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GROUNDWATER WELL MANAGEMENT PLAN VOLUME 1 OF 2 SECTIONS 1 TO 3
APPENDICES A AND B MILLINGTON SUPPACT TN
11/1/2001
ENSAFE INC

GROUNDWATER WELL MANAGEMENT PLAN

NAVAL SUPPORT ACTIVITY MID-SOUTH MILLINGTON, TENNESSEE

**VOLUME I of II
SECTIONS 1 to 3
APPENDICES A and B**

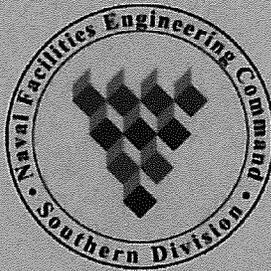
REVISION: 6

CONTRACT NUMBER: N62467-89-D-0318

CTO-0094

CTO-0146

Prepared for:



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

Prepared by:

ENSAFE

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

November 2001

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

Date: November 19, 2001
Signature:
Name: John Steadman, Jr.
Title: Task Order Manager

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EXECUTIVE SUMMARY

This plan updates all previous revisions of the Groundwater Monitoring Well Management Plan originally prepared by EnSafe/Allen & Hoshall in 1995 and outlines inspection criteria and maintenance procedures for wells at the Naval Support Activity (NSA) Mid-South, Millington, Tennessee. Maintenance procedures are designed to ensure well integrity and compliance with local, state, and federal regulations. There are presently 275 groundwater monitoring wells and piezometers, two leak detection wells, five potable water supply wells, and four non-potable water wells in use at and around NSA Mid-South. Four private wells offsite of the base property are also monitored (i.e., water level measurements and/or groundwater sampling) as part of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI).

Most of the monitoring wells were installed at NSA Mid-South sites during the RFI. Some of these RFI sites are nearing official closure. Several wells were closed in 1998 in accordance with a September 23, 1997, technical memorandum. Many of the leak detection wells at NSA Mid-South were also closed in 1998 as the tank systems associated with them were removed. As a result, the well database (Appendix A) has been periodically updated by the Activity (or a designee). The table on the following page provides a summary of the wells currently in the database. Of the 437 wells listed in the table, four closed potable water wells in the Memphis Sand aquifer (see Section 3.3.5.3) are not in the database, and one loess monitoring well is in the database twice as N9407LS and 007G08LS (as explained in Sections 3.3.1.1 and 3.3.4).

**Naval Support Activity Mid-South
Groundwater Well Summary
November 2001**

Well Type	Tank Pit	Alluvium	Loess	Fluvial Deposits	Cockfield Formation	Memphis Sand	Fort Pillow	Total	Data Source
RFI — Open	0	58	14	157	12	0	0	241	Table 3-1
RFI — Closed	0	6	32	18	4	0	0	60	Appendix A
Leak Detection — Open	2	0	0	0	0	0	0	2	Table 3-2
Leak Detection — Closed	39	0	0	0	0	0	0	39	Table 3-2
UST — Open	0	0	34	0	0	0	0	34	Table 3-3
UST — Closed	0	0	39	0	0	0	0	39	Table 3-3
Potable Water — Open	0	0	0	0	0	2	3	5	Table 3-4
Potable Water — Closed	0	0	0	0	0	4	1	5	Sect. 3.3.5.3
Non-Potable/Other — Open	0	0	0	2	1	1	0	4	Table 3-5
Non-Potable/Other — Closed	0	0	0	0	1	0	0	1	Table 3-5
Private (Offsite) — Open	0	0	0	4	0	0	0	4	Appendix A
Total	41	64	119	181	18	7	4	434	

1.0 INTRODUCTION

This revision updates the original Groundwater Monitoring Well Management Plan prepared by EnSafe/Allen & Hoshall (E/A&H) in 1995 and subsequent revisions, with the most recent being Revision 5 prepared by EnSafe Inc. in November 1999. It outlines inspection criteria and maintenance procedures for all monitoring wells installed at the Naval Support Activity (NSA) Mid-South, Millington, Tennessee. Maintenance procedures are designed to ensure well integrity and continued compliance with local, state, and federal regulations. This revised document will be referred to as the Groundwater Well Management Plan (GWMP) for NSA Mid-South, Millington, Tennessee.

During preparation of this plan, EnSafe reviewed reports related to groundwater investigations, Resource Conservation and Recovery Act (RCRA) Facility Investigations (RFIs), underground storage tank (UST) related investigations and monitoring programs, and Activity records to determine how many permanent or temporary groundwater wells have been installed at NSA Mid-South. Based on this research, EnSafe determined that 430 wells and piezometers were installed over the years. Of these, 147 wells have since been closed.

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

In addition to the 119 wells identified in the original plan, E/A&H installed RFI and UST related monitoring wells in 1995 and 1996. EnSafe installed additional RFI and UST monitoring wells from 1997 to 1999, and seven more wells for the Area of Concern A Corrective Measures Study (CMS) in 2000 and 2001. In August 1999, the U.S. Geological Survey (USGS) installed one monitoring well (002G17UA) offsite at SWMU 2. As part of a pilot scale remediation system, Parsons Engineering Science, installed 24 wells on the airfield apron near the former N-6 hangar in 2000. Currently, 286 wells are active at NSA Mid-South. Appendix D contains quadrant maps that show the location of each well, and Section 3 describes each well site.

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

MONITORING WELL INSPECTION LIST

DATE	NAME	WELL NO.	LOCATION
------	------	----------	----------

1. Is the well locked?
 - 1a. If not, list action taken and date the well was locked.

2. Does the well have protective posts?

3. Are protective posts damaged?
 - 3a. If yes, list action taken and date posts were repaired.

4. Is the concrete pad damaged?
 - 4a. If yes, list action taken and date repaired.

5. Is the well cap hex key type?

6. Is well cap sealing properly?
 - 6a. If no, list action taken and date repaired/replaced.

7. Is well cap locked?
 - 7a. If no, list action taken and date repaired.

8. (Flush mount wells) is well cover bolted down?
 - 8a. If no, list action taken and date repaired.

9. Is well cover missing bolts?
 - 9a. If yes, list action taken and date repaired.

10. (Above grade wells) is well outer casing damaged?
 - 10a. If yes, list action taken and date repaired.

11. Additional comments.

FIGURE 2-1
Groundwater Well Management plan
NSA Memphis, Millington, Tennessee

Gaskets on manhole cover rims may become dirty, dried, cracked, or otherwise damaged, allowing rainwater runoff or other contaminants to enter the manhole and potentially the well. These gaskets must be replaced if they show signs of damage.

2.3 Contingencies

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

2.4 Well Repairs/Closures

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

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3.0 WELL BACKGROUND INFORMATION

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

3.1 Well Classification

Wells are classified in one of four categories:

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

Wells are subclassified based on the geologic formation in which they are screened:

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

This plan currently includes 275 monitoring wells, two leak detection wells, five potable water supply wells, and four non-potable water wells. Most wells at NSA Mid-South are monitoring wells installed as part of RFIs or UST Environmental Assessments (EAs). Leak detection wells were installed under a UST upgrade program completed in 1989 and 1990.

The remaining wells were installed for various reasons including potable and irrigation water supplies. Boring and well construction logs are in Appendix C.

3.2 NSA Mid-South Geology

A conceptual model of NSA Mid-South hydrogeology is presented in the *Hydrogeology of Post-Wilcox Group Stratigraphic Units in the Area of the Naval Air Station Memphis, Near Millington, Tennessee* (Kingsbury and Carmichael, 1995). The hydrogeology of NSA Mid-South is summarized below.

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

Below the fluvial deposits are the Cockfield Formation and the Cook Mountain Formation of the Jackson-Upper Claiborne confining unit. The Cockfield is a heterogeneous formation of very fine silty sand interbedded with clay and silt lenses or clay with interbedded fine sand lenses.

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

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

3.3 Well Sites and Origins

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

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

3.3.1 RFI-Related Monitoring Wells

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

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

Table 3-1 shows the number of wells currently present at each site by assembly. Each site is described below with individual site maps provided at the end of this section.

Table 3-1
RFI Monitoring Wells and Piezometers

Assembly	Site	Alluvium	Loess ^a	Fluvial ^b	Cockfield	Total
Assembly A	SWMU 3	0	0	4	0	4
	SWMU 5	0	3	6	0	9
	SWMU 7	0	3 ^c	71 ^d	7	81
	SWMU 8	0	0	0	0	0
	SWMU 60	0	0	2	0	2
	SWMU 66	0	0	1	0	1
Assembly B	SWMU 40	0	0	0	0	0
Assembly C	SWMU 15	0	0	8	0	8
	SWMU 18	0	0	1	0	1
	SWMU 21	0	0	4	0	4
Assembly E	SWMU 2	46	0	0	0	46
	SWMU 9	4	0	0	0	4
	SWMU 14	0	5	4	0	9
	SWMU 59	0	2	1	0	3
	SWMU 65	3	0	0	0	3
Assembly F	SWMU 20	0	0	4	0	4
	SWMU 39	0	0	11	0	11
Assembly H	SWMU 41	4	0	0	0	4
Background	BG	1	0	14	4	19
Parsons	PES	0	0	24	0	24
USGS	USGS	0	1	2	1	4
Total		58	14	157	12	241

Notes:

- a — Does not include one UST loess well at SWMU 5 and four UST loess wells at N-12 (see Table 3-3).
- b — Includes AOC A pilot study injection and extraction wells at SWMU 7 and Parsons sites.
- c — Does not include 007G08LS (also known as N9407LS which is included in Table 3-3).
- d — Includes two lower fluvial deposits wells at N-12 (N12G01LF and N12G02LF).

3.3.1.1 Assembly A

Assembly A consists of eight SWMUs: 1, 3, 5, 7, 8, 60, 66, and 67. Monitoring wells were installed at all of these sites, except SWMUs 1 and 67. Appendix D contains quadrant maps showing the location of the currently active monitoring wells at each SWMU, and locations of any abandoned wells.

SWMU 3 (*N-121 Plating Shop Dry Well*) Building N-121 was a metal plating shop which operated from the early 1950s to the early or mid-1970s. Wastes from this plating shop were disposed of in a dry well (10' x 10' x 6' pit filled with gravel) on the south side of the building, adjacent to Casablanca Street. Three monitoring wells were installed by G&M during the 1985 VS. During an RFI at SWMU 3 in early 1995, E/A&H installed eight additional RFI monitoring wells, which were screened in either the loess or fluvial deposits. The dry well was removed in September 1996 and five monitoring wells 003G01LS, 003G02LS, 003G03LS, 003G04LS, and 003G03MF were closed in November 1998. Four monitoring wells are currently active at SWMU 3. Figure 3-1 shows locations of SWMU 3's currently open wells and its abandoned wells.

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

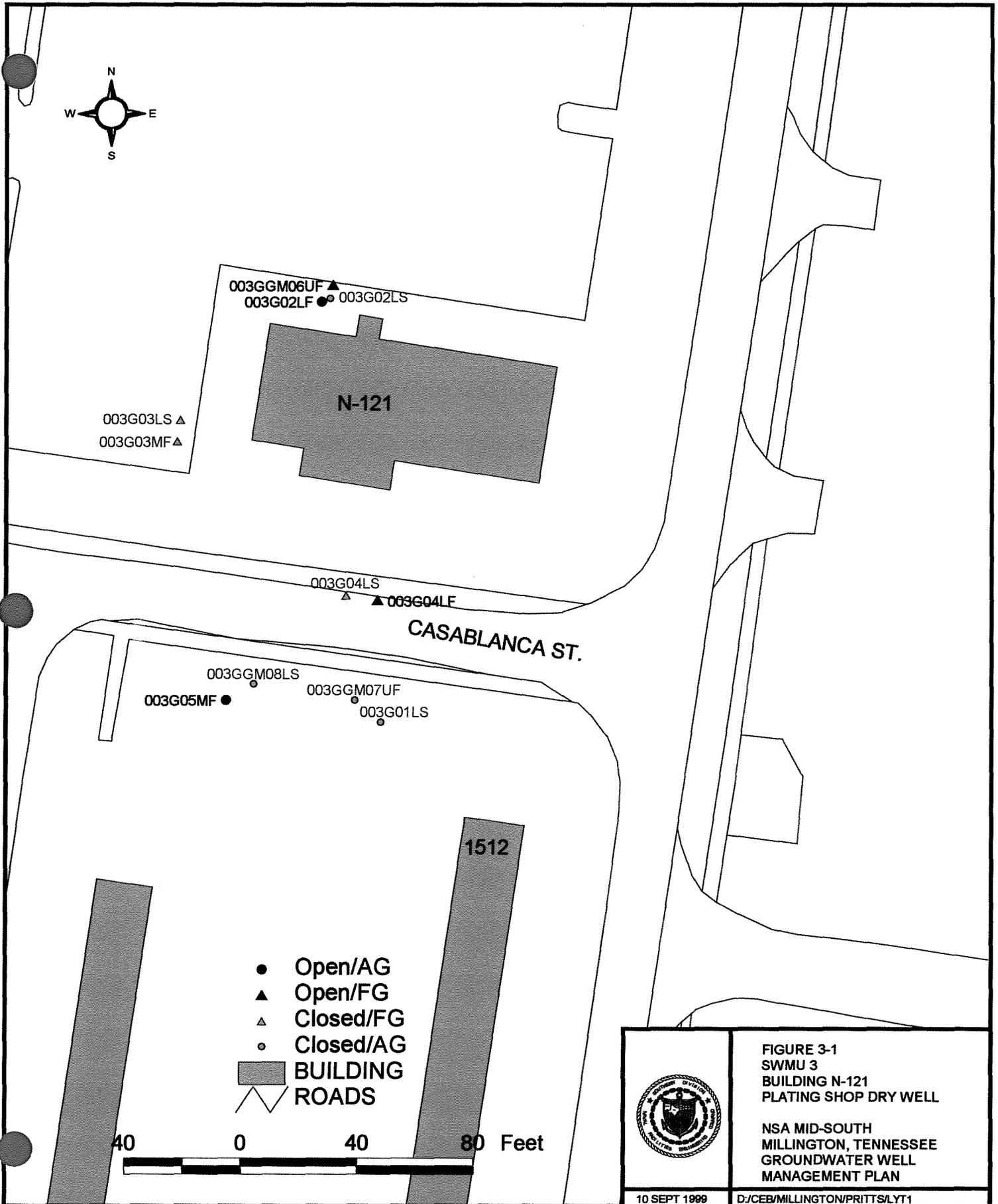
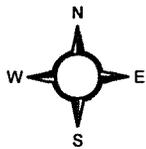


FIGURE 3-1
SWMU 3
BUILDING N-121
PLATING SHOP DRY WELL

NSA MID-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

10 SEPT 1999

D:/CEB/MILLINGTON/PRITTS/LY1



DAKAR ST

005G03UF ● 005G03LS

005G04LS ○

005G06LS ○

005G08LS ▲

005FF09LS ●

005G07LS ○

005FF08LS ●

005FF07LS ○

005FF10LS ○

005FF04LS ○

005FF03LS ○

005FF11LS ○

T148901 ▲

005FF06LS ○

005FF02LS ○

T160801 ▲

T148903 ▲

T148904 ▲

005FF01LS ○

005G02UF ●

005G08LF ●

005G48UF ●

005GAAUF ●

005FF05LS ●

005G04UF ●

005G05LF ●

005G01UF ●

▲75719LS

Navy Exchange

75715LS ▲

75705LS ▲

75706LS ▲

75702LS ▲

75712LS ▲

75714LS ▲

75707LS ▲

75703LS ▲

75701LS ▲

75713LS ▲

75709LS ▲

75718LS ▲

75710LS ▲

75711LS ▲

75708LS ▲

757B4LD ●

TW03 ○

●0BGG14MF

PW4 ●

▲75704LS

- Open/AG
- ▲ Open/FG
- △ Closed/FG
- Closed/AG
- BUILDING
- ▬ ROADS

60 0 60 120 180 Feet



FIGURE 3-2
SWMU 5
AIRCRAFT FIRE FIGHTING
TRAINING AREA
NSA MID-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

SWMU 7 (*N-126 Plating Shop Dry Well*), a dry well associated with a plating shop in hangar N-126, operated from 1955 to 1978. Plating wastes are reported to have been piped to the dry well outside, near the southeast corner of the hangar. G&M installed a middle fluvial deposits monitoring well through the dry well during the VS in 1985. The monitoring well was abandoned in June 1996 and the dry well was removed in September 1996. E/A&H installed 43 RFI wells at SWMU 7 and the airfield apron area from February 1995 to March 1996. From 1997 to mid-1999, EnSafe installed an additional 47 RFI wells and piezometers as part of the AOC A investigation, which extended the original SWMU 7/airfield apron investigation area beyond the main runway and past the northwestern base boundary. Wells at the first nine locations were installed in clusters of four and screened in the loess, upper fluvial deposits, lower fluvial deposits, and the upper Cockfield Formation. An existing loess monitoring well (N9407LS) associated with a 1995 UST EA was renamed 007G08LS to serve as the loess well for cluster number 8. With the exception of three loess wells (007G37F1, 007G37L1 and 007G37L2) installed for an aquifer test, subsequent well installations focused on the upper and/or lower fluvial deposits based on sampling results. In the latter stages of the investigation, some wells were screened in the middle fluvial deposits, and others were screened throughout the entire thickness of the fluvial deposits. Eighteen SWMU 7 RFI wells have been closed.

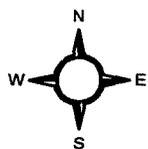
In 1996, two lower fluvial deposits monitoring wells (N12G01LF and N12G02LF) were installed adjacent to Building N-12 and PW-1, respectively, to assess the possible impact on PW-1 of suspected chlorinated solvent releases from activities associated with Building N-12, a former print shop.

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

A second pilot study is being conducted by Parsons Engineering Science to evaluate the feasibility of using vegetable oil injection to remediate a portion of the AOC A groundwater plume, specifically the area of higher chlorinated solvent contamination in the vicinity of monitoring wells 007G15UF and 007G15LF near the former N-6 hanger. Eight injection (four upper and lower fluvial pairs) and 16 monitoring (eight pairs) wells were installed in the former N-6 area in August 2000. The 10-foot-long injection well screens were staggered so that the vegetable oil zone of influence would extend vertically from 45 to 85 feet below land surface and approximately 60 feet laterally. Additional well installation details are provided in the *Final Work Plan for Field Application to Enhance In Situ Bioremediation of Chlorinated Solvents via Vegetable Oil Injection at Site N-6, Former Naval Support Activity Mid-South, Millington, Tennessee* (Parsons, 2000).

Figure 3-3 shows the location of active and abandoned wells associated with SWMU 7 and AOC A.

SWMU 8 (Cemetery Disposal Area) was a hazardous materials disposal area reported to have operated from 1965 to 1980. It is adjacent to the northern end of the main runway (Runway 4-22), and north of Chamberlayne Cemetery. In 1985, G&M installed three fluvial deposits wells during the VS. In early 1995, E/A&H installed four RFI fluvial deposits wells. Two of the G&M wells (008GMW10 and 008GMW12) were closed in November 1995 by E/A&H. Three loess wells were installed during the RFI, but closed within a few weeks because they produced no groundwater. After transfer of the property to the Millington Municipal Airport Authority, two additional wells (008G01FL and 008GMW11) were abandoned in January 1998 during a grading project. In November 1999, the three remaining monitoring wells were grouted in place by EnSafe in accordance with MSCHD guidance. Figure 3-4 shows the former locations of the abandoned wells at SWMU 8.



008GGM11LS

008G04FL

Berm →

008G03FL

008G02LS

008G02FL

008GGM10LS

Access Road

- Open/AG
- ▲ Open/FG
- △ Closed/FG
- Closed/AG
- BUILDING
- ▾ ROADS

 Chamberlayne Cemetery

40 0 40 80 120 Feet



FIGURE 3-4
SWMU 8
CEMETERY DISPOSAL AREA

NSA MID-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

10 SEPT 1999

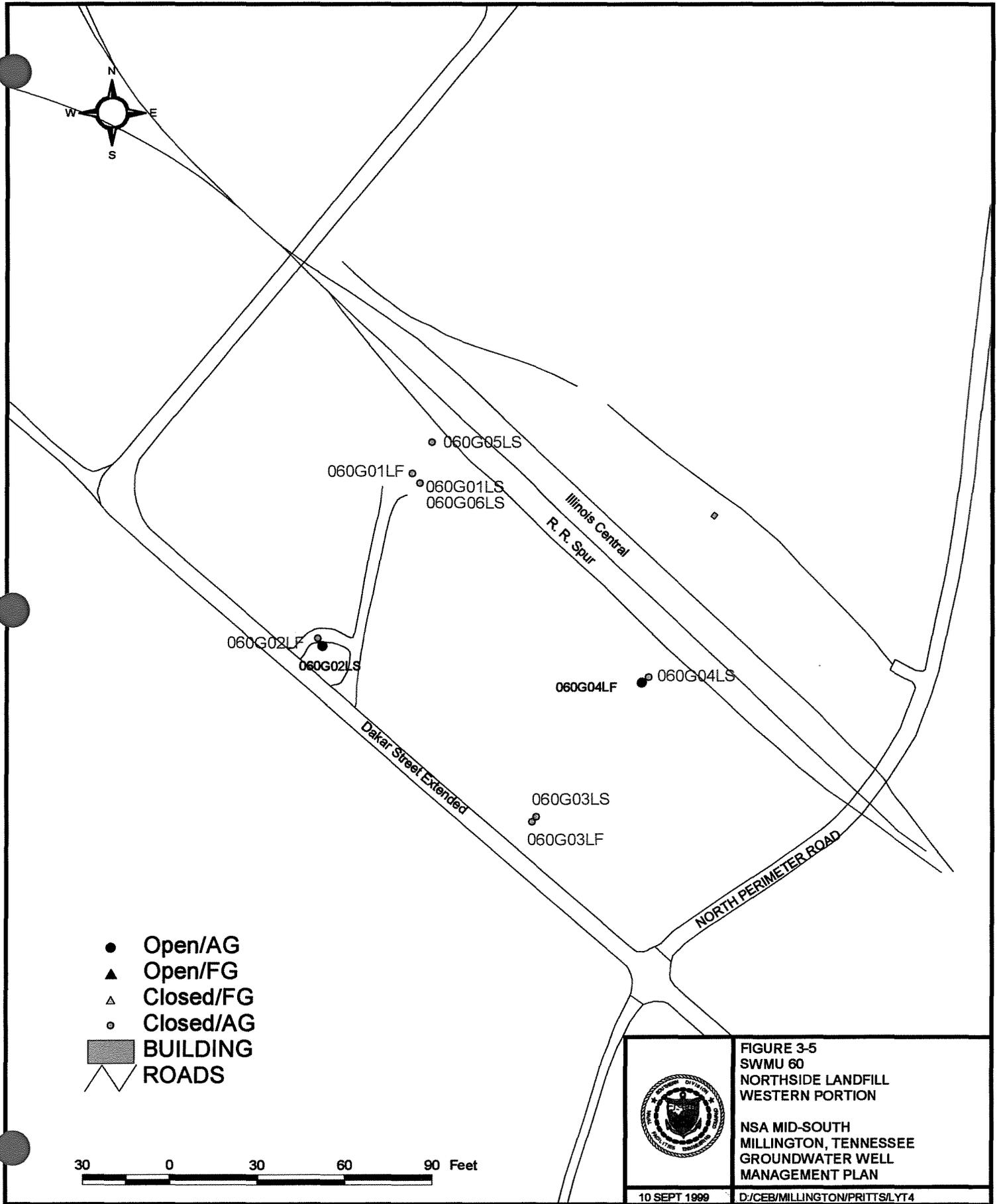
D:/CEB/MILLINGTON/PRITTS/LYT3

SWMU 60 (*Northside Landfill — Western Portion*) is reported to have been used primarily for disposal of demolition debris. The landfill was apparently active between 1951 and 1986. SWMU 60, which is in the southwest portion of the NSA Mid-South Northside, is bounded on the south by Dakar Street, on the west by Outlet Road, to the east by an unpaved perimeter road, and on the north by abandoned Illinois Central Railroad spurs. E/A&H installed 10 monitoring wells during an RFI in early 1995; however, three wells (060G01LS, 060G01LF, and 060G05LS) were abandoned to facilitate a Voluntary Corrective Action conducted by the Navy in December 1997. Five more monitoring wells (060G02LS, 060G03LF, 060G03LS, 060G04LS, and 060G06LS) were abandoned in November 1998. SWMU 60 monitoring wells were screened in the loess and lower fluvial deposits. Monitoring wells 060G02LF and 060G04LF are currently active at this site and provide long-term monitoring of groundwater from SWMU 10 (*Northside Landfill — Eastern Portion*) which is approximately 500 feet upgradient of SWMU 60. Figure 3-5 shows the monitoring well locations for both abandoned and active wells at SWMU 60.

SWMU 66 (*Radar Disposal Area*) was used by the MWR as a debris disposal area for an unknown period of time. SWMU 66, which is in the northeast portion of the NSA Mid-South Northside, is bounded on the west by an abandoned runway, to the north by an abandoned radar facility, and to the east by pasture. As part of the investigation at SWMU 66, one monitoring well was installed by EnSafe in May 1998. Figure 3-6 shows the location of the monitoring well for SWMU 66.

3.3.1.2 Assembly B

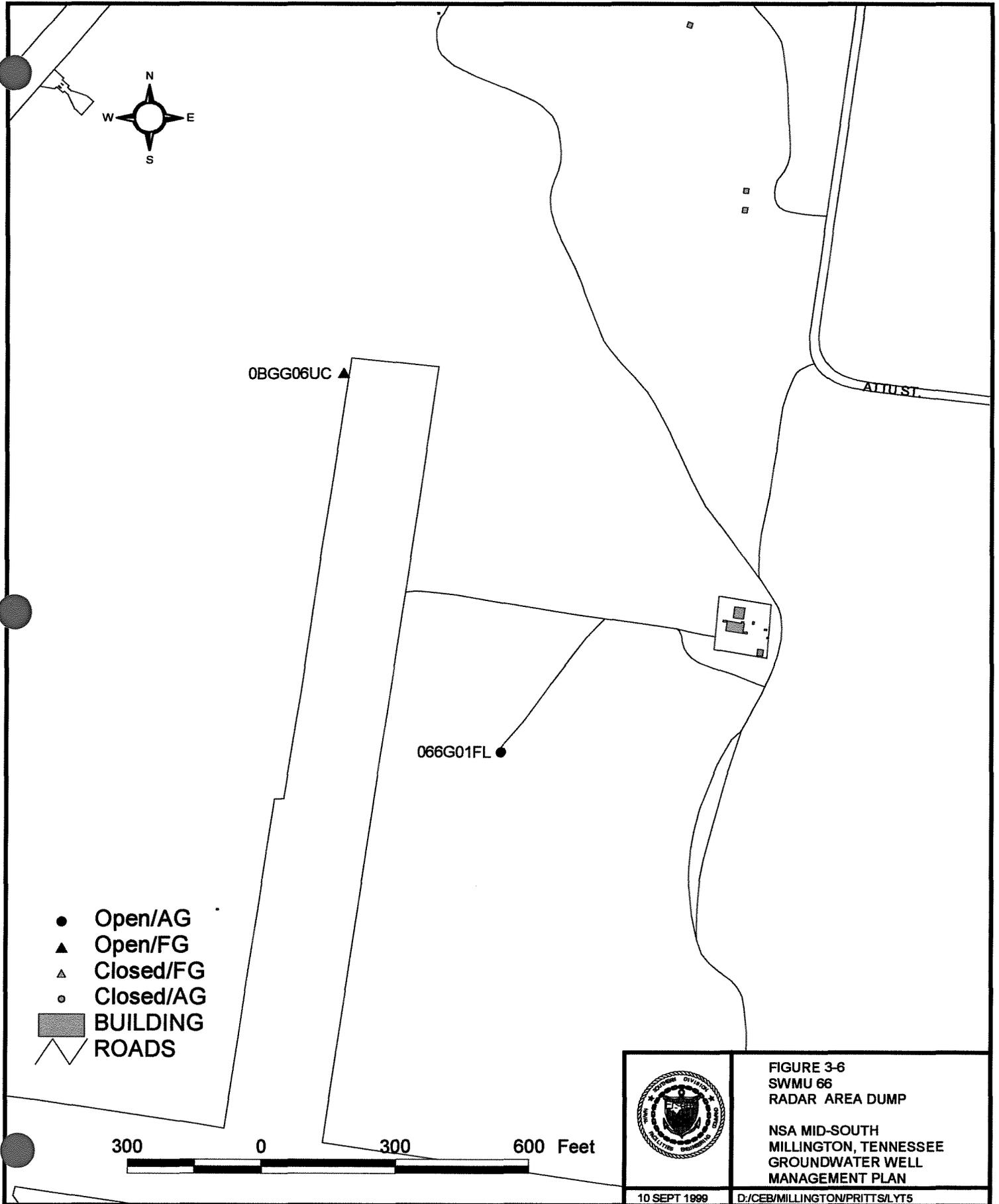
Assembly B includes SWMU 40 Salvage Yard No. 1, where four monitoring wells are currently installed: USGS01LS, USGS02LF, USGS03UC, and USGS04LF. These wells were installed by the U. S. Geological Survey (USGS) to gather hydrological data, but were sampled during the SWMU 40 RFI. Figure 3-7 shows the location of the USGS monitoring wells at SWMU 40.



- Open/AG
- ▲ Open/FG
- △ Closed/FG
- Closed/AG
- BUILDING
- ▭ ROADS

30 0 30 60 90 Feet

	FIGURE 3-5 SWMU 60 NORTHSIDE LANDFILL WESTERN PORTION
	NSA MID-SOUTH MILLINGTON, TENNESSEE GROUNDWATER WELL MANAGEMENT PLAN
10 SEPT 1999	D:/CEB/MILLINGTON/PRITTS/LYT4



- Open/AG
- ▲ Open/FG
- △ Closed/FG
- Closed/AG
- BUILDING
- ▭ ROADS

300 0 300 600 Feet



FIGURE 3-6
SWMU 66
RADAR AREA DUMP

NSA MID-SOUTH
 MILLINGTON, TENNESSEE
 GROUNDWATER WELL
 MANAGEMENT PLAN

10 SEPT 1999

D/CEB/MILLINGTON/PRITTS/LYT5

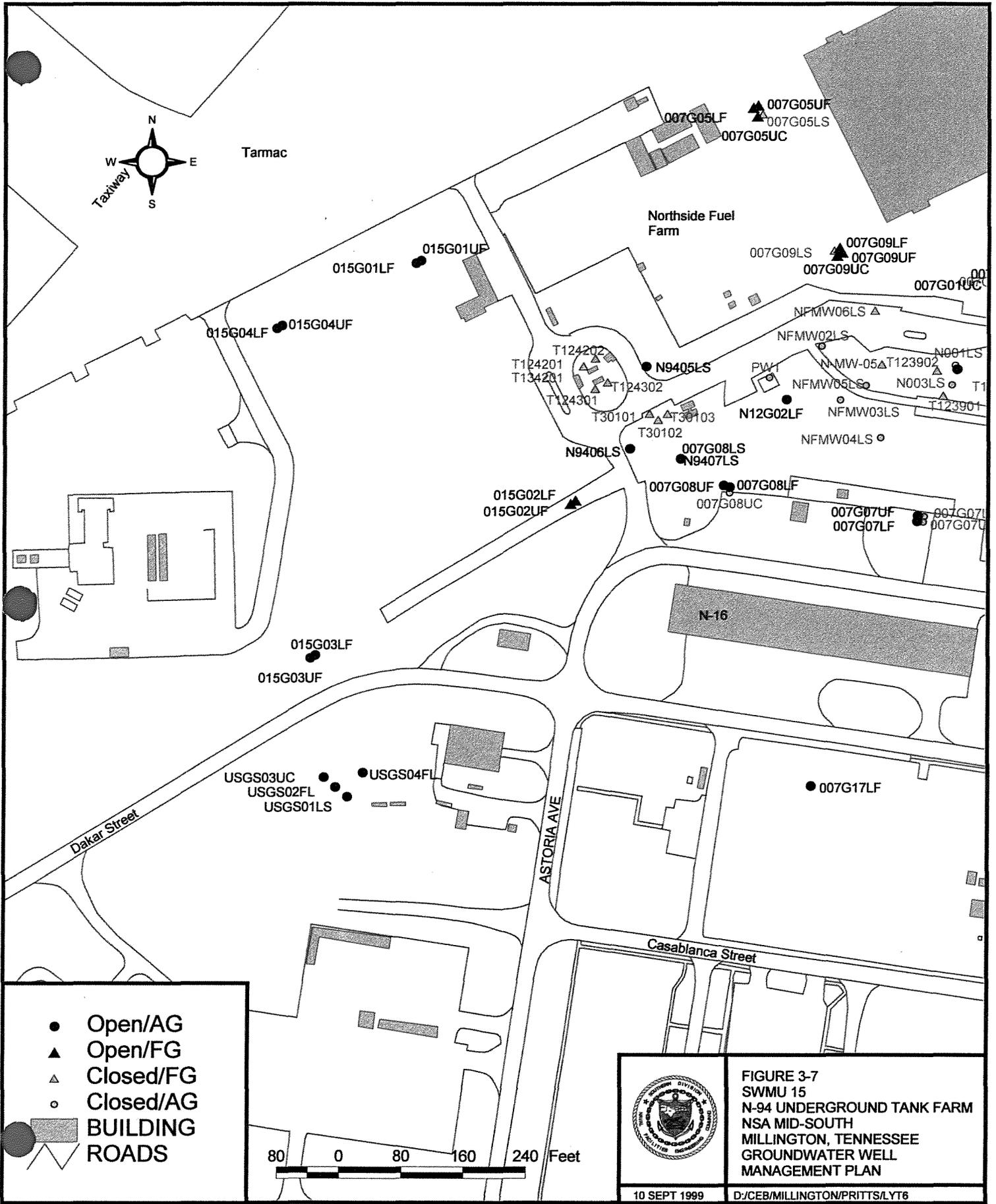


FIGURE 3-7
SWMU 15
N-94 UNDERGROUND TANK FARM
NSA MID-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

10 SEPT 1999

D:/CEB/MILLINGTON/PRIITS/LY6

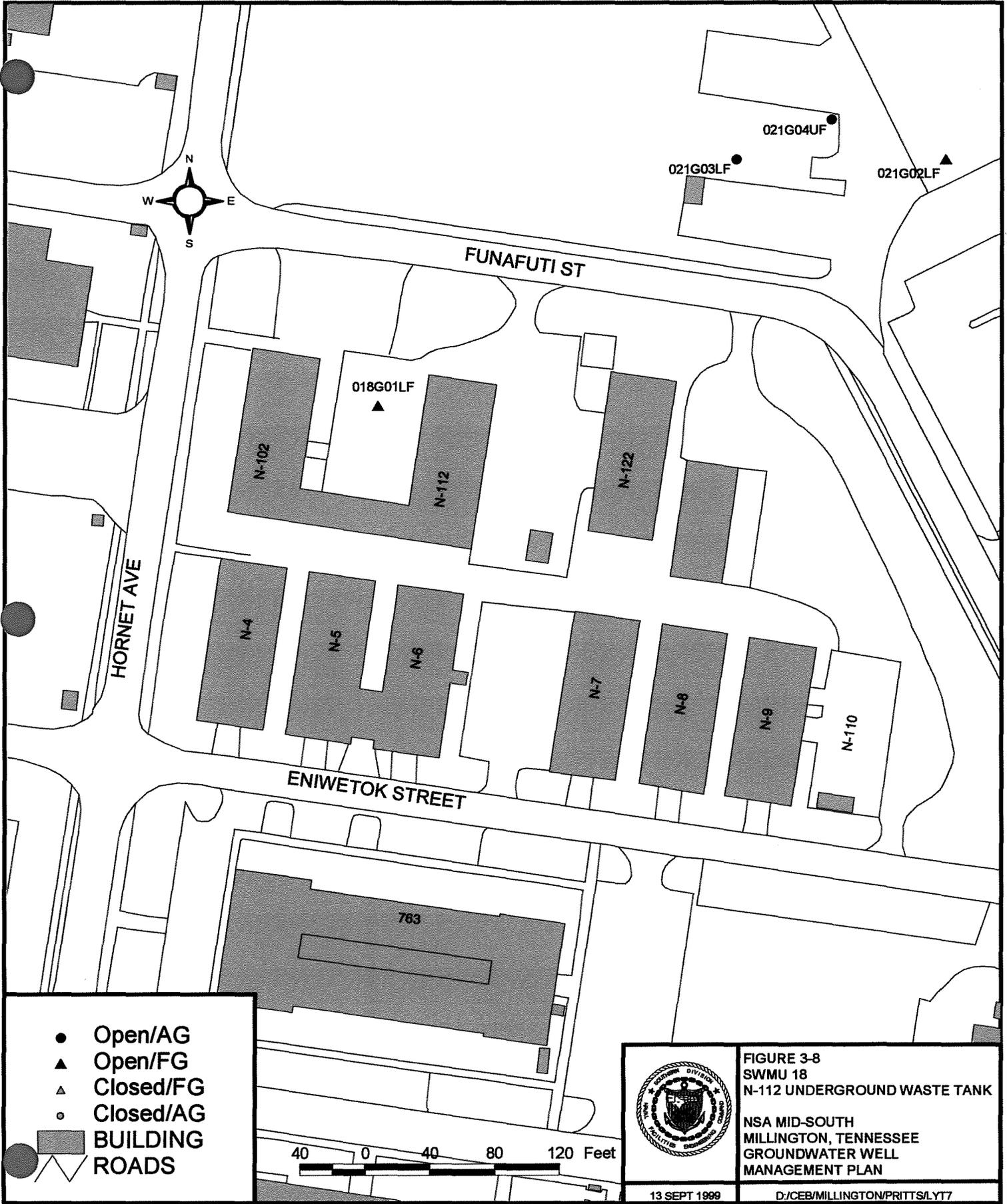
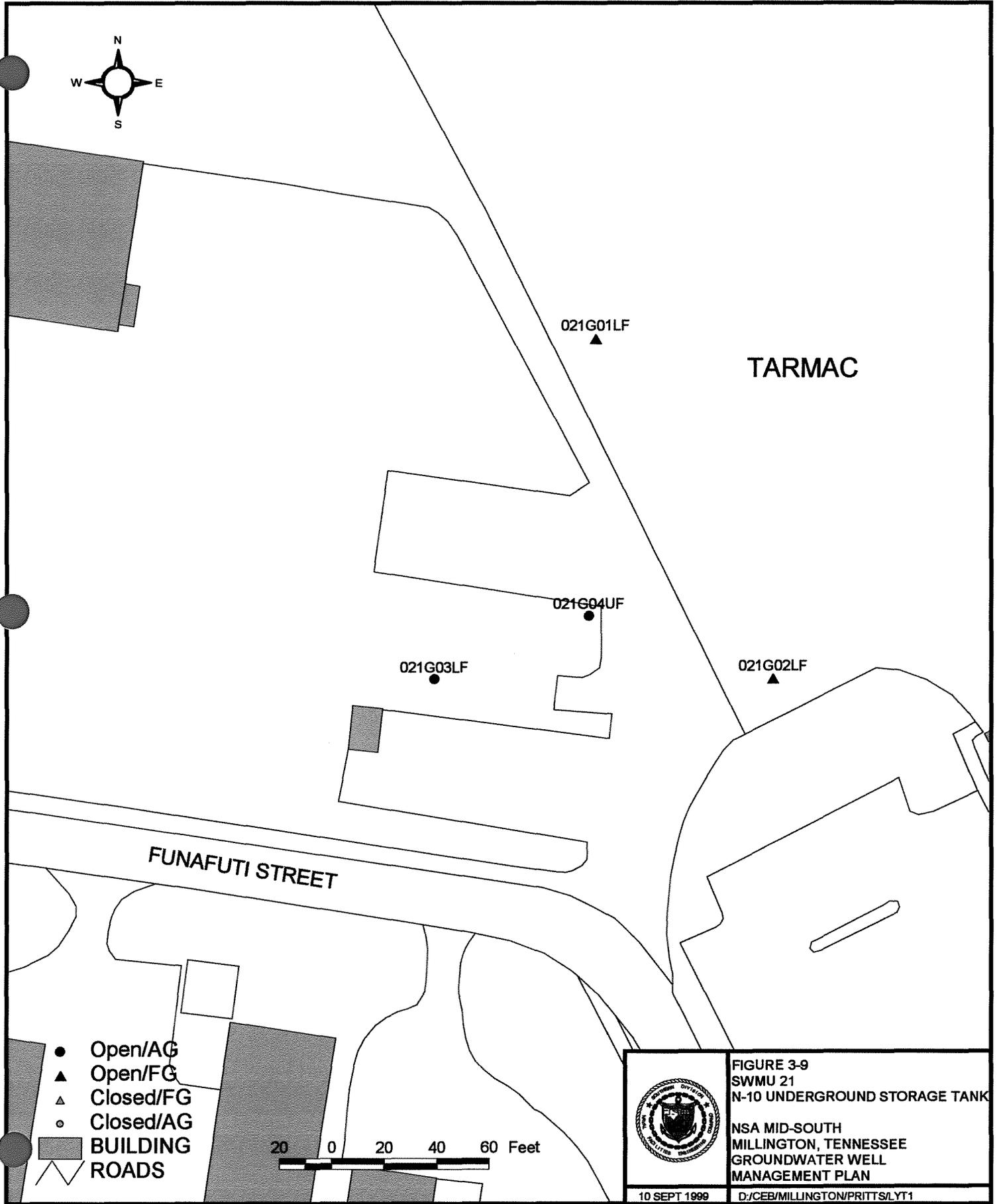


FIGURE 3-8
SWMU 18
N-112 UNDERGROUND WASTE TANK
 NSA MID-SOUTH
 MILLINGTON, TENNESSEE
 GROUNDWATER WELL
 MANAGEMENT PLAN

13 SEPT 1999

DJ/CEB/MILLINGTON/PRITTS/LYT7



TARMAC

021G01LF ▲

021G04UF ●

021G03LF ●

021G02LF ▲

FUNAFUTI STREET

- Open/AG
- ▲ Open/FG
- △ Closed/FG
- Closed/AG
- BUILDING
- ▭ ROADS

20 0 20 40 60 Feet

	<p>FIGURE 3-9 SWMU 21 N-10 UNDERGROUND STORAGE TANK</p>
	<p>NSA MID-SOUTH MILLINGTON, TENNESSEE GROUNDWATER WELL MANAGEMENT PLAN</p>
<p>10 SEPT 1999</p>	<p>D:/CEB/MILLINGTON/PRITTS/LYT1</p>

3.3.1.4 Assembly E

Assembly E includes SWMUs 2, 9, 14, 38, 59, and 65, which required full RFI characterization. Monitoring wells were installed at each Assembly E SWMU, except SWMU 38 (drainage ditches). The Assembly E well sites are shown on the quadrant maps in Appendix D.

SWMU 2 (*Southside Landfill*) operated from 1942 to 1970 at the southeast corner of NSA Mid-South, adjacent to Big Creek Drainage Canal. G&M installed five monitoring wells during the VS. E/A&H installed 27 additional monitoring wells which were screened in the alluvium during the RFI in 1996. EnSafe installed nine more wells south of the Big Creek Drainage Canal in June 1998. In October 1998, monitoring well 002GM01DA (GM-1) was abandoned due to a U.S. Army Corps of Engineers' levee construction project. In August 1999 USGS installed one additional offsite monitoring well (002G17UA). In June 2001, five additional monitoring wells were installed along Big Creek, to further evaluate whether contaminants are migrating offsite. Figure 3-10 shows the well locations.

SWMU 9 (*Sewage Lagoons*) consists of two sewage lagoons on the southern boundary of the NSA Mid-South Southside, approximately 175 feet south of the Big Creek Drainage Canal and 200 feet west of the South Gate. The lagoons were once part of the base wastewater treatment system. The system primarily treated domestic wastewater, but reportedly did receive limited industrial wastewater from aircraft maintenance facilities. The lagoons were operated from 1969 until 1978, when the base connected its sewer system to the city of Millington's sewage treatment system. Four RFI wells were installed at SWMU 9; all were screened in the alluvium. Figure 3-11 shows the well locations.

SWMU 14 (*Building S-140 Site and Seventh Avenue Ditch*) contained a paint spray booth, a paint removal area, and a paint wash-down area used to train Navy personnel in painting processes. It operated from 1943 until the building was demolished in 1985.

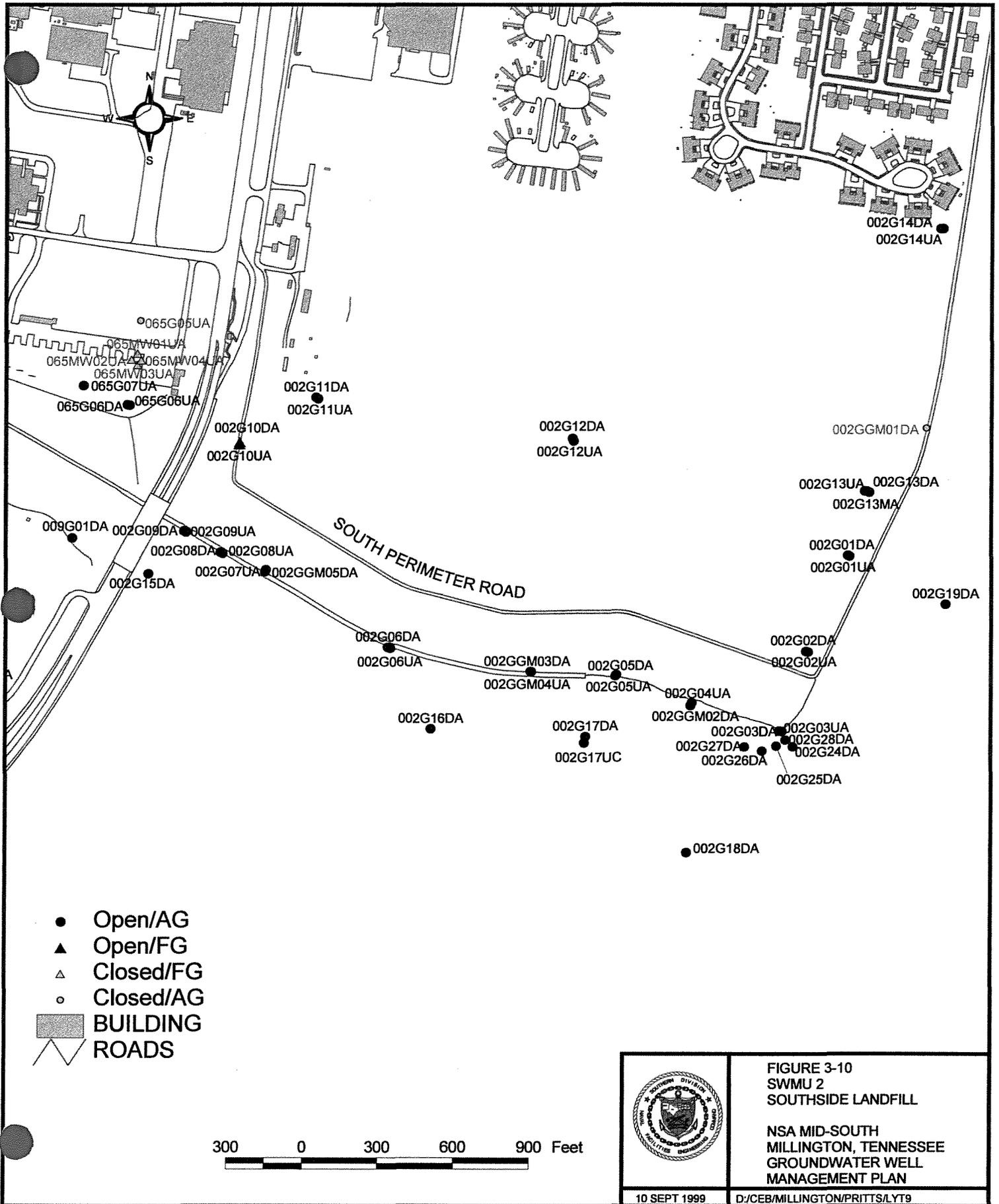
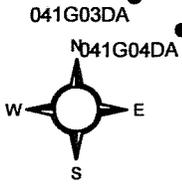


FIGURE 3-10
SWMU 2
SOUTHSIDE LANDFILL

NSA MID-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN



041G03DA
041G04DA

065G05UA

065MW01UA
065MW02UA
065MW03UA
065MW04UA

065G07UA

065G06DA
065G06UA

009G04DA

Lagoon

009G01DA

002G09DA
002G09UA

009G03DA

002G15DA

PAUL BARRET PARKWAY

SINGLETON PARKWAY

009G02DA

002G22DA

- Open/AG
- ▲ Open/FG
- △ Closed/FG
- Closed/AG
- BUILDING
- ▭ ROADS

100 0 100 200 300 Feet



FIGURE 3-11
SWMU 9
SEWAGE LAGOONS

NSA MID-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

10 SEPT 1999

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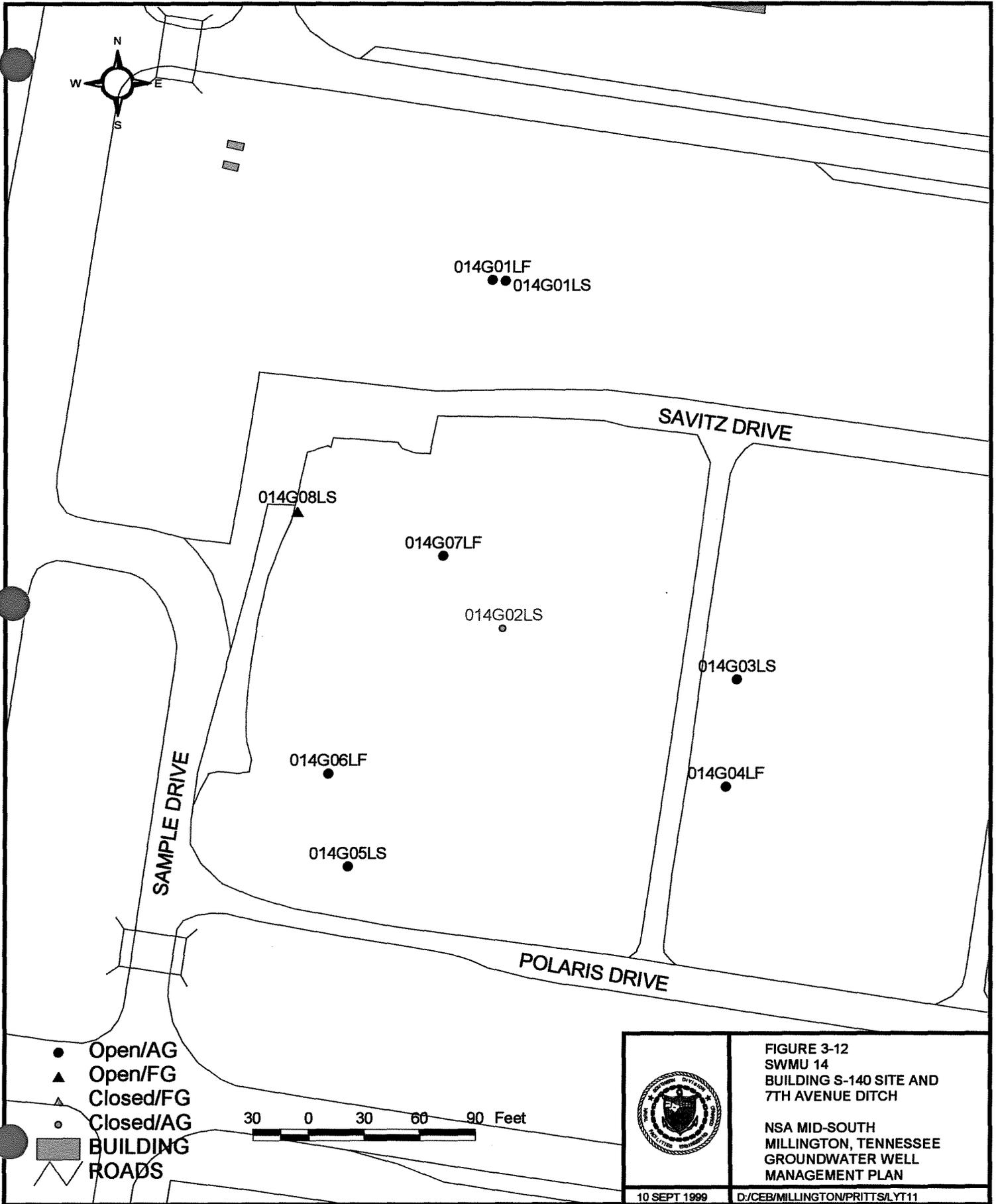


FIGURE 3-12
 SWMU 14
 BUILDING S-140 SITE AND
 7TH AVENUE DITCH

NSA MID-SOUTH
 MILLINGTON, TENNESSEE
 GROUNDWATER WELL
 MANAGEMENT PLAN



10 SEPT 1999

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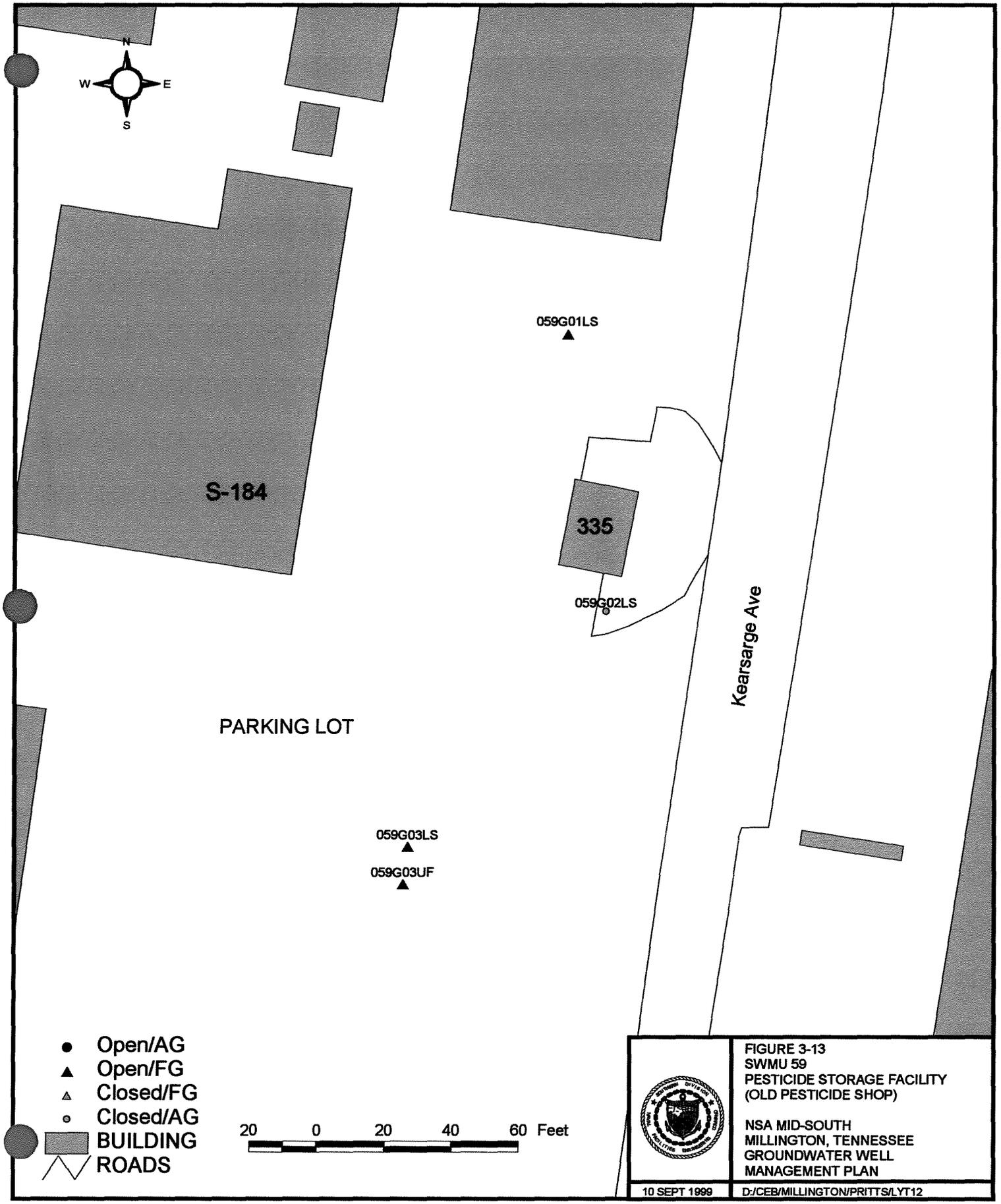


FIGURE 3-13
 SWMU 59
 PESTICIDE STORAGE FACILITY
 (OLD PESTICIDE SHOP)

NSA MID-SOUTH
 MILLINGTON, TENNESSEE
 GROUNDWATER WELL
 MANAGEMENT PLAN

10 SEPT 1999

D:/CEB/MILLINGTON/PRITTS/LYT12

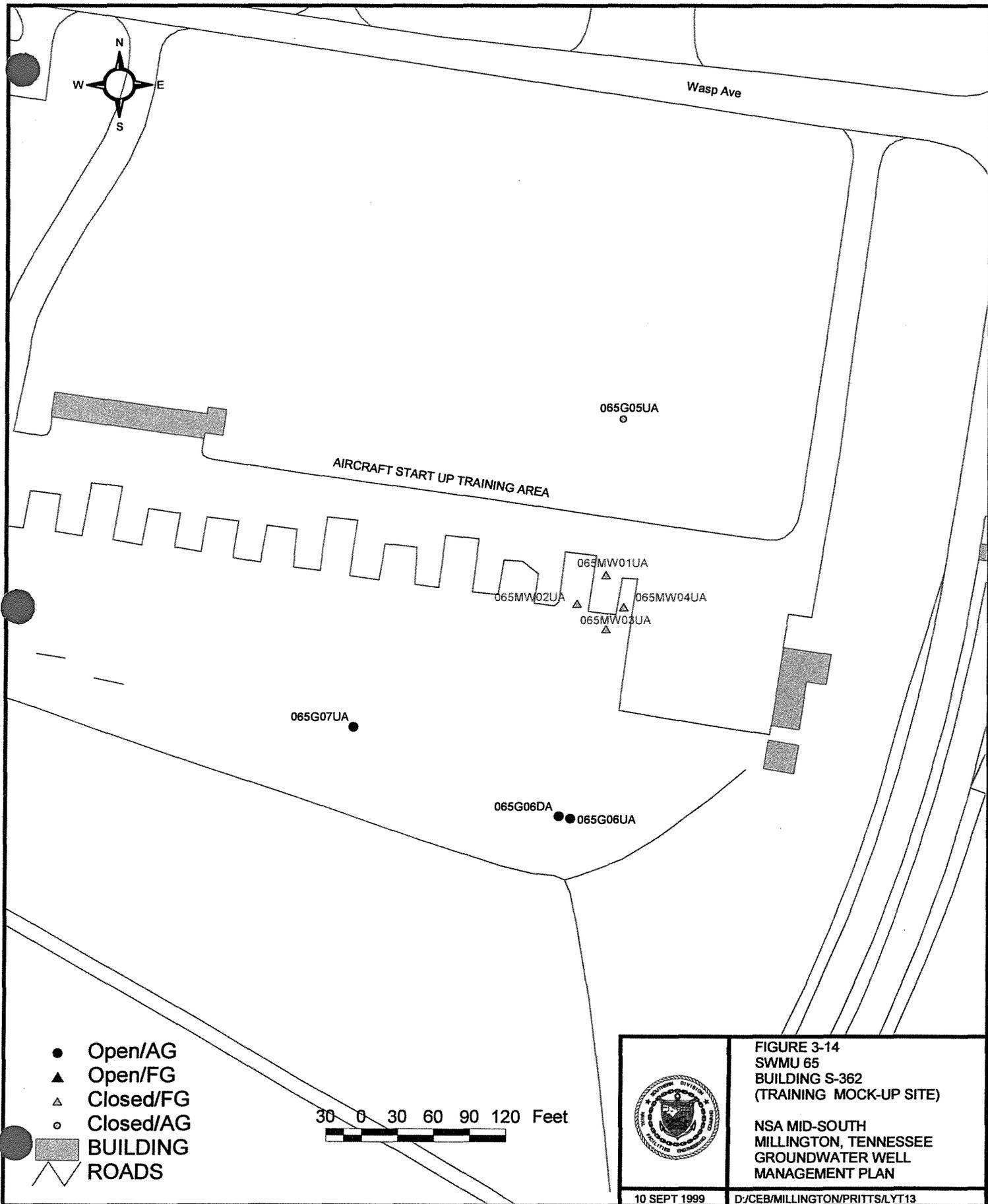


FIGURE 3-14
 SWMU 65
 BUILDING S-362
 (TRAINING MOCK-UP SITE)

NSA MID-SOUTH
 MILLINGTON, TENNESSEE
 GROUNDWATER WELL
 MANAGEMENT PLAN

SWMU 39 (*S-74 PCB Storage Area*) consisted of a concrete slab outside of Buildings S-74 and S-212. Transformers and drums of oil were stored on the slab until Building S-74 was demolished in 1995. Building S-74 was built in 1943 and was operated as a laundry facility until 1981 (38 years). Building S-212 was built in 1947 and stored solvents used at Building S-74. As part of an ongoing RFI, five piezometers (three in May 1998 and two in December 1998) were installed. Three of these piezometers have since been closed with only PZ-4 and PZ-5 still open. In March 1999, nine monitoring wells were installed as part of the investigation. All wells and piezometers are screened in the fluvial deposits. Figure 3-16 shows the location of the active monitoring wells and piezometers at SWMU 39.

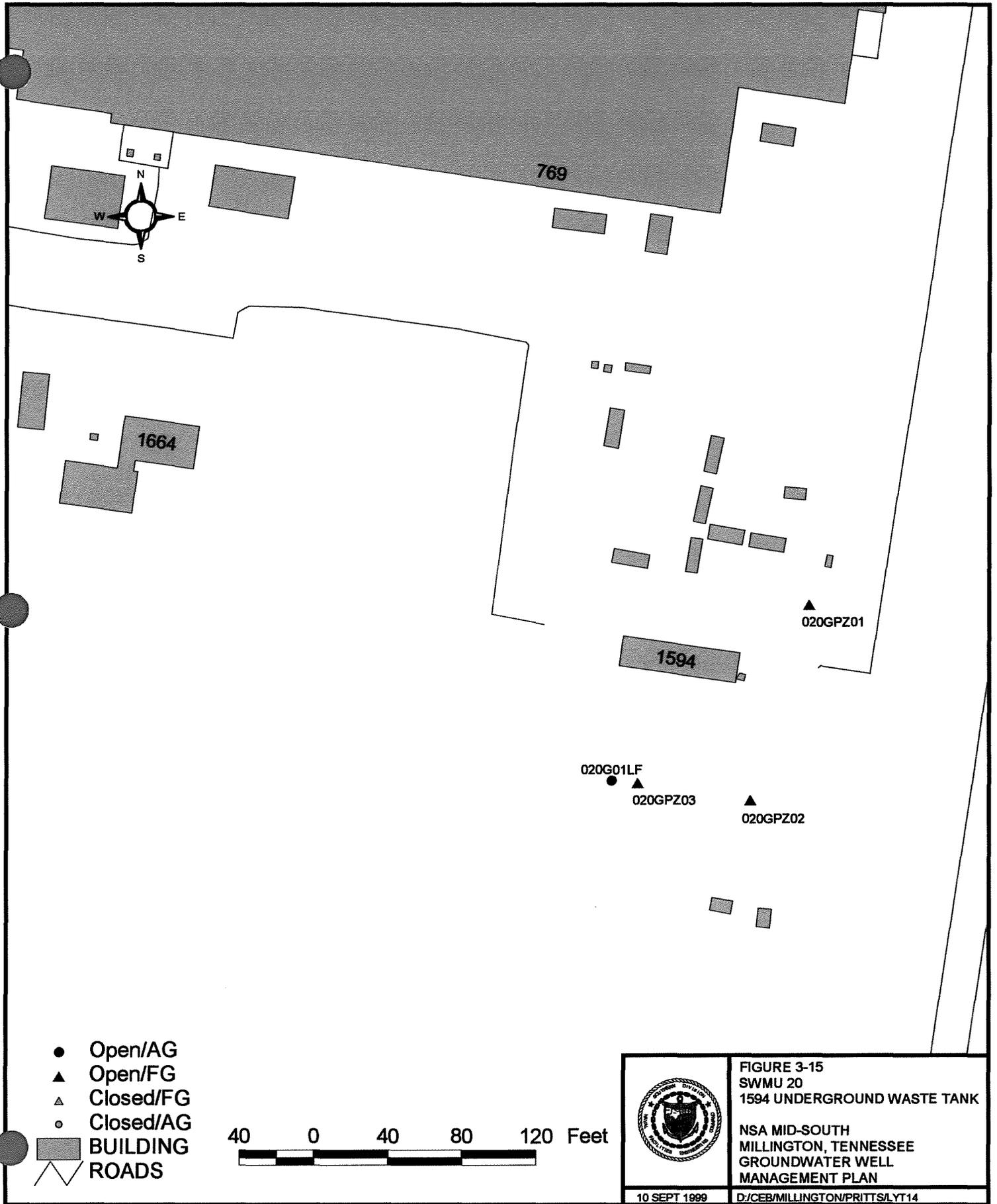
3.3.1.6 Assembly H

Assembly H includes SWMUs 23, 24, and 41. These SWMUs required Confirmatory Sampling Investigations (CSIs) to verify whether releases had occurred and, if so, whether RFI characterization was necessary. Monitoring wells at SWMU 41 are shown on the quadrant maps in Appendix D.

SWMU 41 (*Salvage Yard No. 2*) is an approximately 5,700-square-yard asphalt-covered storage yard used as a nonhazardous storage area. The salvage yard is reported to have been in operation since 1944. Although designated for nonhazardous storage, it may have received hazardous material. The yard was reported to have stored scrap metal, derelict equipment (planes, helicopters, etc.), tires, furniture, and batteries. Four monitoring wells screened in the alluvium were installed in April 1999 as part of the RFI. Figure 3-17 shows the location of the active monitoring wells for SWMU 41.

3.3.2 RFI Background Wells

Twenty-four background monitoring wells were installed at 14 locations around NSA Mid-South to establish ambient groundwater quality for the RFIs. The background wells were screened in either the loess, alluvium, upper fluvial deposits, lower fluvial deposits, or



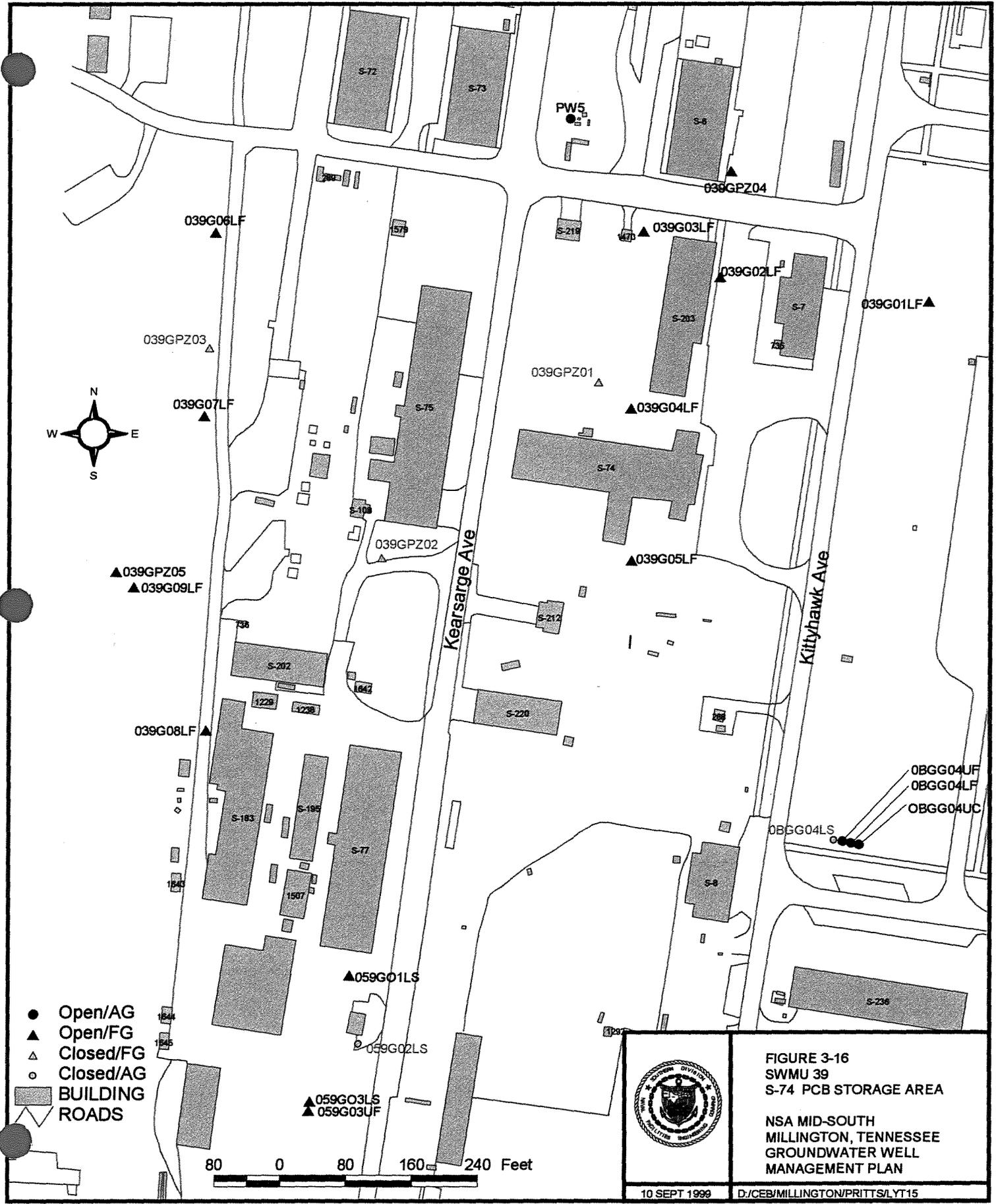
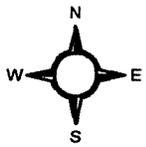
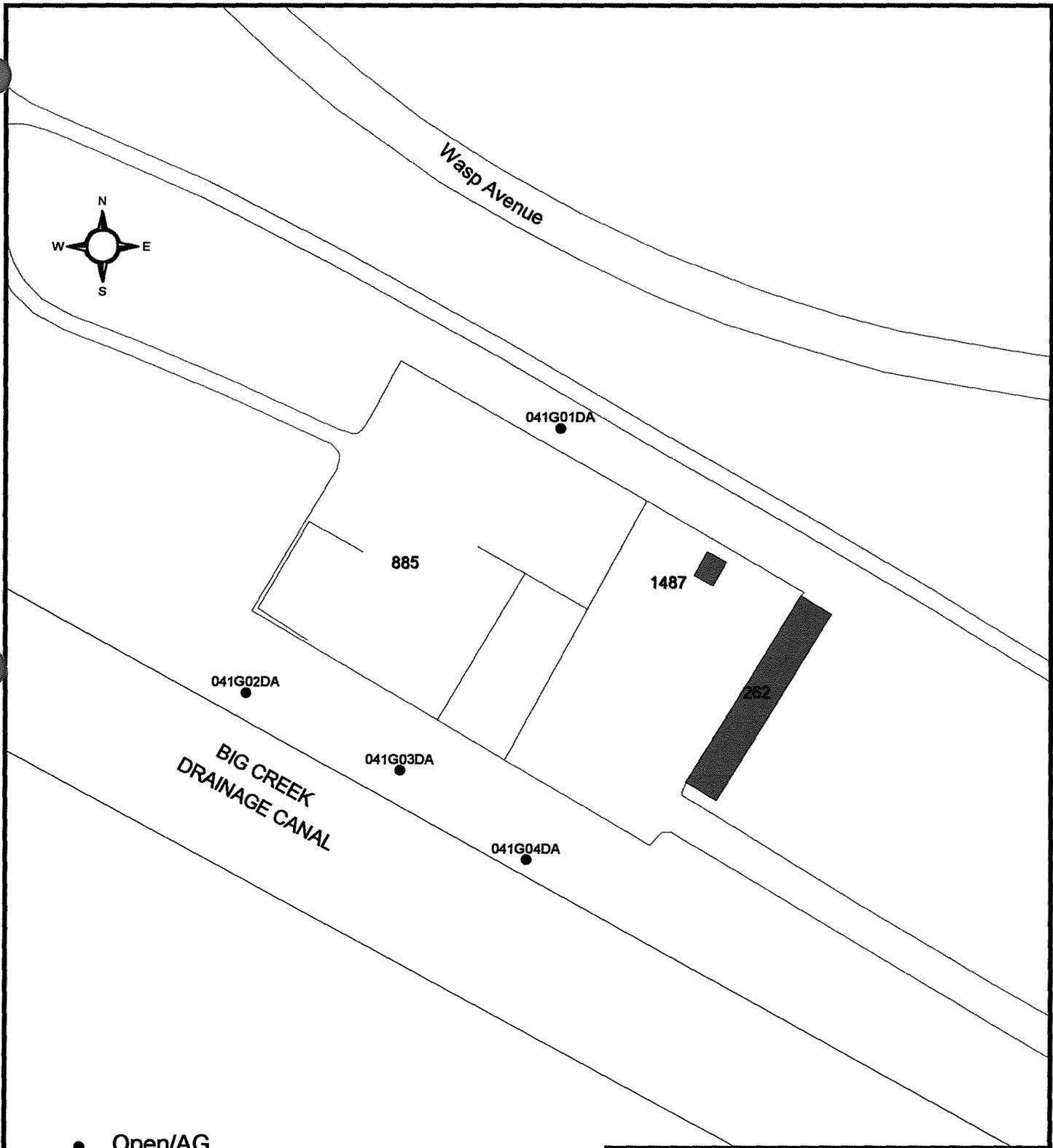


FIGURE 3-16
SWMU 39
S-74 PCB STORAGE AREA

NSA MID-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN



- Open/AG
- ▲ Open/FG
- Closed/AG
- △ Closed/FG
- Building
- ▭ Roads

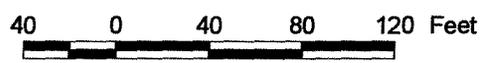


FIGURE 3-17
SWMU 41
SALVAGE YARD NO.2

NSA MID-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

15 Sept 1999

D/JCEB/MILLINGTON/PRITTS/PROJ2.APR/LYT1

**Table 3-2
Leak Detection Wells**

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

Notes:

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

3.3.4 UST and Miscellaneous Investigations

Monitoring wells have been installed during environmental assessments at 10 UST sites at NSA Mid-South under TDEC UST Division regulations. While completing UST-related investigations at these sites, EnSafe, E/A&H and other contractors have installed 73 monitoring wells screened in the loess. Table 3-3 summarizes the UST assessments. Figures 3-18 and 3-19 show well location at the North Fuel Farm and Site T163.

Table 3-3
UST Environmental Assessments

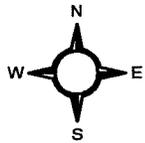
Site	Date mm/yr	Associated Tank(s)	Closed Monitoring Wells	Open Monitoring Wells	Related SWMUs
Navy Flying Club	05/93	T1205N, T1205S	6	0	None
N-126	05/93	T304, T1239	4	0	None
	07/94	T7, T303, T1241	7	0	
N-94	01/92	T301, T1242, T1243	0	3	7
AFFTA	07/92	T1489, T1508	10	1	5
	06/94				
Navy Hospital	05/92	T106, T107 (Not Regulated)	4	0	None
S-50	06/93	Not listed (Not Regulated)	5	0	None
S-376	07/92	T1249, T1482	0	4	None
Navy Exchange	02/86- 06/90	Unknown	1	18	None
S-237	09/92	T237	2	4	None
N-12	01/98	N-12	0	4	None

Navy Exchange (Building 757)

As a result of a large petroleum release at the Navy Exchange Service Station, Building 757, in 1986, many investigations have been completed. Since 1986, 19 monitoring wells have been installed by three different contractors: PSI, Harding-Lawson Associates, and EDGe. A search of the Activity files and MSCHD records produced well construction logs for 21 of the 23 wells. One monitoring well (75715LS) has been closed (date unknown). Figure 3-20 shows the locations of active and abandoned wells at the Navy Exchange.

Navy Flying Club

A UST EA was completed at the Navy Flying Club in May 1993 to investigate petroleum releases from two USTs (T1205N and T1205S). Six monitoring wells were installed by E/A&H and screened in the loess. The six EA monitoring wells were abandoned in March 1999 after TDEC approved closure of the site. Figure 3-21 shows abandoned well locations at the Navy Flying Club site.



▲ T33602 ▲ T33603
T33601
▲

T33703
▲
T33702
▲
T33701
▲

- Open/AG
- ▲ Open/FG
- Closed/AG
- △ Closed/FG
- Building
- ∩ Roads

90 0 90 180 270 Feet

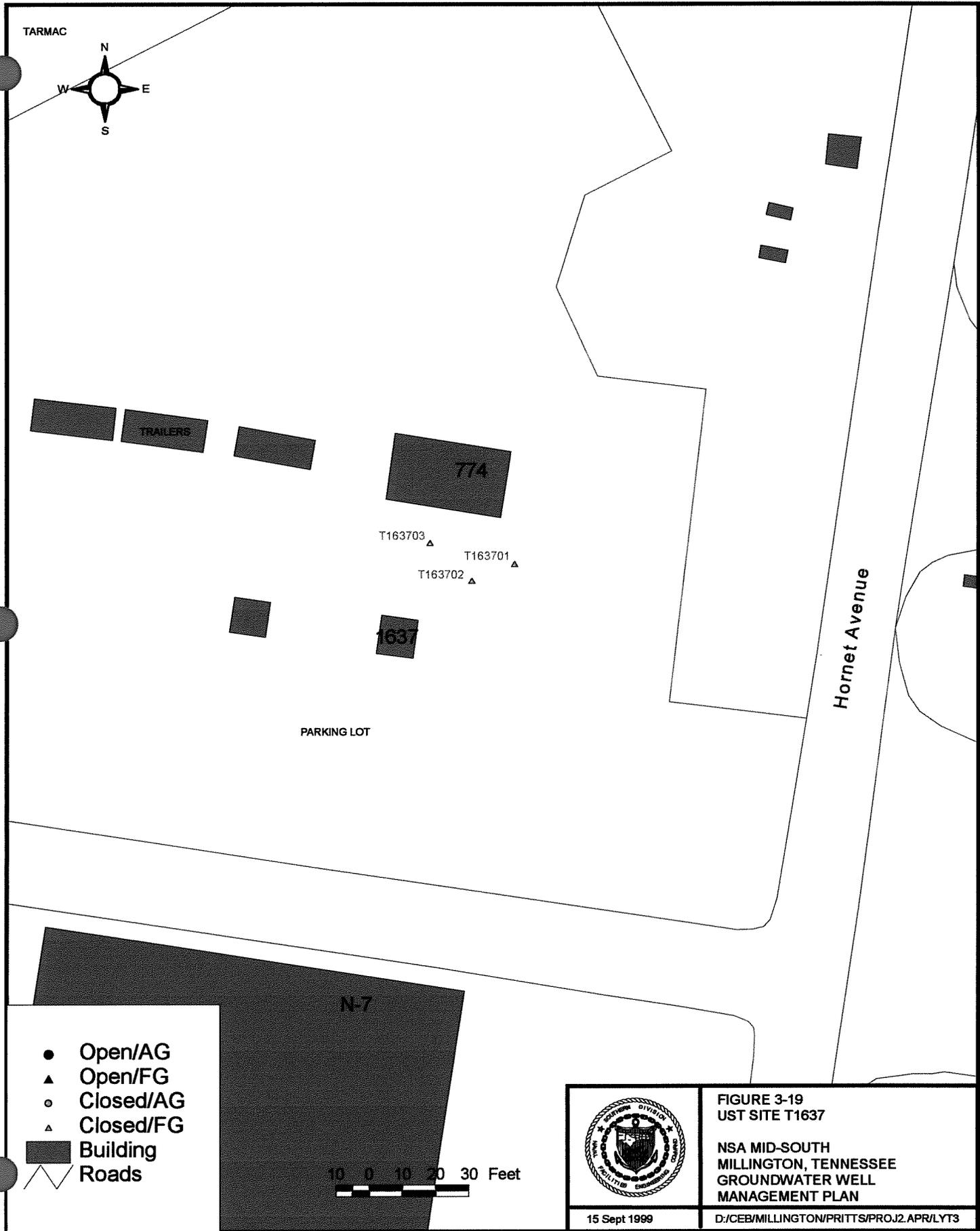


FIGURE 3-18
UST SITE JP5 - Fuel Farm
(NORTH FUEL FARM)

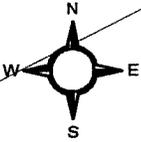
NSA MID-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

15 Sept 1999

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TARMAC



TRAILERS

774

T163703

T163701

T163702

1637

PARKING LOT

Hornet Avenue

N-7

- Open/AG
- ▲ Open/FG
- Closed/AG
- △ Closed/FG
- Building
- Roads

10 0 10 20 30 Feet



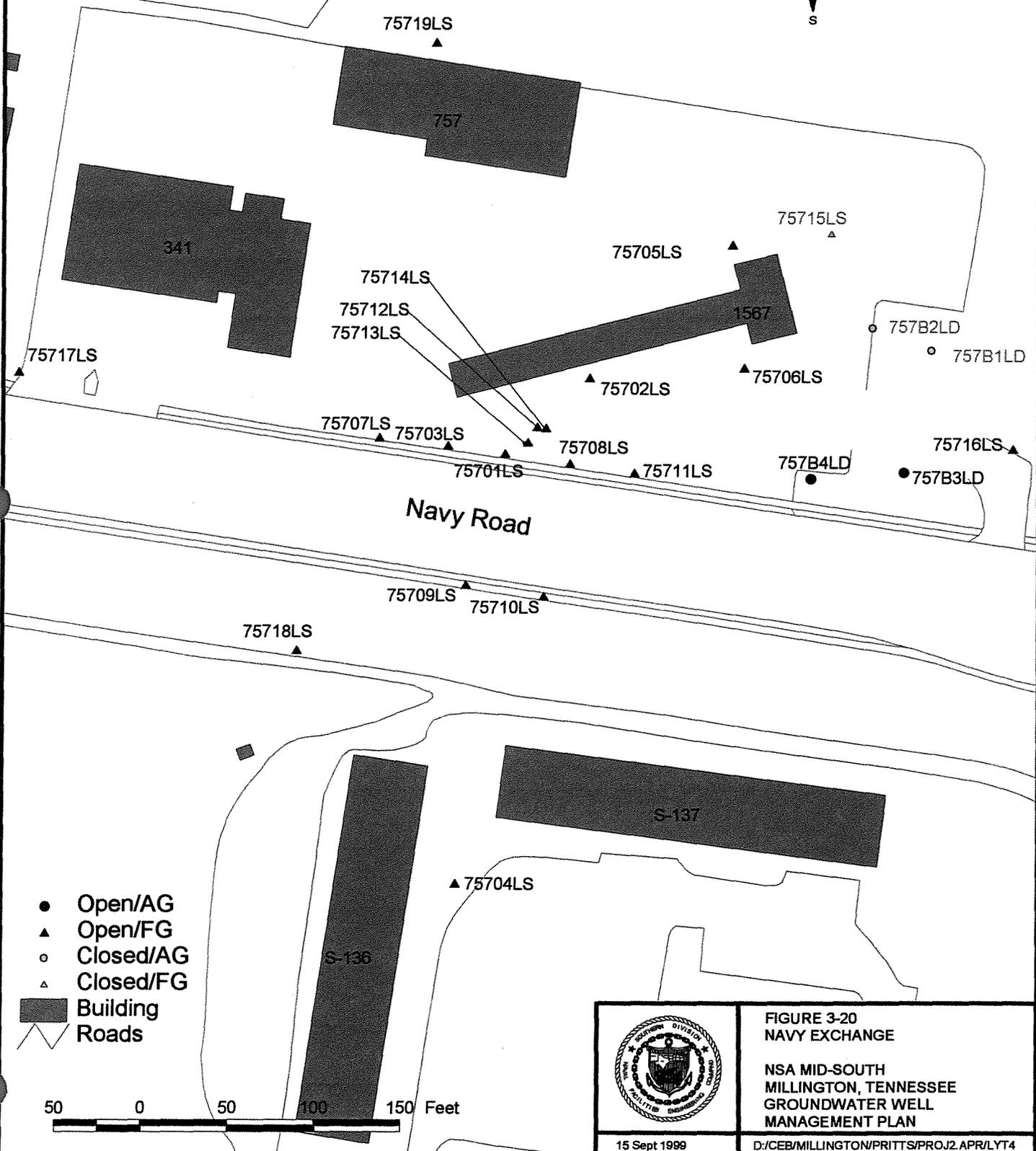
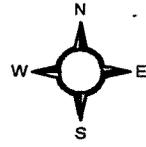
FIGURE 3-19
UST SITE T1637

NSA MID-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

15 Sept 1999

D:/CEB/MILLINGTON/PRITTS/PROJ2.APR/LYT3

○ 005G4BUF
 ○ 005G4AUF
 ● 005G04UF
 ● 005FF05LS
 ○ 005G05LS



- Open/AG
- ▲ Open/FG
- Closed/AG
- △ Closed/FG
- Building
- ▬ Roads

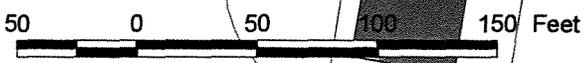
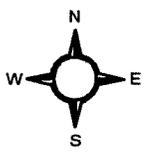
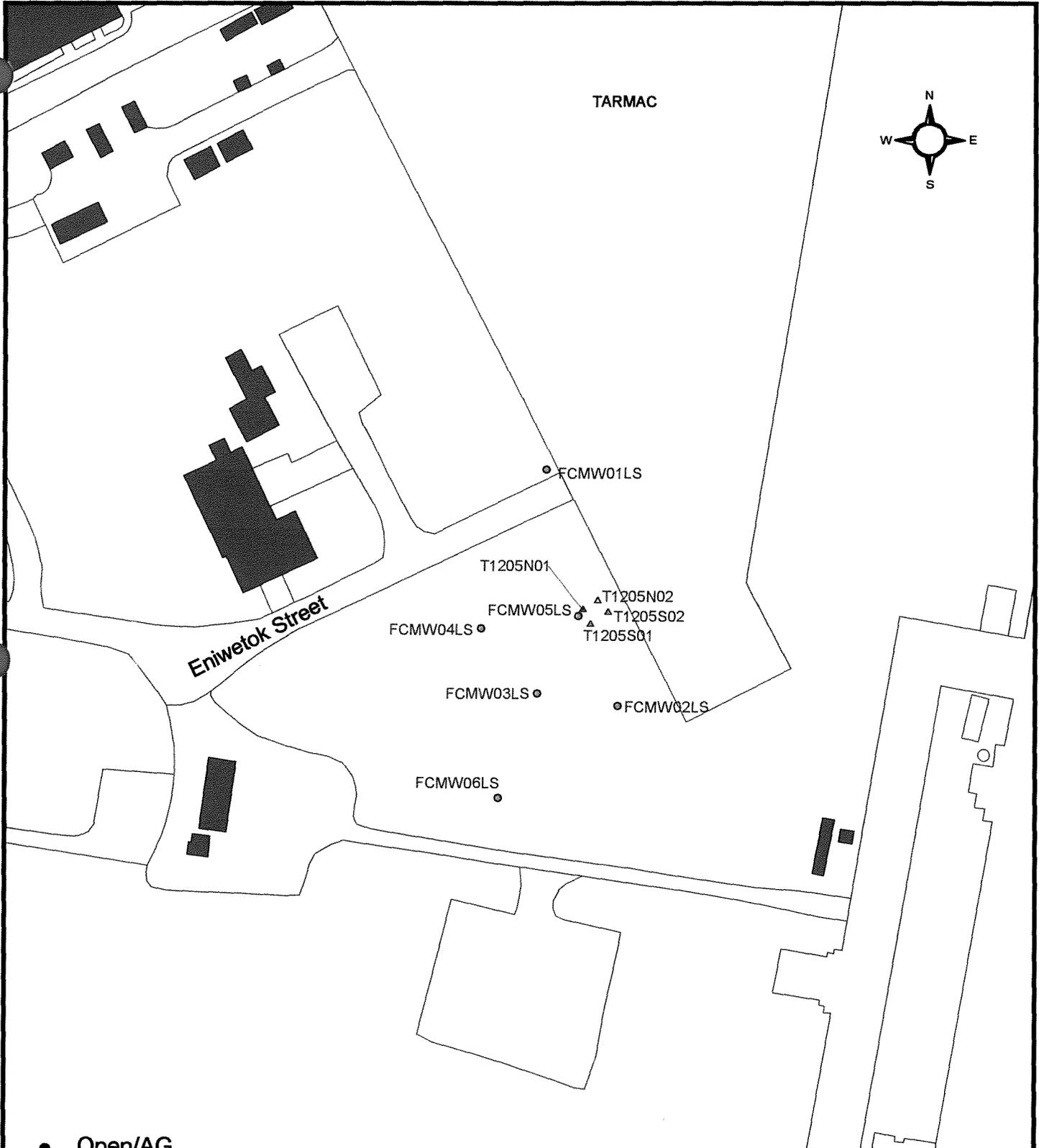


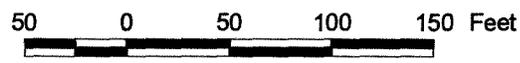
FIGURE 3-20
NAVY EXCHANGE
NSA MID-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

15 Sept 1999

D:/CEB/MILLINGTON/PRITTS/PROJ2.APR/LYT4



- Open/AG
- ▲ Open/FG
- Closed/AG
- △ Closed/FG
- Building
- Roads



	<p>FIGURE 3-21 FLYING CLUB</p> <p>NSA MID-SOUTH MILLINGTON, TENNESSEE GROUNDWATER WELL MANAGEMENT PLAN</p>
<p>15 Sept 1999</p>	<p>D:/CEB/MILLINGTON/PRITTS/PROJ2.APR/LYT8</p>

Southside Service Station (Building S-376)

In July 1992, four loess monitoring wells were installed at the Southside Service Station (Building S-376) to assess a petroleum release (Figure 3-22). All four are screened in the loess and are still open.

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

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

E/A&H completed a second UST EA around tanks T7, T303, and T1241 in May 1993, when six loess monitoring wells were installed. The 1993 wells are shown on Figure 3-3 as NFMW01LS through NFMW06LS. In July 1994, E/A&H installed three loess wells (N001LS, N002LS, N003LS) to assess the area around the third set of tanks (T304 and T1239). The 1993 and 1994 investigations were then combined. Tanks T304 and T1239 were removed by Morrison Knudsen Corp. in July 1997. Three monitoring wells (N001LS, N002LS, and N003LS) were abandoned and one recovery well (RW-1) was installed in the area during removal of the USTs. During September 1998, loess monitoring well NFMW05LS was closed to remove impacted soil from the area. In October 1998, a 4-inch-diameter recovery well (N-MW-05) was installed to replace the abandoned NFMW05LS well. Both recovery wells (RW-1 and N-MW-05) and the five other NFMW wells have since been abandoned.

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

Aircraft Fire Fighting Training Area (SWMU 5)

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

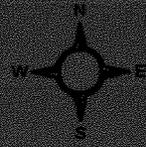
Building S-237

Memphis Environmental Center completed a UST investigation at Building S-237, where six monitoring wells were installed in September 1992. Two were closed by EnSafe in November 1998 due to the expansion of Building S-237. No report on the effort was located during assembly of the original well management plan; however, well permits and well logs were on file at the MSCHD. Figure 3-23 shows the locations of active and abandoned wells at Building S-237.

Navy Hospital

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

S-9



"D" STREET

T148201
▲

S37602LS
▲



S37603LS
▲

T124902
▲



S37601LS
▲

ELECTRICAL
SUBSTATION

T148203
▲

T124901
▲

S37604LS
▲

- Open/AG
- ▲ Open/FG
- Closed/AG
- △ Closed/FG
- Building
- ▭ Roads

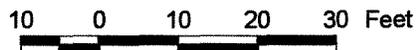
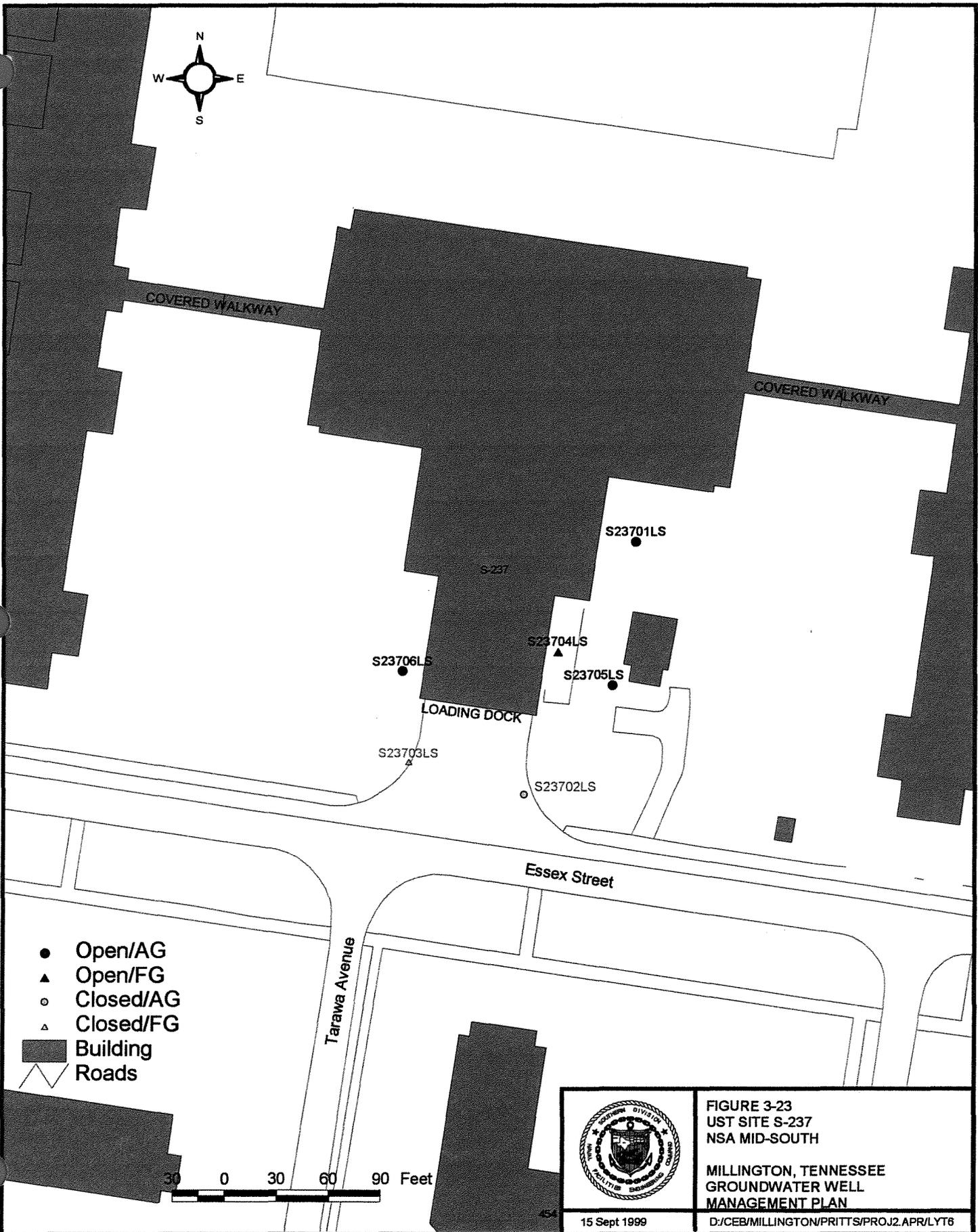
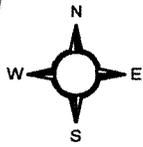


FIGURE 3-22
UST SITE S376

NSA MIS-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

15 Sept 1999

D:/CEB/MILLINGTON/PRITTS/PROJ2.APR/LYT5



- Open/AG
- ▲ Open/FG
- Closed/AG
- △ Closed/FG
- Building
- ▭ Roads

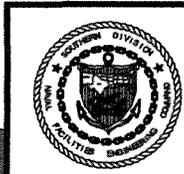


FIGURE 3-23
UST SITE S-237
NSA MID-SOUTH

MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

15 Sept 1999

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The Navy Hospital UST site was closed after approval of a report prepared in accordance with *Technical Guidance Document (TGD) – 015, Procedure to Obtain Closure for Sites in the Monitoring Only Program, State of Tennessee, Department of Underground Storage Tanks, August 1, 1996*. Figure 3-24 shows the abandoned monitoring well locations at the hospital.

Building S-50

During a UST EA completed in June 1993 by E/A&H to assess a fuel oil UST release at Building S-50, five loess monitoring wells were installed. TDEC granted site closure in early 1994 and E/A&H grouted all five monitoring wells in place in August 1994 as outlined in the MSCHD guidance. Quadrant maps in Appendix D show locations of Building S-50 abandoned wells.

3.3.5 Other Water Wells

3.3.5.1 Production (Potable Water Supply) Wells

Four production wells currently supply NSA Mid-South with potable water. Table 3-4 lists their production capacity and total depth. A fifth production well (PW-1), which is currently out of service, was active until November 30, 1994, when it was placed on emergency standby status as a precautionary measure because solvent contaminants were identified in the fluvial deposits nearby. Each production well is secured by a chain-link fence and locked gates. Appendix D quadrant maps show the production well locations.

**Table 3-4
 Production Wells**

Production Wells	Depth (Feet)	Formation	Capacity (gpm ^a)
PW-1	523	Memphis Sand	700-1,000
PW-2	466	Memphis Sand	700-1,000
PW-3	1,450	Fort Pillow	1,000-1,476
PW-4	1,450	Fort Pillow	900-1,404
PW-5	1,435	Fort Pillow	1,400-1,823

Note:

a — Gallons Per Minute

3.3.5.2 Non-Potable Water Supply Wells

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

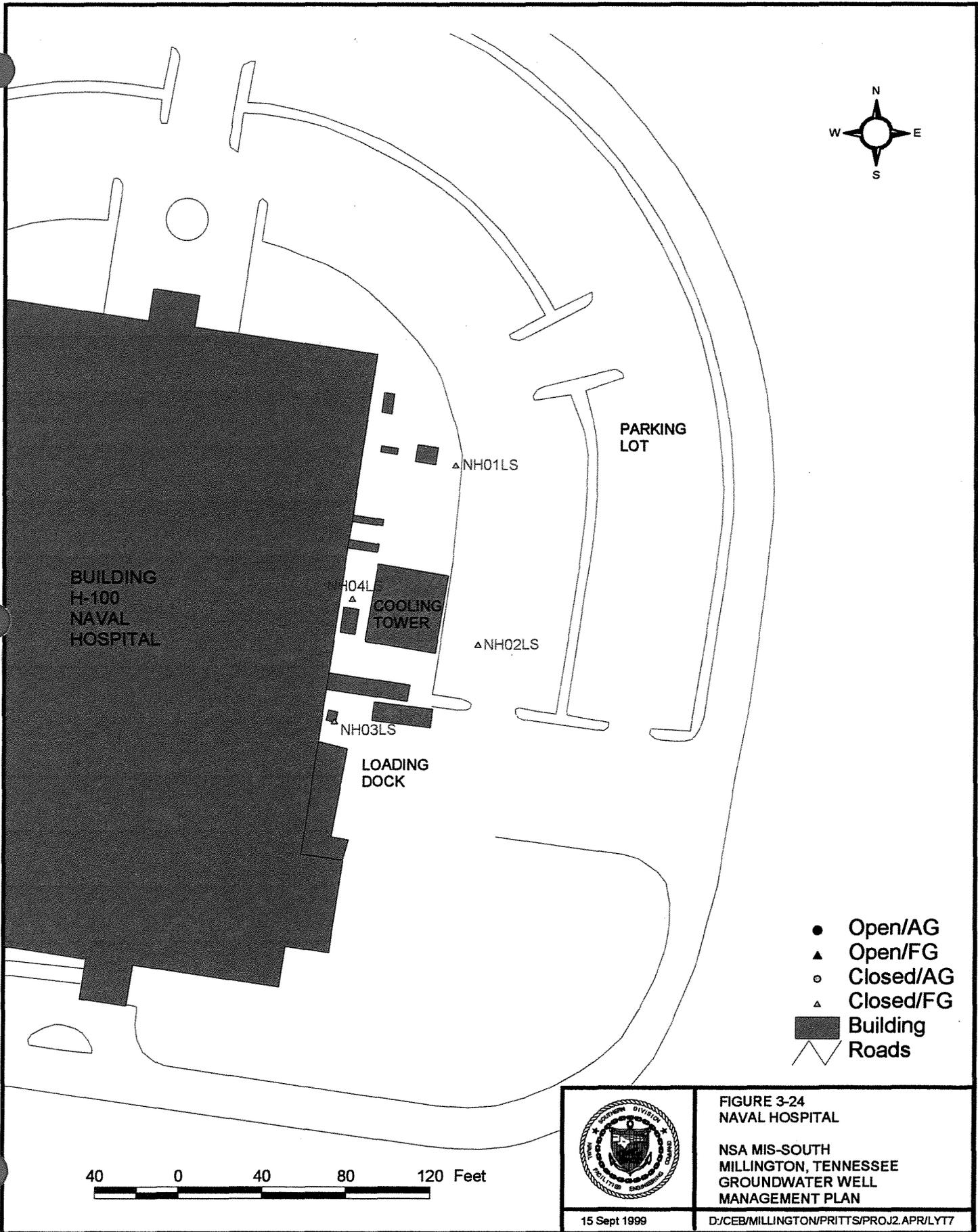
**Table 3-5
 Non-Potable Water Wells**

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

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

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

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



- Open/AG
- ▲ Open/FG
- Closed/AG
- △ Closed/FG
- Building
- ▬ Roads



FIGURE 3-24
NAVAL HOSPITAL

NSA MIS-SOUTH
MILLINGTON, TENNESSEE
GROUNDWATER WELL
MANAGEMENT PLAN

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

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

3.3.5.3 Abandoned Production and Test Wells

Six production wells supplied potable water to NSA Mid-South from 1942 until 1983. As part of the potable water system upgrade, four wells (N-2, S-1, S-2, and S-3) were closed due to poor water quality (i.e., high iron content and high dissolved solids). The wells are reported to be 340 to 510 feet deep and screened in the "500 Foot Sands" aquifer, also known as the Memphis Sand aquifer. These wells were closed by completely filling each well casing with concrete. The two remaining wells, No. 1 (PW-1) and No. 2 (PW-2), were upgraded and three new potable wells were installed (PW-3, PW-4, and PW-5). As part of the upgrade, a test well (TW-1) was installed to assess the use of the Fort Pillow Aquifer of the Wilcox group as a water supply at NSA Mid-South. TW-1 is near PW-4 in the northwest corner of the NSA Mid-South Southside. The wellhead is an 8-inch steel casing that has been welded shut and secured. Wells PW-3, PW-4, and PW-5 were screened in the Fort Pillow aquifer.

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APPENDIX A
WELL DATABASE

The following monitoring wells are located off base property:

002G15DA	002G16DA
002G17DA	002G17UC
002G18DA	002G19DA
002G20DA	002G22DA
002G23DA	007G50LF
007G51LF	007G52LF
007G53LF	007G55LF
007G56LF	

GROUNDWATER WELL MANAGEMENT PLAN

NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNNVL	SCRNL	SCRNS	GND	MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
1	002G01DA	817079.4	353123.1	269.54	ALLUVIUM	MW-RFIE	AG	021926	68	2.8	PVC	2	17'-27'	10	0.01	269.54	4	H	E/A&H	OPEN	BLA	
2	002G01UA	817072.7	353127.3	269.50	ALLUVIUM	MW-RFIE	AG	021936	27	2.5399	PVC	2	17'-27'	10	0.01	269.52	4	H	E/A&H	OPEN	BLA	
3	002G02DA	816815.1	382744.3	269.80	ALLUVIUM	MW-RFIE	AG	020736	51	2.47	PVC	2	11'-31'	10	0.01	267.05	4	H	E/A&H	OPEN	BLA	
4	002G02UA	816905.9	382747.2	269.57	ALLUVIUM	MW-RFIE	AG	021936	27	2.1399	PVC	2	17'-27'	10	0.01	267.43	4	H	E/A&H	OPEN	BLA	
5	002G03DA	816601.9	382433.5	269.52	ALLUVIUM	MW-RFIE	AG	020696	46	2.4099	PVC	2	35'-45'	10	0.01	267.16	4	H	E/A&H	OPEN	BLA	
6	002G03UA	816811.5	382429.8	269.73	ALLUVIUM	MW-RFIE	AG	020696	27	2.45	PVC	2	17'-27'	10	0.01	267.28	4	H	E/A&H	OPEN	BLA	
7	002G04UA	816456.9	382542.8	268.76	ALLUVIUM	MW-RFIE	AG	020596	27	2.23	PVC	2	17'-27'	10	0.01	266.53	4	H	E/A&H	OPEN	BLA	
8	002G05DA	816154.1	382650.0	269.33	ALLUVIUM	MW-RFIE	AG	020596	50.5	2.1699	PVC	2	40.5'-50.5'	10	0.01	267.16	4	H	E/A&H	OPEN	BLA	
9	002G05UA	816158.7	382653.8	269.39	ALLUVIUM	MW-RFIE	AG	020596	27	2.25	PVC	2	17'-27'	10	0.01	267.14	4	H	E/A&H	OPEN	BLA	
10	002G06DA	815254.4	382763.8	268.69	ALLUVIUM	MW-RFIE	AG	020296	54.5	1.8299	PVC	2	44.5'-54.5'	10	0.01	267.86	4	H	E/A&H	OPEN	BLA	
11	002G06UA	815284.6	382769.2	269.61	ALLUVIUM	MW-RFIE	AG	020296	27	1.79	PVC	2	17'-27'	10	0.01	267.62	4	H	E/A&H	OPEN	BLA	
12	002G07DA	814785.1	383041.9	268.21	ALLUVIUM	MW-RFIE	AG	020196	27	2.1099	PVC	2	17'-27'	10	0.01	266.1	4	H	E/A&H	OPEN	BLA	
13	002G08DA	814597.7	383140.3	268.33	ALLUVIUM	MW-RFIE	AG	013196	55	2.2299	PVC	2	45'-55'	10	0.01	267.1	4	H	E/A&H	OPEN	BLA	
14	002G08UA	814597.8	383141.3	268.37	ALLUVIUM	MW-RFIE	AG	020196	27	2.32	PVC	2	17'-27'	10	0.01	267.05	4	H	E/A&H	OPEN	BLA	
15	002G09DA	814443.9	383225.4	267.86	ALLUVIUM	MW-RFIE	AG	013096	46	2.4099	PVC	2	35'-46'	10	0.01	265.53	4	H	E/A&H	OPEN	BLA	
16	002G09UA	814452.3	383220.3	268.09	ALLUVIUM	MW-RFIE	AG	013096	27	2.4099	PVC	2	17'-27'	10	0.01	265.68	4	H	E/A&H	OPEN	BLA	
17	002G10DA	814662.2	383567.2	270.17	ALLUVIUM	MW-RFIE	FG	021396	50	-0.25	PVC	2	40'-50'	10	0.01	270.36	0	H	E/A&H	OPEN	BLA	
18	002G10UA	814663.9	383575.9	270.19	ALLUVIUM	MW-RFIE	FG	021396	32	-0.32	PVC	2	22'-32'	10	0.01	270.36	0	H	E/A&H	OPEN	BLA	
19	002G11DA	814966.6	383752.9	266.77	ALLUVIUM	MW-RFIE	AG	011796	42.2	1.5099	PVC	2	32.2'-42.2'	10	0.01	265.17	4	H	E/A&H	OPEN	BLA	
20	002G11UA	814974.9	383747.3	266.91	ALLUVIUM	MW-RFIE	AG	011896	26.75	1.79	PVC	2	16.75'-26.75'	10	0.01	265.12	4	H	E/A&H	OPEN	BLA	
21	002G12DA	815657.4	383511.1	268.33	ALLUVIUM	MW-RFIE	AG	012996	47.5	2.0699	PVC	2	31.5'-47.5'	10	0.01	266.52	4	H	E/A&H	OPEN	BLA	
22	002G12UA	815657.6	383511.3	268.33	ALLUVIUM	MW-RFIE	AG	012996	27	1.97	PVC	2	17'-27'	10	0.01	266.54	4	H	E/A&H	OPEN	BLA	
23	002G13DA	817177.2	383177.1	269.12	ALLUVIUM	MW-RFIE	AG	012096	65	2.07	PVC	2	35'-65'	10	0.01	267.05	4	H	E/A&H	OPEN	BLA	
24	002G13UA	817153.9	383181.5	269.20	ALLUVIUM	MW-RFIE	AG	012296	46	1.9899	PVC	2	35'-46'	10	0.01	267.23	4	H	E/A&H	OPEN	BLA	
25	002G13DA	817156.0	383282.5	269.36	ALLUVIUM	MW-RFIE	AG	012396	27	1.9299	PVC	2	17'-27'	10	0.01	267.13	4	H	E/A&H	OPEN	BLA	
26	002G14DA	817444.9	384419.9	271.00	ALLUVIUM	MW-RFIE	AG	021496	50	2	PVC	2	40'-50'	10	0.01	269	4	H	E/A&H	OPEN	BLA	
27	002G14UA	817436.7	384419.8	271.23	ALLUVIUM	MW-RFIE	AG	021496	27	2.06	PVC	2	17'-27'	10	0.01	269.17	4	H	E/A&H	OPEN	BLA	
28	002G15DA	814302.4	383055.5	269.20	ALLUVIUM	MW-RFIE	AG	06_98	57.30	2.9	PVC	2	47'-57'	10	0.01	266.30	4	H	ENSAFE	OPEN	BLA	
29	002G16DA	815425.7	382440.0	270.52	ALLUVIUM	MW-RFIE	AG	06_98	76.50	3	PVC	2	46'-56'	10	0.01	267.52	4	H	ENSAFE	OPEN	BLA	
30	002G17UA	814302.4	383070.5	NA	ALLUVIUM	MW-RFIE	AG	81899	30	NA	PVC	2	20'-30'	10	0.01	NA	4	H	USGS	OPEN	BLA	
31	002G17DA	816037.3	382110.4	270.77	ALLUVIUM	MW-RFIE	AG	06_98	77.50	3.1	PVC	2	47'-57'	10	0.01	268.27	4	H	ENSAFE	OPEN	BLA	
32	002G17UC	816031.9	382284.7	271.0	ALLUVIUM	MW-RFIE	AG	06_98	77.50	2.9	PVC	2	47'-57'	10	0.01	268.27	4	H	ENSAFE	OPEN	BLA	
33	002G18DA	816453.3	383194.2	270.20	ALLUVIUM	MW-RFIE	AG	06_98	57.40	2.9	PVC	2	37'-47'	10	0.01	268.40	4	H	ENSAFE	OPEN	BLA	
34	002G18DA	817457.1	382234.0	271.21	ALLUVIUM	MW-RFIE	AG	06_98	57.10	3.1	PVC	2	47'-57'	10	0.01	268.11	4	H	ENSAFE	OPEN	BLA	
35	002G20DA	814913.2	380712.2	270.16	ALLUVIUM	MW-RFIE	AG	06_98	97.00	3	PVC	2	43'-63'	10	0.01	267.06	4	H	ENSAFE	OPEN	BLA	
36	002G22DA	813672.1	381757.1	269.85	ALLUVIUM	MW-RFIE	AG	06_98	56.60	3.2	PVC	2	37'-47'	10	0.01	266.65	4	H	ENSAFE	OPEN	BLA; 002G21 was a boring	
37	002G23DA	816315.3	379536.3	273.38	ALLUVIUM	MW-RFIE	AG	06_98	56.50	2.81	PVC	2	46'-56'	10	0.01	270.57	4	H	ENSAFE	OPEN	BLA	
38	002G24DA	816895.7	382368.9	271.59	ALLUVIUM	MW-RFI-CMS-E	AG	61201	58	1.89	PVC	2	41.4'-51.4'	10	0.01	269.7	4	H	ENSAFE	OPEN	BLA	
39	002G25DA	816790.4	382371.5	272.08	ALLUVIUM	MW-RFI-CMS-E	AG	61301	53	2.43	PVC	2	43'-53'	10	0.01	270.37	4	H	ENSAFE	OPEN	BLA	
40	002G26DA	816733.3	382351.4	266.62	ALLUVIUM	MW-RFI-CMS-E	AG	61401	48	1.74	PVC	2	38'-48'	10	0.01	264.78	4	H	ENSAFE	OPEN	BLA	
41	002G27DA	816842.5	382301.7	269.2	ALLUVIUM	MW-RFI-CMS-E	AG	61501	22.5	1.71	PVC	2	25'-32.5'	10	0.01	262.11	4	H	ENSAFE	OPEN	BLA	
42	002G28DA	816826.7	382302.4	269.69	ALLUVIUM	MW-RFI-CMS-E	AG	61601	20	1.69	PVC	2	46'-50'	10	0.01	269.3	4	H	ENSAFE	OPEN	BLA	
43	002GGM2DA	816422.0	382317.7	269.15	ALLUVIUM	MW-RFIE	AG	061745	44	1.8	PVC	2	37'-47'	5	0.01	267.7	4	H	G&M	OPEN	BLA	
44	002GGM3DA	815822.4	382367.4	270.24	ALLUVIUM	MW-RFIE	AG	021396	45	1.7	PVC	2	46'-45'	5	0.01	268.34	4	H	G&M	OPEN	BLA	
45	002GGM4UA	815813.4	382373.3	270.26	ALLUVIUM	MW-RFIE	AG	021396	22	1.72	PVC	2	47'-22'	5	0.01	268.55	4	H	G&M	OPEN	BLA	
46	002GGM05DA	814768.9	383070.5	269.29	ALLUVIUM	MW-RFIE	AG	121584	57	1.8	PVC	2	52'-57'	5	0.01	266.49	4	H	G&M	OPEN	BLA	
47	002GGM01DA	817381.8	383631.8	269.73	ALLUVIUM	MW-RFIE	AG	120784	50.00	1.83	PVC	2	44'-49'	5	0.01	267.9	4	H	G&M	CLOSED	BLA	
48	003G01LS	814885.0	390696.4	286.41	LOESS	MW-RFIA	AG	012595	22.55	1.42	PVC	2	12'-22'	10	0.01	284.83	4	H	E/A&H	CLOSED	BLA	
49	003G02LF	814864.5	390841.1	289.63	FLUVIAL	MW-RFIA	AG	012695	20.00	3.63	PVC	2	10'-20'	10	0.01	286	4	H	E/A&H	OPEN	BLA	
50	003G02LS	814867.4	390842.1	289.23	LOESS	MW-RFIA	AG	012595	22.61	3.17	PVC	2	12.3'-22.3'	10	0.01	286.13	4	H	E/A&H	CLOSED	BLA	
51	003G03LS	814815.9	390900.1	285.10	LOESS	MW-RFIE	FG	012595	19.75	0.19	PVC	2	6.5'-19.5'	10	0.01	283.65	0	H	E/A&H	CLOSED	BLA	
52	003G03MF	814814.0	390733.7	284.00	FLUVIAL	MW-RFIA	AG	012595	10.50	2.1	PVC	2	6.5'-10.5'	10	0.01	282.83	0	H	E/A&H	CLOSED	BLA	
53	003G04LF	814837.7	390732.4	284.22	FLUVIAL	MW-RFIA	AG	012795	15.95	0.53	PVC	2	7.5'-15.95'	10	0.01	284.33	0	H	E/A&H	OPEN	BLA	
54	003G04LS	814872.9	390740.1	284.51	LOESS	MW-RFIA	FG	012595	11.99	0.19	PVC	2	13'-11.99'	10	0.01	284.20	0	H	E/A&H	CLOSED	BLA	
55	003G05MF	814531.0	390740.9	285.20	FLUVIAL	MW-RFIA	AG	013095	16.72	2.13	PVC	2	6.25'-16.72'	10	0.01	283.69	0	H	E/A&H	OPEN	BLA	
56	003GGM06UF	814867.9	390847.4	286.25	FLUVIAL	MW-RFIA	FG	120784	50	2.19	PVC	2	45'-50'	5	0.01	286.47	4	H	G&M	OPEN	BLA	
57	003GGM07UF	814876.4	390704.0	285.97	FLUVIAL	MW-RFIA	AG	121184	60	2.48	PVC	2	55'-60'	5	0.01	283.94	4	H	G&M	CLOSED	BLA	
58	003GGM08LS	814841.7	390709.6	286.64	LOESS	MW-RFIA	AG	121384	20	1.87	PVC	2	15'-20'	5	0.01	285.13	4	H	G&M	CLOSED	BLA	
59	005FF01LS	810977.8	390093.1	268.67	LOESS	MW-UST	AG	062292	20.3	1.58	PVC	2	15'-20'	5	0.01	267.465	4	H	E/A&H	CLOSED	BLA	
60	005FF02LS	810969.3	390137.6	267.77	LOESS	MW-UST	AG	062292	20.26	1.35	PVC	2	15'-20'	5	0.01	266.804	4	H	E/A&H	CLOSED	BLA	

GROUNDWATER WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNLV	SCRNL	SCRNS	GND	MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
61	005FF03LS	811592.0	390177.0	268.04	LOESS	MW-UST	AG	062392	21.29	1.31	PVC	2	10' 21"	10	0.01	267.94	4	H	E/A&H	CLOSED	BLA	
62	005FF04LS	811592.0	390177.0	267.44	LOESS	MW-UST	AG	062392	18.14	1.54	PVC	2	7' 18"	10	0.01	268.215	4	H	E/A&H	CLOSED	BLA	
63	005FF05LS	811592.0	390177.0	268.73	LOESS	MW-UST	AG	062392	18.33	1.63	PVC	2	7' 18"	10	0.01	267.515	4	H	E/A&H	OPEN	BLA	
64	005FF06LS	811592.0	390177.0	270.05	LOESS	MW-UST	AG	062392	22.85	1.52	PVC	2	12' 22"	10	0.01	269.140	4	H	E/A&H	CLOSED	BLA	
65	005FF07LS	811538.6	390214.4	268.29	LOESS	MW-UST	AG	062392	17.92	1.44	PVC	2	7' 17"	10	0.01	268.92	4	H	E/A&H	CLOSED	BLA	
66	005FF08LS	811444.8	390244.5	268.04	LOESS	MW-UST	AG	062392	17.92	1.44	PVC	2	7' 17"	10	0.01	268.817	4	H	E/A&H	CLOSED	BLA	
67	005FF09LS	811575.1	390255.6	267.73	LOESS	MW-UST	AG	062392	18.14	1.65	PVC	2	8' - 18"	10	0.01	266.424	4	H	E/A&H	CLOSED	BLA	
68	005FF10LS	811571.4	390195.2	268.16	LOESS	MW-UST	AG	062392	19.33	1.63	PVC	2	9' - 19"	10	0.01	266.890	4	H	E/A&H	CLOSED	BLA	
69	005FF11LS	811542.7	390126.2	270.05	LOESS	MW-UST	AG	062392	18.23	1.57	PVC	2	8' - 18"	10	0.01	268.582	4	H	E/A&H	CLOSED	BLA	
70	005G01UF	811337.6	389889.3	271.09	FLUVIAL	MW-RFI-A	AG	012995	54.5	2.39	PVC	2	44' - 54'	10	0.01	268.64	4	H	E/A&H	OPEN	BLA	
71	005G02UF	810966.4	390015.0	270.38	FLUVIAL	MW-RFI-A	AG	021195	52.33	2.32	PVC	2	42' - 52'	10	0.01	267.74	4	H	E/A&H	OPEN	BLA	
72	005G03UF	811337.6	390225.0	267.47	LOESS	MW-RFI-A	AG	021295	11.33	2.63	PVC	2	10.7' - 20.7'	10	0.01	265.43	4	H	E/A&H	CLOSED	BLA	
73	005G04UF	811337.6	390331.0	267.52	FLUVIAL	MW-RFI-A	AG	021295	52.31	2.01	PVC	2	11.3' - 19.3'	10	0.01	265.45	4	H	E/A&H	OPEN	BLA	
74	005G04LS	810966.4	390274.0	268.33	LOESS	MW-RFI-A	AG	021195	20	2.63	PVC	2	ND	ND	0.01	264.2	4	H	E/A&H	CLOSED	BLA	
75	005G04UF	811337.6	390374.0	268.33	FLUVIAL	MW-RFI-A	AG	021195	52.34	2.51	PVC	2	11.3' - 19.3'	10	0.01	265.72	4	H	E/A&H	OPEN	BLA	
76	005G05LF	811314.0	389882.8	271.22	FLUVIAL	MW-RFI-A	AG	012995	68.1	2.52	PVC	2	57.6' - 67.6'	10	0.01	268.69	4	H	E/A&H	OPEN	BLA	
77	005G05LS	811585.2	389970.6	268.73	LOESS	MW-RFI-A	AG	012995	16	1.97	PVC	2	ND	ND	0.01	266.76	4	H	E/A&H	OPEN	BLA	
78	005G06LS	811078.6	390274.3	268.83	LOESS	MW-RFI-A	AG	012995	20.78	2.22	PVC	2	10.3' - 20.3'	10	0.01	264.53	4	H	E/A&H	CLOSED	BLA	
79	005G07LS	810925.6	390241.2	268.95	LOESS	MW-RFI-A	AG	012995	21.22	2.39	PVC	2	10.7' - 20.7'	10	0.01	264.48	4	H	E/A&H	CLOSED	BLA	
80	005G08LF	811521.8	390003.8	270.38	FLUVIAL	MW-RFI-A	AG	080598	74.9	2.49	PVC	2	55' - 65'	10	0.01	267.89	4	H	ENSAFE	OPEN	BLA	
81	005G08LS	811453.9	390242.0	265.60	LOESS	MW-RFI-A	AG	013095	18.1	1.96	PVC	2	10' - 18"	10	0.01	268.98	4	H	ISGS	OPEN	005FF08LS	
82	005G09LS	811575.1	390244.5	267.73	LOESS	MW-RFI-A	AG	013095	16.7	1.91	PVC	2	ND	ND	0.01	265.82	4	H	E/A&H	OPEN	BLA	
83	005G04UF	811521.8	390463.0	269.19	FLUVIAL	MW-RFI-A	AG	022295	53.1	2.17	PVC	2	13.1' - 23.1'	10	0.01	266.53	4	H	E/A&H	CLOSED	BLA	
84	005G04UF	811521.8	390463.0	269.19	FLUVIAL	MW-RFI-A	AG	022295	53.2	2.02	PVC	2	13.1' - 23.1'	10	0.01	266.74	4	H	E/A&H	CLOSED	BLA	
85	007G01LF	813457.3	391813.7	284.31	FLUVIAL	MW-RFI-A	AG	022395	76.77	1.92	PVC	2	11.3' - 21.3'	10	0.01	282.98	4	H	E/A&H	OPEN	BLA	
86	007G01LS	813846.8	391818.3	284.74	LOESS	MW-RFI-A	AG	021195	22.52	2.29	PVC	2	12' - 22'	10	0.01	282.45	4	H	E/A&H	CLOSED	BLA	
87	007G01UC	813849.8	391809.5	284.84	COCKFIELD	MW-RFI-A	AG	022495	109.8	2.17	PVC	2	99.3' - 109.3'	10	0.01	282.34	4	H	E/A&H	OPEN	BLA	
88	007G01UF	813654.8	391820.4	285.00	FLUVIAL	MW-RFI-A	AG	022595	42.14	2.04	PVC	2	31.6' - 41.6'	10	0.01	282.95	4	H	E/A&H	OPEN	BLA	
89	007G02LS	813743.2	391997.9	283.00	LOESS	MW-RFI-A	FG	020795	15	0	PVC	2	10' - 20'	10	0.01	283	0	H	E/A&H	CLOSED	BLA; no UFLF at this cluster	
90	007G02UC	813749.8	391986.1	283.18	COCKFIELD	MW-RFI-A	FG	022495	116.87	ND	PVC	2	106.4' - 116.4'	10	0.01	283.22	0	H	E/A&H	OPEN	BLA	
91	007G03LF	813697.3	391985.0	283.00	FLUVIAL	MW-RFI-A	FG	021595	50.39	0.52	PVC	2	70.2' - 80.2'	10	0.01	283.84	0	H	E/A&H	OPEN	BLA	
92	007G03LS	813903.9	391942.0	283.17	LOESS	MW-RFI-A	FG	021195	21.1	0.40	PVC	2	10.3' - 20.3'	10	0.01	283.93	0	H	E/A&H	CLOSED	BLA	
93	007G03UC	813904.0	391942.0	283.17	COCKFIELD	MW-RFI-A	FG	021495	102.41	0.4	PVC	2	100.2' - 100.2'	10	0.01	283.85	0	H	E/A&H	OPEN	BLA	
94	007G03UF	813903.9	391942.0	283.25	FLUVIAL	MW-RFI-A	FG	021595	49.3	0.3	PVC	2	13.3' - 23.3'	10	0.01	283.78	0	H	E/A&H	OPEN	BLA	
95	007G04LF	813743.2	392143.0	283.12	FLUVIAL	MW-RFI-A	FG	022395	76.65	0.97	PVC	2	11.3' - 21.3'	10	0.01	283.77	0	H	E/A&H	OPEN	BLA	
96	007G04LS	813770.0	392172.0	283.87	LOESS	MW-RFI-A	FG	021795	20	0	PVC	2	10' - 20'	10	0.01	283.87	0	H	E/A&H	CLOSED	BLA	
97	007G04UC	813766.1	392179.6	283.39	COCKFIELD	MW-RFI-A	FG	021895	135.43	-0.34	PVC	2	124.9' - 134.9'	10	0.01	283.76	0	H	E/A&H	CLOSED	BLA	
98	007G04UF	813776.9	392175.8	283.21	FLUVIAL	MW-RFI-A	FG	022195	48.16	-0.5	PVC	2	37.7' - 47.7'	10	0.01	283.88	0	H	E/A&H	OPEN	BLA	
99	007G05LF	813333.2	392052.0	282.28	FLUVIAL	MW-RFI-A	FG	022295	79.24	-0.41	PVC	2	68.7' - 78.7'	10	0.01	282.81	0	H	E/A&H	OPEN	BLA	
100	007G05LS	813345.1	392043.9	282.37	LOESS	MW-RFI-A	FG	020995	20.4	-0.41	PVC	2	9.9' - 19.9'	10	0.01	282.78	0	H	E/A&H	CLOSED	BLA	
101	007G05UC	813358.0	392040.9	282.30	COCKFIELD	MW-RFI-A	FG	022195	135	-0.34	PVC	2	124.5' - 134.5'	10	0.01	282.47	0	H	E/A&H	OPEN	BLA	
102	007G05UF	813339.2	392034.3	282.43	FLUVIAL	MW-RFI-A	FG	022295	48.44	-0.41	PVC	2	17.9' - 27.9'	10	0.01	282.76	0	H	E/A&H	OPEN	BLA	
103	007G06LF	813821.0	391422.4	286.32	FLUVIAL	MW-RFI-A	AG	021595	50.67	0.7	PVC	2	10.2' - 20.2'	10	0.01	284.47	4	H	E/A&H	OPEN	BLA	
104	007G06LS	813812.0	391415.0	286.37	LOESS	MW-RFI-A	AG	021095	22.77	2.13	PVC	2	12.2' - 22.2'	10	0.01	284.21	4	H	E/A&H	CLOSED	BLA	
105	007G06UC	813813.3	391422.4	286.49	COCKFIELD	MW-RFI-A	AG	021495	96.5	2.17	PVC	2	120.2' - 130.2'	10	0.01	284.29	4	H	E/A&H	CLOSED	BLA	
106	007G06UF	813819.5	391473.9	286.48	FLUVIAL	MW-RFI-A	AG	022295	52.88	2.08	PVC	2	42.4' - 52.4'	10	0.01	284.37	4	H	E/A&H	OPEN	BLA	
107	007G07LF	813544.9	391521.8	283.68	FLUVIAL	MW-RFI-A	AG	022395	80.94	1.67	PVC	2	70.4' - 80.4'	10	0.01	282.01	4	H	E/A&H	OPEN	BLA	
108	007G07LS	813553.8	391528.0	284.44	LOESS	MW-RFI-A	AG	021095	22.66	2.46	PVC	2	12.2' - 22.2'	10	0.01	281.86	4	H	E/A&H	CLOSED	BLA	
109	007G07UC	813552.7	391521.3	283.94	COCKFIELD	MW-RFI-A	AG	022295	105	1.96	PVC	2	94.5' - 104.5'	10	0.01	281.94	4	H	E/A&H	CLOSED	BLA	
110	007G07UF	813545.9	391529.3	283.98	FLUVIAL	MW-RFI-A	AG	022395	53	1.96	PVC	2	42.5' - 52.5'	10	0.01	282.01	4	H	E/A&H	OPEN	BLA	
111	007G08LS	813303.9	391645.7	282.32	FLUVIAL	MW-RFI-A	AG	022395	79.04	1.96	PVC	2	61.3' - 71.3'	10	0.01	281.01	4	H	E/A&H	OPEN	BLA	
112	007G08UC	813241.0	391620.0	284.2	LOESS	MW-RFI-A	AG	00822	11.3	2.33	PVC	2	ND	ND	0.01	283.70	4	H	E/A&H	OPEN	107G07UC	
113	007G08UF	813203.0	391582.0	283.10	COCKFIELD	MW-RFI-A	AG	022495	124.2	2.04	PVC	2	117.7' - 127.7'	10	0.01	281.06	4	H	E/A&H	CLOSED	BLA	
114	007G08LF	813221.0	391617.0	282.85	FLUVIAL	MW-RFI-A	AG	022395	49.04	2.13	PVC	2	13.3' - 23.3'	10	0.01	280.93	4	H	E/A&H	OPEN	BLA	
115	007G08LS	813241.0	391622.0	282.33	FLUVIAL	MW-RFI-A	FG	021895	50.9	0.34	PVC	2	10.2' - 20.2'	10	0.01	282.98	0	H	E/A&H	OPEN	BLA	
116	007G09LS	813437.4	391868.9	282.54	LOESS	MW-RFI-A	FG	021295	20.15	-0.34	PVC	2	9.7' - 19.7'	10	0.01	282.89	0	H	E/A&H	CLOSED	BLA	
117	007G09UC	813441.2	391862.5	282.55	COCKFIELD	MW-RFI-A	FG	021595	114.32	-0.34	PVC	2	103.8' - 113.8'	10	0.01	282.82	0	H	E/A&H	OPEN	BLA	
118	007G09UF	813447.7	391866.3	282.90	FLUVIAL	MW-RFI-A	FG	021695	45.54	-0.41	PVC	2	35' - 45'	10	0.01	283.31	0	H	E/A&H	OPEN	BLA	
119	007G10LF	813702.7	393099.1	282.01	FLUVIAL	MW-RFI-A	FG	013896	78	-0.21	PVC	2	68' - 78'	10	0.01	282.222	0	H	E/A&H	OPEN	BLA	
120	007G11LF	813820.5	392805.6	282.94	FLUVIAL	MW-RFI-A	FG	031896	70	-0.42	PVC	2	60' - 70'	10	0.01	283.149	0	H	E/A&H	OPEN	BLA	
121	007G11UF	813779.0	392833.0	283.01	FLUVIAL	MW-RFI-A	AG	031696	50.9	0.34	PVC											

GROUNDWATER WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNLV	SCRNL	SCRNS	GND	MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
126	007G16LF	814103.5	391871.7	287.63	FLUVIAL	MW-RFI-A	AG	031596	80	2.35100	PVC	2	70'-80'	10	0.01	285.28	4	H	E/A&H	OPEN	BLA	
127	007G17LF	813408.7	391181.3	283.20	FLUVIAL	MW-RFI-A	AG	031596	72	2.31	PVC	2	62'-72'	10	0.01	280.893	4	H	E/A&H	OPEN	BLA	
128	007G18LF	812728.2	392222.8	277.58	FLUVIAL	MW-RFI-A	FG	031896	100	-0.08	PVC	2	90'-100'	10	0.01	277.804	0	H	E/A&H	OPEN	BLA	
129	007G19LF	815410.0	393398.7	291.58	FLUVIAL	MW-RFI-A	FG	031497	89	ND	PVC	2	57'-67'	10	0.01	ND	0	H	ENSAFE	OPEN	BLA	
130	007G20LF	813486.0	392485.0	282.70	FLUVIAL	MW-RFI-A	FG	071398	75.00	-0.12	PVC	2	85'-75'	10	0.01	282.82	0	H	ENSAFE	OPEN	BLA	
131	007G21LF	813673.0	392560.3	283.48	FLUVIAL	MW-RFI-A	FG	071498	75.00	-0.23	PVC	2	85'-75'	10	0.01	283.93	0	H	ENSAFE	OPEN	BLA	
132	007G22LF	813905.9	392550.1	284.86	FLUVIAL	MW-RFI-A	FG	071988	77.00	-0.28	PVC	2	87.5'-77.5'	10	0.01	285.15	0	H	ENSAFE	OPEN	BLA	
133	007G23LF	813899.0	392473.4	284.43	COCKFIELD	MW-RFI-A	FG	072988	103.00	-0.22	PVC	2	95'-103'	10	0.01	283.05	0	H	ENSAFE	OPEN	BLA	
134	007G24LF	814887.3	392723.4	285.89	FLUVIAL	MW-RFI-A	FG	073198	82.00	-0.24	PVC	2	72'-82'	10	0.01	285.15	0	H	ENSAFE	OPEN	BLA	
135	007G25LF	814103.5	392115.6	289.95	FLUVIAL	MW-RFI-A	FG	073098	70.00	-0.25	PVC	2	90'-70'	10	0.01	289.31	0	H	ENSAFE	OPEN	BLA	
136	007G26MF	814789.9	392688.0	289.97	FLUVIAL	MW-RFI-A	FG	080498	81.50	-0.33	PVC	2	71.5'-81.5'	10	0.01	290.30	0	H	ENSAFE	OPEN	BLA	
137	007G26MF	814822.5	392954.1	290.13	FLUVIAL	MW-RFI-A	FG	080298	70.00	-0.27	PVC	2	80'-70'	10	0.01	290.40	0	H	ENSAFE	OPEN	BLA	
138	007G27LF	812680.9	392553.5	278.77	FLUVIAL	MW-RFI-A	FG	072198	117.00	-0.09	PVC	2	107'-117'	10	0.01	278.86	0	H	ENSAFE	OPEN	BLA	
139	007G28LF	813467.3	393309.6	281.91	FLUVIAL	MW-RFI-A	FG	071898	80.50	0.04	PVC	2	70.5'-80.5'	10	0.01	281.87	0	H	ENSAFE	OPEN	BLA	
140	007G29LF	813594.0	393384.3	282.29	FLUVIAL	MW-RFI-A	FG	071798	80.00	-0.08	PVC	2	70'-80'	10	0.01	282.37	0	H	ENSAFE	OPEN	BLA	
141	007G30LF	813743.0	393468.2	282.96	FLUVIAL	MW-RFI-A	FG	071698	80.00	-0.08	PVC	2	70'-80'	10	0.01	283.07	0	H	ENSAFE	OPEN	BLA	
142	007G31LF	813333.0	393234.2	280.70	FLUVIAL	MW-RFI-A	FG	071898	78.00	ND	PVC	2	65'-75'	10	0.01	281.00	0	H	ENSAFE	OPEN	BLA	
143	007G32LF	813604.0	393699.2	281.97	FLUVIAL	MW-RFI-A	FG	071998	78.00	ND	PVC	2	65'-75'	10	0.01	282.00	0	H	ENSAFE	OPEN	BLA	
144	007G33LF	813206.4	392912.4	279.49	FLUVIAL	MW-RFI-A	FG	072098	85.00	ND	PVC	2	75'-85'	10	0.01	280.00	0	H	ENSAFE	OPEN	BLA	
145	007G34LF	813091.7	393115.5	283.22	FLUVIAL	MW-RFI-A	FG	072098	81.00	ND	PVC	2	81'-81'	10	0.01	284.00	0	H	ENSAFE	OPEN	BLA	
146	007G35LF	812924.6	393736.6	281.77	FLUVIAL	MW-RFI-A	FG	112298	91.00	ND	PVC	2	81'-91'	10	0.01	282.00	0	H	ENSAFE	OPEN	BLA	
147	007G36LF	812747.6	393592.0	280.72	FLUVIAL	MW-RFI-A	FG	112298	92.00	ND	PVC	2	82'-92'	10	0.01	281.00	0	H	ENSAFE	OPEN	BLA	
148	007G37FL	812560.3	393729.0	280.29	LOESS	MW-RFI-A	FG	071499	90.00	-0.67	PVC	2	50'-90'	10	0.01	280.96	0	H	ENSAFE	OPEN	BLA; aquifer test	
149	007G37L1	812553.3	393723.0	280.13	LOESS	MW-RFI-A	FG	072099	20.00	-0.81	PVC	2	10'-20'	10	0.01	280.94	0	H	ENSAFE	OPEN	BLA; aquifer test	
150	007G37L2	812546.6	393715.6	280.22	LOESS	MW-RFI-A	FG	072099	40.00	-0.6	PVC	2	30'-40'	10	0.01	280.82	0	H	ENSAFE	OPEN	BLA; aquifer test	
151	007G37LF	812573.5	393714.2	280.50	FLUVIAL	MW-RFI-A	AG	020299	81.00	-0.07	PVC	4	81'-91'	40	0.01	280.82	4	H	ENSAFE	OPEN	BLA	
152	007G37LF	812568.2	393708.7	280.42	COCKFIELD	MW-RFI-A	AG	071499	125.00	0.63	PVC	2	115'-125'	10	0.01	281.07	0	H	ENSAFE	OPEN	BLA	
153	007G38LF	812593.3	393399.2	279.94	FLUVIAL	MW-RFI-A	AG	020399	83.00	-0.14	PVC	2	45'-84'	40	0.01	280.12	0	H	ENSAFE	OPEN	BLA	
154	007G39LF	813251.9	394135.8	284.51	FLUVIAL	MW-RFI-A	AG	020599	94.00	-0.32	PVC	2	84'-94'	40	0.01	285.23	0	H	ENSAFE	OPEN	BLA	
155	007G40LF	812442.2	393203.3	279.83	FLUVIAL	MW-RFI-A	AG	020699	87.00	-0.18	PVC	2	87'-87'	40	0.01	279.21	0	H	ENSAFE	OPEN	BLA	
156	007G41LF	812367.7	393876.5	281.89	FLUVIAL	MW-RFI-A	AG	020899	93.00	2.44	PVC	2	53'-93'	40	0.01	279.45	4	H	ENSAFE	OPEN	BLA	
157	007G42LF	811964.9	394573.3	277.01	FLUVIAL	MW-RFI-A	AG	021099	85.00	2.1	PVC	2	45'-85'	40	0.01	274.91	4	H	ENSAFE	OPEN	BLA	
158	007G43LF	812282.5	393011.3	277.25	FLUVIAL	MW-RFI-A	AG	021699	84.00	-0.26	PVC	2	44'-84'	40	0.01	277.51	0	H	ENSAFE	OPEN	BLA	
159	007G44LF	811223.5	394206.6	274.41	FLUVIAL	MW-RFI-A	FG	021799	85.00	0.04	PVC	2	45'-85'	40	0.01	274.37	4	H	ENSAFE	OPEN	BLA	
160	007G45LF	811901.4	394831.5	278.90	FLUVIAL	MW-RFI-A	FG	021999	83.00	-0.17	PVC	2	43'-83'	40	0.01	277.07	0	H	ENSAFE	OPEN	BLA	
161	007G46LF	812144.3	392830.1	275.92	FLUVIAL	MW-RFI-A	FG	022199	82.00	-0.23	PVC	2	82'-82'	40	0.01	278.21	0	H	ENSAFE	OPEN	BLA	
162	007G47LF	811805.1	392785.1	280.24	FLUVIAL	MW-RFI-A	FG	022099	82.00	-0.18	PVC	2	72'-82'	10	0.01	280.22	0	H	ENSAFE	OPEN	BLA	
163	007G48LF	812842.1	394174.7	270.71	FLUVIAL	MW-RFI-A	FG	022399	113.00	-0.18	PVC	2	83'-113'	10	0.01	279.89	0	H	ENSAFE	OPEN	BLA	
164	007G49LF	814743.2	392351.0	289.68	FLUVIAL	MW-RFI-A	FG	041399	99	0.3	PVC	2	70.5'-99.5'	40	0.01	289.98	0	H	ENSAFE	OPEN	BLA	
165	007G50LF	809491.8	393859.0	271.11	FLUVIAL	MW-RFI-A	AG	071799	ND	ND	PVC	2	ND	ND	0.01	281.70	4	H	USGS	CLOSED		
166	007G51LF	808735.7	397084.8	278.73	FLUVIAL	MW-RFI-A	FG	071999	ND	ND	PVC	2	ND	ND	0.01	279.17	0	H	USGS	CLOSED		
167	007G52LF	812022.1	395738.0	278.20	FLUVIAL	MW-RFI-A	AG	071499	85	2.86	PVC	2	75'-85'	10	0.01	275.34	4	H	ENSAFE	CLOSED	BLA	
168	007G53LF	812124.6	396195.0	280.16	FLUVIAL	MW-RFI-A	AG	071499	78	3.04	PVC	2	68'-78'	10	0.01	277.12	4	H	ENSAFE	CLOSED	BLA	
169	007G54LF	812878.3	392837.0	278.84	FLUVIAL	MW-RFI-A	AG	072099	85	-0.3	PVC	2	75'-85'	10	0.01	278.94	4	H	ENSAFE	OPEN	BLA	
170	007G55LF	810649.4	398360.0	282.00	FLUVIAL	MW-RFI-A	AG	072099	105	3.24	PVC	2	85'-105'	10	0.01	278.76	4	H	ENSAFE	CLOSED	BLA	
171	007G56LF	811095.6	393212.0	280.83	FLUVIAL	MW-RFI-A	AG	072099	115	3.54	PVC	2	105'-115'	10	0.01	277.09	4	H	ENSAFE	CLOSED	BLA	
172	007G57LF	813751.0	392231.0	281.07	FLUVIAL	MW-CMS	FG	120399	83	ND	PVC	4	ND	ND	0.01	283.56	0	H	ENSAFE	OPEN	BLA; CMS; original TOC =	
173	007G58LF	813754.0	392167.8	283.22	FLUVIAL	MW-CMS	FG	120399	83	ND	PVC	4	ND	ND	0.01	283.33	0	H	ENSAFE	OPEN	BLA; CMS; surveyed 300	
174	007G59LF	813700.3	392164.0	283.17	FLUVIAL	MW-CMS	FG	120399	83	ND	PVC	4	ND	ND	0.01	283.33	0	H	ENSAFE	OPEN	BLA; CMS; surveyed 300	
175	007G60LF	813702.4	392144.0	283.23	FLUVIAL	MW-CMS	FG	120399	83	ND	PVC	4	ND	ND	0.01	283.33	0	H	ENSAFE	OPEN	BLA; CMS	
176	007G61LF	813613.1	392122.5	283.04	FLUVIAL	MW-CMS	FG	120399	83	ND	PVC	4	ND	ND	0.01	283.33	0	H	ENSAFE	OPEN	BLA; CMS	
177	007G62LF	813795.3	392125.2	283.67	FLUVIAL	MW-RFI-CMS	FG	80300	75	ND	PVC	2	45'-75'	30	0.01	283.37	0	H	ENSAFE	OPEN	BLA	
178	007G63LF	813806.5	392130.7	283.64	FLUVIAL	MW-RFI-CMS	FG	80300	75	ND	PVC	2	45'-75'	30	0.01	283.4	0	H	ENSAFE	OPEN	BLA	
179	HARRIS	809840.1	398819.8	284.58	FLUVIAL	PRIVATE	AG				PVC								Mize	OPEN	Not in use. Behind house on Nursery well	
180	WILLIAMS	810088.4	399105.3	280.03	FLUVIAL	PRIVATE	AG													OPEN	Nursery well	
181	007G64MF	811790.0	392062.0	283.79	FLUVIAL	MW-RFI-A	FG	041085	45.9	ND	PVC	2	ND	ND	ND	283.79	0	H	G&M	CLOSED	BLA; SP; GGMG69MF	
182	007G65MF	812147.0	392783.0	289.59	FLUVIAL	PRIVATE	AG	ND	ND	ND	PVC	2	ND	ND	ND	282.00	0	H	UNKNOWN	OPEN	BLA; UNST (M&M)	
183	007G66LF	811704.1	394526.4	289.49	FLUVIAL	MW-RFI-A	FG	12098	83	ND	PVC	1	55'-83'	10	0.01	286	0	H	ENSAFE	OPEN	BLA	
184	007G67LF	812549.0	394424.1	282.83	FLUVIAL	MW-RFI-A	FG	12098	83	ND	PVC	1	55'-83'	10	0.01	282	0	H	ENSAFE	OPEN	BLA	
185	007G68LF	812593.0	394402.1	278.10	FLUVIAL	MW-RFI-A	FG	12098	83	ND	PVC	1	75'-85'	10	0.01	278	0	H	ENSAFE	OPEN	BLA	
186	007G69LF	811191.7	392225.5	289.58	FLUVIAL	MW-RFI-A	FG	112098	87	0	PVC	1	75'-85'	10	0.01	270	0	H	ENSAFE	OPEN	BLA	
187	008G01FL	816350.3	398026.2	324.83	FLUVIAL	MW-RFI-A	AG	013195	50	2.89	PVC	2	30'-35'	5	0.01	322.14	4	H	E/A&H	CLOSED	BLA	
188	008G02FL	816085.4	397857.5	327.56	FLUVIAL	MW-RFI-A	AG	021095	36.28	2.35	PVC	2	26.8'-36.8'	10	0.01	324.94	4	H	E/A&H	CLOSED	BLA	
189	008G02LS	816109.0	ND																			

GROUNDWATER WELL MANAGEMENT PLAN
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CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNLV	SCRNL	SCRNS	GND	MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
196	009G02DA	813641.1	382613.2	270.80	ALLUVIUM	MW-RF1-E	AG	021096	46	1.95	PVC	2	36' - 46'	10	0.01	268.85	4	H	E/A&H	OPEN	BLA	
197	009G03DA	812919.4	382996.7	269.05	ALLUVIUM	MW-RF1-E	AG	020196	55	1.87	PVC	2	45' - 55'	10	0.01	267.18	4	H	E/A&H	OPEN	BLA	
198	009G04DA	813235.5	383635.2	270.09	ALLUVIUM	MW-RF1-E	AG	021596	72	1.94	PVC	2	62' - 72'	10	0.01	268.15	4	H	E/A&H	OPEN	BLA	
199	014G01LF	815126.6	386066.9	269.11	FLUVIAL	MW-RF1-E	AG	012996	47	1.868	PVC	2	37' - 47'	10	0.01	267.342	4	H	E/A&H	OPEN	BLA	
200	014G01LS	815133.7	386066.3	269.17	LOESS	MW-RF1-E	AG	012996	20.4	1.80500	PVC	2	10.4' - 20.4'	10	0.01	267.365	4	H	E/A&H	OPEN	BLA	
201	014G02LF	815119.9	385780.0	270.32	LOESS	MW-RF1-E	AG	021496	20	1.7593	PVC	2	10' - 20'	10	0.01	268.222	4	H	E/A&H	OPEN	BLA	
202	014G03LF	815238.3	386880.7	271.09	LOESS	MW-RF1-E	AG	021496	20	2.4499	PVC	2	10' - 20'	10	0.01	268.335	4	H	E/A&H	OPEN	BLA	
203	014G04LF	815222.0	387022.7	270.84	FLUVIAL	MW-RF1-E	AG	012396	49	2.0693	PVC	2	19' - 49'	10	0.01	268.110	4	H	E/A&H	OPEN	BLA	
204	014G05LF	815043.7	385745.7	270.32	LOESS	MW-RF1-E	AG	012196	20	1.83	PVC	2	10' - 20'	10	0.01	268.224	4	H	E/A&H	OPEN	BLA	
205	014G06LF	815031.9	385390.0	270.37	FLUVIAL	MW-RF1-E	AG	012196	49	1.84599	PVC	2	39' - 49'	10	0.01	268.624	4	H	E/A&H	OPEN	BLA	
206	014G07LF	815100.1	385917.7	270.63	FLUVIAL	MW-RF1-E	AG	012296	48	1.74799	PVC	2	38' - 48'	10	0.01	268.982	4	H	E/A&H	OPEN	BLA	
207	014G08LS	815021.2	385941.3	268.14	LOESS	MW-RF1-E	FG	012296	20	-0.5	PVC	2	10' - 20'	10	0.01	268.515	0	H	E/A&H	OPEN	BLA	
208	015G01LF	812901.2	391853.0	281.90	FLUVIAL	MW-RF1-C	AG	031396	85	2.43	PVC	2	75' - 85'	10	0.01	279.47	4	H	E/A&H	OPEN	BLA	
209	015G01UF	812907.5	391856.2	282.06	FLUVIAL	MW-RF1-C	AG	031496	50	2.43	PVC	2	40' - 50'	10	0.01	279.83	4	H	E/A&H	OPEN	BLA	
210	015G02LF	813106.3	391548.8	282.85	FLUVIAL	MW-RF1-C	FG	030096	85	-0.42	PVC	2	75' - 85'	10	0.01	283.36	0	H	E/A&H	OPEN	BLA	
211	015G03LF	813100.0	391222.2	283.00	FLUVIAL	MW-RF1-C	FG	031196	48	-0.2	PVC	2	35' - 45'	10	0.01	283.32	0	H	E/A&H	OPEN	BLA	
212	015G04LF	812773.9	391222.2	283.00	FLUVIAL	MW-RF1-C	FG	031296	85	-0.22	PVC	2	70' - 85'	10	0.01	283.29	0	H	E/A&H	OPEN	BLA	
213	015G05LF	812773.9	391222.2	283.00	FLUVIAL	MW-RF1-C	AG	031296	54	-0.26	PVC	2	44' - 54'	10	0.01	283.31	0	H	E/A&H	OPEN	BLA	
214	015G06LF	812773.9	391222.2	283.00	FLUVIAL	MW-RF1-C	AG	031296	49	-0.43	PVC	2	40' - 50'	10	0.01	283.31	0	H	E/A&H	OPEN	BLA	
215	015G07LF	812773.9	391222.2	283.00	FLUVIAL	MW-RF1-C	AG	031396	45	-0.41	PVC	2	45' - 55'	10	0.01	283.31	0	H	E/A&H	OPEN	BLA	
216	018G01LF	814582.6	391519.4	289.07	FLUVIAL	MW-RF1-C	FG	041399	93	-0.24	PVC	2	48' - 88'	40	0.01	289.31	0	H	ENSAFE	OPEN	BLA	
217	020G01LF	813075.9	385490.4	266.05	FLUVIAL	MW-RF1-F	AG	041099	76	-0.18	PVC	2	46' - 76'	30	0.01	266.23	0	H	ENSAFE	OPEN	BLA	
218	020GPZ01	813182.4	385585.0	265.72	FLUVIAL	MW-RF1-F	AG	041099	50.25	ND	PVC	1	45.25' - 50.25'	5	0.01	ND	0	H	ENSAFE	OPEN	BLA	
219	020GPZ02	813150.8	385479.3	265.93	FLUVIAL	MW-RF1-F	FG	041099	49.00	ND	PVC	1	44' - 49'	5	0.01	ND	0	H	ENSAFE	OPEN	BLA	
220	020GPZ03	813090.0	385488.6	266.11	FLUVIAL	MW-RF1-F	FG	041099	47.00	ND	PVC	1	42' - 47'	5	0.01	ND	0	H	ENSAFE	OPEN	BLA	
221	021G01LF	814683.9	391671.7	283.22	FLUVIAL	MW-RF1-C	FG	021196	30	-0.33	PVC	2	61' - 86'	10	0.01	283.32	0	H	E/A&H	OPEN	BLA	
222	021G02LF	814633.3	391671.7	283.22	FLUVIAL	MW-RF1-C	FG	022196	17	-0.42	PVC	2	77' - 67'	10	0.01	283.24	0	H	E/A&H	OPEN	BLA	
223	021G03LF	814603.1	391671.7	283.22	FLUVIAL	MW-RF1-C	AG	022296	63	-0.22	PVC	2	70' - 83'	10	0.01	283.23	0	H	E/A&H	OPEN	BLA	
224	021G04LF	814633.3	391671.7	283.22	FLUVIAL	MW-RF1-C	AG	022396	50	-0.05	PVC	2	60' - 80'	10	0.01	283.24	0	H	E/A&H	OPEN	BLA	
225	028G01LF	815912.6	387214.0	263.15	FLUVIAL	MW-RF1-F	FG	032399	73	-0.31	PVC	2	44' - 74'	30	0.01	263.13	0	H	ENSAFE	OPEN	BLA	
226	039G02LF	811343.9	387743.7	263.47	FLUVIAL	MW-RF1-F	FG	032499	108	-0.17	PVC	2	43' - 103'	60	0.01	263.47	0	H	ENSAFE	OPEN	BLA	
227	039G03LF	811251.2	387798.6	262.33	FLUVIAL	MW-RF1-F	FG	032599	106	-0.41	PVC	2	43' - 103'	60	0.01	262.33	0	H	ENSAFE	OPEN	BLA	
228	039G04LF	811236.1	387585.3	263.17	FLUVIAL	MW-RF1-F	FG	032699	103	-0.23	PVC	2	43' - 103'	60	0.01	263.17	0	H	ENSAFE	OPEN	BLA	
229	039G05LF	811236.9	387399.9	262.43	FLUVIAL	MW-RF1-F	FG	032799	98	-0.27	PVC	2	43' - 93'	50	0.01	262.43	0	H	ENSAFE	OPEN	BLA	
230	039G06LF	810731.7	387798.0	260.96	FLUVIAL	MW-RF1-F	FG	032899	78	-0.29	PVC	2	40' - 70'	30	0.01	260.96	0	H	ENSAFE	OPEN	BLA	
231	039G07LF	810711.9	387679.9	262.19	FLUVIAL	MW-RF1-F	FG	033099	98	-0.18	PVC	2	43' - 93'	50	0.01	262.19	0	H	ENSAFE	OPEN	BLA	
232	039G08LF	810721.7	387684.3	262.40	FLUVIAL	MW-RF1-F	FG	040599	98	-0.44	PVC	2	45' - 95'	50	0.01	262.40	0	H	ENSAFE	OPEN	BLA	
233	039G09LF	810622.0	387488.2	262.15	FLUVIAL	MW-RF1-F	FG	040799	89	-0.16	PVC	2	43' - 93'	50	0.01	262.15	0	H	ENSAFE	OPEN	BLA	
234	039G10LF	811019.0	387470.0	265.30	FLUVIAL	MW-RF1-F	AG	031399	ND	ND	PVC	1	ND	5	0.01	ND	0	H	ENSAFE	CLOSED	BLA	
235	039G11LF	810513.0	387433.8	266.33	FLUVIAL	MW-RF1-F	FG	031399	ND	ND	PVC	1	ND	5	0.01	ND	0	H	ENSAFE	CLOSED	BLA	
236	039GPZ03	810725.3	387658.6	265.35	FLUVIAL	MW-RF1-F	FG	03_99	ND	ND	PVC	1	ND	5	0.01	ND	0	H	ENSAFE	CLOSED	BLA	
237	039GPZ04	811356.7	387872.3	263.38	FLUVIAL	MW-RF1-F	FG	03_99	53.5	ND	PVC	1	48.5' - 53.5'	5	0.01	ND	0	H	ENSAFE	OPEN	BLA	
238	039GPZ05	810613.2	387386.8	262.81	FLUVIAL	MW-RF1-F	FG	03_99	54.00	ND	PVC	1	49' - 54'	5	0.01	ND	0	H	ENSAFE	OPEN	BLA	
239	041G01DA	812661.5	384512.4	267.51	ALLUVIUM	MW-RF1-G	AG	040899	88	2.43	PVC	2	46' - 96'	40	0.01	267.51	4	H	ENSAFE	OPEN	BLA	
240	041G02DA	812498.7	384355.3	265.82	ALLUVIUM	MW-RF1-G	AG	040999	88	2.84	PVC	2	46.3' - 81.3'	35	0.01	265.82	4	H	ENSAFE	OPEN	BLA	
241	041G03DA	812567.9	384369.2	265.81	ALLUVIUM	MW-RF1-G	AG	041199	83	2.83	PVC	2	44.75'	35	0.01	265.81	4	H	ENSAFE	OPEN	BLA	
242	041G04DA	812661.7	384266.8	264.93	ALLUVIUM	MW-RF1-G	AG	041199	83	2.85	PVC	2	44.5' - 70.1'	35	0.01	264.93	4	H	ENSAFE	OPEN	BLA	
243	058G01LF	810891.0	386895.2	263.21	LOESS	MW-RF1-E	FG	030496	20	-0.35	PVC	2	10' - 20'	10	0.01	263.03	0	H	E/A&H	OPEN	BLA	
244	058G02LF	810908.1	386812.8	263.11	LOESS	MW-RF1-E	AG	030296	20	-0.0000	PVC	2	10' - 20'	10	0.01	263.184	4	H	E/A&H	CLOSED	BLA	
245	058G03LF	810842.1	386742.2	263.15	LOESS	MW-RF1-E	FG	030496	20	-0.24	PVC	2	10' - 20'	10	0.01	263.155	0	H	E/A&H	OPEN	BLA	
246	059G03UF	810847.9	386731.5	263.32	FLUVIAL	MW-RF1-E	FG	030496	50	-0.42	PVC	2	40' - 50'	10	0.01	263.506	0	H	E/A&H	OPEN	BLA	
247	060G01LF	810324.8	391547.5	271.44	FLUVIAL	MW-RF1-A	AG	020295	75	2.25	PVC	2	65' - 75'	10	0.01	269.19	4	H	E/A&H	CLOSED	BLA	
248	060G01LS	810333.5	391535.9	271.88	LOESS	MW-RF1-A	AG	020295	18.65	2.13	PVC	2	ND	ND	0.01	269.75	4	H	E/A&H	CLOSED	BLA	
249	060G02LF	810214.2	391352.9	270.90	FLUVIAL	MW-RF1-A	AG	020295	95.56	2.47	PVC	2	85.1' - 95.1'	10	0.01	268.36	4	H	E/A&H	OPEN	BLA	
250	060G02LS	810219.4	391344.6	270.84	LOESS	MW-RF1-A	AG	020195	22.68	1.99	PVC	2	12.2' - 22.2'	10	0.01	268.75	4	H	E/A&H	CLOSED	BLA	
251	060G03LF	810214.2	391352.9	270.90	FLUVIAL	MW-RF1-A	AG	020195	95.56	2.47	PVC	2	85.1' - 95.1'	10	0.01	268.36	4	H	E/A&H	OPEN	BLA	
252	060G03LS	810219.4	391344.6	270.84	LOESS	MW-RF1-A	AG	020195	22.68	1.99	PVC	2	12.2' - 22.2'	10	0.01	268.75	4	H	E/A&H	CLOSED	BLA	
253	060G04LF	810214.2	391352.9	270.90	FLUVIAL	MW-RF1-A	AG	020195	95.56	2.47	PVC	2	85.1' - 95.1'	10	0.01	268.36	4	H	E/A&H	OPEN	BLA	
254	060G04LS	810219.4	391344.6	270.84	LOESS	MW-RF1-A	AG	020195	22.68	1.99	PVC	2	12.2' - 22.2'	10	0.01	268.75	4	H	E/A&H	CLOSED	BLA	

GROUNDWATER WELL MANAGEMENT PLAN
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CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNNVL	SCRNL	SCRNS	GND	MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
256	06G08LS	810386.3	391535.2	271.98	LOESS	MW-RFI-A	AG	021395	20	2.13	PVC	2	10'-20'	10	0.01	269.75	4	H	E/A&H	CLOSED	BLA	
257	06G09UA	814269.9	384057.1	266.04	ALLUVIUM	MW-RFI-E	AG	021796	20	1.94	PVC	2	10'-20'	10	0.01	264.1	4	H	E/A&H	CLOSED	BLA	
258	06G06DA	814217.6	383725.2	266.12	ALLUVIUM	MW-RFI-E	AG	021796	42	1.94	PVC	2	32'-42'	10	0.01	264.18	4	H	E/A&H	OPEN	BLA	
259	06G06UA	814227.2	383723.3	266.28	ALLUVIUM	MW-RFI-E	AG	021796	20	2.03	PVC	2	10'-20'	10	0.01	264.25	4	H	E/A&H	OPEN	BLA	
260	06G07UA	814046.4	383800.0	264.86	ALLUVIUM	MW-RFI-E	AG	021796	20	2.01	PVC	2	10'-20'	10	0.01	262.85	4	H	E/A&H	OPEN	BLA	
261	06M010UA	810258.0	383271.0	263.74	ALLUVIUM	MW-RFI-E	FG	022922	16	0.92	PVC	2	5'-15'	10	0.01	263.54	0	E	MEC	CLOSED	BLA	
262	06M020UA	810239.0	383303.0	263.57	ALLUVIUM	MW-RFI-E	FG	022922	16	0.92	PVC	2	5'-15'	10	0.01	263.54	0	E	MEC	CLOSED	BLA	
263	06M030UA	810256.0	383322.0	263.47	ALLUVIUM	MW-RFI-E	FG	022922	16	0.92	PVC	2	5'-15'	10	0.01	263.54	0	E	MEC	CLOSED	BLA	
264	06M040UA	810271.0	383300.0	263.39	ALLUVIUM	MW-RFI-E	FG	022922	16	0.92	PVC	2	5'-15'	10	0.01	263.74	0	E	MEC	CLOSED	BLA	
265	06G01UF	817452.2	384512.2	264.47	FLUVIAL	MW-RFI-A	AG	020485	27	2.13	PVC	2	33'-37'	10	0.01	264.08	4	H	ENSAFE	OPEN	BLA	
266	06G01LF	819343.2	389919.2	266.57	FLUVIAL	MW-RFI-BG	AG	010995	65.3	2.1	PVC	2	54.8' - 64.8'	10	0.01	266.33	4	H	E/A&H	OPEN	BLA	
267	06G01LS	819356.7	389936.9	266.10	LOESS	MW-RFI-BG	AG	011095	18	1.38	PVC	2	7.5' - 17.5'	10	0.01	266.55	4	H	E/A&H	CLOSED	BLA	
268	06G01UF	819350.0	389927.5	266.68	FLUVIAL	MW-RFI-BG	AG	011495	46	2.04	PVC	2	35.5' - 45.5'	10	0.01	266.49	4	H	E/A&H	OPEN	BLA	
269	06G02LF	817894.6	386844.7	274.74	FLUVIAL	MW-RFI-BG	AG	011795	64.25	2.06	PVC	2	53.8' - 63.8'	10	0.01	274.45	4	H	E/A&H	OPEN	BLA	
270	06G02LS	817884.2	386825.0	274.87	LOESS	MW-RFI-BG	AG	011295	20	2.32	PVC	2	9.5' - 19.5'	10	0.01	274.32	4	H	E/A&H	CLOSED	BLA	
271	06G02UF	817893.7	386835.2	274.85	FLUVIAL	MW-RFI-BG	AG	011795	45.96	2.07	PVC	2	33.5' - 43.5'	10	0.01	273.75	4	H	E/A&H	OPEN	BLA	
272	06G03UC	810518.0	387114.0	ND	COCKFIELD	MW-RFI-BG	AG	ND	48.30	ND	PVC	2	ND	ND	0.01	ND	0	H	ENSAFE	OPEN	BLA	
273	06G04LF	811504.1	387754.2	264.33	FLUVIAL	MW-RFI-BG	AG	011195	70.5	2.13	PVC	2	60.5' - 70.5'	10	0.01	264.15	4	H	E/A&H	OPEN	BLA	
274	06G04LS	811494.2	387755.2	264.34	LOESS	MW-RFI-BG	AG	011195	20.5	2.5	PVC	2	10.5' - 20.5'	10	0.01	264.3	4	H	E/A&H	CLOSED	BLA	
275	06G04UC	811511.2	387011.2	264.50	COCKFIELD	MW-RFI-BG	AG	023395	105	2.04	PVC	2	91' - 103'	10	0.01	264.53	4	H	ENSAFE	OPEN	BLA	
276	06G04UF	811494.2	387056.4	264.63	FLUVIAL	MW-RFI-BG	AG	011695	50	2.08	PVC	2	40' - 50'	10	0.01	264.26	4	H	E/A&H	OPEN	BLA	
277	06G05LF	810290.7	389941.4	268.02	FLUVIAL	MW-RFI-BG	AG	011095	78.17	2.133	PVC	2	68' - 78'	10	0.01	265.887	4	H	E/A&H	OPEN	BLA	
278	06G05LS	810288.6	389919.8	268.81	LOESS	MW-RFI-BG	AG	011295	20.7	2.27	PVC	2	10.5' - 20.5'	10	0.01	266.34	4	H	E/A&H	CLOSED	BLA	
279	06G05UF	810290.5	389930.9	268.18	FLUVIAL	MW-RFI-BG	AG	011295	55.03	1.92	PVC	2	44.5' - 54.5'	10	0.01	266.26	4	H	E/A&H	OPEN	BLA	
280	06G06UC	816808.1	395504.5	320.02	COCKFIELD	MW-RFI-BG	FG	022996	62	-0.34	PVC	2	52' - 62'	10	0.01	320.25	0	H	E/A&H	OPEN	BLA	
281	06G07UC	818501.5	393700.1	323.23	COCKFIELD	MW-RFI-BG	AG	030298	60	2.15	PVC	2	50' - 60'	10	0.01	321.68	4	H	E/A&H	OPEN	BLA	
282	06G08UF	820054.9	391888.3	299.47	FLUVIAL	MW-RFI-BG	FG	031796	60	-0.32	PVC	2	50' - 60'	10	0.01	299.48	0	H	E/A&H	OPEN	BLA	
283	06G09UF	817163.7	390512.0	314.32	FLUVIAL	MW-RFI-BG	AG	040396	72	2.12	PVC	2	62' - 72'	10	0.01	312.7	4	H	E/A&H	OPEN	BLA	
284	06G09UF	817167.0	390511.5	313.20	FLUVIAL	MW-RFI-BG	AG	031496	55	2.11	PVC	2	45' - 55'	10	0.01	312.59	4	H	E/A&H	CLOSED	BLA	
285	06G10UF	813112.4	387211.2	272.50	FLUVIAL	MW-RFI-BG	AG	030396	58	1.92	PVC	2	50' - 60'	10	0.01	273.56	4	H	E/A&H	OPEN	BLA	
286	06G11MA	810231.8	386390.5	263.84	ALLUVIUM	MW-RFI-BG	AG	021896	48	2.63	PVC	2	38' - 48'	10	0.01	261.81	4	H	E/A&H	OPEN	BLA	
287	06G12UF	814713.0	388949.4	268.71	FLUVIAL	MW-RFI-BG	FG	021896	46	-0.41	PVC	2	38' - 46'	10	0.01	268.9	0	H	E/A&H	OPEN	BLA	
288	06G13UF	822202.5	389892.1	292.28	FLUVIAL	MW-RFI-BG	AG	030996	55	2.58	PVC	2	45' - 55'	10	0.01	289.7	4	H	E/A&H	OPEN	BLA	
289	06G14MF	810851.0	388460.0	268.43	FLUVIAL	MW-RFI-BG	AG	030596	57.8	2.5	PVC	2	47' - 57'	10	0.01	265.96	4	H	E/A&H	OPEN	BLA; originally JET1	
290	75701LS	811786.0	389653.0	270.64	LOESS	MW-UST	FG	010787	20.7	-0.43	PVC	4	5.5' - 20.5'	14.8	0.02	271.07	0	H	HLA	OPEN	BLA	
291	75702LS	811783.0	389670.0	270.81	LOESS	MW-UST	FG	010587	19.1	-0.33	PVC	4	5' - 15'	14.8	0.02	271.07	0	H	HLA	OPEN	BLA	
292	75703LS	811783.0	389657.0	270.42	LOESS	MW-UST	FG	010887	19.3	-0.33	PVC	4	5' - 15'	14.8	0.02	270.34	0	H	HLA	OPEN	BLA	
293	75704LS	811758.0	389630.0	269.17	LOESS	MW-UST	FG	010987	19.7	-0.33	PVC	4	5' - 15'	14.8	0.02	269.9	0	H	HLA	OPEN	BLA	
294	75705LS	811810.0	389723.0	271.42	LOESS	MW-UST	FG	010987	19.7	-0.33	PVC	4	5' - 15'	14.8	0.02	271.72	0	H	HLA	OPEN	BLA	
295	75706LS	811824.0	389702.0	270.34	LOESS	MW-UST	FG	010987	19.7	-0.33	PVC	4	5' - 15'	14.8	0.02	270.26	0	H	HLA	OPEN	BLA	
296	75707LS	811713.0	389662.0	270.08	LOESS	MW-UST	FG	110387	25.5	-0.5	PVC	4	5' - 25'	20	0.02	270.58	0	H	HLA	OPEN	BLA	
297	75708LS	811823.0	389647.0	271.26	LOESS	MW-UST	FG	110387	25.5	-0.3	PVC	4	5' - 25'	20	0.02	271.56	0	H	HLA	OPEN	BLA	
298	75709LS	811763.0	389577.0	271.39	LOESS	MW-UST	FG	110487	25.5	-0.34	PVC	4	5' - 25'	20	0.02	271.73	0	H	HLA	OPEN	BLA	
299	75710LS	811808.0	389570.0	271.22	LOESS	MW-UST	FG	110487	25.5	-0.69	PVC	4	5' - 25'	20	0.02	271.91	0	H	HLA	OPEN	BLA	
300	75711LS	811866.4	389641.5	270.89	LOESS	MW-UST	FG	110587	25.5	-0.27	PVC	4	5' - 25'	20	0.02	271.67	0	H	HLA	OPEN	BLA	
301	75712LS	811801.0	389663.0	270.43	LOESS	MW-UST	FG	061390	15	-0.43	PVC	4	5' - 15'	9.5	0.02	271.26	0	H	ERCE	OPEN	BLA	
302	75713LS	811799.0	389659.0	270.30	LOESS	MW-UST	FG	061390	15	-0.28	PVC	4	5' - 15'	9.5	0.02	270.66	0	H	ERCE	OPEN	BLA	
303	75714LS	811809.0	389668.0	270.37	LOESS	MW-UST	FG	061490	29	-0.43	PVC	4	5' - 25'	9.3	0.02	270.79	0	H	ERCE	OPEN	BLA	
304	75715LS	811974.0	389760.0	272.29	LOESS	MW-UST	FG	061590	15	-0.35	PVC	4	5' - 15'	9.5	0.02	272.54	0	H	ERCE	CLOSED	BLA	
305	75716LS	812079.0	389855.0	273.85	LOESS	MW-UST	FG	061390	15	-0.39	PVC	4	5' - 15'	9.5	0.02	273.25	0	H	ERCE	OPEN	BLA	
306	75717LS	811504.0	389700.0	268.71	LOESS	MW-UST	FG	061390	15	-0.32	PVC	4	5' - 15'	9.5	0.02	269.03	0	H	ERCE	OPEN	BLA	
307	75718LS	811866.0	389538.0	268.89	LOESS	MW-UST	FG	061390	15	-0.52	PVC	4	5' - 15'	9.5	0.02	267.41	0	H	ERCE	OPEN	BLA	
308	75719LS	811745.2	389890.7	268.80	LOESS	MW-UST	FG	061390	15	-0.55	PVC	4	5' - 15'	9.5	0.02	269.345	0	H	ERCE	OPEN	BLA	
309	757B1LD	812032.0	389712.0	275.10	TANK PIT	LD-UST	AG	02_86	15	0.82	PVC	4	ND	ND	ND	274.28	ND	ND	ND	CLOSED	BLA	
310	757B2LD	811988.0	389725.0	274.68	TANK PIT	LD-UST	AG	02_86	15	0.71	PVC	4	ND	ND	ND	273.95	ND	ND	ND	CLOSED	BLA	
311	757B3LD	812010.0	389712.0	274.83	TANK PIT	LD-UST	AG	02_86	15	0.82	PVC	4	ND	ND	ND	274.03	ND	ND	ND	CLOSED	BLA	
312	757B4LD	811987.0	389633.0	273.50	TANK PIT	LD-UST	AG	02_86	15	0.82	PVC	4	ND	ND	ND	273.43	ND	ND	ND	CLOSED	BLA	
313	FCM01LS	818466.0	391285.0	296.27	LOESS	MW-UST	AG	051193	22.5	2.29	PVC	2	7' - 22'	15	0.01	296.19	4	H	E/A&H	CLOSED	BLA	
314	FCM02LS	818494.0	391129.0	297.53	LOESS	MW-UST	AG	051293	22.5	2.29	PVC	2	7' - 22'	15	0.01	297.41	4	H	E/A&H	CLOSED	BLA	
315	FCM03LS	818539.0	391170.0	297.85	LOESS	MW-UST	AG	051293	22.5	2.29	PVC	2	7' - 22'	15	0.01	298.41	4	H	E/A&H	CLOSED	BLA	
316	FCM04LS	815501.0	391181.0	297.98	LOESS	MW-UST	AG	051293	22.5	2.24	PVC	2	7' - 22'	15	0.01	295.74	4	H	E/A&H	CLOSED	BLA	
317	FCM05LS	815567.0	391190.0	298.29	LOESS	MW-UST	AG	051193	22.5	2.29	PVC	2	7' - 22'	15	0.01	296	4	H	E/A&H	CLOSED	BLA	
318	FCM06LS	815513.0	391066.0	295.72	LOESS	MW-UST	AG	0715														

GROUNDWATER WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNINVL	SCRNL	SCRNS	GND	MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
321	N00101	81342.0	39172.0	274.90	LOESS	MW-UST	AG	071094	26	2.45	PVC	2	6'-20"	15	0.01	272.33	4	H	ENSAFE	CLOSED	BLA	
322	N00102	81343.0	39172.0	272.19	LOESS	MW-UST	AG	071094	20	2.45	PVC	2	6'-20"	15	0.01	268.74	4	H	ENSAFE	CLOSED	BLA	
323	N00103	81344.0	39167.0	274.24	LOESS	MW-UST	AG	071224	20	2.8	PVC	2	6'-20"	15	0.01	273.75	4	H	ENSAFE	CLOSED	BLA	
324	N12001L	81373.4	39153.1	285.30	FLUVIAL	MW-RFA	AG	071093	37	2.02	PVC	2	7.0'-5.11'	10	0.01	283.20	4	H	ENSAFE	OPEN	BLA	
325	N12001S	81378.0	39184.7	284.90	LOESS	MW-UST	FG	060689	38	2.24	PVC	2	5'-10'	15	0.01	283.18	4	H	ENSAFE	OPEN	BLA	
326	N12002LF	813376.4	391678.3	285.84	FLUVIAL	MW-RFA	AG	080498	85	2.36	PVC	2	67'-77'	10	0.01	283.48	4	H	ENSAFE	OPEN	BLA	
327	N12002LS	813892.2	391676.8	287.06	LOESS	MW-UST	AG	010688	19	2.23	PVC	2	4'-10'	15	0.01	284.83	4	H	ENSAFE	OPEN	BLA	
328	N12003LS	813786.4	391672.9	286.89	LOESS	MW-UST	AG	010798	19	2.1	PVC	2	3'-18'	15	0.01	284.59	4	H	ENSAFE	OPEN	BLA	
329	N12004LS	813887.7	391660.4	287.41	LOESS	MW-UST	AG	010688	18	2.01	PVC	2	3'-18'	15	0.01	285.4	4	H	ENSAFE	OPEN	BLA	
330	N78101	819379.8	398870.8	323.57	COCKFIELD	NON-POT	FG	072167	215	0.01	PVC	4	200' - 215'	15	ND	323.56	0	H	UNKNOWN	OPEN	aka V-77 (Lake)	
331	NF0002S	813197.0	391720.0	285.99	LOESS	MW-UST	AG	010692	20	2.32	PVC	4	6'-18'	10	0.01	282.67	3	H	ENSAFE	OPEN	BLA aka N00101S was	
332	NF0002S	813170.0	391615.0	286.74	LOESS	MW-UST	AG	010692	17	2.44	PVC	4	6'-18'	10	0.01	284.27	3	H	ENSAFE	OPEN	BLA	
333	NF0007LS	813224.0	391802.4	286.32	LOESS	MW-UST	AG	010692	20	2.44	PVC	4	6'-18'	10	0.01	283.98	3	H	ENSAFE	OPEN	BLA aka N07008LS	
334	NF0001LS	813176.0	391726.0	285.48	LOESS	MW-UST	AG	010692	22.51	2.27	PVC	2	7'-22'	15	0.01	283.71	4	H	E/A&H	CLOSED	BLA	
335	NF0002LS	813421.0	391747.0	284.89	LOESS	MW-UST	AG	051483	22.55	2.28	PVC	2	7'-22'	15	0.01	282.52	4	H	E/A&H	CLOSED	BLA	
336	NFMW03LS	813446.0	391677.0	285.99	LOESS	MW-UST	AG	051793	22.57	2.13	PVC	2	7'-22'	15	0.01	283.86	4	H	E/A&H	CLOSED	BLA	
337	NFMW04LS	813498.0	391629.0	286.61	LOESS	MW-UST	AG	051493	27.3	2.39	PVC	2	7'-27'	20	0.01	284.22	4	H	E/A&H	CLOSED	BLA	
338	NFMW05LS	813478.0	391696.0	285.25	LOESS	MW-UST	AG	051393	27.55	2.08	PVC	2	7'-27'	20	0.01	283.17	4	H	E/A&H	CLOSED	BLA	
339	NFMW06LS	813040.0	391792.0	282.03	LOESS	MW-UST	FG	010885	20.15	-2.06	PVC	2	5'-20'	15	0.01	282.29	0	H	E/A&H	CLOSED	BLA	
340	NH01LS	821761.0	388800.0	288.01	LOESS	MW-UST	FG	051892	27.4	-0.22	PVC	2	17'-27'	10	0.01	288.23	4	H	E/A&H	CLOSED	BLA	
341	NH02LS	821772.0	388741.0	288.30	LOESS	MW-UST	FG	051892	27.2	-0.23	PVC	2	17'-27'	10	0.01	288.75	0	H	E/A&H	CLOSED	BLA	
342	NH03LS	821704.0	388872.0	277.48	LOESS	MW-UST	FG	052032	22.4	-0.27	PVC	2	17'-22'	10	0.01	279.83	0	H	E/A&H	CLOSED	BLA	
343	NH04LS	821745.0	388749.0	276.16	LOESS	MW-UST	FG	052032	19.6	-0.23	PVC	2	17'-22'	10	0.01	278.53	0	H	E/A&H	CLOSED	BLA	
344	NH05LS	813490.0	391723.0	285.00	LOESS	MW-UST	FG	010692	25.00	1.00	PVC	4	10'-25'	15	0.01	283.0	0	H	ENSAFE	CLOSED	BLA	
345	OC001	813131.0	391778.0	285.40	FLUVIAL	NON-POT	AG	No Data	70	0.0	Steel	4	ND	ND	ND	286.00	0	H	PWORKS	OPEN	estimated from USGS topo	
346	PW-N1	813354.0	391706.0	284.58	MPH SAND	POTABLE	AG	91483	523	2.58	Steel	12.0x8.0	463' - 518'	55	0.03	282	0	P	PWORKS	OPEN	Off line, aka V-20	
347	PW-N2	814097.0	391295.0	287.23	MPH SAND	POTABLE	AG	102460	471	2.23	Steel	12.0x8.0	415' - 465'	50	0.008	285	0	P	PWORKS	OPEN	aka V-4	
348	PW-N3	812921.0	389653.0	284.77	FT PILLOW	POTABLE	AG	71985	1455	1.77	Steel	18.0x12.0	1335' - 1450'	105.00'	0.03	293	0	P	PWORKS	OPEN	BLA, aka U-60	
349	PW-S4	810942.0	389390.0	289.71	FT PILLOW	POTABLE	AG	101885	1454	3.71	Steel	18.0x12.0	1346' - 1449'	90.00'	0.03	266	0	P	PWORKS	OPEN	Unused, BLA, aka U-58	
350	PW-S5	811162.0	387936.0	267.00	FT PILLOW	POTABLE	AG	90685	1439	3	Steel	18.0x12.0	1272' - 1434'	137.00'	0.03	264	0	P	PWORKS	OPEN	BLA, aka U-59	
351	RW1	811162.0	387936.0	267.00	LOESS	MW-UST	FG	071097	25	ND	PVC	4	2'-18"	18.58	0.01	ND	0	H	ENSAFE	CLOSED	BLA	
352	RW009	814111.5	392333.5	294.1	FLUVIAL	NON-POT	AG	No Data	75	0.5	PVC	4	66'-17'	10	ND	293.5	0	H	UNKNOWN	OPEN	aka V-31 (Rwy) E	
353	S23701LS	814683.0	388510.0	269.73	LOESS	MW-UST	AG	022332	15	2.41	PVC	2	5'-15'	10	0.01	272.32	4	H	MEC	OPEN	BLA	
354	S23702LS	814595.0	388418.0	272.33	LOESS	MW-UST	FG	022332	15	2.41	PVC	2	5'-15'	10	0.01	272.40	0	H	MEC	CLOSED	BLA	
355	S23703LS	814532.0	388433.0	272.55	LOESS	MW-UST	FG	022332	15	-0.22	PVC	2	5'-15'	10	0.01	267.85	0	H	MEC	CLOSED	BLA	
356	S23704LS	814618.0	388497.0	269.69	LOESS	MW-UST	FG	92392	10	-0.21	PVC	2	5'-10'	5	0.01	269.9	0	H	MEC	OPEN	BLA	
357	S23705LS	814648.0	388477.0	273.31	LOESS	MW-UST	FG	101392	15	2.38	PVC	2	5'-15'	10	0.01	270.93	4	H	MEC	OPEN	BLA	
358	S23706LS	814529.0	388485.0	272.37	LOESS	MW-UST	AG	101392	15	2.47	PVC	2	5'-15'	10	0.01	269.9	4	H	MEC	OPEN	BLA	
359	S37801LS	811222.0	386420.0	264.83	LOESS	MW-UST	FG	072992	15	-0.16	PVC	2	5'-15'	10	0.01	265.09	0	H	E/A&H	OPEN	BLA	
360	S37802LS	811167.0	386459.0	265.02	LOESS	MW-UST	FG	072992	15	-0.07	PVC	2	5'-15'	10	0.01	265.09	0	H	E/A&H	OPEN	BLA	
361	S37803LS	811270.0	386434.0	264.76	LOESS	MW-UST	FG	073092	15	0.3	PVC	2	5'-15'	10	0.01	265.09	0	H	E/A&H	OPEN	BLA	
362	S37804LS	811210.0	386403.0	264.00	LOESS	MW-UST	FG	073092	15	-0.22	PVC	2	5'-15'	10	0.01	264.78	0	H	E/A&H	OPEN	BLA	
363	S40001LS	814531.0	387381.0	267.44	LOESS	MW-UST	FG	051503	21.3	-0.24	PVC	2	6'-21"	15	0.01	267.39	0	E	E/A&H	CLOSED	BLA	
364	S50002LS	814516.0	387260.0	266.96	LOESS	MW-UST	FG	051503	21.3	-0.24	PVC	2	6'-21"	15	0.01	267.39	0	E	E/A&H	CLOSED	BLA	
365	S50003LS	814520.0	387370.0	267.29	LOESS	MW-UST	FG	051503	21.3	-0.24	PVC	2	6'-21"	15	0.01	267.72	0	E	E/A&H	CLOSED	BLA	
366	S50004LS	814429.0	387308.0	268.58	LOESS	MW-UST	FG	061793	21.1	-0.15	PVC	2	6.1'-21.1'	15	0.01	266.73	0	E	E/A&H	CLOSED	BLA	
367	S50005LS	814533.0	387307.0	271.08	LOESS	MW-UST	FG	061893	21.1	-0.25	PVC	2	6.1'-21.1'	15	0.01	271.33	0	E	E/A&H	CLOSED	BLA	
368	T1205N01	815570.0	391195.0	296.00	TANK PIT	LD-UST	FG	010490	15	ND	PVC	2	2.5'-15'	12.5	0.01	296.00	0	ND	UNKNOWN	CLOSED	BLA	
369	T1205N02	815580.0	391201.0	296.00	TANK PIT	LD-UST	FG	010490	15	ND	PVC	2	2.5'-15'	12.5	0.01	296.00	0	ND	UNKNOWN	CLOSED	BLA	
370	T1205S01	815575.0	391185.0	295.77	TANK PIT	LD-UST	FG	010490	15	-0.16	PVC	2	2.5'-15'	12.5	0.01	295.93	0	ND	UNKNOWN	CLOSED	BLA	
371	T1205S02	815587.0	391193.0	296.08	TANK PIT	LD-UST	FG	010490	15	0.16	PVC	2	2.5'-15'	12.5	0.01	296.93	0	ND	UNKNOWN	CLOSED	BLA	
372	T123901	812577.0	391683.0	283.32	TANK PIT	LD-UST	FG	010990	15	-0.2	PVC	2	2.5'-15'	12.5	0.01	284.12	0	ND	UNKNOWN	CLOSED	BLA	
373	T123902	812569.0	391715.0	283.95	TANK PIT	LD-UST	FG	010990	15	-0.24	PVC	2	2.5'-15'	12.5	0.01	283.40	0	ND	UNKNOWN	CLOSED	BLA	
374	T123903	812635.0	391704.0	283.55	TANK PIT	LD-UST	FG	010990	15	-0.27	PVC	2	2.5'-15'	12.5	0.01	284.12	0	ND	UNKNOWN	CLOSED	BLA	
375	T124001	813116.0	391720.0	283.35	TANK PIT	LD-UST	FG	010490	15	-0.21	PVC	2	2.5'-15'	12.5	0.01	284.12	0	ND	UNKNOWN	CLOSED	BLA aka N9401LS	
376	T124202	813131.0	391731.0	283.72	TANK PIT	LD-UST	FG	010490	15	-0.4	PVC	2	2.5'-15'	12.5	0.01	284.12	0	ND	UNKNOWN	CLOSED	BLA; aka N9402LS	
377																						

GROUNDWATER WELL MANAGEMENT PLAN
NSA MID-SOUTH DATABASE

CNT	ID	EASTING	NORTHING	TOC	FORM	TYPE	MOUNT	INSTALLED	TD	STKUP	MAT	DIA	SCRNINVL	SCRNL	SCRNS	GND	MSL	POST	CAP	CONTRACTOR	STATUS	NOTES
386	T148903	811530.0	390090.0	267.84	TANK PIT	LD-UST	FG	122889	15	-0.53	PVC	2	2.5' - 15'	12.5	0.01	268.37	0	ND	UNKNOWN	CLOSED	BLA	
387	T148904	811559.0	390096.0	267.29	TANK PIT	LD-UST	FG	122889	15	-0.75	PVC	2	2.5' - 15'	12.5	0.01	268.04	0	ND	UNKNOWN	CLOSED	BLA	
388	T150801	810989.0	390137.0	268.00	TANK PIT	LD-UST	FG	122889	15	-0.37	PVC	2	2.5' - 15'	12.5	0.01	268.37	0	ND	UNKNOWN	CLOSED	BLA	
389	T150802	No Data	No Data	267.74	TANK PIT	LD-UST	FG	122989	15	No Data	PVC	2	2.5' - 15'	12.5	0.01	No Data	0	ND	UNKNOWN	CLOSED	BLA	
390	T150803	No Data	No Data	266.67	TANK PIT	LD-UST	FG	122989	15	No Data	PVC	2	2.5' - 15'	12.5	0.01	No Data	0	ND	UNKNOWN	CLOSED	BLA	
391	T163701	814420.0	392024.0	268.47	TANK PIT	LD-UST	FG	010990	15	-0.17	PVC	2	2.5' - 15'	12.5	0.01	268.24	0	H	ERCR	CLOSED	BLA	
392	T163702	814407.0	392039.0	268.13	TANK PIT	LD-UST	FG	010990	15	-0.23	PVC	2	2.5' - 15'	12.5	0.01	268.39	0	H	ERCR	CLOSED	BLA	
393	T163703	814394.0	392050.0	268.45	TANK PIT	LD-UST	FG	010990	15	-0.23	PVC	2	2.5' - 15'	12.5	0.01	268.71	0	H	ERCR	CLOSED	BLA	
394	T30101	813321.0	391858.0	263.59	TANK PIT	LD-UST	FG	010990	15	-0.37	PVC	2	2.5' - 15'	12.5	0.01	263.79	0	H	ERCR	CLOSED	BLA	
395	T30102	813212.0	391852.0	263.24	TANK PIT	LD-UST	FG	010990	15	-0.11	PVC	2	2.5' - 15'	12.5	0.01	263.46	0	H	ERCR	CLOSED	BLA	
396	T30103	813224.0	391660.0	263.20	TANK PIT	LD-UST	FG	010990	15	-0.26	PVC	2	2.5' - 15'	12.5	0.01	263.46	0	H	ERCR	CLOSED	BLA	
397	T30401	813665.0	391666.0	264.13	TANK PIT	LD-UST	FG	010990	15	-0.32	PVC	2	2.5' - 15'	12.5	0.01	264.45	0	H	ERCR	CLOSED	BLA	
398	T30402	813664.0	391709.0	263.43	TANK PIT	LD-UST	FG	010990	15	-0.36	PVC	2	2.5' - 15'	12.5	0.01	263.79	0	H	ERCR	CLOSED	BLA	
399	T33601	810272.0	392564.0	271.00	TANK PIT	LD-UST	FG	010390	15	-0.15	PVC	2	2.5' - 15'	12.5	0.01	271.15	0	H	ERCR	CLOSED	BLA	
400	T33602	810229.0	392622.0	270.64	TANK PIT	LD-UST	FG	010390	15	-0.39	PVC	2	2.5' - 15'	12.5	0.01	271.03	0	H	ERCR	CLOSED	BLA	
401	T33701	810370.0	392571.0	270.73	TANK PIT	LD-UST	FG	010390	15	-0.24	PVC	2	2.5' - 15'	12.5	0.01	270.57	0	H	ERCR	CLOSED	BLA	
402	T33702	810510.0	392537.0	270.50	TANK PIT	LD-UST	FG	010390	15	-0.31	PVC	2	2.5' - 15'	12.5	0.01	270.51	0	H	ERCR	CLOSED	BLA	
403	T33703	810433.0	392432.0	271.29	TANK PIT	LD-UST	FG	010390	15	-0.31	PVC	2	2.5' - 15'	12.5	0.01	271.57	0	H	ERCR	CLOSED	BLA	
404	T33704	810510.0	392432.0	270.91	TANK PIT	LD-UST	FG	010390	15	-0.31	PVC	2	2.5' - 15'	12.5	0.01	271.32	0	H	ERCR	CLOSED	BLA	
405	T33705	810714.0	392456.0	270.02	WELCOX	MW-USGS	AG	10185	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	WORKS	CLOSED		
406	USGS01LS	812814.1	391167.4	277.52	LOESS	MW-USGS	AG	041295	19.8	4.52	PVC	4	8' - 18'	10	0.01	273	4	D	USGS	OPEN	BLA, aka U-102LS	
407	USGS02FL	813798.9	391179.6	277.74	FLUVIAL	MW-USGS	AG	041595	70.5	4.77	PVC	4	59' - 69'	10	0.01	273	4	D	USGS	OPEN	BLA, aka U-102LF	
408	USGS03UC	812784.0	391192.4	277.73	COCKFIELD	MW-USGS	AG	041495	120	4.73	PVC	4	105' - 115'	10	0.01	273	4	D	USGS	OPEN	BLA, aka U-102C	
409	USGS04FL	812834.3	391198.4	ND	FLUVIAL	MW-USGS	AG	061595	70.5	ND	PVC	4	40' - 70'	30	0.01	273	4	D	USGS	OPEN	BLA, aka U-103	
410	S172-1	819529.6	398783.0	332.67	COCKFIELD	NON-POT	ND	ND	189	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	CLOSED	Lakehouse storage	
411	PES-MW-1S	815020.0	392213.3	293.24	FLUVIAL	MW-PES	FG	071800	85	ND	ND	2	55.0 - 75.0	10	ND	ND	ND	ND	PARSONS	OPEN		
412	PES-MW-1D	815020.0	392213.3	293.44	FLUVIAL	MW-PES	FG	071801	85	ND	ND	2	75.0 - 85.0	10	ND	ND	ND	ND	PARSONS	OPEN		
413	PES-MW-2S	815042.0	392219.3	293.20	FLUVIAL	MW-PES	FG	072000	54.3	ND	ND	2	45.4 - 55.4	10	ND	ND	ND	ND	PARSONS	OPEN		
414	PES-MW-2D	815042.0	392219.3	293.21	FLUVIAL	MW-PES	FG	072001	75	ND	ND	2	65.0 - 75.0	10	ND	ND	ND	ND	PARSONS	OPEN		
415	PES-MW-3S	815056.0	392224.7	293.09	FLUVIAL	MW-PES	FG	072300	85	ND	ND	2	55.0 - 65.0	10	ND	ND	ND	ND	PARSONS	OPEN		
416	PES-MW-3D	815056.0	392224.7	293.12	FLUVIAL	MW-PES	FG	072300	85	ND	ND	2	75.0 - 85.0	10	ND	ND	ND	ND	PARSONS	OPEN		
417	PES-MW-4S	815070.4	392230.1	293.44	FLUVIAL	MW-PES	FG	072300	55.4	ND	ND	2	45.4 - 55.4	10	ND	ND	ND	ND	PARSONS	OPEN		
418	PES-MW-4D	815070.4	392230.1	293.40	FLUVIAL	MW-PES	FG	072300	75	ND	ND	2	65.0 - 75.0	10	ND	ND	ND	ND	PARSONS	OPEN		
419	PES-MW-1S	815062.2	392115.6	293.37	FLUVIAL	MW-PES	FG	071800	55.3	ND	ND	2	45.3 - 55.3	10	ND	ND	ND	ND	PARSONS	OPEN		
420	PES-MW-1D	815062.2	392115.6	293.33	FLUVIAL	MW-PES	FG	071800	80	ND	ND	2	70.0 - 80.0	10	ND	ND	ND	ND	PARSONS	OPEN		
421	PES-MW-2S	815081.0	392228.7	293.08	FLUVIAL	MW-PES	FG	080100	85	ND	ND	2	55.0 - 65.0	10	ND	ND	ND	ND	PARSONS	OPEN		
422	PES-MW-2D	815081.0	392228.7	293.32	FLUVIAL	MW-PES	FG	080100	85	ND	ND	2	75.0 - 85.0	10	ND	ND	ND	ND	PARSONS	OPEN		
423	PES-MW-3S	815042.0	392219.3	293.20	FLUVIAL	MW-PES	FG	072400	55	ND	ND	2	45.4 - 55.4	10	ND	ND	ND	ND	PARSONS	OPEN		
424	PES-MW-3D	815042.0	392219.3	293.40	FLUVIAL	MW-PES	FG	072400	75	ND	ND	2	65.0 - 75.0	10	ND	ND	ND	ND	PARSONS	OPEN		
425	PES-MW-4S	815056.0	392224.7	293.09	FLUVIAL	MW-PES	FG	072100	85	ND	ND	2	55.0 - 65.0	10	ND	ND	ND	ND	PARSONS	OPEN		
426	PES-MW-4D	815056.0	392224.7	293.34	FLUVIAL	MW-PES	FG	072100	85	ND	ND	2	75.0 - 85.0	10	ND	ND	ND	ND	PARSONS	OPEN		
427	PES-MW-5S	815029.1	392250.1	293.27	FLUVIAL	MW-PES	FG	072000	55.4	ND	ND	2	45.4 - 55.4	10	ND	ND	ND	ND	PARSONS	OPEN		
428	PES-MW-5D	815029.1	392250.1	293.27	FLUVIAL	MW-PES	FG	072001	75	ND	ND	2	65.0 - 75.0	10	ND	ND	ND	ND	PARSONS	OPEN		
429	PES-MW-6S	815046.0	392251.7	293.28	FLUVIAL	MW-PES	FG	072200	65	ND	ND	2	55.0 - 65.0	10	ND	ND	ND	ND	PARSONS	OPEN		
430	PES-MW-6D	815046.0	392251.7	293.31	FLUVIAL	MW-PES	FG	072200	85	ND	ND	2	75.0 - 85.0	10	ND	ND	ND	ND	PARSONS	OPEN		
431	PES-MW-7S	815033.0	392221.1	293.08	FLUVIAL	MW-PES	FG	072100	85	ND	ND	2	45.0 - 55.0	10	ND	ND	ND	ND	PARSONS	OPEN		
432	PES-MW-7D	815033.0	392221.1	293.08	FLUVIAL	MW-PES	FG	072100	75	ND	ND	2	65.0 - 75.0	10	ND	ND	ND	ND	PARSONS	OPEN		
433	PES-MW-8S	815011.2	392231.5	292.34	FLUVIAL	MW-PES	FG	072200	65	ND	ND	2	55.0 - 65.0	10	ND	ND	ND	ND	PARSONS	OPEN		
434	PES-MW-8D	815011.2	392231.5	292.34	FLUVIAL	MW-PES	FG	072200	85.3	ND	ND	2	75.3 - 85.3	10	ND	ND	ND	ND	PARSONS	OPEN		

NSA MidSouth Abandoned Well Permit Summary

Well ID	SITE	STATUS	DATE	CONTRACTOR	EMERGENCY PERMIT #	MSCHD Permit #	NOTES
002GGM01DA	002	CLOSED	10/98	Tri-State Testing Services			
003G01LS	003	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
003G02LS	003	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
003G03LS	003	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
003G03MF	003	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
003G04LS	003	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
003GGM07UF	003	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	Listed as OGMG007UF
003GGM08LS	003	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	Listed as OGMG008LS
005FF01LS	005	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
005FF02LS	005	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
005FF03LS	005	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
005FF04LS	005	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
005FF06LS	005	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
005FF08LS	005	CLOSED	12/97				
005FF09LS	005	CLOSED					
005FF10LS	005	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
005FF11LS	005	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
005G03LS	005	CLOSED	11/98				
005G04LS	005	CLOSED	11/98				
005G06LS	005	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
005G07LS	005	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
005G08LS	005	CLOSED	11/98				
005G4AUF	005	CLOSED	11/98	Tri-State Testing Services	98-307-0923		
005G4BUF	005	CLOSED	11/98	Tri-State Testing Services	98-307-0923		
007G01LS	AOC A	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
007G02LS	AOC A	CLOSED					
007G03LS	AOC A	CLOSED	11/98		98-307-0921	99-009	
007G04LS	AOC A	CLOSED					
007G04UC	AOC A	CLOSED					
007G05LS	AOC A	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
007G06LS	AOC A	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
007G06UC	AOC A	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
007G07LS	AOC A	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
007G07UC	AOC A	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
007G08UC	AOC A	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
007G09LS	AOC A	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
007GGM09MF	AOC A	CLOSED	06/96				
008G01FL	008	CLOSED					
008G02FL	008	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
008G02LS	008	CLOSED					
008G03FL	008	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
008G04FL	008	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
008GGM10LS	008	CLOSED	11/95	Tri-State Testing Services			
008GGM11LS	008	CLOSED	11/98				
008GGM12LS	008	CLOSED	11/95	Tri-State Testing Services			
014MW02LS	014	CLOSED	02/96	Alliance Drilling		96-122	
059G02LS	059	CLOSED	11/98				
060G01LF	060	CLOSED	12/97				
060G01LS	060	CLOSED	12/97				
060G02LF	060	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	Listed as 060G02LS
060G03LF	060	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
060G03LS	060	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
060G04LS	060	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
060G05LS	060	CLOSED	12/97				
060G06LS	060	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
065G05UA	065	CLOSED					
0BGG01LS	2033	CLOSED	11/98	Tri-State Testing Services	98-307-0924	99-012	
0BGG02LS	3048	CLOSED	11/98	Tri-State Testing Services	98-307-0924	99-012	
0BGG04LS	S-8	CLOSED	11/98	Tri-State Testing Services	98-307-0923	99-011	

NSA MidSouth Abandoned Well Permit Summary

Well ID	SITE	STATUS	DATE	CONTRACTOR	EMERGENCY PERMIT #	MSCHD Permit #	NOTES
OBGG05LS	BG5	CLOSED	11/98	Tri-State Testing Services	98-307-0923	99-011	
OBGG09UF	1473	CLOSED	11/98	Tri-State Testing Services	98-307-0922	99-010	
75715LS	NEX	CLOSED					
757B1LD	NEX	CLOSED					
757B2LD	NEX	CLOSED					
FCMW01LS	374	CLOSED	03/99	Tri-State Testing Services		99-054	
FCMW02LS	374	CLOSED	03/99	Tri-State Testing Services		99-054	
FCMW03LS	374	CLOSED	03/99	Tri-State Testing Services		99-054	
FCMW04LS	374	CLOSED	03/99	Tri-State Testing Services		99-054	
FCMW05LS	374	CLOSED	03/99	Tri-State Testing Services		99-054	
FCMW06LS	1364	CLOSED	03/99	Tri-State Testing Services		99-054	
N001LS	N-126	CLOSED	07/97	Tri-State Testing Services		097-097	
N002LS	N-126	CLOSED	07/97	Tri-State Testing Services		097-097	
N003LS	N-126	CLOSED	07/97	Tri-State Testing Services		097-097	
NFMW01LS	N-94	CLOSED	08/99	Tri-State Testing Services	99-242-0922		
NFMW02LS	N-94	CLOSED	08/99	Tri-State Testing Services	99-242-0922		
NFMW03LS	N-94	CLOSED	08/99	Tri-State Testing Services	99-242-0922		
NFMW04LS	N-94	CLOSED	08/99	Tri-State Testing Services	99-242-0922		
NFMW05LS	N-94	CLOSED	08/99	Tri-State Testing Services	99-242-0922		
NFMW06LS	N-94	CLOSED	08/99	Tri-State Testing Services	99-242-0922		
NH01LS	HOSP	CLOSED	03/99	Tri-State Testing Services	99-069-0828	099-053	
NH02LS	HOSP	CLOSED	08/96	Tri-State Testing Services			
NH03LS	HOSP	CLOSED	03/99	Tri-State Testing Services	99-069-0828	099-053	
NH04LS	HOSP	CLOSED	03/99	Tri-State Testing Services	99-069-0828	099-053	
N-MW-05	N-126	CLOSED	08/99	Tri-State Testing Services	99-242-0922		
PW1	1658	CLOSED	Unknown	Public Works			well in place, not operational
RW-1	N-94	CLOSED	08/99	Tri-State Testing Services	99-242-0922		
S172-1	S-172	CLOSED	11/95	Tri-State Testing Services			
S23702LS	S-237	CLOSED	11/98	Tri-State Testing Services	98-307-0923	99-011	
S23703LS	S-237	CLOSED	11/98	Tri-State Testing Services	98-307-0923	99-011	
S50G01LS	S-50	CLOSED	08/94	Tri-State Testing Services	94-223-1100		
S50G02LS	S-50	CLOSED	08/94	Tri-State Testing Services	94-223-1100		
S50G03LS	S-50	CLOSED	08/94	Tri-State Testing Services	94-223-1100		
S50G04LS	S-50	CLOSED	08/94	Tri-State Testing Services	94-223-1100		
S50G05LS	S-50	CLOSED	08/94	Tri-State Testing Services	94-223-1100		
T1205N01	NFC	CLOSED					
T1205N02	NFC	CLOSED					
T1205S01	NFC	CLOSED	11/95	Tri-State Testing Services			
T1205S02	NFC	CLOSED	11/95	Tri-State Testing Services			
T123901	N-126	CLOSED	07/97	Tri-State Testing Services		097-097	
T123902	N-126	CLOSED	07/97	Tri-State Testing Services		097-097	
T123903	N-126	CLOSED	07/97	Tri-State Testing Services		097-097	
T124201	N-94	CLOSED	1992				
T124202	N-94	CLOSED	1992				
T124301	N-94	CLOSED	1992				
T124302	N-94	CLOSED	1992				
T124901	S376	CLOSED	06/96	Tri-State Testing Services			
T124902	S376	CLOSED	06/96				
T134201	N-94	CLOSED					
T148201	S376	CLOSED					
T148202	S376	CLOSED					
T148203	S376	CLOSED					
T148901	AFFTF	CLOSED	11/95	Tri-State Testing Services			
T148902	AFFTF	CLOSED	11/95	Tri-State Testing Services			
T148903	AFFTF	CLOSED	1991				
T148904	AFFTF	CLOSED					
T150801	AFFTF	CLOSED	11/95	Tri-State Testing Services			
T150802	AFFTF	CLOSED	1990/1991				
T150803	AFFTF	CLOSED	1990/1991				

NSA MidSouth Abandoned Well Permit Summary

Well ID	SITE	STATUS	DATE	CONTRACTOR	EMERGENCY PERMIT #	MSCHD Permit #	NOTES
T163701	163	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
T163702	163	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
T163703	163	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
T30101	N-94	CLOSED	1992				
T30102	N-94	CLOSED	1992				
T30103	N-94	CLOSED	1992				
T30401	N-126	CLOSED	07/97	Tri-State Testing Services		097-097	
T30402	N-126	CLOSED	07/97	Tri-State Testing Services		097-097	
T33601	336	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
T33602	336	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
T33603	336	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
T33701	337	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
T33702	337	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
T33703	337	CLOSED	11/98	Tri-State Testing Services	98-307-0921	99-009	
TW01	211	CLOSED	Unkown	Public Works			Well in place, welded closed
Notes: All wells were abandoned in accordance with the Technical Memorandum: <i>Rational for RFI Monitoring Well Abandonment and Long-Term Monitoring Recommendations</i> (EnSafe/Allen & Hoshall, May 14, 1997) and the Memphis and Shelby County Health Department <i>Groundwater/Monitoring Well Regulations (Section 9)</i> unless otherwise noted in notes column.							

APPENDIX B

**APPLICABLE OR RELEVANT
AND
APPROPRIATE REQUIREMENTS**

**SOUTHERN DIVISION NAVAL FACILITIES
ENGINEERING COMMAND**

**GUIDELINES FOR GROUNDWATER MONITORING
WELL INSTALLATION**

PART 1: GENERAL

1.1 INTRODUCTION

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

1.2 APPLICABLE PUBLICATIONS

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

**1.2.1 American Association of State Highway and Transportation
Officials (AASHTO)**

M 220 Epoxy Coatings Specifications

1.2.2 American Society of Testing and Materials (ASTM)

A 120 Pipe, Steel, Black and Hot-dipped, Zinc coated, welded and seamless

A 312 Seamless and Welded Austenitic Stainless Steel Pipe

B 209 Aluminum and Aluminum-alloy Sheet and Plate

C 150 Portland Cement

C 778 Standard Sand

D 1457 Polytetrafluoroethylene (PTFE) Molding and Extrusion Materials

D 1785 Standard Specification of Polyvinyl Chloride Pipe (PVC Pipe, Schedules 40, 80, 120)

D 1586 Method for Penetration Test and Split Barrel Sampling of Soils

GUIDELINES FOR GROUNDWATER MONITORING WELL INSTALLATION (cont'd)

2.1.6 Annular Space Fill Materials

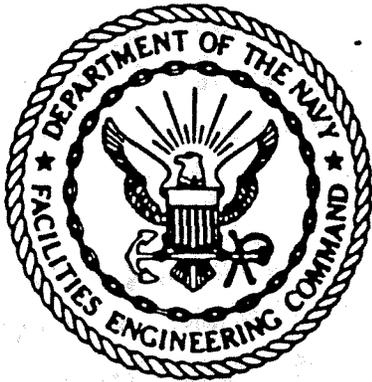
- a. Filter pack shall be 98% pure silica, cleaned with potable water, have a uniformity coefficient of 1-3, and a specific gravity of 2.6 - 2.7. The filter pack shall meet ASTM C 775 standard sand specifications.
- b. 1/4-inch bentonite pellets shall be 90% montmorillonite clay, with a bulk dry density 80 lbs/cu ft, a specific gravity 1.2, and a pH of 8.5-10.5.
- c. Granular bentonite shall conform to API std 13-A for bentonite.
- d. Portland Cement shall conform to ASTM C 150 Type I.

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

- a. 24 inch diameter 0.25 inch wall thickness
- b. 20 inch diameter 0.25 inch wall thickness
- c. 16 inch diameter 0.25 inch wall thickness
- d. 10.75 inch diameter 0.25 inch wall thickness
- e. 24 inch diameter 0.50 inch wall thickness
- f. 20 inch diameter 0.50 inch wall thickness
- g. 16 inch diameter 0.50 inch wall thickness
- h. 10.75 inch diameter 0.365 inch wall thickness

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

- a. Locking 16-gauge steel protective well cover, round or square and 5-ft in length
- b. Flush mount 22-gauge steel, water resistant welded box with 3/8-inch steel lid, locking device and padlock guard
- c. Concrete pad at ground surface (3' X 4' X 6") ASTM C 150
- d. Padlock (brass, corrosion resistant, keyed alike) ASTM F 883
- e. Steel protective post (4-inch diameter, 6-ft length, 1/4-inch thickness, concrete filled) ASTM A 120.
- f. Well designation sign, sheet aluminum, ASTM B 209, 1/8 inch by 18 inch by 6 inch, anchors and fasteners compatible with sign, designation to be provided by EIC, the designation shall be stamped into the plate with 4-inch letters and numbers.
- g. High visibility yellow epoxy paint AASHTO M220.



FEBRUARY 1985

GROUND-WATER MONITORING GUIDE

NEESA 20.2-031A



**NAVAL ENERGY AND ENVIRONMENTAL
SUPPORT ACTIVITY**

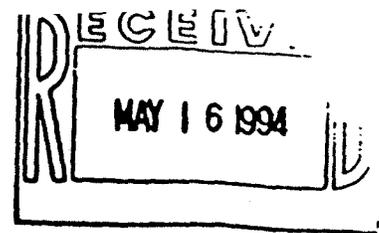
Port Hueneme, California 93043

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

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

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

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



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Supply
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ANNOUNCEMENT

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

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

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

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

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

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

4. Cathodic protection wells.
 5. Wells used for dewatering purposes in construction work.
 6. Monitor wells, geotechnical test borings and piezometers that are regulated by rules of the Water Quality Control Board or otherwise by the Department.
 7. Ponds, pits, sumps and drainage trenches.
 8. Contaminant recovery wells otherwise regulated by the Department.
- (27) "Pumps" and "pumping equipment" means any equipment or materials utilized or intended for use in withdrawing or obtaining ground-water, including well seals.
- (28) "Recovery well" means any well constructed for the purpose of removing contaminated ground water or other liquids from the subsurface.
- (29) "Repair" means work involved in deepening, reaming, sealing, installing, or changing casing depths, perforating, screening, or cleaning, acidizing, or redevelopment of a well excavation, or any other work which results in breaking or opening a well seal.
- (30) "Standard Dimension Ratio (SDR)" means the quotient obtained when the outside diameter of thermoplastic well casing is divided by the wall thickness.
- (31) "Static water level" means the level at which the water stands in the well when the well is not being pumped and is expressed as the distance from a fixed reference point to the water level in the well.
- (32) "Supervision" means the act of overseeing, directing and managing workers engaged in the business of constructing wells, or installing pumps or installing water treatment equipment on well or spring supplies.
- (33) "Well" or "water well" means a hole drilled, re-drilled or dug into the earth, by boring or otherwise, for the production of water.
- (34) "Well construction" means all acts necessary to construct wells for the production of water including but not limited to the location and excavation of the well; placement of casings, screens and fittings; development and testing.
- (35) "Well development" means the procedures used to remove mud or fine material from the drilled borehole, correct any damage to the aquifer that occurred during drilling and improve the water passageways into the well from the aquifer.
- (36) "Well driller" or "water-well contractor" means any individual, firm or corporation engaged in the business of constructing wells.

NEW RULES

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1200-4-9-.10 WELL CONSTRUCTION STANDARDS

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

(1) Requirements

- (a) No person shall construct, reconstruct, or repair, or cause to be constructed, reconstructed or repaired any water well; nor shall any person install, repair, or cause to be installed or repaired any pump, pumping equipment, water filter or water treatment device to be used on a water well except in accordance with the provisions of the Water Wells Act (T.C.A. 69-11-101 et. seq.) and these rules.
- (b) Every well driller, within thirty (30) days after completion of a water well, shall submit a report on the construction or reconstruction of the well to the Department. The well completion report shall be made on a form provided by the Department or a reasonable facsimile approved by the Department.

- (c) For each water well completed in Tennessee after the effective date of this rule, a one-time registration/inspection fee of seventy five dollars (\$75.00) shall be paid to the Department by the driller or contractor who supervised the drilling of the well.
1. The fee shall be submitted to the Department by the driller at the time of submission of the well completion report.
 2. The amount of the registration/inspection fee shall be reviewed annually by the Board and their recommendations for adjustment of the fee shall be presented to the Commissioner for final action.
 3. The requirement of payment to the Department of a one-time registration/inspection fee shall not apply to water wells drilled in any local jurisdiction which is authorized, by private act or pursuant to the provisions of an adopted "home rule" charter, to regulate the location and construction of water wells and which has established a fee for the inspection of water wells.
- (d) When strict compliance with these standards is impractical, the driller or installer shall make application to the Department for approval of equivalent alternative standards (a variance) prior to the work being done. The Department may grant the request for a variance based on if it determines the proposed standards offer an equivalent or higher level of protection to the environment. In an emergency or in exceptional instances, the Department will respond to a verbal request provided the applicant submits a written application within ten (10) days of the verbal application.

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

(2) Location

- (a) The construction of a water well is prohibited at other than a safe distance from any known potential source of contamination. The minimum safe distances shown in Table A shall apply for the sources of contamination listed therein:
- (b) A water-supply well may be constructed in an area subject to flooding provided the top of the water tight casing terminates not less than two (2) feet above the maximum recorded flood elevation.
- (c) ~~Proximity~~ Proximity to buildings, pits, and basements:
1. A well located adjacent to a building shall be so located that the center line of the well extended vertically will clear any projection from the building by not less than five (5) feet.
 2. New wells shall not be constructed in pits or basements.
- (d) New wells shall not be constructed closer than 25 feet from property lines or highway rights-of-way.

TABLE A

MINIMUM DISTANCES TO SEPARATE WATER WELLS
FROM POTENTIAL SOURCES OF CONTAMINATION

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

(3) Source of Water Supply

- (a) The source of water for any well shall be at least twenty (20) feet below the surface of the ground.
- (b) The driller shall develop the most favorable water-bearing zone(s) and seal off any source(s) of less desirable quality.
- (c) It shall be the duty of any person attempting to construct a water well to seal off salt water, oil, gas, or any other fluid or material which might contaminate a source of fresh water.

(4) Drilling Fluids

- (a) Water used for drilling shall be obtained from a potable water source, or shall be treated with enough liquid bleach or hypochlorite granules to retain a free-chlorine residual content of at least 5 parts per million (ppm).
- (b) Drilling fluids and additives shall be materials specified by the manufacturer for use in water well construction and approved by the Department.
- (c) During the course of drilling a water well with air rotary equipment, a minimum of three (3) gallons per minute of water must be injected or added into the air stream.

(5) Casing

- (a) Wells drilled for the production of water shall be cased with watertight casing extending from at least six (6) inches above to at least twenty (20) feet below the land surface. For wells located in areas subject to flooding, see rule 1200-4-9-.10(2)(b).
 - 1. The watertight casing in wells constructed to obtain water from a consolidated rock formation shall be firmly seated and sealed below all crevices that release inferior quality water or mud; the well or to a depth of at least five (5) feet below the top of the consolidated rock whichever is greater.

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

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

1. Be new, seamless or welded, black or galvanized steel pipe conforming to the weights and dimensions given in Table B and meeting the American Society for Testing and Materials (ASTM) Standards A53-87b or A589-85. Used or reject pipe shall not be used;
2. Have water-tight joints that may be welded, or threaded and coupled; and
3. Be equipped with a drive shoe if the casing is to be driven.
4. Pipe sizes that are not listed in Table B and are less than ten (10) inches in diameter shall match listed values as closely as possible.
5. Pipe sizes that are ten (10) inches in diameter or larger shall be Schedule 20 pipe as a minimum.

TABLE B

MINIMUM DIMENSIONS AND WEIGHTS FOR WATER WELL CASING

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

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

1. The casing is new;
2. The casing meets or exceeds the requirements of ASTM Standard F-480-88 and bears the NSF (National Sanitation Foundation) seal in each section of casing;
3. The Standard Dimension Ratio (SDR) shall not exceed 26;

4. The casing is installed after the borehole has been drilled to the final depth of the finished well, and no additional drilling takes place after the casing has been installed; and
 5. Joints shall be solvent cemented with a quick-setting cement, or threaded and coupled.
- (d) In areas where the water is obtained from overburden above the consolidated rock surface, the casing shall be set at or just above the consolidated rock. A screen may be attached to the bottom of the casing or the lowermost few feet of the casing may be slotted or perforated to allow water to enter the well provided the top of the screen or the topmost perforation in the casing is at least 20 feet below land surface. The completed well shall be finished so that extraneous material such as sediment cannot enter the well.

(6) Backfilling and Grouting

- (a) The annular space between the casing and borehole wall of the well shall be backfilled with an impervious material such as grout, bentonite chips or cuttings mixed with bentonite granules or pellets.
- (b) Placement of the backfill material shall be done in such a way that there are no bridges or gaps in the annulus. The top of the backfill material shall remain level with the land surface surrounding the well.
- (c) If bentonite-based grout is used for backfill, it shall be placed in accordance with the manufacturer's recommendations.
- (d) If cement-based grout is used for backfill, it shall be placed around the casing by one of the following methods:

1. Pressure

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

2. Pumping

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

3. Other

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

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

(7) Well Screens

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

(b) - The well screen shall:

1. Be of steel, stainless steel, plastic or other Department approved material and shall be of a strength to satisfactorily withstand chemical and physical forces applied to it during and after installation;
2. Be of a design to permit optimum development of the aquifer with minimum head loss consistent with the intended use of the well;
3. Have openings designed to prevent clogging and shall be free of rough edges, irregularities or other defects that may accelerate or contribute to corrosion or clogging; and
4. Be provided with such fittings as are necessary to seal the top of the screen to the watertight casing and to close the bottom. If the screen is installed through the casing, a packer, seal or other approved design shall be used to prevent the entry of ground water into the well through any openings other than the screen.

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

1. Water quality to the extent that intermixing of the waters would result in deterioration of the water quality in any aquifer or zone.
2. Static water levels that would result in depletion of water from any aquifer or zone, or significant loss of head in any aquifer or zone.

(8) Gravel-Packed Wells

(a) In constructing a gravel-packed well:

1. The gravel shall be composed of quartz, granite, or similar rock material and shall be clean, rounded, uniform, water-washed and free from clay, silt, or other deleterious material.
2. The gravel shall be placed in the annular space around the screens and casing by any method that will insure accurate placement and avoid bridging or segregation.

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

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

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

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

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

(9) Large Diameter Wells

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

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

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

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

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

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

(10) Well Development

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

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

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

(c) Disinfect the well.

(11) Wellhead Completion

- (a) The top of the casing shall be cut off smooth and level, be free from dents and cracks, and shall terminate at least six (6) inches above the land surface except in areas subject to flooding. See Rule 1200-4-9-.10(2)(b).
- (b) No well casing shall be cut off or cut into below ground surface except by a licensed driller or licensed installer to install a pitless unit or adapter. Pitless units or adapters shall comply with the Water Systems Council's Pitless Adapter Division (PAD) FAS-1 (6th Ed., March 1987) and shall bear the PAD symbol of certification or shall otherwise have been approved by the Department.
- (c) Pitless units or adapters shall be constructed and installed so as to prevent the entrance of contaminants into the well or potable water supply, conduct water from the well, protect the water from freezing, and provide access to water system parts within the well.
- (d) The surface surrounding the well head shall slope away from the well head in all directions.
- (e) Every water well that flows under natural artesian pressure shall be equipped with a valve so that the flow can be completely stopped.

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

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

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

- (1) The capacity of the pump shall be consistent with the intended use and yield characteristics of the well.
- (2) The pump and related equipment for the well shall be conveniently located to permit easy access and removal for repair and maintenance.
- (3) The base plate of a pump placed directly over the well shall be designed to form a watertight seal with the well casing or pump foundation.
- (4) In installations where the pump is not located directly over the well, the annular space between the casing and pump intake or discharge piping shall be closed with a watertight seal designed specifically for this purpose.
- (5) The well shall be properly vented at the wellhead to allow for pressure changes within the well. The vent shall be screened to prevent entry of insects.

- (6) Any suction line installed underground between the well and pump shall be surrounded by six (6) inches of impervious material such as cement or encased in a larger pipe that is sealed at each end.
- (7) All conduits, valves and other plumbing fixtures used to convey water from a water-supply well to any building or other outlet shall be installed in accordance with manufacturer's requirements.
- (8) All pressure tanks shall be installed above ground unless the tank is specifically designated by the manufacturer for below ground burial.
- (9) The electrical wiring and equipment used in connection with the installation of a water well pump shall:
 - (a) Meet underwriters specifications;
 - (b) Be installed in accordance with the National Electrical Code or local codes and ordinances if the latter are more restrictive;
 - (c) Be equipped with a fused or circuit breaker disconnect switch.
 - (d) Be served by an entirely separate circuit from other equipment.
- (10) Water filters and water treatment units shall be installed and serviced to accommodate water quality problems as determined by physical, chemical or bacteriological evaluation or field test; and the function of the equipment shall achieve the results specified by the manufacturer. In servicing and installing treatment units the sanitation of the water supply shall be protected.

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

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

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

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

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

Measures: 2 cups = 1 pint (pt)
 2 pints = 1 quart (qt)
 4 quarts = 1 gallon (gal)

7 tablets = 1 ounce (oz)
 8 ounces = 1/2 pound (lb)
 16 ounces = 1 pound (lb)

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

Pints of liquid bleach = $D^2 h + 1500$

Ounces of dry granules = $D^2 h + 1300$,

where: D = Diameter of well in inches

h = height of water above bottom of well in feet.

- (b) Place the required amount of liquid bleach or dry granules in the well by one of the following methods:
 - 1. Dry granules or tablets may be dropped in the top of the well and allowed to settle to the bottom; or
 - 2. Liquid bleach may be mixed with water and poured in the top of the well and allowed to settle to the bottom.
- (c) Agitate the water in the well to insure thorough dispersion of the chlorine throughout the entire length of the well.
- (d) The well casing, pump column and any other equipment above the water level in the well, shall be thoroughly rinsed with the chlorine solution as a part of the disinfecting process.
- (e) The chlorine treated water shall stand in the well for a period not less than twelve (12) hours. The well shall, thereafter, be pumped until the odor of the chlorine is no longer detectable.

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

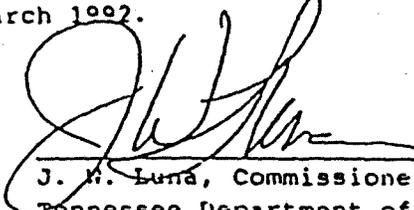
- (1) All materials used in the replacement or repair of any water well shall meet the requirements for a new installation.
- (2) Plastic pipe approved by the National Sanitation Foundation (NSF) and rated at 160 psi (SDR = 26) may be used for liner casing. The liner casing shall be installed with centering guides to insure proper centering in the well and the annular space around the liner casing shall be completely sealed at both ends to repel the inflow of extraneous material from the lined interval.
- (3) Repairs to wells completed with the top of the well casing terminating below ground shall include extending the well casing above land surface in accordance with rule 1200-4-9-.10(5)(a).

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

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

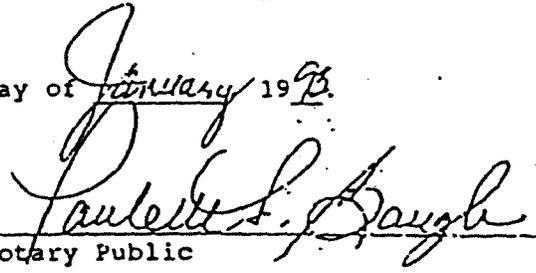
- (1) Each water well constructed or reconstructed after the effective date of this rule shall be equipped immediately upon completion by the driller of the well with an identification tag or decal bearing a registration number to be supplied by the Department.
- (2) The identification tag or decal shall be securely attached to the well casing or other appurtenance where it is readily visible.
- (3) The identification tag or decal shall not be removed from the well unless otherwise approved by the Department.

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



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

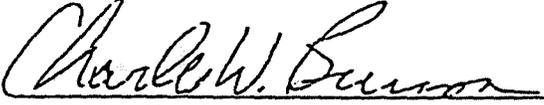
Subscribed and sworn to before me this the 21st day of January 1993.



Pauline S. Bough
Notary Public

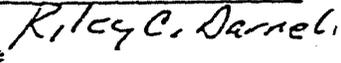
My commission expires on the 27th day of July, 1996.

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



Charles W. Burson
Attorney General and Reporter

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



Riley C. Darnell
Secretary of State

By: 

Richard Powell

12:50 PM
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SECRET

**TENNESSEE DEPARTMENT OF
ENVIRONMENT AND CONSERVATION
DIVISION OF UNDERGROUND
STORAGE TANKS**



**ENVIRONMENTAL
ASSESSMENT
GUIDELINES**

JANUARY 1994

II. GROUND WATER INVESTIGATION PROCEDURES

A. Number, Type and Location of Monitoring Wells

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

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

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

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

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

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

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

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

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

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

B. Drilling Methods

The following drilling methods are acceptable to the Division:

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

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

1. Mud Rotary
2. Cable Tool

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

C. Special Procedures for Documenting Results of Bedrock Sections

1. Camera Logging Procedures

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

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

2. Rock Coring

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

D. Single Cased Monitoring Well Installation Procedures

1. Casing and Screen Type

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

2. Screen Length and Placement

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

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

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

3. Minimum Borehole Diameter

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

4. Placement and Type of Filter Pack

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

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

5. Placement and Type of Filter Pack Seal

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

6. Placement and Type of Annular Grout

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

7. Surface Completion

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

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

E. Double Cased Monitoring Well Installation Procedures

1. Casing and Screen Type

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

2. Outer Casing Placement

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

3. Screen Length and Placement

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

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

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

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

4. Minimum Borehole Diameter

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

5. Placement and Type of the Filter Pack

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

6. Placement and Type of the Filter Pack Seal

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

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

7. Placement and Type of the Inner Annular Grout

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

8. Surface Completion

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

F. Open-Hole Well Installation Procedures

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

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

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

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

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

G. Well Development

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

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

1. Bailing
2. Pumping
3. Surging

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

**MEMPHIS/SHELBY COUNTY
WATER WELL REGULATIONS**

JUNE 1994

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RULES AND REGULATIONS OF WELLS
IN
SHELBY COUNTY

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

SECTION 1 -- GENERAL PROVISIONS

1.01 -- Statutory Authority

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

1.02 -- Scope and Applicability

- A. Minimum requirements are hereby prescribed in these Rules and Regulations governing the location, design, installation, use, disinfection, modification, repair and abandonment of water wells and associated pumping equipment, or any other type of well. No person shall conduct any activity contrary to the provisions of these regulations, and all such activities which are contracted for shall be carried out only by those persons having a valid Tennessee License for Water Well Drillers, and Pump Installers and/or those engineers or geologists registered in the State of Tennessee. These regulations supersede all other well construction regulations.
- B. These regulations apply to well construction activities from the initial penetration or excavation of the ground, through development, modification, equipment installation, repair and disinfection. Set up of construction equipment before actual penetration or excavation is not considered part of the construction.
- C. The regulations apply to the construction activities of any and all types of wells.

- D. The installation of all wells or other activities conducted for the purpose of obtaining geologic or hydrologic information shall receive prior approval from the Department in the form of a Well Construction Permit.
- E. Amendments may be made to inspection and permit fees to reflect reasonable costs of services provided by the Memphis and Shelby County Health Department and to establish well water conservation fees as a means of controlling the usage of water or waste of groundwater by way of private wells.

1.03 -- Health Department Powers and Duties

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

Section 2 -- SHORT TITLE

Shelby County Well Construction Code

Section 3 -- DEFINITIONS

- 3.01 -- Abandoned Well: Any type of well that has been permanently discontinued for further use. A well shall be declared abandoned when the pump has been disconnected or removed for reasons other than repair or replacement; when the well is in such a state of disrepair that continued use for the purpose intended is impracticable; or when the well is not maintained in such a condition that allows for periodic sampling and testing by the Department.
- 3.02 -- Abandonment: The act of properly sealing an abandoned well.
- 3.03 -- Adequate Water Supply: A well which after installation will supply enough water in a capacity so that the well can be used for drinking, culinary, food processing and other purposes.
- 3.04 -- Agricultural Well: A well constructed for the primary purpose of providing a source of water for agriculture.
- 3.05 -- Agriculture: The term agriculture is defined as the art of being engaged in farming as the leading pursuit and includes cultivating the soil; producing crops; and/or raising livestock, poultry, or fish; and in varying degrees the preparation of these products for human use.
- 3.06 -- Aquifer: A geologic formation, group of formations or part of a formation capable of yielding a significant amount of groundwater to wells, springs, or surface water.
- 3.07 -- Auxiliary Intake: Any source of water system, piping, connection, or device whereby water may be secured other than that normally used.
- 3.08 -- Bentonite Grouts: A Bentonite grout shall consist of a high solid sodium montmorillonite. The grout shall yield solids ranging from twenty to thirty (20-30%) percent, with a minimum density equal to or greater than 9.4 pounds per gallon, and a permeability of

approximately 1×10^{-7} centimeters per second or less. The manufacturers mixing instructions shall be followed and any polymer added to bentonite slurry mixes must be approved by the Department prior to use.

- 3.09 -- Board: The Ground Water Quality Control Board for Shelby County.
- 3.10 -- Commercial Well: A well constructed for the purpose of providing groundwater to a commercial business, facility, or premise for use as a potable water supply when public water is not available; for air conditioning, and other heat exchange systems; sprinkler systems for landscaping and other land beautification uses; nurseries; filling and retaining levels of lakes in subdivisions, apartment complexes, and similar multiple dwelling facilities; and any other such commercial uses.
- 3.11 -- Contaminated Well: Any type of well containing a foreign substance, either chemical, radiological, or biological, which tends to degrade the quality of the water so as to constitute a hazard or impair the usefulness of the water.
- 3.12 -- Contamination: Alteration of the physical, chemical, or biological quality of the water so that it is harmful or potentially injurious to the health of the users or for the intended use of the water, or to the extent it poses a danger of polluting the groundwater aquifers.
- 3.13 -- Cross Connection: An actual or potential connection, arrangement or condition by or through which a supply of potable water could be contaminated, polluted or infected.
- 3.14 -- Deep Well: Any type of well constructed to a depth that penetrates the stratum of clay known as the Jackson Formation, the water bearing formation known as the Memphis Sands, or the water bearing formation known as the Fort Pillow Sands. Any well is considered a deep well if the Jackson Formation is not found to exist at the construction site.
- 3.15 -- Delinquent: Unpaid or past due well fees that are subject to additional fees or penalties.
- 3.16 -- Department: The Memphis and Shelby County Health Department.

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

- 3.29 -- Modification: Alteration, rework or repair involving a material change in the design or construction of a well including but not limited to deepening, reaming, casing, re-casing, perforating, re-perforating, installation of liner pipe, packers and seals, screen removal and replacement, or redeveloping a well by surging, chemical treatment, jetting, etc.
- 3.30 -- Monitoring Well: A well constructed for monitoring Groundwater quality and/or water level.
- 3.31 -- Municipality: A political unit having corporate status and powers of self-government and, includes any other form of government within the political jurisdiction of Shelby County.
- 3.32 -- Observation Well: A well constructed for the primary purpose of obtaining accurate, periodic measurements of groundwater.
- 3.33 -- Owner: Any person or his legal representative, agent, or assign who owns, leases, operates, or controls any parcel of land where a well is or may be located.
- 3.34 -- Permit: An official document issued by the Department granting the specific activity set forth in the document.
- 3.35 -- Person: Any individual, firm, association, organization, partnership, business, institution, enterprise, municipality, commission, political subdivision or duly established entity, trust, corporation, company, contractor, supplier, installer, user or owner, or any Federal, State or Local government agency or public district or any officer or employee thereof.
- 3.36 -- Potable Water Supply: Any source of water which is satisfactory for drinking, culinary, and domestic purposes, and meets the requirements of the Department.
- 3.37 -- Premise: A tract of land with the buildings thereon.
- 3.38 -- Private Water Supply: Any groundwater supply located on

- 3.17 -- Dewatering or Drainage Well: A well constructed for the primary purpose of lowering the water table for the construction of footings, sewer lines, building foundations, elevator shafts, etc.
- 3.18 -- Domestic Well: A well constructed for the primary purpose of providing a source of drinking water to a single family residence.
- 3.19 -- Emergency: Unforeseen circumstances that exist beyond the control of the applicant.
- 3.20 -- Geothermal Well: A well constructed for the primary purpose of adding or removing British Thermal Units (Btu) from groundwater for heating or cooling purposes.
- 3.21 -- Groundwater: Water occurring naturally in underground formations that are saturated with water and includes but is not limited to perched water tables and aquifers or zones that are seasonally, periodically or permanently saturated.
- 3.22 -- Groundwater Heat Pump: Any mechanical device used for heating or cooling, which adds or removes British Thermal Units (Btu) from groundwater.
- 3.23 -- Grout: A stable, impervious, minimum-shrinkage bonding material that is capable of producing a water tight seal required to protect against the intrusion of contamination.
- 3.24 -- Health Director: The Director of the Memphis and Shelby County Health Department.
- 3.25 -- Industrial Well: A well constructed for the purpose of providing water for use in processing, washing, packaging or manufacturing of a product.
- 3.26 -- Injection Well: A well used to inject fluid into the subsurface.
- 3.27 -- Irrigation Well: A well constructed for the primary purpose of providing a source of water by way of sprinklers, artificial ditches or channels, or by any other means for use in nurseries, golf courses, land beautification, silviculture, growing sod, greenhouses, and any other such uses.
- 3.28 -- Justifiable Need: A genuine need for a private water supply as determined by the Board and, which need is based upon the availability of an adequate water

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

- 3.39 -- Public Water Supply: Any publicly or privately owned water system operating as a public utility which operates fifteen (15) or more service connections or regularly serves twenty-five (25) people sixty (60) or more days per year.
- 3.40 -- Pump Installer: Any person who installs or repairs water well pumps or who installs filters and water treatment devices.
- 3.41 -- Quasi-Public Water Supply: A water supply used or made available by a person to his employees, tenants, members or guests for drinking; or in connection with the manufacturing or handling of ice, foods, or drinks, such as candy, ice cream, milk, ice bottled drinks, and any other food or drink products. The source of quasi-public water supply may be a private well, or the public water supply.
- 3.42 -- Reasonable Use: That use of water which is ordinarily required by industries, firms, and individuals in the usual operation of their business or residence.
- 3.43 -- Recovery Well: A well constructed for the purpose of recovering products which have intersected the water table by way of leaking underground storage tanks, surface spills, etc.
- 3.44 -- Repair: Any modification, replacement, or other alteration of any well, or pumping equipment which requires a breaking or opening of the well seal or any waterlines up to and including the pressure tank and any coupling appurtenant thereto.
- 3.45 -- Shallow Well: Any type of well constructed to a depth shallower than the stratum of clay known as the Jackson Formation which is found just above the water bearing sands known as the Memphis Sands.
- 3.46 -- Site: Any one legal unit of a subdivision, parcel of land, or location where drilling activities are to take place.
- 3.47 -- Soil Boring: Any hole that is drilled, cored, dug, washed, driven, jetted, redrilled, bored, or otherwise constructed, which exceeds thirty (30) feet, for the purpose of determining geological formations, water level, or for the purpose of founding structures.

- 3.48 -- Temporary Abandonment: Means any observation or monitoring well covered with a secure cap that is water tight and which is being used for the investigation or management of groundwater by a governmental agency.
- 3.49 -- Test Well : Any excavation, either cased or uncased, that is constructed for the purpose of determining the location or physical characteristics of underground formations or for evaluating or monitoring the characteristics or behavior of the formations or the water contained therein, or for obtaining the information needed to design a well prior to its construction.
- 3.50 -- Utilities: Any power lines or underground cables which supply electrical power, telephone lines, cable television lines, natural gas lines, water mains, water lines, or sewer lines.
- 3.51 -- Water Well: Wells which are constructed and so equipped with casings, screens, pumps, fittings, etc., and have been developed for the primary purpose of producing a supply of water regardless of the intended usage for said supply.
- 3.52 -- Water Well Contractor: Any person, firm, or corporation who has duly registered as such with the State of Tennessee and shall have paid the annual registration fee and obtained a permit to contract for construction of wells as therein provided and, who has obtained the necessary privilege license to construct, repair, and service wells in Shelby County.
- 3.53 -- Well: A well is any hole that is drilled, cored, dug, washed, driven, jetted, redrilled, bored, or otherwise constructed which intersects the water table for: the production of water; monitoring of contaminants; recovering product; dewatering or drainage purposes; determining water levels; lowering the water table; or any boring into the subsurface thirty (30) feet or deeper.
- 3.54 -- Well Construction: Any type of work that is performed on a well including but not limited to the installation of new wells; the modification, alteration, or repair of existing wells; or, their abandonment.
- 3.55 -- Well Driller: Any person who manages or supervises the digging, drilling or redrilling of well.

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

Section 4 GENERAL REQUIREMENTS AND PROCEDURES

4.01 -- Applications

- A. Any person requesting the installation, modification, repair, or abandonment of a water well or any other type well shall make application to the Department.
- B. All applications requesting new well installation or the modification of an existing well shall be accompanied by a plot plan showing the location of all underground utilities within fifty (50) feet of the proposed well; grade elevations in relation to adjoining areas and drainage patterns of the area; location of the residence, business, etc.; locations of septic tanks and field lines when applicable; other existing and proposed buildings and structures; any water service lines that may exist on the premises; any drainage ditches, lakes, ponds, streams, etc., that may exist at the premise; any roads or dedicated right-of-ways or easements; and any other pertinent information deemed necessary by the Department. The application shall also include a sketch of how the well is to be constructed.
- C. A water well cannot be sited or placed in service within a half-mile of the designated boundaries of a listed federal or State Superfund site or Resource Conservation and Recovery Act corrective action site, unless the well owner can make a demonstration that the well will not enhance the movement of contaminated groundwater or materials into the shallow or deep aquifer.
- D. An application may be obtained from the Department, and if approved, such application shall be in force and in effect for ninety (90) days from the date of its issuance. If work has not commenced within ninety (90) days of issuance, an extension may be granted by the Department upon request by the applicant.
- E. A processing fee shall be submitted with all

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

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

4.02 -- Permits Required

- A. A permit shall be obtained from the Department prior to beginning the installation, modification, repair, or abandonment of a water well or any other type of well, soil boring or pumping equipment within Shelby County.
- B. The issuance of a construction permit is dependent upon:
1. the application being on the proper form and containing the required information, provided that the proposed construction or repair will not be contrary to applicable laws, rules, orders, or regulations of the Department or other government agencies;
 2. additional information which may be required as the Department deems necessary such as geophysical logs, geologic samples and logs, and well pumping tests; and
 3. the justifiable need for a well.
- C. If a well application is approved by the Department, the well driller shall be issued a permit. Receipt of the permit shall constitute permission to begin well construction upon prior notification to the Department.

- D. Permission to begin construction of a water well or any other type of well may be applied for by telephone when emergency conditions exist which would justify such a request. The Department may, at its discretion, grant such emergency permits with an additional fee of fifty (\$50) dollars.
- E. A written permit shall be obtained from the Department and renewed annually to operate or maintain a commercial or industrial well regardless of the intended usage of said well.
- F. A written permit shall be obtained from the Department and renewed annually for wells constructed at residential premises where public water is available regardless of the intended usage of said supply.
- G. A written permit shall be obtained from the Department and renewed annually to operate or maintain a quasi-public water supply.
- H. All renewable permits shall be valid for one year, and, may be renewed at the expiration thereof upon payment of the fees hereinafter set forth. Such permits may be revoked by the Department upon the violation by the holder of any terms of the permit or these Rules and Regulations or in any emergency when, in the judgement of the Department, the continued operation of the quasi-public or private water supply or maintenance of a well for any reason shall constitute a health hazard. The holder of such permit, after such revocation, shall have the right of appeal.

4.03 -- Fees Required

- A. All applications requesting a permit to construct water wells or any other wells shall require a processing fee of twenty-five (\$25.00) dollars be paid to the Department when such applications are submitted. The processing fee is not refundable, regardless of the status of approval.
- B. The yearly permit to operate or maintain a quasi-public or a private water supply or well, other than a domestic well shall not be issued until an inspection fee of one hundred (\$100.00) dollars per well is paid each year to the Department.
- C. An inspection fee of one hundred (\$100.00) dollars

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

- D. Dewatering or drainage wells require an inspection fee of one hundred (\$100.00) dollars per site.
- E. Owners of domestic wells shall not be liable for an annual inspection fee, except when public water becomes available to a residential premise, then the well being used at said premise shall be subject to applicable fees being paid.
- F. Any new water wells constructed within the calendar year shall be subject to the inspection fee being paid at the time the well construction permit is issued. This fee will be prorated on a quarterly basis.
- G. Any construction permits issued on an emergency basis require an additional processing fee of fifty (\$50.00) dollars be paid to the Department.
- H. All inspection fees are due upon notification by the Department and are delinquent thirty (30) days after said notification.
- I. An annual fee of twenty (\$20.00) dollars per well shall be assessed for all active monitoring, vent, air sparging and recovery wells, or any other type well related to the remediation of groundwater at a site located within Shelby County.

4.04 -- Well Driller

- A. All water production wells to be constructed in Memphis and Shelby County shall be constructed only by persons having a valid license under the TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION, Division of Groundwater Protection.
- B. A well driller shall have in his possession a valid well construction permit before any construction is to begin.
- C. The well driller to whom a well construction permit is issued is responsible for the construction of the well in accordance with the permit and

applicable laws and regulations.

- D. It shall be the well driller's duty to inform persons requesting the services of his company, to construct, repair, alter, modify, or to perform any other service related to a well of the requirements of these Rules and Regulations.
- E. The well driller shall be held liable for any type of well work initiated prior to the Department issuing a written permit.
- F. It shall be the duty of the well driller to notify the Department when construction on a well is to begin and when the work is completed so that proper inspections can be made during and after construction, and for the purpose of collecting samples from production wells.
- G. The well driller shall notify the Department when repair or modification work, as directed within these Rules and Regulations, is done on a well.
- H. Within thirty (30) days after a well has been constructed or modified, the well driller shall submit a report of construction (well log) to the Department on such forms as are prescribed or which may be furnished by the Department.
- I. The well driller shall notify the Department prior to beginning abandonment procedures on a well.

Section 5 -- WELL CONSTRUCTION STANDARDS FOR WATER WELL

5.01 -- General

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

5.02 -- Siting Criteria

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

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

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

2. Twenty-five (25) feet from a road or dedicated right-of-way or easement.
 3. Fifteen (15) feet from a building foundation for the purpose of protecting the well from a foundation of soil treated to control pests, insects, or vermin.
 4. One hundred (100) feet from any subsurface sewage disposal system such as a septic tank and/or field lines.
 5. One hundred (100) feet from any identifiable sources of contamination such as but not limited to disposal fields, seepage pits, manure piles, barns, underground fuel tanks, etc.
 6. Fifty (50) feet from any storm drain or sanitary sewer that flows by gravity.
 7. One hundred (100) feet from any sewage force main.
 8. Fifty (50) feet from any drainage canal, ditch, stream, lake, or similar body of water.
 9. Fifteen (15) feet from power lines and underground cables for electrical power.
 10. Twenty-five (25) feet from natural gas lines
 11. Twenty-five (25) feet from any water main as defined by the utility owner.
- B. The well site shall not be subject to flooding and shall be at least two (2) feet above the 100-year recurrence flood level for the area. If necessary, the area shall be filled with material approved by the Department, properly graded and maintained to prevent the accumulation or retention of surface water.
- C. Lots requiring a well for a potable water supply and a septic tank system for sewage disposal shall be a minimum of four (4) acres in size.

- D. All parcels of land requiring a well for a source of potable water shall be self-supporting in that sharing a water supply shall not be allowed. A water line shall not cross property boundaries for the purpose of providing potable water to a premise on a permanent basis.
- E. A well cannot be sited or placed in service within a half-mile of the designated boundaries of a listed federal or State Superfund site or Resource Conservation and Recovery Act corrective action site, unless the well owner can make a demonstration that the well will not enhance the movement of contaminated groundwater or materials into the shallow or deep aquifer.

5.03 -- Sanitary Protection of Wells

- A. All water used in the construction of a well shall be from an approved potable water supply. Water obtained from lakes, ponds, streams, and other such surface water sources is not approved and shall not be used in the well construction process.
- B. It shall be the responsibility of the well driller to protect the opening made in drilling the well against any foreign material or any other type of contamination from entering the opening.
- C. In the event a well becomes contaminated or obstructed, the well driller shall take whatever measures necessary to clear the well of contamination or obstruction. Should he decide to abandon the well for any reason, the well shall be filled in a manner prescribed by Section 9 of these Rules and Regulations.
- D. Whenever construction stops before the well is grouted and pumping equipment is installed, the open annular space shall be covered and the well casing capped. The cap shall be either threaded onto the casing secured by a friction type device which locks onto the casing, welded, or secured by such other device or method as may be approved by the Department. It shall be the responsibility of the owner to maintain the integrity of the protective device placed on the well opening by the well driller.
- E. A well shall be drilled to a size that will permit the outer casing to be surrounded by a water tight seal a minimum of two (2) inches thick. All wells

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

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

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

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

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

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

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

5.04 -- Construction Materials And Other Requirements

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

5.05 -- Sanitary Protection Of The Well Pumping Facilities

- A. A sanitary well seal that is water tight shall be provided at the terminal of any well casing in order to prevent any contamination from entering the well casing. The well casing shall terminate no less than one (1) inch above the foundation of the well.
- B. If the well is to be vented, it shall be required to have an inverted screened vent.
- C. The pump base foundation shall be reinforced, if the forces exerted are such that reinforcement is required, and shall be a minimum of two (2) inches larger than the base plate. The concrete used shall be of a strength suitable to withstand any vibrations, etc., to which it may be subjected.

- D. All water wells shall be provided with a readily accessible faucet or tap on the well discharge line at the well head for the collection of water samples.
- E. Where pitless adapters are used, they shall be required to meet National Sanitation Foundation (NSF) specifications for subsurface installations and shall bear the NSF seal.
- F. The water tight casing or curbing of any well shall extend not less than six (6) inches above the established ground surface or twenty-four (24) inches above the maximum high water level where flooding occurs.
- G. Any oil-lubricated pump installed in a well shall utilize oil or grease lubricants which carry a USDA H-1 rating. The installer must supply the Department documentation to verify that the lubricant used has an H-1 rating.

5.06 -- Maintenance of Wells

- A. Wells shall be maintained in an operative condition at all times in order for water samples to be collected for analytical purposes.
- B. A source of power shall be made available to the well either by a permanent connection or by way of a temporary source such as a generator.
- C. All wells shall be maintained in a condition whereby they are not a hazard to health or environment nor a source of potential contamination to the groundwater aquifers.
- D. When a well is determined to be abandoned as defined by these Rules and Regulations, the owner shall be ordered to seal the well in accordance with the requirements of the Department.

5.07 -- Disinfection of Wells

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

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

5.08 -- Sampling of a Well

- A. After a well has been drilled, modified, or repaired, a negative bacteriological sample shall be obtained prior to placing the well into service.
- B. A well shall not be connected into a premise until a sample has been collected which produces negative bacteriological results.
- C. If a sample collected from a newly constructed well is positive for E. coliform bacteria, it shall be the well driller's responsibility to take whatever steps are necessary to properly disinfect the well. Two (2) consecutive bacteriological samples producing negative results must be obtained prior to placing the well into service.
- D. Whenever a well is repaired or modified, it shall be the responsibility of the well driller to notify the Department upon completion of work to sample the well for bacteriological purity. It shall be the well driller's responsibility to properly disinfect the well upon completion.

Section 6 -- MONITORING AND RECOVERY WELLS CONSTRUCTION STANDARDS

6.01 General

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

- B. All wells shall be constructed in a manner that will guard against contamination of the groundwater aquifers underlying Shelby County. No person shall construct, repair, modify, or abandon or cause to be constructed, repaired, modified, or abandoned any well contrary to the provisions of these Rules and Regulations.
- C. Within thirty (30) days after well construction the well driller or authorized contractor responsible for well installation shall submit a well drillers log for every well installed at a site. Any sample analysis results for a monitoring or recovery well shall be submitted with the logs of the well.

6.02

Siting Criteria

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

6.03

Sanitary Protection of Wells

- A. All water used in the construction of a well shall be from an approved potable water supply. Water obtained from lakes, ponds, streams and other such surface water sources is not approved and shall not be used in the well construction process.
- B. It shall be the responsibility of the well driller to protect the opening made during the drilling and to prevent any type of contamination from entering.
- C. Should a well be abandoned for any reason, the well shall be filled in a manner prescribed by Section 9 of these Rules and Regulations.
- D. Whenever construction stops before the well is grouted the open annular space shall be covered and the casing capped. The casing cap shall be either threaded onto the casing, secured by a friction type device which locks onto the casing welded or secured by such other device or method as may be approved by the Department. It shall be the responsibility of the owner to maintain the integrity of the protective device placed on the

well opening by the well driller.

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

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

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

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

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

The grout mixture may be pumped from the surface when:

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

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

- H. The borehole shall not hydraulically connect separate aquifers.

6.04 -- Construction Materials And Other Requirements

- A. All materials, components, parts, etc., used in the installation of a monitoring or recovery well, such as the casing, screen, pumping equipment, pressure tank, wiring, pipe and other such components, must comply with the standards as established in the RULES OF THE TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION, DIVISION OF WATER SUPPLY, CHAPTER 1200-4-10, entitled WELL CONSTRUCTION AND ABANDONMENT STANDARDS. When deemed necessary, the Department may require standards and specifications to be more stringent than those required by the State of Tennessee.
- B. The well shall be backfilled to a point, a minimum of two (2) feet above the top of the screen with filter sand, followed by a minimum of two (2) feet bentonite pellet seal above, which shall be grouted in accordance with Section 6.03.
- C. All piping materials shall be flush joint and threaded pipe. No solvent weld cements or other components shall be allowed. End points shall have threaded ends or be riveted on. Slip on ends are not allowed. Top caps shall be threaded or have some type of locking feature.
- D. Bentonite pellets shall have a maximum size of one quarter (1/4) inch to prevent bridging and shall then be activated with potable water.

6.05 -- Protection of the Well

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

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

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

6.06 -- Maintenance of Wells

- A. Wells shall be maintained in an operative condition at all times in order for water samples to be collected for analytical purposes and shall have at least one (1) keyed lock to prevent tampering. Because of the potential for surface runoff to enter the below grade protective structure and/or well, installation of a removable cover with a flexible o-ring or gasket attached at the point where the cover fits over the protective structure and/or well will be necessary to prevent surface runoff from entering the well.
- B. All wells shall be maintained in a condition whereby they are not a hazard to health or environment nor a source of contamination to the groundwater aquifers.
- C. When a well is determined to be abandoned, as defined by these rules and regulations, the owner shall be ordered to seal the well in accordance with the requirements of Section 9 of these regulations.

Section 7 -- SOIL BORINGS

7.01 -- Regulations

- A. Any soil boring of thirty (30) feet or less shall not require a permit or require professional supervision for the purposes of this ordinance.
- B. All borings to a depth greater than thirty (30) feet but less than one hundred (100) feet shall require a permit and must be under the supervision of a licensed water well driller or an engineer or geologist registered in the

State of Tennessee. An application must be submitted to the Department prior to the permit being issued. A plot plan showing the proposed soil boring must also be submitted along with the application.

- C. Modifications to the permit related to the number of borings and depth not to exceed one hundred (100) feet, may be made at the discretion of the licensed well driller, engineer or geologist on the site. Details of these changes shall be included in the final report within thirty (30) days of job completion.
- D. All borings in excess of one hundred (100) feet must be permitted by the Memphis and Shelby County Health Department and be under the supervision of a licensed well driller, an engineer or a geologist registered in the State of Tennessee.
- E. Any soil boring that is converted to a monitoring well after being permitted as a soil boring will be required to apply for a permit as a monitoring well.

7.02 -- Closure of Boreholes

- A. All shallow boreholes, up to thirty (30) feet, shall be filled with the material taken from the hole or like material.
- B. For medium depth holes, thirty (30) feet to one hundred (100) feet, the log may be consulted before the method of filling is determined. For cases when the boring does not encounter water, fill shall be as noted in Section 7.02 A. above. When water is encountered the boring shall be filled in accordance with Section 7.03 C. below, or with bentonite pellets which will not dissolve for a minimum of thirty (30) minutes, to a depth of not less than two (2) feet above the upper stratum in which the water was encountered. Completion of the filling of the borehole shall be with the material from the boring as in 7.02 A above. The placement of the bentonite shall depend upon the method of drilling and whether the hole stands open. When the hole is open above the water bearing material the bentonite pellets may be dropped

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

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

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

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

Section 8 -- INSPECTIONS

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

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

- B. When during construction, modification, repair, or abandonment of any well the Department finds the work is not being done in accordance with rules, regulations and standards as required the Department shall give the owner and well driller written notice stating which rules, regulations or standards are being violated. At such time the Department may order that necessary corrective action be taken within a reasonable time to be prescribed in such order. Any such order shall become final unless the person or persons named therein requests, by written petition, a hearing before the Board no later than fourteen (14) days after the date such order is served. Failure to act in accordance with the order of the Department after receipt of written notice shall be grounds for revocation of the permit.
- C. All private water supplies shall be subject to inspection by the Department and when deemed necessary, said supplies shall be made available for the collection of samples in order to determine the purity of the supply. When a water sample is found to have contamination the owner shall be required to take whatever steps necessary to correct the contamination problem.
- D. All wells shall be subject to inspection by the Department and shall be made available for the collection of samples in order to determine the purity of the supply.

Section 9 -- ABANDONMENT OF WELLS

9.01 -- General Requirements

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

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

- A. All abandoned wells shall be filled with Portland cement grout, a high solids bentonite grout, or a Portland cement grout and bentonite combination in such a way that they do not produce water or act as a conduit for the interchange of waters of undesirable quality with those whose quality is desirable, or present a hazard to the safety and well being of people and/or animals.
- B. The owner shall submit a plan to fill at the owners expense any abandoned or condemned well within thirty (30) days after receipt of notice from the Department.
- C. All abandoned wells shall be filled only by a person having a valid drillers license from the Tennessee Department of Environment and Conservation, or be an engineer or geologist registered with the State of Tennessee.
- D. Within thirty (30) days of filling an abandoned well, the driller, engineer or geologist responsible for the well abandonment shall submit to the Department a well abandonment report. The report must be completely filled out and signed by the authorized contractor responsible for well abandonment.
- E. The Department may require any well owner to have an abandoned well sealed when the well:
 - 1. is contaminated;
 - 2. is a potential source of contamination to the groundwater aquifers underlying Shelby County;
 - 3. is not maintained in an operative condition for the purpose of collecting samples.
- F. Observation and monitoring wells being actively used for the investigation or management of groundwater by federal, state or local governmental agencies or research

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

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

9.02 -- Sealing And Fill Materials

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

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

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

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

Department as appropriate grouting material.

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

9.03 -- Abandonment Procedures

- A. Prior to filling the well, a plan shall be submitted within thirty (30) days containing a description of the general condition of the well. All available information about the construction of the well or information that any obstructions exist which would interfere with the filling and sealing process of the well shall be submitted with the application. Should any obstructions exist they shall, if practical as determined by the Department, be removed by cleaning out the hole or redrilling.
- B. All wells shall be filled with the required sealing or fill materials from the bottom of the well up, by methods that avoid separation or dilution of the seal material.
- C. The grout shall be pumped into the well through a tremmie pipe in one continuous operation.
- D. The tremmie pipe may be moved upward as the well is filled from the bottom up, if the pipe extends at least one (1) foot into the seal material.
- E. Before abandonment procedures begin an abandoned well shall have all pumping or plumbing equipment removed to insure freedom from obstructions that may interfere with the sealing operation.
- F. The well shall be chlorinated prior to sealing by addition of sufficient quantities of liquid bleach or dry hypochlorite granules.

Section 10 -- CROSS CONNECTION CONTROL

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

- A. All cross connection requirements for private

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

Section 11 -- LIMITATION ON USE OF WATER

- A. Water pumped by private and/or quasi-public water supplies for residential, commercial and industrial purposes shall be limited to reasonable use.
- B. The waste of groundwater from water wells by way of continual discharges or from any type of equipment utilizing well water shall not be permitted.
 - 1. Any person requesting a permit to construct a water well for use in an underground heat pump system; in retaining levels of lakes, ponds, or similar bodies of water; in commercial and industrial processes; irrigation; or in any other uses whereby a continual groundwater discharge may occur shall limit such discharges by taking conservation steps established by the Department. Failure to comply with this section shall result in the rejection of the permit application.
 - 2. Any person having an existing well whereby a continual discharge occurs shall be required to take whatever conservation steps the Department may deem necessary to prevent such discharges. Failure to comply with this section is a misdemeanor and upon conviction the violator shall be fined a minimum of twenty-five (\$25.00) dollars per day up to a maximum of five hundred (\$500.00) dollars per day with each day such violation of this section occurs constituting a separate offense.
- C. The Department shall take whatever steps it deems necessary to conserve groundwater obtained by way of private water supplies for cooling, refrigeration and air conditioning

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

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

Section 12 -- AVAILABILITY OF PUBLIC WATER

12.01 -- Public Water Available To A Premise

- A. Public water shall be deemed available to a premise other than a subdivision when it is located within three hundred (300) feet of said premise.
- B. When proposed subdivisions are comprised of premises used or intended for human habitation or other establishments where a water supply is or may be used for human consumption and where such subdivision is located within one quarter (1/4) mile of public water distribution facilities in existence in a dedicated right-of-way, the developer of such subdivision shall extend the water supply mains and connect all lots thereto.
- C. The distance between an existing water main in a dedicated right-of-way and a premise or proposed subdivision shall be measured by an actual or imaginary straight line upon the ground or in the air between the point within the premise or subdivision nearest to the existing water main in dedicated right-of-way and the point where the existing water main in a dedicated right-of-way comes into closest proximity with the premise or proposed subdivision.
- D. The connection to a public water supply shall be made in accordance with the requirements of all applicable rules and regulations of any

county, state, or municipal agency having jurisdiction thereof.

- E. The provisions of this section relate to single-family, multi-family, commercial and industrial-zoned lots and are applicable to new subdivisions, and existing subdivisions which are unplatted or unrecorded.
- F. The provisions of this section shall not apply when a utility cannot provide a public water distribution system due to the utility's franchise limitation or the inability or unwillingness of a city to extend its public water distribution system.
- G. The construction of a well shall not be permitted at a premise where public water is available and which said water supply has a yield and pump capacity to provide the quantity of water which the user has stated is necessary for purposes for which the water is intended to be used unless otherwise provided by this code.
- H. When a public water system (pws) is available to a residential premise the potable water shall be obtained from the public water system. A well may be approved by the Department for construction on a residential premise where public water is available under the following circumstances:
 - 1. For filling a lake, providing such lake, pond or similar continuous body of water is not less than one (1) acre in size, with the total parcel of land being no less than four (4) acres in size.
 - 2. For irrigation, provided such parcel of land is no less than four (4) acres in size.
 - 3. For watering livestock, provided the parcel of land to be served is no less than four (4) acres in size.
- I. A well may be approved by the Department for construction on a commercial and/or industrially zoned premise where public water is available, provided the owner demonstrates to the Department that no reasonable

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

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

12.02 -- Public Water Not Available To A Premise

- A. Public water shall be deemed not available to a premise if it is located a distance greater than three hundred (300) feet of said premise.
- B. Public water may be deemed not available to a ppremise if the topography and land surface features are such that they economically or structurally prevent connecting to public water.

12.03 -- Auxiliary Intake

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

Section 13 -- INJECTION WELLS

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

Section 14 -- VARIANCES

14.01 -- Existing Wells

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

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

14.02 -- Appeals -- Procedure

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

- A. The Board shall have and exercise the power, duty and responsibility to hear and decide all matters concerning a variance to or an exception taken to any decision, ruling, requirement, rule, regulations or order of the Board or the Department. Such appeal shall be made within fifteen (15) days after receiving notice of such decision, ruling, requirement, rule, regulation, or order by filing a written notice of appeal directly to the Board specifying the grounds thereof and the relief requested. Such an appeal shall act as a stay of decision, ruling, requirement, rule, regulation, or order in question until the Board has taken final action on the appeal, except when the Department has determined that a health hazard exists. The Board shall, not less than thirty (30) days after the date of the receipt of the notice of appeal, set a date for the hearing and shall give notice thereof by certified mail to the interested parties.
- B. Hearing before the Board shall be conducted in the following manner:
 - (1) The technical secretary of the Board or his/her representative shall act as the hearing officer to conduct such hearing.
 - (2) Any person making an appeal may appear in person or by agent or attorney and present evidence, both written and/or oral, pertinent to the issues involved and may examine and cross-examine witnesses.
 - (3) All testimony shall be presented under oath and recorded. The Board is

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

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

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

Section 15 -- RULES AND REGULATIONS OF THE DEPARTMENT

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

Section 16 -- CONSTITUTIONALITY OF ORDINANCE

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

Section 17 -- CONFLICT OF LAWS

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

Section 18 -- ENFORCEMENT AND PENALTIES

18.01 -- Enforcement

- A. If the Department determines that the holder

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

- B. The Department may petition a court of competent jurisdiction for injunctions or other appropriate relief to enforce the provisions of these Rules and Regulations. The attorney of the appropriate jurisdiction shall represent the Department when requested to do so.
- C. Any person who willfully violates any of the provisions of these Rules and Regulations is guilty of a misdemeanor.
- D. Any well owner who knowingly causes or permits a hazardous or potentially hazardous condition to exist due to well construction or any other reasons as outlined in these Rules and Regulations which could cause deterioration of groundwater aquifers in the system shall forfeit his right to an approved, certified permit. He shall also be liable to enforcement action.

18.02 -- Penalties

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