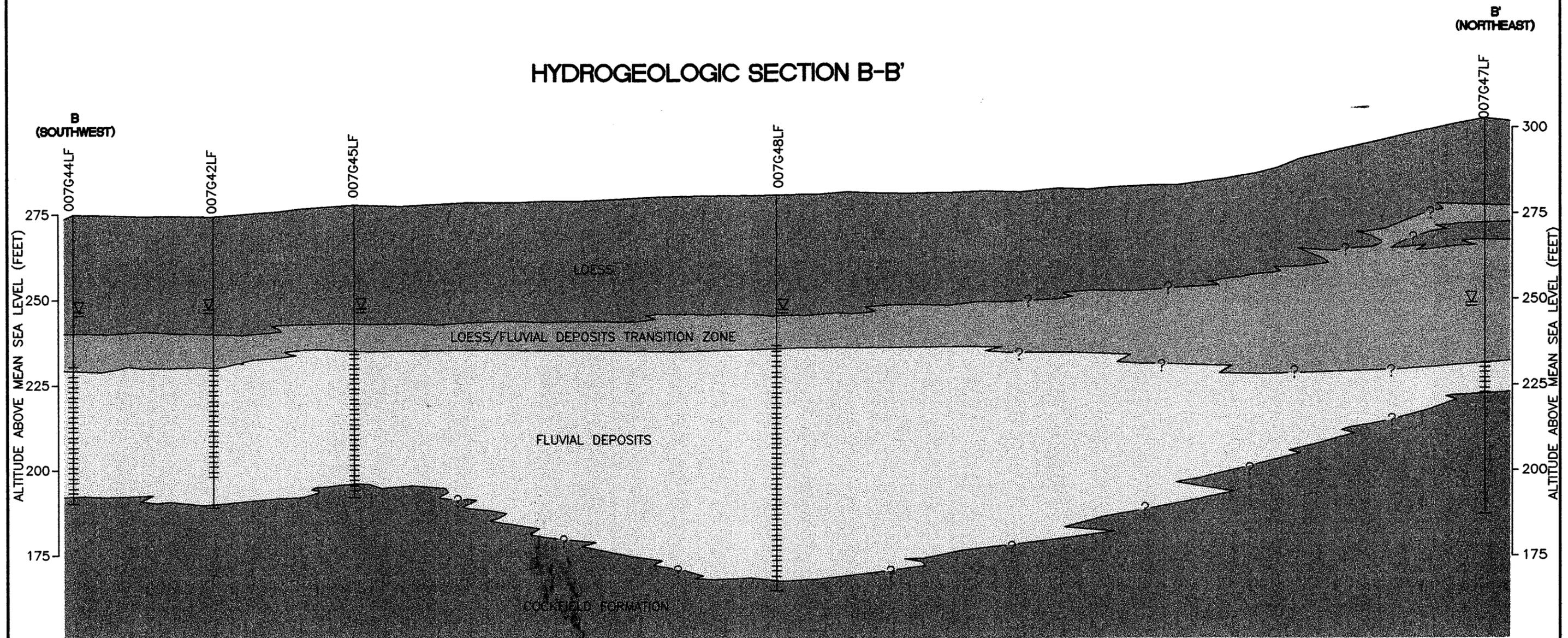


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NSA MID-SOUTH  
MILLINGTON, TENNESSEE

FIGURE 3-2  
HYDROGEOLOGIC SECTION A-A'

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# HYDROGEOLOGIC SECTION B-B'

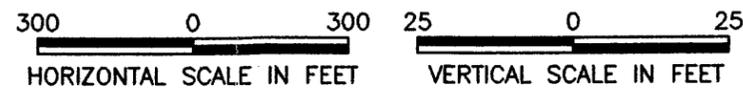


**LEGEND**

- LOESS: SILT, CLAYEY SILT, AND/OR SILTY CLAY; UPPER CONFINING UNIT TO THE FLUVIAL DEPOSITS AQUIFER.
- LOESS/FLUVIAL DEPOSITS TRANSITION ZONE: SANDY SILT AND/OR CLAY, CLAYEY SILT, CLAY, SAND, GRAVEL MIXTURES. PART OF UPPER CONFINING UNIT TO THE FLUVIAL DEPOSITS AQUIFER.
- FLUVIAL DEPOSITS: FINE TO COARSE SAND WITH GRAVELS AND/OR SANDY GRAVEL MIXTURES.

- COCKFIELD FORMATION: FINE SAND, CLAY, LIGNITE COMMONLY INTERBEDDED. LOWER CONFINING UNIT TO THE FLUVIAL DEPOSITS AQUIFER.

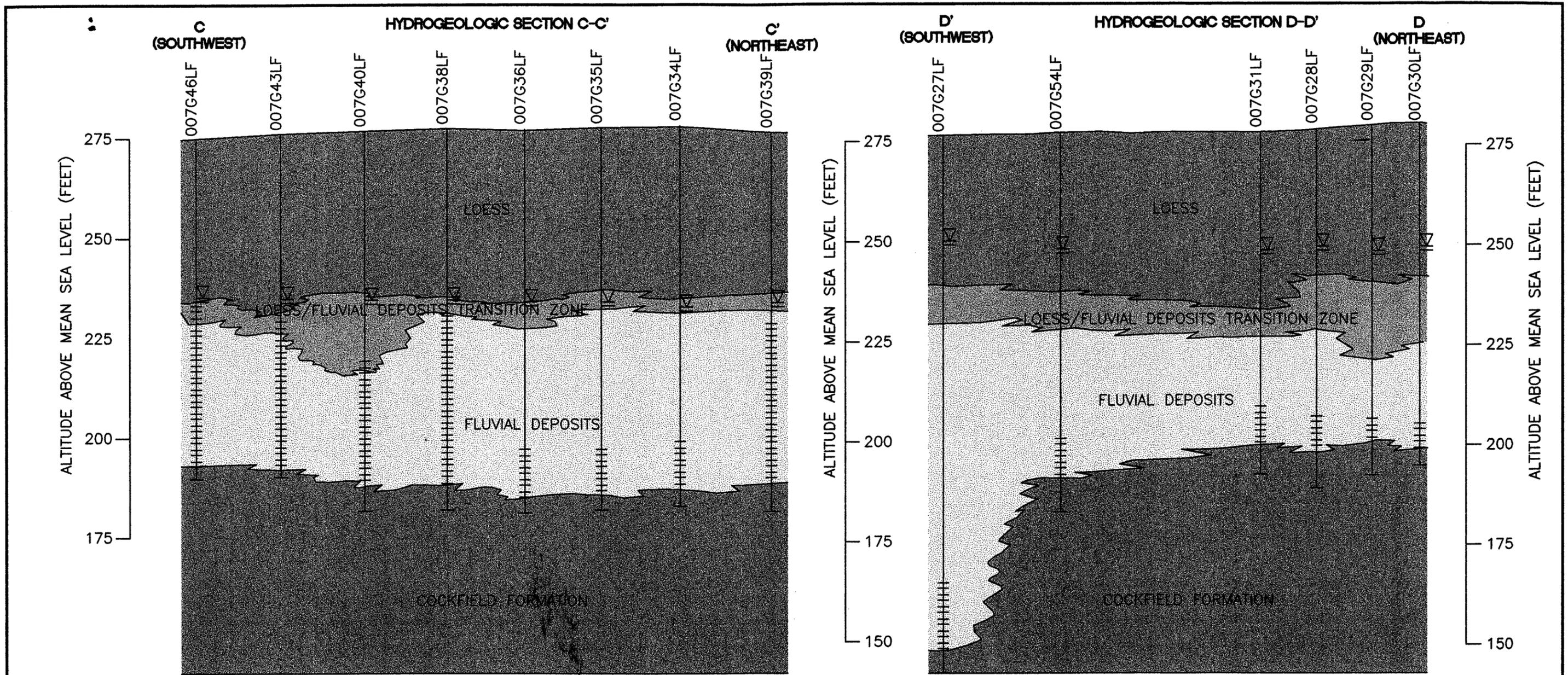
- WATER LEVEL MEASURED OCTOBER 1999
- WELL SCREEN



RFI ADDENDUM  
NSA MID-SOUTH  
MILLINGTON, TENNESSEE

FIGURE 3-3  
HYDROGEOLOGIC SECTION B-B'

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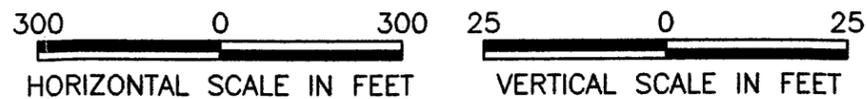


**LEGEND**

- LOESS: SILT, CLAYEY SILT, AND/OR SILTY CLAY; UPPER CONFINING UNIT TO THE FLUVIAL DEPOSITS AQUIFER.
- LOESS/FLUVIAL DEPOSITS TRANSITION ZONE: SANDY SILT AND/OR CLAY, CLAYEY SILT, CLAYEY SAND OR GRAVEL MIXTURES. PART OF UPPER CONFINING UNIT TO THE FLUVIAL DEPOSITS AQUIFER.
- FLUVIAL DEPOSITS: FINE TO COARSE SAND WITH GRAVELS AND/OR SANDY GRAVEL MIXTURES.

- COCKFIELD FORMATION: FINE SAND, CLAY, LIGNITE COMMONLY INTERBEDDED. LOWER CONFINING UNIT TO THE FLUVIAL DEPOSITS AQUIFER.

- WATER LEVEL MEASURED OCTOBER 1999
- WELL SCREEN



RFI ADDENDUM  
NSA MID-SOUTH  
MILLINGTON, TENNESSEE

FIGURE 3-4  
HYDROGEOLOGIC SECTION  
C-C' AND D-D'

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007G47LF, which is made up of an atypical section of pink, gray, and yellow brown lean clay, unique to this area only.

The *fluvial deposits* lie unconformably beneath the loess/fluvial deposits transition zone and are recognized by the uppermost presence of very fine-grained sand. In general, the fluvial deposits consist of an upper sand-dominated portion and a lower gravel-dominated portion. Sand-dominated fluvial sediments are characterized by very fine- to coarse-grained sand (if gravels are present) coarsening downward in the sequence. These sands locally contain lenses of silt and/or clay and the sand may be micaceous. The lower part of the fluvial deposits generally contains more gravel and is characterized by mixtures of poorly to moderately sorted gravels and fine- to very coarse-grained sand, coarsening downward. Gravels are rounded to subangular and have a maximum longitudinal diameter of 2.5 inches.

Thickness of the fluvial deposits typically ranges between 30 and 45 feet, however, thicker than usual sections were identified at wells 007G27LF (90 feet thick), 007G48LF (67 feet) and 007G55LF (62 feet) shown in Figures 3-4, 3-3, and 3-2, respectively. Conversely, an anomalously thin gravel section (8 feet thick) was identified at well 007G47LF, where the loess/fluvial deposits transition zone was unusually thick.

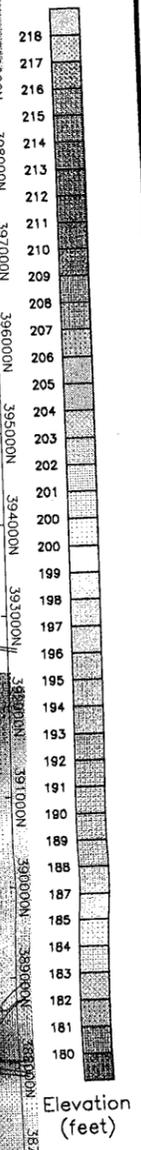
The *Cockfield Formation* lies unconformably below the fluvial deposits and is similarly present beneath the airfield area and off the base property. Depth to the Cockfield Formation ranges from 77 to 127 feet bls, ranging in elevation from 200 feet msl to 145 feet msl at wells 007G29LF and 007G27LF respectively, slightly lower than earlier investigated areas. Like the previously investigated areas, the upper contact of the Cockfield Formation is similarly distinguished by a marked change from the overlying gravel-dominated sediments of the fluvial deposits to a heterogeneous mixture of sand, silt, clayey sand, clay, and lignite. A computer-generated contour map of the top of the Cockfield Formation (Figure 3-5) shows the irregularities of the contact

between the fluvial deposits and Cockfield Formation, with the cooler colors representing deeper sections to the Cockfield and the warmer colors representing shallower sections. The Cockfield Formation generally deepens west and east of a ridge-like feature trending north-south from the base's southside. On the Northside, the Cockfield Formation appears to be shallow beneath a plateau-like feature at the base's north end with depth to the Cockfield deepening west and northwest of this feature. Figure 3-2 illustrates the subtle downward dip of the Cockfield Formation along a southeast-northwest transect in the direction of contaminant flow.

The RFI report suggested that the high contrast in grain size and clay content between the Cockfield Formation and the fluvial deposits would impede vertical contaminant migration. The abundance of lignite and wood debris in the Cockfield Formation and its potential sorption capacity were thought to further minimize potential vertical migration of contaminants in the fluvial deposits. To quantify these properties, Shelby tube samples and discrete soil samples were collected from the Cockfield Formation during the third phase of well construction. As shown in Table 3-1, total organic carbon concentrations varied significantly from 2,100 milligrams per kilogram (mg/kg) to 120,000 mg/kg (12 %). Sample depths, locations and concentrations are also listed in Table 3-1.

### **3.2 Geotechnical/Design Data**

Shelby tubes and grab soil samples were collected to further characterize the properties of the fluvial deposits and Cockfield Formation during the third and fifth well construction phases in July 1998 and February 1999.



RFI ADDENDUM  
NSA MID-SOUTH  
MILLINGTON, TENNESSEE

FIGURE 3-5  
TOP OF COCKFIELD FORMATION

DWG DATE: 02/14/00 | DWG NAME: BORDER

*RFI Report Addendum*  
*NSA Mid-South*  
*AOC A — Northside Fluvial Groundwater*  
*Revision: 0; February 17, 2000*

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**Table 3-1**  
**Total Organic Carbon in Cockfield Formation**  
**NSA Mid-South**

Well ID	Sample Depth (feet bls) <sup>a</sup>	Concentration (mg/kg)
007G21LF	83 - 84	24,000
007G22LF	77 - 87	34,000
	87 - 97	20,000
	97 - 107	2,100
	107 - 117	13,000
	122 - 123	120,000 <sup>b</sup>
	117 - 127	8,500
007G25LF	125 - 127	76,000
007G27LF	126 - 128	73,000
007G28LF	84 - 86	33,000
007G29LF	85 - 87	31,000

**Notes:**

- a — feet below land surface
- b — biased sample collected from a 6-inch lignite seam

Four Shelby tubes collected from the Cockfield Formation were submitted to Tri-State Testing, Memphis, Tennessee, using applicable American Society of Testing and Materials (ASTM) methods for soil classification and permeability, moisture content, total porosity, and grain size analyses. Ten grab samples from the fluvial deposits were submitted for soil classification and grain-size analysis. Table 3-2 summarizes the analytical results for the collected samples. Analytical reports and grain-size distribution curves are provided in Appendix C.

Soil properties show distinctive trends corresponding to the stratigraphic units from which they were collected. The fluvial deposits samples have been classified as a range of grain sizes from clay, poorly graded sand (SP), to well graded gravel (GW). Samples collected from the Cockfield Formation have been classified as either sandy clayey silt to light gray silty sand with clay lenses and organics (lignite). The coefficients of permeability for the Cockfield Formation range from  $5.5 \times 10^{-5}$  centimeters per second (cm/sec) to  $1.6 \times 10^{-6}$  cm/sec.

Table 3-2  
 Geotechnical Samples Collected from AOC A Borings

Sample ID	*USCS Soil Classification	Coefficient of Permeability (cm/sec)	Moisture Content (%)	Total Porosity (%)	Median Grain Size (mm)
<b>Fluvial Deposits Samples</b>					
007S38-57	poorly graded sand (SP) — silty sand (SM)	—	—	—	0.18
007S38-67	poorly graded sand (SP)	—	—	—	0.27
007S38-77	well graded gravel (GW)	—	—	—	15
007S38-87	poorly graded sand (SP)	—	—	—	0.75
007S39-55	poorly graded sand (SP)	—	—	—	0.32
007S39-65	poorly graded sand (SP)	—	—	—	0.27
007S39-75	poorly graded sand (SP)	—	—	—	0.32
007S39-85	poorly graded sand (SP)	—	—	—	0.90
007S39-91	poorly graded sand (SP)	—	—	—	2
007S40-60	clay (CL)	—	—	—	—
<b>Cockfield Formation Samples</b>					
007S23-87	silty sand with clay seams (SM)	$4.2 \times 10^{-6}$	31.8	46.8	0.08
007S25-127	silty sand (SP - SM)	$5.5 \times 10^{-5}$	13.1	33.3	0.15
007S27-139	clay and clayey silty sand (SM)	$1.6 \times 10^{-6}$	22.6	39.9	0.08
007S28-89	sandy-clayey silt (ML)	$9.1 \times 10^{-5}$	26.5	41.7	0.04

**Notes:**

- SP — poorly graded sand USCS soil classification from laboratory
- SM — silty sand mixture USCS soil classification from laboratory
- GW — well graded gravel/sand mixture USCS soil classification from laboratory
- ML — silt, clayey silt USCS soil classification from laboratory
- mm — millimeters
- cm/sec — centimeters per second
- — Analysis not applicable to sample
- \* — Samples classified according to the Unified Soil Classification System.

Sample ID 007S39-91 corresponds with well location 007G39LF and sample depth of 91 feet.

Soil samples were not analyzed for Atterberg limits; therefore, the distinction between clay and silt was not made by the soil laboratory.

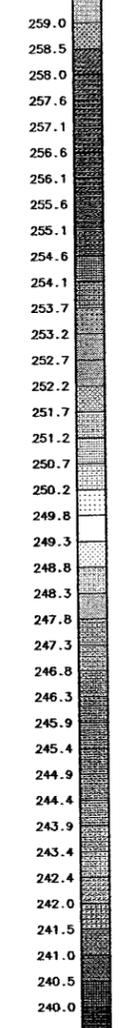
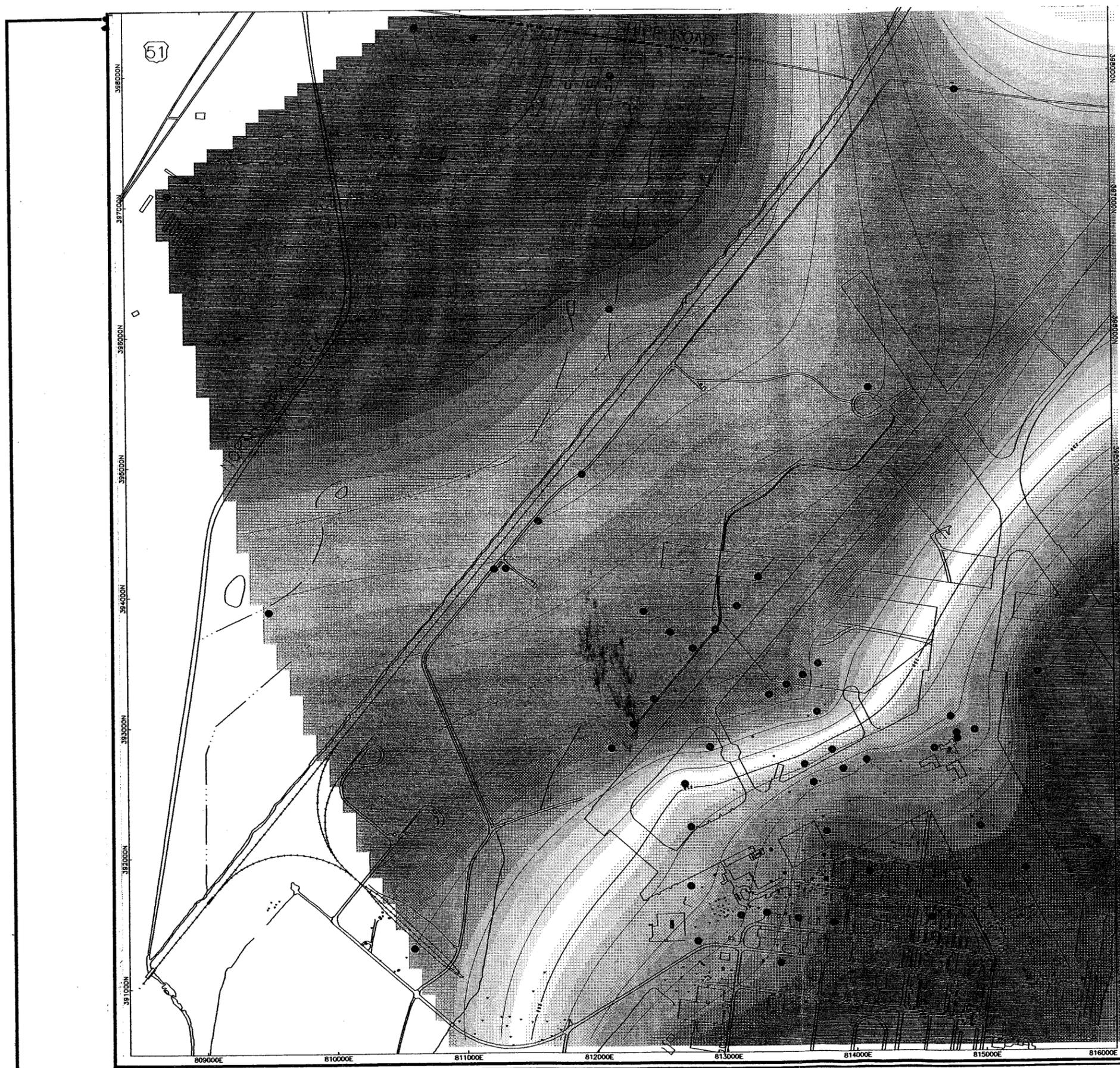
### **3.3 Site-Specific Hydrogeology**

A computer-contoured potentiometric map of the fluvial deposits aquifer water levels collected in November 1999 is shown in Figure 3-6. Flow direction in the fluvial deposits is shown to continue primarily northwestward, with localized small scale deviations. Hydraulic gradients vary across the study area as indicated by the different spacing between groundwater contours. In areas south and southeast of Building N-126, total head changes 1 foot over a distance of roughly 750 to 1,200 feet, while north of N-126 steeper gradients are evident where similar changes in head are seen over a 150 to 300 feet. North of the runway, gradients flatten again to 1 foot of elevation change roughly every 500 feet. Varying hydraulic gradients are also seen north of the runway to the perimeter road, where gradients again flatten and then steepen between the perimeter road and Shipp Road.

The varying hydraulic gradients are likely indicative of heterogeneities in aquifer properties. The hydraulic gradient, or head loss per unit length of travel, reflects the frictional resistance that develops in aquifer pores during flow (Driscoll, 1986). Therefore it stands to reason that steeper gradients indicate less conductive areas. K values derived by the USGS and EnSafe during aquifer pump tests indicate a similar correlation with flatter hydraulic gradients in more hydraulically conductive areas (discussed further below).

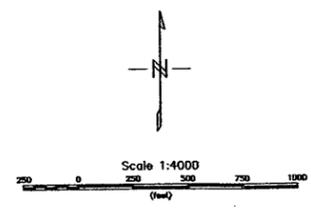
Reconciling the groundwater analytical data with the conceptual model became increasingly difficult when contaminants were detected off the base property boundary, beyond the distance predicted with fate and transport models. Therefore, the BCT decided that aquifer properties needed further evaluation the airfield area, north of the runway.

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GW Elevation  
(feet)

Plot Summary  
 - Data from GW measurements in November 1999  
 - Dark gray dots are measurement points  
 - CAD drawings: 34PLUME1.DXF, 34PLUME2.DXF  
 - Plot file 1029.plt generated 01-12-00 via Geocad  
 - N:\WPS\USERS\HUGHES\MEMPHIS\GEOCHEM\PLUMES




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FIGURE 3-6  
 POTENTIOMETRIC MAP OF FLUVIAL  
 DEPOSITS GROUNDWATER

DWG DATE:02/14/00 DWG NAME: BORDER

*RFI Report Addendum*  
*NSA Mid-South*  
*AOC A — Northside Fluvial Groundwater*  
*Revision: 0; February 17, 2000*

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### **Aquifer Characterization**

A 24-hour constant rate aquifer test was conducted on August 12, 1999, at the northwest side of the airfield runway at well 007G37LF (Figure 3-1). The objectives of the aquifer characterization were to:

- Further refine the aquifer parameters, particularly the transmissivity (T) and hydraulic conductivity (K) in areas northwest of the airfield runway.
- Evaluate optimum pumping rates and the zone of influence for any needed groundwater containment system.
- Collect enough data to further refine the groundwater model for contaminant transport.

A long-term constant-rate pumping test was performed by pumping well 007G37LF at 42 gallons per minute for 24 hours in order to simulate the local effects of long-term pumping. Recovery monitoring was also performed for 24 hours after pumping ceased to provide additional data for analysis. The pumping well and 14 observation wells were monitored during the aquifer characterization test and drawdown effects were measured 2,200 feet from the pumping well at the conclusion of the test (EnSafe, November 16, 1999).

Aquifer parameters were estimated by matching drawdown and recovery curves at each well to Theis and Hantush-Jacob type-curves for a confined aquifer and a leaky confined aquifer, respectively. Transmissivity values were estimated to range from 1,296 to 4,320 with a geometric mean of 2,448 ft<sup>2</sup>/day. Transmissivity values were relatively consistent across the study area except east and northwest (wells 007G34LF and 007G39LF) of the pumping well where lesser drawdown was identified and higher transmissivity values were calculated. Dividing the transmissivity by the aquifer thickness, the study area's mean K was estimated at 59 feet per day,

an order of magnitude higher than the K value calculated by the USGS southwest of N-126 (5.3 feet per day).

### **Fluvial Deposits Groundwater Velocities**

Horizontal groundwater velocities for the fluvial deposits have been calculated using the following derivation of Darcy's law:

$$V = Ki/n$$

where:

- K = hydraulic conductivity
- i = groundwater gradient
- n = effective porosity

As shown in Figure 3-6, groundwater gradients vary across the study area from 0.0017 feet/foot north of the runway (between 007G36LF and 007G45LF) to 0.0062 feet/foot outside the base property (between 007G53LF and 007G55LF), resulting in groundwater velocities varying across the study area as well. Assuming an effective porosity of 27% and using the 59 feet per day for K, groundwater velocities are calculated to range from 136 feet per year north of the runway to 494 feet per year outside the base property boundary.

#### 4.0 NATURE AND EXTENT OF CONTAMINATION

This section presents the additional AOC A RFI data collected between May 1997 and July 1999. Table 4-1 lists the sampling events and wells that were sampled during this time. Groundwater samples collected during the addendum were analyzed using different levels of quality control (QC). For example, groundwater screening samples collected from the third to sixth phases of well construction were analyzed at either an onsite field laboratory or at ETC using a Level II or equivalent DQO, while groundwater samples collected during Events 4 and 5 of long-term monitoring were analyzed using a combination of Level III and IV equivalent DQO. However, a general comparison of data indicates that screening data are consistent with samples analyzed with a higher QC level; therefore, all the groundwater data in this section are weighted equally.

**Table 4-1**  
**Groundwater Sampling Events in RFI Addendum**  
**AOC A — NSA Mid-South**

Sampling Event	Fluvial Deposits Wells Sampled	Cockfield Wells Sampled
Long-Term Monitoring Event 4 (May 1997)	003G04LF	007G01UC - 007G05UC, 007G09UC
	005G01UF - 005G04UF, 005G05LF	
	007G01LF, 007G01UF, 007G03LF - 007G18LF, 007G03UF - 007G09UF	
	015G01UF - 015G04UF, 015G01LF - 015G04LF	
	060G02LF, 060G04LF	

**Table 4-1**  
**Groundwater Sampling Events in RFI Addendum**  
**AOC A — NSA Mid-South**

<b>Sampling Event</b>	<b>Fluvial Deposits Wells Sampled</b>	<b>Cockfield Wells Sampled</b>
Long-Term Monitoring Event 5 (November 1997)	003G04LF  005G01UF – 005G04UF, 005G05LF  007G01LF, 007G01UF, 007G03LF – 007G18LF, 007G19MF 007G03UF– 007G09UF,  060G02LF, 060G04LF	007G01UC, 007G02UC – 007G09UC
Third Well Construction Phase (August 1998)	007G04LF, 007G04UF, 007G10LF – 007G12LF, 007G15LF, 007G20LF – 007G23LF, 007G24MF – 007G26MF 007G27LF – 007G30LF,  005G08LF  N12G01LF, N12G02LF	007G22UC
Diffusion Pilot Study <sup>a</sup> (September 1998)	007G01UF (D) 007G04LF (D) 007G05LF (D)	
Fourth Well Construction Phase (November 1998)	007G04LF 007G10LF – 007G12LF 007G20LF – 007G23LF 007G24MF – 007G26MF 007G28LF – 007G36LF	
Fifth Well Construction Phase (February 1999)	007G31LF (D) – 007G36LF(D5) 007G37LF – 007G48LF  007GPZ01 – 007GPZ03	

**Table 4-1**  
**Groundwater Sampling Events in RFI Addendum**  
**AOC A — NSA Mid-South**

Sampling Event	Fluvial Deposits Wells Sampled	Cockfield Wells Sampled
Diffusion Sampling Event (March 1999)	V-81 (runway well) (D2) 007G04LF (D2), 007G04UF (D2) 007G11LF (D2), 007G18LF (D2), 007G20LF(D2), 007G21LF (D2), 007G22LF (D2), 007G23LF (D2), 007G27LF(D2) -07G35LF(D2), 007G36LF(D3), 007G37LF(D9),007G38LF(D2), 007G39LF (D10), 007G40LF(D2), 007G41LF (D10), 007G42LF (D5), 007G43LF(D2), 007G44LF(D5), 007G45LF(D4), 007G46LF(D10)007G48LF (D5), 007G49LF(D8), 018G01LF (D2)	
Sixth Well Construction Phase (July 1999)	007G52LF – 007G56LF, McNamara Well (007GMCNA)	

**Notes:**

- D — Designates sample collected with diffusion sampler.
- D5 — Designates 5 diffusion samplers left at discrete intervals in the well screen.
- a — Data from the diffusion pilot study have been grouped with data from the third well construction phase in Table 4-2 because so few samples were collected with the diffusion pilot study.

To illustrate the contaminants' spatial distribution, the maximum concentrations detected over the course of the addendum's monitoring are presented. Table 4-1 shows that select wells were sampled at multiple intervals with diffusion samplers; however, to facilitate data presentation, only the maximum concentrations detected from the multiple intervals are discussed below and presented in the figures. Similarly, the maximums are used from well pairs screening the fluvial deposits upper and lower sections. Each set of analytical data along with any vertical concentration gradients identified with the diffusion samplers is presented in Appendix A. Because the contaminant distribution is complex and warrants further discussion, Section 5

provides a geochemical conceptual model in an effort to explain the contaminant plumes and their ultimate fate and transport.

Table 4-2, at the end of this section, presents the frequency, range, mean, and MCL for each VOC detected. It also lists the cumulative MCL exceedance or "M factor" for each fluvial deposits monitoring well during the addendum monitoring. This factor represents the sum of the maximum concentrations detected during monitoring, divided by the respective MCLs for the compounds (e.g., M Factor =  $(9 \mu\text{g/L TCE})/5 \mu\text{g/L} + (8 \mu\text{g/L carbon tetrachloride})/5 \mu\text{g/L} = 1.8 + 1.6 = 3.4$ ).

The value is very conservative because it represents the maximum detections over all sampling events. For example, the maximum carbon tetrachloride detected during Event 4 of long-term monitoring can be summed with the maximum TCE detected during the diffusion sampling event. Possible synergistic effects associated with multiple contaminants are not considered.

#### **4.1 VOCs in the Fluvial Deposits Groundwater**

Figures 4-1 through 4-9, at the end of this section, present the primary contaminants of concern identified in the fluvial deposits: PCE, TCE, 1,2-DCE, 1,2-DCA, 1,1-DCE, 1,1-DCA, carbon tetrachloride, chloroform, and benzene. Red circles have been used to designate MCL exceedances while green triangles designate non detections or detections below MCLs. The red circles are scaled in size according to the magnitude of the MCL exceedances (i.e., 1 to 10 times the MCL, 10 to 100 times the MCL, and 100 to 1000 times the MCL). The maximum detected concentrations are also shown in the figures below the well IDs. Data presented in the original RFI report from the earlier sampling events are generally consistent with the later addendum sampling; therefore, the values presented in the figures are thought to conservatively reflect existing AOC A contaminant concentrations.

### **PCE in Fluvial Deposits Groundwater**

PCE exceeded its 5  $\mu\text{g/L}$  MCL at 18 locations (Figure 4-1), including locations surrounding Building N-126, within the grass infield, and in the transect of wells north of and paralleling the runway. The highest PCE was identified at SWMU 18 (018G01LF), which is east-southeast of N-126, where 270  $\mu\text{g/L}$  were detected. Exceedances were also identified at the edge of the grassy infield at 007G11LF, where 150  $\mu\text{g/L}$  were detected. Figure 4-1 also shows the downgradient extent dropping off at the base property boundary. Concentrations dropped from 8  $\mu\text{g/L}$  at PZ-3 along the base perimeter road, to below the MCL in offsite well 007G52LF, where 4.7  $\mu\text{g/L}$  were detected.

Interviews with Navy personnel did not indicate past PCE usage. The BCT speculated that PCE may have been used to clean airplane turbine engines parked adjacent to the grass infield. Solvent is reported to have been "sucked through" the turbines toward the grass during cleaning processes. Other speculated and known source areas are presented in Section 1 of the AOC A RFI Report (EnSafe, February 17, 2000).

### **TCE in Fluvial Deposits Groundwater**

TCE was the most prevalent VOC detected in the fluvial deposits groundwater at AOC A. Figure 4-2 shows the 5  $\mu\text{g/L}$  MCL exceedance in three general groupings: (1) areas surrounding Building N-126 and south of it, (2) the aircraft taxiways and grassy infield, and (3) northwest of the runway to the perimeter road. TCE concentrations were less than 100  $\mu\text{g/L}$  in all wells, except four locations within the apron area and taxiway. The maximum TCE concentration (4,400  $\mu\text{g/L}$ ) was detected adjacent to Building N-126 in well 007G04LF.<sup>1</sup> The second highest TCE concentration was identified near the former N-6 hangar in the upper fluvial deposits well

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<sup>1</sup>Six additional wells installed in November and December 1999 as a part of the CMS bioremediation pilot study have identified 6,680  $\mu\text{g/L}$  TCE, a new area maximum. Data collected from the pilot study will be presented in the AOC A CMS.

007G15UF where 600  $\mu\text{g/L}$  TCE was detected. Interviews with navy personnel found that spent chlorinated solvents were reportedly used in this area for weed control around the former N-6 hangar.

Monitoring well 007G11LF, adjacent to the taxiway and grassy infield, contained 340  $\mu\text{g/L}$ . This same well also contained the high PCE concentration. TCE's downgradient extent as shown on Figure 4-2, extends off the base property boundary; however, concentrations are below the MCL in offsite well 007G52LF, where 3.7  $\mu\text{g/L}$  TCE was detected. TCE exceeded the MCL in PZ-3 at the perimeter road where 6.1  $\mu\text{g/L}$  was detected.

#### **1,2-DCE (total) in Fluvial Deposits Groundwater**

Figure 4-3 shows the maximum 1,2-DCE (total) was detected at well 007G09LF which contained 35  $\mu\text{g/L}$ . Detections are shown in multiple wells south of Building N-126 and north of the runway, however, most of the concentrations are less than 10  $\mu\text{g/L}$ . Depending on the sampling event, 1,2-DCE was reported as either 1,2-DCE total or in its separate components cis- and trans-1,2-DCE. An MCL does not exist for 1,2-DCE total; however, cis-1,2-DCE's MCL is 70  $\mu\text{g/L}$ . Assuming all the detections in Figure 4-3 are cis-1,2-DCE, none of the detections exceed the MCL.

Event 4 of long term monitoring identified an anomalous 150  $\mu\text{g/L}$  of 1,2 DCE (total) in addition to several other VOCs in well 060G02LF, however, concentrations were absent in previous and two subsequent confirmation events indicating the contaminants were attributed to an extraneous source and not representative of this well's groundwater (EnSafe, September 17, 1997).

#### **1,1-DCE in Fluvial Deposits Groundwater**

1,1-DCE exceeded its 7  $\mu\text{g/L}$  MCL at four locations in areas adjacent to, and south of Building N-126 and near the former N-6 hangar east of Building N-126 (Figure 4-4). The

maximum was in the upper fluvial deposits groundwater at well 007G15UF, where 380  $\mu\text{g/L}$  was detected. 1,1-DCE concentrations drop off to either non detect or below the MCLs at downgradient grassy infield locations.

### **1,1-DCA in Fluvial Deposits Groundwater**

Figure 4-5 shows 1,1-DCA was detected in 14 monitoring wells; however, concentrations were below the 800  $\mu\text{g/L}$  tap water RBC in all wells (an MCL does not exist for 1,1-DCA). The highest detections were near the former N-6 hangar in well 007G15UF, where 67  $\mu\text{g/L}$  was detected.

### **1,2-DCA in Fluvial Deposits Groundwater**

1,2-DCA was detected in four monitoring wells; however, it exceeded the 5  $\mu\text{g/L}$  MCL in well 007G03LF, southeast of Building N-126, at 14  $\mu\text{g/L}$  (Figure 4-6). Other 1,2-DCA detections are southwest and west of Building N-126.

### **Carbon Tetrachloride in Fluvial Deposits Groundwater**

Carbon tetrachloride exceeded its 5  $\mu\text{g/L}$  MCL beneath a large portion of the apron area and downgradient to the base perimeter road (Figure 4-7). The highest concentrations were in wells adjacent to Building N-126 and upgradient of it in wells 007G04LF and 007G03LF which both had maximum concentrations of 42  $\mu\text{g/L}$ . Similar concentrations were identified at the following wells: (1) 007G15UF, near the former N-6 hangar (14  $\mu\text{g/L}$ ) (2) well 007G18LF, at the edge of the taxiway and the infield (27  $\mu\text{g/L}$ ), and (3) well 007G23LF in the taxiway (30  $\mu\text{g/L}$ ). Carbon tetrachloride above the MCL extends downgradient to the perimeter road at PZ-3, where 11  $\mu\text{g/L}$  was detected at PZ-3. Off site well 007G52LF, downgradient from PZ-3, contained 3.3  $\mu\text{g/L}$ , which is below the MCL.

### **Chloroform in Fluvial Deposits Groundwater**

Chloroform was detected across most of the study area (Figure 4-8); however, it did not exceed the 100  $\mu\text{g/L}$  MCL in any groundwater samples. The highest concentration was identified at 007G15UF where 44  $\mu\text{g/L}$  were detected. Most detections were less than 10  $\mu\text{g/L}$ .

### **Other VOCs in Fluvial Deposits Groundwater**

Additional VOCs detected in the fluvial deposits groundwater included the following: benzene, ethylbenzene, xylenes, carbon disulfide, acetone, 2-hexanone, 1,2-dichloropropane, vinyl chloride, and 4-methyl-2-pentanone. Two of these compounds, benzene and vinyl chloride, exceeded their MCLs (Figure 4-9). Benzene exceeded its 5  $\mu\text{g/L}$  MCL in two SWMU 15 wells and one well near the former N-6 hangar (007G15UF). The maximum benzene concentration (3,900  $\mu\text{g/L}$ ) was detected in SWMU 15's upper fluvial deposits well 015G01UF. Vinyl chloride exceeded its 2  $\mu\text{g/L}$  MCL in an abandoned domestic PVC supply well at the McNamara property (007GMCNA) which has been included in the offsite wells monitored as part of the RFI. Vinyl chloride was not detected in other AOC A wells indicating this contaminant is likely a well artifact and not attributable to NSA Mid-South contaminants. This well has been out of service for approximately 35 years.

## **4.2 VOCs in the Cockfield Formation Groundwater**

To confirm whether or not contaminants were migrating from the fluvial deposits aquifer into the lower confining unit, select upper Cockfield Formation monitoring wells were sampled during the addendum monitoring. Table 4-3 summarizes the VOCs detected in the Cockfield Formation during the addendum. Analytical results from Event 4 identified VOCs exceeding regulatory standards in three of the Cockfield Formation wells (007G04UC, 007G05UC, and 007G09UC). However, VOCs were not detected during the confirmation event conducted in July 1997 nor were they detected in Event 5 of long-term monitoring (November 1997). An evaluation of the anomalous VOCs detected during Event 4 was provided in a technical memorandum (EnSafe, September 1997), which concluded that the contamination's source was likely attributable to cross contamination from a previously sampled well.

Table 4-2  
 VOCs in Fluvial Deposits Groundwater  
 NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well	Fourth Well	Fifth Well	Diffusion	Sixth Well	Frequency	Range	Mean	M FACT
						Phase	Phase	Phase	Sampling Event	Phase				
005G04LF	Benzene	0.36	5.0	ND	1.80I	—	—	—	—	—	1	1.8	1.80	0.360
													M Factor Total	0.36
005G01UF				ND	ND	—	—	—	—	—	0			
005G02UF				ND	ND	—	—	—	—	—	0			
005G03UF				ND	ND	—	—	—	—	—	0			
005G04UF	Carbon tetrachloride	0.16	5.0	1.2 J	3.0 J	—	—	—	—	—	2	1.2	3.0	0.600
													M Factor Total	0.60
005G05LF				ND	ND	—	—	—	—	—	0			
007G01LF	1,1-Dichloroethane	800		4.2 J	4.5 J	—	—	—	—	—	2	4.2	4.5	0.000
	1,1-Dichloroethene	0.044	7.0	6.2	6.9 J	—	—	—	—	—	2	6.2	6.9	0.986
	1,2-Dichloroethene (total)	55		1.8 J	1.9 J	—	—	—	—	—	2	1.8	1.9	0.000
	Carbon tetrachloride	0.16	5.0	5.7	3.4 J	—	—	—	—	—	2	3.4	4.5	1.140
	Chloroform	0.15	100.0	1.5 J	1.1 J	—	—	—	—	—	2	1.1	1.5	0.015
	Trichloroethene	1.6	5.0	8.4	9.6	—	—	—	—	—	2	8.4	9.6	1.920
													M Factor Total	4.0
007G01UF	1,1-Dichloroethane	800		24.0	24.0	—	—	—	—	—	3	24	29	0.000
	1,1-Dichloroethene	0.044	7.0	5.9	5.0	8.0 (D)	—	—	—	—	3	5	8	1.143
	1,2-Dichloroethene (total)	55		5.6	5.8	6.4 (D)	—	—	—	—	3	5.6	6.4	0.000
	1,2-Dichloropropane	0.16	5.0	ND	ND	0.93 J (D)	—	—	—	—	1	0.93	0.93	0.186
	Tetrachloroethene	1.1	5.0	9.10	8.8	2.3 J (D)	—	—	—	—	3	2.3	9.1	1.820
	Trichloroethene	1.6	5.0	10.00	8.6	7.3 (D)	—	—	—	—	3	7.3	10	2.000
													M Factor Total	5.1
007G03LF	1,2-Dichloroethane	0.12	5.0	9.3	14.0	—	—	—	—	—	2	9.3	14	2.800
	Carbon tetrachloride	0.16	5.0	42.0	28.0	—	—	—	—	—	2	28	42	8.400
	Chloroform	0.15	100.0	15.0	14.0	—	—	—	—	—	2	14	15	0.150
	Tetrachloroethene	1.1	5.0	5.1	10.0	—	—	—	—	—	2	5.1	10	2.000
	Trichloroethene	1.6	5.0	160.0	170.0	—	—	—	—	—	2	160	170	34.000
													M Factor Total	47.2
007G03UF				ND	ND	—	—	—	—	—	0			

RFI Report Addendum  
 NSA Mid-South  
 AOC A — Northside Fluvial Groundwater  
 Revision: 0; February 17, 2000

Table 4-2  
 VOCs in Fluvial Deposits Groundwater  
 NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well	Fourth Well	Fifth Well	Diffusion	Sixth Well	Frequency	Range	Mean	M FACT	
						Phase	Phase	Phase	Sampling Event	Phase					
007G04LF	1,1-Dichloroethane	800		ND	ND	—	—	—	1.0 J	—	1	1	1	0.000	
	1,1-Dichloroethene	0.044	7.0	7.6	7.7	14	44.0 J (D)	—	45.0	—	5	7.6	45	23.66	6.429
	1,2-Dichloroethene (total)	55		1.5 J	2.0 J	3.1	7.0 J	—	7.0	—	4	1.5	7	3.40	0.000
	Benzene	0.36	5.0	ND	ND	ND	ND	—	3.0	—	1	3	3	3.00	0.600
	Carbon tetrachloride	0.16	5.0	11.0	ND	32 (D)	42.0 J	—	3.0 J	—	4	3	42	22.00	8.400
	Chloroform	0.15	100.0	2.3 J	1.8 J	5 (D)	6.0 J	—	5.0	—	5	1.8	6	4.02	0.060
	cis-1,2-Dichloroethene	61	70.0	NA	NA	NA	7.0 J	—	—	—	1	7	7	7.00	0.100
	Tetrachloroethene	1.1	5.0	35.0	44.0	24.0	20.0 J	—	51.0	—	5	20	51	34.80	10.200
	Trichloroethene	1.6	5.0	870.0 D	1400.0 D	1300.0 D	3500.0 D	—	4400.0 D	—	5	870	4400	2694	880.0
														M Factor Total	905
007G04UF	Benzene	0.36	5.0	ND	ND	ND	—	—	2.0 J	—	1	2	2	2.00	0.400
	Trichloroethene	1.6	5.0	—	—	3.40 J	—	—	ND	—	1	3.4	3.4	3.40	0.680
	Carbon Tetrachloride	0.16	5.0	1.2	3	ND	—	—	ND	—	2	1.2	3	2.1	0.6
													M Factor Total	1.7	
007G05LF	1,2-Dichloroethane	0.12	5.0	2.9 J	2.0 J	1.0 J (D)	—	—	—	—	3	1	2.9	1.97	0.580
	Carbon tetrachloride	0.16	5.0	6.6	5.8	4.3 J (D)	—	—	—	—	3	4.3	6.6	5.57	1.320
	Chloroform	0.15	100.0	3.1 J	3.1 J	2.3 J (D)	—	—	—	—	3	2.3	3.1	2.83	0.031
	Tetrachloroethene	1.1	5.0	1.6 J	ND	1.2 J (D)	—	—	—	—	2	1.2	1.6	1.40	0.320
	Trichloroethene	1.6	5.0	28.0	25.0	24.0 (D)	—	—	—	—	3	24	28	25.67	5.600
													M Factor Total	7.8	
007G05UF				ND	ND	—	—	—	—	—	0				
007G06LF	Acetone	610		46.0 J	ND	—	—	—	—	—	1	46	46	46.00	0.000
	Tetrachloroethene	1.1	5.0	3.0 J	7.3	—	—	—	—	—	2	3	7.3	5.15	1.460
	Trichloroethene	1.6	5.0	2.1 J	2.4 J	—	—	—	—	—	2	2.1	2.4	2.25	0.480
													M Factor Total	1.94	
007G06UF	2-Hexanone	1500		1.1 J	ND	—	—	—	—	—	1	1.1	1.1	1.10	0.000
007G07LF	1,1-Dichloroethene	0.044	7.0	2.9 J	2.4 J	—	—	—	—	—	2	2.4	2.9	2.65	0.414
	1,2-Dichloroethene (total)	55		ND	0.98 J	—	—	—	—	—	1	0.98	0.98	0.98	0.000
	Carbon tetrachloride	0.16	5.0	1.0 J	1.2 J	—	—	—	—	—	2	1	1.2	1.10	0.240
	Tetrachloroethene	1.1	5.0	13.0	18.0	—	—	—	—	—	2	13	18	15.30	3.600
	Trichloroethene	1.6	5.0	6.7	8.9	—	—	—	—	—	2	6.7	8.9	7.80	1.780
													M Factor Total	6.0	

Table 4-2  
VOCs in Fluvial Deposits Groundwater  
NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well	Fourth Well	Fifth Well	Diffusion	Sixth Well	Frequency	Range	Mean	M FACT	
						Phase	Phase	Phase	Sampling	Phase					
007G07UF	Acetone	610		33.0 J	ND	—	—	—	—	—	1	33	33	33.00	0.000
007G08LF	1,1-Dichloroethane	800		4.7 J	ND	—	—	—	—	—	1	4.7	4.7	4.70	0.000
	1,1-Dichloroethene	0.044	7.0	8.9	ND	—	—	—	—	—	1	8.9	8.9	8.90	1.271
	1,2-Dichloroethene (total)	55		1.3 J	ND	—	—	—	—	—	1	1.3	1.3	1.30	0.000
	Trichloroethene	1.6	5.0	5.8	1.3 J	—	—	—	—	—	2	1.5	5.8	3.65	1.160
														M Factor Total	1.4
007G08UF	1,2-Dichloroethane	0.12	5.0	1.7 J	2.1 J	—	—	—	—	—	2	1.7	2.1	1.90	0.420
	Trichloroethene	1.6	5.0	1.8 J	1.3 J	—	—	—	—	—	2	1.3	1.8	1.55	0.360
														M Factor Total	0.78
007G09LF	1,2-Dichloroethene (total)	55		35.0	15.0	—	—	—	—	—	2	15	35	25.00	0.000
	4-Methyl-2-Pentanone (MIBK)	140		ND	120.0	—	—	—	—	—	1	120	120	120.00	0.000
	Tetrachloroethene	1.1	5.0	40.0	14.0	—	—	—	—	—	2	14	40	27.00	8.000
	Trichloroethene	1.6	5.0	8.5	ND	—	—	—	—	—	1	8.5	8.5	8.50	1.700
														M Factor Total	9.7
007G09UF	Acetone	610		47.0 J	ND	—	—	—	—	—	1	47	47	47.00	0.000
007G10LF	Carbon tetrachloride	0.16	5.0	12.0	14.0	7.2	9.0 J	—	—	—	4	7.2	14	10.55	2.800
	Chloroform	0.15	100.0	5.9	8.5	6.0	4.0 J	—	—	—	4	4	8.5	6.10	0.085
	Tetrachloroethene	1.1	5.0	10.0	21.0	12.0	7.0 J	—	—	—	4	7	21	12.50	4.200
	Trichloroethene	1.6	5.0	16.0	45.0	20.0	10.0 J	—	—	—	4	10	45	22.75	9.000
														M Factor Total	16.1
007G11LF	1,2-Dichloroethene (total)	55		ND	2.8 J	ND	ND	—	—	—	1	2.8	2.8	2.80	0.000
	Carbon tetrachloride	0.16	5.0	6.0	6.4	4.0 J	4.0 J	—	—	—	5	4	12	6.48	2.400
	Chloroform	0.15	100.0	10.0	10.0	9.4	7.0 J	—	—	—	5	7	12	9.68	0.120
	Tetrachloroethene	1.1	5.0	40.0	150.0	54.0	4.0 J	—	—	—	4	4	150	62.00	30.000
	Trichloroethene	1.6	5.0	93.0	340.0	130.0	11.0 J	—	—	—	4	11	340	143.50	68.000
														M Factor Total	100.5
007G12LF				ND	ND	ND	ND	—	—	—	0				
007G13LF				ND	ND	—	—	—	—	—	0				
007G14LF				ND	ND	—	—	—	—	—	0				

RFI Report Addendum  
 NSA Mid-South  
 AOC A – Northside Fluvial Groundwater  
 Revision: 0; February 17, 2000

Table 4-2  
 VOCs in Fluvial Deposits Groundwater  
 NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well	Fourth Well	Fifth Well	Diffusion	Sixth Well	Frequency	Range	Mean	M FACT
						Phase	Phase	Phase	Sampling Event	Phase				
007G15LF	1,1-Dichloroethene	0.044	7.0	6.3	ND	3.9 J	—	—	—	—	2	3.9 - 6.3	5.10	0.900
	Carbon tetrachloride	0.16	5.0	27.0	2.8 J	15.0	—	—	—	—	3	2.8 - 27	14.93	5.400
	Chloroform	0.15	100.0	7.40	2.7 J	5.6	—	—	—	—	3	2.7 - 7.4	5.23	0.074
	Tetrachloroethene	1.1	5.0	ND	1.1 J	ND	—	—	—	—	1	1.1 - 1.1	1.10	0.220
	Trichloroethene	1.6	5.0	12.0	12.0	6.5	—	—	—	—	3	6.5 - 12	10.17	2.400
													<b>M Factor Total</b>	<b>9.0</b>
007G15UF	1,1-Dichloroethane	800		67.0	51.0	64.0	—	—	—	—	3	51 - 67	60.67	0.000
	1,1-Dichloroethene	0.044	7.0	380.0 D	320.0	320.0 D	—	—	—	—	3	320 - 380	340.00	54.286
	1,2-Dichloroethene (total)	55		20.0	18.0	19.0	—	—	—	—	3	18 - 20	19.00	0.000
	Acetone	610		ND	93.0	ND	—	—	—	—	1	93 - 93	93.00	0.000
	Benzene	0.36	5.0	6.6	4.6 J	4.6 J	—	—	—	—	3	4.6 - 6.6	5.27	1.320
	Carbon tetrachloride	0.16	5.0	14.0	9.8	4.3 J	—	—	—	—	3	4.3 - 14	9.37	2.800
	Chloroform	0.15	100.0	44.0	30.0	17.0	—	—	—	—	3	17 - 44	30.33	0.440
	Tetrachloroethene	1.1	5.0	ND	0.8 J	0.58 J	—	—	—	—	2	0.58 - 0.8	0.69	0.160
	Trichloroethene	1.6	5.0	600.0 D	580.0 D	580.0 D	—	—	—	—	3	580 - 600	586.67	120.000
													<b>M Factor Total</b>	<b>179</b>
007G16LF	Carbon tetrachloride	0.16	5.0	23.0	37.0	—	—	—	—	—	2	23 - 37	30.00	7.400
	Chloroform	0.15	100.0	4.30 J	6.10	—	—	—	—	—	2	4.3 - 6.1	5.20	0.061
	Trichloroethene	1.6	5.0	11.0	15.0	—	—	—	—	—	2	11 - 15	13.00	3.000
													<b>M Factor Total</b>	<b>10.5</b>
007G17LF				ND	ND	—	—	—	—	—	0			
007G18LF	1,1-Dichloroethane	800		ND	2.2 J	—	—	—	ND	—	1	2.2 - 2.2	2.20	0.000
	1,1-Dichloroethene	0.044	7.0	ND	5.3	—	—	—	ND	—	1	5.3 - 5.3	5.30	0.757
	1,2-Dichloroethane	0.12	5.0	ND	ND	—	—	—	3.0	—	1	3 - 3	3.00	0.600
	Carbon tetrachloride	0.16	5.0	ND	27.0	—	—	—	4.0	—	2	4 - 27	15.50	5.400
	Chloroform	0.15	100.0	1.80 J	7.8	—	—	—	3.0	—	3	1.8 - 7.8	4.20	0.078
	Trichloroethene	1.6	5.0	8.50	10.0	—	—	—	17.0	—	3	8.5 - 17	11.83	3.400
													<b>M Factor Total</b>	<b>10.2</b>
007G19MF				—	ND	—	—	—	—	—	0			
007G20LF				—	—	ND	ND	—	ND	—	0			

Table 4-2  
VOCs in Fluvial Deposits Groundwater  
NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well	Fourth Well	Fifth Well	Diffusion	Sixth Well	Frequency	Range	Mean	M FACT	
						Phase	Phase	Phase	Sampling Event	Phase					
007G21LF	Tetrachloroethene	1.1	5.0	—		4.1 I	9.0 J	—	6.00	—	3	4.1	9	6.37	1.800
	Trichloroethene	1.6	5.0	—		13.0	25.0 I	—	25.00	—	3	13	25	21.00	5.000
												M Factor Total	6.8		
007G22LF	1,2-Dichloroethene (total)	55		—		ND	ND	—	18.00	—	1	18	18	18	0.000
	Carbon tetrachloride	0.16	5.0	—		11.0	16.0 J	—	ND	—	2	11	16	13.50	3.200
	Chloroform	0.15	100.0	—		9.5	6.0 J	—	4.00	—	3	4	9.5	6.50	0.095
	Tetrachloroethene	1.1	5.0	—		13.0	12.0 J	—	94.00	—	3	12	94	39.67	18.800
	Trichloroethene	1.6	5.0	—		12.0	9.0 J	—	83.00	—	3	9	83	34.67	16.600
												M Factor Total	38.7		
007G23LF	Carbon tetrachloride	0.16	5.0	—		30.0	18.0 J	—	24.00	—	3	18	30	24.00	6.000
	Chloroform	0.15	100.0	—		ND	3.0 J	—	4.00	—	2	3	4	3.50	0.040
	Tetrachloroethene	1.1	5.0	—		ND	ND	—	3.00 J	—	1	3	3	3.00	0.600
	Trichloroethene	1.6	5.0	—		30.0	23.0 J	—	25.00	—	3	23	30	26.00	6.000
												M Factor Total	12.6		
007G24MF				—		ND	ND	—	—	—	0				
007G25MF	1,1-Dichloroethene	0.044	7.0	—		2.9 J	2.0 J	—	—	—	2	2	2.9	2.45	0.414
	Chloroform	0.15	100.0	—		2.0 J	ND	—	—	—	1	2	2	2.00	0.020
	Trichloroethene	1.6	5.0	—		18.0	13.0 J	—	—	—	2	13	18	15.50	3.600
												M Factor Total	4.0		
007G26MF	Trichloroethene	1.6	5.0	—		1.8 J	4.0 J	—	—	—	2	1.8	4	2.90	0.800
												M Factor Total	0.8		
007G27LF				—		ND	ND	—	ND	—	0				
007G28LF	Carbon tetrachloride	0.16	5.0	—		2.0 J	3.0 J	—	3.0 J	—	3	2	3	2.67	0.600
	Chloroform	0.15	100.0	—		6.2	3.0 J	—	6.0	—	3	5	6.2	5.73	0.062
	Tetrachloroethene	1.1	5.0	—		17.0 J	11.0 J	—	12.0	—	3	11	17	13.33	3.400
	Trichloroethene	1.6	5.0	—		35.0	24.0 J	—	29.0	—	3	24	35	29.33	7.000
												M Factor Total	11.1		
007G29LF	Chloroform	0.15	100.0	—		ND	ND	—	2.0 J	—	1	2	2	2.00	0.020
												M Factor Total	0.02		
007G30LF				—		ND	ND	—	ND	—	0				

RFI Report Addendum  
 NSA Mid-South  
 AOC A — Northside Fluvial Groundwater  
 Revision: 0; February 17, 2000

Table 4-2  
 VOCs in Fluvial Deposits Groundwater  
 NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well	Fourth Well	Fifth Well	Diffusion	Sixth Well	Frequency	Range	Mean	M FACT	
						Phase	Phase	Phase	Sampling	Phase					
007G31LF	1,1-Dichloroethane	800		—	—	—	ND	1.29	1.0 J	—	2	1	1.29	1.15	0.000
	1,1-Dichloroethene	0.044	7.0	—	—	—	ND	1.74	2.0 J	—	2	1.74	2	1.87	0.286
	Tetrachloroethene	1.1	5.0	—	—	—	3.0 J	4.65	4.0	—	3	3	4.65	3.88	0.930
	Trichloroethene	1.6	5.0	—	—	—	17.0 J	21.7	28.0	—	3	17	28	22.73	5.690
													<b>M Factor Total</b>	<b>6.8</b>	
007G32LF	Carbon tetrachloride	0.16	5.0	—	—	—	6.0 J	ND	ND	—	1	6	-6	6.00	1.200
	Tetrachloroethene	1.1	5.0	—	—	—	7.0 J	ND	ND	—	1	7	-7	7.00	1.400
	Trichloroethene	1.6	5.0	—	—	—	22.0 J	ND	ND	—	1	22	-22	22.00	4.400
													<b>M Factor Total</b>	<b>7</b>	
007G33LF	Carbon disulfide	1000		—	—	—	ND	3.60	ND	—	1	3.6	3.6	3.60	0.000
007G34LF	Benzene	0.36	5.0	—	—	—	ND	ND	2.0 J	—	1	2	-2	2.00	0.400
	Carbon disulfide	1000		—	—	—	ND	ND	3.0	—	1	3	-3	3.00	0.000
	Carbon tetrachloride	0.16	5.0	—	—	—	ND	4.77	ND	—	1	4.77	-4.77	4.77	0.954
	Chloroform	0.15	100.0	—	—	—	10.0	7.8	5.0	—	3	5	-10	7.60	0.100
	Tetrachloroethene	1.1	5.0	—	—	—	4.0	1.95 J	ND	—	2	1.95	-4	2.98	0.800
	Trichloroethene	1.6	5.0	—	—	—	10.0	6.01	3.0 J	—	3	3	-10	6.34	2.000
													<b>M Factor Total</b>	<b>4.25</b>	
007G35LF	Trichloroethene	1.6	5.0	—	—	—	6.0 J	5.60	7.0	—	3	5.6	7	6.20	1.400
													<b>M Factor Total</b>	<b>1.4</b>	
007G36LF	1,1-Dichloroethane	800		—	—	—	4.0	4.41	4.0	—	3	4	-4.41	4.14	0.000
	1,1-Dichloroethene	0.044	7.0	—	—	—	ND	1.46	2.0 J	—	2	1.46	-2	1.73	0.286
	1,2-Dichloroethene (total)	55		—	—	—	10.0	9.9	9.0	—	2	9	-10	9.5	0.000
	Carbon tetrachloride	0.16	5.0	—	—	—	11.0	11.4	10.0	—	3	10	-11.4	10.8	2.280
	Chloroform	0.15	100.0	—	—	—	4.0	4.41	4.0	—	3	4	-4.41	4.14	0.044
	cis-1,2-Dichloroethene	61	70.0	—	—	—	10.0	9.9	NA	—	2	9.87	-10	9.94	0.143
	Tetrachloroethene	1.1	5.0	—	—	—	6.0	5.1	6.0	—	3	5.04	-6	5.68	1.200
	Trichloroethene	1.6	5.0	—	—	—	36.0	33.9	32.0	—	3	32	-36	33.97	7.200
													<b>M Factor Total</b>	<b>11.15</b>	

Table 4-2  
VOCs in Fluvial Deposits Groundwater  
NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well	Fourth Well	Fifth Well	Diffusion	Sixth Well	Frequency	Range	Mean	M FACT	
						Phase	Phase	Phase	Sampling Event	Phase					
007G37LF	1,1-Dichloroethane	800		--	--	--	--	1.6	1.0J	--	2	1	1.62	1.31	0.000
	1,2-Dichloroethene (total)	55		--	--	--	--	3.4	3.0J	--	2	3	3.4	3.2	0.000
	Carbon tetrachloride	0.16	5.0	--	--	--	--	ND	1.0J	--	1	1	1	1.0	0.200
	Chloroform	0.15	100.0	--	--	--	--	9.7	3.0J	--	2	3	9.74	6.37	0.097
	cis-1,2-Dichloroethene	61	70.0	--	--	--	--	3.4	NA	--	1	3.4	3.4	3.40	0.049
	Tetrachloroethene	1.1	5.0	--	--	--	--	2.4	7.0	--	2	2.43	7	4.72	1.400
	Trichloroethene	1.6	5.0	--	--	--	--	12.5	6.0	--	2	6	12.5	9.25	2.500
													<b>M Factor Total</b>	<b>4.25</b>	
007G38LF	1,1-Dichloroethane	800		--	--	--	--	2.5	ND	--	1	2.52	2.52	2.52	0.000
	Carbon tetrachloride	0.16	5.0	--	--	--	--	6.3	6.0	--	2	6	6.32	6.16	1.264
	Chloroform	0.15	100.0	--	--	--	--	3.9	4.0	--	2	3.9	4	3.95	0.040
	cis-1,2-Dichloroethene	61	70.0	--	--	--	--	5.8	NA	--	1	5.78	5.78	5.78	0.083
	1,2-Dichloroethene (total)	55		--	--	--	--	5.8	ND	--	0				
	Tetrachloroethene	1.1	5.0	--	--	--	--	5.9	ND	--	1	5.9	5.9	5.86	1.172
	Trichloroethene	1.6	5.0	--	--	--	--	16.1	2.0J	--	2	2	16.1	9.05	3.220
													<b>M Factor Total</b>	<b>5.8</b>	
007G39LF	Chloroform	0.15	100.0	--	--	--	--	2.4	ND	--	1	2.4	2.4	2.38	0.024
007G40LF	1,1-Dichloroethane	800		--	--	--	--	1.5	ND	--	1	1.5	1.5	1.54	0.000
	1,2-Dichloroethene (total)	55		--	--	--	--	3.5	1.0J	--	2	1	3.5	2.25	0.000
	Carbon tetrachloride	0.16	5.0	--	--	--	--	5.9	7.0	--	2	5.9	7	6.46	1.400
	Chloroform	0.15	100.0	--	--	--	--	3.1	2.0J	--	2	2	3.13	2.57	0.031
	cis-1,2-Dichloroethene	61	70.0	--	--	--	--	3.5	NA	--	1	3.5	3.5	3.49	0.050
	Tetrachloroethene	1.1	5.0	--	--	--	--	3.0	ND	--	1	3.0	3.0	2.98	0.596
	Trichloroethene	1.6	5.0	--	--	--	--	ND	6.00	--	1	6	6	6.00	1.200
													<b>M Factor Total</b>	<b>3.3</b>	

RFI Report Addendum  
 NSA Mid-South  
 AOC A — Northside Fluvial Groundwater  
 Revision: 0; February 17, 2000

Table 4-2  
 VOCs in Fluvial Deposits Groundwater  
 NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well	Fourth Well	Fifth Well	Diffusion	Sixth Well	Frequency	Range	Mean	M FACT	
						Phase	Phase	Phase	Sampling	Phase					
007G41LF	1,1-Dichloroethane	800		--	--	--	--	3.8	ND	--	1	1.8	1.8	1.77	0.000
	1,2,3-Trichlorobenzene			--	--	--	--	1.1	ND	--	1	1.1	1.1	1.12	0.000
	1,2-Dichloroethene (total)	55		--	--	--	--	3.4	2.0 J	--	2	2	3.4	2.00	0.000
	Carbon tetrachloride	0.16	5.0	--	--	--	--	1.9	2.0 J	--	2	1.9	2	1.95	0.400
	Chloroform	0.15	100.0	--	--	--	--	3.6	2.0 J	--	2	2	3.6	2.82	0.036
	cis-1,2-Dichloroethene	61	70.0	--	--	--	--	3.4	NA	--	1	3.4	3.4	3.36	0.048
	Tetrachloroethene	1.1	5.0	--	--	--	--	3.1	2.0 J	--	2	2	3.1	2.54	0.614
	Trichloroethene	1.6	5.0	--	--	--	--	12.0	8.0	--	2	8	12	10.00	2.490
													M Factor Total	3.5	
007G42LF	1,1-Dichloroethane	800		--	--	--	--	ND	1.0 J	--	1	1	1	1.00	0.000
	Chloroform	0.15	100.0	--	--	--	--	2.5	ND	--	1	2.5	2.5	2.52	0.025
	Trichloroethene	1.6	5.0	--	--	--	--	1.5	2.00 J	--	2	1.5	2	1.77	0.400
													M Factor Total	0.425	
007G43LF	Carbon tetrachloride	0.16	5.0	--	--	--	--	3.7	6.0	--	2	3.7	6	4.85	1.200
	Chloroform	0.15	100.0	--	--	--	--	3.8	3.0 J	--	2	3	3.8	3.39	0.038
	cis-1,2-Dichloroethene	61	70.0	--	--	--	--	1.4	NA	--	1	1.4	1.4	1.41	0.020
	1,2-Dichloroethene (total)	55		--	--	--	--	1.4	ND	--	1	1.4	1.4	1.4	
	Trichloroethene	1.6	5.0	--	--	--	--	5.1	4.00	--	2	4	5.1	4.55	1.018
													M Factor Total	2.26	
007G44LF	Chloroform	0.15	100.0	--	--	--	--	2.6	ND	--	1	2.6	2.6	2.55	0.026
007G45LF	Chloroform	0.15	100.0	--	--	--	--	3.0	ND	--	1	3	3	3.00	0.030
	cis-1,2-Dichloroethene	61	70.0	--	--	--	--	1.5	NA	--	1	1.5	1.5	1.45	0.021
	1,2-Dichloroethene	55		--	--	--	--	1.5	ND	--	1	1.5	1.5	1.5	
	Trichloroethene	1.6	5.0	--	--	--	--	5.8	ND	--	1	5.8	5.8	5.84	1.168
													M Factor Total	1.22	
007G46LF	1,1-Dichloroethane	800		--	--	--	--	1.3	ND	--	1	1.3	1.3	1.27	0.000
	Chloroform	0.15	100.0	--	--	--	--	1 J	ND	--	1	1.0	1.0	0.99	0.010
	Trichloroethene	1.6	5.0	--	--	--	--	1.8	ND	--	1	1.8	1.8	1.78	0.356
													M Factor Total	0.366	
007G47LF	Chloroform	0.15	100.0	--	--	--	--	2.1	--	--	1	2.1	2.1	2.15	0.022
													M Factor Total	0.04	

Table 4-2  
VOCs in Fluvial Deposits Groundwater  
NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well		Fourth Well		Fifth Well		Diffusion Sampling		Sixth Well		Range	Mean	M FACT
						Phase	Phase	Phase	Phase	Event	Phase	Frequency						
007G48LF	Chloroform	0.15	100.0	—	—	—	—	—	—	1.4	—	ND	—	1	1.4	1.4	1.41	0.014
<b>M Factor Total</b>																		
007G49LF	Acetone	610	—	—	—	—	—	—	—	—	—	8.0 J	—	1	8	8	8.00	1.000
	Trichloroethene	1.6	5.0	—	—	—	—	—	—	—	—	2.0 J	—	1	2	2	2.00	0.400
<b>M Factor Total</b>																		
007G52LF	Carbon tetrachloride	0.16	5.0	—	—	—	—	—	—	—	—	—	3.3	1	3.3	3.3	3.29	0.658
	Chloroform	0.15	100.0	—	—	—	—	—	—	—	—	—	3.4	1	3.4	3.4	3.35	0.034
	cis-1,2-Dichloroethene	61	70.0	—	—	—	—	—	—	—	—	—	2.0	1	2.0	2.0	2.0	0.028
	1,2-Dichloroethene (total)	55	—	—	—	—	—	—	—	—	—	—	2.0	1	2.0	2.0	2.0	—
	Tetrachloroethene	1.1	5.0	—	—	—	—	—	—	—	—	—	4.7	1	4.72	4.7	4.7	0.944
	Toluene	750	1000.0	—	—	—	—	—	—	—	—	—	1.4 B	1	1.44	1.4	1.4	0.001
	Trichloroethene	1.6	5.0	—	—	—	—	—	—	—	—	—	3.7	1	3.74	3.7	3.7	0.748
<b>M Factor Total</b>																		
007G53LF	Toluene	750	1000.0	—	—	—	—	—	—	—	—	—	1.5 B	1	1.54	1.5	1.5	0.002
007G54LF	Carbon tetrachloride	0.16	5.0	—	—	—	—	—	—	—	—	—	1.6	1	1.6	1.6	1.6	0.320
	Chloroform	0.15	100.0	—	—	—	—	—	—	—	—	—	1.6	1	1.57	1.6	1.6	0.016
	cis-1,2-Dichloroethene	61	70.0	—	—	—	—	—	—	—	—	—	2.3	1	2.31	2.3	2.3	0.033
	1,2-Dichloroethene (total)	55	—	—	—	—	—	—	—	—	—	—	2.3	1	2.3	2.3	2.3	—
	Tetrachloroethene	1.1	5.0	—	—	—	—	—	—	—	—	—	2.7	1	2.69	2.69	2.69	0.538
	Trichloroethene	1.6	5.0	—	—	—	—	—	—	—	—	—	7.9	1	7.9	7.9	7.90	1.580
<b>M Factor Total</b>																		
007G55LF				—	—	—	—	—	—	—	—	—	ND	0				
007G56LF				—	—	—	—	—	—	—	—	—	ND	0				
007GMCNA	Acetone	610	—	—	—	—	—	—	—	—	—	—	17.5 J	1	17.5	17.5	17.50	0.000
	Toluene	750	1000.0	—	—	—	—	—	—	—	—	—	1.1 B	1	1.12	1.12	1.12	0.001
	Vinyl chloride	0.019	2.0	—	—	—	—	—	—	—	—	—	6.5	1	6.46	6.46	6.46	1.230
<b>M Factor Total</b>																		
007GPZ01				—	—	—	—	—	—	ND	—	—	—	0				3.23

RFI Report Addendum  
 NSA Mid-South  
 AOC A — Northside Fluvial Groundwater  
 Revision: 0; February 17, 2000

Table 4-2  
 VOCs in Fluvial Deposits Groundwater  
 NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well	Fourth Well	Fifth Well	Diffusion	Sixth Well	Frequency	Range	Mean	M FACT	
						Phase	Phase	Phase	Sampling	Phase					
007GPZ02	Carbon tetrachloride	0.16	5.0	--	--	--	--	3.2	--	--	1	3.22	3.22	3.22	0.644
	Chloroform	0.15	100.0	--	--	--	--	3.3	--	--	1	3.26	3.26	3.26	0.633
	Tetrachloroethene	1.1	5.0	--	--	--	--	2.4	--	--	1	2.44	2.44	2.44	0.488
	Trichloroethene	1.6	5.0	--	--	--	--	2.1	--	--	1	2.06	2.06	2.06	0.412
													<b>M Factor Total</b>	<b>1.58</b>	
007GPZ03	1,1-Dichloroethane	800		--	--	--	--	1.3	2.0 J	--	2	1.31	-2	1.66	0.000
	1,2-Dichloroethene (total)	55		--	--	--	--	3.0	3.0	--	1	3	-3	3.00	0.000
	Carbon tetrachloride	0.16	5.0	--	--	--	--	8.9	11.0	--	2	8.89	-11	9.95	2.200
	Chloroform	0.15	100.0	--	--	--	--	3.2	2.0 J	--	2	2	-3.19	2.60	0.032
	cis-1,2-Dichloroethene	61	70.0	--	--	--	--	3.0	NA	--	1	3.04	-3.04	3.04	0.043
	Tetrachloroethene	1.1	5.0	--	--	--	--	6.5	8.0	--	2	6.46	-8	7.23	1.600
	Trichloroethene	1.6	5.0	--	--	--	--	6.1	6.0	--	2	6	-6.08	6.04	1.216
													<b>M Factor Total</b>	<b>5.1</b>	
015G01LF	Benzene	0.36	5.0	1.8	--	--	--	--	--	--	1	1.8	-1.8	1.8	0.36
	Trichloroethene	1.6	5.0	7.4	--	--	--	--	--	--	1	7.4	-7.4	7.4	1.5
	Tetrachloroethene	1.1	5.0	1.5	--	--	--	--	--	--	1	1.5	-1.5	1.5	0.3
	1,2-Dichloroethene (total)	55		1.5	--	--	--	--	--	--	1	1.5	-1.5	1.5	0.00
													<b>M Factor Total</b>	<b>2.2</b>	
015G01UF	Benzene	0.36	5	3,900	--	--	--	--	--	--	1	3,900	-3,900	3,900	780
	Ethylbenzene	1300		21	--	--	--	--	--	--	1	21	-21	21	0.00
													<b>M Factor Total</b>	<b>780</b>	
015G02LF	1,1-Dichloroethane			1.7	--	--	--	--	--	--	1	1.7	-1.7	1.7	0.00
	Benzene	0.36	5	3	--	--	--	--	--	--	1	3	-3	3	0.6
	Trichloroethene	1.6	5.0	1.6	--	--	--	--	--	--	1	1.6	-1.6	1.6	0.32
													<b>M Factor Total</b>	<b>0.92</b>	
015G02UF	Benzene	0.36	5	11	--	--	--	--	--	--	1	11	-11	11	2.2
	Ethylbenzene	1300		57	--	--	--	--	--	--	1	57	-57	57	0.00
	Xylene(s)	12000		5.1	--	--	--	--	--	--	1	5.1	-5.1	5.1	0.00
													<b>M Factor Total</b>	<b>2.2</b>	
015G03LF				ND	--	--	--	--	--	--	0				0.00
015G03UF				ND	--	--	--	--	--	--	0				0.00
015G04LF	Trichloroethene	1.6	5.0	1.9	--	--	--	--	--	--	1	1.9	-1.9	1.9	0.38

Table 4-2  
 VOCs in Fluvial Deposits Groundwater  
 NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well	Fourth Well	Fifth Well	Diffusion	Sixth Well	Frequency	Range	Mean	M FACT	
						Phase	Phase	Phase	Sampling	Phase					
015G04UF				ND	—	—	—	—	—	—	0			0.00	
018G01LF	1,2-Dichloroethene (total)	55		—	—	—	—	—	2.0 J	—	1	2.00	2.00	2.00	0.000
	Acetone	610		—	—	—	—	—	540.0 D	—	1	540.00	540.00	540.00	0.000
	Tetrachloroethene	1.1	5.0	—	—	—	—	—	270.0 D	—	1	270.00	270.00	270.00	54.000
	Trichloroethene	1.6	5.0	—	—	—	—	—	19.0	—	1	19.00	19.00	19.00	1.800
													<b>M Factor Total</b>	<b>57.8</b>	
060G02LF	1,1,1-Trichloroethane	540	200.0	210.0/ND	ND	—	—	—	—	—	1	210	- 210	210.00	1.050
	1,1-Dichloroethane	800		89.0/ND	ND	—	—	—	—	—	1	89	- 89	89.00	0.000
	1,1-Dichloroethene	0.044	7.0	4.6 J/ND	ND	—	—	—	—	—	1	4.6	- 4.6	4.60	0.657
	1,2-Dichloroethene (total)	55		150.0 J/ND	ND	—	—	—	—	—	1	150	- 150	150.00	0.000
	2-Butanone (MEK)	1900		110.0/ND	ND	—	—	—	—	—	1	110	- 110	110.00	0.000
	4-Methyl-2-Pentanone (MIBK)	140		21.0 J/ND	ND	—	—	—	—	—	1	21	- 21	21.00	0.000
	Acetone	610		150.0/ND	ND	—	—	—	—	—	1	150	- 150	150.00	0.000
	Ethylbenzene	1300	700.0	25.0/ND	ND	—	—	—	—	—	1	25	- 25	25.00	0.036
	Methylene chloride	4.1		17.0/ND	ND	—	—	—	—	—	1	17	- 17	17.00	0.000
	Toluene	750	1000.00	230.00/ND	ND	—	—	—	—	—	1	230	- 230	230.00	0.230
	Xylene (Total)	12000	10000.0	98.00 J/ND	ND	—	—	—	—	—	1	98	- 98	98.00	0.010
													<b>M Factor Total</b>	<b>1.98</b>	
060G04LF				ND	ND	—	—	—	—	—	0				
N12G01LF	1,1-Dichloroethane	800		—	—	7.50	—	—	—	—	1	7.5	- 7.5	7.50	0.000
	1,1-Dichloroethene	0.044	7.0	—	—	1.90 J	—	—	—	—	1	1.9	- 1.9	1.90	0.271
	1,2-Dichloroethene (total)	55		—	—	2.80 J	—	—	—	—	1	2.8	- 2.8	2.80	0.000
	Carbon tetrachloride	0.16	5.0	—	—	7.10	—	—	—	—	1	7.1	- 7.1	7.10	1.420
	Tetrachloroethene	1.1	5.0	—	—	6.40	—	—	—	—	1	6.4	- 6.4	6.40	1.280
	Trichloroethene	1.6	5.0	—	—	28.00	—	—	—	—	1	28	- 28	28.00	5.600
													<b>M Factor Total</b>	<b>8.57</b>	

RFI Report Addendum  
 NSA Mid-South  
 AOC A — Northside Fluvial Groundwater  
 Revision: 0; February 17, 2000

Table 4-2  
 VOCs in Fluvial Deposits Groundwater  
 NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Event 5	Third Well	Fourth Well	Fifth Well	Diffusion	Sixth Well	Frequency	Range	Mean	M FACT	
						Phase	Phase	Phase	Sampling	Phase					
NH2G02LF	1,2-Dichloroethene (total)	55		—	—	12.00	—	—	—	—	1	12	12	12.00	0.000
	Carbon tetrachloride	0.16	5.0	—	—	0.82 (J)	—	—	—	—	1	0.82	0.82	0.82	0.164
	Methylene chloride	4.1		—	—	2.20 (J)	—	—	—	—	1	2.2	2.2	2.20	0.000
	Tetrachloroethene	1.1	5.0	—	—	1.80 (J)	—	—	—	—	1	1.8	1.8	1.80	0.360
	Trichloroethene	1.6	5.0	—	—	9.40	—	—	—	—	1	9.4	9.4	9.40	1.880
													M Factor Total	2.4	
RDYGV81	Tetrachloroethene	1.1	5.0	—	—	—	—	—	5.0	—	1	5.0	5.0	5.0	1.0
Runway Well	Acetone	610		—	—	—	—	—	28	—	1	28	28	28	0.05
													M Factor Total	1.1	

- Notes:
- — sample not analyzed during sampling event.
  - ND — constituent not detected
  - NA — not applicable/not analyzed for constituent
  - D — diffusion sample
  - (D) — dilution of sample required for analysis
  - (J) — estimated value
  - 210/ND — designates anomalous concentration (210 µg/L) and confirmation concentration (ND) measured in July 1997.
  - M Fact — M Factor represents the sum of MCL exceedances detected at well. Value derived by dividing the maximum detected concentration by the constituent's MCL. Where multiple contaminants are present, values are summed to derive M Factor.

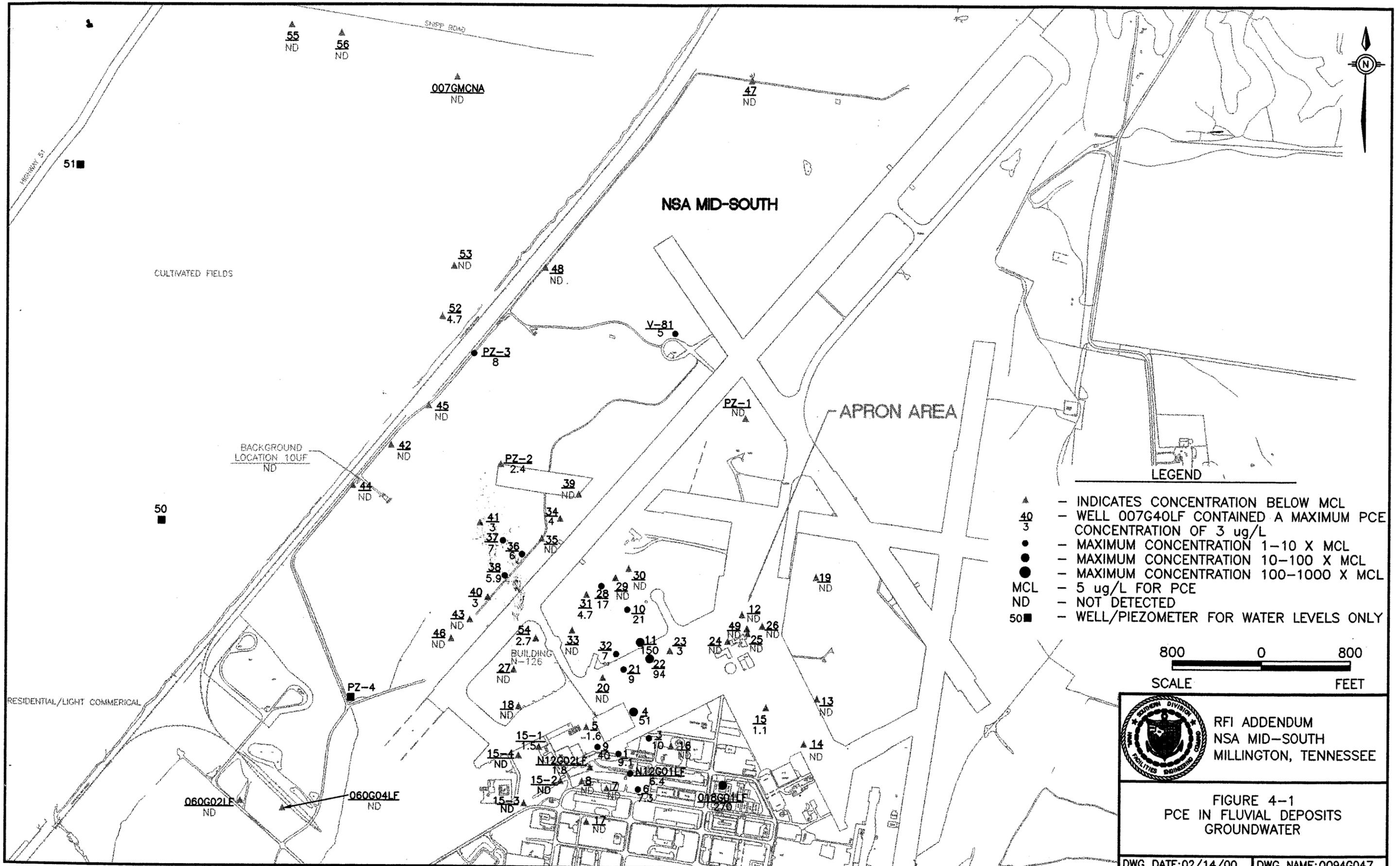
Table 4-3  
VOCs in Cockfield Formation Groundwater  
NSA Mid-South AOC A

Well ID	Parameter	RBC	MCL	Event 4	Confirmation Event	Event 5	Third Well Phase	Freq.	Range	Mean	M FACT
007G01UC				ND	—	ND	—	0			
007G02UC				ND	—	ND	—	0			
007G03UC				ND	—	ND	—	0			
007G04UC	Benzene	0.36	5.0	15.0	ND	ND	—	1	15 - 15	15.0	3.0
007G05UC	Benzene	0.36	5.0	0.99 J	ND	ND	—	1	0.99 - 0.99	0.99	0.2
007G09UC	1,1,1-Trichloroethane	540	200.0	390.0	ND	ND	—	1	390 - 390	390.0	1.9
	1,1-Dichloroethane	800		120.0	ND	ND	—	1	120 - 120	120.0	0.0
	1,1-Dichloroethene	0.044	7.0	10.0	ND	ND	—	1	10 - 10	10.0	1.43
	1,2-Dichloroethene (total)	55		190.0 J	ND	ND	—	1	190 - 190	190.0	0.0
	Ethylbenzene	1300	700.0	30.0	ND	ND	—	1	30 - 30	30.0	0.04
	Methylene chloride	4.1		18.0	ND	ND	—	1	18 - 18	18.0	0.0
	Toluene	750	1000.0	300.0	ND	ND	—	1	300 - 300	300.0	0.3
	Xylene (Total)	12000	10000.0	110.0 J	ND	ND	—	1	110 - 110	110.0	0.01
007G22UC				—	—	—	ND	0			

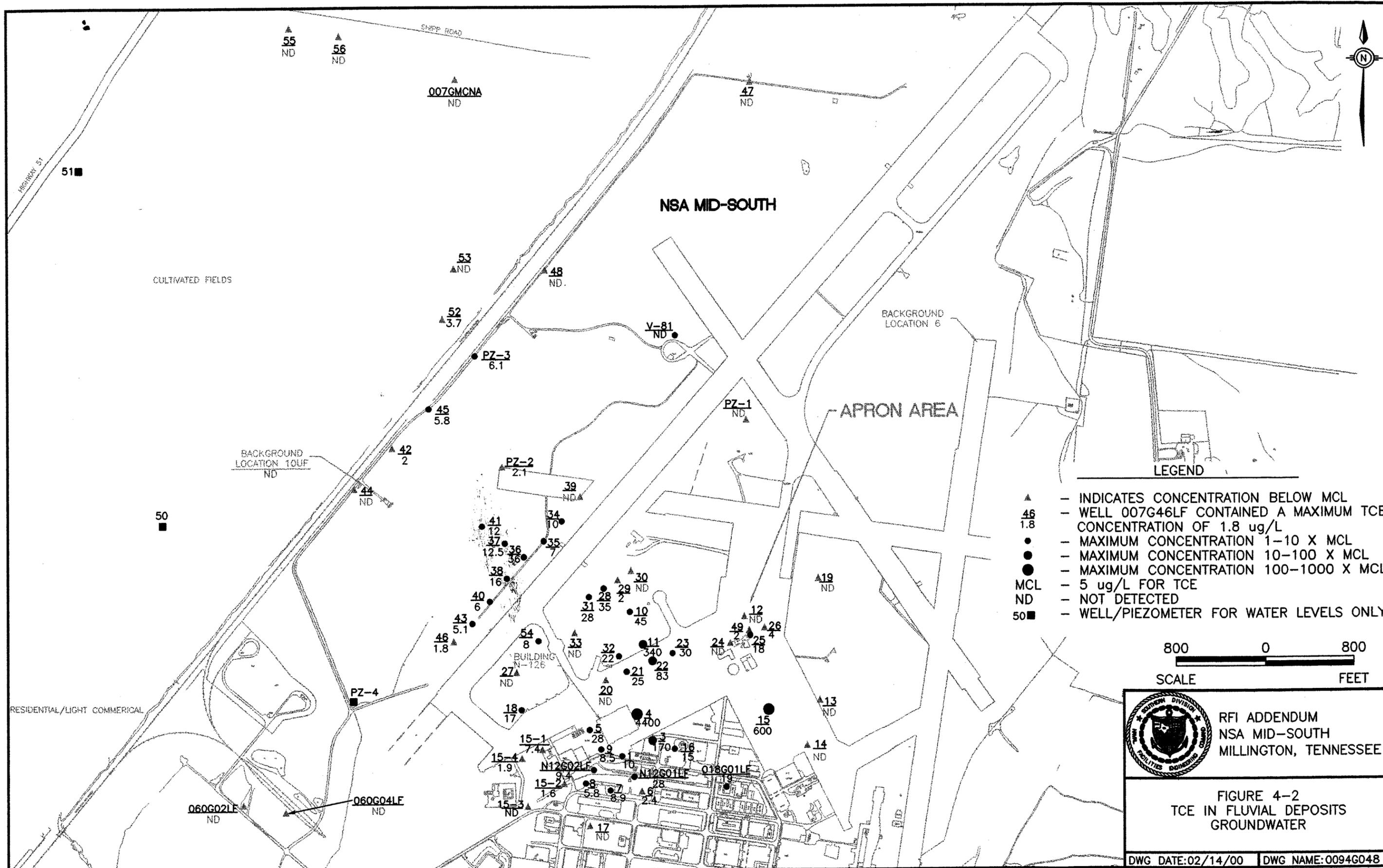
**Notes:**

- sample not analyzed during sampling event.
- ND constituent not detected
- M Fact — M Factor represents the sum of MCL exceedances detected at well. Value derived by dividing the maximum detected concentration by the constituent's MCL. Where multiple contaminants are present, values are summed to derive M Factor.

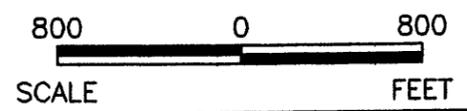
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- ▲ - INDICATES CONCENTRATION BELOW MCL
- ▲ 46 1.8 - WELL 007G46LF CONTAINED A MAXIMUM TCE CONCENTRATION OF 1.8 ug/L
- - MAXIMUM CONCENTRATION 1-10 X MCL
- - MAXIMUM CONCENTRATION 10-100 X MCL
- - MAXIMUM CONCENTRATION 100-1000 X MCL
- MCL - 5 ug/L FOR TCE
- ND - NOT DETECTED
- 50 ■ - WELL/PIEZOMETER FOR WATER LEVELS ONLY



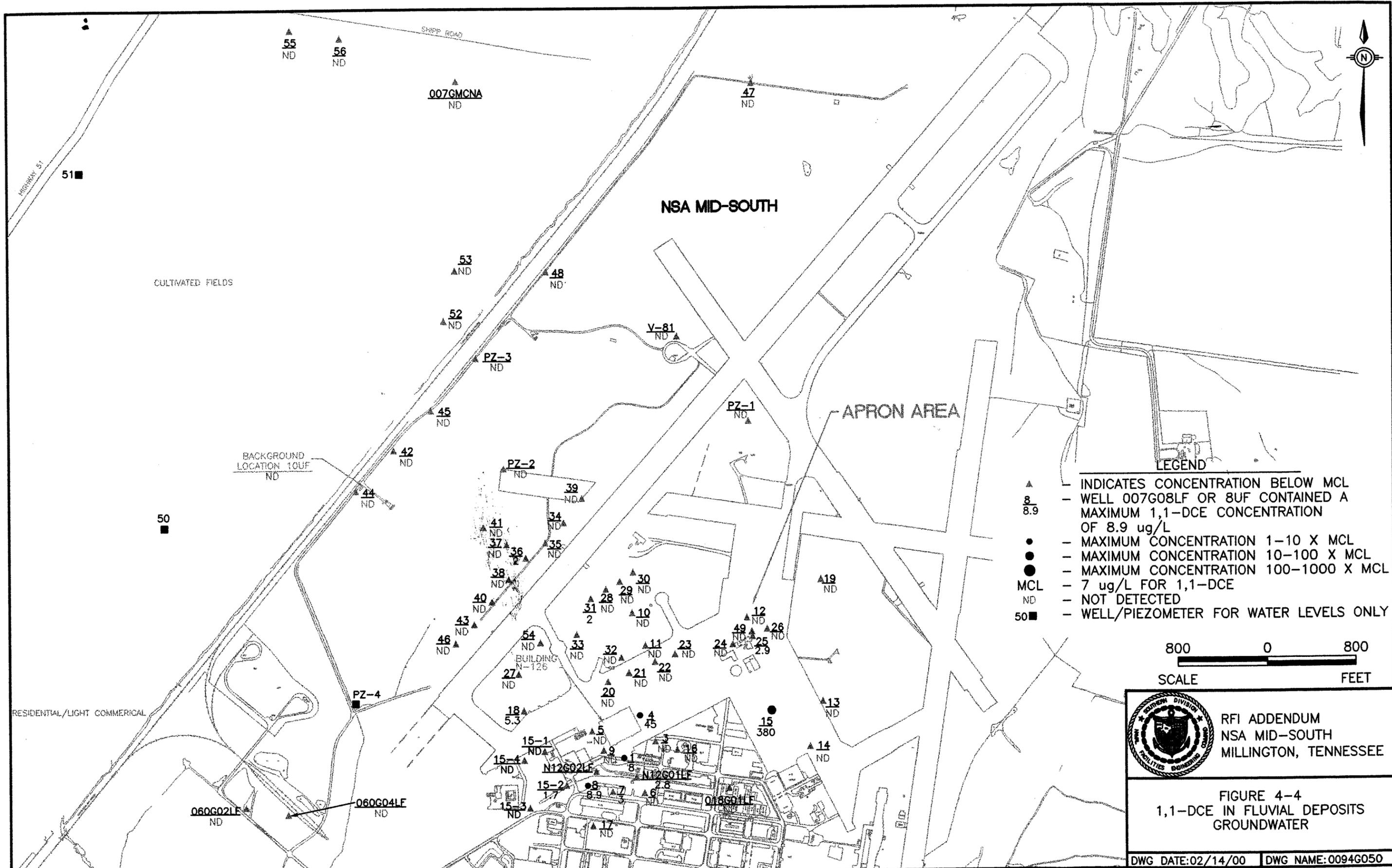
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MILLINGTON, TENNESSEE

FIGURE 4-2  
TCE IN FLUVIAL DEPOSITS  
GROUNDWATER

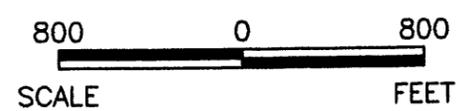
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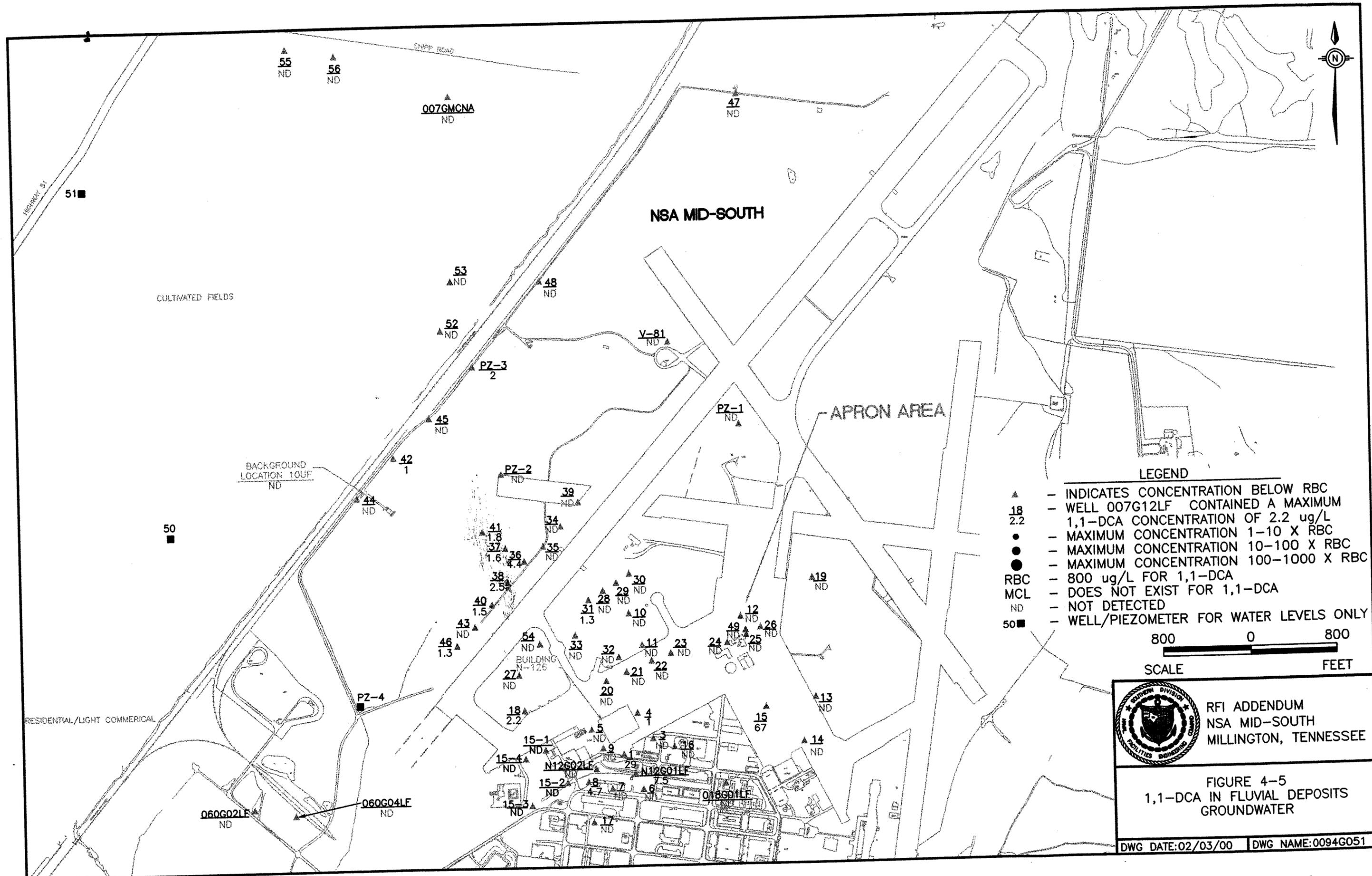
- LEGEND**
- ▲ - INDICATES CONCENTRATION BELOW MCL
  - 8/8.9 - WELL 007G08LF OR 8UF CONTAINED A MAXIMUM 1,1-DCE CONCENTRATION OF 8.9 ug/L
  - - MAXIMUM CONCENTRATION 1-10 X MCL
  - - MAXIMUM CONCENTRATION 10-100 X MCL
  - - MAXIMUM CONCENTRATION 100-1000 X MCL
  - MCL - 7 ug/L FOR 1,1-DCE
  - ND - NOT DETECTED
  - 50 ■ - WELL/PIEZOMETER FOR WATER LEVELS ONLY



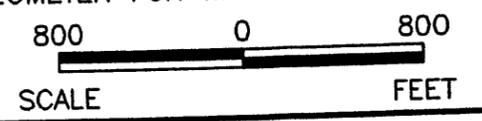
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FIGURE 4-4  
1,1-DCE IN FLUVIAL DEPOSITS  
GROUNDWATER

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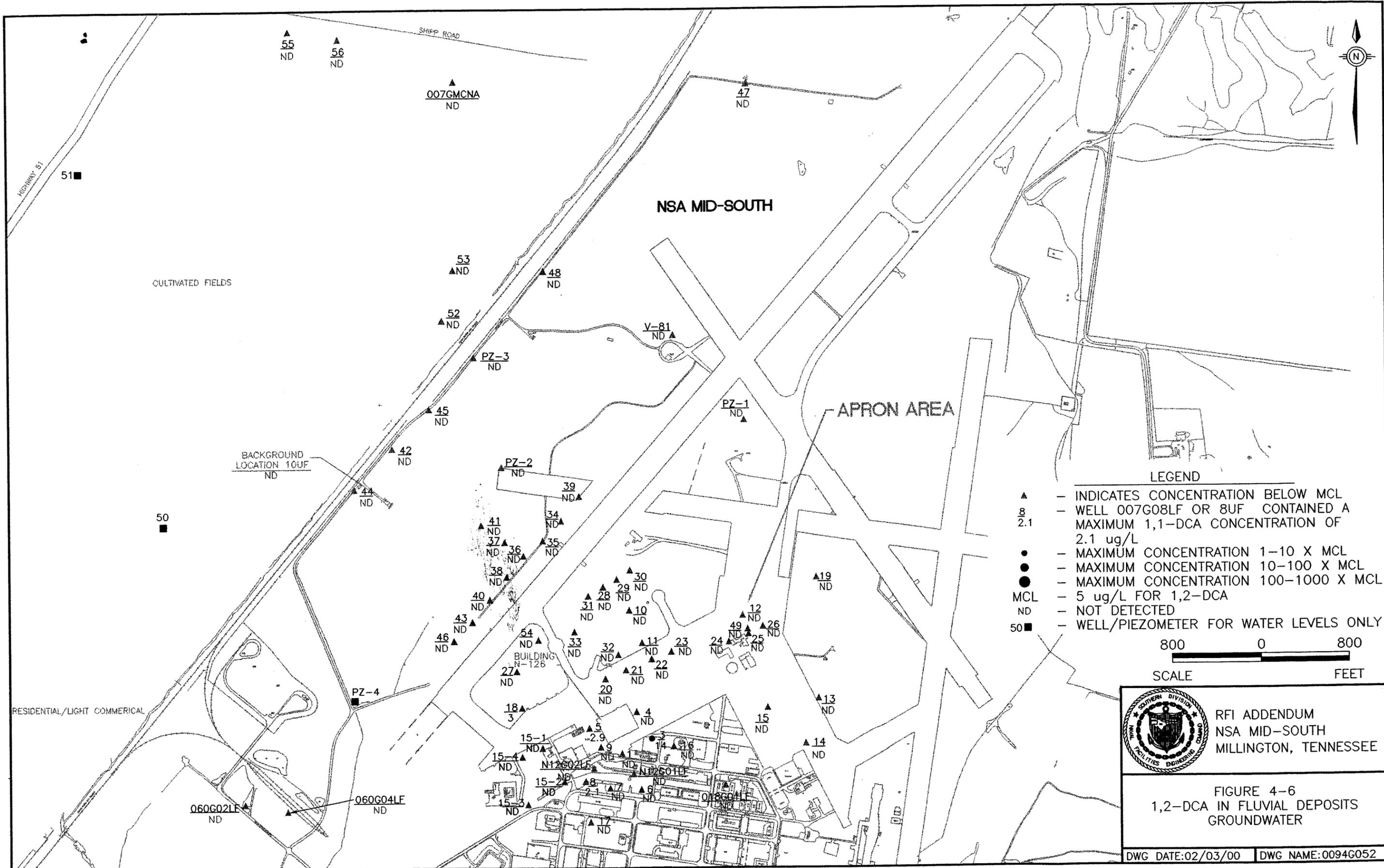
- LEGEND**
- ▲ - INDICATES CONCENTRATION BELOW RBC
  - - WELL 007G12LF CONTAINED A MAXIMUM 1,1-DCA CONCENTRATION OF 2.2 ug/L
  - (small) - MAXIMUM CONCENTRATION 1-10 X RBC
  - (medium) - MAXIMUM CONCENTRATION 10-100 X RBC
  - (large) - MAXIMUM CONCENTRATION 100-1000 X RBC
  - RBC - 800 ug/L FOR 1,1-DCA
  - MCL - DOES NOT EXIST FOR 1,1-DCA
  - ND - NOT DETECTED
  - 50 ■ - WELL/PIEZOMETER FOR WATER LEVELS ONLY



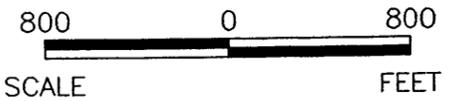
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FIGURE 4-5  
1,1-DCA IN FLUVIAL DEPOSITS  
GROUNDWATER

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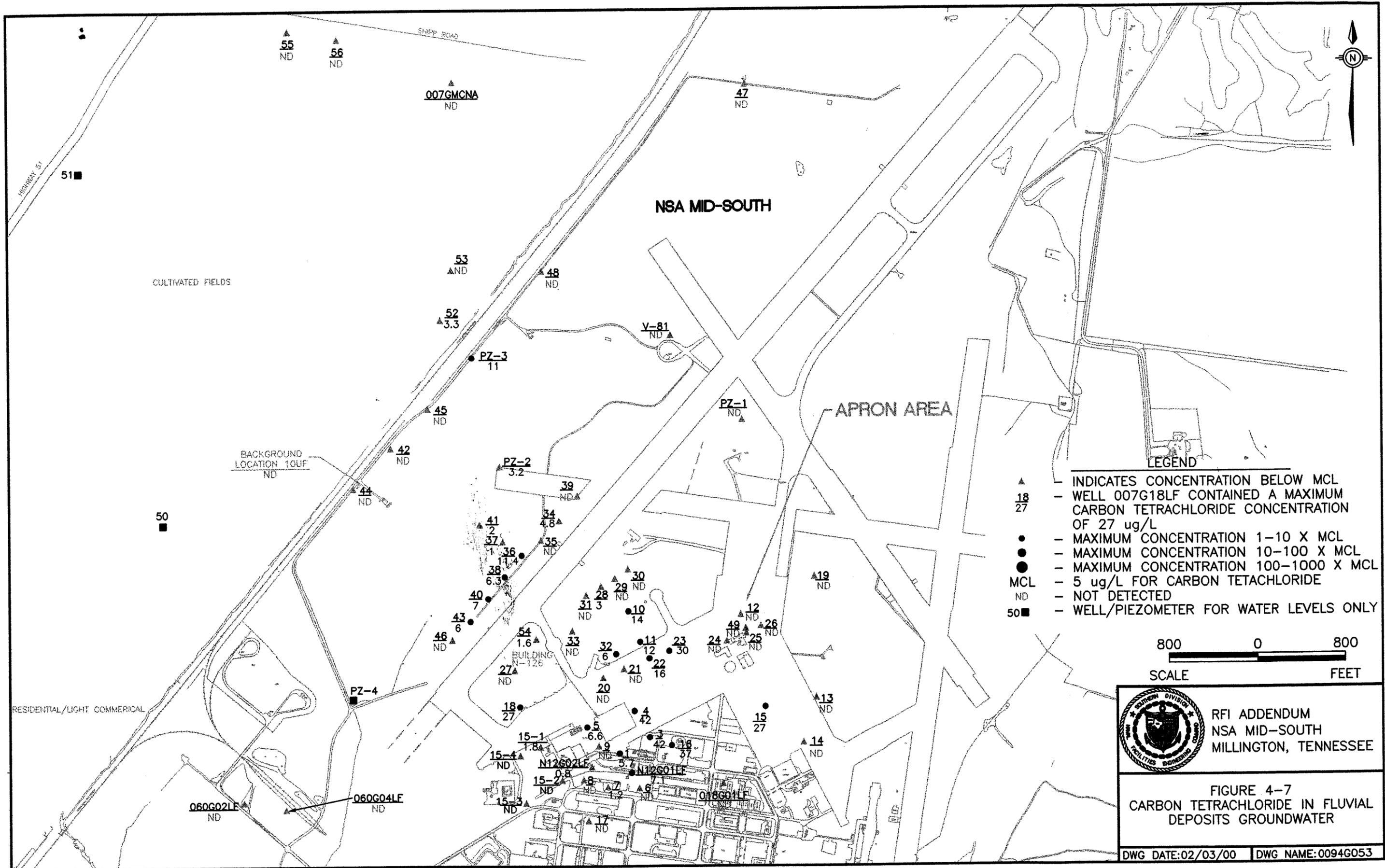
- LEGEND**
- ▲ - INDICATES CONCENTRATION BELOW MCL
  - 8/2.1 - WELL 007G08LF OR 8UF CONTAINED A MAXIMUM 1,1-DCA CONCENTRATION OF 2.1 ug/L
  - - MAXIMUM CONCENTRATION 1-10 X MCL
  - - MAXIMUM CONCENTRATION 10-100 X MCL
  - - MAXIMUM CONCENTRATION 100-1000 X MCL
  - MCL - 5 ug/L FOR 1,2-DCA
  - ND - NOT DETECTED
  - 50 ■ - WELL/PIEZOMETER FOR WATER LEVELS ONLY



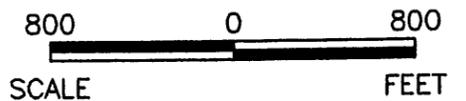
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FIGURE 4-6  
1,2-DCA IN FLUVIAL DEPOSITS  
GROUNDWATER

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- LEGEND**
- ▲ - INDICATES CONCENTRATION BELOW MCL
  - 18 - WELL 007G18LF CONTAINED A MAXIMUM CARBON TETRACHLORIDE CONCENTRATION OF 27 ug/L
  - 27
  - - MAXIMUM CONCENTRATION 1-10 X MCL
  - - MAXIMUM CONCENTRATION 10-100 X MCL
  - - MAXIMUM CONCENTRATION 100-1000 X MCL
  - MCL - 5 ug/L FOR CARBON TETRACHLORIDE
  - ND - NOT DETECTED
  - 50 ■ - WELL/PIEZOMETER FOR WATER LEVELS ONLY



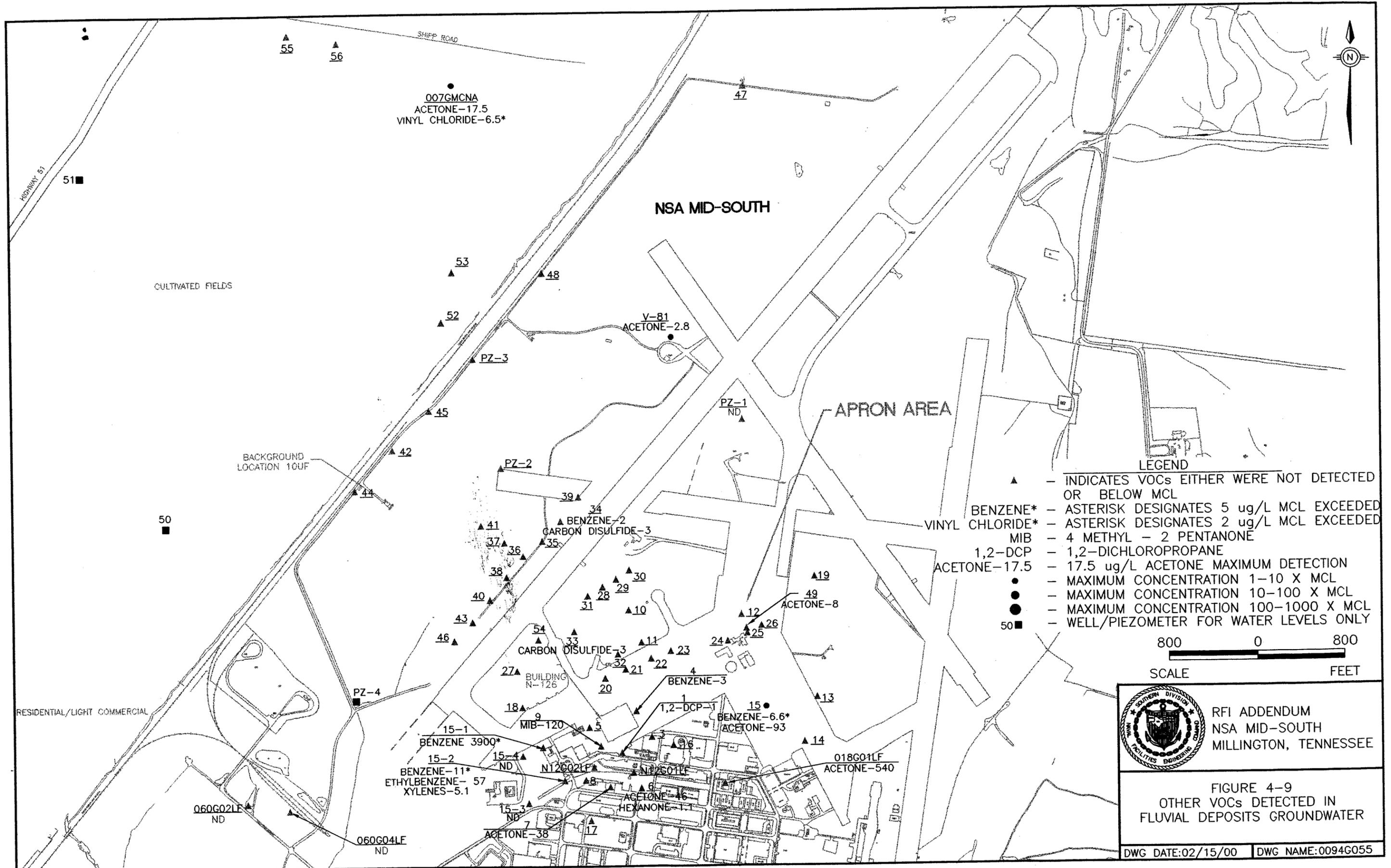

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**FIGURE 4-7  
CARBON TETRACHLORIDE IN FLUVIAL  
DEPOSITS GROUNDWATER**

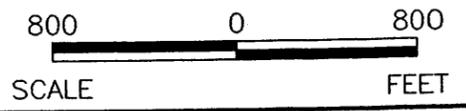
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- LEGEND**
- ▲ - INDICATES VOCs EITHER WERE NOT DETECTED OR BELOW MCL
  - BENZENE\* - ASTERISK DESIGNATES 5 ug/L MCL EXCEEDED
  - VINYL CHLORIDE\* - ASTERISK DESIGNATES 2 ug/L MCL EXCEEDED
  - MIB - 4 METHYL - 2 PENTANONE
  - 1,2-DCP - 1,2-DICHLOROPROPANE
  - ACETONE-17.5 - 17.5 ug/L ACETONE MAXIMUM DETECTION
  - - MAXIMUM CONCENTRATION 1-10 X MCL
  - - MAXIMUM CONCENTRATION 10-100 X MCL
  - - MAXIMUM CONCENTRATION 100-1000 X MCL
  - 50■ - WELL/PIEZOMETER FOR WATER LEVELS ONLY





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FIGURE 4-9  
OTHER VOCs DETECTED IN  
FLUVIAL DEPOSITS GROUNDWATER

DWG DATE: 02/15/00    DWG NAME: 0094G055

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## 5.0 CHEMICAL CONCEPTUAL MODEL

This section discusses fate and transport of chlorinated solvents in the AOC A fluvial deposits groundwater. Isolated spots of semivolatile organic compounds (SVOCs) and some metals were reported in surface or subsurface loess soil or in fluvial deposits groundwater in the RFI report (EnSafe, February 17, 2000), but regulatory exceedances are limited in number and areal extent. The most important contaminant group within the study area is VOCs, especially chlorinated solvents, which are the sole focus of this discussion. The full suite of contaminants is discussed in Appendix F of the AOC A RFI (EnSafe, February 17, 2000), along with basic principles of fate and transport.

Chlorinated solvents are widely distributed in the fluvial deposits groundwater, and their spatial distribution and chemical composition are complex, precluding a quick, intuitive interpretation. This section describes a chemical conceptual model designed to partly explain this complex data set. The conceptual model has two primary objectives:

- (1) *To propose a physical theory of contaminant origin and transport:* The theory explains how contaminants from past spills have moved into the ground, their physical nature as sources within the ground, and the origin of resultant dissolved-phase plumes.
- (2) *To produce a spatial map of interpreted plumes:* The maps include estimates of downgradient extent and spatial patterns of plumes.

The conceptual model addresses issues of plume extent, migrating versus static plume boundaries, extent of offsite migration, contaminant longevity, and potential effectiveness of bioattenuation. As such, it has important implications for future selection of clean-up strategies.

## 5.1 Salient Features of the Model

### 5.1.1 Characteristics of the Original Releases

The disposal practices for chlorinated solvents in the apron area are poorly known. A few sites where solvents were directly released to the ground have been identified (see Figure 1-1 of the RFI report [EnSafe, February 17, 2000]), but the locations or even existence of any other releases are largely unknown. However, it is clear that probably more than a dozen source areas are widely distributed in the apron area.

**Types of chemicals:** It is known that TCE, 1,1,1-TCA, and carbon tetrachloride were used to clean and degrease aircraft parts and perform other operations in the apron area. No evidence indicates that the DCE/DCA compounds were used. There is no historic evidence that PCE was used in the area, but its presence in groundwater indicates it was.

**Age of releases to the ground:** The oldest documented release dates back to the 1960s, but other spills undoubtedly occurred before and after that period. One would reasonably expect that some releases occurred during the expansion of Naval Air Station Memphis during World War II, and most probably occurred prior to the more environmentally sensitive 1980s. Thus, it is reasonable to conclude that most sources are between 15 and 55 years old, with perhaps a median age of 40 years. The use of carbon tetrachloride as a solvent was discontinued in the United States in the mid-1960s, meaning that plumes of this compound and its daughter product, chloroform, are probably approximately 35 years old. At least in the N-126 area, TCA is reported to have been replaced by TCE in the early to middle 1980s; thus, TCA releases are probably more than 10 years old.

**Quantity and mode of releases:** The volume of released solvents is an important factor in how contaminants move through the subsurface. But the way in which they are released is also important. For example, consider two releases of a dense non-aqueous phase liquid (DNAPL):

the first as a 10-gallon instantaneous spill, the second as a 1-gallon, slow, continuous drip. One might expect the larger spill to create the more serious DNAPL slug, and ~~this~~ may be true at some sites. However, the opposite could be true because the larger spill, which is quickly disconnected from its source, has a smaller head, resulting in a breakup of the DNAPL slug, whereas the smaller, continual drip would create a DNAPL stringer with a significant head, possibly causing it to penetrate more deeply. Of course, many other competing factors, such as surface volatilization, vaporization, and geologic complexity also influence contaminant mobility.

The quantity of solvents released to the ground is unknown in every instance, but one. As noted in Section 3 of the RFI report (EnSafe, February 17, 2000), perhaps 150 to 250 gallons per year of spent Inhibisol (1,1,1-TCA) and an unspecified amount of TCE beginning in the 1980s were poured onto the grassy area south of Building N-126 or leaked from mobile bowsers in the same general area. Although a dozen or so chlorinated solvents have been detected, it is curious that TCA does not show up in any samples from the apron area; further, the grassy area is actually one of the least TCE-contaminated areas within the apron area.

The modes of release are only slightly better known. It is reported that some solvents in the Building N-126 area dripped from the bowsers onto pavement or grass, while others were dumped from buckets onto the pavement or grass or poured into storm sewers. At N-6, chemicals are reported to have been sprayed as a weed killer in the former grassy area east of the building, and were also probably released in an open-air area west of the building where students learned to clean aircraft parts. At other areas of detected groundwater contamination, the mode of release is unknown.

In no case are the release characteristics known well enough to develop a quantitative model of how the contaminants may have moved from the surface through the ground. Instead, such a model must be inferred by the present patterns of contamination.

### **5.1.2 Presence of Numerous Plumes**

Given the large number of probable surface releases, it is not surprising that numerous plumes are also present. A careful look at the three-dimensional chemical patterns provides evidence of multiple, sometimes overlapping plumes. The same conclusion has been reached using geostatistics (NewFields, 1996). For example, the TCE data show no spatial structure vertically or horizontally, suggesting that many of the sampling points are in separate, unrelated contamination spots.

### **5.1.3 Expected Plume Lengths**

A ballpark estimate of maximum plume length can be made using available data. Two very different hydraulic conductivities have been obtained from pump tests in the apron area (5.3 feet per day) and the line of wells north of the runway (59 feet per day). The pattern of potentiometric contours suggests that the site is divided into three flow regimes: a shallow gradient in the apron area, steep gradients in the runway area, and shallower gradients north of the runway. In the absence of comprehensive hydraulic conductivity data at each well, it is reasonable to assume an arithmetic average value of 32 feet per day. Gradients over the flowpaths range from 0.0017 to 0.003, with an average of 0.0024. Assuming a net effective porosity of 27% (see Section 3), the groundwater flow rate in the lower part of the fluvial deposits aquifer is calculated at 101 feet/year ( $9.6 \times 10^{-5}$  cm/s). Assuming spills occurred 15 to 55 years ago, groundwater would have moved 1,500-5,600 feet in the intervening years. Using a mean total organic carbon fraction of 0.001, solvents would be retarded by a factor ranging from 1.1 (1,2-DCA) to 4.1 (carbon tetrachloride) (equations from Cohen & Mercer, 1993). Hence plumes might have moved as little as 365 feet and as far as 5,100 feet since contaminant release.

Unfortunately, ballpark estimates at this site suffer from the heterogeneity of the fluvial deposits aquifer. Because of the complex depositional history typical of fluvial paleoenvironments, the aquifer consists of interbraided clays, silts, and sands. Permeability channels are likely in many

areas. Under these conditions, plumes would not likely have textbook geometric symmetry and plumes might be longer than a one-dimensional estimate would indicate. Alternatively, bioattenuation and lateral diffusion might make a plume shorter than the estimate. Since these factors are not well known, mathematical estimates of plume lengths are of limited value.

An alternative to modeling is to look at the spatial data and infer the plume lengths directly. Three plumes — designated N-126, North Apron, and N-6 — are sufficiently defined to analyze. Figures 5-1 to 5-3, which show profile plots of these three plumes, depict the TCE and carbon tetrachloride detections as examples. The highest recorded value across time for each sampling point was used. Monitoring well and DPT data are included, and the fluvial deposits results are split into upper, middle, and lower zones because of plume stratification. Data plotted at "0.1" are non detects.

Of the plumes that are better defined, lengths vary from 50 to 800 feet. The stronger plumes with starting concentrations of at least 500  $\mu\text{g/L}$  typically have no direct control to fix their lengths, either due to lack of appropriate middle-fluvial control (N-6 plume) or interpreted mixing with additional downgradient sources (N-126 and North Apron plumes). However, casual inspection of the plots suggests that these plumes might be 1,000 to 2,000 feet long, using the MCL value as a reference. This range roughly agrees with the idealized calculation above.

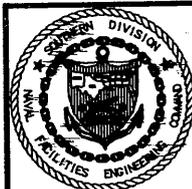
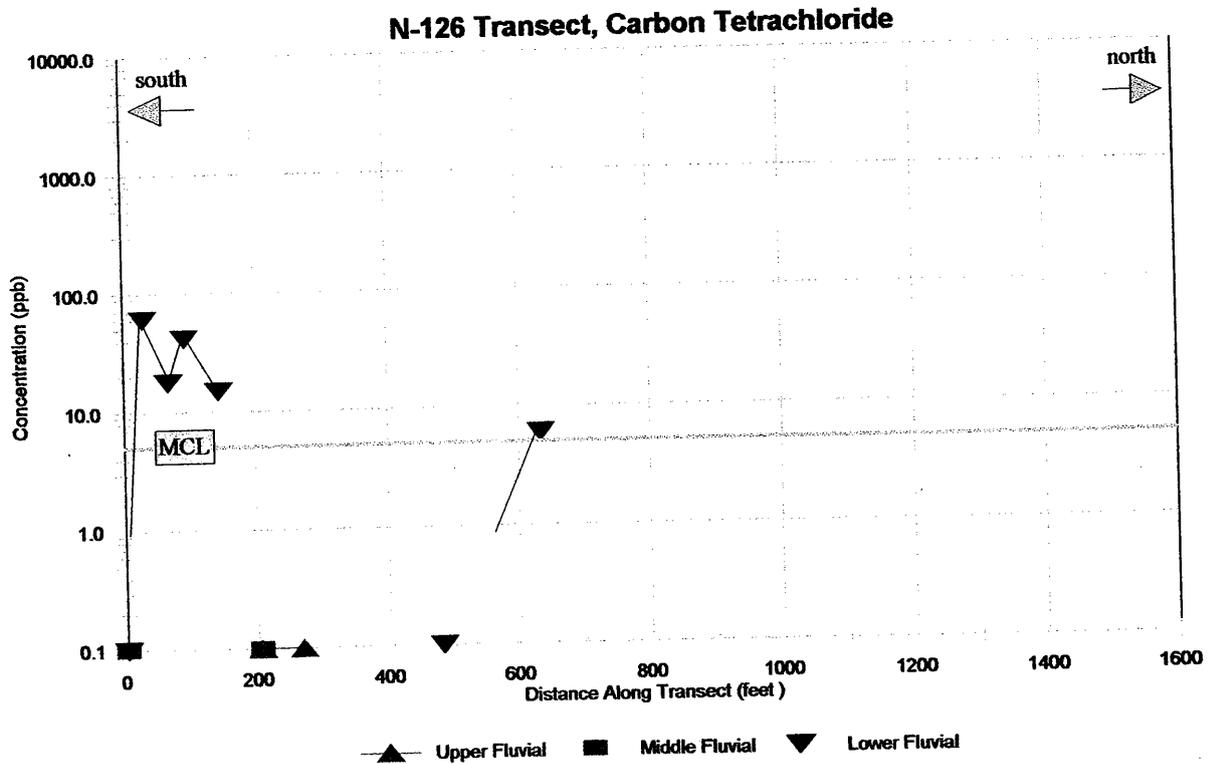
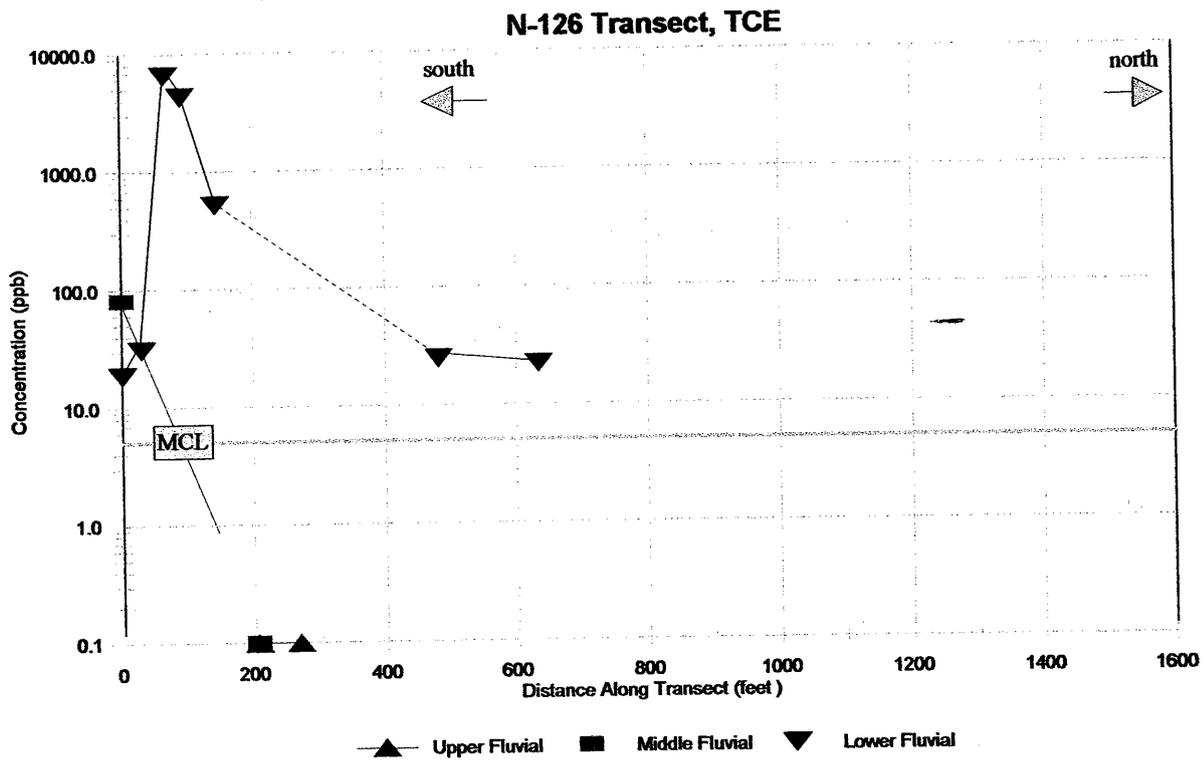
Remember that such interpretations are biased by spatial undersampling and irregularly spaced sampling points. Hence, even relative plume lengths are difficult to estimate. For example, consider several nearby wells with PCE and 1,1,1-TCA detections. One might assume that the 1,1,1-TCA plume might be nearly three times longer, but if the PCE source concentration is much higher than the concentration is at the TCA source, the PCE plume might actually be longer. When only a few spatial samples are available, it is difficult to know whether the sampling is actually representative of the plume. Are the wells on the plume core, or at its fringes? In the

source, or outside? Upgradient or downgradient? Is there one coincident spill site or two adjacent spill sites? Is one contaminant more severely attenuated by biodegradation than the other? Clearly, estimates of plume lengths are at best approximate, because they depend so heavily on poorly known geometric factors.

#### 5.1.4 Expected Plume Widths

*Transverse dispersion effects:* Calculations of lateral dispersion of plumes are useful only for reasonably isotropic sand aquifers. For such an aquifer, given a  $2.0 \times 10^{-5}$  cm/sec flow velocity, plumes might have a length-to-width ratio of roughly 2:1 (Freeze and Cherry (1979, p.396). However, the anisotropic, low-permeability geology, which characterizes the fluvial deposits makes, quantitative estimates of plume widths unreliable. It is difficult to estimate plume widths directly from the data because of insufficient sampling and the uncertainty of the source spill or leak's width. Recent drilling near Building N-126 as part of the pilot study, however, has provided an unusually dense set of monitoring wells near the source of the plume with the highest level of contaminants in the study area (well 007G04LF). Six wells are clustered along a 128-foot length of the flow path. Starting with the most contaminated well (007G58LF, with TCE=6,680  $\mu\text{g/L}$ ), the well-to-well contamination gradients were defined as change in TCE concentration divided by the well separation. The gradients progressing down the flowpath were +135, -91, and -72  $\mu\text{g/L/foot}$  (the sign indicates increase or decrease to and from the most contaminated well on the path). A single gradient calculated between 007G58LF and 007G59LF, 16 feet to its east (perpendicular to the flowpath), yielded -407  $\mu\text{g/L/foot}$ . Assuming a reasonably small, isotropic source, this suggests that the length-to-width ratio of this plume is roughly 4:1.

It is not known if this result is representative of the site as a whole, but the 4:1 ratio is assumed to be reasonable for this conceptual model. However, the strongest control on plume widths would be the source size and isotropy. For example, a distributed source such as weed spraying at former Building N-6 would spread the plume out on a scale of perhaps 100 feet — far greater



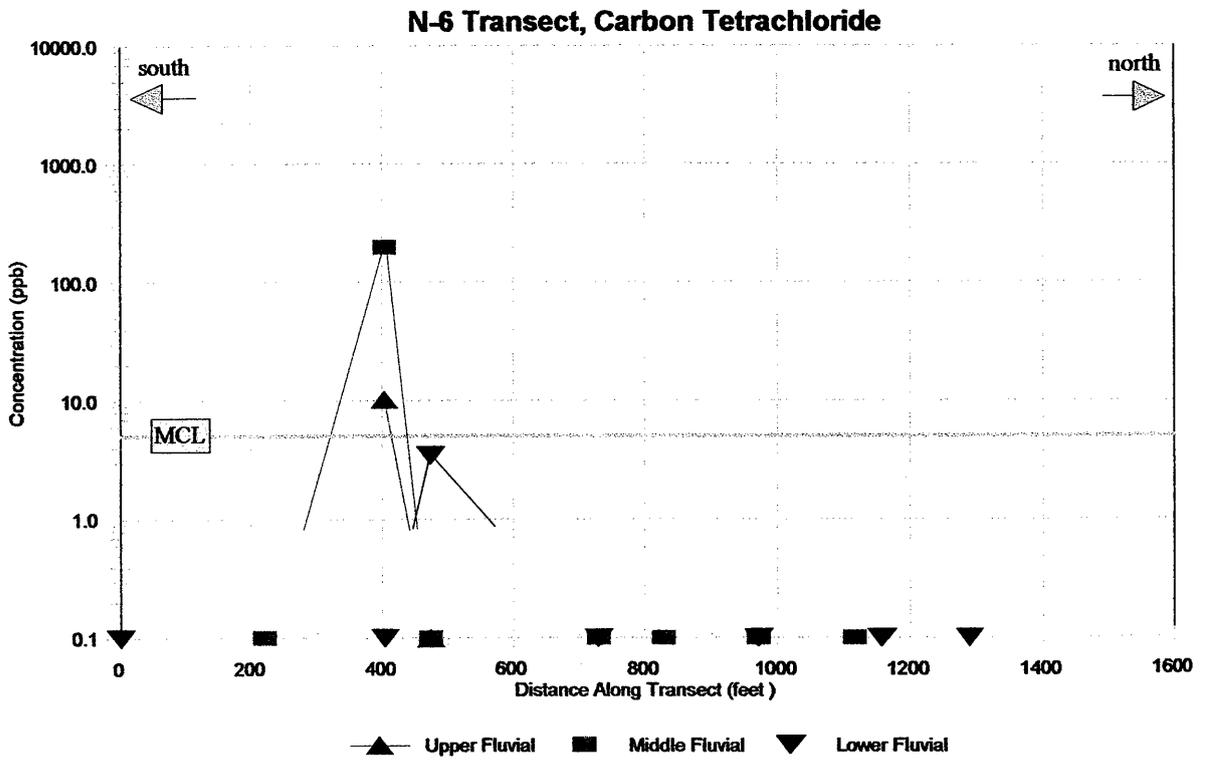
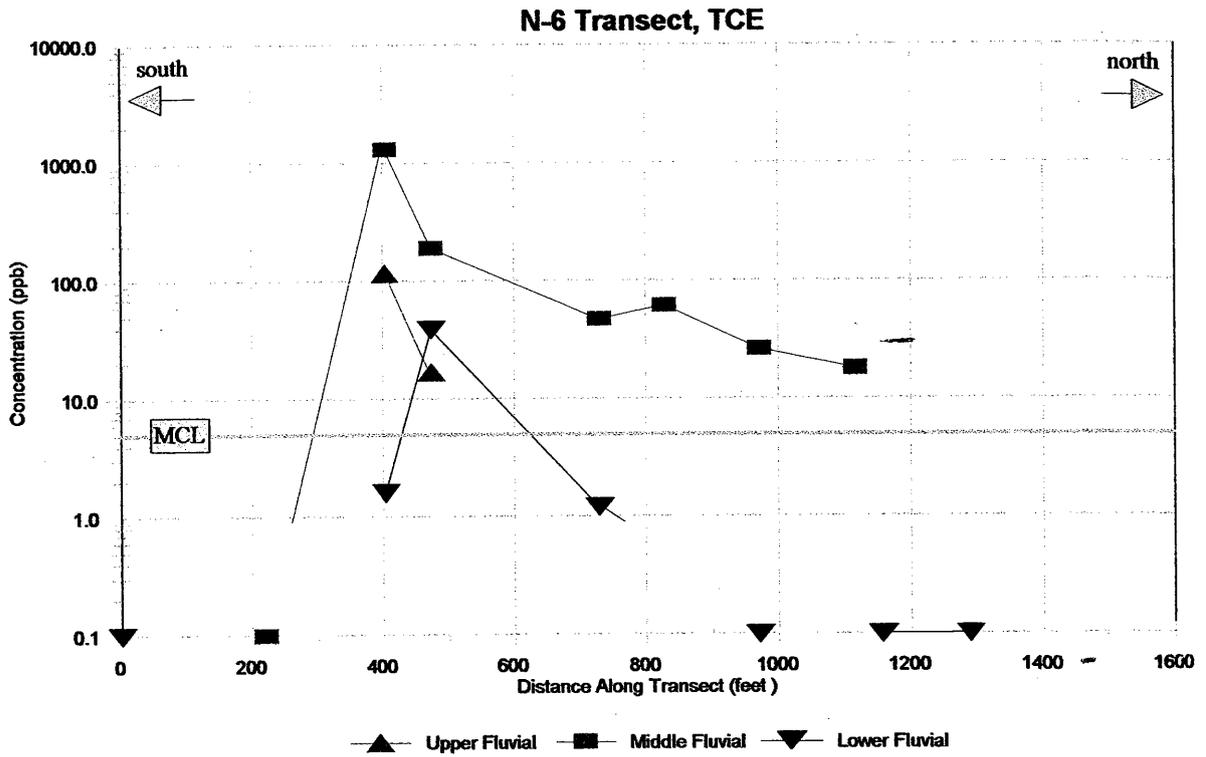
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MILLINGTON, TENNESSEE

FIGURE 5-1  
N-126 PLUME TRANSECTS TCE AND  
CARBON TETRACHLORIDE

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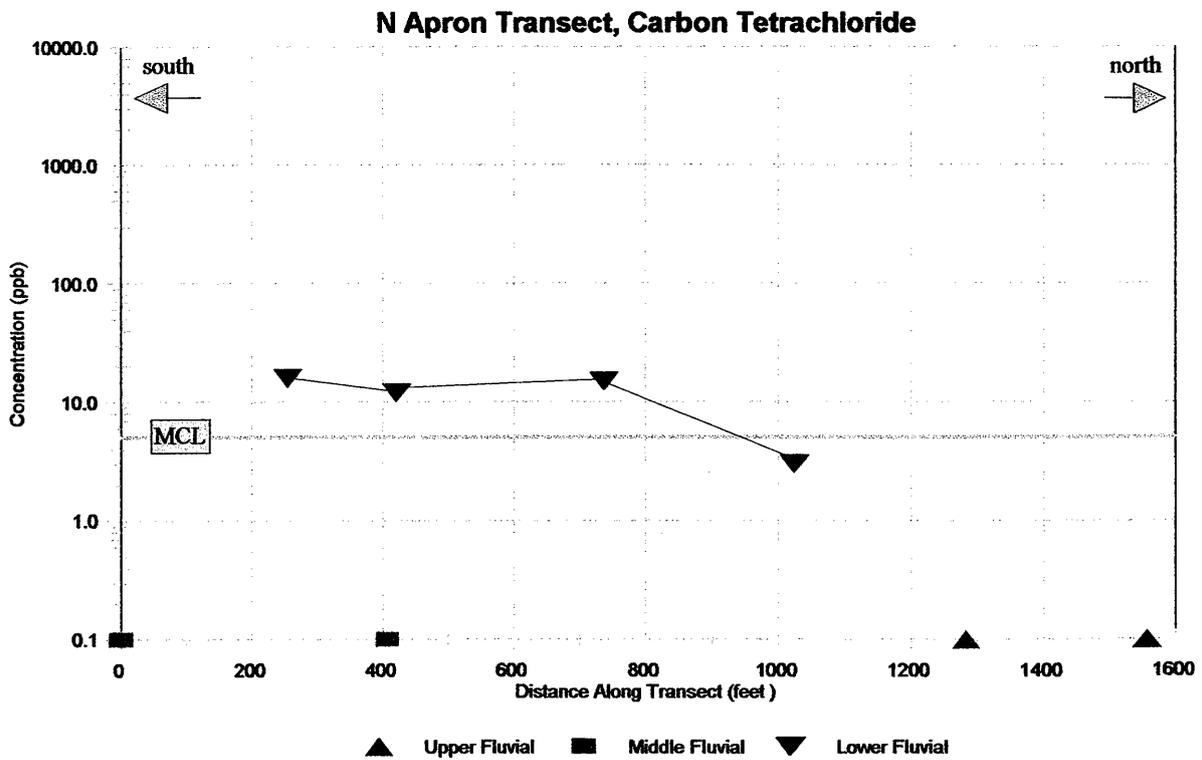
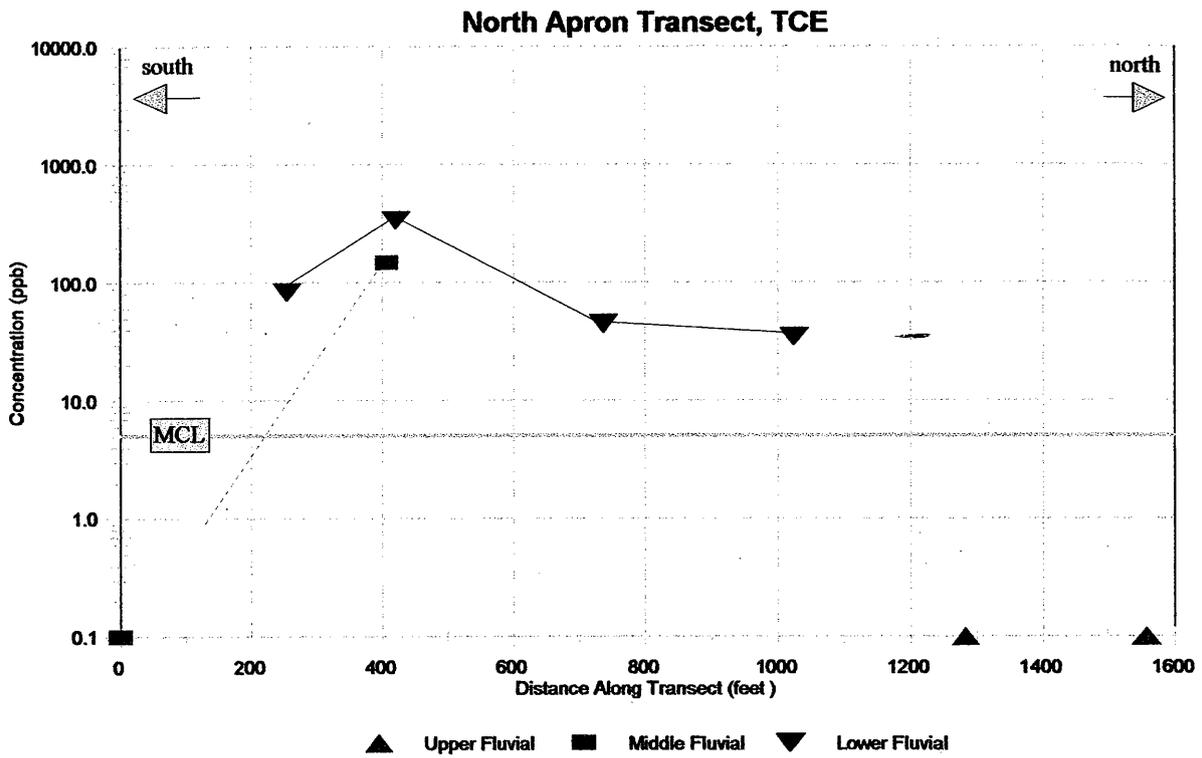
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FIGURE 5-2  
N-6 PLUME TRANSECTS TCE AND  
CARBON TETRACHLORIDE

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FIGURE 5-3  
NORTH APRON PLUME TRANSECTS  
TCE AND CARBON TETRACHLORIDE

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than nominal dispersive effects. Given the inherent uncertainty in source geometries, then, dispersive versus advective issues do not strongly affect the conceptual model. Instead, plumes are simply drawn to best fit the concentrations and chemical profiles.

***Groundwater flow changes:*** One of the factors that can affect plume widths is changing groundwater flow directions over time. Such changes might be possible in a system with a complexly anisotropic porosity subjected to variable recharge due to rainfall and partial concrete ground cover.

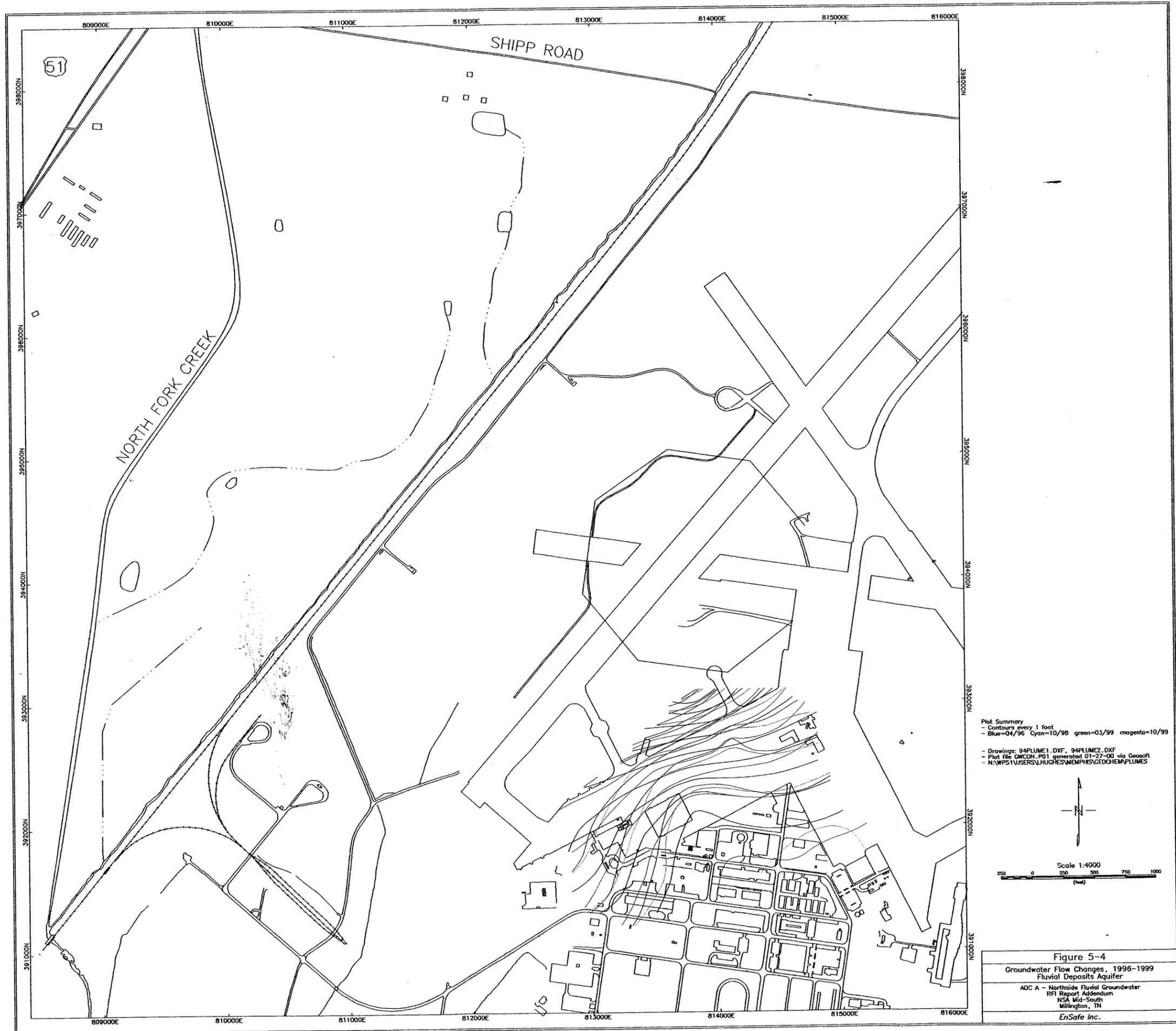
Figure 5-4 shows the potentiometric contours for the lower portion of the fluvial deposits over four sampling events between April 1996 and November 1999. The sole objective of the map is to look at qualitative groundwater flow patterns across time, so extraneous quantitative information has been omitted; the contour interval is 1 foot. Numerous changes are apparent, some are contouring artifacts due to the fact that different wells were sampled in each sampling event. But some dispersive effects are evident. The most significant changes occur on the north part of the contoured area at monitoring wells 007G10LF, -G11LF, and -G12LF. Sequential water level measurements over the past three years have shown that, as levels rise and fall basewide with rainfall, the effect in these three wells is retarded or mitigated. Table 5-1 summarizes this effect. Changes with respect to measurements in April 1996 are less in the three wells than the other apron-area wells. The effect varies in magnitude with the sample date. While the hydrologic origins of this effect are beyond the scope of this section, such a differential change must have some laterally dispersive effects on plumes. An informal inspection of the contours in Figure 5-4 suggests that the flowpath angle could change by more than  $\pm 10$  degrees. It is unknown what kinds of changes may have occurred over the longer period during which contaminants have been present.

**Table 5-1**  
**Groundwater Level Changes Referenced to 4/96 Measurements**  
**(feet of change since 4/96)**

Well Group	8/96	10/98	3/99	9/99	10/99
wells except 10-12	-0.86 ± .15	-0.54 ± .17	1.57 ± .08	-2.35 ± .45	-3.55 ± .15
wells 10-12	0.10 ± .13	1.44 ± .07	2.38 ± .25	-0.27 ± .06	-1.28 ± .10

### 5.1.5 Short-Term Time Stability of Plumes

Because sampling has been conducted over a 4-year period using different drilling and sampling methods, it is necessary to consider the consistency of the data over time. Figure 5-6 shows the trends in six chlorinated solvent concentrations at the most contaminated wells. All samples, including diffusion samples and duplicates, are shown in the plots. None of the wells clearly exhibits an increase or decrease in concentration over time, though 007G03LF shows suggestions of an increase in some chemicals. But there are large variations of an apparent random nature. The largest variations are observed in 007G04LF and 007G11LF, but all wells show at least half an order of magnitude variability in concentrations. Most of the time-series individual-well data have standard deviations approaching the average concentration for that well. A full explanation of these variations is beyond the purpose of this section, but it is sufficient to note that samples have been taken from 10-foot screens and 40-foot screens covering the entire fluvial deposits aquifer; samples have been taken by pumping, micropurging, and diffusion samplers; on-site and various off-site laboratories have been used; screen bases have varied slightly with respect to the fluvial deposits base; sampling has been done in various wet and dry seasons; some samples are from heterogeneous parts of the aquifer where recharge and transmissivity interactions are undoubtedly complex and may vary with time.



Plot Summary  
 - Contours every 1 foot  
 - Blue=04/96 Cyan=10/98 green=03/99 magenta=10/99  
 - Drawings: 94PLUME1.DXF, 94PLUME2.DXF  
 - Plot file GWCON.P01 generated 01-27-00 via Geosoft  
 - N:\WP51\USERS\JHUGHES\MEMPHIS\GEOCHEM\PLUMES

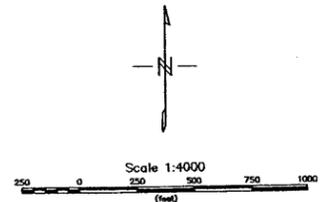
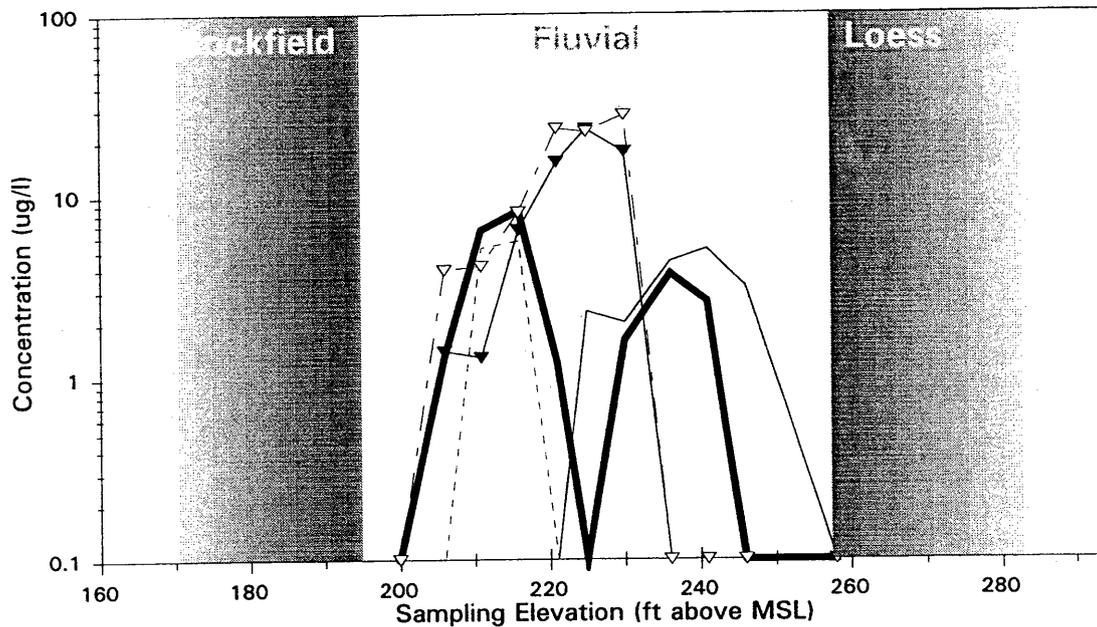


Figure 5-4  
 Groundwater Flow Changes, 1996-1999  
 Fluvial Deposits Aquifer  
 ADC A - Northside Fluvial Groundwater  
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 NSA, Mid-South  
 Millington, TN  
 EnSafe Inc.

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— TCE                      - - - 1,1-DCE                      — 1,2-DCE  
 —▼ carbon tetrachloride    -▼- chloroform



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 MILLINGTON, TENNESSEE

FIGURE 5-5  
 VERTICAL ZONATION OF  
 CONTAMINATION

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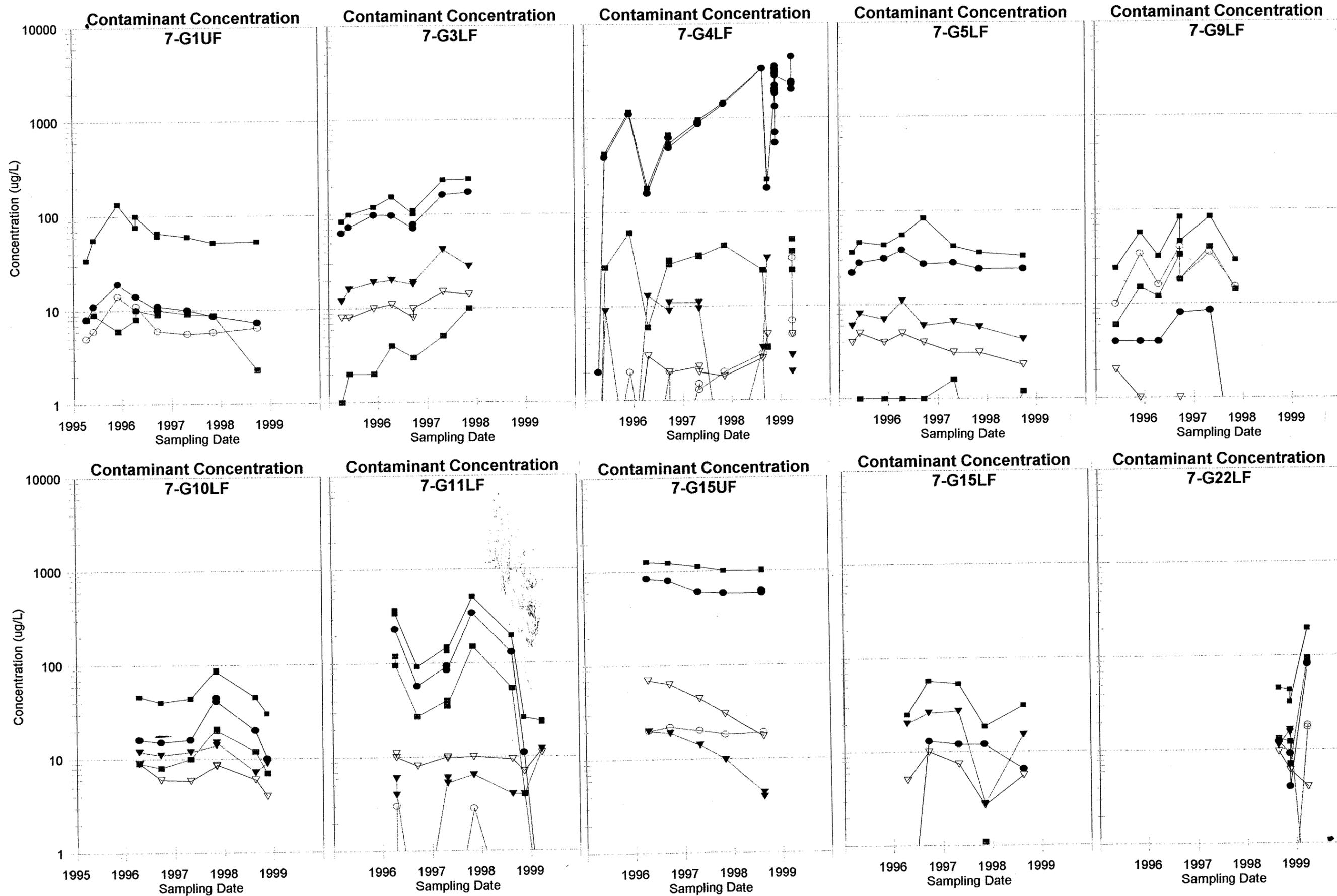


Figure 5-6

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Concentrations of the various chemicals are correlated: when one goes up or down, the others do too. This effect can be quantified by comparing observed and calculated standard deviations for the ratios of various chemicals. Figure 5-7 shows an example for the TCE/PCE ratio. In this plot, the propagated error is the mathematically expected error for a ratio of two components with purely random noise; the actual error is the standard deviation obtained from the actual TCE/PCE ratios over time. Each point represents the time-series for a single well. The 45-degree line signifies uncorrelated data; data above the line are anticorrelated, those below are correlated. Most of the TCE/PCE data are moderately to highly correlated. Other chemicals show similar behavior.

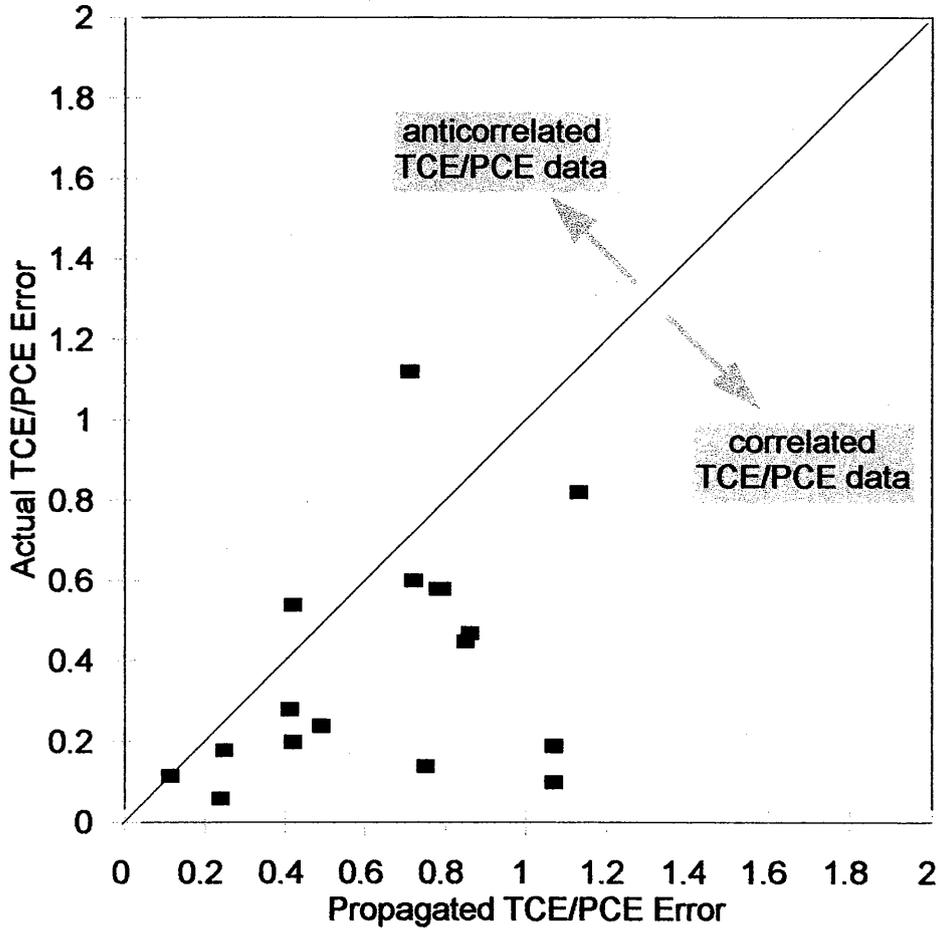
Because the data are correlated, one might expect ratios of various components to be more stable over time than the concentrations themselves. Figure 5-8 shows an example of TCE and PCE data for the most contaminated wells. A unique colored symbol is used for each well, and multiple symbols for a given well show values for each sampling event over time (duplicates are also plotted). While total concentrations vary for both chemicals in each well, note that the plot points for any given well tend to cluster on a line with a 45-degree slope, indicating a relatively constant ratio over time. Each well falls on a different line, indicating a different TCE/PCE ratio characteristic of the plume intersected by the well. Because these "geochemical fingerprints" are so stable with respect to time and sampling methodology, they are a useful diagnostic tool in plume analysis. Typical applications include differentiating partly overlapping plumes and evaluating the degree of biodegradation.

#### **5.1.6 Chemical Fingerprinting**

Chemical fingerprinting has been extensively exploited to differentiate plumes in this conceptual model. As an example of this application, Figure 5-9 shows PCE-TCE correlations for all samples

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### TCE/PCE Correlation Analysis



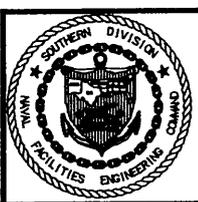
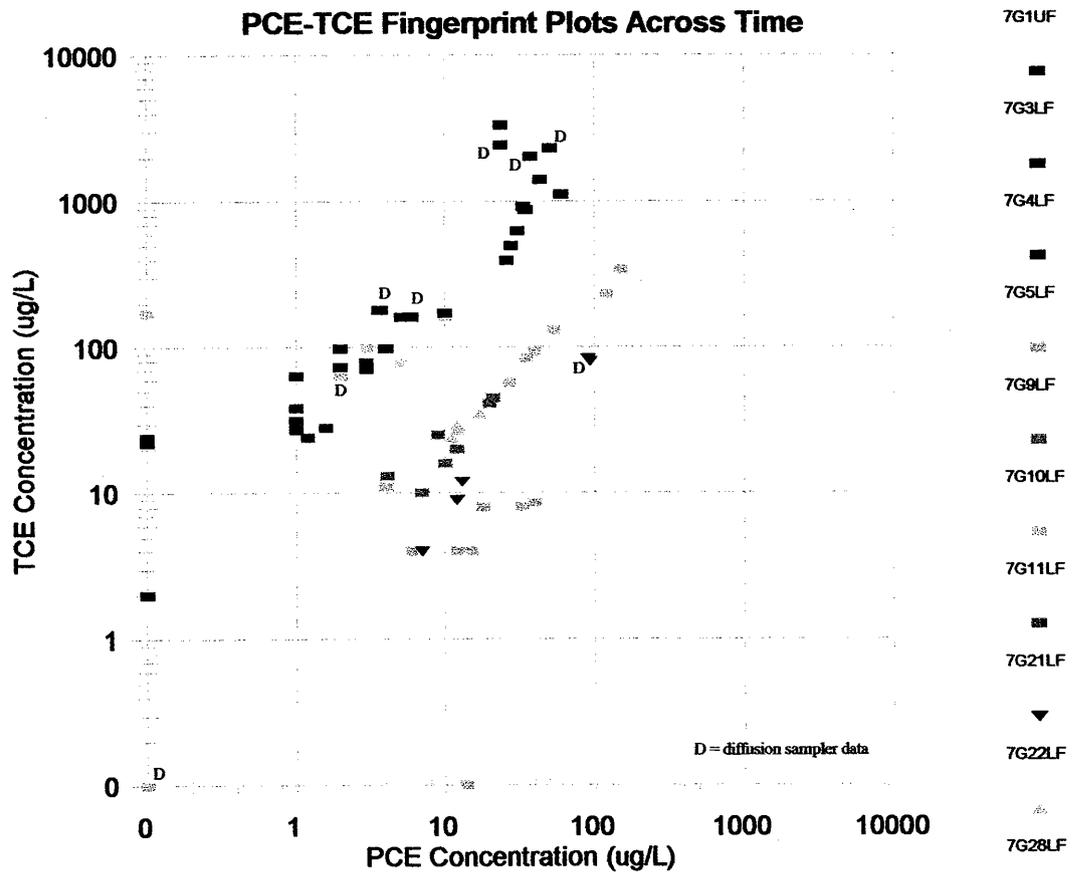
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FIGURE 5-7  
TCE/PCE CORRELATION ANALYSIS

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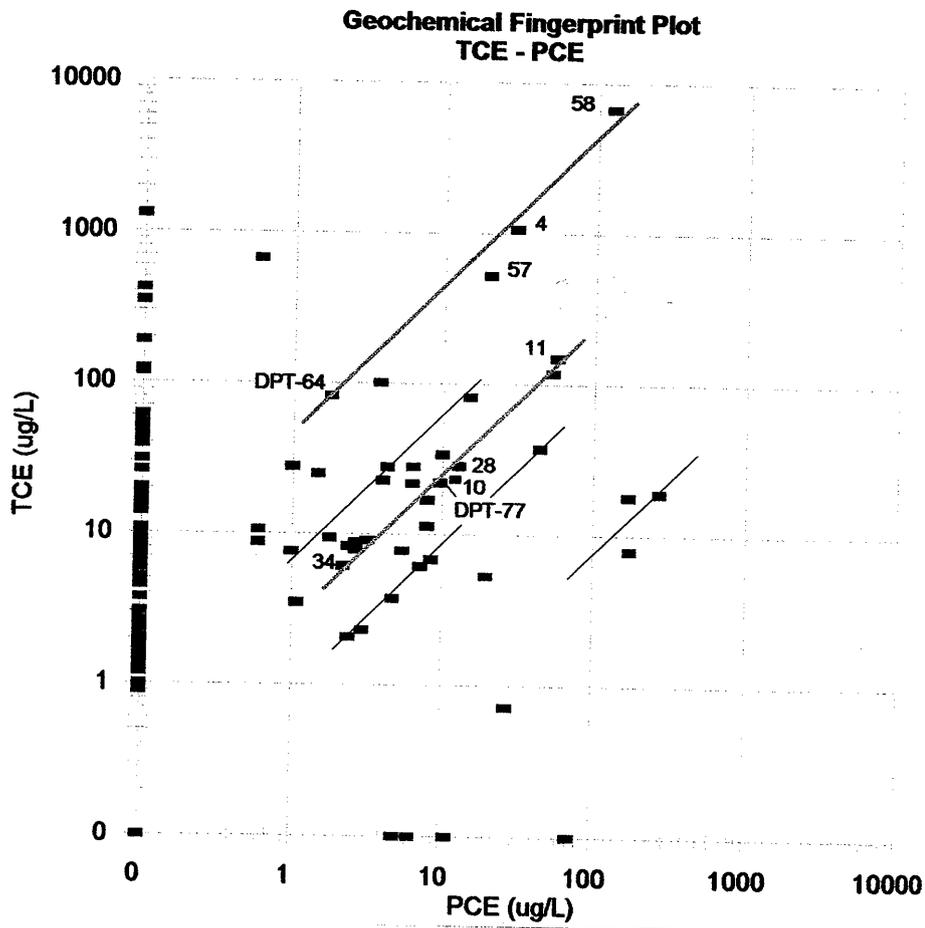
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FIGURE 5-8  
 PCE/TCE CHEMICAL FINGERPRINT  
 PLOT (SPECIFIC WELLS)

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FIGURE 5-9  
PCE/TCE CHEMICAL FINGERPRINT  
PLOT (ALL DATA)

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obtained within the study area. Data for each well are average values over time, including duplicates. The data tend to form populations that can be assigned to linear trends. For example, the upper linear trend in the plot includes three wells and a DPT that fall within the Building N-126 plume; despite the fact that individual concentrations vary by two orders of magnitude within this plume, the geochemical signature with respect to PCE and TCE remains relatively constant. Similarly, the middle linear trend is populated by wells and a DPT that fall within the north apron-edge plume north of Building N-126. If these two plumes were to come together, one would expect to see samples plotting between the two trend lines. Other TCE-1,2-DCE, carbon tetrachloride-chloroform, etc., scatter plots show similar correlations.

Plan maps of fingerprint parameters are useful. Figure 5-10 shows an example of a plot of TCE/PCE ratios for wells where both parameters exceed  $5 \mu\text{g/L}$  (smaller values are too noisy to yield reliable ratios). Dot color varies with the TCE/PCE ratio; groundwater contours are from November 1999 measurements. A few flow paths are drawn on the figure (long black arrows) to illustrate how data of similar fingerprint style tend to cluster. While a much more thorough series of plots is required to interpret this pattern, the spatial coherence of the trends suggests the presence of multiple plumes with differing chemical histories.

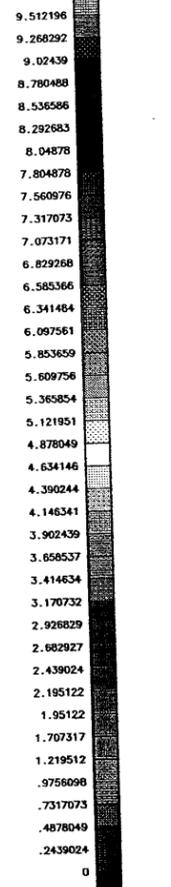
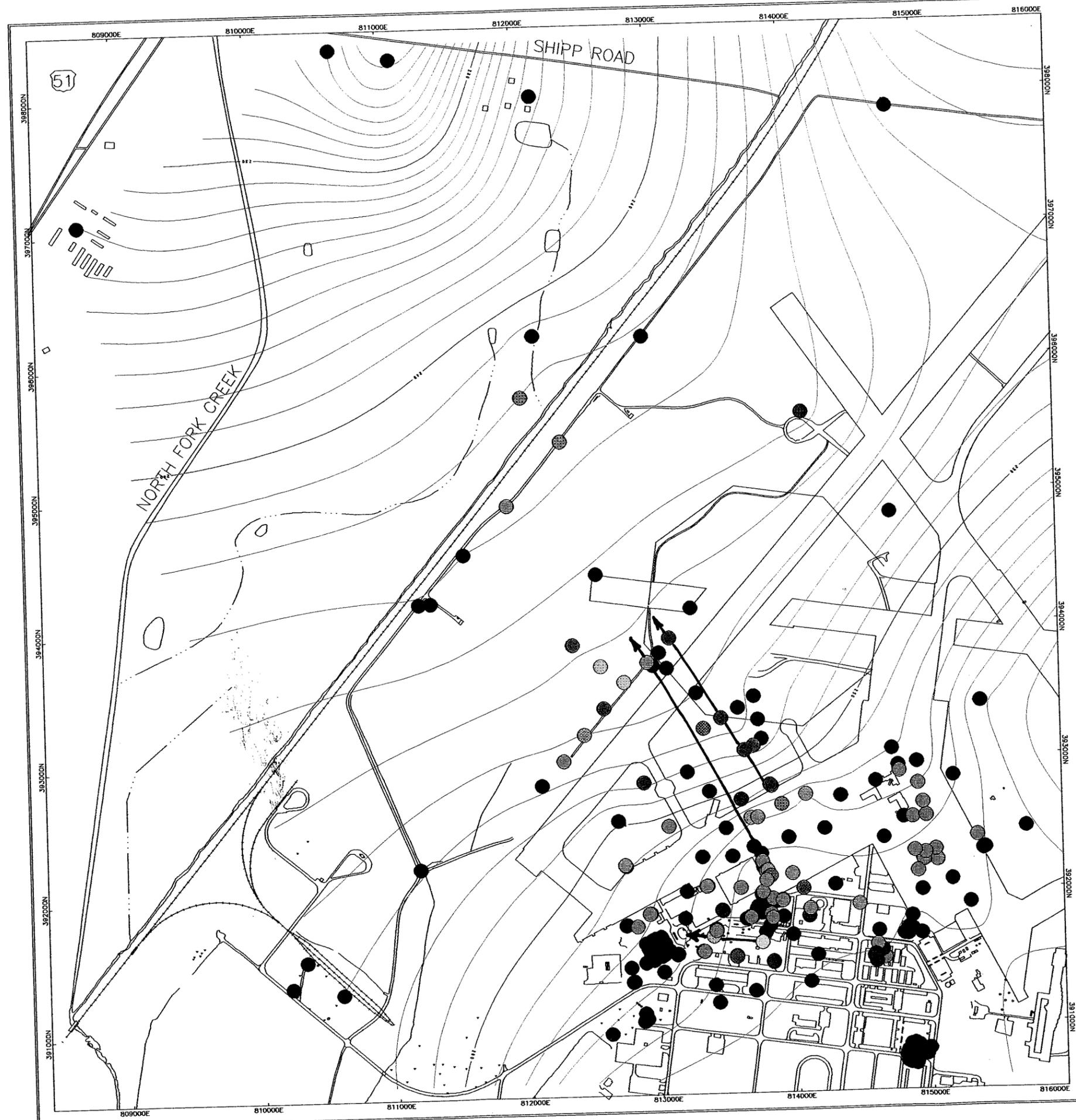
Several mechanisms influence a plume's chemical fingerprint. The original source composition is a significant factor. TCE spills will plot differently from TCE-PCE spills. In the absence of other complicating factors, plumes can be readily differentiated on this basis. However, there are several such complicating factors. With several nearby plumes of different source chemicals, mixing will occur. Thus, if a PCE spill is near a TCE spill, the fingerprint will vary with the exact position of the well with respect to the two plumes. If many sample points are available, this phenomenon can be recognized on the scatter plot by two distinct data clusters with some transitional points scattered between them. However, plumes are rarely sampled densely enough

to see this. Another common complication is that plume composition rarely remains the same in space or time. For example, within a single PCE-TCE plume, the chemicals may form zones because of mechanical processes, with one dominating the plume's core and the other dominating its fringes. Biodegradation can also be a significant factor. Because PCE degrades to TCE, sometimes in a spatially zoned pattern, the fingerprint will vary within a given plume and will not accurately predict the original source composition.

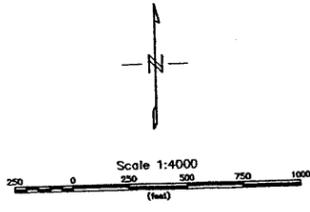
While these factors may seem to mitigate the usefulness of fingerprinting, an integrated interpretation of all the available data can help sort out the complexities sufficiently to make a reasonable interpretation. One useful procedure is to evaluate the effectiveness of biodegradation at each point, then apply it to interpreting the fingerprint plots.

### **5.1.7 Biodegradation**

PCE, TCE, 1,1,1-TCA, and carbon tetrachloride are known to have been used as solvents at NSA Mid-South. These primary compounds degrade, primarily through biologic activity but in some cases by other processes, to a series of daughter products, particularly 1,1-DCA, 1,1-DCE, 1,2-DCA, 1,2-DCE, vinyl chloride, chloroethane, chloroform, and methylene chloride (the latter could have been used as a solvent, but for this discussion is considered a degradation product). Hence, ratios of a certain daughter to its parent provide an indication of biodegradation. An index of biodegradation can also be calculated by dividing the sum of the daughter compound concentrations by the total of parents and daughters. The index has the advantage of being less noisy than two-component ratios, since the larger data set it encompasses results in a smaller random-error component in the result.



Plot Summary  
 - Contours: GW surfaces for 10/99; interval=1 foot  
 - Dots: black=TCE or PCE <5 ppb  
 color: according to ratio (see color bar)  
 - Drawings: 94PLUME1.DXF, 94PLUME2.DXF  
 - Plot file: TCEPCE.PDI generated D1-27-00 via Geosoft  
 - N:\WP51\USERS\JHUGHES\MEMPHIS\GEOCHEM\PLUMES



**Figure 5-10**  
 Ratio of TCE to PCE  
 Fluvial Deposits Aquifer  
 ADC A - Northside Fluvial Groundwater  
 R71 Report Addendum  
 NSA Mid-South  
 Millington, TN  
 EnSafe Inc.

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Figure 5-11 shows the fraction of daughter products by a series of colored dots. Cool colors indicate low daughter concentrations, warm color high concentrations; black dots occur where the sum of chlorinated solvents is less than 5  $\mu\text{g/L}$  (below which the index is very noisy). As observed in the TCE/PCE plot of Figure 5-10, coherent trends along certain flowpaths are suggested. The cluster of strongly degraded products on the south-central part of the plot occurs over a former fuel farm south of N-126, suggesting increased biodegradation in this reducing environment.

Some caution should be exercised when interpreting this plot. If daughter products are destroyed rapidly in a certain environment, the index of biodegradation will be low even though the biodegradation process could be quite vigorous. For example, vinyl chloride is rapidly destroyed at many sites, and its absence does not necessarily indicate degradation has not occurred.

#### **5.1.8 Is DNAPL Present?**

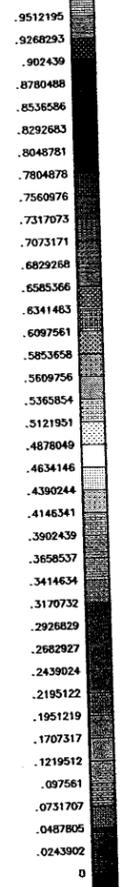
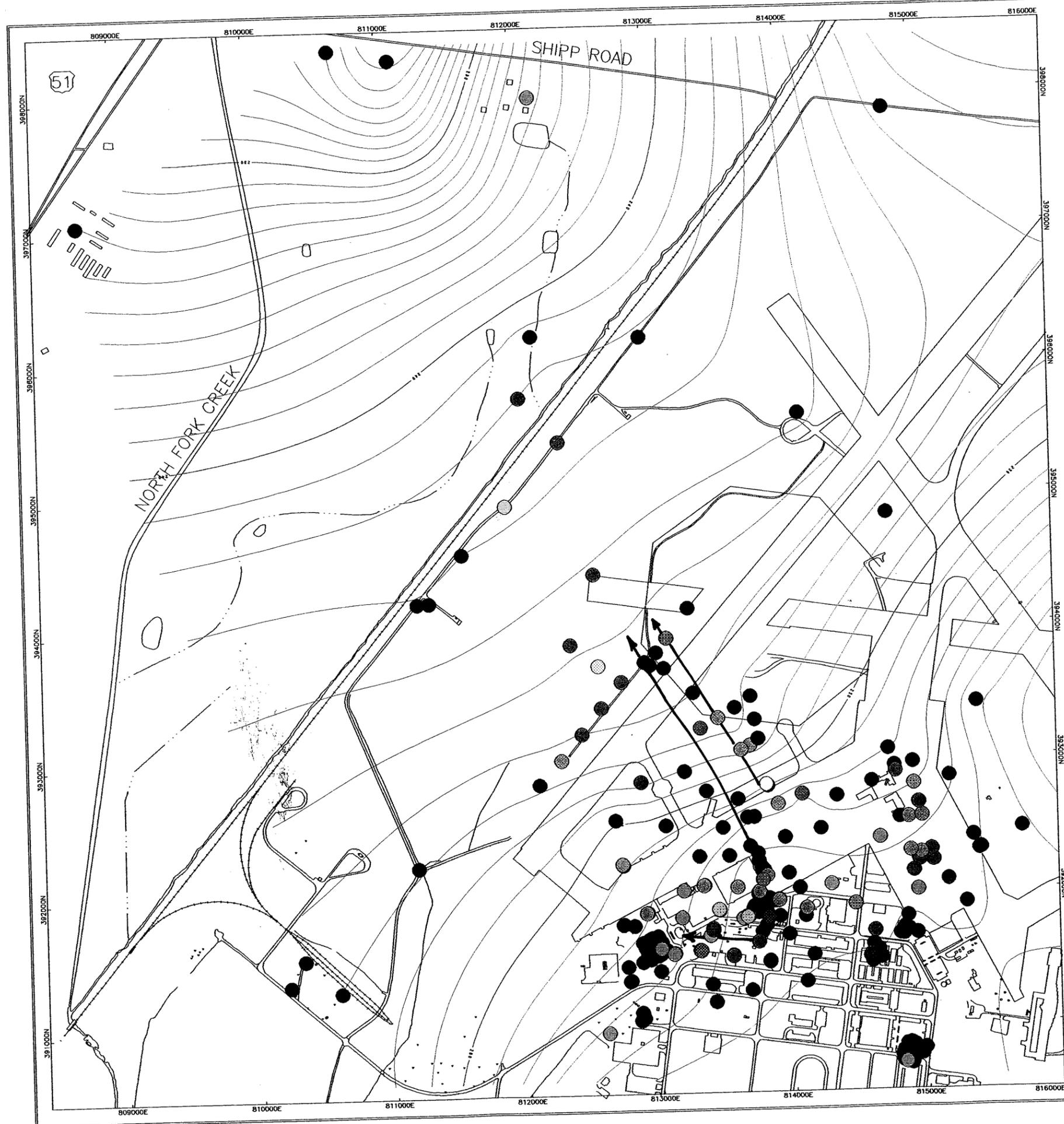
None of the sampling data or matrix samples have indicated saturated-phase liquid. This is a common result, even at sites where DNAPL is definitely known to be present, because the narrow, complex DNAPL channels and pools are statistically difficult to find with the borehole. Thus, the fact that pure product has not been found is inconclusive with regard to the presence or absence of DNAPL at this site.

Instead, the presence of DNAPL must be checked indirectly by looking for high concentrations in dissolved-phase plumes. A common rule-of-thumb is that DNAPL is indicated when detected dissolved-phase solvents reach 1% of a particular compound's solubility (Cohen and Mercer, 1993). It is useful to compare the data to this benchmark.

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*NSA Mid-South*  
*AOC A — Northside Fluvial Groundwater*  
*Revision: 0; February 17, 2000*

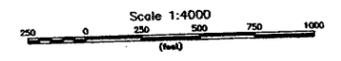
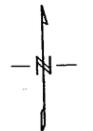
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Fraction

Plot Summary  
 - Contours: GW surface for 10/99; interval=1 foot  
 - Data: black=total chlorinated <math>< 3 \text{ ppb}</math>  
 color: according to fraction (see color bar)  
 - Drawings: 94PLUME1.DXF, 94PLUME2.DXF  
 - Plot file DAUGHTER.P01 generated 01-27-00 via Geosoft  
 - N:\WP51\USERS\LHUGHES\WEMPHIS\GEOCHEM\PLUMES



**Figure 5-11**  
 Fraction of Daughtery Products  
 Fluvial Deposits Aquifer  
 AOC A - Northside Fluvial Groundwater  
 RFI Report Addendum  
 NSA Mid-South  
 Millington, TN  
 EnSafe Inc.

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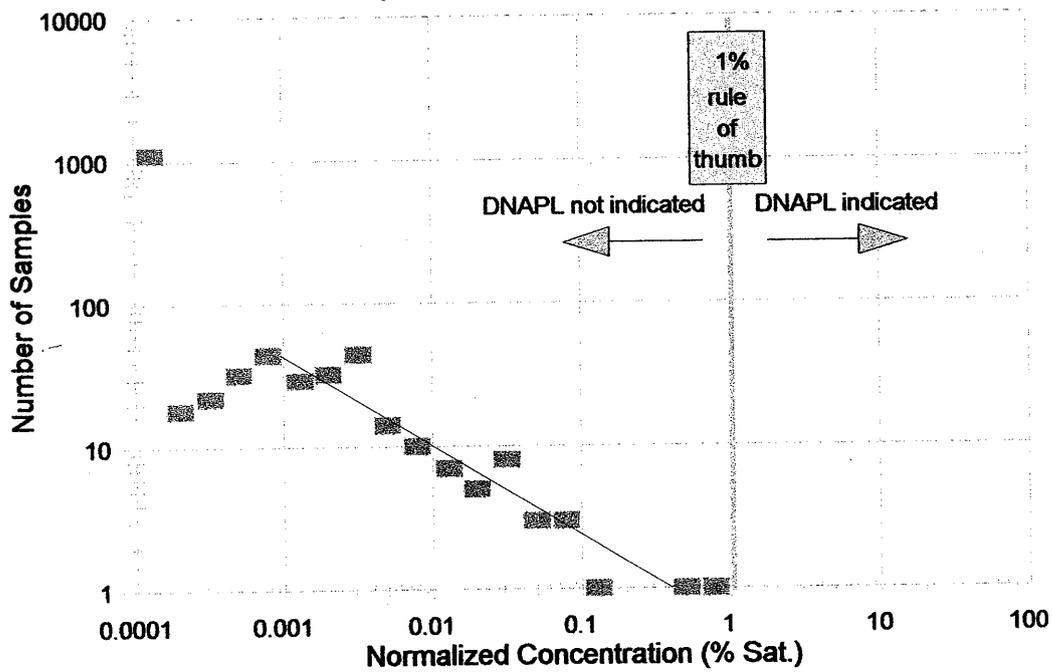
Analytical data from all wells, direct push technology (DPT), and Geoprobe points within Figure 5-10's mapped area were analyzed for the fluvial deposits. Some points were sampled at several different elevations within the fluvial aquifer, resulting in 347 sample points in three-dimensional space. Only parent compounds were included in the study, because they were the originally released chemicals and could constitute a DNAPL slug. TCE could, of course, be a PCE daughter in some places, but was conservatively defined as a parent for this study. For multiple sampling events at wells, the highest recorded value was used (even if a duplicate). The 347 sample points multiplied by the four parent analytes provides a statistically adequate 1,388 samples for the analysis.

To facilitate DNAPL analysis, each compound's data were normalized to the compound's calculated solubility. Expressed in terms of percent of solubility, all 1,388 samples were combined and sorted logarithmically for the histogram in Figure 5-12. Percent of solubility increases to the right; the data have been grouped into logarithmically spaced intervals. The 1% benchmark is shown as a vertical line; the shaded zone to the right suggests the presence of DNAPL.

Seventy-nine percent of the data are nondetections. Within the 0.0001 to 0.001 percent band, data are scattered because of artifacts caused by different quantitation limits among the four compounds examined. But starting at solubilities greater than 0.001%, the number of samples with higher percent solubilities progressively decreases. The highest measured value is 0.6% of the TCE solubility (007G58LF). A power-curve fit to the data ( $y=0.58x^{-.63}$ ,  $R=-.96$ , shown as a straight line in this log-log plot) predicts that less than one detection would be expected for solubilities above 0.41%, roughly agreeing with the observed highest value of 0.6%.

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**Distribution Plot of "Parent" Solvents  
(PCE, TCE, 1,1,1-TCA, CCl4)**



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FIGURE 5-12  
DISTRIBUTION PLOT OF  
PARENT CONCENTRATIONS

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The statistical analysis indicates that drilling to date has not identified a classic DNAPL pool. The fact that some of the drilling has been highly targeted to likely source locations raises a question as to whether or not a classic DNAPL pool exists at this site. However, this does not rule out such an occurrence, and certainly does not discount a possible discontinuous, rarefied string of tiny DNAPL globules.

## **5.2 Proposed Contaminant Transport Mechanism**

Three theories are proposed to explain the presence of dissolved-phase plumes at this site:

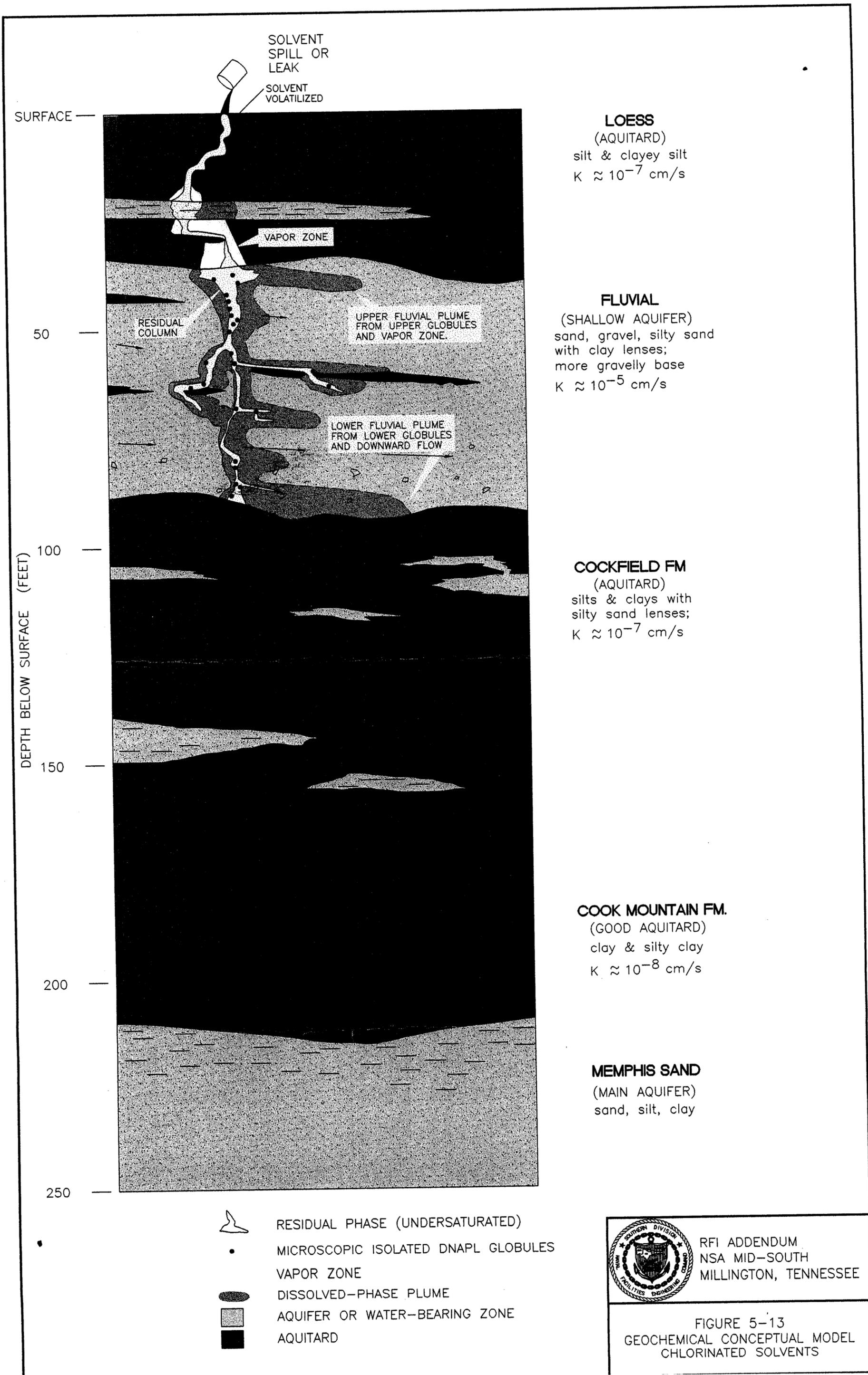
- ***DNAPL source model*** — Contaminants have migrated into the ground and are present as a continuous stringer of saturated-phase liquid, wetting lenses and fingers of higher porosity, and pooling in low spots atop impermeable barriers. This is the standard model often assumed for sites with solvent releases.
  
- ***Globule model*** — Contaminants formerly entered the ground as a saturated-phase liquid, but sorption to the soil matrix and dispersive effects have separated the liquid into isolated, microscopic-sized DNAPL globules. When washed by groundwater, these globules produce complex plumes of low-concentration, dissolved-phase solvents. No DNAPL pools or continuous DNAPL strings are needed for this model, only microscopic globules.
  
- ***APL model*** — Contaminants never existed as a substantial saturated phase, but entered the fluvial deposits as a vapor or aqueous phase, becoming sorbed to the fluvial matrix as an aqueous phase liquid (APL). Chapelle (1997) notes that chlorinated ethenes, having a modest sorptive capacity, might "bleed" off sorption sites in the matrix to the aqueous phase for some time, causing the observed contaminant plumes. No DNAPL or

saturated-phase globules are needed for this model; all solvents are in purely aqueous (dissolved) phase.

*Theorized transport of the globule model* — The previous discussion has shown that the classic DNAPL source model is not strongly indicated in the data, but the other two models bear further examination. Figure 5-13 shows the proposed mechanism for the globule theory. Solvents released to the ground are partly volatilized at the surface, but the rest penetrate through the loess as a DNAPL column. Within the loess, volatilization sets up an undersaturated vapor zone near the column. The vapor zone is better developed in areas of limited surface recharge, such as under the concrete apron. Saturated zones in the loess may wash the DNAPL column and create small dissolved-phase plumes within this unit.

As the DNAPL column enters the fluvial deposits, its mobility increases because of higher permeability. Anisotropy within the fluvial deposits causes the column to assume a complex geometry. It moves steadily downward as narrow, twisted, interconnecting fingers and lenses. Downward movement is driven by gravity and the head of the continuous DNAPL column; mobility is very high and retention by capillary forces is minimal under this pressure. Once the release is stopped, the pressure within the column decreases, mobility decreases, and capillary retention occurs at the trailing edge. The column diminishes as DNAPL is trapped by capillary forces between matrix grains. At some point, the column begins to break into ever-smaller blobs, ultimately producing a "residual column" of disconnected, small globules. It is still DNAPL — not in the classic sense of columns and pools, but rather as a distributed, sparse network of tiny source blobs of saturated-phase solvent.

Under this scenario, dissolved-phase plumes (the only form of solvent detected in the apron area) have two origins. The primary source is continual washing of the globules by groundwater.



SOLVENT SPILL OR LEAK  
SOLVENT VOLATILIZED

SURFACE

VAPOR ZONE

50

RESIDUAL COLUMN

UPPER FLUVIAL PLUME FROM UPPER GLOBULES AND VAPOR ZONE.

LOWER FLUVIAL PLUME FROM LOWER GLOBULES AND DOWNWARD FLOW

100

150

200

250

**LOESS**  
(AQUITARD)  
silt & clayey silt  
 $K \approx 10^{-7}$  cm/s

**FLUVIAL**  
(SHALLOW AQUIFER)  
sand, gravel, silty sand with clay lenses; more gravelly base  
 $K \approx 10^{-5}$  cm/s

**COCKFIELD FM**  
(AQUITARD)  
silts & clays with silty sand lenses;  
 $K \approx 10^{-7}$  cm/s

**COOK MOUNTAIN FM.**  
(GOOD AQUITARD)  
clay & silty clay  
 $K \approx 10^{-8}$  cm/s

**MEMPHIS SAND**  
(MAIN AQUIFER)  
sand, silt, clay

-  RESIDUAL PHASE (UNDERSATURATED)
-  MICROSCOPIC ISOLATED DNAPL GLOBULES
-  VAPOR ZONE
-  DISSOLVED-PHASE PLUME
-  AQUIFER OR WATER-BEARING ZONE
-  AQUITARD



RFI ADDENDUM  
NSA MID-SOUTH  
MILLINGTON, TENNESSEE

FIGURE 5-13  
GEOCHEMICAL CONCEPTUAL MODEL  
CHLORINATED SOLVENTS

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Higher concentrations thus occur where there are more globules, or where more vigorous washing occurs, or in porous "traps" within the geology. A secondary source is an upper-fluvial deposits plume originating from where the residual vapor zone in the loess contacts the fluvial deposits.

The plume acts as a fingerprint of the loess vapor zone, but is distended downgradient. In actual practice, it is unlikely that these two types of contributions would be differentiated in the field.

### **Globule and APL Models Contrasted**

The globule and APL models differ substantially in the mechanism by which the present subsurface sources were transported. In the globule theory, the original transport was through a DNAPL column, which has since dispersed and contains only disconnected remnants, each now sustaining a dissolved-phase plume. The APL model must employ a non-DNAPL mechanism to move the contaminants to the lower part of the fluvial deposits. This poses a problem because a truly aqueous-phase liquid would not sink when introduced to the fluvial deposits despite its high specific gravity (Pankow and Cherry, 1996, p.76) because buoyancy effects would counteract the density differences. Thus, APL contaminants would spread only in response to externally applied forces.

What forces might be postulated to do this? Three are hypothesized: (1) a downward hydraulic head, (2) simple isotropic dispersion, or (3) sinking and spreading through preferential pathways of high porosity.

The hydraulic explanation is unsatisfactory because of the weak vertical head within the fluvial deposits at this site. Even in local areas where the head is strongest, it is insufficient to explain the concentrated lower-fluvial plumes in this data set. The dispersive mechanism does not adequately explain the observed plume geometries. Plumes often have upper- and lower-fluvial

contaminants directly beneath the postulated release points, coincident with each other in plan view, sometimes with higher concentrations in the lower part of the fluvial deposits. Dispersion would cause the plume to widen, migrate downgradient, and weaken as it spreads out to lower depths, a pattern which is not indicated in the data. Finally, preferential spreading along interconnected porous facies seems reasonable enough, at least in some local areas, given the depositional complexity of the fluvial deposits. This would require preferred permeability in a near vertical direction to explain the coincidence of upper- and lower-fluvial plumes. It is difficult to understand why this specific pattern would be repeated in so many local areas within the site, and why, if permeability increases generally with depth in the fluvial deposits, a stronger vertical hydrologic gradient is not observed.

For these reasons, the globule model is selected as the simplest and most adequate explanation of the available data.

### **5.3 Spatial Interpretation**

#### **5.3.1 Interpretation Process**

After examining fingerprint plots and other geochemical data, a series of maps were constructed for each key solvent. Each contained the fluvial deposits groundwater contours and the sample locations. Beside each location, a block of data listed the sample depth (compared to the top and bottom of the fluvial deposits), the concentration, and the percent daughter products, all listed vertically according to sample depth. Using chemical fingerprint plots, suspected source locations, and the map data, plumes were drawn for upper, middle, and lower levels within the fluvial deposits. The plots were compared for chemical and spatial consistency, considering such factors as hydrologic gradients, chemical partitioning, logical biodegradation patterns, known stratification, etc. Plumes were modified according to these factors, compared again, then completed. Finally, these upper-middle-lower fluvial deposits plume maps were synthesized to produce a single image of the fluvial deposits as a whole, accounting for the highest recorded

values in plan view, regardless of vertical position. Thus, the final maps presented here represent the interpreted maximum spatial extent of contaminants within the fluvial deposits aquifer.

The process produced a reasonably adequate representation of all the available data. While it is thought that the model is the best of several alternative depictions, it is by no means presented as an exclusive "correct" view because of the many uncertainties of spatial undersampling, variability in sampling methodology and uncertainty in how well sampling actually reflects true contamination in the groundwater. Of these, spatial undersampling is probably the most significant contributor to uncertainty. By most environmental examples, this is a very densely sampled site for the observed levels of concentration, but the scale of hydrogeologic complexity makes it unfeasible to sample densely enough to fully define the observed features. However, the existing data are sufficient to propose this conceptual model as a working tool to help solve practical remediation issues at the site.

### **5.3.2 Results**

Figures 5-14 through 5-21 show the interpreted plumes for the more prevalent solvents. Plots for chemicals that occur sparsely or not at all (1,1,1-TCA, vinyl chloride, chloroethane, methylene chloride) are omitted. The color scheme is the same for each plot; MCLs are indicated by red contours. Slight irregularities in contour/color lines are computer gridding artifacts and are not physically significant. As a reminder, the contours and colors are interpretive, and do not directly reflect the data at every sampling point.

The most significant contamination consists of TCE and carbon tetrachloride, but PCE and the various daughter products are strongly evident in some areas. The daughter products of PCE/TCE appear in many places, but there is no consistent spatial pattern indicating which daughter is present in a given location. However, in the fuel farm south of N-126, daughter products (particularly 1,2-DCE) are strongly and consistently present. Because fuel products are present

beneath the fuel farm, the environment there is reducing, and thus biodegradation is expected to be more active. In contrast, chloroform, as a daughter of carbon tetrachloride, is found everywhere its parent is, regardless of local redox conditions.

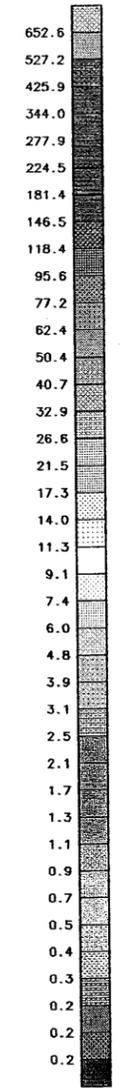
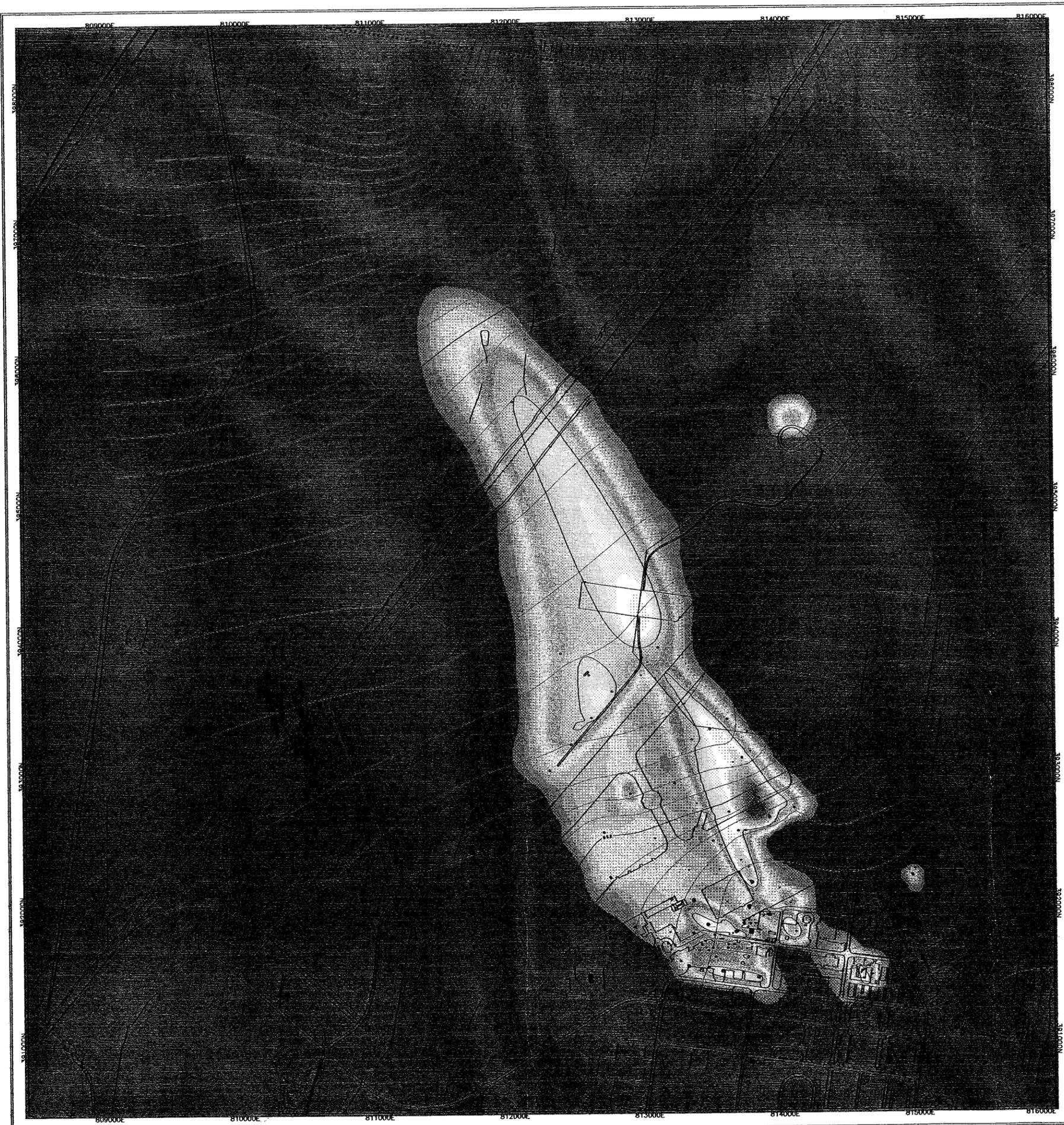
Of interest are the missing chemicals. As noted earlier, 1,1,1-TCA is reported to have been released in large quantities, yet it is rarely found in the groundwater. Vinyl chloride and chloromethane, though daughters of PCE/TCE, are nearly absent from the groundwater data, and 1,2-DCA is present only in small quantities. Though chloroform is seen nearly everywhere carbon tetrachloride is detected, methylene chloride is nearly absent.

Figure 5-22 shows a three-dimensional representation of the TCE plumes within the apron area. The vertical scale has a 10:1 exaggeration.

### **5.3.3 Comments on Sources**

*The N-6 area* — Two, distinct sources (designated N-6 east and N-6 west) are observed here. The eastern source is probably the area reported to have been sprayed for weed control. TCE and carbon tetrachloride appear to have been used in this process. 1,1,1-TCA could have been used, but no trace of it remains today. Elsewhere on the site, TCA is known to have been used, but was only detected in groundwater in one place, suggesting it likely has degraded to daughter products. The plumes contain various daughter products of TCE and TCA, especially 1,1-DCE.

The N-6 west source is enigmatic. Contaminant patterns do not favor the UST reported at the former building's center as the source, though it cannot be ruled out (E/A&H, Technical Memorandum, July 28, 1997). Perhaps a plumbing break or some other undocumented release occurred at the former hangar. In any case, the source chemistry is similar to that of its eastern counterpart.



Concentration (ppb)

Plot Summary  
 - Colors are interpreted contaminant conceptual model  
 - Red contours are interpreted MCL (if promulgated)  
 - Blue contours: GW surface for 10/99; interval=1 foot  
 - Drawings: 94PLUME1.DXF, 94PLUME2.DXF  
 - Plot file: PCE.P01 generated 01-27-00 via Geosoft  
 - N:\MPS\USERS\HUGHES\MEMPHIS\GEOCHEM\PLUMES

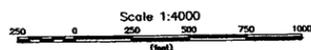
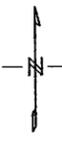
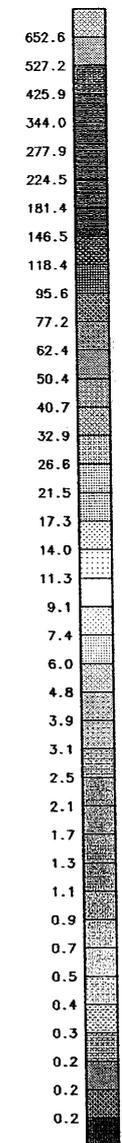
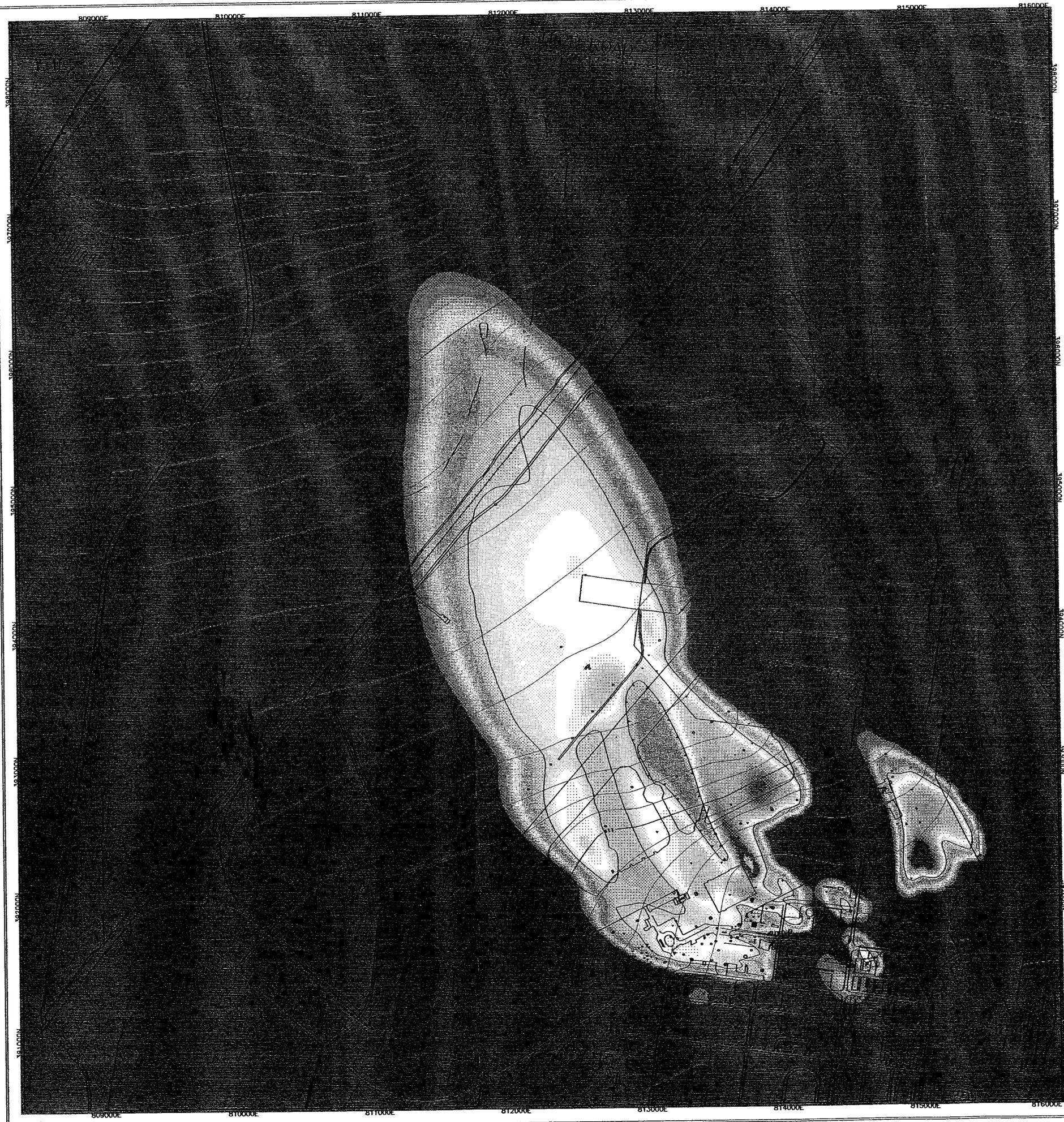


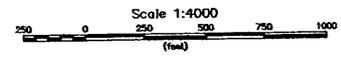
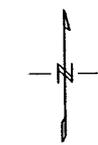
Figure 5-14  
 PCE Conceptual Model  
 Fluvial Deposits Aquifer  
 AOC A - Northside Fluvial Groundwater  
 RFI Report Addendum  
 NSA Mid-South  
 Wittington, TN  
 EnSafe Inc.

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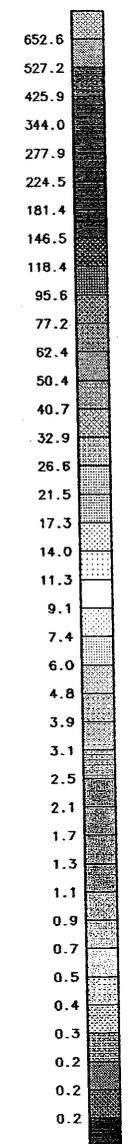
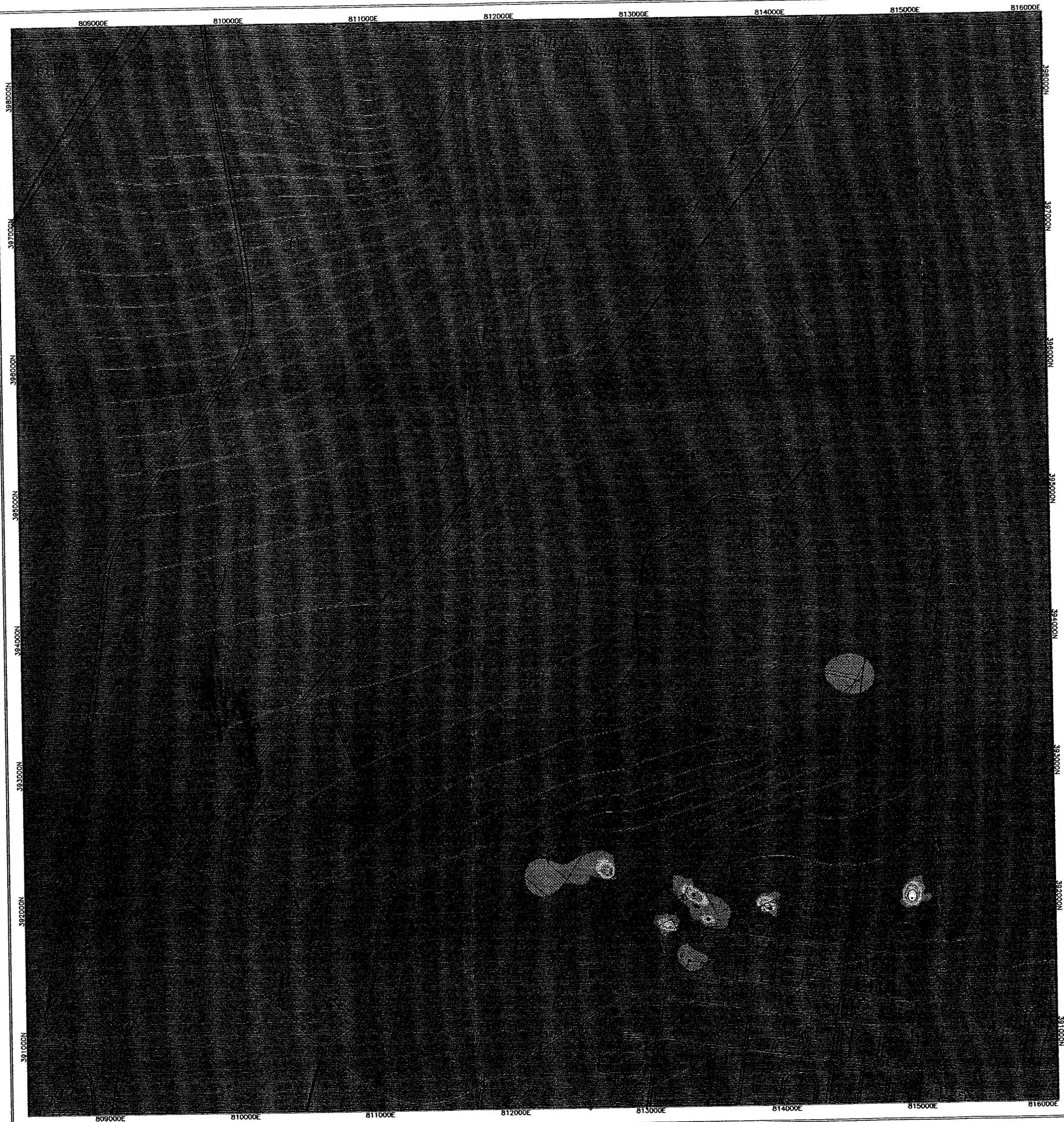
Concentration  
(ppb)

Plot Summary  
 - Colors are interpreted contaminant conceptual model  
 - Red contours are interpreted MCL (if promulgated)  
 - Blue contours: GW surface for 10/99; interval=1 foot  
 - Drawings: 94PLUME1.DXF, 94PLUME2.DXF  
 - Plot file TCE\_P01 generated 01-27-00 via Geosoft  
 - N:\WP51\USERS\HUGHES\MEMPHIS\GEOCHEM\PLUMES



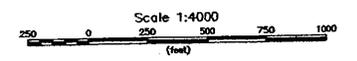
**Figure 5-15**  
 TCE Conceptual Model  
 Fluvial Deposits Aquifer  
 AOC A - Northside Fluvial Groundwater  
 RFI Report Addendum  
 NSA Mid-South  
 Millington, TN  
 EnSafe Inc.

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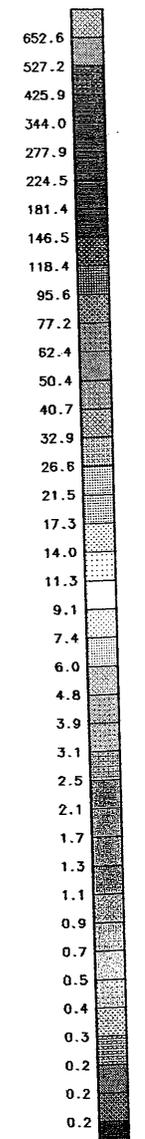
Concentration (ppb)

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 - Red contours are interpreted MCL (if promulgated)  
 - Blue contours: GW surface for 10/99; interval=1 foot  
 - Drawings: 94PLUME1.DXF, 94PLUME2.DXF  
 - Plot file: 12DCA.P01 generated 01-27-00 via Geosoft  
 - N:\WP51\USERS\HUGHES\MEMPHIS\GEOCHEM\PLUMES



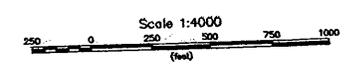
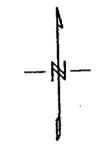
**Figure 5-16**  
 1,2-DCA Conceptual Model  
 Fluvial Deposits Aquifer  
 ADC A - Northside Fluvial Groundwater  
 RFI Report Addendum  
 NSA Mid-South  
 Millington, TN  
 EnSafe Inc.

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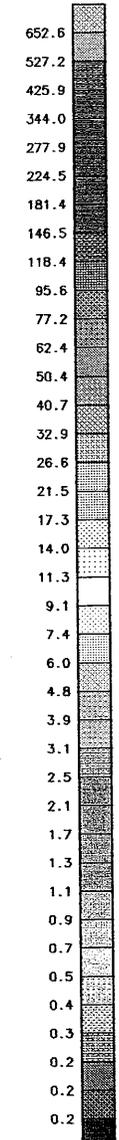
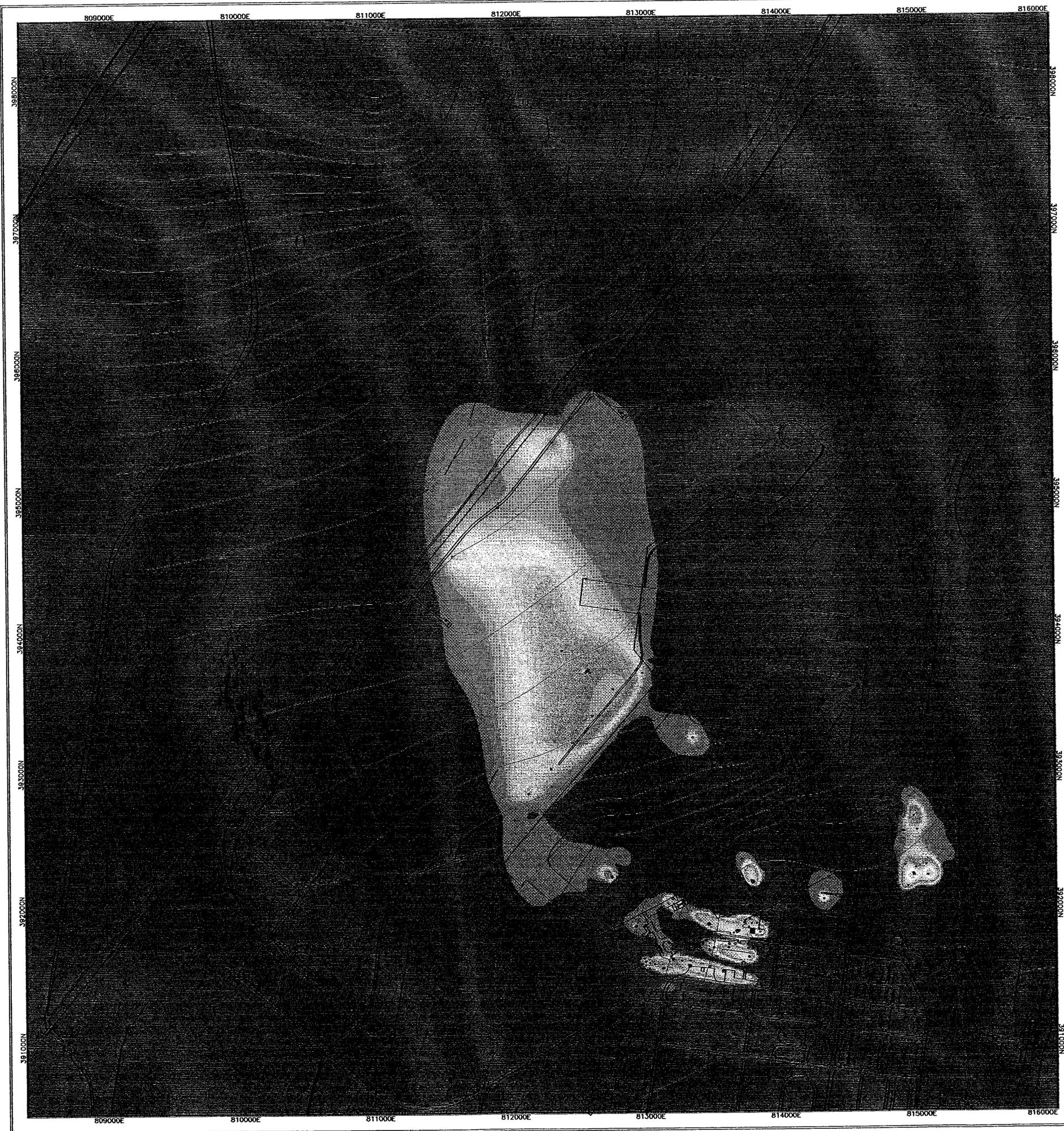
Concentration  
(ppb)

- Plot Summary
- Colors are interpreted contaminant conceptual model
  - Red contours are interpreted MCL (if promulgated)
  - Blue contours: GW surface for 10/30; interval=1 foot
  - Drawings: 94PLUME1.DXF, 94PLUME2.DXF
  - Plot File 12DCE.P01 generated 01-27-00 via Geocart
  - N:\WP51\USERS\HUGHES\WEMPHIS\GEOCHEM\PLUMES



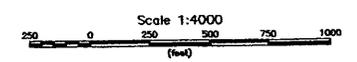
**Figure 5-17**  
**1,2-DCE Conceptual Model**  
**Fluvial Deposits Aquifer**  
 AOC A - Northside Fluvial Groundwater  
 RFI Report Addendum  
 NSA Mid-South  
 Murrington, TN  
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Concentration (ppb)

**Plot Summary**  
 - Colors are interpreted contaminant conceptual model  
 - Red contours are interpreted MCL (if promulgated)  
 - Blue contours: GW surface for 10/99; interval=1 foot  
 - Drawings: 94PLUME1.DXF, 94PLUME2.DXF  
 - Plot file 11DCA.P01 generated 01-27-00 via Geosoft  
 - N:\WP51\USERS\JHUGHES\WEMPHIS\GEOCHEM\PLUMES

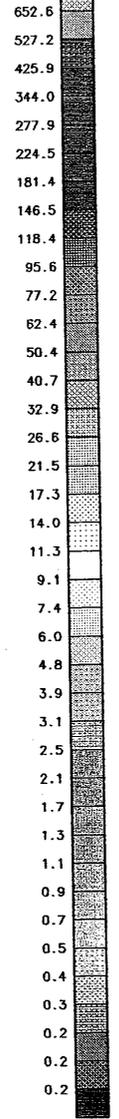


**Figure 5-18**  
 1,1-DCA Conceptual Model  
 Fluvial Deposits Aquifer  
 ADC A - Northside Fluvial Groundwater  
 RFI Report Addendum  
 NSA Mid-South  
 Millington, TN  
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*NSA Mid-South*  
*AOC A — Northside Fluvial Groundwater*  
*Revision: 0; February 17, 2000*

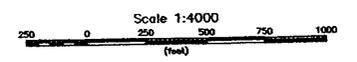
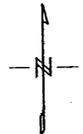
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Concentration  
(ppb)

Plot Summary  
 - Colors are interpreted contaminant conceptual model  
 - Red contours are interpreted MCL (if promulgated)  
 - Blue contours: GW surface for TQ/S9; interval=1 foot  
 - Drawings: 94PLUME1.DXF, 94PLUME2.DXF  
 - Plot file: 11DCE.P01 generated D1-27-00 via Geosoft  
 - N:\WP51\USERS\J.HUGHES\WEMPHIS\GEOCHEM\PLUMES

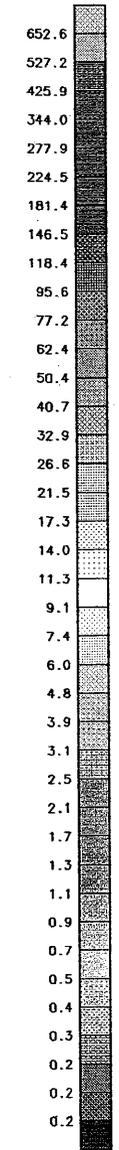
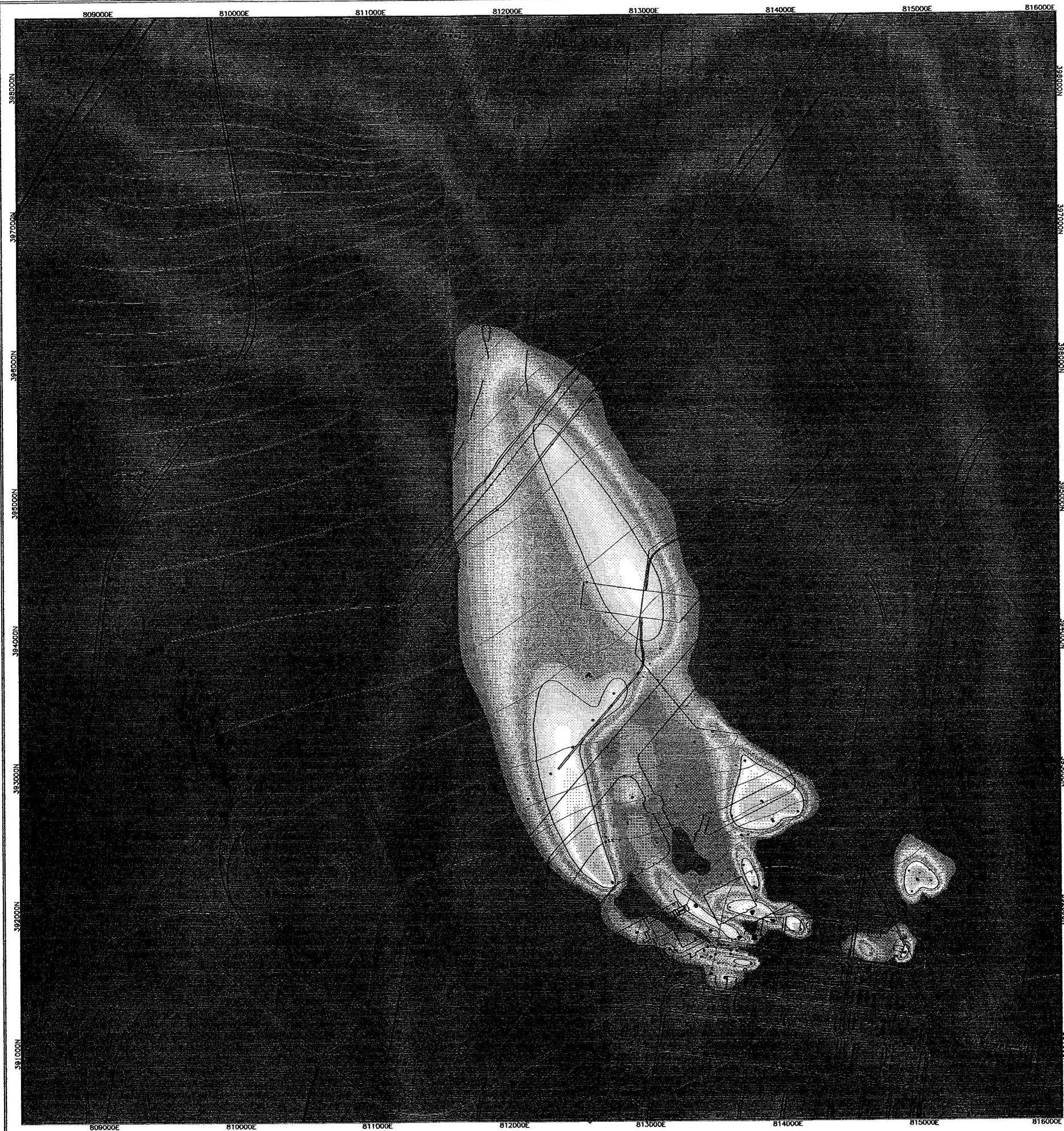


**Figure 5-19**  
 1,1-DCE Conceptual Model  
 Fluvial Deposits Aquifer  
 ADC A - Northside Fluvial Groundwater  
 RFI Report Addendum  
 NSA Mid-South  
 Millington, TN  
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*NSA Mid-South*  
*AOC A — Northside Fluvial Groundwater*  
*Revision: 0; February 17, 2000*

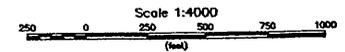
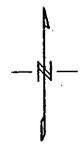
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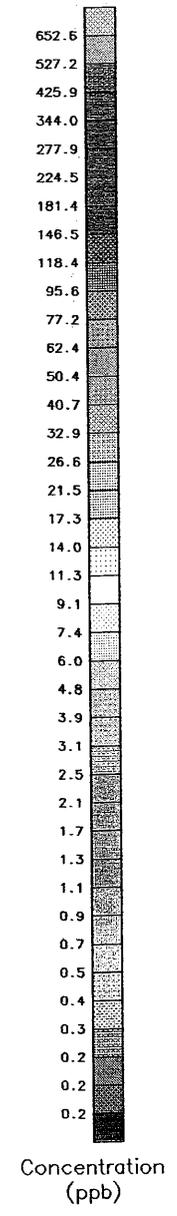
Concentration  
(ppb)

Plot Summary  
 - Colors are interpreted contaminant conceptual model  
 - Red contours are interpreted NGL (if prorogated)  
 - Blue contours: CW surface for 10/89; interval=1 foot  
 - Drawings: 94PLUME1.DXF, 94PLUME2.DXF  
 - Plot file CARBTET.P01 generated 01-27-00 via Geosoft  
 - N:\WP51\USERS\HUGHES\WEMPHIS\GEOCHEM\PLUMES



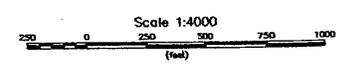
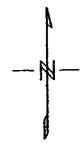
**Figure 5-20**  
 Carbon Tetrachloride Conceptual Model  
 Fluvial Deposits Aquifer  
 ADC A - Northside Fluvial Groundwater  
 RFI Report Addendum  
 NSA Mid-South  
 Millington, TN  
 EnSafe Inc.

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Concentration  
(ppb)

Plot Summary  
 - Colors are interpreted contaminant conceptual model  
 - Red contours are interpreted MCL (if promulgated)  
 - Blue contours: GW surface for 10/99; interval=1 foot  
 - Drawings: 94PLUME1.DXF, 94PLUME2.DXF  
 - Plot file CHLPM.P01 generated 01-27-00 via Geocart  
 - N:\WP51\USERS\J.HUGHES\WMPHS\GEOCHEM\PLUMES



**Figure 5-21**  
 Chloroform Conceptual Model  
 Fluvial Deposits Aquifer  
 AOC A - Northside Fluvial Groundwater  
 RFI Report Addendum  
 NSA Mid-South  
 Millington, TN  
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*NSA Mid-South*  
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It is particularly interesting to compare how the two plumes vary in intensity from chemical to chemical and with depth. The patterns are quite complex. The western plume dominates in the lower part of the fluvial deposits, the eastern one in the middle fluvial deposits, and the western one once again in the lower part of the fluvial deposits. A similar progression is observed for many of the other solvents. The pattern could possibly be an artifact of sampling density variations at the three depths, or may be related to complexly varying local environmental conditions, which could control biodegradation (e.g., dissolved oxygen concentrations, organic carbon).

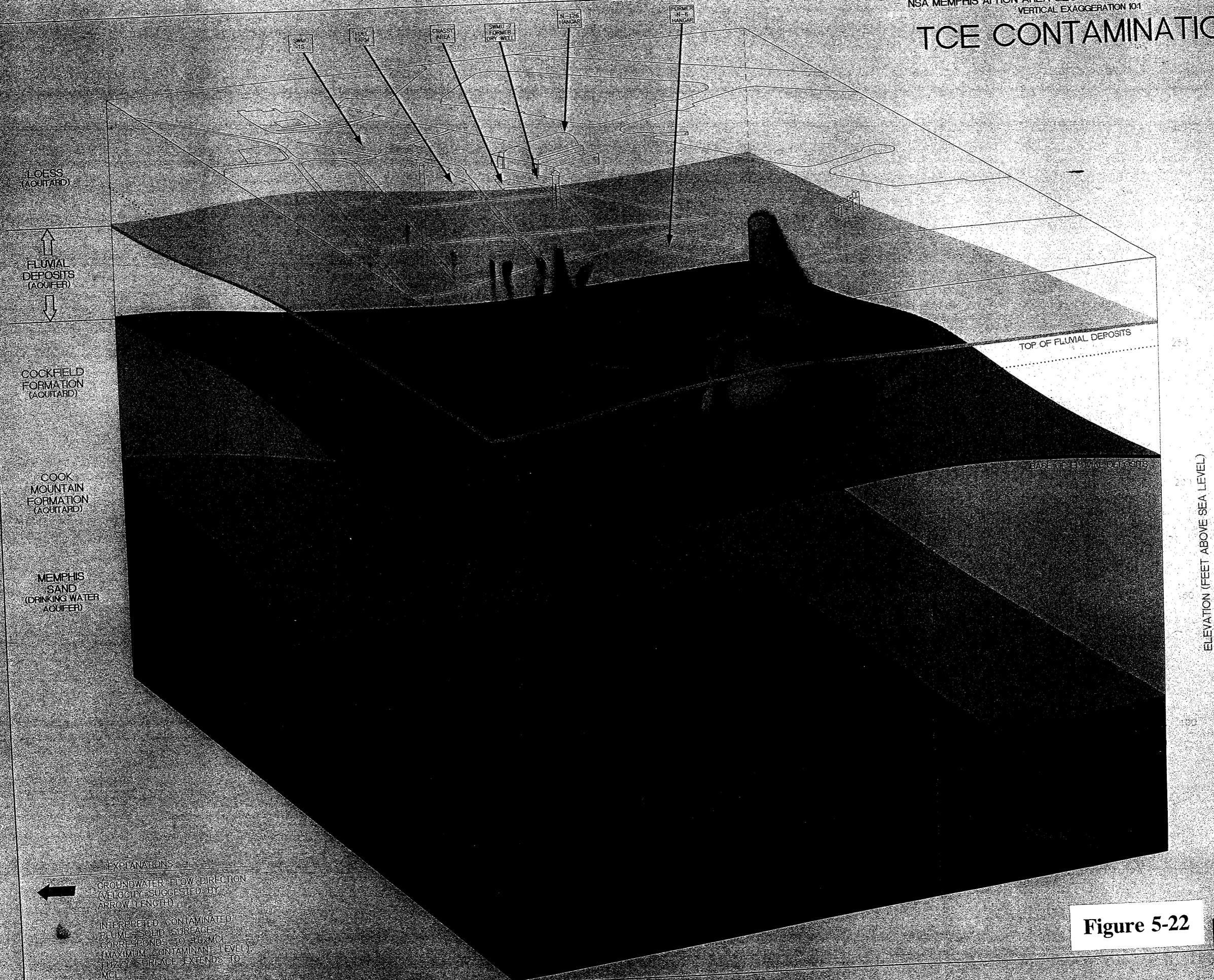
A third source is interpreted on the runway edge to the east, comingling with the N-6 plumes in some areas.

Several weak, isolated spots of daughter products also occur northwest and south of N-6, and probably represent separate minor releases.

- *The water tower (814300E/391850N)* — The unknown source in this area included TCE and carbon tetrachloride, solvents potentially used by a painting contractor several decades ago. Contamination is deep in the fluvial deposits; shallow expressions are not noted, but the sampling is sparse in this area. TCE occurs without daughter products, whereas carbon tetrachloride is accompanied by its daughter, chloroform.
  
- *The N-126 source area (east side)* — This area contains the highest concentration of chlorinated solvents detected at NSA Mid-South. Two sources are postulated: a major release into or leak through the storm drain just east of the building and a leakage of chemicals via the southeast footings of the building. These sources are speculative and are not documented in any historical investigations done to date. TCE dominates the source

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# TCE CONTAMINATION



**EXPLANATIONS**

← GROUNDWATER FLOW DIRECTION (VELOCITY SUGGESTED BY ARROW LENGTH)

● INTERPRETED CONTAMINATED PLUME - SOLID SURFACE CORRESPONDS TO 40 MCL (MAXIMUM CONTAMINANT LEVEL); FUZZY SURFACE EXTENDS TO MCL

**Figure 5-22**

*RFI Report Addendum*  
*NSA Mid-South*  
*AOC A — Northside Fluvial Groundwater*  
*Revision: 0; February 17, 2000*

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chemistry, supplemented by minor PCE (at only one of the sources) and carbon tetrachloride (both sources). PCE/TCE daughters are minimal, but the daughter product of carbon tetrachloride, chloroform, is persistent. Note that the dry well, which raised the initial concerns leading to this investigation, is not postulated as a source.

- ***The N-126 source area (west side)*** — Two releases are postulated: one via the building's southwest footings, the other from the wash rack area south of the building. The wash-rack source is not necessarily from the washing operations, but could result from other causes, such as a storm sewer leak or perhaps a temporary solvent storage area. Neither postulated source is documented, but simply inferred from the data. Source chemicals for both plumes were TCE, PCE, and carbon tetrachloride; again, TCA is not observed, but might have been formerly present.

Contamination is strongest in the lower and middle parts of the fluvial deposits. Chloroform accompanies carbon tetrachloride, as at other areas of this site, but several PCE/TCE daughters (especially 1,2-DCE and 1,1-DCA) are also prevalent, and in the upper parts of the fluvial deposits, they are more common than their parent products. Note that these plumes occur in the fuel farm south of N-126, where reducing conditions exist. A third, narrow plume, located in the center of the fuel farm, shows only traces of TCE and is strongly degraded to 1,2-DCE.

- ***The grassy area south of N-126*** — Given the extensive releases said to have taken place in the small grassy area, the near-absence of contaminants there is remarkable. However, a source is postulated in the parking lot to the east (possibly the bowzers discussed earlier). The release appears to have been mostly TCE, with some carbon tetrachloride and minor PCE (1,1,1-TCA, if released, has completely degraded). The PCE and TCE are in middle

and lower levels of the fluvial deposits, while carbon tetrachloride is in the lower fluvial deposits only. Chloroform is present, but PCE/TCE daughters are absent.

- **Isolated plumes south and west of N-126** — Several small, isolated plumes are interpreted, but with considerable uncertainty. Sampling is more sparse in this area, and contaminant concentrations in most samples are low. Without any observed core of higher concentrations, it seems unlikely that these plumes come from the same source; yet isolated plume drawing is certainly biased by selection effects (where the samples happened to be located). Hence, it is likely that more spots of low contaminant concentrations are present, but not drawn in this model, and that the depictions here are not accurate in details such as size and shapes.

The plumes consist mostly of TCE, with some PCE and minor daughter products; carbon tetrachloride and chloroform are absent. Both upper and lower fluvial contaminants are present.

- **The apron edges** — A significant PCE, TCE, and carbon tetrachloride release apparently occurred in the grass area north of the north apron edge near the center of the study area. Based on the near-absence of PCE/TCE daughters, TCE was probably an original constituent of the release (along with PCE) rather than just a degraded product of PCE. These chemicals might have been used in aircraft engine degreasing, but if so, three separate chemicals (PCE, TCE, and carbon tetrachloride) appear to have been used. There appear to be at least two geochemically distinct sources. Perhaps this site was used for many years during the phasing in and out of these chemicals; however, no records or interviews suggest such a long-term operation in this area. Contamination is strongest in the lower part of the fluvial deposits. Note that daughters of the PCE/TCE/TCA group

are rare, but the carbon tetrachloride daughter, chloroform, is dominant at this location — a familiar pattern in the apron area.

- *The "runway source" along the old road southwest of the octagon* — North of the main runway, near the octagon marking the former taxi and parking area, a line of wells was installed. Many of these wells showed moderate to low levels of contamination. A source of low concentration is postulated in this area because it is the simplest, most straightforward, and geochemically consistent explanation of the data. The primary support for this source is the pattern of detected contaminants; slightly higher concentrations were detected in the transect of wells north and parallel to the runway (maximum TCE concentration of 36  $\mu\text{g/L}$  detected at 007G36LF) compared to upgradient wells south of the runway (8  $\mu\text{g/L}$  TCE detected at 007G54LF). The contaminated wells north of the runway are separated from apron-area sources by a broad, fairly well-sampled "null zone" consistently characterized by low contamination concentrations. While one or two non-detects in the null zone might be attributed to peculiar stratigraphy or an artifact of well screening position, it is unreasonable to assume that all the sampling data there are completely unrepresentative of groundwater contamination. It is worth noting that the null zone is well shown in all solvent species, both parent and daughter. There are several contaminated wells in the null zone, but it is difficult to see how the plumes they represent could result in the pattern of contamination seen along the runway. Fingerprinting shows apron-area plumes to be diverse geochemically, whereas the runway wells are homogeneous. While it is possible to maintain that mixing from apron-area plumes has occurred down gradient, it is simpler to assume that these are geochemically separate sources. Finally, it should be noted that apron-area plumes are typically less than 1,500 feet long, but a length of 5,000 feet would be required if apron-area wells were the source. The latter distance is certainly possible, based on previous calculations, but is not

consistent with other plumes. This is not to say that runway and apron-area plumes have not comingled; in fact, comingling is likely, and is postulated in this model.

Other, apparently minor sources are postulated throughout the area, primarily concentrated south of the apron and along the apron edges.

## **5.4 Possible Implications to Cleanup**

### **5.4.1 Selecting an Appropriate Cleanup Strategy**

If the conceptual model is correct, the contaminant mass is so discontinuously and complexly dispersed that it is no longer a source in the classic sense. This conclusion has two practical ramifications.

First, there may be no large-scale, coherent source to find by normal exploratory means. The sorbed or trapped contaminants would be very hard to identify without microscopic analysis, and the disturbance in drilling, extracting, and transporting core samples would likely alter them from their original state. Further, given the discontinuous nature of the contaminant zones, it would be statistically unlikely that a borehole would encounter trapped globules by chance.

Second, without a coherent source, source extraction by pump-and-treat or any other current technology is not likely a viable remedial option; indeed, even at sites where a true source is identified, this technology is generally ineffective for DNAPL removals (Pankow and Cherry, 1996, p.85, 112; Nelson et al., 1996; Cherry and Mackay, 1993). One could consider pump-and-treat for containing the disseminated plumes, but studies have shown that this approach is ineffective for attaining ARARS (e.g., Ward, 1996; Cherry and Mackay, 1993).

#### **5.4.2 Is Natural Attenuation "Working"?**

This question has three components: (1) is NAT occurring?; (2) is NAT containing the plume migration?; (3) will NAT prevent the plumes from reaching a receptor? While considering these questions, it should be recalled that NAT includes mechanical-dispersive mechanisms (retardation, dispersion) as well as the familiar biological ones.

The data clearly show that NAT is occurring. Daughter products, the direct result of reductive dehalogenation, are present in many areas of the apron, and are prevalent in spots. Key subsurface parameters are moderately favorable to reductive dehalogenation in some areas, though not everywhere (E/A&H, May 16, 1997; Chapelle, 1997).

Whether NAT acts as an effective barrier to plume migration is a more difficult question. Because the average fraction of daughter products at the site is approximately 0.3, biodegradation alone probably cannot remediate the plumes. But nonbiologic NAT processes — retardation (sorption), dispersion, and nonbiologic decay — have been suggested as potentially more effective than biologic processes at this site (Chapelle, 1997). Hence, there is some possibility that NAT could be a viable remedial process.

The method of evaluating NAT's effect on plume migration is to install monitoring wells at the plume's leading edge and monitor the trend in contaminants over time. Unfortunately, this approach is marred by two problems: plumes move slowly with respect to project schedules, and the error in measuring low-concentration contaminants at the leading edge is large. For example, consider the longest part of the runway source plume, which extends approximately 2,000 feet. An off-site detection well shows 5 ppb of TCE; the error of this level of measurement has been shown in other wells to be  $\pm 5$  ppb. In the presence of this level of noise, the plume would have to advance such that the contaminant level rises to approximately 15 ppb (because the 15 ppb level has typical noise greater than  $\pm 5$  ppb). The plume "source" contaminant level is 50 ppb (based

on observed data), that the contaminant level drops exponentially, and that the plume is 40 years old. The plume would have to advance another 2,000 feet before a definitive increase to 15 ppb could be statistically supported in the detection well — a process that would take at least another 40 years. Of course, alternative assumptions could increase or decrease this time interval, but the point is that the process of detecting plume movement could take a long time.

The present data are insufficient to establish whether the plumes are in steady state or not. Noise in the time plots (Figure 5-6) obscures any trends, if present.

It is also important to consider plume migration with respect to receptors. It is not clear at this time what and where receptors might be. It has been suggested (Carmichael et al., 1997) that faults may cut the Cockfield Formation and deeper units near the apron area, possibly providing hydraulic connection between the fluvial deposits and the Memphis Sand. Contaminant and tritium studies suggest that any faults do not channel contaminants or waters to the Cockfield Formation or to the Memphis Sand in the apron area. The CMS will address these important issues.

## **5.5 Conclusions**

With few exceptions, solvent concentrations in the fluvial deposits aquifer are quite low with respect to solubility and do not directly indicate the presence of pooled DNAPL. However, MCLs for several chemicals are exceeded at several mostly small, isolated spots in the apron area. Based on observed concentrations, hydrogeology, and other available data, a chemical conceptual model is proposed. The model theorizes that earlier DNAPL releases have left isolated, microscopic, saturated-phase globules, which are distributed in a spatially complex way within the fluvial deposits — not a pooled DNAPL source in the classic sense. These produce a network of multiple, small, dissolved-phase plumes with complex geometries and varying degrees of mechanical, chemical, and biological degradation acting upon them.

The nature of the model, based upon the latest scientific findings, suggests that active remedial efforts such as pump-and-treat are unlikely to remove the globule sources or reduce the plume concentrations to ARARs. Instead, the goal would be containment. Natural attenuation is occurring, but its effectiveness in halting plume migration is uncertain. Further, making that determination by monitoring wells at the leading edge of the plume(s) may take a long time.

*RFI Report Addendum*  
*NSA Mid-South*  
*AOC A — Northside Fluvial Groundwater*  
*Revision: 0; February 17, 2000*

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## **6.0 CONCLUSIONS AND RECOMMENDATIONS**

The following conclusions and recommendations are based on the additional AOC A RFI data collected between May 1997 and July 1999. This addendum and the original RFI report *Area of Concern (AOC) A — Northside Fluvial Groundwater RFI*, (EnSafe, February 17, 2000) comprise the AOC A RFI for NSA Mid-South Northside Fluvial Groundwater.

- Chlorinated solvents have been identified in the fluvial deposits groundwater beneath a broad area of the NSA Mid-South Northside airfield, beyond the distance predicted in Revision 1 of the RFI report (EnSafe, June 1998).
- PCE, TCE, and carbon tetrachloride concentrations exceeded their MCLs in the fluvial deposits groundwater at the base property boundary, approximately 2,900 feet downgradient from the suspected source areas. However, concentrations attenuate to either below the detection limit or below their respective MCLs in the off-site monitoring wells, approximately 450 feet downgradient of the base's perimeter road.
- Fluvial deposits aquifer characteristics vary significantly across the study area. An additional aquifer pump test conducted since submitting the original RFI report indicated that the hydraulic conductivity in the airfield infield, north of the runway, was an order of magnitude higher than a previously evaluated area southwest of Building N-126.
- No evidence of chlorinated solvents migrating vertically from the fluvial deposits aquifer into the Cockfield Formation was identified during the RFI. Chlorinated solvents were absent in groundwater samples collected from wells screened in the confining unit. The potential for contaminants to migrate through the confining unit into the Memphis aquifer is low, given the low permeability of the Cockfield formation (Shelby tube values ranged

from  $5.5 \times 10^{-5}$  cm/sec to  $1.6 \times 10^{-6}$  cm/sec) and its high organic content (TOC values ranged from 0.2% to 12%).

- Chlorinated solvent concentrations in the fluvial deposits aquifer will be addressed in the AOC A CMS. The aquifer parameters calculated in the airfield infield will be used in the CMS for contaminant transport modeling.

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*RFI Report Addendum*  
*NSA Mid-South*  
*AOC A — Northside Fluvial Groundwater*  
*Revision: 0; February 17, 2000*

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**Appendix A**  
**Analytical Data**

**Groundwater Data from  
Event 4 of Long Term Monitoring (April and May 1997)**

Event 4 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VOA		SAMPLE ID ----->	003-G-04LF-04	005-G-01UF-04	005-G-02UF-04	005-G-03UF-04	005-G-04UF-04	005-G-05LF-04			
		ORIGINAL ID ----->	003G04LF04	005G01UF04	005G02UF04	005G03UF04	005G04UF04	005G05LF04			
		LAB SAMPLE ID ----->	S772088*3	S772088*6	S772088*7	S772088*8	S772088*9	S772562*2			
		ID FROM REPORT --->	003G04LF04	005G01UF04	005G02UF04	005G03UF04	005G04UF04	005G05LF04			
		SAMPLE DATE ----->	04/15/97	04/15/97	04/15/97	04/15/97	04/15/97	05/06/97			
		DATE ANALYZED ---->	04/17/97	04/17/97	04/17/97	04/17/97	04/17/97	05/14/97			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MEM07	VAL	MEM07	VAL	MEM07	VAL	MEM07	VAL	MEM18	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene										
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane										
67-66-3	Chloroform										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride							1.2	J		
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene										
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
108-88-3	Toluene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene										
124-48-1	Dibromochloromethane										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
78-93-3	2-Butanone (MEK)										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
10061-01-5	cis-1,3-Dichloropropene										
10061-02-6	trans-1,3-Dichloropropene										
591-78-6	2-Hexanone										
1330-20-7	Xylene (Total)										
540-59-0	1,2-Dichloroethene (total)										

Event 4 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VOA		SAMPLE ID ----->	007-G-01LF-04	007-G-01UC-04	007-G-01UF-04	007-G-02UC-04	007-G-03LF-04	007-G-03UC-04					
		ORIGINAL ID ----->	007G01LF04	007G01UC04	007G01UF04	007G02UC04	007G03LF04	007G03UC04					
		LAB SAMPLE ID ---->	S772153A*3	S772611*1	S772088*11	S772216*1	S772153A*4	S772282*1					
		ID FROM REPORT -->	007G01LF04	007G01UC04	007G01UF04	007G02UC04	007G03LF04	007G03UC04					
		SAMPLE DATE ----->	04/17/97	05/07/97	04/15/97	04/21/97	04/17/97	04/23/97					
		DATE ANALYZED ---->	04/19/97	05/14/97	04/17/97	04/23/97	04/19/97	04/28/97					
		MATRIX ----->	Water	Water	Water	Water	Water	Water					
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L					
CAS #	Parameter	MEM07	VAL	MEM18	VAL	MEM07	VAL	MEM12	VAL	MEM07	VAL	MEM12	VAL
74-87-3	Chloromethane												
75-01-4	Vinyl chloride												
74-83-9	Bromomethane												
75-00-3	Chloroethane												
75-35-4	1,1-Dichloroethene	6.2				5.9							
75-09-2	Methylene chloride												
75-34-3	1,1-Dichloroethane	4.2	J			24.							
67-66-3	Chloroform	1.5	J					15.					
71-55-6	1,1,1-Trichloroethane												
56-23-5	Carbon tetrachloride	5.7						42.					
71-43-2	Benzene												
107-06-2	1,2-Dichloroethane							9.3					
79-01-6	Trichloroethene	8.4				10.		160.					
78-87-5	1,2-Dichloropropane												
75-27-4	Bromodichloromethane												
108-88-3	Toluene												
79-00-5	1,1,2-Trichloroethane												
127-18-4	Tetrachloroethene					9.1		5.1					
124-48-1	Dibromochloromethane												
108-90-7	Chlorobenzene												
100-41-4	Ethylbenzene												
100-42-5	Styrene												
75-25-2	Bromoform												
79-34-5	1,1,2,2-Tetrachloroethane												
67-64-1	Acetone												
75-15-0	Carbon disulfide												
78-93-3	2-Butanone (MEK)												
108-10-1	4-Methyl-2-Pentanone (MIBK)												
10061-01-5	cis-1,3-Dichloropropene												
10061-02-6	trans-1,3-Dichloropropene												
591-78-6	2-Hexanone												
1330-20-7	Xylene (Total)												
540-59-0	1,2-Dichloroethene (total)	1.8	J			5.6							

Event 4 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SUB46-VQA		SAMPLE ID ----->	007-G-03UF-04	007-G-04LF-04	007-G-04UC-04	007-G-04UF-04	007-G-05LF-04	007-G-05UC-04					
		ORIGINAL ID ----->	007G03UF04	007G04LF04	007G04UC04	007G04UF04	007G05LF04	007G05UC04					
		LAB SAMPLE ID ---->	S772642*2	S772153A*5	S772642*3	S772153A*6	S772129A*2	S772642*4					
		ID FROM REPORT -->	007G03UF04	007G04LF04	007G04UC04	007G04UF04	007G05LF04	007G05UC04					
		SAMPLE DATE ----->	05/08/97	04/17/97	05/08/97	04/17/97	04/16/97	05/08/97					
		DATE ANALYZED -->	05/14/97	04/19/97	05/14/97	04/19/97	04/22/97	05/14/97					
		MATRIX ----->	Water	Water	Water	Water	Water	Water					
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L					
CAS #	Parameter	MEM18	VAL	MEM07	VAL	MEM18	VAL	MEM07	VAL	MEM10	VAL	MEM18	VAL
74-87-3	Chloromethane												
75-01-4	Vinyl chloride												
74-83-9	Bromomethane												
75-00-3	Chloroethane												
75-35-4	1,1-Dichloroethene			7.6									
75-09-2	Methylene chloride												
75-34-3	1,1-Dichloroethane												
67-66-3	Chloroform			2.3	J					3.1	J		
71-55-6	1,1,1-Trichloroethane												
56-23-5	Carbon tetrachloride			11.						6.6			
71-43-2	Benzene					15.						0.99	J
107-06-2	1,2-Dichloroethane									2.9	J		
79-01-6	Trichloroethene			870.	D					28.			
78-87-5	1,2-Dichloropropane												
75-27-4	Bromodichloromethane												
108-88-3	Toluene												
79-00-5	1,1,2-Trichloroethane												
127-18-4	Tetrachloroethene			35.						1.6	J		
124-48-1	Dibromochloromethane												
108-90-7	Chlorobenzene												
100-41-4	Ethylbenzene												
100-42-5	Styrene												
75-25-2	Bromoform												
79-34-5	1,1,2,2-Tetrachloroethane												
67-64-1	Acetone												
75-15-0	Carbon disulfide												
78-93-3	2-Butanone (MEK)												
108-10-1	4-Methyl-2-Pentanone (MIBK)												
10061-01-5	cis-1,3-Dichloropropene												
10061-02-6	trans-1,3-Dichloropropene												
591-78-6	2-Hexanone												
1330-20-7	Xylene (Total)												
540-59-0	1,2-Dichloroethene (total)			1.5	J								

Event 4 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VOA		SAMPLE ID ----->	007-G-05UF-04	007-G-06LF-04	007-G-06UF-04	007-G-07LF-04	007-G-07UF-04	007-G-08LF-04			
		ORIGINAL ID ----->	007G05UF04	007G06LF04	007G06UF04	007G07LF04	007G07UF04	007G08LF04			
		LAB SAMPLE ID ---->	S772088*12	S772153A*7	S772153A*8	S772642*5	S772642*6	S772642*7			
		ID FROM REPORT -->	007G05UF04	007G06LF04	007G06UF04	007G07LF04	007G07UF04	007G08LF04			
		SAMPLE DATE ----->	04/15/97	04/17/97	04/17/97	05/08/97	05/08/97	05/08/97			
		DATE ANALYZED ---->	04/17/97	04/19/97	04/19/97	05/14/97	05/14/97	05/14/97			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MEM07	VAL	MEM07	VAL	MEM07	VAL	MEM18	VAL	MEM18	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene						2.9 J			8.9	
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane									4.7 J	
67-66-3	Chloroform										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride							1. J			
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene			2.1 J				6.7		5.8	
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
108-88-3	Toluene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene			3. J				13.			
124-48-1	Dibromochloromethane										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										
67-64-1	Acetone			46. J				33. J			
75-15-0	Carbon disulfide										
78-93-3	2-Butanone (MEK)										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
10061-01-5	cis-1,3-Dichloropropene										
10061-02-6	trans-1,3-Dichloropropene										
591-78-6	2-Hexanone					1.1 J					
1330-20-7	Xylene (Total)										
540-59-0	1,2-Dichloroethene (total)									1.3 J	

Event 4 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VOA		SAMPLE ID ----->	007-G-08UF-04	007-G-09LF-04	007-G-09UC-04	007-G-09UF-04	007-G-10LF-04	007-G-11LF-04					
		ORIGINAL ID ----->	007G08UF04	007G09LF04	007G09UC04	007G09UF04	007G10LF04	007G11LF04					
		LAB SAMPLE ID ---->	S772642*8	S772129A*3	S772642A*7	S772129A*4	S772642*9	S772129A*5					
		ID FROM REPORT -->	007G08UF04	007G09LF04	007G09UC04	007G09UF04	007G10LF04	007G11LF04					
		SAMPLE DATE ----->	05/08/97	04/16/97	05/08/97	04/16/97	05/08/97	04/16/97					
		DATE ANALYZED ---->	05/15/97	04/22/97	05/18/97	04/22/97	05/18/97	04/22/97					
		MATRIX ----->	Water	Water	Water	Water	Water	Water					
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L					
CAS #	Parameter	MEM18	VAL	MEM10	VAL	MEM22	VAL	MEM10	VAL	MEM18	VAL	MEM10	VAL
74-87-3	Chloromethane												
75-01-4	Vinyl chloride												
74-83-9	Bromomethane												
75-00-3	Chloroethane												
75-35-4	1,1-Dichloroethene					10.							
75-09-2	Methylene chloride					18.							
75-34-3	1,1-Dichloroethane					120.							
67-66-3	Chloroform							5.9				10.	
71-55-6	1,1,1-Trichloroethane					390.							
56-23-5	Carbon tetrachloride							12.				6.	
71-43-2	Benzene												
107-06-2	1,2-Dichloroethane	1.7	J										
79-01-6	Trichloroethene	1.8	J	8.5				16.				93.	
78-87-5	1,2-Dichloropropane												
75-27-4	Bromodichloromethane												
108-88-3	Toluene					300.							
79-00-5	1,1,2-Trichloroethane												
127-18-4	Tetrachloroethene			40.				10.				40.	
124-48-1	Dibromochloromethane												
108-90-7	Chlorobenzene												
100-41-4	Ethylbenzene					30.							
100-42-5	Styrene												
75-25-2	Bromoform												
79-34-5	1,1,2,2-Tetrachloroethane												
67-64-1	Acetone							47.	J				
75-15-0	Carbon disulfide												
78-93-3	2-Butanone (MEK)												
108-10-1	4-Methyl-2-Pentanone (MIBK)												
10061-01-5	cis-1,3-Dichloropropene												
10061-02-6	trans-1,3-Dichloropropene												
591-78-6	2-Hexanone												
1330-20-7	Xylene (Total)					110.	J						
540-59-0	1,2-Dichloroethene (total)			35.		190.	J						

Event 4 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VOA		SAMPLE ID ----->	007-G-12LF-04	007-G-13LF-04	007-G-14LF-04	007-G-15LF-04	007-G-15UF-04	007-G-16LF-04			
		ORIGINAL ID ----->	007G12LF04	007G13LF04	007G3LF04	007G15LF04	007G15UF04	007G16LF04			
		LAB SAMPLE ID ---->	S772642A*1	S772153A*9	S772153A*10	S772129A*6	S772129A*7	S772129A*8			
		ID FROM REPORT -->	007G12LF04	007G13LF04	007G3LF04	007G15LF04	007G15UF04	007G16LF04			
		SAMPLE DATE ----->	05/08/97	04/17/97	04/17/97	04/16/97	04/16/97	04/16/97			
		DATE ANALYZED -->	05/18/97	04/19/97	04/19/97	04/22/97	04/22/97	04/22/97			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MEM22	VAL	MEM07	VAL	MEM07	VAL	MEM10	VAL	MEM10	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene						6.3	380.	D		
75-09-2	Methylene chloride							67.			
75-34-3	1,1-Dichloroethane						7.4	44.		4.3	J
67-66-3	Chloroform										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride						27.	14.		23.	
71-43-2	Benzene							6.6			
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene						12.	600.	D	11.	
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
108-88-3	Toluene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene										
124-48-1	Dibromochloromethane										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
78-93-3	2-Butanone (MEK)										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
10061-01-5	cis-1,3-Dichloropropene										
10061-02-6	trans-1,3-Dichloropropene										
591-78-6	2-Hexanone										
1330-20-7	Xylene (Total)										
540-59-0	1,2-Dichloroethene (total)							20.			

Event 4 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VOA		SAMPLE ID ----->	007-G-17LF-04	007-G-18LF-04	060-G-02LF-04	060-G-04LF-04			
		ORIGINAL ID ----->	007G17LF04	007G18LF04	060G02LF04	060G04LF04			
		LAB SAMPLE ID ---->	S772153A*11	S772190*1	S772642A*4	S772642A*5			
		ID FROM REPORT -->	007G17LF04	007G18LF04	060G02LF04	060G04LF04			
		SAMPLE DATE ----->	04/17/97	04/18/97	05/08/97	05/08/97			
		DATE ANALYZED -->	04/19/97	04/22/97	05/18/97	05/18/97			
		MATRIX ----->	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MEM07	VAL	MEM12	VAL	MEM22	VAL	MEM22	VAL
74-87-3	Chloromethane								
75-01-4	Vinyl chloride								
74-83-9	Bromomethane								
75-00-3	Chloroethane								
75-35-4	1,1-Dichloroethene					4.6	J		
75-09-2	Methylene chloride					17.			
75-34-3	1,1-Dichloroethane					89.			
67-66-3	Chloroform			1.8	J				
71-55-6	1,1,1-Trichloroethane					210.			
56-23-5	Carbon tetrachloride								
71-43-2	Benzene								
107-06-2	1,2-Dichloroethane								
79-01-6	Trichloroethene			8.5					
78-87-5	1,2-Dichloropropane								
75-27-4	Bromodichloromethane								
108-88-3	Toluene					230.			
79-00-5	1,1,2-Trichloroethane								
127-18-4	Tetrachloroethene								
124-48-1	Dibromochloromethane								
108-90-7	Chlorobenzene								
100-41-4	Ethylbenzene					25.			
100-42-5	Styrene								
75-25-2	Bromoform								
79-34-5	1,1,2,2-Tetrachloroethane								
67-64-1	Acetone					150.			
75-15-0	Carbon disulfide								
78-93-3	2-Butanone (MEK)					110.			
108-10-1	4-Methyl-2-Pentanone (MIBK)					21.	J		
10061-01-5	cis-1,3-Dichloropropene								
10061-02-6	trans-1,3-Dichloropropene								
591-78-6	2-Hexanone								
1330-20-7	Xylene (Total)					98.	J		
540-59-0	1,2-Dichloroethene (total)					150.	J		

DATALCP3  
02/11/00

Event 4 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI (Addendum)

Page: 1  
Time: 08:53

SWB46-VOA		SAMPLE ID ----->	015-G-01LF-04	015-G-01UF-04	015-G-02LF-04	015-G-02UF-04	015-G-03LF-04	015-G-03UF-04	
		ORIGINAL ID ----->	015G01LF04	015G01UF04	015G02LF04	015G02UF04	015G03LF04	015G03UF04	
		LAB SAMPLE ID ----->	S776380A*1	S776405A*2	S776405A*3	S776405A*4	S776405A*6	S776380A*3	
		ID FROM REPORT ----->	015G01LF04	015G01UF04	015G02LF04	015G02UF04	015G03LF04	015G03UF04	
		SAMPLE DATE ----->	11/10/97	11/11/97	11/11/97	11/11/97	11/11/97	11/10/97	
		DATE ANALYZED ----->	11/18/97	11/18/97	11/18/97	11/18/97	11/18/97	11/18/97	
		MATRIX ----->	Water	Water	Water	Water	Water	Water	
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	
CAS #	Parameter	MEM35	VAL	MEM35	VAL	MEM35	VAL	MEM35	VAL
74-87-3	Chloromethane								
74-83-9	Bromomethane								
75-01-4	Vinyl chloride								
75-00-3	Chloroethane					1.7	J		
75-35-4	1,1-Dichloroethene								
75-09-2	Methylene chloride								
75-34-3	1,1-Dichloroethane								
67-66-3	Chloroform								
71-55-6	1,1,1-Trichloroethane	1.8	J						
56-23-5	Carbon tetrachloride			3900.	D	3.	J	11.	
71-43-2	Benzene								
107-06-2	1,2-Dichloroethane	7.4				1.6	J		
79-01-6	Trichloroethene								
78-87-5	1,2-Dichloropropane								
75-27-4	Bromodichloromethane								
108-88-3	Toluene								
79-00-5	1,1,2-Trichloroethane	1.5	J						
127-18-4	Tetrachloroethene								
124-48-1	Dibromochloromethane							57.	
108-90-7	Chlorobenzene			21.					
100-41-4	Ethylbenzene								
100-42-5	Styrene								
75-25-2	Bromoform								
79-34-5	1,1,2,2-Tetrachloroethane								
67-64-1	Acetone								
75-15-0	Carbon disulfide								
78-93-3	2-Butanone (MEK)								
108-10-1	4-Methyl-2-Pentanone (MIBK)								
10061-01-5	cis-1,3-Dichloropropene								
10061-02-6	trans-1,3-Dichloropropene								
591-78-6	2-Hexanone							5.1	
1330-20-7	Xylene (Total)								
540-59-0	1,2-Dichloroethene (total)	1.5	J						

Event 4 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI (Addendum)

SW846-VQA	SAMPLE ID ----->	015-G-04LF-04	015-G-04UF-04
	ORIGINAL ID ----->	015G04LF04	015G04UF04
	LAB SAMPLE ID ---->	S776405A*7	S776380A*4
	ID FROM REPORT -->	015G04LF04	015G04UF04
	SAMPLE DATE ----->	11/11/97	11/10/97
	DATE ANALYZED ---->	11/18/97	11/18/97
	MATRIX ----->	Water	Water
	UNITS ----->	UG/L	UG/L

CAS #	Parameter	MEM35	VAL	MEM35	VAL
74-87-3	Chloromethane				
74-83-9	Bromomethane				
75-01-4	Vinyl chloride				
75-00-3	Chloroethane				
75-35-4	1,1-Dichloroethene				
75-09-2	Methylene chloride				
75-34-3	1,1-Dichloroethane				
67-66-3	Chloroform				
71-55-6	1,1,1-Trichloroethane				
56-23-5	Carbon tetrachloride				
71-43-2	Benzene				
107-06-2	1,2-Dichloroethane				
79-01-6	Trichloroethene	1.9	J		
78-87-5	1,2-Dichloropropane				
75-27-4	Bromodichloromethane				
108-88-3	Toluene				
79-00-5	1,1,2-Trichloroethane				
127-18-4	Tetrachloroethene				
124-48-1	Dibromochloromethane				
108-90-7	Chlorobenzene				
100-41-4	Ethylbenzene				
100-42-5	Styrene				
75-25-2	Bromoform				
79-34-5	1,1,2,2-Tetrachloroethane				
67-64-1	Acetone				
75-15-0	Carbon disulfide				
78-93-3	2-Butanone (MEK)				
108-10-1	4-Methyl-2-Pentanone (MIBK)				
10061-01-5	cis-1,3-Dichloropropene				
10061-02-6	trans-1,3-Dichloropropene				
591-78-6	2-Hexanone				
1330-20-7	Xylene (Total)				
540-59-0	1,2-Dichloroethene (total)				

Event 4 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI (Addendum)

SW846-VOA		SAMPLE ID ----->	OBG-G-10UF-04					
		ORIGINAL ID ----->	OBGG10UF04					
		LAB SAMPLE ID ----->	S772560*2					
		ID FROM REPORT -->	OBGG10UF04					
		SAMPLE DATE ----->	05/06/97					
		DATE ANALYZED ----->	05/14/97					
		MATRIX ----->	Water					
		UNITS ----->	UG/L					
CAS #	Parameter	MEM20	VAL					
74-87-3	Chloromethane							
74-83-9	Bromomethane							
75-01-4	Vinyl chloride							
75-00-3	Chloroethane							
75-09-2	Methylene chloride							
67-64-1	Acetone							
75-15-0	Carbon disulfide							
75-35-4	1,1-Dichloroethene							
75-34-3	1,1-Dichloroethane							
540-59-0	1,2-Dichloroethene (total)							
67-66-3	Chloroform							
107-06-2	1,2-Dichloroethane							
78-93-3	2-Butanone (MEK)							
71-55-6	1,1,1-Trichloroethane							
56-23-5	Carbon tetrachloride							
75-27-4	Bromodichloromethane							
78-87-5	1,2-Dichloropropane							
10061-01-5	cis-1,3-Dichloropropene							
79-01-6	Trichloroethene							
124-48-1	Dibromochloromethane							
79-00-5	1,1,2-Trichloroethane							
71-43-2	Benzene							
10061-02-6	trans-1,3-Dichloropropene							
75-25-2	Bromoform							
108-10-1	4-Methyl-2-Pentanone (MIBK)							
591-78-6	2-Hexanone							
127-18-4	Tetrachloroethene							
79-34-5	1,1,2,2-Tetrachloroethane							
108-88-3	Toluene							
108-90-7	Chlorobenzene							
100-41-4	Ethylbenzene							
100-42-5	Styrene							
1330-20-7	Xylene (Total)							

**Groundwater Data from  
Event 5 of Long Term Monitoring (November 1997)**

Event 5 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VQA		SAMPLE ID ----->	003-G-04LF-05	005-G-01UF-05	005-G-02UF-05	005-G-03UF-05	005-G-04UF-05	005-G-05LF-05			
		ORIGINAL ID ----->	003G04LF05	005G01UF05	005G02UF05	005G03UF05	005G04UF05	005G05LF05			
		LAB SAMPLE ID ---->	S776405*3	S776275*6	S776275*7	S776296*6	S776296*7	S776275*3			
		ID FROM REPORT -->	003G04LF05	005G01UF05	005G02UF05	005G03UF05	005G04UF05	005G05LF05			
		SAMPLE DATE ----->	11/11/97	11/04/97	11/04/97	11/05/97	11/05/97	11/04/97			
		DATE ANALYZED ---->	11/17/97	11/06/97	11/06/97	11/07/97	11/07/97	11/06/97			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MEM34	VAL	MEM32	VAL	MEM32	VAL	MEM32	VAL	MEM32	VAL
74-87-3	Chloromethane										
74-83-9	Bromomethane										
75-01-4	Vinyl chloride										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene										
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane										
67-66-3	Chloroform										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride							3.	J		
71-43-2	Benzene	1.8	J								
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene										
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
108-88-3	Toluene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene										
124-48-1	Dibromochloromethane										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
78-93-3	2-Butanone (MEK)										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
10061-01-5	cis-1,3-Dichloropropene										
10061-02-6	trans-1,3-Dichloropropene										
591-78-6	2-Hexanone										
1330-20-7	Xylene (Total)										
540-59-0	1,2-Dichloroethene (total)										

Event 5 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VOA		SAMPLE ID ----->	007-G-01LF-05	007-G-01UC-05	007-G-01UF-05	007-G-02UC-05	007-G-03LF-05	007-G-03UC-05			
		ORIGINAL ID ----->	007G01LF05	007G01UC05	007G01UF05	007G02UC05	007G03LF05	007G03UC05			
		LAB SAMPLE ID ---->	S776328*1	S776328*7	S776328*8	S776328*9	S776380*1	S776296*8			
		ID FROM REPORT -->	007G01LF05	007G01UC05	007G01UF05	007G02UC05	007G03LF05	007G03UC05			
		SAMPLE DATE ----->	11/06/97	11/06/97	11/06/97	11/06/97	11/10/97	11/05/97			
		DATE ANALYZED --->	11/07/97	11/07/97	11/07/97	11/07/97	11/17/97	11/07/97			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MEM33	VAL	MEM33	VAL	MEM33	VAL	MEM34	VAL	MEM32	VAL
74-87-3	Chloromethane										
74-83-9	Bromomethane										
75-01-4	Vinyl chloride										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene	6.9				5.					
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane	4.5	J			24.					
67-66-3	Chloroform	1.1	J					14.			
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride	3.4	J					28.			
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane							14.			
79-01-6	Trichloroethene	9.6				8.6		170.			
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
108-88-3	Toluene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene					8.8		10.			
124-48-1	Dibromochloromethane										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
78-93-3	2-Butanone (MEK)										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
10061-01-5	cis-1,3-Dichloropropene										
10061-02-6	trans-1,3-Dichloropropene										
591-78-6	2-Hexanone										
1330-20-7	Xylene (Total)										
540-59-0	1,2-Dichloroethene (total)	1.9	J			5.8					

Event 5 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VOA		SAMPLE ID ----->	007-G-03UF-05	007-G-04LF-05	007-G-04UC-05	007-G-04UF-05	007-G-05LF-05	007-G-05UC-05					
		ORIGINAL ID ----->	007G03UF05	007G04LF05	007G04UC05	007G04UF05	007G05LF05	007G05UC05					
		LAB SAMPLE ID ---->	S776296*9	S776380*2	S776362A*3	S776328*10	S776362A*1	S776362*8					
		ID FROM REPORT -->	007G03UF05	007G04LF05	007G04UC05	007G04UF05	007G05LF05	007G05UC05					
		SAMPLE DATE ----->	11/05/97	11/10/97	11/07/97	11/06/97	11/07/97	11/07/97					
		DATE ANALYZED ---->	11/07/97	11/17/97	11/10/97	11/07/97	11/10/97	11/10/97					
		MATRIX ----->	Water	Water	Water	Water	Water	Water					
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L					
CAS #	Parameter	MEM32	VAL	MEM34	VAL	MEM33	VAL	MEM33	VAL	MEM33	VAL	MEM34	VAL
74-87-3	Chloromethane												
74-83-9	Bromomethane												
75-01-4	Vinyl chloride												
75-00-3	Chloroethane												
75-35-4	1,1-Dichloroethene			7.7									
75-09-2	Methylene chloride												
75-34-3	1,1-Dichloroethane												
67-66-3	Chloroform			1.8	J			3.1	J				
71-55-6	1,1,1-Trichloroethane												
56-23-5	Carbon tetrachloride							5.8					
71-43-2	Benzene												
107-06-2	1,2-Dichloroethane							2.	J				
79-01-6	Trichloroethene			1400.	D			25.					
78-87-5	1,2-Dichloropropane												
75-27-4	Bromodichloromethane												
108-88-3	Toluene												
79-00-5	1,1,2-Trichloroethane												
127-18-4	Tetrachloroethene			44.									
124-48-1	Dibromochloromethane												
108-90-7	Chlorobenzene												
100-41-4	Ethylbenzene												
100-42-5	Styrene												
75-25-2	Bromoform												
79-34-5	1,1,2,2-Tetrachloroethane												
67-64-1	Acetone												
75-15-0	Carbon disulfide												
78-93-3	2-Butanone (MEK)												
108-10-1	4-Methyl-2-Pentanone (MIBK)												
10061-01-5	cis-1,3-Dichloropropene												
10061-02-6	trans-1,3-Dichloropropene												
591-78-6	2-Hexanone												
1330-20-7	Xylene (Total)												
540-59-0	1,2-Dichloroethene (total)			2.	J								

Event 5 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VDA		SAMPLE ID ----->	007-G-05UF-05	007-G-06LF-05	007-G-06UF-05	007-G-07LF-05	007-G-07UF-05	007-G-08LF-05			
		ORIGINAL ID ----->	007G05UF05	007G06LF05	007G06UF05	007G07LF05	007G07UF05	007G08LF05			
		LAB SAMPLE ID ---->	S776328*18	S776362A*2	S776328*11	S776328*12	S776328*13	S776481B*3			
		ID FROM REPORT -->	007G05UF05	007G06LF05	007G06UF05	007G07LF05	007G07UF05	007G08LF05			
		SAMPLE DATE ----->	11/06/97	11/07/97	11/06/97	11/06/97	11/06/97	11/14/97			
		DATE ANALYZED ---->	11/10/97	11/10/97	11/07/97	11/07/97	11/07/97	11/23/97			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MEM33	VAL	MEM33	VAL	MEM33	VAL	MEM33	VAL	MEM39	VAL
74-87-3	Chloromethane										
74-83-9	Bromomethane										
75-01-4	Vinyl chloride										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene					2.4	J				
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane										
67-66-3	Chloroform										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride					1.2	J				
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane									1.5	J
79-01-6	Trichloroethene			2.4	J	8.9					
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
108-88-3	Toluene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene			7.3		18.					
124-48-1	Dibromochloromethane										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
78-93-3	2-Butanone (MEK)										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
10061-01-5	cis-1,3-Dichloropropene										
10061-02-6	trans-1,3-Dichloropropene										
591-78-6	2-Hexanone										
1330-20-7	Xylene (Total)										
540-59-0	1,2-Dichloroethene (total)					0.98	J				

Event 5 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VOA		SAMPLE ID ----->	007-G-08UF-05	007-G-09LF-05	007-G-09UC-05	007-G-09UF-05	007-G-10LF-05	007-G-11LF-05			
		ORIGINAL ID ----->	007G08UF05	007G09LF05	007G09UC05	007G09UF05	007G10LF05	007G11LF05			
		LAB SAMPLE ID ---->	S776362A*4	S776362*2	S776380*6	S776362*9	S776362*10	S776362*3			
		ID FROM REPORT -->	007G08UF05	007G09LF05	007G09UC05	007G09UF05	007G10LF05	007G11LF05			
		SAMPLE DATE ----->	11/07/97	11/07/97	11/10/97	11/07/97	11/07/97	11/07/97			
		DATE ANALYZED ---->	11/10/97	11/10/97	11/18/97	11/10/97	11/10/97	11/10/97			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MEM33	VAL	MEM34	VAL	MEM34	VAL	MEM34	VAL	MEM34	VAL
74-87-3	Chloromethane										
74-83-9	Bromomethane										
75-01-4	Vinyl chloride										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene										
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane										
67-66-3	Chloroform							8.5		10.	
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride							14.		6.4	
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane		2.1 J								
79-01-6	Trichloroethene		1.3 J					45.		340.	
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
108-88-3	Toluene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene			14.				21.		150.	
124-48-1	Dibromochloromethane										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
78-93-3	2-Butanone (MEK)										
108-10-1	4-Methyl-2-Pentanone (MIBK)			120.							
10061-01-5	cis-1,3-Dichloropropene										
10061-02-6	trans-1,3-Dichloropropene										
591-78-6	2-Hexanone										
1330-20-7	Xylene (Total)										
540-59-0	1,2-Dichloroethene (total)			15.						2.8 J	

Event 5 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VQA		SAMPLE ID ----->	007-G-12LF-05	007-G-13LF-05	007-G-14LF-05	007-G-15LF-05	007-G-15UF-05	007-G-16LF-05			
		ORIGINAL ID ----->	007G12LF05	007G13LF05	007G14LF05	007G15LF05	007G15UF05	007G16LF05			
		LAB SAMPLE ID ---->	S776380*7	S776405*1	S776328*2	S776362*4	S776380*3	S776362*5			
		ID FROM REPORT -->	007G12LF05	007G13LF05	007G14LF05	007G15LF05	007G15UF05	007G16LF05			
		SAMPLE DATE ----->	11/10/97	11/11/97	11/06/97	11/07/97	11/10/97	11/07/97			
		DATE ANALYZED ---->	11/18/97	11/17/97	11/07/97	11/10/97	11/20/97	11/10/97			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MEM34	VAL	MEM34	VAL	MEM33	VAL	MEM34	VAL	MEM34	VAL
74-87-3	Chloromethane										
74-83-9	Bromomethane										
75-01-4	Vinyl chloride										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene							320.			
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane							51.			
67-66-3	Chloroform						2.7 J	30.		6.1	
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride						2.8 J	9.8		37.	
71-43-2	Benzene							4.6 J			
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene						12.	580. D		15.	
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
108-88-3	Toluene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene						1.1 J	0.8 J			
124-48-1	Dibromochloromethane										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										
67-64-1	Acetone							93.			
75-15-0	Carbon disulfide										
78-93-3	2-Butanone (MEK)										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
10061-01-5	cis-1,3-Dichloropropene										
10061-02-6	trans-1,3-Dichloropropene										
591-78-6	2-Hexanone										
1330-20-7	Xylene (Total)										
540-59-0	1,2-Dichloroethene (total)							18.			

Event 5 of Long Term Monitoring  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VOA		SAMPLE ID ----->	007-G-17LF-05	007-G-18LF-05	007-G-19MF-05	060-G-02LF-05	060-G-04LF-05				
		ORIGINAL ID ----->	007G17LF05	007G18LF05	007G19MF05	060G02LF05	060G04LF05				
		LAB SAMPLE ID ---->	S776328*3	S776362*6	S776481B*1	S776328*16	S776296*10				
		ID FROM REPORT -->	007G17LF05	007G18LF05	007G19MF05	060G02LF05	060G04LF05				
		SAMPLE DATE ----->	11/06/97	11/07/97	11/14/97	11/06/97	11/05/97				
		DATE ANALYZED --->	11/07/97	11/10/97	11/23/97	11/08/97	11/07/97				
		MATRIX ----->	Water	Water	Water	Water	Water				
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L				
CAS #	Parameter	MEM33	VAL	MEM34	VAL	MEM39	VAL	MEM33	VAL	MEM32	VAL
74-87-3	Chloromethane										
74-83-9	Bromomethane										
75-01-4	Vinyl chloride										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene			5.3							
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane			2.2	J						
67-66-3	Chloroform			7.8							
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride			27.							
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene			10.							
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
108-88-3	Toluene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene										
124-48-1	Dibromochloromethane										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
78-93-3	2-Butanone (MEK)										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
10061-01-5	cis-1,3-Dichloropropene										
10061-02-6	trans-1,3-Dichloropropene										
591-78-6	2-Hexanone										
1330-20-7	Xylene (Total)										
540-59-0	1,2-Dichloroethene (total)										

**Groundwater Data from  
Third Well Construction Phase  
(August and September 1998)**

Third Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum  
(includes diffusion pilot study samp.)

SW846-VOA		SAMPLE ID ----->	007-G-01UF-DF	007-G-04LF-5A	007-G-04LF-DF	007-G-04UF-5A	007-G-05LF-DF	007-G-10LF-5A					
		ORIGINAL ID ----->	007G01UFD	007G04LF5A	007G04LDF	007G04UF5A	007G05LDF	007G10LF5A					
		LAB SAMPLE ID ----->	S885886*1	S885010*2	S885886*3	S885010*3	S885886*2	S885010*4					
		ID FROM REPORT ----->	007G01UFD	007G04LF5A	007G04LDF	007G04UF5A	007G05LDF	007G10LF5A					
		SAMPLE DATE ----->	09/28/98	08/19/98	09/28/98	08/19/98	09/28/98	08/19/98					
		DATE ANALYZED ----->	10/05/98	08/23/98	10/05/98	08/23/98	10/05/98	08/23/98					
		MATRIX ----->	Water	Water	Water	Water	Water	Water					
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L					
CAS #	Parameter	MEM64	VAL	MEM59	VAL	MEM64	VAL	MEM59	VAL	MEM64	VAL	MEM59	VAL
74-87-3	Chloromethane												
74-83-9	Bromomethane												
75-01-4	Vinyl chloride												
75-00-3	Chloroethane												
75-35-4	1,1-Dichloroethene	8.		14.		0.96	J						
75-09-2	Methylene chloride												
75-34-3	1,1-Dichloroethane	29.											
67-66-3	Chloroform			2.8	J	5.				2.3	J	6.	
71-55-6	1,1,1-Trichloroethane												
56-23-5	Carbon tetrachloride			3.6	J	32.				4.3	J	7.2	
71-43-2	Benzene												
107-06-2	1,2-Dichloroethane									1.	J		
79-01-6	Trichloroethene	7.3		3300.	D	180.	D	3.4	J	24.		20.	
78-87-5	1,2-Dichloropropane	0.93	J										
75-27-4	Bromodichloromethane												
108-88-3	Toluene												
79-00-5	1,1,2-Trichloroethane												
127-18-4	Tetrachloroethene	2.3	J	24.		3.6	J			1.2	J	12.	
124-48-1	Dibromochloromethane												
108-90-7	Chlorobenzene												
100-41-4	Ethylbenzene												
100-42-5	Styrene												
75-25-2	Bromoform												
79-34-5	1,1,2,2-Tetrachloroethane												
67-64-1	Acetone												
75-15-0	Carbon disulfide												
78-93-3	2-Butanone (MEK)												
108-10-1	4-Methyl-2-Pentanone (MIBK)												
10061-01-5	cis-1,3-Dichloropropene												
10061-02-6	trans-1,3-Dichloropropene												
591-78-6	2-Hexanone												
1330-20-7	Xylene (Total)												
540-59-0	1,2-Dichloroethene (total)	6.4		3.1	J								

Third Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum  
(includes diffusion pilot study samp.)

SW846-VOA		SAMPLE ID ----->	007-G-11LF-5A	007-G-12LF-5A	007-G-15LF-5A	007-G-15UF-5A	007-G-20LF-5A	007-G-21LF-5A					
		ORIGINAL ID ----->	007G11LF5A	007G12LF5A	007G15LF5A	007G15UF5A	007G20LF5A	007G21LF5A					
		LAB SAMPLE ID ---->	S885010*5	S885120*3	S885010*6	S885010*7	S885090*3	S885120*4					
		ID FROM REPORT -->	007G11LF5A	007G12LF5A	007G15LF5A	007G15UF5A	007G20LF5A	007G21LF5A					
		SAMPLE DATE ----->	08/19/98	08/25/98	08/19/98	08/19/98	08/21/98	08/24/98					
		DATE ANALYZED -->	08/23/98	09/04/98	08/24/98	08/24/98	08/28/98	09/04/98					
		MATRIX ----->	Water	Water	Water	Water	Water	Water					
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L					
CAS #	Parameter	MEM59	VAL	MEM61	VAL	MEM59	VAL	MEM59	VAL	MEM59	VAL	MEM61	VAL
74-87-3	Chloromethane												
74-83-9	Bromomethane												
75-01-4	Vinyl chloride												
75-00-3	Chloroethane												
75-35-4	1,1-Dichloroethene					3.9	J	320.	D				
75-09-2	Methylene chloride							64.					
75-34-3	1,1-Dichloroethane							17.					
67-66-3	Chloroform	9.4				5.6							
71-55-6	1,1,1-Trichloroethane												
56-23-5	Carbon tetrachloride	4.	J			15.		4.3	J				
71-43-2	Benzene							4.6	J				
107-06-2	1,2-Dichloroethane												
79-01-6	Trichloroethene	130.				6.5		580.	D			13.	
78-87-5	1,2-Dichloropropane												
75-27-4	Bromodichloromethane												
108-88-3	Toluene												
79-00-5	1,1,2-Trichloroethane												
127-18-4	Tetrachloroethene	54.						0.58	J			4.1	J
124-48-1	Dibromochloromethane												
108-90-7	Chlorobenzene												
100-41-4	Ethylbenzene												
100-42-5	Styrene												
75-25-2	Bromoform												
79-34-5	1,1,2,2-Tetrachloroethane												
67-64-1	Acetone												
75-15-0	Carbon disulfide												
78-93-3	2-Butanone (MEK)												
108-10-1	4-Methyl-2-Pentanone (MIBK)												
10061-01-5	cis-1,3-Dichloropropene												
10061-02-6	trans-1,3-Dichloropropene												
591-78-6	2-Hexanone												
1330-20-7	Xylene (Total)												
540-59-0	1,2-Dichloroethene (total)							19.					

Third Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum  
(includes diffusion pilot study samp.)

SW846-VOA		SAMPLE ID ----->	007-G-22LF-5A	007-G-22UC-5A	007-G-23LF-5A	007-G-24MF-5A	007-G-25MF-5A	007-G-26MF-5A			
		ORIGINAL ID ----->	007G22LF5A	007G22UC5A	007G23LF5A	007G24MF5A	007G25MF5A	007G26MF5A			
		LAB SAMPLE ID ---->	S885120*5	S885120*6	S885120*7	S885090*4	S885090*5	S885090*6			
		ID FROM REPORT -->	007G22LF5A	007G22UC5A	007G23LF5A	007G24MF5A	007G25MF5A	007G26MF5A			
		SAMPLE DATE ----->	08/24/98	08/24/98	08/25/98	08/21/98	08/20/98	08/20/98			
		DATE ANALYZED ---->	09/04/98	09/04/98	09/05/98	08/28/98	08/28/98	08/28/98			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MEM61	VAL	MEM61	VAL	MEM61	VAL	MEM59	VAL	MEM59	VAL
74-87-3	Chloromethane										
74-83-9	Bromomethane										
75-01-4	Vinyl chloride										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene							2.9	J		
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane							2.	J		
67-66-3	Chloroform	9.5									
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride	11.				30.					
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene	12.				30.		18.		1.8	J
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
108-88-3	Toluene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene	13.									
124-48-1	Dibromochloromethane										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
78-93-3	2-Butanone (MEK)										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
10061-01-5	cis-1,3-Dichloropropene										
10061-02-6	trans-1,3-Dichloropropene										
591-78-6	2-Hexanone										
1330-20-7	Xylene (Total)										
540-59-0	1,2-Dichloroethene (total)										

Third Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum  
(includes diffusion pilot study samp.)

SW846-VOA		SAMPLE ID ----->	007-G-27LF-5A	007-G-28LF-5A	007-G-29LF-5A	007-G-30LF-5A	N12-G-01LF-5A	N12-G-02LF-5A			
		ORIGINAL ID ----->	007G27LF5A	007G28LF5A	007G29LF5A	007G30LF5A	N12G01LF5A	N12G02LF5A			
		LAB SAMPLE ID ---->	S885010*8	S885010*9	S885010*10	S885010*11	S885120*9	S885090*8			
		ID FROM REPORT -->	007G27LF5A	007G28LF5A	007G29LF5A	007G30LF5A	N12G01LF5A	N12G02LF5A			
		SAMPLE DATE ----->	08/19/98	08/19/98	08/19/98	08/19/98	08/25/98	08/20/98			
		DATE ANALYZED -->	08/24/98	08/25/98	08/24/98	08/24/98	09/05/98	08/28/98			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MEM59	VAL	MEM59	VAL	MEM59	VAL	MEM61	VAL	MEM59	VAL
74-87-3	Chloromethane										
74-83-9	Bromomethane										
75-01-4	Vinyl chloride										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene						1.9	J			
75-09-2	Methylene chloride									2.2	J
75-34-3	1,1-Dichloroethane						7.5				
67-66-3	Chloroform			6.2							
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride			2.	J		7.1			0.82	J
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene			35.			28.			9.4	
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
108-88-3	Toluene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene			17.	J		6.4			1.8	J
124-48-1	Dibromochloromethane										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
78-93-3	2-Butanone (MEK)										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
10061-01-5	cis-1,3-Dichloropropene										
10061-02-6	trans-1,3-Dichloropropene										
591-78-6	2-Hexanone										
1330-20-7	Xylene (Total)										
540-59-0	1,2-Dichloroethene (total)						2.8	J		12.	

**Groundwater Data from  
Fourth Well Construction Phase (November 1998)**

DATALCP3  
02/11/00

Fourth Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum

Page: 1  
Time: 09:27

8260-V0A		SAMPLE ID ----->	007-G-04LF-5B	007-G-10LF-5B	007-G-11LF-5B	007-G-12LF-5B	007-G-20LF-5B	007-G-21LF-5B			
		ORIGINAL ID ----->	007G04LF5B	007G10LF5B	007G11LF5B	007G12LF5B	007G20LF5B	007G21LF5B			
		LAB SAMPLE ID ----->	11229806	11199815	11199814	11199819	11219806	11229846			
		ID FROM REPORT ----->	007G04LF5B	007G10LF5B	007G11LF5B	007G12LF5B	007G20LF5B	007G21LF5B			
		SAMPLE DATE ----->	11/22/98	11/18/98	11/18/98	11/19/98	11/21/98	11/20/98			
		DATE ANALYZED ----->	11/22/98	11/19/98	11/19/98	11/20/98	11/21/98	11/24/98			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL
75-71-8	Dichlorodifluoromethane										
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-69-4	Trichlorofluoromethane										
75-35-4	1,1-Dichloroethene										
75-09-2	Methylene chloride										
156-60-5	trans-1,2-Dichloroethene										
75-34-3	1,1-Dichloroethane										
594-20-7	2,2-Dichloropropane										
156-59-2	cis-1,2-Dichloroethene										
67-66-3	Chloroform			4.	J	7.	J				
74-97-5	Chlorobromomethane										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride			9.	J	4.	J				
563-58-6	1,1-Dichloropropene										
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene	3300.	J	10.	J	11.	J		25.	J	
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
74-95-3	Dibromomethane										
10061-01-5	cis-1,3-Dichloropropene										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene			7.	J	4.	J		9.	J	
142-28-9	1,3-Dichloropropane										
124-48-1	Dibromochloromethane										
106-93-4	1,2-Dibromoethane										
108-90-7	Chlorobenzene										
630-20-6	1,1,1,2-Tetrachloroethane										
100-41-4	Ethylbenzene										
95-47-6	o-Xylene										
100-42-5	Styrene										
75-25-2	Bromoform										

Fourth Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-04LF-5B	007-G-10LF-5B	007-G-11LF-5B	007-G-12LF-5B	007-G-20LF-5B	007-G-21LF-5B			
		ORIGINAL ID ----->	007G04LF5B	007G10LF5B	007G11LF5B	007G12LF5B	007G20LF5B	007G21LF5B			
		LAB SAMPLE ID ---->	11229806	11199815	11199814	11199819	11219806	11229846			
		ID FROM REPORT -->	007G04LF5B	007G10LF5B	007G11LF5B	007G12LF5B	007G20LF5B	007G21LF5B			
		SAMPLE DATE ----->	11/22/98	11/18/98	11/18/98	11/19/98	11/21/98	11/20/98			
		DATE ANALYZED ---->	11/22/98	11/19/98	11/19/98	11/20/98	11/21/98	11/24/98			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL
98-82-8	Benzene, 1-methylethyl-										
79-34-5	1,1,2,2-Tetrachloroethane										
108-86-1	Bromobenzene										
103-65-1	n-Propylbenzene										
95-49-8	2-Chlorotoluene										
108-67-8	Benzene, 1,3,5-trimethyl-										
106-43-4	4-Chlorotoluene										
98-06-6	tert-Butylbenzene										
95-63-6	Benzene, 1,2,4-trimethyl										
135-98-8	sec-Butylbenzene										
99-87-6	p-Isopropyltoluene										
541-73-1	1,3-Dichlorobenzene										
106-46-7	1,4-Dichlorobenzene										
104-51-8	n-Butylbenzene										
95-50-1	1,2-Dichlorobenzene										
96-12-8	1,2-Dibromo-3-Chloropropane										
120-82-1	1,2,4-Trichlorobenzene										
87-68-3	Hexachlorobutadiene										
91-20-3	Naphthalene										
87-61-6	1,2,3-Trichlorobenzene										
9999900-05-0	m+p Xylene										
96-18-4	1,2,3-Trichloropropane										

Fourth Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-22LF-5B	007-G-23LF-5B	007-G-24MF-5B	007-G-25MF-5B	007-G-26MF-5B	007-G-28LF-5B			
		ORIGINAL ID ----->	007G22LF5B	007G23LF5B	007G24MF5B	007G25MF5B	007G26MF5B	007G28LF5B			
		LAB SAMPLE ID ---->	11209811	11199818	11199817	11199809	11199816	11199810			
		ID FROM REPORT -->	007G22LF5B	007G23LF5B	007G24MF5B	007G25MF5B	007G26MF5B	007G28LF5B			
		SAMPLE DATE ----->	11/19/98	11/19/98	11/19/98	11/18/98	11/19/98	11/18/98			
		DATE ANALYZED -->	11/20/98	11/20/98	11/20/98	11/19/98	11/19/98	11/19/98			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL
75-71-8	Dichlorodifluoromethane										
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-69-4	Trichlorofluoromethane										
75-35-4	1,1-Dichloroethene					2.	J				
75-09-2	Methylene chloride										
156-60-5	trans-1,2-Dichloroethene										
75-34-3	1,1-Dichloroethane										
594-20-7	2,2-Dichloropropane										
156-59-2	cis-1,2-Dichloroethene										
67-66-3	Chloroform	6.	J	3.	J			5.	J		
74-97-5	Chlorobromomethane										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride	16.	J	18.	J			3.	J		
563-58-6	1,1-Dichloropropene										
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene	9.	J	23.	J	13.	J	4.	J	24.	J
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
74-95-3	Dibromomethane										
10061-01-5	cis-1,3-Dichloropropene										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene	12.	J							11.	J
142-28-9	1,3-Dichloropropane										
124-48-1	Dibromochloromethane										
106-93-4	1,2-Dibromoethane										
108-90-7	Chlorobenzene										
630-20-6	1,1,1,2-Tetrachloroethane										
100-41-4	Ethylbenzene										
95-47-6	o-Xylene										
100-42-5	Styrene										
75-25-2	Bromoform										

Fourth Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-22LF-5B	007-G-23LF-5B	007-G-24MF-5B	007-G-25MF-5B	007-G-26MF-5B	007-G-28LF-5B			
		ORIGINAL ID ----->	007G22LF5B	007G23LF5B	007G24MF5B	007G25MF5B	007G26MF5B	007G28LF5B			
		LAB SAMPLE ID ---->	11209811	11199818	11199817	11199809	11199816	11199810			
		ID FROM REPORT -->	007G22LF5B	007G23LF5B	007G24MF5B	007G25MF5B	007G26MF5B	007G28LF5B			
		SAMPLE DATE ----->	11/19/98	11/19/98	11/19/98	11/18/98	11/19/98	11/18/98			
		DATE ANALYZED ---->	11/20/98	11/20/98	11/20/98	11/19/98	11/19/98	11/19/98			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL
98-82-8	Benzene, 1-methylethyl-										
79-34-5	1,1,2,2-Tetrachloroethane										
108-86-1	Bromobenzene										
103-65-1	n-Propylbenzene										
95-49-8	2-Chlorotoluene										
108-67-8	Benzene, 1,3,5-trimethyl-										
106-43-4	4-Chlorotoluene										
98-06-6	tert-Butylbenzene										
95-63-6	Benzene, 1,2,4-trimethyl										
135-98-8	sec-Butylbenzene										
99-87-6	p-Isopropyltoluene										
541-73-1	1,3-Dichlorobenzene										
106-46-7	1,4-Dichlorobenzene										
104-51-8	n-Butylbenzene										
95-50-1	1,2-Dichlorobenzene										
96-12-8	1,2-Dibromo-3-Chloropropane										
120-82-1	1,2,4-Trichlorobenzene										
87-68-3	Hexachlorobutadiene										
91-20-3	Naphthalene										
87-61-6	1,2,3-Trichlorobenzene										
9999900-05-0	m+p Xylene										
96-18-4	1,2,3-Trichloropropane										

Fourth Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-29LF-5B	007-G-30LF-5B	007-G-31LF-5B	007-G-32LF-5B	007-G-32LF-5C	007-G-33LF-5B			
		ORIGINAL ID ----->	007G29LF5B	007G30LF5B	007G31LF5B	007G32LF5B	007G32LF5C	007G33LF5B			
		LAB SAMPLE ID ---->	11199808	11199811	11209804	11209806	11249812	11209807			
		ID FROM REPORT -->	007G29LF5B	007G30LF5B	007G31LF5B	007G32LF5B	007G32LF5C	007G33LF5B			
		SAMPLE DATE ----->	11/18/98	11/18/98	11/20/98	11/20/98	11/24/98	11/20/98			
		DATE ANALYZED -->	11/19/98	11/19/98	11/20/98	11/20/98	11/24/98	11/20/98			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL
75-71-8	Dichlorodifluoromethane										
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-69-4	Trichlorofluoromethane										
75-35-4	1,1-Dichloroethene										
75-09-2	Methylene chloride										
156-60-5	trans-1,2-Dichloroethene										
75-34-3	1,1-Dichloroethane										
594-20-7	2,2-Dichloropropane										
156-59-2	cis-1,2-Dichloroethene										
67-66-3	Chloroform										
74-97-5	Chlorobromomethane										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride					6.	J				
563-58-6	1,1-Dichloropropene										
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene				17.	J	22.	J	4.	J	
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
74-95-3	Dibromomethane										
10061-01-5	cis-1,3-Dichloropropene										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene				3.	J	7.	J			
142-28-9	1,3-Dichloropropane										
124-48-1	Dibromochloromethane										
106-93-4	1,2-Dibromoethane										
108-90-7	Chlorobenzene										
630-20-6	1,1,1,2-Tetrachloroethane										
100-41-4	Ethylbenzene										
95-47-6	o-Xylene										
100-42-5	Styrene										
75-25-2	Bromoform										

Fourth Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-29LF-5B	007-G-30LF-5B	007-G-31LF-5B	007-G-32LF-5B	007-G-32LF-5C	007-G-33LF-5B			
		ORIGINAL ID ----->	007G29LF5B	007G30LF5B	007G31LF5B	007G32LF5B	007G32LF5C	007G33LF5B			
		LAB SAMPLE ID ---->	11199808	11199811	11209804	11209806	11249812	11209807			
		ID FROM REPORT -->	007G29LF5B	007G30LF5B	007G31LF5B	007G32LF5B	007G32LF5C	007G33LF5B			
		SAMPLE DATE ----->	11/18/98	11/18/98	11/20/98	11/20/98	11/24/98	11/20/98			
		DATE ANALYZED -->	11/19/98	11/19/98	11/20/98	11/20/98	11/24/98	11/20/98			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL
98-82-8	Benzene, 1-methylethyl-										
79-34-5	1,1,2,2-Tetrachloroethane										
108-86-1	Bromobenzene										
103-65-1	n-Propylbenzene										
95-49-8	2-Chlorotoluene										
108-67-8	Benzene, 1,3,5-trimethyl-										
106-43-4	4-Chlorotoluene										
98-06-6	tert-Butylbenzene										
95-63-6	Benzene, 1,2,4-trimethyl										
135-98-8	sec-Butylbenzene										
99-87-6	p-Isopropyltoluene										
541-73-1	1,3-Dichlorobenzene										
106-46-7	1,4-Dichlorobenzene										
104-51-8	n-Butylbenzene										
95-50-1	1,2-Dichlorobenzene										
96-12-8	1,2-Dibromo-3-Chloropropane										
120-82-1	1,2,4-Trichlorobenzene										
87-68-3	Hexachlorobutadiene										
91-20-3	Naphthalene										
87-61-6	1,2,3-Trichlorobenzene										
9999900-05-0	m+p Xylene										
96-18-4	1,2,3-Trichloropropane										

Fourth Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-33LF-5C	007-G-34LF-5B	007-G-35LF-5B	007-G-36LF-5B			
		ORIGINAL ID ----->	007G33LF5C	007G4LF210	007G35LF5B	007G36LF5B			
		LAB SAMPLE ID ---->	11229842	11229831	11229843	11229833			
		ID FROM REPORT -->	007G33LF5C	007G4LF210	007G35LF5B	007G36LF5B			
		SAMPLE DATE ----->	11/20/98	11/22/98	11/23/98	11/23/98			
		DATE ANALYZED -->	11/24/98	11/23/98	11/24/98	11/23/98			
		MATRIX ----->	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL
75-71-8	Dichlorodifluoromethane								
74-87-3	Chloromethane								
75-01-4	Vinyl chloride								
74-83-9	Bromomethane								
75-00-3	Chloroethane								
75-69-4	Trichlorofluoromethane								
75-35-4	1,1-Dichloroethene								
75-09-2	Methylene chloride								
156-60-5	trans-1,2-Dichloroethene								
75-34-3	1,1-Dichloroethane					4.			
594-20-7	2,2-Dichloropropane								
156-59-2	cis-1,2-Dichloroethene					10.			
67-66-3	Chloroform			10.		4.			
74-97-5	Chlorobromomethane								
71-55-6	1,1,1-Trichloroethane								
56-23-5	Carbon tetrachloride					11.			
563-58-6	1,1-Dichloropropene								
71-43-2	Benzene								
107-06-2	1,2-Dichloroethane								
79-01-6	Trichloroethene			10.		6.	J	36.	
78-87-5	1,2-Dichloropropane								
75-27-4	Bromodichloromethane								
74-95-3	Dibromomethane								
10061-01-5	cis-1,3-Dichloropropene								
108-88-3	Toluene								
10061-02-6	trans-1,3-Dichloropropene								
79-00-5	1,1,2-Trichloroethane								
127-18-4	Tetrachloroethene			4.		6.			
142-28-9	1,3-Dichloropropane								
124-48-1	Dibromochloromethane								
106-93-4	1,2-Dibromoethane								
108-90-7	Chlorobenzene								
630-20-6	1,1,1,2-Tetrachloroethane								
100-41-4	Ethylbenzene								
95-47-6	o-Xylene								
100-42-5	Styrene								
75-25-2	Bromoform								

Fourth Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-33LF-5C	007-G-34LF-5B	007-G-35LF-5B	007-G-36LF-5B			
		ORIGINAL ID ----->	007G33LF5C	007G4LF210	007G35LF5B	007G36LF5B			
		LAB SAMPLE ID ---->	11229842	11229831	11229843	11229833			
		ID FROM REPORT -->	007G33LF5C	007G4LF210	007G35LF5B	007G36LF5B			
		SAMPLE DATE ----->	11/20/98	11/22/98	11/23/98	11/23/98			
		DATE ANALYZED ---->	11/24/98	11/23/98	11/24/98	11/23/98			
		MATRIX ----->	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	0001A	VAL	0001A	VAL	0001A	VAL	0001A	VAL
98-82-8	Benzene, 1-methylethyl-								
79-34-5	1,1,2,2-Tetrachloroethane								
108-86-1	Bromobenzene								
103-65-1	n-Propylbenzene								
95-49-8	2-Chlorotoluene								
108-67-8	Benzene, 1,3,5-trimethyl-								
106-43-4	4-Chlorotoluene								
98-06-6	tert-Butylbenzene								
95-63-6	Benzene, 1,2,4-trimethyl								
135-98-8	sec-Butylbenzene								
99-87-6	p-Isopropyltoluene								
541-73-1	1,3-Dichlorobenzene								
106-46-7	1,4-Dichlorobenzene								
104-51-8	n-Butylbenzene								
95-50-1	1,2-Dichlorobenzene								
96-12-8	1,2-Dibromo-3-Chloropropane								
120-82-1	1,2,4-Trichlorobenzene								
87-68-3	Hexachlorobutadiene								
91-20-3	Naphthalene								
87-61-6	1,2,3-Trichlorobenzene								
9999900-05-0	m+p Xylene								
96-18-4	1,2,3-Trichloropropane								

**Groundwater Data from  
Fifth Well Construction Phase (February 1999)**

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-31LF-5B	007-G-32LF-5B	007-G-33LF-5B	007-G-34LF-5B	007-G-35LF-5B	007-G-36LF-5C
		ORIGINAL ID ----->	007G31LF5B	007G32LF5B	007G33LF5B	007G34LF5B	007G35LF5B	007G36LF5C
		LAB SAMPLE ID ----->	9902120-10	9902120-08	9902120-09	9902120-01	9902120-02	9901093-01
		ID FROM REPORT ----->	007G31LF5B	007G32LF5B	007G33LF5B	007G34LF5B	007G35LF5B	007G36LF5C
		SAMPLE DATE ----->	02/03/99	02/03/99	02/03/99	02/03/99	02/03/99	01/06/99
		DATE EXTRACTED ----->	02/17/99	02/14/99	02/17/99	02/14/99	02/14/99	01/08/99
		DATE ANALYZED ----->	02/17/99	02/14/99	02/17/99	02/14/99	02/14/99	01/08/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9902120	9902120	9902120	9902120	9902120	9901093
67-64-1	Acetone							
75-05-8	Acetonitrile							NR
107-02-8	Acrolein							
107-13-1	Acrylonitrile							
71-43-2	Benzene							
108-86-1	Bromobenzene							
74-97-5	Chlorobromomethane							
75-27-4	Bromodichloromethane							
75-25-2	Bromoform							
74-83-9	Bromomethane							
104-51-8	n-Butylbenzene							
135-98-8	sec-Butylbenzene							
98-06-6	tert-Butylbenzene							
78-93-3	2-Butanone (MEK)							
75-15-0	Carbon disulfide				3.6			
124-48-1	Dibromochloromethane							
75-00-3	Chloroethane							
110-75-8	2-Chloroethylvinylether							
67-66-3	Chloroform					7.81		4.41
74-87-3	Chloromethane							
95-49-8	2-Chlorotoluene							
106-43-4	4-Chlorotoluene							
96-12-8	1,2-Dibromo-3-Chloropropane							
106-93-4	1,2-Dibromoethane							
74-95-3	Dibromomethane							
95-50-1	1,2-Dichlorobenzene							
541-73-1	1,3-Dichlorobenzene							
106-46-7	1,4-Dichlorobenzene							
75-71-8	Dichlorodifluoromethane							
75-34-3	1,1-Dichloroethane		1.29					4.41
107-06-2	1,2-Dichloroethane							
75-35-4	1,1-Dichloroethene		1.74					1.36
156-59-2	cis-1,2-Dichloroethene							9.87
156-60-5	trans-1,2-Dichloroethene							
78-87-5	1,2-Dichloropropane							
142-28-9	1,3-Dichloropropane							

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-31LF-5B	007-G-32LF-5B	007-G-33LF-5B	007-G-34LF-5B	007-G-35LF-5B	007-G-36LF-5C
		ORIGINAL ID ----->	007G31LF5B	007G32LF5B	007G33LF5B	007G34LF5B	007G35LF5B	007G36LF5C
		LAB SAMPLE ID ----->	9902120-10	9902120-08	9902120-09	9902120-01	9902120-02	9901093-01
		ID FROM REPORT --->	007G31LF5B	007G32LF5B	007G33LF5B	007G34LF5B	007G35LF5B	007G36LF5C
		SAMPLE DATE ----->	02/03/99	02/03/99	02/03/99	02/03/99	02/03/99	01/06/99
		DATE EXTRACTED --->	02/17/99	02/14/99	02/17/99	02/14/99	02/14/99	01/08/99
		DATE ANALYZED ----->	02/17/99	02/14/99	02/17/99	02/14/99	02/14/99	01/08/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9902120	9902120	9902120	9902120	9902120	9901093
594-20-7	2,2-Dichloropropane							
563-58-6	1,1-Dichloropropene							
10061-01-5	cis-1,3-Dichloropropene							
10061-02-6	trans-1,3-Dichloropropene							
141-78-6	Ethyl acetate							NR
100-41-4	Ethylbenzene							
87-68-3	Hexachlorobutadiene							
591-78-6	2-Hexanone							
74-88-4	Methyl iodide							
98-82-8	Benzene, 1-methylethyl-							
99-87-6	p-Isopropyltoluene							
75-09-2	Methylene chloride							
108-10-1	4-Methyl-2-Pentanone (MIBK)							
1634-04-4	Methyl tert-butyl ether							NR
91-20-3	Naphthalene							
103-65-1	n-Propylbenzene							
100-42-5	Styrene							
630-20-6	1,1,1,2-Tetrachloroethane							
79-34-5	1,1,2,2-Tetrachloroethane							
127-18-4	Tetrachloroethene		4.65 B			1.95 J		5.04
108-88-3	Toluene							
87-61-6	1,2,3-Trichlorobenzene							
120-82-1	1,2,4-Trichlorobenzene							
71-55-6	1,1,1-Trichloroethane							
79-00-5	1,1,2-Trichloroethane							
79-01-6	Trichloroethene		21.7			6.01	5.6	33.9
75-69-4	Trichlorofluoromethane							
96-18-4	1,2,3-Trichloropropane							
95-63-6	Benzene, 1,2,4-trimethyl							
108-67-8	Benzene, 1,3,5-trimethyl-							
108-05-4	Vinyl acetate							
75-01-4	Vinyl chloride							
95-47-6	o-Xylene							NR
56-23-5	Carbon tetrachloride					4.77		11.4
108-90-7	Chlorobenzene							
108-38-3	m-Xylene		NR	NR	NR	NR	NR	NR

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-31LF-5B	007-G-32LF-5B	007-G-33LF-5B	007-G-34LF-5B	007-G-35LF-5B	007-G-36LF-5C
		ORIGINAL ID ----->	007G31LF5B	007G32LF5B	007G33LF5B	007G34LF5B	007G35LF5B	007G36LF5C
		LAB SAMPLE ID ---->	9902120-10	9902120-08	9902120-09	9902120-01	9902120-02	9901093-01
		ID FROM REPORT -->	007G31LF5B	007G32LF5B	007G33LF5B	007G34LF5B	007G35LF5B	007G36LF5C
		SAMPLE DATE ----->	02/03/99	02/03/99	02/03/99	02/03/99	02/03/99	01/06/99
		DATE EXTRACTED -->	02/17/99	02/14/99	02/17/99	02/14/99	02/14/99	01/08/99
		DATE ANALYZED ---->	02/17/99	02/14/99	02/17/99	02/14/99	02/14/99	01/08/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter	9902120	9902120	9902120	9902120	9902120	9902120	9901093
1330-20-7	Xylene (Total)							
110-57-6	trans-1,4-Dichloro-2-butene	NR	NR	NR	NR	NR	NR	

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-36LF-84	007-G-36LF-86	007-G-36LF-88	007-G-36LF-90	007-G-36LF-92	007-G-37LF-5A
		ORIGINAL ID ----->	007G36LF84	007G36LF86	007G36LF88	007G36LF90	007G36LF92	007G37LF5A
		LAB SAMPLE ID ---->	9902120-03	9902120-04	9902120-05	9902120-06	9902120-07	9902164-01
		ID FROM REPORT ---->	007G36LF84	007G36LF86	007G36LF88	007G36LF90	007G36LF92	007G37LF5A
		SAMPLE DATE ----->	02/03/99	02/03/99	02/03/99	02/03/99	02/03/99	02/04/99
		DATE EXTRACTED -->	02/14/99	02/14/99	02/14/99	02/14/99	02/14/99	02/05/99
		DATE ANALYZED ---->	02/14/99	02/14/99	02/14/99	02/14/99	02/14/99	02/05/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9902120	9902120	9902120	9902120	9902120	9902164
67-64-1	Acetone							
75-05-8	Acetonitrile							
107-02-8	Acrolein							
107-13-1	Acrylonitrile							
71-43-2	Benzene							
108-86-1	Bromobenzene							
74-97-5	Chlorobromomethane							
75-27-4	Bromodichloromethane							
75-25-2	Bromoform							
74-83-9	Bromomethane							
104-51-8	n-Butylbenzene							
135-98-8	sec-Butylbenzene							
98-06-6	tert-Butylbenzene							
78-93-3	2-Butanone (MEK)							
75-15-0	Carbon disulfide							
124-48-1	Dibromochloromethane							
75-00-3	Chloroethane							
110-75-8	2-Chloroethylvinylether							
67-66-3	Chloroform		2.29	3.04	3.65	3.63	3.68	9.74
74-87-3	Chloromethane							
95-49-8	2-Chlorotoluene							
106-43-4	4-Chlorotoluene							
96-12-8	1,2-Dibromo-3-Chloropropane							
106-93-4	1,2-Dibromoethane							
74-95-3	Dibromomethane							
95-50-1	1,2-Dichlorobenzene							
541-73-1	1,3-Dichlorobenzene							
106-46-7	1,4-Dichlorobenzene							
75-71-8	Dichlorodifluoromethane							
75-34-3	1,1-Dichloroethane			1.89	3.94	3.92	3.88	1.62
107-06-2	1,2-Dichloroethane							
75-35-4	1,1-Dichloroethene				1.46	1.24	1.17	
156-59-2	cis-1,2-Dichloroethene			4.22	8.8	8.43	8.63	3.4
156-60-5	trans-1,2-Dichloroethene							
78-87-5	1,2-Dichloropropane							
142-28-9	1,3-Dichloropropane							

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-36LF-84	007-G-36LF-86	007-G-36LF-88	007-G-36LF-90	007-G-36LF-92	007-G-37LF-5A
		ORIGINAL ID ----->	007G36LF84	007G36LF86	007G36LF88	007G36LF90	007G36LF92	007G37LF5A
		LAB SAMPLE ID ---->	9902120-03	9902120-04	9902120-05	9902120-06	9902120-07	9902164-01
		ID FROM REPORT -->	007G36LF84	007G36LF86	007G36LF88	007G36LF90	007G36LF92	007G37LF5A
		SAMPLE DATE ----->	02/03/99	02/03/99	02/03/99	02/03/99	02/03/99	02/04/99
		DATE EXTRACTED -->	02/14/99	02/14/99	02/14/99	02/14/99	02/14/99	02/05/99
		DATE ANALYZED ---->	02/14/99	02/14/99	02/14/99	02/14/99	02/14/99	02/05/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9902120	9902120	9902120	9902120	9902120	9902164
594-20-7	2,2-Dichloropropane							
563-58-6	1,1-Dichloropropene							
10061-01-5	cis-1,3-Dichloropropene							
10061-02-6	trans-1,3-Dichloropropene							
141-78-6	Ethyl acetate							
100-41-4	Ethylbenzene							
87-68-3	Hexachlorobutadiene							
591-78-6	2-Hexanone							
74-88-4	Methyl iodide							
98-82-8	Benzene, 1-methylethyl-							
99-87-6	p-Isopropyltoluene							
75-09-2	Methylene chloride							
108-10-1	4-Methyl-2-Pentanone (MIBK)							
1634-04-4	Methyl tert-butyl ether							
91-20-3	Naphthalene							
103-65-1	n-Propylbenzene							
100-42-5	Styrene							
630-20-6	1,1,1,2-Tetrachloroethane							
79-34-5	1,1,2,2-Tetrachloroethane							
127-18-4	Tetrachloroethene				4.7 J	4.58 J	4. J	2.43
108-88-3	Toluene							
87-61-6	1,2,3-Trichlorobenzene							
120-82-1	1,2,4-Trichlorobenzene							
71-55-6	1,1,1-Trichloroethane							
79-00-5	1,1,2-Trichloroethane							
79-01-6	Trichloroethene	1.69	11.6	28.6	29.2	29.6	12.5	
75-69-4	Trichlorofluoromethane							
96-18-4	1,2,3-Trichloropropane							
95-63-6	Benzene, 1,2,4-trimethyl							
108-67-8	Benzene, 1,3,5-trimethyl-							
108-05-4	Vinyl acetate							
75-01-4	Vinyl chloride							
95-47-6	o-Xylene							
56-23-5	Carbon tetrachloride		2.5	8.71	8.04	7.82		
108-90-7	Chlorobenzene							
108-38-3	m-Xylene	NR	NR	NR	NR	NR	NR	NR

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-36LF-84	007-G-36LF-86	007-G-36LF-88	007-G-36LF-90	007-G-36LF-92	007-G-37LF-5A
		ORIGINAL ID ----->	007G36LF84	007G36LF86	007G36LF88	007G36LF90	007G36LF92	007G37LF5A
		LAB SAMPLE ID ---->	9902120-03	9902120-04	9902120-05	9902120-06	9902120-07	9902164-01
		ID FROM REPORT -->	007G36LF84	007G36LF86	007G36LF88	007G36LF90	007G36LF92	007G37LF5A
		SAMPLE DATE ----->	02/03/99	02/03/99	02/03/99	02/03/99	02/03/99	02/04/99
		DATE EXTRACTED -->	02/14/99	02/14/99	02/14/99	02/14/99	02/14/99	02/05/99
		DATE ANALYZED ---->	02/14/99	02/14/99	02/14/99	02/14/99	02/14/99	02/05/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter	9902120	9902120	9902120	9902120	9902120	9902120	9902164
1330-20-7	Xylene (Total)							
110-57-6	trans-1,4-Dichloro-2-butene	NR	NR	NR	NR	NR	NR	NR

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-V0A		SAMPLE ID ----->	007-G-38LF-5A	007-G-39LF-5A	007-G-40LF-5A	007-G-41LF-5A	007-G-42LF-5A	007-G-43LF-5A
		ORIGINAL ID ----->	007G38LF5A	007G39LF5A	007G40LF5A	007G41LF5A	007G42LF5A	007G43LF5A
		LAB SAMPLE ID ----->	9902176-01	9902212-01	9902222-01	9902252-01	9902317-02	9902532-01
		ID FROM REPORT -->	007G38LF5A	007G39LF5A	007G40LF5A	007G41LF5A	013G42LF5A	007G43LF5A
		SAMPLE DATE ----->	02/05/99	02/05/99	02/07/99	02/09/99	02/10/99	02/17/99
		DATE EXTRACTED -->	02/05/99	02/06/99	02/08/99	02/09/99	02/11/99	02/18/99
		DATE ANALYZED ----->	02/05/99	02/06/99	02/08/99	02/09/99	02/11/99	02/18/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9902176	9902212	9902222	9902252	9902317	9902532
67-64-1	Acetone							
75-05-8	Acetonitrile							
107-02-8	Acrolein							
107-13-1	Acrylonitrile							
71-43-2	Benzene							
108-86-1	Bromobenzene							
74-97-5	Chlorobromomethane							
75-27-4	Bromodichloromethane							
75-25-2	Bromoform							
74-83-9	Bromomethane							
104-51-8	n-Butylbenzene							
135-98-8	sec-Butylbenzene							
98-06-6	tert-Butylbenzene							
78-93-3	2-Butanone (MEK)							
75-15-0	Carbon disulfide							
124-48-1	Dibromochloromethane							
75-00-3	Chloroethane							
110-75-8	2-Chloroethylvinylether							
67-66-3	Chloroform		3.9	2.38	3.13	3.63	2.52	3.78
74-87-3	Chloromethane							
95-49-8	2-Chlorotoluene							
106-43-4	4-Chlorotoluene							
96-12-8	1,2-Dibromo-3-Chloropropane							
106-93-4	1,2-Dibromoethane							
74-95-3	Dibromomethane							
95-50-1	1,2-Dichlorobenzene							
541-73-1	1,3-Dichlorobenzene							
106-46-7	1,4-Dichlorobenzene							
75-71-8	Dichlorodifluoromethane							
75-34-3	1,1-Dichloroethane		2.52		1.54	1.77		
107-06-2	1,2-Dichloroethane							
75-35-4	1,1-Dichloroethene							
156-59-2	cis-1,2-Dichloroethene		5.78		3.49	3.36		1.41
156-60-5	trans-1,2-Dichloroethene							
78-87-5	1,2-Dichloropropane							
142-28-9	1,3-Dichloropropane							

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-38LF-5A	007-G-39LF-5A	007-G-40LF-5A	007-G-41LF-5A	007-G-42LF-5A	007-G-43LF-5A
		ORIGINAL ID ----->	007G38LF5A	007G39LF5A	007G40LF5A	007G41LF5A	007G42LF5A	007G43LF5A
		LAB SAMPLE ID ---->	9902176-01	9902212-01	9902222-01	9902252-01	9902317-02	9902532-01
		ID FROM REPORT -->	007G38LF5A	007G39LF5A	007G40LF5A	007G41LF5A	013G42LF5A	007G43LF5A
		SAMPLE DATE ----->	02/05/99	02/05/99	02/07/99	02/09/99	02/10/99	02/17/99
		DATE EXTRACTED -->	02/05/99	02/06/99	02/08/99	02/09/99	02/11/99	02/18/99
		DATE ANALYZED ---->	02/05/99	02/06/99	02/08/99	02/09/99	02/11/99	02/18/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9902176	9902212	9902222	9902252	9902317	9902532
594-20-7	2,2-Dichloropropane							
563-58-6	1,1-Dichloropropene							
10061-01-5	cis-1,3-Dichloropropene							
10061-02-6	trans-1,3-Dichloropropene							
141-78-6	Ethyl acetate							
100-41-4	Ethylbenzene							
87-68-3	Hexachlorobutadiene							
591-78-6	2-Hexanone							
74-88-4	Methyl iodide							
98-82-8	Benzene, 1-methylethyl-							
99-87-6	p-Isopropyltoluene							
75-09-2	Methylene chloride							
108-10-1	4-Methyl-2-Pentanone (MIBK)							
1634-04-4	Methyl tert-butyl ether							
91-20-3	Naphthalene							
103-65-1	n-Propylbenzene							
100-42-5	Styrene							
630-20-6	1,1,1,2-Tetrachloroethane							
79-34-5	1,1,2,2-Tetrachloroethane							
127-18-4	Tetrachloroethene		5.86		2.98		3.07	
108-88-3	Toluene							
87-61-6	1,2,3-Trichlorobenzene					1.12		
120-82-1	1,2,4-Trichlorobenzene							
71-55-6	1,1,1-Trichloroethane							
79-00-5	1,1,2-Trichloroethane							
79-01-6	Trichloroethene		16.1			12.	1.53	5.09
75-69-4	Trichlorofluoromethane							
96-18-4	1,2,3-Trichloropropane							
95-63-6	Benzene, 1,2,4-trimethyl							
108-67-8	Benzene, 1,3,5-trimethyl-							
108-05-4	Vinyl acetate							
75-01-4	Vinyl chloride							
95-47-6	o-Xylene							
56-23-5	Carbon tetrachloride		6.32		5.92	1.89		3.7
108-90-7	Chlorobenzene							
108-38-3	m-Xylene		NR	NR	NR	NR	NR	NR

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-38LF-5A	007-G-39LF-5A	007-G-40LF-5A	007-G-41LF-5A	007-G-42LF-5A	007-G-43LF-5A
		ORIGINAL ID ----->	007G38LF5A	007G39LF5A	007G40LF5A	007G41LF5A	007G42LF5A	007G43LF5A
		LAB SAMPLE ID ---->	9902176-01	9902212-01	9902222-01	9902252-01	9902317-02	9902532-01
		ID FROM REPORT -->	007G38LF5A	007G39LF5A	007G40LF5A	007G41LF5A	013G42LF5A	007G43LF5A
		SAMPLE DATE ----->	02/05/99	02/05/99	02/07/99	02/09/99	02/10/99	02/17/99
		DATE EXTRACTED -->	02/05/99	02/06/99	02/08/99	02/09/99	02/11/99	02/18/99
		DATE ANALYZED ---->	02/05/99	02/06/99	02/08/99	02/09/99	02/11/99	02/18/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter	9902176	9902212	9902222	9902252	9902317	9902532	
1330-20-7	Xylene (Total)							
110-57-6	trans-1,4-Dichloro-2-butene	NR	NR	NR	NR	NR	NR	NR

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-44LF-5A	007-H-44LF-5A	007-G-45LF-5A	007-G-46LF-5A	007-G-47LF-5A	007-G-48LF-5A
		ORIGINAL ID ----->	007G44LF5A	007H44LF5A	007G45LF5A	007G46LF5A	007G47LF5A	007G48LF5A
		LAB SAMPLE ID --->	9902569-01	9902569-02	9902622-01	9902631-03	9902760-01	9902760-03
		ID FROM REPORT -->	007G44LF5A	007H44LF5A	007G45LF5A	007G46LF5A	007G47LF5A	007G48LF5A
		SAMPLE DATE ----->	02/18/99	02/18/99	02/19/99	02/21/99	02/23/99	02/24/99
		DATE EXTRACTED -->	02/18/99	02/18/99	02/20/99	02/22/99	02/24/99	02/24/99
		DATE ANALYZED --->	02/18/99	02/18/99	02/20/99	02/22/99	02/24/99	02/24/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9902569	9902569	9902622	9902631	9902760	9902760
67-64-1	Acetone							
75-05-8	Acetonitrile							
107-02-8	Acrolein							
107-13-1	Acrylonitrile							
71-43-2	Benzene							
108-86-1	Bromobenzene							
74-97-5	Chlorobromomethane							
75-27-4	Bromodichloromethane							
75-25-2	Bromoform							
74-83-9	Bromomethane							
104-51-8	n-Butylbenzene							
135-98-8	sec-Butylbenzene							
98-06-6	tert-Butylbenzene							
78-93-3	2-Butanone (MEK)							
75-15-0	Carbon disulfide							
124-48-1	Dibromochloromethane							
75-00-3	Chloroethane							
110-75-8	2-Chloroethylvinylether							
67-66-3	Chloroform		2.55	2.83	3.	0.99 J	2.15	1.41
74-87-3	Chloromethane							
95-49-8	2-Chlorotoluene							
106-43-4	4-Chlorotoluene							
96-12-8	1,2-Dibromo-3-Chloropropane							
106-93-4	1,2-Dibromoethane							
74-95-3	Dibromomethane							
95-50-1	1,2-Dichlorobenzene							
541-73-1	1,3-Dichlorobenzene							
106-46-7	1,4-Dichlorobenzene							
75-71-8	Dichlorodifluoromethane							
75-34-3	1,1-Dichloroethane					1.27		
107-06-2	1,2-Dichloroethane							
75-35-4	1,1-Dichloroethene							
156-59-2	cis-1,2-Dichloroethene				1.45			
156-60-5	trans-1,2-Dichloroethene							
78-87-5	1,2-Dichloropropane							
142-28-9	1,3-Dichloropropane							

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-44LF-5A	007-H-44LF-5A	007-G-45LF-5A	007-G-46LF-5A	007-G-47LF-5A	007-G-48LF-5A
		ORIGINAL ID ----->	007G44LF5A	007H44LF5A	007G45LF5A	007G46LF5A	007G47LF5A	007G48LF5A
		LAB SAMPLE ID ---->	9902569-01	9902569-02	9902622-01	9902631-03	9902760-01	9902760-03
		ID FROM REPORT -->	007G44LF5A	007H44LF5A	007G45LF5A	007G46LF5A	007G47LF5A	007G48LF5A
		SAMPLE DATE ----->	02/18/99	02/18/99	02/19/99	02/21/99	02/23/99	02/24/99
		DATE EXTRACTED -->	02/18/99	02/18/99	02/20/99	02/22/99	02/24/99	02/24/99
		DATE ANALYZED ---->	02/18/99	02/18/99	02/20/99	02/22/99	02/24/99	02/24/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9902569	9902569	9902622	9902631	9902760	9902760
594-20-7	2,2-Dichloropropane							
563-58-6	1,1-Dichloropropane							
10061-01-5	cis-1,3-Dichloropropene							
10061-02-6	trans-1,3-Dichloropropene							
141-78-6	Ethyl acetate							
100-41-4	Ethylbenzene							
87-68-3	Hexachlorobutadiene							
591-78-6	2-Hexanone							
74-88-4	Methyl iodide							
98-82-8	Benzene, 1-methylethyl-							
99-87-6	p-Isopropyltoluene							
75-09-2	Methylene chloride							
108-10-1	4-Methyl-2-Pentanone (MIBK)							
1634-04-4	Methyl tert-butyl ether							
91-20-3	Naphthalene							
103-65-1	n-Propylbenzene							
100-42-5	Styrene							
630-20-6	1,1,1,2-Tetrachloroethane							
79-34-5	1,1,2,2-Tetrachloroethane							
127-18-4	Tetrachloroethene							
108-88-3	Toluene							
87-61-6	1,2,3-Trichlorobenzene							
120-82-1	1,2,4-Trichlorobenzene							
71-55-6	1,1,1-Trichloroethane							
79-00-5	1,1,2-Trichloroethane							
79-01-6	Trichloroethene				5.84	1.78		
75-69-4	Trichlorofluoromethane							
96-18-4	1,2,3-Trichloropropane							
95-63-6	Benzene, 1,2,4-trimethyl							
108-67-8	Benzene, 1,3,5-trimethyl-							
108-05-4	Vinyl acetate							
75-01-4	Vinyl chloride							
95-47-6	o-Xylene							
56-23-5	Carbon tetrachloride							
108-90-7	Chlorobenzene							
108-38-3	m-Xylene		NR	NR	NR	NR	NR	NR

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-44LF-5A	007-H-44LF-5A	007-G-45LF-5A	007-G-46LF-5A	007-G-47LF-5A	007-G-48LF-5A
		ORIGINAL ID ----->	007G44LF5A	007H44LF5A	007G45LF5A	007G46LF5A	007G47LF5A	007G48LF5A
		LAB SAMPLE ID --->	9902569-01	9902569-02	9902622-01	9902631-03	9902760-01	9902760-03
		ID FROM REPORT -->	007G44LF5A	007H44LF5A	007G45LF5A	007G46LF5A	007G47LF5A	007G48LF5A
		SAMPLE DATE ----->	02/18/99	02/18/99	02/19/99	02/21/99	02/23/99	02/24/99
		DATE EXTRACTED -->	02/18/99	02/18/99	02/20/99	02/22/99	02/24/99	02/24/99
		DATE ANALYZED --->	02/18/99	02/18/99	02/20/99	02/22/99	02/24/99	02/24/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9902569	9902569	9902622	9902631	9902760	9902760
1330-20-7	Xylene (Total)							
110-57-6	trans-1,4-Dichloro-2-butene	NR	NR	NR	NR	NR	NR	NR

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-PZ01-5B	007-G-PZ02-5A	007-G-PZ02-5B	007-G-PZ03-5A	007-G-PZ03-5B
		ORIGINAL ID ----->	007GPZ015B	007GPZ025A	007GPZ025B	007GPZ035A	007GPZ035B
		LAB SAMPLE ID ----->	9812134-03	9902760-02	9812134-01	9902631-02	9812134-02
		ID FROM REPORT ----->	007GPZ015B	007GPZ025A	007GPZ025B	007GPZ035A	007GPZ035B
		SAMPLE DATE ----->	12/02/98	02/23/99	12/02/98	02/21/99	12/02/98
		DATE EXTRACTED ----->	12/04/98	02/24/99	12/04/98	02/22/99	12/04/98
		DATE ANALYZED ----->	12/04/98	02/24/99	12/04/98	02/22/99	12/04/98
		MATRIX ----->	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9902134	9902760	9902134	9902631	9902134
67-64-1	Acetone						
75-05-8	Acetonitrile		NR		NR		NR
107-02-8	Acrolein						
107-13-1	Acrylonitrile						
71-43-2	Benzene						
108-86-1	Bromobenzene						
74-97-5	Chlorobromomethane						
75-27-4	Bromodichloromethane						
75-25-2	Bromoform						
74-83-9	Bromomethane						
104-51-8	n-Butylbenzene						
135-98-8	sec-Butylbenzene						
98-06-6	tert-Butylbenzene						
78-93-3	2-Butanone (MEK)						
75-15-0	Carbon disulfide						
124-48-1	Dibromochloromethane						
75-00-3	Chloroethane						
110-75-8	2-Chloroethylvinylether						
67-66-3	Chloroform			1.53	3.26	2.65	3.19
74-87-3	Chloromethane						
95-49-8	2-Chlorotoluene						
106-43-4	4-Chlorotoluene						
96-12-8	1,2-Dibromo-3-Chloropropane						
106-93-4	1,2-Dibromoethane						
74-95-3	Dibromomethane						
95-50-1	1,2-Dichlorobenzene						
541-73-1	1,3-Dichlorobenzene						
106-46-7	1,4-Dichlorobenzene						
75-71-8	Dichlorodifluoromethane						
75-34-3	1,1-Dichloroethane					1.31	
107-06-2	1,2-Dichloroethane						
75-35-4	1,1-Dichloroethene						
156-59-2	cis-1,2-Dichloroethene					3.04	
156-60-5	trans-1,2-Dichloroethene						
78-87-5	1,2-Dichloropropane						
142-28-9	1,3-Dichloropropane						

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-PZ01-5B	007-G-PZ02-5A	007-G-PZ02-5B	007-G-PZ03-5A	007-G-PZ03-5B
		ORIGINAL ID ----->	007GPZ015B	007GPZ025A	007GPZ025B	007GPZ035A	007GPZ035B
		LAB SAMPLE ID ----->	9812134-03	9902760-02	9812134-01	9902631-02	9812134-02
		ID FROM REPORT ----->	007GPZ015B	007GPZ025A	007GPZ025B	007GPZ035A	007GPZ035B
		SAMPLE DATE ----->	12/02/98	02/23/99	12/02/98	02/21/99	12/02/98
		DATE EXTRACTED ----->	12/04/98	02/24/99	12/04/98	02/22/99	12/04/98
		DATE ANALYZED ----->	12/04/98	02/24/99	12/04/98	02/22/99	12/04/98
		MATRIX ----->	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9902134	9902760	9902134	9902631	9902134
594-20-7	2,2-Dichloropropane						
563-58-6	1,1-Dichloropropene						
10061-01-5	cis-1,3-Dichloropropene						
10061-02-6	trans-1,3-Dichloropropene						
141-78-6	Ethyl acetate	NR			NR		NR
100-41-4	Ethylbenzene						
87-68-3	Hexachlorobutadiene						
591-78-6	2-Hexanone						
74-88-4	Methyl iodide						
98-82-8	Benzene, 1-methylethyl-						
99-87-6	p-Isopropyltoluene						
75-09-2	Methylene chloride						
108-10-1	4-Methyl-2-Pentanone (MIBK)						
1634-04-4	Methyl tert-butyl ether	NR			NR		NR
91-20-3	Naphthalene						
103-65-1	n-Propylbenzene						
100-42-5	Styrene						
630-20-6	1,1,1,2-Tetrachloroethane						
79-34-5	1,1,2,2-Tetrachloroethane						
127-18-4	Tetrachloroethene			2.44 J		6.46	
108-88-3	Toluene						
87-61-6	1,2,3-Trichlorobenzene						
120-82-1	1,2,4-Trichlorobenzene						
71-55-6	1,1,1-Trichloroethane						
79-00-5	1,1,2-Trichloroethane						
79-01-6	Trichloroethene			2.06		6.08	
75-69-4	Trichlorofluoromethane						
96-18-4	1,2,3-Trichloropropane						
95-63-6	Benzene, 1,2,4-trimethyl						
108-67-8	Benzene, 1,3,5-trimethyl-						
108-05-4	Vinyl acetate						
75-01-4	Vinyl chloride						
95-47-6	o-Xylene	NR			NR		NR
56-23-5	Carbon tetrachloride			3.22		8.89	
108-90-7	Chlorobenzene						
108-38-3	m-Xylene	NR		NR		NR	

Fifth Well Construction Event  
NSA MID-SOUTH, AOC A RFI Addendum  
(007G31LF-007G36LF from diffusion samp.)

8260-VOA		SAMPLE ID ----->	007-G-PZ01-5B	007-G-PZ02-5A	007-G-PZ02-5B	007-G-PZ03-5A	007-G-PZ03-5B	
		ORIGINAL ID ----->	007GPZ015B	007GPZ025A	007GPZ025B	007GPZ035A	007GPZ035B	
		LAB SAMPLE ID ---->	9812134-03	9902760-02	9812134-01	9902631-02	9812134-02	
		ID FROM REPORT -->	007GPZ015B	007GPZ025A	007GPZ025B	007GPZ035A	007GPZ035B	
		SAMPLE DATE ----->	12/02/98	02/23/99	12/02/98	02/21/99	12/02/98	
		DATE EXTRACTED -->	12/04/98	02/24/99	12/04/98	02/22/99	12/04/98	
		DATE ANALYZED ---->	12/04/98	02/24/99	12/04/98	02/22/99	12/04/98	
		MATRIX ----->	Water	Water	Water	Water	Water	
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	
CAS #	Parameter	9902134	9902760	9902134	9902631	9902134		
1330-20-7	Xylene (Total)							
110-57-6	trans-1,4-Dichloro-2-butene		NR		NR			

**Groundwater Data from  
Diffusion Sampling Event (March 1999)**

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-04LF-63	007-G-04LF-67	007-G-04UF-42	007-G-04UF-46	007-G-11LF-63	007-G-11LF-67	
		ORIGINAL ID ----->	007G04LF63	007G04LF67	007G04UF42	007G04UF46	007G11LF63	007G11LF67	
		LAB SAMPLE ID ---->	9903612-03	9903612-04	9903612-05	9903612-06	9903612-07	9903612-08	
		ID FROM REPORT -->	007G04LF63	007G04LF67	007G04UF42	007G04UF46	007G11LF63	007G11LF67	
		SAMPLE DATE ----->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	
		DATE EXTRACTED -->	03/26/99	03/26/99	03/29/99	03/29/99	03/30/99	03/30/99	
		DATE ANALYZED ---->	03/26/99	03/26/99	03/29/99	03/29/99	03/30/99	03/30/99	
		MATRIX ----->	Water	Water	Water	Water	Water	Water	
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	
CAS #	Parameter	MS014	VAL	MS014	VAL	MS014	VAL	MS014	VAL
74-87-3	Chloromethane								
75-01-4	Vinyl chloride								
74-83-9	Bromomethane								
75-00-3	Chloroethane								
75-35-4	1,1-Dichloroethene	45.		32.					
67-64-1	Acetone								
75-15-0	Carbon disulfide								
75-09-2	Methylene chloride								
75-34-3	1,1-Dichloroethane	1.	J						
78-93-3	2-Butanone (MEK)								
67-66-3	Chloroform	5.		3.			12.		11.
71-55-6	1,1,1-Trichloroethane								
56-23-5	Carbon tetrachloride	2.	J	3.	J		12.		12.
71-43-2	Benzene	3.	J	3.		1.	J	2.	J
107-06-2	1,2-Dichloroethane								
79-01-6	Trichloroethene	4400.	D	2400.	D				
78-87-5	1,2-Dichloropropane								
75-27-4	Bromodichloromethane								
10061-01-5	cis-1,3-Dichloropropene								
108-10-1	4-Methyl-2-Pentanone (MIBK)								
108-88-3	Toluene								
10061-02-6	trans-1,3-Dichloropropene								
79-00-5	1,1,2-Trichloroethane								
127-18-4	Tetrachloroethene	51.		38.					
591-78-6	2-Hexanone								
124-48-1	Dibromochloromethane								
540-59-0	1,2-Dichloroethene (total)	7.		5.					
1330-20-7	Xylene (Total)								
108-90-7	Chlorobenzene								
100-41-4	Ethylbenzene								
100-42-5	Styrene								
75-25-2	Bromoform								
79-34-5	1,1,2,2-Tetrachloroethane								

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-18LF-93	007-G-18LF-97	007-G-20LF-69	007-G-20LF-74	007-G-21LF-69	007-G-21LF-74					
		ORIGINAL ID ----->	007G18LF93	007G18LF97	007G20LF69	007G20LF74	007G21LF69	007G21LF74					
		LAB SAMPLE ID ---->	9903612-09	9903612-10	9903612-11	9903612-12	9903613-01	9903613-02					
		ID FROM REPORT -->	007G18LF93	007G18LF97	007G20LF69	007G20LF74	007G21LF69	007G21LF74					
		SAMPLE DATE ----->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99					
		DATE EXTRACTED -->	03/30/99	03/29/99	03/29/99	03/29/99	03/26/99	03/26/99					
		DATE ANALYZED ---->	03/30/99	03/29/99	03/29/99	03/29/99	03/26/99	03/26/99					
		MATRIX ----->	Water	Water	Water	Water	Water	Water					
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L					
CAS #	Parameter	MS014	VAL	MS014	VAL	MS014	VAL	MS014	VAL	MS015	VAL	MS015	VAL
74-87-3	Chloromethane												
75-01-4	Vinyl chloride												
74-83-9	Bromomethane												
75-00-3	Chloroethane												
75-35-4	1,1-Dichloroethene												
67-64-1	Acetone												
75-15-0	Carbon disulfide												
75-09-2	Methylene chloride												
75-34-3	1,1-Dichloroethane												
78-93-3	2-Butanone (MEK)												
67-66-3	Chloroform	3.		3.	J								
71-55-6	1,1,1-Trichloroethane												
56-23-5	Carbon tetrachloride	4.		3.									
71-43-2	Benzene												
107-06-2	1,2-Dichloroethane	3.		3.	J								
79-01-6	Trichloroethene	17.		14.				25.				24.	
78-87-5	1,2-Dichloropropane												
75-27-4	Bromodichloromethane												
10061-01-5	cis-1,3-Dichloropropene												
108-10-1	4-Methyl-2-Pentanone (MIBK)												
108-88-3	Toluene												
10061-02-6	trans-1,3-Dichloropropene												
79-00-5	1,1,2-Trichloroethane												
127-18-4	Tetrachloroethene							6.				6.	
591-78-6	2-Hexanone												
124-48-1	Dibromochloromethane												
540-59-0	1,2-Dichloroethene (total)												
1330-20-7	Xylene (Total)												
108-90-7	Chlorobenzene												
100-41-4	Ethylbenzene												
100-42-5	Styrene												
75-25-2	Bromoform												
79-34-5	1,1,2,2-Tetrachloroethane												

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-22LF-72	007-G-22LF-77	007-G-23LF-76	007-G-23LF-81	007-G-27LF-11	007-G-27LF-16			
		ORIGINAL ID ----->	007G22LF72	007G22LF77	007G23LF76	007G23LF81	007G27LF11	007G27LF16			
		LAB SAMPLE ID ---->	9903613-03	9903613-04	9903613-05	9903613-06	9903613-07	9903613-08			
		ID FROM REPORT -->	007G22LF72	007G22LF77	007G23LF76	007G23LF81	007G27LF11	007G27LF16			
		SAMPLE DATE ----->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99			
		DATE EXTRACTED -->	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99			
		DATE ANALYZED ---->	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MS015	VAL	MS015	VAL	MS015	VAL	MS015	VAL	MS015	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane										
78-93-3	2-Butanone (MEK)										
67-66-3	Chloroform	4.		4.		4.		3.			
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride					21.		24.			
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene	80.		83.		25.		22.			
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
10061-01-5	cis-1,3-Dichloropropene										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene	94.		91.		3. J		2. J			
591-78-6	2-Hexanone										
124-48-1	Dibromochloromethane										
540-59-0	1,2-Dichloroethene (total)	18.		17.							
1330-20-7	Xylene (Total)										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-28LF-75	007-G-28LF-80	007-G-29LF-74	007-G-29LF-79	007-G-30LF-74	007-G-30LF-79			
		ORIGINAL ID ----->	007G28LF75	007G28LF80	007G29LF74	007G29LF79	007G30LF74	007G30LF79			
		LAB SAMPLE ID ---->	9903613-09	9903613-10	9903613-11	9903613-12	9903613-13	9903613-14			
		ID FROM REPORT -->	007G28LF75	007G28LF80	007G29LF74	007G29LF79	007G30LF74	007G30LF79			
		SAMPLE DATE ----->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99			
		DATE EXTRACTED -->	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99			
		DATE ANALYZED ---->	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MS015	VAL	MS015	VAL	MS015	VAL	MS015	VAL	MS015	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane										
78-93-3	2-Butanone (MEK)										
67-66-3	Chloroform	5.		6.		2. J		2. J			
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride	3. J		3. J							
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene	27.		29.							
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
10061-01-5	cis-1,3-Dichloropropene										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene	12.		12.							
591-78-6	2-Hexanone										
124-48-1	Dibromochloromethane										
540-59-0	1,2-Dichloroethene (total)										
1330-20-7	Xylene (Total)										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-31LF-72	007-G-31LF-77	007-G-32LF-72	007-G-32LF-77	007-G-33LF-79	007-G-33LF-84			
		ORIGINAL ID ----->	007G31LF72	007G31LF77	007G32LF72	007G32LF77	007G33LF79	007G33LF84			
		LAB SAMPLE ID ---->	9903613-15	9903613-16	9903613-17	9903613-18	9903613-19	9903613-20			
		ID FROM REPORT -->	007G31LF72	007G31LF77	007G32LF72	007G32LF77	007G33LF79	007G33LF84			
		SAMPLE DATE ----->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99			
		DATE EXTRACTED -->	03/26/99	03/29/99	03/29/99	03/29/99	03/29/99	03/29/99			
		DATE ANALYZED ---->	03/26/99	03/29/99	03/29/99	03/29/99	03/29/99	03/29/99			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MS015	VAL	MS015	VAL	MS015	VAL	MS015	VAL	MS015	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene	2.	J	2.	J						
67-64-1	Acetone										
75-15-0	Carbon disulfide										
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane			1.	J						
78-93-3	2-Butanone (MEK)										
67-66-3	Chloroform										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride										
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene	28.		26.							
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
10061-01-5	cis-1,3-Dichloropropene										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene	4.		4.							
591-78-6	2-Hexanone										
124-48-1	Dibromochloromethane										
540-59-0	1,2-Dichloroethene (total)										
1330-20-7	Xylene (Total)										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-34LF-85	007-G-34LF-90	007-G-35LF-85	007-G-35LF-90	007-G-36LF-84	007-G-36LF-88			
		ORIGINAL ID ----->	007G34LF85	007G34LF90	007G35LF85	007G35LF90	007G36LF84	007G36LF88			
		LAB SAMPLE ID --->	9903566-03	9903566-04	9903566-05	9903566-06	9903566-07	9903566-08			
		ID FROM REPORT -->	007G34LF85	007G34LF90	007G35LF85	007G35LF90	007G36LF84	007G36LF88			
		SAMPLE DATE ----->	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99			
		DATE EXTRACTED -->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99			
		DATE ANALYZED --->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MS013	VAL	MS013	VAL	MS013	VAL	MS013	VAL	MS013	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene						1.	J		2.	J
67-64-1	Acetone										
75-15-0	Carbon disulfide			3.							
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane						4.			4.	
78-93-3	2-Butanone (MEK)										
67-66-3	Chloroform	1.	J	5.			3.			4.	
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride						10.			9.	
71-43-2	Benzene	2.	J								
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene			3.	J	7.			7.	26.	
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
10061-01-5	cis-1,3-Dichloropropene										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene						6.			6.	
591-78-6	2-Hexanone										
124-48-1	Dibromochloromethane										
540-59-0	1,2-Dichloroethene (total)						8.			9.	
1330-20-7	Xylene (Total)										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-36LF-92	007-G-37LF-53	007-G-37LF-57	007-G-37LF-61	007-G-37LF-65	007-G-37LF-69			
		ORIGINAL ID ----->	007G36LF92	007G37LF53	007G37LF57	007G37LF61	007G37LF65	007G37LF69			
		LAB SAMPLE ID ---->	9903566-09	9903614-01	9903614-02	9903614-03	9903614-04	9903614-05			
		ID FROM REPORT -->	007G36LF92	007G37LF53	007G37LF57	007G37LF61	007G37LF65	007G37LF69			
		SAMPLE DATE ----->	03/24/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99			
		DATE EXTRACTED -->	03/25/99	03/29/99	03/29/99	03/29/99	03/29/99	03/29/99			
		DATE ANALYZED ---->	03/25/99	03/29/99	03/29/99	03/29/99	03/29/99	03/29/99			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MS013	VAL	MS016	VAL	MS016	VAL	MS016	VAL	MS016	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene	2.	J								
67-64-1	Acetone										
75-15-0	Carbon disulfide										
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane	4.		1.	J	1.	J	1.	J	1.	J
78-93-3	2-Butanone (MEK)										
67-66-3	Chloroform	4.		2.	J	2.	J	2.	J	2.	J
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride	9.		1.	J	1.	J	1.	J	1.	J
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene	32.		5.		6.		6.		6.	
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
10061-01-5	cis-1,3-Dichloropropene										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene	6.		6.		6.		7.		7.	
591-78-6	2-Hexanone										
124-48-1	Dibromochloromethane										
540-59-0	1,2-Dichloroethene (total)	8.		3.	J	3.	J	3.	J	3.	J
1330-20-7	Xylene (Total)										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-37LF-73	007-G-37LF-77	007-G-37LF-81	007-G-37LF-85	007-G-38LF-66	007-G-38LF-81				
		ORIGINAL ID ----->	007G37LF73	007G37LF77	007G37LF81	007G37LF85	007G38LF66	007G38LF81				
		LAB SAMPLE ID ---->	9903614-06	9903614-07	9903614-08	9903614-09	9903566-10	9903566-11				
		ID FROM REPORT ---->	007G37LF73	007G37LF77	007G37LF81	007G37LF85	007G38LF66	007G38LF81				
		SAMPLE DATE ----->	03/25/99	03/25/99	03/25/99	03/25/99	03/24/99	03/24/99				
		DATE EXTRACTED -->	03/29/99	03/29/99	03/29/99	03/29/99	03/25/99	03/25/99				
		DATE ANALYZED ---->	03/29/99	03/29/99	03/29/99	03/29/99	03/25/99	03/25/99				
		MATRIX ----->	Water	Water	Water	Water	Water	Water				
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L				
CAS #	Parameter	MS016	VAL	MS016	VAL	MS016	VAL	MS013	VAL	MS013	VAL	
74-87-3	Chloromethane											
75-01-4	Vinyl chloride											
74-83-9	Bromomethane											
75-00-3	Chloroethane											
75-35-4	1,1-Dichloroethene											
67-64-1	Acetone											
75-15-0	Carbon disulfide											
75-09-2	Methylene chloride											
75-34-3	1,1-Dichloroethane	1.	J	1.	J	1.	J	1.	J			
78-93-3	2-Butanone (MEK)											
67-66-3	Chloroform	2.	J	3.	J	2.	J	4.		2.	J	
71-55-6	1,1,1-Trichloroethane											
56-23-5	Carbon tetrachloride	1.	J	1.	J	1.	J			6.		
71-43-2	Benzene											
107-06-2	1,2-Dichloroethane											
79-01-6	Trichloroethene	5.		5.		6.		6.	1.	J	2.	J
78-87-5	1,2-Dichloropropane											
75-27-4	Bromodichloromethane											
10061-01-5	cis-1,3-Dichloropropene											
108-10-1	4-Methyl-2-Pentanone (MIBK)											
108-88-3	Toluene											
10061-02-6	trans-1,3-Dichloropropene											
79-00-5	1,1,2-Trichloroethane											
127-18-4	Tetrachloroethene	6.		6.		7.		6.				
591-78-6	2-Hexanone											
124-48-1	Dibromochloromethane											
540-59-0	1,2-Dichloroethene (total)	3.	J	3.	J	3.	J	3.	J			
1330-20-7	Xylene (Total)											
108-90-7	Chlorobenzene											
100-41-4	Ethylbenzene											
100-42-5	Styrene											
75-25-2	Bromoform											
79-34-5	1,1,2,2-Tetrachloroethane											

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-39LF-57	007-G-39LF-61	007-G-39LF-65	007-G-39LF-69	007-G-39LF-73	007-G-39LF-77	
		ORIGINAL ID ----->	007G39LF57	007G39LF61	007G39LF65	007G39LF69	007G39LF73	007G39LF77	
		LAB SAMPLE ID ---->	9903614-10	9903614-11	9903614-12	9903614-13	9903614-14	9903614-15	
		ID FROM REPORT -->	007G39LF57	007G39LF61	007G39LF65	007G39LF69	007G39LF73	007G39LF77	
		SAMPLE DATE ----->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	
		DATE EXTRACTED -->	03/29/99	03/29/99	03/29/99	03/30/99	03/30/99	03/30/99	
		DATE ANALYZED ---->	03/29/99	03/29/99	03/29/99	03/30/99	03/30/99	03/30/99	
		MATRIX ----->	Water	Water	Water	Water	Water	Water	
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	
CAS #	Parameter	MS016	VAL	MS016	VAL	MS016	VAL	MS016	VAL
74-87-3	Chloromethane								
75-01-4	Vinyl chloride								
74-83-9	Bromomethane								
75-00-3	Chloroethane								
75-35-4	1,1-Dichloroethene								
67-64-1	Acetone								
75-15-0	Carbon disulfide								
75-09-2	Methylene chloride								
75-34-3	1,1-Dichloroethane								
78-93-3	2-Butanone (MEK)								
67-66-3	Chloroform								
71-55-6	1,1,1-Trichloroethane								
56-23-5	Carbon tetrachloride								
71-43-2	Benzene								
107-06-2	1,2-Dichloroethane								
79-01-6	Trichloroethene								
78-87-5	1,2-Dichloropropane								
75-27-4	Bromodichloromethane								
10061-01-5	cis-1,3-Dichloropropene								
108-10-1	4-Methyl-2-Pentanone (MIBK)								
108-88-3	Toluene								
10061-02-6	trans-1,3-Dichloropropene								
79-00-5	1,1,2-Trichloroethane								
127-18-4	Tetrachloroethene								
591-78-6	2-Hexanone								
124-48-1	Dibromochloromethane								
540-59-0	1,2-Dichloroethene (total)								
1330-20-7	Xylene (Total)								
108-90-7	Chlorobenzene								
100-41-4	Ethylbenzene								
100-42-5	Styrene								
75-25-2	Bromoform								
79-34-5	1,1,2,2-Tetrachloroethane								

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-39LF-81	007-G-39LF-85	007-G-39LF-89	007-G-39LF-93	007-G-40LF-70	007-G-40LF-80					
		ORIGINAL ID ----->	007G39LF81	007G39LF85	007G39LF89	007G39LF93	007G40LF70	007G40LF80					
		LAB SAMPLE ID ---->	9903614-16	9903614-17	9903614-18	9903614-19	9903566-12	9903566-13					
		ID FROM REPORT -->	007G39LF81	007G39LF85	007G39LF89	007G39LF93	007G40LF70	007G40LF80					
		SAMPLE DATE ----->	03/25/99	03/25/99	03/25/99	03/25/99	03/24/99	03/24/99					
		DATE EXTRACTED -->	03/30/99	03/30/99	03/30/99	03/30/99	03/25/99	03/25/99					
		DATE ANALYZED ---->	03/30/99	03/30/99	03/30/99	03/30/99	03/25/99	03/25/99					
		MATRIX ----->	Water	Water	Water	Water	Water	Water					
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L					
CAS #	Parameter	MS016	VAL	MS016	VAL	MS016	VAL	MS016	VAL	MS013	VAL	MS013	VAL
74-87-3	Chloromethane												
75-01-4	Vinyl chloride												
74-83-9	Bromomethane												
75-00-3	Chloroethane												
75-35-4	1,1-Dichloroethene												
67-64-1	Acetone												
75-15-0	Carbon disulfide												
75-09-2	Methylene chloride												
75-34-3	1,1-Dichloroethane												
78-93-3	2-Butanone (MEK)												
67-66-3	Chloroform									2.	J	2.	J
71-55-6	1,1,1-Trichloroethane									7.		7.	
56-23-5	Carbon tetrachloride												
71-43-2	Benzene												
107-06-2	1,2-Dichloroethane												
79-01-6	Trichloroethene									6.		6.	
78-87-5	1,2-Dichloropropane												
75-27-4	Bromodichloromethane												
10061-01-5	cis-1,3-Dichloropropene												
108-10-1	4-Methyl-2-Pentanone (MIBK)												
108-88-3	Toluene												
10061-02-6	trans-1,3-Dichloropropene												
79-00-5	1,1,2-Trichloroethane												
127-18-4	Tetrachloroethene												
591-78-6	2-Hexanone												
124-48-1	Dibromochloromethane												
540-59-0	1,2-Dichloroethene (total)									1.	J	1.	J
1330-20-7	Xylene (Total)												
108-90-7	Chlorobenzene												
100-41-4	Ethylbenzene												
100-42-5	Styrene												
75-25-2	Bromoform												
79-34-5	1,1,2,2-Tetrachloroethane												

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-41LF-56	007-G-41LF-60	007-G-41LF-64	007-G-41LF-68	007-G-41LF-72	007-G-41LF-76	
		ORIGINAL ID ----->	007G41LF56	007G41LF60	007G41LF64	007G41LF68	007G41LF72	007G41LF76	
		LAB SAMPLE ID ---->	9903564-01	9903564-02	9903564-03	9903564-04	9903564-05	9903564-06	
		ID FROM REPORT -->	007G41LF56	007G41LF60	007G41LF64	007G41LF68	007G41LF72	007G41LF76	
		SAMPLE DATE ----->	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99	
		DATE EXTRACTED -->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	
		DATE ANALYZED ---->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	
		MATRIX ----->	Water	Water	Water	Water	Water	Water	
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	
CAS #	Parameter	MS012	VAL	MS012	VAL	MS012	VAL	MS012	VAL
74-87-3	Chloromethane								
75-01-4	Vinyl chloride								
74-83-9	Bromomethane								
75-00-3	Chloroethane								
75-35-4	1,1-Dichloroethene								
67-64-1	Acetone								
75-15-0	Carbon disulfide								
75-09-2	Methylene chloride								
75-34-3	1,1-Dichloroethane								
78-93-3	2-Butanone (MEK)								
67-66-3	Chloroform					1. J	1. J	1. J	
71-55-6	1,1,1-Trichloroethane								
56-23-5	Carbon tetrachloride								
71-43-2	Benzene								
107-06-2	1,2-Dichloroethane								
79-01-6	Trichloroethene						3. J	2. J	
78-87-5	1,2-Dichloropropane								
75-27-4	Bromodichloromethane								
10061-01-5	cis-1,3-Dichloropropene								
108-10-1	4-Methyl-2-Pentanone (MIBK)								
108-88-3	Toluene								
10061-02-6	trans-1,3-Dichloropropene								
79-00-5	1,1,2-Trichloroethane								
127-18-4	Tetrachloroethene						1. J	2. J	
591-78-6	2-Hexanone								
124-48-1	Dibromochloromethane								
540-59-0	1,2-Dichloroethene (total)								
1330-20-7	Xylene (Total)								
108-90-7	Chlorobenzene								
100-41-4	Ethylbenzene								
100-42-5	Styrene								
75-25-2	Bromoform								
79-34-5	1,1,2,2-Tetrachloroethane								

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-41LF-80	007-G-41LF-84	007-G-41LF-88	007-G-41LF-92	007-G-42LF-52	007-G-42LF-59			
		ORIGINAL ID ----->	007G41LF80	007G41LF84	007G41LF88	007G41LF92	007G42LF52	007G42LF59			
		LAB SAMPLE ID ---->	9903564-07	9903564-08	9903564-09	9903564-10	9903564-11	9903564-12			
		ID FROM REPORT ---->	007G41LF80	007G41LF84	007G41LF88	007G41LF92	007G42LF52	007G42LF59			
		SAMPLE DATE ----->	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99			
		DATE EXTRACTED --->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99			
		DATE ANALYZED ---->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MS012	VAL	MS012	VAL	MS012	VAL	MS012	VAL	MS012	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane										
78-93-3	2-Butanone (MEK)										
67-66-3	Chloroform	2.	J	2.	J	2.	J	2.	J		
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride	2.	J	2.	J	2.	J	2.	J		
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene	6.		8.		6.		5.			
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
10061-01-5	cis-1,3-Dichloropropene										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene	2.	J	2.	J	2.	J	2.	J		
591-78-6	2-Hexanone										
124-48-1	Dibromochloromethane										
540-59-0	1,2-Dichloroethene (total)	2.	J	2.	J	2.	J	2.	J		
1330-20-7	Xylene (Total)										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-V0A		SAMPLE ID ----->	007-G-42LF-66	007-G-42LF-73	007-G-42LF-80	007-G-43LF-58	007-G-43LF-73	007-G-44LF-52					
		ORIGINAL ID ----->	007G42LF66	007G42LF73	007G42LF80	007G43LF58	007G43LF73	007G44LF52					
		LAB SAMPLE ID ---->	9903564-13	9903564-14	9903564-15	9903566-14	9903566-15	9903615-12					
		ID FROM REPORT -->	007G42LF66	007G42LF73	007G42LF80	007G43LF58	007G43LF73	007G44LF52					
		SAMPLE DATE ----->	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99	03/25/99					
		DATE EXTRACTED -->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/29/99					
		DATE ANALYZED ---->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/29/99					
		MATRIX ----->	Water	Water	Water	Water	Water	Water					
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L					
CAS #	Parameter	MS012	VAL	MS012	VAL	MS012	VAL	MS013	VAL	MS013	VAL	MS017	VAL
74-87-3	Chloromethane												
75-01-4	Vinyl chloride												
74-83-9	Bromomethane												
75-00-3	Chloroethane												
75-35-4	1,1-Dichloroethene												
67-64-1	Acetone												
75-15-0	Carbon disulfide												
75-09-2	Methylene chloride												
75-34-3	1,1-Dichloroethane					1.	J						
78-93-3	2-Butanone (MEK)							3.	J		2.	J	
67-66-3	Chloroform												
71-55-6	1,1,1-Trichloroethane							6.			5.		
56-23-5	Carbon tetrachloride												
71-43-2	Benzene												
107-06-2	1,2-Dichloroethane												
79-01-6	Trichloroethene					2.	J	3.			4.		
78-87-5	1,2-Dichloropropane												
75-27-4	Bromodichloromethane												
10061-01-5	cis-1,3-Dichloropropene												
108-10-1	4-Methyl-2-Pentanone (MIBK)												
108-88-3	Toluene												
10061-02-6	trans-1,3-Dichloropropene												
79-00-5	1,1,2-Trichloroethane												
127-18-4	Tetrachloroethene												
591-78-6	2-Hexanone												
124-48-1	Dibromochloromethane												
540-59-0	1,2-Dichloroethene (total)												
1330-20-7	Xylene (Total)												
108-90-7	Chlorobenzene												
100-41-4	Ethylbenzene												
100-42-5	Styrene												
75-25-2	Bromoform												
79-34-5	1,1,2,2-Tetrachloroethane												

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-44LF-59	007-G-44LF-66	007-G-44LF-73	007-G-44LF-80	007-G-45LF-50	007-G-45LF-57			
		ORIGINAL ID ----->	007G44LF59	007G44LF66	007G44LF73	007G44LF80	007G45LF50	007G45LF57			
		LAB SAMPLE ID ---->	9903615-14	9903615-16	9903615-13	9903615-11	9903614-20	9903615-01			
		ID FROM REPORT -->	007G44LF59	007G44LF66	007G44LF73	007G44LF80	007G45LF50	007G45LF57			
		SAMPLE DATE ----->	03/25/99	03/25/99	03/25/99	03/25/99	03/24/99	03/24/99			
		DATE EXTRACTED -->	03/29/99	03/30/99	03/29/99	03/29/99	03/30/99	03/29/99			
		DATE ANALYZED ---->	03/29/99	03/30/99	03/29/99	03/29/99	03/30/99	03/29/99			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MS017	VAL	MS017	VAL	MS017	VAL	MS016	VAL	MS017	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane										
78-93-3	2-Butanone (MEK)										
67-66-3	Chloroform										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride										
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene										
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
10061-01-5	cis-1,3-Dichloropropene										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene										
591-78-6	2-Hexanone										
124-48-1	Dibromochloromethane										
540-59-0	1,2-Dichloroethene (total)										
1330-20-7	Xylene (Total)										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-45LF-64	007-G-45LF-70	007-G-46LF-45	007-G-46LF-49	007-G-46LF-53	007-G-46LF-57	
		ORIGINAL ID ----->	007G45LF64	007G45LF70	007G46LF45	007G46LF49	007G46LF53	007G46LF57	
		LAB SAMPLE ID ---->	9903615-02	9903615-03	9903566-16	9903566-17	9903566-18	9903566-19	
		ID FROM REPORT -->	007G45LF64	007G45LF70	007G46LF45	007G46LF49	007G46LF53	007G46LF57	
		SAMPLE DATE ----->	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99	
		DATE EXTRACTED -->	03/29/99	03/29/99	03/25/99	03/26/99	03/26/99	03/26/99	
		DATE ANALYZED ---->	03/29/99	03/29/99	03/25/99	03/26/99	03/26/99	03/26/99	
		MATRIX ----->	Water	Water	Water	Water	Water	Water	
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	
CAS #	Parameter	MS017	VAL	MS017	VAL	MS013	VAL	MS013	VAL
74-87-3	Chloromethane								
75-01-4	Vinyl chloride								
74-83-9	Bromomethane								
75-00-3	Chloroethane								
75-35-4	1,1-Dichloroethene								
67-64-1	Acetone								
75-15-0	Carbon disulfide								
75-09-2	Methylene chloride								
75-34-3	1,1-Dichloroethane								
78-93-3	2-Butanone (MEK)								
67-66-3	Chloroform								
71-55-6	1,1,1-Trichloroethane								
56-23-5	Carbon tetrachloride								
71-43-2	Benzene								
107-06-2	1,2-Dichloroethane								
79-01-6	Trichloroethene								
78-87-5	1,2-Dichloropropane								
75-27-4	Bromodichloromethane								
10061-01-5	cis-1,3-Dichloropropene								
108-10-1	4-Methyl-2-Pentanone (MIBK)								
108-88-3	Toluene								
10061-02-6	trans-1,3-Dichloropropene								
79-00-5	1,1,2-Trichloroethane								
127-18-4	Tetrachloroethene								
591-78-6	2-Hexanone								
124-48-1	Dibromochloromethane								
540-59-0	1,2-Dichloroethene (total)								
1330-20-7	Xylene (Total)								
108-90-7	Chlorobenzene								
100-41-4	Ethylbenzene								
100-42-5	Styrene								
75-25-2	Bromoform								
79-34-5	1,1,2,2-Tetrachloroethane								

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-46LF-61	007-G-46LF-65	007-G-46LF-69	007-G-46LF-73	007-G-46LF-77	007-G-46LF-81			
		ORIGINAL ID ----->	007G46LF61	007G46LF65	007G46LF69	007G46LF73	007G46LF77	007G46LF81			
		LAB SAMPLE ID ---->	9903566-20	9903567-01	9903567-02	9903567-03	9903567-04	9903567-05			
		ID FROM REPORT -->	007G46LF61	007G46LF65	007G46LF69	007G46LF73	007G46LF77	007G46LF81			
		SAMPLE DATE ----->	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99			
		DATE EXTRACTED -->	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99			
		DATE ANALYZED ---->	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99	03/26/99			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MS013	VAL	MS014	VAL	MS014	VAL	MS014	VAL	MS014	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethane										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane										
78-93-3	2-Butanone (MEK)										
67-66-3	Chloroform										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride										
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene										
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
10061-01-5	cis-1,3-Dichloropropene										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										
127-18-4	Tetrachloroethene										
591-78-6	2-Hexanone										
124-48-1	Dibromochloromethane										
540-59-0	1,2-Dichloroethene (total)										
1330-20-7	Xylene (Total)										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										

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Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

Page: 17  
Time: 09:43

8260-VOA		SAMPLE ID ----->	007-G-48LF-58	007-G-48LF-68	007-G-48LF-78	007-G-48LF-88	007-G-48LF-98	RDY-G-0V81-01			
		ORIGINAL ID ----->	007G48LF58	007G48LF68	007G48LF78	007G48LF88	007G48LF98	RDYG0V8101			
		LAB SAMPLE ID ---->	9903564-16	9903564-17	9903564-18	9903564-19	9903564-20	9903615-09			
		ID FROM REPORT -->	007G48LF58	007G48LF68	007G48LF78	007G48LF88	007G48LF98	RDYG0V8101			
		SAMPLE DATE ----->	03/24/99	03/24/99	03/24/99	03/24/99	03/24/99	03/25/99			
		DATE EXTRACTED -->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/29/99			
		DATE ANALYZED ---->	03/25/99	03/25/99	03/25/99	03/25/99	03/25/99	03/29/99			
		MATRIX ----->	Water	Water	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MS012	VAL	MS012	VAL	MS012	VAL	MS012	VAL	MS017	VAL
74-87-3	Chloromethane										
75-01-4	Vinyl chloride										
74-83-9	Bromomethane										
75-00-3	Chloroethane										
75-35-4	1,1-Dichloroethene										
67-64-1	Acetone										
75-15-0	Carbon disulfide										
75-09-2	Methylene chloride										
75-34-3	1,1-Dichloroethane										
78-93-3	2-Butanone (MEK)										
67-66-3	Chloroform										
71-55-6	1,1,1-Trichloroethane										
56-23-5	Carbon tetrachloride										
71-43-2	Benzene										
107-06-2	1,2-Dichloroethane										
79-01-6	Trichloroethene										
78-87-5	1,2-Dichloropropane										
75-27-4	Bromodichloromethane										
10061-01-5	cis-1,3-Dichloropropene										
108-10-1	4-Methyl-2-Pentanone (MIBK)										
108-88-3	Toluene										
10061-02-6	trans-1,3-Dichloropropene										
79-00-5	1,1,2-Trichloroethane										5.
127-18-4	Tetrachloroethene										
591-78-6	2-Hexanone										
124-48-1	Dibromochloromethane										
540-59-0	1,2-Dichloroethene (total)										
1330-20-7	Xylene (Total)										
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
75-25-2	Bromoform										
79-34-5	1,1,2,2-Tetrachloroethane										

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	RDY-G-0V81-02				
		ORIGINAL ID ----->	RDYGOV8102				
		LAB SAMPLE ID ---->	9903615-10				
		ID FROM REPORT -->	RDYGOV8102				
		SAMPLE DATE ----->	03/25/99				
		DATE EXTRACTED -->	03/29/99				
		DATE ANALYZED ----->	03/29/99				
		MATRIX ----->	Water				
		UNITS ----->	UG/L				
CAS #	Parameter	MS017	VAL				
74-87-3	Chloromethane						
75-01-4	Vinyl chloride						
74-83-9	Bromomethane						
75-00-3	Chloroethane						
75-35-4	1,1-Dichloroethene						
67-64-1	Acetone	28.					
75-15-0	Carbon disulfide						
75-09-2	Methylene chloride						
75-34-3	1,1-Dichloroethane						
78-93-3	2-Butanone (MEK)						
67-66-3	Chloroform						
71-55-6	1,1,1-Trichloroethane						
56-23-5	Carbon tetrachloride						
71-43-2	Benzene						
107-06-2	1,2-Dichloroethane						
79-01-6	Trichloroethene						
78-87-5	1,2-Dichloropropane						
75-27-4	Bromodichloromethane						
10061-01-5	cis-1,3-Dichloropropene						
108-10-1	4-Methyl-2-Pentanone (MIBK)						
108-88-3	Toluene						
10061-02-6	trans-1,3-Dichloropropene						
79-00-5	1,1,2-Trichloroethane	5.					
127-18-4	Tetrachloroethene						
591-78-6	2-Hexanone						
124-48-1	Dibromochloromethane						
540-59-0	1,2-Dichloroethene (total)						
1330-20-7	Xylene (Total)						
108-90-7	Chlorobenzene						
100-41-4	Ethylbenzene						
100-42-5	Styrene						
75-25-2	Bromoform						
79-34-5	1,1,2,2-Tetrachloroethane						

DATALCP3  
02/11/00

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

Page: 19  
Time: 09:43

SW846-VOA		SAMPLE ID ----->	007-G-49LF-58	007-G-49LF-63	007-G-49LF-68	007-G-49LF-73	007-G-49LF-78	007-G-49LF-83	
		ORIGINAL ID ----->	007G49LF58	007G49LF63	007G49LF68	007G49LF73	007G49LF78	007G49LF83	
		LAB SAMPLE ID ---->	9906572-15	9906572-16	9906572-17	9906572-18	9906572-19	9906572-20	
		ID FROM REPORT -->	007G49LF58	007G49LF63	007G49LF68	007G49LF73	007G49LF78	007G49LF83	
		SAMPLE DATE ----->	06/22/99	06/22/99	06/22/99	06/22/99	06/22/99	06/22/99	
		DATE EXTRACTED -->	06/24/99	06/24/99	06/24/99	06/24/99	06/24/99	06/25/99	
		DATE ANALYZED ---->	06/24/99	06/24/99	06/24/99	06/24/99	06/24/99	06/25/99	
		MATRIX ----->	Water	Water	Water	Water	Water	Water	
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	
CAS #	Parameter	MS027	NV	MS027	NV	MS027	NV	MS027	NV
74-87-3	Chloromethane								
75-01-4	Vinyl chloride								
74-83-9	Bromomethane								
75-00-3	Chloroethane								
75-35-4	1,1-Dichloroethene			8.	J	6.	J		
67-64-1	Acetone								
75-15-0	Carbon disulfide								
75-09-2	Methylene chloride								
75-34-3	1,1-Dichloroethane								
78-93-3	2-Butanone (MEK)								
67-66-3	Chloroform								
71-55-6	1,1,1-Trichloroethane								
56-23-5	Carbon tetrachloride								
71-43-2	Benzene								
107-06-2	1,2-Dichloroethane			2.	J	2.	J		
79-01-6	Trichloroethene								
78-87-5	1,2-Dichloropropane								
75-27-4	Bromodichloromethane								
10061-01-5	cis-1,3-Dichloropropene								
108-10-1	4-Methyl-2-Pentanone (MIBK)								
108-88-3	Toluene								
10061-02-6	trans-1,3-Dichloropropene								
79-00-5	1,1,2-Trichloroethane								
127-18-4	Tetrachloroethene								
591-78-6	2-Hexanone								
1330-20-7	Xylene (Total)								
124-48-1	Dibromochloromethane								
540-59-0	1,2-Dichloroethene (total)								
108-90-7	Chlorobenzene								
100-41-4	Ethylbenzene								
100-42-5	Styrene								
75-25-2	Bromoform								
79-34-5	1,1,2,2-Tetrachloroethane								

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

SW846-VOA		SAMPLE ID ----->	007-G-49LF-88	007-G-49LF-93	018-G-01LF-65	018-G-01LF-85			
		ORIGINAL ID ----->	007G49LF88	007G49LF93	018G01LF65	018G01LF85			
		LAB SAMPLE ID ---->	9906573-01	9906573-02	9906573-04	9906573-06			
		ID FROM REPORT -->	007G49LF88	007G49LF93	018G01LF65	018G01LF85			
		SAMPLE DATE ----->	06/22/99	06/22/99	06/23/99	06/23/99			
		DATE EXTRACTED -->	06/25/99	06/25/99	06/25/99	06/25/99			
		DATE ANALYZED -->	06/25/99	06/25/99	06/25/99	06/25/99			
		MATRIX ----->	Water	Water	Water	Water			
		UNITS ----->	UG/L	UG/L	UG/L	UG/L			
CAS #	Parameter	MS028	NV	MS028	NV	MS028	NV	MS028	NV
74-87-3	Chloromethane								
75-01-4	Vinyl chloride								
74-83-9	Bromomethane								
75-00-3	Chloroethane								
75-35-4	1,1-Dichloroethene								
67-64-1	Acetone					540.	DJ	370.	DJ
75-15-0	Carbon disulfide								
75-09-2	Methylene chloride								
75-34-3	1,1-Dichloroethane								
78-93-3	2-Butanone (MEK)								
67-66-3	Chloroform								
71-55-6	1,1,1-Trichloroethane								
56-23-5	Carbon tetrachloride								
71-43-2	Benzene								
107-06-2	1,2-Dichloroethane								
79-01-6	Trichloroethene					18.		19.	
78-87-5	1,2-Dichloropropane								
75-27-4	Bromodichloromethane								
10061-01-5	cis-1,3-Dichloropropene								
108-10-1	4-Methyl-2-Pentanone (MIBK)								
108-88-3	Toluene								
10061-02-6	trans-1,3-Dichloropropene								
79-00-5	1,1,2-Trichloroethane								
127-18-4	Tetrachloroethene					170.		270.	D
591-78-6	2-Hexanone								
1330-20-7	Xylene (Total)								
124-48-1	Dibromochloromethane								
540-59-0	1,2-Dichloroethene (total)					2.	J	2.	J
108-90-7	Chlorobenzene								
100-41-4	Ethylbenzene								
100-42-5	Styrene								
75-25-2	Bromoform								
79-34-5	1,1,2,2-Tetrachloroethane								

NSA MID-SOUTH  
NSA MID-SOUTH, NORTHSIDE DIFFUSION EVENT

8260-VOA		SAMPLE ID ----->	007-G-PZ03-82	007-G-PZ04-83			
		ORIGINAL ID ----->	007GP20382	007GP20483			
		LAB SAMPLE ID ---->	9903648-02	9903648-01			
		ID FROM REPORT -->	007GP20382	007GP20483			
		SAMPLE DATE ----->	03/26/99	03/26/99			
		DATE EXTRACTED -->	03/30/99	03/30/99			
		DATE ANALYZED ---->	03/30/99	03/30/99			
		MATRIX ----->	Water	Water			
		UNITS ----->	UG/L	UG/L			
CAS #	Parameter	MS017	VAL	MS017	VAL		
74-87-3	Chloromethane						
75-01-4	Vinyl chloride						
74-83-9	Bromomethane						
75-00-3	Chloroethane						
75-35-4	1,1-Dichloroethene						
67-64-1	Acetone						
75-15-0	Carbon disulfide						
75-09-2	Methylene chloride						
75-34-3	1,1-Dichloroethane	2.	J				
78-93-3	2-Butanone (MEK)						
67-66-3	Chloroform	2.	J				
71-55-6	1,1,1-Trichloroethane						
56-23-5	Carbon tetrachloride	11.					
71-43-2	Benzene						
107-06-2	1,2-Dichloroethane						
79-01-6	Trichloroethene	6.					
78-87-5	1,2-Dichloropropane						
75-27-4	Bromodichloromethane						
10061-01-5	cis-1,3-Dichloropropene						
108-10-1	4-Methyl-2-Pentanone (MIBK)						
108-88-3	Toluene						
10061-02-6	trans-1,3-Dichloropropene						
79-00-5	1,1,2-Trichloroethane						
127-18-4	Tetrachloroethene	8.					
591-78-6	2-Hexanone						
124-48-1	Dibromochloromethane						
540-59-0	1,2-Dichloroethene (total)	3.					
1330-20-7	Xylene (Total)						
108-90-7	Chlorobenzene						
100-41-4	Ethylbenzene						
100-42-5	Styrene						
75-25-2	Bromoform						
79-34-5	1,1,2,2-Tetrachloroethane						

Diffusion Sampling Event  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-PZ03-82	007-G-PZ04-83			
		ORIGINAL ID ----->	007GP20382	007GP20483			
		LAB SAMPLE ID ---->	9903648-02	9903648-01			
		ID FROM REPORT -->	007GP20382	007GP20483			
		SAMPLE DATE ----->	03/26/99	03/26/99			
		DATE EXTRACTED -->	03/30/99	03/30/99			
		DATE ANALYZED ----->	03/30/99	03/30/99			
		MATRIX ----->	Water	Water			
		UNITS ----->	UG/L	UG/L			
CAS #	Parameter	MS017	VAL	MS017	VAL		
74-87-3	Chloromethane						
75-01-4	Vinyl chloride						
74-83-9	Bromomethane						
75-00-3	Chloroethane						
75-35-4	1,1-Dichloroethene						
67-64-1	Acetone						
75-15-0	Carbon disulfide						
75-09-2	Methylene chloride						
75-34-3	1,1-Dichloroethane		2. J				
78-93-3	2-Butanone (MEK)						
67-66-3	Chloroform		2. J				
71-55-6	1,1,1-Trichloroethane						
56-23-5	Carbon tetrachloride		11.				
71-43-2	Benzene						
107-06-2	1,2-Dichloroethane						
79-01-6	Trichloroethene		6.				
78-87-5	1,2-Dichloropropane						
75-27-4	Bromodichloromethane						
10061-01-5	cis-1,3-Dichloropropene						
108-10-1	4-Methyl-2-Pentanone (MIBK)						
108-88-3	Toluene						
10061-02-6	trans-1,3-Dichloropropene						
79-00-5	1,1,2-Trichloroethane						
127-18-4	Tetrachloroethene		8.				
591-78-6	2-Hexanone						
124-48-1	Dibromochloromethane						
540-59-0	1,2-Dichloroethene (total)		3.				
1330-20-7	Xylene (Total)						
108-90-7	Chlorobenzene						
100-41-4	Ethylbenzene						
100-42-5	Styrene						
75-25-2	Bromoform						
79-34-5	1,1,2,2-Tetrachloroethane						

**Groundwater Data from  
Sixth Well Construction Phase (July 1999)**

DATALCP3  
02/11/00

### Sixth Well Construction Phase NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-0055-LF	007-G-0056-LF	007-G-52LF-6B	007-G-53LF-6B	007-G-54LF-01	007-G-MCNA-01
		ORIGINAL ID ----->	007G0055LF	007G0056LF	007G52LF6B	007G53LF6B	007G54LF	007GMCNA01
		LAB SAMPLE ID ---->	990763603	990763602	990722801	990722802	990728201	990718701
		ID FROM REPORT -->	007G0055LF	007G0056LF	007G52LF6B	007G53LF6B	007G54LF	007GMCNA01
		SAMPLE DATE ----->	07/23/99	07/23/99	07/10/99	07/11/99	07/13/99	07/08/99
		DATE ANALYZED ---->	07/26/99	07/26/99	07/12/99	07/12/99	07/15/99	07/09/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9907636	9907636	9907228	9907228	9907282	9907187
67-64-1	Acetone							17.5 J
75-05-8	Acetonitrile							
107-02-8	Acrolein							
107-13-1	Acrylonitrile							
71-43-2	Benzene							
108-86-1	Bromobenzene							
74-97-5	Chlorobromomethane							
75-27-4	Bromodichloromethane							
75-25-2	Bromoform							
74-83-9	Bromomethane							
104-51-8	n-Butylbenzene							
135-98-8	sec-Butylbenzene							
98-06-6	tert-Butylbenzene							
78-93-3	2-Butanone (MEK)							
75-15-0	Carbon disulfide							
124-48-1	Dibromochloromethane							
75-00-3	Chloroethane							
110-75-8	2-Chloroethylvinylether							
67-66-3	Chloroform				3.35		1.57	
74-87-3	Chloromethane							
95-49-8	2-Chlorotoluene							
106-43-4	4-Chlorotoluene							
96-12-8	1,2-Dibromo-3-Chloropropane							
106-93-4	1,2-Dibromoethane							
74-95-3	Dibromomethane							
95-50-1	1,2-Dichlorobenzene							
541-73-1	1,3-Dichlorobenzene							
106-46-7	1,4-Dichlorobenzene							
75-71-8	Dichlorodifluoromethane							
75-34-3	1,1-Dichloroethane							
107-06-2	1,2-Dichloroethane							
75-35-4	1,1-Dichloroethene							
156-59-2	cis-1,2-Dichloroethene				1.98		2.31	
156-60-5	trans-1,2-Dichloroethene							
78-87-5	1,2-Dichloropropane							
142-28-9	1,3-Dichloropropane							
594-20-7	2,2-Dichloropropane							

Sixth Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID ----->	007-G-0055-LF	007-G-0056-LF	007-G-52LF-6B	007-G-53LF-6B	007-G-54LF-01	007-G-MCNA-01
		ORIGINAL ID ----->	007G0055LF	007G0056LF	007G52LF6B	007G53LF6B	007G54LF	007GMCNA01
		LAB SAMPLE ID ---->	990763603	990763602	990722801	990722802	990728201	990718701
		ID FROM REPORT -->	007G0055LF	007G0056LF	007G52LF6B	007G53LF6B	007G54LF	007GMCNA01
		SAMPLE DATE ----->	07/23/99	07/23/99	07/10/99	07/11/99	07/13/99	07/08/99
		DATE ANALYZED ---->	07/26/99	07/26/99	07/12/99	07/12/99	07/15/99	07/09/99
		MATRIX ----->	Water	Water	Water	Water	Water	Water
		UNITS ----->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter		9907636	9907636	9907228	9907228	9907282	9907187
563-58-6	1,1-Dichloropropene							
10061-01-5	cis-1,3-Dichloropropene							
10061-02-6	trans-1,3-Dichloropropene							
141-78-6	Ethyl acetate							
100-41-4	Ethylbenzene							
87-68-3	Hexachlorobutadiene							
591-78-6	2-Hexanone							
74-88-4	Methyl iodide							
98-82-8	Benzene, 1-methylethyl-							
99-87-6	p-Isopropyltoluene							
75-09-2	Methylene chloride							
108-10-1	4-Methyl-2-Pentanone (MIBK)							
1634-04-4	Methyl tert-butyl ether							
91-20-3	Naphthalene							
103-65-1	n-Propylbenzene							
100-42-5	Styrene							
630-20-6	1,1,1,2-Tetrachloroethane							
79-34-5	1,1,2,2-Tetrachloroethane				4.72		2.69	
127-18-4	Tetrachloroethene				1.44 B	1.54 B		1.12 B
108-88-3	Toluene							
87-61-6	1,2,3-Trichlorobenzene							
120-82-1	1,2,4-Trichlorobenzene							
71-55-6	1,1,1-Trichloroethane							
79-00-5	1,1,2-Trichloroethane				3.74		7.9	
79-01-6	Trichloroethene							
75-69-4	Trichlorofluoromethane							
96-18-4	1,2,3-Trichloropropane							
95-63-6	Benzene, 1,2,4-trimethyl							
108-67-8	Benzene, 1,3,5-trimethyl-							
108-05-4	Vinyl acetate							1.66
75-01-4	Vinyl chloride							
95-47-6	o-Xylene							
56-23-5	Carbon tetrachloride				3.29		1.6	
108-90-7	Chlorobenzene							
108-38-3	m-Xylene							
1330-20-7	Xylene (Total)	NR	NR	NR	NR	NR	NR	NR
110-57-6	trans-1,4-Dichloro-2-butene	NR	NR	NR	NR	NR	NR	NR

Sixth Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID -----> 007-G-MCNA-MA ORIGINAL ID -----> 007GMCNAMA LAB SAMPLE ID ----> 990446301 ID FROM REPORT --> 007GMCNAMA SAMPLE DATE -----> 04/15/99 DATE ANALYZED ----> 04/23/99 MATRIX -----> Water UNITS -----> UG/L					
CAS #	Parameter	9904463					
67-64-1	Acetone						
75-05-8	Acetonitrile						
107-02-8	Acrolein						
107-13-1	Acrylonitrile						
71-43-2	Benzene						
108-86-1	Bromobenzene						
74-97-5	Chlorobromomethane						
75-27-4	Bromodichloromethane						
75-25-2	Bromoform						
74-83-9	Bromomethane						
104-51-8	n-Butylbenzene						
135-98-8	sec-Butylbenzene						
98-06-6	tert-Butylbenzene						
78-93-3	2-Butanone (MEK)						
75-15-0	Carbon disulfide						
124-48-1	Dibromochloromethane						
75-00-3	Chloroethane						
110-75-8	2-Chloroethylvinylether						
67-66-3	Chloroform						
74-87-3	Chloromethane						
95-49-8	2-Chlorotoluene						
106-43-4	4-Chlorotoluene						
96-12-8	1,2-Dibromo-3-Chloropropane						
106-93-4	1,2-Dibromoethane						
74-95-3	Dibromomethane						
95-50-1	1,2-Dichlorobenzene						
541-73-1	1,3-Dichlorobenzene						
106-46-7	1,4-Dichlorobenzene						
75-71-8	Dichlorodifluoromethane						
75-34-3	1,1-Dichloroethane						
107-06-2	1,2-Dichloroethane						
75-35-4	1,1-Dichloroethene						
156-59-2	cis-1,2-Dichloroethene						
156-60-5	trans-1,2-Dichloroethene						
78-87-5	1,2-Dichloropropane						
142-28-9	1,3-Dichloropropane						
594-20-7	2,2-Dichloropropane						

Sixth Well Construction Phase  
NSA MID-SOUTH, AOC A RFI Addendum

8260-VOA		SAMPLE ID -----> 007-G-MCNA-MA ORIGINAL ID -----> 007GMCNAMA LAB SAMPLE ID ----> 990446301 ID FROM REPORT --> 007GMCNAMA SAMPLE DATE -----> 04/15/99 DATE ANALYZED ----> 04/23/99 MATRIX -----> Water UNITS -----> UG/L					
CAS #	Parameter	9904463					
563-58-6	1,1-Dichloropropene						
10061-01-5	cis-1,3-Dichloropropene						
10061-02-6	trans-1,3-Dichloropropene						
141-78-6	Ethyl acetate						
100-41-4	Ethylbenzene						
87-68-3	Hexachlorobutadiene						
591-78-6	2-Hexanone						
74-88-4	Methyl iodide						
98-82-8	Benzene, 1-methylethyl-						
99-87-6	p-Isopropyltoluene						
75-09-2	Methylene chloride						
108-10-1	4-Methyl-2-Pentanone (MIBK)						
1634-04-4	Methyl tert-butyl ether						
91-20-3	Naphthalene						
103-65-1	n-Propylbenzene						
100-42-5	Styrene						
630-20-6	1,1,1,2-Tetrachloroethane						
79-34-5	1,1,2,2-Tetrachloroethane						
127-18-4	Tetrachloroethene						
108-88-3	Toluene						
87-61-6	1,2,3-Trichlorobenzene						
120-82-1	1,2,4-Trichlorobenzene						
71-55-6	1,1,1-Trichloroethane						
79-00-5	1,1,2-Trichloroethane						
79-01-6	Trichloroethene						
75-69-4	Trichlorofluoromethane						
96-18-4	1,2,3-Trichloropropane						
95-63-6	Benzene, 1,2,4-trimethyl						
108-67-8	Benzene, 1,3,5-trimethyl-						
108-05-4	Vinyl acetate						
75-01-4	Vinyl chloride	6.46					
95-47-6	o-Xylene						
56-23-5	Carbon tetrachloride						
108-90-7	Chlorobenzene						
108-38-3	m-Xylene	NR					
1330-20-7	Xylene (Total)						
110-57-6	trans-1,4-Dichloro-2-butene	NR					

**Appendix B**  
**Boring Logs**

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SMU 5</i>
Project No: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1015 on 8-5-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1530 on 8-5-98</i>	Depth to Groundwater: Measured:
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>75 feet</i>
Geologist: <i>Ben Brantley</i>	Well Screen: <i>55 to 65 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0-3'								Surface soil: Roots and organic debris. (0-3') Moderate yellowish brown silt mixed with light olive gray silt, dry and medium stiff. NO RECOVERY from 3-11.5'		<p>2" diam., Sch. 40 PVC</p> <p>grout</p>
3-11.5'			s-1	60	0.2			(11.5-13.5') Grayish green silt, wet and medium stiff; petroleum odor. (13.5-18.5') Moderate yellowish brown with light olive gray silt, moist to wet, and medium stiff; manganese inclusions present.		
11.5-13.5'							ML	(18.5-25') Olive gray clayey silt, stiff and moist.		
13.5-18.5'			s-2	35	78.0			(23.5-26.5') Olive gray clayey silt mixed with light olive brown, stiff and moist.		
18.5-25'								(26.5-30') Moderate yellowish brown streaked with dark yellowish brown and light olive gray silt.		
23.5-26.5'			s-3	80	BG			(30.5-35') Light gray to light olive gray sandy clay, stiff to medium stiff, moist to wet.		
26.5-30'								(35-38') Light olive gray clay (very stiff and hard) with dark yellowish orange sandy clay.		
30.5-35'			s-4	90	0.6		CL	(38-42.5') Dark yellowish orange and grayish orange fine micaceous sand.		
35-38'										
38-42.5'							SM			

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SMMU 5</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1015 on 8-5-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1530 on 8-5-98</i>	Depth to Groundwater: <i>Measured:</i>
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>75 feet</i>
Geologist: <i>Ben Brantley</i>	Well Screen: <i>55 to 65 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							SM	(40.5-51') 6" thick section of gravels present.		
45			s-5	100	0.2		SW	Grayish orange coarse sand with scattered gravels up to 1" long dimension. Same as above at 42.5'.		
50							SP	(47-51') Dark yellowish orange and grayish orange fine sand.		
55			s-6	85	0.8		SW	(51-55') Same lithologic colors; fine to medium gravelly sand; gravels up to .75" long dimension.  (55-65') Grayish orange, medium to coarse gravelly sand; gravels up to 1" long dimension.		
65			s-7	90	0.4		GM	(65-65.5') Dark yellowish orange silty sandy gravel, wet.		
70							CL	Dusky yellowish brown clay, stiff to hard.		
75			s-8	100	0.4			Light olive gray fine sand lenses within clay matrix from 74.5-75'.  <b>Boring completed at 75'bgs</b>		
80										



**Environmental & Safety Designs, Inc.**

**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: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

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
			s-1	100	na		Fill	(0-2') Gravel and fill.		<p>2" diam., Sch. 40 PVC</p> <p>grout</p>
			s-2	100	na		ML	(2-3') Silt, moderate yellowish brown mottled with olive gray. Contains organic material.		
5							Fill	(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		ML	(17-20') Same as above.		
20								(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			s-6	105	0.4		ML	(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.		



**Environmental & Safety Designs, Inc.**

**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: *Measured:*

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

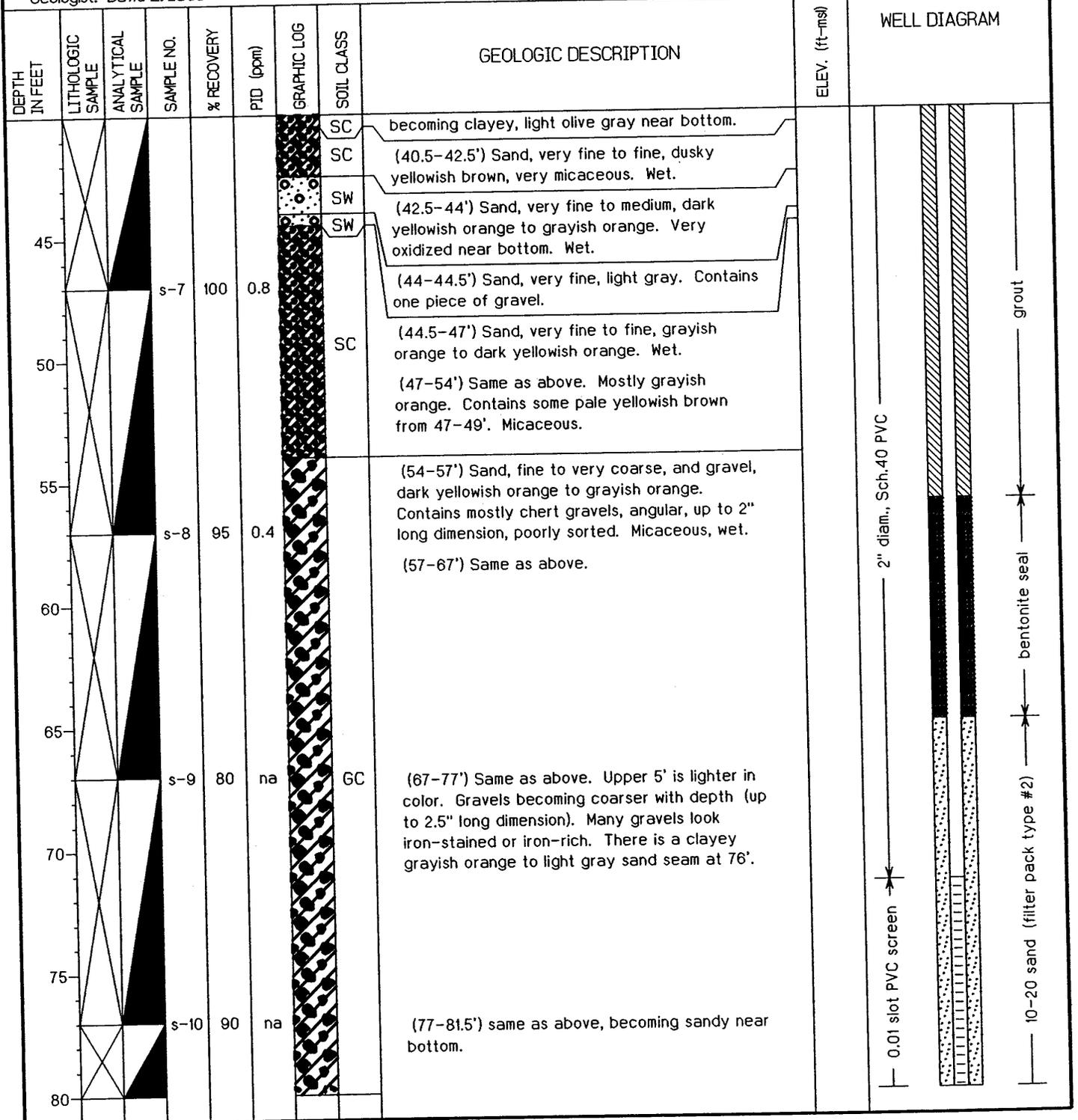
Groundwater Elevation:

Drilling Company: *Alliance*

Total Depth: *87 feet*

Geologist: *David E. Ladd*

Well Screen: *71.5 to 81.5 feet*





Environmental & Safety Designs, Inc.

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: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

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 SC CL	(81.5-83.5') Tcf. Sand, very fine, dark yellowish orange mottled with light gray and olive gray.  (83.5-87') Clay, and sand, very fine, dusky yellowish brown with light gray sand seams. Lignitic, especially at top. Micaceous. .1-87 <b>Bottom of boring at 87'bgs</b>		
90										
95										
100										
105										
110										
115										
120										



**Environmental & Safety Designs, Inc.**

**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: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

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
0-6'								Grass and roots.		
0.5-5'							ML	Moderate brown streaked with yellowish gray silt, dry.		
5-8.5'			s-1	80	0.4			Same as above, without yellow gray streaks Wet from 7-8.5'.		
8.5-15'							ML	NO RECOVERY from 8.5-15'.		
15-23'			s-2	35	BG			Dark yellowish brown clayey silt, moist and medium stiff.		
23-25'							BG	Moderate yellowish brown clayey silt, moist and medium stiff.		
25-29'			s-3	80	BG		ML	Dark yellowish orange mixed with yellowish gray clayey silt, moist and medium stiff.		
27-29'								Manganese and iron streaks.		
29-34'							ML	Moderate yellowish brown sandy silt with yellowish gray streaks.		
34-35'			s-4	105	BG		SM	Grayish orange to dark yellowish orange silty sand.		
35-38.5'							CL	Light brown to moderate reddish brown (rust-colored) sandy clay, with grayish orange silt, stiff and moist.		
38.5-40'							SC	Dark yellowish orange fine sand (micaceous)		



**Environmental & Safety Designs, Inc.**

**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: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

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	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			s-5	90	0.2	[Cross-hatched pattern]	SC	(38.5-65.5') Light brown fine sand with grayish orange and yellowish gray fine sand.  (45-55') Grayish orange fine sand, micaceous.		<p>2" diam., Sch. 40 PVC</p> <p>0.01 slot PVC screen</p> <p>10-20 sand (filter pack type #2)</p> <p>grout</p> <p>bentonite plug</p> <p>bentonite seal</p> <p>bentonite plug</p>
55			s-6	85	0.4	[Cross-hatched pattern]	SC	Same as above.		
60						[Cross-hatched pattern]	SC	(55-65.5') Grayish orange fine sand, micaceous.		
65			s-7	75	0.2	[Dotted pattern]	SW	Grayish orange gravelly sand, fine to coarse-grained.		
70						[Dotted pattern]	GM	(65.5-67.5') Pale brown sandy gravel. (67.5-68.5') Gravels up to 2" long dimension. (68.5-78') Grayish orange and dark yellowish orange sandy gravel.		
75			s-8	85	0.6	[Dotted pattern]	GM			
80						[Dotted pattern]	SM	(78-79.5') Grayish orange and light gray fine silty sand.		



**Environmental & Safety Designs, Inc.**

**Log of Monitoring Well N12G02LF**

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>Apron Area, near N-12 site</i>
Project No: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1445 on 8-4-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1630 on 8-4-98</i>	Depth to Groundwater: <span style="float: right;">Measured:</span>
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>85 feet</i>
Geologist: <i>Ben Brantley</i>	Well Screen: <i>67 to 77 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (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 
90								<b>Boring completed at 85'bgs.</b>		
95										
100										
105										
110										
115										
120										

# EnSafe/Allen & Hoshall

# Monitoring Well 018G01LF

Project: NSA-Midsouth SWMU 18

Location: NSA Mid-south, Millington, TN

Project No: 0146

Surface Elevation: feet msl

Started at 1400 on 4-12-99

TOC Elevation: feet msl

Completed at 0900 on 4-13-99

Depth to Groundwater: feet Measured:

Drilling Method: Rotasonic; 4" barrel through 6" casing

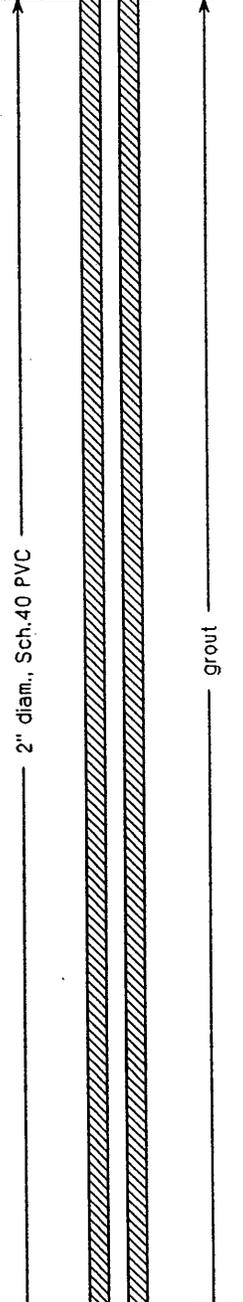
Groundwater Elevation: feet msl

Drilling Company: Alliance

Total Depth: 93 feet

Geologist: Carol Davis

Well Screen: 48 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
0								Concrete over base to 1'.		
5			1	88			CL	Loess consisting of orange brown silty clay. Moist.		 <p>2" diam., Sch. 40 PVC</p> <p>grout</p>
10							ML	Loess consisting of orange brown silt. Moist.		
15			2	100			SP	Iron staining and concretions or nodules from 11 to 18.5'. Orange brown fine sand.		
25							CL	Pale orange brown to yellowish gray, slightly silty clay, with minor zones of very fine sandy clay.		

# EnSafe/Allen & Hoshall

# Monitoring Well 018G01LF

Project: NSA-Midsouth SHMU 18

Location: NSA Mid-south, Millington, TN

Project No: 0146

Surface Elevation: feet msl

Started at 1400 on 4-12-99

TOC Elevation: feet msl

Completed at 0900 on 4-13-99

Depth to Groundwater: feet Measured:

Drilling Method: Rotasonic; 4" barrel through 6" casing

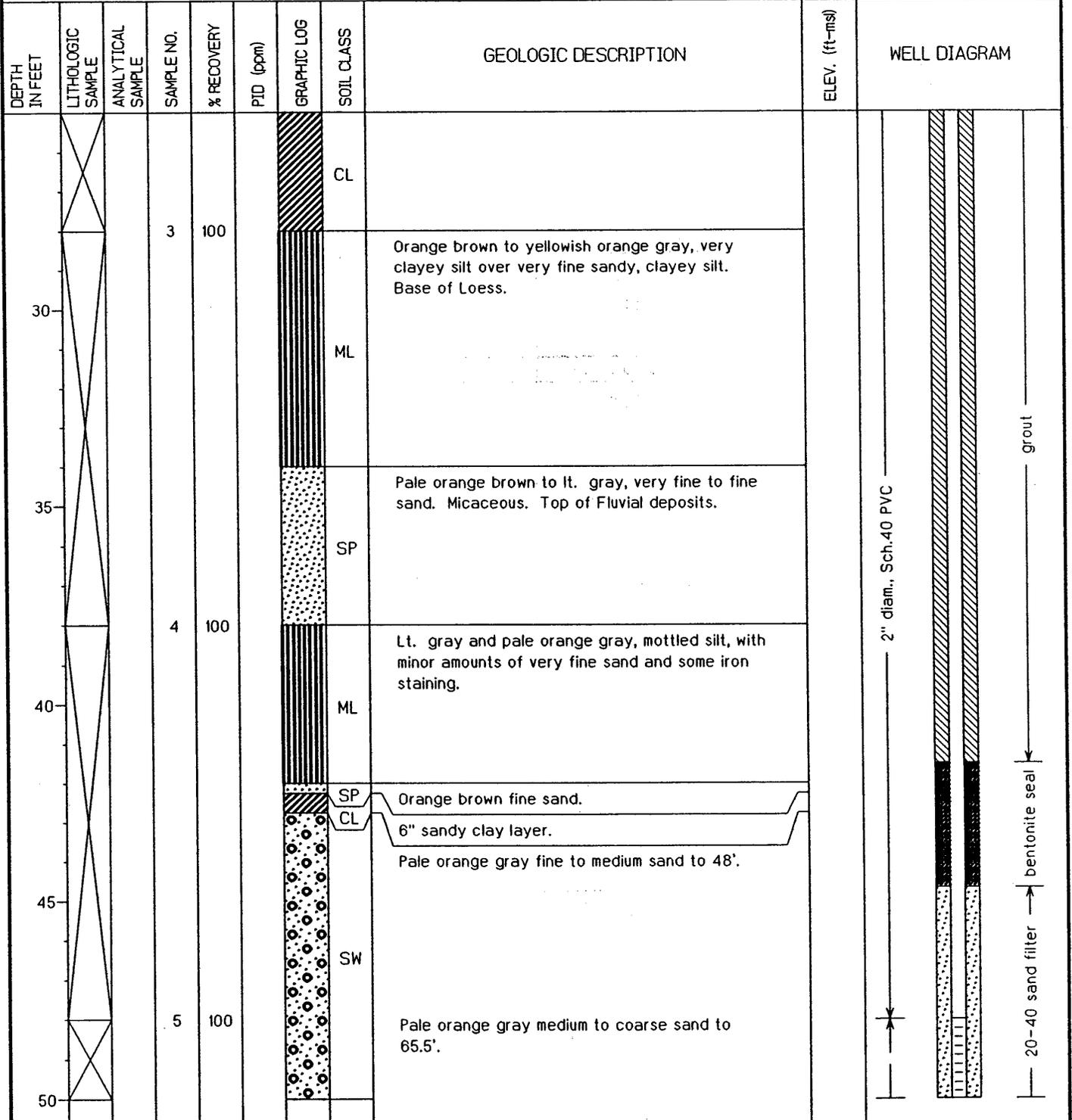
Groundwater Elevation: feet msl

Drilling Company: Alliance

Total Depth: 93 feet

Geologist: Carol Davis

Well Screen: 48 to 88 feet



# EnSafe/Allen & Hoshall

# Monitoring Well 018G01LF

Project: NSA-Midsouth SWMU 18

Location: NSA Mid-south, Millington, TN

Project No: 0146

Surface Elevation: feet msl

Started at 1400 on 4-12-99

TOC Elevation: feet msl

Completed at 0900 on 4-13-99

Depth to Groundwater: feet Measured:

Drilling Method: Rotasonic; 4" barrel through 6" casing

Groundwater Elevation: feet msl

Drilling Company: Alliance

Total Depth: 93 feet

Geologist: Carol Davis

Well Screen: 48 to 88 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
55			6	100			SW	Some very coarse sand, gravel pieces, and clay nodules from 50.5 to 65.5.		<p>0.01 slot PVC screen</p> <p>20-40 sand filter</p>
60							SW CL	Alternating lt. olive gray clay with some lignite bands and medium to coarse sand.		
65			7	100			SW	Pale orange gray medium to coarse sand. Some very coarse sand, gravel pieces, and clay nodules present.		
70										
75										

# EnSafe/Allen & Hoshall

# Monitoring Well 018G01LF

Project: NSA-Midsouth SWMU 18

Location: NSA Mid-south, Millington, TN

Project No.: 0146

Surface Elevation: feet msl

Started at 1400 on 4-12-99

TOC Elevation: feet msl

Completed at 0900 on 4-13-99

Depth to Groundwater: feet Measured:

Drilling Method: Rotasonic; 4" barrel through 6" casing

Groundwater Elevation: feet msl

Drilling Company: Alliance

Total Depth: 93 feet

Geologist: Carol Davis

Well Screen: 48 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
80			8	80			SW	Turns to medium to very coarse sand from 80 to 83.5'.		<p>0.01 slot PVC screen</p> <p>20-40 sand filter</p> <p>backfill</p>
85							GW	Very fine to medium gravel.		
							ML	Orange brown and lt. gray, mottled or banded, very fine sandy silt. Base of Fluvial deposits.		
			9	100			ML CL	Very dark brown with gray banding, silty clay to clayey silt. Top of Cockfield.		
90							ML	Very dk. brown with gray banding, slightly clayey silt. Micaceous.		
95			10	100				End of boring @ 93' bgs.		
100										



# Log of Monitoring Well 007G19MF

Project: <i>NSA Memphis</i>	Location: <i>Millington, TN. SWMU 7 - Building N-126</i>
Project No.: <i>0094-08420</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1130 on 3-13-97</i>	TOC Elevation: <i>291.62 feet msl</i>
Completed at <i>1140 on 3-14-97</i>	Coordinates: Easting: <i>815409.00</i> Northing: <i>393398.88</i>
Drilling Method: <i>Hollow Stem Augers</i>	Groundwater Elevation: <i>261.62</i>
Drilling Company: <i>Tri-State Drilling</i>	Total Depth: <i>69.0 feet</i>
Geologist: <i>Charlie Ivey</i>	Well Screen: <i>57 to 67 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0-2'			1		.1	[Concrete symbol]		Lithologic log from neighboring well 007G12LF (0-2') Concrete.		[Well Diagram: 0-2' concrete section]
2-22'			2	70	.1	[Silt symbol]	ML	(2-22') Silt, light brown to gray.		[Well Diagram: 2-22' silt section]
14-16'					.1	[Silt symbol]		Silt, light brown to yellowish-brown, with some organic material, moist.		[Well Diagram: 14-16' silt section]
14-16'					.1	[Silt symbol]		(14-16') With dark yellowish-orange mottling.		[Well Diagram: 14-16' silt section]
14-16'					.1	[Silt symbol]		Silt, yellowish-brown to yellowish-gray, wet.		[Well Diagram: 14-16' silt section]
25-34'			3	100		[Clay symbol]	CL ML	Clay and silt, brown, with some iron concretions.		[Well Diagram: 25-34' clay/silt section]
25-34'						[Clay symbol]		Silt and clay, yellowish-brown to light brown, with some dark yellowish-orange mottling.		[Well Diagram: 25-34' clay/silt section]
34-37'			4	86		[Contact symbol]		Contact with Fluvial Deposits (34-90') estimated at 34'.		[Well Diagram: 34-37' contact section]
37-43'						[Sand symbol]	SC SM	(37-43') Sand, clay, and silt, reddish-brown to dark yellowish-orange, moist.		[Well Diagram: 37-43' sand section]

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: *291.62 feet msl*

Completed at 1140 on 3-14-97

Coordinates: Easting: *815409.00* Northing: *393398.88*

Drilling Method: *Hollow Stem Augers*

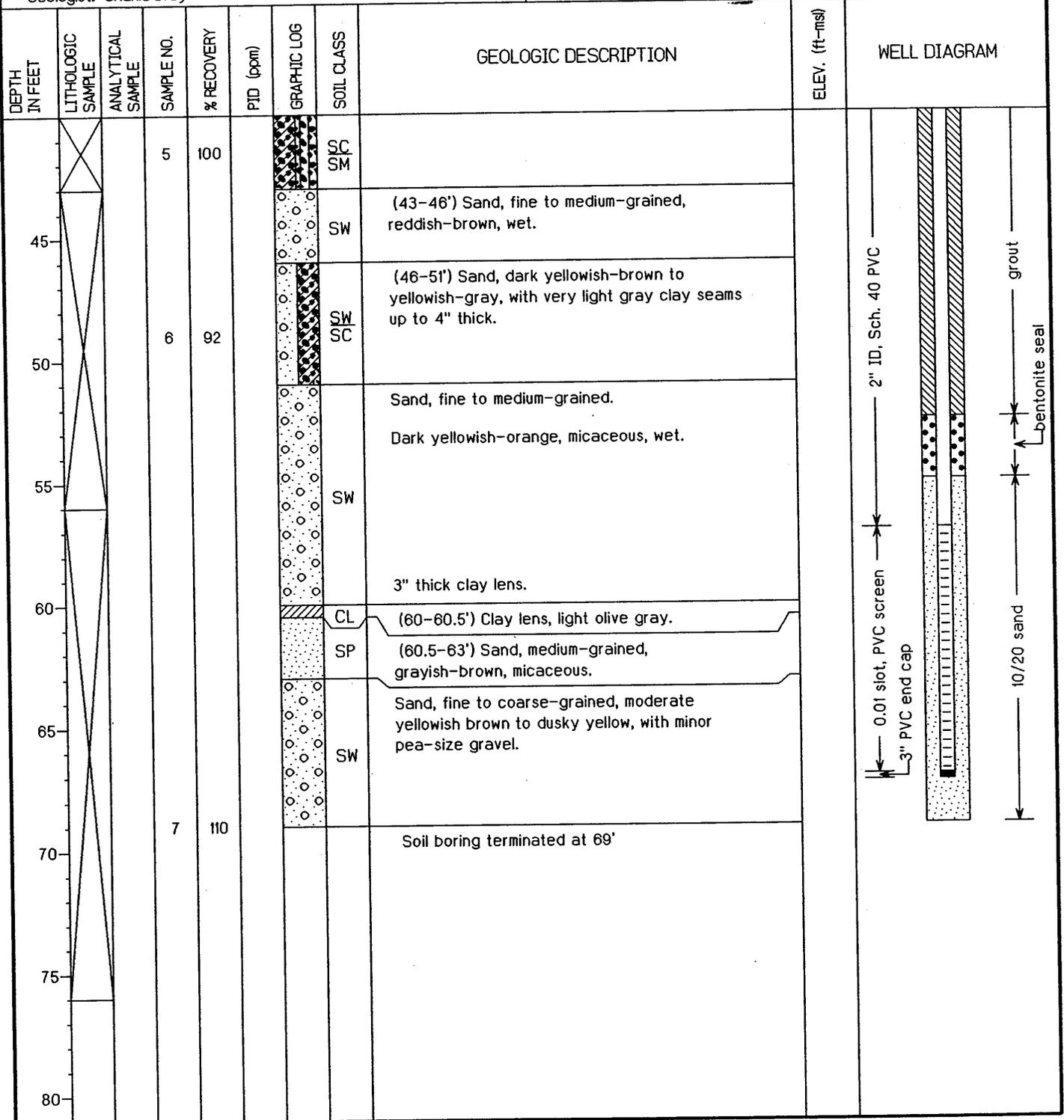
Groundwater Elevation: *261.62*

Drilling Company: *Tri-State Drilling*

Total Depth: *69.0 feet*

Geologist: *Charlie Ivey*

Well Screen: *57 to 67 feet*





**Environmental & Safety Designs, Inc.**

**Log of Monitoring Well 007G2OLF**

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SMMU 7/AOC A</i>
Project No: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1055 (soil boring) on 7-13-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1800 (soil boring) on 7-13-98</i>	Depth to Groundwater: <i>Measured:</i>
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>85 feet</i>
Geologist: <i>Ben Brantley and Carol Davis</i>	Well Screen: <i>65 to 75 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							Ccr	Surface conditions: Concrete (Ccr) from 0-8"; asphalt mixed with sand (subgrade) from 8-12".		
5			s-1	75	na		ML Dark yellowish brown mottled with medium light gray clayey silt, dry with diesel odor.  (5-6') Moderate brown to medium yellowish brown friable/hard silt.			
10							ML (6-9') Olive gray clayey silt, moist.			
15			s-2	80	na		(9-21') Moderate yellowish brown mottled with light gray silt, moist. Lignite grains scattered throughout.			
20							Moderate yellowish brown with iron staining and light olive gray mottling/lenses of silt, very moist.			
25			s-3	85	na		ML (25-35') Pale yellowish brown to light olive gray clayey silt with iron stains (25-27'), moist and medium stiff.			
30										
35			s-4	70	na			Same as above, to 42.5'.  NOTE: slightly sandy (very fine) and iron magnesium partings (36-41').		
40										



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G20LF

Project: NAS Memphis Millington, TN

Location: SWMU 7/AOC A

Project No.: 0094

Surface Elevation: feet msl

Started at 1055 (soil boring) on 7-13-98

TOC Elevation: feet msl

Completed at 1800 (soil boring) on 7-13-98

Depth to Groundwater: Measured:

Drilling Method: Rotasonic; 4" core barrel through 6" casing

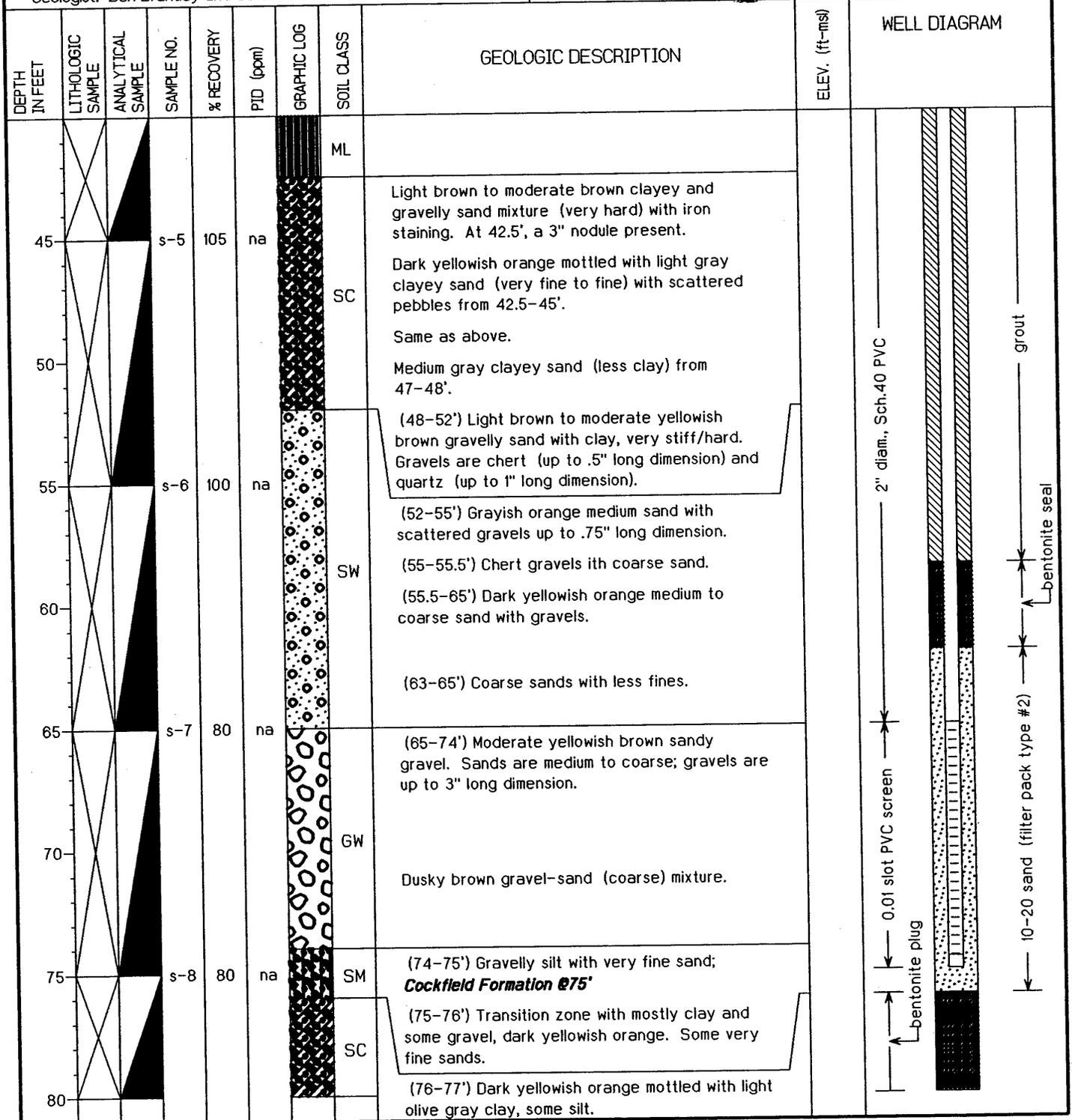
Groundwater Elevation:

Drilling Company: Alliance

Total Depth: 85 feet

Geologist: Ben Brantley and Carol Davis

Well Screen: 65 to 75 feet





Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G20LF

Project: *NAS Memphis Millington, TN*

Location: *SHMU 7/AOC A*

Project No.: *0094*

Surface Elevation: *feet msl*

Started at *1055 (soil boring) on 7-13-98*

TOC Elevation: *feet msl*

Completed at *1800 (soil boring) on 7-13-98*

Depth to Groundwater: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

Drilling Company: *Alliance*

Total Depth: *85 feet*

Geologist: *Ben Brantley and Carol Davis*

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)	WELL DIAGRAM
85			s-9	110	na		SC	(77-85') Dusky brown to dusky yellowish brown clay with some silty lenses, micaceous. Some patches of very fine sand.  <b>Boring completed at 85'bgs</b>		bentonite plug
90										
95										
100										
105										
110										
115										
120										

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SNMU 7/AOC A</i>
Project No: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>0840 (see soil boring log) on 7-14-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1115 (see soil boring log) on 7-14-98</i>	Depth to Groundwater: Measured:
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>85 feet</i>
Geologist: <i>Ben Brantley</i>	Well Screen: <i>65 to 75 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0-8"							Ccr	Surface conditions: Concrete (Ccr) from 0-8", with sand and gravel subgrade.		
1-5'							ML	(1-5') Moderate to dark yellowish brown silt, hard and dry.		
2.5-3'			s-1	80	na		ML	Greenish gray staining and diesel odor from 2.5-3'.		
3-6'							ML	Same as above to 6'.		
6-8.5'								(6-8.5') Olive gray to moderate to yellowish brown clayey silt, with manganese staining and streaks.		
8.5-15'								NO RECOVERY from 8.5-15'.		
15-28'			s-2	35	na			(15-28') Dark yellowish orange streaked with moderate yellowish brown clayey silt.		
28-32'							ML	Same as above.		
32-32.5'			s-3	85	na		ML	(28-32') Pale yellowish brown clayey silt with iron stains and streaks, medium stiff and moist.		
32.5-35'								(32-32.5') Olive gray clayey silt.		
35-37'			s-4	75	na			NO RECOVERY from 32.5-35'.		
37-41.5'							CL	(35-37') Moderate yellowish brown with light gray streaking, silty clay, moist, medium stiff.		
41.5-40'								(37-41.5') Moderate brown to moderate yellowish brown with light gray streaks, sandy clay, medium stiff.		

Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No: *0094*

Surface Elevation: *feet msl*

Started at *0840 (see soil boring log) on 7-14-98*

TOC Elevation: *feet msl*

Completed at *1115 (see soil boring log) on 7-14-98*

Depth to Groundwater: *Measured:*

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

Drilling Company: *Alliance*

Total Depth: *85 feet*

Geologist: *Ben Brantley*

Well Screen: *65 to 75 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			s-5	100	na		CL	(41.5-45') Moderate yellowish brown and light gray sandy clay. (41.5-42.5') Streaks of organic material. (45-47') Same as above.		<p>2" diam., Sch.40 PVC            0.01 slot PVC screen            bentonite plug            bentonite seal            10-20 sand (filter pack type #2)            grout</p>
50							SM	(47-48') Moderate yellowish brown and light olive gray silty sand with scattered pebbles.		
55			s-6	90	na		SW	(48-55') Gravelly sand, medium to coarse, dark yellowish orange. Contains some light gray material and iron-stained material at 48'. Contains some dark yellowish brown material from 53-55'. Gravel is 1.5" long dimension.  (55-61') Sandy gravel, dark yellowish orange, medium to coarse, wet.		
65			s-7	100	na		GM	(61-65') Gravel, sandy and silty, medium to coarse sands, dark yellowish brown to moderate brown. Gravel is 3" long dimension, wet.		
70								NO RECOVERY from 65-70'.		
75			s-8	65	na		CL	(70-71') Gravel, chert, up to 2" long dimension, wet.		
							GC	(71-74.5') Gravel, sandy, dark yellowish orange with a pale yellowish orange seam at 74', wet.		
							CL	Clay, dusky yellowish brown, micaceous.		
							GC	(75-77') Clay, sand, medium to coarse, and gravel. Moderate brown, mottled with dusky yellowish brown, dark yellowish brown, and dark yellowish orange. Gravel up to 2" long dimension.		
80							CL			



**Environmental & Safety Designs, Inc.**

**Log of Monitoring Well 007G2ILF**

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>0840 (see soil boring log) on 7-14-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1115 (see soil boring log) on 7-14-98</i>	Depth to Groundwater: Measured:
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>85 feet</i>
Geologist: <i>Ben Brantley</i>	Well Screen: <i>65 to 75 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			s-9	105	na		CL	(77-85') Tcf. Clay, dusky yellowish brown mottled with light gray sand seams, very fine to fine. Contains scattered lignitic material.  Contains much more light gray sand from 83-85'.  Sample: 007S002184 @ 84'bgs collected for VOC and TOC analyses.		<p>bentonite plug</p> <p>Lost Shelby Tube</p>
90							st	3" diameter Shelby Tube broke off in hole (no recovery).  <b>Boring completed at 85'bgs</b>		
95										
100										
105										
110										
115										
120										



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G22LF

Project: NAS Memphis Millington, TN

Location: SWMU 7/AOC A

Project No: 0094

Surface Elevation: feet msl

Started at 1315 on 7-18-98

TOC Elevation: feet msl

Completed at 0935 on 7-19-98

Depth to Groundwater: Measured:

Drilling Method: Rotasonic; 4" core barrel through 6" casing

Groundwater Elevation:

Drilling Company: Alliance

Total Depth: 127 feet

Geologist: David E. Ladd

Well Screen: 67.5 to 77.5 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0-2.5'							Ccr	Surface conditions: Concrete on runway (0-2.5').		
2.5-7'			s-1	na	BG		ML	(2.5-7') Silt, clayey, moderate yellowish brown with olive gray material. Contains ground asphalt near top. Sample smells like fuel.		
7-10.5'			s-2	55	1500		ML	(7-10.5') Silt, clayey, olive gray, hard and dry. Contains some dark yellowish brown material.		
10.5-11.5'								(10.5-11.5') Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled with olive gray. Contains iron-manganese concretions. Very hard and dry to ~11.5'. Lost returns from 11.5-17'.		
11.5-17'			s-3	50	900		ML	(17-27') Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled with some dark yellowish orange. Very moist.		
17-27'								(17-27') Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled with some dark yellowish orange. Very moist.		
27-29'			s-4	100	15			(27-29') Same as above, becoming with light olive gray.		
29-37'							ML	(29-37') Silt, clayey, olive gray to medium dark gray, containing iron-manganese nodules and light olive brown material below 31'. Near 37', becoming mostly medium dark gray and dark yellowish brown. Moist.		
37-127'										



**Environmental & Safety Designs, Inc.**

**Log of Monitoring Well 007G22LF**

Project: *NAS Memphis Millington, TN*

Location: *SWMJ 7/AOC A*

Project No.: *0094*

Surface Elevation: *feet msl*

Started at *1315 on 7-18-98*

TOC Elevation: *feet msl*

Completed at *0935 on 7-19-98*

Depth to Groundwater: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

Drilling Company: *Alliance*

Total Depth: *127 feet*

Geologist: *David E. Ladd*

Well Screen: *67.5 to 77.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
37-37.5'			s-5	100	BG		ML	(37-37.5') Same as above.		
37.5-46'						ML	(37.5-46') Silt and clay, moderate yellowish brown to dark yellowish orange with light gray to olive gray material. Contains scattered iron-manganese nodules. Becoming slightly sandy with more light gray material near 46'.			
46-47'			s-6	100	BG		CL	(46-47') Clay, sand, very fine, and silt, moderate yellowish brown mottled with light gray to olive gray and dark yellowish orange. Contains scattered gravel. Moist.		
47-49.5'						SC	SC	(47-49.5') Same as above. Contains iron-manganese nodules.		
49.5-52.5'						SC	SC	(49.5-52.5') Sand, very fine to fine, and clay with scattered gravels, dark yellowish orange to moderate yellowish brown mottled with light gray. Gravel up to 1.5" long dimension. Wet. Gravel is chert and quartz.		
52.5-57'			s-7	120	BG		SP	(52.5-57') Sand, very fine to fine, dark yellowish orange to moderate yellowish brown, mottled with light gray. Slightly micaceous. Contains scattered clay seams. At 56.5', contains light gray clay seam with organic streaks. Wet.		
57-57.5'								(57-57.5') Same as above.		
57.5-67'								(57.5-67') Sand, coarse to very coarse, and gravel, dark yellowish orange to very pale orange. Gravel is chert and quartz up to 2" long dimension, angular to rounded. Wet, upper 1' is clayey.		
67-77'			s-8	120	0.4			(67-77') Same as above. 67.5-70' is darker in color, containing lignitic sand grains. Red iron-staining near 76'. 76-77' contains silt and smaller gravels.		



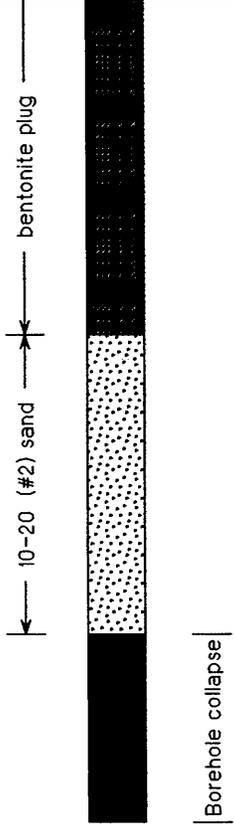
**Environmental & Safety Designs, Inc.**

**Log of Monitoring Well 007G22LF**

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1315 on 7-18-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>0935 on 7-19-98</i>	Depth to Groundwater: <span style="float: right;">Measured:</span>
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>127 feet</i>
Geologist: <i>David E. Ladd</i>	Well Screen: <i>67.5 to 77.5 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
75			s-9	110	BG		SP	(77-77.5') Same as above.		<p>0.01 slot PVC screen</p> <p>10-20 sand (filter pack type #2)</p> <p>bentonite plug</p>
80						CL	(77.5-87') Clay, sandy, dusky yellowish brown to dark yellowish brown mottled with light gray sand seams. Contains scattered lignite. Abundant lignite and some gravel at top 2" of section. Very micaceous.  Took composite TOC sample 007S002287 from 77-87'.			
85			s-10	110	0.2		CL	(87-92.5') Same as above. Contains more sand.		
90							SC	(92.5-97') Sand, very fine to fine, light gray with dark yellowish brown clay seams. Contains abundant lignite and mica. Wet.  Took composite TOC sample 007S002297 from 87-97' on 7/19.		
95			s-11	110	BG		SC	(97-107') Same as above. Color becoming olive gray to light olive gray, less lignite. Took composite TOC sample 007S022107 from 97-107' on 7/19. Collected VOC samples 007S022098 from well 007G22UC at 98' on 7/29.		
100										
105										

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1315 on 7-18-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>0935 on 7-19-98</i>	Depth to Groundwater: Measured:
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>127 feet</i>
Geologist: <i>David E. Ladd</i>	Well Screen: <i>67.5 to 77.5 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
								<i>Bottom of boring for well 007G22UC (TD=105')</i>		
110			s-12	120	1500		SC	(107-117') Same as above, abundant lignite, especially near 112'. Took composite TOC sample 007S022117 from 107-117' on 7/19.		
115			s-13	120	0.4			(117-127') Same as above. Piece of marcasite nodule at 118'. Abundant lignite at ~119' and ~123'. Clay seam ~7" thick at 126'.  Took composite TOC sample 007S022127 from 117-127' on 7/19.  Took VOC and TOC sample 007S022123 from 123' on 7/19.		
120			s-14	100	BG			<b>Bottom of boring at 127'</b>  This lithologic log also serves as the log for 007G22UC, which was drilled to 105'.		
125										
130										
135										
140										



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G22UC

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SHMU 7/AOC A</i>
Project No: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at on <i>7-29-98</i>	TOC Elevation: <i>feet msl</i>
Completed at on <i>7-29-98</i>	Depth to Groundwater: Measured:
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>105 feet</i>
Geologist: <i>David E. Ladd</i>	Well Screen: <i>93 to 103 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							Ccr	Surface conditions: Concrete on runway (0-2.5').		<p>2" diam., Sch. 40 PVC</p> <p>grout</p>
5			s-1	na	BG		ML	(2.5-7') Silt, clayey, moderate yellowish brown with olive gray material. Contains ground asphalt near top. Sample smells like fuel.		
10			s-2	55	1500		ML	(7-10.5') Silt, clayey, olive gray, hard and dry. Contains some dark yellowish brown material.		
15			s-3	50	900		ML	(10.5-11.5') Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled with olive gray. Contains iron-manganese concretions. Very hard and dry to ~11.5'. Lost returns from 11.5-17'.		
20			s-3	50	900		ML	(17-27') Silt, clayey, moderate yellowish brown to dark yellowish orange, mottled with some dark yellowish orange. Very moist.		
25			s-4	100	15		ML	(27-29') Same as above, becoming with light olive gray.		
30							ML	(29-37') Silt, clayey, olive gray to medium dark gray, containing iron-manganese nodules and light olive brown material below 31'. Near 37', becoming mostly medium dark gray and dark yellowish brown. Moist.		
35										



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G22UC

Project: NAS Memphis Millington, TN

Location: SWMU 7/AOC A

Project No: 0094

Surface Elevation: feet msl

Started at on 7-29-98

TOC Elevation: feet msl

Completed at on 7-29-98

Depth to Groundwater: Measured:

Drilling Method: Rotasonic; 4" core barrel through 6" casing

Groundwater Elevation:

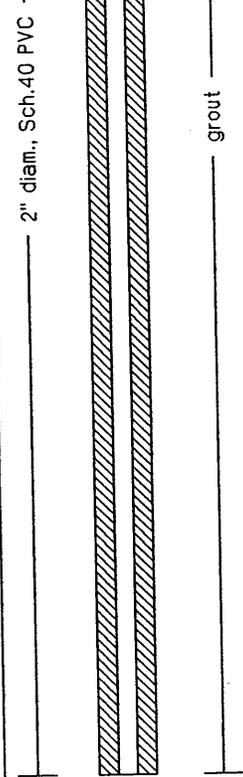
Drilling Company: Alliance

Total Depth: 105 feet

Geologist: David E. Ladd

Well Screen: 93 to 103 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
37-37.5'			s-5	100	BG		ML	(37-37.5') Same as above.		
37.5-46'							ML	(37.5-46') Silt and clay, moderate yellowish brown to dark yellowish orange with light gray to olive gray material. Contains scattered iron-manganese nodules. Becoming slightly sandy with more light gray material near 46'.		
46-47'			s-6	100	BG		CL	(46-47') Clay, sand, very fine, and silt, moderate yellowish brown mottled with light gray to olive gray and dark yellowish orange. Contains scattered gravel. Moist.		
47-49.5'							SC	(47-49.5') Same as above. Contains iron-manganese nodules.		
49.5-52.5'							SC	(49.5-52.5') Sand, very fine to fine, and clay with scattered gravels, dark yellowish orange to moderate yellowish brown mottled with light gray. Gravel up to 1.5" long dimension. Wet. Gravel is chert and quartz.		
52.5-57'			s-7	120	BG		SC	(52.5-57') Sand, very fine to fine, dark yellowish orange to moderate yellowish brown, mottled with light gray. Slightly micaceous. Contains scattered clay seams. At 56.5', contains light gray clay seam with organic streaks. Wet.		
57-57.5'								(57-57.5') Same as above.		
57.5-67'							SP	(57.5-67') Sand, coarse to very coarse, and gravel, dark yellowish orange to very pale orange. Gravel is chert and quartz up to 2" long dimension, angular to rounded. Wet, upper 1' is clayey.		
67-77'			s-8	120	0.4			(67-77') Same as above. 67.5-70' is darker in color, containing lignitic sand grains. Red iron-staining near 76'. 76-77' contains silt and smaller gravels.		





Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G22UC

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>on 7-29-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>on 7-29-98</i>	Depth to Groundwater: Measured:
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>105 feet</i>
Geologist: <i>David E. Ladd</i>	Well Screen: <i>93 to 103 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
75			s-9	110	BG		SP	(77-77.5') Same as above.		<p>2" diam., Sch.40 PVC</p> <p>0.01 slot PVC screen</p> <p>grout</p> <p>bentonite seal</p> <p>10-20 sand (filter pack type #2)</p>
80							CL	(77.5-87') Clay, sandy, dusky yellowish brown to dark yellowish brown mottled with light gray sand seams. Contains scattered lignite. Abundant lignite and some gravel at top 2" of section. Very micaceous. Took composite TOC sample 007S002287 from 77-87'.		
85			s-10	110	0.2			(87-92.5') Same as above. Contains more sand.		
90							SC	(92.5-97') Sand, very fine to fine, light gray with dark yellowish brown clay seams. Contains abundant lignite and mica. Wet. Took composite TOC sample 007S002297 from 87-97' on 7/19.		
95			s-11	110	BG			(97-105') Same as above. Color becoming olive gray to light olive gray, less lignite. Took composite TOC sample 007S022107 from 97-107' on 7/19 (see boring log for well 007G22LF). Collected VOC samples 007S022098 from well 007G22UC at 98' on 7/29.		
100										
105			s-12	120	1500					



# Log of Monitoring Well 007G23LF

Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No: *0094*

Surface Elevation: *feet msl*

Started at *0915 on 7-31-98*

TOC Elevation: *feet msl*

Completed at *1200 on 7-31-98*

Coordinates: Easting: \_\_\_\_\_ Northing: \_\_\_\_\_

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation: \_\_\_\_\_

Drilling Company: *Alliance*

Total Depth: *85 feet*

Geologist: *David E. Ladd*

Well Screen: *72 to 82 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0-15'							Ccr	(0-15') Surface conditions: Asphalt and concrete (Ccr)		<p>2" diam., Sch. 40 PVC</p> <p>grout</p>
1.5-2.5'							CL	(1.5-2.5') Clay and silt, olive gray to greenish gray; moist.		
2.5-5'			s-1	57	0.2		ML	(2.5-5') Silt, moderate yellowish brown mottled with olive gray.		
5-9.5'								(5-9.5') Same as above, less olive gray material with depth.		
9.5-10'			s-2	45	1.0		CL	(9.5-10') Silt, olive gray to greenish gray.		
10-15'								(10-15') NO RECOVERY; Lost returns, driller said material was very soft.		
15-19'							CL	(15-19') Same as above (9.5-10') but clayey, becoming mottled with moderate yellowish brown material near 19'. Contains root material at 17'; moist.		
19-25'							ML	(19-25') Silt, moderate yellowish brown mottled with dark yellowish orange and olive gray. Contains organic material, especially near 25'		
25-35'			s-3	85	0.2		CL	(25-35') Clay, silty, olive gray becoming mottled with dark yellowish orange and light olive brown material below 31'. Also contains iron manganese nodules below 31'. Moist near top.		
35-36'								(35-36') Same as above with some light gray material.		
36-42.5'			s-4	85	0.2		CL	(36-42.5') Clay, sandy, moderate yellowish brown to dark yellowish orange mottled with light gray. Contains scattered gravel near bottom. Contains iron manganese nodules and organic material.		



# Log of Monitoring Well 007G23LF

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SHMU 7/AOC A</i>
Project No: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>0915 on 7-31-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1200 on 7-31-98</i>	Coordinates: Easting: _____ Northing: _____
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation: _____
Drilling Company: <i>Alliance</i>	Total Depth: <i>85 feet</i>
Geologist: <i>David E. Ladd</i>	Well Screen: <i>72 to 82 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			s-5	90	BG		CL	(42.5-45') Sand, clay, and gravel, dark yellowish orange. Contains a little light gray material, higher clay content, and less gravel near top. Moist; hard. Gravel is mostly rounded; chert up to .75" long dimension. Contains iron concretions.		<p>2" diam., Sch.40 PVC</p> <p>grout</p> <p>bentonite seal</p> <p>0.01 slot PVC screen</p> <p>10-20 sand (filter pack type #2)</p>
50					BG		SC	(45-52') Same as above, less gravel from 46-49'. Poorly sorted. Contains moderate brown to dark reddish brown material from 50-52'. Moist to wet.		
55			s-6	95	BG		CL	(52-54') Clay, grayish orange mottled with moderate orange pink and grayish orange pink. Moist and soft.		
55					BG		SC	(54-55') Sand, very fine to fine, dark yellowish orange. Contains grayish orange clay seams. Wet.		
55					BG		CL	(55-56') Sand, very fine to fine, dark yellowish orange. Micaceous, lignitic, wet.		
55					BG		SC	(55-56') Sand, very fine to fine, dark yellowish orange. Micaceous, lignitic, wet.		
55					BG		CL	(56-56.5') Clay, grayish orange mottled with moderate orange pink and grayish orange pink. Moist, soft.		
55					BG		SC	(56-56.5') Clay, grayish orange mottled with moderate orange pink and grayish orange pink. Moist, soft.		
65			s-7	95	BG		SC	(56.5-57.5') Sand, very fine to fine, dark yellowish orange. Micaceous, lignitic, wet.		
65					BG		SC	(57.5=58') Sand, very fine to fine, dusky yellowish brown mottled with dark yellowish orange and light gray. Micaceous, highly lignitic, wet.		
65					BG		SC	(57.5=58') Sand, very fine to fine, dusky yellowish brown mottled with dark yellowish orange and light gray. Micaceous, highly lignitic, wet.		
70					BG		CL	(58-58.5') Clay, grayish orange mottled with moderate orange pink and grayish orange pink. Moist and soft.		
75			s-8	90	BG		SW	(58.5-61') Sand, very fine to fine, dark yellowish orange. Micaceous. Lignitic, wet. Highly lignitic at top.		
75					BG		CL	(61-61.5') Clay, grayish orange to light gray. Moist and soft.		
80					BG		SW	(61.5-65') Sand, very fine to fine, dark yellowish orange. Micaceous, lignitic and wet.		

Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No: *0094*

Surface Elevation: *feet msl*

Started at *0915 on 7-31-98*

TOC Elevation: *feet msl*

Completed at *1200 on 7-31-98*

Coordinates: Easting: \_\_\_\_\_ Northing: \_\_\_\_\_

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation: \_\_\_\_\_

Drilling Company: *Alliance*

Total Depth: *85 feet*

Geologist: *David E. Ladd*

Well Screen: *72 to 82 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	85	BG		SW	(85-86.5') Sand, very fine to fine, with scattered gravel, grayish orange to light gray. Contains scattered light gray clay seams. Wet.		<p>Shelby Tube</p> <p>bentonite plug</p> <p>10-20 sand (filter pack type #2)</p>
							CL	(86.5-88.5') Sand, medium to coarse, gravel and clay, olive gray to very light gray. Gravel up to 1" long dimension. Poorly sorted, wet, lignitic.		
			ST	100	BG		S.T.	(88.5-75') Sand, coarse to very coarse, and gravel, dark yellowish orange. Becoming grayish orange from 71-73' with less gravel. Gravel is mostly chert up to 2" long dimension. Poorly sorted, wet. Highly lignitic at top.		
90								(75-83.5') Sand, medium to very coarse, and gravel, dark yellowish orange. Gravel up to 3" long dimension, mostly rounded quartz and rounded to angular chert. Gravel becoming larger near bottom, with less sand. Wet.		
95								(83.5-85') Clay, dusky yellowish brown mottled with light gray sand seams. Highly lignitic, moist.		
100								Bottom of boring at 85'. Took 3" diameter shelly tube from 85-87.5'.		
105										
110										
115										
120										

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>0920 on 7-30-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1515 on 7-30-98</i>	Depth to Groundwater: Measured:
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>95 feet</i>
Geologist: <i>David E. Ladd</i>	Well Screen: <i>60 to 70 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0-2.5'							Ccr	(0-2.5') Surface conditions: Asphalt and concrete (Ccr)		
2.5-5'			s-1	120	0.2		ML	(2.5-5') Silt, moderate yellowish brown mottled with some olive gray near top. Contains some asphalt at top. Hard, dry. (5-9') Same as above.		
5-9'			s-2	35	1.0		ML	(9-15') NO RECOVERY; lost returns. Driller said material was very soft. (15-20') NO RECOVERY; lost returns.		
9-15'							ML			
15-20'							ML	(20-25') Silt, dark yellowish orange mottled with olive gray. Contains organic nodules. Micaceous.		
20-25'			s-3	25	0.2		ML	(25-35') Silt and clay, olive gray to greenish gray. Contains abundant iron-manganese nodules. Mottled with dark yellowish orange near very top. Moist.		
25-35'							ML			
35-35.5'			s-4	95	0.2		ML	(35-35.5') Same as above.		
35.5-41'							ML	(35.5-41') Silt and clay, moderate yellowish brown to dark yellowish orange mottled with olive gray to greenish gray. Contains organic material. Contains abundant lignite near 41'. Moist.		



**Environmental & Safety Designs, Inc.**

**Log of Monitoring Well 007G24MF**

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SHMU 7/AOC A</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>0920 on 7-30-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1515 on 7-30-98</i>	Depth to Groundwater: <i>Measured:</i>
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>95 feet</i>
Geologist: <i>David E. Ladd</i>	Well Screen: <i>60 to 70 feet</i>

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	110	BG		ML	(41-45') Clay, silty, with scattered gravel, moderate yellowish brown to dark yellowish orange, mottled with a little light gray material. Gravel is small rounded chert and quartz. Contains abundant iron concretions. Becoming sandy near 45'; moist.		<p>2" diam., Sch.40 PVC</p> <p>grout</p> <p>bentonite seal</p> <p>0.01 slot PVC screen</p> <p>10-20 sand (filter pack type #2)</p>
							CL	(45-46') Same as above.		
							SC	(46-46.5') Sand, very fine, and clay, with gravel, moderate brown to reddish brown. Very cohesive.		
50							SC	(46.5-52') Sand, fine to medium, and clay, with gravel, dark yellowish orange with some light gray material. Gravel is up to 2" long dimension. Poorly sorted. Contains abundant iron concretions. Mostly light gray near 52'.		
55			s-6	100	BG		SP	(52-55') Sand, very coarse, and gravel, dark yellowish orange. Gravel is chert and quartz up to 1.5" long dimension. Some clay content. Wet.		
60							SP	(55-65') Sand, very fine to fine, grayish orange to dark yellowish orange. Upper 3' of core is mostly grayish orange, and contains some light gray. Micaceous and lignitic, wet.		
65			s-7	100	BG		SP	(65-75') Sand, very fine to fine, grayish orange to dark yellowish orange. At 66' color is mostly grayish orange pink. Micaceous and lignitic. Contains light gray clay seam at 72.5'. Contains rare chert gravel (~3 pieces) at 74', wet.		
75			s-8	95	BG		SP	(75-85') Sand, very fine to fine, grayish orange. Micaceous and lignitic. Wet. Contains several pieces of chert gravel up to .75" long dimension between 84' and 85'.		
80										



**Environmental & Safety Designs, Inc.**

**Log of Monitoring Well 007G24MF**

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>0920 on 7-30-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1515 on 7-30-98</i>	Depth to Groundwater: _____ Measured:
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation: _____
Drilling Company: <i>Alliance</i>	Total Depth: <i>95 feet</i>
Geologist: <i>David E. Ladd</i>	Well Screen: <i>60 to 70 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			s-9	95	BG		SP			 <p>bentonite plug</p> <p>10-20 sand (filter pack type #2)</p>
85-88.5						SP	(85-88.5') Sand, very coarse, and gravel, dark yellowish orange. Gravel is mostly angular to rounded chert up to 2.5" long dimension. Wet. Poorly sorted.			
88.5-95						CL	Tcf (88.5-95') Clay, sandy, dusky yellowish brown. Becomes mottled with light gray very fine sand seams below 92'. Micaceous and lignitic.			
95			s-10	100	BG			<b>Bottom of boring at 95ft bgs.</b>		
100										
105										
110										
115										
120										



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G25MF

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>0945 on 8-3-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>on 8-4-98</i>	Depth to Groundwater: Measured:
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>127 feet</i>
Geologist: <i>Ben Brantley</i>	Well Screen: <i>71.5 to 81.5 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS.	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							Ccr	Surface conditions: Concrete (~20").		
							ML	(1.2-3') Light olive gray silt, dry and hard from 2-3', mottled with greenish gray material.		
5			s-1	100	0.4		ML	(3-7.5') Dark yellowish brown to moderate yellowish brown silt, dry and hard.		
10								(7.5-9') Light olive gray and moderate yellowish brown silt, dry and hard. (8.5-9') Manganese concretions. NO RECOVERY from 9.5-15'.		
15			s-2	40	BG			(15-19') Dark yellowish orange with light olive gray and yellowish gray silt. Manganese and iron stains throughout; medium stiff and moist.		
20							ML	NO RECOVERY from 20-25'.		
25			s-3	40	BG			(25-29') Pale yellowish to dark yellowish brown silt with scattered manganese nodules and iron staining throughout.		
30								NO RECOVERY from 29-35'; Driller uncertain whether loss of recovery is at top or bottom of each run with loss. Loss has been assumed to be at the bottom of the runs with loss.		
35			s-4	40	0.2		ML	(35-42') Moderate yellowish brown clayey silt with dark yellowish orange and medium light gray clayey silt.		
40							CL	Light bluish gray clay lenses streaked in above matrix between 38.5' and 40'.		



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G25MF

Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No.: *0094*

Surface Elevation: *feet msl*

Started at *0945 on 8-3-98*

TOC Elevation: *feet msl*

Completed at *on 8-4-98*

Depth to Groundwater: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

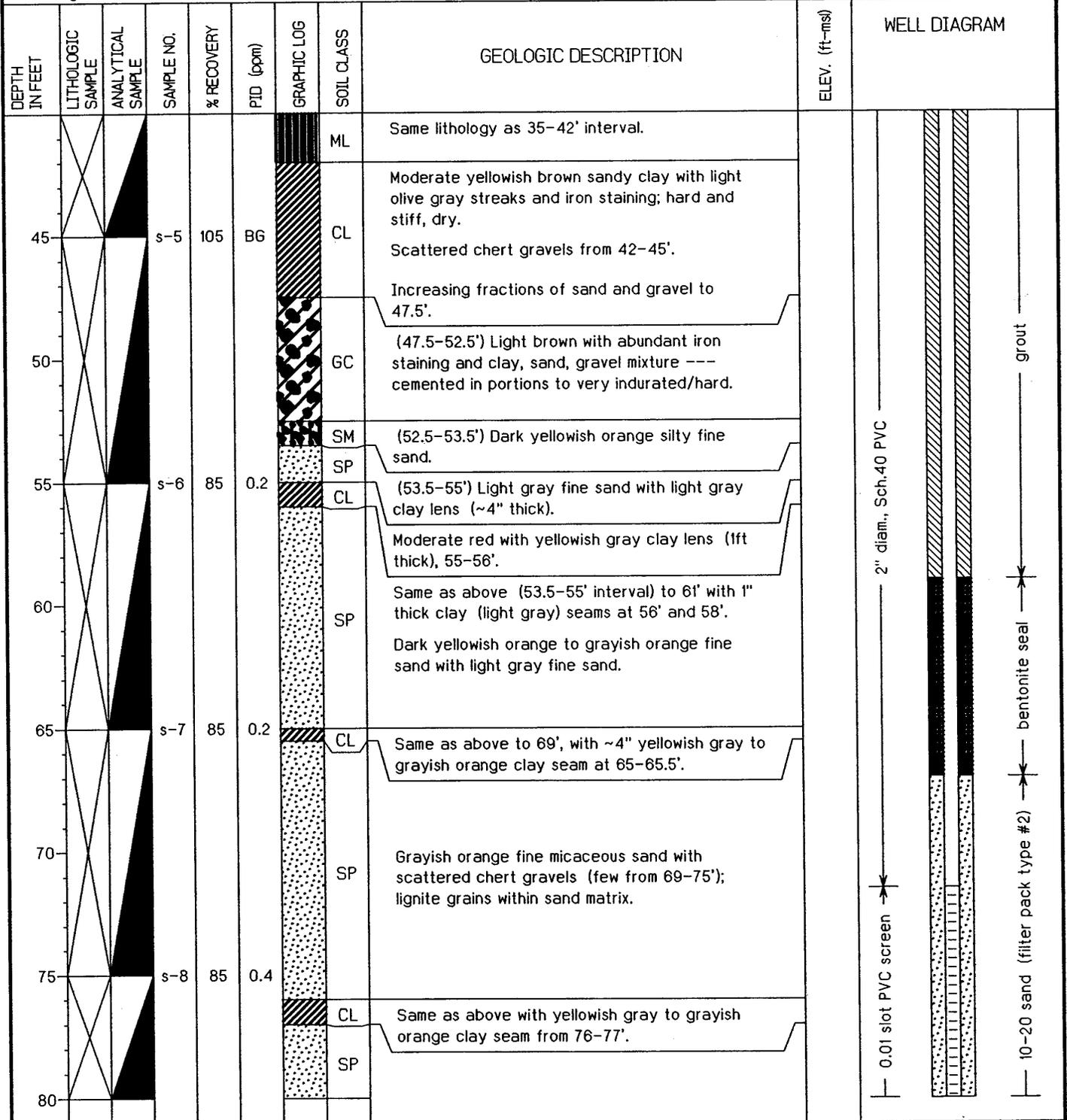
Groundwater Elevation:

Drilling Company: *Alliance*

Total Depth: *127 feet*

Geologist: *Ben Brantley*

Well Screen: *71.5 to 81.5 feet*





Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G25MF

Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No.: *0094*

Surface Elevation: *feet msl*

Started at *0945 on 8-3-98*

TOC Elevation: *feet msl*

Completed at *on 8-4-98*

Depth to Groundwater: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

Drilling Company: *Alliance*

Total Depth: *127 feet*

Geologist: *Ben Brantley*

Well Screen: *71.5 to 81.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			s-9	80	BG		SP	Same as above (85.5-76') to 92'.		<p>10-20 sand (filter pack type #2)</p> <p>NATURAL PLUG (hole collapse)</p>
90										
95			s-10	90	0.2		GW	Light brown and dark yellowish orange sandy gravel (up to 2" long dimension); poorly sorted sands - fine to very coarse.		
100							SM	Yellowish gray to olive gray fine silty sand.		
105			s-11	80	0.2		SM	Light gray and grayish orange fine sand; lignitic and micaceous. Few scattered chert gravels around 103'.		
110							SP	Grayish orange fine sand with light gray clay seams 1/8" to 1/4" thick from 107-109'. Dark yellowish orange sand seam at 107.5'. Light gray fine sand with light gray clay seams from 109-115'.		
115			s-12	85	BG		SP	Light gray fine sand with grayish orange fine sand from 115-124'.		
120										



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G25MF

Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No: *0094*

Surface Elevation: *feet msl*

Started at *0945 on 8-3-98*

TOC Elevation: *feet msl*

Completed at *on 8-4-98*

Depth to Groundwater: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

Drilling Company: *Alliance*

Total Depth: *127 feet*

Geologist: *Ben Brantley*

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
125			s-13	90	BG		SP			<p>NATURAL PLUG (hole collapse)</p>
			S.T.	100	BG		SM	Pale brown and dark yellowish brown silty sand; lignite at bottom 2" of run.		
					BG		SC	Shelby tube pushed from 125-127"; bottom of tube contains lignite within a clay matrix. VOC sample collected from bottom of Shelby tube.		
130										
135										
140										
145										
150										
155										
160										



**Environmental & Safety Designs, Inc.**

**Log of Monitoring Well 007G26MF**

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1455 on 8-2-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1645 on 8-2-98</i>	Depth to Groundwater:                      Measured:
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>70 feet</i>
Geologist: <i>Ben Brantley</i>	Well Screen: <i>60 to 70 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							Ccr	Surface conditions: Concrete from 0-2' (Ccr)		
5			s-1	100	BG		ML	(2-5') Moderate yellowish brown silt; very stiff and hard.		
10							ML	Same as above, mottled with olive gray silt from 5-7'; contains wood fragments. (7-9') Dark yellowish orange mottled with light gray silt; iron and manganese inclusions present.		
15			s-2	40	BG		ML	Light olive gray with iron streaks; clayey silt, medium stiff and moist to wet.		
25			s-3	90	0.4		ML	(19.5-20') Moderate yellowish brown with light gray clayey silt and manganese nodules. (20.5-25') Dark yellowish orange with light olive gray clayey silt, less moist and more stiff; iron streaks throughout section. (25-33') Moderate yellowish brown clayey silt, stiff and moist.		
35			s-4	75	0.2		ML	Same as above with light olive gray and iron staining from 33-35'.  Same as above to 42'; stiff and hard; manganese nodules from 35-37'.		
40										



**Environmental & Safety Designs, Inc.**

**Log of Monitoring Well 007G26MF**

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1455 on 8-2-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1645 on 8-2-98</i>	Depth to Groundwater: <i>Measured:</i>
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>70 feet</i>
Geologist: <i>Ben Brantley</i>	Well Screen: <i>60 to 70 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			s-5	100	0.2		ML CL SC	(42-44') Dark yellowish orange sandy, silty clay, stiff and hard, streaked with light gray; pebbles scattered from 40-45' (1/4" to 1/2" long dimension). (44-45') Dark yellowish orange clayey sand; medium stiff and moist. (45-46') Same as above with scattered gravels throughout.		<p>2" diam., Sch.40 PVC 0.01 slot PVC screen grout bentonite seal 10-20 sand (filter pack type #2)</p>
50						CL	(46-47') Moderate reddish brown cemented mixture of clay, sand, pebbles, and gravel. (47-54') Grayish orange to dark yellowish orange silty fine sand.			
55			s-6	95	BG		BG	Moderate red clay mottled with dark yellowish orange and yellowish gray silty fine sand. Grayish orange fine sand mottled with dark yellowish orange and yellowish gray fine sand (micaceous).		
60							SP	Moderate red to light red with pinkish gray clay seams at 56.5', 57.5', 58', 60', 61', 63'; seams range from 1 to 4 inches thick.		
65			s-7	85	0.2		SP	Same as above with few scattered gravels up to 1/2" long dimension.		
70			s-8	60	BG		BG			
								<b>Total depth of boring is 70ft bgs.</b>		
75										
80										



# Log of Monitoring Well 007G27LF

Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No.: *0094*

Surface Elevation: *feet msl*

Started at *0800 on 7-20-98*

TOC Elevation: *feet msl*

Completed at *1600 on 7-20-98*

Coordinates: Easting: \_\_\_\_\_ Northing: \_\_\_\_\_

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation: \_\_\_\_\_

Drilling Company: *Alliance*

Total Depth: *137 feet*

Geologist: *David E. Ladd*

Well Screen: *107 to 117 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0-5			s-1	90	40		ML	(0-5') Silt, clayey, moderate yellowish brown mottled with a little olive gray, especially at ~4'. Contains roots and organic material.		
5-7			s-2	100	BG		ML	(5-7') Same as above, containing iron-manganese nodules.		
7-17							ML	(7-17') Same as above, very clayey, less olive gray material, abundant organic material.		
17-23			s-3	80	BG		ML	(17-23') Same as above. Contains more olive gray material.		
23-27							ML	(23-27') Silt, olive gray, contains rare iron-manganese nodules.		
27-36			s-4	65	BG		ML	(27-36') Same as above, becoming olive gray to light olive gray. Abundant iron-manganese nodules below 30'. From 32-26', becoming mottled with moderate yellowish brown and light olive brown material. Becoming very dry and hard near 36'.		
36-41			s-5	100	BG		ML	(36-37') Silt, moderate yellowish brown to dark yellowish orange, containing iron-manganese nodules. (37-41') Same as above, containing some dark yellowish brown and olive gray material, becoming slightly sandy.		



# Log of Monitoring Well 007G27LF

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>0800 on 7-20-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1600 on 7-20-98</i>	Coordinates: Easting: _____ Northing: _____
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation: _____
Drilling Company: <i>Alliance</i>	Total Depth: <i>137 feet</i>
Geologist: <i>David E. Ladd</i>	Well Screen: <i>107 to 117 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			s-6	80	BG		ML CL	(41-46') Clay, silt, and sand, very fine, moderate yellowish brown mottled with dark yellowish orange and light gray. Light gray material is mostly clay. Contains iron-manganese nodules; moist.		<p>2" diam., Sch.40 PVC</p> <p>grout</p>
50						SC CL	(46-47') Sand, very fine, and clay, light gray; moist.			
						SW SP	(47-48') Clay, silt, sand, very fine, and gravel up to .5" long dimension, moderate yellowish brown mottled with light gray and dark yellowish orange.			
55			s-7	90	0.2		SC	(48-49.5') Sand, fine to medium, and gravel up to .25" long dimension, very pale orange. Contains some moderate yellowish brown clay; wet.		
60							SP	(49.5-50.5') Sand, fine, dark yellowish orange mottled with light gray; rare gravel at 50.5'; wet.		
							SP	(50.5-55') Sand, very fine, clayey, light brownish gray, becoming mottled with dark yellowish orange near bottom. Sand becoming coarser near bottom.		
65							SP	(55-57') Sand, coarse to very coarse, and gravel up to 1" long dimension, dark yellowish orange. Clayey near top; wet.		
			s-8	85	BG		SP	(57-63.5') Same as above. Gravel up to 1" long dimension. Gravel is rare from 58-60'.		
70							SP	(63.5-67') Sand, very fine to fine, grayish orange to dark yellowish orange. Rare gravels at ~65, one piece up to 2" long dimension, wet. Micaceous and lignitic.		
							SW	(67-70') Sand, coarse to very coarse, and gravel up to .75" long dimension, very pale orange to dark yellowish orange; wet.		
75			s-9	65	BG		SW	(70-77') Sand, very fine to fine, dark yellowish orange, contains rare gravelly seams with coarse to very coarse sands at ~74' and 75'. Otherwise, contains rare gravels throughout. Contains rare clay seams; ferruginous sand zone at ~74', wet. (77-82') Same as above: sand, with rare scattered gravel; grayish orange, with dark yellowish orange coarse gravel at 79'.		
80										

Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No.: *0094*

Surface Elevation: *feet msl*

Started at *0800 on 7-20-98*

TOC Elevation: *feet msl*

Completed at *1600 on 7-20-98*

Coordinates: Easting: \_\_\_\_\_ Northing: \_\_\_\_\_

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

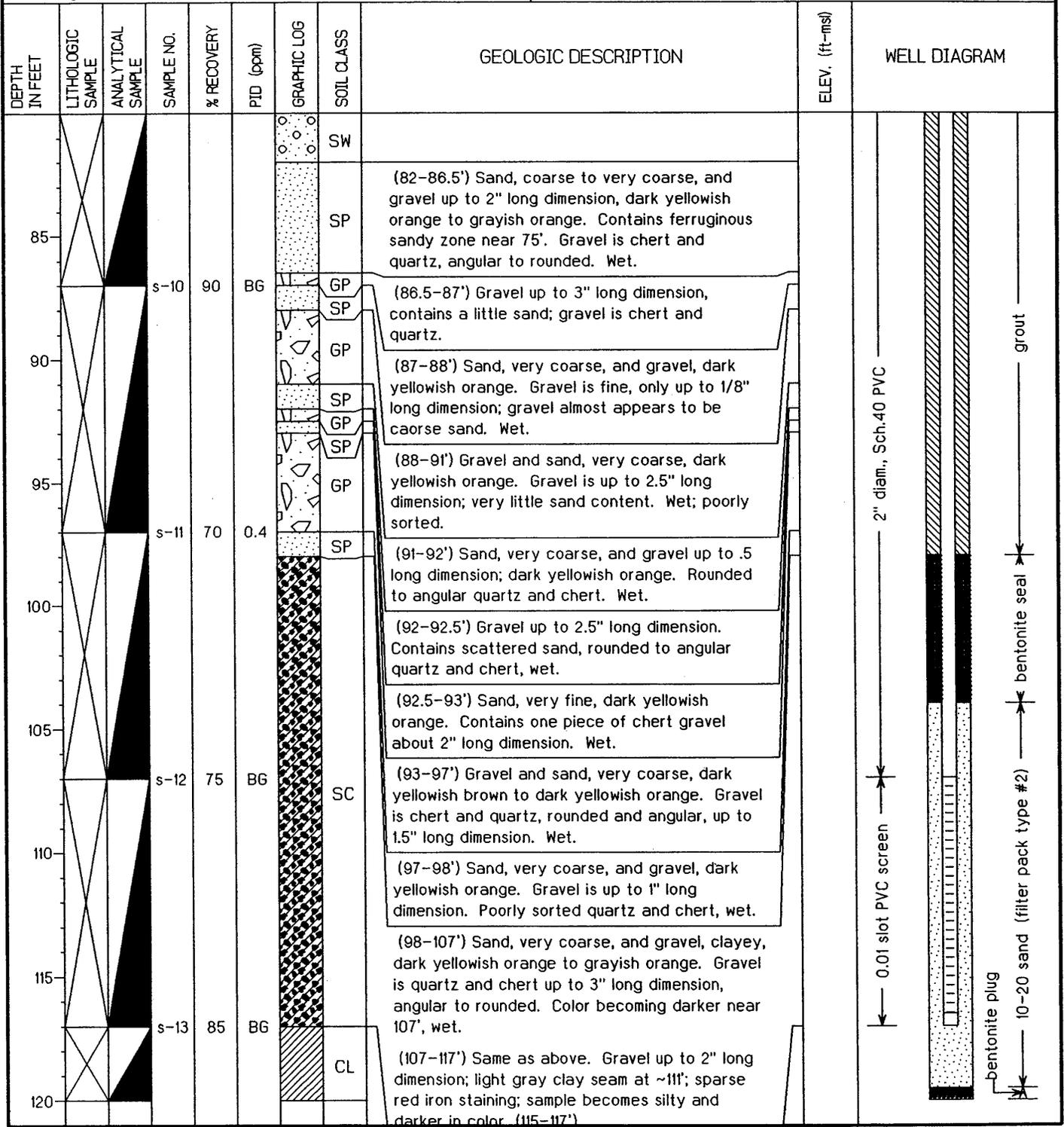
Groundwater Elevation: \_\_\_\_\_

Drilling Company: *Alliance*

Total Depth: *137 feet*

Geologist: *David E. Ladd*

Well Screen: *107 to 117 feet*



Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No.: *0094*

Surface Elevation: *feet msl*

Started at *0800 on 7-20-98*

TOC Elevation: *feet msl*

Completed at *1600 on 7-20-98*

Coordinates: Easting: \_\_\_\_\_ Northing: \_\_\_\_\_

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

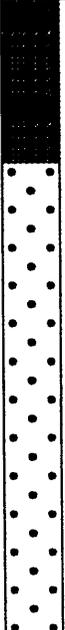
Groundwater Elevation: \_\_\_\_\_

Drilling Company: *Alliance*

Total Depth: *137 feet*

Geologist: *David E. Ladd*

Well Screen: *107 to 117 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			s-14	85	BG		CL	(117-125') Clay, sand, fine to very coarse, and gravel, dusky yellowish brown to dark yellowish brown. Significant clay seams throughout. Gravel up to 1.5" long dimension. Very lignitic, slightly micaceous. Wet.		 <p>bentonite plug</p> <p>NATURAL PLUG (hole collapse)</p>
							GW	(125-127') Gravel and sand, very coarse, dark yellowish orange, silty. Gravel up to 1.5" long dimension. Contains dusky yellowish brown to dark yellowish brown clay near 127'; wet.		
130							GW	(127-128') Gravel and sand, dusky yellowish brown to dark yellowish brown, wet.		
							CL	(128-137') Clay, dusky yellowish brown to dark yellowish brown. Contains light gray sand seams scattered through upper 5'. Contains abundant lignite, especially near 128'. Micaceous and very hard and stiff.		
135			s-15	120	BG		CL	Took sample 007S027128 from 128' for VOC and TOC.		
140			S.T.	100	BG		CL	<b>Bottom of boring at 137'; took 3" shelly tube from 137-139.5'</b>		
145										
150										
155										
160										



**Environmental & Safety Designs, Inc.**

**Log of Monitoring Well 007G28LF**

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1345 on 7-17-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1630 on 7-17-98</i>	Depth to Groundwater: <i>Measured:</i>
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>87 feet</i>
Geologist: <i>David E. Ladd</i>	Well Screen: <i>70.5 to 80.5 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0-3'							Fill	(0-3') Fill-asphalt, clay, red sand, and pebbles. Probably lost the first 1-2 feet.		
3-7'						CL	(3-7') Clay and silt, moderate yellowish brown. Contains some olive gray material. Stiff.			
7.5-12'			s-1	50	BG	ML	Same as above to 7.5'. (7.5-12') Silt, olive gray to greenish gray; contains rare root material.			
12-14'						CL	(12-14') Clay, dark yellowish brown to dusky yellowish brown, stiff.			
14-17'			s-2	75	BG	ML	(14-17') Silt, olive gray to greenish gray. Contains iron-manganese nodules.			
17-27'						ML	(17-27') Silt, clayey, moderate yellowish brown mottled with dark yellowish orange and olive gray. Contains iron-manganese nodules.			
27-36'			s-3	95	BG	ML	(27-36') Same as above. Becoming clayey with more olive gray material. Contains light olive brown material and light gray material near bottom; moist.			
36-37'			s-4	85	BG	ML	(36-37') Silt, slightly clayey, light olive brown with a little light gray; dry and hard.			
37-47'						SC CL	(37-47') Clay, silt, and sand, very fine, dark yellowish orange. Becomes progressively sandier with depth.			



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G28LF

Project: NAS Memphis Millington, TN

Location: SWMU 7/AOC A

Project No.: 0094

Surface Elevation: feet msl

Started at 1345 on 7-17-98

TOC Elevation: feet msl

Completed at 1630 on 7-17-98

Depth to Groundwater: Measured:

Drilling Method: Rotasonic; 4" core barrel through 6" casing

Groundwater Elevation:

Drilling Company: Alliance

Total Depth: 87 feet

Geologist: David E. Ladd

Well Screen: 70.5 to 80.5 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			s-5	100	BG		SL	Becomes mottled with light gray sand below 41.5' and contains olive gray clay from 41-41.5'; moist.		<p>2" diam., Sch. 40 PVC</p> <p>0.01 slot PVC screen</p> <p>10-20 sand (filter pack type #2)</p> <p>bentonite seal</p> <p>grout</p>
47-50.5					BG			(47-50.5') Same as above; becoming sandier with depth.		
50.5-53					BG		SW	(50.5-53') Sand, medium to coarse, and gravel up to 1" long dimension, grayish orange, poorly sorted, rounded to angular, wet. Contains light gray clayey material at top.		
53-56					BG		SP	(53-56') sand, coarse to very coarse, with scattered small gravel, very pale orange to grayish orange, wet.		
56-57			s-6	120	BG		SP	(56-57') Sand, very coarse, clay, and gravel, moderate yellowish brown to dark yellowish orange, with some light gray clayey material. Gravel up to .75" long dimension.		
57-57.5					BG		GP	(57-57.5') Same as above. Gravel up to 3" long dimension. Wet.		
57.5-59					BG			(57.5-59') Gravel with scattered sand; gravel is .5" (long dim.) at top, becoming larger to ~2.5" long dimension near 59'.		
59-67			s-7	100	BG			(59-67') Sand, coarse to very coarse, and gravel, dark yellowish orange. Gravel up to 2" long dimension, wet.		
67-72					BG		SP	(67-72') Same as above.		
72-77					BG			(72-77') NO RECOVERY; lost returns. Driller said he felt like we were still in sand and gravel.		
77-81			s-8	50	BG			(77-81') Same as above. Zone from 78-79' contains lignitic sand grains.		



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G28LF

Project: NAS Memphis Millington, TN

Location: SWMU 7/AOC A

Project No.: 0094

Surface Elevation: feet msl

Started at 1345 on 7-17-98

TOC Elevation: feet msl

Completed at 1630 on 7-17-98

Depth to Groundwater: Measured:

Drilling Method: Rotasonic; 4" core barrel through 6" casing

Groundwater Elevation:

Drilling Company: Alliance

Total Depth: 87 feet

Geologist: David E. Ladd

Well Screen: 70.5 to 80.5 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-9	110	BG		CL	Tcf. (81-87') Clay, slightly sandy, dusky yellowish brown to dark yellowish brown mottled with light gray sandy seams. Micaceous and slightly lignitic. Stiff.		
90			s-10	80	BG		CL	TOC and VOC sample 007S002886 taken from 86'. <b>Bottom of boring at 87'</b> 3" (diameter) Shelby tube taken from 87-89.5'.		
95										
100										
105										
110										
115										
120										



**Environmental & Safety Designs, Inc.**

**Log of Monitoring Well 007G29LF**

Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No.: *0094*

Surface Elevation: *feet msl*

Started at *1050 on 7-16-98*

TOC Elevation: *feet msl*

Completed at *1615 on 7-16-98*

Depth to Groundwater: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

Drilling Company: *Alliance*

Total Depth: *87 feet*

Geologist: *David E. Ladd*

Well Screen: *70 to 80 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0-1'							Asph	(0-1') Asphalt.		<p>2" diam., Sch. 40 PVC</p> <p>grout</p>
1-4'							Fill	(1-4') Silt, clayey, moderate yellowish brown. Contains organic material and roots. Stiff.		
4-5'			s-1	100	BG			(4-5') Same as above. Contains asphalt from 4-4.5'		
5-7'			s-2	100	BG		ML	(5-7') Silt, olive gray. Dry.		
7-9.5'							ML	(7-9.5') Same as above, becoming clayey.		
9.5-17'							ML	(9.5-17') Silt, clayey, moderate yellowish brown mottled with olive gray and dark yellowish orange. Mostly olive gray material from 11-15'. Contains iron-manganese nodules and organic material.		
17-25'			s-3	75	BG		ML	(17-25') Same as above. Becoming moist and containing less iron- manganese nodules and organic material. Color becoming mostly olive gray near bottom.		
25-27'							CL	(25-27') Clay, olive gray. Contains rare organic material and iron- manganese nodules.		
27-33'			s-4	85	BG		CL	(27-33') Clay and silt, moderate yellowish brown mottled with olive gray. Contains some dark yellowish orange staining. Becoming mostly olive gray near 33'.		
33-35'							ML	(33-35') Silt, moderate yellowish brown mottled with light gray. Contains numerous iron-manganese nodules.		



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G29LF

Project: *NAS Memphis Millington, TN*

Location: *SHMU 7/AOC A*

Project No.: *0094*

Surface Elevation: *feet msl*

Started at *1050 on 7-16-98*

TOC Elevation: *feet msl*

Completed at *1615 on 7-16-98*

Depth to Groundwater:

Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

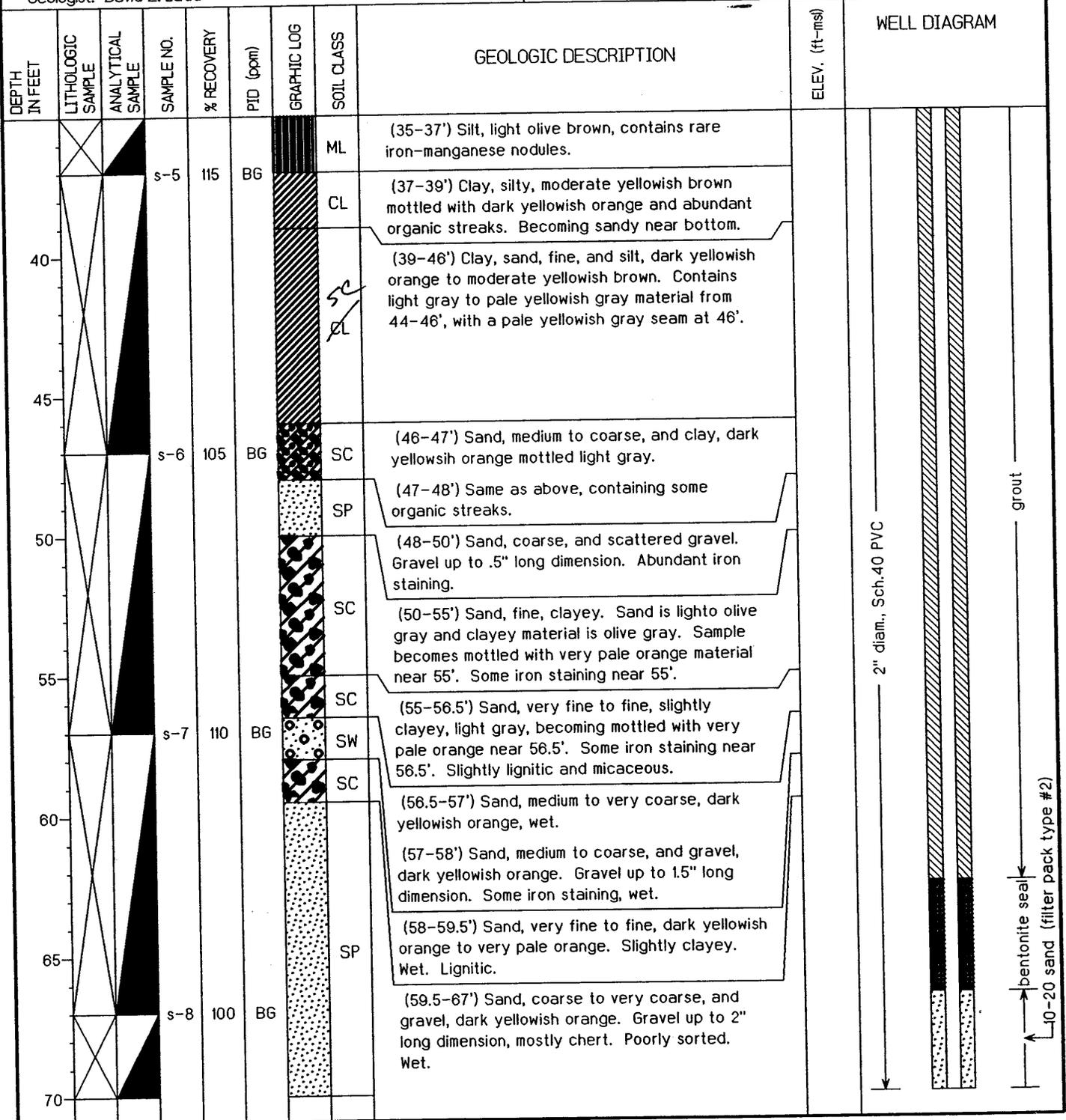
Groundwater Elevation:

Drilling Company: *Alliance*

Total Depth: *87 feet*

Geologist: *David E. Ladd*

Well Screen: *70 to 80 feet*





Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G29LF

Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No: *0094*

Surface Elevation: *feet msl*

Started at *1050 on 7-16-98*

TOC Elevation: *feet msl*

Completed at *1615 on 7-16-98*

Depth to Groundwater: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

Drilling Company: *Alliance*

Total Depth: *87 feet*

Geologist: *David E. 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)	WELL DIAGRAM
75			s-9	100	BG		SP	(67-77') Same as above. Gravel up to 2" long dimension, chert and quartz, rounded to angular. ~3" zone at ~65' containing dark yellowish orange and black sand grains.		<p>0.01 slot PVC screen</p> <p>10-20 sand (filter pack type #2)</p> <p>Shelby tube (No recovery)</p>
80							CL	Tcf (79.5-87') Clay, slightly silty, dusky yellowish brown to dark yellowish brown, mottled with light gray very fine sand seams. Predominant sand seams at 85' and 86'. Very micaceous. Contains scattered lignite. Stiff.		
85			s-10	110	BG			TOC and VOC sample 007S002987 collected at 87'. <b>Bottom of boring at 87'</b>		
90			S.T.	0	BG			3" (diameter) Shelby tube from 87-89.5': NO RECOVERY		
95										
100										
105										



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G30LF

Project: *NAS Memphis Millington, TN*

Location: *SWMU 7/AOC A*

Project No.: *0094*

Surface Elevation: *feet msl*

Started at *1130 on 7-15-98*

TOC Elevation: *feet msl*

Completed at *1730 on 7-15-98*

Depth to Groundwater: Measured:

Drilling Method: *Rotasonic; 4" core barrel through 6" casing*

Groundwater Elevation:

Drilling Company: *Alliance*

Total Depth: *85 feet*

Geologist: *David E. Ladd*

Well Screen: *70 to 80 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
							Ccr	Surface conditions: Asphalt (0-1')		
5			s-1	60			ML	(1-5') Silt, clayey, moderate yellowish brown. Contains roots and some asphalt material.  (5-10') Probably lost recovery; lithologic break somewhere between 5' and 10'.		
10							ML	(10-12.5') Silt, clay, light olive gray mottled with some moderate brown; moist.		
15			s-2	40			ML	(12.5-15') Silt, clayey, moderate yellowish brown mottled with dark yellowish orange and a little light olive gray. Contains some organic material and rare iron-manganese nodules.  (15-19') NO RECOVERY.		
20							ML	(19-22') Silt, very clayey, moderate yellowish brown mottled with very little dark yellowish orange, very moist.		
25			s-3	40			ML	(22-28') Silt, clayey, olive gray to greenish gray, mottled with moderate yellowish brown from 25-28'; moist.		
30							ML	(28-33') Silt, slightly clayey, moderate yellowish brown with dark yellowish orange streaks. Contains some reddish brown streaks ~33'.		
35			s-4	50			CL	(33-37.5') Clay, silty, olive gray mottled with moderate yellowish brown and dark yellowish orange; stiff. Near bottom, becoming slightly sandy, and containing lignitic material.		
40							SC ML	(37.5-42.5') Silt, sand, very fine to fine, and clay, moderate yellowish brown mottled with dark yellowish orange and olive gray. Contains some organic material.		



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G30LF

Project: NAS Memphis Millington, TN

Location: SWMU 7/AOC A

Project No.: 0094

Surface Elevation: feet msl

Started at 1130 on 7-15-98

TOC Elevation: feet msl

Completed at 1730 on 7-15-98

Depth to Groundwater: Measured:

Drilling Method: Rotasonic; 4" core barrel through 6" casing

Groundwater Elevation:

Drilling Company: Alliance

Total Depth: 85 feet

Geologist: David E. Ladd

Well Screen: 70 to 80 feet

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
45			s-5	110			SC ML	(42.5-46') Sand, very fine to medium, clayey, moderate yellowish brown mottled with dark yellowish orange and light gray. Becoming olive gray from 45-46'.		<p>2" diam., Sch.40 PVC</p> <p>grout</p> <p>bentonite seal</p> <p>0.01 slot PVC screen</p> <p>10-20 sand (filter pack type #2)</p>
50							SC CL	(46-50.5') Clay, sandy, dusky yellowish brown. Contains a pale yellowish brown to light gray sand seam at ~50'. Slightly micaceous.		
55			s-6	105			SP SC	(50.5-53') Sand, fine to medium, light gray, with clayey seams. Pale yellowish brown near top and bottom; wet, micaceous.		
55							CL SW	(53-53.5') Clay, light gray, and gravel up to 1" long dimension; moist.		
60							SP	(53.5-55') Sand, fine to coarse, and gravel, dark yellowish orange. Gravel up to 1.5" long dimension. Some gravel is iron stained and there are iron concretions near top of sample.		
65			s-7	105			SP	(55-65') Sand, coarse to very coarse, and gravel. Moderate yellowish brown to dark yellowish orange. Contains dark yellowish brown to dusky yellowish brown sand from 57-58'. Gravel is quartz and chert up to 2" long dimension, rounded to angular, poorly sorted. Wet.		
70							SP	(65-74') Same as above, becoming moderate yellowish brown to dark yellowish brown from 70-71.5'. HNu hit of 2ppm at ~71.5'. Sand becoming dark yellowish orange and a little silty near 74'.		
75			s-8	100			GP	(74-76') Gravel and sand, coarse to very coarse, dark yellowish orange. Gravel, mostly chert, up to 3" long dimension. Poorly sorted, micaceous and wet.		
80							SP	(76-81') Sand, coarse to very coarse, and gravel, dark yellowish brown. Gravel up to 3" long dimension. Poorly sorted and wet. Becoming lighter in color near 81'.		



Environmental & Safety Designs, Inc.

Log of Monitoring Well 007G30LF

Project: <i>NAS Memphis Millington, TN</i>	Location: <i>SWMU 7/AOC A</i>
Project No.: <i>0094</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1130 on 7-15-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1730 on 7-15-98</i>	Depth to Groundwater: <i>Measured:</i>
Drilling Method: <i>Rotasonic; 4" core barrel through 6" casing</i>	Groundwater Elevation:
Drilling Company: <i>Alliance</i>	Total Depth: <i>85 feet</i>
Geologist: <i>David E. Ladd</i>	Well Screen: <i>70 to 80 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
85			s-9	105			SP	Tcf		<p>bentonite plug</p> <p>10-20 sand (filter pack type #2)</p>
							CL	(81-85') Clay, dusky yellowish brown, contains some light gray sandy seams. Stiff.		
								<b>Bottom of boring at 85'.</b>		
90										
95										
100										
105										
110										
115										
120										

EnSafe Inc.

Log of Monitoring Well 007G31LF

Project: NSAMEM, SHMU 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	PTD (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0									Surface conditions: grassy area south of runway, west of 007G28LF.		
0-5								ML	(0'-5') Clayey silt, yellow-brown, friable and dry.		
5			1	100					(5'-8') Clayey silt, gray-greenish gray, medium stiff and moist.		
8-9								CL	(8'-9') Clay, dusky brown to dark gray, stiff to hard, and dry.		
9-14									(9'-14') Clayey silt, greenish gray with yellow-orange iron staining, medium stiff and moist.		
12-14									Manganese inclusions from 12'-14'.		
15			2	90					Same as above to 16'.		
16-25									(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'.		
29-32.5									(29'-32.5') Clayey silt, olive gray and dark brown with iron staining, stiff and dry.		
30											

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
35			4	100				ML	(32.5'-34.5') Silty clay, grayish green, stiff and moist near bottom foot of core.		<p>2" diam., Sch. 40 PVC</p> <p>high solids grout</p>
35							CL	(34.5'-35') Clayey silt, orange to brown, stiff to hard, and dry.			
40							ML	Same as above, moist and soft from 36'-40'. (40'-43') Clayey silt, mottled gray and orange-brown, stiff and moist.			
45			5	100			SC ML	Clayey silt, as above, becoming sandy at 43'. Same as above to 51', increasingly sandy, stiff to soft, moist.			
55							SW	(51'-67') Gravelly sand, brownish orange, medium- to coarse-grained, well graded and wet, gravels up to 1.5" in diameter (LD).			
60											

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	PTD (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
65			6	80				SW			<p>2" diam., Sch. 40 PVC</p> <p>0.01 slot PVC screen</p> <p>10-20 sand filter</p> <p>bentonite chips</p>
67-69							SP	(67'-69') Sand, tan, fine- to medium-grained.			
69-79							SW	(69'-79') Sand with gravels resuming at 69'.			
75-79							GW	(75'-79') Silty and sandy gravels, orange to brown, gravels up to 3" in diameter (LD).			
79-85							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
0									Surface conditions: grassy area, approximately 5-10 yds. north of the taxiway, 300 ft. west of 007G11LF.		
0-7.5'			1	100				ML	(0'-7.5') Clayey silt, yellow-brown, stiff and dry.		
7.5-8.5'								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'									(8.5'-15') No Recovery.		
15-16'			2	35					(15'-16') Clayey silt, greenish gray, moist and stiff.		
16-26'									(16'-26') Clayey silt, yellowish brown, moist and soft.		
26-28'									(26'-28') Silt to clayey silt, gray, medium stiff and moist.		
28-35'			3	100				ML	(28'-35') Clayey silt, olive green to greenish gray, stiff to hard, 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	PTD (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'.		<p>2" diam., Sch. 40 PVC</p> <p>high solids grout</p>
40								ML	(39'-45') Clayey silt, mottled yellowish brown and reddish orange, with gray streaks, stiff.		
45								ML CL	Same as above, becoming sandy with scattered pebbles (~1/4" diam. LD) from 41'-45', medium stiff and moist.		
50								SW	(45'-47.5') Silt and clay, gravelly and sandy, yellowish brown and light gray, medium stiff.		
55			5	93				SW	(47.5'-55') Sand, silty, with gravel (up to 1" diam. LD, chert), yellowish brown.		
60								GW	Same as above; sand ranges from fine- to coarse-grained, with gravels up to 2" diam. LD. Silt content decreasing past 51'.		
								GW	(59'-72') Sandy gravel, orange brown; gravels up to 2" diam. LD, with sand as fine to coarse grained.		

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	PTD (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
65								GW			<p>2" diam., Sch. 40 PVC</p> <p>0.01 slot PVC screen</p> <p>10-20 sand filter</p> <p>bentonite chips</p> <p>bentonite chips</p> <p>hole collapse</p>
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							

# 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	PTD (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0									Surface conditions: grassy area between taxiway and runway, approx. 100 ft. east of western access strip between taxiway and runway.		<p>2" diam., Sch. 40 PVC</p> <p>high solids grout</p>
0-4'			1	80			ML	(0'-4') Clayey silt, dark brown, hard and dry.			
4-7.5'								Same as above to 7.5'.			
7.5-10'								(7.5'-10') Clayey silt, yellowish brown and olive gray, stiff and moist. Manganese inclusions from 9'-10'.			
10-15'								No R	No Recovery from 10'-15'.		
15-28'			2	50					(15'-28') Clayey silt, yellowish brown and olive gray, stiff, moist.		
28-95'								ML			
25			3	100							

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	PTD (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
30								ML	(28'-31') Clayey silt, greenish gray, stiff to hard and dry.		<p>2" diam., Sch. 40 PVC</p> <p>high solids grout</p>
35			4	90			No R	No Recovery.			
40								ML	Same as above (clayey silt) to 48'.		
45									Becoming sandy at 44', increasingly sandy to 48'.		
50								GW	(48'-49') Sandy gravel, orangish brown.		
								No R	No Recovery from 49'-55'.		

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	PTD (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
55			5	70			No R				
60							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.		
70											
75			6	100							

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	PTD (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
80								SW	(76'-86') Sandy gravel, yellowish brown, with gravels ranging from pea size up to 2" diam. LD.		
85			7	100				GW			
90								CL	(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.		
95			8	130					End of boring at 95'.		
100											

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	PTD (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0									Surface conditions: grassy area near northern fence, approx. 175 ft. north of the runway and approx. 200 ft. west of the old runway strip.		<p>2" diam., Sch. 40 PVC</p> <p>high solids grout</p>
0-4			1	80			ML	(0'-4') Clayey silt, dark brown, friable and dry. Iron staining visible from 3'-4'.			
5-8								(5'-8') Clayey silt, greenish gray, soft and moist.			
8-11.5								(8'-11.5') Clayey silt, mottled yellowish brown and gray, stiff and moist, with manganese inclusions throughout.			
11.5-15								No R	No Recovery from 11.5'-15'.		
15-25			2	65				ML	Same as above, increasingly soft and wet with depth toward 25'; iron staining and manganese inclusions throughout.		
25			3	100							

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

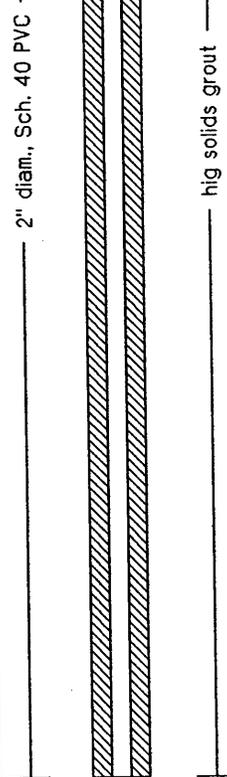
Drilling Company: Boart-Longyear

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.		
35			4	100				ML	(32'-37') Clayey silt, greenish gray mottled with olive green iron- stained clayey silt.		
40									(37'-43') Clayey silt, mottled brown and light gray, stiff and moist.		
45								SC	(43'-46') Sandy silt, mottled orangish brown and light gray, stiff and moist.		
								SP	(46'-48') Sand, fine-grained, mottled light gray with orange and with yellowish brown, moist to wet and micaceous.		
50								No R	No Recovery from 48'-55'.		



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
55			5	65			No R				<p>2" diam., Sch. 40 PVC</p> <p>high solids grout</p> <p>chips</p>
							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- graded sand.			
65							SW	(63'-64') Same as above, with color change to mottled tan and light gray fine-grained sand. (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- graded, no gravels).			
75			6	90			No R		No Recovery from 73'-75'.		

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
								SP	Same as above to 78'.		<p>2" diam., Sch. 40 PVC</p> <p>0.01 slot PVC screen</p> <p>10-20 sand filter</p> <p>bentonite chips</p> <p>hole collapse</p>
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							ML	(90'-95') Sandy silt, dark gray, very stiff, with gray clay a clay lens (~1/8" thick) between 90'-91'.			
90											
95			7	80					End of boring at 95'.		
100											

# 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
0-5			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.		<p>2" diam., Sch. 40 PVC</p> <p>high solids grout</p>
5-16			2	95				(7'-16') Clayey silt, greenish to olive gray mottled with yellowish brown clayey silt, manganese inclusions throughout, stiff and dry.			
16-26			3	100			ML	(16'-26') Clayey silt, yellowish brown and olive gray, iron manganese inclusions throughout, medium stiff and moist.			
26-29			4	95				(26'-29') Clayey silt, dark gray, stiff and moist.			
29-35								(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.			
35-38								Same as above to 38'.			
38-40								(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	PTD (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
40-43'								ML	(40'-43') Sandy silt, yellowish brown and gray, stiff.		<p>2" diam., Sch. 40 PVC</p> <p>high solids grout</p> <p>bentonite chips</p>
43-45'								(43'-45') Same as above with gravels up to 1" diam. LD.			
45-51'							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).			
51-55'							No R	No Recovery from 51'-55'.			
55-60'			5	80			SW	(55'-60') Sand, well graded (medium-grained, well sorted sand with poorly sorted sandy gravels, coarsening downward to 60').			
60-61'								(60'-61') Sand, yellowish brown and orangish brown, very fine-grained.			
61-72.5'							SP	(61'-72.5') Sand, yellowish brown and orangish brown, fairly well sorted (poorly graded), fine- to medium-grained; very few, rare pebbles in section.			
72.5-73'							SW	(72.5'-73') Sand, orangish brown, medium- to coarse-grained, with gravels.			
73-75'							No R	No Recovery from 73'-75'.			
75-91'			6	93			SP	(75'-91') Sand, fine- to medium-grained, gravels very rare to none except near 90'-91'.			

# 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
85								SP			
90							SP ML	(91'-94') Sandy silt, dark gray, with thin (<1mm) lignite lenses.			
95			7	95				<b>End of boring at 95'.</b>			
100											
105											
110											
115											
120											

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	PTD (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.		<p>2" diam., Sch. 40 PVC</p> <p>high solids grout</p>
7								Same as above to 7'.  (7'-17') Clayey silt, dark brown, hard and stiff, dry.			
15			2	85				ML	(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.		
30									(28'-34.5') Clayey silt, mottled yellowish brown and olive gray, soft and moist.		

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	PTD (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'.		<p>2" diam., Sch. 40 PVC</p> <p>high solids grout</p>
45							SC	(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.			
50							GW	(49'-51') Sandy gravel, orangish brown, gravels up to 1.5" diam. LD.			
55			5	80			No R	No Recovery from 51'-55'.			
55							GW	Same as above to 56', gravels up to 2" diam. LD.			
60							SP	(56'-66') Sand, mottled yellowish brown, orangish brown, and gray, fine- to medium-grained, well sorted (poorly graded) and micaceous.			

# 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

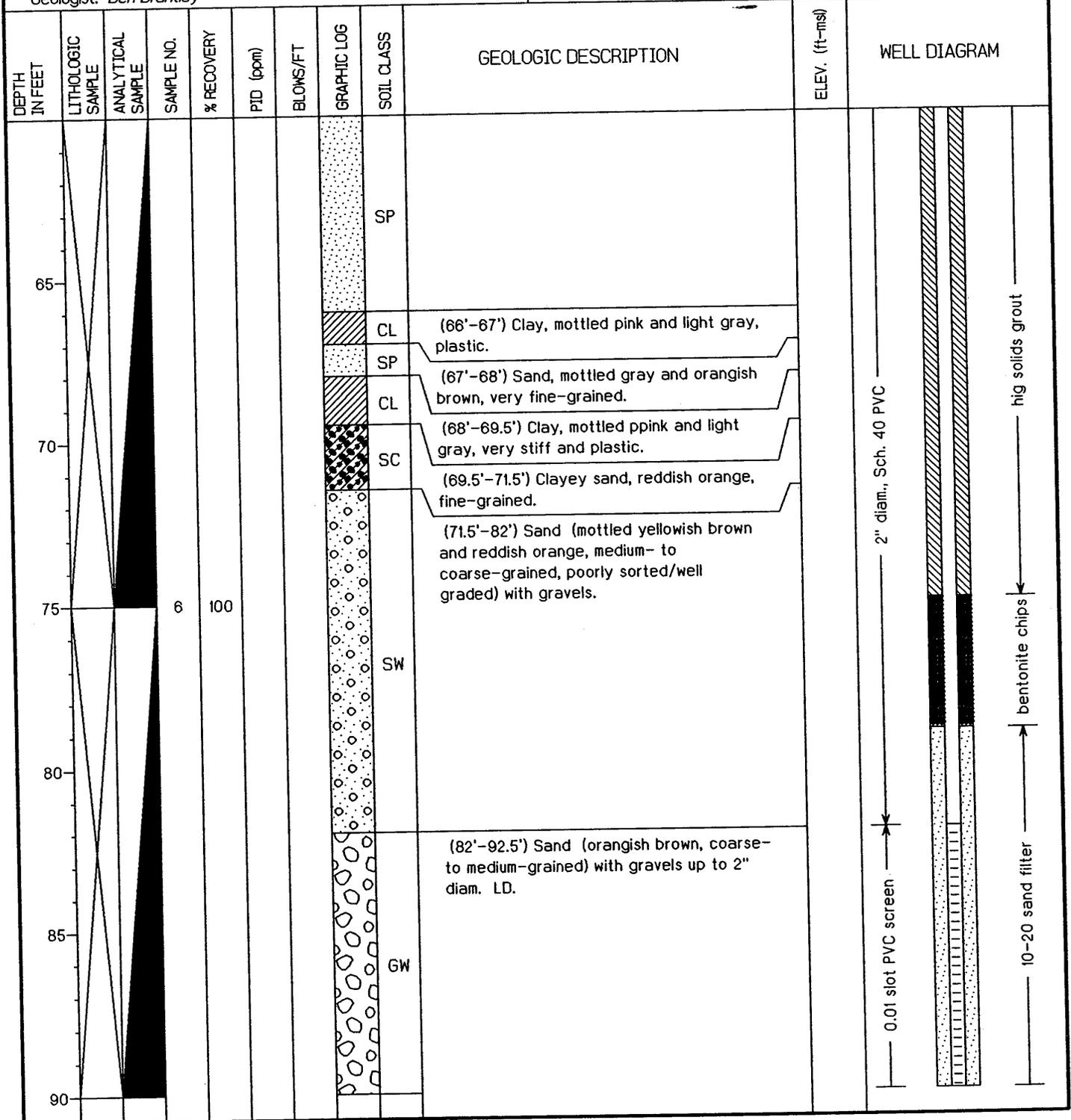
Groundwater Elevation: feet msl

Drilling Company: Boart-Longyear

Total Depth: 95 feet

Geologist: Ben Brantley

Well Screen: 82 to 92 feet



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	PTD (ppm)	BLOWS/FT	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
95			7	100					(92.5'-95') Sandy silt, dark gray, with lignitic laminations throughout section.		
									End of boring at 95'.		
100											
105											
110											
115											
120											

NSA MID-SOUTH  
Millington, TN.

Started : 7/14/99  
Finished : 7/14/99  
Drilling Method : Rotasonic  
Drilling Company : Alliance Drilling  
Geologist : B. Brantley

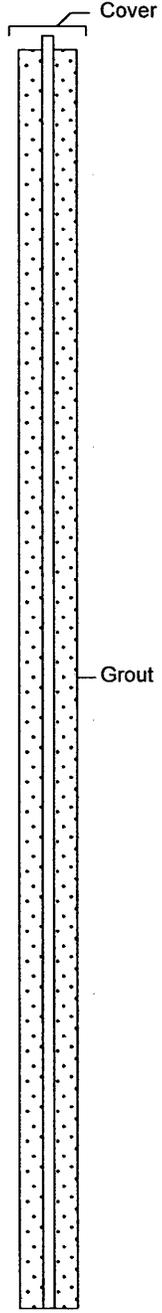
Northing : 393729.29  
Easting : 812560.30  
TOC Elevation : 280.29  
Total Depth : 90 feet  
Well Screen : 50 to 90 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G37F1  
Elev.: 280.29

Depth in Feet	Surf. Elev. 280.96	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	280						(0 - 2) Lt. brown clayey silt, moist
1		1					(2 - 5) Lt. brown clayey silt, dry, hard
5	275						(5 - 7) Yellowish brown and greenish gray clayey silt, moist, soft to med. stiff
7							(7 - 16) Yellowish brown and greenish gray clayey silt w/ manganese and iron stains, moist, soft to med. stiff
10	270	2					(16 - 21) Yellowish brown and greenish gray clayey silt, moist, soft to med. stiff
15	265						(21 - 25) Lt. olive gray clayey silt w/ iron staining, moist, med. stiff
16							(25 - 35) Olive gray silt w/ rusty brown streaks, moist, very stiff
20	260	3				ML	(35 - 37) Lt. brown yellowish orange greenish gray clayey silt, moist, very stiff manganese streaks at 36
25	255						
30	250	4					
35	245						
40	240	5				CL	(37 - 41) Lt. brown silty clay w/ Lt. gray streaks, moist, very stiff
41						SC	(41 - 50) Lt. brown sandy clay w/ Lt. gray streaks (sand increases with depth), moist, very stiff
45							





# BORING LOG of 007G37F1

(Page 2 of 2)

NSA MID-SOUTH  
Millington, TN.

Location: AOCA/SWMU 7

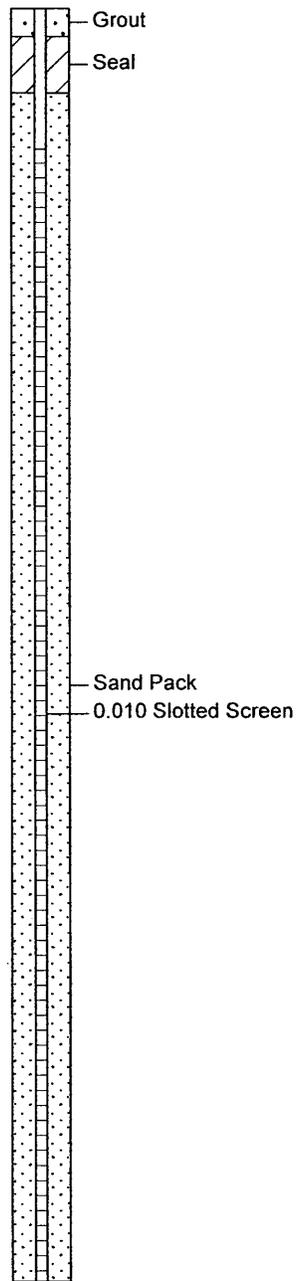
Project #: CTO 0094

Started : 7/14/99  
 Finished : 7/14/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

Northing : 393729.29  
 Easting : 812560.30  
 TOC Elevation : 280.29  
 Total Depth : 90 feet  
 Well Screen : 50 to 90 feet

Well: 007G37F1  
 Elev.: 280.29

Depth in Feet	Surf. Elev. 280.96	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	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
						SW	(57.5 - 65) Yellowish brown (tan) med. to coarse grained sand w/ gravel (up to 1/2" dia.)
60	220	7				SW	(65 - 69) Yellowish brown (tan) med. to coarse grained sand w/ gravel (increases content and size with depth)
65	215					SW	
70	210	8				SP	(69 - 71) Tan fine sand
						SW	(71 - 75) Tan fine to coarse sand w/ gravel
75	205					GW	(75 - 85) Lt. brown sandy gravel (up to 2" dia.)
						GW	(85 - 90) Lt. brown sandy gravel w/ increase in sand contents and less gravel (up to 2" dia.)
80	200	9				GW	
85	195	10				GW	
90						GW	





# BORING LOG of 007G37L1

(Page 1 of 1)

NSA MID-SOUTH  
Millington, TN.

Started : 1400 7/20/99  
 Finished : 1440 7/20/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : C. Davis

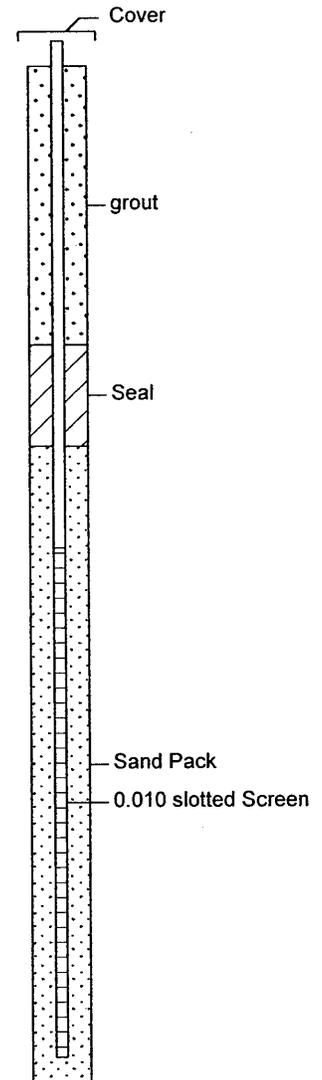
Northing : 393722.68  
 Easting : 812553.28  
 TOC Elevation : 280.13  
 Total Depth : 20 feet  
 Well Screen : 10 to 20 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Depth in Feet	Surf. Elev. 280.94	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0							(0 - 5) Lt. brown clayey (slightly) silt, slightly moist
2.80		1	80			ML	
5							(5 - 8) Lt. gray clayey silt w/ mottled iron staining, slightly moist to moist, medium stiff
2.75						ML	
8							(8 - 15) Lt. brown to Lt. yellowish-orange brown clayey silt w/ some gray mottling and iron-mang. nodules, moist, slightly stiff
10		2	75			ML	
12.70							(15 - 20) Lt. brown and Lt. gray mottled clayey silt w/ iron-mang. nodules and iron staining, moist, slightly stiff
15		3	70			ML	
12.65							
20							
12.60							
25							

Well: 007G37L1  
Elev.: 280.94





# BORING LOG of 007G37L2

(Page 1 of 1)

NSA MIDSOUTH  
Millington, TN.

Started : 1000 7/20/99  
 Finished : 1130 7/20/99  
 Drilling Method : Rotasonic  
 Drilling Company : Allinace Drilling  
 Geologist : C. Davis

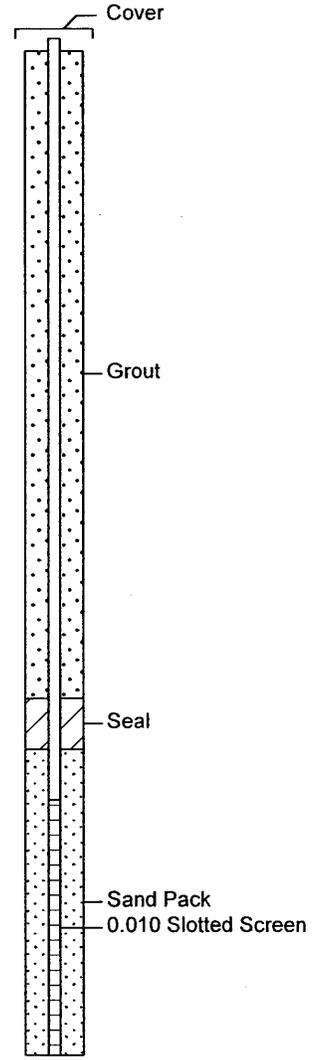
Northing : 393715.55  
 Easting : 812546.55  
 TOC Elevation : 280.22  
 Total Depth : 40 feet  
 Well Screen : 30 to 40 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G37L2  
 Elev.: 280.82

Depth in Feet	Surf. Elev. 280.82	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	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			ML	(8 - 15) Lt. brown and greenish gray mottled clayey silt w/ some iron-manganese nodules, moist, sightly stiff (15 - 22.5) Lt. brown and greenish gray mottled clayey silt (increasing clay content) w/ some iron-manganese nodules, moist, sightly stiff
15	265					ML	
20	260	3	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
25	255					ML	
30	250	4	100			ML	(31.5 - 33) Lt. gray and yellowish orange mottled clayey silt, slighty moist, stiff
35	245	5	100			ML	(33 - 35) Lt. gray and yellowish orange mottled clayey silt, slighty moist, very stiff (35 - 38) Olive gray and Lt. brown mottled clayey silt, slighty moist, stiff (38 - 40) Lt. gray clayey silt mottled w Lt/ brown clayey silt, slighty moist to moist, stiff
40	240						
45	235						
50							



12-16-... N:\WELL LOGS\NSAMIDSOUTH\007G37L2.BOR



# BORING LOG of 007G37LF

(Page 1 of 2)

NSA MID-SOUTH  
Millington, TN.

Started : 1440 2/1/99  
 Finished : 1010 2/2/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

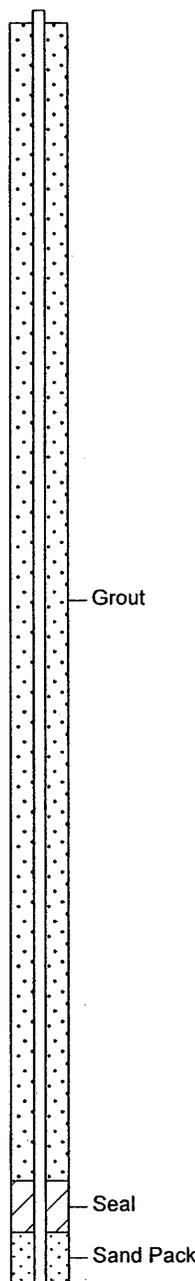
Northing : 393714.18  
 Easting : 812575.75  
 Grass Elevation : 280.52  
 Total Depth : 95 feet  
 Well Screen : 51 to 91 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Depth in Feet	Surf. Elev. 280.52	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	280						(0 - 3) Lt. brown silt, wet 0" - 6", dry and hard 6" - 3'
1		1	60			ML	
5	275						(5 - 8) Lt. brown and olive gray silt w/ manganese, moist, med. stiff (8 - 15) Lt. brown silt, moist, med. stiff
10	270	2	110			ML	
15	265						(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
20	260	3	100			ML	
25	255						(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 (43 - 46) Lt. brown with gray sandy clay, moist, soft (46 - 49) Gray w/ LT. brown sandy clay w/ trace of gravel, wet, very stiff
30	250	4	100				
35	245						
40	240	5	100			CL	
45	235						
50		6	100				
						SW	

Well: 007G37LF  
 Elev.: 280.59  
 Cover



12-16-... N:\WELL LOGS\NSAMIDSOUTH\007G37LF.BOR

NSA MID-SOUTH  
Millington, TN.

Started : 1440 2/1/99  
 Finished : 1010 2/2/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

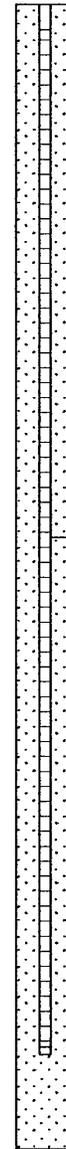
Northing : 393714.18  
 Easting : 812575.75  
 Grass Elevation : 280.52  
 Total Depth : 95 feet  
 Well Screen : 51 to 91 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G37LF  
 Elev.: 280.59

Depth in Feet	Surf. Elev. 280.52	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
50	230	6	100			SW	(49 - 54) Orange brown med. coarse sand, w/ gravel (up to 2" in diameter)
55	225					SP	(54 - 55) Lt. brown (tan) fine sand
		7	75			SW	(55 - 56) Orange brown fine to coarse sand w/ gravel (up to 1.5")
60	220					SP	(56 - 60) Tan brown fine sand
65	215	8	100			SW	(60 - 74) Orange brown med. coarse sand w/ gravel (up to 1.5")
70	210						
75	205	9	95			GW	(74 - 90) Orange brown sandy clay w/ gravel (up to 2")
80	200						
85	195	10	95			SW	(90 - 91.5) Lt. brown fine to coarse sand, clayey w/ trace of pebbles
90	190					SP	(91.5 - 92) Tan brown fine sand, silty and clayey w/ trace of pebbles
95	185					SP	(92 - 95) Greenish gray and dark brown silty sand, very lignitic, wet
100							



0.010 Slotted Screen  
 Sand Pack



# BORING LOG of 007G37UC

(Page 1 of 2)

NSA MID-SOUTH  
Millington, TN.

Started : 1630 7/12/99  
 Finished : 1440 7/13/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

Northing : 393736.90  
 Easting : 812568.19  
 TOC Elevation : 280.42  
 Total Depth : 125 feet  
 Well Screen : 115 to 125 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G37UC  
 Elev.: 281.07

Depth in Feet	Surf. Elev. 281.07	SAMPLES	% Rec-covery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	281						(0 - 2) Lt. brown clayey silt, moist
		1	80				(2 - 5) Lt. brown clayey silt, dry, hard
5	276						(5 - 7) Yellowish brown and greenish gray clayey silt, moist, soft to med. stiff
		2	80				(7 - 16) Yellowish brown and greenish gray clayey silt w/ manganese and iron stains, moist, soft to med. stiff
10	271						(16 - 21) Yellowish brown and greenish gray clayey silt, moist, soft to med. stiff
		3	100			ML	(21 - 25) Lt. olive gray clayey silt w/ iron staining, moist, med. stiff
15	266						(25 - 35) Olive gray silt w/ rusty brown streaks, moist, very stiff
		4	100				(35 - 37) Lt. brown yellowish orange greenish gray clayey silt, moist, very stiff manganese streaks at 36
20	261						
25	256						
30	251						
35	246						
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
						SW	(51.5 - 55.5) Reddish brown to Lt. brown med. to coarse sand w/ gravel (up to 2" dia.)
55	226					SP	(55.5 - 57.5) Yellowish brown (tan) fine grained sand
						SW	(57.5 - 65) Yellowish brown (tan) med. to coarse grained sand w/ gravel (up to 1/2" dia.)
60	221	7	80				(65 - 69) Yellowish brown (tan) med. to coarse grained sand w/ gravel (increases content and size with depth)
65							

Cover

Grout

12-16 1003 N:WELL LOGS\NSAMIDSOUTH\007G37UC.BOR



# BORING LOG of 007G37UC

(Page 2 of 2)

NSA MID-SOUTH  
Millington, TN.

Started : 1630 7/12/99  
 Finished : 1440 7/13/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

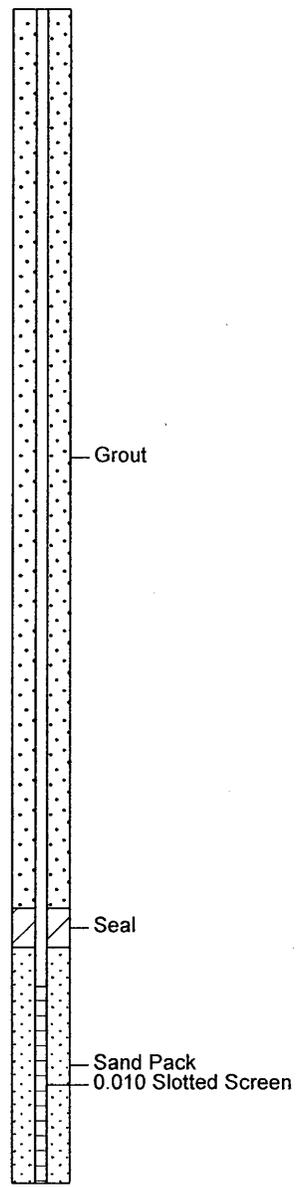
Northing : 393736.90  
 Easting : 812568.19  
 TOC Elevation : 280.42  
 Total Depth : 125 feet  
 Well Screen : 115 to 125 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G37UC  
 Elev.: 281.07

Depth in Feet	Surf. Elev. 281.07	SAMPLES	% Rec-covery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	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				
						GW	(85 - 90) Lt. brown sandy gravel w/ increase in sand contents and less gravel (up to 2" dia.)
85	196						
							(90 - 94) Lt. brown sandy gravel (up to 2" dia.)
90	191	10	100				
						SC	(94 - 95) Dark gray olive gray clayey fine sand w/ lignite lenses throughout, moist
95	186					CL	(95 - 99) Olive gray sandy clay, moist, very stiff to hard (thin lignite laminations (< 1mm))
						SC	(99 - 102) Olive gray clayey sand, stiff
100	181	11	100				
						CL	(102 - 107) Olive gray greenish gray clay w/ sand laminations (up to 1/2" thick), dry, very hard
105	176						
						SC	(107 - 109) Olive gray sandy lignitic clay, moist, stiff to hard
110	171	12	100			CL	(109 - 114) Olive gray clay, dry, hard
						SP	(114 - 114.5) Lt. gray fine sand
115	166					CL	(114.5 - 116) Olive gray clay, dry, hard Lignite layer (4" thick) at 115
						SP	(116 - 125) Lt. gray very fine sand w/ clayey zones (1
120	161	13	100				
125	156						
130							



NSA MID-SOUTH  
Millington, TN.

Started : 1030 2/3/99  
Finished : 1600 2/3/99  
Drilling Method : Rotasonic  
Drilling Company : Alliance Drilling  
Geologist : B. Brantley

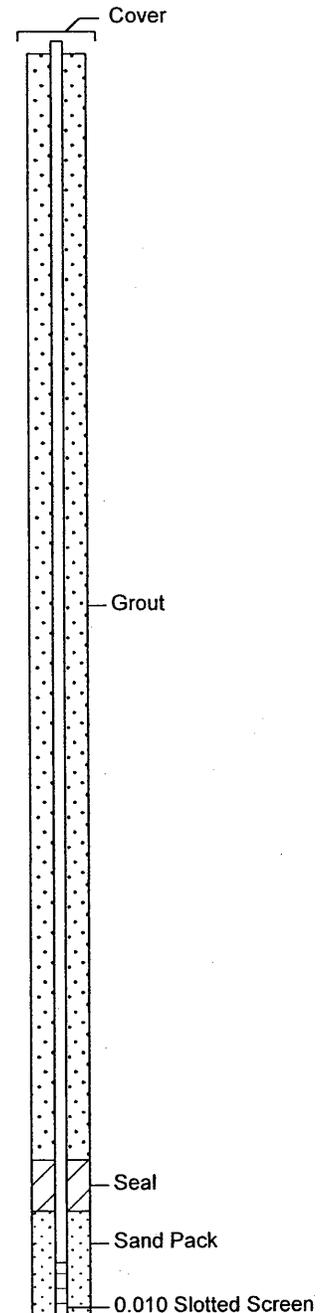
Northing : 393399.15  
Easting : 812593.25  
TOC Elevation : 279.96  
Total Depth : 88 feet  
Well Screen : 48 to 88 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Depth in Feet	Surf. Elev. 280.12	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	280						(0 - 5) Brown clayey silt, moist, very stiff
1		1	100				
5	275						(5 - 13) Lt. brown clayey silt, moist, med. stiff
10	270	2	100				
13							(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							(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				
41						CL	(41 - 45) Orange brown w/ grey silty clay, trace of pebbles (1/8" to 1/4"), moist, stiff
45	235						(45 - 51) Yellow brown clayey med. coarse sand w/ gravel (up to 2"), wet
45		6	90			SW	(51 - 53) Yellow brown fine coarse sand w/ gravel, wet
50							

Well: 007G38LF  
Elev.: 280.12



NSA MID-SOUTH  
Millington, TN.

Started : 1030 2/3/99  
 Finished : 1600 2/3/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

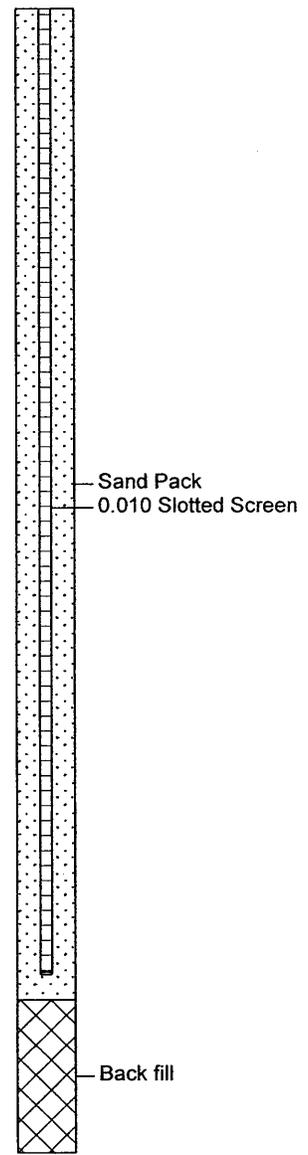
Northing : 393399.15  
 Easting : 812593.25  
 TOC Elevation : 279.96  
 Total Depth : 88 feet  
 Well Screen : 48 to 88 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G38LF  
 Elev.: 280.12

Depth in Feet	Surf. Elev. 280.12	SAMPLES	% Rec-covery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
50	230	6	90			SW	
						SP (53 - 54) Tan brown w/ pink streaks silty fine sand	
55	225	7	100			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	8	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 - 74) Tan med coarse sand w/ gravel (up to 3/4"), wet	
65	215	9	100			SW	
						GW (74 - 85) Orange brown med. coarse sandy gravel (up to 2")	
70	210	10	90			SW (85 - 88) Orange brown med coarse sand w/ gravel	
						OL (88 - 95) Dark brown clayey silt w/ fine sand stringers and lignite throughout, moist, very stiff	
75	205						
80	200						
85	195						
90	190						
95	185						
100							



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NSA MID-SOUTH  
Millington, TN.

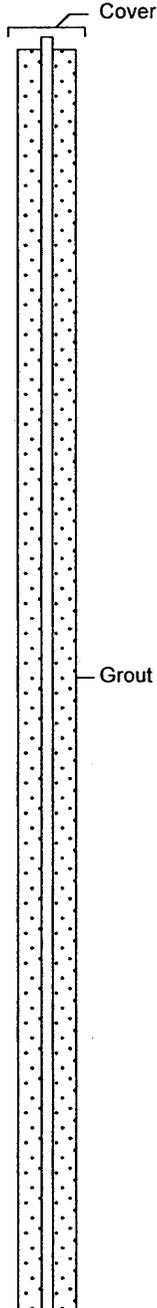
Location: AOCA/SWMU 7  
Project #: CTO 0094

Started : 1030 2/4/99  
Finished : 1030 2/5/99  
Drilling Method : Rotasonic  
Drilling Company : Alliance Drilling  
Geologist : B. Brantley

Northing : 394136.80  
Easting : 813257.86  
TOC Elevation : 284.91  
Total Depth : 95 feet  
Well Screen : 54 to 94 feet

Well: 007G39LF  
Elev.: 285.23

Depth in Feet	Surf. Elev. 285.23	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	285						(0 - 12) Dark brown clayey silt, moist, med. stiff
1		1	80				(12 - 17) Dark brown and greenish gray clayey silt w/ manganese scattered throughout, moist, med. stiff
5	280						(17 - 21) Dark brown clayey silt, moist, stiff
10	275	2	100				
15	270					ML	
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						(33 - 37) Lt. brown (tan) silty sand, moist, soft
37							(37 - 45) Orange brown w/ gray silty sand, moist
40	245	5	100			SP	(45 - 51) Tan and orange brown fine sand, wet, micaceous
45	240	6	90				
50							





# BORING LOG of 007G39LF

(Page 2 of 2)

NSA MID-SOUTH  
Millington, TN.

Started : 1030 2/4/99  
 Finished : 1030 2/5/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

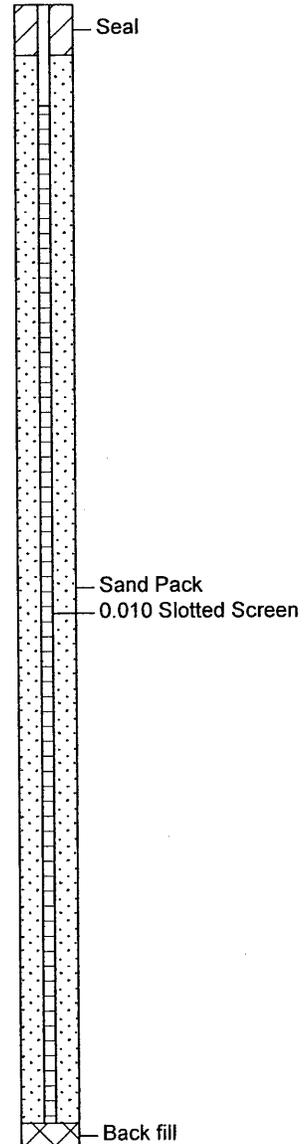
Northing : 394136.80  
 Easting : 813257.86  
 TOC Elevation : 284.91  
 Total Depth : 95 feet  
 Well Screen : 54 to 94 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Depth in Feet	Surf. Elev. 285.23	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
50	235	6	90			SP	(51 - 53) Lt. gray fine and med. sand w/ gravel scattered (up to 1/2"), wet
55	230					SW	(53 - 57) Orange brown fine to med sand w/ few gravel
						SP	(57 - 61) Orange brown fine sand
60	225	7	100			SW	(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					GW	(77 - 80) Tan and orange brown sandy gravel
80	205	9	100			SW	(80 - 86) Orange brown fine and coarse sand w/ trace of gravel
85	200					GW	(86 - 94) Tan med and coarse sandy gravel (gravel up to 2")
90	195	10	100			SC	(94 - 95) Dark brown clayey fine sand
95	190					SC	

Well: 007G39LF  
Elev.: 285.23



12-16-1033 N:WELL LOGS\NSAMIDSOUTH\007G39LF.BOR



# BORING LOG of 007G40LF

(Page 1 of 2)

NSA MID-SOUTH  
Millington, TN.

Location: AOCA/SWMU 7

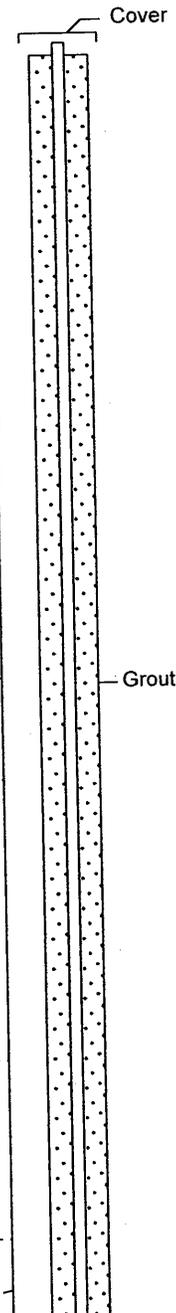
Project #: CTO 0094

Started : 1030 2/3/99  
Finished : 1600 2/3/99  
Drilling Method : Rotasonic  
Drilling Company : Alliance Drilling  
Geologist : B. Brantley

Northing : 393203.88  
Easting : 812442.18  
TOC Elevation : 279.03  
Total Depth : 95 feet  
Well Screen : 57 to 87 feet

Depth in Feet	Surf. Elev. 279.21	SAMPLES	% Rec-covery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	279						(0 - 6) Brown clayey silt, dry, very stiff
5	274	1	100				(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 - 40) Brown w/ gray clayey silt w/ trace of sand, moist, med. stiff
35	244					ML	
40	239	5	100			SC	(40 - 45) Orange brown w/ gray sandy clay, moist, med. stiff (45 - 47) Orange brown w/ gray sandy clay, dry, very stiff
45	234						
50		6	90			SP	(47 - 49) Orange brown fine sand w/ trace of gravel, moist
						CL	

Well: 007G40LF  
Elev.: 279.21



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NSA MID-SOUTH  
Millington, TN.

Location: AOCA/SWMU 7

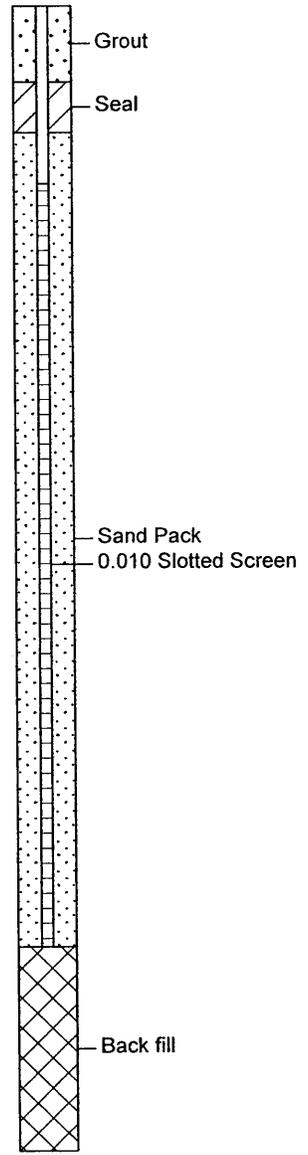
Project #: CTO 0094

Started : 1030 2/3/99  
 Finished : 1600 2/3/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

Northing : 393203.88  
 Easting : 812442.18  
 TOC Elevation : 279.03  
 Total Depth : 95 feet  
 Well Screen : 57 to 87 feet

Well: 007G40LF  
 Elev.: 279.21

Depth in Feet	Surf. Elev. 279.21	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
50	229	6	90			CL	(49 - 55.5) Orange brown w/ Lt. gray sandy clay, moist, med. stiff
55	224						SC
						SP	(56 - 57) Tan fine sand, moist
						SC	(57 - 58) Pink and Lt. gray clay, moist, soft
60	219	7	100			SP	(58 - 61) Pink and Lt. gray and orange brown sandy clay
							GP
						GP	(64 - 66) Tan brown med. to coarse sandy gravel (gravel up to 1")
							(66 - 75) Tan brown med. to coarse sand w/ gravel (up to 1")
70	209	8	100			SW	(73 - 75) increasingly coarser sands and gravelly
75	204	9	100			GW	(75 - 84) Orange brown coarse sandy gravel (gravel up to 2")
80	199	9	100			GP	(84 - 87) Chert gravel (avg. size between 1/4" and 1/2"), poorly graded
85	194	10	100			OL	(87 - 95) Dark brown clay w/ fine sand (contents varies from stringers to none, predominately clay), moist, stiff to very stiff
90	189						
95	184						
100							



12-16-1999 N:\WELL LOGS\NSAMIDSOUTH\007G40LF.BOR

NSA MID-SOUTH  
Millington, TN.

Location: AOCA/SWMU 7

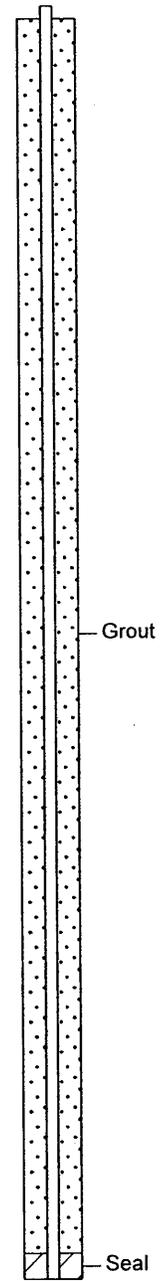
Project #: CTO 0094

Started : 0915 2/7/99  
 Finished : 1200 2/7/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

Northing : 393876.47  
 Easting : 812367.69  
 TOC Elevation : 281.89  
 Total Depth : 95 feet  
 Well Screen : 53 to 93 feet

Well: 007G41LF  
 Elev.: 279.45  
 Cover

Depth in Feet	Surf. Elev. 279.45	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	279						(0 - 4) Lt. brown clayey silt, dry, very stiff
5	274	1	80				(4 - 15) Orange brown and Lt. gray clayey silt w/ manganese scattered throughtout, moist, stiff (15 - 18) Orange brown and Lt. gray clayey silt w/ manganese scattered throughtout, wet, stiff
10	269	2	85				(18 - 24) Tan brown clayey silt w/ iron stains throughout, wet, med. stiff. (24 - 31) Dark olive gray clayey silt, moist, med. stiff (31 - 34) Brown gray and olive gray clayey silt, dry, very stiff
15	264					ML	
20	259	3	100				
25	254						
30	249	4	85				
35	244					CL	(34 - 34.5) Greenish gray fat clay lense, moist, soft (34.5 - 35) Brown gray and olive gray clayey silt, dry, very stiff (35 - 42) Lt. brown and Lt. gray sandy clay, moist, soft
40	239	5	100			SC	(42 - 47) Orange brown clayey sand w/ gravel, moist
45	234						
50		6	100			SP	(47 - 52) Orange brown med. coarse sand, wet (52 - 54) Tan brown med. coarse sand, wet



NSA MID-SOUTH  
Millington, TN.

Started : 0915 2/7/99  
 Finished : 1200 2/7/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

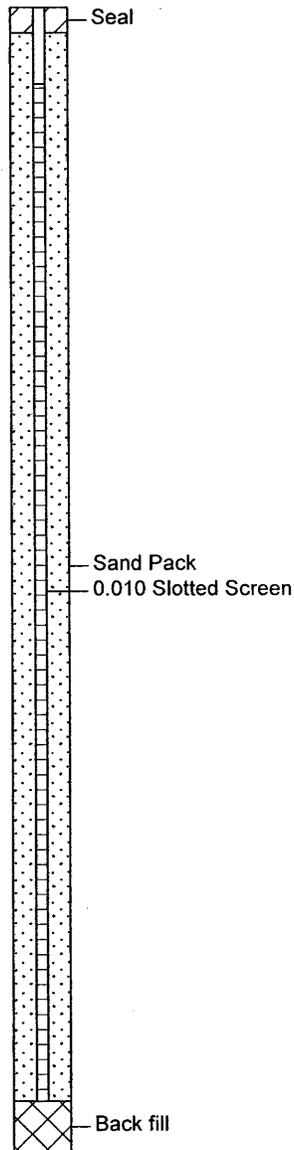
Northing : 393876.47  
 Easting : 812367.69  
 TOC Elevation : 281.89  
 Total Depth : 95 feet  
 Well Screen : 53 to 93 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Depth in Feet	Surf. Elev. 279.45	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
50	229	6	100			SP	
55	224						(54 - 63) Tan brown med. and coarse sand w/ small gravel (1/4" dia.) (63 - 73) Tan brown med. and coarse sand w/ increasing gravel contents (up to 1" dia.)
60	219	7	100			SW	
65	214						
70	209	8	85				
75	204					SP	(73 - 75) Orange brown coarse sand w/ gravel (up to 1/2" dia.) (75 - 86) Orange brown med. and coarse sandy gravel (1/4" to 1" dia. gravel), wet
80	199	9	100			GW	
85	194						
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

Well: 007G41LF  
Elev.: 279.45



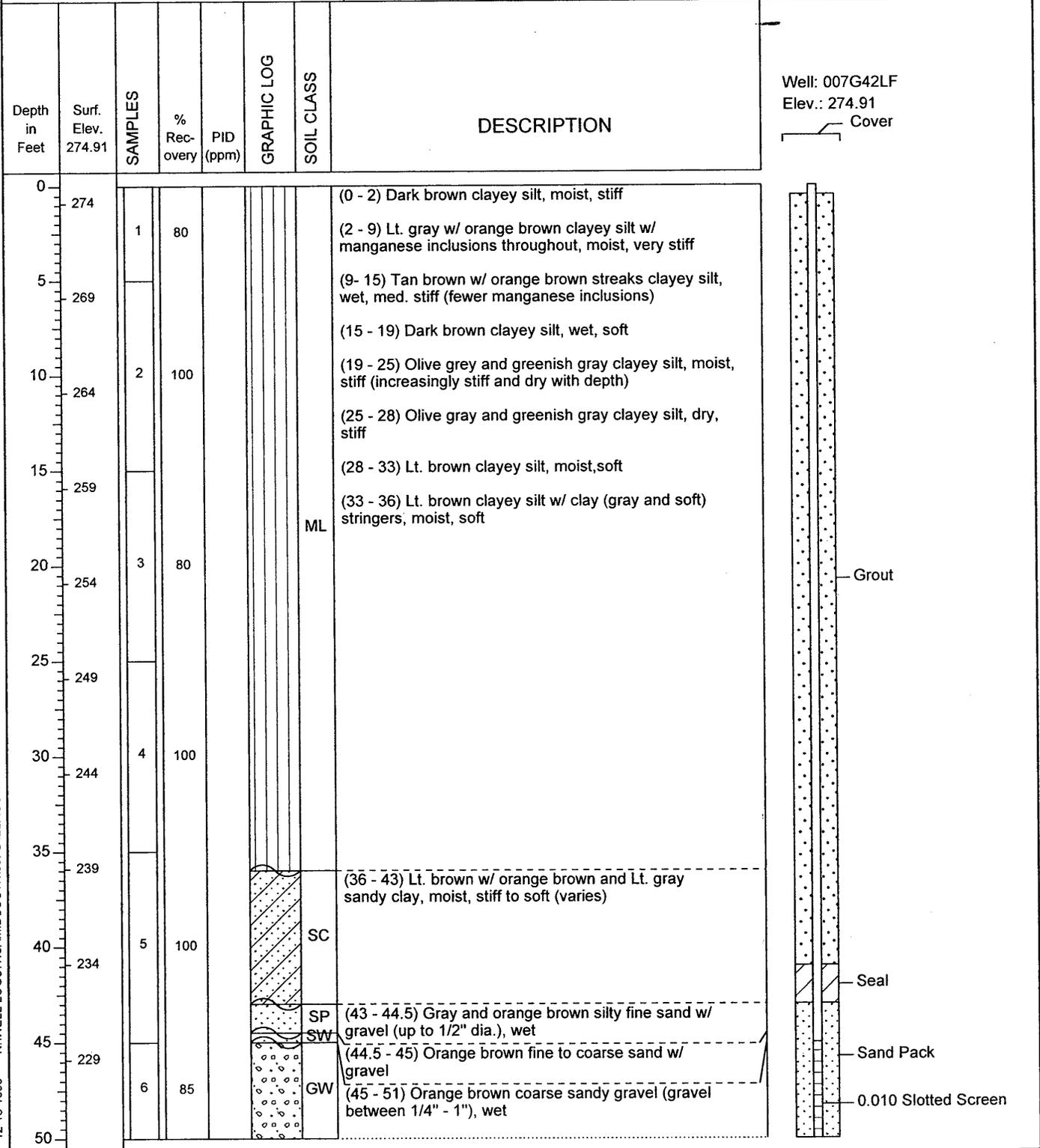
NSA MID-SOUTH  
Millington, TN.

Started : 1500 2/9/99  
 Finished : 1800 2/9/99  
 Drilling Method : Rotasonic  
 Drilling Company : Allinace Drilling  
 Geologist : B. Brantley

Northing : 394573.25  
 Easting : 811564.88  
 TOC Elevation : 277.01  
 Total Depth : 95 feet  
 Well Screen : 45 to 85 feet

Location: AOCA/SWMU 7

Project #: CTO 0094



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NSA MID-SOUTH  
Millington, TN.

Location: AOCA/SWMU 7

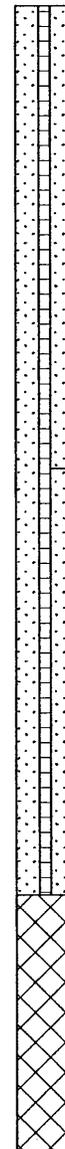
Project #: CTO 0094

Started : 1500 2/9/99  
 Finished : 1800 2/9/99  
 Drilling Method : Rotasonic  
 Drilling Company : Allinace Drilling  
 Geologist : B. Brantley

Northing : 394573.25  
 Easting : 811564.88  
 TOC Elevation : 277.01  
 Total Depth : 95 feet  
 Well Screen : 45 to 85 feet

Well: 007G42LF  
 Elev.: 274.91

Depth in Feet	Surf. Elev. 274.91	SAMPLES	% Rec-covery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
50	224	6	85			GW	(51 - 58) Orange brown fine sand, moist
55	219					SP	
60	214	7	100			SW	(58 - 59) Orange brown med. to coarse sand w/ gravel (up to 1" dia.), wet
						SP	(59 - 60) Orange brown fine sand w/ gravel, wet
						SW	(60 - 65) Orange brown med. coarse sand w/ gravel (up to 2" dia.), wet
65	209					SW	(65 - 77) Reddish brown med. coarse sand w/ gravel, wet
70	204	8	90			GW	
75	199					GW	
80	194	9	100			GW	(77 - 86) Orange reddish brown sandy gravel ( up to 2"), wet
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							



NSA MID-SOUTH  
Millington, TN.

Started : 1020 2/16/99  
 Finished : 1500 2/16/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

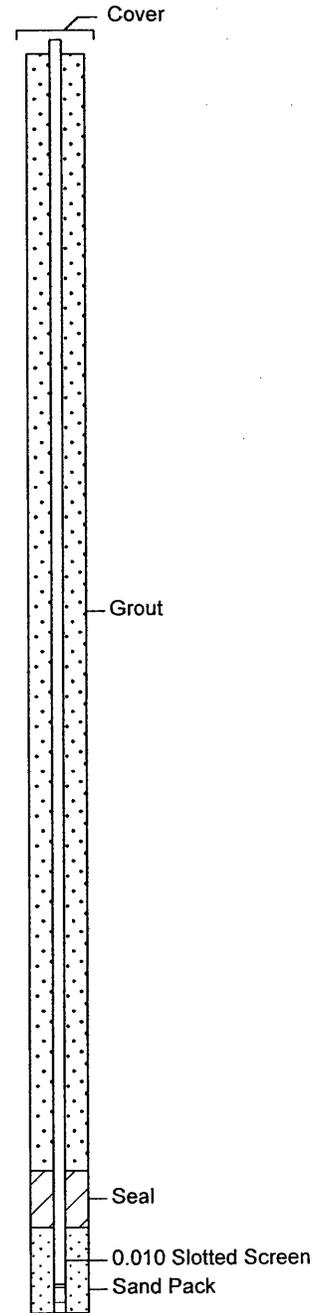
Northing : 393011.20  
 Easting : 812282.54  
 TOC Elevation : 277.25  
 Total Depth : 85 feet  
 Well Screen : 44 to 84 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G43LF  
 Elev.: 277.51

Depth in Feet	Surf. Elev. 277.51	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	277						(0 - 5) Lt. brown clayey silt, moist, very stiff
		1	100				(5 - 7) Lt. brown clayey silt, increasingly moist, med. stiff
5	272						(7 - 10) Dark brown and olive gray clayey silt, dry, very stiff
							(10 - 12) Dark brown mixed w/ greenish gray clayey silt, dry, stiff
10	267	2	90				(12 - 15) Greenish gray w/ yellowish brown clayey silt
							(15 - 22) Yellow brown w/ Lt. gray clayey silt w/ manganese and iron staining from 20 - 22, wet, soft
15	262					ML	
20	257	3	100				(22 - 25) Dark brown clayey silt, moist, soft
							(25 - 27) Olive gray clayey silt, moist, med. stiff
25	252						(27 - 33) Lt. gray w/ greenish gray and yellowish brown clayey silt, moist, med. stiff, manganese inclusions from 32 - 33
30	247	4	100				
							(33 - 35) Lt. brown w/ Lt. gray silty clay w/ manganese, dry, hard
35	242						(35 - 44) Yellowish brown w/ Lt. gray silty clay, moist, med. stiff
						CL	
40	237	5	100				
45						SC	





# BORING LOG of 007G43LF

(Page 2 of 2)

NSA MID-SOUTH  
Millington, TN.

Started : 1020 2/16/99  
 Finished : 1500 2/16/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

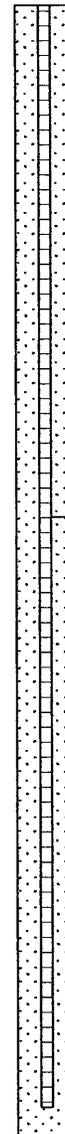
Northing : 393011.20  
 Easting : 812282.54  
 TOC Elevation : 277.25  
 Total Depth : 85 feet  
 Well Screen : 44 to 84 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G43LF  
 Elev.: 277.51

Depth in Feet	Surf. Elev. 277.51	SAMPLES	% Rec-covery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	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
							(57 - 64) Tan brown fine sand, wet
60	217	7	100			SP	
							(64 - 70) Orange brown gravelly med. to coarse sand, wet
							(70 - 75) Tan brown gravelly med. to coarse sand, wet
65	212					SW	
70	207	8	100				
							(75 - 84) Lt. brown (tan) sandy gravel
75	202					GW	
80	197	9	100				
						OH	(84 - 85) Dark brown clay/ Lt. gray lenses and fine sand, moist, med. stiff
85	192						
		10	100				
90							





# BORING LOG of 007G44LF

(Page 1 of 1)

NSA MID-SOUTH  
Millington, TN.

Started : 1100 2/17/99  
 Finished : 1600 2/17/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

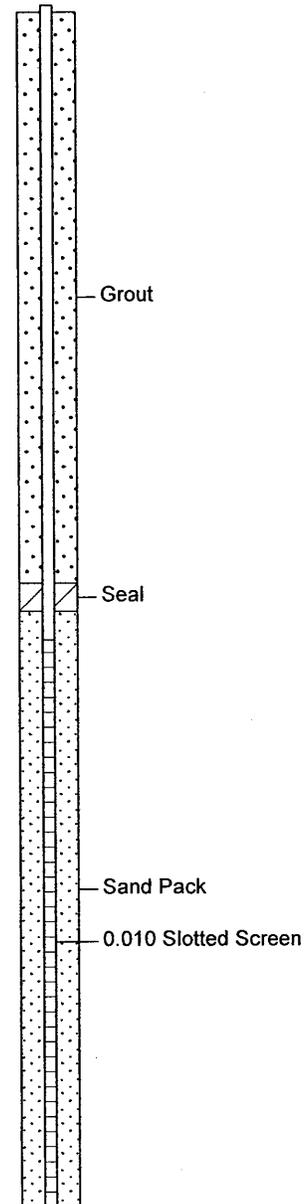
Northing : 394206.64  
 Easting : 811223.45  
 TOC Elevation : 274.37  
 Total Depth : 85 feet  
 Well Screen : 45 to 85 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Depth in Feet	Surf. Elev. 274.37	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	274	1	60				(0 - 5) Lt. brown w/ greenish gray clayey silt, wet, stiff
5	269						(5 - 15) Lt. brown w/ greenish gray clayey silt w/ manganese inclusions throughout, wet, med. stiff
10	264	2	65				(15 - 22) Lt. brown w/ greenish gray clayey silt w/ manganese inclusions throughout, wet, soft
15	259						(22 - 28) Greenish gray clayey silt, moist, soft (increasingly stiff with depth)
20	254	3	75			ML	(28 - 33) Olive gray, greenish gray w/ Lt. brown clayey silt, moist, very stiff
25	249						(33 - 35) Lt. brown clayey silt, wet, med. stiff
30	244	4	100				
35	239						(35 - 46.5) Lt. brown w/ Lt. gray clay streaked sandy clay, moist, med. stiff
40	234	5	85			SC	Trace of gravel (1/4" dia.) at 38 Gravelly clay at 43 - 44
45	229						
50	224	6	100			SW	(46.5 - 51) Lt. brown med. to coarse sand w/ gravel (up to 1/2"), wet
55	219						(51 - 59) Lt. brown and tan fine sand, micaceous, wet
60	214	7	100			SP	
65	209						(59 - 65) Orange brown gravelly fine to coarse sand, (up to 2" dia. gravel), wet
70	204	8	85			SW	(65 - 83) Orange brown gravelly coarse sand, (up to 2" dia. gravel), wet
75	199						
80	194	9	100				
85	189						(83 - 84) Orange brown sandy gravel (1/2" to 2" dia.)
90		10	100				(84 - 85) Dark gray, olive gray silty fine sand w/ lignite

Well: 007G44LF  
 Elev.: 274.41  
 Cover





# BORING LOG of 007G45LF

(Page 1 of 1)

NSA MID-SOUTH  
Millington, TN.

Started : 0020 2/18/99  
 Finished : 1530 2/18/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

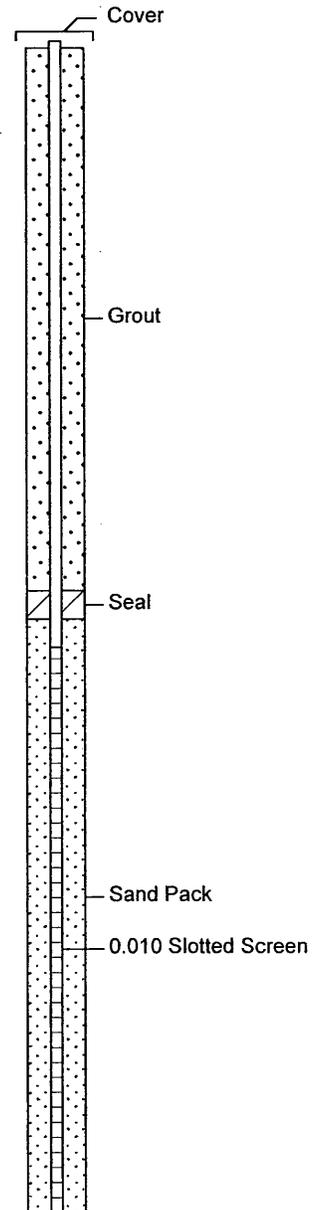
Northing : 394931.50  
 Easting : 811901.36  
 TOC Elevation : 276.90  
 Total Depth : 85 feet  
 Well Screen : 43 to 83 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Depth in Feet	Surf. Elev. 277.07	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	277	1	80				(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					ML	(15 - 20) Lt. gray and yellow brown clayey silt, wet, med. stiff
20	257	3	90				(20 - 22) Grayish brown clayey silt, moist, soft
25	252						(22 - 29) Greenish gray silt, moist, med. stiff
30	247	4	100				(29 - 35) Yellow brown w/ orange brown and Lt. gray streaks clayey silt, moist, med. stiff
35	242						(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			SC	(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					GW	(42 - 46.5) Orange brown sandy gravel, wet, slightly cemented
50	227	6	85			SW	(46.5 - 47.5) Lt. gray med coarse sand w/ small gravel (< 1/2" dia. ), wet
55	222						(47.5 - 56) Tan brown fine sand, wet
60	217	7	100			SP	(56 - 63) Tan brown med. sand w/ trace of chert pebbles, wet
65	212						(63 - 75) Orange brown fine coarse sand w/ trace of gravel (increase in gravel contents with depth), wet
70	207	8	100			SW	3" thick layer of cemented sands between 74 and 75
75	202						(75 - 82) Yellow orange brown sandy gravel (up to 2" dia.), wet
80	197	9	90			GW	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

Well: 007G45LF  
Elev.: 277.07



NSA MID-SOUTH  
Millington, TN.

Started : 0915 2/21/99  
 Finished : 1500 2/21/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

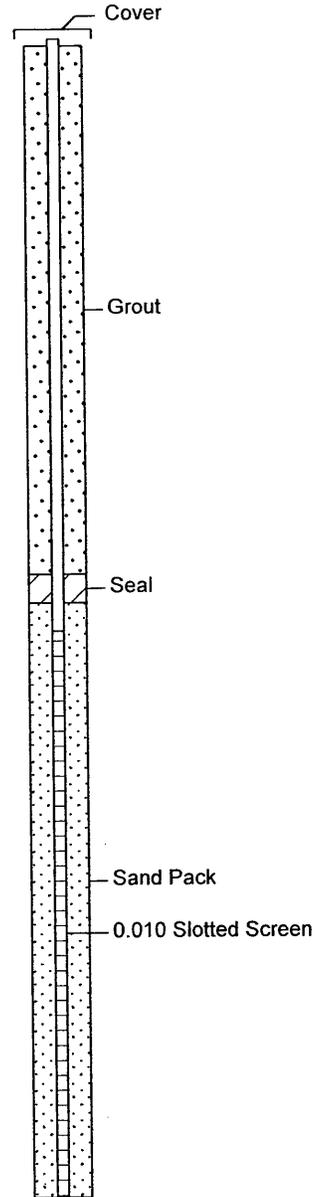
Northing : 392830.60  
 Easting : 812114.61  
 TOC Elevation : 275.92  
 Total Depth : 85 feet  
 Well Screen : 42 to 82 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Depth in Feet	Surf. Elev. 276.21	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	276	1	80				(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					ML	(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						
30	246	4	100			CL	(27 - 35) Yellow brown and Lt. gray silt clay, moist, med. stiff and stiff
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
60	216	7	100				(54.5 - 55) Orange brown med. sand. (55 - 57) Lt. gray fine sand, wet (57 - 62) Orange brown med. sand, wet
65	211						
70	206	8	90			SW	(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.) (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





# BORING LOG of 007G47LF

(Page 1 of 2)

NSA MID-SOUTH  
Millington, TN.

Started : 1100 2/19/99  
 Finished : 1400 2/20/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

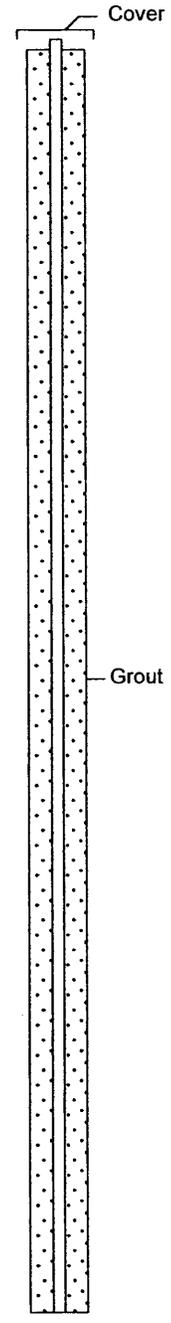
Northing : 397855.14  
 Easting : 814805.31  
 TOC Elevation : 302.04  
 Total Depth : 115 feet  
 Well Screen : 72 to 82 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G47LF  
 Elev.: 302.22

Depth in Feet	Surf. Elev. 302.22	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	302						(0 - 12) Lt. brown silt, dry hard
		1	80				(12 - 15) Lt. brown silt, moist, soft
5	297						(15 - 20) Lt. brown silt, dry, hard
							(20 - 23) Lt. brown silt, dry, hard (friable)
10	292	2	80			ML	(23 - 25) Lt. brown silt, moist, med. stiff, trace of sand between 24 and 25
15	287						
20	282	3	100				
25	277					SC	(25 - 30) Orange brown sandy clay, moist, very stiff scattered pebbles (< 5%) between 28 - 30
30	272	4	100			SP	(30 - 35) Reddish brown silty fine sand, wet, no gravel
35	267					SC	(35 - 41) Yellow brown w/ pink and Lt. gray sandy clay, moist, stiff
40	262	5	100				(41 - 53) Pink w/ Lt. gray clay, moist, soft to med. stiff
45	257					CL	
50	252	6	100				
						SC	(53 - 54) Yellow brown sandy clay, moist, med. stiff
55	247					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							



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NSA MID-SOUTH  
Millington, TN.

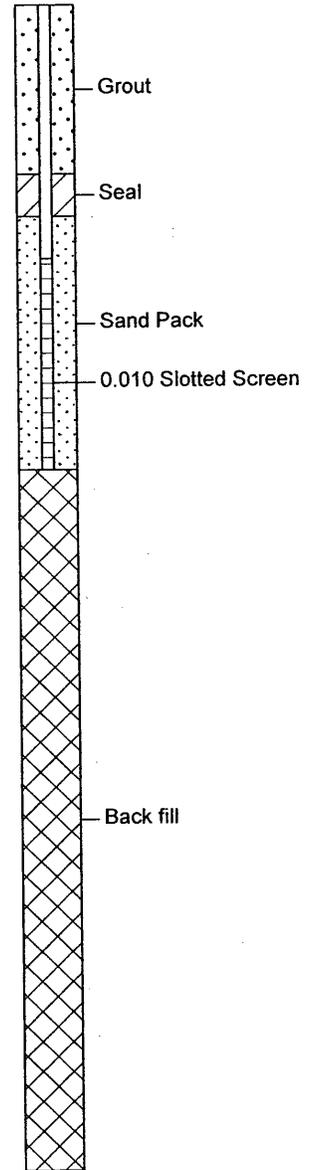
Location: AOCA/SWMU 7  
Project #: CTO 0094

Started : 1100 2/19/99  
Finished : 1400 2/20/99  
Drilling Method : Rotasonic  
Drilling Company : Alliance Drilling  
Geologist : B. Brantley

Northing : 397855.14  
Easting : 814805.31  
TOC Elevation : 302.04  
Total Depth : 115 feet  
Well Screen : 72 to 82 feet

Well: 007G47LF  
Elev.: 302.22

Depth in Feet	Surf. Elev. 302.22	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
60	242	7	100			CH	
65	237						
70	232	8	100			SC	(69 - 72) Pink w/ Lt. gray sandy clay, moist, soft
75	227					SP	(72 - 74.5) Lt. gray clayey sand w/ gravel (1/4" to 1/2"), wet
80	222	9	100			GW	(74.5 - 80) Yellow brown sandy gravel (up to 1") w/ clay, moist to wet
85	217					CL	(80 - 84) Yellow brown silty clay, moist, med. stiff
90	212	10	100			SC	(84 - 85) Gray sandy clay, moist, soft (cockfield) (85 - 98) Gray sandy clay, moist to wet, med. stiff to stiff
95	207						
100	202	11	100			SP	(98 - 115) Gray fine sand, wet Lignite lense at 104 (2" thick) and 105 (i/2" thick) Lignite seam at 113 (4" thick)
105	197						
110	192	12	100			SP	
115	187						
120							



NSA MID-SOUTH  
Millington, TN.

Started : 1615 2/22/99  
 Finished : 1300 2/23/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

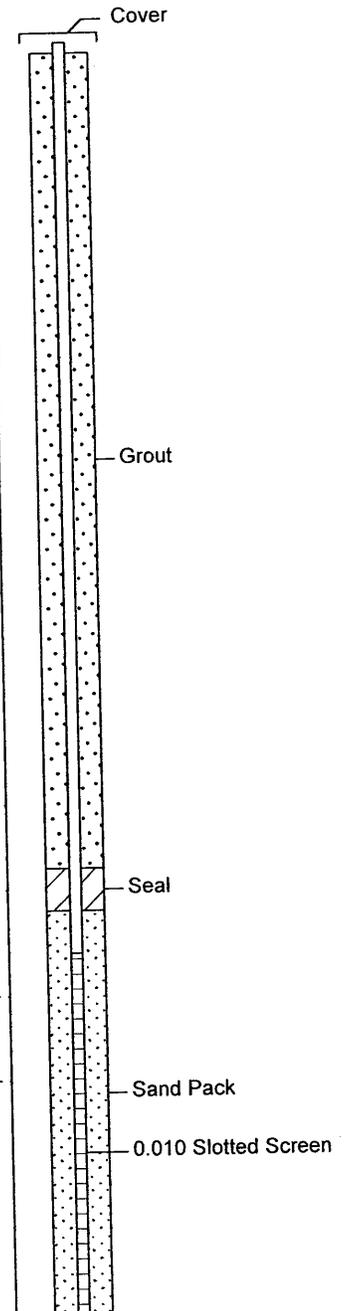
Northing : 396174.74  
 Easting : 812942.06  
 TOC Elevation : 279.71  
 Total Depth : 115 feet  
 Well Screen : 43 to 113 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Depth in Feet	Surf. Elev. 279.89	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	279	1	100				(0 - 3) Lt. brown clayey silt, dry, hard
5	274						(3 - 5) Lt. brown clayey silt, wet, soft (5 - 9) Gray clayey silt, wet, very soft
10	269	2	95			ML	(9 - 16) Olive grey yellowish brown w/ minor orange brown clayey silt, wet, soft (16 - 26) Dark gray to olive gray clayey silt, wet, soft
15	264						
20	259	3	80				
25	254						(26 - 29) Greenish gray silty clay, moist, very stiff trace of pebbles at 25
30	249	4	90			CL	(29 - 36) Olive gray silty clay w/ scattered pebbles, moist, very stiff
35	244						(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				(49 - 65) Orange brown fine coarse sand w/ gravel (up to 1" dia.)
55	224					SW	
60		7	100				

Well: 007G48LF  
Elev.: 279.89



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NSA MID-SOUTH  
Millington, TN.

Started : 1615 2/22/99  
Finished : 1300 2/23/99  
Drilling Method : Rotasonic  
Drilling Company : Alliance Drilling  
Geologist : B. Brantley

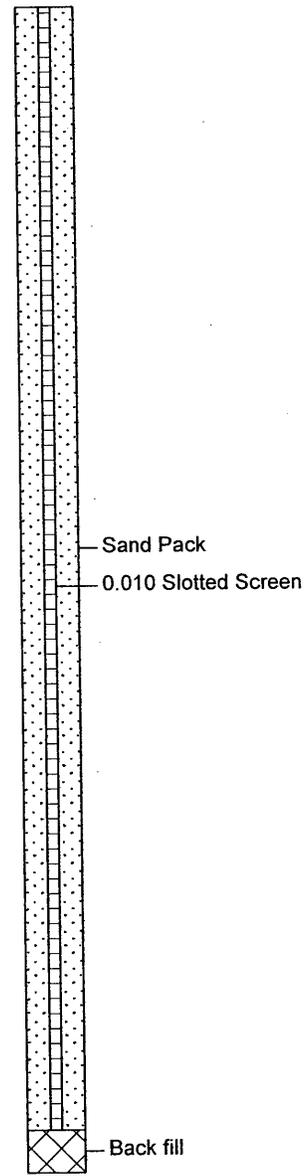
Northing : 396174.74  
Easting : 812942.06  
TOC Elevation : 279.71  
Total Depth : 115 feet  
Well Screen : 43 to 113 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Depth in Feet	Surf. Elev. 279.89	SAMPLES	% Rec-covery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	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					SP	(77 - 85) Orange brown med. to very coarse sand w/ trace of gravel
80	199	9	100			SW	
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					SW	(95 - 98) Orange brown med. to coarse sand w/ increase of gravel content
100	179	11	100			SW	(98 - 105) Orange brown gravelly sand
105	174					SW	(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

Well: 007G48LF  
Elev.: 279.89



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# BORING LOG of 007G49LF

(Page 1 of 3)

NSA MID-SOUTH  
Millington, TN.

Location: AOCA/SWMU 7

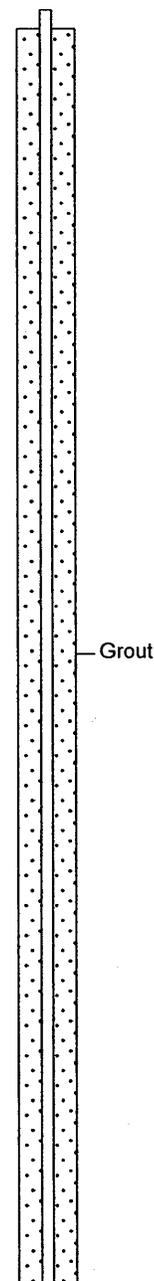
Project #: CTO 0094

Started : 0950 4/13/99  
 Finished : 1421 4/13/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : C. Davis

Northing : 392931.02  
 Easting : 814783.22  
 TOC Elevation : 289.68  
 Total Depth : 98 feet  
 Well Screen : 56.5 to 96.5 feet

Well: 007G49LF  
 Elev.: 289.98  
 Cover

Depth in Feet	Surf. Elev. 289.98	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0							(0 - .5) Concrete and gravel
289						ML	(.5 - 4) Dark, orangish brown silt mottled w/ Lt. olive gray silt, some iron staining, moist
5		1	40				(4 - 8) No recovery
284							
10						ML	(8 - 16) Lt. olive gray silt and clayey silt, mottled w/ orangish brown silt and clayey silt w/ iron staining and nodules, moist
279		2	80				
15							
274							(16 - 18) No recovery
20							(18 - 24) Same as above, but little to no iron nodules, lots of iron staining and more clay content
269		3	100				
25						ML	(24 - 27) Pale orangish Lt. brown to gray clayey silt, moist
264							(27 - 28) Lt. olive gray silt and clayey silt, mottled w/ orangish brown silt and clayey silt w/ iron staining and nodules, moist
30		4	100				(28 - 35) Dusky orangish brown clayey to very clayey silt w/ iron staining, moist



12-16-1000 N:\WELL LOGS\NSAMIDSOUTH\007G49LF.BOR

NSA MID-SOUTH  
Millington, TN.

Location: AOCA/SWMU 7

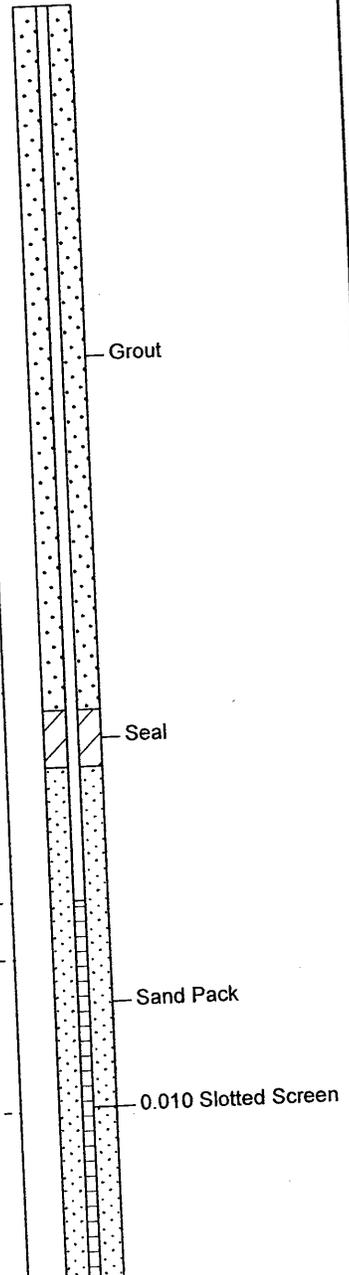
Project #: CTO 0094

Started : 0950 4/13/99  
 Finished : 1421 4/13/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : C. Davis

Northing : 392931.02  
 Easting : 814783.22  
 TOC Elevation : 289.68  
 Total Depth : 98 feet  
 Well Screen : 56.5 to 96.5 feet

Well: 007G49LF  
 Elev.: 289.98

Depth in Feet	Surf. Elev. 289.98	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
33	256	4	100				(35 - 45) Orangish brown and Lt. olive gray mottled clayey to very clayey silt w/ iron staining, moist
38	251					ML	
43	246	5	100				(45 - 47) Orangish brown and Lt. olive gray mottled clayey to very clayey silt w/ iron staining and minor amounts of very fine sand, moist
48	241					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.
53	236	6	100			SC	(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
58	231					SW	(56.5 - 58) Pale orangish to pale yellowish gray fine to med. sand, wet
						SP	(58 - 62) Pale orangish brown fine sand, wet
63		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



12-16-1999 N:WELL LOGS\NSAMIDSOUTH\007G49LF.BOR

NSA MID-SOUTH  
Millington, TN.

Location: AOCA/SWMU 7

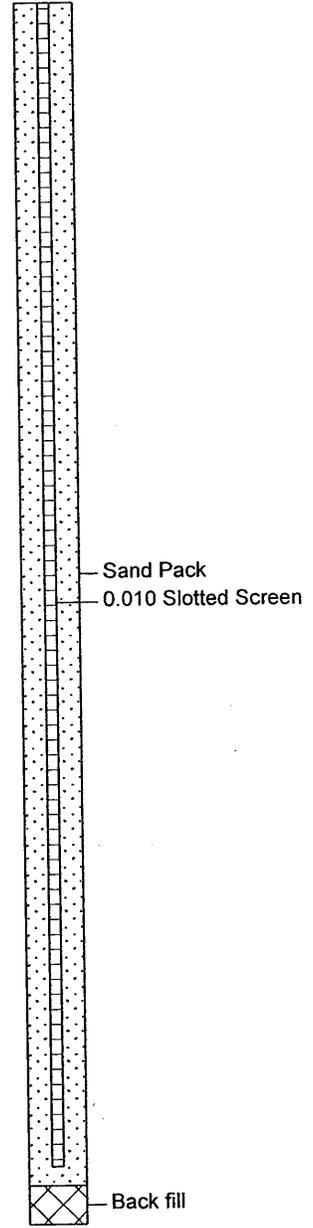
Project #: CTO 0094

Started : 0950 4/13/99  
 Finished : 1421 4/13/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : C. Davis

Northing : 392931.02  
 Easting : 814783.22  
 TOC Elevation : 289.68  
 Total Depth : 98 feet  
 Well Screen : 56.5 to 96.5 feet

Well: 007G49LF  
 Elev.: 289.98

Depth in Feet	Surf. Elev. 289.98	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
66	223	7	100			SC	(68 - 78) Yellowish gray to Lt. orangish brown fine to med sand w/ occasional very fine gravel, wet, Lt. gray clay, very moist
71	218	8	80			SW	(78 - 86) Same, clay lense at 78.5 (2" thick)
76	213						
81	208	9	100			SP	(88 - 91) Pale orangish gray med. sand, wet (91 - 92) Pale orangish gray med. sand w/ gravel (up to 1 1/2")
86	203						(86 - 88) No recovery
91	198	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")
96						CL	(94.5 - 95) Gray to Lt. gray clay moist, some yellowish and orangish gray mottling (95 - 98) Very dark brown silty clay, w/ clayey silt bands, micaceous, moist



12-16-1999 N:\WELL LOGS\NSAMIDSOUTH\007G49LF.BOR



# BORING LOG of 007G50LF

(Page 1 of 1)

NSA MID-SOUTH  
Millington, TN.

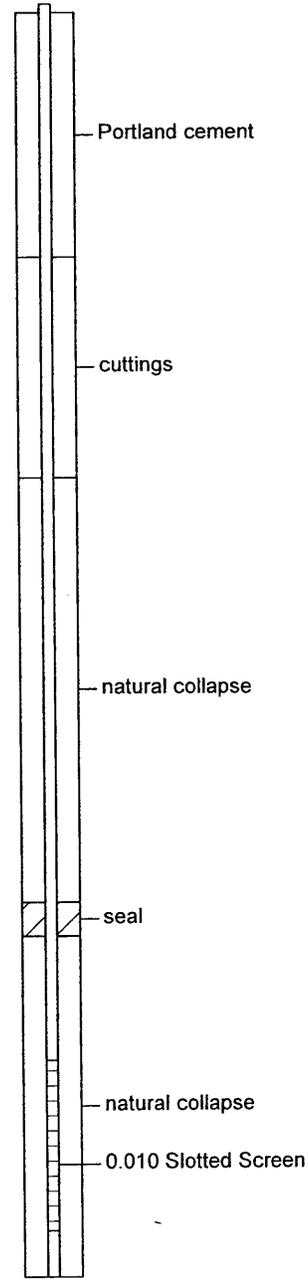
Location: AOCA/SWMU 7  
Project #: CTO 0094

Started : 0915 6/8/98  
Finished :  
Drilling Method : 3 1/4" ID HSA  
Drilling Company : USGS  
Geologist : V. Carmichael

Northing : 393883.00  
Easting : 809492.00  
TOC Elevation : 271.00  
Total Depth : 75 feet  
Well Screen : 62.3 to 72.3 feet

Depth in Feet	Surf. Elev. 262.00	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	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					ML	(20-25) Clayey silt, brownish-gray, moist (color change @ 22' bls)
25	237						(25-30) Clayey silt, light brownish gray ( gray color @ 27' bls), moist
30	232						(30-35) Clayey silt, gray, moist
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 angular, 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					SP	(55-60) No returns, drilling like sand and gravel
60	202						(60-65) No returns
65	197						(65-70) No returns
70	192					GW	(70-75) No returns
75							

Well: 007G50LF  
Elev.: 271.00  
Cover



01-14-2000 N:\WELL LOGS\NSAMIDSOUTH\007G50LF.BOR



# BORING LOG of 007G51LF

(Page 1 of 1)

NSA MID-SOUTH  
Millington, TN.

Location: AOCA/SWMU 7

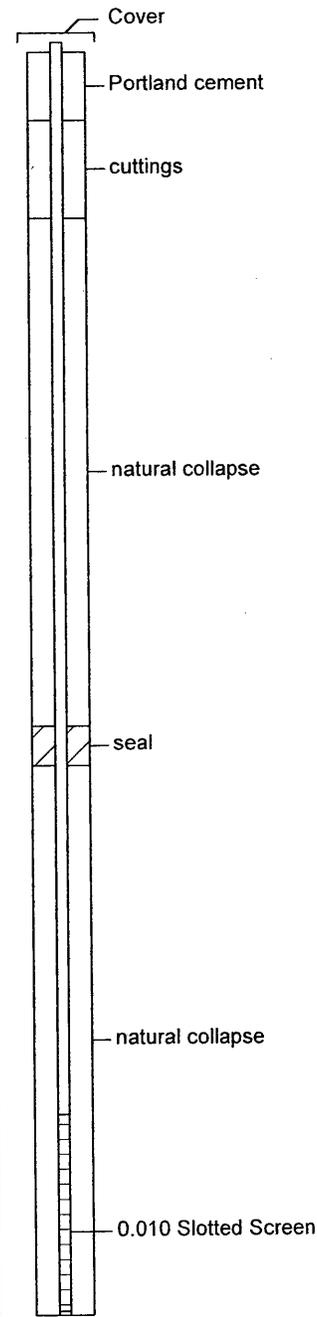
Project #: CTO 0094

Started : 1600 6/10/98  
 Finished : 1030 6/11/98  
 Drilling Method : 3 1/4" ID HSA  
 Drilling Company : USGS  
 Geologist : V. Carmichael

Northing : 397085.00  
 Easting : 808736.00  
 TOC Elevation : 279.00  
 Total Depth : 65 feet  
 Well Screen : 54.8 to 64.8 feet

Well: 007G51LF  
 Elev.: 279.00

Depth in Feet	Surf. Elev. 279.00	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	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, slightly 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					ML	(25-30) Same as above. Larry said hard layer @ 26 1/2' BLS
30	249	1					(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							



01-14-2000 N:\WELL LOGS\NSAMIDSOUTH\007G51LF.BOR



# BORING LOG of 007G52LF

(Page 1 of 2)

NSA MID-SOUTH  
Millington, TN.

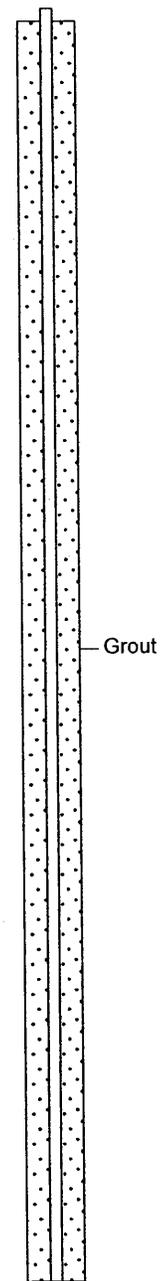
Location: AOCA/SWMU 7  
Project #: CTO 0094

Started : 0805 7/9/99  
Finished : 1730 7/9/99  
Drilling Method : Rotasonic  
Drilling Company : Alliance Drilling  
Geologist : B. Brantley

Northing : 395738.31  
Easting : 812022.10  
TOC Elevation : 278.20  
Total Depth : 95 feet  
Well Screen : 75 to 85 feet

Depth in Feet	Surf. Elev. 275.34	SAMPLES	% Rec-covery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	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			ML	
15	260						(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	3	100				
25	250						
30	245	4	100			SM	(28 - 31.5) Olive gray silty sand, wet, med. stiff
						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
						GC	(35 - 37) Olive gray to dark gray sandy clayw/ trace of gravel (up to 1/4" dia.), wet, med. stiff
40	235	5	100				(37 - 41) Olive gray to Lt. brown clayey sand gravel mixture, wet
						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	6	85			SP	
50							

Well: 007G52LF  
Elev.: 275.34  
Cover



12-16-1999 N:\WELL LOGS\NSAMIDSOUTH\007G52LF.BOR

NSA MID-SOUTH  
Millington, TN.

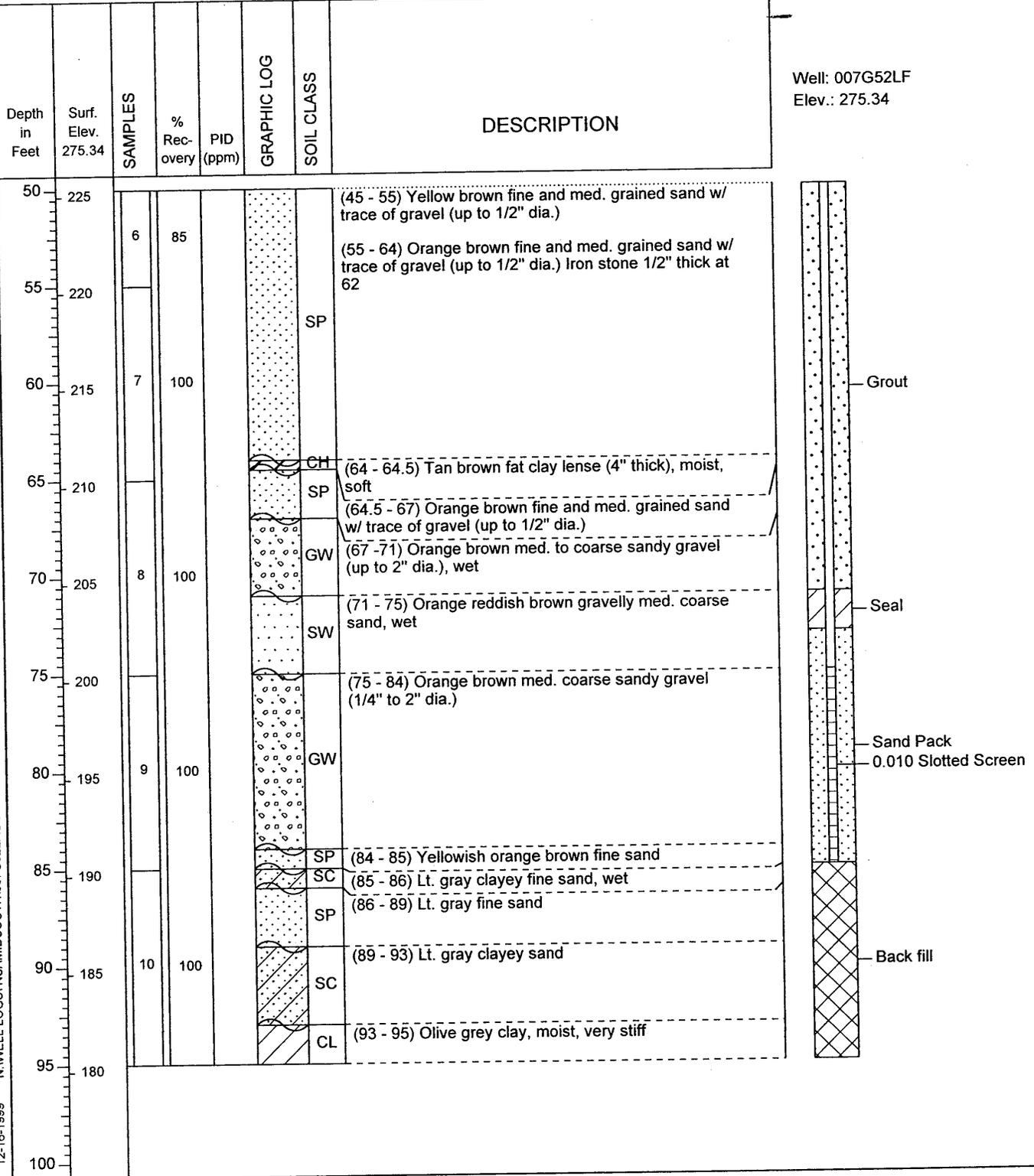
Started : 0805 7/9/99  
 Finished : 1730 7/9/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

Northing : 395738.31  
 Easting : 812022.10  
 TOC Elevation : 278.20  
 Total Depth : 95 feet  
 Well Screen : 75 to 85 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G52LF  
 Elev.: 275.34





# BORING LOG of 007G53LF

(Page 1 of 2)

NSA MID-SOUTH  
Millington, TN.

Location: AOCA/SWMU 7

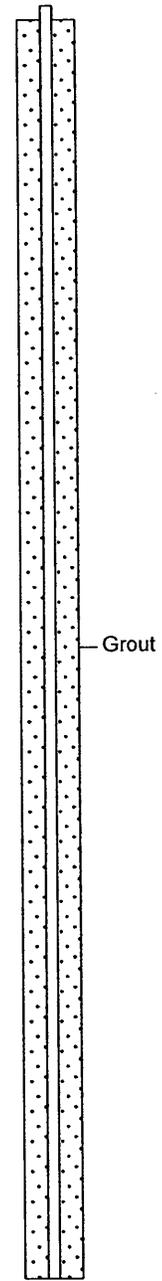
Project #: CTO 0094

Started : 0820 7/10/99  
 Finished : 1400 7/10/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

Northing : 3961955.38  
 Easting : 812124.48  
 TOC Elevation : 280.16  
 Total Depth : 85 feet  
 Well Screen : 68 to 78 feet

Depth in Feet	Surf. Elev. 277.12	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	277	1	90				(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			ML	
15	262						(15 - 20.5) Dark gray clayey silt w/ lignitic lenses/seams between 15 and 18, wet, soft
20	257	3	55				(20.5 - 26) Dark gray clayey silt, wet, soft
25	252						
30	247	4	100			CL	(26 - 28) Greenish gray and dark gray silty clay, moist, stiff (28 - 30) Greenish gray and dark gray sandy clay, moist
35	242					SC	(30 - 33) Olive gray clayey sand w/ trace of pebbles, wet, soft (33 - 35) Greenish gray clayey sand, wet, hard (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
45						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

Well: 007G53LF  
 Elev.: 277.12  
 Cover



12-16-1999 N:\WELL LOGS\NSAMIDSOUTH\007G53LF.BOR

NSA MID-SOUTH  
Millington, TN.

Started : 0820 7/10/99  
 Finished : 1400 7/10/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

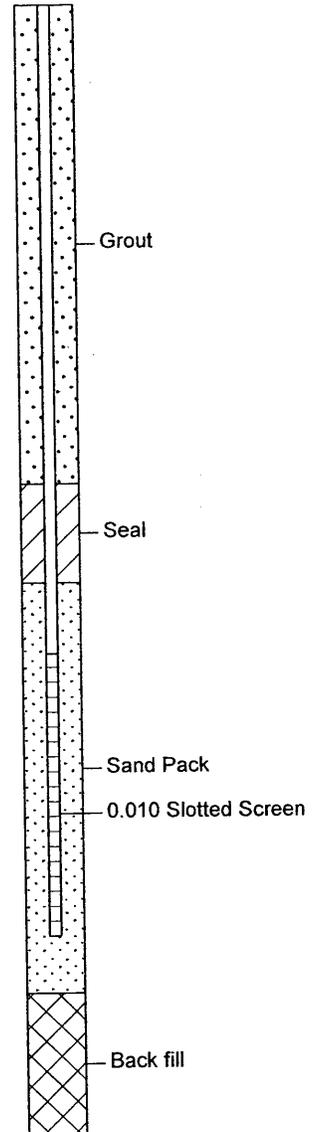
Northing : 3961955.38  
 Easting : 812124.48  
 TOC Elevation : 280.16  
 Total Depth : 85 feet  
 Well Screen : 68 to 78 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G53LF  
 Elev.: 277.12

Depth in Feet	Surf. Elev. 277.12	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
45	232					SW	
50	227	6	100			SW	(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					SP	
60	217	7	90			SW	
65	212					SW	(65 - 76) Orange brown gravelly med. to coarse sand w/ fines (gravel up to 1" dia.)
70	207	8	80			SW	
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
						SP	(81 - 85) Lt. gray fine sand w/ Lt. olive gray clay lenses scattered throughout
85	192						
90							





# BORING LOG of 007G54LF

(Page 1 of 2)

NSA MID-SOUTH  
Millington, TN.

Location: AOCA/SWMU 7

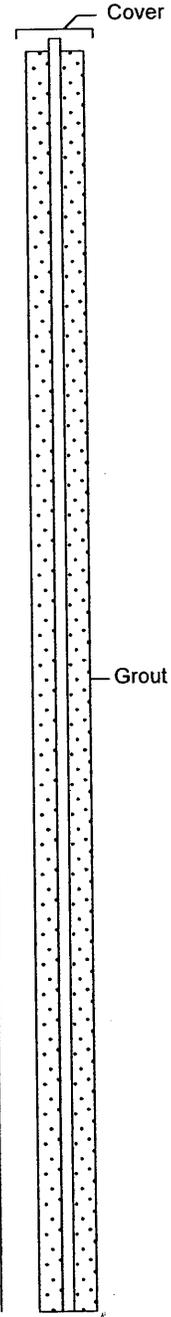
Project #: CTO 0094

Started : 1415 7/11/99  
 Finished : 0915 7/12/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

Northing : 392837.38  
 Easting : 812878.255  
 TOC Elevation : 278.64  
 Total Depth : 95 feet  
 Well Screen : 75 to 85 feet

Well: 007G54LF  
 Elev.: 278.94

Depth in Feet	Surf. Elev. 278.94	SAMPLES	% Rec-covery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	278	1	80				(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			ML	(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
20	258	3	95				(17 - 23) Olive gray to greenish gray clayey silt, wet, soft
25	253						(23 - 25) Dark olive gray silty clay, moist, soft
30	248	4	100			CL	(25 - 32) Greenish gray silty clay, dry, very stiff
35	243						(32 - 35) Yellowish brown and Lt. brown silty clay w/ manganese striations at 34 - 35, dry, hard
40	238	5	100			SC	(35 - 38) Yellowish brown, Lt. brown and Lt. gray silty clay w/ manganese striations, dry, hard
45	233						(38 - 41) Lt. brown sandy clay, moist, med. stiff
50		6	100				(41 - 45) Lt. brown/orange brown and Lt. gray clayey sand, wet
							(45 - 49) Lt. brown, orange brown and Lt. gray clayey sand w/ trace of gravel (up to 1/4" dia.), wet
						GW	



12-16-1999 N:\WELL LOGS\NSAMIDSOUTH\007G54LF.BOR

NSA MID-SOUTH  
Millington, TN.

Started : 1415 7/11/99  
 Finished : 0915 7/12/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : B. Brantley

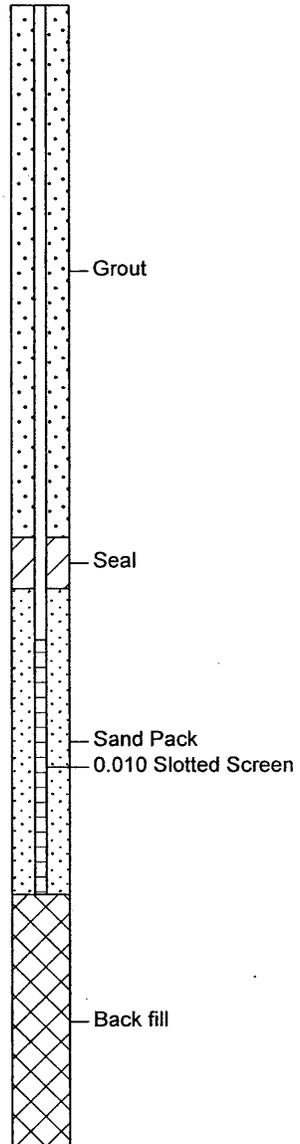
Northing : 392837.38  
 Easting : 812878.255  
 TOC Elevation : 278.64  
 Total Depth : 95 feet  
 Well Screen : 75 to 85 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G54LF  
 Elev.: 278.94

Depth in Feet	Surf. Elev. 278.94	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
50	228	6	100			GW	(49 - 55) Lt. brown to orange brown sandy gravel
55	223					SW	(55 - 66.5) Yellowish brown fine to coarse sand w/ trace of gravel
60	218	7	100			SW	
65	213					SP	(66.5 - 68.5) Tan and Lt. gray fine sand
70	208	8	100			SP	(68.5 - 70) Lt. brown med. sand w/ few gravel
75	203					SW	(70 - 71.5) Yellowish brown fine sand
80	198	9	100			SW	(71.5 - 81) Yellow brown coarse gravelly sand w/ fines
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							



NSA MID-SOUTH  
Millington, TN.

Started : 15455 7/22/99  
Finished : 1200 7/23/99  
Drilling Method : Rotasonic  
Drilling Company : Alliance Drilling  
Geologist : C. Davis

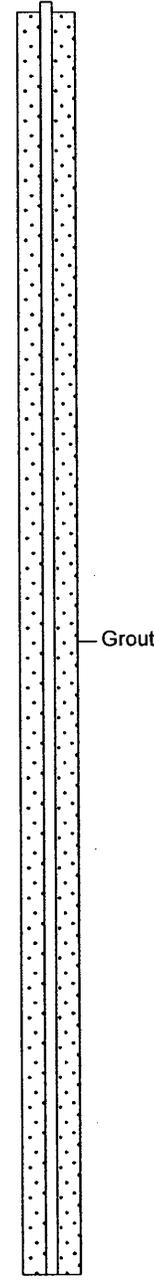
Northing : 398359.55  
Easting : 810649.43  
TOC Elevation : 282.00  
Total Depth : 115 feet  
Well Screen : 85 to 105 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G55LF  
Elev.: 278.76  
Cover

Depth in Feet	Surf. Elev. 278.76	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	278						(0 - 5) Lt. brown to med. brown clayey silt, moist, stiff
5	273	1	100				(5 - 15) Lt. brown to med. brown clayey silt w/ less clay content, moist
10	268	2	110				(15 - 25) Lt. brown to med. brown clayey silt w/ iron staining, moist
15	263					ML	(25 - 29) Lt. brown and Lt. gray mottled very clayey silt w/ iron staining, moist, stiff
20	258	3					
25	253						
30	248	4	110			CL	(29 - 32.5) Orangish brown silty clay w/ iron-manganese nodules, moist
35	243					ML	(32.5 - 35) Lt. brown and Lt. gray mottled slightly clayey silt w/ iron-manganese nodules, slightly moist, slightly stiff to friable
40	238	5	100			SC	(35 - 39) Lt. brown and Lt. gray mottled slightly clayey silt w/ iron-manganese nodules, slightly moist, slightly stiff to friable (two areas - 36 and 37.5 are mostly iron nodules and very stained)
45	233					SW	(39 - 40) Lt. gray fine sandy and fine gravelly clayey silt, moist
50	228	6	100				(40 - 41) Lt. gray and pale yellowish orange brown clayey silt, moist, med, stiff
55	223						(41 - 42.5) Yellowish orange clayey gravelly sand (up to 1" dia), very moist
60		7	100			SP	(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



12-16-1999 N:\WELL LOGS\NSAMIDSOUTH\007G55LF.BOR



# BORING LOG of 007G55LF

(Page 2 of 2)

NSA MID-SOUTH  
Millington, TN.

Started : 15455 7/22/99  
 Finished : 1200 7/23/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : C. Davis

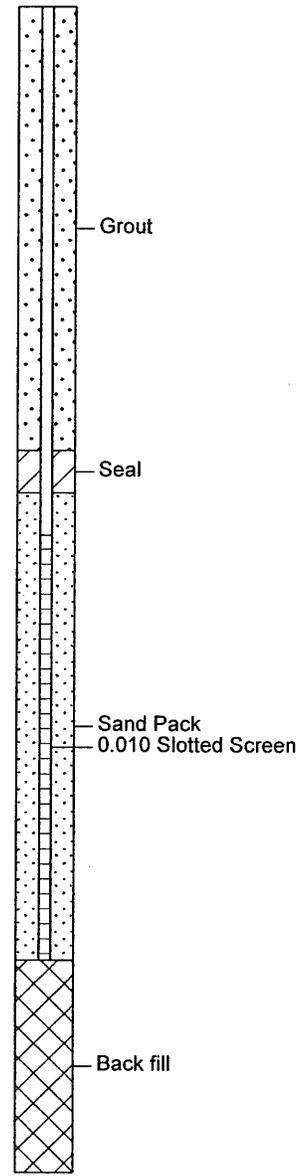
Northing : 398359.55  
 Easting : 810649.43  
 TOC Elevation : 282.00  
 Total Depth : 115 feet  
 Well Screen : 85 to 105 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G55LF  
 Elev.: 278.76

Depth in Feet	Surf. Elev. 278.76	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
60	218	7	100			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
65	213						(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)
70	208	8	100				(63.5 - 65) Yellowish orange brown med. sand and fine gravel mix (up to 1" dia.), wet
75	203					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
80	198	9	100				
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 - 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
95	183						
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							



NSA MID-SOUTH  
Millington, TN.

Started : 1020 7/21/99  
 Finished : 1015 7/22/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : C. Davis

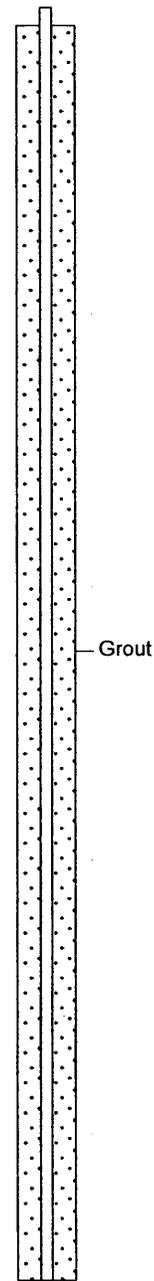
Northing : 398282.45  
 Easting : 811099.55  
 TOC Elevation : 280.63  
 Total Depth : 135 feet  
 Well Screen : 105 to 115 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Depth in Feet	Surf. Elev. 277.09	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
0	277						(0 - 5) Med. brown silt, dry to slightly moist, slightly stiff
		1	80				(5 - 15) Lt. brown and Lt. grey mottled slightly clayey silt w/ iron staining and iron-manganese nodules, slightly moist, slightly stiff
5	272					ML	(15 - 15.5) Grayish brown clayey silt w/ iron staining, moist
10	267	2	55				
15	262						(15.5 - 24) Grayish brown silty clay, moist
20	257	3	100			CL	
25	252					ML CH	(24 - 25) Grayish brown clayey silt w/ iron staining, moist (25 - 26) Brownish gray silty clay, very moist (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			ML	
35							

Well: 007G56LF  
 Elev.: 277.09  
 Cover





# BORING LOG of 007G56LF

(Page 3 of 4)

NSA MID-SOUTH  
Millington, TN.

Started : 1020 7/21/99  
 Finished : 1015 7/22/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : C. Davis

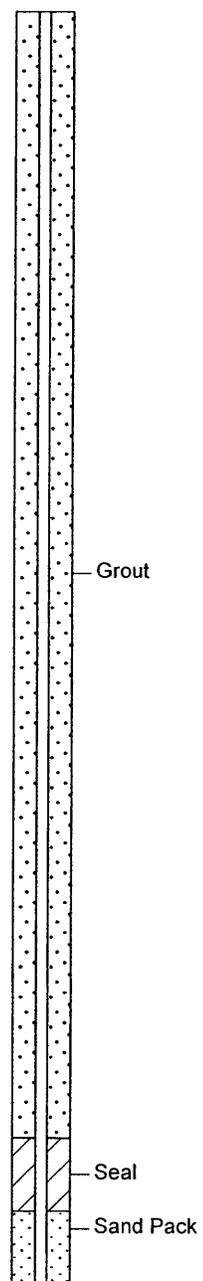
Northing : 398282.45  
 Easting : 811099.55  
 TOC Elevation : 280.63  
 Total Depth : 135 feet  
 Well Screen : 105 to 115 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G56LF  
 Elev.: 277.09

Depth in Feet	Surf. Elev. 277.09	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	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					GW	(75 - 76) Yellowish orangish brown fine to coarse gravel (up 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	9	100				(81 - 87) Pale yellow to pale orange iron stained fine sand, wet
						SP	
85	192					SW	(87 - 88) Fine to coarse sand and gravel (up to 1" dia.) w/ some gray clay, wet
						SP	(88 - 89) Pale yellow to pale orange iron stained fine sand w/ some gravel (up to 1" dia.), wet
90	187	10	100			SW	(89 - 90) Fine to coarse sand and gravel (up to 1" dia.) w/ some gray clay, wet
						SP	(90 - 91) Pale yellow to pale orange iron stained fine sand w/ some gravel (up to 2 1/2" dia.), wet
						SW	(91 - 92.5) Fine to coarse sand and gravel (up to 1" dia.) w/ some gray clay, wet
95	182					SW	(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
							(95 - 101) Fine to coarse sand and gravel (up to 5" dia.) w/ gray clay, wet
100	177	11	100			SC	(101 - 104) Fine to coarse sand and gravel (up to 1" dia.) w/ increasing gray clay contents, wet
105						SW	



12-16-1... N:\WELL LOGS\NSAMIDSOUTH\007G56LF.BOR



# BORING LOG of 007G56LF

(Page 2 of 4)

NSA MID-SOUTH  
Millington, TN.

Started : 1020 7/21/99  
 Finished : 1015 7/22/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : C. Davis

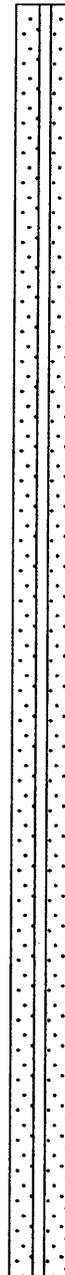
Northing : 398282.45  
 Easting : 811099.55  
 TOC Elevation : 280.63  
 Total Depth : 135 feet  
 Well Screen : 105 to 115 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G56LF  
 Elev.: 277.09

Depth in Feet	Surf. Elev. 277.09	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	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
						SP	(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							



Grout

12-16 N:\WELL LOGS\NSAMIDSOUTH\007G56LF.BOR

NSA MID-SOUTH  
Millington, TN.

Started : 1020 7/21/99  
 Finished : 1015 7/22/99  
 Drilling Method : Rotasonic  
 Drilling Company : Alliance Drilling  
 Geologist : C. Davis

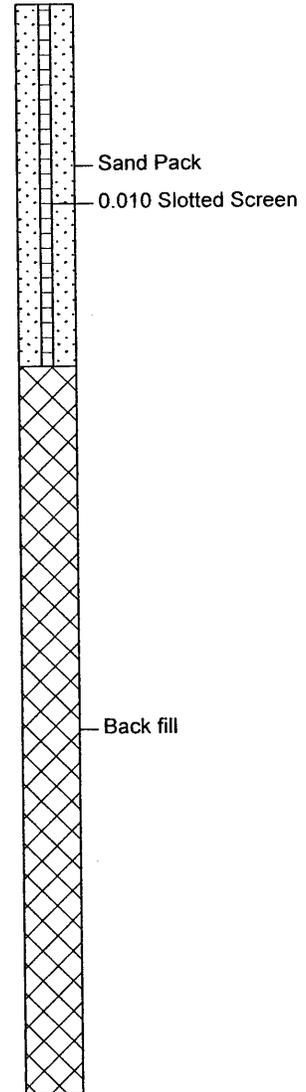
Northing : 398282.45  
 Easting : 811099.55  
 TOC Elevation : 280.63  
 Total Depth : 135 feet  
 Well Screen : 105 to 115 feet

Location: AOCA/SWMU 7

Project #: CTO 0094

Well: 007G56LF  
 Elev.: 277.09

Depth in Feet	Surf. Elev. 277.09	SAMPLES	% Recovery	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION
105	172						(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					CL	(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							



**Appendix C**  
**Geotechnical Data**

Measurement of Hydraulic Conductivity —

Client: EnSafe

Date of Report: 09/08/98 Client Project No.: 0094

Project Name: Naval Air Station, Memphis, TN

Sample I.D.: SWMU 7/AOC, Sample No. 007S002888

Soil Description: Dark Brown to Black Sandy Clayey Silt

Test Media: City of Memphis Water

Volumetric Air Content	.016 cm <sup>3</sup> -air/cm <sup>3</sup> -soil
Volumetric Water Content	.401 cm <sup>3</sup> -H <sub>2</sub> O/cm <sup>3</sup> -soil
Total Soil Porosity	.417 cm <sup>3</sup> /cm <sup>3</sup> -soil
Soil Bulk Density (wet)	119.7 lbs/ft <sup>3</sup>
Soil Bulk Density (dry)	94.6 lbs/ft <sup>3</sup>
Moisture Content	26.5 Percent

PERMEABILITY

Temperature Correction,  $R_t = .989$

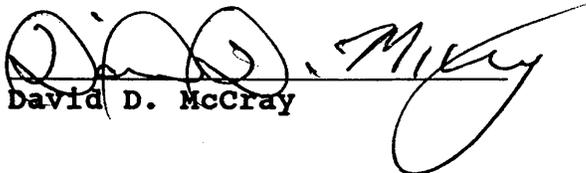
$$\begin{aligned}K_1 &= 8.7 \times 10^{-5} \text{ cm/sec} \\K_2 &= 9.3 \times 10^{-5} \text{ cm/sec} \\K_3 &= 9.0 \times 10^{-5} \text{ cm/sec} \\K_4 &= 9.3 \times 10^{-5} \text{ cm/sec}\end{aligned}$$

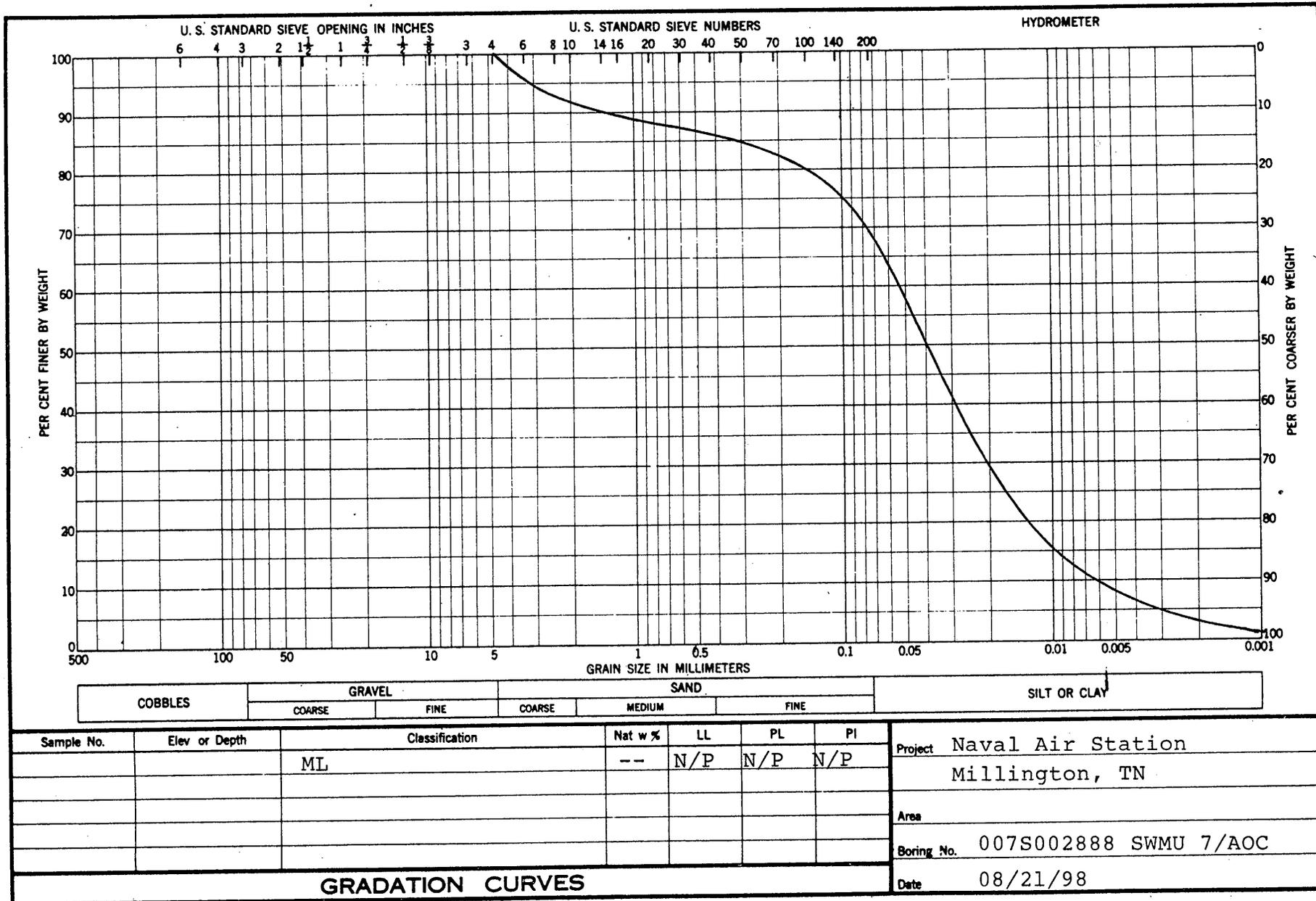
Coefficient of Permeability,  $K_{20} = 9.1 \times 10^{-5} \text{ cm/sec}$

Test in accordance with Method 9100 of Test Methods for evaluating Solid Waste, Third Edition, (SW-846) and in general accordance with ASTM D-5084-90.

Lab No.: P-98-084

Reviewed By:

  
David D. McCray





**TR STATE  
TESTING SERVICES, INC.**

**Measurement of Hydraulic Conductivity**

**Client: EnSafe**

**Date of Report: 09/08/98**

**Client Project No.: 0094**

**Project Name: Naval Air Station, Memphis, TN**

**Sample I.D.: SWMU 7/AOC, Sample No. 007S025127**

**Soil Description: Gray Silty Sand**

**Test Media: City of Memphis Water**

Volumetric Air Content	.107 cm <sup>3</sup> -air/cm <sup>3</sup> -soil
Volumetric Water Content	.226 cm <sup>3</sup> -H <sub>2</sub> O/cm <sup>3</sup> -soil
Total Soil Porosity	.333 cm <sup>3</sup> /cm <sup>3</sup> -soil
Soil Bulk Density (wet)	122.0 lbs/ft <sup>3</sup>
Soil Bulk Density (dry)	107.9 lbs/ft <sup>3</sup>
Moisture Content	13.1 Percent

**PERMEABILITY**

**Temperature Correction, R<sub>t</sub> = .991**

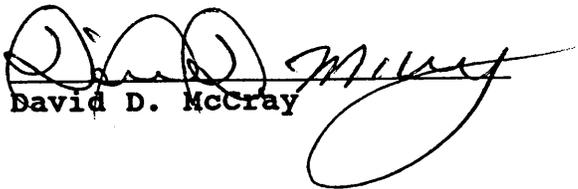
- K<sub>1</sub> = 5.3 X 10<sup>-5</sup> cm/sec**
- K<sub>2</sub> = 5.0 X 10<sup>-5</sup> cm/sec**
- K<sub>3</sub> = 6.1 X 10<sup>-5</sup> cm/sec**
- K<sub>4</sub> = 5.7 X 10<sup>-5</sup> cm/sec**

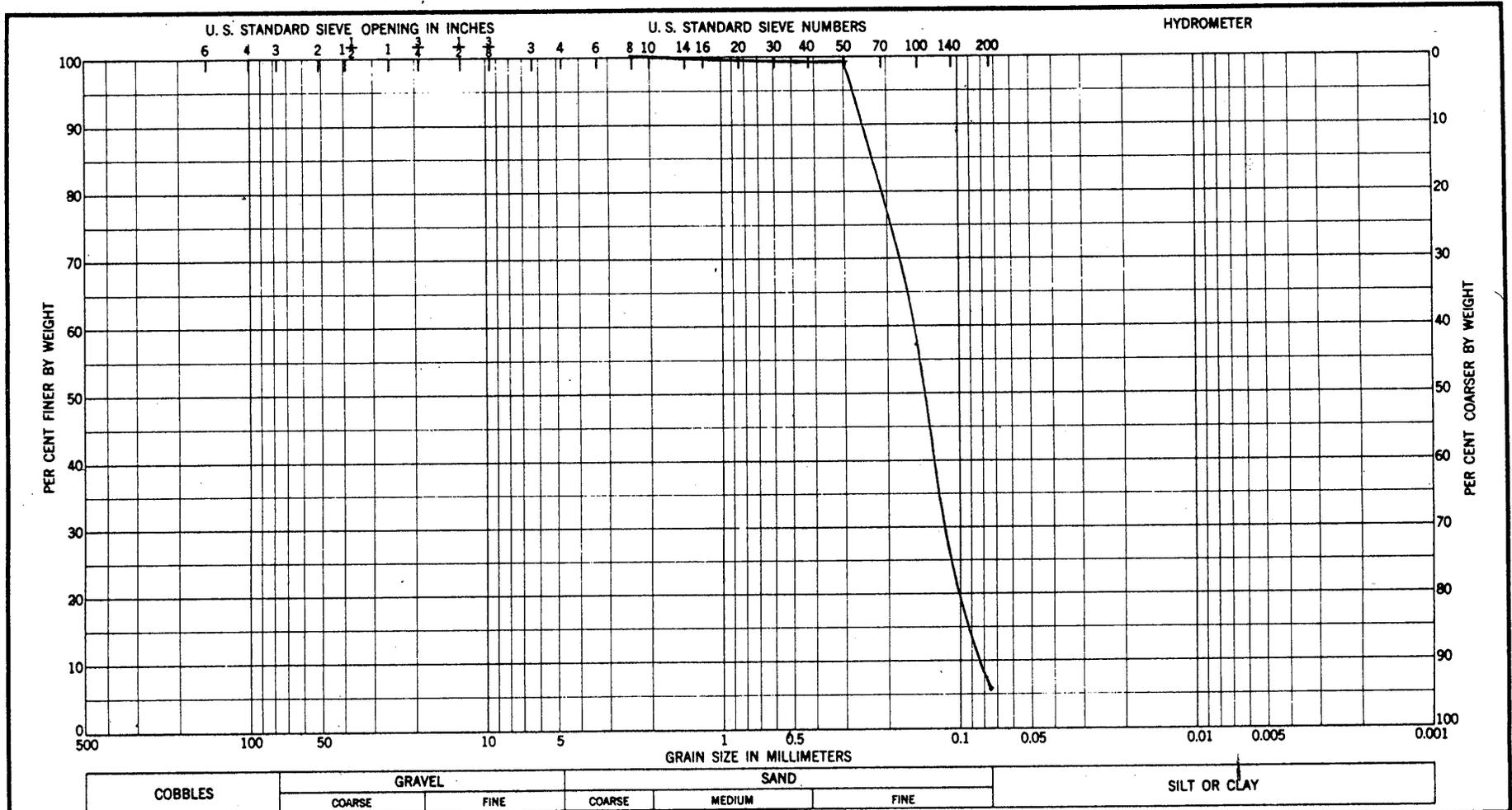
**Coefficient of Permeability, K<sub>20</sub> = 5.5 X 10<sup>-5</sup> cm/sec**

**Test in accordance with Method 9100 of Test Methods for evaluating Solid Waste, Third Edition, (SW-846) and in general accordance with ASTM D-5084-90.**

**Lab No.: P-98-083**

**Reviewed By:**

  
**David D. McCray**



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI	Project
		SP-SM	--	N/P	N/P	N/P	Naval Air Station Millington, TN
							Area
							Boring No. 007S025127 SWMU 7/AOC
							Date 08/21/98

**GRADATION CURVES**



Measurement of Hydraulic Conductivity —

Client: EnSafe

Date of Report: 08/25/98 Client Project No.: 0094

Project Name: Naval Air Station, Memphis, TN

Sample I.D.: SWMU 7/AOCA, Sample No. 00780227139

Soil Description: Dark Brown Clay & Gray Clayey Silty Sand

Test Media: City of Memphis Water

Volumetric Air Content	.046 cm <sup>3</sup> -air/cm <sup>3</sup> -soil
Volumetric Water Content	.353 cm <sup>3</sup> -H <sub>2</sub> O/cm <sup>3</sup> -soil
Total Soil Porosity	.399 cm <sup>3</sup> /cm <sup>3</sup> -soil
Soil Bulk Density (wet)	119.6 lbs/ft <sup>3</sup>
Soil Bulk Density (dry)	97.6 lbs/ft <sup>3</sup>
Moisture Content	22.6 Percent

PERMEABILITY

Temperature Correction,  $R_t = .991$

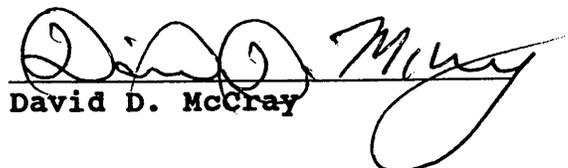
$K_1 = 1.8 \times 10^{-6}$	cm/sec
$K_2 = 1.1 \times 10^{-6}$	cm/sec
$K_3 = 1.9 \times 10^{-6}$	cm/sec
$K_4 = 1.7 \times 10^{-6}$	cm/sec

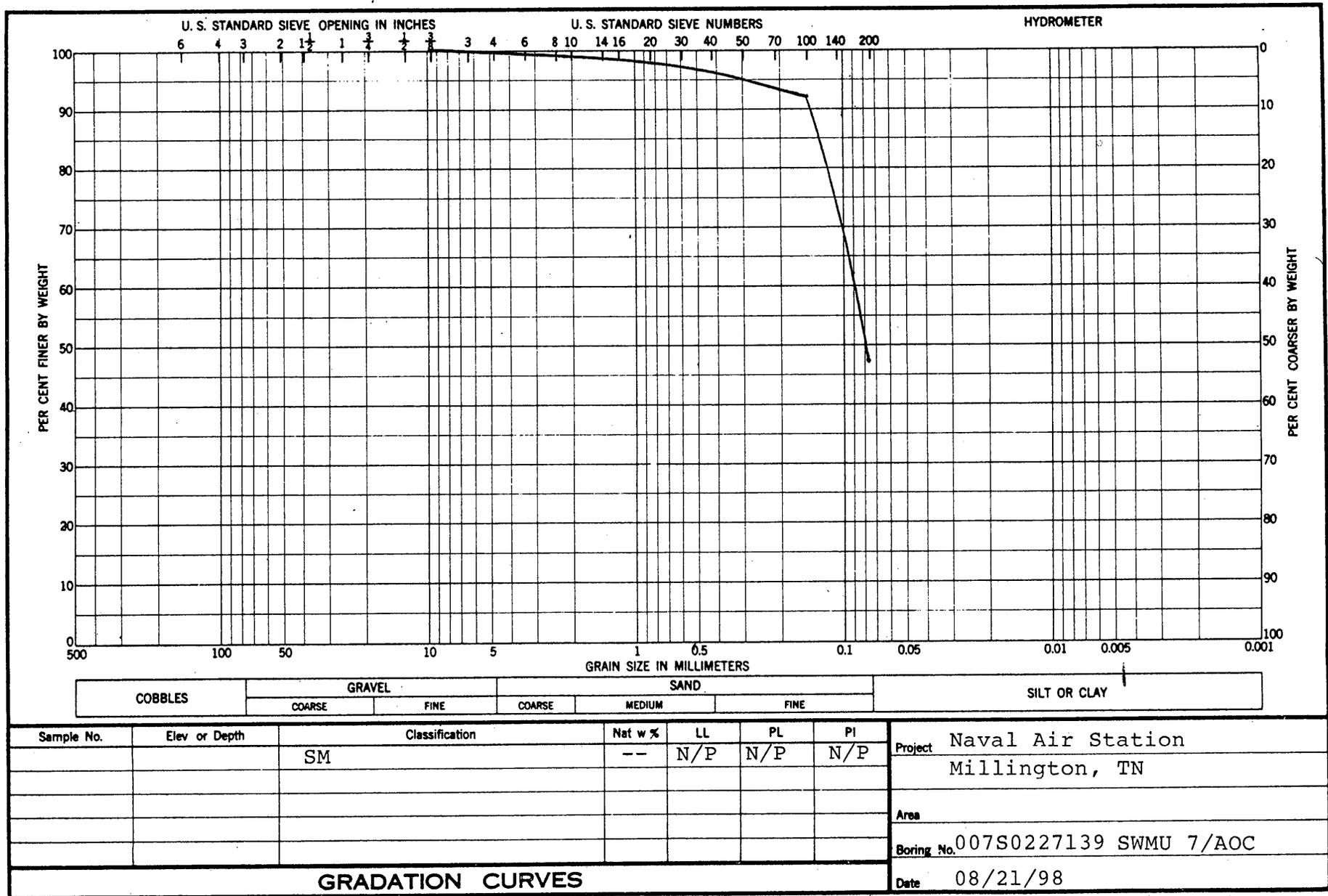
Coefficient of Permeability,  $K_{20} = 1.6 \times 10^{-6}$  cm/sec

Test in accordance with Method 9100 of Test Methods for evaluating Solid Waste, Third Edition, (SW-846) and in general accordance with ASTM D-5084-90.

Lab No.: P-98-085

Reviewed By:

  
David D. McCray





**INTERSTATE  
TESTING SERVICES, INC.**

**Measurement of Hydraulic Conductivity**

**Client: EnSafe**

**Date of Report: 08/21/98**

**Client Project No.: 0094**

**Project Name: Naval Air Station, Memphis, TN**

**Sample I.D.: SWMU 7/AOCA, Sample No. 007S002387**

**Soil Description: Light Gray Silty Sand with very thin clay  
lenses and organics**

**Test Media: City of Memphis Water**

Volumetric Air Content	.029 cm <sup>3</sup> -air/cm <sup>3</sup> -soil
Volumetric Water Content	.439 cm <sup>3</sup> -H <sub>2</sub> O/cm <sup>3</sup> -soil
Total Soil Porosity	.468 cm <sup>3</sup> /cm <sup>3</sup> -soil
Soil Bulk Density (wet)	113.5 lbs/ft <sup>3</sup>
Soil Bulk Density (dry)	86.1 lbs/ft <sup>3</sup>
Moisture Content	31.8 Percent

**PERMEABILITY**

**Temperature Correction, R<sub>t</sub> = .973**

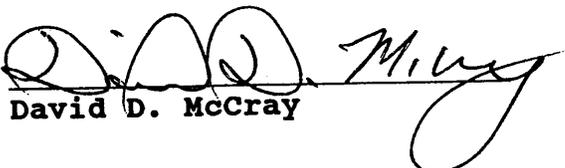
**K<sub>1</sub> = 3.8 X 10<sup>-6</sup> cm/sec**  
**K<sub>2</sub> = 4.3 X 10<sup>-6</sup> cm/sec**  
**K<sub>3</sub> = 3.8 X 10<sup>-6</sup> cm/sec**  
**K<sub>4</sub> = 4.7 X 10<sup>-6</sup> cm/sec**

**Coefficient of Permeability, K<sub>20</sub> = 4.2 X 10<sup>-6</sup> cm/sec**

**Test in accordance with Method 9100 of Test Methods for  
evaluating Solid Waste, Third Edition, (SW-846) and in general  
accordance with ASTM D-5084-90.**

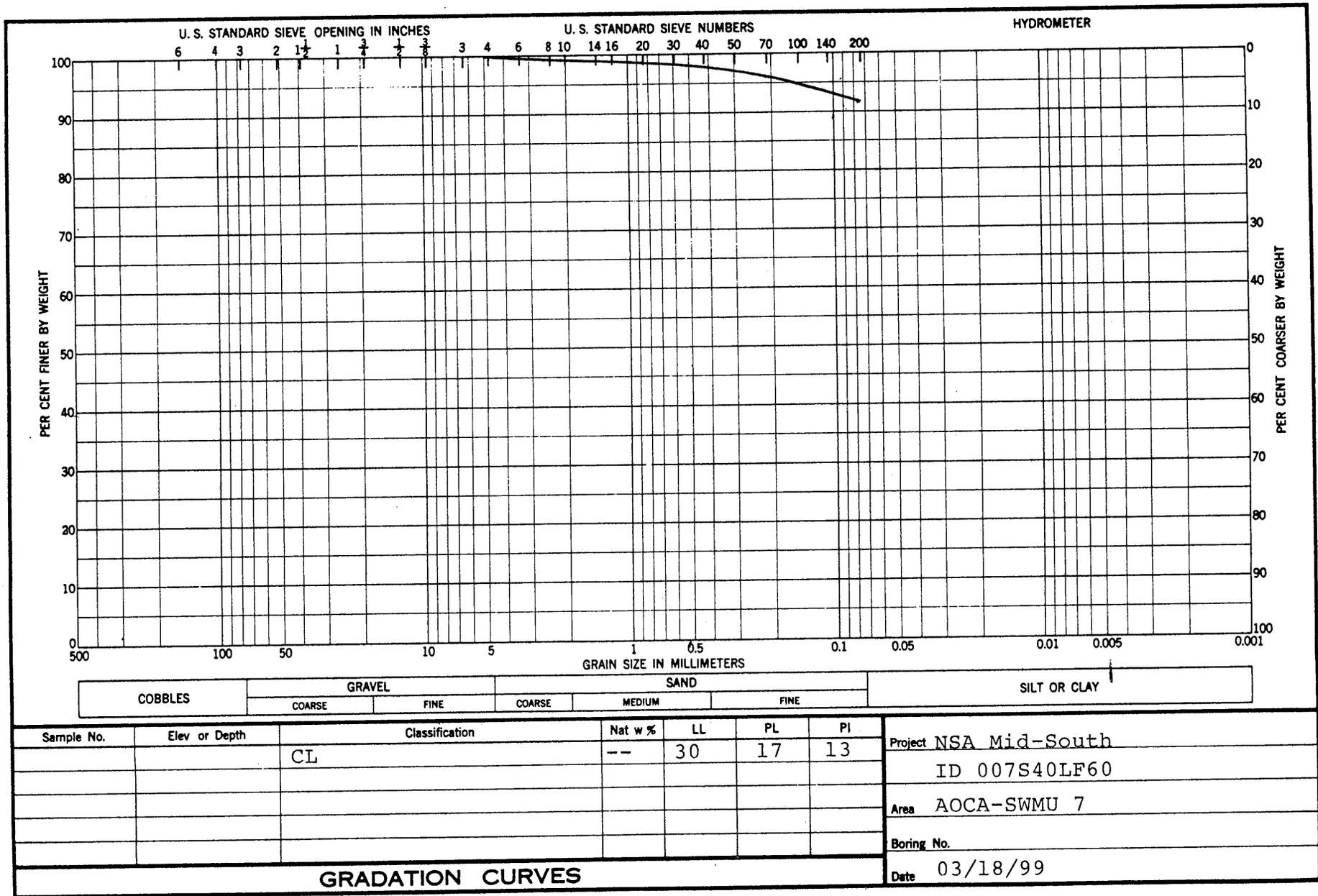
**Lab No.: P-98-086**

**Reviewed By:**

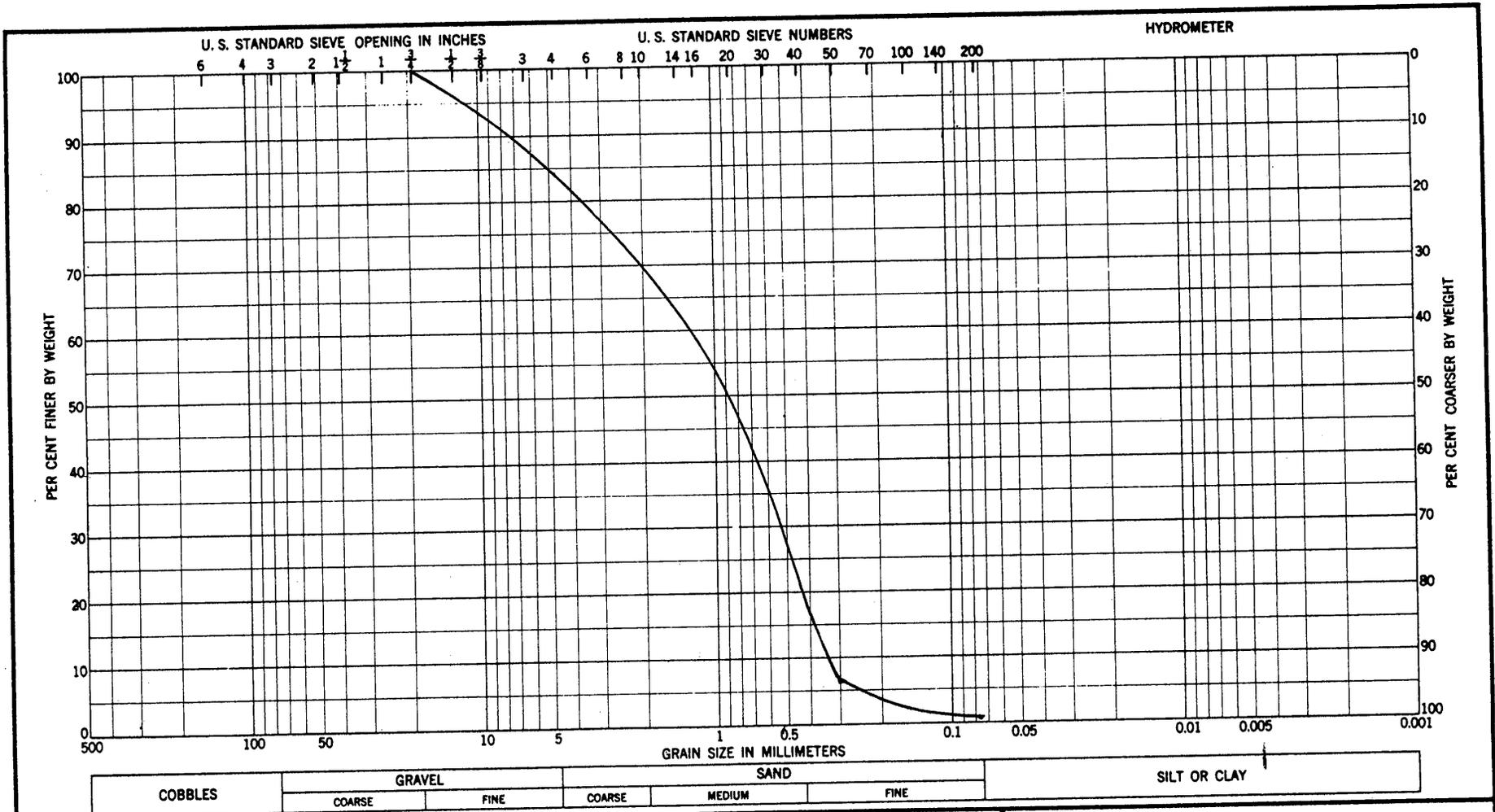
  
**David D. McCray**

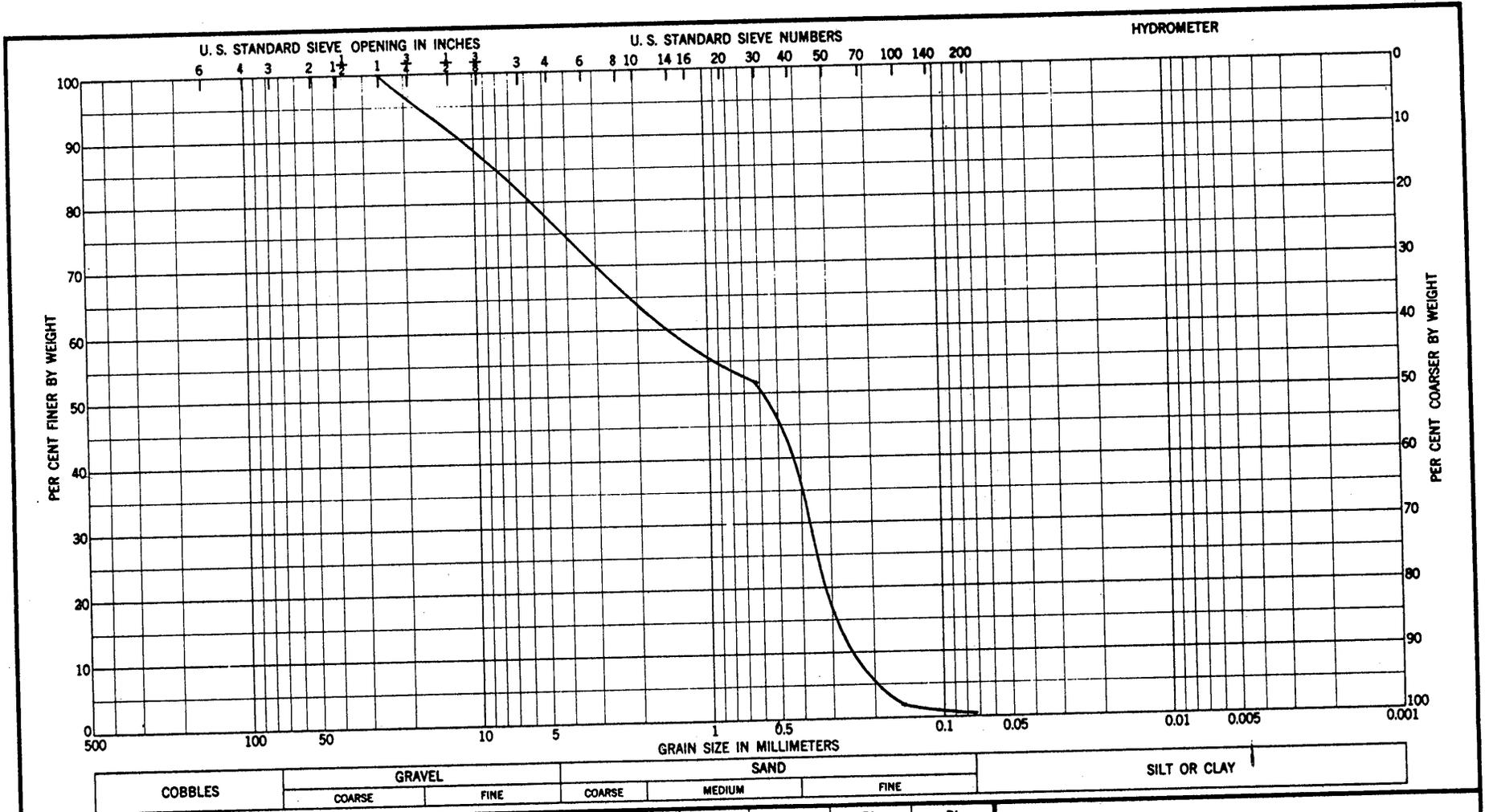






**GRADATION CURVES**

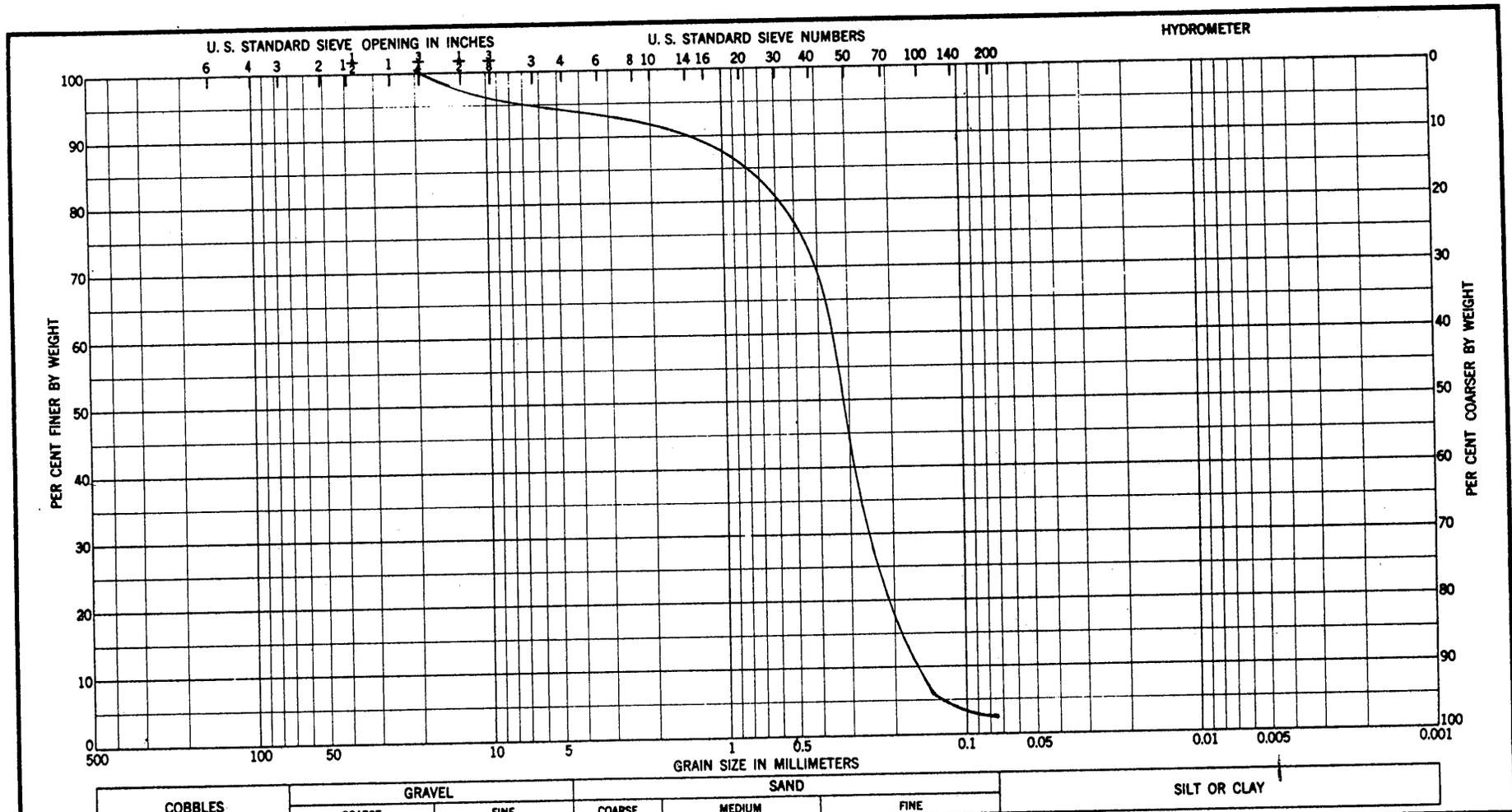




Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
		SP	--	N/P	N/P	N/P

Project NSA Mid-South  
 ID 007S39LF65  
 Area AOCA-SWMU 7  
 Boring No.  
 Date 03/18/99

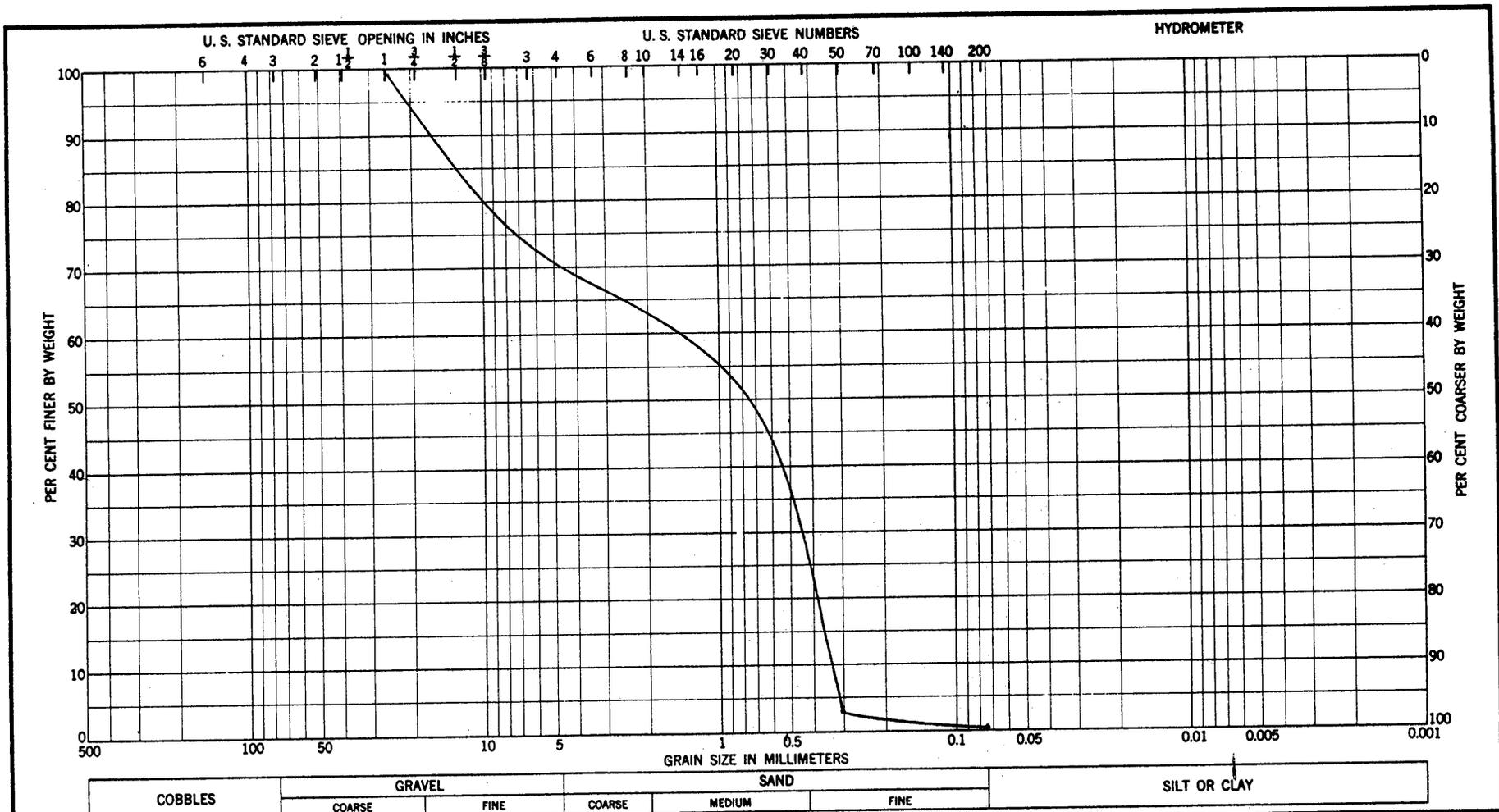
**GRADATION CURVES**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI	Project
		SP	--	N/P	N/P	N/P	NSA Mid-South ID 007S39LF55
							Area AOCA-SWMU 7
							Boring No.
							Date 03/18/99

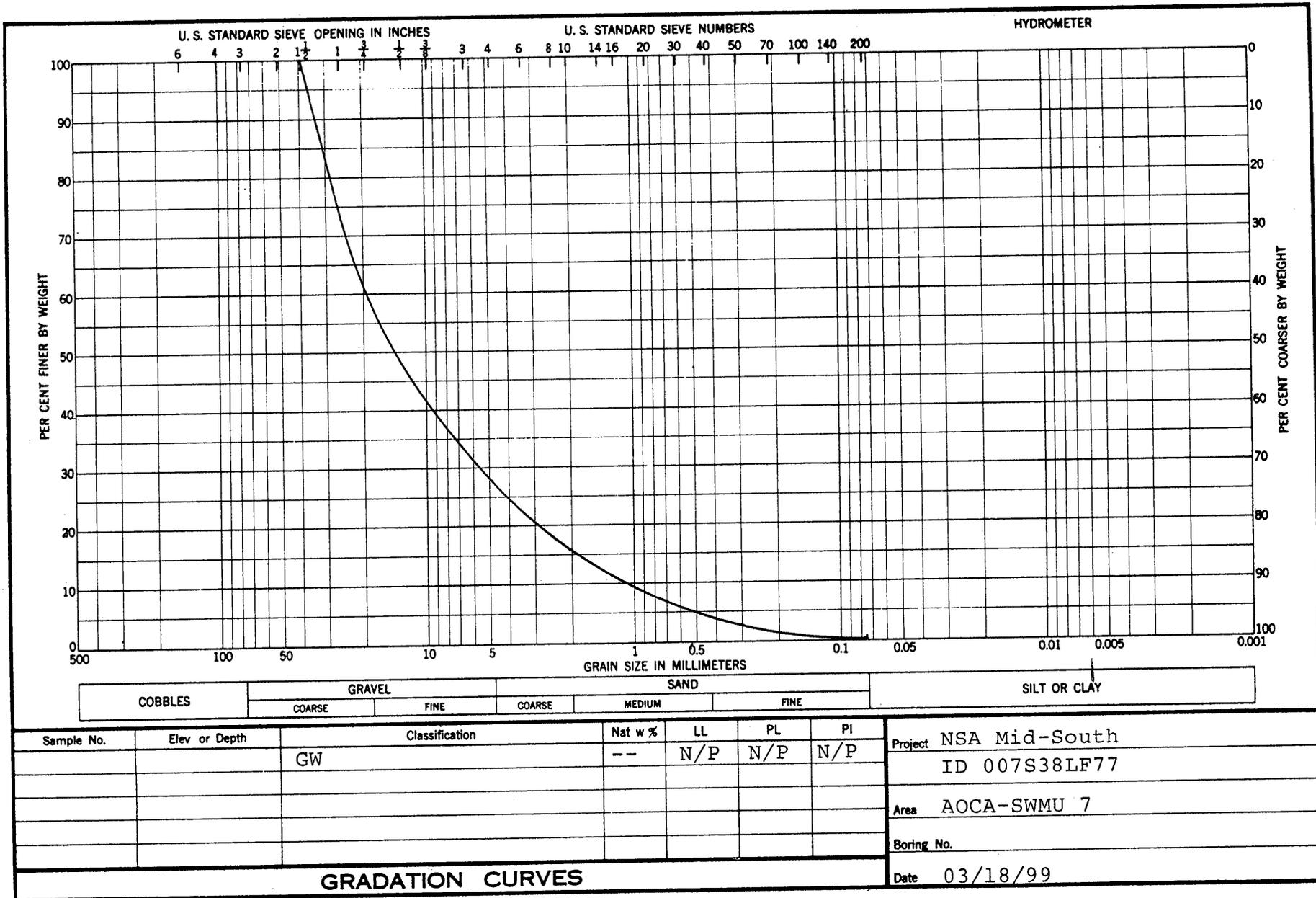
**GRADATION CURVES**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

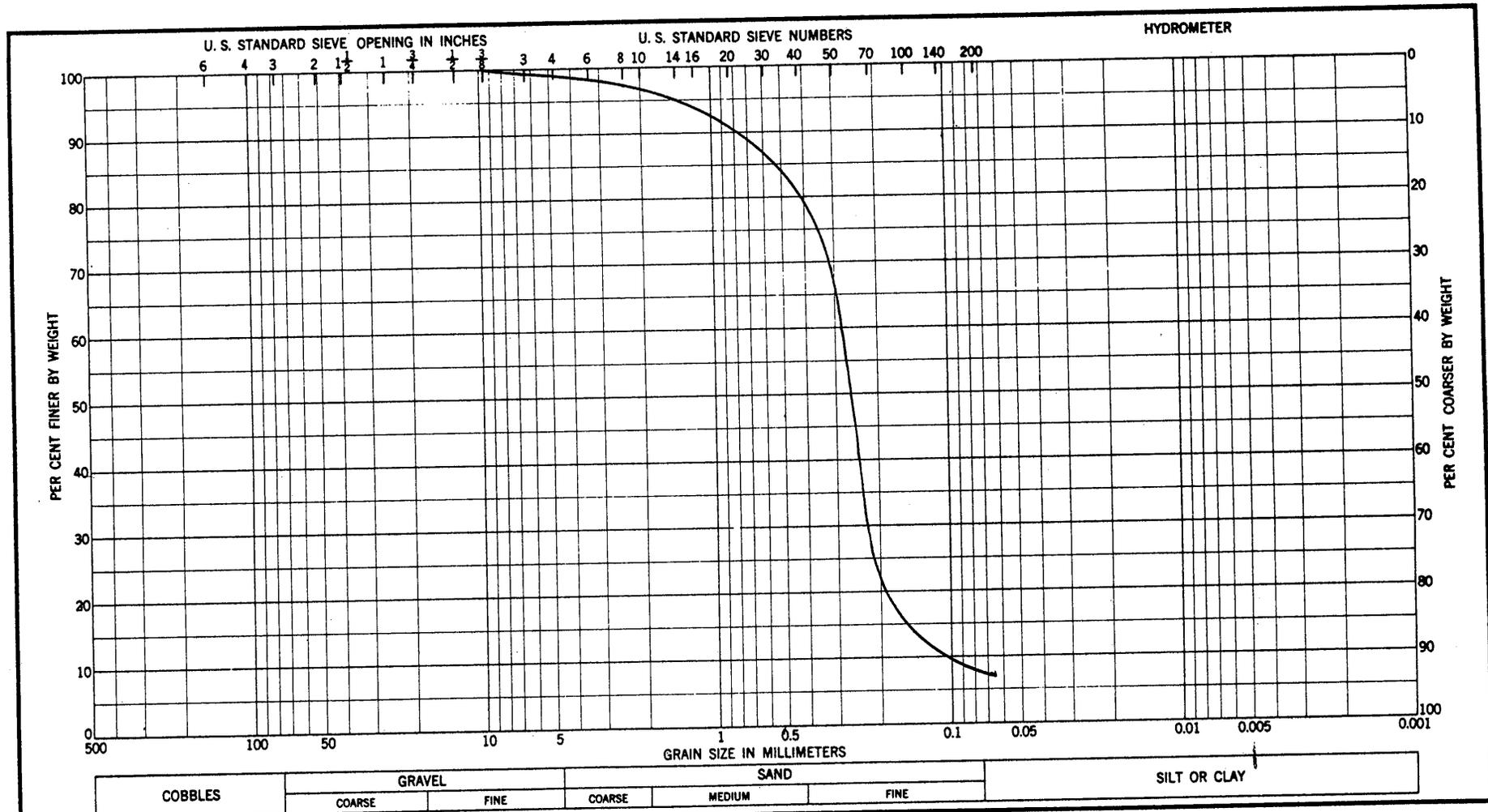
Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI	Project
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							ID 007S38LF87
							Area AOCA-SWMU 7
							Boring No.
							Date 03/18/99

**GRADATION CURVES**



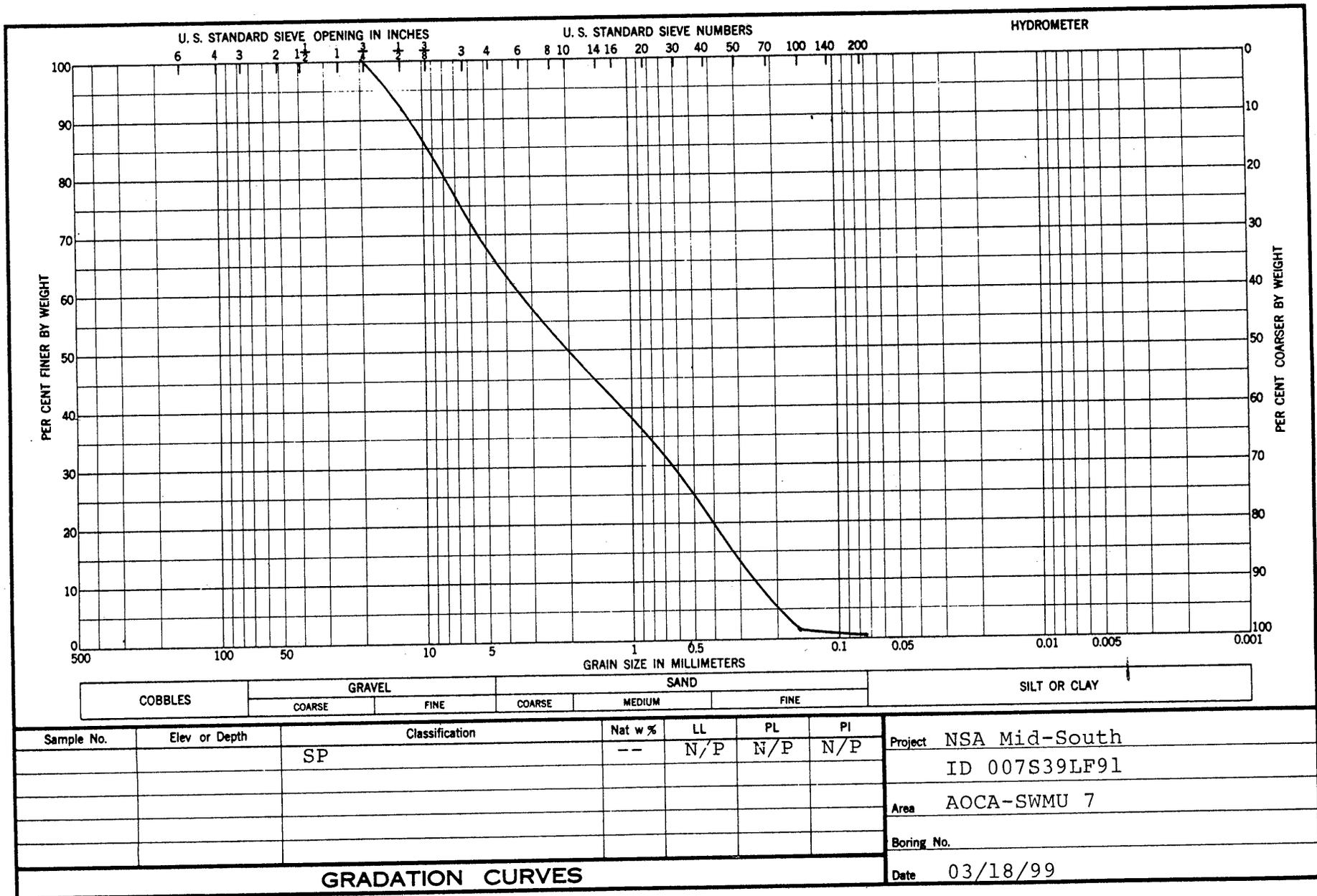
**GRADATION CURVES**





Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI	Project
		SP-SM	--	N/P	N/P	N/P	NSA Mid-South ID 007S38LF57
							Area AOCA-SWMU 7
							Boring No.
							Date 03/18/99

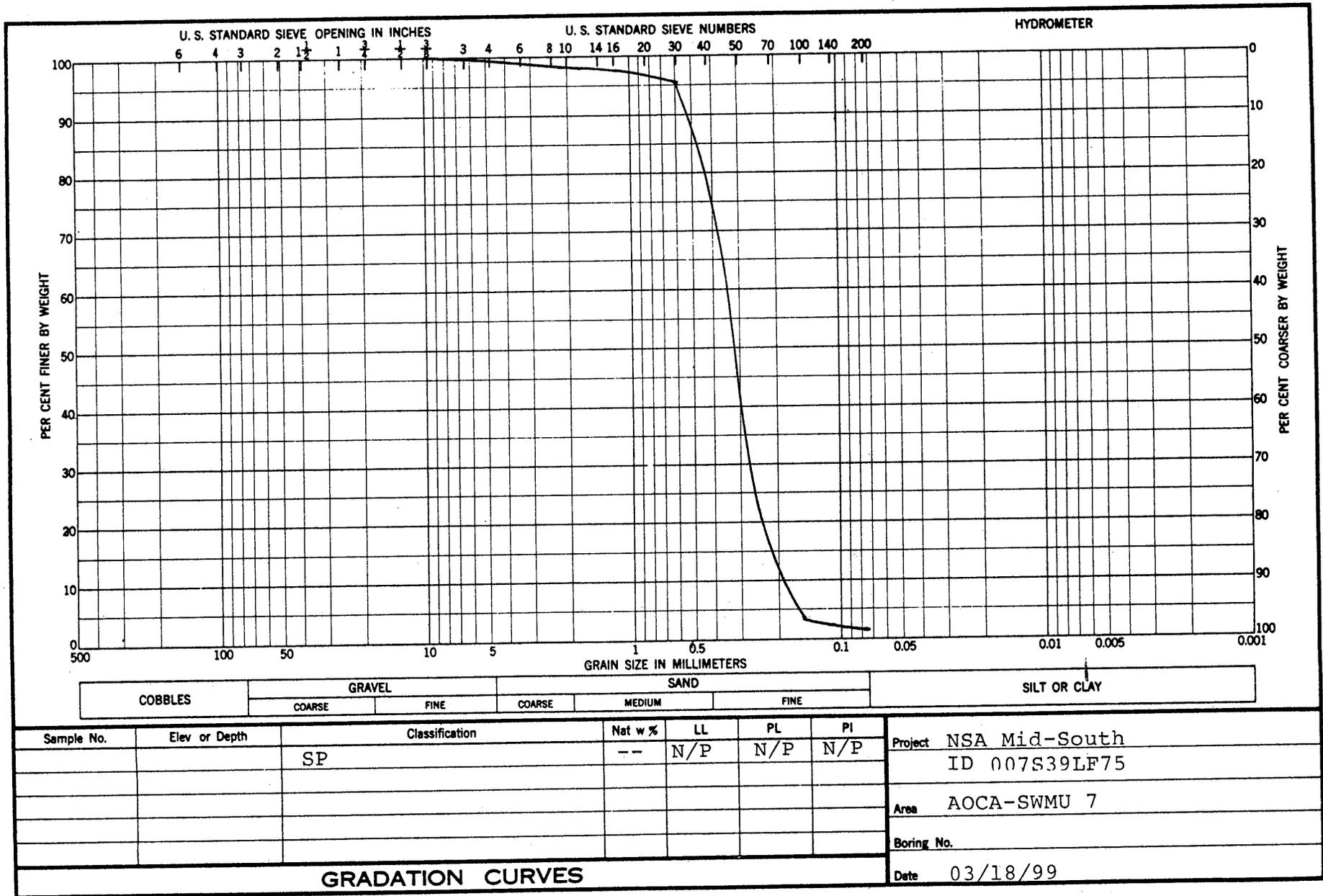
**GRADATION CURVES**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI	Project
		SP	--	N/P	N/P	N/P	NSA Mid-South
							ID 007S39LF91
							Area AOCA-SWMU 7
							Boring No.
							Date 03/18/99

**GRADATION CURVES**



Project NSA Mid-South  
 ID 007S39LF75  
 Area AOCA-SWMU 7  
 Boring No.  
 Date 03/18/99

**GRADATION CURVES**



# CHAIN OF CUSTODY RECORD

800-588-7962  
 MEMPHIS, TENNESSEE  
 CHARLESTON, SC; CINCINNATI, OH; DALLAS, TX; JACKSON, TN; KNOXVILLE, TN;  
 LANCASTER, PA; NASHVILLE, TN; NORFOLK, VA; PADUCAH, KY; PENSACOLA, FL;  
 RALEIGH, NC; COLOGNE, GERMANY

PROJECT/JOB NO: 000 NSA Mid South  
 COC NO: \_\_\_\_\_  
 PO NO: 2556  
 REL NO: \_\_\_\_\_  
 LAB NAME: Tri State Testing

CLIENT: NSA Mid South PROJECT MANAGER: Lawson Anderson  
 LOCATION: POC A - SWMU 7 TELE/FAX NO: \_\_\_\_\_  
 SAMPLERS: (SIGNATURE) Ben Brantley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION		NO. OF CONTAINERS	ANALYSIS REQUIRED				REMARKS
					TEMP.	CHEMICAL		Seive Analysis	Soil Classification	Porosity		
107538LF57	2-3-99	1400	S	<del>Ziploc</del>		NONE	1	X	X	X		Fluvial
007538LF67		1415	S	Ziploc Bags			1	X	X	X		Fluvial
007538LF77		1430	S				1	X	X	X		Fluvial
007538LF87		1600	S				1	X	X	X		Fluvial
007539LF55	2-5-99	1200					1	X	X	X		
007539LF65		1215					1	X	X	X		
007539LF75		1415					1	X	X	X		
007539LF85		1445					1	X	X	X		
007539LF91		1545					1	X	X	X		
007540LF60		1020					1	X	X	X		

RELINQUISHER: <u>Ben Brantley</u>	DATE: <u>3-15-99</u>	RECEIVER: <u>David De McCray</u>	DATE: <u>3-15-99</u>	RELINQUISHER: _____	DATE: _____	RECEIVER: _____	DATE: _____
PRINTED: <u>Ben Brantley</u>	TIME: _____	PRINTED: <u>David De McCray</u>	TIME: _____	PRINTED: _____	TIME: _____	PRINTED: _____	TIME: _____
COMPANY: <u>En Safe</u>		COMPANY: <u>Tri-state</u>	TIME: <u>1405</u>	COMPANY: _____		COMPANY: _____	

METHOD OF SHIPMENT: Picked up by Tri State COMMENTS: \_\_\_\_\_  
 SHIPMENT NO: \_\_\_\_\_  
 SEND RESULTS TO: \_\_\_\_\_



## Measurement of Hydraulic Conductivity

Client: EnSafe

Date of Report: 09/08/98 Client Project No.: 0094

Project Name: Naval Air Station, Memphis, TN

Sample I.D.: SWMU 7/AOC, Sample No. 007S002888

Soil Description: Dark Brown to Black Sandy Clayey Silt

Test Media: City of Memphis Water

Volumetric Air Content	.016 cm <sup>3</sup> -air/cm <sup>3</sup> -soil
Volumetric Water Content	.401 cm <sup>3</sup> -H <sub>2</sub> O/cm <sup>3</sup> -soil
Total Soil Porosity	.417 cm <sup>3</sup> /cm <sup>3</sup> -soil
Soil Bulk Density (wet)	119.7 lbs/ft <sup>3</sup>
Soil Bulk Density (dry)	94.6 lbs/ft <sup>3</sup>
Moisture Content	26.5 Percent

### PERMEABILITY

Temperature Correction,  $R_t = .989$

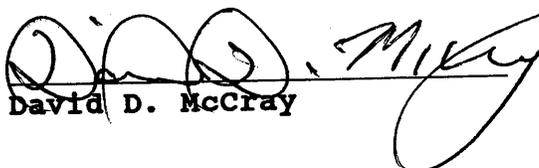
$$\begin{aligned}K_1 &= 8.7 \times 10^{-5} \text{ cm/sec} \\K_2 &= 9.3 \times 10^{-5} \text{ cm/sec} \\K_3 &= 9.0 \times 10^{-5} \text{ cm/sec} \\K_4 &= 9.3 \times 10^{-5} \text{ cm/sec}\end{aligned}$$

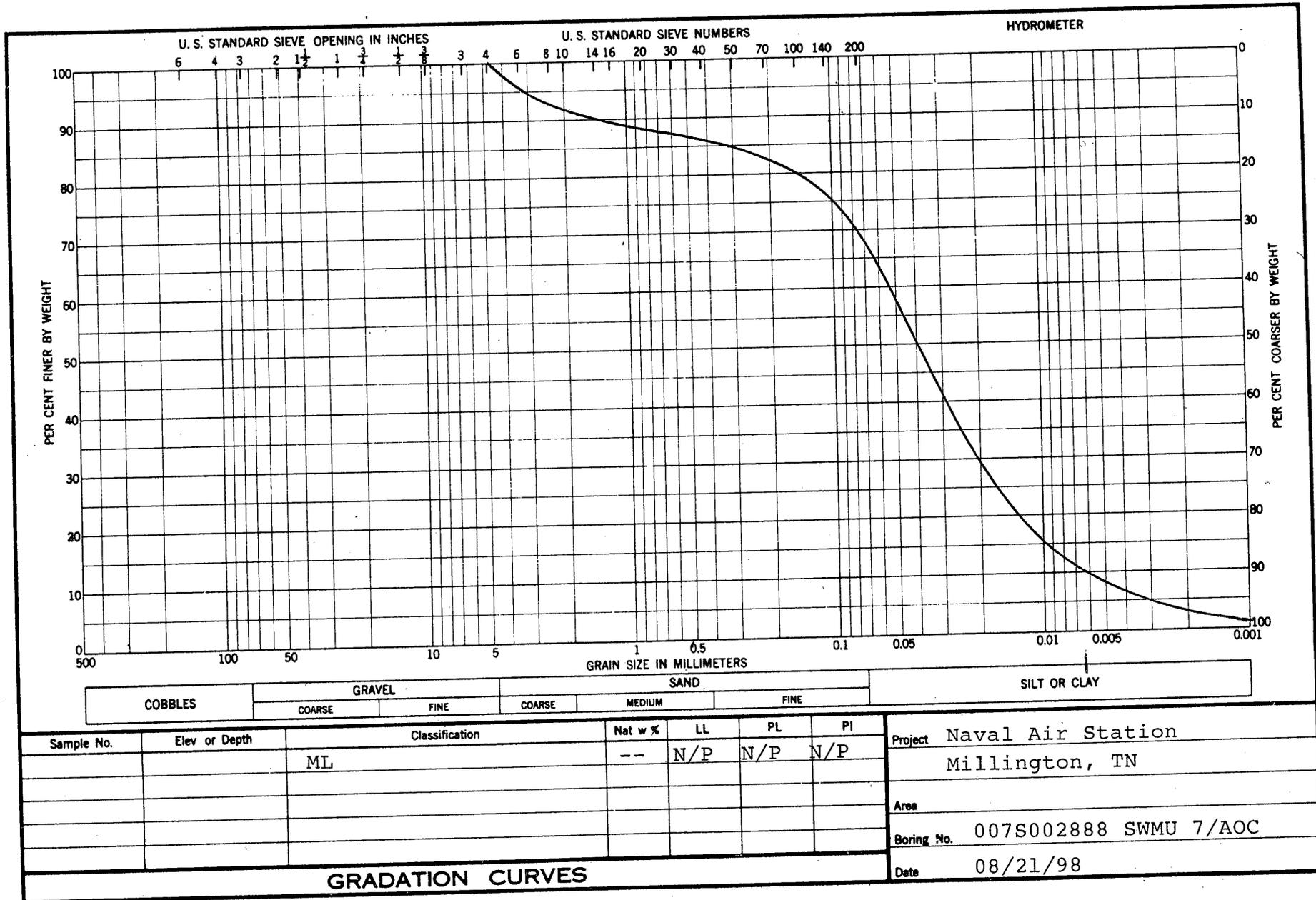
Coefficient of Permeability,  $K_{20} = 9.1 \times 10^{-5} \text{ cm/sec}$

Test in accordance with Method 9100 of Test Methods for evaluating Solid Waste, Third Edition, (SW-846) and in general accordance with ASTM D-5084-90.

Lab No.: P-98-084

Reviewed By:

  
David D. McCray



**GRADATION CURVES**



## Measurement of Hydraulic Conductivity

Client: EnSafe

Date of Report: 09/08/98

Client Project No.: 0094

Project Name: Naval Air Station, Memphis, TN

Sample I.D.: SWMU 7/AOC, Sample No. 007S025127

Soil Description: Gray Silty Sand

Test Media: City of Memphis Water

Volumetric Air Content	.107 cm <sup>3</sup> -air/cm <sup>3</sup> -soil
Volumetric Water Content	.226 cm <sup>3</sup> -H <sub>2</sub> O/cm <sup>3</sup> -soil
Total Soil Porosity	.333 cm <sup>3</sup> /cm <sup>3</sup> -soil
Soil Bulk Density (wet)	122.0 lbs/ft <sup>3</sup>
Soil Bulk Density (dry)	107.9 lbs/ft <sup>3</sup>
Moisture Content	13.1 Percent

### PERMEABILITY

Temperature Correction,  $R_t = .991$

$$K_1 = 5.3 \times 10^{-5} \text{ cm/sec}$$

$$K_2 = 5.0 \times 10^{-5} \text{ cm/sec}$$

$$K_3 = 6.1 \times 10^{-5} \text{ cm/sec}$$

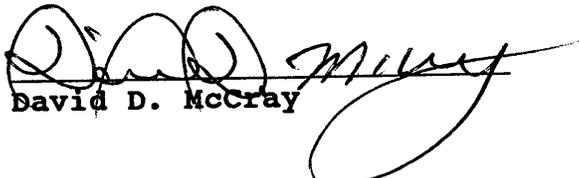
$$K_4 = 5.7 \times 10^{-5} \text{ cm/sec}$$

Coefficient of Permeability,  $K_{20} = 5.5 \times 10^{-5} \text{ cm/sec}$

Test in accordance with Method 9100 of Test Methods for evaluating Solid Waste, Third Edition, (SW-846) and in general accordance with ASTM D-5084-90.

Lab No.: P-98-083

Reviewed By:

  
David D. McCray





Measurement of Hydraulic Conductivity —

Client: EnSafe

Date of Report: 08/25/98 Client Project No.: 0094

Project Name: Naval Air Station, Memphis, TN

Sample I.D.: SWMU 7/AOCA, Sample No. 007S0227139

Soil Description: Dark Brown Clay & Gray Clayey Silty Sand

Test Media: City of Memphis Water

Volumetric Air Content	.046 cm <sup>3</sup> -air/cm <sup>3</sup> -soil
Volumetric Water Content	.353 cm <sup>3</sup> -H <sub>2</sub> O/cm <sup>3</sup> -soil
Total Soil Porosity	.399 cm <sup>3</sup> /cm <sup>3</sup> -soil
Soil Bulk Density (wet)	119.6 lbs/ft <sup>3</sup>
Soil Bulk Density (dry)	97.6 lbs/ft <sup>3</sup>
Moisture Content	22.6 Percent

PERMEABILITY

Temperature Correction,  $R_t = .991$

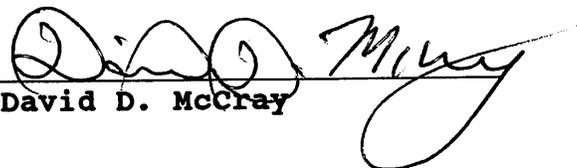
$K_1 = 1.8 \times 10^{-6}$  cm/sec  
 $K_2 = 1.1 \times 10^{-6}$  cm/sec  
 $K_3 = 1.9 \times 10^{-6}$  cm/sec  
 $K_4 = 1.7 \times 10^{-6}$  cm/sec

Coefficient of Permeability,  $K_{20} = 1.6 \times 10^{-6}$  cm/sec

Test in accordance with Method 9100 of Test Methods for evaluating Solid Waste, Third Edition, (SW-846) and in general accordance with ASTM D-5084-90.

Lab No.: P-98-085

Reviewed By:

  
David D. McCray



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI	Project
		SM	--	N/P	N/P	N/P	Naval Air Station Millington, TN
							Area
							Boring No. 007S0227139 SWMU 7/AOC
							Date 08/21/98

**GRADATION CURVES**



**TESTING SERVICES, INC.**

**Measurement of Hydraulic Conductivity**

**Client: EnSafe**

**Date of Report: 08/21/98      Client Project No.: 0094**

**Project Name: Naval Air Station, Memphis, TN**

**Sample I.D.: SWMU 7/AOCA, Sample No. 007S002387**

**Soil Description: Light Gray Silty Sand with very thin clay lenses and organics**

**Test Media: City of Memphis Water**

Volumetric Air Content	.029 cm <sup>3</sup> -air/cm <sup>3</sup> -soil
Volumetric Water Content	.439 cm <sup>3</sup> -H <sub>2</sub> O/cm <sup>3</sup> -soil
Total Soil Porosity	.468 cm <sup>3</sup> /cm <sup>3</sup> -soil
Soil Bulk Density (wet)	113.5 lbs/ft <sup>3</sup>
Soil Bulk Density (dry)	86.1 lbs/ft <sup>3</sup>
Moisture Content	31.8 Percent

**PERMEABILITY**

**Temperature Correction, R<sub>t</sub> = .973**

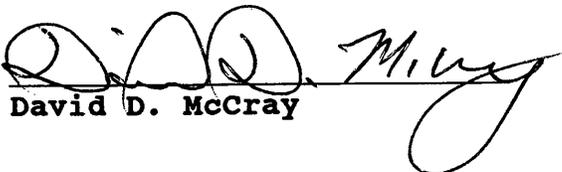
**K<sub>1</sub> = 3.8 X 10<sup>-6</sup> cm/sec**  
**K<sub>2</sub> = 4.3 X 10<sup>-6</sup> cm/sec**  
**K<sub>3</sub> = 3.8 X 10<sup>-6</sup> cm/sec**  
**K<sub>4</sub> = 4.7 X 10<sup>-6</sup> cm/sec**

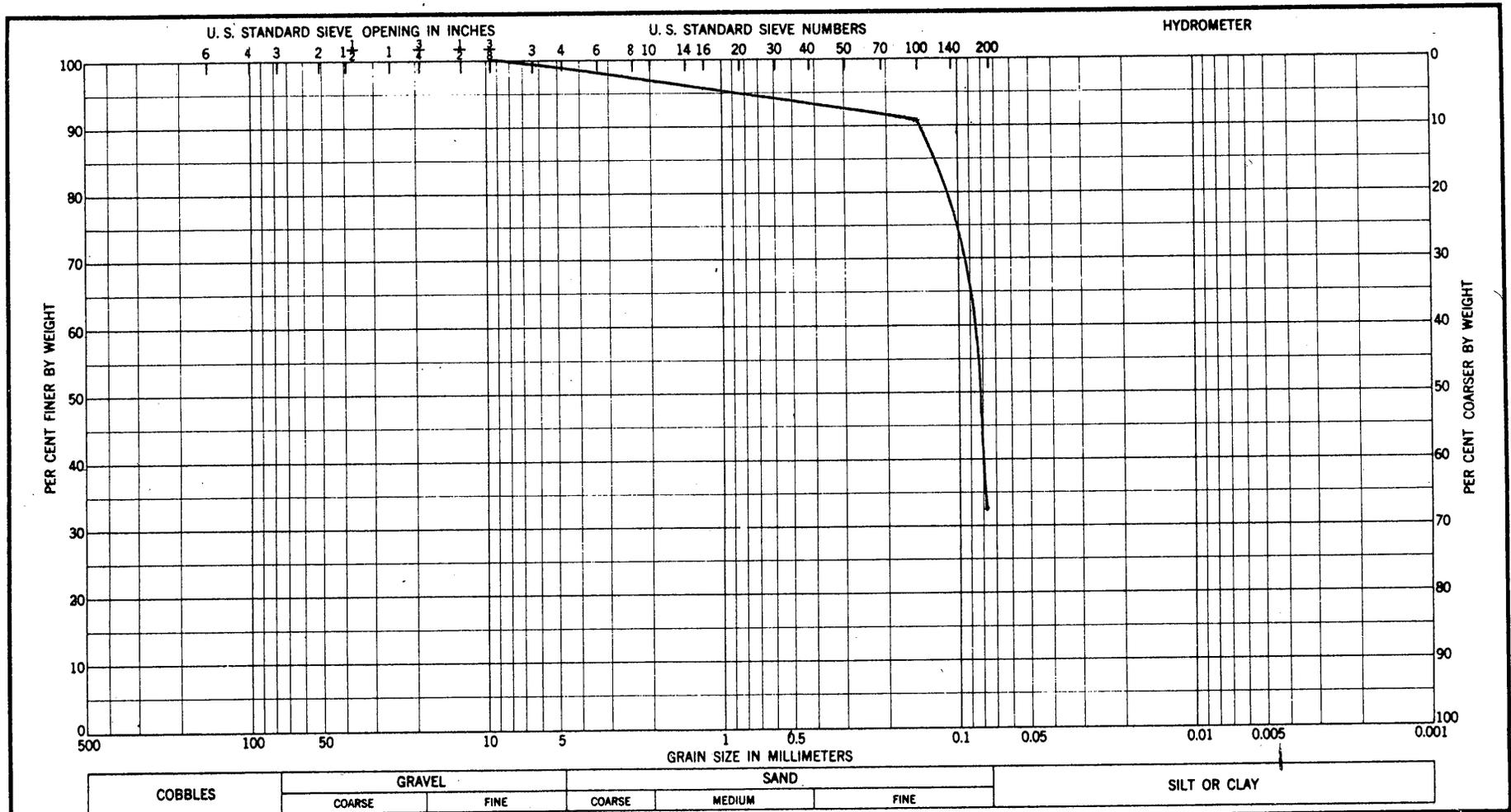
**Coefficient of Permeability, K<sub>20</sub> = 4.2 X 10<sup>-6</sup> cm/sec**

**Test in accordance with Method 9100 of Test Methods for evaluating Solid Waste, Third Edition, (SW-846) and in general accordance with ASTM D-5084-90.**

**Lab No.: P-98-086**

**Reviewed By:**

  
**David D. McCray**



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI	Project
		SM	--	N/P	N/P	N/P	Naval Air Station Millington, TN
							Area
							Boring No. 007S002387 SWMU 7/AOCA
							Date 08/21/98

**GRADATION CURVES**



