



THE MEMPHIS DEPOT TENNESSEE

ADMINISTRATIVE RECORD COVER SHEET

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TECHNICAL MEMORANDUM

CH2MHILL

Draft Field Sampling Plan Addendum for Operable Unit (OU) 2

TO: Tennessee Department of Environment and Conservation (TDEC)
EPA Region IV
Memphis Depot Caretaker
US Army Corps of Engineers, Huntsville

FROM: CH2M HILL

DATE: August 18, 1998

Introduction

As part of a continuing program of evaluating its hazardous waste management practices, the United States Army is performing Remedial Investigations/Feasibility Studies (RI/FS) at the Defense Distribution Depot Memphis Tennessee (DDMT). Previously completed site investigations at DDMT have confirmed the existence of contamination, and RI/FS investigations are underway to determine the extent of this contamination and appropriate remedial actions at the Main Installation, which consists of Operable Units 2, 3, and 4 (OU-2, 3 and 4). This Technical Memorandum presents a sampling plan for additional environmental characterization of surface soil, subsurface soil, surface water and sediment, and some site-specific groundwater locations. The environmental sampling proposed herein is based on a review of the initial Main Installation sampling. Additional groundwater characterization of the entire Main Installation Fluvial Aquifer was proposed in to the BCT in a Technical Memorandum issued on May 8, 1998, and further discussed in the June, 1998, partnering meeting.

DDMT has initiated a series of environmental contamination investigations and remediation projects under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Base Realignment and Closure Act (BRAC). The sites investigated fall into three categories:

1. Screening Sites where environmental contamination was suspected but not confirmed. The objective of the environmental sampling was to determine if a release to the environment had occurred and therefore sample locations were biased to areas where releases would have been suspected.
2. RI sites where existing environmental contamination was evaluated for nature and extent. The objective of the environmental sampling was to evaluate the type of contamination and its horizontal and vertical extent.
3. Base Relocation and Closure (BRAC) property parcels where environmental sampling was performed to determine if the property was suitable for transfer or lease. The objective of the BRAC sampling was to determine if chemicals existed in the surface soil

and subsurface soil in concentrations that might present a concern for industrial and, in the case of Parcel 2, residential uses.

A Field Sampling Plan (FSP) was approved for OU- 2 in 1995, and the field investigation implementing this plan occurred in late 1996 and early 1997. Results of the field investigations were presented in a series of Letter Reports in 1997 and 1998. The data were also reviewed by the BRAC Cleanup Team (BCT) during a series of meetings in the summer and fall of 1997 wherein recommendations on additional characterization were made and documented in the meeting minutes.

During these meetings, the BCT determined that a comprehensive and conservative risk-based approach to evaluating the environmental data was needed. Following EPA Region IV guidance on performing a preliminary risk assessment, a Preliminary Risk Evaluation Report (CH2M HILL, 1998) was prepared on a BRAC parcel and CERCLA site basis. The risks calculated in the Preliminary Risk Evaluation (PRE) were also used as a basis for requiring additional sampling.

A series of sites was proposed for Early Removal (ER) action in the 1995 FSP, prior to inclusion of DDMT in the BRAC program. Most of these sites are in Dunn Field, only three were identified in the Main Installation. The requirements for early action have changed under BRAC, focusing on expedited removals for sites in parcels that are a priority for lease or transfer. Characterization of these sites is proposed prior to ER action.

Methodology

Data from the Screening Sites and RI Results of the field investigations, the BRAC Sampling Recommendations (Woodward Clyde, 1996) and the results of the Preliminary Risk Evaluation (CH2M HILL, 1998) were reviewed in preparation for updating the FSPs. CH2M HILL's risk assessment staff reviewed the updated risk-based screening levels and all the available data to ensure that enough were available to complete the risk assessment before preparing the revised FSPs for each site presented below.

In addition, CH2M HILL staff field verified the proposed sampling locations, and staking and photographing each proposed sample location.

The collection of additional data is generically proposed to satisfy one of the following considerations.

Sufficient Number of Data Points. The number of usable data points was tabulated to assess whether a sufficient number existed to perform a risk assessment. Specific criteria used were if there was enough of data points to support a statistical estimate of the exposure concentration at each site and if the analytical methods were sufficient to characterize the site. If an insufficient data population existed for a site, additional data has been proposed.

Definition of the Extent of Contamination. Results of the field investigations indicated some samples at a site that exceeded the screening criteria for certain parameters. The configuration of these samples was reviewed to assess whether additional samples were needed to adequately characterize the extent of the area exceeding health-based criteria.

Characterization of the Nature of Contamination. If earlier sampling at a site indicated the presence of a contaminant in some of the samples, sampling for additional types of contamination may need to occur.

Assurance of Absence of Contamination. A sufficiently broad spectrum of analyses is also necessary to fully understand the nature of contamination at each site. If a site is judged free of contamination, the number of samples and the suite of analyses should be reviewed for adequacy. The current knowledge of recent past use may not be an adequate indicator of the potential contaminants at a site.

Evaluation of Groundwater Contamination. At some sites, surface and subsurface soil concentrations exceed criteria that signify the potential for transfer from soil to groundwater via leaching. Additional subsurface soil sampling may be proposed or grab samples of groundwater may be obtained to directly determine if an impact to groundwater is occurring.

Sufficiency for Feasibility Studies. Feasibility samples are proposed at sites where remedial activities are likely and data are needed to evaluate the feasibility of different remedial technologies. If, for instance, surface soil at a particular site contains elevated concentrations of arsenic and subsurface soil does not, then samples would be collected from 0 to 6 inches, 6 to 12 inches and 12 to 18 inches to determine if removing the surface soil was a feasible remedial option. TCLP samples may be collected to determine if the surface soil could be covered without the risk of the contaminants leaching to the groundwater. Geotechnical samples may be collected to evaluate if other technologies such as soil vapor extraction, solidification or other engineering control may be applicable at the site. Geotechnical testing will include grain size distribution, moisture content, pH, alkalinity, cation exchange capacity, and total organic carbon.

Changes to Field or Laboratory Methods

EPA has promulgated a change in the methods used for collection and analysis of VOCs in soil. The sampling proposed in this addendum to the FSP incorporates this methodology for VOC analysis of soils. Previous methods have demonstrated a significant low bias in the quantitation of VOC's in soil samples (EPA, 1997).

The samples collected as part of the 1995 FSP's were analyzed by the traditional "purge and trap" procedures outlined in Update II to SW-846 (Method 5030A, Revision 1, 1992). However, on June 13, 1997, Method 5030B and Method 5035 were promulgated in SW-846 Update III. This update removed the option to analyze soils / sediments by Method 5030 and replaced it with Method 5035, "Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Water Samples". Method 5035 has several options in sample collection: field preserving with methanol or sodium bisulfite or collecting in EnCore samplers and submitting to the laboratory for preservation within the specified 48 hours.

Revised Site Sampling and Analysis Plans

For each of the sites in this OU that require additional sampling, a synopsis of the revised sampling plan is presented below. A figure is presented for each site showing both the

previous sampling locations (including sampling performed by other firms) and any new sampling proposed in this addendum. A table for each site itemizes each new proposed sample, and provides the rationale and proposed suite of analyses.

Any Screening Sites that occur in this OU are presented in a separate FSP for Screening Sites. Early Removal (ER) and BRAC sites are presented in the OU in which they occur.

RI Site 27: Former Recoupment Area (Building S-873)

During the RI Sampling Program at this site, a few chemicals of concern (COCs) were detected in the surface soil. These COCs include PAH compounds, iron, vanadium, antimony and arsenic.

Additional samples are needed to confirm the presence of some of these COCs as well as the horizontal and vertical extent of contamination at the site. A total of ten surface soil samples (SS27K through SS27T) will be taken—to identify the extent of contamination along the foundation of Building S-873, south and southeast of the building. Three of these surface soil samples will be taken in the same location as previous surface soil samples to confirm the presence of a detected COC. The remaining surface soil samples will be collected to delineate horizontal contamination, especially north of the site along the railroad tracks. At each of the 10 surface soil sample locations, samples will be collected at depths of 0 to 12 inches. When applicable, the samples will be analyzed for PPM, PAH compounds and TAL. See Table 1 for specifics.

In addition to the surface soil samples, five shallow soil borings (SB27F through SB27J) will be installed to further assess the vertical and horizontal extent of PAH contamination at the site. Samples will be analyzed for PAHs using the Toxicity Characteristic Leaching Protocol (TCLP) to evaluate the potential for vertical migration. The borings will be taken to a depth of 10 ft. Samples from 0 to 1 foot depth will be analyzed for PAH and TCLP PAH to provide correlation between the two types of results and allow for a comparison of old and new data. Finally, fifteen more surface soil samples will be collected for feasibility study information to determine the depth of possible soil removal. The soils will be analyzed for PAH compounds and geotechnical parameters. These surface soil samples will be collected from five locations (FS27U through FS27X) at interval depths of 0 to 6 inches, 6 to 12 inches and 12 to 18 inches. See Figure 1 for location of new samples as well as previous samples taken at the site.

RI Site 32: Sandblasting Waste Accumulation Area

For Site 32, COCs detected in the surface soil include PAH compounds, PCBs, antimony, arsenic, chromium, lead, cadmium, dieldrin and DDT.

Additional samples are needed to characterize the extent of contamination from metals and pesticides at the site. Since RI Site 32 is located in the same vicinity as Screening Site 33, the additional samples to be taken at this site are discussed in the *Draft Addenda for the Screening Sites Field Sampling Plan*.

RI Site 34: Underground Waste Oil Storage Tanks

The lateral extent of PAHs needs further delineation at this site, and therefore four additional surface soil samples (SS34G through SS34J) are proposed to be taken from 0.0 to 1.0 feet in depth. The location of these samples is shown in Figure 2. Each of these samples will be analyzed for PAH compounds, as shown in Table 2.

BRAC Sites (30, 26, and 23): RR Tracks East of Building 970

COCs detected at these sites include arsenic, chromium, dieldrin, lead, antimony, barium, beryllium, cadmium, chromium, iron, PAH compounds and zinc.

Four additional samples are needed to delineate PAH contamination in surface soils, as shown in Figure 3. The samples will be collected from 0 to 12 inches. To complete the assessment of depth of soil contamination, three sample depths (i.e., 0.0 to 0.5, 0.5 to 1.0, and 1.0 to 1.5 ft.) will be sampled at two different locations and analyzed for PAH TCLP and geotechnical parameters (Table 3). The depth distributions will be used to assess soil quantities for remediation.

ER Site 87: DDT, Banned Pesticides (Building 1084)

Additional sampling is required at this site to investigate whether pesticides are present in the soil near Building 1084 (Table 4). Surface soil samples will be collected northwest, northeast and southwest of Building 1084 at depths of 0 to 12 inches (Figure 4). The samples will be analyzed for pesticides and PCBs.

Furthermore, six more surface soil samples will be collected just southwest and northeast of Building 1084 for Feasibility Study information. The samples will be collected from two locations at interval depths of 0 to 6 inches, 6 to 12 inches and 12 to 18 inches. These samples will also be analyzed for pesticides, PCBs and geotechnical parameters.

References

CH2M HILL. *Final Preliminary Risk Evaluation*. Prepared for United States Army Engineering Support Center, Huntsville, Alabama. April 1998.

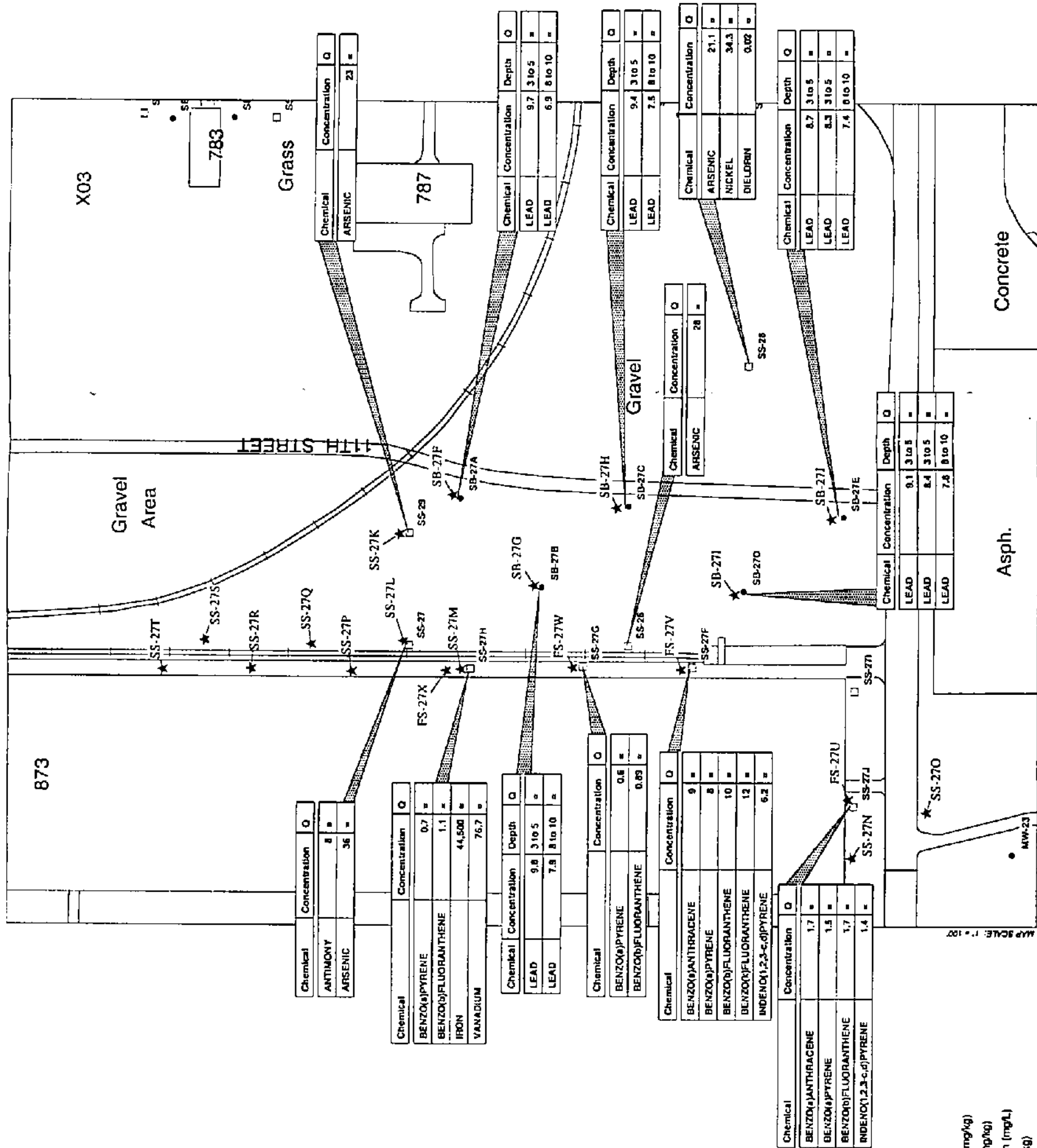
"Determination of Volatiles in Soil-Directive for Change", Memorandum from Norman Niedergang, Director, Waste, Pesticides and Toxics Division, U.S. EPA Region 5, December 22, 1997.

Woodward-Clyde. *Sampling and Analysis Recommendations*. 1996.

Table 1 Site 27, Former Backup Area Proposed Addition to Field Sampling Plan DOH# Delivery Order #1, Main Installation August, 1991														
Type of Site	OU No.	Parent Site No.	Site No.	Description	Sampling Objective	Proposed Sample ID	Sample Interval (ft)	Sample Location/Use	Analysis				Comments	
RI	2	25	27	Former Backup Area	Further delineate extent and continuity of the site, and confirm the presence of vanadium at SS-27H	SS-27N	0-1	At SS-27N for confirmation	BTEX					Surface soil contamination has not been detected in the northern area of site 27
						SS-27L	0-1	At SS-27L for confirmation	PPM Metals					
						SS-27H	0-1	At SS-27H for confirmation of Vanadium	VOC					
						SS-27N	0-1	West of SS-27J to delineate surface soil contamination	PAH					
						SS-27O	0-1	South of SS-27J to delineate surface soil contamination	PAH					
						SS-27P	0-1	North of SS-27 for horizontal delineation along RR tracks	VOC					
						SS-27O	0-1	North of SS-27 for horizontal delineation along RR tracks	PAH					
						SS-27R	0-1	North of SS-27 for horizontal delineation along RR tracks	PAH					
						SS-27S	0-1	North of SS-27 for horizontal delineation along RR tracks	PAH					
						SS-27T	0-1	North of SS-27 for horizontal delineation along RR tracks	PAH					
						SS-27U	0-1	North of SS-27 for horizontal delineation along RR tracks	PAH					
						SS-27V	0-1	North of SS-27 for horizontal delineation along RR tracks	PAH					
						SS-27T	0-1	North of SS-27 for horizontal delineation along RR tracks	PAH					
						SS-27U	0-0.5, 0.5-1.0, 1.0-1.5	At SS-27U to determine the depth of possible soil removal	PAH					
						SS-27V	0-0.5, 0.5-1.0, 1.0-1.5	At SS-27V to determine the depth of possible soil removal	PAH					
						SS-27W	0-0.5, 0.5-1.0, 1.0-1.5	At SS-27W to determine the depth of possible soil removal	PAH					
						SS-27X	0-0.5, 0.5-1.0, 1.0-1.5	At SS-27X to determine the depth of possible soil removal	PAH					
						SS-27F	0-1, 3-5, 8-10	Near SS-27F to obtain PAH concentration data	PAH compounds					
						SS-27G	0-1, 3-5, 8-10	Near SS-27G to obtain PAH concentration data	PAH compounds					
					SS-27H	0-1, 3-5, 8-10	Near SS-27H to obtain PAH concentration data	PAH compounds						
					SS-27I	0-1, 3-5, 8-10	Near SS-27I to obtain PAH concentration data	PAH compounds						
SS-27J	0-1, 3-5, 8-10	Near SS-27J to obtain PAH concentration data	PAH compounds											

Table 2 Site 34 - Underground Waste Oil Storage Tanks Proposed Addendum to Field Sampling Plan DDMT Delivery Order 11 - Main Installation August, 1998																
Type of Site	OU No.	Parcel No.	Site No.	Description	Sampling Objective	Proposed Sample ID	Sample Interval (ft)	Sample Location/Basis	Analyses							Comments
									BTEX	Metals	VOC	PAH	Pest/PCB	TAL	TCL	
RI	2	24	34	Underground Waste Oil Storage Tanks	Delineate lateral extent of PAHs	SS-34G	0-1	Approximately 50 ft north east of SS-34F				1				
						SS-34H	0-1	Approximately 40 ft west of SB-34A				1				
						SS-34I	0-1	Approximately 50 ft south of SB-34A				1				
						SS-34J	0-1	Approximately 50 ft south of SS-34E				1				

Table 4 Site #7 - DDT, Banned Pesticides (Building 1084) Proposed Addendum to Field Sampling Plan DDMT Delivery Order II - Main Installation August, 1993																		
Type of Site	OU No.	Parcel No.	Site No.	Description	Sampling Objective	Proposed Sample ID	Sample Interval (ft)	Sample Location/Basis	Analyses							Comments		
									BTEX	PPM	VOC	PAH	Pest/PCB	TAL	TCL			
ER	2	35	87	DDT, Banned Pesticides (Building 1084)	Investigate if pesticides are present in soil near Building 1084	SS-87A	0-1	Just northwest of building 1084						1				
						SS-87B	0-1	Just northeast of building 1084					1					
						SS-87C	0-1	Just southwest of building 1084					-	1				
					Feasibility Study Information	FS-87A	0.0-0.5, 0.5-1.0, 1.0-1.5	Just northeast of building 1084							3			Collect geotechnical suite and pesticide TCLP from 0 to 1.5 ft composite
						FS-87C	0.0-0.5, 0.5-1.0, 1.0-1.5	Just southwest of building 1084								3		

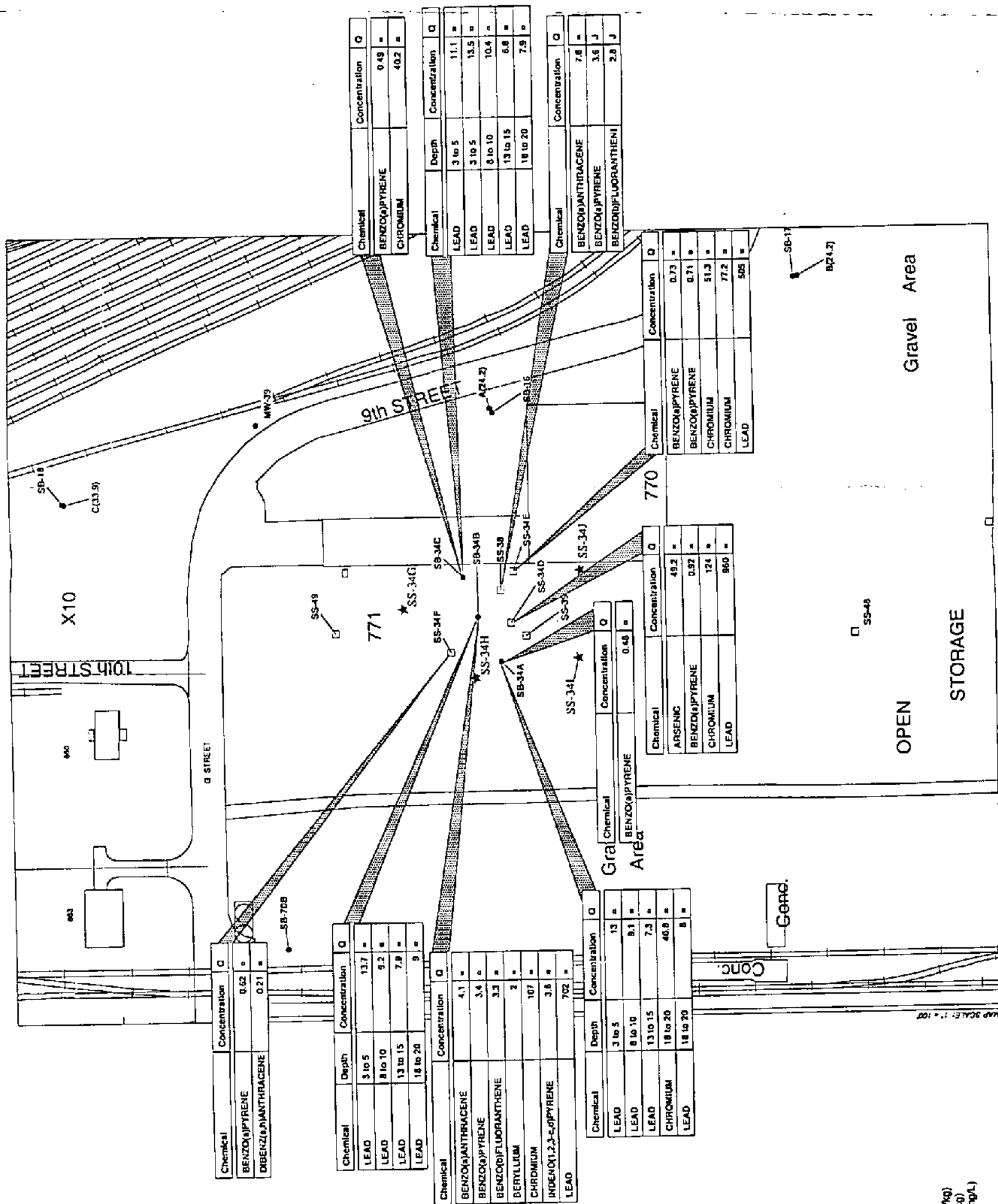


LEGEND

- Surface Soil Sampling Location (mg/kg)
- Soil Boring Sampling Location (mg/kg)
- Surface Water Sampling Location (mg/L)
- ★ Sediment Sample Location (mg/kg)
- ★ Proposed Sampling Location
- (Q) Qualifier Definitions
 - indicates unqualified detection
 - J - indicates estimated value above detection limit, but below reporting limit.

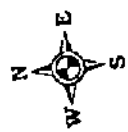
Figure 1
RI Site 27, Former Recoupment Area (bldg S-873)
Constituents Exceeding Risk-Based Criteria
Defense Distribution Depot Memphis, TN

Sampling locations without data boxes had no constituents exceeding risk-based criteria



LEGEND
□ Surface Soil Sampling Location (mg/kg)
● Soil Boring Sampling Location (mg/kg)
○ Surface Water Sampling Location (mg/L)
○ Sediment Sample Location (mg/kg)
○ Proposed Sampling Location

(Q) Outlier Definitions
- - - indicates unqualified detection
J - indicates estimated value above detection limit, but below reporting limit.



Sampling locations without data boxes had no constituents exceeding risk-based criteria

Figure 2
RI Site 34, Underground Waste Storage Oil Tanks
Constituents Exceeding Risk-Based Criteria
Defense Distribution Depot Memphis, TN

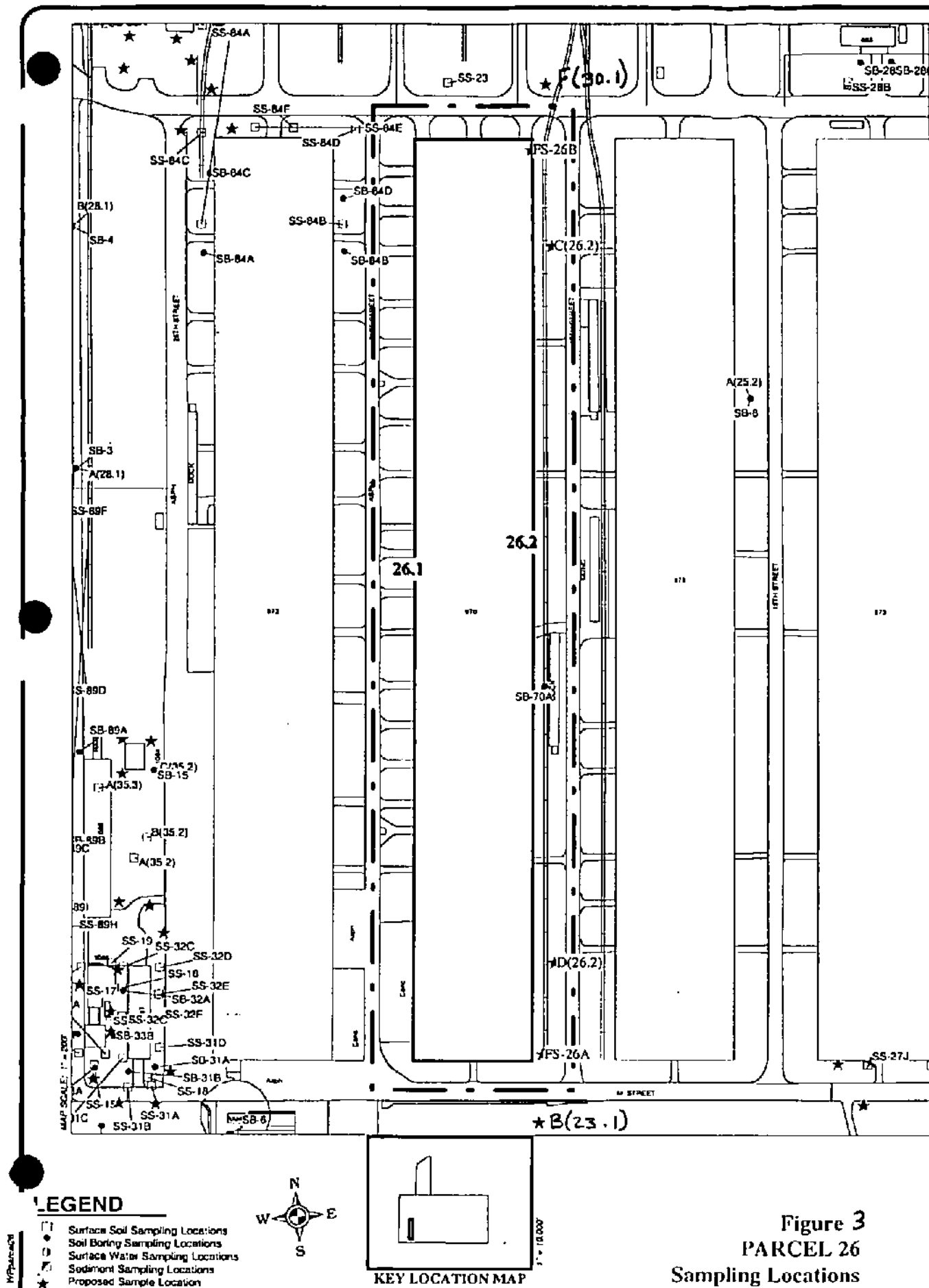
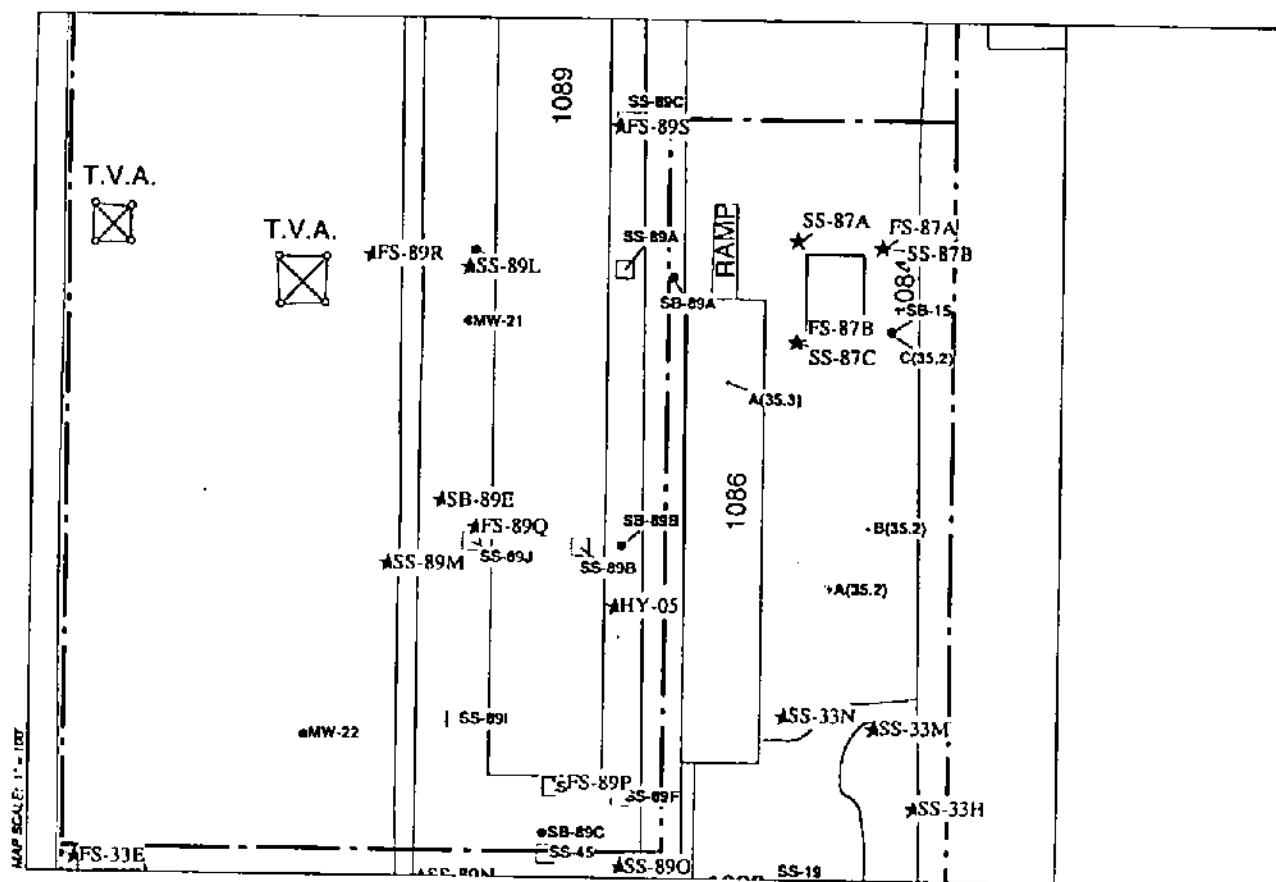


Figure 3
PARCEL 26
Sampling Locations



LEGEND

- Surface Soil Sampling Locations
- Soil Boring Sampling Locations
- Surface Water Sampling Locations
- ▣ Sediment Sampling Locations
- ★ Proposed Sampling Location

Figure 4
Site 87, DDT, Banned Pesticides
Sampling Locations

Defense Distribution Depot Memphis, TN

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