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DEFENSE DISTRIBUTION DEPOT MEMPHIS

REMEDIAL INVESTIGATION SITES LETTER REPORTS

MAY 1998

CH2MHILL

U.S. Army Engineering and Support Center, Huntsville

Preface

This report summarizes the Remedial Investigation (RI) Sampling Program conducted at the Defense Distribution Depot Memphis, Tennessee (DDMT). Given the need to combine the Base Realignment and Closure (BRAC) and Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) programs, the Huntsville Division Corps of Engineers (CEHNC) directed CH2M HILL to prepare separate modular reports that present the RI sites information for each property parcel.

The following Letter Reports are presented in a modular style so that the DDMT property parcels may be evaluated individually. Each report is an independent, stand-alone document so that the reports may be easily provided to potential property buyers. The reports have been combined in a single notebook for management ease. Each report consists of a brief site description, previous investigation results, sampling procedures, site maps, data summary tables, contaminant fate and transport evaluation, preliminary risk evaluation, and summary and recommendations for further activities at each RI site.

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for

Defense Distribution Depot Memphis, Tennessee

May 1998

Prepared for

U.S. Army Engineering and Support Center, Huntsville

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139282.RR.ZZ

Executive Summary and Overview Remedial Investigation Sites Sampling Program Defense Distribution Depot Memphis, Tennessee

Background

The Base Realignment and Closure (BRAC) 95 Commission selected the Defense Distribution Depot Memphis, Tennessee (DDMT) for closure under the BRAC process. All 642 acres of this facility are considered BRAC property. In preparing the *Environmental Baseline Survey* (Woodward-Clyde, 1996), the DDMT facility was divided into 35 parcels based on the environmental condition of the property. DDMT is currently undergoing a dynamic process wherein properties defined as BRAC parcels are being transferred from government control to other private- and public-sector industrial or recreational uses.

In October 1992, DDMT was placed on the National Priorities List (NPL) by the United States Environmental Protection Agency (EPA). Therefore, DDMT must fulfill requirements under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980(CERCLA) and National Contingency Plan (NCP). A remedial investigation/feasibility study (RI/FS) is being conducted to determine the nature and extent of contamination at the sites identified as requiring an RI, evaluate the risk to human health and the environment, and screen potential cleanup actions. The purpose of the RI Sampling Program, which is part of the RI/FS, is to accomplish the following:

- Characterize releases from the sites
- Assess the nature and extent of soil and surface water contamination attributable to past operations
- Gather and evaluate data to determine the need for interim remedial actions for the sites
- Evaluate the risk to human health and the environment as part of the comprehensive RI
- Assess the feasibility of remedial actions for the sites needing further actions

The purpose of these letter reports is to evaluate the results of the RI Sampling Program and the sampling from previous investigations and to recommend further actions at RI sites in these parcels.

Data and information for the CERCLA-governed RI sites have been organized and presented by BRAC parcels to support parcel leasing. Early risk-based evaluation of BRAC parcel and CERCLA site environmental data has been performed to establish a Finding of Suitability to

Lease (FOSL) or Finding of Suitability to Transfer (FOST), which permits lease or transfer of parcels and buildings.

A BRAC Cleanup Team (BCT) is formed at each facility affected by the BRAC process. At DDMT, the BCT consists of representatives from DDMT, EPA Region IV, Tennessee Department of Environment and Conservation (TDEC), with support from the U.S. Army Corps of Engineers (COE), Huntsville (CEHNC), and CH2M HILL.

Methodology

The RI Sampling Program was based on the *Operable Units 2, 3, and 4 Field Sampling Plans* (CH2M HILL, 1995). Sampling was conducted for areas where data gaps exist and where sampling and analyses are required to characterize the nature and extent of contaminants from past activities at the site.

RI site data were collected for surface soil, subsurface soil, and surface water (sampling locations are shown in Figure ES-1). Samples were collected and sent to CH2M HILL Analytical Services in Montgomery, Alabama in accordance with the procedures outlined in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995). Table ES-1 summarizes the analytical methods used for the RI Sampling Program. COE's split samples were collected from approximately ten percent of the samples collected at DDMT for a quality control check by the COE laboratory in Georgia. The results of the split samples will be reported in the final RI Report.

A relational, statistical database was the basis for creating data summary tables and for comparing RI Sites' data with screening level data. Screening level data are comparison criteria that were developed from applicable regulatory criteria for each media or from background values. The comparison criteria are used to evaluate the known contamination at a site to assess whether it exceeds an acceptable risk.

In addition, the BCT established some parameter-specific screening criteria for surface soils during a workshop held in Memphis, Tennessee, in August 1997. These screening criteria were developed for parameters that were frequently detected at elevated concentrations and were based on background concentrations from the residential and recreational areas surrounding DDMT, residential land use, risk-based criteria (RBC), or CERCLA criteria. Updated background values were also used in the screening tables (found in the *Final Background Sampling Program Technical Memorandum* [CH2M HILL, 1998]). Figures provided with each RI site show the parameters exceeding RBC at each sampling location within the site. These parameters are also shown in bold in the data summary tables for each site.

Constituents of potential concern (COPCs) are parameters that exceed both background values and the screening criteria. COPCs are discussed in Section 3.1 of each parcel report. Not all exceedances shown in the figures for each site are COPCs. A site may have several exceedances of a particular parameter at various sample locations, but the exceedances are only COPCs if both the background value and at least one screening criteria are exceeded. COPCs for each site are summarized in Table ES-2, but are not itemized by sample location. For a complete

discussion of which specific sample location had a COPC, refer to Section 3.1 of each parcel report.

A Preliminary Risk Evaluation (PRE) was conducted to provide a preliminary evaluation of environmental data and, thereby, provide input into the risk management decisions for the BCT. The PRE methodology and results are presented in the *Defense Depot Memphis, Tennessee, Preliminary Risk Evaluation Report* (CH2M HILL, 1998). EPA Region IV has published guidance on performing a PRE to determine the suitability to lease parcels based on their known or suspected environmental condition (EPA, 1994), and this guidance was followed in preparing the PRE. The PRE calculation and evaluation were performed for all RI sites sampled. The PRE methodology results in a conservative risk calculation that will not be exceeded if the site undergoes a baseline risk assessment. The PRE results are summarized by generally categorizing sites into one of the following categories: No Further Assessment, Further Risk Assessment, or Interim Remedial Action.

Results

Table ES-2 summarizes the COPCs by media for all the RI sites in the Main Installation. These COPCs are discussed in detail in each parcel report and are summarized by media below. The media tables presented for each site provide more details on the COPCs.

Surface Soils

Compounds detected in surface soils were compared to five types of screening levels to determine the COPCs for surface soil. The five types of screening levels include background values soil ingestion, RBCs (EPA, 1997) in both a residential and industrial setting, and soil-screening levels for transfer from soil to groundwater. Background values are based on 22 surface soil samples taken from the perimeter of the DDMT Main Installation and Dunn Field (11 on-site samples), as well as residential areas, golf courses, cemeteries, schools, and recreational areas (11 off-site samples) within two miles of DDMT.

COPCs were found more often in surface soil than any other media. A total of 16 parameters were identified as COPCs for surface soils, at a total of 9 sites. The most common COPCs were polynuclear aromatic hydrocarbon (PAH) compounds, which were identified at 3 of the 9 sites. Arsenic, chromium, lead, and dieldrin were the other common COPCs, which were detected in at least two of the nine RI sites.

The subgroup of PAH compounds (specifically benzo[a]anthracene, benzo]a]pyrene, benzo[b]flouranthene, and indeno[1,2,3-cd]pyrene) were detected in the surface soil at RI Sites 27, 34, and 57. PAHs are observed throughout the DDMT Main Installation generally from samples in proximity to railroad tracks. Sitewide PAHs will be evaluated in the *Main Installation Remedial Investigation Report.*

The pesticide dieldrin was determined to be a COPC in surface soils at three RI Sites: 48, 58, and 59. Dieldrin is found in many surface soil samples collected throughout the DDMT Main Installation. The dieldrin concentrations in these surface soil samples result from general pesticide application in grassy areas and around warehouses that are not associated with

management of hazardous substances in specific RI sites. Dieldrin, currently being evaluated as a sitewide constituent, will be reported in the *Main Installation Remedial Investigation Report*. Dieldrin is further discussed below in "Sitewide Issues."

Metals (including antimony, arsenic, cadmium, chromium, and lead) were detected as COPCs in RI Site 32 surface soils. Arsenic, chromium, and lead were detected as COPCs in RI Site 34 surface soils as well. The metals iron and vanadium were detected as COPCs in RI Site 27.

Polychlorinated biphenyls (PCBs) that are COPCs are confined to one site (RI Site 48).

Dichlorodiphenyldichloroethene (DDE) and dichlorodiphenyltrichloroethane (DDT) are COPCs at RI Site 57.

Subsurface Soils

Compounds detected in subsurface soils were compared to two types of screening levels. Subsurface soil screening levels consist of background values and soil screening levels for transfer from soil to groundwater. The groundwater protection criteria values are the generic soil screening levels (SSLs) from EPA guidance (EPA, 1996, EPA/540/R-95/128). These values are based on a dilution-attenuation factor (DAF) of 20 applied to a health-based groundwater concentration, which accounts for natural processes that reduce contaminant concentrations in the subsurface. Background values are based on 22 subsurface soil samples taken from the perimeter of the DDMT Main Installation and Dunn Field, as well as residential areas, schools, and recreational areas within two miles of DDMT. Table ES-2 summarizes the parameters that met the criteria for subsurface soil COPCs.

There were no COPCs in the subsurface soils at the RI Sites, except for the elevated chromium detection at the 18- to 20-foot depth at RI Site 34. Increasing chromium concentrations with depth is likely due to variation in soil types that occur with depth and is representative of leaching of surface contamination.

Surface Water

COPCs in surface water were those compounds that exceeded background values and at least one screening level (Table ES-2). Surface water screening levels consist of background values, Tennessee state values, federal ambient water quality criteria for the protection of human health for the ingestion of organisms and water (AWQC-HH), and federal ambient water quality criteria, chronic for the protection of freshwater aquatic life (AWQC-AO) values. Surface water background criteria are based on 22 surface water samples taken from streams at locations upgradient from DDMT surface water drainage.

Both sites sampled for surface water had COPCs: RI Sites 25 and 26. Only DDE was common at both Sites 25 and 26, and DDE was the only COPC for Site 25. The other COPCs for Site 26 included arsenic, dissolved arsenic, lead, zinc, and DDT.

Sediments

Detected compounds were compared to three types of screening levels: background values, sediment preliminary remediation goal (PRG) values, and National Oceanic and Atmospheric

Administration (NOAA) values to determine the sediment COPCs. Parameters that were COPCs in sediments are shown in Table ES-2. Sediment background criteria are based on 22 sediment samples taken from streams at locations upgradient from DDMT surface water drainage.

Sediments were not sampled during the RI investigation, but historical data from the 1990 RI (Law Environmental, 1990) are available. DDE, DDT, dichlorodiphenyl dichloroethane (DDD), and lead are parameters of historical interest at RI Site 25, while bis(2-ethylhexyl_phthalate are parameters of historical interest at RI Site 26.

Sitewide Issues

Dieldrin

Dieldrin exists at DDMT in surface soils, subsurface soils, and sediments. It is a COPC in surface soils at three sites (RI Sites 48, 58, and 59), but is not a COPC in any other media at RI sites.

Since dieldrin is only minutely soluble in water, its most likely migration pathway at DDMT is via erosion as suspended soil particles in the surface water, where it potentially would be available to aquatic organisms. Dieldrin in the subsurface soils should be relatively immobile and not impact groundwater quality.

Dieldrin has been identified as a sitewide problem in surface soils, and the need for a sitewide risk evaluation has been identified. Figure ES-2 shows the dieldrin concentrations in surface soil across the Main Installation. The residential RBC for soil ingestion for dieldrin is 0.04 milligrams per kilogram (mg/kg), and the industrial RBC for soil ingestion is 0.36 mg/kg. Detected concentrations of dieldrin relative to the industrial RBC screening criteria are plotted in Figure ES-2.

Appendix B of the Draft PRE (CH2M HILL, 1997) contains a Draft Technical Memorandum that statistically compares the dieldrin data from DDMT itself with background data obtained for dieldrin in the Memphis vicinity. Preliminary risk considerations indicated the elevated concentrations of dieldrin detected in many surface soil samples across the Main Installation of DDMT were well above risk-based criteria for both residential and industrial land uses.

Most of the detected concentrations at the site, as well as background, are above health-based screening levels. However, dieldrin has not been in use at DDMT since the 1970s when it was banned for surface applications within the U.S. Thus, observed concentrations are from historical rather than current pesticide application. Because concentrations of dieldrin remain elevated for approximately 20 years after application, dieldrin is persistent in the environment.

A risk evaluation of dieldrin and other associated pesticides in environmental media across the DDMT Main Installation will be performed and reported in the RI Report.

PAH Compounds

PAH compounds, found sitewide in surface soil at DDMT, are attributed to railroad operations. PAHs may come from creosote seepage from railroad track cross ties, historical railcar leaks to the surface, or application of a pentachlorophenol (PCP)/used-oil mixture that was historically applied for weed control along the tracks. Migration of PAH compounds across the surface may occur with surface soil transport mechanisms including surface water runoff and wind action.

These compounds were detected in surface soils at three RI sites: 27, 34, and 57. Benzo(a)anthracene, benzo(b)pyrene, benzo(b)flouranthene, and indeno(1,2,3-cd)pyrene were the most common PAH compounds detected, occurring at all three sites. RI Site 57 had the most extensive contamination, with ten different PAH compounds detected, while RI Site 27 had five compounds and RI Site 34 had only 4 compounds detected. PAH compounds will be addressed as a sitewide problem as part of an upcoming risk evaluation.

PAH compounds are a mixture of heavier hydrocarbons, are similar in chemical and physical characteristics, and tend to migrate and behave similarly in the environment. Generally, these compounds have low vapor pressures, are only marginally soluble in water, and have a high affinity for soils. They would be expected to migrate as adsorbed components of soils and potentially would be available to aquatic organisms in turbid surface water or to bottom feeders in areas with contaminated sediments. These compounds do not bioaccumulate significantly because of their rapid metabolism and excretion by most aquatic organisms.

DDE and DDT

DDE and DDT, found in surface soils sitewide at DDMT because of historical pesticide application, will be addressed in an upcoming risk evaluation. Not only is DDT found as a COPC in surface soil at RI Site 57, but it is also a COPC in surface water at RI Site 26. DDE is a COPC in surface soils at only one site (RI Site 57) and in surface water at two sites (RI Sites 25 and 26). DDD was not a COPC at any site.

DDT and two of its degradation breakdown products, DDD and DDE, exist in surface soils at DDMT and should not be mobile in this environment. These compounds have an extremely high affinity for soil and, essentially, are insoluble in water. DDT also was reported in sediments at four sites on DDMT, indicating that migration via this pathway has occurred from surface soil at DDMT. These compounds can bioaccumulate and become more concentrated as they move up in the food chain and potentially could affect receptors via this migration pathway.

Conclusions and Recommendations

The following are the overall conclusions for the Main Installation:

- Of the media sampled, surface soils have the most COPCs at the greatest number of sites. COPCs in surface soils include metals, PCBs, PAH compounds, and pesticides.

- The subsurface soil at the sites is essentially free of contamination. Only one metal was detected in subsurface soil at one site: Chromium was a COPC at RI Site 34.

Of the two ponds in the Golf Course (Parcel 3), which are the only RI Sites with surface water, RI Site 26 had six COPCs, while RI Site 25 had only one COPC. Of the nine sites on the Main Installation, only five require further sampling to evaluate the extent of contamination. These sites are shown in Table ES-3. Recommendations for the Main Installation involve conducting sitewide risk evaluations for a few parameters of concern across the Main Installation, conducting risk evaluations for specific parameters at a site, and conducting additional sampling at some of the sites requiring further action. The recommendations are summarized by site in the comments column of Table ES-3.

In some cases a further evaluation of metals data against background values in surface and subsurface soils is recommended. This evaluation can be performed without additional sampling.

Site 48, the Building 274 Cafeteria, is scheduled for leasing under the BRAC program. After review of the PCB levels in soil surrounding the building, the BCT decided to recommend an early action soil removal at this building. A soil removal design is currently underway.

Table ES-1

Summary of Analysis Methods for RI Sites Sampling on Main Installation
RI Sites Sampling Program
Defense Distribution Depot Memphis, Tennessee

Matrix	QA/QC Level	Parameter Analysis	Method of Analysis
Soil	2	TCL-Dioxins/Furans	CLP-SOW DFLM1.1
Soil	2	Zinc	SW846 Method 6010B
Soil	2	TCL-Semivolatiles GC/MS	SW846 Method 8270B
Soil	2	TCL-Volatiles GC/MS	SW846 Method 8260A
Soil	2	TCL-Pesticides GC	
Soil	2	Herbicides	SW846 Method 8151
Soil	2	PNA'S GC	SW846 Method 8100
Soil	2	Fluoride	EPA 340.2 (Mod.)
Soil	2	pH	SW846 9045
Soil	2	Priority Pollutant Metals (PPM)	SW846 Method 6010B/7000 SERIES
Soil	2	TAL Metals (TAL)	SW846 Method 6010B/7000 SERIES
Soil	2	PCB'S GC	SW846 Method 8081
Soil	3	TCL-Volatiles GC/MS	SW846 Method 8260A
Soil	3	TCL-Semivolatiles GC/MS	SW846 Method 8270B
Soil	3	Priority Pollutant Metals (PPM)	SW846 Method 6010B/7000 SERIES
Soil	3	TAL Metals (TAL)	SW846 Method 6010B/7000 SERIES
Soil	3	Zinc	SW846 Method 6010B
Soil	3	TCL-Dioxins/Furans	CLP-SOW DFLM1.1
Soil	3	Herbicides	SW846 Method 8151
Soil	3	PCB'S GC	SDW846 Method 8081
Soil	3	Phenols GC	SW846 Method 8040
Soil	3	PNA'S GC	SW846 Method 8100
Soil	3	TCL-Pesticides/PCB'S GC	SW846 Method 8081
Soil	3	Fluoride	EPA 340.2 (Mod.)
Soil	3	pH	SW846 Method 9045
Surface Water	3	TCL-Volatiles GC/MS	SW846 Method 8260A
Surface Water	3	TCL-Semivolatiles GC/MS	SW846 Method 8270B
Surface Water	3	Priority Pollutant Metals (PPM)	SW846 Method 6010B/7000 SERIES
Surface Water	3	Priority Pollutant Metals, Soluble (PPM)	SW846 Method 6010B/7000 SERIES
Surface Water	3	TAL- Metals (TAL)	SW846 Method 6010B/7000 SERIES
Surface Water	3	TAL- Metals, Soluble (TAL)	SW846 Method 6010B/7000 SERIES
Surface Water	3	TCL- Pesticides Only GC	SW846 Method 8081
Surface Water	3	TCL-PCB'S GC	SW846 Method 8081

T ES-1

Summary of Analysis Methods for RI Sites Sampling on Main Installation
RI Sites Sampling Program
Defense Distribution Depot Memphis, Tennessee

Matrix	QA/QC Level	Parameter Analysis	Method of Analysis
Surface Water	3	TCL-Dioxins/Furans	CLP-SOW DFLM1.1
Surface Water	3	PNA'S GC	SW846 Method 8100
Surface Water	3	Thiodiglycol	USACOE Method UL09/LL9
Surface Water	3	Solids, Total Suspended (TSS)	EPA 160.2
Surface Water	3	Carbon, Total Organic (TOC)	EPA 415.2
Surface Water	3	TCL- Pesticides/PCB'S	SW846 Method 8081
Notes: Includes surface and subsurface soil samples.			

Table ES-2

Summary of COPCs[a]

RI Sites Sampling Program

Defense Distribution Depot Memphis, Tennessee

Constituent of Potential Concern	Surface Soil	Subsurface Soil	Surface Water	Sediment
Metals				
Antimony	32			
Arsenic	32, 34		26	
Dissolved Arsenic			26	
Cadmium	32			
Chromium	32, 34	34		
Lead	32, 34		26	
Zinc			26	
Iron	27			
Vanadium	27			
PCBs				
Polychlorinated biphenyl - 1260 (Arochlor 1260)	48			
PAHs				
Benzo(a)anthracene	27, 34, 57			
Benzo(a)pyrene	27, 34, 57			
Benzo(b)flouranthene	27, 34, 57			
Benzo(k)flouranthene	27, 57			
Benzo(g,h,i)perylene	57			
Chrysene	57			
Dibenzo(a,h)anthracene	57			
Flouranthene	57			
Indeno(1,2,3-cd)pyrene	27, 34, 57			
Pyrene	57			
Pesticides				
DDE	57		25, 26	
DDT	57		26	
Dieldrin	48, 58, 59			
Notes:				
[a]Based on CH2M HILL data; does not include historical data from 1990 RI				

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Table ES-3
Summary of Site Recommendations
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Parcel	Site	Site Name	Potential Issues Requiring Risk Assessment	Additional Samples Required (Yes or No)	Comments
3	25	Golf Course Pond	Pesticides	Yes	A baseline risk evaluation will be performed as part of the RI report.
3	26	Lake Danielson	Pesticides	Yes	A baseline risk evaluation will be performed as part of the RI report.
4	58	Pesticides, Herbicides (Pad 267)	Dieldrin	No	Further assessment of dieldrin in the surface soils under the residential land use scenario is required.
4	59	Pesticides, Cleaners (Building 273)	Dieldrin	No	Further assessment of dieldrin in the surface soils under the residential land use scenario is required.
5	48	Post Cafeteria, Building 274 and Surrounding Area	PCBs	Yes	Additional sampling is recommended at this site to evaluate the extent of PCB constituents in surface soil and to support a human health risk evaluation for the site. A soil removal design is currently underway.
12	57	Building 629	Pesticides	Yes	Further risk assessment is needed to evaluate pesticide contamination west of Building 629. Additional surface soil samples--biased toward waste handling or waste release areas--should be collected north and south of the west side of the building.
24	27	Former Recoupment Area (Building S-873)	PAHs, Metals (arsenic, antimony, and vanadium)	Yes	Further risk assessment is recommended for PAHs and metals present at levels of potential concern to human health. Additional surface soil sampling is recommended for this site.
24	34	Underground Waste Oil Storage Tanks at Building 770	PAHs, Metals (arsenic, chromium and lead)	No	Further risk evaluation of metals and PAHs in the surface and subsurface soils, without additional sampling, should be conducted to assess potential human health risks at the site.
35	32	Sandblasting Waste Accumulation Area	Metals (chromium and lead), PAHs, and Dieldrin	No	Potential risks associated with high concentrations of metals requires further comparison of the background population with data collected from RI Site 32 and nearby screening sites. Further assessment of PAHs and dieldrin in the surface soil is needed.

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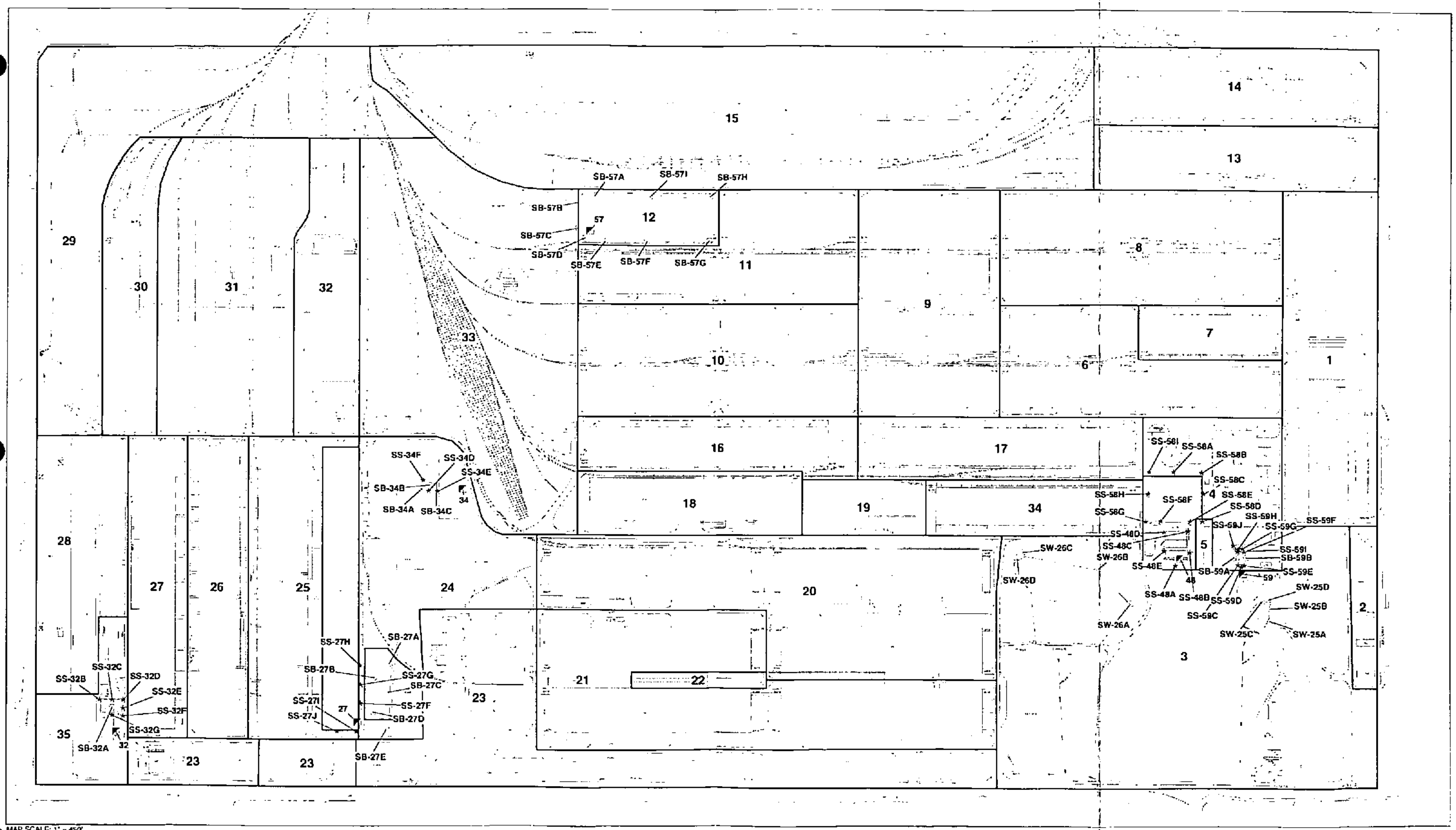

MAP SCALE: 1" = 450'

LEGEND

- PARCEL BOUNDARY
- SOIL SAMPLE LOCATION
- SEDIMENT SAMPLE LOCATION
- SOIL BORING LOCATION
- SURFACE WATER SAMPLE LOCATION

N W E S

Figure ES-1
RI Sampling Locations
Defense Distribution Depot Memphis, TN

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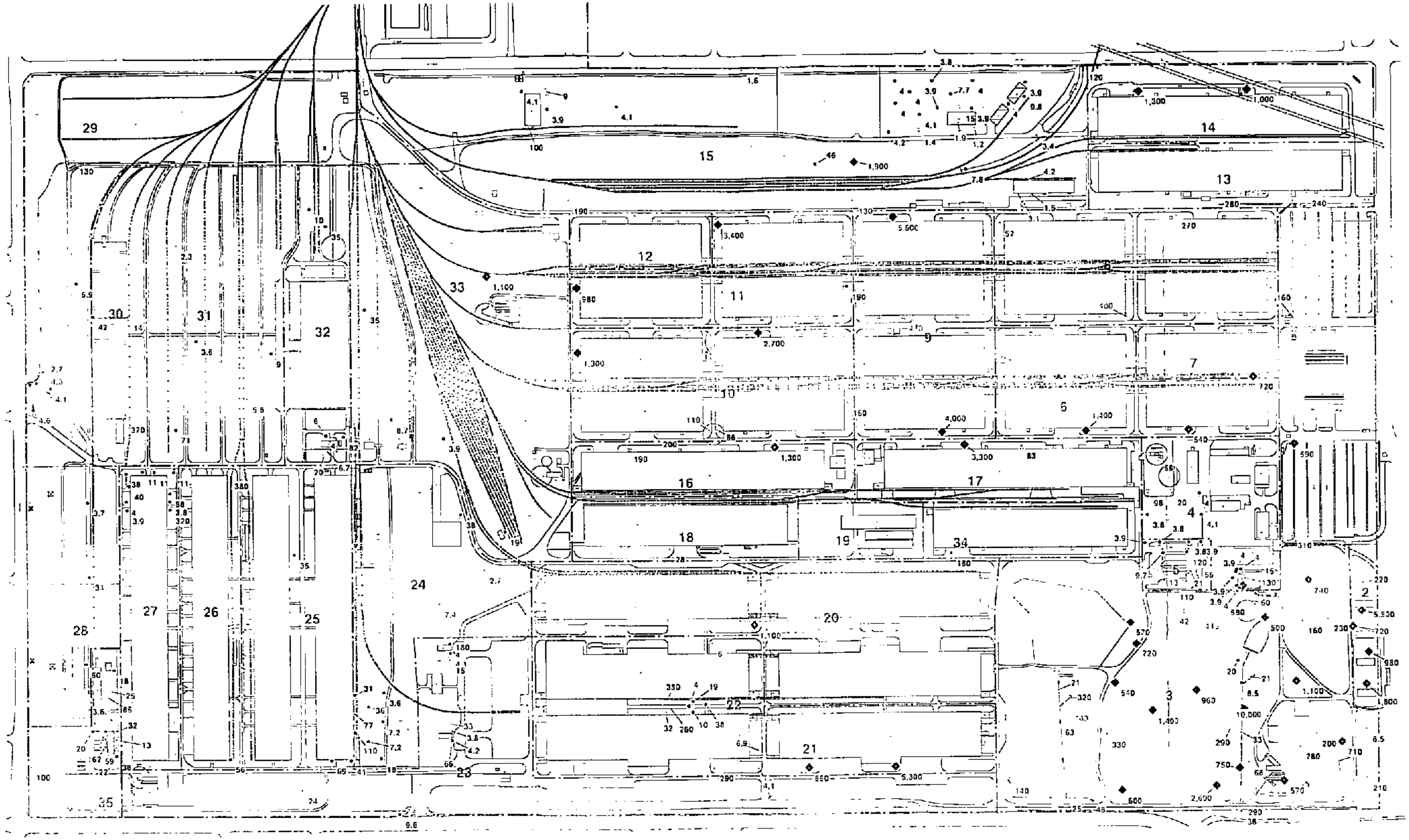

LEGEND

- • NON-DETECT DIELDRIN CONCENTRATION
- ◇ DIELDRIN CONCENTRATION < 360 ug/kg
  DIELDRIN CONCENTRATION > 360 ug/kg and < 500 ug/kg
- ◆ DIELDRIN CONCENTRATION > 500 ug/kg

FIGURE ES-2

DIELDRIN CONCENTRATIONS IN SURFACE SOIL

DEFENSE DISTRIBUTION DEPOT MEMPHIS, TENNESSEE

MAP SCALE: 1" = 500'

CH2MHILL

TAB

Parcel 3

Parcel 3

Remedial Investigation Sites Sampling Program

for

Defense Distribution Depot Memphis, Tennessee

May 1998

Prepared for

U.S. Army Engineering and Support Center, Huntsville

Prepared by

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139282.RR.ZZ

Parcel 3 Report
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Parcel 3 is a 2,163,177-square-foot (ft^2) parcel in the southeastern corner of the Main Installation in Operable Unit (OU)-3. Parcel 3 consists of the golf course; Lake Danielson; the Golf Course Pond; and Buildings 188, 189, 192, 193, 194, 195, 196, 197, and 198. Samples were collected at Remedial Investigation (RI) Sites 25 and 26 in this parcel during the RI Sampling Program. Sampling activities at this site are described below.

The RI Sites in this document have been identified by the Defense Distribution Depot Memphis, Tennessee (DDMT) through a review of existing documents, interviews with facility personnel, and knowledge of the facility's operations. RI sites are locations at DDMT that have been known to have past releases as a result of facility operations. These sites have been previously identified as requiring a RI and have a confirmed presence of contaminants. The following RI Sites are located in Parcel 3:

- RI Site 25: Golf Course Pond
- RI Site 26: Lake Danielson

Additional sites identified with past potential releases to the environment from past operations are addressed in the Screening Sites Sampling Program. General areas within the installation without any known industrial operations involving hazardous chemicals are addressed in the Base Realignment and Closure (BRAC) Sampling Program. Results of these programs are addressed in separate letter reports.

The purpose of the RI Sampling Program, which is part of the Remedial Investigation/Feasibility Study (RI/FS), is to accomplish the following:

- Characterize potential releases from the sites
- Assess the nature and extent of soil and surface water contamination attributable to past operations
- Gather and evaluate data to determine the need for interim remedial actions for the sites
- Evaluate the risk to human health and the environment
- Assess the feasibility of remedial actions for the sites needing further actions

The purpose of this letter report is to evaluate the results of the RI Sampling Program and sampling from previous investigations and to recommend further actions at RI sites in this parcel. The remainder of this report presents the results of past investigations; RI Sampling

Program strategy, procedures, and results; and recommendations for future investigations at each site.

Surface soils, subsurface soils, and surface water were investigated as part of the RI Sampling Program. Surface soil samples (any sample whose lowest depth is 2 feet or less) were taken both as independent samples and as the upper interval of a soil boring profile. Thus, surface soil samples taken as part of a soil boring may have an "SB" designation and are initially discussed under Subsurface Soil Sampling Procedure (Section 2.2.2.2). However, the results from that upper interval are presented in the surface soil tables and discussions in Section 3.0.

Site 25: Golf Course Pond (Subparcel 3.8)

1.0 Introduction

Table 1 presents the parcel grouping, location and status information for this site.

TABLE 1
Parcel 3, Site 25 Information
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

Parcel	Building Number	RI/FS OU	Site Number	CERCLA[1] Status
3	Golf Course Pond	3	25	RI

1CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act of 1980

The Golf Course Pond, constructed in the 1940s, is located in the northeastern corner of the DDMT. This pond is an unlined, man-made pond measuring approximately 75 feet wide and 125 feet long with an earthen dam. The 0.23-acre pond receives surface water runoff from the golf course and the southeastern part of the facility. Stormwater enters the pond through overland flow and from two stormwater drainage pipes (one 8-inch-diameter pipe and one 36-inch-diameter pipe). Overflow from the pond flows to an open, concrete-lined storm drain that eventually drains into Nonconnah Creek, a tributary of the Mississippi River. The site configuration, sample locations and constituents exceeding Risk-Based Criteria (RBC) are shown in Figure 1.

2.0 Study Area Investigation

This discussion includes details of the sampling conducted by CH2M HILL for the RI Sampling Program efforts. The historical data results are included in the following discussions as well; however, sampling strategy and analysis included in the historical reports are not repeated here.

2.1 Other Investigations

Sampling has occurred in this parcel as part of the initial RIs at DDMT, reported by Law Environmental (1990) and as part of the EDRW, Inc. (1996) investigation of off-site drainage

pathways. Two sediment samples (SD4 and SD5) and two surface water samples (SW4 and SW5) were collected by Law Environmental (1990). Sample SD4 was located at the northern end of the pond, and SD-5 was located in the southeast corner. Both were sampled at the sediment/water interface at a depth of nine inches.

Previous surface water samples collected from the Golf Course Pond indicated that the pond water was generally free of the tested analytes. However, metals and pesticides were detected in sediment from the pond, and fish tissue samples exhibited pesticide and polychlorinated biphenyl (PCB) residues.

Radian collected additional sediment and fish tissue samples for the Baseline Risk Assessment of surface impoundments at the golf course (Radian International, 1997) (shown in Table 2). Three additional sediment samples were taken from the Golf Course Pond (SD11, SD12, and SD13) and analyzed for pesticides. No fish samples were taken from the pond. Heptachlor epoxide, chlordane, and dieldrin were not detected in any of the three samples taken. Dichlorodiphenyldichloroethene (DDE) and dichlorodiphenyldichloroethane (DDD) were detected in all three samples, while dichlorodiphenyltrichloroethane (DDT) was only detected in Sample SD13. Concentrations of DDE, DDD, and DDT ranged from 35 micrograms per kilogram (µg/kg) dry weight to 134 µg/kg dry weight.

2.2 RI Sampling Program

2.2.1 Sampling Strategy

This sampling strategy was developed to evaluate whether releases have occurred to surface water and to assess the potential of contaminant transport into the pond by stormwater. For this sampling program, surface water samples were collected from stormwater runoff entering the pond to assess the potential that contaminants would be transported into the pond by stormwater.

Four surface water samples were collected from stormwater runoff entering the pond along the north and eastern edges to assess whether contaminants are entering the pond. Two surface water samples were analyzed for target compound list/target analyte list (TCL/TAL) constituents in accordance with the *Operable Unit 3 Field Sampling Plan* (CH2M HILL, 1995).

2.2.2 Sampling Procedures

This section describes the sampling procedures and laboratory analyses performed for surface water.

TABLE 2
Pesticides Concentrations Reported for the 1997 Sediment and Fish Samples Collected from the Golf Course Impoundments at the Defense Distribution Depot, Memphis, Tennessee
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

	Concentrations					
Sample No.	**Heptachlor Epoxide**	**DDE**	**DDD**	**DDT**	**Chlordane**	**Dieldrin**
Sediment (µg/kg dry weight)						
1	54	850	211	99	640	ND
2	ND	ND	ND	ND	ND	ND
3	87	1650	537	157	3890	ND
5	ND	386	123	ND	1030	ND
6	88	1470	712	166	2150	ND
7	ND	76	46	71	ND	ND
8	67	1170	448	164	2390	ND
9	ND	102	33	ND	210	ND
10	115	1780	1000	227	2440	ND
11	ND	95	48	ND	ND	ND
12	ND	95	38	ND	ND	ND
13	ND	134	65	35	ND	ND
15	114	2120	883	234	2870	ND
Fish (µg/kg as received)						
1	ND	3190	490	12	732	45
2	ND	600	124	ND	166	13

Notes:
Samples 1-10 and 15 are from Lake Danielson. Samples 11-13 are from the Golf Course Pond.
Sediment Sample No. 2 had higher detection limits, due to small sample size.
Sediment Sample No. 4 could not be collected due to gravel covering the pond bottom at that location.
Sediment Sample No. 15 was a duplicate of No. 6.
Fish Sample No. 1 was a whole-body analysis. Fish Sample No. 2 was filleted.
Both fish samples were from Lake Danielson.
Source: Radian International, 1997

2.2.2.1 Surface Water Sampling Procedures

With the approval of the Tennessee Department of Environment and Conservation (TDEC) and the United States Environmental Protection Agency (EPA), surface water samples were collected from four locations (SW25A, SW25B, SW25C, and SW25D) at this site (shown in Figure 1). The following details the sample locations:

- Sample SW25A was taken on the east side of the Golf Course. The sample was collected from the concentrated stream of overland flow that was flowing into the pond from 1st Street.
- Sample SW25B, north of SW25A, was collected from a partially submerged outfall of a 36-inch diameter concrete drain pipe.

- Sample SW25C was collected north of the Golf Course Pond from the outfall of a 12-inch diameter concrete pipe that discharges from a storm drain at Building 273 (RI Site 59).
- Sample SW25D, taken north of the Golf Course Pond, was collected from the overland flow from the golf course and Building 271that is concentrating and flowing into the northern tip of the pond.

The locations were sampled twice during the field effort. Each location was sampled during two separate storm events of more than 0.2 inches of rainfall. SW25A, however, was not collected during the second storm event because there was not enough stormwater flow at that location to collect a sample. The samples were collected where stormwater outfalls or overland runoffs discharge into the pond. Samples were collected as close as possible to the beginning of each storm event to coincide with first flush of the stormwater.

The surface water samples were collected using a clean, unpreserved laboratory bottle. The surface water was collected in the unpreserved bottle and then poured into the appropriate laboratory bottles for analysis. Samples for dissolved metals analysis were filtered using a peristaltic pump and in-line, 0.45-micron filters. Field parameters of pH, specific conductivity, temperature, and dissolved oxygen were measured for each sample and are summarized in Table 3. To prevent the potential for cross-contamination, a new unpreserved laboratory bottle was used to collect each sample and new peristaltic pump tubing and filters were used on each filtered sample.

TABLE 3
Parcel 3, Site 25 Surface Water Sampling Results
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

Sample Location	pH (SU[1])	Conductivity (µmhos/cm[2])	Temperature (°C[3])	Dissolved Oxygen (mg/L[4])
1st Storm Event				
SW25A	6.86	42	4.5	12.0
SW25B	6.32	10	4.5	11.4
SW25C	6.27	10	4.6	10.8
SW25D	6.53	40	4.2	10.0
2nd Storm Event				
SW25A	--	--	--	--
SW25B	6.99	40	11.1	8.8
SW25C	6.91	41	10.8	10.2
SW25D	6.50	39	10.3	8.2

Notes:
SW25A was not collected during the second storm event.
1SU – standard unit
2µmhos/cm – microhos per centimeter
3°C – degrees Celsius
4mg/L – milligrams per liter

2.2.3 Analytical Procedures

All samples were sent to CH2M HILL's Analytical Services in Montgomery, Alabama for analysis. Five surface water samples were analyzed for pesticides, PCBs, and total and dissolved metals. Two of these surface water samples (one from each sampling event) were also analyzed for TCL/TAL parameters. Samples received at the laboratory were analyzed in accordance with the procedures specified in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at DDMT.

A data quality evaluation (DQE) was performed to assess the effect of the overall analytical process on the usability of the data. The DQE established that the detection of acetone, 2-butanone, and bis(2-ethylhexyl)phthalate can be attributed to field sampling and laboratory contamination rather than environmental conditions at the site. Also, poor duplicate precision for metals in the duplicate soil samples should be attributed to poor sample homogeneity as well as to potentially poor sampling and analysis precision. With exception of the qualifications listed above, the DQE concluded that data can be used in the project decision-making process.

3.0 Interpretation of Sampling Results

3.1 Presentation of Results

Section 3.1.1 presents results of the RI Sampling Program for RI Site 25. Data are presented by media for surface water and compared with appropriate screening criteria in Table 25-A and 25-B. Data from the 1997 CH2M HILL investigation are presented along with historical data from the *Remedial Investigations at DDMT, Final Report* (Law Environmental, 1990). If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold on the summary table.

Constituents of potential concern (COPCs) are parameters that exceed both background values and the screening criteria. Where concentrations exceed the selected background value, the concentration is compared with the observed range of background values as reviewed and established by the BRAC Cleanup Team (BCT).

COPCs identified for RI Site 25 include DDE in the surface water; no COPCs were identified for sediments since they were not sampled in the 1997 CH2M HILL sampling event. However, environmental sampling performed by Radian (Radian International, 1997) indicated elevated concentrations of DDD, DDT, and DDE in sediment samples.

Bis(2-ethylhexyl)phthalate and n-nitrosodiphenylamine are parameters of historical interest in the surface water, and DDE, DDT, DDD, and lead are parameters of historical interest in the sediments.

3.1.1 Surface Water

Results of the surface water analyses with values above detection limits are shown in Table 25-A. This table also contains three types of comparison criteria for surface water. If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold. Several of the naturally occurring inorganic chemicals were

detected within the background levels. Low levels of DDE and dieldrin were also detected. Only DDE was slightly above the Federal Ambient Water Quality Criteria for the Protection of Human Health for the Ingestion of Organisms and Water (AWQC-HH).

3.1.2 Sediments

Although sediments were not sampled during the most recent sampling event, sediment data are available from the 1990 RI conducted by Law Environmental (Table 25-B). At each sampling location, two of the three pesticides (DDD, DDE, and DDT) were detected with depth (at the nine-inch sampling interval). DDD and DDE were detected at the surface and at depth at Sample SD4 sampling location, while DDD and DDT were detected at the surface and at depth at location Sample SD5. DDD was detected at all four sampling points.

Sediment data are also available from the 1997 Radian investigation. Three sediment samples were taken in the pond, and DDD, DDE, and DDT were detected in all of them. DDE and DDD were detected in all three samples, and DDT was detected in Sample SD13.

Lead was a COPC at sampling location SD5 in both the surface and nine-inch sampling depths.

3.2 Vertical and Lateral Extent

Bis(2-ethylhexyl)phthalate and n-nitrosodiphenylamine in surface water were detected in SW4 and SW5 in the historical data (Law Environmental, 1990) but were not detected in the sediments in that data set. These parameters were not detected in the more recent investigations. These chemicals are also common laboratory contaminants and may not be site-related.

DDE was sporadically detected in surface water and sediments. It was detected at 0.000032J mg/L in SW25B in the first sampling event but not the second. These organo-chlorine pesticides have very low solubility, thus their detection in the water samples may be related to the suspended particulates.

In the historical sediment data set, DDE was detected at the surface in Samples SD4 and SD5, and with depth at Sample SD4. The 1997 Radian sediment sampling event detected similar concentrations of DDE near Sample SD4 (taken at the northern area of the pond) but lower concentrations of DDE near Sample SD5 (taken at the southern area of the pond). DDD and DDT were not detected in surface water in recent sampling events but were detected in sediments in historical data. DDD was found in both sediment locations at all depths, while DDT was found in one sediment location (Sample SD5) at all depths. The 1997 Radian sediment sampling event detected much lower concentrations of DDD and DDT when compared to the 1990 Law Environmental data.

Lead was detected in three surface water samples (SW25A, SW25B, and SW25D) at concentrations that exceeded the Federal Ambient Water Quality Criteria - Chronic Values for the Protection of Freshwater Aquatic Life (AWQC-AO) but were below background values. Lead was a COPC in sediments at Sample SD5 at the surface and the nine-inch sampling depth, exceeding background values, sediment preliminary remediation goal (PRG) values, and National Oceanic and Atmospheric Administration (NOAA) values.

3.3 Potential Migration Pathways

The following paragraphs provide a general discussion of the potential migration pathways based on physical and chemical properties of the COPCs at RI Site 25.

Lead is present at concentrations greater than background, or above screening criteria, in surface soils, subsurface soils, and sediment at DDMT. Generally, lead is moderately soluble and potentially can be leached from any of these forms of occurrence, reaching concentrations in aqueous solution in both groundwater and surface water that would be of concern to both human and ecological receptors. Additionally, lead in surface soils and sediment potentially may move as suspended particulate matter in surface waters and impact aquatic organisms.

DDT and two of its degradation breakdown products, DDD and DDE, exist in subsurface soils at DDMT; these products should not be mobile in this environment. These compounds have an extremely high affinity for soil and are essentially insoluble in water. As long as they are buried and the potential for direct contact is controlled, the potential to migrate is minimal. Should soil contaminated with these compounds be uncovered, they potentially would be able to be moved through wind action and/or as suspended material in surface water. DDT also was reported in sediments at two sites on DDMT, indicating migration via this pathway has occurred. These compounds can bioaccumulate and become more concentrated as they move up in the food chain and could potentially affect receptors via this migration pathway.

3.4 Additional Data Needs

Existing sampling was performed in three different sampling efforts, over a period of eight years (between 1989 to 1997). The RI sampling event was performed to represent first flush runoff conditions into the pond. The 1990 Law Environmental RI sampling event was performed to characterize contamination within the surface water. And the 1997 Radian investigation sampling event was performed to further characterize pesticide contamination in sediment. Sample data indicate that pesticides exist in the stormwater entering the impoundments, in the pond water itself, in the fish, and in the impoundment sediments.

A baseline risk evaluation will be performed using existing data to determine the potential ecological and human health exposure for this small pond. No additional data is proposed for the risk assessment. However, additional data collection, especially in the sediments, may be necessary to support a risk management decision, feasibility study, and other activities necessary to complete the CERCLA process for this site.

4.0 Interpretation of Screening Criteria Comparisons

4.1 Methodology

The Preliminary Risk Evaluation (PRE) was performed in accordance with the *Guidance on Preliminary Risk Evaluations for the Purpose of Reaching a Finding of Suitability to Lease (FOSL)* (EPA Region IV, 1994). A discussion of the PRE methodology in provided as Appendix A to this document.

4.2 RI Site 25 Risk

A human health screening comparison was made for the surface soils. Since the pond had only surface water and sediment sampling, an ecological screening was performed by comparing against background and AWQC-AO and AWQC-HH criteria, similar to the screening evaluation reported above. Surface water at the site has low levels of DDE; sediments have polynuclear aromatic hydrocarbons (PAHs); and chlorinated pesticide and its degradation products, DDD, DDE, and DDT, were above background and the sediment screening criteria in the sediment samples collected from this pond. Sediments also have lead above background and screening levels. Most of the PAHs were within background levels.

A baseline ecological and human health risk evaluation will be performed to determine the habitat quality and the target receptor end points for this pond.

5.0 Summary and Recommendations

5.1 Summary

No COPCs were identified based on the sampling performed by CH2M HILL in 1997. No sediment sampling was performed in the more recent sampling event. However, parameters of historical interest were identified in both the surface waters and sediments from the 1990 RI (Law Environmental, 1990). A baseline risk evaluation will be performed to determine the ecological and human health exposure end point of interest for this small pond.

5.2 Recommendations

The pond is a relatively small site, and existing data are sufficient to determine the site contamination conditions. A baseline risk evaluation will be performed as part of the RI report.

However, additional data collection, especially in the sediments, may be necessary to support a risk management decision, FS, and other activities necessary to complete the CERCLA process for this site.

Site 26: Lake Danielson (Subparcel 3.6)

1.0 Introduction

Table 4 presents the location and status information for this site.

TABLE 4
Parcel 3, Site 26 Information
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

Parcel	Building Number	RI/FS OU	Site Number	CERCLA Status
3	Lake Danielson	3	26	FS

Lake Danielson is located in the northwestern corner of the DDMT golf course, just east of Buildings 470 and 489. This lake, measuring approximately 3.5 acres with an earthen dam, is an unlined, man-made stormwater runoff pond and reservoir for fire fighting; it is a maximum of 15 feet deep. The lake receives runoff from the central portion of DDMT, which contains most of the warehouses at the site. Stormwater from this area enters the lake through a 48-inch-diameter concrete pipe located at the northwestern corner of the lake. A smaller amount of stormwater flow enters the lake by overland flow from areas immediately surrounding the lake. Overflow from the pond flows to an open, concrete-lined storm drain (drop pipe) to the Lake Danielson Outlet Ditch, which eventually drains into Nonconnah Creek, a tributary of the Mississippi River.

Lake Danielson has been used in the past for fire tank truck testing and recreation. Fire tank truck testing consisted of fire trucks withdrawing water from the lake to test various equipment (pumps, hoses, and instruments) and then discharging the water back into the lake. Recreational use (fishing) was discontinued in 1986 after pesticides and PCBs were detected in fish tissue from the lake (CH2M HILL, 1998). The site configuration, sample locations and constituents exceeding RBC are shown in Figure 2.

2.0 Study Area Investigation

This discussion includes details of the sampling conducted by CH2M HILL for the RI Sampling Program efforts. The historical data results are included in the following discussions as well; however, sampling strategy and analysis included in the historical reports are not repeated here.

2.1 Other Investigations

Previous surface water, sediment, and fish tissue samples were collected in 1986 from the lake by the United States Army Environmental Hygiene Agency (USAEHA) and during the 1990 RI. Five surface water samples (SW3, SW6, SW7, SW8, and SW13) and three sediment samples

(SD1, SD2, and SD3) were collected during the 1990 RI (Law Environmental, 1990). DDT was detected in stormwater entering the lake from the 48-inch-diameter stormwater pipe in 1986; DDT was not, however, detected in a sample collected in the same location in 1990. Pesticides and metals were detected in sediment from the lake in both studies. Fish tissue (catfish) samples collected from the lake in 1986 indicated the presence of pesticides and PCBs.

Radian collected additional sediment and fish tissue samples for the Baseline Risk Assessment of surface impoundments at the golf course (Radian International, 1997) (shown in Table 2 on page 4). Nine additional sediment samples and two fish samples were analyzed for pesticides.

2.2 RI Sampling Program

2.2.1 Sampling Strategy

This sampling strategy was developed to evaluate whether releases have occurred to surface water and to assess the potential for contaminant transport from the surrounding land surface into the pond by stormwater. For this sampling program, surface water samples were collected from stormwater runoff entering the pond to assess the potential that contaminants would be transported into the pond by stormwater.

Surface water samples were collected in the vicinity of the 48-inch diameter stormwater pipe and along the northeast and east edge of the lake to detect any contaminants that may be entering the lake through overland flow. These surface water samples collected during the storm events are expected to contain suspended surface soil particulates. At least one sample analyzed for TCL/TAL constituents in accordance with the *Operable Unit 3 Field Sampling Plan* (CH2M HILL, 1995).

2.2.2 Sampling Procedures

This section describes the sampling procedures and laboratory analyses performed for surface water.

2.2.2.1 Surface Water Sampling Procedures

Surface water samples were collected from four locations (SW26A, SW26B, SW26C, and SW26D) at this site (shown in Figure 2). The following details the sample locations:

- Sample SW26A was taken at the northeast corner of Lake Danielson where the stream flows into the lake. The sample was collected from the overland flow.
- Sample SW26B was taken at the north corner of Lake Danielson from a small unlined drainage ditch discharging into the lake.
- SW26C was taken near the northwest corner of Lake Danielson. The sample was collected from a concrete ditch that conveys water from a 48-inch concrete drain pipe into the lake.
- SW26D was taken at the northwest corner of Lake Danielson, from the overland flow concentrating along the lake edge, and flowing parallel to the shore before discharging into the lake (west of outfall).

The locations were sampled twice during the field effort. Each location was sampled during two separate storm events of more than 0.2 inches of rainfall. The samples were collected where stormwater outfalls or overland runoffs discharge into the pond. Samples were collected as close as possible to the beginning of each storm event to coincide with first flush of the stormwater.

The surface water samples were collected using a clean, unpreserved laboratory bottle. The surface water was collected in the unpreserved bottle and then poured into the appropriate laboratory bottles for analysis. Samples for dissolved metals analysis were filtered using a peristaltic pump and in-line, 0.45-micron filters. Field parameters of pH, specific conductivity, temperature, and dissolved oxygen were measured for each sample and are summarized in Table 5. To prevent the potential for cross-contamination, a new unpreserved laboratory bottle was used to collect each sample and new peristaltic pump tubing and filters were used on each filtered sample.

TABLE 5
Parcel 3, Site 26 Surface Water Sampling Results
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

Sample Location	pH (SU)	Conductivity (µmhos/cm)	Temperature (°C)	Dissolved Oxygen (mg/L)
1st Storm Event				
SW26A	6.01	45	3.9	11.6
SW26B	6.46	23	3.5	11.0
SW26C	6.67	18	3.9	10.3
SW26D	6.62	40	4.0	10.8
2nd Storm Event				
SW26A	6.82	56	10.1	9.2
SW26B	7.01	40	9.8	9.8
SW26C	7.07	49	11.3	9.4
SW26D	6.95	65	10.5	9.2

2.2.3 Analytical Procedures

All samples were submitted to CH2M HILL's Analytical Services in Montgomery, Alabama for analysis. Six surface water samples were analyzed for pesticides, PCBs, and total and dissolved metals. Two of these surface water samples (one from each sampling event) were also analyzed for TCL/TAL parameters. The samples were analyzed in accordance with the procedures outlined in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995).

A United States Army Corps of Engineers (COE) split sample was collected during the second storm event at SW26C. This surface water sample was sent to the COE's Atlanta, Georgia laboratory for analysis of TCL/TAL parameters.

A DQE was performed to assess the effect of the overall analytical process on the usability of the data. The DQE established that the detection of acetone, 2-butanone, and bis(2-

ethylhexyl)phthalate can be attributed to field sampling and laboratory contamination rather than environmental conditions at the site. Also, poor duplicate precision for metals in the duplicate soil samples should be attributed to poor sample homogeneity as well as to potentially poor sampling and analysis precision. With exception of the qualifications listed above, the DQE concluded that data can be used in the project decision-making process.

3.0 Interpretation of Sampling Results

3.1 Presentation of Results

Section 3.1.1 presents results of the RI Sampling Program for RI Site 26. Data are presented by media for surface water and compared with appropriate screening criteria in Tables 26-A and 26-B. Data from the 1997 CH2M HILL investigation are presented along with historical data from the *Remedial Investigations at DDMT, Final Report* (Law Environmental, 1990). If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold on the summary table.

COPCs are parameters that exceed both background values and the screening criteria. Where concentrations exceed the selected background value, the concentration is compared with the observed range of background values as reviewed and established by the BCT.

COPCs identified for RI Site 26 include arsenic, dissolved arsenic, DDE, DDT, lead, and zinc in surface waters. No COPCs were identified in sediments because sediments were not sampled in the recent CH2M HILL sampling event. However, environmental sampling conducted by Radian (Radian International, 1997) indicated elevated concentrations of DDD, DDT , DDE, and other pesticides in sediment samples.

Bis(2-ethylhexyl)phthalate and n-nitrosodiphenylamine are parameters of detected during the historical sampling in surface waters. These chemicals are also common laboratory contaminants and may not be site-related.

DDE, DDD, and bis(2-ethylhexyl)phthalate are parameters detected in historical sediment s samples.

3.1.1 Surface Water

Results of the surface water sampling analyses with values above the detection limits are shown in Table 26-A. This table also contains three types of comparison criteria for surface water. If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold.

Arsenic and dissolved arsenic were both found to exceed the background values and the AWQC-HH in Samples SW26B and SW26D and in Samples SW6, SW7, and SW8 from the 1990 RI (Law Environmental, 1990).

The AWQC-HH value for DDE was exceeded in all four surface water samples and Sample SW6 from the 1990 RI, while the Tennessee state, AWQC-HH, and AWQC-AO values were exceeded for DDT in Samples SW26A, SW26C, and SW26D.

Lead exceeded the AWQC-AO value at all sampling stations, but only exceeded background and AWQC-AO values at Sample SW26D. Zinc exceeded background and AWQC-AO values at Sample SW26C.

During the 1990 RI, bis(2-ethylhexyl)phthalate exceeded the AWQC-HH in four samples, and n-nitrosodiphenylamine exceeded the Tennessee state value in one sample. Both of these chemicals are also common laboratory contaminants and may not be site-related.

3.1.2 Sediments

Although sediments were not sampled during the most recent sampling event, sediment data are available from the 1990 RI conducted by Law Environmental (Table 26-B). In Samples SD1 and SD3, DDD and DDE were detected at the surface but not at the nine-inch depth. Concentrations exceeded background, PRG, and NOAA values.

In all three sediment samples, at both the surface and nine-inch sampling depths, bis(2-ethylhexyl)phthalate was detected at concentrations that exceeded the background value of 0.48 milligrams per kilogram (mg/kg), ranging from 0.53J to 0.76J mg/kg. These concentrations were above EPA Region IV sediment screening criterion of 0.182 mg/kg.

Sediment data are also available from the 1997 Radian investigation (Radian International, 1998). Nine samples were collected from the lake and analyzed for pesticides. No dieldrin was detected in any of the samples. However, DDD, DDE, and DDT were detected in all samples except for Sample SD2. Concentrations ranged from 46 to 1,650 µg/kg dry weight. Chlordane was detected in seven of the nine samples, ranging from 210 to 3,890 µg/kg dry weight. Heptachlor epoxide was detected in five of the nine samples, ranging from 54 to 115 µg/kg dry weight.

3.2 Vertical and Lateral Extent

The Lake Danielson Pond was sampled during three separate sampling events. During 1990 RI Law Environmental sampling efforts, sediment and surface water samples were collected from within the pond. During the RI sampling efforts (CH2M HILL, 1997), only surface water was sampled from storm runoff points around the pond to assess the runoff contribution to the pond sediments and surface water. More recently, Radian (1997) sampling efforts were performed to further characterize pesticides contamination in the sediments. The sediment and surface water from this 3.5-acre pond was adequately characterized during these sampling efforts. The potential runoff from the pond has been sampled at the stormwater runoff point to the pond. Chemicals detected in the sediments and surface water of the pond are typical to the DDMT surface media. Low-level chlorinated pesticides and naturally occurring inorganic chemicals observed in the surface soils across the base were also detected in the pond sediments. Two of the common laboratory contaminants observed in the pond media may be sampling artifacts from the plasticware and thought to be not site-related. The following text presents a brief chemical-specific discussion.

Bis(2-ethylhexyl)phthalate was detected in four of the five historical surface water samples and in all historical sediment samples. It was not detected in the more recent surface water samples. This is one of the common laboratory contaminant chemicals.

N-nitrosodiphenylamine in surface water was detected in only one of the five historical surface water samples (Law Environmental, 1990). It was detected in all three historical sediment samples at the surficial depth but only in one sediment sample at the nine-inch depth. This parameter was not detected in the more recent investigations. This chemical is also a common laboratory contaminant and is thought to be from sampling artifacts and not site-related.

Arsenic is naturally occurring in surface waters and was detected in both the recent and historical samples, but it was not detected in the sediments. Arsenic and dissolved arsenic were detected in two of the four recent surface water samples (Samples SW26B and SW26D) and in three of the five historical samples (Samples SW6, SW7, and SW8).

DDE was detected in all four surface water sampling locations in the first sampling event, but it was not detected at all in the second event. DDE was only found in surficial sediments in two (Samples SD1 and SD3) of the three historical sediment sampling locations. The more recent sampling event conducted by Radian detected much higher concentrations of DDE throughout the pond, with one exception for Sample No. 2 taken at the southeast corner of the pond, which did not detect DDE.

DDT was detected in three of the four surface water sampling locations in the first sampling event but was not detected at all in the second event. DDT was not found in the historical sediment sampling locations. DDT was detected in five of the nine Radian samples.

DDD was not detected in the four surface water sampling locations. DDD was found in surficial sediments in two (Samples SD1 and SD3) of the three 1990 Law Environmental RI sampling locations. The concentrations detected during the 1990 RI Law Environmental sampling event were lower than those detected during the 1997 Radian sampling event.

3.3 Potential Migration Pathways

The following paragraphs provide a general discussion of the potential migration pathways based on physical and chemical properties of the COPCs at RI Site 26.

Arsenic exists at several sites on DDMT in surface soils at concentrations above screening levels. Arsenic's mobility and toxicity are tied to its complex geochemistry and its ability to readily form soluble complexes. Arsenic may also readily be adsorbed onto clays, oxides, or humic organic material and may migrate as suspended soil in surface water or as a sediment. Arsenic can exist in four common oxidation states, and these control its solubility. It readily transports through aquatic environments as a dissolved salt or as a complex with an organic compound.

Lead is present at concentrations greater than background, or above screening criteria, in surface soils, subsurface soils, and sediment at DDMT. Lead is moderately soluble and potentially can be leached from any of these forms of occurrence, reaching concentrations in aqueous solution in both groundwater and surface water that would be of concern to both human and ecological receptors. Additionally, lead in surface soils and sediment potentially may move as suspended particulate matter in surface waters and impact aquatic organisms.

DDT and two of its degradation breakdown products, DDD and DDE, exist in subsurface soils at DDMT; these products should not be mobile in this environment. These compounds have an

extremely high affinity for soil and are essentially insoluble in water. As long as they are buried and the potential for direct contact is controlled, the potential to migrate is minimal. Should soil contaminated with these compounds be uncovered, they potentially would be able to be moved through wind action and/or as suspended material in surface water. DDT also was reported in sediments at two sites on DDMT, indicating migration via this pathway has occurred. These compounds can bioaccumulate and become more concentrated as they move up in the food chain and could potentially affect receptors via this migration pathway.

3.4 Additional Data Needs

Sample data indicate that pesticides exist in the stormwater entering the impoundments, in the pond water itself, in the fish, and in the impoundment sediments. A baseline risk evaluation will be performed using existing data, to determine the potential ecological and human health exposure for this lake. No additional data is proposed for the risk assessment. However, additional data collection may be necessary to support a risk management decision, FS, and other activities necessary to complete the CERCLA process for this site.

4.0 Interpretation of Screening Criteria Comparisons

4.1 Methodology

The PRE was performed in accordance with the *Guidance on Preliminary Risk Evaluations for the Purpose of Reaching a Finding of Suitability to Lease (FOSL)* (EPA Region IV, 1994). A discussion of the PRE methodology in provided as Appendix A to this document.

4.2 RI Site 26 Risk

No risk ratios or systemic toxicity ratios are estimated because all of the detected chemicals were below background levels (based on the recent data set). Therefore, no further action is recommended at this site.

Surface water was sampled from Lake Danielson outlet ditches by Law Environmental. Three of the eight samples had slightly elevated lead near the stormwater outfall area to the lake. The observed lead concentrations were similar to the background concentrations and could be from suspended sediment particles. No sediment sampling was performed during the RI efforts. A baseline risk evaluation will be performed to evaluate the ecological habitat and potential ecological and human health exposure at this site.

5.0 Summary and Recommendations

5.1 Summary

Elevated concentrations of metals and pesticides were detected in the surface water and sediment at Lake Danielson. The COPCs identified based on the recent sampling performed by

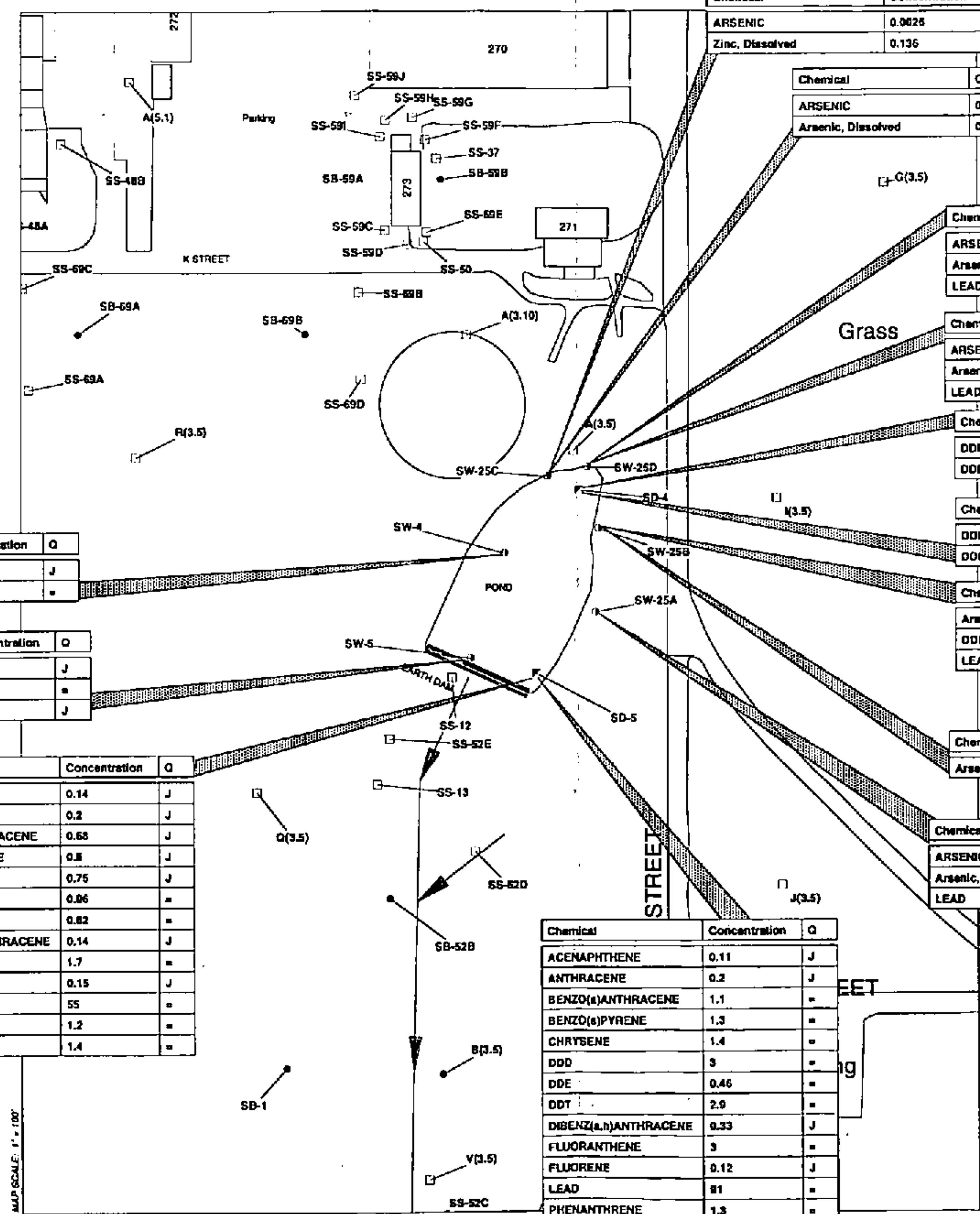
CH2M HILL in 1997 include arsenic, dissolved arsenic, DDE, DDT, lead, and zinc in surface waters. In addition, historical data collected had arsenic, bis(2-ethylhexyl)phthalate, DDE, and n-nitrosodiphenylamine in surface water and bis(2-ethylhexyl)phthalate, DDD, and DDE in sediments from the 1990 RI (Law Environmental, 1990). A baseline risk evaluation will be performed as part of the RI report to characterize the ecological and human health risks from the observed chemicals in the pond sediments and surface water.

5.2 Recommendations

A baseline risk evaluation is proposed to evaluate the human health and ecological significance of the observed sediment and surface water contamination. However, additional data collection may be necessary to support a risk management decision, FS, and other activities necessary to complete the CERCLA process for this site.

Acronyms

°C	degrees Celsius
µmhos/cm	micromhos per centimeter
AWQC-AO	Federal Ambient Water Quality Criteria - Chronic Values for the Protection of Freshwater Aquatic Life
AWQC-HH	Federal Ambient Water Quality Criteria for the Protection of Human Health for the Ingestion of Organisms and Water
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COE	United States Army Corps of Engineers
COPC	constituent of potential concern
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDMT	Defense Distribution Depot Memphis, Tennessee
DDT	dichlorodiphenyltrichloroethane
DQE	Data Quality Evaluation
EPA	United States Environmental Protection Agency
FOSL	Finding of Suitability to Lease
FS	feasibility study
ft^2	square feet
mg/L	milligrams per liter
NOAA	National Oceanic and Atmospheric Administration
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
PRE	Preliminary Risk Evaluation
PRG	preliminary remediation goal
RBC	risk-based criteria
RI	Remedial Investigation
SU	standard units
TCL/TAL	target compound list/ target analyte list
TDEC	Tennessee Department of Environment and Conservation
USAEHA	United States Army Environmental Hygiene Agency
USAESC	United States Army Engineer Service Center



Chemical	Concentration	Q
ARSENIC	0.0025	J
Zinc, Dissolved	0.136	J

Chemical	Concentration	Q
ARSENIC	0.0038	J
Arsenic, Dissolved	0.0034	J

Chemical	Concentration	Q
ARSENIC	0.008	J
Arsenic, Dissolved	0.0073	J
LEAD	0.005	J

Chemical	Concentration	Q
ARSENIC	0.0153	=
Arsenic, Dissolved	0.0084	J
LEAD	0.0162	J

Chemical	Concentration	Q
DDD	0.28	=
DDE	0.064	=

Chemical	Concentration	Q
DDD	0.19	=
DDE	0.068	=

Chemical	Concentration	Q
Arsenic, Dissolved	0.0025	J
DDE	3.2E-005	J
LEAD	0.0052	J

Chemical	Concentration	Q
Arsenic, Dissolved	0.0016	J

Chemical	Concentration	Q
ARSENIC	0.013	=
Arsenic, Dissolved	0.0084	J
LEAD	0.0169	J

Chemical	Concentration	Q
bis(2-ETHYLHEXYL) PHTHALATE	0.003	J
COPPER	0.046	=

Chemical	Concentration	Q
bis(2-ETHYLHEXYL) PHTHALATE	0.005	J
COPPER	0.03	=
N-NITROSODIPHENYLAMINE	0.003	J

Chemical	Concentration	Q
ACENAPHTHENE	0.14	J
ANTHRACENE	0.2	J
BENZO(a)ANTHRACENE	0.68	J
BENZO(a)PYRENE	0.8	J
CHRYSENE	0.75	J
DDD	0.86	=
DDT	0.82	=
DIBENZ(a,h)ANTHRACENE	0.14	J
FLUORANTHENE	1.7	=
FLUORENE	0.15	J
LEAD	55	=
PHENANTHRENE	1.2	=
PYRENE	1.4	=

Chemical	Concentration	Q
ACENAPHTHENE	0.11	J
ANTHRACENE	0.2	J
BENZO(a)ANTHRACENE	1.1	=
BENZO(a)PYRENE	1.3	=
CHRYSENE	1.4	=
DDD	3	=
DDE	0.46	=
DDT	2.9	=
DIBENZ(a,h)ANTHRACENE	0.33	J
FLUORANTHENE	3	=
FLUORENE	0.12	J
LEAD	81	=
PHENANTHRENE	1.3	=
PYRENE	2.4	=
ZINC	80.9	=

LEGEND

- ☐ Surface Soil Sampling Location (mg/kg)
- ● Soil Boring Sampling Location (mg/kg)
- ○ Surface Water Sampling Location (mg/L)
- ☒ Sediment Sample Location (mg/kg)

(Q) Qualifier 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 1
RI Site 25, Golf Course Pond
Constituents Exceeding Risk-Based Criteria
Defense Distribution Depot Memphis, TN

CH2MHILL

Chemical	Concentration	Q
ALUMINUM	0.576	=
Arsenic, Dissolved	0.0024	J
DDE	5.8E-005	J
DDT	0.00015	=
LEAD	0.011	J
ZINC	0.184	J
Zinc, Dissolved	0.145	J

Chemical	Concentration	Q
ALUMINUM	0.118	J
ZINC	0.457	J
Zinc, Dissolved	0.406	J

Chemical	Concentration	Q
ARSENIC	0.0529	=
Arsenic, Dissolved	0.0216	=
CHROMIUM	0.0128	=
COPPER	0.0213	J
DDE	2.6E-005	J
DDT	5.4E-005	J
LEAD	0.0262	J
NICKEL	0.016	J
ZINC	0.124	J

Chemical	Concentration	Q
ARSENIC	0.037	=
bis(2-ETHYLHEXYL) PHTHALATE	0.003	J
COPPER	0.019	=

Chemical	Concentration	Q
ARSENIC	0.0354	=
Arsenic, Dissolved	0.0096	J
DDE	2.9E-005	J
LEAD	0.0188	J

Chemical	Concentration	Q
ARSENIC	0.0223	=
Arsenic, Dissolved	0.0193	=
LEAD	0.0037	J

Chemical	Concentration	Q
ARSENIC	0.0774	=
Arsenic, Dissolved	0.0405	=
CHROMIUM	0.0186	=
COPPER	0.0216	J
LEAD	0.0224	J
NICKEL	0.0175	J
ZINC	0.199	J

Chemical	Concentration	Q
bis(2-ETHYLHEXYL) PHTHALATE	0.006	J

Chemical	Concentration	Q
ARSENIC	0.048	=
COPPER	0.024	=
DDE	0.00021	=

Chemical	Concentration	Q
ARSENIC	0.0123	=
Arsenic, Dissolved	0.0099	J
CHROMIUM	0.016	=
LEAD	0.0091	J

Chemical	Concentration	Q
BENZO(a)ANTHRACENE	0.23	J
CHRYSENE	0.3	J
DDD	0.045	=
DDE	0.11	=
FLUORANTHENE	0.7	J
PHENANTHRENE	0.33	J
PYRENE	0.81	J

Chemical	Concentration	Q
ARSENIC	0.0123	=
Arsenic, Dissolved	0.0078	J
DDE	3.1E-005	J
DDT	4.7E-005	J
LEAD	0.0089	J

Chemical	Concentration	Q
ARSENIC	0.041	=
bis(2-ETHYLHEXYL) PHTHALATE	0.002	J
COPPER	0.02	=
N-NITROSODIPHENYLAMINE	0.003	J

Chemical	Concentration	Q
DDD	0.047	=
DDE	0.036	=

Chemical	Concentration	Q
bis(2-ETHYLHEXYL) PHTHALATE	0.003	J
COPPER	0.027	=

J STREET

LAKE DANIELSON

L STREET

EARTH DAM

L STREET

SW-26C
SW-26D
SW-6
SW-13
SD-2
SW-26B
SD-3
E(3.5)
SW-26A
SW-5
SW-7
SD-1
SW-3
MW-25
MW-25A
SS-51A
SS-51B
SB-51C
F(3.5)
T(3.5)

MAP SCALE: 1" = 100'

N
W
E
S

LEGEND

- Surface Soil Sampling Location (mg/kg)
- Soil Boring Sampling Location (mg/kg)
- Surface Water Sampling Location (mg/L)
- Sediment Sample Location (mg/kg)

(Q) Qualifer 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 26, Lake Danielson
Constituents Exceeding Risk-Based Criteria
Defense Distribution Depot Memphis, TN

CH2MHILL

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Table 25-A
Summary of Detected Compounds in Surface Water
Compared to Screening Levels for Site 25
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	TN State[4]	AWQC-HH[5]	AWQC-AO[6]	Units
CH2M HILL	3	ALUMINUM	SW25B2	0.064	J	5.1	NA	NA	.087	MG/L
CH2M HILL	3	ALUMINUM	SW25B2	0.0498	J	5.1	NA	NA	.087	MG/L
CH2M HILL	3	Aluminum, Dissolved	SW25B2	0.014	J	.471	NA	NA	.087	MG/L
CH2M HILL	3	Aluminum, Dissolved	SW25B2	0.0147	J	.471	NA	NA	.087	MG/L
CH2M HILL	3	ARSENIC	SW25A1	0.013	=	.018	.05	.000018	.19	MG/L
CH2M HILL	3	ARSENIC	SW25C1	0.0026	J	.018	.05	.000018	.19	MG/L
CH2M HILL	3	ARSENIC	SW25C2	0.0038	J	.018	.05	.000018	.19	MG/L
CH2M HILL	3	ARSENIC	SW25D1	0.008	J	.018	.05	.000018	.19	MG/L
CH2M HILL	3	ARSENIC	SW25D2	0.0153	=	.018	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW25A1	0.0084	J	.012	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW25B1	0.0025	J	.012	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW25B2	0.0018	J	.012	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW25C2	0.0034	J	.012	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW25D1	0.0073	J	.012	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW25D2	0.0084	J	.012	.05	.000018	.19	MG/L
CH2M HILL	3	CALCIUM	SW25B1	2.49	J	32	NA	NA	NA	MG/L
CH2M HILL	3	CALCIUM	SW25B1	2.44	J	32	NA	NA	NA	MG/L
CH2M HILL	3	CALCIUM	SW25B2	8.37	=	32	NA	NA	NA	MG/L
CH2M HILL	3	CALCIUM	SW25B2	8.15	=	32	NA	NA	NA	MG/L
CH2M HILL	3	Calcium, Dissolved	SW25B1	2.29	J	30	NA	NA	NA	MG/L
CH2M HILL	3	Calcium, Dissolved	SW25B1	2.68	J	30	NA	NA	NA	MG/L
CH2M HILL	3	Calcium, Dissolved	SW25B2	7.49	=	30	NA	NA	NA	MG/L
CH2M HILL	3	Calcium, Dissolved	SW25B2	8.05	=	30	NA	NA	NA	MG/L
CH2M HILL	3	DDE	SW25B1	0.000032	J	NA	NA	.00000059	.0105	MG/L
CH2M HILL	3	DIELDRIN	SW25A1	0.00043	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	DIELDRIN	SW25B1	0.00016	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	DIELDRIN	SW25C2	0.000044	J	NA	NA	NA	NA	MG/L
CH2M HILL	3	DIELDRIN	SW25D1	0.000053	J	NA	NA	NA	NA	MG/L
CH2M HILL	3	DIELDRIN	SW25D2	0.000045	J	NA	NA	NA	NA	MG/L
CH2M HILL	3	IRON	SW25B1	0.306	=	6.1	NA	NA	1	MG/L
CH2M HILL	3	IRON	SW25B1	0.245	=	6.1	NA	NA	1	MG/L
CH2M HILL	3	IRON	SW25B2	0.417	=	6.1	NA	NA	1	MG/L
CH2M HILL	3	IRON	SW25B2	0.432	=	6.1	NA	NA	1	MG/L

Table 25-A
Summary of Detected Compounds in Surface Water
Compared to Screening Levels for Site 25
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	TN State[4]	AWQC-HH[5]	AWQC-AO[6]	Units
CH2M HILL	3	Iron, Dissolved	SW25B2	0.253	=	.12	NA	NA	1	MG/L
CH2M HILL	3	Iron, Dissolved	SW25B2	0.215	=	.12	NA	NA	1	MG/L
CH2M HILL	3	LEAD	SW25A1	0.0169	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	LEAD	SW25B1	0.0052	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	LEAD	SW25B1	0.0026	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	LEAD	SW25C1	0.0023	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	LEAD	SW25D1	0.005	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	LEAD	SW25D2	0.0162	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	Lead, Dissolved	SW25D1	0.0023	J	.023	.05	NA	.0032	MG/L
CH2M HILL	3	MAGNESIUM	SW25B1	0.286	J	7.7	NA	NA	NA	MG/L
CH2M HILL	3	MAGNESIUM	SW25B1	0.271	J	7.7	NA	NA	NA	MG/L
CH2M HILL	3	MAGNESIUM	SW25B2	1.58	J	7.7	NA	NA	NA	MG/L
CH2M HILL	3	MAGNESIUM	SW25B2	1.57	J	7.7	NA	NA	NA	MG/L
CH2M HILL	3	Magnesium, Dissolved	SW25B1	0.263	J	6.9	NA	NA	NA	MG/L
CH2M HILL	3	Magnesium, Dissolved	SW25B1	0.418	J	6.9	NA	NA	NA	MG/L
CH2M HILL	3	Magnesium, Dissolved	SW25B2	1.62	J	6.9	NA	NA	NA	MG/L
CH2M HILL	3	Magnesium, Dissolved	SW25B2	1.57	J	6.9	NA	NA	NA	MG/L
CH2M HILL	3	MANGANESE	SW25B1	0.0167	=	.66	NA	NA	NA	MG/L
CH2M HILL	3	MANGANESE	SW25B1	0.0146	J	.66	NA	NA	NA	MG/L
CH2M HILL	3	MANGANESE	SW25B2	0.0684	=	.66	NA	NA	NA	MG/L
CH2M HILL	3	MANGANESE	SW25B2	0.0698	=	.66	NA	NA	NA	MG/L
CH2M HILL	3	Manganese, Dissolved	SW25B1	0.0103	J	.35	NA	NA	NA	MG/L
CH2M HILL	3	Manganese, Dissolved	SW25B1	0.0097	J	.35	NA	NA	NA	MG/L
CH2M HILL	3	POTASSIUM	SW25B2	2.73	J	7.3	NA	NA	NA	MG/L
CH2M HILL	3	POTASSIUM	SW25B2	2.54	J	7.3	NA	NA	NA	MG/L
CH2M HILL	3	Potassium, Dissolved	SW25B2	2.55	J	6.7	NA	NA	NA	MG/L
CH2M HILL	3	Potassium, Dissolved	SW25B2	2.58	J	6.7	NA	NA	NA	MG/L
CH2M HILL	3	SODIUM	SW25B2	1.08	J	21	NA	NA	NA	MG/L
CH2M HILL	3	SODIUM	SW25B2	0.993	J	21	NA	NA	NA	MG/L
CH2M HILL	3	SUSPENDED SOLIDS	SW25A1	94	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	SUSPENDED SOLIDS	SW25B1	15	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	SUSPENDED SOLIDS	SW25B1	10	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	SUSPENDED SOLIDS	SW25D1	21	=	NA	NA	NA	NA	MG/L

Table 25-A
Summary of Detected Compounds in Surface Water
Compared to Screening Levels for Site 25
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	TN State[4]	AWQC-HH[5]	AWQC-AO[6]	Units
CH2M HILL	3	SUSPENDED SOLIDS	SW25D2	557	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW25A1	14.6	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW25B1	2.3	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW25B1	2.6	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW25B2	5.9	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW25B2	6	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW25C1	2.8	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW25C2	9.5	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW25D1	16.8	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW25D2	23	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	ZINC	SW25B2	0.0613	J	.29	5	NA	.11	MG/L
CH2M HILL	3	ZINC	SW25B2	0.0702	J	.29	5	NA	.11	MG/L
CH2M HILL	3	ZINC	SW25C2	0.0862	J	.29	5	NA	.11	MG/L
CH2M HILL	3	ZINC	SW25D2	0.0734	J	.29	5	NA	.11	MG/L
CH2M HILL	3	Zinc, Dissolved	SW25C1	0.136	J	.41	5	NA	.11	MG/L
LAW	3	ACETONE	SW4	0.002	J	NA	NA	NA	NA	MG/L
LAW	3	ACETONE	SW5	0.002	J	NA	NA	NA	NA	MG/L
LAW	3	BARIUM	SW4	0.014	=	.13	1	NA	NA	MG/L
LAW	3	BARIUM	SW5	0.014	=	.13	1	NA	NA	MG/L
LAW	3	bis(2-ETHYLHEXYL) PHTHALATE	SW4	0.003	J	NA	15	.0018	NA	MG/L
LAW	3	bis(2-ETHYLHEXYL) PHTHALATE	SW5	0.005	J	NA	15	.0018	NA	MG/L
LAW	3	COPPER	SW4	0.046	=	.075	1	NA	.012	MG/L
LAW	3	COPPER	SW5	0.03	=	.075	1	NA	.012	MG/L
LAW	3	N-NITROSODIPHENYLAMINE	SW5	0.003	J	NA	.000049	.005	.0585	MG/L
LAW	3	ZINC	SW4	0.022	=	.29	5	NA	.11	MG/L
LAW	3	ZINC	SW5	0.022	=	.29	5	NA	.11	MG/L

Notes:
1. Detected values are obtained from the *Draft Parcel 3 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Tennessee State values are from Table 3-8 of the *Generic Remedial Investigation/Feasibility Study Work Plan*, CH2M HILL, August 1995.

Table 25-A
Summary of Detected Compounds in Surface Water
Compared to Screening Levels for Site 25
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	TN State[4]	AWQC-HH[5]	AWQC-AO[6]	Units

5. Federal Ambient Water Quality Criteria for the Protection of Human Health for the Ingestion of Organisms and Water (AWQC-HH) values are from Table 3-8 of the *Generic Remedial Investigation/Feasibility Study Work Plan*, CH2M HILL, August 1995.
6. Federal Ambient Water Quality Criteria, Chronic for the Protection of Freshwater Aquatic Life (AWQC-AO) values are from Table 3-8 of the *Generic Remedial Investigation/Feasibility Study Work Plan*, CH2M HILL, August 1995.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
= - indicates unqualified detection.
J - indicates estimated value above the detection limit but below the reporting limit.

Table 25-B
Summary of Detected Compounds in Sediment
Compared to Screening Levels for Site 25
Remedial Investigation Sampling Program
Defense Depot Memphis, Tennessee

Data Source[1]	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	PRG-Sed[4]	NOAA-Sed[5]	Units
LAW	ACENAPHTHENE	SD-5-9	**0.14**	J	.77	**.022**	.15	MG/KG
LAW	ACENAPHTHENE	SD-5-SS	**0.11**	J	.77	**.022**	.15	MG/KG
LAW	ACETONE	SD-4-9	0.14	=	NA	NA	NA	MG/KG
LAW	ACETONE	SD-4-SS	0.17	=	NA	NA	NA	MG/KG
LAW	ACETONE	SD-5-9	0.024	=	NA	NA	NA	MG/KG
LAW	ACETONE	SD-5-SS	0.021	=	NA	NA	NA	MG/KG
LAW	ALPHA ENDOSULFAN	SD-5-SS	0.2	=	NA	NA	NA	MG/KG
LAW	ANTHRACENE	SD-5-9	**0.2**	J	1.6	**.085**	**.085**	MG/KG
LAW	ANTHRACENE	SD-5-SS	**0.2**	J	1.6	**.085**	**.085**	MG/KG
LAW	BARIUM	SD-4-9	95.2	=	118	NA	NA	MG/KG
LAW	BARIUM	SD-4-SS	96	=	118	NA	NA	MG/KG
LAW	BARIUM	SD-5-9	104	=	118	NA	NA	MG/KG
LAW	BARIUM	SD-5-SS	101	=	118	NA	NA	MG/KG
LAW	BENZO(a)ANTHRACENE	SD-5-9	**0.68**	J	2.9	**.16**	**.23**	MG/KG
LAW	BENZO(a)ANTHRACENE	SD-5-SS	**1.1**	=	2.9	**.16**	**.23**	MG/KG
LAW	BENZO(a)PYRENE	SD-5-9	**0.5**	J	2.5	**.23**	**.4**	MG/KG
LAW	BENZO(a)PYRENE	SD-5-SS	**1.3**	=	2.5	**.23**	**.4**	MG/KG
LAW	BENZO(b)FLUORANTHENE	SD-5-9	0.69	J	2.2	NA	NA	MG/KG
LAW	BENZO(b)FLUORANTHENE	SD-5-SS	1.8	=	2.2	NA	NA	MG/KG
LAW	BENZO(g,h,i)PERYLENE	SD-5-9	0.39	J	1.8	NA	NA	MG/KG
LAW	BENZO(g,h,i)PERYLENE	SD-5-SS	0.94	=	1.8	NA	NA	MG/KG
LAW	BENZO(k)FLUORANTHENE	SD-5-9	0.69	J	2.3	NA	NA	MG/KG
LAW	BENZO(k)FLUORANTHENE	SD-5-SS	1.6	=	2.3	NA	NA	MG/KG
LAW	BENZOIC ACID	SD-4-9	0.45	J	NA	NA	NA	MG/KG
LAW	BENZOIC ACID	SD-4-SS	0.68	J	NA	NA	NA	MG/KG
LAW	BENZOIC ACID	SD-5-9	0.97	J	NA	NA	NA	MG/KG
LAW	BENZOIC ACID	SD-5-SS	1.2	J	NA	NA	NA	MG/KG
LAW	bis(2-ETHYLHEXYL) PHTHALATE	SD-4-9	0.63	J	.48	NA	NA	MG/KG
LAW	bis(2-ETHYLHEXYL) PHTHALATE	SD-4-SS	0.71	J	.48	NA	NA	MG/KG
LAW	bis(2-ETHYLHEXYL) PHTHALATE	SD-5-9	0.71	J	.48	NA	NA	MG/KG

Table 25-B
Summary of Detected Compounds in Sediment
Compared to Screening Levels for Site 25
Remedial Investigation Sampling Program
Defense Depot Memphis, Tennessee

Data	Parameter[2]	StationID	Detected	Project	Background	PRG-Sed[4]	NOAA-Sed[5]	Units
LAW	bis(2-ETHYLHEXYL) PHTHALATE	SD-5-SS	0.71	J	.48	NA	NA	MG/KG
LAW	CADMIUM	SD-5-SS	0.9	=	29	1	5	MG/KG
LAW	CHROMIUM	SD-4-9	11	=	20	33	80	MG/KG
LAW	CHROMIUM	SD-4-SS	13	=	20	33	80	MG/KG
LAW	CHROMIUM	SD-5-9	21	=	20	33	80	MG/KG
LAW	CHROMIUM	SD-5-SS	28	=	20	33	80	MG/KG
LAW	CHRYSENE	SD-5-9	0.75	J	3.2	.22	.4	MG/KG
LAW	CHRYSENE	SD-5-SS	1.4	=	3.2	.22	.4	MG/KG
LAW	COPPER	SD-4-9	16	=	58	28	70	MG/KG
LAW	COPPER	SD-4-SS	15	=	58	28	70	MG/KG
LAW	COPPER	SD-5-9	26	=	58	28	70	MG/KG
LAW	COPPER	SD-5-SS	28	=	58	28	70	MG/KG
LAW	DDD	SD-4-9	0.28	=	.0061	NA	.002	MG/KG
LAW	DDD	SD-4-SS	0.19	=	.0061	NA	.002	MG/KG
LAW	DDD	SD-5-9	0.96	=	.0061	NA	.002	MG/KG
LAW	DDD	SD-5-SS	3	=	.0061.	NA	.002	MG/KG
LAW	DDE	SD-4-9	0.064	=	.0072	.0017	.002	MG/KG
LAW	DDE	SD-4-SS	0.068	=	.0072	.0017	.002	MG/KG
LAW	DDE	SD-5-SS	0.46	=	.0072	.0017	.002	MG/KG
LAW	DDT	SD-5-9	0.62	=	NA	NA	.001	MG/KG
LAW	DDT	SD-5-SS	2.9	=	NA	NA	.001	MG/KG
LAW	DIBENZ(a,h)ANTHRACENE	SD-5-9	0.14	J	.7	.031	.06	MG/KG
LAW	DIBENZ(a,h)ANTHRACENE	SD-5-SS	0.33	J	.7	.031	.06	MG/KG
LAW	FLUORANTHENE	SD-4-SS	0.13	J	7.1	.38	.6	MG/KG
LAW	FLUORANTHENE	SD-5-9	1.7	=	7.1	.38	.6	MG/KG
LAW	FLUORANTHENE	SD-5-SS	3	=	7.1	.38	.6	MG/KG
LAW	FLUORENE	SD-5-9	0.15	J	1.69	.018	.035	MG/KG
LAW	FLUORENE	SD-5-SS	0.12	J	1.69	.018	.035	MG/KG
LAW	INDENO(1,2,3-c,d)PYRENE	SD-5-9	0.35	J	1.7	NA	NA	MG/KG
LAW	INDENO(1,2,3-c,d)PYRENE	SD-5-SS	0.9	=	1.7	NA	NA	MG/KG
LAW	LEAD	SD-4-9	6	=	35.2	21	35	MG/KG

Table 25-B
Summary of Detected Compounds in Sediment
Compared to Screening Levels for Site 25
Remedial Investigation Sampling Program
Defense Depot Memphis, Tennessee

Data	Parameter[2]	StationID	Detected	Project	Background	PRG-Sed[4]	NOAA-Sed[5]	Units
LAW	LEAD	SD-4-SS	5	=	35.2	21	35	MG/KG
LAW	LEAD	SD-5-9	55	=	35.2	21	35	MG/KG
LAW	LEAD	SD-5-SS	91	=	35.2	21	35	MG/KG
LAW	MERCURY	SD-4-9	0.04	=	4	.1	.15	MG/KG
LAW	MERCURY	SD-4-SS	0.05	=	4	.1	.15	MG/KG
LAW	MERCURY	SD-5-9	0.04	=	4	.1	.15	MG/KG
LAW	MERCURY	SD-5-SS	0.06	=	4	.1	.15	MG/KG
LAW	METHYL ETHYL KETONE	SD-4-9	0.005	J	.01	NA	NA	MG/KG
LAW	METHYL ETHYL KETONE	SD-4-SS	0.006	J	.01	NA	NA	MG/KG
LAW	METHYLENE CHLORIDE	SD-4-9	0.029	=	NA	NA	NA	MG/KG
LAW	METHYLENE CHLORIDE	SD-4-SS	0.027	=	NA	NA	NA	MG/KG
LAW	METHYLENE CHLORIDE	SD-5-9	0.025	=	NA	NA	NA	MG/KG
LAW	METHYLENE CHLORIDE	SD-5-SS	0.014	=	NA	NA	NA	MG/KG
LAW	N-NITROSODIPHENYLAMINE	SD-4-SS	0.19	J	NA	NA	NA	MG/KG
LAW	N-NITROSODIPHENYLAMINE	SD-5-9	0.19	J	NA	NA	NA	MG/KG
LAW	N-NITROSODIPHENYLAMINE	SD-5-SS	0.28	J	NA	NA	NA	MG/KG
LAW	NICKEL	SD-4-9	13	=	30	NA	30	MG/KG
LAW	NICKEL	SD-4-SS	13	=	30	NA	30	MG/KG
LAW	NICKEL	SD-5-9	14	=	30	NA	30	MG/KG
LAW	NICKEL	SD-5-SS	14	=	30	NA	30	MG/KG
LAW	PENTACHLOROPHENOL	SD-5-SS	0.27	J	NA	NA	NA	MG/KG
LAW	PHENANTHRENE	SD-4-SS	0.1	J	6.9	.14	.225	MG/KG
LAW	PHENANTHRENE	SD-5-9	1.2	=	6.9	.14	.225	MG/KG
LAW	PHENANTHRENE	SD-5-SS	1.3	=	6.9	.14	.225	MG/KG
LAW	PYRENE	SD-4-SS	0.1	J	2.9	.29	NA	MG/KG
LAW	PYRENE	SD-5-9	1.4	=	2.9	.29	NA	MG/KG
LAW	PYRENE	SD-5-SS	2.4	=	2.9	.29	NA	MG/KG
LAW	TOLUENE	SD-5-9	0.002	J	.014	NA	NA	MG/KG
LAW	Total Polynuclear Aromatic Hydrocarbons	SD-4-SS	0.33	=	NA	NA	NA	MG/KG
LAW	Total Polynuclear Aromatic Hydrocarbons	SD-5-9	8.98	=	NA	NA	NA	MG/KG
LAW	Total Polynuclear Aromatic Hydrocarbons	SD-5-SS	16.5	=	NA	NA	NA	MG/KG

Table 25-B
Summary of Detected Compounds in Sediment
Compared to Screening Levels for Site 25
Remedial Investigation Sampling Program
Defense Depot Memphis, Tennessee

Data	Parameter[2]	StationID	Detected	Project	Background	PRG-Sed[4]	NOAA-Sed[5]	Units
LAW	ZINC	SD-4-9	43.2	=	797	68	120	MG/KG
LAW	ZINC	SD-4-SS	44.7	=	797	68	120	MG/KG
LAW	ZINC	SD-5-9	66.8	=	797	68	120	MG/KG
LAW	ZINC	SD-5-SS	**80.9**	=	797	68	120	MG/KG

Notes:

1. Detected values are obtained from the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Sediment Preliminary Remediation Goal (PRG) values are from Table 3-10 of the *Generic Remedial Investigation/Feasibility Study Work Plan*, CH2M HILL, August 1995.
5. National Oceanic and Atmospheric Administration (NOAA) values are from Table 3-10 of the *Generic Remedial Investigation/Feasibility Study Work Plan*, CH2M HILL, August 1995.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
= - indicates unqualified detection
J - indicates estimated value above the detection limit but below the reporting limit.

Table 26-A
Summary of Detected Compounds in Surface Water
Compared to Screening Levels for Site 26
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	TN State[4]	AWQC-HH[5]	AWQC-AO[6]	Units
CH2M HILL	3	ALUMINUM	SW26C1	0.576	=	5.1	NA	NA	.087	MG/L
CH2M HILL	3	ALUMINUM	SW26C2	0.118	J	5.1	NA	NA	.087	MG/L
CH2M HILL	3	Aluminum, Dissolved	SW26C2	0.0814	J	.471	NA	NA	.087	MG/L
CH2M HILL	3	ARSENIC	SW26A1	0.0123	=	.018	.05	.000018	.19	MG/L
CH2M HILL	3	ARSENIC	SW26A2	0.0123	=	.018	.05	.000018	.19	MG/L
CH2M HILL	3	ARSENIC	SW26B1	0.0364	=	.018	.05	.000018	.19	MG/L
CH2M HILL	3	ARSENIC	SW26B2	0.0223	=	.018	.05	.000018	.19	MG/L
CH2M HILL	3	ARSENIC	SW26D1	0.0629	=	.018	.05	.000018	.19	MG/L
CH2M HILL	3	ARSENIC	SW26D2	0.0774	=	.018	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW26A1	0.0078	J	.012	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW26A2	0.0099	J	.012	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW26B1	0.0096	J	.012	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW26B2	0.0193	=	.012	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW26C1	0.0024	J	.012	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW26D1	0.0216	=	.012	.05	.000018	.19	MG/L
CH2M HILL	3	Arsenic, Dissolved	SW26D2	0.0405	=	.012	.05	.000018	.19	MG/L
CH2M HILL	3	CALCIUM	SW26C1	4.2	J	32	NA	NA	NA	MG/L
CH2M HILL	3	CALCIUM	SW26C2	9.08	=	32	NA	NA	NA	MG/L
CH2M HILL	3	Calcium, Dissolved	SW26C1	3.34	J	30	NA	NA	NA	MG/L
CH2M HILL	3	Calcium, Dissolved	SW26C2	9.62	=	30	NA	NA	NA	MG/L
CH2M HILL	3	CHROMIUM	SW26A2	0.014	=	.036	.05	NA	.011	MG/L
CH2M HILL	3	CHROMIUM	SW26B1	0.0101	=	.036	.05	NA	.011	MG/L
CH2M HILL	3	CHROMIUM	SW26D1	0.0128	=	.036	.05	NA	.011	MG/L
CH2M HILL	3	CHROMIUM	SW26D2	0.0186	=	.036	.05	NA	.011	MG/L
CH2M HILL	3	COPPER	SW26D1	0.0213	J	.075	1	NA	.012	MG/L
CH2M HILL	3	COPPER	SW26D2	0.0216	J	.075	1	NA	.012	MG/L
CH2M HILL	3	DDE	SW26A1	0.000031	J	NA	NA	.00000059	.0105	MG/L
CH2M HILL	3	DDE	SW26B1	0.000029	J	NA	NA	.00000059	.0105	MG/L
CH2M HILL	3	DDE	SW26C1	0.000058	J	NA	NA	.00000059	.0105	MG/L
CH2M HILL	3	DDE	SW26D1	0.000026	J	NA	NA	.00000059	.0105	MG/L
CH2M HILL	3	DDT	SW26A1	0.000047	J	NA	.000000024	.00000059	.000001	MG/L
CH2M HILL	3	DDT	SW26C1	0.00015	=	NA	.000000024	.00000059	.000001	MG/L
CH2M HILL	3	DDT	SW26D1	0.000054	J	NA	.000000024	.00000059	.000001	MG/L

Table 26-A
Summary of Detected Compounds in Surface Water
Compared to Screening Levels for Site 26
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	TN State[4]	AWQC-HH[5]	AWQC-AO[6]	Units
CH2M HILL	3	DIELDRIN	SW26A1	0.000093	J	NA	NA	NA	NA	MG/L
CH2M HILL	3	DIELDRIN	SW26A2	0.0001	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	DIELDRIN	SW26B1	0.000035	J	NA	NA	NA	NA	MG/L
CH2M HILL	3	DIELDRIN	SW26D2	0.00028	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	IRON	SW26C1	0.835	=	6.1	NA	NA	1	MG/L
CH2M HILL	3	LEAD	SW26A1	0.0089	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	LEAD	SW26A2	0.0081	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	LEAD	SW26B1	0.0188	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	LEAD	SW26B2	0.0037	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	LEAD	SW26C1	0.011	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	LEAD	SW26D1	0.0262	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	LEAD	SW26D2	0.0224	J	.019	.05	NA	.0032	MG/L
CH2M HILL	3	Lead, Dissolved	SW26D1	0.0031	J	.023	.05	NA	.0032	MG/L
CH2M HILL	3	MAGNESIUM	SW26C1	0.388	J	7.7	NA	NA	NA	MG/L
CH2M HILL	3	MAGNESIUM	SW26C2	1.28	J	7.7	NA	NA	NA	MG/L
CH2M HILL	3	Magnesium, Dissolved	SW26C1	0.213	J	6.9	NA	NA	NA	MG/L
CH2M HILL	3	Magnesium, Dissolved	SW26C2	1.4	J	6.9	NA	NA	NA	MG/L
CH2M HILL	3	MANGANESE	SW26C1	0.0461	=	.66	NA	NA	NA	MG/L
CH2M HILL	3	MANGANESE	SW26C2	0.0084	J	.66	NA	NA	NA	MG/L
CH2M HILL	3	Manganese, Dissolved	SW26C1	0.0207	=	.35	NA	NA	NA	MG/L
CH2M HILL	3	Manganese, Dissolved	SW26C2	0.0074	J	.35	NA	NA	NA	MG/L
CH2M HILL	3	NICKEL	SW26B1	0.0117	J	.023	.0134	.61	.16	MG/L
CH2M HILL	3	NICKEL	SW26D1	0.016	J	.023	.0134	.61	.16	MG/L
CH2M HILL	3	NICKEL	SW26D2	0.0175	J	.023	.0134	.61	.16	MG/L
CH2M HILL	3	POTASSIUM	SW26C2	1.91	J	7.3	NA	NA	NA	MG/L
CH2M HILL	3	Potassium, Dissolved	SW26C1	0.751	J	6.7	NA	NA	NA	MG/L
CH2M HILL	3	Potassium, Dissolved	SW26C2	1.43	J	6.7	NA	NA	NA	MG/L
CH2M HILL	3	SODIUM	SW26C1	0.975	J	21	NA	NA	NA	MG/L
CH2M HILL	3	SODIUM	SW26C2	0.963	J	21	NA	NA	NA	MG/L
CH2M HILL	3	Sodium, Dissolved	SW26C2	0.907	J	22	NA	NA	NA	MG/L
CH2M HILL	3	SUSPENDED SOLIDS	SW26A1	106	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	SUSPENDED SOLIDS	SW26A2	282	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	SUSPENDED SOLIDS	SW26B1	364	=	NA	NA	NA	NA	MG/L

Table 26-A
Summary of Detected Compounds in Surface Water
Compared to Screening Levels for Site 26
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	TN State[4]	AWQC-HH[5]	AWQC-AO[6]	Units
CH2M HILL	3	SUSPENDED SOLIDS	SW26B2	14	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	SUSPENDED SOLIDS	SW26C1	9	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	SUSPENDED SOLIDS	SW26C2	6	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	SUSPENDED SOLIDS	SW26D1	1180	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	SUSPENDED SOLIDS	SW26D2	603	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW26A1	13.5	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW26A2	15	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW26B1	10.4	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW26B2	10	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW26C1	7.4	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW26C2	3.6	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW26D1	12.4	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	TOTAL ORGANIC CARBON	SW26D2	9.4	=	NA	NA	NA	NA	MG/L
CH2M HILL	3	ZINC	SW26B1	0.0857	J	.29	5	NA	.11	MG/L
CH2M HILL	3	ZINC	SW26B2	0.0658	J	.29	5	NA	.11	MG/L
CH2M HILL	3	ZINC	SW26C1	0.184	J	.29	5	NA	.11	MG/L
CH2M HILL	3	ZINC	SW26C2	0.467	J	.29	5	NA	.11	MG/L
CH2M HILL	3	ZINC	SW26D1	0.124	J	.29	5	NA	.11	MG/L
CH2M HILL	3	ZINC	SW26D2	0.199	J	.29	5	NA	.11	MG/L
CH2M HILL	3	Zinc, Dissolved	SW26C1	0.145	J	.41	5	NA	.11	MG/L
CH2M HILL	3	Zinc, Dissolved	SW26C2	0.406	J	.41	5	NA	.11	MG/L
LAW	3	ACETONE	SW3	0.003	J	NA	NA	NA	NA	MG/L
LAW	3	ACETONE	SW7	0.002	J	NA	NA	NA	NA	MG/L
LAW	3	ACETONE	SW8	0.002	J	NA	NA	NA	NA	MG/L
LAW	3	ARSENIC	SW6	0.048	=	.018	.05	.000018	.19	MG/L
LAW	3	ARSENIC	SW7	0.041	=	.018	.05	.000018	.19	MG/L
LAW	3	ARSENIC	SW8	0.037	=	.018	.05	.000018	.19	MG/L
LAW	3	BARIUM	SW13	0.06	=	.13	1	NA	NA	MG/L
LAW	3	BARIUM	SW3	0.015	=	.13	1	NA	NA	MG/L
LAW	3	BARIUM	SW6	0.017	=	.13	1	NA	NA	MG/L
LAW	3	BARIUM	SW7	0.015	=	.13	1	NA	NA	MG/L
LAW	3	BARIUM	SW8	0.015	=	.13	1	NA	NA	MG/L
LAW	3	BENZOIC ACID	SW13	0.005	J	NA	NA	NA	NA	MG/L

Table 26-A
Summary of Detected Compounds in Surface Water
Compared to Screening Levels for Site 26
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	TN State[4]	AWQC-HH[5]	AWQC-AO[6]	Units
LAW	3	bis(2-ETHYLHEXYL) PHTHALATE	SW13	**0.006**	J	NA	15	.0018	NA	MG/L
LAW	3	bis(2-ETHYLHEXYL) PHTHALATE	SW3	**0.003**	J	NA	15	.0018	NA	MG/L
LAW	3	bis(2-ETHYLHEXYL) PHTHALATE	SW7	**0.002**	J	NA	15	.0018	NA	MG/L
LAW	3	bis(2-ETHYLHEXYL) PHTHALATE	SW8	**0.003**	J	NA	15	.0018	NA	MG/L
LAW	3	COPPER	SW3	**0.027**	=	.075	1	NA	**.012**	MG/L
LAW	3	COPPER	SW6	**0.024**	=	.075	1	NA	**.012**	MG/L
LAW	3	COPPER	SW7	**0.02**	=	.075	1	NA	**.012**	MG/L
LAW	3	COPPER	SW8	**0.019**	=	.075	1	NA	**.012**	MG/L
LAW	3	DDE	SW6	**0.00021**	=	NA	NA	.00000059	.0105	MG/L
LAW	3	METHYLENE CHLORIDE	SW3	0.001	J	NA	1.5	.0047	1.93	MG/L
LAW	3	METHYLENE CHLORIDE	SW7	0.002	J	NA	1.5	.0047	1.93	MG/L
LAW	3	METHYLENE CHLORIDE	SW8	0.001	J	NA	1.5	.0047	1.93	MG/L
LAW	3	N-NITROSODIPHENYLAMINE	SW7	**0.003**	J	NA	.000049	.005	.0585	MG/L
LAW	3	ZINC	SW13	0.054	=	.29	5	NA	.11	MG/L
LAW	3	ZINC	SW3	0.068	=	.29	5	NA	.11	MG/L
LAW	3	ZINC	SW6	0.041	=	.29	5	NA	.11	MG/L
LAW	3	ZINC	SW7	0.032	=	.29	5	NA	.11	MG/L
LAW	3	ZINC	SW8	0.037	=	.29	5	NA	.11	MG/L

Notes:

1. Detected values are obtained from the *Draft Parcel 3 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Tennessee State values are from Table 3-8 of the *Generic Remedial Investigation/Feasibility Study Work Plan*, CH2M HILL, August 1995.
5. Federal Ambient Water Quality Criteria for the Protection of Human Health for the Ingestion of Organisms and Water (AWQC-HH) values are from Table 3-8 of the *Generic Remedial Investigation/Feasibility Study Work Plan*, CH2M HILL, August 1995.
6. Federal Ambient Water Quality Criteria, Chronic for the Protection of Freshwater Aquatic Life (AWQC-AO) values are from Table 3-8 of the *Generic Remedial Investigation/Feasibility Study Work Plan*, CH2M HILL, August 1995.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
= - indicates unqualified detection.
J - indicates estimated value above the detection limit but below the reporting limit.

Table 26-B
Summary of Detected Compounds in Sediment
Compared to Screening Levels for Site 26
Remedial Investigation Sampling Program
Defense Depot Memphis, Tennessee

Data Source[1]	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	PRG-Sed[4]	NOAA-Sed[5]	Units
LAW	ACETONE	SD-1-9	0.075	=	NA	NA	NA	MG/KG
LAW	ACETONE	SD-1-SS	0.071	=	NA	NA	NA	MG/KG
LAW	ACETONE	SD-2-9	0.051	=	NA	NA	NA	MG/KG
LAW	ACETONE	SD-2-SS	0.046	=	NA	NA	NA	MG/KG
LAW	ACETONE	SD-3-9	0.036	=	NA	NA	NA	MG/KG
LAW	ACETONE	SD-3-SS	0.043	=	NA	NA	NA	MG/KG
LAW	BARIUM	SD-1-9	88.4	=	118	NA	NA	MG/KG
LAW	BARIUM	SD-1-SS	76	=	118	NA	NA	MG/KG
LAW	BARIUM	SD-2-9	110	=	118	NA	NA	MG/KG
LAW	BARIUM	SD-2-SS	122	=	118	NA	NA	MG/KG
LAW	BARIUM	SD-3-9	99	=	118	NA	NA	MG/KG
LAW	BARIUM	SD-3-SS	89.7	=	118	NA	NA	MG/KG
LAW	BENZO(a)ANTHRACENE	SD-3-SS	0.23	J	2.9	.16	.23	MG/KG
LAW	BENZO(a)PYRENE	SD-3-SS	0.23	J	2.5	.23	.4	MG/KG
LAW	BENZO(b)FLUORANTHENE	SD-3-SS	0.38	J	2.2	NA	NA	MG/KG
LAW	BENZO(g,h,i)PERYLENE	SD-3-SS	0.2	J	1.8	NA	NA	MG/KG
LAW	BENZO(k)FLUORANTHENE	SD-3-SS	0.29	J	2.3	NA	NA	MG/KG
LAW	BENZOIC ACID	SD-1-9	0.49	J	NA	NA	NA	MG/KG
LAW	BENZOIC ACID	SD-1-SS	0.46	J	NA	NA	NA	MG/KG
LAW	BENZOIC ACID	SD-2-9	0.59	J	NA	NA	NA	MG/KG
LAW	BENZOIC ACID	SD-2-SS	0.3	J	NA	NA	NA	MG/KG
LAW	BENZOIC ACID	SD-3-9	0.47	J	NA	NA	NA	MG/KG
LAW	BENZOIC ACID	SD-3-SS	0.16	J	NA	NA	NA	MG/KG
LAW	bis(2-ETHYLHEXYL) PHTHALATE	SD-1-9	0.57	=	.48	NA	NA	MG/KG
LAW	bis(2-ETHYLHEXYL) PHTHALATE	SD-1-SS	0.55	=	.48	NA	NA	MG/KG
LAW	bis(2-ETHYLHEXYL) PHTHALATE	SD-2-9	0.53	J	.48	NA	NA	MG/KG
LAW	bis(2-ETHYLHEXYL) PHTHALATE	SD-2-SS	0.58	J	.48	NA	NA	MG/KG
LAW	bis(2-ETHYLHEXYL) PHTHALATE	SD-3-9	0.64	J	.48	NA	NA	MG/KG
LAW	bis(2-ETHYLHEXYL) PHTHALATE	SD-3-SS	0.76	J	.48	NA	NA	MG/KG

Table 26-B
Summary of Detected Compounds in Sediment
Compared to Screening Levels for Site 26
Remedial Investigation Sampling Program
Defense Depot Memphis, Tennessee

Data	Parameter[2]	StationID	Detected	Project	Background	PRG-Sed[4]	NOAA-Sed[5]	Units
LAW	CADMIUM	SD-1-SS	0.7	=	29	1	5	MG/KG
LAW	CHROMIUM	SD-1-9	13	=	20	33	80	MG/KG
LAW	CHROMIUM	SD-1-SS	13	=	20	33	80	MG/KG
LAW	CHROMIUM	SD-2-9	10	=	20	33	80	MG/KG
LAW	CHROMIUM	SD-2-SS	12	=	20	33	80	MG/KG
LAW	CHROMIUM	SD-3-9	9	=	20	33	80	MG/KG
LAW	CHROMIUM	SD-3-SS	12	=	20	33	80	MG/KG
LAW	CHRYSENE	SD-3-SS	0.3	J	3.2	.22	.4	MG/KG
LAW	COPPER	SD-1-9	23	=	58	28	70	MG/KG
LAW	COPPER	SD-1-SS	20	=	58	28	70	MG/KG
LAW	COPPER	SD-2-9	17	=	58	28	70	MG/KG
LAW	COPPER	SD-2-SS	18	=	58	28	70	MG/KG
LAW	COPPER	SD-3-9	16	=	58	28	70	MG/KG
LAW	COPPER	SD-3-SS	15	=	58	28	70	MG/KG
LAW	DDD	SD-1-SS	0.047	=	.0061	NA	.002	MG/KG
LAW	DDD	SD-3-SS	0.045	=	.0061	NA	.002	MG/KG
LAW	DDE	SD-1-SS	0.036	=	.0072	.0017	.002	MG/KG
LAW	DDE	SD-3-SS	0.11	=	.0072	.0017	.002	MG/KG
LAW	FLUORANTHENE	SD-1-9	0.071	J	7.1	.38	.6	MG/KG
LAW	FLUORANTHENE	SD-1-SS	0.074	J	7.1	.38	.6	MG/KG
LAW	FLUORANTHENE	SD-2-SS	0.1	J	7.1	.38	.6	MG/KG
LAW	FLUORANTHENE	SD-3-SS	0.7	J	7.1	.38	.6	MG/KG
LAW	INDENO(1,2,3-c,d)PYRENE	SD-3-SS	0.21	J	1.7	NA	NA	MG/KG
LAW	MERCURY	SD-1-9	0.05	=	4	.1	.15	MG/KG
LAW	MERCURY	SD-1-SS	0.04	=	4	.1	.15	MG/KG
LAW	MERCURY	SD-2-9	0.05	=	4	.1	.15	MG/KG
LAW	MERCURY	SD-2-SS	0.05	=	4	.1	.15	MG/KG
LAW	METHYL ETHYL KETONE	SD-1-9	0.003	J	.01	NA	NA	MG/KG
LAW	METHYL ETHYL KETONE	SD-2-SS	0.001	J	.01	NA	NA	MG/KG

Table 26-B
Summary of Detected Compounds in Sediment
Compared to Screening Levels for Site 26
Remedial Investigation Sampling Program
Defense Depot Memphis, Tennessee

Data	Parameter[2]	StationID	Detected	Project	Background	PRG-Sed[4]	NOAA-Sed[5]	Units
LAW	METHYLENE CHLORIDE	SD-1-9	0.038	=	NA	NA	NA	MG/KG
LAW	METHYLENE CHLORIDE	SD-1-SS	0.042	=	NA	NA	NA	MG/KG
LAW	METHYLENE CHLORIDE	SD-2-9	0.022	=	NA	NA	NA	MG/KG
LAW	METHYLENE CHLORIDE	SD-2-SS	0.022	=	NA	NA	NA	MG/KG
LAW	METHYLENE CHLORIDE	SD-3-9	0.022	=	NA	NA	NA	MG/KG
LAW	METHYLENE CHLORIDE	SD-3-SS	0.028	=	NA	NA	NA	MG/KG
LAW	N-NITROSODIPHENYLAMINE	SD-1-SS	0.1	J	NA	NA	NA	MG/KG
LAW	N-NITROSODIPHENYLAMINE	SD-2-SS	0.17	J	NA	NA	NA	MG/KG
LAW	N-NITROSODIPHENYLAMINE	SD-3-9	0.1	J	NA	NA	NA	MG/KG
LAW	N-NITROSODIPHENYLAMINE	SD-3-SS	0.27	J	NA	NA	NA	MG/KG
LAW	NICKEL	SD-1-9	14	=	30	NA	30	MG/KG
LAW	NICKEL	SD-1-SS	11	=	30	NA	30	MG/KG
LAW	NICKEL	SD-2-9	12	=	30	NA	30	MG/KG
LAW	NICKEL	SD-2-SS	14	=	30	NA	30	MG/KG
LAW	NICKEL	SD-3-9	13	=	30	NA	30	MG/KG
LAW	NICKEL	SD-3-SS	14	=	30	NA	30	MG/KG
LAW	PHENANTHRENE	SD-3-SS	**0.33**	J	6.9	**.14**	.225	MG/KG
LAW	PYRENE	SD-3-SS	**0.61**	J	2.9	.29	NA	MG/KG
LAW	Total Polynuclear Aromatic Hydrocarbons	SD-1-9	0.071	=	NA	NA	NA	MG/KG
LAW	Total Polynuclear Aromatic Hydrocarbons	SD-1-SS	0.074	=	NA	NA	NA	MG/KG
LAW	Total Polynuclear Aromatic Hydrocarbons	SD-2-SS	0.1	=	NA	NA	NA	MG/KG
LAW	Total Polynuclear Aromatic Hydrocarbons	SD-3-SS	3.48	=	NA	NA	NA	MG/KG
LAW	ZINC	SD-1-9	47.8	=	797	68	120	MG/KG
LAW	ZINC	SD-1-SS	44.5	=	797	68	120	MG/KG
LAW	ZINC	SD-2-9	47.6	=	797	68	120	MG/KG

Table 26-B
Summary of Detected Compounds in Sediment
Compared to Screening Levels for Site 26
Remedial Investigation Sampling Program
Defense Depot Memphis, Tennessee

Data	Parameter[2]	StationID	Detected	Project	Background	PRG-Sed[4]	NOAA-Sed[5]	Units
LAW	ZINC	SD-2-SS	50.9	=	797	68	120	MG/KG
LAW	ZINC	SD-3-9	45.4	=	797	68	120	MG/KG
LAW	ZINC	SD-3-SS	48.8	=	797	68	120	MG/KG

Notes:

1. Detected values are obtained from the *Remedial Investigation at DDMT Final Report,* Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum* , CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Sediment Preliminary Remediation Goal (PRG) values are from Table 3-10 of the *Generic Remedial Investigation/Feasibility Study Work Plan* , CH2M HILL, August 1995.
5. National Oceanic and Atmospheric Administration (NOAA) values are from Table 3-10 of the *Generic Remedial Investigation/Feasibility Study Work Plan* , CH2M HILL, August 1995.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
= - indicates unqualified detection
J - indicates estimated value above the detection limit but below the reporting limit.

TAB

Parcel 4

Parcel 4

Remedial Investigation Sites Sampling Program

for

Defense Distribution Depot Memphis, Tennessee

May 1998

Prepared for

U.S. Army Engineering and Support Center, Huntsville

Prepared by

CH2M HILL

2567 Fairlane Drive

Montgomery, Alabama 36116

139282.RR.ZZ

Parcel 4 Report
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Parcel 4 is a 432,120-square-foot (ft^2) parcel in the southeastern/eastern corner of the Main Installation in Operable Unit (OU)-3. Parcel 4 consists of Buildings 251, 252, 253, 254, 256, 257, 260, 261, 263, 265, 270, 271, and 273. Samples were collected at Remedial Investigation (RI) Sites 58 and 59 in this parcel during the RI Sampling Program. Sampling activities at these sites are described below.

The RI Sites in this document have been identified by the Defense Distribution Depot Memphis, Tennessee (DDMT) through a review of existing documents, interviews with facility personnel, and knowledge of the facility's operations. RI sites at DDMT are those areas that have been known/suspected to have past releases as a result of facility operations. These sites have been previously identified as requiring a RI and have a confirmed presence of contamination. The following two RI Sites are located in Parcel 4:

- RI Site 58: Pad 267 (Subparcel 4.9)
- RI Site 59: Building 273

Additional sites identified with past potential releases to the environment from past operations are addressed in the Screening Sites Sampling Program. There are two screening sites located within this parcel. General areas within the installation without any known industrial operations involving hazardous chemicals were addressed in the Base Realignment and Closure (BRAC) Sampling Program. Results of these two investigations are addressed in separate letter reports.

The purpose of the RI Sampling Program, which is part of the Remedial Investigation/ Feasibility Study (RI/FS), is to accomplish the following:

- Characterize potential releases from the sites
- Assess the nature and extent of soil and surface water contamination attributable to past operations
- Gather and evaluate data to determine the need for interim remedial actions for the sites
- Evaluate the risk to human health and the environment as part of the comprehensive RI
- Assess the feasibility of remedial actions for the sites needing further actions

The purpose of this letter report is to evaluate the results of the RI Sampling Program and sampling from previous investigations and to recommend further actions at RI sites in this

parcel. The remainder of this report presents the results of past investigations; RI Sampling Program strategy, procedures, and results; and recommendations for each site.

Surface soils, subsurface soils, and surface water were investigated as part of the RI Sampling Program. Surface soil samples (any sample whose lowest depth is 2 feet or less) were taken both as independent samples and as the upper interval of a soil boring profile. Thus, surface soil samples taken as part of a soil boring may have an "SB" designation and are initially discussed under Subsurface Soil Sampling Procedure (Section 2.2.2.2). However, the results from that upper interval are presented in the surface soils tables and discussions in Section 3.0.

Site 58: Pad 267

1.0 Introduction

Table 1 presents the location and status information for this site.

TABLE 1
Parcel 4, Site 58 Information
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

Parcel	Building Number	RI/FS OU	Site Number	CERCLA[1] Status
4	T-267	3	58	RI

[1]CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act

Pad 267 refers to the area that was formerly the site of Building T-267, the Pesticide Shop. This 150-foot by 200-foot building was previously located north of current Building 274. The building was demolished in 1987 and the area is now a paved parking lot.

Building T-267 was formerly used for storage and mixing of pesticides and herbicides that were applied to the DDMT grounds by DDMT Entomology Division personnel. The dates of operation of the shop are unknown but are estimated to have been from the 1940s until the mid-1980s.

The Installation Assessment conducted during March 1981 documented that rinse water from pesticide and herbicide spraying operations was dumped on the ground near the facility until 1980. The specific location where rinse water was dumped is unknown. After that time, the rinse water was held for the mixing of later batches. Past pesticide and herbicide spray operations at DDMT generally included 2,4-D on grassy areas, Monuron on railroad track areas, pyrethrum in textile warehouses, Hy-Var-X in gravel areas, and phostoxin (aluminum phosphide) for stack and transit fumigation (United States Army Toxic and Hazardous Materials Agency, 1982). The site configuration, sample locations, and constituents exceeding Risk-Based Criteria (RBC) are shown in Figure 1.

2.0 Study Area Investigation

2.1 Previous Investigations

No previous soil sampling data exist for this site.

2.2 RI Sampling Program

2.2.1 Sampling Strategy

This sampling strategy was developed to evaluate whether releases have occurred to surface soil from the past pesticide and herbicide storage/uses. For this sampling program, surface soil samples were collected to assess the horizontal extent of the potential soil contamination from past activities at the site.

Because the exact location of the rinsewater dumping is unknown, surface soil samples were taken at numerous locations surrounding the pad. At least one sample was analyzed for target compound list/target analyte list (TCL/TAL) constituents in accordance with the *Operable Unit 3 Field Sampling Plan* (CH2M HILL, 1995), to assess whether other unknown contamination is present.

2.2.2 Sampling Procedures

This section describes the sampling procedures and laboratory analyses performed for surface soil. RI Site 58 is located in Parcel 4 at DDMT. However, some of the surface soil samples associated with RI Site 58 were located and collected in Parcel 5. A description of activities at RI Site 58 is also included in the Parcel 5 report.

2.2.2.1 Surface Soil Sampling Procedures

With the approval of Tennessee Department of Environment and Conservation (TDEC) and the U.S. Environmental Protection Agency (EPA), surface soil samples were collected from nine locations (SS58A, SS58B, SS58C, SS58D, SS58E, SS58F, SS58G, SS58H, and SS58I) at this site (shown in Figure 1). The following details the sampling locations:

- Sample SS58A was taken approximately 90 feet east of the gasoline storage location just 2 feet north of H Street.
- Sample SS58B was taken 12 feet west and 3 feet north of the northwest corner of Building 263
- Sample SS58C was collected 12 feet west and 46 feet south of the southwest corner of the building
- Sample SS58D was collected 68 feet south of Sample SS58C.
- Sample SS58E was taken in the asphalt parking area just north of the northeast corner of Building 274, 48 feet west of Sample SS58D.

- Sample SS58F was taken 82 feet west of Sample SS58E.
- Sample SS58G was taken 60 feet west of Sample SS58F.
- Sample SS58H was collected 190 feet west of Sample SS58C.
- Sample SS58I was taken 75 feet west of the gasoline storage area and one foot north of H Street, just east of 2nd Street.

Five of the nine samples (SS58A, SS58B, SS58C, SS58H, and SS58I) were located within Parcel 4; the remaining four surface soil samples were collected in Parcel 5. All sample results for RI Site 58 are discussed in this parcel report.

Seven of the nine sampling locations were covered with asphalt (SS58B, SS58C, SS58D, SS58E, SS58F, SS58G, and SS58H). Before sampling, a hole was bored through the asphalt using an electric jackhammer. The surface soil samples were collected from the upper 12 inches of native soil beneath the asphalt. At the two locations not covered by asphalt, the samples were collected from the zero- to 1-foot interval.

The surface soil samples were collected using a stainless-steel hand auger. Volatile organic compound (VOC) samples were collected from the first auger bucket before compositing to prevent volatilization. Part of the VOC sample was placed in a sealable plastic for head space analysis with a photoionization detector (PID). The results of the head space analyses were used to select samples for analysis of the TCL/TAL parameters and Level 3 constituents of potential concern (COPC) analysis. Even though VOCs were not a COPC for this site, VOC jars were filled for each sample because one surface sample was required to be submitted for TCL/TAL analysis based on headspace results. The VOC jars were not submitted to the laboratory for the samples not analyzed for the TCL/TAL.

The remaining soil from each sample was composited in a stainless-steel bowl and then transferred into the appropriate sample jars. All sampling tools were decontaminated before each use according to the procedures specified in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at DDMT.

2.2.3 Analytical Procedures

All samples were submitted to CH2M HILL's Analytical Services in Montgomery, Alabama for analysis. Four surface soil samples from Parcel 4 were analyzed for pesticides and herbicides. One surface soil sample, which had exhibited the highest field headspace result, was analyzed for TCL/TAL parameters. The samples were analyzed in accordance with the procedures outlined in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995).

A data quality evaluation (DQE) was performed to assess the effect of the overall analytical process on the usability of the data. The DQE established that the detection of acetone, 2-butanone, and bis(2-ethylhexyl)phthalate can be attributed to field sampling and laboratory contamination rather than environmental conditions at the site. Also, poor duplicate precision for metals in the duplicate soil samples should be attributed to poor sample homogeneity as well as to potentially poor sampling and analysis precision. With exception to the qualifications listed above, the DQE concluded that data can be used in the project decision-making process.

3.0 Interpretation of Sampling Results

3.1 Presentation of Results

Section 3.1.1 presents results of the RI Sampling Program for RI Site 58. Data are presented by media for surface soil and compared with appropriate screening criteria in Tables 58-A and 58-B. If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold on the summary table.

COPCs are parameters that exceed both background values and the screening criteria. Where concentrations exceed the selected background value, the concentration is compared with the observed range of background values as reviewed and established by the BRAC Cleanup Team (BCT).

Dieldrin was the only COPC identified for RI Site 58.

3.1.1 Surface Soil

There are no true surface soils at this site. All the samples collected are from soils underneath asphalt covered areas. Thus, any detected constituents are not a direct exposure concern at this site. Surface soil sampling locations with values above the detection limits are shown in Tables 58-A and 58-B. The tables show all surface soil detections from Site 58; however, a column has been added to the table indicating from which parcel the sample was collected. These tables also contain the comparison criteria for surface soil. If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold.

3.1.1.1 BCT Screening Criteria

Table 58-A summarizes constituents for which BCT has selected screening criteria. Based on the comparison of detected chemicals with the criteria, there are no constituents that exceed background or screening criteria.

3.1.1.2 Other Screening Criteria

Table 58-B compares the remaining constituents with the soil ingestion screening criteria for both residential and industrial exposure scenarios. Dieldrin is the only constituent that exceeds background values and a screening criteria. Dieldrin was detected in the surface soil at Sample SS58I at a concentration of 0.098J milligrams per kilogram (mg/kg) and slightly lower in a duplicate sample, which exceeds both the background value and the residential RBC. However dieldrin is below the industrial criterion of 0.36 mg/kg.

3.2 Vertical and Lateral Extent

Nine surface soil samples were collected around the former pesticide storage area. None of the site-related pesticides were detected in the surface soils. Dieldrin was detected at two sample locations in this site (SS58A and SS58I) but at only one location that exceeded criteria. The detected dieldrin levels are similar to those found across the installation.

Dieldrin is a sitewide COPC and will be addressed in an upcoming sitewide risk evaluation.

There were no boring samples collected at this site. However, there was probably no vertical extent of contamination because there were no COPCs detected in the surface soil, except for the sitewide COPC dieldrin.

3.3 Potential Migration Pathways

Dieldrin exists at DDMT in surface and subsurface soils. Since this compound is only minutely soluble in water, its most likely migration pathway at this site is via erosion as suspended soil particles in the surface water where it potentially would be available to aquatic organisms. Dieldrin in the subsurface soils should be relatively immobile and not impact groundwater quality.

3.4 Additional Data Needs

Since the concentration of dieldrin is below an industrial criterion, no further sampling is recommended at this time. Further assessment of dieldrin in the surface soils under the residential land use scenario is required and will be performed on a sitewide basis.

4.0 Interpretation of Screening Criteria Comparisons

4.1 Methodology

The Preliminary Risk Evaluation (PRE) was performed in accordance with the *Guidance on Preliminary Risk Evaluations for the Purpose of Reaching a Finding of Suitability to Lease (FOSL)* (EPA Region IV, 1994). A discussion of the PRE methodology in provided as Appendix A to this document.

4.2 RI Site 58 Risk

A PRE was performed for RI Site 58 (Subparcel 4.9), as reported in the Draft PRE (CH2M HILL, 1998). Because there are no screening or BRAC sites within this subparcel, risks are based on the RI data only. Carcinogenic and noncarcinogenic risks were calculated, and are presented in Table 4-12 of the draft PRE.

The carcinogenic risk ratio for an industrial worker is well below a risk level of one in a million. The risk ratio for a resident from dieldrin, in one of the nine samples collected at this site, is a risk level of four in a million.

There are no noncarcinogenic chemicals at this site.

Thus, there are no significant health concerns for this site under industrial land use conditions. The only COPC is dieldrin; however, the concentration is at 0.098J mg/kg, which is well below the identified critical concentration of 0.5 mg/kg. Therefore, no further action is recommended

at this site under the industrial land use scenario. Further assessment is required under the residential land use scenario and will be performed on a sitewide basis.

5.0 Summary and Recommendations

5.1 Summary

The only environmental concern at this site is dieldrin under the residential land use scenario.

5.2 Recommendations

Further assessment of dieldrin in the surface soils under the residential land use scenario is required and will be performed on a sitewide basis. No further sampling is expected at RI Site 58.

Site 59: Building 273

1.0 Introduction

Table 2 below presents the location and status information for this site.

TABLE 2
Parcel 4, Site 59 Information
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

Parcel	Building Number	RI/FS OU	Site Number	CERCLA Status
4	T-273	3	59	RI

Building T-273 is a 10-foot by 50-foot metal building located north of the DDMT golf course. This building reportedly was used as a mixing area for golf course pesticide and herbicide spray operations. Dates of these operations are unknown but are believed to have occurred from the 1940s to the mid-1980s. The building has also been used to store mogas and fertilizers. The site configuration, sample locations, and constituents exceeding RBC are shown in Figure 2.

2.0 Study Area Investigation

These discussions include details of the sampling conducted by CH2M HILL for the RI Sampling Program efforts. Historical data results are included in the following discussions as well; however, sampling strategy and analysis included in the historical reports are not repeated here.

2.1 Previous Investigations

Two surface soil samples (SS37 and SS50) were collected at this site during the 1990 RI (Law Environmental, 1990). The samples detected VOCs, polynuclear aromatic hydrocarbons (PAHs), and pesticides. The pesticide concentrations detected generally indicate that either minor spillage or disposal of pesticide rinse water may have occurred in this area.

2.2.1 Sampling Strategy

This sampling strategy was developed to evaluate whether releases have occurred to surface soil and subsurface soil. For this sampling program, surface soil and subsurface soil samples were collected to assess the vertical and horizontal extent of soil contamination from past activities at the site.

Since the exact location of potential spillage was unknown, samples were taken around the perimeter of the building. At least one sample for each media was analyzed for TCL/TAL

constituents in accordance with the *Operable Unit 3 Field Sampling Plan* (CH2M HILL, 1995) to detect other unknown contamination at the site.

2.2.2 Sampling Procedures

Sections 2.2.2.1 and 2.2.2.2 describe the sampling procedures and laboratory analyses performed for surface soil and subsurface soil.

2.2.2.1 Surface Soil Sampling Procedures

With the approval of the TDEC and EPA, surface soil samples were collected from ten locations (SB59A, SB59B, SS59C, SS59D, SS59E, SS59F, SS59G, SS59H, SS59I, and SS59J) at this site (shown in Figure 2). The samples were collected around the perimeter of Building T-273. Surface soil samples associated with borings are discussed in Section 2.2.2.2. The following details the sample locations:

- Sample SS59C was taken 2 feet west and 4 feet south of the southwest corner of the golf course supply shed.
- Sample SS59D was collected 8 feet south and 6 feet west of the southeast corner of the golf course supply shed.
- Sample SS59E was taken 8 feet north of K Street, just 6 feet east of the golf course supply shed.
- Sample SS59F was taken 1 foot east and one foot south of the northeast corner of the supply shed.
- Sample SS59G was collected 4 feet north and 7 feet west of the northeast corner of the shed.
- Sample SS59H was taken 4 feet north of the northwest corner of the shed
- Sample SS59I was collected 4 feet south and 4 feet west of the northwest corner of the shed.
- Sample SS59J was taken 4 feet west and 15 feet north of the northwest corner of Building T-273.

Seven of the ten sampling locations were covered with asphalt (SB59A, SS59C, SS59D, SS59G, SS59H, SS59I, and SS59J). Before sampling, a hole was bored through the asphalt using a core drill. The surface soil samples were collected from the upper 12 inches of native soil beneath the asphalt. At the two locations not covered by asphalt, the samples were collected from the zero- to 1-foot interval.

One optional soil sample was collected at RI Site 59 (Sample SS59J). This sample was collected to delineate the potential VOC contamination detected by field screening near the northwestern corner of Building T-273.

The surface soil samples were collected using a stainless-steel hand auger. VOC samples were collected from the first auger bucket before compositing to prevent volatilization. Part of the VOC sample was placed in a sealable plastic bag for head space analysis with a PID. Results of the head space analyses were used to select samples for analysis of the TCL/TAL parameters and Level 3 COPC analysis. Even though VOCs were not a COPC for this site, VOC jars were

filled for each sample because one surface sample was required to be submitted for TCL/TAL analysis based on headspace results. The VOC jars were not submitted to the laboratory for the samples not analyzed for the TCL/TAL.

The remaining soil from each sample was composited in a stainless-steel bowl and then transferred into the appropriate sample jars. All sampling tools were decontaminated before each use according to the procedures specified in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at DDMT.

2.2.2.2 Subsurface Soil Sampling Procedures

With the approval of the TDEC and EPA, subsurface soil samples were taken from two locations (SB59A and SB59B) at this site (shown in Figure 2). The borings were located adjacent to Building T-273. Subsurface samples were collected from the boring at two depths: 3 to 5 feet and 8 to 10 feet. The following details the sample locations:

- Sample SB59A was taken 24 feet south and 3 feet west of the northwest corner of the golf course supply shed.
- Sample SB59B was taken 18 feet north and 3 feet east of the southeast corner of the golf course supply shed.

The samples were collected using a 2-inch-diameter, stainless-steel, core-barrel sampler. The entire length of each soil core was screened with a PID for organic vapors before sample collection so that sampling intervals could be biased toward any contamination detected by the field screening. Part of each sample was placed in a sealable plastic bag for head space analysis with a PID. Results of the head space analyses were used to select samples for Level 3 COPC analysis. The remaining soil from each sample was composited in a stainless-steel bowl and then transferred into the appropriate sample jars. All sampling tools were decontaminated before each use according to the procedures outlined in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at DDMT.

2.3 Analytical Procedures

The samples were submitted to CH2M HILL's Analytical Services in Montgomery, Alabama for analysis. Eight surface soil samples and four subsurface samples were analyzed for pesticides, herbicides, and PAHs. One surface soil sample, which had exhibited the highest field head space result, was analyzed for TCL/TAL parameters. The one optional surface soil sample was analyzed for VOCs, pesticides, herbicides, and PAHs. One subsurface soil sample from the 8- to 10-foot interval was analyzed for grain size, Atterburg limits, moisture content, pH, alkalinity, cation exchange capacity, and total organic carbon. The samples were analyzed in accordance with the procedures in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995).

United States Army Corps of Engineers' (COE) split samples were collected from Samples SS59H and SS59J. Sample SS59H was sent to the COE's Atlanta, Georgia laboratory for analysis of TCL/TAL parameters. Sample SS59J was sent to the same laboratory for analysis of VOCs, pesticides, herbicides, and metals.

A DQE was performed to assess the effect of the overall analytical process on the usability of the data. The DQE established that the detection of acetone, 2-butanone, and bis(2-ethylhexyl)phthalate can be attributed to field sampling and laboratory contamination rather than environmental conditions at the site. Also, poor duplicate precision for metals in the duplicate soil samples should be attributed to poor sample homogeneity as well as to potentially poor sampling and analysis precision. With exception to the qualifications listed above, the DQE concluded that data can be used in the project decision-making process.

3.0 Interpretation of Sampling Results

3.1 Presentation of Results

Sections 3.1.1 and 3.1.2 present results of the RI Sampling Program for RI Site 59. Data are presented by media for surface soil and subsurface soils and compared with appropriate screening criteria in Tables 59-A, 59-B, and 59-C. Data from the 1997 CH2M HILL investigation are presented along with historical data from the *Remedial Investigations at DDMT, Final Report* (Law Environmental, 1990). If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold on the summary table.

COPCs are parameters that exceed both background values and the screening criteria. Where concentrations exceed the selected background value, the concentration is compared with the observed range of background values as reviewed and established by the BCT.

Organo-chlorine pesticides from historical use, dichlorodiphenyltrichloroethane (DDT)/dichlorodiphenyldichloroethene (DDE), dieldrin, heptachlor, low levels of PAHs, and arsenic were identified as COPCs, if the soils are to become surface soil at RI Site 59. There are no COPCs in subsurface soils at this site.

3.1.1 Surface Soil

Results of the surface soil analyses with values above detection limits are shown in Tables 59-A and 59-B.

3.1.1.1 BCT Screening Criteria

Table 59-A summarizes constituents for which the BCT has selected a screening criteria. In two samples (SB59B and SS59E) benzo(a)pyrene was detected at concentrations that exceed the BCT value of 0.088 mg/kg, but do not exceed the background value of 0.96 mg/kg. No other detections above background or screening values were noted. However, in the historical data from the 1990 RI (Law Environmental, 1990), arsenic was detected in Sample SS37 (42 mg/kg) at concentrations exceeding the BCT value of 20 mg/kg, and benzo(b)fluoranthene was detected in Sample SS50 (1.1J mg/kg) at concentrations exceeding both the background and BCT values.

3.1.1.2 Other Screening Criteria

Table 59-B compares the remaining constituents with the soil ingestion screening criteria for both residential and industrial exposure scenarios. Dieldrin is the only constituent that exceeds

background values and a screening criteria. Dieldrin was detected in the surface soil at Sample SB59B at a concentration of 0.13 mg/kg, which exceeds both the background value and the residential RBC for soil ingestion. At Sample SS59E, dieldrin was detected at 0.58 mg/kg, which exceeds both background values and the residential and industrial RBC for soil ingestion. Dieldrin also exceeded background values and the residential and industrial RBC for soil ingestion in two historical samples (Sample SS37 at 1.4 mg/kg and SS50 at 3.8 mg/kg) from the 1990 RI (Law Environmental, 1990).

Elevated levels of some constituents were detected in the surface soil in the historical data collected during the 1990 RI (Law Environmental, 1990). For example, at Sample SS37, DDT was detected at 4 mg/kg, exceeding both the background and residential RBC values. At Sample SS50, DDE (4.3 mg/kg), DDT (3J mg/kg), heptachlor (1.1 mg/kg), and heptachlor epoxide (0.34 mg/kg) were detected at concentrations exceeding background values and residential RBC values for soil ingestion for these parameters.

3.1.2 Subsurface Soil

Table 59-C summarizes all subsurface soil samples with values above detection limits. No detections were found in the subsurface soil samples taken as part of the RI Sampling Program.

3.2 Vertical and Lateral Extent

There are no exposed soils at this site. Collected samples were drilled through asphalt. Dieldrin was not detected in the subsurface soils, but was found in three surface soils taken in 1997, and in two historical surface soil samples. Dieldrin was a COPC in two of the three recent samples, which exceeded residential and industrial risk ratios.

Dieldrin is a sitewide COPC and will be addressed in an upcoming sitewide risk evaluation.

There were two borings taken at this site: one east of Building 273 and the other west of the building. There were no detections in the subsurface soil samples and there appears to be no vertical extent of contamination at the site.

3.3 Potential Migration Pathways

Soils are covered with asphalt, thus limiting potential for migration. Following text provides some generic properties of the observed COPCs.

Dieldrin exists at DDMT in surface and subsurface soils. Since this compound is only minutely soluble in water, its most likely migration pathway at this site is via erosion as suspended soil particles in the surface water where it potentially would be available to aquatic organisms. Dieldrin in the subsurface soils should be relatively immobile and not impact groundwater quality.

3.4 Additional Data Needs

Further risk assessment is necessary for the residential land and industrial use scenario for dieldrin and will be performed on a sitewide basis since dieldrin is detected throughout the DDMT Main Installation.

4.0 Interpretation of Screening Criteria Comparisons

4.1 Methodology

The PRE was performed in accordance with the *Guidance on Preliminary Risk Evaluations for the Purpose of Reaching a Finding of Suitability to Lease (FOSL)* (EPA Region IV, 1994). A discussion of the PRE methodology in provided as Appendix A to this document.

4.2 RI Site 59 Risk

A PRE was performed for RI Site 59 (Subparcel 4.10) as reported in the Draft PRE (CH2M HILL, 1998). Because there are no screening or BRAC sites within this subparcel, risks are based on the RI data only. Carcinogenic and noncarcinogenic risks were calculated, and the results are shown in Table 4-13 of the Draft PRE.

The carcinogenic risk ratio for an industrial worker is a risk level of one in a million. The risk ratio for a resident from dieldrin, in two of the samples collected at this site, is a risk level of 19 in a million.

There are no noncarcinogenic chemicals at this site.

Thus, the COPC at this site is dieldrin (based on the RI data only). No other carcinogenic or noncarcinogenic ratios are exceeded. Further risk assessment is necessary for the residential land use, but no further action is necessary under the industrial land use scenario.

5.0 Summary and Recommendations

5.1 Summary

Soil samples were collected from underneath asphalt paved areas. Dieldrin in the surface soils is a concern for the residential and industrial land use scenario. No parameters were detected in the subsurface soil samples taken.

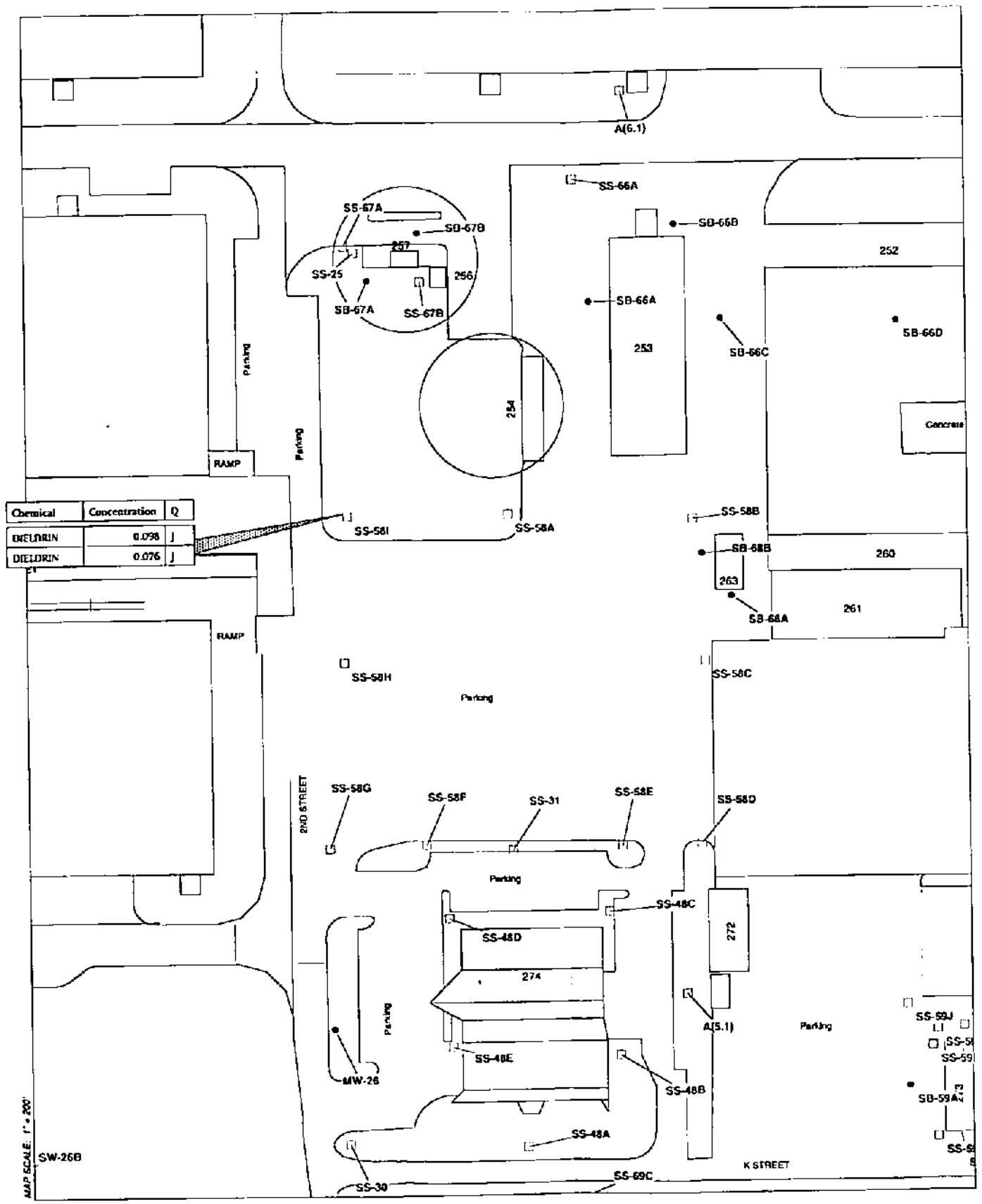
Elevated levels of some constituents were detected in the surface soil in the data collected during the 1990 RI. These include arsenic, DDE, DDT, dieldrin, heptachlor, heptachlor epoxide, and benzo(b)fluoranthene.

5.2 Recommendations

No additional sampling is required, as the available data are adequate to define the nature and extent of contamination. Further assessment of dieldrin in the surface soils under the residential land use scenario is required and will be performed on a sitewide basis

Acronyms

BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COE	United States Army Corps of Engineers
COPC	constituent of potential concern
DDE	dichlorodiphenyl dichloroethene
DDMT	Defense Distribution Depot Memphis, Tennessee
DDT	dichlorodiphenyltrichloroethane
DQE	Data Quality Evaluation
EPA	United States Environmental Protection Agency
FOSL	Finding of Suitability to Lease
ft^2	square feet
FS	feasibility study
mg/kg	milligrams per kilogram
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbons
PID	photoionization detector
PRE	Preliminary Risk Evaluation
RBC	risk-based criteria
RI	Remedial Investigation/Feasibility Study
TCL/TAL	target compound list/ target analyte list
TDEC	Tennessee Department of Environment and Conservation
VOC	volatile organic compound



LEGEND

- Surface Soil Sampling Location (mg/kg)
- Soil Boring Sampling Location (mg/kg)
- Surface Water Sampling Location (mg/L)
- Sediment Sample Location (mg/kg)

(Q) Qualifier 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 1
RI Site 58, Pad 267
Constituents Exceeding Risk-Based Criteria
Defense Distribution Depot Memphis, TN

CH2MHILL

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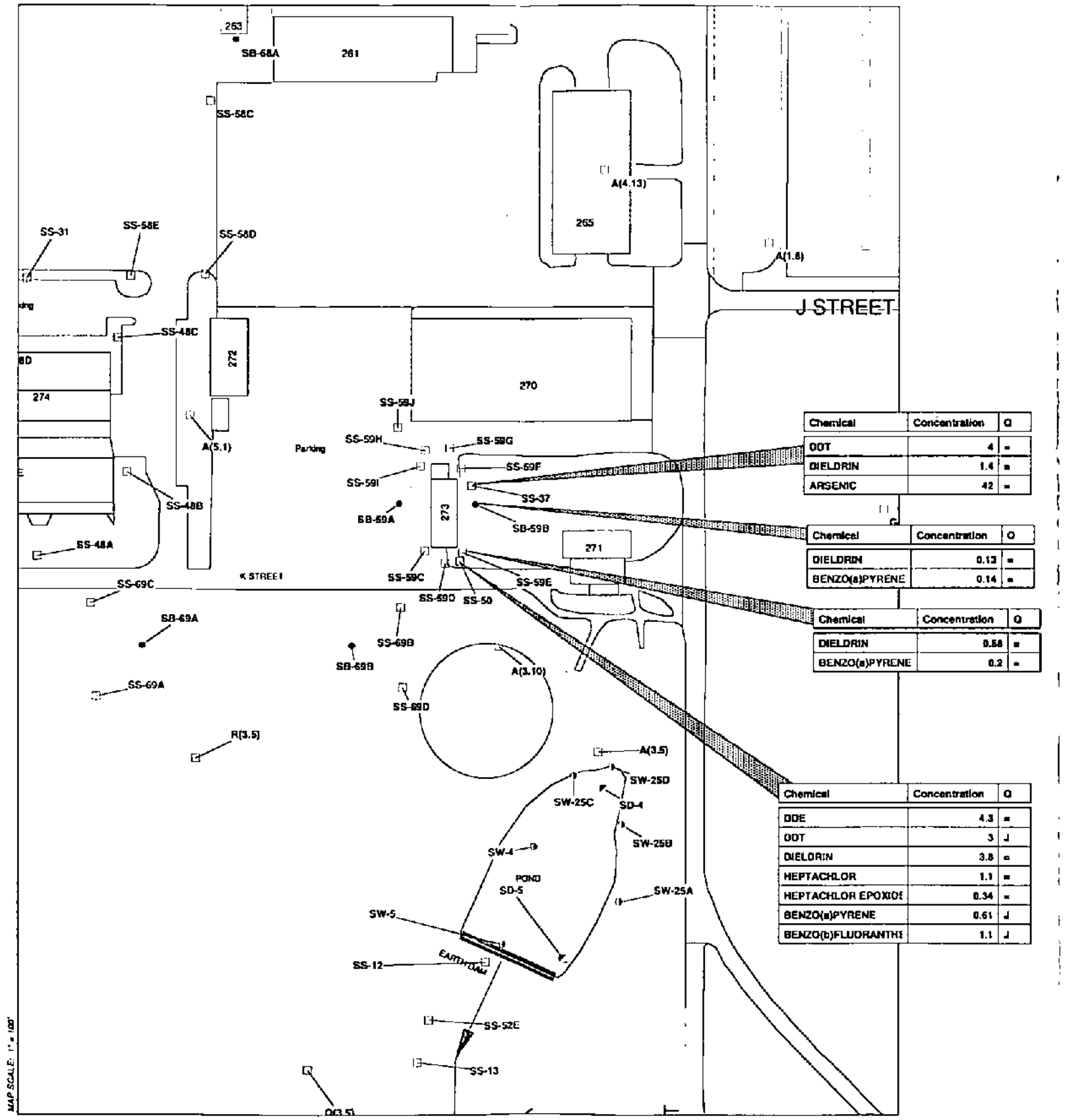

Chemical	Concentration	Q
DDT	4	=
DIELDRIN	1.4	=
ARSENIC	42	=

Chemical	Concentration	Q
DIELDRIN	0.13	=
BENZO(a)PYRENE	0.14	=

Chemical	Concentration	Q
DIELDRIN	0.58	=
BENZO(a)PYRENE	0.2	=

Chemical	Concentration	Q
DDE	4.3	=
DDT	3	J
DIELDRIN	3.8	=
HEPTACHLOR	1.1	=
HEPTACHLOR EPOXIDE	0.34	=
BENZO(a)PYRENE	0.61	J
BENZO(b)FLUORANTHE	1.1	J

LEGEND

- Surface Soil Sampling Location (mg/kg)
- Soil Boring Sampling Location (mg/kg)
- Surface Water Sampling Location (mg/L)
- Sediment Sample Location (mg/kg)

(Q) Qualifer 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 59, Building 273
Constituents Exceeding Risk-Based Criteria
Defense Distribution Depot Memphis, TN

CH2MHILL

RISTRSS WOR - Sht004

Table 58-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 58
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	4	ALUMINUM	SS58C	12700	=	24000	24000	Bkgd	MG/KG
CH2M HILL	4	ARSENIC	SS58C	8.4	=	20	20	Bckg	MG/KG
CH2M HILL	4	CHROMIUM	SS58C	12.5	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	4	IRON	SS58C	16400	=	37000	37000	Bckg	MG/KG
CH2M HILL	4	LEAD	SS58C	11.5	=	30	400	CERCLA	MG/KG
CH2M HILL	4	MANGANESE	SS58C	481	=	1300	1300	Bckg	MG/KG
CH2M HILL	4	ZINC	SS58C	61.3	=	130	23000	Residential RBC	MG/KG

Notes:

1. Detected values are obtained from the *Draft Parcel 4 and 5 Report-Remedial Investigation Sampling Program for Defense Depot* Memphis, TN, CH2M HILL, 1997.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Based on values selected by the BRAC Cleanup Team in the August 1997 BCT meeting minutes, Memphis, Tennessee.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection
BCT - BRAC Cleanup Team

Table 58-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 58
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	4	ALPHA-CHLORDANE	SS58A	0.0032	J	.029	.49	4.4	MG/KG
CH2M HILL	4	ALPHA-CHLORDANE	SS58I	0.049	J	.029	.49	4.4	MG/KG
CH2M HILL	4	ALPHA-CHLORDANE	SS58I	0.04	J	.029	.49	4.4	MG/KG
CH2M HILL	4	BARIUM	SS58C	93.8	=	234	550	14000	MG/KG
CH2M HILL	4	CALCIUM	SS58C	954	=	5840	NA	NA	MG/KG
CH2M HILL	4	COBALT	SS58C	7.7	=	18.3	470	12000	MG/KG
CH2M HILL	4	COPPER	SS58C	14.4	J	33	310	8200	MG/KG
CH2M HILL	4	DDD	SS58I	0.13	J	.0067	2.7	24	MG/KG
CH2M HILL	4	DDD	SS58I	0.12	J	.0067	2.7	24	MG/KG
CH2M HILL	4	DDE	SS58A	0.011	=	.16	1.9	17	MG/KG
CH2M HILL	4	DDE	SS58I	0.62	=	.16	1.9	17	MG/KG
CH2M HILL	4	DDE	SS58I	0.52	=	.16	1.9	17	MG/KG
CH2M HILL	4	DDT	SS58A	0.014	=	.074	1.9	17	MG/KG
CH2M HILL	4	DDT	SS58I	1.8	=	.074	1.9	17	MG/KG
CH2M HILL	4	DDT	SS58I	1.7	=	.074	1.9	17	MG/KG
CH2M HILL	4	DIELDRIN	SS58A	0.02	=	.086	.04	.36	MG/KG
CH2M HILL	4	DIELDRIN	SS58I	0.098	J	.086	.04	.36	MG/KG
CH2M HILL	4	DIELDRIN	SS58I	0.076	J	.086	.04	.36	MG/KG
CH2M HILL	4	GAMMA-CHLORDANE	SS58A	0.0037	J	.026	.49	4.4	MG/KG
CH2M HILL	4	GAMMA-CHLORDANE	SS58I	0.055	J	.026	.49	4.4	MG/KG
CH2M HILL	4	GAMMA-CHLORDANE	SS58I	0.046	J	.026	.49	4.4	MG/KG
CH2M HILL	4	MAGNESIUM	SS58C	2100	=	4600	NA	NA	MG/KG
CH2M HILL	4	NICKEL	SS58C	14.2	=	30	160	4100	MG/KG
CH2M HILL	4	POTASSIUM	SS58C	1780	=	1820	NA	NA	MG/KG
CH2M HILL	4	TETRACHLOROETHYLENE (PCE)	SS58C	0.013	=	NA	NA	NA	MG/KG
CH2M HILL	4	VANADIUM	SS58C	24.5	=	48.4	55	1400	MG/KG
CH2M HILL	5	DDD	SS58G	0.0056	=	.0067	2.7	24	MG/KG
CH2M HILL	5	DDE	SS58G	0.0086	=	.16	1.9	17	MG/KG
CH2M HILL	5	DDT	SS58G	0.0068	=	.074	1.9	17	MG/KG

Notes:
1. Detected values are obtained from the *Draft Parcel 4 and 5 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.

Table 58-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 58
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	

3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Risk-Based Concentrations are obtained from the *EPA Region III Risk-based Concentrations Table*, R.L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection

Table 59-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 59
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	4	ACENAPHTHENE	SS59I	0.059	=	NA	470	Residential RBC	MG/KG
CH2M HILL	4	ALUMINUM	SS59H	15600	=	24000	24000	Bkgd	MG/KG
CH2M HILL	4	ARSENIC	SS59H	11.6	=	20	20	Bckg	MG/KG
CH2M HILL	4	BENZO(a)ANTHRACENE	SB59B	0.14	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	4	BENZO(a)ANTHRACENE	SS59E	0.21	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	4	BENZO(a)PYRENE	SB59B	0.14	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	4	BENZO(a)PYRENE	SS59E	0.2	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	4	BENZO(b)FLUORANTHENE	SB59B	0.13	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	4	BENZO(b)FLUORANTHENE	SS59E	0.2	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	4	BENZO(g,h,i)PERYLENE	SB59B	0.1	=	.82	230	Residential RBC	MG/KG
CH2M HILL	4	BENZO(k)FLUORANTHENE	SB59B	0.16	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	4	BENZO(k)FLUORANTHENE	SS59E	0.14	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	4	CHROMIUM	SS59H	16.1	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	4	CHRYSENE	SB59B	0.14	=	.94	88	Residential RBC	MG/KG
CH2M HILL	4	CHRYSENE	SS59E	0.2	=	.94	88	Residential RBC	MG/KG
CH2M HILL	4	FLUORANTHENE	SB59B	0.28	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	4	FLUORANTHENE	SS59E	0.37	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	4	FLUORANTHENE	SS59F	0.08	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	4	FLUORANTHENE	SS59F	0.081	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	4	INDENO(1,2,3-c,d)PYRENE	SB59B	0.12	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	4	IRON	SS59H	21300	=	37000	37000	Bckg	MG/KG
CH2M HILL	4	LEAD	SS59H	14.9	=	30	400	CERCLA	MG/KG
CH2M HILL	4	MANGANESE	SS59H	499	=	1300	1300	Bckg	MG/KG
CH2M HILL	4	PHENANTHRENE	SB59B	0.22	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	4	PHENANTHRENE	SS59E	0.24	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	4	PHENANTHRENE	SS59F	0.076	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	4	PHENANTHRENE	SS59F	0.079	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	4	PYRENE	SB59B	0.2	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	4	PYRENE	SS59E	0.27	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	4	PYRENE	SS59F	0.064	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	4	PYRENE	SS59F	0.072	=	1.5	230	Residential RBC	MG/KG

Table 59-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 59
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	4	ZINC	SS59H	63.3	=	130	23000	Residential RBC	MG/KG
LAW	4	ACENAPHTHENE	SS50	0.2	J	NA	470	Residential RBC	MG/KG
LAW	4	ANTHRACENE	SS50	0.33	J	.096	2300	Residential RBC	MG/KG
LAW	4	ANTIMONY	SS37	5	=	7	7	Bckg	MG/KG
LAW	4	ARSENIC	SS37	42	=	20	20	Bckg	MG/KG
LAW	4	ARSENIC	SS50	12	=	20	20	Bckg	MG/KG
LAW	4	BENZO(a)ANTHRACENE	SS50	0.81	J	.71	0.88	Residential RBC	MG/KG
LAW	4	BENZO(a)PYRENE	SS50	0.61	J	.96	0.088	Residential RBC	MG/KG
LAW	4	BENZO(b)FLUORANTHENE	SS37	0.62	J	.78	0.88	Residential RBC	MG/KG
LAW	4	BENZO(b)FLUORANTHENE	SS50	1.1	J	.78	0.88	Residential RBC	MG/KG
LAW	4	CHROMIUM	SS37	13	=	24.8	39	Residential RBC	MG/KG
LAW	4	CHROMIUM	SS50	17	=	24.8	39	Residential RBC	MG/KG
LAW	4	CHRYSENE	SS50	0.99	J	.94	88	Residential RBC	MG/KG
LAW	4	FLUORANTHENE	SS37	0.78	J	1.6	310	Residential RBC	MG/KG
LAW	4	FLUORANTHENE	SS50	2.2	=	1.6	310	Residential RBC	MG/KG
LAW	4	FLUORENE	SS50	0.16	J	NA	310	Residential RBC	MG/KG
LAW	4	INDENO(1,2,3-c,d)PYRENE	SS50	0.37	J	.7	0.88	Residential RBC	MG/KG
LAW	4	LEAD	SS37	71	=	30	400	CERCLA	MG/KG
LAW	4	LEAD	SS50	157	=	30	400	CERCLA	MG/KG
LAW	4	PHENANTHRENE	SS37	0.52	J	.61	2300	Residential RBC	MG/KG
LAW	4	PHENANTHRENE	SS50	2	=	.61	2300	Residential RBC	MG/KG
LAW	4	PYRENE	SS37	0.58	J	1.5	230	Residential RBC	MG/KG
LAW	4	PYRENE	SS50	2.5	=	1.5	230	Residential RBC	MG/KG
LAW	4	ZINC	SS37	80.4	=	130	23000	Residential RBC	MG/KG
LAW	4	ZINC	SS50	290	=	130	23000	Residential RBC	MG/KG

Notes:

1. Detected values are obtained from the *Draft Parcel 4 Report-Remedial Investigation Sampling Program for Defense Depot* Memphis, TN, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.

Table 59-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 59
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units

4. Based on values selected by the BRAC Cleanup Team in the August 1997 BCT meeting minutes, Memphis, Tennessee.
Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection
BCT - BRAC Cleanup Team

Table 59-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 59
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	4	1,2-DICHLOROETHENE, TOTAL	SS59H	0.004	J	NA	NA	NA	MG/KG
CH2M HILL	4	ACETONE	SS59J	0.095	=	NA	780	20000	MG/KG
CH2M HILL	4	ALPHA-CHLORDANE	SB59B	0.022	J	.029	.49	4.4	MG/KG
CH2M HILL	4	ALPHA-CHLORDANE	SS59E	0.08	J	.029	.49	4.4	MG/KG
CH2M HILL	4	ALPHA-CHLORDANE	SS59F	0.015	=	.029	.49	4.4	MG/KG
CH2M HILL	4	ALPHA-CHLORDANE	SS59F	0.0071	=	.029	.49	4.4	MG/KG
CH2M HILL	4	BARIUM	SS59H	103	=	234	550	14000	MG/KG
CH2M HILL	4	CALCIUM	SS59H	986	=	5840	NA	NA	MG/KG
CH2M HILL	4	CARBON DISULFIDE	SS59H	0.002	J	.012	780	20000	MG/KG
CH2M HILL	4	COBALT	SS59H	6.4	=	18.3	470	12000	MG/KG
CH2M HILL	4	COPPER	SS59H	18.5	J	33	310	8200	MG/KG
CH2M HILL	4	DDD	SS59C	0.017	=	.0067	2.7	24	MG/KG
CH2M HILL	4	DDD	SS59D	0.0028	J	.0067	2.7	24	MG/KG
CH2M HILL	4	DDD	SS59F	0.012	J	.0067	2.7	24	MG/KG
CH2M HILL	4	DDD	SS59F	0.0058	J	.0067	2.7	24	MG/KG
CH2M HILL	4	DDD	SS59H	0.016	=	.0067	2.7	24	MG/KG
CH2M HILL	4	DDD	SS59I	0.0033	J	.0067	2.7	24	MG/KG
CH2M HILL	4	DDD	SS59J	0.003	J	.0067	2.7	24	MG/KG
CH2M HILL	4	DDE	SB59B	0.44	=	.16	1.9	17	MG/KG
CH2M HILL	4	DDE	SS59C	0.015	=	.16	1.9	17	MG/KG
CH2M HILL	4	DDE	SS59D	0.002	J	.16	1.9	17	MG/KG
CH2M HILL	4	DDE	SS59E	0.69	=	.16	1.9	17	MG/KG
CH2M HILL	4	DDE	SS59F	0.036	=	.16	1.9	17	MG/KG
CH2M HILL	4	DDE	SS59F	0.024	=	.16	1.9	17	MG/KG
CH2M HILL	4	DDE	SS59G	0.0082	=	.16	1.9	17	MG/KG
CH2M HILL	4	DDE	SS59H	0.011	=	.16	1.9	17	MG/KG
CH2M HILL	4	DDE	SS59I	0.0028	J	.16	1.9	17	MG/KG
CH2M HILL	4	DDE	SS59J	0.0051	=	.16	1.9	17	MG/KG
CH2M HILL	4	DDT	SB59B	0.77	=	.074	1.9	17	MG/KG
CH2M HILL	4	DDT	SS59C	0.0028	J	.074	1.9	17	MG/KG
CH2M HILL	4	DDT	SS59D	0.0017	J	.074	1.9	17	MG/KG
CH2M HILL	4	DDT	SS59E	0.38	=	.074	1.9	17	MG/KG

Table 59-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 59
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	4	DDT	SS59F	0.085	=	.074	1.9	17	MG/KG
CH2M HILL	4	DDT	SS59F	0.042	=	.074	1.9	17	MG/KG
CH2M HILL	4	DDT	SS59G	0.01	=	.074	1.9	17	MG/KG
CH2M HILL	4	DDT	SS59H	0.0084	=	.074	1.9	17	MG/KG
CH2M HILL	4	DDT	SS59J	0.017	=	.074	1.9	17	MG/KG
CH2M HILL	4	DIELDRIN	SB59B	0.13	=	.086	.04	.36	MG/KG
CH2M HILL	4	DIELDRIN	SS59E	0.58	=	.086	.04	.36	MG/KG
CH2M HILL	4	DIELDRIN	SS59F	0.016	J	.086	.04	.36	MG/KG
CH2M HILL	4	DIELDRIN	SS59F	0.01	=	.086	.04	.36	MG/KG
CH2M HILL	4	GAMMA-CHLORDANE	SB59B	0.016	J	.026	.49	4.4	MG/KG
CH2M HILL	4	GAMMA-CHLORDANE	SS59E	0.061	J	.026	.49	4.4	MG/KG
CH2M HILL	4	GAMMA-CHLORDANE	SS59F	0.015	=	.026	.49	4.4	MG/KG
CH2M HILL	4	GAMMA-CHLORDANE	SS59F	0.0074	=	.026	.49	4.4	MG/KG
CH2M HILL	4	MAGNESIUM	SS59H	2590	=	4600	NA	NA	MG/KG
CH2M HILL	4	METHYL ETHYL KETONE	SS59J	0.009	J	.002	4700	100000	MG/KG
CH2M HILL	4	METHYLENE CHLORIDE	SS59J	0.002	J	NA	85	760	MG/KG
CH2M HILL	4	NICKEL	SS59H	17	=	30	160	4100	MG/KG
CH2M HILL	4	POTASSIUM	SS59H	2060	=	1820	NA	NA	MG/KG
CH2M HILL	4	TETRACHLOROETHYLENE (PCE)	SS59H	0.073	J	NA	NA	NA	MG/KG
CH2M HILL	4	TETRACHLOROETHYLENE (PCE)	SS59J	0.004	J	NA	NA	NA	MG/KG
CH2M HILL	4	TRICHLOROETHYLENE (TCE)	SS59J	0.003	J	NA	58	520	MG/KG
CH2M HILL	4	VANADIUM	SS59H	30.9	=	48.4	55	1400	MG/KG
LAW	4	ACETONE	SS37	0.015	=	NA	780	20000	MG/KG
LAW	4	ACETONE	SS50	0.022	=	NA	780	20000	MG/KG
LAW	4	BARIUM	SS37	76.9	=	234	550	14000	MG/KG
LAW	4	BARIUM	SS50	78.4	=	234	550	14000	MG/KG
LAW	4	BETA BHC	SS50	2.5	=	NA	NA	NA	MG/KG
LAW	4	bis(2-ETHYLHEXYL) PHTHALATE	SS37	0.71	J	NA	46	410	MG/KG
LAW	4	bis(2-ETHYLHEXYL) PHTHALATE	SS50	1.7	=	NA	46	410	MG/KG
LAW	4	CADMIUM	SS37	2	=	1.4	3.9	100	MG/KG
LAW	4	CADMIUM	SS50	1.9	=	1.4	3.9	100	MG/KG
LAW	4	COPPER	SS37	18	=	33	310	8200	MG/KG

Table 59-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 59
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
LAW	4	COPPER	SS50	15	=	33	310	8200	MG/KG
LAW	4	DDE	SS37	1.2	=	.16	1.9	17	MG/KG
LAW	4	DDE	SS50	4.3	=	.16	1.9	17	MG/KG
LAW	4	DDT	SS37	4	=	.074	1.9	17	MG/KG
LAW	4	DDT	SS50	3	J	.074	1.9	17	MG/KG
LAW	4	DIELDRIN	SS37	1.4	=	.086	.04	.36	MG/KG
LAW	4	DIELDRIN	SS50	3.8	=	.086	.04	.36	MG/KG
LAW	4	HEPTACHLOR	SS50	1.1	=	NA	.14	1.3	MG/KG
LAW	4	HEPTACHLOR EPOXIDE	SS50	0.34	=	.0045	.07	.63	MG/KG
LAW	4	MERCURY	SS37	0.32	=	.43	2.3	61	MG/KG
LAW	4	MERCURY	SS50	0.5	=	.43	2.3	61	MG/KG
LAW	4	METHYLENE CHLORIDE	SS37	0.013	=	NA	85	760	MG/KG
LAW	4	METHYLENE CHLORIDE	SS50	0.016	=	NA	85	760	MG/KG
LAW	4	NICKEL	SS37	11	=	30	160	4100	MG/KG
LAW	4	NICKEL	SS50	8	=	30	160	4100	MG/KG
LAW	4	TETRACHLOROETHYLENE (PCE)	SS37	0.002	J	NA	NA	NA	MG/KG
LAW	4	TOLUENE	SS37	0.003	J	.012	1600	41000	MG/KG
LAW	4	TOTAL XYLENES	SS37	0.008	J	.009	NA	NA	MG/KG
LAW	4	TRICHLOROETHYLENE (TCE)	SS37	0.004	J	NA	58	520	MG/KG

Notes:
1. Detected values are obtained from the *Draft Parcel 4 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*. CH2M HILL. 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Risk-Based Concentrations are obtained from the *EPA Region III Risk-based Concentrations Table*, R.L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection

Table 59-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 59
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
No detections were found.									

Notes:
1. Detected values are obtained from the *Draft Parcel 4 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. RBC-GWP values are obtained from the *EPA Region III Risk-based Concentrations Table*, R. L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
= - indicates unqualified detection
J - indicates estimated value above the detection limit but below the reporting limit.
RBC-GWP - Risk-Based Concentrations - Groundwater Protection

TAB

Parcel 5

Parcel 5

Remedial Investigation Sites Sampling Program

for

Defense Distribution Depot Memphis, Tennessee

May 1998

Prepared for

U.S. Army Engineering and Support Center, Huntsville

Prepared by

CH2M HILL

2567 Fairlane Drive

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Parcel 5 Report
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Parcel 5 is a 87,170-square-foot (ft^2) parcel in the southeastern part of the Main Installation in Operable Unit (OU)-3. Parcel 5 consists of Buildings 272 and 274. Samples were collected at Remedial Investigation (RI) Sites 48 and 58 in this parcel during the RI Sampling Program. Sampling activities at these sites are described below.

The RI Sites in this document have been identified by the Defense Distribution Depot Memphis, Tennessee (DDMT) through a review of existing documents, interviews with facility personnel, and knowledge of the facility's operations. RI sites at DDMT are those areas that have been known or suspected to have past releases as a result of facility operations. These sites have been previously identified as requiring a RI and have a confirmed presence of contaminants. The following RI Site is located in Parcel 5:

- RI Site 48: Former PCB Transformer Storage Area (Subparcel 5.2)

Note that the two samples from RI Site 58 (located in Parcel 4) were actually collected from Parcel 5. However, all sampling results for RI Site 58 are discussed in the Parcel 4 RI Report.

Additional sites identified with past releases to the environment from past operations are addressed in the Screening Sites Sampling Program. General areas within the installation without any known industrial operations involving hazardous chemicals were addressed in the Base Realignment and Closure (BRAC) Sampling Program. Results of these programs are addressed in separate letter reports.

The purpose of the RI Sampling Program, which is part of the Remedial Investigation/Feasibility Study (RI/FS), is to accomplish the following:

- Characterize releases from the sites
- Assess the nature and extent of soil and surface water contamination attributable to past operations
- Gather and evaluate data to determine the need for interim remedial actions for the sites
- Evaluate the risk to human health and the environment as part of the comprehensive RI
- Assess the feasibility of remedial actions for the sites needing further actions

The purpose of this letter report is to evaluate the results of the RI Sampling Program and sampling from previous investigations and to recommend further actions at RI sites in this parcel. The remainder of this report presents the results of past investigations; RI Sampling Program strategy, procedures, and results; and recommendations for each site.

Surface soils, subsurface soils, and surface water were investigated as part of the RI Sampling Program. Surface soil samples (any sample whose lowest depth is 2 feet or less) were taken both as independent samples and as the upper interval of a soil boring profile. Thus, surface soil samples taken as part of a soil boring may have an "SB" designation and are initially discussed under Subsurface Soil Sampling Procedure (Section 2.2.2.2). However, the results from that upper interval are presented in the surface soils tables and discussions in Section 3.0.

Site 48: Former PCB Transformer Storage Area

1.0 Introduction

Table 1 presents the location and status information for this site.

TABLE 1
Parcel 5, Site 48 Information
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

Parcel	Building Number	RI/FS OU	Site Number	CERCLA[1] Status
5	274	3	48	RI

[1]CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act of 1980

Site 48 was the former storage location of at least two electrical transformers. The transformers were discovered during the Installation Assessment conducted in March 1981. Tests of the fluid from the transformers indicated less than 50 parts per million (ppm) of polychlorinated biphenyls (PCBs). Building 274 ("J" Street Cafeteria), which was constructed in 1989 after transformer storage had ceased and measures 13,500 square feet, is now located at this site. The site configuration, sample locations, and constituents exceeding Risk-Based Criteria (RBC) are shown in Figure 1.

2.0 Study Area Investigation

These discussions include details of the sampling conducted by CH2M HILL for the RI Sampling Program efforts. Historical data results are included in the following discussions as well; however, sampling strategy and analysis included in the historical reports are not repeated here.

2.1 Previous Investigations

Two surface soil samples (SS30 and SS31) were collected at this site during the 1990 RI (Law Environmental, 1990). These samples detected polynuclear aromatic hydrocarbons (PAHs) and pesticides, but no PCBs.

2.2 RI Sampling Program

2.2.1 Sampling Strategy

This sampling strategy was developed to evaluate whether releases have occurred to surface soil at RI Site 48. For this sampling program, surface soil samples were collected to assess the horizontal extent of the potential soil contamination from past activities at the site.

Because the exact location of potential contamination was unknown, the samples were spaced evenly around the building in the grassy area directly outside the building. One sample was analyzed for target compound list/target analyte list (TCL/TAL) constituents in accordance with the *Operable Unit 3 Field Sampling Plan* (CH2M HILL, 1995) to detect any unknown contamination at the site. The following sections detail the sampling procedures and laboratory analyses performed for surface soil.

2.2.2 Sampling Procedures

This section describes the sampling procedures and laboratory analyses performed for surface soil.

2.2.2.1 Surface Soil Sampling Procedures

With the approval of the Tennessee Department of Environment and Conservation (TDEC) and the United States Environmental Protection Agency (EPA), surface soil samples were collected from five locations (SS48A, SS48B, SS48C, SS48D, and SS48E) at this site (shown in Figure 1). All samples, collected around the perimeter of Building 274, were collected from the interval of zero to 1 foot. The following details the sampling locations:

- Sample SS48A was taken 24 feet south of the center of the south side of Building 274.
- Sample SS48B was taken 7 feet east of the east side of Building 274 and 5 feet south of the sidewalk extending from the east side of the building.
- Sample SS48C was taken 6 feet north and 5 feet east of the northeast corner of Building 274.
- Sample SS48D was taken 5 feet west of the northwest corner of Building 274.
- Sample SS48E was collected 35 feet north of the southwest corner of Building 274 and 6 feet west of the west side of Building 274.

The surface soil samples were collected using a stainless-steel hand auger. Volatile organic compound (VOC) samples were collected from the first auger bucket before compositing to prevent volatilization. Part of the VOC sample was placed in a sealable plastic bag for head space analysis with a photoionization detector (PID). The results of the head space analysis were used to select samples for analysis of the TCL/TAL parameters and Level 3 constituents of potential concern (COPC) analysis. The remaining soil from each sample was composited in a stainless-steel bowl and then transferred into the appropriate sample jars. All sampling tools were decontaminated before each use according to the procedures specified in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at the DDMT.

2.2.3 Analytical Procedures

All samples were submitted to CH2M HILL's Analytical Services in Montgomery, Alabama for analysis. Four surface soil samples were analyzed for VOCs, pesticides, and PCBs. One surface soil sample, which had exhibited the highest field head space result, was analyzed for TCL/TAL parameters. The samples were analyzed in accordance with the procedures outlined in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995).

A United States Army Corps of Engineers (COE) split-sample was collected from SS48A. This surface soil sample was sent to the COE's Atlanta, Georgia laboratory for analysis of the TCL/TAL parameters. TDEC also collected a split-sample from SS48A for TCL/TAL analysis at TDEC's laboratory.

A data quality evaluation (DQE) was performed to assess the effect of the overall analytical process on the usability of the data. The DQE established that the detection of acetone, 2-butanone, and bis(2-ethylhexyl)phthalate can be attributed to field sampling and laboratory contamination rather than environmental conditions at the site. Also, poor duplicate precision for metals in the duplicate soil samples should be attributed to poor sample homogeneity as well as to potentially poor sampling and analysis precision. With exception to the qualifications listed above, the DQE concluded that data can be used in the project decision-making process.

3.0 Interpretation of Sampling Results

3.1 Presentation of Results

This section presents results of the RI Sampling Program for Site 48. Data are presented for surface soils and compared with appropriate screening criteria in Tables 48-A and 48-B. Data from the 1997 CH2M HILL investigation are presented along with historical data from the *Remedial Investigations at DDMT, Final Report* (Law Environmental, 1990). If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold on the summary table.

COPCs are parameters that exceed both background values and the screening criteria. Where concentrations exceed the selected background value, the concentration is compared with the observed range of background values as reviewed and established by the BRAC Cleanup Team (BCT).

COPCs identified for RI Site 48 include PCB-1260 and dieldrin in surface soils.

3.1.1 Surface Soil

Surface soil sampling locations with values above the detection limits are shown in Tables 48-A and 48-B. The tables show all surface soil detections from RI Site 48 and contain the comparison criteria for surface soil. If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold.

3.1.1.1 BCT Screening Criteria

Table 48-A summarizes constituents for which the BCT has selected a screening criteria. One constituent, PCB-1260, exceeds both the background value of 0.11 milligrams per kilogram (mg/kg) and the BCT value of 0.083 mg/kg. Exceedances occurred in three of the five samples (SS48B, SS48C, and SS48E) and ranged from 0.18 mg/kg to 1.4 mg/kg.

Benzo(a)pyrene at SS30, a data point from the 1991 RI (Law Environmental, 1990), exceeded the BCT value but not the background value.

3.1.1.2 Other Screening Criteria

Table 48-B compares the remaining constituents with the soil ingestion screening criteria for both residential and industrial exposure scenarios. Dieldrin is the only constituent that exceeds background values and a screening criteria. Dieldrin was detected in the surface soil at Sample SS48A at a concentration of 0.11 mg/kg, exceeding both background and the residential RBC value; however, it is below an industrial RBC value.

3.2 Vertical and Lateral Extent

Seven surface soil samples were collected from the surface soil. The COPCs detected in the surface soil were dieldrin and PCB-1260. Dieldrin was detected at concentrations similar to those found elsewhere at DDMT.

PCB-1260 was detected in all five surface soil samples taken at this site; however, only three of the five samples (SS48B, SS48C, and SS48E) exceeded background and BCT values. The elevated PCB concentrations detected in the three samples are east of Building 274. RI Site 58 samples taken east of these samples did not detect PCB compounds. The Screening Site 69 samples taken south of these samples did not detect PCB compounds. Additional samples are needed to determine the extent of PCB contamination north of the area. Nonetheless, the lateral extent of contamination in this area is limited to the strips of grass surrounding the building and parking lot.

Dieldrin was detected in three of the five samples, but only exceeded background and BCT values in one sample (SS48A). Dieldrin is a sitewide COPC and will be addressed in an upcoming sitewide risk evaluation.

No subsurface soil samples have been taken at this site. PCB compounds and dieldrin have a very low solubility and are not expected at depth. These compounds have not been observed in borehole samples in other locations at the site. Therefore, additional vertical sampling is not necessary at RI Site 48.

3.3 Potential Migration Pathways

The following paragraphs provide a general discussion of the potential migration pathways for the constituents found at RI Site 48.

Dieldrin exists at DDMT in surface and subsurface soils. Since this compound is only minutely soluble in water, its most likely migration pathway at this site is via erosion as suspended soil

particles in the surface water where it potentially would be available to aquatic organisms. Dieldrin in the subsurface soils should be relatively immobile and not impact groundwater quality.

PCBs, as a group, are relatively insoluble in water; therefore, they tend to migrate primarily through physical transport such as erosion via surface water. At DDMT, PCB-1260 has been detected at concentrations of concern in surface soils. This material is subject to migration either via wind action or surface water transport, and the PCB would be present as an absorbed chemical on the clay platelets that compose the soil. This material could potentially be ingested either by breathing contaminated dust or by aqueous organisms exposed to turbid water or bottom feeding of contaminated sediment.

3.4 Additional Data Needs

Building 274 is currently scheduled to be leased for private-sector uses. This site has been identified by the BCT as an early removal site due to the presence of PCBs and the intent to transfer the site. Exposed soil surrounding Building 274 will be sampled and removed if the PCB concentrations in surface soil exceed the risk-based criteria for industrial land use. Samples of surface soil remaining in-place or brought in as fill material will be obtained. No subsurface soil sampling is proposed as part of the RI.

4.0 Interpretation of Screening Criteria Comparisons

4.1 Methodology

The Preliminary Risk Evaluation (PRE) was performed in accordance with the *Guidance on Preliminary Risk Evaluations for the Purpose of Reaching a Finding of Suitability to Lease (FOSL)* (EPA Region IV, 1994). A discussion of the PRE methodology in provided as Appendix A to this document.

4.2 RI Site 48 Risk

A PRE was performed for RI Site 48 (Subparcel 5.2) as reported in the draft PRE (CH2M HILL, 1998). Because there are no screening or BRAC sites within this subparcel, risks are based on the RI data only. Carcinogenic and noncarcinogenic risks were calculated and are presented in Table 4-15 of the draft PRE. The carcinogenic risk ratio for an industrial worker is well below a risk level of 1 in a million. A residential exposure-based risk ratio was 15 in a million. The risks are due to the presence of PCB-1260 in three of the samples and dieldrin in one sample from the site.

There are no noncarcinogenic ratios exceeding a value of 1.0 for either a residential or an industrial scenario.

5.0 Summary and Recommendations

5.1 Summary

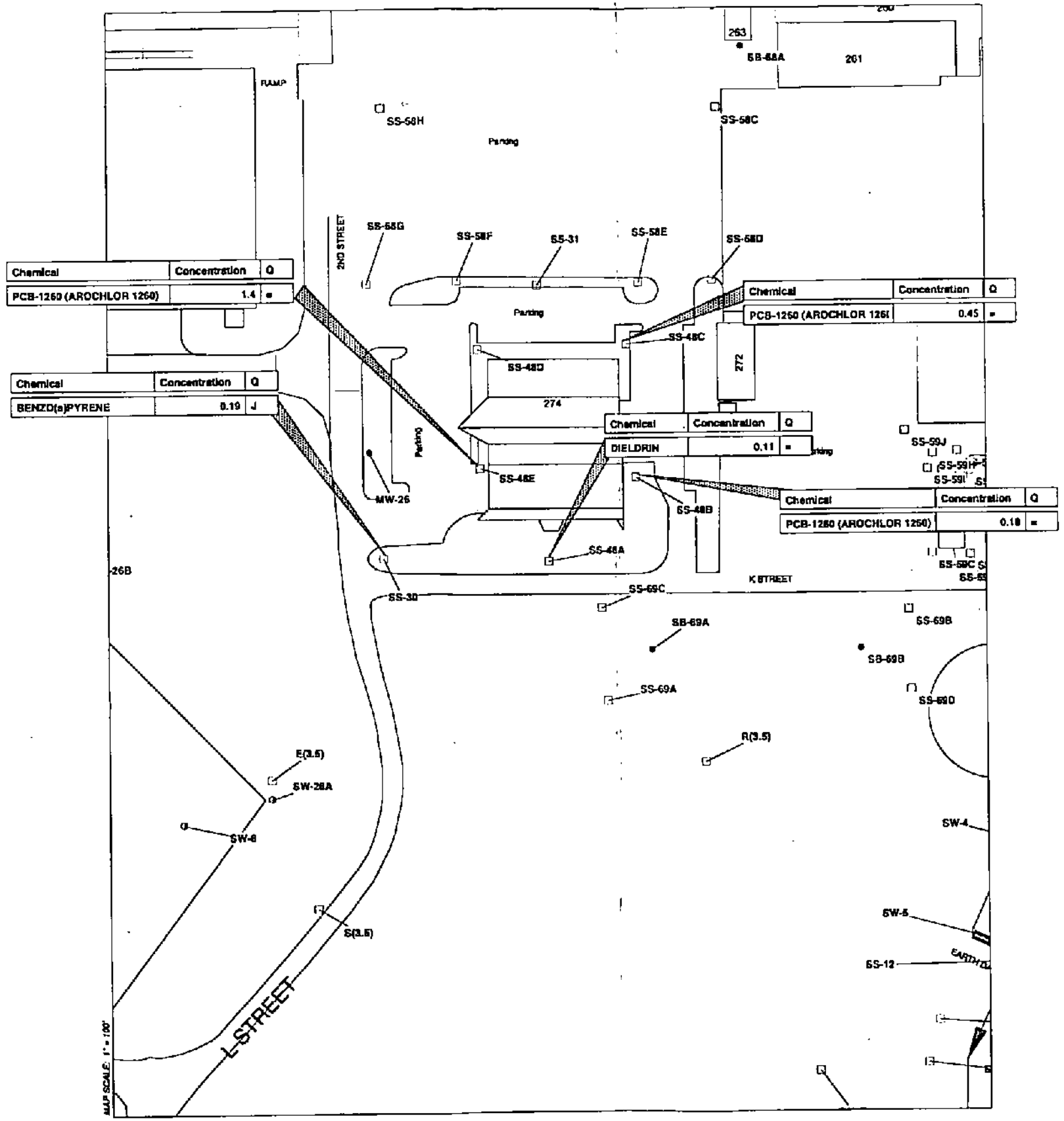
PCB-1260 and dieldrin were detected in three samples and one sample, respectively, at values that exceed the background and screening criteria. A surface soil removal action is currently being implemented at this site. Additional soil characterization will be performed during this remedial action.

5.2 Recommendations

A surface soil removal action is being implemented at this site. The chemical composition of soil that is left in place or brought in as fill should be characterized, a risk assessment should be performed on the remediated site, and the results should be documented in the Main Installation RI Report.

Acronyms

BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COE	United States Army Corps of Engineers
COPC	constituent of potential concern
DDMT	Defense Distribution Depot Memphis, Tennessee
DQE	Data Quality Evaluation
EPA	United States Environmental Protection Agency
FOSL	Finding of Suitability to Lease
FS	Feasibility Study
ft^2	Square feet
mg/kg	milligrams per kilogram
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
PID	photoionization detector
ppm	parts per million
PRE	Preliminary Risk Evaluation
RBC	risk-based criteria
RI	Remedial Investigation/Feasibility Study
TCL/TAL	target compound list/ target analyte list
TDEC	Tennessee Department of Environment and Conservation
VOC	Volatile organic compound



LEGEND

- Surface Soil Sampling Location (mg/kg)
- Soil Boring Sampling Location (mg/kg)
- Surface Water Sampling Location (mg/L)
- Sediment Sample Location (mg/kg)

(Q) Qualifer 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 1
RI Site 48, Former PCB Transformer Storage Area
Constituents Exceeding Risk-Based Criteria
Defense Distribution Depot Memphis, TN

CH2MHILL

Table 48-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 48
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	5	ALUMINUM	SS48A	13700	=	24000	24000	Bkgd	MG/KG
CH2M HILL	5	ARSENIC	SS48A	13.2	=	20	20	Bckg	MG/KG
CH2M HILL	5	BENZO(a)ANTHRACENE	SS48A	0.045	J	.71	0.88	Residential RBC	MG/KG
CH2M HILL	5	BENZO(a)PYRENE	SS48A	0.052	J	.96	0.088	Residential RBC	MG/KG
CH2M HILL	5	BENZO(b)FLUORANTHENE	SS48A	0.069	J	.78	0.88	Residential RBC	MG/KG
CH2M HILL	5	BENZO(g,h,i)PERYLENE	SS48A	0.052	J	.82	230	Residential RBC	MG/KG
CH2M HILL	5	BENZO(k)FLUORANTHENE	SS48A	0.067	J	.78	8.8	Residential RBC	MG/KG
CH2M HILL	5	CHROMIUM	SS48A	16	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	5	CHRYSENE	SS48A	0.068	J	.94	88	Residential RBC	MG/KG
CH2M HILL	5	FLUORANTHENE	SS48A	0.1	J	1.6	310	Residential RBC	MG/KG
CH2M HILL	5	INDENO(1,2,3-c,d)PYRENE	SS48A	0.047	J	.7	0.88	Residential RBC	MG/KG
CH2M HILL	5	IRON	SS48A	21800	=	37000	37000	Bckg	MG/KG
CH2M HILL	5	LEAD	SS48A	22.1	=	30	400	CERCLA	MG/KG
CH2M HILL	5	MANGANESE	SS48A	483	=	1300	1300	Bckg	MG/KG
CH2M HILL	5	PCB-1260 (AROCHLOR 1260)	SS48B	**0.18**	=	.11	**0.083**	Residential RBC	MG/KG
CH2M HILL	5	PCB-1260 (AROCHLOR 1260)	SS48C	**0.45**	=	.11	**0.083**	Residential RBC	MG/KG
CH2M HILL	5	PCB-1260 (AROCHLOR 1260)	SS48D	0.026	J	.11	0.083	Residential RBC	MG/KG
CH2M HILL	5	PCB-1260 (AROCHLOR 1260)	SS48E	**1.4**	=	.11	**0.083**	Residential RBC	MG/KG
CH2M HILL	5	PCB-1260 (AROCHLOR 1260)	SS48E	0.076	J	.11	0.083	Residential RBC	MG/KG
CH2M HILL	5	PYRENE	SS48A	0.098	J	1.5	230	Residential RBC	MG/KG
CH2M HILL	5	ZINC	SS48A	75	=	130	23000	Residential RBC	MG/KG
LAW	5	ANTIMONY	SS30	4	=	7	7	Bckg	MG/KG
LAW	5	ARSENIC	SS30	19	=	20	20	Bckg	MG/KG
LAW	5	ARSENIC	SS31	12	=	20	20	Bckg	MG/KG
LAW	5	BENZO(a)ANTHRACENE	SS30	0.24	J	.71	0.88	Residential RBC	MG/KG
LAW	5	BENZO(a)PYRENE	SS30	**0.19**	J	.96	**0.088**	Residential RBC	MG/KG
LAW	5	BENZO(b)FLUORANTHENE	SS30	0.32	J	.78	0.88	Residential RBC	MG/KG
LAW	5	BENZO(g,h,i)PERYLENE	SS30	0.23	J	.82	230	Residential RBC	MG/KG
LAW	5	CHROMIUM	SS30	14	=	24.8	39	Residential RBC	MG/KG
LAW	5	CHROMIUM	SS31	10	=	24.8	39	Residential RBC	MG/KG
LAW	5	CHRYSENE	SS30	0.23	J	.94	88	Residential RBC	MG/KG
LAW	5	FLUORANTHENE	SS30	0.39	J	1.6	310	Residential RBC	MG/KG

Table 48-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 48
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
LAW	5	INDENO(1,2,3-c,d)PYRENE	SS30	0.18	J	.7	0.88	Residential RBC	MG/KG
LAW	5	LEAD	SS30	81	=	30	400	CERCLA	MG/KG
LAW	5	LEAD	SS31	5	=	30	400	CERCLA	MG/KG
LAW	5	PHENANTHRENE	SS30	0.21	J	.61	2300	Residential RBC	MG/KG
LAW	5	PYRENE	SS30	0.34	J	1.5	230	Residential RBC	MG/KG
LAW	5	ZINC	SS30	69	=	130	23000	Residential RBC	MG/KG
LAW	5	ZINC	SS31	11	=	130	23000	Residential RBC	MG/KG

Notes:

1. Detected values are obtained from the *Draft Parcel 5 Report-Remedial Investigation Sampling Program for Defense Depot* Memphis, TN, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Based on values selected by the BRAC Cleanup Team in the August 1997 BCT meeting minutes, Memphis, Tennessee.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection
BCT - BRAC Cleanup Team

Table 48-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 48
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	5	ACETONE	SS48B	0.006	J	NA	780	20000	MG/KG
CH2M HILL	5	ACETONE	SS48C	0.005	J	NA	780	20000	MG/KG
CH2M HILL	5	ACETONE	SS48D	0.033	=	NA	780	20000	MG/KG
CH2M HILL	5	ACETONE	SS48E	0.005	J	NA	780	20000	MG/KG
CH2M HILL	5	ACETONE	SS48E	0.015	=	NA	780	20000	MG/KG
CH2M HILL	5	ALPHA-CHLORDANE	SS48B	0.019	J	.029	.49	4.4	MG/KG
CH2M HILL	5	ALPHA-CHLORDANE	SS48C	0.027	J	.029	.49	4.4	MG/KG
CH2M HILL	5	ALPHA-CHLORDANE	SS48D	0.0046	J	.029	.49	4.4	MG/KG
CH2M HILL	5	ALPHA-CHLORDANE	SS48E	0.0077	J	.029	.49	4.4	MG/KG
CH2M HILL	5	BARIUM	SS48A	168	=	234	550	14000	MG/KG
CH2M HILL	5	CADMIUM	SS48A	0.31	J	1.4	3.9	100	MG/KG
CH2M HILL	5	CALCIUM	SS48A	1740	=	5840	NA	NA	MG/KG
CH2M HILL	5	COBALT	SS48A	8.3	=	18.3	470	12000	MG/KG
CH2M HILL	5	COPPER	SS48A	21.1	=	33	310	8200	MG/KG
CH2M HILL	5	DDD	SS48E	0.057	=	.0067	2.7	24	MG/KG
CH2M HILL	5	DDD	SS48E	0.055	J	.0067	2.7	24	MG/KG
CH2M HILL	5	DDE	SS48A	0.14	=	.16	1.9	17	MG/KG
CH2M HILL	5	DDE	SS48B	0.13	=	.16	1.9	17	MG/KG
CH2M HILL	5	DDE	SS48C	0.47	=	.16	1.9	17	MG/KG
CH2M HILL	5	DDE	SS48D	0.015	=	.16	1.9	17	MG/KG
CH2M HILL	5	DDE	SS48E	0.079	=	.16	1.9	17	MG/KG
CH2M HILL	5	DDE	SS48E	0.054	J	.16	1.9	17	MG/KG
CH2M HILL	5	DDT	SS48A	0.18	=	.074	1.9	17	MG/KG
CH2M HILL	5	DDT	SS48B	0.52	=	.074	1.9	17	MG/KG
CH2M HILL	5	DDT	SS48C	0.6	=	.074	1.9	17	MG/KG
CH2M HILL	5	DDT	SS48D	0.035	=	.074	1.9	17	MG/KG
CH2M HILL	5	DDT	SS48E	0.3	=	.074	1.9	17	MG/KG
CH2M HILL	5	DDT	SS48E	0.39	=	.074	1.9	17	MG/KG
CH2M HILL	5	DIELDRIN	SS48A	0.11	=	.086	.04	.36	MG/KG
CH2M HILL	5	DIELDRIN	SS48B	0.021	J	.086	.04	.36	MG/KG
CH2M HILL	5	DIELDRIN	SS48E	0.013	J	.086	.04	.36	MG/KG
CH2M HILL	5	GAMMA-CHLORDANE	SS48B	0.013	J	.026	.49	4.4	MG/KG

Table 48-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 48
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	5	GAMMA-CHLORDANE	SS48C	0.02	J	.026	.49	4.4	MG/KG
CH2M HILL	5	GAMMA-CHLORDANE	SS48D	0.0044	J	.026	.49	4.4	MG/KG
CH2M HILL	5	GAMMA-CHLORDANE	SS48E	0.0063	J	.026	.49	4.4	MG/KG
CH2M HILL	5	MAGNESIUM	SS48A	2630	=	4600	NA	NA	MG/KG
CH2M HILL	5	METHYL ETHYL KETONE	SS48D	0.034	=	.002	4700	100000	MG/KG
CH2M HILL	5	NICKEL	SS48A	17.6	=	30	160	4100	MG/KG
CH2M HILL	5	POTASSIUM	SS48A	3090	=	1820	NA	NA	MG/KG
CH2M HILL	5	VANADIUM	SS48A	32	=	48.4	55	1400	MG/KG
LAW	5	ACETONE	SS30	0.004	J	NA	780	20000	MG/KG
LAW	5	ACETONE	SS31	0.007	J	NA	780	20000	MG/KG
LAW	5	BARIUM	SS30	78.1	=	234	550	14000	MG/KG
LAW	5	BARIUM	SS31	21.9	=	234	550	14000	MG/KG
LAW	5	bis(2-ETHYLHEXYL) PHTHALATE	SS30	0.35	J	NA	46	410	MG/KG
LAW	5	bis(2-ETHYLHEXYL) PHTHALATE	SS31	0.46	=	NA	46	410	MG/KG
LAW	5	CADMIUM	SS30	1	=	1.4	3.9	100	MG/KG
LAW	5	COPPER	SS30	22	=	33	310	8200	MG/KG
LAW	5	COPPER	SS31	6	=	33	310	8200	MG/KG
LAW	5	DDE	SS30	0.078	=	.16	1.9	17	MG/KG
LAW	5	DDE	SS31	0.018	=	.16	1.9	17	MG/KG
LAW	5	DDT	SS30	1	=	.074	1.9	17	MG/KG
LAW	5	DDT	SS31	0.19	=	.074	1.9	17	MG/KG
LAW	5	MERCURY	SS30	0.04	=	.43	2.3	61	MG/KG
LAW	5	MERCURY	SS31	0.02	=	.43	2.3	61	MG/KG
LAW	5	METHYLENE CHLORIDE	SS30	0.003	J	NA	85	760	MG/KG
LAW	5	METHYLENE CHLORIDE	SS31	0.007	=	NA	85	760	MG/KG
LAW	5	NICKEL	SS30	13	=	30	160	4100	MG/KG
LAW	5	NICKEL	SS31	3	=	30	160	4100	MG/KG
LAW	5	SILVER	SS30	0.6	=	2	39	1000	MG/KG
LAW	5	TOLUENE	SS30	0.003	J	.012	1600	41000	MG/KG
LAW	5	Total Polynuclear Aromatic Hydrocarbons	SS30	2.33	=	NA	NA	NA	MG/KG

Notes:
1. Detected values are obtained from the *Draft Parcel 5 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.

Table 48-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 48
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	

2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Risk-Based Concentrations are obtained from the *EPA Region III Risk-based Concentrations Table*, R.L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection

TAB

Parcel 12

Remedial Investigation Sites Sampling Program

for

Defense Distribution Depot Memphis, Tennessee

May 1998

Prepared for

U.S. Army Engineering and Support Center, Huntsville

Prepared by

CH2M HILL

2567 Fairlane Drive

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Parcel 12 Report
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Parcel 12 is a 193,644-square-foot (ft^2) parcel in the north-central portion of the Main Installation in Operable Unit (OU)-4. Parcel 12 consists of Building 629 and the associated railroad tracks. Samples were collected at Remedial Investigation (RI) Site 57 in this parcel during the RI Sampling Program. Sampling activities and results at this site are discussed below.

The RI Sites in this document have been identified by the Defense Distribution Depot Memphis, Tennessee (DDMT) through a review of existing documents, interviews with facility personnel, and knowledge of the facility's operations. RI sites at DDMT are identified as those areas that have been known or suspected to have past releases as a result of facility operations. These sites have been previously identified as requiring a RI and have a confirmed presence of contaminants. The following RI Site is located in Parcel 12:

- RI Site 57: Building 629

Additional sites identified with past potential releases to the environment from past operations are addressed in the Screening Sites Sampling Program. General areas within the installation without any known industrial operations involving hazardous chemicals were addressed in the Base Realignment and Closure (BRAC) Sampling Program. Results of these two programs are addressed in separate letter reports.

The purpose of the RI Sampling Program, which is part of the Remedial Investigation /Feasibility Study (RI/FS), is to accomplish the following:

- Characterize potential releases from the sites
- Assess the nature and extent of soil and surface water contamination attributable to past operations
- Gather and evaluate data to determine the need for interim remedial actions for the sites
- Evaluate the risk to human health and the environment as part of the comprehensive RI
- Assess the feasibility of remedial actions for the sites needing further actions

The purpose of this letter report is to evaluate the results of the RI Sampling Program and sampling from previous investigations and to recommend further actions at RI sites in this parcel. The remainder of this report presents the results of past investigations; RI Sampling Program strategy, procedures, and results; and recommendations for each site.

Surface soils, subsurface soils, and surface water were investigated as part of the RI Sampling Program. Surface soil samples (any sample whose lowest depth is 2 feet or less) were taken

both as independent samples and as the upper interval of a soil boring profile. Thus, surface soil samples taken as part of a soil boring may have an "SB" designation and are initially discussed under Subsurface Soil Sampling Procedure (Section 2.2.2.2). However, the results from that upper interval are presented in the surface soils tables and discussed in Section 3.1.1.

Site 57: Building 629

1.0 Introduction

Table 1 presents the location and status information for this site.

TABLE 1
Parcel 12, Site 57 Information
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

Parcel	Building Number	RI/FS OU	Site Number	CERCLA[1] Status
12	629	4	57	RI

[1]CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act of 1980

Building 629 is the former hazardous materials storage building that had been used to store dichlorodiphenyltrichloroethane (DDT), herbicides, solvents, oxidizers, and other toxic and corrosive materials. Past releases may have occurred in this area, including a documented spill of an unknown amount of hydrofluoric acid (oxidizer). The site configuration, sample locations, and constituents exceeding Risk-Based Criteria (RBC) are shown in Figure 1.

2.0 Study Area Investigation

This discussion includes details of the sampling conducted by CH2M HILL for the RI Sampling Program efforts. The historical data results are included in the following discussions; however sampling strategy and analysis included in the historical reports are not repeated here.

2.1 Previous Investigations

Four surface soil samples (SS10, SS11, SS42 and SS43) were collected at this site during the 1990 RI (Law Environmental, 1990) in areas where spills may have occurred. Polynuclear aromatic hydrocarbons (PAHs), pesticides, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals were detected in these samples.

2.2 RI Sampling Program

2.2.1 Sampling Strategy

This sampling strategy was developed to evaluate whether releases have occurred to surface and subsurface soil at RI Site 57. For this sampling program, subsurface soil samples were collected to assess potential contaminant concentrations in the shallow subsurface soil at the site.

Most of Parcel 12 is occupied by Building 629, reducing the exposed soil to a thin strip of maintained gravel-covered area on the north, west, and east sides of the building. The south side of Building 629 is adjacent to railroad tracks. The sampling locations at RI Site 57 surround Building 629. The sampling locations at Site 57 were evaluated and selected based on the following criteria:

- The area was used for loading and unloading
- The area was used as a storage location
- Historical information indicates report of spills, other potential contaminant activities, or previous investigations in the area

2.2.2 Sampling Procedures

This section describes the sampling procedures and laboratory analyses performed for subsurface soil.

2.2.2.1 Surface Soil Sampling Procedures

Surface soil samples were collected from nine locations (SB57A, SB57B, SB57C, SB57D, SB57E, SB57F, SB57G, SB57H, and SB57I) at this site associated with borings (shown in Figure 1). Their locations are described under Section 2.2.2.2.

2.2.2.2 Subsurface Soil Sampling Procedures

With the approval of the Tennessee Department of Environment and Conservation (TDEC) and the United States Environmental Protection Agency (EPA), subsurface soil samples were collected from nine locations (SB57A, SB57B, SB57C, SB57D, SB57E, SB57F, SB57G, SB57H, and SB57I) at this site (shown in Figure 1). The borings were located around the perimeter of Building 629. The following details the sample locations:

- Sample SB57A was taken 14 feet north and 24 feet east from the northwest corner of Building 629.
- Sample SB57B was taken 43 feet west of the northwest corner of Building 629.
- Sample SB57C was taken 44 feet west and 90 feet south of the northwest corner of Building 629.
- Sample SB57D was taken 2 feet north of the loading dock located at the southwest corner of Building 629.

- Sample SB57E was taken 40 feet east of the southwest corner of Building 629.
- Sample SB57F was taken 164 feet east of Sample SB57E.
- SB57G was taken 206 feet east of Sample SB57F.
- Sample SB57H was taken 17 feet east and 3 feet north of the northeast corner of Building 629.
- Sample SB57I was taken 3 feet north and 212 feet west of the northeast corner of Building 629.

Subsurface samples were collected at each boring location from three depths: zero to 2 feet, 3 to 5 feet, and 8 to 10 feet. Samples were collected using a 2-inch-diameter, stainless-steel, core-barrel sampler. The entire length of each soil core was screened with a photoionization detector (PID) for organic vapors before sample collection so that sampling intervals could be biased toward any contamination detected by the field screening. VOC samples were collected first before compositing using a stainless-steel spoon. Part of each VOC sample was placed in a sealable plastic bag for head space analysis with a PID. Results of the head space analyses were used to select samples for Level 3 constituent of potential concern (COPC) analysis.

The remaining soil from each sample was composited in a stainless-steel bowl and then transferred into the appropriate sample jars. All sampling tools were decontaminated before each use according to the procedures outlined in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at the DDMT.

2.2.3 Analytical Procedures

All samples were submitted to CH2M HILL's Analytical Services in Montgomery, Alabama for analysis. Twenty-seven subsurface soil samples were analyzed for PAHs, VOCs, SVOCs, pesticides, and priority pollutant metals. The samples were analyzed in accordance with the procedures specified in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995).

A United States Army Corps of Engineers (COE) split sample was collected from the 3- to 5-foot interval of SB57I. This subsurface soil sample was sent to the COE's Atlanta, Georgia laboratory for analysis of VOCs, SVOCs, pesticides, and priority pollutant metals.

A data quality evaluation (DQE) was performed to assess the effect of the overall analytical process on the usability of the data. The DQE established that the detection of acetone, 2-butanone, and bis(2-ethylhexyl)phthalate can be attributed to field sampling and laboratory contamination rather than environmental conditions at the site. Also, poor duplicate precision for metals in the duplicate soil samples should be attributed to poor sample homogeneity as well as to potentially poor sampling and analysis precision. With exception of the qualifications listed above, the DQE concluded that data can be used in the project decision-making process.

3.0 Interpretation of Sampling Results

3.1 Presentation of Results

Sections 3.1.1 and 3.1.2 presents results of the RI Sampling Program for RI Site 57. Data are presented by media for surface and subsurface soil and compared with appropriate screening criteria in Tables 57-A through 57-C. Data from the 1997 CH2M HILL investigation are presented along with historical data from the *Remedial Investigations at DDMT, Final Report* (Law Environmental, 1990). If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold on the summary table.

COPCs are parameters that exceed both background values and the screening criteria. Where concentrations exceed the selected background value, the concentration is compared with the observed range of background values as reviewed and established by the BRAC Cleanup Team (BCT).

COPCs identified for RI Site 57 include PAH compounds, dichlorodiphenyldichloroethene (DDE) and DDT in the surface soils. Historical COPCs in the surface soils include antimony, arsenic, chromium, lead, alpha-chlordane, cadmium, copper, dichlorodiphenyldichloroethane (DDD), dieldrin, gamma-chlordane, heptachlor epoxide, and nickel. There were no COPCs identified in the subsurface soils.

3.1.1 Surface Soil

Results of the surface soils analyses with values above detection limits are shown in Tables 57-A and 57-B.

3.1.1.1 BCT Screening Criteria

Table 57-A summarizes constituents detected in surface soil compared against background and screening criteria approved by BCT. PAH compounds--including benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, benzo(k)flouranthene, dibenz(a,h)anthracene, indeno (1,2,3-c,d)pyrene, chrysene, flouranthene, pyrene, and benzo(g,h,i)perylene--were found at concentrations exceeding the screening criteria. The observed PAH concentrations are elevated in Sample SB57E, which was collected south of the building and adjacent to the railroad tracks. PAH compounds were not detected in Samples SB57F and SB57G, which were also taken near the railroad tracks. The 1990 RI (Law Environmental, 1990) detected even higher concentrations of PAH compounds in Sample SS42, which was taken west of Building 629. The observed PAHs appear to be associated with railroad operations or other non-point sources.

Historical parameters of concern in the surface soil for which the BCT has selected screening criteria values include antimony, arsenic, chromium, and lead. An elevated concentration of antimony was detected in the Law Environmental study at 8 milligrams per kilogram (mg/kg) in Sample SS11, which slightly exceeds the BCT criteria (background) value of 7 mg/kg. The more recent study did not detect antimony exceedances.

Arsenic was also detected in the 1990 RI (Law Environmental, 1990) at 26 mg/kg in Sample SS43, which exceeds the BCT criteria (background) value of 20 mg/kg. Arsenic was detected in

all nine CH2M HILL surface soil samples at concentrations ranging from 2.5 mg/kg to 13.7 mg/kg, none of which exceed the BCT or background criteria value. Arsenic appears to be naturally occurring at these levels. Chromium was detected in the Law Environmental study at 135 mg/kg in Sample SS11, which exceeds the BCT criteria value of 39 mg/kg and the background value of 24.8 mg/kg. Chromium was detected in all nine CH2M HILL surface soil samples at concentrations ranging from 9.9 mg/kg to 15.9 mg/kg, in which none exceed the BCT or background criteria value.

Lead was detected in the Law Environmental study at 1680 mg/kg and 1120 mg/kg in Samples SS11 and SS42, which exceeds the BCT criteria value of 400 mg/kg and the background value of 30 mg/kg. Lead was detected in all nine CH2M HILL surface soil samples at concentrations ranging from 7.3 mg/kg to 33.2 mg/kg, none of which exceed the BCT criteria value.

3.1.1.2 Other Screening Criteria

Table 57-B summarizes the remaining constituents compared with the soil ingestion screening criteria for both residential and industrial exposure scenarios. COPCs DDE and DDT were found in Sample SB57E at concentrations that exceed the background values (0.16 mg/kg for DDE and 0.074 mg/kg for DDT) and the residential RBC for soil ingestion (1.9 mg/kg for both constituents). These constituents did not exceed the industrial RBC. However, DDE and DDT were detected in the Law Environmental 1990 RI study at 39 mg/kg and 59 mg/kg, respectively, which exceed the industrial RBC for soil ingestion (17 mg/kg for both constituents).

The Law Environmental 1990 RI also detected dieldrin, alpha-chlordane, gamma-chlordane, cadmium, copper, nickel, and heptachlor epoxide at concentrations exceeding the background values and industrial and residential RBC for soil ingestion. These constituents were not detected at elevated concentrations in the more recent sampling event.

Dieldrin was detected in a sample (SS10) from the 1990 RI (Law Environmental, 1990) at 4.5 mg/kg, which exceeds the industrial and residential RBC for soil ingestion values of 0.36 mg/kg and 0.04 mg/kg, respectively. Dieldrin was only detected at 0.005 mg/kg in the CH2M HILL sampling event. However, dieldrin is a sitewide COPC and will be addressed as part of the RI risk evaluation.

Alpha-chlordane and gamma-chlordane were detected in one sample (SS10) from the Law Environmental 1990 RI at 4 mg/kg, which exceeds the background value of 0.029 mg/kg and 0.026 mg/kg and the residential RBC of 0.49 mg/kg (for both constituents). The detected concentrations are near the industrial RBC of 4.4 mg/kg (for both constituents). Alpha chlordane and gamma-chlordane were not detected in the CH2M HILL sampling event.

Cadmium was detected in the Law Environmental 1990 RI (Samples SS11 and SS42) at concentrations well below the industrial RBC (100 mg/kg); however, the concentrations did slightly exceed the background value of 1.4 mg/kg and the residential RBC of 3.9 mg/kg. Cadmium was detected in three CH2M HILL samples at concentrations below screening criteria values.

Copper was detected in a sample (SS042) from the Law Environmental 1990 RI at 705 mg/kg, well below the industrial RBC (8,200 mg/kg), but well above the background value of 33

mg/kg and the residential RBC of 310 mg/kg. Copper was detected in all nine CH2M HILL samples at concentrations below screening criteria values.

Heptachlor epoxide was detected in a sample (SS10) from the 1990 Law Environmental 1990 RI at 0.25 mg/kg, which exceeds the background value of 0.0045 mg/kg and the residential RBC of 0.07 mg/kg.

Nickel was detected in a sample (SS42) from the Law Environmental 1990 RI at 367 mg/kg, which exceeds the background value of 30 mg/kg and the residential RBC of 160 mg/kg. Nickel was detected in all nine CH2M HILL samples at concentrations below screening criteria values.

3.1.2 Subsurface Soil

Results of the subsurface soil analyses with values above detection limits are shown in Table 57-C. There were no COPCs detected in the subsurface soil.

3.2 Vertical and Lateral Extent

A total of twelve samples, including samples from the Law Environmental 1990 RI, were collected from biased locations at RI Site 57 in order to characterize potential releases from the site. Based on the data collected, observed contamination is limited to the surface soils, and no leaching is apparent. COPCs were detected in surface soil but not in subsurface soil. The COPCs detected in the surface soil include PAH compounds, DDE, and DDT. Other parameters of concern detected in the previous RI conducted by Law Environmental in 1990 include metals and other pesticides, such as dieldrin, alpha-chlordane, and gamma-chlordane.

PAH compounds were detected in surface soil at elevated concentrations in Sample SB57E, which was taken south of Building 629 on the western side. The detected concentrations ranged from 2.1 mg/kg to 10 mg/kg. Very high concentrations of PAH compounds were detected in the samples from the 1990 RI (Law Environmental,1990), Samples SS11 and SS42, ranging from 72 mg/kg to 970 mg/kg, in which the higher concentrations were detected in Sample SS42. Sample SS11 was taken south of Building 629 just west of Sample SB57E, and Sample SS42 was taken west of Building 629 on the northern end. Note that a CH2M HILL sample, SB57B, was taken just northwest of Sample SS42 (but farther away from the building), and there were no detections of PAH compounds.

Elevated concentrations of metals (arsenic, chromium, lead, cadmium, copper, nickel, and antimony) were detected in the previous investigation, mostly in Samples SS11 and SS42. An elevated concentration of arsenic was detected in the previous Sample SS43, which was taken south of Building 629 near Sample SB57E. The more recent RI samples were taken in the same vicinity as the previous samples, but the detected metal concentrations were within the range of background levels. It appears the lateral extent of metals contamination in surface soil has been defined by the more recent sampling event.

DDE and DDT were detected at elevated concentrations in Sample SB57E, which was collected south of Building 629 on the western end. Other pesticides (alpha- and gamma-chlordane, dieldrin, DDE, and DDT) were detected at elevated concentrations in the previous investigation samples (Samples SS10, SS11, SS42, and SS43). All of these samples were taken either west of

Building 629 or south of Building 629. The CH2M HILL samples taken in the same vicinity (besides Sample SB57E, which did detect exceedances) detected concentrations of DDE and DDT that were within the range of background levels. However, additional samples are needed south and west of the existing samples (at the southwest corner of Building 629) to determine the lateral extent of pesticides contamination at the site.

PAH compounds and dieldrin are found in surface soil throughout the Main Installation and will be addressed in an upcoming sitewide risk evaluation.

3.3 Potential Migration Pathways

Arsenic exists at several sites on DDMT in surface soils at concentrations above screening levels. Arsenic's mobility and toxicity are tied to its complex geochemistry and its ability to readily form soluble complexes. Arsenic may also readily be adsorbed onto clays, oxides, or humic organic material and may migrate as suspended soil in surface water or as a sediment. Arsenic can exist in four common oxidation states, and these control its solubility. It readily transports through aquatic environments as a dissolved salt or as a complex with an organic compound.

Benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, benzo(b)fluoranthene, and indeno(1,2,3-c,d)pyrene--a group of related, long-chain PAHs have similar chemical and physical characteristics and tend to migrate and behave in the environment in a similar manner. Generally, these compounds have low vapor pressures, are only marginally soluble in water, and have a high affinity for soils. All of these compounds have been detected at concentrations above screening values for surface soils at DDMT. They would be expected to migrate as adsorbed components of the soils and would potentially be available to aquatic organisms in turbid surface water or to bottom feeders in areas with contaminated sediments. That none of these compounds was detected in sediments indicates this is not a major source of contaminant migration for these compounds at this site. These compounds do not bioaccumulate significantly due to their rapid metabolism and excretion by most aquatic organisms.

Chlordane was detected in surface soils at DDMT. It has a high affinity for soils and is only marginally soluble in water. Sorption to soil particles and transport via surface water or wind is its primary potential migration mode. It potentially would be available to aquatic organisms if it existed as suspended sediment in turbid surface water or as a sediment in an area with bottom feeders; also, it would bioaccumulate in that environment. However, since it was not detected in either of these media during sampling activities at DDMT, chlordane is not believed to be an ongoing contaminant release mechanism at the site.

Chromium has been reported from surface and subsurface soils at DDMT in concentrations greater than the screening levels. Chromium occurs in two oxidation states: +3 and +6. The trivalent form, which is of little risk, readily combines with aqueous hydroxide to form insoluble chromium hydroxide. The hexavalent form is soluble and tends to stay in solution, unless some activated carbon material is present for it to sorb onto. Dissolved chromium is readily adsorbed onto sediments but may be bioaccumulated through aquatic organisms.

DDT and two of its degradation breakdown products, DDD and DDE, exist in subsurface soils at DDMT; these products should not be mobile in this environment. These compounds have an extremely high affinity for soil and are essentially insoluble in water. As long as they are buried and the potential for direct contact is controlled, the potential to migrate is minimal. Should soil contaminated with these compounds be uncovered, they potentially would be able to be moved through wind action and/or as suspended material in surface water. DDT also was reported in sediments at two sites on DDMT, indicating migration via this pathway has occurred. These compounds can bioaccumulate and become more concentrated as they move up in the food chain and could potentially affect receptors via this migration pathway.

Dieldrin exists at DDMT in surface and subsurface soils. Since this compound is only minutely soluble in water, its most likely migration pathway at this site is via erosion as suspended soil particles in the surface water where it potentially would be available to aquatic organisms. Dieldrin in the subsurface soils should be relatively immobile and not impact groundwater quality.

Lead is present at concentrations greater than background, or above screening criteria, in surface soils, subsurface soils, and sediment at DDMT. Lead is moderately soluble and potentially can be leached from any of these forms of occurrence, reaching concentrations in aqueous solution in both groundwater and surface water that would be of concern to both human and ecological receptors. Additionally, lead in surface soils and sediment potentially may move as suspended particulate matter in surface waters and impact aquatic organisms.

3.4 Additional Data Needs

The surface soil data is not defined at the southwest and northwest side of Building 629 for pesticide contamination. Additional surface soil samples should be taken on the west, north, and south side of Building 629. Each of the sample locations should be biased toward some kind of waste handling or waste release areas (BCT, 1997).

4.0 Interpretation of Screening Criteria Comparisons

4.1 Methodology

The Preliminary Risk Evaluation (PRE) was performed in accordance with the *Guidance on Preliminary Risk Evaluations for the Purpose of Reaching a Finding of Suitability to Lease (FOSL)* (EPA Region IV, 1994). A discussion of the PRE methodology in provided as Appendix A to this document.

4.2 RI Site 57 Risk

Carcinogenic and noncarcinogenic risks for RI Site 57 are presented in Table 4-22 of the draft PRE (United States Army Engineer Service Center [USAESC], 1998), and detailed chemical-specific estimates are presented in Appendix A of the PRE.

The PRE carcinogenic risk ratios were within a one in a million risk level for an industrial worker and three in a million for a residential receptor, primarily from DDE and DDT at sampling location SB57E.

The noncarcinogenic ratio was below a value of 1.0 for both industrial and residential receptors.

Thus, in accordance with the PRE, there are no significant carcinogenic or noncarcinogenic human health impacts of concern at this site. It is likely that RI Site 57 will not require further action, but further risk assessment is necessary to confirm this.

5.0 Summary and Recommendations

5.1 Summary

COPCs at RI Site 57 include PAH compounds, DDE, and DDT in the surface soil. Antimony, arsenic, chromium, lead, alpha-chlordane, cadmium, copper, DDD, dieldrin, gamma-chlordane, heptachlor epoxide, and nickel were detected in the surface soil in the previous RI conducted in 1990 (Law Environmental, 1990). There were no COPCs identified in the subsurface soils.

The PAH compounds, dieldrin, and associated pesticides detected in the surface soil are sitewide COPCs and will be addressed in an upcoming sitewide risk evaluation.

Pesticides are found in the surface soil throughout the Main Installation due to routine application. However, there are slight risks associated with this site due to the presence of DDE and DDT. The PRE results presented in the Draft PRE (CH2M HILL, 1998) indicate that carcinogenic risk ratios were within one in a million for an industrial worker; however, the ratio was exceeded for a residential receptor due to the presence of DDE and DDT just south of Building 629 near the railroad tracks.

The noncarcinogenic ratios were below a value of one for both industrial and residential receptors.

The concentrations of metals (including arsenic, antimony, chromium, copper, nickel, and cadmium) that exceed background and screening criteria values were detected in the previous investigation conducted by Law Environmental in 1990. The more recent sampling did not detect any exceedances of metals.

5.2 Recommendations

Additional sampling is required to determine the extent of pesticide contamination. Further risk assessment is needed at this site to evaluate pesticide contamination just southwest of Building 629. The surface soil on the west end of Building 629 is a potential early removal candidate pending the outcome of the additional soil sampling (BCT, 1997).

Acronyms

BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response. Compensation, and Liability Act of 1980
COE	United States Army Corps of Engineers
COPC	constituent of potential concern
DDD	dichlorodiphenyldichloroethane
DDMT	Defense Distribution Depot Memphis, Tennessee
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DQE	Data Quality Evaluation
EPA	United States Environmental Protection Agency
FOSL	Finding of Suitability to Lease
FS	feasibility study
ft²	square feet
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbons
PID	photoionization detector
PRE	Preliminary Risk Evaluation
RBC	risk-based criteria
RI	Remedial Investigation
SVOC	semivolatile organic compound
TCL/TAL	target compound list/ target analyte list
TDEC	Tennessee Department of Environment and Conservation
USAESC	United States Army Engineer Service Center
VOC	volatile organic compound

Chemical	Concentration	Q
BENZO(a)ANTHRACENE	870	=
BENZO(a)PYRENE	450	=
BENZO(b)FLUORANTHENE	540	=
BENZO(g,h,i)PERYLENE	380	=
BENZO(k)FLUORANTHENE	450	=
CHRYSENE	620	=
DIBENZ(a,h)ANTHRACENE	160	=
FLUORANTHENE	860	=
INDENO(1,2,3-c,d)PYRENE	310	=
LEAD	1,120	=
PYRENE	670	=
CADMIUM	11.5	=
COPPER	705	=
DDE	9	J
DDT	7.9	J
GAMMA-CHLORDANE	0.62	J
NICKEL	367	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	8.1	=
LEAD	8 to 10	7.4	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	8.6	=
LEAD	3 to 5	9.3	=
LEAD	8 to 10	7.4	=

Chemical	Concentration	Q
ALPHA-CHLORDANE	4	=
DDE	4.5	=
DDT	6.7	=
DIELDRIN	0.24	=
GAMMA-CHLORDANE	4	=
HEPTACHLOR EPOXIDE	0.25	=
BENZO(a)ANTHRACENE	9.5	=
BENZO(a)PYRENE	8.3	=
BENZO(b)FLUORANTHENE	9.5	=
BENZO(k)FLUORANTHENE	10	=
DIBENZ(a,h)ANTHRACENE	1.4	J
INDENO(1,2,3-c,d)PYRENE	4.8	=
ALPHA-CHLORDANE	4	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	8.5	=
LEAD	8 to 10	9.5	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	8.4	=
LEAD	8 to 10	10	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	10.5	=
LEAD	8 to 10	8.4	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	10.8	=
LEAD	8 to 10	10	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	9.4	=
LEAD	3 to 8	8.5	=
LEAD	8 to 10	6.3	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	11	=
LEAD	3 to 5	13.1	=
LEAD	8 to 10	8.8	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	9.8	=
LEAD	8 to 10	7.5	=

Chemical	Concentration	Q
ANTIMONY	8	=
BENZO(a)ANTHRACENE	110	=
BENZO(a)PYRENE	100	=
BENZO(b)FLUORANTHENE	110	=
BENZO(k)FLUORANTHENE	92	=
CHROMIUM	135	=
CHRYSENE	120	=
DIBENZ(a,h)ANTHRACENE	9.8	=
INDENO(1,2,3-c,d)PYRENE	72	=
LEAD	1,580	=
CADMIUM	6	=
DDD	3.6	=
DDE	39	=
DDT	59	=
GAMMA-CHLORDANE	2.4	J

Chemical	Concentration	Q
ARSENIC	26	=
BENZO(a)ANTHRACENE	5.3	=
BENZO(a)PYRENE	5.3	=
BENZO(b)FLUORANTHENE	9.3	=
DIBENZ(a,h)ANTHRACENE	1.4	=
INDENO(1,2,3-c,d)PYRENE	2.8	=
DDE	2.5	J
DIELDRIN	4.5	=

Chemical	Concentration	Q
DDE	2.3	=
DDT	3	=
BENZO(a)ANTHRACENE	6.9	=
BENZO(a)PYRENE	6.9	=
BENZO(b)FLUORANTHENE	10	=
BENZO(k)FLUORANTHENE	10	=
DIBENZ(a,h)ANTHRACENE	2.1	=
INDENO(1,2,3-c,d)PYRENE	4.4	=

B(15.6)

C(11.1)

SB-57A
SB-57B
SB-57C
SB-57D
SB-57E
SB-57F
SB-57G
SB-57H
SB-57I
SS-10
SS-11
SS-42
SS-43

C STREET
D STREET
RAM
RAM
MP
T

LEGEND

- Surface Soil Sampling Location (mg/kg)
- Soil Boring Sampling Location (mg/kg)
- Surface Water Sampling Location (mg/L)
- Sediment Sample Location (mg/kg)

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

N
W E
S

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

Figure 1
RI Site 57, Building 629
Constituents Exceeding Risk-Based Criteria
Defense Distribution Depot Memphis, TN

CH2MHILL

Table 57-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	12	ACENAPHTHENE	SB57E	1.4	=	NA	470	Residential RBC	MG/KG
CH2M HILL	12	ANTHRACENE	SB57E	2.2	=	.096	2300	Residential RBC	MG/KG
CH2M HILL	12	ANTIMONY	SB57G	0.92	=	7	7	Bckg	MG/KG
CH2M HILL	12	ANTIMONY	SB57H	1.2	=	7	7	Bckg	MG/KG
CH2M HILL	12	ARSENIC	SB57A	10.1	=	20	20	Bckg	MG/KG
CH2M HILL	12	ARSENIC	SB57B	9.3	=	20	20	Bckg	MG/KG
CH2M HILL	12	ARSENIC	SB57C	11.6	=	20	20	Bckg	MG/KG
CH2M HILL	12	ARSENIC	SB57D	13.7	=	20	20	Bckg	MG/KG
CH2M HILL	12	ARSENIC	SB57E	2.5	=	20	20	Bckg	MG/KG
CH2M HILL	12	ARSENIC	SB57F	10.6	=	20	20	Bckg	MG/KG
CH2M HILL	12	ARSENIC	SB57G	8.7	=	20	20	Bckg	MG/KG
CH2M HILL	12	ARSENIC	SB57H	9.3	=	20	20	Bckg	MG/KG
CH2M HILL	12	ARSENIC	SB57I	6.2	=	20	20	Bckg	MG/KG
CH2M HILL	12	BENZO(a)ANTHRACENE	SB57E	9.9	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	12	BENZO(a)PYRENE	SB57E	8.9	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	12	BENZO(b)FLUORANTHENE	SB57E	10	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	12	BENZO(g,h,i)PERYLENE	SB57E	5	=	.82	230	Residential RBC	MG/KG
CH2M HILL	12	BENZO(k)FLUORANTHENE	SB57E	10	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	12	CARBAZOLE	SB57E	13	J	.067	32	Residential RBC	MG/KG
CH2M HILL	12	CHROMIUM	SB57A	11.8	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	12	CHROMIUM	SB57B	11.3	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	12	CHROMIUM	SB57C	11.2	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	12	CHROMIUM	SB57D	17.8	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	12	CHROMIUM	SB57E	9.9	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	12	CHROMIUM	SB57F	14.1	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	12	CHROMIUM	SB57G	11.9	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	12	CHROMIUM	SB57H	15.9	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	12	CHROMIUM	SB57I	11.1	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	12	CHRYSENE	SB57E	11	=	.94	88	Residential RBC	MG/KG
CH2M HILL	12	DIBENZ(a,h)ANTHRACENE	SB57E	2.1	=	.26	0.088	Residential RBC	MG/KG
CH2M HILL	12	FLUORANTHENE	SB57E	23	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	12	FLUORENE	SB57E	1.1	=	NA	310	Residential RBC	MG/KG

Table 57-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	12	INDENO(1,2,3-c,d)PYRENE	SB57E	4.4	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	12	LEAD	SB57A	10.5	=	30	400	CERCLA	MG/KG
CH2M HILL	12	LEAD	SB57B	10.4	=	30	400	CERCLA	MG/KG
CH2M HILL	12	LEAD	SB57C	13.7	=	30	400	CERCLA	MG/KG
CH2M HILL	12	LEAD	SB57D	16	=	30	400	CERCLA	MG/KG
CH2M HILL	12	LEAD	SB57E	33.2	=	30	400	CERCLA	MG/KG
CH2M HILL	12	LEAD	SB57F	11.7	=	30	400	CERCLA	MG/KG
CH2M HILL	12	LEAD	SB57G	14.2	=	30	400	CERCLA	MG/KG
CH2M HILL	12	LEAD	SB57H	19.8	=	30	400	CERCLA	MG/KG
CH2M HILL	12	LEAD	SB57I	7.3	=	30	400	CERCLA	MG/KG
CH2M HILL	12	PHENANTHRENE	SB57E	11	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	12	PYRENE	SB57E	17	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	12	ZINC	SB57A	51.1	=	130	23000	Residential RBC	MG/KG
CH2M HILL	12	ZINC	SB57B	50	=	130	23000	Residential RBC	MG/KG
CH2M HILL	12	ZINC	SB57C	66.5	=	130	23000	Residential RBC	MG/KG
CH2M HILL	12	ZINC	SB57D	75.2	=	130	23000	Residential RBC	MG/KG
CH2M HILL	12	ZINC	SB57E	99.6	=	130	23000	Residential RBC	MG/KG
CH2M HILL	12	ZINC	SB57F	113	=	130	23000	Residential RBC	MG/KG
CH2M HILL	12	ZINC	SB57G	54	=	130	23000	Residential RBC	MG/KG
CH2M HILL	12	ZINC	SB57H	68.9	=	130	23000	Residential RBC	MG/KG
CH2M HILL	12	ZINC	SB57I	35.4	=	130	23000	Residential RBC	MG/KG
LAW	12	2-METHYLNAPHTHALENE	SS10	0.5	J	NA	310	Residential RBC	MG/KG
LAW	12	2-METHYLNAPHTHALENE	SS11	2	J	NA	310	Residential RBC	MG/KG
LAW	12	ACENAPHTHENE	SS10	2.3	=	NA	470	Residential RBC	MG/KG
LAW	12	ACENAPHTHENE	SS11	20	=	NA	470	Residential RBC	MG/KG
LAW	12	ACENAPHTHENE	SS42	64	J	NA	470	Residential RBC	MG/KG
LAW	12	ACENAPHTHENE	SS43	1.1	J	NA	470	Residential RBC	MG/KG
LAW	12	ANTHRACENE	SS10	4.4	=	.096	2300	Residential RBC	MG/KG
LAW	12	ANTHRACENE	SS11	26	=	.096	2300	Residential RBC	MG/KG
LAW	12	ANTHRACENE	SS42	130	J	.096	2300	Residential RBC	MG/KG
LAW	12	ANTHRACENE	SS43	1.8	=	.096	2300	Residential RBC	MG/KG
LAW	12	ANTIMONY	SS11	8	=	7	7	Bckg	MG/KG

Table 57-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
LAW	12	ARSENIC	SS10	12	=	20	20	Bckg	MG/KG
LAW	12	ARSENIC	SS11	20	=	20	20	Bckg	MG/KG
LAW	12	ARSENIC	SS42	12	=	20	20	Bckg	MG/KG
LAW	12	ARSENIC	SS43	26	=	20	20	Bckg	MG/KG
LAW	12	BENZO(a)ANTHRACENE	SS10	9.5	=	.71	0.88	Residential RBC	MG/KG
LAW	12	BENZO(a)ANTHRACENE	SS11	110	=	.71	0.88	Residential RBC	MG/KG
LAW	12	BENZO(a)ANTHRACENE	SS42	970	=	.71	0.88	Residential RBC	MG/KG
LAW	12	BENZO(a)ANTHRACENE	SS43	5.3	=	.71	0.88	Residential RBC	MG/KG
LAW	12	BENZO(a)PYRENE	SS10	8.3	=	.96	0.088	Residential RBC	MG/KG
LAW	12	BENZO(a)PYRENE	SS11	100	=	.96	0.088	Residential RBC	MG/KG
LAW	12	BENZO(a)PYRENE	SS42	450	=	.96	0.088	Residential RBC	MG/KG
LAW	12	BENZO(a)PYRENE	SS43	5.2	=	.96	0.088	Residential RBC	MG/KG
LAW	12	BENZO(b)FLUORANTHENE	SS10	9.5	=	.78	0.88	Residential RBC	MG/KG
LAW	12	BENZO(b)FLUORANTHENE	SS11	110	=	.78	0.88	Residential RBC	MG/KG
LAW	12	BENZO(b)FLUORANTHENE	SS42	540	=	.78	0.88	Residential RBC	MG/KG
LAW	12	BENZO(b)FLUORANTHENE	SS43	9.3	=	.78	0.88	Residential RBC	MG/KG
LAW	12	BENZO(g,h,i)PERYLENE	SS10	5.3	=	.82	230	Residential RBC	MG/KG
LAW	12	BENZO(g,h,i)PERYLENE	SS11	85	=	.82	230	Residential RBC	MG/KG
LAW	12	BENZO(g,h,i)PERYLENE	SS42	360	=	.82	230	Residential RBC	MG/KG
LAW	12	BENZO(g,h,i)PERYLENE	SS43	2.9	=	.82	230	Residential RBC	MG/KG
LAW	12	BENZO(k)FLUORANTHENE	SS10	10	=	.78	8.8	Residential RBC	MG/KG
LAW	12	BENZO(k)FLUORANTHENE	SS11	92	=	.78	8.8	Residential RBC	MG/KG
LAW	12	BENZO(k)FLUORANTHENE	SS42	450	=	.78	8.8	Residential RBC	MG/KG
LAW	12	CHROMIUM	SS10	24	=	24.8	39	Residential RBC	MG/KG
LAW	12	CHROMIUM	SS11	135	=	24.8	39	Residential RBC	MG/KG
LAW	12	CHROMIUM	SS42	39	=	24.8	39	Residential RBC	MG/KG
LAW	12	CHROMIUM	SS43	15	=	24.8	39	Residential RBC	MG/KG
LAW	12	CHRYSENE	SS10	8.9	=	.94	88	Residential RBC	MG/KG
LAW	12	CHRYSENE	SS11	120	=	.94	88	Residential RBC	MG/KG
LAW	12	CHRYSENE	SS42	620	=	.94	88	Residential RBC	MG/KG
LAW	12	CHRYSENE	SS43	6.8	=	.94	88	Residential RBC	MG/KG
LAW	12	DIBENZ(a,h)ANTHRACENE	SS10	1.4	J	.26	0.088	Residential RBC	MG/KG

Table 57-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
LAW	12	DIBENZ(a,h)ANTHRACENE	SS11	**9.8**	=	.26	**0.088**	Residential RBC	MG/KG
LAW	12	DIBENZ(a,h)ANTHRACENE	SS42	**160**	=	.26	**0.088**	Residential RBC	MG/KG
LAW	12	DIBENZ(a,h)ANTHRACENE	SS43	**1.4**	=	.26	**0.088**	Residential RBC	MG/KG
LAW	12	DIBENZOFURAN	SS10	1.3	J	.647	31	Residential RBC	MG/KG
LAW	12	DIBENZOFURAN	SS11	9.7	=	.647	31	Residential RBC	MG/KG
LAW	12	DIBENZOFURAN	SS42	24	J	.647	31	Residential RBC	MG/KG
LAW	12	DIBENZOFURAN	SS43	0.34	J	.647	31	Residential RBC	MG/KG
LAW	12	FLUORANTHENE	SS10	23	=	1.6	310	Residential RBC	MG/KG
LAW	12	FLUORANTHENE	SS11	280	=	1.6	310	Residential RBC	MG/KG
LAW	12	FLUORANTHENE	SS42	**860**	=	1.6	**310**	Residential RBC	MG/KG
LAW	12	FLUORANTHENE	SS43	9.3	=	1.6	310	Residential RBC	MG/KG
LAW	12	FLUORENE	SS10	2.6	=	NA	310	Residential RBC	MG/KG
LAW	12	FLUORENE	SS11	16	=	NA	310	Residential RBC	MG/KG
LAW	12	FLUORENE	SS42	47	J	NA	310	Residential RBC	MG/KG
LAW	12	FLUORENE	SS43	0.88	J	NA	310	Residential RBC	MG/KG
LAW	12	INDENO(1,2,3-c,d)PYRENE	SS10	**4.9**	=	.7	**0.88**	Residential RBC	MG/KG
LAW	12	INDENO(1,2,3-c,d)PYRENE	SS11	**72**	=	.7	**0.88**	Residential RBC	MG/KG
LAW	12	INDENO(1,2,3-c,d)PYRENE	SS42	**310**	=	.7	**0.88**	Residential RBC	MG/KG
LAW	12	INDENO(1,2,3-c,d)PYRENE	SS43	**2.8**	=	.7	**0.88**	Residential RBC	MG/KG
LAW	12	LEAD	SS10	81	=	30	400	CERCLA	MG/KG
LAW	12	LEAD	SS11	**1680**	=	30	**400**	CERCLA	MG/KG
LAW	12	LEAD	SS42	**1120**	=	30	**400**	CERCLA	MG/KG
LAW	12	LEAD	SS43	126	=	30	400	CERCLA	MG/KG
LAW	12	PHENANTHRENE	SS10	19	=	.61	2300	Residential RBC	MG/KG
LAW	12	PHENANTHRENE	SS11	200	=	.61	2300	Residential RBC	MG/KG
LAW	12	PHENANTHRENE	SS42	620	=	.61	2300	Residential RBC	MG/KG
LAW	12	PHENANTHRENE	SS43	7	=	.61	2300	Residential RBC	MG/KG
LAW	12	PYRENE	SS10	18	=	1.5	230	Residential RBC	MG/KG
LAW	12	PYRENE	SS11	180	=	1.5	230	Residential RBC	MG/KG
LAW	12	PYRENE	SS42	**870**	=	1.5	**230**	Residential RBC	MG/KG
LAW	12	PYRENE	SS43	9.3	=	1.5	230	Residential RBC	MG/KG
LAW	12	ZINC	SS10	63.4	=	130	23000	Residential RBC	MG/KG

Table 57-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
LAW	12	ZINC	SS11	960	=	130	23000	Residential RBC	MG/KG
LAW	12	ZINC	SS42	10400	=	130	23000	Residential RBC	MG/KG
LAW	12	ZINC	SS43	94.8	=	130	23000	Residential RBC	MG/KG

Notes:
1. Detected values are obtained from the *Draft Parcel 12 Report-Remedial Investigation Sampling Program for Defense Depot* Memphis, TN, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report* , Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum* , CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Based on values selected by the BRAC Cleanup Team in the August 1997 BCT meeting minutes, Memphis, Tennessee.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection
BCT - BRAC Cleanup Team

Table 57-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	12	ACETONE	SB57A	0.011	J	NA	780	20000	MG/KG
CH2M HILL	12	ACETONE	SB57B	0.078	=	NA	780	20000	MG/KG
CH2M HILL	12	ACETONE	SB57C	0.007	J	NA	780	20000	MG/KG
CH2M HILL	12	ACETONE	SB57E	0.007	J	NA	780	20000	MG/KG
CH2M HILL	12	ACETONE	SB57G	0.017	=	NA	780	20000	MG/KG
CH2M HILL	12	ACETONE	SB57H	0.019	=	NA	780	20000	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57A	0.13	J	NA	46	410	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57B	1.7	=	NA	46	410	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57C	0.064	J	NA	46	410	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57G	0.096	J	NA	46	410	MG/KG
CH2M HILL	12	BROMOMETHANE	SB57C	0.002	J	NA	11	290	MG/KG
CH2M HILL	12	CADMIUM	SB57D	0.29	J	1.4	3.9	100	MG/KG
CH2M HILL	12	CADMIUM	SB57E	1.2	=	1.4	3.9	100	MG/KG
CH2M HILL	12	CADMIUM	SB57F	0.27	J	1.4	3.9	100	MG/KG
CH2M HILL	12	CARBON DISULFIDE	SB57B	0.001	J	.012	780	20000	MG/KG
CH2M HILL	12	COPPER	SB57A	16.4	=	33	310	8200	MG/KG
CH2M HILL	12	COPPER	SB57B	16	=	33	310	8200	MG/KG
CH2M HILL	12	COPPER	SB57C	20.5	=	33	310	8200	MG/KG
CH2M HILL	12	COPPER	SB57D	21.4	=	33	310	8200	MG/KG
CH2M HILL	12	COPPER	SB57E	7.8	=	33	310	8200	MG/KG
CH2M HILL	12	COPPER	SB57F	17.7	=	33	310	8200	MG/KG
CH2M HILL	12	COPPER	SB57G	15.7	=	33	310	8200	MG/KG
CH2M HILL	12	COPPER	SB57H	21.4	=	33	310	8200	MG/KG
CH2M HILL	12	COPPER	SB57I	11.5	=	33	310	8200	MG/KG
CH2M HILL	12	DDD	SB57D	0.0028	J	.0067	2.7	24	MG/KG
CH2M HILL	12	DDE	SB57A	0.002	J	.16	1.9	17	MG/KG
CH2M HILL	12	DDE	SB57C	0.0025	J	.16	1.9	17	MG/KG
CH2M HILL	12	DDE	SB57D	0.0063	=	.16	1.9	17	MG/KG
CH2M HILL	12	DDE	SB57E	2.3	=	.16	1.9	17	MG/KG
CH2M HILL	12	DDE	SB57F	0.014	=	.16	1.9	17	MG/KG
CH2M HILL	12	DDE	SB57G	0.0075	=	.16	1.9	17	MG/KG
CH2M HILL	12	DDT	SB57A	0.0035	J	.074	1.9	17	MG/KG
CH2M HILL	12	DDT	SB57D	0.021	=	.074	1.9	17	MG/KG
CH2M HILL	12	DDT	SB57E	3	=	.074	1.9	17	MG/KG

Table 57-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	12	DDT	SB57F	0.022	=	.074	1.9	17	MG/KG
CH2M HILL	12	DDT	SB57G	0.022	=	.074	1.9	17	MG/KG
CH2M HILL	12	DDT	SB57H	0.0024	J	.074	1.9	17	MG/KG
CH2M HILL	12	DIELDRIN	SB57A	0.005	=	.086	.04	.36	MG/KG
CH2M HILL	12	GAMMA BHC (LINDANE)	SB57D	0.0029	=	NA	NA	NA	MG/KG
CH2M HILL	12	METHYL ETHYL KETONE	SB57B	0.01	J	.002	4700	100000	MG/KG
CH2M HILL	12	METHYLENE CHLORIDE	SB57H	0.001	J	NA	85	760	MG/KG
CH2M HILL	12	NICKEL	SB57A	16.2	=	30	160	4100	MG/KG
CH2M HILL	12	NICKEL	SB57B	16.7	=	30	160	4100	MG/KG
CH2M HILL	12	NICKEL	SB57C	19.5	=	30	160	4100	MG/KG
CH2M HILL	12	NICKEL	SB57D	20.9	=	30	160	4100	MG/KG
CH2M HILL	12	NICKEL	SB57E	4.4	=	30	160	4100	MG/KG
CH2M HILL	12	NICKEL	SB57F	18	=	30	160	4100	MG/KG
CH2M HILL	12	NICKEL	SB57G	17.2	=	30	160	4100	MG/KG
CH2M HILL	12	NICKEL	SB57H	17.2	=	30	160	4100	MG/KG
CH2M HILL	12	NICKEL	SB57I	11.2	=	30	160	4100	MG/KG
LAW	12	1,1,2-TRICHLOROETHANE	SS42	0.011	=	NA	11	100	MG/KG
LAW	12	ACENAPHTHYLENE	SS10	0.55	J	.19	NA	NA	MG/KG
LAW	12	ACENAPHTHYLENE	SS11	1.9	J	.19	NA	NA	MG/KG
LAW	12	ACETONE	SS10	0.067	=	NA	780	20000	MG/KG
LAW	12	ACETONE	SS11	0.095	=	NA	780	20000	MG/KG
LAW	12	ACETONE	SS42	0.024	=	NA	780	20000	MG/KG
LAW	12	ACETONE	SS43	0.021	=	NA	780	20000	MG/KG
LAW	12	ALPHA-CHLORDANE	SS10	4	=	.029	.49	4.4	MG/KG
LAW	12	BARIUM	SS10	57.6	=	234	550	14000	MG/KG
LAW	12	BARIUM	SS11	343	=	234	550	14000	MG/KG
LAW	12	BARIUM	SS42	108	=	234	550	14000	MG/KG
LAW	12	BARIUM	SS43	70.8	=	234	550	14000	MG/KG
LAW	12	BETA BHC	SS42	1.8	=	NA	NA	NA	MG/KG
LAW	12	bis(2-ETHYLHEXYL) PHTHALATE	SS10	0.5	J	NA	46	410	MG/KG
LAW	12	bis(2-ETHYLHEXYL) PHTHALATE	SS43	1.3	J	NA	46	410	MG/KG
LAW	12	CADMIUM	SS10	1.1	=	1.4	3.9	100	MG/KG
LAW	12	CADMIUM	SS11	6	=	1.4	3.9	100	MG/KG
LAW	12	CADMIUM	SS42	11.8	=	1.4	3.9	100	MG/KG

Table 57-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
LAW	12	CARBON DISULFIDE	SS10	0.002	J	.012	780	20000	MG/KG
LAW	12	CARBON DISULFIDE	SS11	0.008	=	.012	780	20000	MG/KG
LAW	12	COPPER	SS10	16	=	33	310	8200	MG/KG
LAW	12	COPPER	SS11	135	=	33	310	8200	MG/KG
LAW	12	COPPER	SS42	705	=	33	310	8200	MG/KG
LAW	12	COPPER	SS43	15	=	33	310	8200	MG/KG
LAW	12	DDD	SS10	2.1	=	.0067	2.7	24	MG/KG
LAW	12	DDD	SS11	3.6	=	.0067	2.7	24	MG/KG
LAW	12	DDD	SS42	1.4	J	.0067	2.7	24	MG/KG
LAW	12	DDD	SS43	0.32	J	.0067	2.7	24	MG/KG
LAW	12	DDE	SS10	4.5	=	.16	1.9	17	MG/KG
LAW	12	DDE	SS11	39	=	.16	1.9	17	MG/KG
LAW	12	DDE	SS42	9	J	.16	1.9	17	MG/KG
LAW	12	DDE	SS43	2.5	J	.16	1.9	17	MG/KG
LAW	12	DDT	SS10	6.7	=	.074	1.9	17	MG/KG
LAW	12	DDT	SS11	59	=	.074	1.9	17	MG/KG
LAW	12	DDT	SS42	7.9	J	.074	1.9	17	MG/KG
LAW	12	DDT	SS43	0.71	J	.074	1.9	17	MG/KG
LAW	12	DIELDRIN	SS10	0.24	=	.086	.04	.36	MG/KG
LAW	12	DIELDRIN	SS43	4.5	=	.086	.04	.36	MG/KG
LAW	12	ENDRIN KETONE	SS11	12	=	NA	NA	NA	MG/KG
LAW	12	GAMMA-CHLORDANE	SS10	4	=	.026	.49	4.4	MG/KG
LAW	12	GAMMA-CHLORDANE	SS11	2.4	J	.026	.49	4.4	MG/KG
LAW	12	GAMMA-CHLORDANE	SS42	0.62	J	.026	.49	4.4	MG/KG
LAW	12	HEPTACHLOR	SS10	0.12	=	NA	.14	1.3	MG/KG
LAW	12	HEPTACHLOR EPOXIDE	SS10	0.25	=	.0045	.07	.63	MG/KG
LAW	12	MERCURY	SS10	0.08	=	.43	2.3	61	MG/KG
LAW	12	MERCURY	SS11	0.84	=	.43	2.3	61	MG/KG
LAW	12	MERCURY	SS42	1.3	=	.43	2.3	61	MG/KG
LAW	12	METHOXYCHLOR	SS42	1.5	J	NA	39	1000	MG/KG
LAW	12	METHYLENE CHLORIDE	SS10	0.018	=	NA	85	760	MG/KG
LAW	12	METHYLENE CHLORIDE	SS11	0.013	=	NA	85	760	MG/KG
LAW	12	METHYLENE CHLORIDE	SS42	0.008	=	NA	85	760	MG/KG
LAW	12	METHYLENE CHLORIDE	SS43	0.007	=	NA	85	760	MG/KG

Table 57-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
LAW	12	N-NITROSODIPHENYLAMINE	SS10	0.51	J	NA	130	1200	MG/KG
LAW	12	N-NITROSODIPHENYLAMINE	SS11	1.9	J	NA	130	1200	MG/KG
LAW	12	NAPHTHALENE	SS10	1.9	=	NA	310	8200	MG/KG
LAW	12	NAPHTHALENE	SS11	4.6	=	NA	310	8200	MG/KG
LAW	12	NAPHTHALENE	SS43	0.13	J	NA	310	8200	MG/KG
LAW	12	NICKEL	SS42	**367**	=	30	**160**	4100	MG/KG
LAW	12	NICKEL	SS43	5	=	30	160	4100	MG/KG
LAW	12	PENTACHLOROPHENOL	SS43	0.27	J	NA	5.3	48	MG/KG
LAW	12	SILVER	SS10	3	=	2	39	1000	MG/KG
LAW	12	SILVER	SS11	9	=	2	39	1000	MG/KG
LAW	12	TETRACHLOROETHYLENE (PCE)	SS42	0.003	J	NA	NA	NA	MG/KG
LAW	12	TOLUENE	SS10	0.006	J	.012	1600	41000	MG/KG
LAW	12	TOLUENE	SS11	0.018	=	.012	1600	41000	MG/KG
LAW	12	TOLUENE	SS42	0.004	J	.012	1600	41000	MG/KG
LAW	12	TOLUENE	SS43	0.007	=	.012	1600	41000	MG/KG

Notes:
1. Detected values are obtained from the *Draft Parcel 12 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Risk-Based Concentrations are obtained from the *EPA Region III Risk-based Concentrations Table*, R.L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection

Table 57-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	12	ACETONE	SB57A	3 to 5	0.009	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57A	8 to 10	0.009	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57B	3 to 5	0.006	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57B	3 to 5	0.008	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57B	8 to 10	0.008	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57C	3 to 5	0.008	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57C	8 to 10	0.008	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57D	3 to 5	0.008	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57D	3 to 5	0.008	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57D	8 to 10	0.009	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57E	3 to 5	0.007	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57E	8 to 10	0.006	J	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57F	3 to 5	0.017	=	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57F	8 to 10	0.018	=	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57G	3 to 5	0.017	=	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57G	3 to 5	0.017	=	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57G	8 to 10	0.018	=	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57H	3 to 5	0.023	=	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57H	8 to 10	0.023	=	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57I	3 to 5	0.017	=	NA	16	MG/KG
CH2M HILL	12	ACETONE	SB57I	8 to 10	0.018	=	NA	16	MG/KG
CH2M HILL	12	ANTIMONY	SB57F	3 to 5	1.2	=	NA	5	MG/KG
CH2M HILL	12	ANTIMONY	SB57F	8 to 10	1.1	=	NA	5	MG/KG
CH2M HILL	12	ANTIMONY	SB57G	3 to 5	1.2	=	NA	5	MG/KG
CH2M HILL	12	ANTIMONY	SB57G	3 to 5	1	=	NA	5	MG/KG
CH2M HILL	12	ANTIMONY	SB57G	8 to 10	1.3	=	NA	5	MG/KG
CH2M HILL	12	ANTIMONY	SB57H	3 to 5	0.88	=	NA	5	MG/KG

Table 57-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	12	ANTIMONY	SB57H	8 to 10	0.99	=	NA	5	MG/KG
CH2M HILL	12	ANTIMONY	SB57I	3 to 5	1.2	=	NA	5	MG/KG
CH2M HILL	12	ANTIMONY	SB57I	8 to 10	0.93	=	NA	5	MG/KG
CH2M HILL	12	ARSENIC	SB57A	3 to 5	5.9	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57A	8 to 10	4.3	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57B	3 to 5	8.6	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57B	3 to 5	8.9	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57B	8 to 10	4.7	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57C	3 to 5	9.6	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57C	8 to 10	8.9	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57D	3 to 5	11	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57D	3 to 5	9.8	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57D	8 to 10	8	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57E	3 to 5	9.1	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57E	8 to 10	7.7	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57F	3 to 5	8.6	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57F	8 to 10	5.5	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57G	3 to 5	6.9	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57G	3 to 5	8.5	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57G	8 to 10	4.7	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57H	3 to 5	1.3	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57H	8 to 10	4.4	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57I	3 to 5	7.2	=	17	29	MG/KG
CH2M HILL	12	ARSENIC	SB57I	8 to 10	4.8	=	17	29	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57A	3 to 5	0.13	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57A	8 to 10	1.8	=	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57C	3 to 5	0.047	J	NA	3600	MG/KG

Table 57-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57C	8 to 10	0.35	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57D	3 to 5	0.072	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57D	8 to 10	0.33	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57E	3 to 5	0.08	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57E	8 to 10	0.098	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57F	3 to 5	1.2	=	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57F	8 to 10	0.076	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57G	3 to 5	0.065	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57G	3 to 5	0.22	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57G	8 to 10	0.16	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57H	3 to 5	0.12	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57H	8 to 10	0.16	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57I	3 to 5	0.15	J	NA	3600	MG/KG
CH2M HILL	12	bis(2-ETHYLHEXYL) PHTHALATE	SB57I	8 to 10	0.26	J	NA	3600	MG/KG
CH2M HILL	12	BROMOMETHANE	SB57B	8 to 10	0.001	J	NA	.2	MG/KG
CH2M HILL	12	BROMOMETHANE	SB57C	3 to 5	0.002	J	NA	.2	MG/KG
CH2M HILL	12	CHROMIUM	SB57A	3 to 5	10.9	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57A	8 to 10	13.1	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57B	3 to 5	11.7	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57B	3 to 5	11.8	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57B	8 to 10	11.3	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57C	3 to 5	12.1	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57C	8 to 10	13.2	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57D	3 to 5	10.2	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57D	3 to 5	11.9	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57D	8 to 10	10.6	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57E	3 to 5	12.8	=	26	38	MG/KG

Table 57-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	12	CHROMIUM	SB57E	8 to 10	10.8	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57F	3 to 5	11.8	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57F	8 to 10	11.3	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57G	3 to 5	13	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57G	3 to 5	14	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57G	8 to 10	14	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57H	3 to 5	14.5	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57H	8 to 10	16.7	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57I	3 to 5	10.8	=	26	38	MG/KG
CH2M HILL	12	CHROMIUM	SB57I	8 to 10	15	=	26	38	MG/KG
CH2M HILL	12	COPPER	SB57A	3 to 5	19.8	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57A	8 to 10	11.7	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57B	3 to 5	16.5	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57B	3 to 5	16.2	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57B	8 to 10	13.5	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57C	3 to 5	16.2	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57C	8 to 10	18.6	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57D	3 to 5	16.6	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57D	3 to 5	18.5	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57D	8 to 10	17.9	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57E	3 to 5	16.5	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57E	8 to 10	17.9	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57F	3 to 5	16.1	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57F	8 to 10	13.6	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57G	3 to 5	15.8	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57G	3 to 5	17.1	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57G	8 to 10	12.2	=	33	NA	MG/KG

Table 57-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	12	COPPER	SB57H	3 to 5	16.3	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57H	8 to 10	19.6	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57I	3 to 5	15.9	=	33	NA	MG/KG
CH2M HILL	12	COPPER	SB57I	8 to 10	13.2	=	33	NA	MG/KG
CH2M HILL	12	DDE	SB57E	8 to 10	0.0018	J	.0015	54	MG/KG
CH2M HILL	12	DDE	SB57F	8 to 10	0.0016	J	.0015	54	MG/KG
CH2M HILL	12	DDE	SB57G	3 to 5	0.0056	=	.0015	54	MG/KG
CH2M HILL	12	DDE	SB57G	3 to 5	0.011	=	.0015	54	MG/KG
CH2M HILL	12	DDT	SB57D	3 to 5	0.0021	J	.0072	32	MG/KG
CH2M HILL	12	DDT	SB57E	8 to 10	0.0016	J	.0072	32	MG/KG
CH2M HILL	12	DDT	SB57F	8 to 10	0.0026	J	.0072	32	MG/KG
CH2M HILL	12	DDT	SB57G	3 to 5	0.031	=	.0072	32	MG/KG
CH2M HILL	12	DDT	SB57G	3 to 5	0.015	=	.0072	32	MG/KG
CH2M HILL	12	DDT	SB57G	8 to 10	0.0022	J	.0072	32	MG/KG
CH2M HILL	12	GAMMA BHC (LINDANE)	SB57D	3 to 5	0.0014	J	NA	.009	MG/KG
CH2M HILL	12	GAMMA BHC (LINDANE)	SB57D	3 to 5	0.0022	=	NA	.009	MG/KG
CH2M HILL	12	GAMMA BHC (LINDANE)	SB57D	8 to 10	0.0027	=	NA	.009	MG/KG
CH2M HILL	12	LEAD	SB57A	3 to 5	8.1	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57A	8 to 10	7.4	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57B	3 to 5	9.6	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57B	3 to 5	9.3	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57B	8 to 10	7.4	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57C	3 to 5	10.8	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57C	8 to 10	10	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57D	3 to 5	11	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57D	3 to 5	13.1	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57D	8 to 10	8.8	=	24	1.5	MG/KG

Table 57-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	12	LEAD	SB57E	3 to 5	10.5	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57E	8 to 10	8.4	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57F	3 to 5	9.8	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57F	8 to 10	7.5	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57G	3 to 5	9.4	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57G	3 to 5	8.5	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57G	8 to 10	8.3	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57H	3 to 5	8.4	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57H	8 to 10	10	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57I	3 to 5	8.5	=	24	1.5	MG/KG
CH2M HILL	12	LEAD	SB57I	8 to 10	9.5	=	24	1.5	MG/KG
CH2M HILL	12	METHYL ETHYL KETONE	SB57H	3 to 5	0.001	J	NA	NA	MG/KG
CH2M HILL	12	NICKEL	SB57A	3 to 5	16.1	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57A	8 to 10	14.1	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57B	3 to 5	17.3	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57B	3 to 5	17	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57B	8 to 10	15	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57C	3 to 5	18	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57C	8 to 10	19.4	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57D	3 to 5	18	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57D	3 to 5	19.8	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57D	8 to 10	16.1	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57E	3 to 5	18.5	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57E	8 to 10	16.2	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57F	3 to 5	17.6	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57F	8 to 10	16.2	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57G	3 to 5	18	=	37	130	MG/KG

Table 57-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	12	NICKEL	SB57G	3 to 5	18.6	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57G	8 to 10	14.7	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57H	3 to 5	18.3	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57H	8 to 10	29.1	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57I	3 to 5	17	=	37	130	MG/KG
CH2M HILL	12	NICKEL	SB57I	8 to 10	18.1	=	37	130	MG/KG
CH2M HILL	12	TETRACHLOROETHYLENE (PCE)	SB57G	3 to 5	0.002	J	NA	.06	MG/KG
CH2M HILL	12	TETRACHLOROETHYLENE (PCE)	SB57G	3 to 5	0.003	J	NA	.06	MG/KG
CH2M HILL	12	TETRACHLOROETHYLENE (PCE)	SB57G	8 to 10	0.007	J	NA	.06	MG/KG
CH2M HILL	12	ZINC	SB57A	3 to 5	48.9	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57A	8 to 10	34.2	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57B	3 to 5	52.5	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57B	3 to 5	51	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57B	8 to 10	34.7	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57C	3 to 5	57.3	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57C	8 to 10	46.4	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57D	3 to 5	59.5	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57D	3 to 5	55.2	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57D	8 to 10	46.9	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57E	3 to 5	55.5	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57E	8 to 10	46	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57F	3 to 5	58.9	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57F	8 to 10	36.8	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57G	3 to 5	44.9	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57G	3 to 5	53.6	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57G	8 to 10	37.5	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57H	3 to 5	62.3	=	110	12000	MG/KG

Table 57-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 57
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	12	ZINC	SB57H	8 to 10	64.7	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57I	3 to 5	45.7	=	110	12000	MG/KG
CH2M HILL	12	ZINC	SB57I	8 to 10	43.7	=	110	12000	MG/KG

Notes:
1. Detected values are obtained from the *Draft Parcel 12 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. RBC-GWP values are obtained from the *EPA Region III Risk-based Concentrations Table*, R. L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
= - indicates unqualified detection
J - indicates estimated value above the detection limit but below the reporting limit.
RBC-GWP - Risk-Based Concentrations - Groundwater Protection

TAB

Parcel 24

Parcel 24

Remedial Investigation Sites Sampling Program

for

Defense Distribution Depot Memphis, Tennessee

May 1998

Prepared for

U.S. Army Engineering and Support Center, Huntsville

Prepared by

CH2M HILL

2567 Fairlane Drive

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139282.RR.ZZ

Parcel 24 Report
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Parcel 24 is a 805,512-square-foot (ft^2) parcel in the southwestern part of the Main Installation in Operable Unit (OU)-2. Parcel 24 consists of Buildings 770 and 771, open storage area X03, the adjacent railroad tracks, and the gravel parking area east of Building S-873. Samples were collected at Remedial Investigation (RI) Sites 27 and 34 in this parcel during the RI Sampling Program.

The RI Sites in this document have been identified by the Defense Distribution Depot Memphis, Tennessee (DDMT) through a review of existing documents, interviews with facility personnel, and knowledge of the facility's operations. RI sites at DDMT are identified as those areas that have been known or suspected to have past releases as a result of facility operations. These sites have been previously identified as requiring a RI and have a confirmed presence of contamination. The following RI Sites are located in Parcel 24:

- RI Site 27: Former Recoupment Area (Building S-873) (Subparcel 24.1)
- RI Site 34: Underground Waste Oil Storage Tanks at Building 770 (Subparcel 24.3)

Additional sites identified with past potential releases from past operations to the environment are addressed in the Screening Sites Sampling Program. General areas within the installation without any known industrial operations involving hazardous chemicals were addressed in the Base Realignment and Closure (BRAC) Sampling Program. Results of these programs are addressed in separate letter reports. There are no screening sites within this parcel.

The purpose of the RI Sampling Program, which is part of the Remedial Investigation/ Feasibility Study (RI/FS), is to accomplish the following:

- Characterize potential releases from the sites
- Assess the nature and extent of soil and surface water contamination attributable to past operations
- Gather and evaluate data to determine the need for interim remedial actions for the sites
- Evaluate the risk to human health and the environment as part of the comprehensive RI
- Assess the feasibility of remedial actions for the sites needing further actions

The purpose of this letter report is to evaluate the results of the RI Sampling Program and sampling from previous investigations, determine whether adequate sampling has been performed for an RI, and recommend further actions at RI sites in this parcel. The remainder of

this report presents the results of past investigations; RI Sampling Program strategy, procedures, and results; and recommendations for each site.

Surface soils, subsurface soils, and surface water were investigated as part of the RI Sampling Program. Surface soil samples (any sample whose lowest depth is 2 feet or less) were taken both as independent samples and as the upper interval of a soil boring profile. Thus, surface soil samples taken as part of a soil boring may have an "SB" designation and are initially discussed under Subsurface Soil Sampling Procedure (Section 2.2.2.2). However, the results from that upper interval are presented in the surface soils tables and discussions in Section 3.1.1.

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

1.0 Introduction

Table 1 presents the location and status information for this site.

TABLE 1
Parcel 24, Site 27 Information
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

Parcel	Building Number	RI/FS OU	Site Number	CERCLA[1] Status
24	Parking Area East of S-873	2	27	RI

[1]CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act

Building S-873 is an open-sided, metal-roofed shed that served as the DDMT materials recoupment or recovery area from 1942 to 1986. This site was formerly used for packing and repacking hazardous and nonhazardous materials from damaged and leaking containers. The specific boundaries of the site are unknown; however, it is known that recoupment activities were conducted in the southeastern corner of the building and in the gravel parking area to the east of the building. The gravel parking area east of the building is the part of this site located in Parcel 24. The southeastern corner of Building S-873 is located in Parcel 25. Two surface soil samples were located in Parcel 25, but are included in this Parcel 24 discussion to maintain a complete Site 27 data set. The site configuration, sample locations, and constituents exceeding Risk-Based Criteria (RBC) are shown in Figure 1.

2.0 Study Area Investigation

This discussion includes details of the sampling conducted by CH2M HILL for the RI Sampling Program efforts. The historical data results are included in the following discussions as well; however, sampling strategy and analysis included in the historical reports are not repeated here.

2.1 Previous Investigations

Soil contaminated with pesticides dichlorodiphenyltrichloroethane (DDT) and dichlorodiphenyldichloroethene (DDE) from previous spills has been remediated previously at this location, resulting in the removal and disposal of contaminated soils. Approximately the upper 0.5 to 1 foot of soil in this area was removed and disposed of by DDMT in 1985.

In addition, four surface soil samples (SS26, SS27, SS28, and SS29) were collected at this site during the 1990 RI conducted by Law Environmental in areas where spills may have occurred. Polynuclear aromatic hydrocarbons (PAHs), semivolatile organic compounds (SVOCs), and metals were detected in these samples.

2.2 RI Sampling Program

2.2.1 Sampling Strategy

The sampling strategy was developed to evaluate whether releases have occurred to surface and subsurface soil. For this sampling program, surface soil and subsurface soil samples were collected to assess the vertical and horizontal extent of soil contamination from the past activities at the site. At least one sample for each media was analyzed for target compound list/target analyte list (TCL/TAL) constituents in accordance with the *Operable Unit 2 Field Sampling Plan* (CH2M HILL, 1995).

The sampling locations at RI Site 27 were located east of Building 873 on the southern end. The specific boundaries of the site were unknown, other than the knowledge that packing and repacking activities occurred in the southeast corner of the building and the gravel parking area to the east of the building.

2.2.2 Sampling Procedures

This section describes the sampling procedures and laboratory analyses performed for surface and subsurface soil.

2.2.2.1 Surface Soil Sampling Procedures

With the approval of the Tennessee Department of Environment and Conservation (TDEC) and the United States Environmental Protection Agency (EPA), surface soil samples were collected from ten locations (SB27A, SB27B, SB27C, SB27D, SB27E, SS27F, SS27G, SS27H, SS27I, and SS27J) at this site (shown in Figure 1). Eight samples (SB27A, SB27B, SB27C, SB27D, SB27E, SS27F, SS27G, and SS27H) are located in Parcel 24; the remaining two samples (SS27I and SS27J) are located in Parcel 25. Surface soil samples associated with borings are discussed in Section 2.2.2.2. The following details each sample location:

- Sample SS27F was taken 86 feet north of the southeast corner of Building 873.
- Sample SS27G was taken 64 feet north of Sample SS27F.
- Sample SS27H was taken 52 feet north of Sample SS27G.

- Sample SS27I was taken 1 feet south of the southeast corner of Building 873 (in Parcel 25).
- Sample SS27J was taken 62 feet west of the southeast corner of Building 873 (in Parcel 25).

All surface soil samples were collected from the zero- to 1-foot interval. Because surface soils at the site were too compacted to hand auger, all samples were collected using the direct-push probe. A stainless-steel, core-barrel sampler was pushed by the probe over the zero- to 1-foot interval at each location. Volatile organic compound (VOC) samples were collected first before compositing using a stainless-steel spoon. Part of the VOC sample was placed in a sealable plastic bag for head space analysis with a photoionization detector (PID). The results of the head space analyses were used to select samples for analysis of the TCL/TAL parameters and Level 3 constituents of potential concern (COPC) analysis. The remaining soil was composited in a stainless-steel bowl and then transferred into the appropriate sample jars. All sampling tools were decontaminated before each use according to the procedures specified in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at DDMT.

2.2.2.2 Subsurface Soil Sampling Procedures

With the approval of the TDEC and the EPA, subsurface soil samples were collected from five locations (SB27A, SB27B, SB27C, SB27D, and SB27E) at this site (shown in Figure 1). The following details each sample locations:

- Sample SB27A was taken 88 feet east and 8 feet south of Sample SS27H.
- Sample SB27B was taken 72 feet north of Sample SS27F and 27 feet west of Sample SB27C.
- Sample SB27C was taken 12 feet south and 88 feet east of Sample SS27G.
- Sample SB27D was taken 52 feet south and 32 feet west of Sample SB27C.
- Sample SB27E was taken directly south of Sample SB27C, which was 64 feet south of Sample SB27D.

Subsurface samples were collected at each boring location (SB27A, SB27B, SB27C, SB27D, and SB27E) from three depths: 1 to 2 feet, 3 to 5 feet, and 8 to 10 feet. The samples were collected using a 2-inch-diameter, stainless-steel, core-barrel sampler. The entire length of each soil core was screened with a PID for organic vapors before sample collection so that sampling intervals could be biased toward any contamination detected by the field screening. VOC samples were collected first before compositing using a stainless-steel spoon. Part of each VOC sample was placed in a sealable plastic bag for head space analysis with a PID. The results of the head space analyses were used to select samples for Level 3 COPC analysis. The remaining soil from each sample was composited in a stainless-steel bowl and then transferred into the appropriate sample jars. All sampling tools were decontaminated before each use according to the procedures outlined in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for RI/FS currently being conducted at DDMT.

2.2.3 Analytical Procedures

All samples were submitted to CH2M HILL's Analytical Services in Montgomery, Alabama, for analysis. A total of 7 surface soil and 18 subsurface soil samples from Parcel 24 and two surface

soil samples from Parcel 25 were analyzed for VOCs, PAHs, pesticides, and priority pollutant metals. One surface soil sample, which exhibited the highest field head space result, was analyzed for the TCL/TAL parameters. One subsurface soil sample from the 8- to 10-foot interval was analyzed for grain size, Atterburg limits, moisture content, pH, alkalinity, cation exchange capacity, and total organic carbon. The samples were analyzed in accordance with the procedures specified in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995).

A data quality evaluation (DQE) was performed to assess the effect of the overall analytical process on the usability of the data. The DQE established that the detection of acetone, 2-butanone, and bis(2-ethylhexyl)phthalate can be attributed to field sampling and laboratory contamination rather than environmental conditions at the site. Also, poor duplicate precision for metals in the duplicate soil samples should be attributed to poor sample homogeneity as well as to potentially poor sampling and analysis precision. With exception to the qualifications listed above, the DQE concluded that data can be used in the project decision-making process.

3.0 Interpretation of Sampling Results

3.1 Presentation of Results

Sections 3.1.1 and 3.1.2 present results of the RI Sampling Program for RI Site 27. Data are presented by media for surface and subsurface soil and compared with appropriate screening criteria in Tables 27-A through 27-C. Data from the 1997 CH2M HILL investigation are presented along with historical data from the *Remedial Investigations at DDMT, Final Report* (Law Environmental, 1990). If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold on the summary tables.

COPCs are parameters that exceed both background values and the screening criteria. Where concentrations exceed the selected background value, the concentration is compared with the observed range of background values as reviewed and established by the BRAC Cleanup Team (BCT).

COPCs identified for RI Site 27 include PAH compounds, iron, and vanadium in the surface soils. There were no COPCs identified in the subsurface soils.

3.1.1 Surface Soil

Results of the surface soils analyses with values above detection limits are shown in Tables 27-A and 27-B.

3.1.1.1 BCT Screening Criteria

Table 27-A summarizes constituents for which the BCT has selected a screening criteria for surface soil. COPCs detected in the surface soil include PAH compounds and iron.

PAH compounds, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, benzo(k)flouranthene, and indeno (1,2,3-c,d)pyrene, were found at concentrations exceeding the screening criteria. The observed PAH concentrations are more elevated in Sample SS27F, which was collected just north of the southeast corner of Building 873 near the railroad tracks.

Elevated concentrations of PAH compounds appear to exist throughout the DDMT and could be from non-point sources, such as railroad tracks, asphalt paved roads, and/or vehicular traffic. Thus, observed PAHs may not be site-related. Another COPC, iron, was detected in Sample SS27H at 44,500 milligrams per kilograms (mg/kg), which exceeds the BCT (background) value of 37,000 mg/kg.

Historical parameters of concern in the surface soil for which the BCT has selected screening criteria values include antimony and arsenic. An elevated concentration of antimony was detected in the 1990 RI (Law Environmental, 1990) Sample SS27 at 8 mg/kg, which slightly exceeds the BCT criteria (background) value of 7 mg/kg. The more recent study did not detect antimony exceedances.

Arsenic was detected in the 1990 RI (Law Environmental, 1990) at 28 mg/kg (Sample SS26), 36 mg/kg (Sample SS27) and 23 mg/kg (Sample SS29), all of which exceed the BCT criteria (background) value of 20 mg/kg. Arsenic was detected in eight CH2M HILL surface soil samples at concentrations ranging from 1.9 mg/kg to 11.5 mg/kg, none of which exceed the BCT or background criteria value.

3.1.1.2 Other Screening Criteria

Table 27-B summarizes the remaining constituents compared with the soil ingestion screening criteria for both residential and industrial exposure scenarios. The COPC vanadium was found in Sample SS27H at 76.7 mg/kg, which exceeds the background value of 48.4 mg/kg and the residential RBC for soil ingestion value of 55 mg/kg. This constituent did not exceed the industrial RBC.

3.1.2 Subsurface Soil

Results of the subsurface soils analyses with values above detection limits are shown in Table 27-C. There were no COPCs detected in the subsurface soil.

3.2 Vertical and Lateral Extent

A total of fourteen locations, including samples from the 1990 Law Environmental RI, were sampled from biased locations at RI Site 27 in order to characterize potential releases from the site. Based on the data collected so far, the COPCs do not persist across the two media evaluated. COPCs were detected in surface soil but not in subsurface soil. The COPCs detected in the surface soil include PAH compounds, iron and vanadium. Other parameters of concern detected in the previous RI include arsenic and antimony.

PAH compounds were detected in elevated concentrations in Sample SS27F, which was collected just north of the southeast corner of Building S-873 near the railroad tracks, and in Sample SS27J, which was taken west of the southeast corner of Building S-873. PAH compounds were not detected in Sample SS27I, which was taken at the southeast corner of Building S-873; nor were PAH compounds detected in the surface soil samples taken along the east side of Building S-873 farther away from the building. PAH compounds are sitewide COPCs and will be addressed in an upcoming sitewide risk evaluation. Iron was detected in one sample (SS27H) at 44,500 mg/kg, which exceeds background values. No concentrations of iron were detected in the subsurface soils or during the previous surface soil investigations.

Vanadium was detected in one sample (SS27H) at 76.7 mg/kg, which exceeds background values. No concentrations of vanadium were detected in the subsurface soils or during the previous surface soil investigations.

Elevated concentrations of arsenic and antimony were detected in the previous investigation. Antimony was detected at 5 mg/kg (Sample SS28), 6 mg/kg (Sample SS29), 7 mg/kg (Sample SS26), and 8 mg/kg (Sample SS27). All samples (SS26 through SS29) were taken east of Building 873 on the southern end. The samples taken closer to the building, Samples SS27 and SS26, detected the highest concentrations of antimony, which only slightly exceed background values. Note that two CH2M HILL samples detected antimony in the same vicinity as the previous samples, but elevated concentrations were not detected.

Arsenic was detected at 17 mg/kg (Sample SS28), 23 mg/kg (Sample SS29), 28 mg/kg (Sample SS26), and 36 mg/kg (Sample SS27). Again, the samples taken closer to the building, SS27 and SS26, detected the highest concentrations of arsenic, which exceed background values. The arsenic detections in the recent sampling event, all taken south of the 1990 Law Environmental RI sample with the highest exceedance (Sample SS27), were within the naturally occurring levels and do not appear to be site-related.

Contamination observed in surface soils has not leached to the subsurface soil since surface soil COPCs were not detected in subsurface samples. It appears contaminant concentrations are similar in the surface soil near the building and away from the building. Additional sampling is needed at this site to determine the lateral extent of metals contamination in the northern part of the RI Site.

3.3 Potential Migration Pathways

Benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, benzo(b)fluoranthene, and indeno(1,2,3-c,d)pyrene--a group of related, long-chain PAHs—have similar chemical and physical characteristics and tend to migrate and behave in the environment in a similar manner. Generally, these compounds have low vapor pressures, are only marginally soluble in water, and have a high affinity for soils. All of these compounds have been detected at concentrations above screening values for surface soils at DDMT. They would be expected to migrate as adsorbed components of the soils and would potentially be available to aquatic organisms in turbid surface water or to bottom feeders in areas with contaminated sediments. That none of these compounds was detected in sediments indicates this is not a major source of contaminant migration for these compounds at this site. These compounds do not bioaccumulate significantly due to their rapid metabolism and excretion by most aquatic organisms.

Arsenic exists at several sites on DDMT in surface soils at concentrations above screening levels. Arsenic's mobility and toxicity are tied to its complex geochemistry and its ability to readily form soluble complexes. Arsenic may also readily be adsorbed onto clays, oxides, or humic organic material and may migrate as suspended soil in surface water or as a sediment. Arsenic can exist in four common oxidation states, and these control its solubility. It readily transports through aquatic environments as a dissolved salt or as a complex with an organic compound.

3.4 Additional Data Needs

Surface soil contamination has not been defined in the northern area of RI Site 27 along the east side of Building S-873 for metals detection. Additional surface soil sampling is recommended for arsenic and antimony. In addition, a surface soil sample is needed to confirm the elevated concentration of vanadium at RI Site 27.

4.0 Interpretation of Screening Criteria Comparisons

4.1 Methodology

The Preliminary Risk Evaluation (PRE) was performed in accordance with the *Guidance on Preliminary Risk Evaluations for the Purpose of Reaching a Finding of Suitability to Lease (FOSL)* (EPA Region IV, 1994). A discussion of the PRE methodology is provided in Appendix A to this document.

4.2 RI Site 27 Risk

Carcinogenic and noncarcinogenic risks for RI Site 27 are presented in Table 4-45 of the draft PRE (United States Army Engineer Support Center ([USAESC], 1998), and detailed chemical-specific estimates are presented in Appendix A of the PRE.

The PRE carcinogenic risk ratios were well above a level of one in a million due to the presence of PAHs in surface soils in all of the samples.

The noncarcinogenic PRE ratios were not above a value of one for industrial workers but were above one for the residential scenario due to PAHs and metals in the soil.

5.0 Summary and Recommendations

5.1 Summary

RI Site 27 has been used for packing and repacking hazardous and nonhazardous materials from damaged and leaking containers. COPCs, including PAH compounds, iron, and vanadium, were detected in the surface soils of this area. Other historical parameters of concern detected in the surface soils were antimony and arsenic. According to Table 5-2 of the draft PRE, the carcinogenic risk ratios were well above a level of one in a million due to the presence of PAHs. The noncarcinogenic ratios were not above a value of one for industrial workers, but they were above one for the residential scenario due to PAHS and metals in the soil.

5.2 Recommendations

Further risk assessment will be conducted as part of the RI report preparation to determine the human health ecological risks under baseline conditions at this site. Additional surface soil

sampling is recommended for arsenic and antimony. In addition, a surface soil sample is needed to confirm the elevated concentration of vanadium at RI Site 27.

Site 34: Underground Waste Oil Storage Tanks at Building 770

1.0 Introduction

Table 2 presents the location and status information for this site.

TABLE 2
Parcel 24, Site 34 Information
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

Parcel	Building Number	RI/FS OU	Site Number	CERCLA Status
24	770	2	34	RI

Site 34 consists of two former 1,000-gallon steel underground storage tanks (USTs) previously located west of the vehicle maintenance shop (Building 770). The tanks stored waste motor oil from vehicles from the 1960s until they were removed in 1989. Prior to 1969, Building 770 also was used for cleaning and preserving heavy equipment before shipment overseas. The site configuration, sample locations, and constituents exceeding RBC are shown in Figure 2.

2.0 Study Area Investigation

This discussion includes details of the sampling conducted by CH2M HILL for the RI Sampling Program efforts. The historical data results are included in the following discussions; however, sampling strategy and analysis included in the historical reports are not repeated here.

2.1 Previous Investigations

Four surface soil samples (SS38, SS39, SS48, and SS49) were collected at this site during the 1990 RI conducted by Law Environmental in the vicinity of the waste oil storage tanks. These surface soil samples have indicated the presence of PAHs, which could be from used oils or heavy fuel oil residuals. Other detected contaminants include VOCs, pesticides, and metals.

2.2 RI Sampling Program

2.2.1 Sampling Strategy

This sampling strategy was developed to evaluate whether releases have occurred to surface and subsurface soil. For this sampling program, Surface soil and subsurface soil samples were collected to assess the vertical and horizontal extent of soil contamination from past activities at the site. At least one sample for each media was analyzed for TCL/TAL constituents in accordance with the *Operable Unit 2 Field Sampling Plan* (CH2M HILL, 1995). The RI Site 34

sampling locations were placed west of Building 770 in the general vicinity of the former waste oil storage tanks.

2.2.2 Sampling Procedures

This section describes the sampling procedures and laboratory analyses performed for surface and subsurface soil.

2.2.2.1 Surface Soil Sampling Procedures

With the approval of the TDEC and the EPA, surface soil samples were collected from six locations (SB34A, SB34B, SB34C, SS34D, SS34E, and SS34F) at this site (shown in Figure 2). Surface soil samples associated with borings are discussed in Section 2.2.2.2. The following details each sample location:

- Sample SS34D was taken 110 feet south and 30 feet west of the northwest corner of Building 770.
- Sample SS34E was taken 110 feet south and 6 feet west of the northwest corner of Building 770.
- Sample SS34F was taken 70 feet south and 85 feet west of the northwest corner of Building 770.

All surface soil samples were collected from the interval of zero to 1 foot. The surface soil samples were collected using a stainless-steel hand auger. VOC samples were collected from the first auger bucket before compositing to prevent volatilization. Part of the VOC sample was placed in a sealable plastic bag for head space analysis with a PID. The results of the head space analyses were used to select samples for Level 3 COPC analysis. The remaining soil from each sample was composited in a stainless-steel bowl and then transferred into the appropriate sample jars. All sampling tools were decontaminated before each use according to the procedures in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at DDMT.

2.2.2.2 Subsurface Soil Sampling Procedures

With the approval of the TDEC and EPA, subsurface soil samples were taken from three locations (SB34A , SB34A, and SB34C) at this site (shown in Figure 2). The borings were located in the following areas:

- Sample SB34A was taken 7 feet northwest of the point that is 55 feet west and 118 feet south of the northwest corner of Building 770.
- Sample SB34B was taken approximately 30 feet west of Building 770, just 9 feet north measuring from the north side of the part of Building 770 that extends to the east.
- Sample SB34C was taken approximately 10 feet west of Building 770, just 26 feet north measuring from the north side of the part of Building 770 that extends to the east.

Subsurface samples were collected at each boring location from four depths: 3 to 5 feet, 8 to 10 feet, 13 to 15 feet, and 18 to 20 feet. Samples were collected using a 2-inch-diameter, stainless-steel, core-barrel sampler. The entire length of each soil core was screened with a PID for

organic vapors before sample collection so that sampling intervals could be biased toward any contamination detected by the field screening. VOC samples were collected first before compositing using a stainless-steel spoon. Part of each VOC sample was placed in a sealable plastic bag for head space analysis with a PID. The results of the head space analyses were used to select samples for analysis of the TCL/TAL parameters and Level 3 COPC analysis. The remaining soil from each sample was composited in a stainless-steel bowl and then transferred into the appropriate sample jars. All sampling tools were decontaminated before each use according to the procedures specified in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at DDMT.

2.2.3 Analytical Procedures

All samples were submitted to CH2M HILL's Analytical Services in Montgomery, Alabama for analysis. Six surface soil and 11 subsurface soil samples were analyzed for VOCs, PAHs, and priority pollutant metals. One subsurface soil sample, which exhibited the highest field head space result, was analyzed for TCL/TAL parameters. The samples were analyzed in accordance with the procedures outlined in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995).

A United States Army Corps of Engineers (COE) split sample was collected from the zero- to 1-foot interval of Sample SB34A. This surface soil sample was sent to the COE's Atlanta, Georgia laboratory for analysis of VOCs, PAHs, and priority pollutant metals.

A DQE was performed to assess the effect of the overall analytical process on the usability of the data. The DQE established that the detection of acetone, 2-butanone, and bis(2-ethylhexyl)phthalate can be attributed to field sampling and laboratory contamination rather than environmental conditions at the site. Also, poor duplicate precision for metals in the duplicate soil samples should be attributed to poor sample homogeneity as well as to potentially poor sampling and analysis precision. With exception to the qualifications listed above, the DQE concluded that data can be used in the project decision-making process.

3.0 Interpretation of Sampling Results

3.1 Presentation of Results

Sections 3.1.1 and 3.1.2 present results of the RI Sampling Program for RI Site 34. Data are presented by media for surface and subsurface soil and compared with appropriate screening criteria in Tables 34-A, 34-B, and 34-C. Data from the 1997 CH2M HILL investigation are presented along with historical data from the *Remedial Investigations at DDMT, Final Report* (Law Environmental, 1990). If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold on the summary table.

COPCs are parameters that exceed both background and the screening criteria. Where concentrations exceed the selected background value, the concentration is compared with the observed range of background values as reviewed and established by the BCT.

COPCs identified for RI Site 34 include arsenic, PAH compounds, chromium, and lead.

3.1.1 Surface Soil

Results of the surface soils analyses with values above detection limits are shown in Tables 34-A and 34-B.

3.1.1.1 BCT Screening Criteria

Table 34-A summarizes constituents for which the BCT has selected a screening criteria for surface soil. The COPCs detected in the surface soil include PAH compounds, arsenic, chromium, and lead.

PAH compounds, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, and indeno(1,2,3-c,d)pyrene, were found at concentrations exceeding the screening criteria and background values. The observed PAH concentrations are elevated in Sample SB34B, which is not associated with railroad tracks. PAH compounds were detected below screening criteria values in the other five surface soil samples taken around Sample SB34B. The 1990 RI conducted by Law Environmental detected elevated concentrations of PAH compounds in Sample SS38, which was taken just south of Sample SB34B.

Arsenic was detected in all six surface soil samples. One detection in Sample SS34D at 49.2 mg/kg exceeded the BCT (background) value of 20 mg/kg. Other detections of arsenic were below background values, ranging from 4.3 mg/kg to 10.9 mg/kg.

Chromium was detected in all six samples. Elevated concentrations were detected in five of the samples at 107 mg/kg (Sample SB34B), 40.2 mg/kg (Sample SB34C), 124 mg/kg (Sample SS34D), 51.3 mg/kg (Sample SS34E) and 77.2 mg/kg (duplicate Sample SS34E). These concentrations exceed the BCT value of 39 mg/kg and the background value of 24.8 mg/kg. The 1990 RI (Law Environmental, 1990) detected concentrations of chromium ranging from 6 mg/kg to 19 mg/kg, which did not exceed screening criteria values.

Lead was detected in all six samples. Elevated concentrations were detected in three of the samples at 702 mg/kg (Sample SB34B), 960 mg/kg (Sample SS34D), and 505 mg/kg (Sample SS34E). These concentrations exceed the BCT value of 400 mg/kg and the background value of 30 mg/kg. The Law Environmental 1990 RI detected concentrations of lead ranging from 4 mg/kg to 48 mg/kg.

A historical parameter of concern is antimony. Antimony was detected in the 1990 RI at 17 mg/kg (Law Environmental 1990), which exceeds the BCT (background) value of 7 mg/kg. Antimony was not detected in the recent RI sampling event.

3.1.1.2 Other Screening Criteria

Table 34-B summarizes the remaining constituents compared with the soil ingestion screening criteria for both residential and industrial exposure scenarios. There were no COPCs detected.

3.1.2 Subsurface Soil

Results of the subsurface soils analyses with values above detection limits are shown in Table 34-C. Chromium was the only constituent detected in the subsurface soil at concentrations near screening criteria. Chromium was detected in all three borings at depths of 3 to 20 feet. The concentration detected in Sample SB34A at 40.8 mg/kg (18- to 20-foot depth) exceeds the

background value of 26 mg/kg but is nearly equal to the RBC-groundwater protection value of 38 mg/kg. Other detected concentrations were within the background value range.

3.2 Vertical and Lateral Extent

The site is an area associated with an old UST used to store fuel oil. No surface soil contamination is expected to exist at this site. A total of eight locations, including 1990 RI Environmental Law samples, were sampled from biased locations at RI Site 34 in order to characterize potential releases from the storage tanks. Potential releases may not have occurred from the UST, as the subsurface soil had no petroleum related contamination above the screening criteria. Low levels of PAHs and metals were detected at this site at concentrations similar to other concentrations detected elsewhere at the installation. The COPCs detected in the surface soil include PAH compounds, arsenic, chromium, and lead.

Chromium was elevated in subsurface soils at concentrations near COPC criteria. The concentration of chromium in the subsurface soil increased with depth up to 20 feet; however, the detected chromium concentrations were within the background value range. Only one exceedance was noted in Sample SB34A at the 18- to 20-foot depth.

PAH compounds were detected in surface soil in Sample SB34B at elevated concentrations ranging from 3.3 mg/kg to 4.1 mg/kg. Sample SB34B was collected west of Building 770 where the former USTs were located. The presence of PAH observed at this site could be from fuel oil residuals. Arguably, PAH compounds are sitewide COPCs and will be addressed as part of a RI in the near future.

Elevated concentrations of arsenic, chromium, and lead were detected in a number of surface soil samples. In Sample SS34D, collected just south of Sample SB34B, detections of arsenic, chromium, and lead were greater than twice the screening level values. The metals concentrations detected in the previous RI samples were within the background value ranges.

In summary, elevated concentrations of metals were detected in Samples SB34B, SS34D, and SS34E. The samples collected around these three samples, including a BRAC sample, detected the same metal constituents but at levels within background value ranges. The surface soil data collected so far appears to bound the extent of metal contamination to the locations of Samples SB34B, SS34D, and SS34E.

Chromium was also detected at elevated concentrations in the subsurface soil at a depth of 18 to 20 feet. Chromium concentrations in the subsurface soil tend to slightly increase with depth up to 20 feet. The increase in chromium concentration with depth could be due to changes in soil types that occur with depth.

3.3 Potential Migration Pathways

Arsenic exists at several sites on DDMT in surface soils at concentrations above screening levels. Arsenic's mobility and toxicity are tied to its complex geochemistry and its ability to readily form soluble complexes. Arsenic may also readily be adsorbed onto clays, oxides, or humic organic material and may migrate as suspended soil in surface water or as a sediment. Arsenic can exist in four common oxidation states, and these control its solubility. It readily

transports through aquatic environments as a dissolved salt or as a complex with an organic compound.

Chromium has been reported from surface and subsurface soils at DDMT in concentrations greater than the screening levels. Chromium occurs in two oxidation states: +3 and +6. The trivalent form, which is of little risk, readily combines with aqueous hydroxide to form insoluble chromium hydroxide. The hexavalent form is soluble and tends to stay in solution, unless some activated carbon material is present for it to sorb onto. Dissolved chromium is readily adsorbed onto sediments but may be bioaccumulated through aquatic organisms.

Lead is present at concentrations greater than background, or above screening criteria, in surface soils, subsurface soils, and sediment at DDMT. Lead is moderately soluble and potentially can be leached from any of these forms of occurrence, reaching concentrations in aqueous solution in both groundwater and surface water that would be of concern to both human and ecological receptors. Additionally, lead in surface soils and sediment potentially may move as suspended particulate matter in surface waters and impact aquatic organisms.

Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-c,d)pyrene—a group of related, long-chain PAHs—have similar chemical and physical characteristics and tend to migrate and behave in the environment in a similar manner. Generally, these compounds have low vapor pressures, are only marginally soluble in water, and have a high affinity for soils. All of these compounds have been detected at concentrations above screening values for surface soils at DDMT. They would be expected to migrate as adsorbed components of the soils and would potentially be available to aquatic organisms in turbid surface water or to bottom feeders in areas with contaminated sediments. That none of these compounds was detected in sediments indicates this is not a major source of contaminant migration for these compounds at this site. These compounds do not bioaccumulate significantly due to their rapid metabolism and excretion by most aquatic organisms.

3.4 Additional Data Needs

Further sampling is not recommended at this time. Further risk evaluation of metals and PAHs in the surface and subsurface soils, without additional sampling, should be conducted to assess potential human health risks at the site.

4.0 Interpretation of Screening Criteria Comparisons

4.1 Methodology

The PRE was performed in accordance with the *Guidance on Preliminary Risk Evaluations for the Purpose of Reaching a Finding of Suitability to Lease (FOSL)* (EPA Region IV, 1994). A discussion of the PRE methodology is provided in Appendix A to this document.

4.2 RI Site 34 Risk

Carcinogenic and noncarcinogenic risks for RI Site 34 are presented in Table 4-46 of the draft PRE (USAESC, 1998), and detailed chemical-specific estimates are presented in Appendix A of the PRE.

The carcinogenic risk ratios were exceeded for both industrial and residential receptors from PAHs and arsenic in the soil samples.

The noncarcinogenic PRE ratio was not exceeded above a value of 1.0 for an industrial worker; however, the noncarcinogenic PRE ratio was slightly above 1.0 for the residential scenario.

5.0 Summary and Recommendations

5.1 Summary

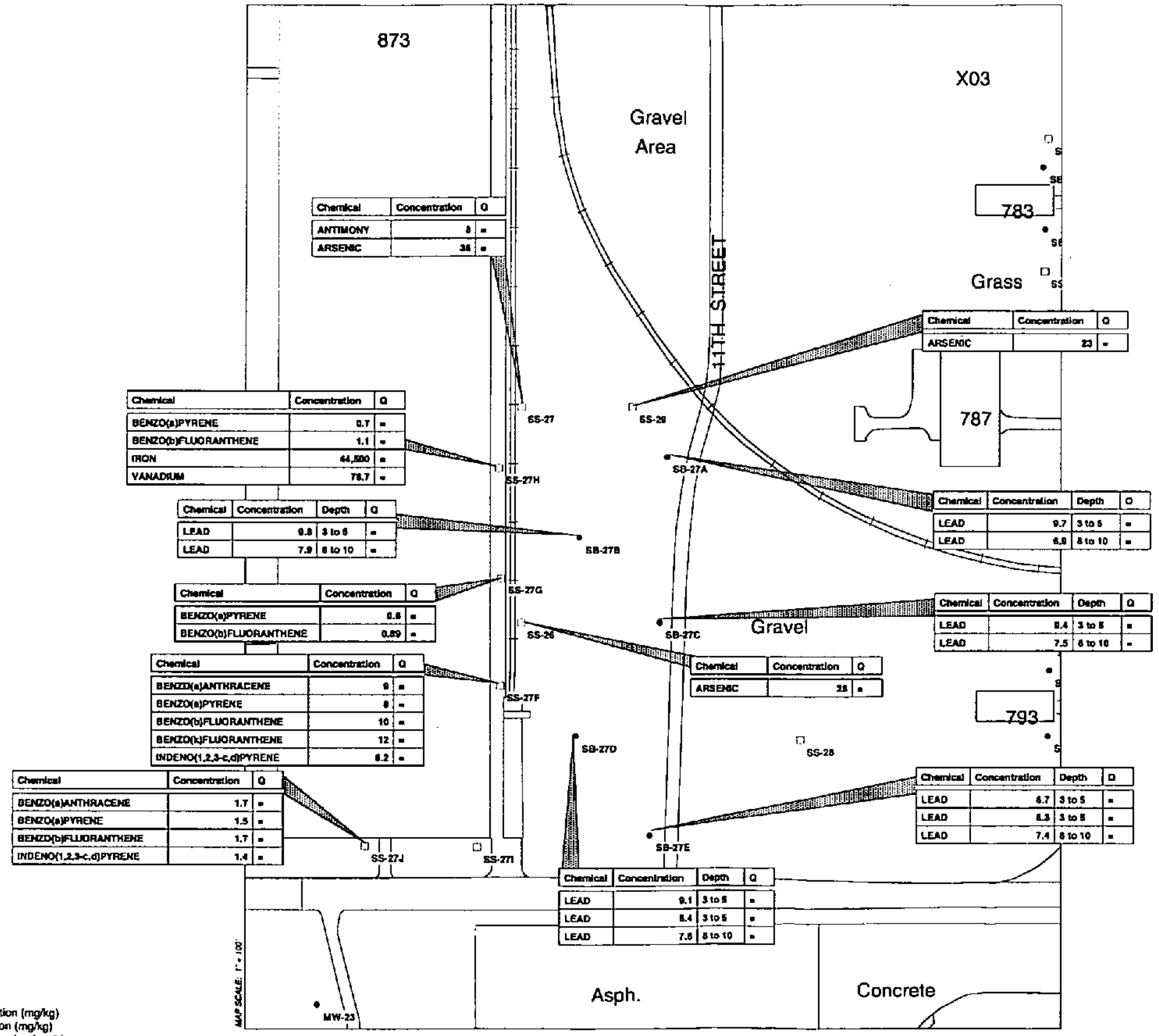
Some risks are associated with this site due to the presence of PAHs and metals in the surface soil. According to Table 5-2 of the draft PRE, the carcinogenic risk ratios for this site were exceeded for both industrial and residential receptors due to the presence of PAHs and arsenic in the surface soil. The noncarcinogenic risk ratio was exceeded for the residential receptor only.

5.2 Recommendations

Further risk evaluation of metals and PAHs in surface soil, without additional sampling, is recommended for this site.

Acronyms

BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COE	United States Army Corps of Engineers
COPC	constituent of potential concern
DDMT	Defense Distribution Depot Memphis, Tennessee
DQE	Data Quality Evaluation
EPA	United States Environmental Protection Agency
FOSL	Finding of Suitability to Lease
FS	Feasibility Study
ft^2	square feet
mg/kg	milligrams per kilogram
OU	Operable Unit
PAH	polycyclic aromatic hydrocarbons
PID	photoionization detector
PRE	Preliminary Risk Evaluation
RBC	Risk-based Concentration
RI	Remedial Investigation
SVOC	Semivolatile Organic Compound
TCL/TAL	target compound list/ target analyte list
TDEC	Tennessee Department of Environment and Conservation
USAESC	United States Army Engineer Service Center
UST	underground storage tank
VOC	Volatile Organic Compound



LEGEND

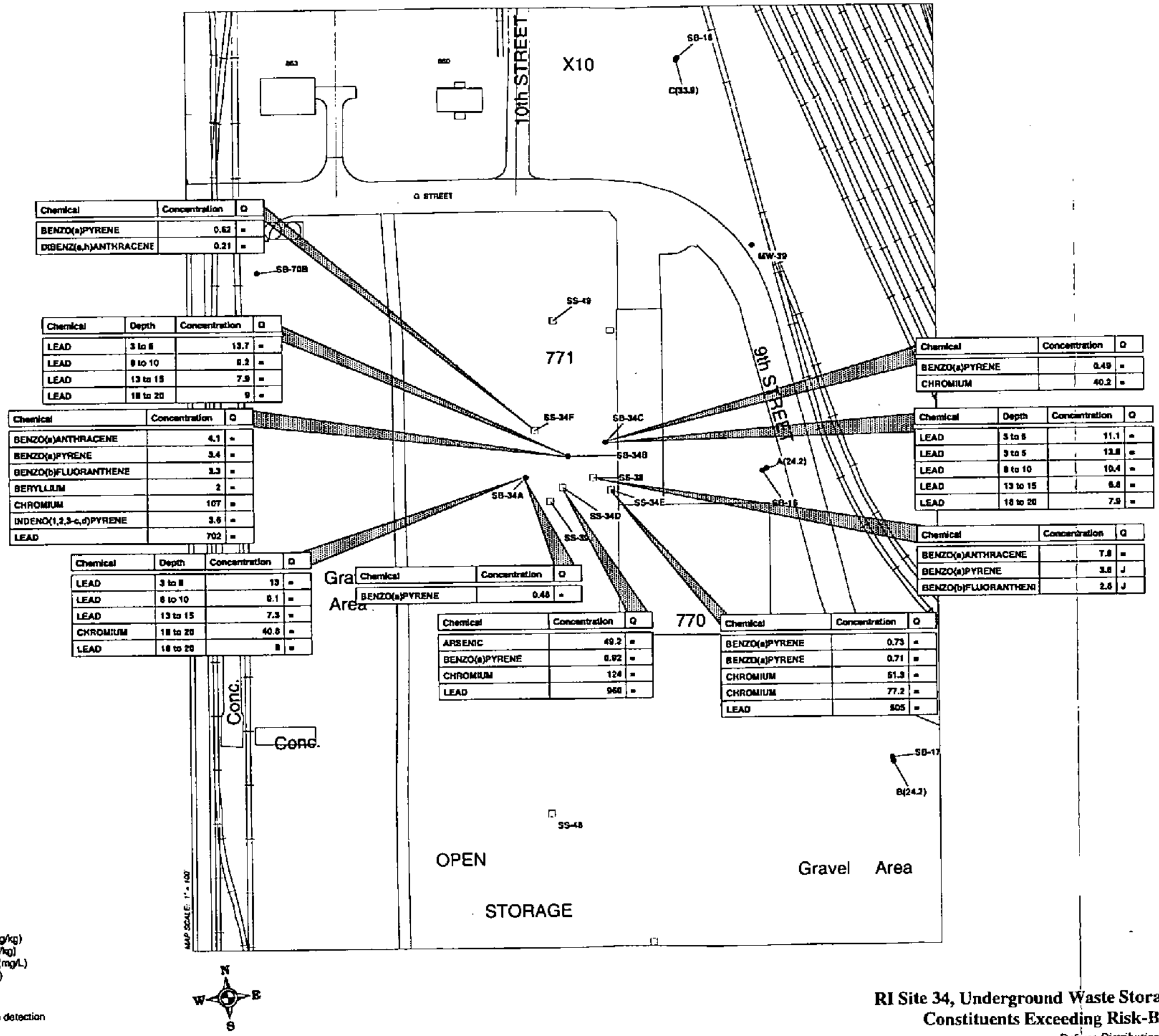
- Surface Soil Sampling Location (mg/kg)
- Soil Boring Sampling Location (mg/kg)
- Surface Water Sampling Location (mg/L)
- Sediment Sample Location (mg/kg)

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

CH2MHILL



Chemical	Concentration	Q
BENZO(a)PYRENE	0.62	=
DIBENZ(a,h)ANTHRACENE	0.21	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	13.7	=
LEAD	8 to 10	8.2	=
LEAD	13 to 15	7.9	=
LEAD	18 to 20	9	=

Chemical	Concentration	Q
BENZO(a)ANTHRACENE	4.1	=
BENZO(a)PYRENE	3.4	=
BENZO(b)FLUORANTHENE	3.3	=
BERYLLIUM	2	=
CHROMIUM	107	=
INDENO(1,2,3-c,d)PYRENE	3.6	=
LEAD	702	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	13	=
LEAD	8 to 10	8.1	=
LEAD	13 to 15	7.3	=
CHROMIUM	18 to 20	40.8	=
LEAD	18 to 20	8	=

Chemical	Concentration	Q
BENZO(a)PYRENE	0.48	=

Chemical	Concentration	Q
ARSENIC	49.2	=
BENZO(a)PYRENE	0.92	=
CHROMIUM	124	=
LEAD	960	=

Chemical	Concentration	Q
BENZO(a)PYRENE	0.49	=
CHROMIUM	40.2	=

Chemical	Depth	Concentration	Q
LEAD	3 to 5	11.1	=
LEAD	3 to 5	13.8	=
LEAD	8 to 10	10.4	=
LEAD	13 to 15	6.6	=
LEAD	18 to 20	7.9	=

Chemical	Concentration	Q
BENZO(a)ANTHRACENE	7.8	=
BENZO(a)PYRENE	3.8	J
BENZO(b)FLUORANTHENE	2.6	J

Chemical	Concentration	Q
BENZO(a)PYRENE	0.73	=
BENZO(a)PYRENE	0.71	=
CHROMIUM	51.3	=
CHROMIUM	77.2	=
LEAD	505	=

LEGEND

- Surface Soil Sampling Location (mg/kg)
- Soil Boring Sampling Location (mg/kg)
- Surface Water Sampling Location (mg/L)
- Sediment Sample Location (mg/kg)

(Q) Qualifer 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

CH2MHILL

RISITE34.WOR

Table 27-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	24	2-METHYLNAPHTHALENE	SS27H	0.51	=	NA	310	Residential RBC	MG/KG
CH2M HILL	24	ACENAPHTHENE	SS27F	1.7	=	NA	470	Residential RBC	MG/KG
CH2M HILL	24	ACENAPHTHENE	SS27H	0.73	=	NA	470	Residential RBC	MG/KG
CH2M HILL	24	ALUMINUM	SS27H	11100	=	24000	24000	Bkgd	MG/KG
CH2M HILL	24	ANTHRACENE	SS27F	1.8	=	.096	2300	Residential RBC	MG/KG
CH2M HILL	24	ANTHRACENE	SS27H	0.41	=	.096	2300	Residential RBC	MG/KG
CH2M HILL	24	ANTIMONY	SS27G	2	J	7	7	Bckg	MG/KG
CH2M HILL	24	ANTIMONY	SS27H	1.7	J	7	7	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB27A	5.1	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB27A	11.1	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB27B	4.1	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB27B	11.5	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB27C	3.6	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB27C	10	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB27D	1.9	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB27D	8.7	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB27E	2.8	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB27E	8.7	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SS27F	5	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SS27F	9.5	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SS27G	4.9	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SS27G	9.8	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SS27H	4.6	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SS27H	9.9	=	20	20	Bckg	MG/KG
CH2M HILL	24	BENZO(a)ANTHRACENE	SS27F	9	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)ANTHRACENE	SS27G	0.55	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)ANTHRACENE	SS27H	0.42	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)PYRENE	SS27F	8	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)PYRENE	SS27G	0.6	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)PYRENE	SS27H	0.7	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	24	BENZO(b)FLUORANTHENE	SS27F	10	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(b)FLUORANTHENE	SS27G	0.89	=	.78	0.88	Residential RBC	MG/KG

Table 27-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	24	BENZO(b)FLUORANTHENE	SS27H	1.1	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(g,h,i)PERYLENE	SS27F	4.9	=	.82	230	Residential RBC	MG/KG
CH2M HILL	24	BENZO(g,h,i)PERYLENE	SS27G	0.61	=	.82	230	Residential RBC	MG/KG
CH2M HILL	24	BENZO(g,h,i)PERYLENE	SS27H	0.69	=	.82	230	Residential RBC	MG/KG
CH2M HILL	24	BENZO(k)FLUORANTHENE	SS27F	12	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	24	BENZO(k)FLUORANTHENE	SS27G	0.75	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	24	BENZO(k)FLUORANTHENE	SS27H	1	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	24	BERYLLIUM	SS27G	0.11	J	1.1	1.1	Bckg	MG/KG
CH2M HILL	24	BERYLLIUM	SS27H	0.33	J	1.1	1.1	Bckg	MG/KG
CH2M HILL	24	CARBAZOLE	SS27H	0.13	J	.067	32	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB27A	13.8	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB27A	13.6	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB27B	15.8	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB27B	12.5	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB27C	10.8	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB27C	12.3	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB27D	6.8	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB27D	12.8	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB27E	12.7	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB27E	12.5	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SS27F	27	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SS27F	13.5	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SS27G	13.6	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SS27G	13.2	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SS27H	18.9	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SS27H	10	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHRYSENE	SS27F	11	=	.94	88	Residential RBC	MG/KG
CH2M HILL	24	CHRYSENE	SS27G	0.55	=	.94	88	Residential RBC	MG/KG
CH2M HILL	24	CHRYSENE	SS27H	0.77	=	.94	88	Residential RBC	MG/KG
CH2M HILL	24	DIBENZOFURAN	SS27H	0.49	=	.647	31	Residential RBC	MG/KG
CH2M HILL	24	FLUORANTHENE	SB27C	0.12	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORANTHENE	SS27F	14	=	1.6	310	Residential RBC	MG/KG

Table 27-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	24	FLUORANTHENE	SS27G	0.93	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORANTHENE	SS27H	1.5	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORENE	SB27C	0.14	=	NA	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORENE	SS27F	2	=	NA	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORENE	SS27H	0.59	=	NA	310	Residential RBC	MG/KG
CH2M HILL	24	INDENO(1,2,3-c,d)PYRENE	SS27F	6.2	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	24	INDENO(1,2,3-c,d)PYRENE	SS27G	0.49	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	24	INDENO(1,2,3-c,d)PYRENE	SS27H	0.73	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	24	IRON	SS27H	44500	=	37000	37000	Bckg	MG/KG
CH2M HILL	24	LEAD	SB27A	11.9	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SB27A	12	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SB27B	16.1	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SB27B	15.8	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SB27C	7.6	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SB27C	11.2	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SB27D	9.7	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SB27D	9.3	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SB27E	25	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SB27E	9.7	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SS27F	156	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SS27F	10.5	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SS27G	60.3	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SS27G	10.9	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SS27H	40.5	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SS27H	10.4	=	30	400	CERCLA	MG/KG
CH2M HILL	24	MANGANESE	SS27H	150	=	1300	1300	Bckg	MG/KG
CH2M HILL	24	PHENANTHRENE	SB27C	0.16	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	24	PHENANTHRENE	SS27F	8.2	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	24	PHENANTHRENE	SS27G	0.6	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	24	PHENANTHRENE	SS27H	1.6	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	24	PYRENE	SB27C	0.1	J	1.5	230	Residential RBC	MG/KG
CH2M HILL	24	PYRENE	SS27F	12	=	1.5	230	Residential RBC	MG/KG

Table 27-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	24	PYRENE	SS27G	0.73	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	24	PYRENE	SS27H	1.1	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB27A	25.4	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB27A	74.8	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB27B	29.2	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB27B	64.8	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB27C	40.2	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB27C	58.1	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB27D	23.1	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB27D	78.2	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB27E	20.9	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB27E	61.9	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SS27F	412	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SS27F	59.4	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SS27G	44.3	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SS27G	58.3	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SS27H	65.8	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SS27H	56.6	=	130	23000	Residential RBC	MG/KG
LAW	24	ANTIMONY	SS26	7	=	7	7	Bckg	MG/KG
LAW	24	ANTIMONY	SS27	8	=	7	7	Bckg	MG/KG
LAW	24	ANTIMONY	SS28	5	=	7	7	Bckg	MG/KG
LAW	24	ANTIMONY	SS29	6	=	7	7	Bckg	MG/KG
LAW	24	ARSENIC	SS26	28	=	20	20	Bckg	MG/KG
LAW	24	ARSENIC	SS27	36	=	20	20	Bckg	MG/KG
LAW	24	ARSENIC	SS28	17	=	20	20	Bckg	MG/KG
LAW	24	ARSENIC	SS29	23	=	20	20	Bckg	MG/KG
LAW	24	BENZO(a)ANTHRACENE	SS26	0.045	J	.71	0.88	Residential RBC	MG/KG
LAW	24	BENZO(b)FLUORANTHENE	SS26	0.07	J	.78	0.88	Residential RBC	MG/KG
LAW	24	CHROMIUM	SS26	16	=	24.8	39	Residential RBC	MG/KG
LAW	24	CHROMIUM	SS27	17	=	24.8	39	Residential RBC	MG/KG
LAW	24	CHROMIUM	SS28	6	=	24.8	39	Residential RBC	MG/KG
LAW	24	CHROMIUM	SS29	10	=	24.8	39	Residential RBC	MG/KG

Table 27-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
LAW	24	CHRYSENE	SS26	0.044	J	.94	88	Residential RBC	MG/KG
LAW	24	FLUORANTHENE	SS26	0.075	J	1.6	310	Residential RBC	MG/KG
LAW	24	LEAD	SS26	17	=	30	400	CERCLA	MG/KG
LAW	24	LEAD	SS27	13	=	30	400	CERCLA	MG/KG
LAW	24	LEAD	SS28	15	=	30	400	CERCLA	MG/KG
LAW	24	LEAD	SS29	11	=	30	400	CERCLA	MG/KG
LAW	24	PHENANTHRENE	SS26	0.055	J	.61	2300	Residential RBC	MG/KG
LAW	24	PYRENE	SS26	0.055	J	1.5	230	Residential RBC	MG/KG
LAW	24	ZINC	SS26	70.5	=	130	23000	Residential RBC	MG/KG
LAW	24	ZINC	SS27	67	=	130	23000	Residential RBC	MG/KG
LAW	24	ZINC	SS28	9	=	130	23000	Residential RBC	MG/KG
CH2M HILL	25	ACENAPHTHENE	SS27J	0.58	=	NA	470	Residential RBC	MG/KG
CH2M HILL	25	ANTHRACENE	SS27J	0.58	=	.096	2300	Residential RBC	MG/KG
CH2M HILL	25	ARSENIC	SS27I	9.8	=	20	20	Bckg	MG/KG
CH2M HILL	25	ARSENIC	SS27I	9.3	=	20	20	Bckg	MG/KG
CH2M HILL	25	ARSENIC	SS27J	2.1	=	20	20	Bckg	MG/KG
CH2M HILL	25	ARSENIC	SS27J	9.3	=	20	20	Bckg	MG/KG
CH2M HILL	25	ARSENIC	SS27J	8.9	=	20	20	Bckg	MG/KG
CH2M HILL	25	BENZO(a)ANTHRACENE	SS27J	1.7	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	25	BENZO(a)PYRENE	SS27J	1.5	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	25	BENZO(b)FLUORANTHENE	SS27J	1.7	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	25	BENZO(g,h,i)PERYLENE	SS27J	1.1	=	.82	230	Residential RBC	MG/KG
CH2M HILL	25	BENZO(k)FLUORANTHENE	SS27J	1.6	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	25	CHROMIUM	SS27I	11.6	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	25	CHROMIUM	SS27I	12.5	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	25	CHROMIUM	SS27J	9.9	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	25	CHROMIUM	SS27J	13.1	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	25	CHROMIUM	SS27J	11.7	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	25	CHRYSENE	SS27J	1.8	=	.94	88	Residential RBC	MG/KG
CH2M HILL	25	FLUORANTHENE	SS27J	3.6	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	25	FLUORENE	SS27J	0.66	=	NA	310	Residential RBC	MG/KG
CH2M HILL	25	INDENO(1,2,3-c,d)PYRENE	SS27J	1.4	=	.7	0.88	Residential RBC	MG/KG

Table 27-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	25	LEAD	SS27I	12.6	=	30	400	CERCLA	MG/KG
CH2M HILL	25	LEAD	SS27I	9.9	=	30	400	CERCLA	MG/KG
CH2M HILL	25	LEAD	SS27J	27.5	=	30	400	CERCLA	MG/KG
CH2M HILL	25	LEAD	SS27J	9.4	=	30	400	CERCLA	MG/KG
CH2M HILL	25	LEAD	SS27J	9.9	=	30	400	CERCLA	MG/KG
CH2M HILL	25	PHENANTHRENE	SS27J	2.8	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	25	PYRENE	SS27J	2.7	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	25	ZINC	SS27I	62.6	=	130	23000	Residential RBC	MG/KG
CH2M HILL	25	ZINC	SS27I	47.8	=	130	23000	Residential RBC	MG/KG
CH2M HILL	25	ZINC	SS27J	41.9	=	130	23000	Residential RBC	MG/KG
CH2M HILL	25	ZINC	SS27J	55.8	=	130	23000	Residential RBC	MG/KG
CH2M HILL	25	ZINC	SS27J	51.7	=	130	23000	Residential RBC	MG/KG

Notes:
1. Detected values are obtained from the *Draft Parcel 24 and 25 Report-Remedial Investigation Sampling Program for Defense Depot* Memphis, TN, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Based on values selected by the BRAC Cleanup Team in the August 1997 BCT meeting minutes, Memphis, Tennessee.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection
BCT - BRAC Cleanup Team

Table 27-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	24	ACENAPHTHYLENE	SS27H	0.088	J	.19	NA	NA	MG/KG
CH2M HILL	24	ACETONE	SB27A	0.022	=	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SB27A	0.03	=	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SB27B	0.023	=	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SB27B	0.028	=	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SB27C	0.023	=	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SB27C	0.03	=	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SB27D	0.02	=	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SB27D	0.026	=	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SB27E	0.006	J	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SS27F	0.029	=	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SS27F	0.004	J	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SS27G	0.011	J	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SS27H	0.008	J	NA	780	20000	MG/KG
CH2M HILL	24	ALPHA-CHLORDANE	SB27D	0.0023	J	.029	.49	4.4	MG/KG
CH2M HILL	24	ALPHA-CHLORDANE	SS27F	0.059	=	.029	.49	4.4	MG/KG
CH2M HILL	24	ALPHA-CHLORDANE	SS27G	0.23	J	.029	.49	4.4	MG/KG
CH2M HILL	24	ALPHA-CHLORDANE	SS27H	0.11	=	.029	.49	4.4	MG/KG
CH2M HILL	24	BARIUM	SS27H	80.2	=	234	550	14000	MG/KG
CH2M HILL	24	CADMIUM	SB27A	2.2	=	1.4	3.9	100	MG/KG
CH2M HILL	24	CADMIUM	SS27F	2.1	=	1.4	3.9	100	MG/KG
CH2M HILL	24	CADMIUM	SS27G	0.36	J	1.4	3.9	100	MG/KG
CH2M HILL	24	CADMIUM	SS27H	0.62	=	1.4	3.9	100	MG/KG
CH2M HILL	24	CALCIUM	SS27H	4970	=	5840	NA	NA	MG/KG
CH2M HILL	24	COBALT	SS27H	5	J	18.3	470	12000	MG/KG
CH2M HILL	24	COPPER	SB27A	8.2	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SB27A	18.8	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SB27B	6.1	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SB27B	18.9	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SB27C	5.4	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SB27C	17.4	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SB27D	4.2	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SB27D	15.3	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SB27E	7.3	=	33	310	8200	MG/KG

Table 27-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	24	COPPER	SB27E	16.1	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SS27F	34.8	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SS27F	15.9	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SS27G	53.6	J	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SS27G	19.3	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SS27H	41.1	J	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SS27H	16.7	=	33	310	8200	MG/KG
CH2M HILL	24	DDE	SB27A	0.005	=	.16	1.9	17	MG/KG
CH2M HILL	24	DDE	SB27B	0.013	J	.16	1.9	17	MG/KG
CH2M HILL	24	DDE	SB27C	0.0037	J	.16	1.9	17	MG/KG
CH2M HILL	24	DDE	SB27D	0.0044	J	.16	1.9	17	MG/KG
CH2M HILL	24	DDE	SB27E	0.019	=	.16	1.9	17	MG/KG
CH2M HILL	24	DDT	SB27A	0.018	=	.074	1.9	17	MG/KG
CH2M HILL	24	DDT	SB27B	0.099	=	.074	1.9	17	MG/KG
CH2M HILL	24	DDT	SB27C	0.013	=	.074	1.9	17	MG/KG
CH2M HILL	24	DDT	SB27D	0.012	=	.074	1.9	17	MG/KG
CH2M HILL	24	DDT	SB27E	0.036	=	.074	1.9	17	MG/KG
CH2M HILL	24	DDT	SS27G	0.062	J	.074	1.9	17	MG/KG
CH2M HILL	24	DDT	SS27H	0.04	=	.074	1.9	17	MG/KG
CH2M HILL	24	DIETHYL PHTHALATE	SS27H	0.9	=	NA	6300	100000	MG/KG
CH2M HILL	24	GAMMA-CHLORDANE	SB27D	0.002	J	.026	.49	4.4	MG/KG
CH2M HILL	24	GAMMA-CHLORDANE	SS27F	0.12	=	.026	.49	4.4	MG/KG
CH2M HILL	24	GAMMA-CHLORDANE	SS27G	0.24	J	.026	.49	4.4	MG/KG
CH2M HILL	24	GAMMA-CHLORDANE	SS27H	0.12	=	.026	.49	4.4	MG/KG
CH2M HILL	24	MAGNESIUM	SS27H	929	=	4600	NA	NA	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27A	0.002	J	NA	85	760	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27B	0.002	J	NA	85	760	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27B	0.002	J	NA	85	760	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27C	0.002	J	NA	85	760	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27C	0.004	J	NA	85	760	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27D	0.003	J	NA	85	760	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27D	0.004	J	NA	85	760	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SS27F	0.002	J	NA	85	760	MG/KG
CH2M HILL	24	NAPHTHALENE	SS27H	0.085	J	NA	310	8200	MG/KG

Table 27-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	24	NICKEL	SB27A	6.6	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SB27A	19.2	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SB27B	4.4	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SB27B	17.3	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SB27C	3.3	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SB27C	18.4	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SB27D	3.2	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SB27D	17.2	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SB27E	4.3	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SB27E	17.2	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SS27F	9	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SS27F	16.7	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SS27G	8.5	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SS27G	16.9	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SS27H	14.5	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SS27H	17.9	=	30	160	4100	MG/KG
CH2M HILL	24	PENTACHLOROPHENOL	SS27H	0.68	=	NA	5.3	48	MG/KG
CH2M HILL	24	POTASSIUM	SS27H	2220	=	1820	NA	NA	MG/KG
CH2M HILL	24	TRICHLOROETHYLENE (TCE)	SS27F	0.001	J	NA	58	520	MG/KG
CH2M HILL	24	VANADIUM	SS27H	76.7	=	48.4	55	1400	MG/KG
LAW	24	ACETONE	SS26	0.005	J	NA	780	20000	MG/KG
LAW	24	ACETONE	SS27	0.003	J	NA	780	20000	MG/KG
LAW	24	ACETONE	SS28	0.009	J	NA	780	20000	MG/KG
LAW	24	ACETONE	SS29	0.005	J	NA	780	20000	MG/KG
LAW	24	BARIUM	SS26	143	=	234	550	14000	MG/KG
LAW	24	BARIUM	SS27	105	=	234	550	14000	MG/KG
LAW	24	BARIUM	SS28	18.3	=	234	550	14000	MG/KG
LAW	24	BARIUM	SS29	18.5	=	234	550	14000	MG/KG
LAW	24	bis(2-ETHYLHEXYL) PHTHALATE	SS26	0.44	=	NA	46	410	MG/KG
LAW	24	bis(2-ETHYLHEXYL) PHTHALATE	SS27	0.32	J	NA	46	410	MG/KG
LAW	24	bis(2-ETHYLHEXYL) PHTHALATE	SS28	0.38	J	NA	46	410	MG/KG
LAW	24	bis(2-ETHYLHEXYL) PHTHALATE	SS29	0.34	J	NA	46	410	MG/KG
LAW	24	COPPER	SS26	22	=	33	310	8200	MG/KG
LAW	24	COPPER	SS27	22	=	33	310	8200	MG/KG

Table 27-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
LAW	24	COPPER	SS28	5	=	33	310	8200	MG/KG
LAW	24	COPPER	SS29	6	=	33	310	8200	MG/KG
LAW	24	DI-n-BUTYL PHTHALATE	SS26	0.044	J	NA	780	20000	MG/KG
LAW	24	DIETHYL PHTHALATE	SS26	0.077	J	NA	6300	100000	MG/KG
LAW	24	MERCURY	SS26	0.03	=	.43	2.3	61	MG/KG
LAW	24	MERCURY	SS28	0.02	=	.43	2.3	61	MG/KG
LAW	24	MERCURY	SS29	0.03	=	.43	2.3	61	MG/KG
LAW	24	METHYLENE CHLORIDE	SS26	0.023	=	NA	85	760	MG/KG
LAW	24	METHYLENE CHLORIDE	SS27	0.012	=	NA	85	760	MG/KG
LAW	24	METHYLENE CHLORIDE	SS28	0.004	J	NA	85	760	MG/KG
LAW	24	METHYLENE CHLORIDE	SS29	0.004	J	NA	85	760	MG/KG
LAW	24	N-NITROSODIPHENYLAMINE	SS27	0.049	J	NA	130	1200	MG/KG
LAW	24	NICKEL	SS26	20	=	30	160	4100	MG/KG
LAW	24	NICKEL	SS27	18	=	30	160	4100	MG/KG
LAW	24	NICKEL	SS28	5	=	30	160	4100	MG/KG
LAW	24	NICKEL	SS29	6	=	30	160	4100	MG/KG
LAW	24	TOLUENE	SS26	0.003	J	.012	1600	41000	MG/KG
LAW	24	TOLUENE	SS27	0.004	J	.012	1600	41000	MG/KG
LAW	24	TOLUENE	SS28	0.033	=	.012	1600	41000	MG/KG
LAW	24	TOLUENE	SS29	0.001	J	.012	1600	41000	MG/KG
LAW	24	Total Polynuclear Aromatic Hydrocarbons	SS26	0.344	=	NA	NA	NA	MG/KG
LAW	24	TOTAL XYLENES	SS28	0.002	J	.009	NA	NA	MG/KG
CH2M HILL	25	ACETONE	SS27I	0.004	J	NA	780	20000	MG/KG
CH2M HILL	25	ACETONE	SS27I	0.005	J	NA	780	20000	MG/KG
CH2M HILL	25	ACETONE	SS27J	0.003	J	NA	780	20000	MG/KG
CH2M HILL	25	ACETONE	SS27J	0.006	J	NA	780	20000	MG/KG
CH2M HILL	25	ACETONE	SS27J	0.024	=	NA	780	20000	MG/KG
CH2M HILL	25	ALPHA-CHLORDANE	SS27I	0.083	=	.029	.49	4.4	MG/KG
CH2M HILL	25	ALPHA-CHLORDANE	SS27I	0.0048	=	.029	.49	4.4	MG/KG
CH2M HILL	25	ALPHA-CHLORDANE	SS27J	0.2	=	.029	.49	4.4	MG/KG
CH2M HILL	25	ALPHA-CHLORDANE	SS27J	0.012	=	.029	.49	4.4	MG/KG
CH2M HILL	25	ALPHA-CHLORDANE	SS27J	0.016	=	.029	.49	4.4	MG/KG
CH2M HILL	25	CADMIUM	SS27J	0.76	=	1.4	3.9	100	MG/KG
CH2M HILL	25	COPPER	SS27I	15	=	33	310	8200	MG/KG

Table 27-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	25	COPPER	SS27I	17.9	=	33	310	8200	MG/KG
CH2M HILL	25	COPPER	SS27J	4.1	=	33	310	8200	MG/KG
CH2M HILL	25	COPPER	SS27J	16	=	33	310	8200	MG/KG
CH2M HILL	25	COPPER	SS27J	15.9	=	33	310	8200	MG/KG
CH2M HILL	25	GAMMA-CHLORDANE	SS27I	0.087	=	.026	.49	4.4	MG/KG
CH2M HILL	25	GAMMA-CHLORDANE	SS27I	0.0048	=	.026	.49	4.4	MG/KG
CH2M HILL	25	GAMMA-CHLORDANE	SS27J	0.22	=	.026	.49	4.4	MG/KG
CH2M HILL	25	GAMMA-CHLORDANE	SS27J	0.011	=	.026	.49	4.4	MG/KG
CH2M HILL	25	GAMMA-CHLORDANE	SS27J	0.016	=	.026	.49	4.4	MG/KG
CH2M HILL	25	HEPTACHLOR	SS27J	0.035	J	NA	.14	1.3	MG/KG
CH2M HILL	25	METHYLENE CHLORIDE	SS27J	0.002	J	NA	85	760	MG/KG
CH2M HILL	25	NICKEL	SS27I	16.4	=	30	160	4100	MG/KG
CH2M HILL	25	NICKEL	SS27I	18.3	=	30	160	4100	MG/KG
CH2M HILL	25	NICKEL	SS27J	5.5	=	30	160	4100	MG/KG
CH2M HILL	25	NICKEL	SS27J	17.3	=	30	160	4100	MG/KG
CH2M HILL	25	NICKEL	SS27J	18	=	30	160	4100	MG/KG

Notes:
1. Detected values are obtained from the *Draft Parcel 24 and 25 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Risk-Based Concentrations are obtained from the *EPA Region III Risk-based Concentrations Table*, R.L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection

Table 27-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	24	ACETONE	SB27A	3 to 5	0.005	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB27A	8 to 10	0.004	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB27B	3 to 5	0.004	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB27B	8 to 10	0.007	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB27C	3 to 5	0.008	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB27C	8 to 10	0.004	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB27D	3 to 5	0.004	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB27D	3 to 5	0.003	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB27D	8 to 10	0.004	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB27E	3 to 5	0.006	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB27E	3 to 5	0.006	J	NA	16	MG/KG
CH2M HILL	24	ARSENIC	SB27A	3 to 5	9	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB27A	8 to 10	5.8	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB27B	3 to 5	8.9	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB27B	8 to 10	5.5	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB27C	3 to 5	8.8	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB27C	8 to 10	5.5	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB27D	3 to 5	8.4	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB27D	3 to 5	8.1	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB27D	8 to 10	5.2	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB27E	3 to 5	7.8	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB27E	3 to 5	7.7	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB27E	8 to 10	4.2	=	17	29	MG/KG
CH2M HILL	24	BERYLLIUM	SB27E	8 to 10	0.2	J	1.2	63	MG/KG
CH2M HILL	24	CHROMIUM	SB27A	3 to 5	23.2	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB27A	8 to 10	26	=	26	38	MG/KG

Table 27-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	24	CHROMIUM	SB27B	3 to 5	23.5	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB27B	8 to 10	23	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB27C	3 to 5	22.7	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB27C	8 to 10	22.5	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB27D	3 to 5	11.4	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB27D	3 to 5	24.7	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB27D	8 to 10	25	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB27E	3 to 5	26.8	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB27E	3 to 5	24.6	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB27E	8 to 10	14.8	=	26	38	MG/KG
CH2M HILL	24	COPPER	SB27A	3 to 5	15.9	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB27A	8 to 10	14	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB27B	3 to 5	15.9	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB27B	8 to 10	14	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB27C	3 to 5	16.3	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB27C	8 to 10	14.2	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB27D	3 to 5	16.4	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB27D	3 to 5	16.3	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB27D	8 to 10	14.6	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB27E	3 to 5	17	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB27E	3 to 5	15.2	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB27E	8 to 10	11.7	J	33	NA	MG/KG
CH2M HILL	24	LEAD	SB27A	3 to 5	9.7	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB27A	8 to 10	6.9	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB27B	3 to 5	9.8	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB27B	8 to 10	7.9	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB27C	3 to 5	9.4	=	24	1.5	MG/KG

Table 27-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	24	LEAD	SB27C	8 to 10	7.5	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB27D	3 to 5	8.4	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB27D	3 to 5	9.1	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB27D	8 to 10	7.8	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB27E	3 to 5	8.3	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB27E	3 to 5	8.7	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB27E	8 to 10	7.4	=	24	1.5	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27A	3 to 5	0.001	J	NA	.02	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27A	8 to 10	0.001	J	NA	.02	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27B	3 to 5	0.001	J	NA	.02	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27D	8 to 10	0.001	J	NA	.02	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27E	3 to 5	0.004	J	NA	.02	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB27E	3 to 5	0.002	J	NA	.02	MG/KG
CH2M HILL	24	NICKEL	SB27A	3 to 5	17.9	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB27A	8 to 10	15.9	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB27B	3 to 5	16.5	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB27B	8 to 10	16.4	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB27C	3 to 5	17.5	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB27C	8 to 10	15.6	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB27D	3 to 5	17.4	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB27D	3 to 5	18.1	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB27D	8 to 10	15.1	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB27E	3 to 5	17.7	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB27E	3 to 5	17	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB27E	8 to 10	14.1	=	37	130	MG/KG
CH2M HILL	24	ZINC	SB27A	3 to 5	52.1	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB27A	8 to 10	37.6	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB27B	3 to 5	56.2	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB27B	8 to 10	37.3	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB27C	3 to 5	56.2	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB27C	8 to 10	40	=	110	12000	MG/KG

Table 27-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 27
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	24	ZINC	SB27D	3 to 5	50.4	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB27D	3 to 5	49.1	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB27D	8 to 10	40.1	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB27E	3 to 5	43.4	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB27E	3 to 5	41.6	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB27E	8 to 10	36	=	110	12000	MG/KG

Notes:

1. Detected values are obtained from the *Draft Parcel 24 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. RBC-GWP values are obtained from the *EPA Region III Risk-based Concentrations Table*, R. L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
= - indicates unqualified detection
J - indicates estimated value above the detection limit but below the reporting limit.
RBC-GWP - Risk-Based Concentrations - Groundwater Protection

Table 34-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	24	ACENAPHTHENE	SS34E	0.26	=	NA	470	Residential RBC	MG/KG
CH2M HILL	24	ACENAPHTHENE	SS34F	0.11	=	NA	470	Residential RBC	MG/KG
CH2M HILL	24	ANTHRACENE	SB34B	1.4	=	.096	2300	Residential RBC	MG/KG
CH2M HILL	24	ANTHRACENE	SS34E	0.32	=	.096	2300	Residential RBC	MG/KG
CH2M HILL	24	ANTHRACENE	SS34E	0.22	=	.096	2300	Residential RBC	MG/KG
CH2M HILL	24	ANTHRACENE	SS34F	0.13	=	.096	2300	Residential RBC	MG/KG
CH2M HILL	24	ARSENIC	SB34A	1.7	J	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB34B	8.8	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SB34C	8.5	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SS34D	49.2	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SS34E	10.9	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SS34E	11.3	=	20	20	Bckg	MG/KG
CH2M HILL	24	ARSENIC	SS34F	4.3	=	20	20	Bckg	MG/KG
CH2M HILL	24	BENZO(a)ANTHRACENE	SB34A	0.49	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)ANTHRACENE	SB34B	4.1	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)ANTHRACENE	SB34C	0.55	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)ANTHRACENE	SS34D	0.83	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)ANTHRACENE	SS34E	0.85	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)ANTHRACENE	SS34E	0.76	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)ANTHRACENE	SS34F	0.62	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)PYRENE	SB34A	0.48	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)PYRENE	SB34B	3.4	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)PYRENE	SB34C	0.49	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)PYRENE	SS34D	0.92	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)PYRENE	SS34E	0.73	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)PYRENE	SS34E	0.71	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	24	BENZO(a)PYRENE	SS34F	0.62	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	24	BENZO(b)FLUORANTHENE	SB34A	0.54	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(b)FLUORANTHENE	SB34B	3.3	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(b)FLUORANTHENE	SB34C	0.46	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(b)FLUORANTHENE	SS34D	0.83	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(b)FLUORANTHENE	SS34E	0.66	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(b)FLUORANTHENE	SS34E	0.7	=	.78	0.88	Residential RBC	MG/KG

Table 34-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	24	BENZO(b)FLUORANTHENE	SS34F	0.64	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	24	BENZO(g,h,i)PERYLENE	SB34A	0.41	=	.82	230	Residential RBC	MG/KG
CH2M HILL	24	BENZO(g,h,i)PERYLENE	SB34B	2.6	=	.82	230	Residential RBC	MG/KG
CH2M HILL	24	BENZO(g,h,i)PERYLENE	SB34C	0.41	=	.82	230	Residential RBC	MG/KG
CH2M HILL	24	BENZO(g,h,i)PERYLENE	SS34D	0.59	=	.82	230	Residential RBC	MG/KG
CH2M HILL	24	BENZO(g,h,i)PERYLENE	SS34E	0.49	=	.82	230	Residential RBC	MG/KG
CH2M HILL	24	BENZO(g,h,i)PERYLENE	SS34E	0.52	=	.82	230	Residential RBC	MG/KG
CH2M HILL	24	BENZO(g,h,i)PERYLENE	SS34F	0.47	=	.82	230	Residential RBC	MG/KG
CH2M HILL	24	BENZO(k)FLUORANTHENE	SB34A	0.52	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	24	BENZO(k)FLUORANTHENE	SB34B	3.1	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	24	BENZO(k)FLUORANTHENE	SB34C	0.46	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	24	BENZO(k)FLUORANTHENE	SS34D	0.73	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	24	BENZO(k)FLUORANTHENE	SS34E	0.68	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	24	BENZO(k)FLUORANTHENE	SS34E	0.72	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	24	BENZO(k)FLUORANTHENE	SS34F	0.62	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	24	BERYLLIUM	SB34B	2	=	1.1	1.1	Bckg	MG/KG
CH2M HILL	24	CHROMIUM	SB34A	18.8	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB34B	107	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SB34C	40.2	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SS34D	124	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SS34E	51.3	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SS34E	77.2	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHROMIUM	SS34F	34.8	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	24	CHRYSENE	SB34A	0.58	=	.94	88	Residential RBC	MG/KG
CH2M HILL	24	CHRYSENE	SB34B	3.8	=	.94	88	Residential RBC	MG/KG
CH2M HILL	24	CHRYSENE	SB34C	0.52	=	.94	88	Residential RBC	MG/KG
CH2M HILL	24	CHRYSENE	SS34D	0.83	=	.94	88	Residential RBC	MG/KG
CH2M HILL	24	CHRYSENE	SS34E	0.76	=	.94	88	Residential RBC	MG/KG
CH2M HILL	24	CHRYSENE	SS34E	0.71	=	.94	88	Residential RBC	MG/KG
CH2M HILL	24	CHRYSENE	SS34F	0.82	=	.94	88	Residential RBC	MG/KG
CH2M HILL	24	DIBENZ(a,h)ANTHRACENE	SS34F	0.21	=	.26	0.088	Residential RBC	MG/KG
CH2M HILL	24	FLUORANTHENE	SB34A	0.99	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORANTHENE	SB34B	8.1	=	1.6	310	Residential RBC	MG/KG

Table 34-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	24	FLUORANTHENE	SB34C	1.2	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORANTHENE	SS34D	1.7	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORANTHENE	SS34E	1.8	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORANTHENE	SS34E	1.5	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORANTHENE	SS34F	1.3	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORENE	SB34B	1.6	=	NA	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORENE	SS34E	0.3	=	NA	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORENE	SS34E	0.26	=	NA	310	Residential RBC	MG/KG
CH2M HILL	24	FLUORENE	SS34F	0.14	=	NA	310	Residential RBC	MG/KG
CH2M HILL	24	INDENO(1,2,3-c,d)PYRENE	SB34A	0.61	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	24	INDENO(1,2,3-c,d)PYRENE	SB34B	3.6	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	24	INDENO(1,2,3-c,d)PYRENE	SB34C	0.48	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	24	INDENO(1,2,3-c,d)PYRENE	SS34D	0.81	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	24	INDENO(1,2,3-c,d)PYRENE	SS34E	0.73	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	24	INDENO(1,2,3-c,d)PYRENE	SS34E	0.74	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	24	INDENO(1,2,3-c,d)PYRENE	SS34F	0.57	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	24	LEAD	SB34A	94.1	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SB34B	702	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SB34C	93.6	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SS34D	960	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SS34E	340	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SS34E	505	=	30	400	CERCLA	MG/KG
CH2M HILL	24	LEAD	SS34F	145	=	30	400	CERCLA	MG/KG
CH2M HILL	24	PHENANTHRENE	SB34A	0.41	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	24	PHENANTHRENE	SB34B	5.3	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	24	PHENANTHRENE	SB34C	0.96	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	24	PHENANTHRENE	SS34D	0.97	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	24	PHENANTHRENE	SS34E	1.2	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	24	PHENANTHRENE	SS34E	0.93	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	24	PHENANTHRENE	SS34F	0.71	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	24	PYRENE	SB34A	0.94	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	24	PYRENE	SB34B	6.2	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	24	PYRENE	SB34C	0.95	=	1.5	230	Residential RBC	MG/KG

Table 34-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	24	PYRENE	SS34D	1.3	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	24	PYRENE	SS34E	1.3	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	24	PYRENE	SS34E	1.2	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	24	PYRENE	SS34F	1	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB34A	42.1	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB34B	234	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SB34C	50.5	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SS34D	577	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SS34E	182	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SS34E	205	=	130	23000	Residential RBC	MG/KG
CH2M HILL	24	ZINC	SS34F	61.5	=	130	23000	Residential RBC	MG/KG
LAW	24	2-METHYLNAPHTHALENE	SS38	0.61	J	NA	310	Residential RBC	MG/KG
LAW	24	2-METHYLNAPHTHALENE	SS39	4	=	NA	310	Residential RBC	MG/KG
LAW	24	ANTIMONY	SS39	17	=	7	7	Bckg	MG/KG
LAW	24	ARSENIC	SS38	9	=	20	20	Bckg	MG/KG
LAW	24	ARSENIC	SS39	13	=	20	20	Bckg	MG/KG
LAW	24	BENZO(a)ANTHRACENE	SS38	7.8	=	.71	0.88	Residential RBC	MG/KG
LAW	24	BENZO(a)ANTHRACENE	SS48	0.08	J	.71	0.88	Residential RBC	MG/KG
LAW	24	BENZO(a)PYRENE	SS38	3.6	J	.96	0.088	Residential RBC	MG/KG
LAW	24	BENZO(a)PYRENE	SS48	0.062	J	.96	0.088	Residential RBC	MG/KG
LAW	24	BENZO(b)FLUORANTHENE	SS38	2.8	J	.78	0.88	Residential RBC	MG/KG
LAW	24	BENZO(b)FLUORANTHENE	SS48	0.15	J	.78	0.88	Residential RBC	MG/KG
LAW	24	BENZO(b)FLUORANTHENE	SS49	0.09	J	.78	0.88	Residential RBC	MG/KG
LAW	24	BENZO(k)FLUORANTHENE	SS38	4.6	=	.78	8.8	Residential RBC	MG/KG
LAW	24	CHROMIUM	SS38	10	=	24.8	39	Residential RBC	MG/KG
LAW	24	CHROMIUM	SS48	19	=	24.8	39	Residential RBC	MG/KG
LAW	24	CHROMIUM	SS49	6	=	24.8	39	Residential RBC	MG/KG
LAW	24	CHRYSENE	SS38	2.2	J	.94	88	Residential RBC	MG/KG
LAW	24	CHRYSENE	SS48	0.11	J	.94	88	Residential RBC	MG/KG
LAW	24	DIBENZOFURAN	SS39	0.35	J	.647	31	Residential RBC	MG/KG
LAW	24	FLUORANTHENE	SS38	12	=	1.6	310	Residential RBC	MG/KG
LAW	24	FLUORANTHENE	SS48	0.16	J	1.6	310	Residential RBC	MG/KG
LAW	24	FLUORANTHENE	SS49	0.066	J	1.6	310	Residential RBC	MG/KG

Table 34-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
LAW	24	FLUORENE	SS38	0.62	J	NA	310	Residential RBC	MG/KG
LAW	24	INDENO(1,2,3-c,d)PYRENE	SS48	0.053	J	.7	0.88	Residential RBC	MG/KG
LAW	24	LEAD	SS38	48	=	30	400	CERCLA	MG/KG
LAW	24	LEAD	SS39	24	=	30	400	CERCLA	MG/KG
LAW	24	LEAD	SS48	90	=	30	400	CERCLA	MG/KG
LAW	24	LEAD	SS49	4	=	30	400	CERCLA	MG/KG
LAW	24	PHENANTHRENE	SS38	18	=	.61	2300	Residential RBC	MG/KG
LAW	24	PHENANTHRENE	SS39	1.1	J	.61	2300	Residential RBC	MG/KG
LAW	24	PHENANTHRENE	SS48	0.085	J	.61	2300	Residential RBC	MG/KG
LAW	24	PHENANTHRENE	SS49	0.037	J	.61	2300	Residential RBC	MG/KG
LAW	24	PYRENE	SS38	13	=	1.5	230	Residential RBC	MG/KG
LAW	24	PYRENE	SS39	0.88	J	1.5	230	Residential RBC	MG/KG
LAW	24	PYRENE	SS48	0.17	J	1.5	230	Residential RBC	MG/KG
LAW	24	PYRENE	SS49	0.15	J	1.5	230	Residential RBC	MG/KG
LAW	24	ZINC	SS38	411	=	130	23000	Residential RBC	MG/KG
LAW	24	ZINC	SS39	122	=	130	23000	Residential RBC	MG/KG
LAW	24	ZINC	SS48	55.2	=	130	23000	Residential RBC	MG/KG
LAW	24	ZINC	SS49	59.4	=	130	23000	Residential RBC	MG/KG

Notes:

1. Detected values are obtained from the *Draft Parcel 24 Report-Remedial Investigation Sampling Program for Defense Depot* Memphis, TN, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Based on values selected by the BRAC Cleanup Team in the August 1997 BCT meeting minutes, Memphis, Tennessee.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection
BCT - BRAC Cleanup Team

Table 34-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	24	ACETONE	SB34B	0.035	=	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SB34C	0.016	=	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SS34D	0.003	J	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SS34E	0.002	J	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SS34E	0.008	J	NA	780	20000	MG/KG
CH2M HILL	24	ACETONE	SS34F	0.002	J	NA	780	20000	MG/KG
CH2M HILL	24	CADMIUM	SB34A	0.59	=	1.4	3.9	100	MG/KG
CH2M HILL	24	COPPER	SB34A	7.1	J	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SB34B	18.2	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SB34C	12	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SS34D	51.5	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SS34E	27.9	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SS34E	27	=	33	310	8200	MG/KG
CH2M HILL	24	COPPER	SS34F	12.6	=	33	310	8200	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB34C	0.002	J	NA	85	760	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SS34D	0.002	J	NA	85	760	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SS34E	0.001	J	NA	85	760	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SS34E	0.002	J	NA	85	760	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SS34F	0.002	J	NA	85	760	MG/KG
CH2M HILL	24	NICKEL	SB34A	4.6	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SB34B	7.6	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SB34C	10.4	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SS34D	15.7	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SS34E	16.3	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SS34E	16.3	=	30	160	4100	MG/KG
CH2M HILL	24	NICKEL	SS34F	6.3	=	30	160	4100	MG/KG
CH2M HILL	24	TOLUENE	SB34A	0.002	J	.012	1600	41000	MG/KG
CH2M HILL	24	TOTAL XYLENES	SB34A	0.002	J	.009	NA	NA	MG/KG
LAW	24	1,1,1-TRICHLOROETHANE	SS38	0.11	=	NA	NA	NA	MG/KG
LAW	24	3-NITROANILINE	SS49	0.036	J	NA	23	610	MG/KG
LAW	24	ACETONE	SS38	0.047	J	NA	780	20000	MG/KG
LAW	24	ACETONE	SS39	0.2	=	NA	780	20000	MG/KG

Table 34-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
LAW	24	ACETONE	SS48	0.051	=	NA	780	20000	MG/KG
LAW	24	ACETONE	SS49	0.022	=	NA	780	20000	MG/KG
LAW	24	BARIUM	SS38	20.9	=	234	550	14000	MG/KG
LAW	24	BARIUM	SS39	15.8	=	234	550	14000	MG/KG
LAW	24	BARIUM	SS48	19.3	=	234	550	14000	MG/KG
LAW	24	BARIUM	SS49	11.7	=	234	550	14000	MG/KG
LAW	24	BENZYL BUTYL PHTHALATE	SS39	1.3	J	.645	1600	41000	MG/KG
LAW	24	BETA BHC	SS38	0.29	=	NA	NA	NA	MG/KG
LAW	24	BETA BHC	SS48	0.026	=	NA	NA	NA	MG/KG
LAW	24	BETA BHC	SS49	0.014	=	NA	NA	NA	MG/KG
LAW	24	bis(2-ETHYLHEXYL) PHTHALATE	SS38	4.8	=	NA	46	410	MG/KG
LAW	24	bis(2-ETHYLHEXYL) PHTHALATE	SS48	0.34	=	NA	46	410	MG/KG
LAW	24	bis(2-ETHYLHEXYL) PHTHALATE	SS49	0.16	J	NA	46	410	MG/KG
LAW	24	CADMIUM	SS38	1	=	1.4	3.9	100	MG/KG
LAW	24	CADMIUM	SS39	3	=	1.4	3.9	100	MG/KG
LAW	24	CADMIUM	SS48	0.5	=	1.4	3.9	100	MG/KG
LAW	24	CADMIUM	SS49	0.8	=	1.4	3.9	100	MG/KG
LAW	24	COPPER	SS38	13	=	33	310	8200	MG/KG
LAW	24	COPPER	SS39	18	=	33	310	8200	MG/KG
LAW	24	COPPER	SS48	10	=	33	310	8200	MG/KG
LAW	24	COPPER	SS49	4	=	33	310	8200	MG/KG
LAW	24	DDD	SS48	0.01	J	.0067	2.7	24	MG/KG
LAW	24	DDE	SS48	0.017	=	.16	1.9	17	MG/KG
LAW	24	DDT	SS48	0.052	=	.074	1.9	17	MG/KG
LAW	24	DI-n-BUTYL PHTHALATE	SS39	0.48	J	NA	780	20000	MG/KG
LAW	24	ETHYLBENZENE	SS38	0.009	J	NA	780	20000	MG/KG
LAW	24	ETHYLBENZENE	SS39	0.006	=	NA	780	20000	MG/KG
LAW	24	GAMMA BHC (LINDANE)	SS38	0.12	=	NA	NA	NA	MG/KG
LAW	24	METHYL ISOBUTYL KETONE	SS39	0.008	J	NA	NA	NA	MG/KG
LAW	24	METHYLENE CHLORIDE	SS38	0.036	=	NA	85	760	MG/KG
LAW	24	METHYLENE CHLORIDE	SS39	0.008	=	NA	85	760	MG/KG
LAW	24	METHYLENE CHLORIDE	SS48	0.005	J	NA	85	760	MG/KG

Table 34-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
LAW	24	METHYLENE CHLORIDE	SS49	0.006	=	NA	85	760	MG/KG
LAW	24	NAPHTHALENE	SS39	1.6	J	NA	310	8200	MG/KG
LAW	24	NICKEL	SS38	3	=	30	160	4100	MG/KG
LAW	24	NICKEL	SS39	7	=	30	160	4100	MG/KG
LAW	24	NICKEL	SS48	6	=	30	160	4100	MG/KG
LAW	24	NICKEL	SS49	5	=	30	160	4100	MG/KG
LAW	24	SELENIUM	SS39	15	=	.81	39	1000	MG/KG
LAW	24	TETRACHLOROETHYLENE (PCE)	SS38	0.031	=	NA	NA	NA	MG/KG
LAW	24	TOLUENE	SS38	0.043	=	.012	1600	41000	MG/KG
LAW	24	TOLUENE	SS39	0.016	=	.012	1600	41000	MG/KG
LAW	24	TOLUENE	SS48	0.013	=	.012	1600	41000	MG/KG
LAW	24	TOLUENE	SS49	0.032	=	.012	1600	41000	MG/KG
LAW	24	Total Polynuclear Aromatic Hydrocarbons	SS38	45.03	=	NA	NA	NA	MG/KG
LAW	24	Total Polynuclear Aromatic Hydrocarbons	SS39	6.48	=	NA	NA	NA	MG/KG
LAW	24	Total Polynuclear Aromatic Hydrocarbons	SS48	0.67	=	NA	NA	NA	MG/KG
LAW	24	Total Polynuclear Aromatic Hydrocarbons	SS49	0.24	=	NA	NA	NA	MG/KG
LAW	24	TOTAL XYLENES	SS38	0.59	=	.009	NA	NA	MG/KG
LAW	24	TOTAL XYLENES	SS39	0.053	=	.009	NA	NA	MG/KG
LAW	24	TOTAL XYLENES	SS48	0.001	J	.009	NA	NA	MG/KG
LAW	24	TOTAL XYLENES	SS49	0.002	J	.009	NA	NA	MG/KG
LAW	24	TRICHLOROETHYLENE (TCE)	SS48	0.001	J	NA	58	520	MG/KG
LAW	24	TRICHLOROETHYLENE (TCE)	SS49	0.002	J	NA	58	520	MG/KG

Notes:
1. Detected values are obtained from the *Draft Parcel 24 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Risk-Based Concentrations are obtained from the *EPA Region III Risk-based Concentrations Table*, R.L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection

Table 34-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	24	ACETONE	SB34A	13 to 15	0.004	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB34A	18 to 20	0.006	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB34A	8 to 10	0.005	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB34B	13 to 15	0.005	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB34B	18 to 20	0.006	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB34B	8 to 10	0.004	J	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB34C	13 to 15	0.021	=	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB34C	18 to 20	0.02	=	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB34C	3 to 5	0.016	=	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB34C	3 to 5	0.032	=	NA	16	MG/KG
CH2M HILL	24	ACETONE	SB34C	8 to 10	0.007	J	NA	16	MG/KG
CH2M HILL	24	ALUMINUM	SB34B	3 to 5	16800	=	21829	NA	MG/KG
CH2M HILL	24	ARSENIC	SB34A	13 to 15	5	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34A	18 to 20	4.4	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34A	3 to 5	11.7	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34A	8 to 10	8.2	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34B	13 to 15	5.1	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34B	18 to 20	4.3	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34B	3 to 5	13.4	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34B	8 to 10	9	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34C	13 to 15	5.4	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34C	18 to 20	4.3	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34C	3 to 5	10.8	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34C	3 to 5	9	=	17	29	MG/KG
CH2M HILL	24	ARSENIC	SB34C	8 to 10	10.1	=	17	29	MG/KG
CH2M HILL	24	BARIUM	SB34B	3 to 5	147	=	300	1600	MG/KG

Table 34-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	24	BENZO(a)ANTHRACENE	SB34C	3 to 5	0.18	=	NA	2	MG/KG
CH2M HILL	24	BENZO(a)PYRENE	SB34C	3 to 5	0.13	=	NA	8	MG/KG
CH2M HILL	24	BENZO(b)FLUORANTHENE	SB34C	3 to 5	0.12	=	NA	5	MG/KG
CH2M HILL	24	BENZO(g,h,i)PERYLENE	SB34C	3 to 5	0.13	=	NA	1400	MG/KG
CH2M HILL	24	BENZO(k)FLUORANTHENE	SB34C	3 to 5	0.1	J	NA	49	MG/KG
CH2M HILL	24	BERYLLIUM	SB34B	3 to 5	0.1	J	1.2	63	MG/KG
CH2M HILL	24	CADMIUM	SB34A	3 to 5	0.27	J	1.4	8	MG/KG
CH2M HILL	24	CADMIUM	SB34B	3 to 5	0.28	J	1.4	8	MG/KG
CH2M HILL	24	CALCIUM	SB34B	3 to 5	912	=	2400	NA	MG/KG
CH2M HILL	24	CHROMIUM	SB34A	13 to 15	22.8	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34A	18 to 20	40.8	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34A	3 to 5	15.8	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34A	8 to 10	24.4	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34B	13 to 15	26.7	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34B	18 to 20	30.1	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34B	3 to 5	16.3	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34B	8 to 10	24.9	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34C	13 to 15	21.6	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34C	18 to 20	35.5	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34C	3 to 5	12.8	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34C	3 to 5	27.4	=	26	38	MG/KG
CH2M HILL	24	CHROMIUM	SB34C	8 to 10	27.9	=	26	38	MG/KG
CH2M HILL	24	CHRYSENE	SB34C	3 to 5	0.15	=	NA	160	MG/KG
CH2M HILL	24	COBALT	SB34B	3 to 5	10	=	20	NA	MG/KG
CH2M HILL	24	COPPER	SB34A	13 to 15	13.4	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB34A	18 to 20	9.4	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB34A	3 to 5	19.5	=	33	NA	MG/KG

Table 34-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	24	COPPER	SB34A	8 to 10	15	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB34B	13 to 15	14.3	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB34B	18 to 20	10.5	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB34B	3 to 5	21.9	J	33	NA	MG/KG
CH2M HILL	24	COPPER	SB34B	8 to 10	16.2	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB34C	13 to 15	12.7	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB34C	18 to 20	11.2	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB34C	3 to 5	16.5	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB34C	3 to 5	18.8	=	33	NA	MG/KG
CH2M HILL	24	COPPER	SB34C	8 to 10	16.6	=	33	NA	MG/KG
CH2M HILL	24	FLUORANTHENE	SB34C	3 to 5	0.34	=	.045	4300	MG/KG
CH2M HILL	24	FLUORENE	SB34C	3 to 5	0.15	=	NA	560	MG/KG
CH2M HILL	24	IRON	SB34B	3 to 5	24200	=	38000	NA	MG/KG
CH2M HILL	24	LEAD	SB34A	13 to 15	7.3	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34A	18 to 20	8	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34A	3 to 5	13	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34A	8 to 10	9.1	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34B	13 to 15	7.9	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34B	18 to 20	9	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34B	3 to 5	13.7	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34B	8 to 10	9.2	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34C	13 to 15	6.8	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34C	18 to 20	7.9	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34C	3 to 5	11.1	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34C	3 to 5	13.5	=	24	1.5	MG/KG
CH2M HILL	24	LEAD	SB34C	8 to 10	10.4	=	24	1.5	MG/KG
CH2M HILL	24	MAGNESIUM	SB34B	3 to 5	3030	=	4900	NA	MG/KG
CH2M HILL	24	MANGANESE	SB34B	3 to 5	1090	=	1500	NA	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB34B	18 to 20	0.002	J	NA	.02	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB34C	3 to 5	0.001	J	NA	.02	MG/KG
CH2M HILL	24	METHYLENE CHLORIDE	SB34C	3 to 5	0.003	J	NA	.02	MG/KG

Table 34-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	24	METHYLENE CHLORIDE	SB34C	8 to 10	0.002	J	NA	.02	MG/KG
CH2M HILL	24	NICKEL	SB34A	13 to 15	15.7	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34A	18 to 20	11.9	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34A	3 to 5	19.9	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34A	8 to 10	16	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34B	13 to 15	15.1	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34B	18 to 20	12.4	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34B	3 to 5	21.2	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34B	8 to 10	16.8	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34C	13 to 15	14.9	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34C	18 to 20	15.4	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34C	3 to 5	17.7	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34C	3 to 5	16.8	=	37	130	MG/KG
CH2M HILL	24	NICKEL	SB34C	8 to 10	17.8	=	37	130	MG/KG
CH2M HILL	24	PHENANTHRENE	SB34C	3 to 5	0.37	=	NA	4300	MG/KG
CH2M HILL	24	POTASSIUM	SB34B	3 to 5	3190	=	1800	NA	MG/KG
CH2M HILL	24	PYRENE	SB34C	3 to 5	0.26	=	.042	2800	MG/KG
CH2M HILL	24	TRICHLOROETHYLENE (TCE)	SB34A	13 to 15	0.007	J	NA	.06	MG/KG
CH2M HILL	24	TRICHLOROETHYLENE (TCE)	SB34A	18 to 20	0.002	J	NA	.06	MG/KG
CH2M HILL	24	TRICHLOROETHYLENE (TCE)	SB34A	8 to 10	0.004	J	NA	.06	MG/KG
CH2M HILL	24	VANADIUM	SB34B	3 to 5	38.4	=	51	6000	MG/KG
CH2M HILL	24	ZINC	SB34A	13 to 15	41.1	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB34A	18 to 20	32.9	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB34A	3 to 5	66.3	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB34A	8 to 10	53.7	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB34B	13 to 15	37.4	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB34B	18 to 20	31	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB34B	3 to 5	74.5	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB34B	8 to 10	51.1	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB34C	13 to 15	37.3	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB34C	18 to 20	35.5	=	110	12000	MG/KG

Table 34-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 34
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	24	ZINC	SB34C	3 to 5	60.8	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB34C	3 to 5	55.3	=	110	12000	MG/KG
CH2M HILL	24	ZINC	SB34C	8 to 10	59.7	=	110	12000	MG/KG

Notes:

1. Detected values are obtained from the *Draft Parcel 24 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. RBC-GWP values are obtained from the *EPA Region III Risk-based Concentrations Table*, R. L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
= - indicates unqualified detection
J - indicates estimated value above the detection limit but below the reporting limit.
RBC-GWP - Risk-Based Concentrations - Groundwater Protection

TAB

Parcel 25

Parcel 25

Remedial Investigation Sites Sampling Program

for

Defense Distribution Depot Memphis, Tennessee

May 1998

Prepared for

U.S. Army Engineering and Support Center, Huntsville

Prepared by

CH2M HILL

2567 Fairlane Drive

Montgomery, Alabama 36116

139282.RR.ZZ

Parcel 25 Report
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Parcel 25 is a 830,835-square-foot (ft^2) parcel in the southwestern part of the Main Installation in Operable Unit (OU)-2. Parcel 25 consists of Buildings 873 and 875 and the adjacent railroad tracks. Two samples were collected at the Remedial Investigation (RI) Site 27, the Former Recoupment Area (Building 873), in this parcel during the RI Sampling Program. RI sites are locations at the Defense Distribution Depot Memphis, Tennessee (DDMT) that have been known to have past releases as a result of facility operations. These sites have been previously identified as requiring a RI and have a confirmed presence of contaminants.

Most samples from RI Site 27 were collected in Parcel 24. Therefore, the RI Site 27 sampling results are discussed in Parcel 24.

TAB

Parcel 35

Remedial Investigation Sites Sampling Program

for

Defense Distribution Depot Memphis, Tennessee

May 1998

Prepared for

U.S. Army Engineering and Support Center, Huntsville

Prepared by

CH2M HILL

2567 Fairlane Drive

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Parcel 35 Report
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Parcel 35 is a 262,545-square-foot (ft^2) parcel in the southwestern part of the Main Installation in Operable Unit (OU)-2. Parcel 35 consists of Buildings 1084, 1086, 1087, 1088, 1090, and 1091. This parcel includes two screening sites and one Remedial Investigation (RI) site, but this report addresses only the RI site data. Samples were collected at RI Site 32 in this parcel during the RI Sampling Program. Sampling activities at this site are described below.

The RI Sites in this document have been identified by the Defense Distribution Depot Memphis, Tennessee (DDMT) through a review of existing documents, interviews with facility personnel, and knowledge of the facility's operations. RI sites are locations at DDMT that have been known to have past releases as a result of facility operations. These sites have been previously identified as requiring a RI and have a confirmed presence of contaminants. The following RI Site is located in Parcel 3:

- RI Site 32: Sandblasting Waste Accumulation Area (Subparcel 35.5)

Additional sites identified with past potential releases to the environment from past operations are addressed in the Screening Sites Sampling Program. General areas within the installation without any known industrial operations involving hazardous chemicals were addressed in the Base Realignment and Closure (BRAC) Sampling Program. Results of these programs are addressed in separate letter reports.

The purpose of the RI Sampling Program, which is part of the Remedial Investigation/ feasibility study (RI/FS), is to accomplish the following:

- Characterize releases from the sites
- Assess the nature and extent of soil and surface water contamination attributable to past operations
- Gather and evaluate data to determine the need for interim remedial actions for the sites
- Evaluate the risk to human health and the environment as part of the comprehensive RI
- Assess the feasibility of remedial actions for the sites needing further actions

The purpose of this letter report is to evaluate the results of the RI Sampling Program and sampling from previous investigations, determine whether adequate sampling has been performed for an RI, and recommend further actions at RI sites in this parcel. The remainder of this report presents the results of past investigations; RI Sampling Program strategy, procedures, and results; and recommendations for each site.

Surface soils, subsurface soils, and surface water were investigated as part of the RI Sampling Program. Surface soil samples (any sample whose lowest depth is 2 feet or less) were taken both as independent samples and as the upper interval of a soil boring profile. Thus, surface soil samples taken as part of a soil boring may have an "SB" designation and are initially discussed under Subsurface Soil Sampling Procedure (Section 2.2.2.2). However, the results from that upper interval are presented in the surface soil tables and discussions in Section 3.0.

Site 32: Sandblasting Waste Accumulation Area

1.0 Introduction

Table 1 presents the location and status information for this site.

TABLE 1
Parcel 35, Site 32 Information
Remedial Investigation Sampling Program, Defense Distribution Depot Memphis, Tennessee

Parcel	Building Number	RI/FS OU	Site Number	CERCLA[1] Status
35	1088	2	32	RI

[1]CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act

Site 32 consists of a corrugated-steel shed with a gravel floor located next to Building 1088 (sandblasting area). Three hoppers collect dust from the sandblasting operations and deposit the dust into 55-gallon drums. The site has been in service since the 1950s. Before Building 1088 and the hopper system were used, sandblasting was conducted on the open ground in the general vicinity of Building 1087. The site configuration, sample locations, and constituents exceeding Risk-Based Criteria (RBC) are shown in Figure 1.

2.0 Study Area Investigation

This discussion includes details of the sampling conducted by CH2M HILL for the RI Sampling Program efforts. The historical data results are included in the following discussions as well; however sampling strategy and analysis included in the historical reports are not repeated here.

2.1 Previous Investigations

Surface soil samples (SS15, SS16, SS17, SS18, SS19, and SS46) collected during the 1990 RI (Law Environmental, 1990) in the vicinity of RI Site 32 have indicated the presence of metals, pesticides, polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PAHs). The RI Sampling Program further defined the extent of these chemicals at the site.

2.2 RI Sampling Program

2.2.1 Sampling Strategy

This sampling strategy was developed to evaluate whether releases have occurred to surface and subsurface soil. For this sampling program, surface and subsurface soil samples were located during the current RI effort to assess the vertical and horizontal extent of soil contamination from past activities in this area. At least one sample for each media was analyzed for target compound list/target analyte list (TCL/TAL) constituents in accordance with the *Operable Unit 2 Field Sampling Plan* (CH2M HILL, 1995).

Results from the 1990 RI conducted by Law Environmental indicated heavy metals contamination at RI Site 32. As a result, sampling was focused around the northern end of Buildings 1087 and 1088 because the area near the southern end of these buildings was investigated during the Screening Sites Sampling Program. The locations were selected to provide a systematic coverage of the area.

2.2.2 Sampling Procedures

This section describes the sampling procedures and laboratory analyses performed for surface and subsurface soil.

2.2.2.1 Surface Soil Sampling Procedures

With the approval of the Tennessee Department of Environment and Conservation (TDEC) and the U.S. Environmental Protection Agency (EPA), surface soil samples were collected from seven locations (SB32A, SS32B, SS32C, SS32D, SS32E, SS32F, and SS32G) at this site (shown in Figure 1). All surface soil samples were collected from the interval of zero to 1 foot. Surface soil samples associated with borings are discussed in Section 2.2.2.2. The following details each sample location:

- Sample SS32B was taken 3 feet west and 1 feet south of the northwest corner of Building 1088 Sand Blasting Area.
- Sample SS32C was taken 9 feet east of the northeast corner of Building 1088, Sand Blasting Area.
- Sample SS32D was taken 10 feet east and 12 feet north of the northeast corner of Building 1087.
- Sample SS32E was taken 10 feet east and 22 feet south of the northeast corner of Building 1087.
- Sample SS32F was taken 7 feet east of Building 1087 and 24 feet south of Sample SS32E.
- Sample SS32G was taken 7 feet west of Building 1087 and 22 feet south of Sample SB32A.

The surface soil samples were collected using a stainless-steel hand auger. Volatile organic compound (VOC) samples were collected from the first auger bucket before compositing to prevent volatilization. Part of the VOC sample was placed in a sealable plastic bag for head space analysis with a photoionization detector (PID). The results of the head space analyses

were used to select samples for analysis of the TCL/TAL parameters and Level 3 constituents of potential concern (COPC) analysis. Even though VOCs were not a COPC for this site, VOC jars were filled for each sample because one surface sample was required to be submitted for TCL/TAL analysis based on head space results. The VOC jars were not submitted to the laboratory for the samples not analyzed for the TCL/TAL.

The remaining soil from each sample was composited in a stainless-steel bowl and then transferred into the appropriate sample jars. All sampling tools were decontaminated before each use according to the procedures specified in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at the DDMT.

2.2.2.2 Subsurface Soil Sampling Procedures

With the approval of the TDEC and EPA, one subsurface soil sample (SB32A) was taken at this site (shown in Figure 1). Sample SB32A was taken 7 feet west and 27 feet south of the northwest corner of Building 1087 at two depths: 3 to 5 feet and 8 to 10 feet. The sample was located between Buildings 1087 and 1088.

This subsurface sample was collected using a 2-inch-diameter, stainless-steel, core-barrel sampler. The entire length of each soil core was screened with a PID for organic vapors before sample collection so that sampling intervals could be biased toward any contamination detected by the field screening. Part of each sample was placed in a sealed plastic bag for head space analysis with a PID. Results of the head space analyses were used to select samples for Level 3 COPC analysis. The remaining soil from each sample was composited in a stainless-steel bowl and then transferred into the appropriate sample jars. All sampling tools were decontaminated before each use according to the procedures outlined in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at DDMT.

2.2.3 Analytical Procedures

All samples were submitted to CH2M HILL's Analytical Services in Montgomery, Alabama for analysis. Six surface soil and two subsurface soil samples were analyzed for priority pollutant metals, PAHs, pesticides, and PCBs. One surface soil sample, which exhibited the highest field head space result, was analyzed for the TCL/TAL parameters. Samples received at the laboratory were analyzed in accordance with the procedures specified in the *Generic Quality Assurance Project Plan* (CH2M HILL, 1995) for the RI/FS currently being conducted at DDMT.

A data quality evaluation (DQE) was performed to assess the effect of the overall analytical process on the usability of the data. The DQE established that the detection of acetone, 2-butanone, and bis(2-ethylhexyl)phthalate can be attributed to field sampling and laboratory contamination rather than environmental conditions at the site. Also, poor duplicate precision for metals in the duplicate soil samples should be attributed to poor sample homogeneity as well as to potentially poor sampling and analysis precision. With exception to the qualifications listed above, the DQE concluded that data can be used in the project decision-making process.

3.0 Interpretation of Sampling Results

3.1 Presentation of Results

Sections 3.1.1 and 3.1.2 present results of the RI Sampling Program for RI Site 32. Data are presented by media for surface and subsurface soil and compared with appropriate screening criteria in Tables 32-A, 32-B, and 32-C. Data from the 1997 CH2M HILL investigation are presented along with historical data from the *Remedial Investigations at DDMT, Final Report* (Law Environmental, 1990). If a value from a sampling location exceeds one of the comparison criteria, that value and the comparison criterion are shown in bold on the summary table.

COPCs are parameters that exceed both background values and the screening criteria. Where concentrations exceed the selected background value, the concentrations are compared with the observed range of background values as reviewed and established by the BRAC Cleanup Team (BCT).

COPCs identified for RI Site 32 include antimony, arsenic, lead, cadmium, and chromium. Historical parameters of concern detected during the 1990 RI conducted by Law Environmental include PAH compounds, PCBs, dieldrin, dichlorodiphenyltrichloroethane (DDT), methylene chloride, and cadmium.

3.1.1 Surface Soil

Results of the surface soils analyses with values above detection limits are shown in Tables 32-A and 32-B.

3.1.1.1 BCT Screening Criteria

Table 32-A summarizes constituents for which the BCT has selected a screening criteria for surface soil. COPCs in the surface soil for which the BCT has selected screening criteria values include the following metals: antimony, arsenic, chromium, and lead. The highest concentrations of metals were detected in Sample SB32A.

Antimony was detected in Sample SB32A at 22.3 milligrams per kilogram (mg/kg), which exceeds the BCT (background) value of 7 mg/kg. The 1990 RI conducted by Law Environmental detected antimony concentrations up to 30 mg/kg. Arsenic was detected in Sample SB32A at 42.5 mg/kg, which exceeds the BCT (background) value of 20 mg/kg. Previous detections of arsenic were below background values.

Chromium was detected in seven samples at elevated concentrations ranging from 45.2 mg/kg to 915 mg/kg, with the highest concentration detected in Sample SB32A. These concentrations exceed a health-based RBC (BCT) value of 39 mg/kg and the background value of 24.8 mg/kg. The 1990 RI conducted by Law Environmental detected even higher concentrations of chromium ranging from 78 mg/kg to 8,680 mg/kg.

Lead was detected in six samples at elevated concentrations ranging from 563 mg/kg to 4,150 mg/kg, with the highest concentration detected in Sample SB32A. These concentrations exceed the BCT value of 400 mg/kg and the background value of 30 mg/kg. The previous RI detected even higher concentrations of lead ranging from 2,060 mg/kg to 17,500 mg/kg.

PAH compounds, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, and indeno(1,2,3-c,d)pyrene, were found at concentrations exceeding the screening criteria in the 1990 RI conducted by Law Environmental. The observed PAH concentrations were elevated in Samples SS16 and SS19. PAH concentrations were not detected above screening criteria and background values in the recent sampling event. PAH compounds appear to exist throughout the Main Installation, and could be from non-point sources such as railroad tracks, runoff from asphalt paved roads, vehicular traffic etc., and will be addressed in an upcoming sitewide risk evaluation.

Elevated concentrations of PCBs were detected during the previous RI at concentrations ranging from 0.095 mg/kg to 10 mg/kg, which exceed the BCT value of 0.083 mg/kg. A background value for PCB in surface soil was not available for comparison.

3.1.1.2 Other Screening Criteria

Table 32-B summarizes the remaining constituents compared with the screening criteria for both residential and industrial exposure scenarios. Cadmium was detected at concentrations that exceed the background values and the residential RBC for soil ingestion. DDT and dieldrin were detected in the 1990 RI conducted by Law Environmental at concentrations that exceed the background value and the industrial and residential RBC for soil ingestion.

Cadmium was detected in Sample SB32A at 5.8 mg/kg, which exceeds the background value of 1.4 mg/kg and the residential RBC of 3.9 mg/kg. Cadmium was detected in the 1990 RI conducted by Law Environmental at 23.4 mg/kg (Sample SS16), 4.7 mg/kg (Sample SS18), and 4.4 mg/kg (Sample SS19), all of which exceed the background and the residential RBC.

DDT was detected in six CH2M HILL samples at concentrations below background and screening criteria values. However, DDT was detected in one sample (SS16) from the 1990 RI conducted by Law Environmental at 7.4 mg/kg, which exceeds the background value of 0.074 mg/kg and the residential RBC of 1.9 mg/kg.

During the 1990 RI, dieldrin concentrations were detected at 0.11 mg/kg (Sample SS15), 0.41 mg/kg (Sample SS16) and 0.22 mg/kg (Sample SS19), all of which exceed the background value of 0.086 mg/kg and the residential RBC of 0.04 mg/kg (Law Environmental, 1990). The detected concentration in Sample SS16 also exceeds the industrial RBC of 0.36 mg/kg. Dieldrin was detected below background values in the recent sampling event.

3.1.2 Subsurface Soil

Results of the subsurface soils analyses with comparisons against screening criteria for chemical concentration values above detection limits are shown in Table 32-C. Common laboratory contaminants, bisethylhexyl phthalate, acetone, and methylene chloride, were detected during the 1990 RI in subsurface soils at various depths, not in shallow soils. Methylene chloride was detected in the 1990 RI (Law Environmental, 1990) at 0.021 mg/kg (depth of 78 to 83 feet), which slightly exceeds the RBC-groundwater protection value of 0.02 mg/kg. Methylene chloride was not detected in the subsurface soil during the recent RI sampling event. Methylene chloride is a common laboratory contaminant and may not be site related.

3.2 Vertical and Lateral Extent

This site is an old paint-stripping facility. All the suspected areas were sampled during the two sampling efforts. A total of twelve surface soil samples and one subsurface soil sample were collected at RI Site 32 in order to characterize potential releases from the site. Based on the data collected so far, the observed contamination is limited to the surface soils, and no leaching is apparent. COPCs (antimony, arsenic, chromium, lead, and cadmium) and historical parameters of concern, including PAH compounds, PCBs, and pesticides, were detected in the surface soil at elevated concentrations. Methylene chloride, a common laboratory contaminant, was detected in the subsurface soil during the 1990 RI (Law Environmental, 1990).

Elevated concentrations of antimony, arsenic, chromium, and lead were detected in the surface soil at Sample SB32A, taken east of Building 1088 and west of Building 1087. Detections of chromium and lead at this boring were greater than ten times the screening level values. Furthermore, chromium and lead were detected at high concentrations in the other surface soil samples (SS32B, SS32C, SS32D, and SS32G). These samples were taken west of Building 1088 on the north end (Sample SS32B), at the northwest corner of Building 1087 (Sample SS32C), southeast of Building 1088 (Sample SS32G), and east of Building 1087 on the north end (Sample SS32D). The concentrations of chromium and lead detected in Samples SS32E and SS32F were within the background value range. These two samples were taken east of Building 1087, just south of Sample SS32D. Concentrations of these metals and PCBs appear to be higher in the sampling areas investigated by Law Environmental, however nature of the contamination is similar across the site, indicating it could be from site-related paint removal operations.

PAH compounds were detected in Samples SS19 and SS16 at elevated concentrations during the 1990 RI conducted by Law Environmental. Sample SS19 was taken north of Building 1088, and Sample SS16 was taken east of Building 1088 on the southern end (west of Building 1087). The detected concentrations ranged from 1.2 mg/kg to 4.6 mg/kg. Note that Sample SB32A was taken in the same vicinity as Sample SS16, and there were no elevated detections of PAH compounds above background values.

DDT and dieldrin were detected at elevated concentrations in Samples SS15, SS16, and SS19 from the 1990 RI (Law Environmental, 1990). DDT, dieldrin, and other pesticides were detected in most of the CH2M HILL samples but not at concentrations above screening criteria values. PAH compounds, DDT, and dieldrin are found in surface soil throughout the Main Installation and will be addressed in an upcoming sitewide risk evaluation.

PCB compounds were detected at elevated concentrations in Samples SS15 and SS17 from the 1990 RI (Law Environmental, 1990). Sample SS15 was taken a few hundred feet south of Building 1088, and Sample SS17 was taken near the southwest corner of Building 1088. The recent RI samples did not detect any PCB compounds, but the samples were collected north of the 1990 RI samples (SS15 and SS17). Screening Site 33 samples, however, were collected near the 1990 RI samples, and concentrations of PCBs were not detected in these samples either. PCB compounds appear to be concentrated in the area south of Building 1088, as observed in the historical data only.

It appears that the surface soil at this site is contaminated with metals due to sandblasting activities. The extent of arsenic and antimony contamination in the surface soil appears to be defined at Samples SB32A and SS16, which were taken adjacent to each other. No other

exceedances of antimony and arsenic were detected in the surface soil samples at this site nor the screening site samples taken near the site. The lateral extent of chromium and lead contamination in surface soil at RI Site 32 appears to cover the entire site. There were exceedances detected in most of the outer limit samples, including Screening Site 31 and 33 samples taken just south of the site.

The vertical extent of contamination has been defined because contaminants observed in surface soils have not leached to the subsurface soil.

3.3 Potential Migration Pathways

Arsenic exists at several sites on DDMT in surface soils at concentrations above screening levels. Arsenic's mobility and toxicity are tied to its complex geochemistry and its ability to readily form soluble complexes. Arsenic may also readily be adsorbed onto clays, oxides, or humic organic material and may migrate as suspended soil in surface water or as a sediment. Arsenic can exist in four common oxidation states, and these control its solubility. It readily transports through aquatic environments as a dissolved salt or as a complex with an organic compound.

Chromium has been reported from surface and subsurface soils at DDMT in concentrations greater than the screening levels. Chromium occurs in two oxidation states: +3 and +6. The trivalent form, which is of little risk, readily combines with aqueous hydroxide to form insoluble chromium hydroxide. The hexavalent form is soluble and tends to stay in solution, unless some activated carbon material is present for it to sorb onto. Dissolved chromium is readily adsorbed onto sediments but may be bioaccumulated through aquatic organisms.

Lead is present at concentrations greater than background, or above screening criteria, in surface soils, subsurface soils, and sediment at DDMT. Lead is moderately soluble and potentially can be leached from any of these forms of occurrence, reaching concentrations in aqueous solution in both groundwater and surface water that would be of concern to both human and ecological receptors. Additionally, lead in surface soils and sediment potentially may move as suspended particulate matter in surface waters and impact aquatic organisms.

Benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, benzo(b)fluoranthene, and indeno(1,2,3-c,d)pyrene—a group of related, long-chain PAHs—have similar chemical and physical characteristics and tend to migrate and behave in the environment in a similar manner. Generally, these compounds have low vapor pressures, are only marginally soluble in water, and have a high affinity for soils. All of these compounds have been detected at concentrations above screening values for surface soils at DDMT. They would be expected to migrate as adsorbed components of the soils and would potentially be available to aquatic organisms in turbid surface water or to bottom feeders in areas with contaminated sediments. That none of these compounds was detected in sediments indicates this is not a major source of contaminant migration for these compounds at this site. These compounds do not bioaccumulate significantly due to their rapid metabolism and excretion by most aquatic organisms.

PCBs, as a group, are relatively insoluble in water; therefore, they tend to migrate primarily through physical transport such as erosion via surface water. At DDMT, PCB-1260 has been

detected at concentrations of concern in surface soils. This material is subject to migration either via wind action or surface water transport, and the PCB would be present as an absorbed chemical on the clay platelets that compose the soil. This material could potentially be ingested either by breathing contaminated dust or by aqueous organisms exposed to turbid water or bottom feeding of contaminated sediment.

DDT and two of its degradation breakdown products, DDD and DDE, exist in subsurface soils at DDMT; these products should not be mobile in this environment. These compounds have an extremely high affinity for soil and are essentially insoluble in water. As long as they are buried and the potential for direct contact is controlled, the potential to migrate is minimal. Should soil contaminated with these compounds be uncovered, they potentially would be able to be moved through wind action and/or as suspended material in surface water. DDT also was reported in sediments at two sites on DDMT, indicating migration via this pathway has occurred. These compounds can bioaccumulate and become more concentrated as they move up in the food chain and could potentially affect receptors via this migration pathway.

Dieldrin exists at DDMT in surface and subsurface soils. Since this compound is only minutely soluble in water, its most likely migration pathway at this site is via erosion as suspended soil particles in the surface water where it potentially would be available to aquatic organisms. Dieldrin in the subsurface soils should be relatively immobile and not impact groundwater quality.

A site-specific fate and transport evaluation of these chemicals will be included as part of the RI report.

3.4 Additional Data Needs

Potential risks associated with metals found at high concentrations requires further risk evaluation without additional sampling. The site has surface soils with metals (chromium and lead) well above the comparison criteria. Available data are considered sufficient to perform this analysis, and no additional data collection is required.

Subsurface soils samples indicate leaching has not occurred at the site, and deep soils are free of contamination.

Additional data may be needed to support the risk evaluation for dieldrin or PAH compounds.

4.0 Interpretation of Screening Criteria Comparisons

4.1 Methodology

The Preliminary Risk Evaluation (PRE) was performed in accordance with the *Guidance on Preliminary Risk Evaluations for the Purpose of Reaching a Finding of Suitability to Lease (FOSL)* (EPA Region IV, 1994). A discussion of the PRE methodology in provided as Appendix A to this document.

4.2 RI Site 32 Risk

Carcinogenic and noncarcinogenic risks for RI Site 32 are presented in Table 4-66 of the draft PRE (United States Army Engineer Support Center [USAESC, 1998]), and detailed chemical-specific estimates are presented in Appendix A of the PRE.

The PRE risk ratios were well above 1 in a million levels for both the industrial and residential scenarios, primarily from the presence of arsenic and a PAH compound.

The noncarcinogenic PRE ratio was below a value of 1.0 for the industrial scenario and was above 1.0 for a residential scenario due to the presence of metals, chromium and lead. Lead does not have toxicity value, however the generally acceptable RBC values of 400 mg/kg for residential and 1,000 mg/kg for industrial criteria were exceeded.

5.0 Summary and Recommendations

5.1 Summary

There are risks associated with RI Site 32 because arsenic, chromium, and lead exist above background levels. The observed metals concentrations are related to the site operations of painting and sand blasting.

According to Table 5-2 of the PRE, results indicate that the carcinogenic risk ratio is above one in a million for both the industrial and residential scenarios primarily from the presence of arsenic and a PAH compound. The PRE results also indicate that the noncarcinogenic residential ratio is above 1.0 due to the presence of metals.

5.2 Recommendations

Due to the significantly elevated levels of metals in the shallow soils, RI Site 32 has been identified for some type of remedial action for soils (BCT, 1997). An RI including a risk-based evaluation for human and ecological end points should be performed. Further comparison of the background population with the data collected from RI Site 32 is needed to determine if further action is required at this site. Available data (including data from other sampling events) are considered sufficient to perform this analysis, and no additional data collection is required.

Acronyms

BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COPC	constituent of potential concern
DDMT	Defense Distribution Depot Memphis, Tennessee
DDT	dichlorodiphenyltrichloroethane
DQE	Data Quality Evaluation
EPA	United States Environmental Protection Agency
FOSL	Finding of Suitability to Lease
ft^2	square feet
FS	feasibility study
mg/kg	milligrams per kilogram
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photoionization detector
PRE	Preliminary Risk Evaluation
RBC	risk-based criteria
RI	Remedial Investigation/Feasibility Study
TCL/TAL	target compound list/ target analyte list
TDEC	Tennessee Department of Environment and Conservation
USAESC	United States Army Engineer Service Center
VOC	volatile organic compound

Chemical	Concentration	Q
BENZO(a)ANTHRACENE	2.2	=
BENZO(a)PYRENE	1.5	J
BENZO(b)FLUORANTHENE	4.8	=
CHROMIUM	2,230	=
INDENO(1,2,3-c,d)PYRENE	1.5	J
LEAD	10,300	=
CADMIUM	4.4	=
DIELDRIN	0.22	=

Chemical	Concentration	Q
CHROMIUM	275	=
LEAD	693	=

Chemical	Concentration	Q
ANTIMONY	30	=
BENZO(a)ANTHRACENE	2.1	J
BENZO(a)PYRENE	1.7	J
BENZO(b)FLUORANTHENE	2.4	J
CHROMIUM	6,710	=
INDENO(1,2,3-c,d)PYRENE	1.2	J
LEAD	17,500	=
PCB-1254 (AROCHLOR 1254)	10	=
CADMIUM	23.4	=
DDT	7.4	=
DIELDRIN	0.41	=

Chemical	Concentration	Q
BENZO(a)PYRENE	0.14	J
CHROMIUM	138	=

Chemical	Concentration	Q
BENZO(a)PYRENE	0.13	=
CHROMIUM	207	=
LEAD	766	=

Chemical	Concentration	Q
BENZO(a)PYRENE	0.61	=
CHROMIUM	138	=
LEAD	678	=

Chemical	Concentration	Q
ANTIMONY	22.3	=
ARSENIC	42.5	=
BENZO(a)PYRENE	0.16	=
CHROMIUM	815	=
LEAD	4,150	=
CADMIUM	5.8	=
DIELDRIN	0.059	=

Chemical	Concentration	Depth	Q
LEAD	9.1	3 to 5	=
LEAD	10.9	8 to 10	=

Chemical	Concentration	Q
BENZO(b)FLUORANTHENE	1.3	J
CHROMIUM	109	=
PCB-1016 (AROCHLOR 1016)	0.14	=
PCB-1232 (AROCHLOR 1232)	0.55	=
PCB-1242 (AROCHLOR 1242)	0.2	=

Chemical	Concentration	Q
BENZO(a)PYRENE	0.12	=
CHROMIUM	338	=
CHROMIUM	164	=
LEAD	1,580	=
LEAD	563	=
DIELDRIN	0.062	=
DIELDRIN	0.05	=

Chemical	Concentration	Q
BENZO(a)PYRENE	0.15	=
CHROMIUM	45.2	=

Chemical	Concentration	Q
CHROMIUM	78	=

Chemical	Concentration	Q
ANTIMONY	26	=
BENZO(a)PYRENE	0.37	J
CHROMIUM	8,680	=
LEAD	2,060	=
CADMIUM	4.7	=

Chemical	Concentration	Q
BENZO(a)PYRENE	0.38	J

Chemical	Concentration	Depth	Q
METHYLENE CHLORIDE	0.021	78 to 83	=

Chemical	Concentration	Q
ANTIMONY	6	=
CHROMIUM	714	=
LEAD	2,670	=
PCB-1016 (AROCHLOR 1016)	0.1	=
PCB-1221 (AROCHLOR 1221)	0.095	=
PCB-1232 (AROCHLOR 1232)	0.27	=
PCB-1242 (AROCHLOR 1242)	0.13	=
DIELDRIN	0.11	=

SB-89D, SS-89A, SB-89A, MW-21, SB-15, A(35.3), SS-89J, SS-89B, SB-89B, B(35.2), A(35.2), SS-89I, SS-89H, SS-89F, SB-89C, SS-45, SS-19, SS-32C, SS-32D, SS-32E, SS-16, SS-32B, SS-17, SB-32A, SS-32G, SS-33B, SB-33B, SS-32F, SB-33C, SS-46, SS-33A, SS-33C, SS-31C, SS-31D, SS-15, SB-31B, SB-31A, SS-18, SB-33A, SS-31B, SS-31A, MW-22, STB-5, SB-8, A(23.9), RAMP, 1084, 1088, 1090, 1091, 895, Concrete, Asphalt, RAIL ROAD, MAP SCALE: 1" = 100'

N W E S

LEGEND

- Surface Soil Sampling Location (mg/kg)
- Soil Boring Sampling Location (mg/kg)
- Surface Water Sampling Location (mg/L)
- Sediment Sample Location (mg/kg)

(Q) Qualifer 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 1
RI Site 32, SandBlasting Waste Accumulation Area
Constituents Exceeding Risk-Based Criteria
Defense Distribution Depot Memphis, TN

CH2MHILL

Table 32-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	35	ACENAPHTHENE	SB32A	0.068	=	NA	470	Residential RBC	MG/KG
CH2M HILL	35	ACENAPHTHENE	SS32E	0.089	J	NA	470	Residential RBC	MG/KG
CH2M HILL	35	ALUMINUM	SS32E	6390	=	24000	24000	Bkgd	MG/KG
CH2M HILL	35	ANTHRACENE	SB32A	0.07	=	.096	2300	Residential RBC	MG/KG
CH2M HILL	35	ANTHRACENE	SS32E	0.2	J	.096	2300	Residential RBC	MG/KG
CH2M HILL	35	ANTIMONY	SB32A	22.3	=	7	7	Bckg	MG/KG
CH2M HILL	35	ANTIMONY	SS32G	7	=	7	7	Bckg	MG/KG
CH2M HILL	35	ARSENIC	SB32A	42.5	=	20	20	Bckg	MG/KG
CH2M HILL	35	ARSENIC	SS32B	14.9	=	20	20	Bckg	MG/KG
CH2M HILL	35	ARSENIC	SS32C	11	=	20	20	Bckg	MG/KG
CH2M HILL	35	ARSENIC	SS32D	14.6	=	20	20	Bckg	MG/KG
CH2M HILL	35	ARSENIC	SS32E	7.7	=	20	20	Bckg	MG/KG
CH2M HILL	35	ARSENIC	SS32F	8.2	=	20	20	Bckg	MG/KG
CH2M HILL	35	ARSENIC	SS32G	17.1	=	20	20	Bckg	MG/KG
CH2M HILL	35	BENZO(a)ANTHRACENE	SB32A	0.15	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)ANTHRACENE	SS32B	0.73	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)ANTHRACENE	SS32C	0.073	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)ANTHRACENE	SS32D	0.12	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)ANTHRACENE	SS32E	0.5	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)ANTHRACENE	SS32F	0.14	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)ANTHRACENE	SS32G	0.13	=	.71	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)PYRENE	SB32A	0.16	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)PYRENE	SS32B	0.61	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)PYRENE	SS32C	0.07	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)PYRENE	SS32D	0.13	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)PYRENE	SS32E	0.38	J	.96	0.088	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)PYRENE	SS32F	0.15	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	35	BENZO(a)PYRENE	SS32G	0.12	=	.96	0.088	Residential RBC	MG/KG
CH2M HILL	35	BENZO(b)FLUORANTHENE	SB32A	0.14	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(b)FLUORANTHENE	SS32B	0.73	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(b)FLUORANTHENE	SS32C	0.057	=	.78	0.88	Residential RBC	MG/KG

Table 32-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	35	BENZO(b)FLUORANTHENE	SS32D	0.1	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(b)FLUORANTHENE	SS32E	0.39	J	.78	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(b)FLUORANTHENE	SS32F	0.14	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(b)FLUORANTHENE	SS32G	0.12	=	.78	0.88	Residential RBC	MG/KG
CH2M HILL	35	BENZO(g,h,i)PERYLENE	SB32A	0.14	=	.82	230	Residential RBC	MG/KG
CH2M HILL	35	BENZO(g,h,i)PERYLENE	SS32B	0.57	=	.82	230	Residential RBC	MG/KG
CH2M HILL	35	BENZO(g,h,i)PERYLENE	SS32D	0.089	=	.82	230	Residential RBC	MG/KG
CH2M HILL	35	BENZO(g,h,i)PERYLENE	SS32E	0.24	J	.82	230	Residential RBC	MG/KG
CH2M HILL	35	BENZO(g,h,i)PERYLENE	SS32F	0.13	=	.82	230	Residential RBC	MG/KG
CH2M HILL	35	BENZO(g,h,i)PERYLENE	SS32G	0.073	=	.82	230	Residential RBC	MG/KG
CH2M HILL	35	BENZO(g,h,i)PERYLENE	SS32G	0.1	=	.82	230	Residential RBC	MG/KG
CH2M HILL	35	BENZO(k)FLUORANTHENE	SB32A	0.13	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	35	BENZO(k)FLUORANTHENE	SS32B	0.72	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	35	BENZO(k)FLUORANTHENE	SS32C	0.057	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	35	BENZO(k)FLUORANTHENE	SS32D	0.11	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	35	BENZO(k)FLUORANTHENE	SS32E	0.39	J	.78	8.8	Residential RBC	MG/KG
CH2M HILL	35	BENZO(k)FLUORANTHENE	SS32F	0.18	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	35	BENZO(k)FLUORANTHENE	SS32G	0.11	=	.78	8.8	Residential RBC	MG/KG
CH2M HILL	35	CARBAZOLE	SS32E	0.16	J	.067	32	Residential RBC	MG/KG
CH2M HILL	35	CHROMIUM	SB32A	915	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	35	CHROMIUM	SS32B	138	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	35	CHROMIUM	SS32C	275	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	35	CHROMIUM	SS32D	207	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	35	CHROMIUM	SS32E	26.6	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	35	CHROMIUM	SS32F	45.2	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	35	CHROMIUM	SS32G	336	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	35	CHROMIUM	SS32G	164	=	24.8	39	Residential RBC	MG/KG
CH2M HILL	35	CHRYSENE	SB32A	0.17	=	.94	88	Residential RBC	MG/KG
CH2M HILL	35	CHRYSENE	SS32B	0.8	=	.94	88	Residential RBC	MG/KG
CH2M HILL	35	CHRYSENE	SS32D	0.12	=	.94	88	Residential RBC	MG/KG
CH2M HILL	35	CHRYSENE	SS32E	0.5	=	.94	88	Residential RBC	MG/KG
CH2M HILL	35	CHRYSENE	SS32F	0.15	=	.94	88	Residential RBC	MG/KG

Table 32-A
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Compared to BCT Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	35	CHRYSENE	SS32G	0.11	=	.94	88	Residential RBC	MG/KG
CH2M HILL	35	FLUORANTHENE	SB32A	0.37	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	35	FLUORANTHENE	SS32B	1.2	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	35	FLUORANTHENE	SS32C	0.11	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	35	FLUORANTHENE	SS32D	0.23	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	35	FLUORANTHENE	SS32E	1.3	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	35	FLUORANTHENE	SS32F	0.29	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	35	FLUORANTHENE	SS32G	0.1	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	35	FLUORANTHENE	SS32G	0.24	=	1.6	310	Residential RBC	MG/KG
CH2M HILL	35	FLUORENE	SB32A	0.094	=	NA	310	Residential RBC	MG/KG
CH2M HILL	35	FLUORENE	SS32E	0.086	J	NA	310	Residential RBC	MG/KG
CH2M HILL	35	INDENO(1,2,3-c,d)PYRENE	SB32A	0.15	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	35	INDENO(1,2,3-c,d)PYRENE	SS32B	0.46	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	35	INDENO(1,2,3-c,d)PYRENE	SS32D	0.11	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	35	INDENO(1,2,3-c,d)PYRENE	SS32E	0.24	J	.7	0.88	Residential RBC	MG/KG
CH2M HILL	35	INDENO(1,2,3-c,d)PYRENE	SS32F	0.14	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	35	INDENO(1,2,3-c,d)PYRENE	SS32G	0.088	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	35	INDENO(1,2,3-c,d)PYRENE	SS32G	0.12	=	.7	0.88	Residential RBC	MG/KG
CH2M HILL	35	IRON	SS32E	12800	=	37000	37000	Bckg	MG/KG
CH2M HILL	35	LEAD	SB32A	4150	=	30	400	CERCLA	MG/KG
CH2M HILL	35	LEAD	SS32B	678	=	30	400	CERCLA	MG/KG
CH2M HILL	35	LEAD	SS32C	693	=	30	400	CERCLA	MG/KG
CH2M HILL	35	LEAD	SS32D	766	=	30	400	CERCLA	MG/KG
CH2M HILL	35	LEAD	SS32E	119	=	30	400	CERCLA	MG/KG
CH2M HILL	35	LEAD	SS32F	105	=	30	400	CERCLA	MG/KG
CH2M HILL	35	LEAD	SS32G	1580	=	30	400	CERCLA	MG/KG
CH2M HILL	35	LEAD	SS32G	563	=	30	400	CERCLA	MG/KG
CH2M HILL	35	MANGANESE	SS32E	475	=	1300	1300	Bckg	MG/KG
CH2M HILL	35	PHENANTHRENE	SB32A	0.38	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	35	PHENANTHRENE	SS32B	0.32	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	35	PHENANTHRENE	SS32C	0.093	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	35	PHENANTHRENE	SS32D	0.16	=	.61	2300	Residential RBC	MG/KG

Table 32-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
CH2M HILL	35	PHENANTHRENE	SS32E	0.88	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	35	PHENANTHRENE	SS32F	0.17	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	35	PHENANTHRENE	SS32G	0.089	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	35	PHENANTHRENE	SS32G	0.16	=	.61	2300	Residential RBC	MG/KG
CH2M HILL	35	PYRENE	SB32A	0.26	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	35	PYRENE	SS32B	1.1	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	35	PYRENE	SS32C	0.087	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	35	PYRENE	SS32D	0.16	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	35	PYRENE	SS32E	0.89	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	35	PYRENE	SS32F	0.24	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	35	PYRENE	SS32G	0.076	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	35	PYRENE	SS32G	0.17	=	1.5	230	Residential RBC	MG/KG
CH2M HILL	35	ZINC	SB32A	1460	=	130	23000	Residential RBC	MG/KG
CH2M HILL	35	ZINC	SS32B	519	=	130	23000	Residential RBC	MG/KG
CH2M HILL	35	ZINC	SS32C	507	=	130	23000	Residential RBC	MG/KG
CH2M HILL	35	ZINC	SS32D	416	=	130	23000	Residential RBC	MG/KG
CH2M HILL	35	ZINC	SS32E	72.1	=	130	23000	Residential RBC	MG/KG
CH2M HILL	35	ZINC	SS32F	4000	=	130	23000	Residential RBC	MG/KG
CH2M HILL	35	ZINC	SS32G	693	=	130	23000	Residential RBC	MG/KG
CH2M HILL	35	ZINC	SS32G	369	=	130	23000	Residential RBC	MG/KG
LAW	28	BENZO(a)ANTHRACENE	SS45	0.16	J	.71	0.88	Residential RBC	MG/KG
LAW	28	BENZO(a)PYRENE	SS45	0.14	J	.96	0.088	Residential RBC	MG/KG
LAW	28	BENZO(b)FLUORANTHENE	SS45	0.16	J	.78	0.88	Residential RBC	MG/KG
LAW	28	CHROMIUM	SS45	138	=	24.8	39	Residential RBC	MG/KG
LAW	28	CHRYSENE	SS45	0.22	J	.94	88	Residential RBC	MG/KG
LAW	28	FLUORANTHENE	SS45	0.34	J	1.6	310	Residential RBC	MG/KG
LAW	28	INDENO(1,2,3-c,d)PYRENE	SS45	0.12	J	.7	0.88	Residential RBC	MG/KG
LAW	28	LEAD	SS45	312	=	30	400	CERCLA	MG/KG
LAW	28	PHENANTHRENE	SS45	0.21	J	.61	2300	Residential RBC	MG/KG
LAW	28	PYRENE	SS45	0.44	J	1.5	230	Residential RBC	MG/KG
LAW	28	ZINC	SS45	202	=	130	23000	Residential RBC	MG/KG
LAW	35	ACENAPHTHENE	SS19	0.25	J	NA	470	Residential RBC	MG/KG

Table 32-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 32
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Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
LAW	35	ANTHRACENE	SS16	0.67	J	.096	2300	Residential RBC	MG/KG
LAW	35	ANTHRACENE	SS17	0.2	J	.096	2300	Residential RBC	MG/KG
LAW	35	ANTHRACENE	SS19	0.26	J	.096	2300	Residential RBC	MG/KG
LAW	35	ANTIMONY	SS15	8	=	7	7	Bckg	MG/KG
LAW	35	ANTIMONY	SS16	30	=	7	7	Bckg	MG/KG
LAW	35	ANTIMONY	SS18	26	=	7	7	Bckg	MG/KG
LAW	35	ANTIMONY	SS19	4	=	7	7	Bckg	MG/KG
LAW	35	ARSENIC	SS15	6	=	20	20	Bckg	MG/KG
LAW	35	ARSENIC	SS18	15	=	20	20	Bckg	MG/KG
LAW	35	BENZO(a)ANTHRACENE	SS16	2.1	J	.71	0.88	Residential RBC	MG/KG
LAW	35	BENZO(a)ANTHRACENE	SS17	0.62	J	.71	0.88	Residential RBC	MG/KG
LAW	35	BENZO(a)ANTHRACENE	SS19	2.2	=	.71	0.88	Residential RBC	MG/KG
LAW	35	BENZO(a)ANTHRACENE	SS46	0.09	J	.71	0.88	Residential RBC	MG/KG
LAW	35	BENZO(a)PYRENE	SS16	1.7	J	.96	0.088	Residential RBC	MG/KG
LAW	35	BENZO(a)PYRENE	SS18	0.37	J	.96	0.088	Residential RBC	MG/KG
LAW	35	BENZO(a)PYRENE	SS19	1.5	J	.96	0.088	Residential RBC	MG/KG
LAW	35	BENZO(a)PYRENE	SS46	0.084	J	.96	0.088	Residential RBC	MG/KG
LAW	35	BENZO(b)FLUORANTHENE	SS15	0.12	J	.78	0.88	Residential RBC	MG/KG
LAW	35	BENZO(b)FLUORANTHENE	SS16	2.4	J	.78	0.88	Residential RBC	MG/KG
LAW	35	BENZO(b)FLUORANTHENE	SS17	1.3	J	.78	0.88	Residential RBC	MG/KG
LAW	35	BENZO(b)FLUORANTHENE	SS18	0.83	J	.78	0.88	Residential RBC	MG/KG
LAW	35	BENZO(b)FLUORANTHENE	SS19	4.6	=	.78	0.88	Residential RBC	MG/KG
LAW	35	BENZO(b)FLUORANTHENE	SS46	0.16	J	.78	0.88	Residential RBC	MG/KG
LAW	35	BENZO(g,h,i)PERYLENE	SS16	1.4	J	.82	230	Residential RBC	MG/KG
LAW	35	BENZO(g,h,i)PERYLENE	SS17	0.84	J	.82	230	Residential RBC	MG/KG
LAW	35	BENZO(k)FLUORANTHENE	SS15	0.1	J	.78	8.8	Residential RBC	MG/KG
LAW	35	BENZO(k)FLUORANTHENE	SS16	2.2	J	.78	8.8	Residential RBC	MG/KG
LAW	35	BENZOIC ACID	SS19	0.32	J	NA	31000	Residential RBC	MG/KG
LAW	35	CHROMIUM	SS15	714	=	24.8	39	Residential RBC	MG/KG
LAW	35	CHROMIUM	SS16	6710	=	24.8	39	Residential RBC	MG/KG
LAW	35	CHROMIUM	SS17	109	=	24.8	39	Residential RBC	MG/KG
LAW	35	CHROMIUM	SS18	8680	=	24.8	39	Residential RBC	MG/KG

Table 32-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
LAW	35	CHROMIUM	SS19	2230	=	24.8	39	Residential RBC	MG/KG
LAW	35	CHROMIUM	SS46	78	=	24.8	39	Residential RBC	MG/KG
LAW	35	CHRYSENE	SS15	0.11	J	.94	88	Residential RBC	MG/KG
LAW	35	CHRYSENE	SS16	2.5	J	.94	88	Residential RBC	MG/KG
LAW	35	CHRYSENE	SS17	0.79	J	.94	88	Residential RBC	MG/KG
LAW	35	CHRYSENE	SS18	1	J	.94	88	Residential RBC	MG/KG
LAW	35	CHRYSENE	SS19	2.5	=	.94	88	Residential RBC	MG/KG
LAW	35	CHRYSENE	SS46	0.13	J	.94	88	Residential RBC	MG/KG
LAW	35	DIBENZOFURAN	SS19	0.21	J	.647	31	Residential RBC	MG/KG
LAW	35	FLUORANTHENE	SS15	0.22	J	1.6	310	Residential RBC	MG/KG
LAW	35	FLUORANTHENE	SS16	5.8	=	1.6	310	Residential RBC	MG/KG
LAW	35	FLUORANTHENE	SS17	1.8	J	1.6	310	Residential RBC	MG/KG
LAW	35	FLUORANTHENE	SS18	1.3	J	1.6	310	Residential RBC	MG/KG
LAW	35	FLUORANTHENE	SS19	3.2	=	1.6	310	Residential RBC	MG/KG
LAW	35	FLUORANTHENE	SS46	0.21	J	1.6	310	Residential RBC	MG/KG
LAW	35	FLUORENE	SS19	0.31	J	NA	310	Residential RBC	MG/KG
LAW	35	INDENO(1,2,3-c,d)PYRENE	SS16	**1.2**	**J**	.7	**0.88**	Residential RBC	MG/KG
LAW	35	INDENO(1,2,3-c,d)PYRENE	SS17	0.63	J	.7	0.88	Residential RBC	MG/KG
LAW	35	INDENO(1,2,3-c,d)PYRENE	SS19	**1.5**	**J**	.7	**0.88**	Residential RBC	MG/KG
LAW	35	LEAD	SS15	2670	=	30	400	CERCLA	MG/KG
LAW	35	LEAD	SS16	17500	=	30	400	CERCLA	MG/KG
LAW	35	LEAD	SS17	247	=	30	400	CERCLA	MG/KG
LAW	35	LEAD	SS18	2060	=	30	400	CERCLA	MG/KG
LAW	35	LEAD	SS19	10300	=	30	400	CERCLA	MG/KG
LAW	35	LEAD	SS46	166	=	30	400	CERCLA	MG/KG
LAW	35	PCB-1016 (AROCHLOR 1016)	SS15	**0.1**	=	NA	**0.083**	Residential RBC	MG/KG
LAW	35	PCB-1016 (AROCHLOR 1016)	SS17	**0.14**	=	NA	**0.083**	Residential RBC	MG/KG
LAW	35	PCB-1221 (AROCHLOR 1221)	SS15	**0.095**	=	NA	**0.083**	Residential RBC	MG/KG
LAW	35	PCB-1232 (AROCHLOR 1232)	SS15	**0.27**	=	NA	**0.083**	Residential RBC	MG/KG
LAW	35	PCB-1232 (AROCHLOR 1232)	SS17	**0.55**	=	NA	**0.083**	Residential RBC	MG/KG
LAW	35	PCB-1242 (AROCHLOR 1242)	SS15	**0.13**	=	NA	**0.083**	Residential RBC	MG/KG
LAW	35	PCB-1242 (AROCHLOR 1242)	SS17	**0.2**	=	NA	**0.083**	Residential RBC	MG/KG

Table 32-A
Summary of Detected Compounds in Surface Soils
Compared to BCT Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	BCT Value[4]	BCT Basis	Units
LAW	35	PCB-1254 (AROCHLOR 1254)	SS16	10	=	NA	0.083	Residential RBC	MG/KG
LAW	35	PHENANTHRENE	SS15	0.13	J	.61	2300	Residential RBC	MG/KG
LAW	35	PHENANTHRENE	SS16	3	J	.61	2300	Residential RBC	MG/KG
LAW	35	PHENANTHRENE	SS17	0.76	J	.61	2300	Residential RBC	MG/KG
LAW	35	PHENANTHRENE	SS18	0.78	J	.61	2300	Residential RBC	MG/KG
LAW	35	PHENANTHRENE	SS19	2.5	=	.61	2300	Residential RBC	MG/KG
LAW	35	PHENANTHRENE	SS46	0.12	J	.61	2300	Residential RBC	MG/KG
LAW	35	PYRENE	SS15	0.16	J	1.5	230	Residential RBC	MG/KG
LAW	35	PYRENE	SS16	4.7	=	1.5	230	Residential RBC	MG/KG
LAW	35	PYRENE	SS17	1.1	J	1.5	230	Residential RBC	MG/KG
LAW	35	PYRENE	SS18	0.86	J	1.5	230	Residential RBC	MG/KG
LAW	35	PYRENE	SS19	2.6	=	1.5	230	Residential RBC	MG/KG
LAW	35	PYRENE	SS46	0.25	J	1.5	230	Residential RBC	MG/KG
LAW	35	ZINC	SS15	996	=	130	23000	Residential RBC	MG/KG
LAW	35	ZINC	SS16	21000	=	130	23000	Residential RBC	MG/KG
LAW	35	ZINC	SS17	270	=	130	23000	Residential RBC	MG/KG
LAW	35	ZINC	SS18	22100	=	130	23000	Residential RBC	MG/KG
LAW	35	ZINC	SS19	4600	=	130	23000	Residential RBC	MG/KG
LAW	35	ZINC	SS46	146	=	130	23000	Residential RBC	MG/KG

Notes:

1. Detected values are obtained from the *Draft Parcel 35 Report-Remedial Investigation Sampling Program for Defense Depot* Memphis, TN, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Based on values selected by the BRAC Cleanup Team in the August 1997 BCT meeting minutes, Memphis, Tennessee.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection
BCT - BRAC Cleanup Team

Table 32-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	35	ACENAPHTHYLENE	SS32B	0.14	=	.19	NA	NA	MG/KG
CH2M HILL	35	BARIUM	SS32E	128	=	234	550	14000	MG/KG
CH2M HILL	35	CADMIUM	SB32A	5.8	=	1.4	3.9	100	MG/KG
CH2M HILL	35	CADMIUM	SS32B	1.9	=	1.4	3.9	100	MG/KG
CH2M HILL	35	CADMIUM	SS32E	0.43	J	1.4	3.9	100	MG/KG
CH2M HILL	35	CADMIUM	SS32F	2.5	=	1.4	3.9	100	MG/KG
CH2M HILL	35	CADMIUM	SS32G	2	=	1.4	3.9	100	MG/KG
CH2M HILL	35	CADMIUM	SS32G	1.3	=	1.4	3.9	100	MG/KG
CH2M HILL	35	CALCIUM	SS32E	11100	=	5840	NA	NA	MG/KG
CH2M HILL	35	COBALT	SS32E	5.7	J	18.3	470	12000	MG/KG
CH2M HILL	35	COPPER	SB32A	235	=	33	310	8200	MG/KG
CH2M HILL	35	COPPER	SS32B	86	=	33	310	8200	MG/KG
CH2M HILL	35	COPPER	SS32C	49.8	=	33	310	8200	MG/KG
CH2M HILL	35	COPPER	SS32D	103	=	33	310	8200	MG/KG
CH2M HILL	35	COPPER	SS32E	20.3	J	33	310	8200	MG/KG
CH2M HILL	35	COPPER	SS32F	24	=	33	310	8200	MG/KG
CH2M HILL	35	COPPER	SS32G	48.9	=	33	310	8200	MG/KG
CH2M HILL	35	COPPER	SS32G	67.9	=	33	310	8200	MG/KG
CH2M HILL	35	DDE	SB32A	0.038	=	.16	1.9	17	MG/KG
CH2M HILL	35	DDE	SS32C	0.0037	=	.16	1.9	17	MG/KG
CH2M HILL	35	DDE	SS32D	0.011	J	.16	1.9	17	MG/KG
CH2M HILL	35	DDE	SS32F	0.005	J	.16	1.9	17	MG/KG
CH2M HILL	35	DDE	SS32G	0.021	J	.16	1.9	17	MG/KG
CH2M HILL	35	DDE	SS32G	0.015	J	.16	1.9	17	MG/KG
CH2M HILL	35	DDT	SB32A	0.15	=	.074	1.9	17	MG/KG
CH2M HILL	35	DDT	SS32C	0.0071	=	.074	1.9	17	MG/KG
CH2M HILL	35	DDT	SS32D	0.022	=	.074	1.9	17	MG/KG
CH2M HILL	35	DDT	SS32F	0.013	=	.074	1.9	17	MG/KG
CH2M HILL	35	DDT	SS32G	0.077	=	.074	1.9	17	MG/KG
CH2M HILL	35	DDT	SS32G	0.03	=	.074	1.9	17	MG/KG
CH2M HILL	35	DIELDRIN	SB32A	0.059	=	.086	.04	.36	MG/KG
CH2M HILL	35	DIELDRIN	SS32D	0.032	=	.086	.04	.36	MG/KG
CH2M HILL	35	DIELDRIN	SS32E	0.013	=	.086	.04	.36	MG/KG
CH2M HILL	35	DIELDRIN	SS32F	0.022	=	.086	.04	.36	MG/KG
CH2M HILL	35	DIELDRIN	SS32G	0.062	=	.086	.04	.36	MG/KG

Table 32-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
CH2M HILL	35	DIELDRIN	SS32G	0.05	=	.086	.04	.36	MG/KG
CH2M HILL	35	MAGNESIUM	SS32E	1530	=	4600	NA	NA	MG/KG
CH2M HILL	35	NAPHTHALENE	SB32A	0.16	=	NA	310	8200	MG/KG
CH2M HILL	35	NICKEL	SB32A	76.3	=	30	160	4100	MG/KG
CH2M HILL	35	NICKEL	SS32B	38.7	=	30	160	4100	MG/KG
CH2M HILL	35	NICKEL	SS32C	27.2	=	30	160	4100	MG/KG
CH2M HILL	35	NICKEL	SS32D	30.3	=	30	160	4100	MG/KG
CH2M HILL	35	NICKEL	SS32E	10.8	=	30	160	4100	MG/KG
CH2M HILL	35	NICKEL	SS32F	18.2	=	30	160	4100	MG/KG
CH2M HILL	35	NICKEL	SS32G	16.4	=	30	160	4100	MG/KG
CH2M HILL	35	NICKEL	SS32G	32	=	30	160	4100	MG/KG
CH2M HILL	35	POTASSIUM	SS32E	1230	=	1820	NA	NA	MG/KG
CH2M HILL	35	SILVER	SB32A	2.5	=	2	39	1000	MG/KG
CH2M HILL	35	VANADIUM	SS32E	17.9	=	48.4	55	1400	MG/KG
LAW	35	2,4-DIMETHYLPHENOL	SS19	0.72	J	NA	160	4100	MG/KG
LAW	35	2-METHYLPHENOL	SS19	1.1	J	NA	390	10000	MG/KG
LAW	35	4-METHYLPHENOL	SS19	0.5	J	NA	39	1000	MG/KG
LAW	35	ACETONE	SS15	0.015	=	NA	780	20000	MG/KG
LAW	35	ACETONE	SS16	0.017	=	NA	780	20000	MG/KG
LAW	35	ACETONE	SS17	0.012	=	NA	780	20000	MG/KG
LAW	35	ACETONE	SS18	0.006	J	NA	780	20000	MG/KG
LAW	35	ACETONE	SS19	0.011	J	NA	780	20000	MG/KG
LAW	35	ACETONE	SS46	0.009	J	NA	780	20000	MG/KG
LAW	35	ALPHA BHC	SS15	0.012	=	NA	NA	NA	MG/KG
LAW	35	ALPHA ENDOSULFAN	SS15	0.019	=	NA	NA	NA	MG/KG
LAW	35	BARIUM	SS15	216	=	234	550	14000	MG/KG
LAW	35	BARIUM	SS16	313	=	234	550	14000	MG/KG
LAW	35	BARIUM	SS17	109	=	234	550	14000	MG/KG
LAW	35	BARIUM	SS18	409	=	234	550	14000	MG/KG
LAW	35	BARIUM	SS19	148	=	234	550	14000	MG/KG
LAW	35	BARIUM	SS46	91.8	=	234	550	14000	MG/KG
LAW	35	BENZYL ALCOHOL	SS18	1	J	NA	2300	61000	MG/KG
LAW	35	BENZYL BUTYL PHTHALATE	SS15	0.096	J	.645	1600	41000	MG/KG
LAW	35	BENZYL BUTYL PHTHALATE	SS16	0.37	J	.645	1600	41000	MG/KG
LAW	35	BETA BHC	SS15	0.026	=	NA	NA	NA	MG/KG

Table 32-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
LAW	35	BETA BHC	SS17	0.043	=	NA	NA	NA	MG/KG
LAW	35	bis(2-ETHYLHEXYL) PHTHALATE	SS15	1.7	=	NA	46	410	MG/KG
LAW	35	bis(2-ETHYLHEXYL) PHTHALATE	SS16	4.3	=	NA	46	410	MG/KG
LAW	35	bis(2-ETHYLHEXYL) PHTHALATE	SS17	0.6	J	NA	46	410	MG/KG
LAW	35	bis(2-ETHYLHEXYL) PHTHALATE	SS18	8.1	=	NA	46	410	MG/KG
LAW	35	bis(2-ETHYLHEXYL) PHTHALATE	SS46	1.4	=	NA	46	410	MG/KG
LAW	35	CADMIUM	SS15	1.9	=	1.4	3.9	100	MG/KG
LAW	35	CADMIUM	SS16	23.4	=	1.4	3.9	100	MG/KG
LAW	35	CADMIUM	SS17	0.7	=	1.4	3.9	100	MG/KG
LAW	35	CADMIUM	SS18	4.7	=	1.4	3.9	100	MG/KG
LAW	35	CADMIUM	SS19	4.4	=	1.4	3.9	100	MG/KG
LAW	35	COPPER	SS15	124	=	33	310	8200	MG/KG
LAW	35	COPPER	SS16	240	=	33	310	8200	MG/KG
LAW	35	COPPER	SS17	72	=	33	310	8200	MG/KG
LAW	35	COPPER	SS18	52	=	33	310	8200	MG/KG
LAW	35	COPPER	SS19	148	=	33	310	8200	MG/KG
LAW	35	COPPER	SS46	76	=	33	310	8200	MG/KG
LAW	35	DDD	SS15	0.045	=	.0067	2.7	24	MG/KG
LAW	35	DDD	SS16	0.25	=	.0067	2.7	24	MG/KG
LAW	35	DDD	SS17	0.052	=	.0067	2.7	24	MG/KG
LAW	35	DDD	SS46	0.013	J	.0067	2.7	24	MG/KG
LAW	35	DDE	SS15	0.11	=	.16	1.9	17	MG/KG
LAW	35	DDE	SS16	1.3	=	.16	1.9	17	MG/KG
LAW	35	DDE	SS17	0.097	=	.16	1.9	17	MG/KG
LAW	35	DDE	SS18	0.4	=	.16	1.9	17	MG/KG
LAW	35	DDE	SS19	0.18	=	.16	1.9	17	MG/KG
LAW	35	DDE	SS46	0.027	=	.16	1.9	17	MG/KG
LAW	35	DDT	SS15	0.45	=	.074	1.9	17	MG/KG
LAW	35	DDT	SS16	7.4	=	.074	1.9	17	MG/KG
LAW	35	DDT	SS17	0.26	=	.074	1.9	17	MG/KG
LAW	35	DDT	SS18	1.1	=	.074	1.9	17	MG/KG
LAW	35	DDT	SS19	0.66	=	.074	1.9	17	MG/KG
LAW	35	DDT	SS46	0.11	=	.074	1.9	17	MG/KG
LAW	35	DELTA BHC	SS17	0.011	=	NA	NA	NA	MG/KG
LAW	35	DI-n-BUTYL PHTHALATE	SS15	0.16	J	NA	780	20000	MG/KG

Table 32-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
LAW	35	DI-n-BUTYL PHTHALATE	SS16	0.47	J	NA	780	20000	MG/KG
LAW	35	DI-n-BUTYL PHTHALATE	SS18	0.95	J	NA	780	20000	MG/KG
LAW	35	DIELDRIN	SS15	0.11	=	.086	.04	.36	MG/KG
LAW	35	DIELDRIN	SS16	0.41	=	.086	.04	.36	MG/KG
LAW	35	DIELDRIN	SS19	0.22	=	.086	.04	.36	MG/KG
LAW	35	GAMMA BHC (LINDANE)	SS15	0.011	=	NA	NA	NA	MG/KG
LAW	35	HEPTACHLOR EPOXIDE	SS15	0.069	=	.0045	.07	.63	MG/KG
LAW	35	MERCURY	SS15	0.04	=	.43	2.3	61	MG/KG
LAW	35	MERCURY	SS16	0.26	=	.43	2.3	61	MG/KG
LAW	35	MERCURY	SS18	0.06	=	.43	2.3	61	MG/KG
LAW	35	MERCURY	SS19	0.18	=	.43	2.3	61	MG/KG
LAW	35	METHYLENE CHLORIDE	SS15	0.016	=	NA	85	760	MG/KG
LAW	35	METHYLENE CHLORIDE	SS16	0.029	=	NA	85	760	MG/KG
LAW	35	METHYLENE CHLORIDE	SS17	0.011	=	NA	85	760	MG/KG
LAW	35	METHYLENE CHLORIDE	SS18	0.009	=	NA	85	760	MG/KG
LAW	35	METHYLENE CHLORIDE	SS19	0.011	=	NA	85	760	MG/KG
LAW	35	METHYLENE CHLORIDE	SS46	0.008	=	NA	85	760	MG/KG
LAW	35	N-NITROSODIPHENYLAMINE	SS15	0.15	J	NA	130	1200	MG/KG
LAW	35	N-NITROSODIPHENYLAMINE	SS16	0.59	J	NA	130	1200	MG/KG
LAW	35	NAPHTHALENE	SS19	0.48	J	NA	310	8200	MG/KG
LAW	35	NICKEL	SS15	37	=	30	160	4100	MG/KG
LAW	35	NICKEL	SS16	53	=	30	160	4100	MG/KG
LAW	35	NICKEL	SS17	23	=	30	160	4100	MG/KG
LAW	35	NICKEL	SS18	16	=	30	160	4100	MG/KG
LAW	35	NICKEL	SS19	32	=	30	160	4100	MG/KG
LAW	35	NICKEL	SS46	24	=	30	160	4100	MG/KG
LAW	35	PHENOL	SS19	0.55	J	NA	4700	100000	MG/KG
LAW	35	SELENIUM	SS18	9	=	.81	39	1000	MG/KG
LAW	35	SILVER	SS16	0.8	=	2	39	1000	MG/KG
LAW	35	TOLUENE	SS15	0.005	J	.012	1600	41000	MG/KG
LAW	35	TOLUENE	SS16	0.004	J	.012	1600	41000	MG/KG
LAW	35	TOLUENE	SS18	0.002	J	.012	1600	41000	MG/KG
LAW	35	TOLUENE	SS19	0.006	=	.012	1600	41000	MG/KG
LAW	35	Total Polynuclear Aromatic Hydrocarbons	SS15	0.84	=	NA	NA	NA	MG/KG
LAW	35	Total Polynuclear Aromatic Hydrocarbons	SS16	27.67	=	NA	NA	NA	MG/KG

Table 32-B
Summary of Detected Compounds in Surface Soils
Compared to Non-BCT Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRACParcel	Parameter[2]	StationID	Detected Value	Project Qualifier	Background Value[3]	Risk-Based Concentrations Soil Ingestion[4]		Units
							Residential	Industrial	
LAW	35	Total Polynuclear Aromatic Hydrocarbons	SS17	8.04	=	NA	NA	NA	MG/KG
LAW	35	Total Polynuclear Aromatic Hydrocarbons	SS18	4.77	=	NA	NA	NA	MG/KG
LAW	35	Total Polynuclear Aromatic Hydrocarbons	SS19	18.92	=	NA	NA	NA	MG/KG
LAW	35	Total Polynuclear Aromatic Hydrocarbons	SS46	0.91	=	NA	NA	NA	MG/KG

Notes:
1. Detected values are obtained from the *Draft Parcel 35 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. Risk-Based Concentrations are obtained from the *EPA Region III Risk-based Concentrations Table*, R.L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
J - indicates estimated value above the detection limit but below the reporting limit.
= - indicates unqualified detection

Table 32-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
CH2M HILL	35	ARSENIC	SB32A	3 to 5	4.8	=	17	29	MG/KG
CH2M HILL	35	ARSENIC	SB32A	8 to 10	7.9	=	17	29	MG/KG
CH2M HILL	35	CHROMIUM	SB32A	3 to 5	17.4	=	26	38	MG/KG
CH2M HILL	35	CHROMIUM	SB32A	8 to 10	21	=	26	38	MG/KG
CH2M HILL	35	COPPER	SB32A	3 to 5	12.9	=	33	NA	MG/KG
CH2M HILL	35	COPPER	SB32A	8 to 10	14.8	=	33	NA	MG/KG
CH2M HILL	35	LEAD	SB32A	3 to 5	9.1	=	24	1.5	MG/KG
CH2M HILL	35	LEAD	SB32A	8 to 10	10.9	=	24	1.5	MG/KG
CH2M HILL	35	NICKEL	SB32A	3 to 5	16.2	=	37	130	MG/KG
CH2M HILL	35	NICKEL	SB32A	8 to 10	11.4	=	37	130	MG/KG
CH2M HILL	35	ZINC	SB32A	3 to 5	46.1	=	110	12000	MG/KG
CH2M HILL	35	ZINC	SB32A	8 to 10	30.1	=	110	12000	MG/KG
LAW	35	ACETONE	STB-5-1	16 to 21	0.018	=	NA	16	MG/KG
LAW	35	bis(2-ETHYLHEXYL) PHTHALATE	STB-5-1	16 to 21	0.45	=	NA	3600	MG/KG
LAW	35	METHYLENE CHLORIDE	STB-5-1	16 to 21	0.013	=	NA	.02	MG/KG
LAW	35	ACETONE	STB-5-2	78 to 83	0.014	=	NA	16	MG/KG
LAW	35	bis(2-ETHYLHEXYL) PHTHALATE	STB-5-2	78 to 83	0.44	=	NA	3600	MG/KG
LAW	35	METHYLENE CHLORIDE	STB-5-2	78 to 83	0.021	=	NA	.02	MG/KG
LAW	35	ACETONE	STB-5-3	83 to 88	0.014	=	NA	16	MG/KG
LAW	35	bis(2-ETHYLHEXYL) PHTHALATE	STB-5-3	83 to 88	0.32	J	NA	3600	MG/KG

Table 32-C
Summary of Detected Compounds in Subsurface Soils
Compared to RBC-GWP Screening Levels for Site 32
Remedial Investigation Sampling Program
Defense Distribution Depot Memphis, Tennessee

Data Source[1]	BRAC Parcel	Parameter[2]	StationID	Depth (ft)	Detection Value	Project Qualifier	Background Value[3]	RBC-GWP[4]	Units
LAW	35	METHYLENE CHLORIDE	STB-5-3	83 to 88	0.012	=	NA	.02	MG/KG

Notes:

1. Detected values are obtained from the *Draft Parcel 35 Report-Remedial Investigation Sampling Program for Defense Depot Memphis, TN*, CH2M HILL, 1997, and the *Remedial Investigation at DDMT Final Report*, Law Environmental, August 1990.
2. The parameter listing includes only the parameters detected within each site and not all the parameters analyzed.
3. Background values are from Table 5-1 of the *Final Background Sampling Program Technical Memorandum*, CH2M HILL, January 1998, and as modified by the BRAC Cleanup Team and reported in Table 3-2 of the same document.
4. RBC-GWP values are obtained from the *EPA Region III Risk-based Concentrations Table*, R. L. Smith, April, 1997.

Bold text indicates detections that exceed a screening level value and the associated screening level value that was exceeded.
NA - indicates screening level values are not available for comparison.
= - indicates unqualified detection
J - indicates estimated value above the detection limit but below the reporting limit.
RBC-GWP - Risk-Based Concentrations - Groundwater Protection

TAB

Appendix A

Appendix A

Preliminary Risk Evaluation Methodology

3.0 Preliminary Risk Evaluation (PRE) Methodology

3.1 Introduction

Initial draft letter reports, which included a screening evaluation of the data collected, were prepared for all sites identified at the Defense Distribution Depot Memphis, Tennessee (DDMT). These data included samples collected as part of the Screening Site (SS), Base Realignment and Closure (BRAC), and Remedial Investigation (RI) site characterization efforts. The purpose of this evaluation was to evaluate whether sites have contamination at levels that would require further investigations for protection of human health and the environment. During the BRAC Cleanup Team (BCT) meetings, the United States Environmental Protection Agency (EPA) and Tennessee Department of Environment and Conservation (TDEC) suggested using a risk evaluation methodology from the Preliminary Risk Evaluation (PRE) guidance (EPA, 1994) to reach Findings of Suitability to Lease (FOSL) conclusions at these sites. This document presents the findings of the PRE as well as recommendations concerning whether the site can be used for industrial, residential, or other purposes while being protective of human receptors. Ecological receptors do not drive the site management decisions at this site due to the highly industrialized nature of DDMT. Ecological risk assessments were therefore not performed as part of this PRE.

3.2 PRE Methodology and Screening Criteria Selection

The PRE methodology (EPA, 1994) identifies a screening protocol to evaluate sites, which is accomplished by preparation of tables that compare the site concentrations with designated screening concentrations, generally the Region III risk-based concentration values. The tables also present a risk ratio between the maximum concentration reported and the screening values. For carcinogens, these ratios are multiplied by 10^{-6}, thus providing a risk estimate. For systemic toxicants, the risk ratios provide an estimate of the non-cancer hazard. The risks calculated for the individual chemicals are summed to estimate the aggregate risk at each sample station.

This guidance was applied to the DDMT sites as follows:

- The criteria used for PRE were selected from the EPA Region III Risk-Based Concentration (RBC) tables (EPA, 1997).
- A PRE was conducted for each sampling point at a site. The maximum sample-station-specific risk associated with a site was used in the risk evaluation. In addition, the average of the sample risks was provided for each site.
- Maps of sample-specific PRE values were prepared that provided geographical distribution of the contamination across each site as well as across the entire DDMT Main Installation. Sediments and surface water ratios were also calculated using

EPA Region IV ecological screening values. These are presented only in Appendix A, and are not included in the site discussions.

- Both industrial worker exposure-based and residential exposure-based PRE risks were calculated.

A risk ratio was not calculated (assumed to be "0") where a chemical was detected below the background concentrations (see Section 3.3.1).

There is no potable groundwater use at the site. There are no known groundwater users of the uppermost aquifer in the downgradient areas of the site. The risk ratios based on comparisons of groundwater concentrations with conservative potable water criteria are used because the screening level effort is designed to provide a conservative screening evaluation.

Because most of the DDMT facility is well developed and has been industrial for a long period of time, there are no ecologically sensitive habitats present within the Main Installation of the facility. Thus only human health protection-based evaluations were conducted for the PRE evaluation discussion in Section 4.

3.2.1 Background Criteria

The background criteria for inorganic constituents are the two-times mean values estimated in the Background Sampling Program Technical Memorandum (CH2M HILL, 1996). All of the sample results were compared with background values for the naturally occurring inorganic constituents. The background values were obtained from the corresponding media, and the detected concentrations were statistically evaluated to estimate the mean concentration.

Some of the background values included in this draft report have since been modified to account for more conservative evaluation of the background. The modified values were calculated by eliminating outliers in the data sets or removing background samples taken from the DDMT perimeter. The DDMT perimeter samples may be influenced by pesticide application, which would bias the natural background levels to higher values. The new background values have been proposed to the BCT, and the values subsequently approved by the BCT were used as the background values in this report. A PRE risk ratio value was not calculated when a chemical did not exceed the background.

According to EPA Region IV guidance, two times the mean, or upper 95 percent concentration (only for selected organic chemicals) was considered as the background concentration and used for comparison with sample-specific detected concentrations at each site and for soil and groundwater.

A chlorinated hydrocarbon pesticide, dieldrin, was detected across the site at DDMT as well as in some of the offsite background samples. A technical memorandum was prepared for the BCT review, analyzing the statistical significance of the detected dieldrin compared to the background (see Appendix B). All data from the site were divided into three sub-groups based on the type of land use and compared against the background. In accordance with this statistical evaluation, dieldrin was not a chemical of potential concern (COPC) in the railroad tracks and open storage areas of the site. It was a COPC at all other areas of the site including the Golf Course and surrounding areas, and warehouse areas. A concentration

above 0.5 milligram per kilogram (mg/kg) in the golf course area indicates an exceedance above background dieldrin levels, and a similar concentration for the warehouses area is 1.3 mg/kg, as per the statistical evaluation. As a conservative measure, 0.5 mg/kg is used as a cut-off point in this screening level effort. The site-specific discussion is included in Section 4.0.

3.2.2 Residential RBCs

Residential RBCs are the target screening criteria protective of human health under residential exposure assumptions. These values are calculated by EPA Region III to be protective against ingestion intake only. Each detected surface soil concentration was compared against these criteria. A carcinogenic and noncarcinogenic ratio was calculated in separate tables in accordance with the PRE guidance. An average risk per site and a sample representing the maximum risk at a site are presented in these tables.

The groundwater RBCs are the values selected from EPA Region III RBC tables. Data from each individual well were compared with these criteria.

3.2.3 Industrial RBCs

Industrial RBCs are the target screening values protective of industrial worker exposures. These values are calculated by EPA Region III to be protective against ingestion intake only; however, the EPA (1994) prescribes use of the Region III risk-based criteria in the PRE calculation. Detected chemicals from surface soil were compared against these criteria. Detected chemicals from each sample were also compared with these worker protection criteria for risk management decisions at sites that will continue to be used as industrial facilities. Both carcinogenic risk ratios and noncarcinogenic PRE ratios were calculated separately following PRE guidance.

A well-specific risk ratio and noncarcinogenic PRE ratio were calculated for groundwater as per the guidance. An industrial scenario was evaluated using the residential water RBC values divided by 0.25 for volatile organic compounds (VOCs), 0.5 for all other chemicals.

In summary, constituents that were detected at a site, but not exceeding the background or PRE risk ratio above 1 in a million (10^{-6}) or a ratio of 1.0 for systemic toxicants are considered unimportant or not significant.

Whenever an inorganic chemical is presenting a risk ratio above one in a million or a Hazard Index (HI) above a value of 1.0, yet the chemical is naturally occurring and the observed concentrations are close to background levels, the ratio exceedance was not considered critical for the following reasons:

- These chemicals are naturally occurring and the concentration ranges could be similar to the site concentration ranges, and a point comparison cannot account for the upper levels in the background, which can be similar in concentrations to the site
- Several of these chemicals are not very toxic and are nutritionally essential to human health
- No apparent site-related activities involving these chemicals—and/or—
- Ratios were exceeded only for the residential scenario

An additional data interpretation not strictly based on the risk ratios is used for dieldrin at the site. Dieldrin was statistically evaluated for its distribution across the site compared to the background (see Appendix B). It is considered a COPC in the Golf Course area and its surrounding parcels, and in the parcels around the warehouses, if concentrations exceed 0.5 mg/kg.

3.2.4 Data Evaluation

Inorganic chemical lead does not have an existing toxicity factor. It is regulated by the EPA based on blood lead uptake in the exposed individuals, which accounts for multiple sources for exposure (e.g., from food) in addition to the environmental media. Lead levels are considered "safe" by most regulatory agencies under residential exposure conditions at 200 to 400 mg/kg, and under industrial exposure conditions at 1,000 mg/kg. The drinking water action level for lead is 15 micrograms per liter (µg/L). Therefore because lead is not classified as either a carcinogenic or noncarcinogenic chemical, lead concentrations from DDMT are compared with these criteria and PRE ratios are included in both carcinogenic and noncarcinogenic tables.

TAB

Appendix B

Appendix B References

References

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