



# THE MEMPHIS DEPOT TENNESSEE

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## ADMINISTRATIVE RECORD COVER SHEET

AR File Number 133

## TECHNICAL MEMORANDUM

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CH2M HILL

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**PREPARED FOR:** John Romeo/CEHND  
Ernest White/CEHND  
Julett Denton/CEHND  
Scott Bradley/CEHND  
Mike Dobbs/DDRE  
Denise Cooper/DDMT

**PREPARED BY:** Edward R. Underwood/WDC

**COPIES:** Mark Corey/MGM  
Leslie Shannon/MGM  
Mark Nielsen/ATL  
Hunter Sartain/MGM  
Mike Harris/ATL  
Greg Underberg/ORO

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Tennessee, Early Removal Task

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### Introduction

The goal of the early removal (ER) program at the Defense Depot Memphis, Tennessee (DDMT), is to remove selected sites as soon as possible, thus expediting cleanup of potential sources of contamination. This concept uses the observational approach that includes a flexible design, in-process monitoring, and as-needed adjustments when remediation develops. Certain elements of information are needed to reasonably scope, specify, and identify contingencies for monitoring and controlling the work, no matter how flexible the design is. This "essential design information" must at least identify to a reasonable degree the location and size of the site, the scope of the work, the presence of obstructions, and special design and safety concerns for which the contractor must plan and bid.

This technical memorandum (TM) summarizes the available essential design information for ER and identifies areas where additional information is needed. This review, however, is limited to information pertaining to the 17 sites listed in CH2M HILL's March 10, 1995, TM on ER site selection (Sites 2, 3, 4, 4.1, 5, 7, 8, 12, 12.1, 13, 16, 16.1, 17 and 85 at Dunn Field; and Sites 29, 87, and 88 at the Main Facility). Two additional Dunn Field sites (Sites 60 and 62) were added to the ER list on September 6, 1995. This TM is based on the results of site visits by CH2M HILL and a review of information from publications and maps of the ER areas.

## Physical Conditions, Dunn Field Sites

### Dunn Field Burial Sites

The northwestern quadrant of Dunn Field was used as a burial site for various materials. The materials included chemical warfare materials (CWM), destroyed or buried ordnance, chemicals, acids, medical supplies, ash, and refuse. Locations of many of the burial sites and a description of the types of wastes buried are shown on the Memphis General Depot Drawing, LOCATION OF MATERIALS BURIED IN DUNN FIELD, dated January 19, 1956, and revised seven times to September 17, 1984. Varied topics on the locations of ordnance, explosive waste, and CWM materials are described in the January 1995 Archives Search Report by the U.S. Army Corps of Engineers, St. Louis District. The Corps of Engineers is conducting additional studies to identify the potential hazards and special measures required for any intrusive work, including ER operations, in the identified areas of Dunn Field.

The October 31, 1990, Revisions to the Feasibility Study by Law Engineering was reviewed. This report essentially duplicates information from other sources but includes useful sampling information.

The U.S. Army Corps of Engineers Waterways Experiment Station conducted electromagnetic and magnetic surveys of Dunn Field to determine if these methods could be effective in locating former disposal areas. The Corps of Engineer's final report *Electromagnetic and Magnetic Surveys of Dunn Field, Defense Depot Memphis, Tennessee*, dated March 1994, reports many anomalous areas that do not correspond with the locations nor the configurations of recorded locations of known trenches in the area (Figure 1). There is some question, however, about the meaning of this information. The report concluded that there are potential burial sites in five of six areas surveyed, although only one of those areas was known to have contained disposal sites. Even at that one site, six locations were identified that could represent disposal areas in addition to those that are currently known to exist.

CH2M HILL conducted field observations on August 18, 1995. The observations indicated many surface irregularities and depressions, suggesting possible burial sites in the northwest quadrant of Dunn Field. Many of the irregularities and depressions appeared to correspond with the mapped waste areas while others did not. Engineers from CH2M HILL revisited the site on October 24, 1995, and mapped the irregularities and depressions noted during the earlier visit. The results of the mapping (Figure 2) confirm that many of the field-identified depressions and irregularities correspond well with previously mapped burial sites, including most ER sites, at Dunn Field. There are also several other areas where mapped depressions and irregularities do not correspond with the mapped burial sites nor with the anomalies noted during the 1994 electromagnetic and magnetic surveys (Figure 3) at Dunn Field.

Base utility maps (U.S. Army Corps of Engineers, Mobile District, October 1, 1991) do not show electrical, water, or telephone service in the northwestern quadrant of Dunn Field. The maps do show Tennessee Valley Authority (TVA) power towers and high-voltage transmission lines along the southern part of the quadrant. Storm drainage structures are also

present in the area with one pipe actually passing beneath some of the mapped CWM and ER sites.

CH2M HILL's March 1995 TM on ER site selection describes conceptual removal scenarios for ER sites at Dunn Field. The scenarios are based on interpretations of the information mentioned previously and assumptions based on probable burial methods and waste forms, and removal, handling, and disposal methods likely to be used. Assumptions and removal scenarios are provided for all ER sites at Dunn Field, except for Sites 60 and 62, which were added to the ER list after the selection TM was completed.

In summary, there is sufficient mapping and field evidence to locate most of the current ER sites on the northwestern quadrant of Dunn Field. Little additional information is available about the depth or condition of buried waste; although reasonable assumptions have been made using probable burial methods and conditions.

Observed surface irregularities and geophysical data indicate the potential that other unmapped burial sites may be present in the northwestern quadrant of Dunn Field. This condition should be investigated further because of the disposal history at Dunn Field, which includes buried CWM and ordnance. This finding could significantly change the scope, difficulty, and safety of ER and other intrusive work at Dunn Field.

#### **Sites 60 and 85--Range Complex, Northeastern Quadrant, Dunn Field**

The northeastern quadrant of Dunn Field contains two ER sites: Site 60, an old pistol range, and Site 85, a range shed used most recently for storing pesticides. The January 1995 Archives Search Report states that the area surrounding Sites 60 and 85 has had little disturbance, except for the burial in 1947 of approximately 300,000 pounds of XX-CC-3 Impregnate approximately 150 feet to the east and a potential burial site (an unidentified cleared area in a 1958 aerial photograph) approximately 150 to the north of the range.

Discussions with the base engineering department indicate that as-built drawings may be available for both sites. The base engineering department will locate, copy, and send these drawings to CH2M HILL. Base utility maps do not show any utilities or storm drainage features in this quadrant of Dunn Field. With the data available, little additional information is needed to develop ER plans and specifications for Sites 60 and 85.

#### **Site 62--Bauxite Piles, Northeastern Quadrant, Dunn Field**

Site 62 contains two above-grade and covered bauxite piles, which have been added recently to the ER list. CH2M HILL understands that DDMT may have these piles removed and that the ER part of the work would be limited to confirmatory sampling and removal of residues.

Little information is needed to scope or design ER because Site 62 is to the north and to the east of areas where hazardous materials or CWM reportedly have been buried. However, performing any associated work (for example, staging areas) or extending the scope of work into the quadrants to the south or southwest should be evaluated for potential below-grade hazards. Extending the scope of work may be necessary because the 1995 Archives Search Report indicates that hazardous materials or CWM may exist in those areas.

Base utility maps do not show utilities or stormwater culverts in Site 62. Because of water service nearby in the southeastern quadrant and drainage culverts in the southeastern and southwestern quadrants, extending the work into those quadrants would have to be considered. High-voltage TVA power lines are the only other utilities shown near Site 62. The power lines may be close enough to the work site to be unsafe for operating drilling rigs, cranes, backhoes, and similar equipment.

### Physical Conditions, Main Installation Area

Three ER sites are currently listed on the main installation: Sites 29, 87, and 88. All are located in proximity to each other along 27th Street. Because of their proximity, they can easily be developed as a single design unit.

#### Sites 88 and 29

Site 88 is an old concrete grease rack and a storage area for petroleum, oil, and lubricants (POL) at Building 1085. The building has been removed, and all that remains of the grease rack is a concrete pad with protruding hydraulic lines. Site 29 was an underground storage tank (UST) associated with the grease rack. The coordinator of UST removal in the DDMT environmental office indicated that the UST had been installed in 1941 and removed in 1988 by the Corps of Engineers. The coordinator had no records of the removal but stated that the records may be available at the Corps of Engineers office in Memphis, Tennessee. The base engineering office provided as-built drawings of the original tank installation.

The March 1995 TM on ER site selection provides a conceptual scope of work for ER at Sites 88 and 29. The ER scenario for Site 88 appears to be valid (for example, removal of concrete and about 1.5 feet of soil). However, the scope of work for Site 29 (for example, tank removal and removal of up to 25 cubic yards of soil) could change significantly, depending on how well the Corps of Engineers cleaned the area adjacent to the tank. Information about tank removal, contaminated soil removal, and confirmation sampling operations, if available from the Corps of Engineers, would be useful in better scoping the level of effort to complete the remediation at Site 29. Little additional information is needed because utilities and other constraints are visible or documented on utility drawings.

#### Site 87

Site 87, or Building 1084, is an old wooden post-and-beam structure with open ends and tin and fiberglass siding. It was once used for storing DDT and other pesticides.

The main open area consists of an open lane through the building with narrow storage space on either sides. This configuration suggests that the building may have been an open maintenance shed with storage space for tools. The floor slab has unidentified steel rails running lengthwise but is now concreted in place. The building is founded on 24 raised-post footings extending upward from the main slab. The concrete footings are flaking badly and appear to have been damaged by freeze-thaw or other environmental conditions.

The base engineering department has indicated that as-built drawings of Building 1084 are available. The drawings are currently being copied for CH2M HILL's use. Little additional information is needed to develop plans and specifications for ER actions at the site.

### Contaminant Information

CH2M HILL sampling plan documents and existing disposal and sampling information prepared by others for Operable Unit 1 (Dunn Field) and Operable Unit 2 (southwestern corner of the main installation) were reviewed to develop a list of potential chemical constituents in areas where current ER sites exist. Table 1 lists the chemicals of concern (COCs) for ER sites.

The information in Table 1 is not site-specific and only serves as a guide for the types of constituents that may be of concern. It shows the target list of constituents that can be used for developing initial cleanup criteria; it also indicates the potential presence of certain constituents based on operations at a particular site. For example, the list includes constituents that may have been associated with storing pesticides at Sites 85 and 87.

### Summary

The review of existing information indicates that enough data are available to prepare performance specifications and design drawings for Sites 60 and 85 at Dunn Field and for Sites 29, 87, and 88 at the main installation. A review of the as-built drawings for these sites will be helpful in better defining probable conditions and reasonable deviations.

With the exception of field evidence, which supports the locations of most of the ER sites, information for developing detailed plans, specifications, and scope for ER within the northwestern quadrant of Dunn Field is limited. Because of the limited information, the project must strongly depend on the observational approach. This includes:

- Developing probable ER conditions on the basis of available mapping and field observations; probable disposal conditions; expected waste form and release conditions; and anticipated excavation, handling, and disposal requirements
- Allowing for reasonable deviations in quantities, waste constituents, and ultimate depths of excavation; reasonable deviations can be monitored and observed at the time of removal
- Having the flexibility to modify the ER scope or the remedial action method if that actual site conditions deviate significantly from the reasonable deviations assumed for the removal

In addition, more information is needed on CWM location issues and other special waste of concern.

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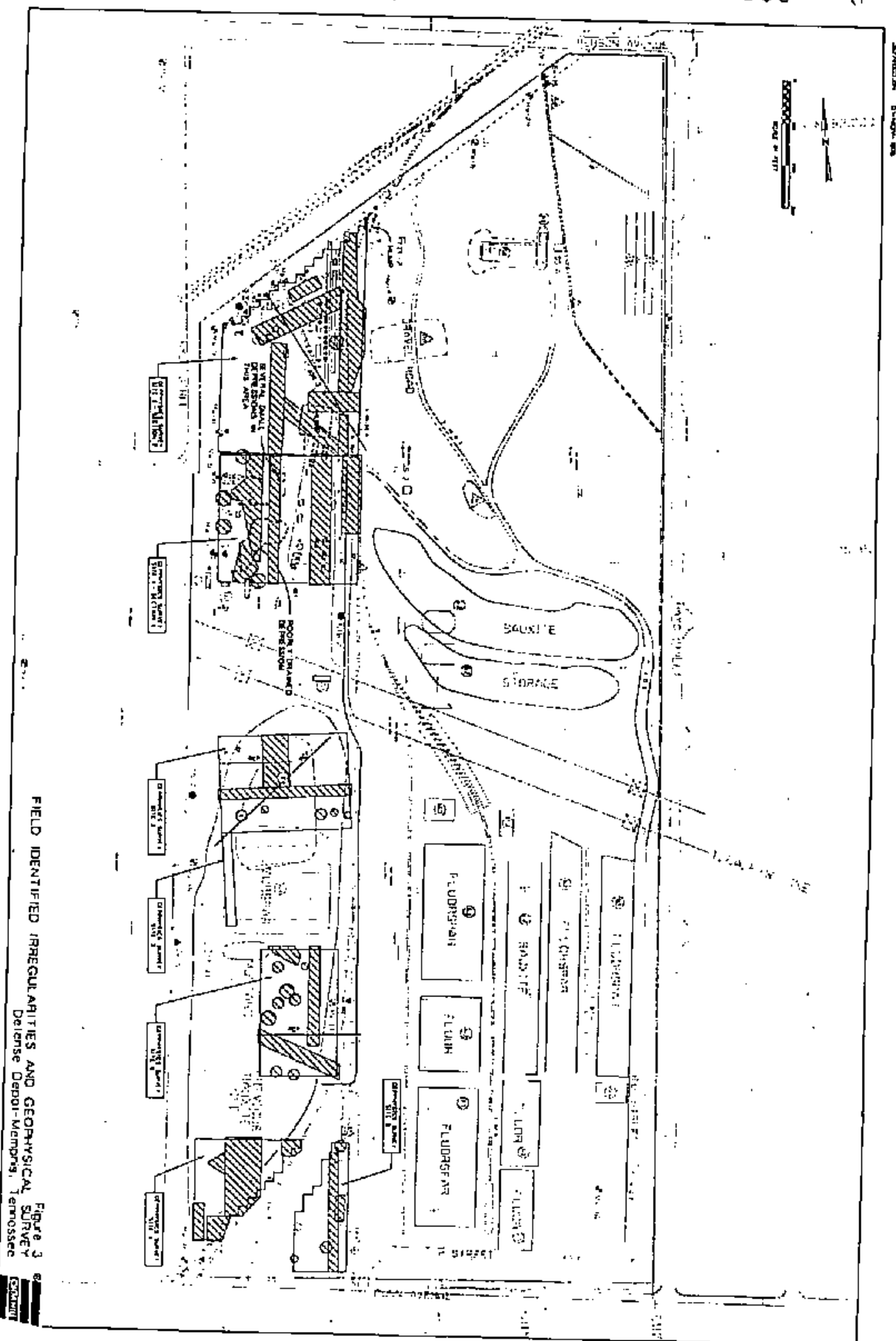
**Table 1**  
**Chemicals of Concern for ER Sites**

Constituent	Detected in			
	Groundwater	Soil	Surface Water	Sediment
<b>Volatile Organic Compounds</b>				
Acetone	X	X	X	X
2-Butanone	X	X		
Carbon tetrachloride	X	X		
Chloroform	X	X		
1,1-Dichloroethane	X			
1,2-Dichloroethane	X	X		
1,1-Dichloroethene	X			
1,2-Dichloroethene	X	X		
Ethylbenzene		X		
2-Hexanone		X		
Methylene chloride	X	X		
2-Methyl-2-pentanone	X	X		
1,1,2,2-Tetrachloroethane	X	X		
Tetrachloroethene	X	X		
Toluene		X		
1,1,1-Trichloroethane	X	X		
1,1,2-Trichloroethane	X			
Trichloroethene	X	X		
Total Xylenes		X		
<b>Semivolatile Organic Compounds</b>				
Acenaphthene		X		
Acenaphthylene		X		
Anthracene		X		
Benzo(a)anthracene		X		
Benzo(a)pyrene		X		
Benzo(b)fluoranthene		X		
Benzo(g,h,i)perylene		X		
Benzo(k)fluoranthene		X		
Benzoic acid	X	X	X	
Benzyl alcohol		X		
bis(2-Ethylhexyl)phthalate	X	X	X	
Butyl benzyl phthalate		X	X	
Chrysene		X		
Dibenzo(a,h)anthracene		X		
Dibenzofuran		X		
Diethylphthalate		X		
2,4-Dimethylphenol		X		
Di-n-butylphthalate	X	X	X	
Di-n-octyl phthalate	X		X	
Fluoranthene		X	X	
Fluorene		X		
Indeno(1,2,3-cd)pyrene		X		
2-Methylnaphthalene		X		

**Table 1**  
**Chemicals of Concern for ER Sites**

Constituent	Detected in			
	Groundwater	Soil	Surface Water	Sediment
2-Methylphenol		X		
4-Methylphenol		X		
Naphthalene		X		
3-Nitroaniline		X		
n-Nitrosodiphenylamine	X	X		
Phenanthrene		X		
Phenol	X	X		
Pyrene		X		
<b>Pesticides and PCBs</b>				
Aldrin		X		
Aroclor-1016		X		
Aroclor-1221		X		
Aroclor-1232		X		
Aroclor-1242		X		
Aroclor-1254		X		
alpha-BHC		X		
beta-BHC		X		
delta-BHC		X		
alpha-Chlordane		X		
4,4'-DDD		X		
4,4'-DDE		X		
4,4'-DDT		X		
Dieldrin		X		
Endrin		X	X	
Endosulfan-I		X		
Heptachlor epoxide		X		
Heptachlor		X		
Lindane		X		
PCBs		X		
<b>Metals</b>				
Antimony	X	X		
Arsenic	X	X		
Barium	X	X	X	
Cadmium	X	X		
Chromium	X	X		
Copper	X	X		
Lead	X	X	X	
Mercury	X	X		
Nickel	X	X		
Selenium	X	X		
Silver	X			
Zinc	X	X	X	









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